Valentine Gold Project: Federal Information Requirements

Round Three Information Requirements:
Response to IR(3)-18

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RESPONSE TO IR(3)-18

IR 3 Reference #:	**IR(3)-18**
IR 2 Reference #:	IR(2)-18 IR(2)-19 IR(2)-21 IR(2)-23 IR(2)-26
EIS Reference:	Baseline Study Appendix 5 Attachment 5-B Section 3.1.1, 4.1.1, and 4.3.1 and Appendix A
Context and Rationale:	The EIS guidelines Section 7.1.2 and 7.2.2 require a characterization program of expected mine material to predict metal leaching and acid rock drainage potential and support the evaluation of associated changes to water quality. Round 2 Information Requirements IR(2)-18, -19, -21, and -23 highlight data gaps in the sampling and testing program for waste rock and low-grade ore from the Marathon deposit, particularly related to under-represented lithologies and kinetic testing of potentially acid generating (PAG) material. Through responses to Round 2 Information Requirements, the Proponent acknowledged these gaps and is addressing them through a sampling and testing program that is currently underway. The proponent stated (Project Description Section 2.3.2.1; page 2.38) that waste rock piles will be built using bottom-up construction, while the response to IR(2)-19 confirms that PAG rock will be encapsulated/blended in the waste rock pile or backfilled in Marathon pit. INAP (2020), a global best practice report, states that bottom-up construction more effectively manages ARD/ML risk than traditional end tipping, emphasizing the importance of accurately estimating material volumes and production schedule for successful implementation. Under- predicting PAG volumes can have serious implications for closure planning (Barritt *et al.,* 2016), and as such the identified data gaps need to be addressed to support successful implementation of this management approach during operations. To date, a sufficiently detailed sample selection rationale has not been provided for waste rock and low-grade ore from the Marathon deposit. Baseline Study Appendix 5 and IR-18 both emphasize the use of gold grade in sample selection, which is correlated with sulphur per response to IR(2)-18. Further, per IR(2)-18 cross sections, the Agency notes continued issues such as spatial gaps and sample locations distal to previously identified PAG material (e.g. gabbro samples in borehole MA-16-082 on cross section 16700E of Appendix IR(2)-18.A; page 37 of PDF). It is unclear if these gaps will be filled by the additional samples proposed for the Acid Rock Drainage (ARD) block model as stated in IR(2)-18a.

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	Per IR-21, the kinetic testing program to date does not include any PAG samples and thus does not capture the potential worst-case reactivity and timing to generation of acidic conditions. Understanding the reactivity of PAG material is critical to support successful mine waste management planning. This is important to accurately evaluate timing to onset of ARD and acidic metal loading rates for input to the updated water quality model. In the response to IR(2)-23c, the proponent indicates that the water quality model will be updated upon completion of the additional static tests and after a full year of analysis of the field bin testing. An updated and substantiated water quality model is necessary to assess potential impacts to fish and fish habitat. Due to these highlighted data gaps, the baseline geochemical characterization program is not considered sufficient to capture risk to fish and fish habitat associated with the Marathon deposit during operations and post closure. Barritt, R., P. Scott, and I. Taylor. 2016. *Managing the waste rock storage design – can we build a waste rock dump that works?* Mine Closure 2016 – AB Fourie and M Tibbett (eds.). 2016 Australian Centre for Geomechanics, Perth, ISBN 978-0-9924810-4-9. Doi: 10.36487/ACG_rep/1608_07_Barritt INAP (International Network on Acid Prevention) 2020. *Rock Placement Strategies to Enhance Operational and Closure Performance of Mine Rock Stockpiles. Phase 1 Work Program – Review, Assessment & Summary of Improved Construction Methods.* Prepared for INAP by Earth Systems & OKane Consultants. https://www.inap.com.au/research/#rockPlacementStrategies
Information Request:	**Option 1:** a. Provide the static test results of the 2021 sampling program. b. Provide a detailed sample selection rationale for the 2021 samples indicating all factors used to select samples. c. Provide a methodology for the kinetic testing program. d. Once a-c have been completed, provide the updated ARD/ML management plan that confirms the approach to waste rock pile construction, and includes kinetic test data available at the time of reporting. e. In consultation with Federal Authorities, update the water quality model based on additional testing/sampling.

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	Option 2: Alternative to a-e Provide an updated ARD/ML management plan that clearly delineates the steps, decisions and actions that will be taken on an ongoing basis by the mine operator to identify and manage PAG materials. The plan must offset the uncertainty associated with the current geochemical characterization of the site with operational requirements that would ensure that PAG materials are managed appropriately to reduce the risk to fish and fish habitat.
Response:	Prior to submission of the EIS and to meet the requirements of the Federal and Provincial EIS guidelines, Marathon completed a Phase 1 and 2 Acid Rock Drainage (ARD)/Metal Leaching (ML) assessment, using methods that generally followed the Mine Environment Neutral Drainage (MEND) publication entitled “Prediction Manual for Characterizing Drainage Chemistry from Sulphidic Geologic Materials” (Price 2009). During technical review of the EIS (i.e., through responses to Information Requirements (IRs), Marathon acknowledged that further ARD/ML work is required to address identified testing gaps and has committed to completing further assessment and associated refinement of Project mitigation as design of the Project progresses. The progress made on additional testing was reported in Appendix IR(2)-19.A (provided in response to Federal Information Requirements issued on October 18, 2021), which included the most recent results at that point in time. In Marathon’s response to IR(2)-18 and IR(2)-19, a delay in the testing schedule for this additional work was also identified. This has been due in part to Covid-19 and resulting health and safety protocols that had limited the number of personnel allowed on site. Delays have continued as all laboratories conducting work for the mining industry are overwhelmed with testing requests due to high levels of exploration and development in the mining industry. Marathon continues to work with the SGS laboratory to complete the remaining test work as soon as possible. While further test results are available since the update provided in Appendix IR(2)-19.A which provide additional confidence in the ARD/ML potential for the Project, the program has not advanced to the point where a response can be provided to Option 1 a) to e), above. Therefore, Marathon has developed a preliminary ARD/ML Plan (as requested in Option 2) that delineates the steps, decisions and actions that will be taken on an ongoing basis by Marathon to identify and manage potentially acid generating (PAG) materials. Marathon acknowledges that the request to provide the ARD/ML Plan (provided in Appendix IR(3)-18.1) is intended to offset the uncertainty associated with the current geochemical characterization of the site in a manner such that all parties are confident that potentially acid-generating (PAG) materials can and will be managed appropriately to reduce the risk

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	to fish and fish habitat. The ARD/ML Plan in Appendix IR(3)-18.1 is considered preliminary as it will need to be updated in consideration of the ongoing ARD/ML testing and analysis, conditions of release received through the provincial and federal environmental assessment processes, and requirements identified through the permitting process. In addition to the ARD/ML Plan provided, this IR response includes the currently available information requested as part of Option 1, as well as supplemental information requested through recent consultation with NRCan. This includes: • Updated static test results from the 2021 sampling program • Detailed sample selection rationale for the samples collected in 2021 indicating the factors used to select samples • The methodology/sample selection plan being used for the upcoming kinetic testing program • Consolidation and integration of information and results provided to date through the EIS and IR responses • Further details regarding the sampling and testing to support block model development • Details surrounding techniques and measures for managing PAG waste, should higher volume or higher reactivity PAG waste be encountered • Forward-looking information/commitments related to sampling, testing, and PAG waste management • Further information on monitoring • Further information on provincial regulatory and permitting requirements relative to ARD/ML • Implications of the above additional information on the assessment of Project effects on fish and fish habitat as presented in the EIS **Updated Static Test Results** Marathon conducted additional static testing of 342 samples (246 from the Marathon pit and 96 from the Leprechaun pit) of overburden, waste rock, low- and high-grade ore since the submission of the EIS, and which have not been previously available for presentation in IR responses regarding ARD/ML. Additional static test results are presented in Appendix B of the ARD/ML Plan (Appendix IR(3)-18.1). The methods of testing and analysis are the same as described in the EIS, with exception of estimates for percentage of PAG waste rock. The current estimates based on tonnages of major lithologies calculated from the geological block model. Some lithologies, that are reported separately in the EIS, are currently combined as indicated in Table 3-1 of the ARD/ML Plan (Appendix IR(3)-18.1). For

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	example, sediments and sediments with quartz-tourmaline-pyrite veins were reported separately in the EIS and currently combined. Updates regarding ARD potential based on the recent static test results are summarized for the Marathon deposit as follows: • The additional static test work for waste rock materials was focused on the gabbro and sedimentary units. All of the new samples of Marathon pit waste rock had Net Potential Ratio (NPR) above 2 and are classified as non-PAG material. As a result, the estimated percentage of PAG (1<NPR) and uncertain waste rock (1<NPR<2) is reduced from 14% (as stated in the EIS) to 9% of the total rock tonnage. There are no exceedances of the *Metal and Diamond Mining Effluent Regulations* (MDMER) limits observed in shake flask extraction (SFE), including the results from the latest tests. No new parameters of concern were identified by screening SFE concentrations. • The additional static test results for low-grade ore materials indicates a modest reduction in the overall percentage of PAG and uncertain samples from 50% to 46%. There are no exceedances of MDMER limits observed in SFE, including the results from the latest tests. Copper (Cu), cadmium (Cd) and lead (Pb) are new parameters that were identified in SFE that exceed the Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (CWQG-FAL); for Cu in 3 samples (6% of the total number of samples tested to date) and for Cd and Pb only in one sample (2% of the total number of samples tested to date). • The additional static tests completed for high-grade ore result in a slight increase in the overall percentage of PAG and uncertain samples of 1% (from 67% reported in the EIS, to 68%). However, the overall percentage of PAG samples (1<NPR) declined from 56% to 36%, showing a reduction in ARD risk related to high grade ore. There are no exceedances of MDMER limits observed in SFE from high-grade ore. In addition to a moderate aluminum (Al) potential identified in the EIS, exceedances for CWQG-FAL were found for zinc (Zn) in 4% of the total number of samples tested to date and for arsenic (As), Cu and Pb in 2% of the total number of samples tested to date. • The additional static tests completed for overburden materials all returned as non-PAG and of the samples tested to date, only one sample is characterized in the uncertain category, contributing to 3% of the total tonnage. The test results show no exceedances of MDMER limits observed in leachates from overburden. Molybdenum is a new parameter exceeding CWQG in one of 30 SFE tests (3% of the total number of samples tested to date) in addition to fluoride (F), Al, As, Cd,

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	Cu, iron (Fe), manganese (Mn), Pb, selenium (Se), and Zn that all show moderate leaching potential. The updated static tests summarized above improve the confidence in the ARD/ML test results and the related predictions and mitigations presented in the EIS. ARD risk potential overall is reduced, and metal leaching risks are essentially unchanged from that presented in the EIS, with the exception of a few parameters exceeding CWQG-FAL in a small percentage of samples. Updates regarding ARD potential based on the recent static test results are summarized for the Leprechaun deposit as follows: • The additional static test work for waste rock was focused on sedimentary units, and all new samples tested had NPR values above 2 and are classified as non-PAG. One uncertain sample of sediment with quartz-tourmaline-pyrite veins (1<NPR<2)), which was previously reported as separate lithology, is now added into sedimentary unit defined by geological block model. As a result, the overall estimated percentage of PAG (1<NPR) and uncertain waste rock (1<NPR<2) increased slightly from 0.5% (as presented in the EIS) to 1.1% of the total rock tonnage. There are no exceedances of MDMER limits observed in SFE, including the results of the latest tests. Arsenic (As) and Mn are new parameters identified in 48% and 1% of total SFE tests completed to date, respectively. • The additional static test work for low-grade ore results in a reduction in the percentage of overall PAG and uncertain samples from 10% (as presented in the EIS) to 4%. There are no exceedances of MDMER limits observed in any SFE, including the results of the latest tests. Iron was a new parameter that exceeded the CWQG-FAL in 38% of all SFE tests completed to date. • The additional static test work for high-grade ore samples results in a reduction in the percentage of overall PAG samples from 13% (as presented in the EIS) to 2%. There are no exceedances of MDMER limits observed in SFE from high grade ore, including the results of the latest tests. In addition to moderate Al potential identified in the EIS, CWQG-FAL's were exceeded for Cu and Fe in 8% of SFE tests completed to date. • The additional static tests completed for overburden returned one sample that classifies as uncertain with overburden, contributing to 11% of the total tonnage. There are no exceedances of MDMER limits observed in leachates from overburden, including the latest test results.

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	No new parameters were identified by screening SFE concentrations against CWQG-FAL's in the latest test results. The updated static tests summarized above improve the confidence in the ARD/ML test results and the related predictions and mitigations presented in the EIS. As result of updated static testing results, materials from the Leprechaun deposit show a slight increase in percentage of PAG and uncertain categories of waste rock and overburden, however, also a significant reduction in ARD risks for low- and high-grade ore. Metal leaching risks are similar to that presented in the EIS, with the exception of As which shows moderate leaching in almost half of SFE tests to date from sediments (waste rock). The significance of this finding will be evaluated in upcoming kinetic testing. Several other parameters exceed CWQG-FAL in a small percentage of samples of different materials. The ARD/ML Management Plan (Appendix IR(3)-18.1) provides detail on the planned mitigations, and adaptive management options to address the identified ARD/ML risk over the life of the Project and post-closure. **2021 Sample Selection Rationale** The 2021 testing program has been focused on Marathon's commitment to fill in testing gaps for specific waste rock lithologies, such as gabbro and sediments, and other mine materials. Samples were collected from exploration drill core considering previous sampling coverage of lithologies and mine material types, previous test results (sample representation/gaps and ARD/ML potential) and available core samples within specific lithologies, to provide greater spatial coverage within the open pits. In particular: • Sampling additional sections to increase sample density along the mineralized corridor containing the most PAG samples, including more samples at depth (e.g. sections 17360E, 17120E and 16940 E from Marathon pit, see sections attached to IR(2)-18.A) • Sampling additional drillholes with gabbro and sediments to comply with MEND requirements (e.g. MA-17-192, MA-17-193, MA-18-264, MA-15-071 and etc., see sections attached to IR(2)-18.A) Gabbro and sediment waste rock, which are located farther from the mineralized corridor, were not extensively drilled or sampled during the exploration program and therefore there is somewhat limited samples for spatial coverage. However, the 2021 static test results confirm that gabbro and sediment waste rock have a significantly lower risk of ARD/ML compared to varieties of quartz porphyry or trondhjemite/granodiorite that host the majority of mineralization. In addition, most of the waste rock samples that have been analyzed represent phase 1 and phase 2 of the

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	open pit mine plan, while less characterized materials are located in the volume between the phase 2 and phase 3 pit mine plan, which will not be mined in the initial two years of operation (Figure IR(3)-18.1). Therefore, the combination of low ADR/ML risk for sediments and gabbro with the delayed mining of these waste rock types provides additional time for sampling and testing. Marathon will collect additional samples of these materials as soon as possible in 2022, expecting that additional drill holes will be required (expecting 16 to 20 relatively shallow drill holes). **Methods for Upcoming Kinetic Testing** The rationale for the selection of samples for the upcoming kinetic testing and the methods for characterization of these samples are discussed in detail in Section 3.3 of the ARD/ML Plan (Appendix IR(3)-18.1). The new set of kinetic tests is focused on PAG "upper case" samples, with NPR being in the lower 10th percentile, sulphur above the 85th percentile, and total metal content above median values for respective material/lithology (Table 3-2 of the ARD/ML Plan). These samples will be submitted for advanced static tests including Net Acid Generating (NAG) tests, mineralogy, and particle size distribution similar to the characterization completed for composite samples, as described in Section 3.2.2 of Baseline Study Appendix 5, Attachment 5-B of the EIS. **Information/Results Provided to Date Through EIS and IR Responses** The information provided to date through the EIS and responses to federal IRs is consolidated in Appendices A of the ARD/ML Plan (Appendix IR(3)-18.1) and summarized in Section 3 of the ARD/ML Plan. **Further Information on Block Model Development** The initial ARD block model will include all acid-base accounting (ABA) tests completed to date (425 for rock, LGO and HGO from Marathon pit) and approximately 1,700 samples tested for total sulphur and inorganic carbon (this testing is currently underway). The ARD block model will be developed using Vulcan (by Maptek), with an anticipated block size of 6 m x 6 m x 6 m, and integrated with the mine block model to forecast the location and timing of PAG waste to be mined from the pit and to plan for ARD management at the waste rock stockpile (planning and creation of areas for encapsulation, etc.). The number of samples selected for testing to date is expected to provide a reasonable model with the level of accuracy required for ARD management, however, block modeling is an iterative process and additional sample collection and testing may be required for improved delineation and segregation of materials during mining. It is also noted that

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	mined waste rock that is not expected to be moved to the waste rock pile until the end of the construction period (currently mid-2024). During construction and operation, sampling of cuttings from a reverse circulation (RC) drilling program, implemented for mine planning, will be collected from 5 m depth intervals in approximately 20 to 40 m deep holes that are spaced on a 25 m by 25 m grid. These samples will be tested at the on-site laboratory for sulphur, inorganic carbon, and trace elements. This additional data will be added to the ARD block model to improve the accuracy (quantity and delineation) of PAG and non-PAG rock 3 to 4 months, minimum, ahead of mining. As mining progresses, samples will also be collected and analyzed from blast hole cuttings to further refine and reconcile the data within the ARD block model. **Techniques and Measures for Managing PAG Waste Under Various Scenarios** Details regarding the techniques and measures that Marathon may need to employ to manage PAG mine waste, should higher volume or higher reactivity PAG waste be identified, are discussed in Sections 4 and 5 of the ARD/ML Plan (Appendix IR(3)-18.1). **Future Commitments Related to Sampling, Testing, PAG Waste Management** Through the course of the technical review of the EIS by both federal and provincial regulators, Marathon has made commitments with respect to on-going and future sampling, testing, and PAG waste management. Marathon has advanced the following commitments: • Collected 246 additional samples from the Marathon pit and 96 samples from the Leprechaun pit and completed static tests (ABA, SFE and trace element). • Completed two humidity cells containing carbonate depleted LGO and tailings from the Marathon deposit (started in 2020) • Continuation of field (bin) kinetic tests of composite materials including nine composite samples representing major waste rock lithologies and low-grade ores from both deposits (started in 2020) • Completion of subaqueous columns and a humidity cell tests that commenced in 2021 on tailing samples from on-going metallurgical work. • The preliminary/available results from these static and kinetic tests are summarized in the ARD/ML Plan (Appendix IR(3)-18.1). More detailed interpretation will be provided in the Phase 3 ARD/ML Report and will

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	be considered during future updates of the water quality model and ARD/ML Plan. The following is a consolidated list of commitments regarding ARD/ML sampling and testing, and PAG Waste Management, including those made in previous IR responses, and as further described in the ARD/ML Management Plan: • Field (bin) kinetic tests will be continued for a minimum of 2 years, and will then be assessed to determine if continuation of the tests is warranted. • Additional samples will be collected and tested where any gaps remain or are identified in the program to date, including the additional sampling of gabbro and sediments distal to mineralized corridor. This will be completed as early as possible in 2022. • A set of kinetic tests on materials with high ARD/ML potential will be started in early 2022. The materials used in the new kinetic test samples will be analyzed for ABA (acid-base accounting), SFE (Shake Flask Extraction) and trace metals, net acid generating test, mineralogy, and particle size distribution. • Ongoing testing required for development of the ARD block model for the Marathon pit will be completed in Q1 of 2022. • An ARD block model will be developed for the Marathon pit to provide refined volume estimates and associated production schedules for PAG classes of rock and ore, and to improve the estimates of PAG material exposures on pit walls. The initial model will be developed during the permitting phase in Q2 of 2022. • Per provincial regulatory requirements and guidelines, Marathon will prepare an ARD/ML Phase 3 Report that will provide analysis and interpretation of the laboratory and field tests described above and all data collected to date for the Project. The report will be completed during the permitting phase in Q2 of 2022 and submitted to the NLDIET – Mines Branch for review. • Water quality predictions (via the water quality model) will be updated during detailed engineering/permitting based on results of the additional ARD/ML testing and analysis, including results from new humidity cells, field kinetic tests, and ARD block model for the Marathon pit. Updated water quality predictions will be incorporated into the final Project design, which will be presented through permitting. • The ARD/ML Management Plan will be updated as additional test results and analysis are completed. The updates to the Plan will incorporate these new results in terms of waste characterization, the potential for ARD/ML related to project components, and any required

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	changes (additional detail, updates, revisions) to the proposed mitigations and monitoring program. Mitigation and management measures will be updated to provide further detail (e.g., planning/design for blending and encapsulation of PAG waste rock material). • Confirmatory ARD sampling/testing and water sampling/testing programs will be implemented to manage PAG materials and identify and manage potential ARD/ML issues. **ARD/ML Monitoring** A description of the planned monitoring and analysis is provided in Section 4 of the ARD/ML Plan (Appendix IR(3)-18.1). **Provincial Regulatory and Permitting Requirements Relative to ARD/ML** As requested by NRCan, the following outlines the ARD/ML-related provincial requirements that Marathon will be required to comply with prior to construction. As per Section 4 of the Newfoundland and Labrador (NL) *Mining Act*, Marathon shall not be permitted to operate the Project until all plans required under the Act have been submitted to the satisfaction of the Minister. While Section 4 of the *Mining Act* only specifically requires a Development Plan and a Rehabilitation and Closure Plan, the associated guidelines for these plans sets out requirements for ARD/ML assessment and management. In addition, the Mines Branch of the NL Department of Industry, Energy and Technology (NLDIET), in response to the Amendment to the EIS (submitted by Marathon on August 6, 2021) has provided specific requirements to Marathon in a letter dated October 29, 2021. Mines Branch has stated that prior to the submission of the development plan and the rehabilitation and closure plan as required under Section 4 of the *Mining Act*, Marathon must submit a satisfactory ARD/ML Management Plan and a satisfactory ARD/ML Report. The ARD/ML Report must: • Characterize and evaluate the potential for and mitigation of ARD/ML at the project using all sampling data collected to date • Conform to the “Prediction Manual for Drainage Chemistry from Sulphidic Geological Materials, MEND Report 1.20.0, December 2009”. • Include an interpretation of results by an ARD/ML Qualified Professional (ARD/ML QP) • The report must include: – Discussion of the adequacy of the number of samples collected on each geologic material and types of tests conducted on the samples

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	– Interpretation of the analytical and test results and justification for further sampling, testing and investigation recommendations – Review the ARD/ML Management Plan, the ARD Block Model and the design and operation of all aspects of the project, including the waste rock piles, tailings management facility, low grade ore stockpile and high grade ore stockpile – Recommendations for ARD/ML prevention, mitigation, and management including practical considerations for the project regarding storage, handling, and long-term disposal of ore, waste rock and tailings – A statement of qualifications by the ARD/ML QP – All analytical results must be appended Through the provincial requirements identified above, Marathon will not be permitted to proceed with construction of the Project until it has demonstrated to NLDIET that ARD/ML risks associated with the Project have been appropriately identified and procedures are in place to manage those risks. **Implications for Fish and Fish Habitat** The updated ARD/ML test work summarized above improves the confidence in the ARD/ML test results and the related predictions and mitigations presented in the EIS. Overall, the results indicate lower ARD potential, with minimal change in the metal leaching potential with the exception of elevated potential for As in waste rock from Leprechaun, which will require additional testing and analysis to determine if further mitigation will be required. The updated test results are consistent or improved relative to the overall ARD/ML risk used to assess potential effects on fish and fish habitat in the EIS, and therefore, there is currently no change to the effects characterization and conclusions presented in the EIS. Once the additional testing and analysis identified earlier in this response have been completed, water quality of discharges from different mine components will be re-modeled. During construction and operation, the effluent monitoring at the discharge points will include: monitoring of facility effluent chemistry, acute toxicity testing for fish and other aquatic organisms in undiluted effluents and biological monitoring studies of aquatic receptors per the requirements of MDMER. The results of modeling and monitoring will be compared to the screening criteria as discussed in Section 4.2 of the ARD/ML Plan (Appendix IR(3)-18.1). The screening criteria include

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	• 75% of the maximum authorized monthly mean concentration for parameters included in Schedule 4 of the MDMER. In the case that: • screening criteria are exceeded for a consecutive number of sampling events (e.g., 3 measurements in a row) and/or • consecutive failure of acute toxicity tests and/or • biological studies indicate degradation of aquatic ecosystem due to the project • the cause of these observations will be investigated and additional mitigation measures implemented to protect the receiving environment. These mitigations will consider control at the source (e.g., changes in mine waste management, chemical, and hydraulic isolation) and/or diversion and treatment of the most contaminated sources of contact water.
Appendix	Appendix IR(3)-18.1: ARD/ML Management Plan (Preliminary)

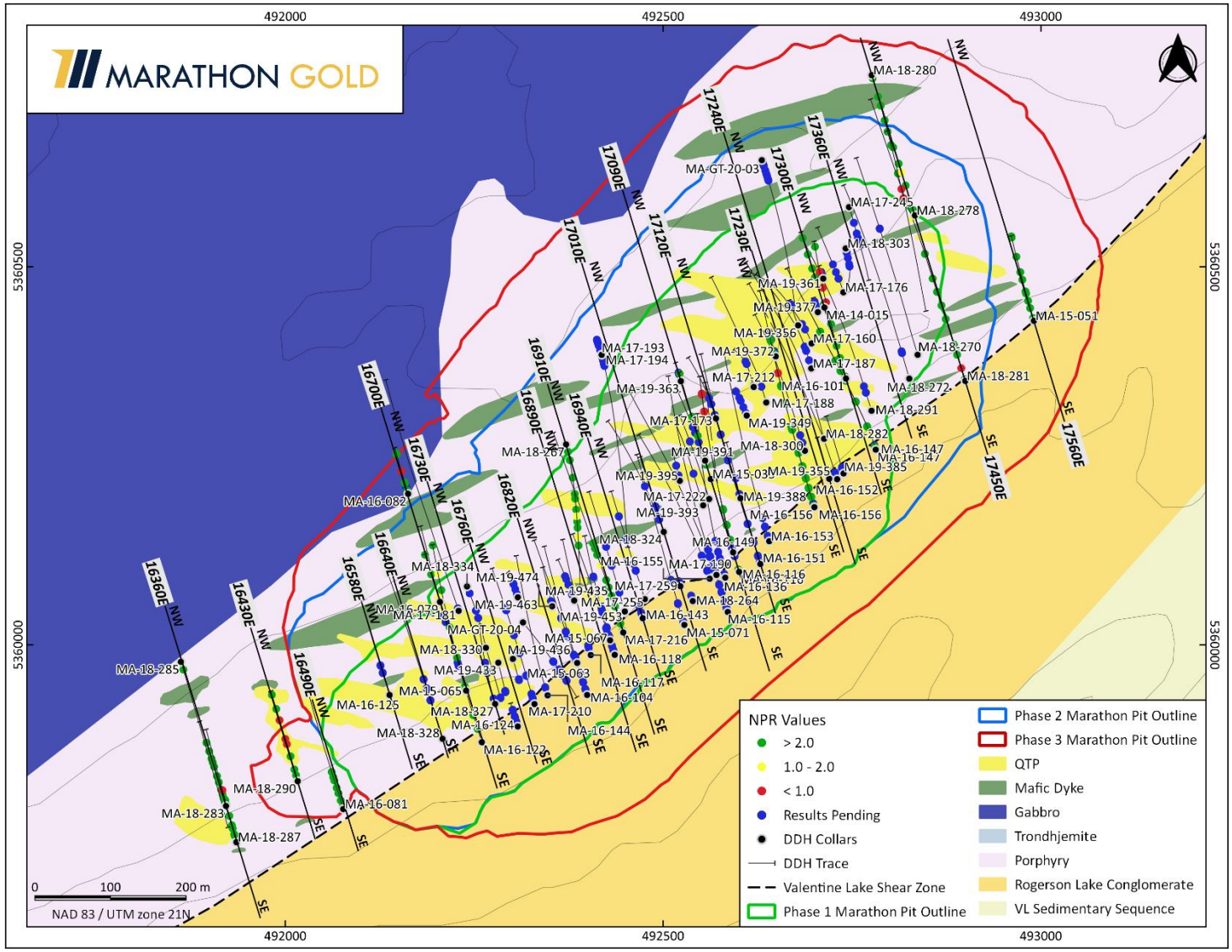

Figure IR(3)-18.1 Phase 1, 2 and 3 of the Marathon Open Pit

Appendix IR(3)-18.1: ARD/ML Management Plan (Preliminary)

VALENTINE GOLD PROJECT

ARD/ML Management Plan (Preliminary)

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List of Acronyms and Abbreviations

ABA	acid base accounting
Al	aluminum
AP	acid potential
ARD	acid rock drainage
As	arsenic
CCME	Canadian Council of Ministers of the Environment
Cd	cadmium
CN(T)	total cyanide
CN_{WAD}	weak acid dissociable cyanide
Cu	copper
CWQG-FAL	Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life
DOC	dissolved organic carbon
EA	environmental assessment
EIS	environmental impact statement
EPP	environmental protection plan
F	fluoride
FDP	final discharge point
Fe	iron
HCT	humidity cell test
Hg	mercury
HGO	high-grade ore
IAAC	Impact Assessment Agency of Canada
ICP-MS	inductively coupled plasma mass spectrometry
IR	Information Requirement
LGO	Low-grade ore
Marathon	Marathon Gold Corporation
MDD	Mineral Development Division
MDMER	*Metal and Diamond Mining Effluent Regulation*
ML	metal leaching
Mn	manganese
Mt	million tonnes
Mo	molybdenum

NAG	net acid generation
NL	Newfoundland and Labrador
NLDECC	Newfoundland and Labrador Department of Environment and Climate Change
NLDIET	Newfoundland and Labrador Department of Industry, Energy, and Technology
non-PAG	non-potentially acid generating
NP	neutralization potential
NPP	net neutralization potential
NPR	neutralization potential ratio
P	phosphorus
PAG	potentially acid generating
Pb	lead
QA/QC	quality assurance / quality control
RC	reverse circulation
RCP	Rehabilitation and Closure Plan
SFE	shake flask extraction
Se	selenium
Stantec	Stantec Consulting Ltd.
t	tonnes
the Project	Valentine Gold Project
TMF	tailings management facility
tpd	tonnes per day
TSS	total suspended solids
Zn	zinc

1.0 INTRODUCTION

Marathon Gold Corporation (Marathon) is proposing to develop an open pit gold mine in central Newfoundland, the Valentine Gold Project (the Project). An Environmental Impact Statement (EIS) for the Project was submitted to the Impact Assessment Agency of Canada (IAAC) on September 29, 2020 and to the Environmental Assessment (EA) Division of the Newfoundland and Labrador Department of Environment and Climate Change (NLDECC) on November 30, 2020 by Marathon. The Project is currently under review by IAAC and NLDECC and is pending EIS/EA approval.

The construction and operation of the Project will be governed by an Environmental and Social Management System, which includes tools such as the corporate environmental and social policies, construction and operational environmental protection plans (EPPs), environmental management plans, and monitoring plans. In general, these plans are considered living documents that are updated as needed throughout the life of a project to reflect the latest project, regulatory and environmental information.

The purpose of this ARD/ML Management Plan is to:

- identify Project components with the potential to generate acid rock drainage and metal leaching (ARD/ML)
- establish and update screening criteria for identification of ARD/ML
- describe measures to manage potentially acid generating and/or metal leaching materials to avoid or reduce potential environmental effects
- describe monitoring programs to evaluate ARD/ML predictions and the effectiveness of management measures
- to identify adaptive management measures/processes that may be employed should monitoring determine that additional or new mitigation measures are required

This ARD/ML Management Plan is considered preliminary as, in addition to updates throughout the life of the Project, it will also need to be updated in consideration of on-going ARD/ML testing and analysis, conditions of Project release that may be received through both the on-going provincial and federal EA processes, and requirements identified through the permitting process.

1.1 PROJECT OVERVIEW AND CONTEXT

The Project is located in a rural area of central Newfoundland, southwest of the Town of Millertown, Newfoundland and Labrador (NL) (

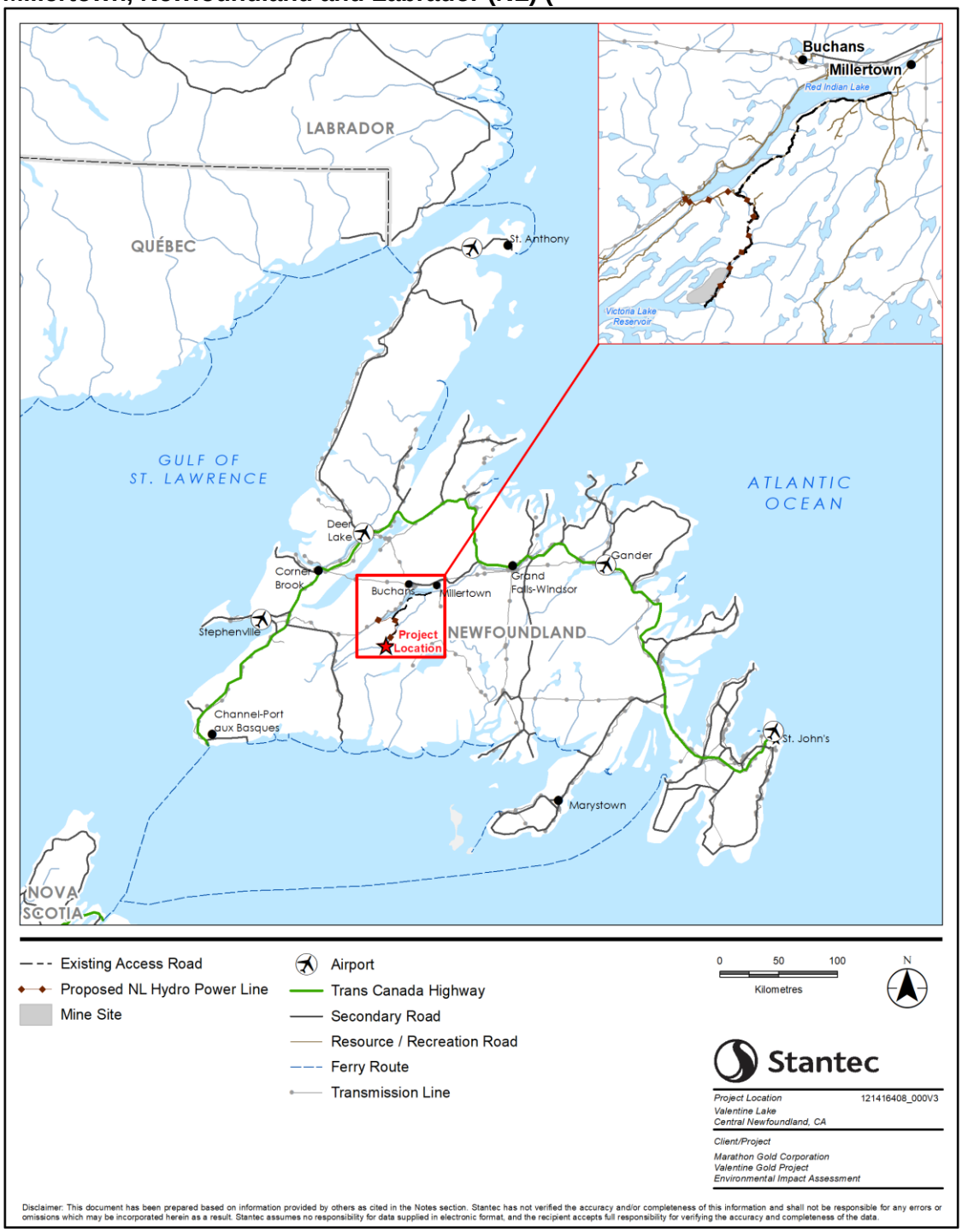

Figure 1-1). The Project consists of two open pits, waste rock piles, ore stockpiling and crushing areas, conventional milling and processing facilities, a tailings management facility (TMF), staff accommodations, and supporting infrastructure including roads, on-site power lines, buildings, and water and effluent management facilities (Figure 1-2). The mine site is currently accessible year-round by an existing public access road (mine access road) that has been maintained by Marathon since 2010. The existing access road will be upgraded and maintained as part of Project construction and operation.

The mine site is subdivided into three components, from north to south, the Marathon Complex, the process plant and TMF Complex, and the Leprechaun Complex. The major Project facilities include the Leprechaun and Marathon open pits, process plant, TMF, waste rock piles, high-grade ore (HGO) and low-grade ore (LGO), topsoil, and overburden stockpiles. Ore from the open pits will be mined for approximately 10 years, stockpiled, and processed at the plant. The plant will operate for another three years by processing ore from the LGO stockpiles of Leprechaun and Marathon deposits. Tailings will be deposited in the TMF for the first nine to ten years of operation and into the exhausted Leprechaun pit for the last three years of operation.

1.2 SCOPE

This Project-specific ARD/ML Management Plan has been designed to identify and manage potentially acid generating (PAG) materials and to mitigate adverse effects on the receiving environment that could result from known or potential sources of ARD/ML. The Plan describes operational requirements for management of PAG materials to reduce the risk of ARD/ML generation, and documents the steps, decisions and actions to be taken to identify and manage PAG materials throughout the life of the Project. The Plan addresses the management of potential PAG materials throughout Project construction, operation and rehabilitation and closure as described in Section 2.1 and for each of the Project components listed in Section 2.2.

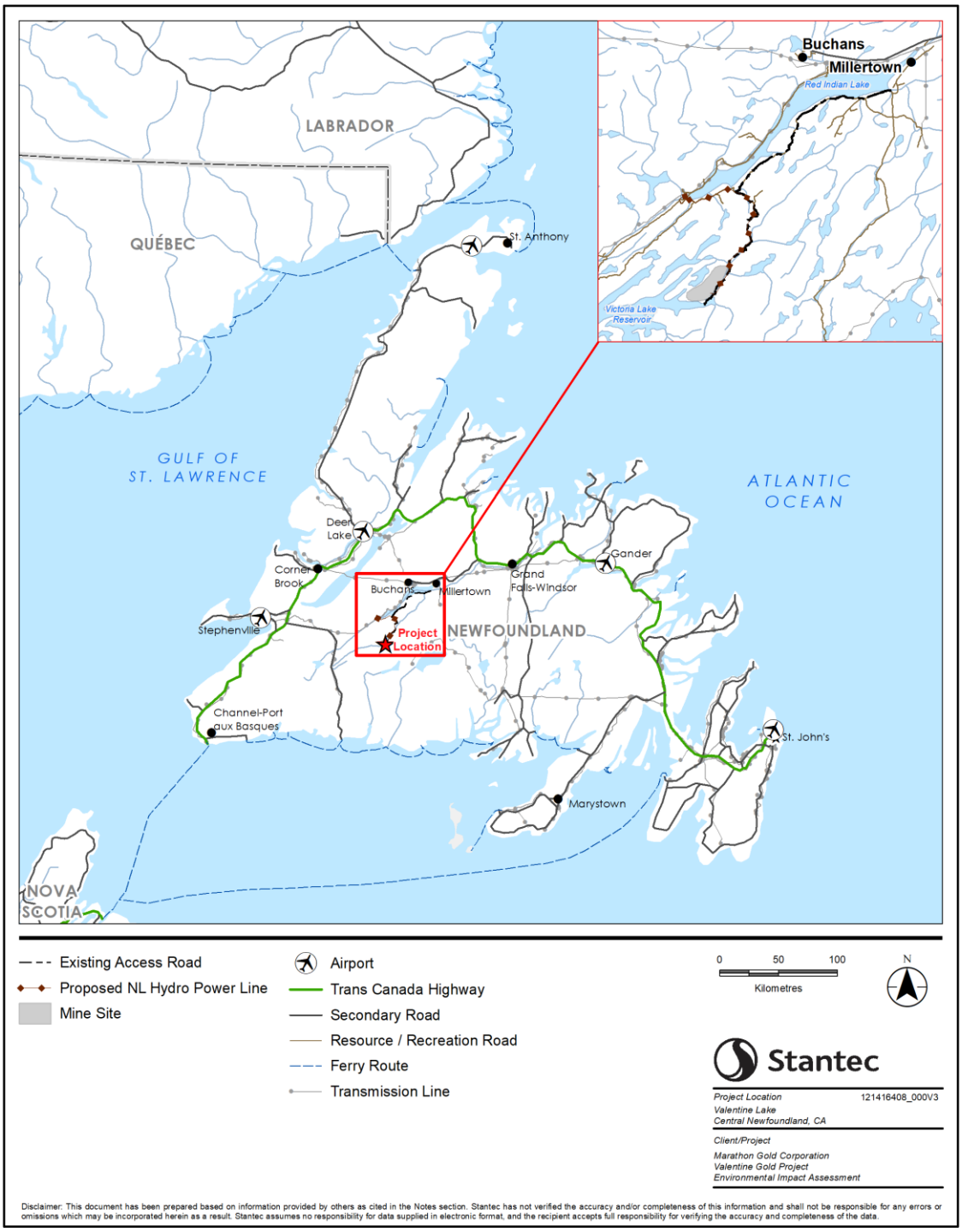

Figure 1-1 Location of Valentine Gold Project

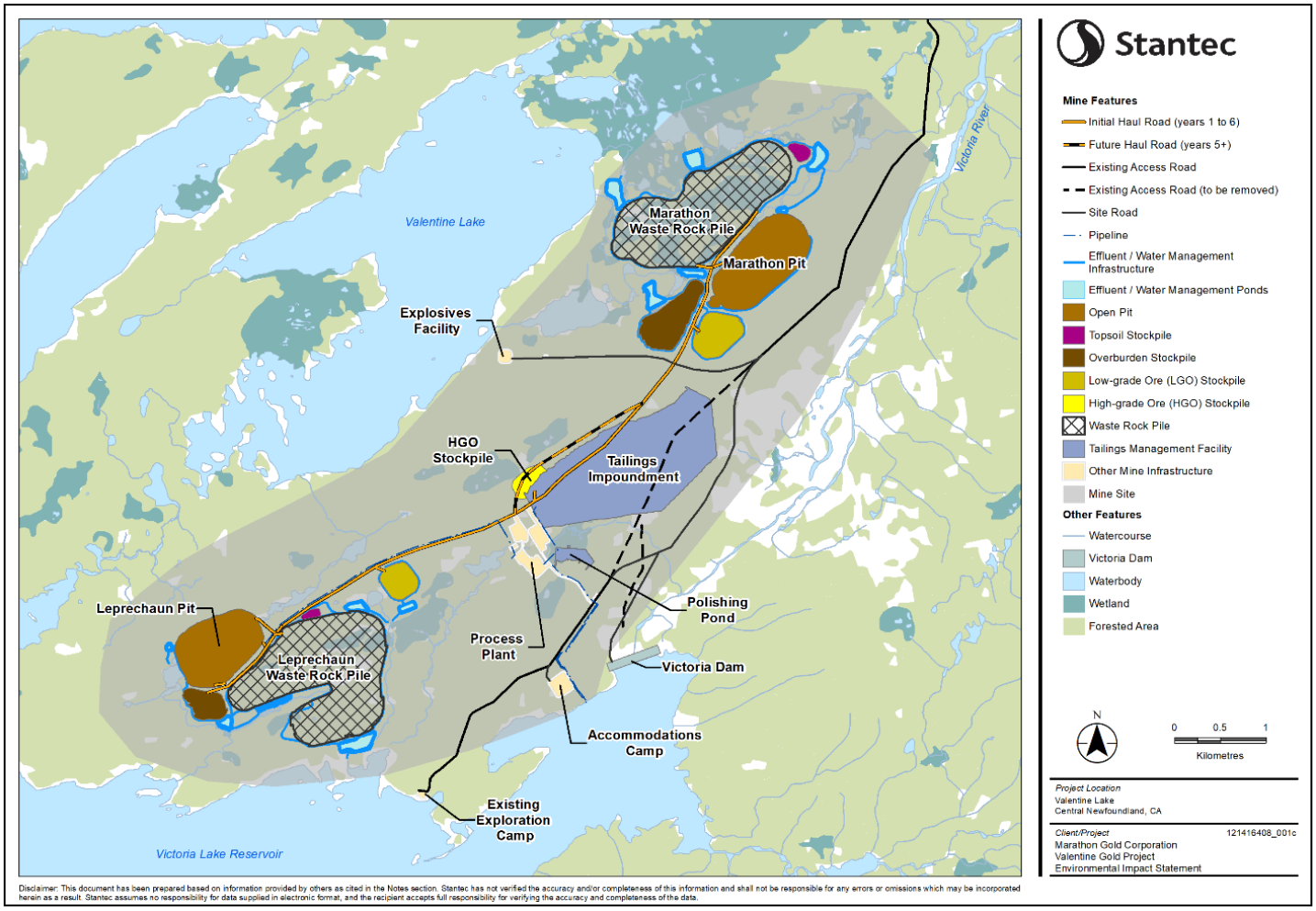

Figure 1-2 Valentine Gold Project Components

1.3 OBJECTIVES

The overall objective of the ARD/ML Management Plan is to document the protocols to be employed to reduce the risk of long-term adverse effects on the receiving environment that may result from the exposure of mine materials, such as overburden, waste rock, ore, low-grade ore, and tailings. To achieve this overall objective, the ARD/ML Management Plan:

- Identifies the federal and provincial legislation, regulations and standards relevant to the management of PAG materials
- Identifies other Project-specific management and monitoring plans relevant to the management of ARD/ML
- Outlines the roles and responsibilities of Project team members in the implementation of this ARD/ML Management Plan
- Provides an overview of the Project phases and components included within the scope of this Plan
- Characterizes the ARD/ML potential of the materials exposed by the Project
- Outlines the procedures to monitor and document geochemical characterization of the Project components, including pre-production testing and analysis and on-site testing and criteria
- Documents the material management methods to be followed to reduce the risk of ARD/ML generation from each Project component
- Outlines the procedures to monitor contact water quality for early identification of conditions indicative of ARD/ML
- Describes the adaptive management approach to mitigation measures for each Project component
- Identifies regulatory reporting requirements
- Documents triggers and procedures for revisions to the ARD/ML Management Plan

1.4 RELATED PLANS AND DOCUMENTS

Geochemical characterization conducted to support this ARD/ML Management Plan considers recommendations provided in “Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials” (MEND Manual) produced by MEND for ARD/ML prediction (Price 2009). This manual was used in developing the geochemical study design and establishing ARD classification for the Project. ARD/ML investigations also considered the federal “Environmental Code of Practice for Metal Mines” prepared by Environment and Climate Change Canada (Environment Canada 2009).

Several other Project-specific management and monitoring plans that relate to the management of ARD/ML are in preparation and are listed in Table 1.1. The information included in Table1.1 is preliminary as these plans are not yet complete. The ARD/ML Management Plan will be further refined and updated prior to start of construction and operation at which point Table 1.1 will be reviewed and updated as needed.

Table 1.1 Management and Monitoring Plans Related to the ARD/ML Management Plan

Management / Monitoring Plan	Scope and Relationship to the ARD/ML Management Plan
Development Plan	Submission of a Development Plan is a requirement for mining projects under the Newfoundland and Labrador (NL) *Mining Act*. The Development Plan will include an overall description of the Project – ownership, geology, mining and processing, tailings management, ARD/ML management, and infrastructure, as well as the plans and schedules and other details for construction and operation of the Project. The Development Plan must describe ARD potential and management requirements for all phases of a project, and this document is updated per a schedule developed in consultation with the NL Department of Industry, Energy, and Technology – Mineral Development Division (NLDIET – MDD), or as required based on changes to a project.
Rehabilitation and Closure Plan	A Rehabilitation and Closure Plan (RCP) is also a requirement under the NL *Mining Act* and describes the approach and plans for rehabilitation and closure of the project. The RCP will include details pertaining to the three key stages of rehabilitation activities that occur over the life span of the Project, which include: • progressive rehabilitation • closure rehabilitation • post-closure monitoring and treatment The RCP must describe ARD potential and management requirements for all phases of a project, specifically addressing the requirements for mine rehabilitation and closure and post-closure to avoid or reduce risk to the environment in long term. The RCP is required to be reviewed and updated regularly, or as required based on changes to a project, and reviewed by NLDIET-MDD).
Construction Environmental Protection Plan	The purpose of the EPP is to outline protection and response measures associated with potential environmental effects related to Project construction activities. The EPP also describes practical procedures required of all personnel (i.e., Marathon employees, contractors and suppliers) to reduce or eliminate potential adverse environmental effects, as well as instructions for addressing planned and unplanned activities/events associated with Project construction. The EPP is closely linked to other management and monitoring plans (such as the ARD/ML Management Plan) as it describes practical procedures required to reduce or eliminate potential adverse environmental effects, as well as instructions for addressing planned and unplanned activities/events associated with Project construction. The key linkage between the Construction EPP and the ARD/ML Management Plan is the identification and use of appropriate non-PAG materials for construction.

Table 1.1 Management and Monitoring Plans Related to the ARD/ML Management Plan

Management / Monitoring Plan	Scope and Relationship to the ARD/ML Management Plan
Water Management Plan	The Water Management Plan includes the water management design for the Project, which has been developed to reduce operational risks and environmental effects of the Project. Objectives of the Plan include reducing water inventory requiring management through perimeter berms to divert external noncontact runoff; reducing the number of final discharge points (FDPs) through grading of ditches and construction of diversion channels to combine discharge points water management ponds; maintaining flow to fish bearing streams and wetlands by maintaining pre-development catchments to the extent feasible; and reducing water management costs during operation through grading and gravitational drainage and thereby reduce pumping requirements. The Water Management Plan is linked to the ARD/ML Management Plan through the water monitoring associated with Project components (waste rock piles, TMF and ore and overburden stockpiles) that may contribute to ARD/ML. Operationally, the contact water management procedures described in Section 4.2 will be a component under the Water Management Plan.
Soil and Rock Management Plan	This plan will include a mass balance estimate and plan for all rock and soil materials that will be excavated and handled over the life of mine. The purpose of the plan is to reduce double handling and stockpiling of materials, make available sufficient overburden and organic materials for progressive and closure rehabilitation, address issues associated with potential ARD/ML, and complete soil and rock materials handling in an efficient and cost-effective manner.
Tailings Management and Deposition Plan	This plan includes operational procedures and management objectives with respect to management of tailings and effluent within the TMF. The plan will describe the methods for tailings deposition within the TMF that will address storage volumes and areas, dam raises (not with tailings) seasonal deposition considerations, dam stability and liner protection, ARD/ML management, water management, dust management, and other requirements for the safe and efficient management of tailings. The Tailings Management and Depositional Plan will include ARD/ML considerations and is thereby linked to the ARD/ML Management Plan.
Groundwater Monitoring Plan	A primary potential effect of mine operation on groundwater quality is the increase in concentrations of chemical parameters in seepage from the waste rock piles and TMF to groundwater, although the effect is likely limited given the long advective groundwater travel time (decades to centuries) to discharge points, and potential for natural attenuation of the parameters along the groundwater flow paths. The purpose of the groundwater monitoring plan is to provide a framework for monitoring potential changes in groundwater quantity and quality and to distinguish naturally occurring changes from changes related to the Project. Results of the Groundwater Monitoring Plan will be considered in the on-going management of PAG material associated with the Project and will help to identify the need for further mitigation and adaptive management measures.

Table 1.1 Management and Monitoring Plans Related to the ARD/ML Management Plan

Management / Monitoring Plan	Scope and Relationship to the ARD/ML Management Plan
Surface Water Monitoring Plan	The objective of the Surface Water Monitoring Plan is to confirm compliance with regulatory requirements, support predictions of effects of the Project on surface water quality, identify changes in drainage patterns and surface water flow, and determine if additional mitigation or response measures are required. The proposed monitoring program includes surface quality monitoring at effluent discharges, downstream receivers, water treatment plant inlets and outlets and reference sites and visual inspections of facility infrastructure. Results of the Surface Water Monitoring Plan will be considered in the on-going management of PAG material associated with the Project and will help to identify the need for further mitigation and adaptive management measures.

1.5 REGULATORY ENVIRONMENT

Several federal and provincial acts and regulations govern the requirements related to avoiding and reducing potential effects of mining on the environment and that relate directly to ARD/ML.

1.5.1 ARD/ML Assessment and Management

Per the NL *Mining Act*, Marathon shall not be permitted to operate the Project until all plans required under the Act have been submitted to the satisfaction of the Minister. While Section 4 of the *Mining Act* only specifically requires a Development Plan and a Rehabilitation and Closure Plan, the associated guidelines for these plans sets out requirements for ARD/ML assessment and management including the design, management, and rehabilitation of waste rock piles, ore and overburden stockpiles, TMF, open pits, and water management components. These plans also address the design and rehabilitation of all other mine components – haul roads, site roads, ore pad, crusher, processing facilities, mine services and associated infrastructure and any associated ARD/ML management requirements that may apply.

Through the provincial requirements identified above, Marathon will not be permitted to proceed with Project until it has demonstrated to NLDIET that ARD/ML risks associated with the Project have been appropriately identified and procedures are in place to manage those risks.

1.5.2 Water and Water Quality

The *Fisheries Act* regulates the protection of fish and fish habitat including water quality. Pursuant to the *Fisheries Act*, the *Metal and Diamond Mining Effluent Regulation* (MDMER) regulates potential adverse effects to fish and fish habitat. The release of metals liberated through ARD/ML has the potential to contravene the deleterious substance provisions and the prohibition against killing fish (by means other than fishing) under the *Fisheries Act*.

Water quality criteria applicable to ARD/ML include the following:

1. Schedule 4 of MDMER enacted under the *Fisheries Act* (SOR/2002-222 2020)
2. Schedule C of Newfoundland and Labrador Regulation 65/03 *Environmental Control Water and Sewage Regulations*, 2003 under the *Water Resources Act* (O.C. 2003-231) (NLR 65/03 2003)

Schedule C of the Newfoundland and Labrador Regulation 65/03 refers to Sections 3, 19.1, and 20 and Schedule 4 of the MDMER as follows:

“A person primarily in the Metal Mining Industry shall comply with sections 3 and 19.1 and 20 and Schedule 4 of the Metal Mining Effluent Regulations (Canada) SOR/2002-222, including any changes or amendments to those sections of and that schedule to those regulations over time.”

Therefore, the MDMER are the primary water quality criteria considered in the ARD/ML Management Plan.

Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (CWQG-FAL) (Canadian Council of Ministers of the Environment [CCME] 2020) are used in ARD/ML assessment as screening criteria, which are not directly applicable to mine discharges.

1.6 ROLES AND RESPONSIBILITIES

Management of ARD/ML requires interdisciplinary coordination from several departments during mine construction, operations and rehabilitation and closure, including the mine engineering, and environmental teams. Table 1-2 provides an overview of the roles and responsibilities at various levels of the Project team.

Table 1.2 Roles and Responsibilities for Implementation of the ARD/ML Management Plan

Position	Role/Responsibility
Mine Manager / Chief Mine Engineer	Understands the objectives of the ARD/ML Management Plan. Maintains records of source location, deposition location, and characteristics of PAG mine rock. Under the advisement of the Environment Manager, ensures only non-PAG mine rock is used for construction. Communicates plan for managing mine rock to site personnel. Ensures site personnel involved in blasting and excavation are trained in implementation of the ARD/ML Management Plan.
Mine Superintendent	Responsible for executing the ARD/ML Management Plan, including for directing site personnel in fulfillment of the mine plan for management of mine rock according to the ARD/ML Management Plan. Responsible for managing, conducting quality assurance/ quality control (QA/QC), and reporting geochemical data. Ensures mine and laboratory technicians are trained in sampling and testing.
Mine and Laboratory Technicians	Understand the objective of the ARD/ML Management Plan and follows direction of the Mine Superintendent and Environmental Superintendent. Responsible for collecting mine rock samples in support of the ARD/ML Management Plan, recording pertinent data, and submitting samples to the laboratory.
Construction Manager	Understands the objectives of the ARD/ML Management Plan. Works with the Mine Engineering/Management team to manage non-PAG mine rock to be used for construction. Coordinates with the Mine Engineering and Environmental teams to address testing requirements for any earthworks construction materials that require ARD/ML evaluation prior to use.
Environmental Manager	Responsible for updating ARD/ML Management Plan as needed. Liaises with and reports to regulators on compliance with conditions of authorizations/permits.
Environmental Superintendent / Coordinator	Supports and advises personnel in adhering to the ARD/ML Management Plan. Responsible for monitoring and reporting on adherence with the ARD/ML Management Plan and compliance with regulatory requirements and conditions of authorization. Responsible for reporting results of water quality and mine rock sampling in accordance with conditions of authorization and MDMER. Ensures environmental technicians are trained in sampling and testing.
Environmental Technicians	Responsible for collecting, recording and submitting water quality samples to the laboratory.
Equipment Operators	Understand the objective of the ARD/ML Management Plan and follow direction of the Site Superintendent.

2.0 PROJECT DEVELOPMENT AND COMPONENTS

2.1 PROJECT DEVELOPMENT

2.1.1 Construction Phase

Project construction is anticipated to begin in 2022 with upgrading the access road, constructing site roads, removing vegetation for site infrastructure, and pre-stripping the open pits. Civil earthworks including for the TMF, foundations and subsurface utilities, and mill and infrastructure construction will occur over an 18 to 22-month period.

2.1.2 Operation Phase

Standard surface mining techniques will be used to mine material from the Marathon and Leprechaun open pits, including blasting, loading, hauling ore from the pit to the mill or stockpiles, processing ore, tailings deposition, hauling and placement of waste rock on the waste rock piles, and phased development of the TMF. Both the Marathon pit and the Leprechaun pit will be mined simultaneously.

For the first three years of operation, ore will be processed through the mill where it will be crushed, milled, and processed through gravity and cyanidation processes to recover the gold. Initially, 6,800 tonnes (t) of ore will be processed daily, with this quantity anticipated to increase to 11,000 tonnes per day (tpd) in Year 4 through the addition of the flotation process. Tailings slurry will be treated to reduce cyanide concentrations prior to disposal. Tailings will be disposed in an engineered TMF for Year 1 to Year 9/10 and will be backfilled into the Leprechaun pit after mining of the pit is complete.

2.1.3 Rehabilitation and Closure Phase

Once mining has ceased, site buildings and infrastructure will be dismantled and removed, sedimentation ponds will be breached (following water quality testing for regulatory compliance) and graded to reestablish drainage patterns, and disturbed areas will be graded, covered with overburden and organic materials, and revegetated. The open pits will be flooded with surface water runoff, precipitation, and groundwater seepage. Excess site contact water will be directed to the pits where practicable to expedite pit flooding. The site will be rehabilitated to as close to pre-development conditions as practicable, or to a suitable condition for an alternate use upon Project closure. The RCP will detail methods to be used for progressive and closure rehabilitation and post-closure monitoring.

2.2 PROJECT COMPONENTS AND ACTIVITIES

2.2.1 Overburden Stockpiles

Approximately 4.1 Mt of overburden will be excavated from the Leprechaun open pit and 7.6 Mt will be excavated from the Marathon open pit. Overburden will be placed in a managed stockpile and will be retained for progressive and closure rehabilitation activities. Drainage from the Marathon overburden pile will flow to Valentine Lake and drainage from Leprechaun overburden will flow to Victoria Lake Reservoir via engineered ditches and sedimentation ponds that make up the site-wide water management system during operations. After closure, the overall direction of flow and the environmental receivers remain the same regardless of whether the ponds are decommissioned and some of the diches are rerouted to the open pits and/or rehabilitated.

2.2.2 Construction Material

Construction rock will be primarily sourced from waste rock generated during development of the open pits. Waste rock types have been characterized with respect to ARD potential as described in Section 3.2 and will be further evaluated for ARD/ML potential prior to use in construction to ensure only non-PAG material with a low potential to generate metal leaching is used in construction.

2.2.3 Waste Rock Piles

The Leprechaun waste rock pile will be located southeast of the Leprechaun open pit. The Marathon waste rock pile will be located northwest of the Marathon open pit. Approximately 146 Mt and 170.6 Mt of waste rock will be excavated from the Leprechaun and Marathon open pits, respectively. Waste rock piles will be constructed in accordance with design recommendations for lift heights, slopes and benching, and assume an overall final closure slope angle of 30 degrees. To accomplish this, the waste rock piles will be constructed by placing single lifts of 10 m, with a 35-degree face angle and a 6.1 m safety bench using bottom-up construction.

As part of progressive and closure rehabilitation, the waste rock piles will be covered with overburden and organics and revegetated to reduce the risk of ARD/ML. Drainage from the Marathon waste rock pile will flow to Valentine Lake and the Victoria River and drainage from Leprechaun waste rock pile will flow toward Victoria Lake Reservoir via engineered ditches and sedimentation ponds that make up the site-wide water management system during operations. After closure, the overall direction of flow and the environmental receivers remain the same regardless of whether the ponds are decommissioned and some of the diches are rerouted to the open pits and/or rehabilitated.

2.2.4 Low Grade Ore Stockpiles

LGO not immediately destined for the process plant will be stockpiled for future processing, either for blending with higher grade ore or processing towards the end of the mine life. Each of the open pits will have an adjacent LGO stockpile. The Marathon LGO stockpile has a capacity of 7.0 Mm^3 and the Leprechaun LGO stockpile has a capacity of 4.1 Mm^3. LGO will be placed on engineered pads with runoff collection systems. Drainage from the Marathon LGO stockpile will flow to Valentine Lake and drainage from Leprechaun waste rock pile will flow toward Victoria Lake Reservoir during operations. At closure, the LGO stockpiles will be removed and associated ponds and diches will be decommissioned.

2.2.5 High Grade Ore Stockpiles

HGO from the Leprechaun and Marathon deposits will be stockpiled together with approximately 30% of the material originating from Leprechaun and the remainder from Marathon, on average. The HGO stockpile will have a capacity of 1.5 Mm^3 and will be placed on an engineered pad with runoff collection systems. During operations, drainage from the high-grade ore stockpile flows by gravity to the TMF pond. The HGO stockpile will only be required for the first 5 to 6 years of operation, at which time it will be decommissioned.

2.2.6 Open Pits

Materials characterized as PAG will be exposed in the pit walls during operations. Post-closure only materials within the highwall above the flooded water level within the pits will remain exposed and these rock types are at low risk of ARD/ML based on testing completed to date. Mine water discharged from the Marathon open pit will flow to the Victoria River, whereas mine water from the Leprechaun open pit will flow to Victoria Lake Reservoir. The open pits will be flooded and PAG material exposed in the pit walls will be submerged preventing ARD from these materials in the post-closure. Drainage from the flooded pits will flow to the same receptors as during operation.

2.2.7 Tailings

Approximately 47 Mt of tailings will be produced from both HGO and LGO with about 38% of the tailings originating from the Leprechaun pit and the remainder from the Marathon pit. Ores from the two open pits will be blended during handling, crushing, milling, and processing such that tailings deposition will be a ‘composite’ of materials from both pits. Blending the materials from both pits is necessary to achieve the grades required for the process design and production requirements for the Project.

Tailings will be managed for the first nine to ten years of operation in the TMF (30 Mt of tailings). After Year 9/10 of the operation phase, tailings will be pumped via pipeline to the exhausted Leprechaun open pit until the cessation of milling operation (17 Mt of tailings). After tailings disposal transitions to the Leprechaun pit, tailings beaches formed in the TMF will be covered with overburden and organics and revegetated. Tailings contained in the Leprechaun pit will be flooded at closure.

Excess water produced by the TMF will be reclaimed to the mill process plant to offset process water demand and limit the volume of discharge from the tailings impoundment to the environment. Excess water from the TMF not reused in ore processing will be treated via the water treatment plant and discharged to a polishing pond prior to discharge to Victoria Lake Reservoir during operations. During closure, drainage from the TMF will flow to the Victoria River.

2.2.8 Water Management

As described in the Water Management Plan (refer to Table 1.1), water management across the site will be implemented to divert non-contact water where feasible. Contact water treatment will focus on sedimentation, as this will reduce total suspended solids (TSS) concentration and the particulate fraction of metals. Water management in each of the three site complexes (Marathon, Process Plant and TMF, and Leprechaun) will function independently, with decentralized water treatment and management in each. Water management components consist of sedimentation ponds, berms, drainage ditches, and pumps to collect and contain surface water runoff from waste rock, LGO stockpiles, overburden stockpiles, open pits and site infrastructure where required.

3.0 ARD/ML CHARACTERIZATION

3.1 INFORMATION AND DATA SOURCES

The following documents related to ARD/ML have been prepared to support the geochemical evaluation of the Project for the EIS:

- Stantec Consulting Ltd. (Stantec). 2018. Preliminary Results of Phase I ARD/ML Assessment. Final report prepared for Marathon Gold Corp. on 23 March 2018. (Also submitted as Baseline Study Appendix 5, Attachment 5-A of the EIS).
- Stantec Consulting Ltd. (Stantec). 2020. Acid Rock Drainage/Metal Leaching (ARD/ML) Assessment. Final report prepared for Marathon Gold Corp. on 22 September 2020. (Also submitted as Baseline Study Appendix 5, Attachment 5-B of the EIS).
- Stantec Consulting Ltd. (Stantec). 2020. Valentine Gold Project Water Quality and Water Quality Modelling Report: Leprechaun Complex and Process Plant &TMF Complex. Final report prepared for Marathon Gold Corp. on 23 September 2020. (Also submitted as Appendix 7A of the EIS).
- Stantec Consulting Ltd. (Stantec). 2020. Valentine Gold Project Water Quality and Water Quality Modelling Report: Marathon Complex. Final report prepared for Marathon Gold Corp. on 25 September 2020. (Also submitted as Appendix 7B of the EIS).

Appendix A contains a consolidation of Marathon's responses to information requests received through the federal and provincial technical review process to date. Note that this appendix may be modified or removed as the ARD/ML Management Plan is advanced and the Phase III ARD/ML Assessment report is completed, as the information currently in the appendix will be updated, moved and/or replaced.

Since the submission of the EIS, Marathon has been conducting additional ARD/ML testing and analysis to address data gaps and requests for additional information that have been identified through the federal and provincial technical review of the EIS. The additional sampling and testing include the following:

- Marathon collected 246 additional samples from the Marathon pit and 96 samples from the Leprechaun pit and completed static tests (acid base accounting (ABA), shake flask extraction (SFE) and trace elements). Certificates of analyses for these tests can be found in Appendix B.
- Marathon completed two humidity cell tests (HCTs) containing carbonate depleted LGO and tailings from the Marathon deposit (started in 2020), and on a tailing sample from on-going metallurgical work (started in 2021). Analytical reports for these tests including timeseries plots for select parameters can be found in Appendix B.
- Marathon continued the field kinetic tests started in 2020. The first year of results from these tests are summarized in the response to Information Requirement (IR) (2)-21 (Appendix A), and the laboratory data are provided in Appendix B.
- Marathon conducted additional water quality model runs to evaluate the sensitivity of results to a reduction of ARD onset time for Marathon's ore, LGO and waste rock (IR 21b in Appendix A).

The methods of testing and analysis are the same as described in the EIS with exception of estimates for percentage of PAG waste rock. The current estimates based on tonnages of major lithologies calculated from geological block model. Some lithologies, that are reported separately in the EIS, are currently combined as indicated in Table 3.1. For example, sediments and sediments with quartz-tourmaline-pyrite veins were reported separately in the EIS and currently combined.

The preliminary results from the laboratory tests and analysis (available to date) are summarized in Section 3.2.

Note: this section of the ARD/ML Management Plan will require specific updates as the Project advances through environmental assessment, detailed engineering, additional ARD/ML test work, assessment and reporting, and permitting to reference and consolidate the appropriate information and data supporting this Plan.

3.2 ARD/ML ASSESSMENT SUMMARY

This section summarizes the ARD/ML characterization of materials excavated or exposed by the Project and is updated based on additional data available since submission of the EIS. The changes in the number of exceedances for ARD and ML thresholds, based on information provided in the EIS and on the recent updates, are presented in Appendix C.

3.2.1 Marathon Deposit

- Overburden: Overburden is classified as non-PAG material, with moderate leaching potential for flouride (F), aluminum (Al), arsenic (As), cadmium (Cd), copper (Cu), iron (Fe), manganese (Mn), lead (Pb), selenium (Se), and zinc (Zn) based on SFE testing. Testing of overburden has only returned one sample in the uncertain category contributing to 3% of the total tonnage. The test results show no exceedances of MDMER limits observed in leachates from overburden. Molybdenum (Mo) has been identified as a new parameter exceeding CWQG-FAL in one of recent 30 SFE tests (3% of the total number of samples) in addition to F, Al, As, Cd, Cu, Fe, Mn, Pb, Se, and Zn that all show moderate leaching potential.
- Waste Rock: The estimated percentage of PAG (1< neutralization potential ratio [NPR]) and uncertain waste rock (1<NPR<2) is reduced from 14% (as stated in the EIS) to 9% of the total rock tonnage (Table 3.1). Average ARD onset time of approximately 4 years for PAG rock was conservatively estimated from humidity cell results (refer to response to IR-21 provided in Appendix A). It should be noted that the most recent data indicates that field NP depletion rates are at least 3 times slower than laboratory rates (sample M QE-POR, Table IR(2)-21.2 Appendix A) indicating that PAG waste is unlikely to acidify before closure when stockpiles will be covered with overburden/soil reducing advective oxygen flux to PAG rock. There are no exceedances of MDMER limits observed in humidity cells field bins and SFE, including the results from the latest tests. No new parameters of concern were identified by screening SFE concentrations. Overall, waste rock lithologies show moderate ML potential for Al, mercury (Hg), Se, and Zn based HCTs.

- LGO: Further testing of LGO resulted in a reduction in the percentage of PAG and uncertain samples from 50% (as stated in the EIS) to 46%. The average ARD onset time in PAG LGO is approximately four years and was re-evaluated based on conservative inputs from laboratory leaching rates (refer to response to IR-21, provided in Appendix A). This conservative estimate only applied to PAG LGO pockets, which may acidify after being stored over 4 years. It should be noted that the most recent data show that field NP depletion rates are 62 times slower than laboratory rates, indicating that PAG LGO is unlikely to acidify before it is processed or covered (Table IR(2)-21.2 Appendix A). There are no exceedances of MDMER limits observed in LGO leachates except for a marginal exceedance for Cu in effluent from the carbonate depleted humidity cell used to simulate acidic conditions (M-LGO CNP DPL, Appendix B). Cu, Cd and Pb are new parameters that were identified in SFE that exceed the CWQG-FAL for Cu in 3 samples (6% of samples tested to date) and for Cd and Pb only in one sample (2% of samples tested to date). Based on these results and previous kinetic testing, Al, Cd, Cu, phosphorus (P), Pb and Zn have moderate leaching potential under neutral conditions, while Cu will likely have high leaching potential if acidic conditions develop.
- HGO: The additional static tests completed for high-grade ore result in a slight increase in the overall percentage of PAG and uncertain samples of 1% (from 67% reported in the EIS, to 68%). However, the overall percentage of PAG samples (1<NPR) declined from 56% to 36%, showing a reduction in ARD risk related to HGO. The average ARD onset time in PAG HGO is approximately 2.5 years and was reevaluated from conservative estimates from laboratory leaching rates (refer to response to IR-21, provided in Appendix A). The probability that PAG material will be stored in the HGO stockpile for 2.5 years is low because of continuous withdrawal of ore to the mill and replenishment with new materials from the open pits. The HGO stockpile is also only required for the first 5 years of operation There are no exceedances of MDMER limits observed in SFE from HGO. In addition to a moderate Al potential identified in the EIS, exceedances for CWQG-FAL were found for Zn in 4% of the total number of samples tested to date and for As, Cu and Pb in 2% of the total number of samples tested to date.

Table 3.1 Estimated Tonnages of Materials and Number of Samples Tested

Block Model Lithology	Material type	Block Model tonnage	Suggested initial frequency per Table 8-2, Mend (2009)	Samples tested to date	samples with NPR<2 (PAG + uncertain)		Tonnage of materials with NPR<2 (PAG + uncertain)	
Units		**Mt**	**#**	**#**	**#**	**%**	**Mt**	**%**
Marathon Deposit								
Metasediments*	Waste Rock	33.4	80	89	0	0%	0	9.2%
Gabbro (GB)	Waste Rock	8.3	26	35	1	3%	0.2	
QEPOR**	Waste Rock	128.9	80	125	15	12%	15.5	
HGO	Ore	21.1	80	96	65	68%	14.3	68%
LGO	Ore	8.6	26	80	37	46%	4.0	46%
Overburden	Waste	7.6	26	30	1	3%	0.3	3%
Leprechaun Deposit								
Metasediments*	Waste Rock	40.3	80	80	1	1.3%	0.5	1.1%
Trondhjemite***	Waste Rock	105.9	80	95	1	1.1%	1.1	
HGO	Ore	12.4	80	41	1	2%	0.3	2%
LGO	Ore	5.0	26	28	1	4%	0.2	4%
Overburden	Waste	4.1	26	9	1	11%	0.5	11%

Notes:

*Sample count includes conglomerate and sediments with QTP veins (QZ-STQP).

**Sample count includes Quartz Porphyry Varieties, Mafic dykes and QTP veins in Quartz Porphyry and Mafic dykes.

***Sample count includes Trondhjemite/Granodiorite, Mafic dykes and QTP veins in Trondhjemite/Granodiorite and Mafic dykes.

The updated static tests summarized above improve the confidence in the ARD/ML test results and the related predictions and mitigation measures presented in the EIS. They show a reduction in ARD risk for lithologies within the Marathon deposit. Metal leaching risks are essentially unchanged from that presented in the EIS, except for Cu that may be above MDMER limits in PAG LGO pockets where acidic conditions may develop, and a few parameters exceeding CWQG-FAL in a small percentage of overburden, HGO and LGO samples.

3.2.2 Leprechaun Deposit

- Overburden: The additional static tests completed for overburden has only one sample that classifies as uncertain with overburden, contributing to 11% of the total tonnage. There are no exceedances of MDMER limits observed in leachates from overburden, including the latest test results. Overburden has moderate leaching potential for Al, Fe, Pb, and Zn. No new parameters were identified by screening SFE concentrations against CWQG-FAL's in the latest test results.
- Waste rock: The additional static test work for waste rock was focused on sedimentary units, and all new samples tested had NPR values above 2 and are classified as non-PAG. One uncertain sample of sediment with quartz-tourmaline-pyrite veins (1<NPR<2)), which was previously reported as separate lithology, is now added into sedimentary unit defined by geological block model. As a result, the overall estimated percentage of PAG (1<NPR) and uncertain waste rock (1<NPR<2) increased slightly from 0.5% (as presented in the EIS) to 1.1% of the total rock tonnage (Table 3-1). There are no exceedances of MDMER limits observed in SFE, humidity cells, and field bins, including the results of the latest tests. As and Mn are new parameters identified in 48% and 1% of SFE tests, respectively. Waste rock shows moderate ML potential for Al, As, Mn, P, Cu, Se, and Zn.
- LGO: The additional static test work for low-grade ore results in a reduction in the percentage of overall PAG and uncertain samples from 10% (as presented in the EIS) to 4%. There are no exceedances of MDMER limits observed in any SFE, including the results of the latest tests. Iron was a new parameter that exceeded the CWQG-FAL in 38% of all SFE tests. Updated results suggest moderate leaching potential for Al, Fe and P.
- HGO: The additional static test work for high-grade ore samples results in a reduction in the percentage of overall PAG samples from 13% (as presented in the EIS) to 2%. There are no exceedances of MDMER limits observed in SFE from high grade ore, including the results of the latest tests. In addition to moderate Al potential identified in the EIS, CWQG-FAL's were exceeded for Cu and Fe in 8% of SFE tests to date.

The updated static tests summarized above improve the confidence in the ARD/ML test results and the related predictions and mitigation measures presented in the EIS. As a consequence of updated static testing results, materials from the Leprechaun deposit show a slight increase in the percentage of waste rock and overburden material classifying as PAG and uncertain, however, also show a significant reduction in ARD risks for LGO and HGO. Metal leaching risks are similar to that presented in the EIS, with the exception of As which shows moderate leaching in almost half of SFE tests to date from

sediments. The significance of this finding will be evaluated in the upcoming kinetic testing. Several other parameters exceed CWQG-FAL in a small percentage of samples of different materials.

3.2.3 Tailings

Composite samples of tailings from both deposits are classified as non-PAG and are not expected to generate ARD. One additional sample of tailings was tested and also classified as non-PAG. Additional sensitivity analysis of tailings chemistry indicates that tailings are not expected to be PAG as a result of mixing of Marathon and Leprechaun ores (refer to response to IR-21 provided in Appendix A). During operation, the TMF pond and pore water will likely exceed the MDMER limits for total cyanide (CN(T)), un-ionized ammonia, and Cu sourced from process water. In addition, high leaching potential is also determined for total ammonia, weak acid dissociable cyanide (CN_{WAD}) (surrogate for free CN), F, Hg, P, and Fe. Seepage from the TMF is conservatively predicted to exceed MDMER limits for CN(T), un-ionized ammonia, and Cu in post-closure.

3.3 PRE-PRODUCTION TESTING AND ANALYSIS

Pre-production ARD/ML laboratory testing and analysis will guide final design of Project components and management of mined, processed and exposed rock materials. Additional ARD/ML work will be used, along with the results obtained to date, to refine the ARD/ML mitigation measures related to waste rock management, stockpile management, and tailings management via this ARD/ML Management Plan, such that PAG materials are managed to avoid or limit potential long-term effects. The continuing pre-production testing and analysis program is detailed as follows:

- Laboratory and field tests:
  - Field kinetic (bin) tests of composite materials initiated in 2020 will be continued for a minimum of 2 years and will then be assessed to determine if continuation of the tests is warranted. The tests include nine composite samples representing major waste rock lithologies and two, low-grade ore samples, one from each deposit.
  - A new set of kinetic tests of materials with high ARD/ML potential will commence in early 2022. This set of laboratory kinetic tests is focused on “upper case” samples with NPR values in the lower 10th percentile, sulphur content above the 85th percentile, and total metal content above median values for respective material / lithology. The rationale and expected chemistry of samples selected for these tests is provided in Table 3.2. These samples will be submitted for advanced static tests including Net Acid Generating (NAG) tests, mineralogy, and particle size distribution similar to the characterization completed for composite samples (see Section 3.2.2 of Baseline Study Appendix 5, Attachment 5-B of the EIS).
  - Ongoing static testing will be completed of approximately 1,700 additional samples required for development of the ARD block model for the Marathon pit and delineation of non-PAG rock in Leprechaun and Marathon pits that will be used as construction material including development of the TMF and subsequent TMF dam raises.

- An ARD block model will be generated for the Marathon pit to provide production schedules for ARD classes of rock and ore and to estimate areas of PAG material exposures on pit walls. The ARD block model will be integrated with the mine block model to forecast the ARD potential for mine rock within the pit, and plan for ARD management at the waste rock pile (e.g., planning and creation of areas for encapsulation). More details on development, update and use of the model during construction and operation is provided in Appendix A (IR(2)-19) and in IR(3)-18.1). The model will be completed in Q1 of 2022.
- Marathon will prepare an ARD/ML Phase 3 Report that will provide analysis and interpretation of all information generated since preparation of the Phase 2 Report. The report will be completed during the permitting phase.
- Water quality predictions will also be updated during the detailed engineering/permitting based on results of the additional testing and analysis, including results from new humidity cells, field kinetic tests, and ARD block model for the Marathon pit.
- The ARD/ML Management Plan will be updated during the detailed engineering/permitting stage to reflect available results. This will include further details for blending and encapsulation of PAG waste rock material and other ARD/ML management requirements.

Table 3.2 Rationale and Chemical Compositions of Samples Selected for Additional Humidity Cell Tests

Sample ID	Hole ID	Original fraction in composite	Composite/HCT ID(s)	Rationale/comment	S tot	TIC	NP	AP	NPR	As	Cd	Cu	Ni	Pb	Zn
					wt%	wt%	kg $CaCO_3$/t		µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
104865	MA-16-125	1/5	1) M LGO-PAG; 2) M LGO-PAG-CO3DEP	Composite of Marathon's ore samples with NPR<1; carbonate depleted sample is a surrogate for acidic conditions.	1.20	0.20	16	38	0.44	1.4	0.01	4.2	1.30	0.58	8.4
129738	MA-17-212	1/5			1.07	0.31	26	34	0.76	0.9	0.02	5.4	0.30	0.64	2.9
170838	MA-18-328	1/5			2.31	0.38	32	72	0.44	1.0	0.04	220	1.40	29	20
193448	MA-19-349	1/5			0.96	0.12	10	30	0.33	1.1	0.01	4.0	0.50	0.61	0.35
946143	MA-19-463	1/5			2.61	0.41	34	82	0.42	1.6	0.02	14	1.00	0.47	22
Expected chemistry of composite					1.63	0.28	24	51	0.46	1.2	0.02	50	0.90	6.3	11
Percentiles in M LGO lithology					0.93	0.45	0.45	0.93	0.06	0.67	0.07	0.93	0.64	0.87	0.50
MA-16-082_42-44	MA-16-082	1	3) GB-PAG; 4) GB-PAG-CO3DEP	PAG gabbro as worst ARD case. Carbonate depleted sample to simulate acidic conditions.	3.0	0.15	12	95	0.1	155	0.2	1550	248	0.8	54
Percentiles in GB lithology					0.97	0.06	0.06	0.97	0.03	0.97	0.93	0.97	0.97	0.83	0.75
86666	MA-15-063	1/2	5) M SED-High S	No PAG samples in sediments. Made a composite from samples with S > 1% and elevated metals for worst case.	1.84	2.99	249	58	4.33	2.30	0.15	13	16	6.50	26.00
101647	MA-16-104	1/2			1.14	1.15	96	36	2.69	1.80	0.07	56	27	7.50	48.00
Expected chemistry of composite					1.49	2.07	172	47	3.70	2.05	0.11	35	22	7.00	37.00
Percentile in M SED lithology					0.98	0.81	0.81	0.98	0.02	0.88	0.93	0.78	0.63	0.94	0.05
MHQC-8	MA-17-165	1/3	6) M ORE-PAG; 7) M ORE-PAG	Composite of Marathon high-grade ore samples with NPR<1; carbonate depleted sample is a surrogate for acidic conditions	2.00	0.20	16	63	0.26	1.10	0.08	290	4.5	0.39	38.00
MHQC-13	MA-19-370	1/3			2.30	0.08	7	72	0.10	2.50	0.19	10	1.6	1.30	14.00
MHQC-16	MA-17-176	1/3			0.89	0.13	11	28	0.38	0.50	< 0.02	13	0.3	1.10	5.20
Expected chemistry of composite					1.73	0.14	11	54	0.21	1.37	0.14	104	2.1	0.93	19.07
Percentile in M HGO lithology					0.88	0.14	0.14	0.88	0.06	0.52	0.89	0.92	0.64	0.29	0.65
20BH-18 GS13	20BH-18 GS13	1	8) M OB-High S	Marathon's worst case of overburden with highest S and lowest NPR.	0.87	0.178	15	27	0.55	51	0.15	43	51	8.2	70
Percentile in M OB lithology					0.97	0.65	0.65	0.97	0.03	0.68	0.58	0.77	0.97	0.87	0.81
LPHQ-1	VL-19-710	1	9) L ORE-High S	Selected Leprechaun ore sample has highest S and lowest NPR among currently available samples.	0.51	0.27	22.3	16.0	1.39	4.10	0.05	17.0	0.80	4.20	18.00
Percentile in L HGO lithology					0.90	0.05	0.05	0.90	0.05	0.71	0.35	0.29	0.03	0.29	0.18
62731	VL-04-86	1/4	10) L-SED High As	Composite from Leprechaun sediments with elevated arsenic	0.005	0.38	31.75	0.16	203	4.4	0.05	82	47	1.5	63
818474	VL-10-150	1/4			0.003	0.10	8.1	0.08	103	6.0	0.03	9.6	26	1.3	58
731	VL-10-185	1/4			0.003	0.24	20.1	0.08	257	4.8	0.04	3.9	20	1.5	52
30915	VL-11-299	1/4			0.003	0.10	8.2	0.08	104	4.7	0.03	34	24	1.2	56
Expected chemistry of composite					0.003	0.20	17.0	0.10	174.	5.0	0.04	32	29	1.4	57
Percentile in L SED lithology					0.67	0.51	0.51	0.60	0.56	0.87	0.32	0.77	0.94	0.52	0.41

4.0 ARD/ML MANAGEMENT

4.1 SAMPLING, TESTING AND ARD CLASSIFICATION OF SOLIDS

4.1.1 Operational Sampling

During construction and operation, sampling will be conducted to refine the ARD block model and improve the accuracy (quantity and delineation) of PAG and non-PAG materials. Sampling is planned to be conducted at rate indicated in Table 4.1. The details of sampling of each material are discussed in Section 4.1.4.

Table 4.1 Summary of Operational Sampling Program

Component	Estimated Tonnage	Sampling Rate	Estimated number of Samples (Life of Mine)
Overburden	11.7 Mt	1 per 50,000 t	234
Waste / Construction Rock	317 Mt	1 per 9,000 t	~35,200[1]
Low Grade Ore	33.5 Mt	1 per 9,000 t	~3,720[1]
High Grade Ore	13.6 Mt	1 per 9,000 t	~1,150[1]
Tailings (End of Pipe)	47 Mt	1 per 48,000 t (Year 1 to 3) 1 per 77,000 t (Year 4 to 9/10)	~ 620
Tailings (Beaches)	TBD	1 per 10,000 m^2 at closure	~250

Notes:

[1] sampling rate may be reduced during operations following reconciliation of the ARD block model and results from the confirmatory sampling program.

Mt million tonnes

TBD to be determined

4.1.2 Laboratory Analyses

Samples will be tested at the on-site laboratory for sulphur, inorganic carbon, and trace elements (by portable X-ray fluorescence or a similar method). A split of one in every ten samples will be analyzed at an external laboratory for standard static tests including acid base accounting (ABA), SFE, and total metals. The split sampling frequency may change depending on the reconciliation of external laboratory results and on-site test results.

Samples that are sent to the external lab will be tested according to methods consistent with Price (2009):

- ABA package including, modified Sobek neutralization potential (NP) with siderite correction, carbonate NP calculated from total inorganic carbon, fizz rating, paste pH, total sulphur by LECO, sulphate sulphur by HCl extraction and acid potential (AP) calculated form difference between total and sulphate sulphur
- SFE testing method, involving continuous mixing of a crushed sample (85% passing 6.3 mm) with deionized water (1:3 rock to water ratio) for 24 hours, and leachate analysis by inductively coupled plasma mass spectrometry (ICP-MS) for trace elements. In addition, SFE leachates will be analyzed for pH, alkalinity and acidity by titration, and sulphate by colourimetry.
- Total metals by aqua regia digestion with ICP-MS detection.

4.1.3 ARD Screening Criteria

ARD potential is required for classification and management of mine materials. ARD potential is evaluated using the NPR that is calculated as the ratio between NP and AP. Samples are classified as non-PAG if NPR >2 and classified as PAG if NPR <2. Preliminary acid generating potential of the samples is evaluated using total inorganic carbon and total sulphur data generated by the on-site laboratory. Values of NP, AP, and NPR are calculated using the following equations (Price 2009):

$$NPR = \frac{NP}{AP} \qquad NP = \%\ total\ inorganic\ carbon\ x\ 83.33 \qquad AP = \%\ sulphur\ x\ 31.25$$

Analysis of siderite corrected NP and carbonate NP typically produce similar results where carbonate NP is greater than 40 kg calcium carbonate ($CaCO_3$)per tonne for the Leprechaun deposit and greater than 20 kg $CaCO_3$ per tonne for the Marathon deposit. At lower carbonate NP, siderite corrected NP results are greater than carbonate NP. Carbonate NP is selected for ARD/ML assessment for the Project because it results in more conservative ARD classification of samples (Stantec 2020a).

4.1.4 Material Management

4.1.4.1 Overburden

Most of overburden from the Leprechaun and Marathon deposits is non-PAG with 11% and 3% of samples classified as uncertain. Confirmatory samples will be collected and tested as overburden is excavated at rate of one sample per 50,000 t per MEND Manual recommending a frequency of 50,000 t to 100,000 t “where all the rock is either PAG or non-PAG and the purpose of sampling is documenting the elemental concentrations and ABA parameters” (Price 2009, page 8-23). If PAG overburden is identified by testing, it will be segregated from non-PAG overburden that will be stockpiled for rehabilitation and placed in the waste rock pile in accordance with the management protocols for PAG waste rock.

4.1.4.2 Construction Rock

Non-PAG waste rock generated during open pit development will be used for construction of pads, roads, and building foundations, or will be placed in the waste rock pile. Based on the current development plan, there is no waste rock expected to placed on the waste rock piles during the construction phase of the Project. Waste rock will be managed such that only non-PAG rock is used in construction.

During pit development and excavation of waste rock for construction, confirmatory samples of cuttings from reverse circulation (RC) drilling in material which are identified as construction material will be collected from 5 m depth intervals from holes spaced at 25 m by 25 m. Any material represented by samples characterized as PAG will be excluded from use in construction and will be managed as described in Section 4.1.4.3.

4.1.4.3 Waste Rock

A higher proportion of PAG waste will be generated from Marathon open pit compared to Leprechaun open pit as described in Section 3.2. As such, an ARD Block Model will be developed for the Marathon deposit as described in Section 3.3 and updated based on confirmatory and operational sampling and testing as described in this section. A similar confirmatory and operational sampling approach will be applied to the Leprechaun pit, however, ARD classification will be prescribed to the mine / resource block model to forecast the location and timing of PAG waste to be mined from the pit and to plan for ARD management.

Confirmatory samples of cuttings from RC drilling in material identified as waste rock will be collected from 5 m depth intervals from holes spaced on a 25 m by 25 m grid, as is common practice in open pit mines. This additional data will be integrated with the Marathon ARD block model to improve the accuracy (quantity and delineation) of PAG and non-PAG rock 3 to 4 months ahead of mining. As mining progresses, samples will also be collected from blast hole cuttings for additional testing to confirm the data within the block model prior to mining. The sampling rate may be reduced following validation of the ARD block model. The ARD block model will be considered to be validated when PAG rock is identified with a minimum accuracy of 95% in a calendar year.

The material characterized as PAG waste rock (NPR <2) extending to the adjacent borehole samples with NPR greater than two (Figure 4-1) will be marked after the blast, excavated, and dispatched to the waste rock pile. PAG rock will be deposited no closer than 9.1 m (bench width 6.1 + 50% safety factor) from final lift face and over a non-PAG truck load (Figure 4-2). A portion of PAG and non-PAG rock loads will be mixed on the pile face and during grading each lift of the stockpile. This mixture will be encapsulated with non-PAG rock (buffer) and deposited as described previously. The blended PAG and non-PAG will be covered with a non-PAG layer forming on the final topmost lift(s) of the stockpile. Non-PAG rock will reduce oxygen flux into the interior of the pile and provide alkalinity to infiltrating water. This approach has been successfully applied for waste rock piles in other mine sites as referenced in Sections 6.6.3.5 and 6.6.3.6 of Global ARD management guide (http://www.gardguide.com/index.php/Chapter) and is applicable to ARD/ML management for this Project. Field tests including pore gas monitoring will be

initiated to evaluate effectiveness of the proposed waste rock blending and encapsulation methods as material becomes available during early operations phase.

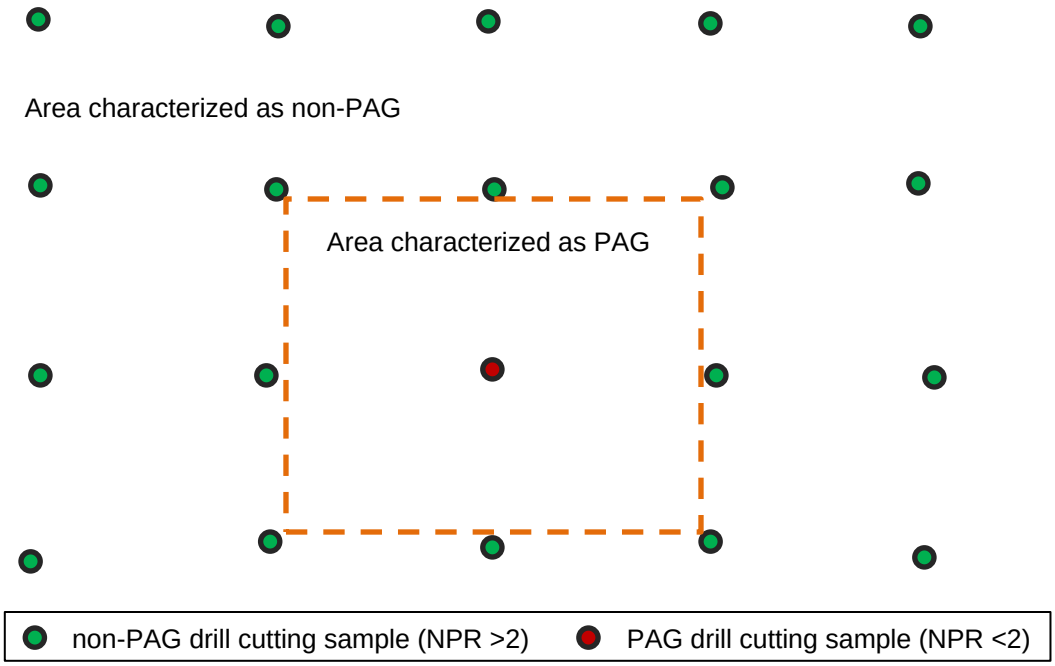

Figure 4-1 Delineation of PAG Material Based on Drill Cuttings (Plan View)

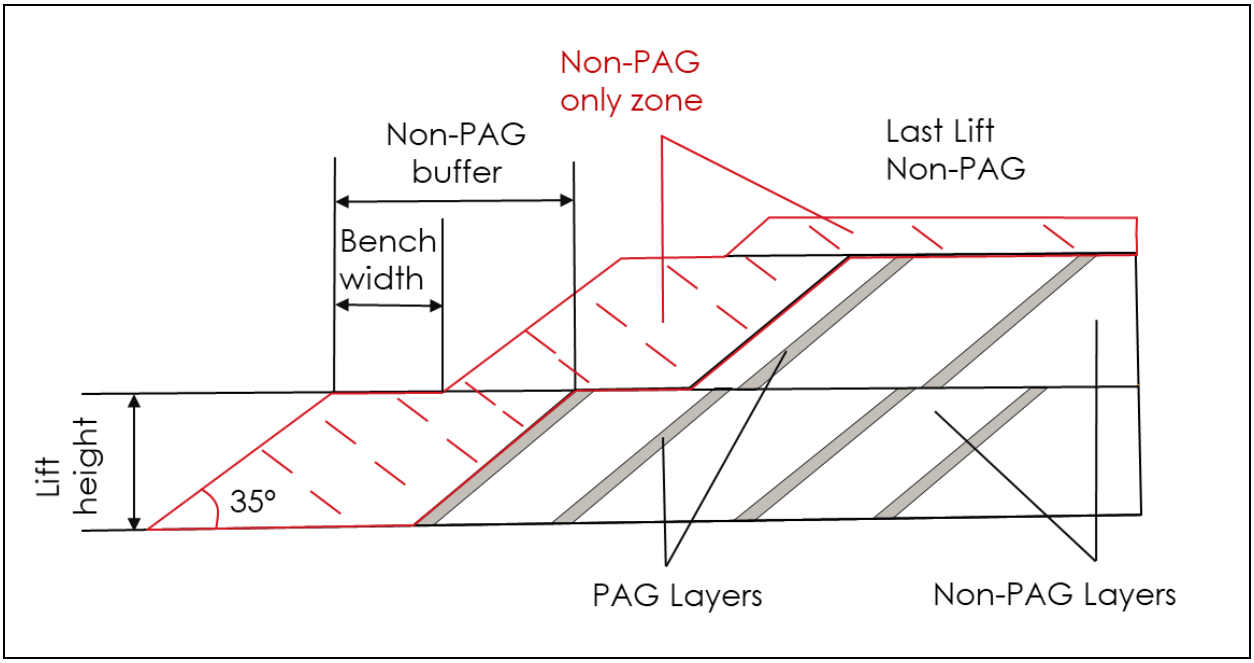

Figure 4-2 Conceptual Cross-Section of Waste Rock Pile

The waste rock piles will be developed from the bottom up, in lifts with specified slopes and benching per closure requirements and will be progressively rehabilitated over the operations phase of the Project. As part of progressive and closure rehabilitation, the waste rock piles will be covered with soil, and revegetated, further inhibiting oxygen and water migration through the piles.

4.1.4.4 Low Grade Ore

Approximately one-half of the Marathon's LGO is classified as potentially non-PAG while most of LGO from Leprechaun (96%) predominantly is non-PAG with excess of NP. Therefore, ARD risk related to Leprechaun LGO stockpile is low and does not require specific ARD management. ARD and associated metal leaching from Marathon's LGO is unlikely to occur before all the LGO has been processed at the mill (refer to responses to IR-21, IR(2)-21 and DIET-08 in Appendix A). Nevertheless, non-PAG LGO will be preferentially stockpiled and PAG LGO will be preferentially directed to the mill feed, as long as the grade requirement for the mill feed is met to further reduce ARD/ML risks.

4.1.4.5 High Grade Ore

Approximately 2% and 68% of ore samples from Leprechaun and Marathon pits, respectively, are conservatively classified as PAG. The overall mixture of Leprechaun and Marathon HGO is classified as non-PAG due to excess of NP, and the HGO stockpile is not expected to generate ARD during its lifetime of 5-6 years, as discussed in detail in the response to IR DIET-09 (Appendix A). Even though ARD is not

expected, to limit exposure of PAG high grade ore within the stockpile, PAG HGO will be preferentially directed to the mill feed, while non-PAG high grade ore will be allocated to the stockpile, as long as the grade requirement for the mill feed is met.

4.1.4.6 Tailings

Tailings will be deposited in the TMF during Year 1 to 9/10 of operation and in the Leprechaun pit during the last three years of operation. During operation, samples of thickened tailings representative of end-of-pipe discharge will be collected weekly. This will result in a sampling rate of one sample per approximately 50,000 t during Year 1 to 3 and one sample per 77,000 t starting in Year 4.

Tailings beaches in the TMF will be rehabilitated prior to closure when tailings deposition transitions to the Leprechaun pit. The approach of preferentially stockpiling non-PAG LGO will create a non-PAG layer of tailings on the surface of the TMF. This non-PAG layer is expected to consume oxygen, reducing oxygen diffusion into tailings deposited earlier. Tailings deposited in the Leprechaun pit will be flooded as quickly as practicable limiting further oxidation and ARD/ML. Additional investigation and assessment, such as one-dimensional modelling or saturated column tests, will be initiated once closure designs and experimental materials are available in first years of operation. These investigations will be designed to assess the efficacy of the closure and rehabilitation plan for tailings in the TMF.

Prior to rehabilitation (soil cover and revegetation) of the tailings beaches, a confirmatory sampling program will be conducted to verify the tailings exposed at closure are non-PAG. A minimum of one tailings sample will be collected for every 10,000 m^2 (100 m x 100 m) from exposed beaches and composed over depth interval from surface to 0.5 m deep, where most of oxygen is consumed and ARD could occur in PAG patches. If a PAG sample is identified, additional samples will be collected at closer spacing to identify the extent of PAG tailings and further mitigation measures, as described in Section 5, may be required. The tailings sampling program will be reviewed annually and updated as additional information becomes available. In post closure, when Leprechaun pit is flooded, the effluent from the TMF will be treated using engineered wetlands prior to discharge to the Victoria River until TMF effluent(s) comply with MDMER (refer to response to IR DIET-05 in Appendix A for further details).

4.1.4.7 Open Pits

The development of ARD block model and operational monitoring will allow to map PAG materials on pit walls/benches. At closure, the majority of these materials will be saturated following accelerated flooding of open pits to reduce the risk of ARD/ML generation. Permanently exposed PAG walls will be covered with non-PAG rock and/or overburden.

Modelling of water quality discharges from open pits considers potential ARD/ML from pit walls and rock rubble accumulated on pit benches. The results of current modelling indicate that discharges from the pits are expected to be near-neutral and will not exceed MDMER limits. This modelling will be updated as additional information becomes available as part of detailed engineering and permitting.

4.2 CONTACT WATER MONITORING, TESTING AND ANALYSIS

A contact water monitoring program will be established to verify the prediction that that ARD/ML should not occur and identify any potential early-stage ARD/ML. Details of this monitoring program are included in the Surface Water Management Plan (Table 1.1). The proposed monitoring program includes surface quality monitoring at effluent discharges, downstream receivers, water treatment plant inlets and outlets and reference sites and visual inspections of facility infrastructure. FDPs will be sampled weekly as part of contact water monitoring. Seepage monitoring locations from overburden, waste rock, LGO stockpiles, open pits and TMF will be identified (e.g., sumps, ditches) to trace potential ARD/ML sources before it appears at discharge locations. The current plan is to sample seepage monitoring locations on monthly basis. A detailed sampling schedule will be developed and incorporated into future updates of this Plan when exact seepage monitoring locations is established during detailed engineering. Details regarding the testing and screening criteria to detect potential early-stage ARD/ML are presented below.

4.2.1 Laboratory Analyses

In situ measurements of pH, temperature, conductivity, oxidation-reduction potential, dissolved oxygen, and turbidity will be completed in the field and samples will be collected for laboratory analysis of the following parameters:

- Physical parameters (pH and conductivity), total hardness, total dissolved solids, TSS, alkalinity, acidity, ammonia nitrogen and selected anions (chloride, fluoride, bromide, sulphate, nitrate, and nitrite)
- Total metals
- Dissolved metals
- Dissolved organic carbon

This list will cover the MDMER requirements for effluent testing and a set of relevant parameters with CWQG-FAL including input values for calculations of site-specific guidelines (pH, temperature, Hardness and dissolved organic carbon (DOC)) for linkage with the Surface Water Monitoring Plan.

4.2.2 Screening Criteria

Screening criteria proposed for contact water samples is presented in Table 4.**Error! Reference source not found.**. Contact water sample results from the laboratory analyses described above will be screened against a value that is 75% of the maximum authorized monthly mean concentration for parameters included in Schedule 4 of the MDMER. In addition to the screening criteria presented in Table 4.2, effluent samples from each final FDP will be tested for acute lethality in accordance with the MDMER.

Table 4.2 Proposed Screening Criteria

Parameter (units)	Screening Criteria
TSS (mg/L)	11.25
Un-ionized ammonia as N (mg/L)	0.375
CN(T) (µg/L)	375
As (µg/L)	50
Cu (µg/L)	75
Pb (µg/L)	60
Nickel (µg/L)	187
Zn (µg/L)	300
Radium 226 (Bq/L)	0.278

5.0 ADAPTIVE MANAGEMENT

Marathon will use an adaptive management framework that allows for adjustment of mitigation measures and management actions in response to monitoring results. The adaptive management framework establishes a process to evaluate monitoring outcomes relative to desired goals for specific mitigation measures as well as broader Project effects.

The premise of adaptive management is to use a cycle of planning, implementation, monitoring, and analysis / learning to systematically determine whether mitigation measures are effective relative to the goals and objectives, while allowing for adjustments to mitigation when monitoring results indicate that the goals and objectives are not being achieved.

The adaptive management framework includes the basic elements functioning together as a feedback system. This framework is inherently linked to each mitigation or management measure, and broadly to each monitoring objective. The basic elements are illustrated in Figure 5-1 and summarized as follows:

- Plan: states the goal, which is supported by targets and performance indicators and presents current actions for ARD/ML management.
- Monitor: seeks to collect data/information on the performance indicators and to report on standard or additional action in respect of the targets/triggers.
- Is adaptive management triggered? This is a logical element defining whether additional mitigation action(s) is needed to meet the performance targets/indicators or that the current material management plan is working.
- Select and evaluate mitigation options: This element corresponds to the evaluation of the effectiveness of a mitigation action in terms of meeting the target. Typically, mitigation measures that meet the target will result in no change to the Plan; whereas mitigation measures that do not meet the

target will be reviewed in detail to identify the root cause of the deficiency and to identify adaptations needed to meet the target. This element can include consultation and engagement with regulators regarding monitoring results and proposed corrective actions

- Implement mitigation: the 'doing' of specific actions, such as implementing one or more mitigation measures. This element circles back to the ‘Monitor’ element as part of understanding whether the corrective actions are effective in achieving the stated goal.

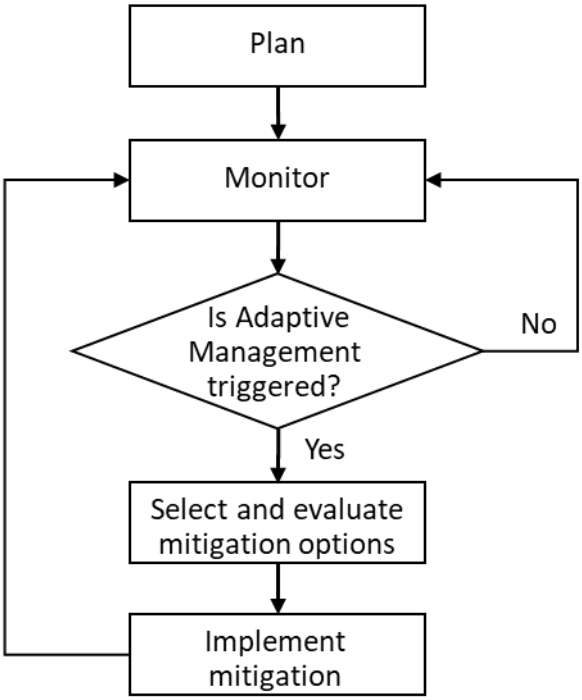

Figure 5-1 Adaptive Management Flow Diagram

Adaptive management will be key to the effective integration of new information acquired through the construction, operation, and closure phases of the Project into the ARD/ML Management Plan. The adaptive management actions will be triggered if planned management activities for the prevention of ARD/ML are not effective. The triggers will include:

- Percentages of PAG materials actually produced does not allow for planned ARD management proposed in Section 4.1.4 (e.g., potential for development of ARD in an LGO stockpile).
- Contact water quality screening criteria at discharge points are exceeded by values in monitoring results during a consecutive number of sampling events (e.g., 3 measurements in a row).

The potential adaptive mitigation options for specific mine components/materials are outlined in separate sections below.

5.1.1 Overburden

As described in Section 4.1.4.1, most of overburden from the Leprechaun and Marathon deposits is classified as non-PAG with 9% and 3% of samples classifying as uncertain, respectively. If these uncertain overburden materials are identified as PAG materials through additional testing (as described in Section 4), the PAG overburden will be segregated from non-PAG overburden that will be stockpiled for rehabilitation and encapsulated in the waste rock pile in accordance with the management protocols for PAG waste rock. If additional overburden materials are identified as PAG through further testing, as most overburden will be stripped in the first five years of mining, waste rock piles are expected to be able to accommodate this additional PAG overburden, particularly within the Leprechaun waste rock pile. In the unlikely event that the waste rock pile do not have capacity to accommodate the additional PAG material, the excess will be segregated and stored in the footprint of the overburden stockpile and moved to the open pits at the closure.

If testing of contact water discharge quality from overburden stockpile exceeds trigger levels identified in Section 4.2, the adaptive management protocol will be implemented to address the drainage water quality issue.

Any reduction in the volume of overburden available for progressive and final rehabilitation will need to be reviewed and adaptive management applied with respect to the materials required for rehabilitation. These potential issues will be considered within the relevant documents listed in Section 1.4.

5.1.2 Construction Rock

The amount of waste rock needed for use as construction materials is small compared to the total volume of waste rock generated from the open pits. The predicted volume of PAG material within waste rock is also relatively low, 9% and 1% from the Marathon and Leprechaun pits, respectively. Even if the amount of PAG waste rock expected from the pits increased significantly, the risk is low that a change in the amount of PAG waste rock would affect the availability of non-PAG rock for construction. The only adaptive management considered to maintain the required supply of non-PAG rock during construction (or during periodic TMF dam raises) may be selective/targeted excavation of non-PAG materials if the scheduled requirements for construction rock do not align with the mine plan (to be determined in part via the ARD block model).

5.1.3 Waste Rock

In consideration of the risk that additional test work (pre-development and confirmatory) determines that PAG waste rock will require additional management beyond that described in Section 4.1.4.3, an estimate of the maximum percentage of PAG waste rock that could be theoretically managed by blending has been completed. The estimate considered factors that limit neutralization of net potential acidity from PAG rock by an excess of NP from non-PAG rock for the Marathon pit, as follows:

- Non-PAG (NPR>2) waste rock has an average Net Neutralization Potential (NNP=NP-AP) of 94.2 kg $CaCO_3$/t, while average NNP of PAG rock (NPR<1) is -24.2 kg $CaCO_3$/t. In order to keep NPR of the PAG/Non-PAG mixture above 2, the excess of NP per tonne of Non-PAG rock should be twice that of AP excess in PAG rock. This condition results in 1.9 tonnes of PAG LGO per tonne of Non-PAG LGO (94.2/(24.2×2)=1.94 or ~ 1.9) based on ABA.
- Kinetic availability of NP was evaluated by comparing the average alkalinity production rate from the last month of humidity cells that contain major rock types from Marathon pit (M QE-POR, M AQPOR and M CG) with the acidity production rate from last month from the carbonate depleted cell with Marathon LGO (M-LGO CNP DPL, Appendix B), which is conservatively used as a surrogate for PAG rock after ARD onset. The average alkalinity production rate from non-PAG rock (10.6 mg $CaCO_3$ /kg/week) is over 2.5 times the average acidity production rate (4 mg $CaCO_3$/kg/week).
- Static tests provide the lowest ratio of non-PAG:PAG materials (1.9:1) of the two test metrics (ratios) indicating that excess of NP in non-PAG LGO is a limiting factor for ARD prevention.
- Using the lowest ratio (1.9:1), a conservative estimate is that the mixture/blend of waste rock within the pile could be up to 66% PAG waste rock while still maintaining neutral conditions.
- The risk that the waste rock production profile will be 66% PAG rock is low based on current estimates for total waste rock volume, with a slightly increased risk in the last years of mining due to mineralized porphyry units at the bottom of Marathon pit.

Similar calculations could be done for Leprechaun waste, but there is only one PAG sample (NPR<1) from Leprechaun waste rock and no data on acidity production rates. As a result, the estimated limit of 66% PAG rock mixture/blend for the Marathon waste rock pile (above) can be conservatively applied to Leprechaun waste rock pile.

Estimated limits for PAG rock management for both deposits will be refined as more data are accumulated. These limits will be considered with the mine plan to determine if additional mitigation is required to manage PAG rock within the waste rock piles.

If waste rock deposition planning indicates that excess PAG materials are generated that cannot be adequately accommodated through encapsulation/blending within the waste rock pile, or in exhausted areas of the pit due to spatial or safety limitations in the final year or two of mining, options to store these materials in temporary locations nearby the pit (waste rock pile or available / expanded stockpile areas will be evaluated. Noting the quantity of waste rock generated in the later years of mining operations are significantly reduced, regardless of where the excess PAG waste rock is stored, the preferred closure option is to return the waste to the pit to be permanently submerged. However, alternative closure scenarios may be considered (such as engineered covers) as the closure plan is finalized and reviewed (internally and by regulators) prior to mine closure.

If testing of contact water quality from the waste rock piles exceeds trigger levels identified in Section 4.2, additional sampling, testing and assessment of the source will be required and further mitigation and management measures may be required, such as segregation of problematic rock or water flow, engineered covers, water treatment and other options will be evaluated.

5.1.4 Low Grade Ore

In consideration of the risk that additional test work (pre-development and confirmatory) indicates that the percentage of PAG LGO could create management challenges within the LGO stockpiles, an estimate of the maximum percentage of PAG LGO that could be theoretically managed has been completed. The estimate considered factors that limit neutralization of net potential acidity from PAG rock by an excess of NP from non-PAG rock that originates from the Marathon pit, as follows:

- Non-PAG (NPR>2) LGO has an average NNP (NNP=NP-AP) of 30 kg $CaCO_3$/t, while the average NNP of PAG LGO (NPR<1) is -10 kg $CaCO_3$/t. In order to keep NPR of the PAG/Non-PAG mixture above 2, the excess NP (30 kg $CaCO_3$/t) from Non-PAG LGO should be double the excess of AP (10 kg $CaCO_3$/t) from PAG LGO. This translates to a requirement of 1.5 tonnes of PAG LGO per tonne of non-PAG LGO based on static testing.
- The alkalinity production rate from Marathon's LGO humidity cell during the last month of HCT operation (22 mg $CaCO_3$/kg/week, M-LGO Met) under neutral pH conditions is 5.5 times greater than the average acidity production rate (4 mg $CaCO_3$/kg/week) from the carbonate depleted cell during the last month of HCT operation, which simulates acidic conditions in random pockets of the Marathon's LGO stockpile (M-LGO CNP DPL, Appendix B).
- Static tests provide the lowest ratio of non-PAG:PAG materials (1.5:1) of the two test metrics indicating that the excess of NP in non-PAG LGO is a limiting factor for ARD prevention.
- The ratio (1.5:1) indicates that the mixture/blend in the Marathon LGO stockpile can contain up to 60% PAG material during a rolling 2.8 year period (i.e., the minimum ARD onset time from humidity cell tests) to maintain neutral drainage.

Similar analysis is conducted for the LGO stockpile at the Leprechaun site:

- The one PAG sample in LGO from the Leprechaun pit has an NNP of -17 kg $CaCO_3$/t, and the average NNP (NNP=NP-AP) of non-PAG LGO is 67 kg $CaCO_3$/t. In order to keep NPR of the PAG/Non-PAG mixture above 2, the excess NP (67 kg $CaCO_3$/t) from Non-PAG LGO should be twice the excess of AP (17 kg $CaCO_3$/t). This condition results in 2 tonnes of PAG LGO per tonne of Non-PAG LGO based on static testing.
- No acidity was generated in any kinetic tests of samples from the Leprechaun deposit. Therefore, the estimates are based on static tests only and minimum ARD onset time for the PAG LGO from Leprechaun is assumed to be similar to that calculated for PAG LGO from the Marathon pit.
- The ratio obtained from the static test results (2:1) indicates that the mixture/blend of LGO can contain up to 66.7% PAG material within the Leprechaun LGO stockpile within a rolling 2.8 year period to maintain neutral drainage.

Estimated limits for PAG LGO management for both deposits will be refined as more data is accumulated. The calculated limits will be considered with the mine plans and ARD block model for the Marathon pit to determine if additional mitigation is required to manage PAG LGO rock within the stockpiles. Water quality modeling from the EIS and later sensitivity analyses indicate that the effluents from LGO stockpiles will

comply with MDMER limits and water treatment is not required. In the case that additional pre-construction modeling indicates need for the water treatment, the current mine plan segregates these effluents from other mine component flow streams in the overall mine design to facilitate collection and further water treatment, if required. Also, if excess PAG LGO (above 60% for Marathon and 66.6% for Leprechaun within a rolling 2.8 year period) is generated, the material will be moved to the HGO stockpile or an adjacent area where contingency mitigation for ARD/ML from HGO will be applied (see Section 5.1.5). In the event of early closure or other circumstances that result in unprocessed LGO, material remaining in the stockpiles will be moved back to the pit or covered (engineered cover) to reduce the risk of ARD/ML generation.

5.1.5 High Grade Ore

Water quality modeling from the EIS indicates that the effluents from the HGO stockpile will comply with the MDMER and specific water treatment is not required. In case there is development of ARD/ML from the HGO stockpile, drainage flows to the TMF pond and is managed as part of process plant / TMF water cycle as described in section 5.1.6 during 5-6 year lifespan of the stockpile. In the event of circumstances that result in unprocessed HGO, material remaining in the stockpile will be submerged (in the pit or TMF pond) or will be covered (engineered cover) to minimize the risk of ARD/ML generation.

5.1.6 Tailings

Risk of ARD/ML generation from tailings is low because of short exposure times due to continued tailings deposition in the TMF during Year 1 to Year 9/10 and rapid submergence of tailings deposited in the Leprechaun pit after Year 9/10. The treatment of discharge from the TMF is included in the project design because water and seepage is conservatively predicted to exceed the MDMER limits for CN(T), un-ionized ammonia, and Cu (see Section 4.1.4.6). In the unlikely event ARD/ML develops in the TMF during operations, the effluent will be treated prior to discharge until Year 9/10 or discharged to Leprechaun pit afterwards until rehabilitation is complete.

If PAG samples are identified during confirmatory sampling of tailings beaches, additional measures will be assessed to reduce the risk of ARD/ML generation at closure. These measures may include, adding NP to areas with PAG tailings (e.g., liming), excavation and relocation of unsaturated PAG tailings to the Leprechaun or Marathon pit and/or (semi-) passive water treatment until TMF effluent(s) comply with MDMER (refer to response to DIET-05 in Appendix A for further details).

5.1.7 Open Pits

If testing of contact water quality from the pits exceeds trigger levels identified in Section 4.2, additional sampling, testing and assessment of the source will be completed. Further mitigation and management measures may be required, such as changes in blasting (in case of nitrogen leaching from undetonated explosives), pit water treatment (e.g., liming), and other options will be evaluated.

During closure, natural development of permanently stratified pit lakes is expected with more concentrated contact water entering the pit at the beginning of pit flooding and cleaner water entering the pit near the end of rehabilitation. If natural stratification does not occur and discharges from pit lakes are predicted to exceed screening criteria because of ARD/ML, such mitigation measures as directing contaminant flows at depth, induced stratification, and/or in-pit treatment will be evaluated. Successful examples of full scale in-pit treatments of acidity, metals, and cyanide species with or without stratification are shown in Chapman et al. (2008), Fisher and Lawrence (2006), Flite and Duckett (2012), Kalin et al. (2000), Pieters et al. (2014), Poling et al. (2003).

6.0 REPORTING

TO BE DEVELOPED: Reporting procedures and documents associated with the ARD/ML Management Plan will be developed to comply with the conditions of release from the provincial and federal environmental assessment processes and permitting requirements (e.g., annual reports required to be submitted to the NLDIET, Mineral Development Division).

7.0 PLAN REVISION

This ARD/ML Management Plan is a living document and will be reviewed and updated by a Qualified Professional as follows:

- Annually at a minimum
- Following changes in the mine plan that may have an effect on ARD/ML prediction
- As required, based on additional laboratory and/or field data that could potentially change the ARD/ML predictions or management protocols provided in this Plan.
- Results of monitoring programs that require a change or adaptation of the management approach(es) described in this document.

Updates or proposed changes to the ARD/ML Management Plan will be submitted to the applicable regulatory authorities for approval.

All ARD/ML Management Plan holders may initiate revisions by forwarding proposed revisions to the Environment Manager, Environmental Superintendent and/or Environmental Coordinator. The following information will be provided on the Revision Request Form for all revision requests:

a) section to be revised

b) nature of the revision

c) rationale for the revision (e.g., environment/worker safety)

d) name of the revision requestor

Approval for revisions will be required from Marathon. When the Environment Manager approves a revision request, details of the revision will be distributed to all ARD/ML Management Plan holders and will be documented in the Revision History Log. Each revision will be accompanied by:

a) revision instructions

b) list of sections being superseded

c) an updated Table of Contents indicating the status of each section in the ARD/ML Management Plan

When ARD/ML Management Plan holders receive a revision, they will, in a timely manner:

a) read the text of the revision

b) check the control sheet to confirm that all the listed pages have been received

c) remove and destroy the superseded pages from their copy of the ARD/ML Management Plan

d) insert the revised pages in the proper place in their copy of the ARD/ML Management Plan

e) page check the ARD/ML Management Plan, using the updated table of contents to confirm the ARD/ML Management Plan is complete and current

f) enter the revision number and date entered on the Revision History Log

g) incorporate the revision into the area of responsibility, as applicable

h) confirm that personnel in their purview are informed of and familiar with the revisions

8.0 REFERENCES

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Stantec Consulting Ltd. (Stantec). 2018. Preliminary Results of Phase I ARD/ML Assessment. Final report prepared for Marathon Gold Corp. on 23 March 2018. (Also submitted as Baseline Study Appendix 5, Attachment 5-A of the EIS).

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APPENDIX A

Compiled Responses to Federal and Provincial Information Requirements related to ARD/ML

This attachment is a compilation of information requirements (IRs) related to acid rock drainage / metal leaching including:

- Federal Round 1 IRs (IR18 – IR25) and associated appendices
- The information requested from NRCan on June 10, 2021 sent separately in an email
- Federal Round 2 IRs (IR(2)-18, IR (2)-19, IR(2)-21, IR(2)-23, IR(2)-26) and associated appendices
- Provincial Round 1 IRs (DIET 05-12, ECC-07, ECCM-24, PC-73-75) and associated appendices

Valentine Gold Project: Federal Information Requirements

Information Request IR-08 to IR-26

Marathon Gold Corporation
36 Lombard Street, Suite 600
Toronto, ON M5C 2X3

April 14, 2021

RESPONSE TO IR-18

ID:	**IR-18**
Expert Department or Group:	NRCan-13
Guideline Reference:	Section 7.1.2
EIS Reference:	Baseline Study Appendix 5 Attachment 5-B Section 3.1.1, 4.1.1, and 4.3.1 and Appendix A
Context and Rationale:	The EIS Guidelines require the proponent to complete a geochemical characterization of waste rock, ore, low grade ore, and overburden in order to predict metal leaching and acid rock drainage. It also refers the proponent to the MEND (2009). Geochemical samples collected from ore, low grade ore, and waste rock were presented on two plan views (ESI - Appendix A Figures A.4 and A.7) and four cross sections (EIS - Appendix A Figures A.5, A.6, A.8, A.9). These figures do not meet the guidance provided in MEND (2009), and do not adequately present the spatial distribution of all ore, low grade ore, and waste rock samples collected as part of this study. The mine rock sample interval length ranged from 1.0-1.5 m, which is shorter than that recommended in the MEND (2009) guidance document. Additionally, short sample intervals can be skewed by potential mineralogical heterogeneity across a geological unit and thus may not be representative of the overall composition of the geological unit. MEND (2009) provides a recommended minimum sampling frequency per waste rock lithology, where the final sample number must be determined based on site- specific conditions, study objectives, and the overall tonnage of each lithology to be mined. Tonnage estimates by waste rock lithology were not provided in baseline study appendix (BSA)-5 to demonstrate that the number of samples collected per lithology are sufficient for each of the main waste rock lithologies to be mined. The approximate proportions of some waste rock lithologies are stated in BSA-5; however, this does not reflect the overall tonnage of material.
Information Request:	a. Provide images (e.g., cross sections or block model images) that show the location of all ore, low grade ore, and waste rock samples from both Leprechaun and Marathon deposits. Also, provide maps of overburden sample locations from both deposits. b. Describe sample heterogeneity with respect to mineralogy and sample observations in the field to justify the short sample interval utilized in this study. Include an evaluation of exploration assay data to support this discussion. c. Provide tonnage estimates for each waste rock, low grade ore, and ore lithology from both the Leprechaun and Marathon deposits, and

ID:	IR-18
	quantitative justification for the number of samples collected to date. Include a plan to address data gaps.
Response:	a. Based on recent consultation with NRCan, it is understood that NRCan is requesting all samples be shown on cross-sections. In response, updated maps and cross-sections showing all samples are provided in Appendix IR-18.A. As well, overburden sample locations are provided on Figure IR-18.1. b. The approach taken in Marathon's geochemical characterization program is based on the geological interpretation and understanding of the gold mineralization and distribution / association of sulphide minerals specific to the deposits. Based on the mineralization characteristics at the Valentine Gold Project, the one-meter sample interval is considered appropriate for evaluating the variability in geochemistry and mineralogy of materials and capturing appropriately the natural variability in distribution of Acid Rock Drainage/Metal Leaching (ARD/ML) properties of the mine rock. An example of the selection table for drill hole MA-18-281 is shown in Table IR-18.1. The gold content is different in the sampled intervals (i.e., 84-85, 142-143, 203-204, 286-287, 362-363) as compared to the adjacent 1 m; this indicates variability in mineralization of the deposit. Longer sample intervals or compositing samples will mask the variability in material properties as indicated on page 8-9 of Mine Environment Neutral Drainage (MEND) Manual (2009). c. The tonnage estimates and number of samples tested are provided in Tables IR-18.2 and IR-18.3 for each lithology identified within the geologic block model. Some lithologies, such as mafic dykes and varieties of quartz porphyry are narrow and are therefore not represented in the block model based on the block sizes; these have been lumped in with larger geologic units containing these lithologies in models for both deposits. Additional sampling and testing of units with low mineralization is required, such as the gabbro and metasediments, which were not as well covered by exploration drill programs targeting gold anomalies. Overall, gold mineralization correlates with sulphide content indicating that undersampled lithological units are likely to have lower ARD/ML potential. Therefore, additional sampling and testing of these units is expected to result in an increase in the estimated tonnage of non-potentially acid generating rock. The additional sampling and testing targets, according to MEND (2009) are presented in Tables IR-18.2 and IR-18.3.

ID:	**IR-18**
	Reference: Mine Environment Neutral Drainage Program (MEND). 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, MEND Report 1.20.1, p. 1-579.
Appendix:	Appendix IR-18.A

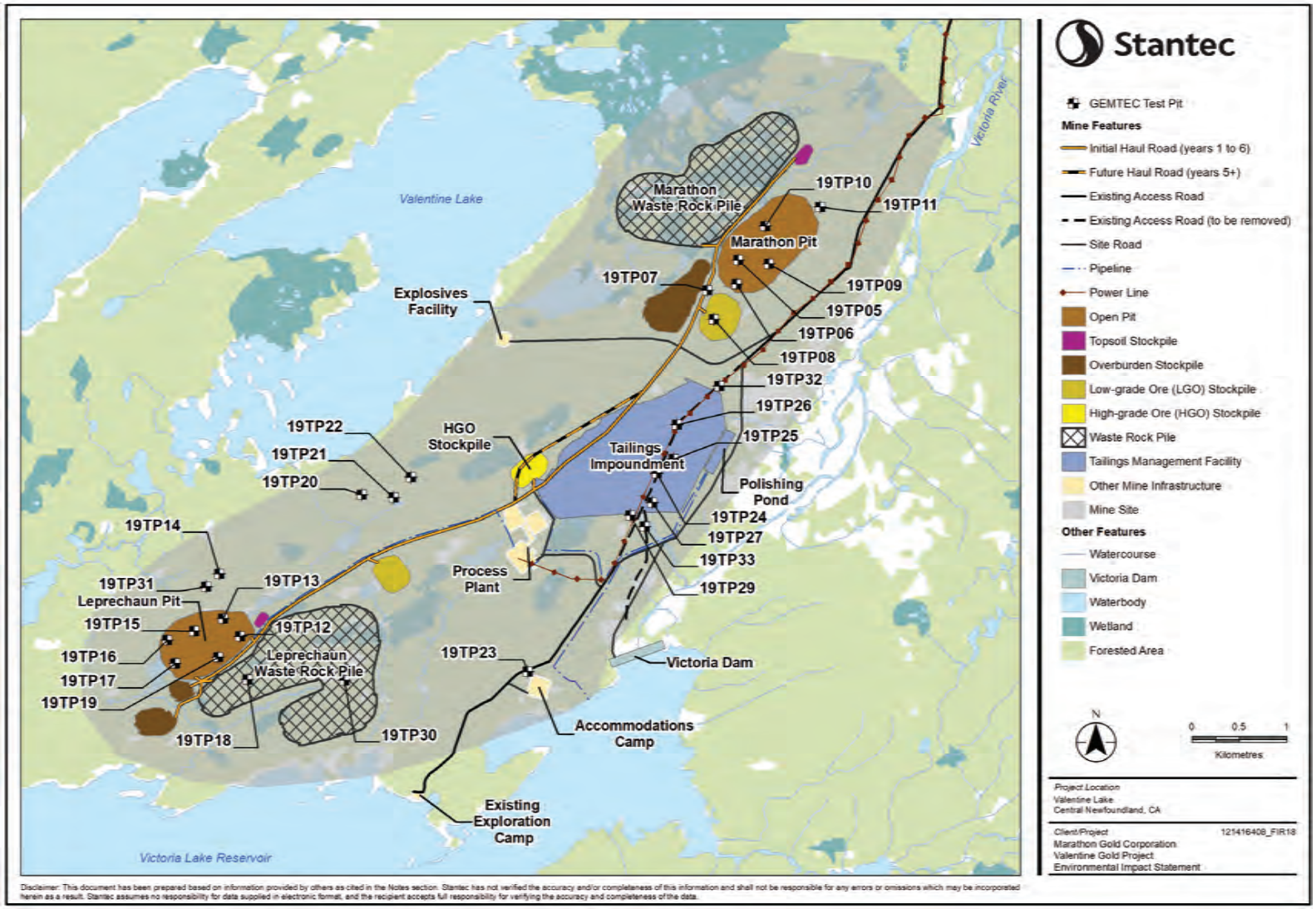

Figure IR-18.1 Overburden Sample Locations

Table IR-18.1 Logs and Assays of MA-18-281 Drill Hole used for Sample Selection.

Hole_ID	From_m	To_m	Au g/t	Lithology
MA-18-281	2.89	4		Conglomerate
MA-18-281	6	7		Conglomerate
MA-18-281	7	9	0.005	Mafic Dike
MA-18-281	9	11	0.005	Qtz-eye Porphyry
MA-18-281	11	13	0.009	Qtz-eye Porphyry
MA-18-281	13	15	0.015	Qtz-eye Porphyry
MA-18-281	15	17	0.005	Qtz-eye Porphyry
MA-18-281	17	19	0.022	Qtz-eye Porphyry
MA-18-281	19	21	0.060	Qtz-eye Porphyry
MA-18-281	21	23	0.011	Mafic Dike
MA-18-281	25	27	0.005	Aphanitic Qtz Porphyry
MA-18-281	27	29	0.005	Aphanitic Qtz Porphyry
MA-18-281	29	30	0.023	Aphanitic Qtz Porphyry
MA-18-281	30	31		Aphanitic Qtz Porphyry
MA-18-281	31	33	0.005	Qtz-eye Porphyry
MA-18-281	49	50	0.010	QZ - Qtz-eye Porphyry + QTP
MA-18-281	52	53	0.005	Qtz-eye Porphyry
MA-18-281	53	54	0.005	Qtz-eye Porphyry
MA-18-281	54	56	0.005	Qtz-eye Porphyry
MA-18-281	56	58	1.027	Qtz-eye Porphyry
MA-18-281	58	60	0.023	Qtz-eye Porphyry
MA-18-281	60	61	0.005	Qtz-eye Porphyry
MA-18-281	61	62	0.005	Qtz-eye Porphyry
MA-18-281	62	64	0.005	Qtz-eye Porphyry
MA-18-281	64	66	1.141	Aphanitic Qtz Porphyry
MA-18-281	68	70	0.005	Qtz-eye Porphyry
MA-18-281	82	83	0.016	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	83	84	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	84	85	0.123	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	85	86	0.341	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	86	87	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	87	88	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	88	89	0.135	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	89	90	0.083	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	90	91	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	91	92	0.005	Qtz-eye Porphyry
MA-18-281	94	96	0.005	Aphanitic Qtz Porphyry
MA-18-281	102	104	0.005	Qtz-eye Porphyry
MA-18-281	122	124	0.005	Aphanitic Qtz Porphyry
MA-18-281	134	136	0.012	Qtz-eye Porphyry
MA-18-281	136	138	0.069	Qtz-eye Porphyry
MA-18-281	138	139	0.201	Qtz-eye Porphyry
MA-18-281	139	140	1.091	Qtz-eye Porphyry
MA-18-281	140	141	0.526	Qtz-eye Porphyry
MA-18-281	141	142	2.028	Qtz-eye Porphyry
MA-18-281	142	143	0.504	Qtz-eye Porphyry
MA-18-281	143	145	0.724	Qtz-eye Porphyry
MA-18-281	145	147	0.015	Aphanitic Qtz Porphyry
MA-18-281	155	157	0.005	Qtz-eye Porphyry
MA-18-281	170	172	0.005	Aphanitic Qtz Porphyry

Note: Intervals highlighted in grey were selected for ARD/ML Testing Program

Table IR-18.1 Logs and Assays of MA-18-281 Drill Hole used for Sample Selection.

Hole_ID	From_m	To_m	Au g/t	Lithology
MA-18-281	172	173	0.005	Aphanitic Qtz Porphyry
MA-18-281	173	174	0.005	Aphanitic Qtz Porphyry
MA-18-281	174	176	0.005	Aphanitic Qtz Porphyry
MA-18-281	176	177	0.005	Aphanitic Qtz Porphyry
MA-18-281	177	178	0.005	Aphanitic Qtz Porphyry
MA-18-281	178	179	0.005	Qtz-eye Porphyry
MA-18-281	191	193	0.005	Aphanitic Qtz Porphyry
MA-18-281	197	199	0.005	Qtz-eye Porphyry
MA-18-281	200	201	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	201	202	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	202	203	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	203	204	0.019	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	204	205	0.014	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	205	206	0.019	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	206	207	0.039	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	207	208	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	208	209	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	209	210	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	210	211	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	211	212	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	212	213	0.005	Qtz-eye Porphyry
MA-18-281	218	220	0.005	Aphanitic Qtz Porphyry
MA-18-281	228	230	0.011	Qtz-eye Porphyry
MA-18-281	230	232	0.005	Qtz-eye Porphyry
MA-18-281	232	233	0.005	Qtz-eye Porphyry
MA-18-281	233	235		Qtz-eye Porphyry
MA-18-281	234	236	0.005	Qtz-eye Porphyry
MA-18-281	236	238	0.005	Qtz-eye Porphyry
MA-18-281	238	240	0.005	Qtz-eye Porphyry
MA-18-281	240	242	0.005	Qtz-eye Porphyry
MA-18-281	242	244	0.005	Qtz-eye Porphyry
MA-18-281	244	246	0.016	Qtz-eye Porphyry
MA-18-281	246	248	0.005	Qtz-eye Porphyry
MA-18-281	248	250	0.012	Qtz-eye Porphyry
MA-18-281	250	252	0.005	Qtz-eye Porphyry
MA-18-281	252	254	0.005	Qtz-eye Porphyry
MA-18-281	254	256	0.005	Qtz-eye Porphyry
MA-18-281	256	258	0.005	Aphanitic Qtz Porphyry
MA-18-281	262	264	0.005	Qtz-eye Porphyry
MA-18-281	282	284	0.005	Mafic Dike
MA-18-281	284	286	0.005	Mafic Dike
MA-18-281	286	287	0.012	Mafic Dike
MA-18-281	287	288	0.012	Mafic Dike
MA-18-281	288	290	0.005	Mafic Dike
MA-18-281	290	292	0.005	Mafic Dike
MA-18-281	292	294	0.005	Mafic Dike
MA-18-281	294	296	0.005	Mafic Dike
MA-18-281	296	298	0.005	Mafic Dike
MA-18-281	298	300	0.005	Mafic Dike
MA-18-281	300	302	0.005	Mafic Dike
MA-18-281	302	304	0.005	Mafic Dike
MA-18-281	304	306	0.005	Aphanitic Qtz Porphyry

Note: Intervals highlighted in grey were selected for ARD/ML Testing Program

Table IR-18.1 Logs and Assays of MA-18-281 Drill Hole used for Sample Selection.

Hole_ID	From_m	To_m	Au g/t	Lithology
MA-18-281	318	320	0.005	Qtz-eye Porphyry
MA-18-281	324	326	0.005	Mafic Dike
MA-18-281	342	344	0.007	Qtz-eye Porphyry
MA-18-281	344	346	0.007	Qtz-eye Porphyry
MA-18-281	346	348	0.008	Qtz-eye Porphyry
MA-18-281	348	350	0.007	Qtz-eye Porphyry
MA-18-281	350	352	0.026	Qtz-eye Porphyry
MA-18-281	352	354	0.050	Qtz-eye Porphyry
MA-18-281	354	356	0.009	Qtz-eye Porphyry
MA-18-281	356	357	0.005	Qtz-eye Porphyry
MA-18-281	357	358	0.005	Qtz-eye Porphyry
MA-18-281	358	359	0.060	Qtz-eye Porphyry
MA-18-281	359	360	0.005	Qtz-eye Porphyry
MA-18-281	360	361	0.005	Qtz-eye Porphyry
MA-18-281	361	362	0.006	Qtz-eye Porphyry
MA-18-281	362	363	0.014	Qtz-eye Porphyry
MA-18-281	363	364	0.019	Qtz-eye Porphyry
MA-18-281	364	365	0.007	Qtz-eye Porphyry
MA-18-281	365	367	0.005	Qtz-eye Porphyry
MA-18-281	367	369	0.005	Qtz-eye Porphyry
MA-18-281	369	371	0.005	Qtz-eye Porphyry
MA-18-281	371	373	0.005	Qtz-eye Porphyry
MA-18-281	373	375	0.007	Qtz-eye Porphyry
MA-18-281	375	377	0.005	Qtz-eye Porphyry
MA-18-281	377	379	0.005	Qtz-eye Porphyry
MA-18-281	379	381	0.005	Qtz-eye Porphyry
MA-18-281	381	383	0.005	Qtz-eye Porphyry
MA-18-281	383	385	0.005	Qtz-eye Porphyry
MA-18-281	385	387	1.229	Qtz-eye Porphyry
MA-18-281	387	388	0.038	QZ - Qtz-eye Porphyry + QTP
MA-18-281	395	396	0.309	Qtz-eye Porphyry
MA-18-281	402	403	0.088	QZ - Qtz-eye Porphyry + QTP
MA-18-281	408	409	1.200	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	409	410	0.026	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	410	411	5.069	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	411	412	0.007	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	412	413	0.219	QZ - Qtz-eye Porphyry + QTP
MA-18-281	413	414	0.107	QZ - Qtz-eye Porphyry + QTP
MA-18-281	414	415	0.251	QZ - Qtz-eye Porphyry + QTP
MA-18-281	415	416	0.196	QZ - Qtz-eye Porphyry + QTP
MA-18-281	416	417	2.454	QZ - Qtz-eye Porphyry + QTP
MA-18-281	417	418	0.584	QZ - Qtz-eye Porphyry + QTP
MA-18-281	418	419	0.114	QZ - Qtz-eye Porphyry + QTP
MA-18-278	10.51	12	0.005	Qtz-eye Porphyry

Note: Intervals highlighted in grey were selected for ARD/ML Testing Program

Table IR-18.2 Tonnages of lithological units from geological block model and numbers of samples per unit for the Marathon Deposit

Block Model Lithology	Material type	Tonnage, Mt	# of samples tested to date	Suggested initial frequency per Table 8-2, MEND 2009	# of additional of samples to be tested per Table 8-2 MEND 2009
Metasediments	Waste Rock	30.3	9	80	71
Gabbro	Waste Rock	8.0	4	26	22
QEPOR	Waste Rock	106.7	125	80	0
High Grade Ore	Ore	14.6	28	80	52
Low Grade Ore	Ore	11.1	15	80	65
Overburden	Waste	7.5	14	26	12

Table IR-18.3 Tonnages of lithological units from geological block model and numbers of samples per unit for the Leprechaun Deposit

Block Model Lithology	Material type	Tonnage, Mt	# of samples tested to date	Suggested initial frequency per Table 8-2, MEND 2009	# of additional of samples to be tested per Table 8-2 MEND 2009
Metasediments	Waste Rock	33	21	80	59
Trondhjemite	Waste Rock	105	93	80	0
High Grade Ore	Ore	8.6	24	26	2
Low Grade Ore	Ore	6.7	13	26	13
Overburden	Waste	3.8	6	26	20

RESPONSE TO IR-19

ID:	**IR-19**
Expert Department or Group:	NRCan-14 MFN-08 ECCC-24
Guideline Reference:	Section 7.2.2
EIS Reference:	Baseline Study Appendix 5 Attachment 5-A and 5- B
Context and Rationale:	The EIS Guidelines require the proponent to complete a geochemical characterization of potential construction material in order to predict acid rock drainage and metal leaching (ARD/ML). A geochemical characterization study must be completed for all construction materials to evaluate their suitability related to ARD/ML. The potential use of waste rock, overburden, and/or quarry material was not discussed in BSA-5, nor was the suitability of waste rock and overburden materials for construction use. Section 6.3.5.3 of the EIS states that the overburden at the Leprechaun and Marathon pits has the potential to leach a number of parameters including aluminum, arsenic, cadmium, copper, fluoride, iron, manganese, lead, selenium and zinc. It goes on to state that the waste rock pile will be covered by growth medium / overburden during rehabilitation, further reducing the risk of acid rock drainage and metals leaching. Table 6.4 in Section 6.4 of the EIS states that progressive rehabilitation will be implemented involving placement of a soil cover and vegetation. However, it is not explained how this will improve conditions at the site if overburden which is leaching metals is used. Section 6.3.5.4 of the EIS states that groundwater mass loadings were calculated based on the geochemical source terms for the ore stockpiles, waste rock piles, and tailings management facility seepage; however, groundwater mass loadings were not calculated for overburden. Section 6.3.5.3 of the EIS states that investigations of acid rock drainage and metals leachate will continue and will include field and laboratory kinetic testing and additional sampling to develop an ARD model. Section 6.0 of BSA 5A states that “Tailings from Leprechaun deposits, are expected to be non-PAG and have excess of NP. This excess of NP can be used to offset ARD potential of tailings from Marathon if ores from Marathon and Leprechaun deposit are processed at the same time and mixed. Therefore, the mixed tailings are not expected to show ARD potential, unless Marathon ore is processed separately from Leprechaun ore and resulting solids are left exposed after the closure. Section 5.2.2 of BSA 5A states that “approximately 14% of the waste rock from the Marathon pit is conservatively estimated to be PAG. Blending PAG and non-PAG rock with excess of neutralization potential and/or encapsulation of PAG waste by non-PAG rock is recommended to neutralize acidity potentially generated in PAG pockets.”

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Information Request:	a. Provide a geochemical characterization of the ARD/ML potential of all materials planned to be used for construction purposes. Include quarries, if applicable. b. Explain how covering the waste rock pile with overburden that is leaching up to ten metals parameters would result in a reduction of metals leaching when covering waste rock. c. Clarify if overburden which is metals leaching will be used for the soil cover. Update the effects analysis and mitigation measures, as appropriate, if overburden leaching metals is proposed to be used on site. d. Given that multiple metals parameters have the potential to leach from overburden, provide a groundwater mass loading for overburden stockpiles or provide a rationale why the overburden was excluded from this analysis. e. Update the analysis of the acid rock drainage and metals leachate investigations if more recent data is available. f. With regard to plans to manage ARD for this project, confirm that mitigation measures (e.g., blending to maintain Neutralization Potential Ratios) to avoid ARD generation will be employed when waste rock is used in onsite infrastructure (e.g., road beds).
Response:	a. It is currently planned that nearly all earthworks construction will utilize waste rock developed from the open pits. All bulk earthworks, including roads, building and stockpile pads, embankments for ditching and water management ponds and dams for the Tailings Management Facility (TMF) will be constructed using waste rock. It is also planned to crush and screen non-potentially acid generating (PAG) waste rock for more detailed earthworks. The waste rock has been characterized as described in Section 5.2 of Valentine Gold Project: Acid Rock Drainage/Metal Leaching (ARD/ML) Assessment Report (BSA-5 in the EIS). This report provided the basis for distinguishing between PAG and non-PAG rock, and further testing will be completed as described in Appendix IR-19.A. Additional testing will be completed during excavation of waste rock materials from the open pits for use in construction, as required to ensure that only non-PAG rock is used. It is expected that a relatively small amount of quarried rock will be required to commence construction, prior to waste rock being available from the open pits, to develop temporary access roads and construction laydown areas. As part of the advancing engineering for the Project, Marathon will be investigating several potential quarry sites that exist within the footprints of future mine infrastructure (e.g., the Leprechuan

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	waste rock pile area) in order to minimize environmental impacts overall. Any potential quarry sources will be sampled and geochemical testing completed as part of this investigation and prior to use in earthworks. Additionally, some overburden (glacial till) materials will be used in small amounts for embankment construction for water management infrastructure. The geochemical characterization of these materials is addressed in part b), below. The only construction material not sourced to date is sand for concrete. The current plan is to source sand from local suppliers who have existing sand quarries; alternatively, non-PAG waste rock will be crushed and screened to provide the sand required. b/c. The overburden is glacial till, which originates from distant locations (based on the glacial history of the site) and was not generated from weathering of Project ore deposits. Covering of the waste rock pile with overburden will reduce advective transport of oxygen to the internal portion of the pile resulting in less sulphide oxidation and metal leaching from the waste rock. The current water quality model includes metal leaching from the overburden cover (Appendix 7A and 7B of the EIS). As a result, the assessment of the effects of metal leaching from overburden has already been considered in the EIS. d. Natural groundwater is already in “dynamic” equilibrium with metals leaching from the vadose zone of overburden with the baseline groundwater chemistry reflecting natural metal leaching from unsaturated overburden into groundwater. This statement is supported by baseline groundwater samples from the overburden showing exceedances of Aluminum, Arsenic, Cadmium, Iron, Manganese, and Zinc, which is similar to the list of metal exceedances observed in Shake Flask Extraction testing of overburden samples (Table C-3 of Appendix 7B and Table B-18 of BSA-5 in the EIS). Based on the concurrence of these observations, the assumption that groundwater quality under overburden will stay similar to baseline conditions is reasonable. Therefore, addition of mass loading from exposed overburden to groundwater is not required. e. Marathon recognizes that further ARD/ML work is required and further assessment and associated refinement of Project mitigation as design of the Project proceeds (refer to Appendix IR-19.A for further information). Specifically, Marathon is committed to completing additional work to address testing gaps identified in the program completed to date, and as noted by NRCan, within the next 6 to 8

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	months and prior to construction. This information is required for final design and permitting under the NL *Mines Act* (NL Department of Industry, Energy, and Technology), and will be shared with NRCan as it becomes available: Specifically, Marathon is committed to completing the following additional work within the indicated timeframes: 1. Continue collection of results from on-going laboratory and field tests in 2021. This work was started in 2020 and will continue until concentrations stabilize. It is expected that updated analysis will be conducted in Q4 of 2021. 2. Additional static testing of samples in Q2 and Q3 of 2021 3. Initiate additional kinetic testing of PAG materials (waste rock, ore and low-grade ore) from major lithologies of the Marathon pit and composite sample of gabbro in Q2 of 2021. f. As described in the response to part a), above, only non-PAG rock will be used in earthworks construction for the Project.
Appendix:	Appendix IR-19.A

RESPONSE TO IR-20

ID:	**IR-20**
Expert Department or Group:	NRCan-15
Guideline Reference:	Section 7.1.2
EIS Reference:	Baseline Study Appendix 5 Attachment 5-B Appendix B and C
Context and Rationale:	The EIS Guidelines require the proponent to complete a geochemical characterization of the expected mine materials in order to predict acid rock drainage and metal leaching (ARD/ML). As indicated in the EIS Guidelines, the MEND (2009) guidance document recommends presenting geochemical test results in tabulates with descriptive statistics, as well as in scatter plots and time series graphs. A complete set of tabulated static test results grouped by lithology and including sample descriptions was not provided for all samples tested. Further, statistics provided in Appendix B Tables of the EIS present results that do not follow basic principles. For example, the Appendix B Tables provide average concentrations that are outside of the minimum and maximum range. Without a complete set of tabulated data, it is not possible to complete the ARD/ML review in terms of evaluating the variability in sample chemistry across each lithology, nor to confirm the validity of the statistical distribution of results. Additionally, a complete set of tabulated kinetic test results for each humidity cell, subaqueous column, and ageing test was not provided in Appendix B, and time series graphs were only provided for select parameters in Appendix C. As such, the long-term evolution and change in leachate quality cannot be evaluated for all parameters.
Information Request:	a. Present updated versions of Appendix Table B-5 and B-17 with the correct statistical calculations recommended in the MEND guidance. b. Provide a complete set of tables for each static test completed for waste rock, low grade ore, and ore by rock type. c. Provide updated statistics in Appendix Tables B-6, B-7, B-18 and B-19 that provide corrected average concentrations and enable the confirmation of the validity of the statistical distribution of results. d. Provide tables and time series graphs for each humidity cell, subaqueous column, and ageing tests for all tested parameters.
Response:	a. Tables B-5, B-17, B-6, B-7, B-18 and B-19 have been reviewed to confirm that the statistical calculations are correct. Average Neutralization Potential Ratio (NPR) values are sometimes outside of the minimum and maximum NPR range for some lithologies because

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	the value of NPR reported as “average” was calculated as the ratio of average Neutralization Potential (NP) and average acid potential (AP), not as the average of individual NPRs. Averaging of ratios would provide misleading results generally showing higher NPR values in this Project. b. An Excel file containing all static tests, which are classified by material (such as rock, ore) and/or lithology, will be provided directly to NRCan. Tables in pdf format containing all static test results for all samples were initially provided in analytical reports compiled in Appendix D of Attachment 5-B of the EIS. c. Please refer to (a) above. d. It is acknowledged that only parameters having an applicable regulatory threshold (*Metal and Diamond Mining Effluent Regulations* limit or/and Canadian Water Quality Guideline for Protection of Freshwater Aquatic Life) were selected for assessment and plotting in Appendix C of Attachment 5-B of the EIS. Sulphate, as an indicator of sulphide oxidation, was also plotted and presented. Time-series graphs are provided in Appendix IR-20.A for constituents with concentrations greater than the detection limit. A complete kinetic database will be provided directly to NRCan in the form of an Excel file for evaluation of leachate quality for all parameters.
Appendix:	Appendix IR-20.A

RESPONSE TO IR-21

ID:	IR-21
Expert Department or Group:	NRCan-16
Guideline Reference:	Section 7.2.2
EIS Reference:	Baseline Study Appendix 5 Attachment 5-B Section 3.1.2, 3.2.2,3.2.3, 4.0, 5.0Chapter 7 Appendix 7A and 7B
Context and Rationale:	The EIS Guidelines require the proponent to evaluate the longer term rates of acid generation and metal leaching, estimates of the potential time to onset of acid rock drainage or metal leaching (ARD/ML), and the quantity and quality of leachate from samples of tailings, waste rock, and ore. These leachate compositions are then used in the water quality model to evaluate the quality of effluent to be released from the site into receiving waters. The EIS Guidelines refer to the MEND (2009) guidance document. The guidance document indicates that samples selected for kinetic testing must be conservatively representative of the lithology they represent, taking into consideration mineralogy, ARD potential, metal/metalloid content, and leaching potential, and documented in the MEND (2009) guidance document. Composite samples were developed to represent low-grade ore, waste rock, and tailings, and were subjected to laboratory static tests, mineralogy, and humidity cell tests to evaluate long-term ARD/ML potential and timing to onset of ARD. A detailed quantitative rationale was not provided to demonstrate that the composite samples are conservatively representative of the overall chemical composition of their respective waste rock lithologies for ARD/ML parameters of concern. Therefore, it is not possible to determine whether the humidity cell test results are a conservative representation of weathering rates for the tested material, and thus appropriately conservative for use as source terms for the water quality models to evaluate the potential future effluent quality related to ARD /ML and neutral mine drainage (NMD). This information is important for decision making regarding management of waste rock, low grade ore, and exposed pit walls, as well as water management and treatment. All composite samples are non-acid generating based on neutralization potential ratio (NPR) values less than 2 (Table 5-2 and Appendix Table B-8), despite approximately 14% of waste rock at Marathon having been classified as potentially acid generating (PAG) based on samples tested and reported to date. This does not meet the MEND (2009) guidance to design a kinetic test program that includes material that will produce problematic drainage chemistry in terms of ARD/ML, even if this material is a lower anticipated waste volume than other units. Further, the timing to

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	onset of acidic conditions was estimated based on mineral depletion calculations using sulphate and alkalinity production rates associated with the dissolution of soluble secondary salts rather than sulphate production from sulphide mineral oxidation. Due to the absence of any evidence of active sulphide mineral oxidation in the tests completed to date, these time estimates are not considered reasonable to support assumptions in the water quality model related to the timing of ARD for low grade ore and waste rock, nor decisions related to waste rock management. Lastly, the metal leaching potential under acidic conditions has not been captured in the humidity cell tests completed on non-acid generating samples to date, which has implications for the source terms and assumptions that were made in the water quality models (Chapter 7 Appendix 7A and 7B) to represent acidic drainage quality from the pit walls and waste rock piles. Therefore, it is not possible to confirm that humidity cell test leachate on potentially acid generating samples would maintain leachate concentrations below MDMER limits. A complete understanding of the risk and extent of ARD and metal loading is required to appropriately manage PAG waste and exposed PAG rock in the pit walls, as well as water management and treatment planning. Therefore, the potential development of ARD in pockets of the waste rock pile or the pit walls has not been sufficiently evaluated to support the assumptions made in the water quality model related to the maintenance of neutral contact water in the ponds below the waste rock and low grade ore stockpiles and captured pit wall runoff.
Information Request:	a. Provide a quantitative rationale for the targeted chemistry of each composite sample used for kinetic testing with respect to the lithology that they represent and percentile rankings for all parameters of interest with respect to ARD-NMD/ML. b. Provide a detailed plan to test potentially acid generating samples from those lithologies identified as containing potentially acid generating material, including static, mineralogy, and kinetic tests. c. Provide rationale for the methods used to determine the lag time to acidic conditions, and a discussion around the sensitivity of the water quality model to the assumptions related to this assumed lag time. d. Provide rationale for assumptions in the water quality model related to the metal load associated with acidic drainage. Complete a sensitivity analysis related to the assumed metal load for potentially acid generating material, including but not limited to the ore, low grade ore, and waste rock piles, and the pit walls. e. Discuss the sensitivity of water quality model predictions in relation to the conservatism of the source terms.

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Response:	a. Composite samples of major lithologies were used for kinetic testing. The composite samples were prepared for each lithology using crushed residual material from individual samples used in the second phase of the Acid Rock Drainage/Metal Leaching (ARD/ML) program. The residual materials were mixed in approximately the same proportions to produce a composite sample representative of the average composition of each lithology. Tables IR-21.1 to IR-21.4 provide a quantitative comparison of parameters measured in the composite to select statistics (average, median and 25th percentile) determined from results of individual samples of the same lithology. The summary tables demonstrate that the majority of parameters of potential concern in composite samples (Table 5-1 of Attachment 5-B of the EIS) have an equal or greater value than the average or/and median reported for the lithology. Therefore, the composite samples generated for kinetic tests are considered representative of each lithology. b. Kinetic testing of potentially acid generating (PAG) samples are anticipated to take years before the neutralization potential (NP) is depleted and acidic leachate is generated. To reduce the testing time, humidity cells were started on a carbonate-depleted tailings from Marathon ore (Sample CND-1) and on low grade ore (sample MLGO-Met) from Marathon in August of 2020. Carbonate depletion transforms material into PAG, prior to testing. The results of these tests are presented in the Appendix IR-21.A and were used for development of the water quality model as discussed in part d) of this response (below). Additional kinetic testing of PAG materials (waste rock, ore and low-grade ore) from major lithologies of the Marathon pit and a composite sample of gabbro material will be started in Q2 of 2021. These samples will be submitted for static tests including net acid generating (NAG) tests, mineralogy and particle size distribution similar to the characterization of composite samples described in Attachment 5-B of the EIS. The results of this test work will be included in the ARD/ML Management Plan (see Appendix IR-19.A) which will be provided to NRCan, for review and comment. c. The discussion on rationale for the methods used to determine the lag time to acidic conditions and estimate on the possible ranges of ARD onset lag time for exposed PAG materials is provided in the Appendix IR-21.B. d. In the Marathon water quality model, the leaching rates for acidic conditions were considered as stated in the last paragraph of Section 5.3.1.1 in Appendix 7B of the EIS. “All leaching rates are obtained from

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	neutral drainage because none of the geochemical tests have developed acidic leachate. However, samples of some lithologies are expected to generate acidic drainage resulting in an increase in metal leaching in localized zones of PAG materials. In order to account for this increase, neutral leaching rates are inflated by factors of 11.9 for Zinc, 7.5 for Nickel, 3.5 for Iron, 1.8 for Cadmium, 1.6 for Lead 1.2 for Copper, 1.1 for sulphate in PAG rock mass at ARD onset time. These inflation factors were estimated as a ratio of first-month leaching from carbonate depleted humidity cell containing Marathon LGO to the same rates from the initial (non-depleted) sample for LGO." The range of acidic rates was accounted for in the GoldSim water quality model through probabilistic inputs of ARD onset time and variability of neutral leaching rate. An example of the resulting probability distribution for acidic term for copper is shown on Figure IR-21.1. Sensitivity analyses related to the effect of ARD onset to metal load for potentially acid generating material for low grade ore and waste rock piles, and the pit walls is presented in Appendix IR-21.B. e. The source terms, such as leaching rates, ARD onset times, scaling factors and concentrations in solutions were treated as probabilistic inputs in the water quality model (Section 5.3.1 in Appendix 7B of the EIS). These inputs included very conservative values, such as maximum laboratory leaching rate and shortest ARD onset time. Probabilistic combinations of conservative inputs produced conservative results for water quality as presented in the EIS. Additional discussion on the sensitivity of source terms is provided in Appendix IR-21.B. Reference: Mine Environment Neutral Drainage Program (MEND). 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, MEND Report 1.20.1, p. 1-579.
Appendix:	Appendix IR-21.A and IR-21.B

Table IR-21.1 Comparison of ABA statistics for individual samples to composite samples (ID is in bold).

Parameter	S_{TOTAL}	$S_{SULPHATE}$	$S_{SULPHIDE}$	Carb. NP	AP	NNP	Carb. NPR
Units	**wt.%**			**kg $CaCO_3$/t**			
1. Trondhjemite and Granodiorite (TRJ), 54 samples							
25th, %ile	0.020	0.010	0.01	28.7	0.3	54	96
Median	0.035	0.010	0.02	36.6	0.6	61	59
Average	0.06	0.013	0.05	42.4	1.5	65	29
L TRJ	0.08	0.050	0.03	48.3	0.9	47	**51**
2. QZ - Trondhjemite + QTP and QZ - Granodiorite + QTP (QZ-TQTP), 33 samples							
25th, %ile	0.056	0.005	0.04	27.7	1.3	54	21
Median	0.110	0.010	0.09	36.1	2.8	65	13
Average	0.15	0.017	0.13	45.2	4.1	69	11
L QZ-QTP	0.11	0.050	0.06	44.7	1.9	43	24
3. Conglomerate and Sediments (CG and SED), 17 samples							
25th, %ile	0.003	0.010	0.01	5.0	0.3	13	17
Median	0.010	0.010	0.01	12.5	0.3	21	42
Average	0.01	0.015	0.01	15.0	0.4	28	38
L SED	< 0.005	< 0.02	< 0.02	9.2	0.6	8.6	**15**
5. Mafic Dike (MD), 19 samples							
25th, %ile	0.076	0.025	0.05	72.1	1.4	113	51
Median	0.120	0.040	0.06	125.7	1.9	171	66
Average	0.19	0.039	0.15	116.3	4.8	159	24
L MD	0.13	0.060	0.07	97.3	2.2	95	**44**
7. QZ-QTP, 3 samples							
25th, %ile	0.049	0.020	0.02	54.1	0.8	53	69
Median	0.068	0.030	0.03	69.8	0.9	69	74
Average	0.06	0.027	0.03	69.7	1.2	90	60
L QZ-QTP	0.05	0.030	0.02	51.6	0.62	51	83
8. Low-Grade Ore, 10 samples							
25th, %ile	0.096	0.010	0.08	15.4	2.5	27	6.1
Median	0.213	0.015	0.15	34.1	4.5	52	8
Average	0.25	0.039	0.22	45.4	6.8	67	7
L LGO	0.16	0.060	0.10	37.9	3.1	35	12
LLGO-Met	0.27	0.040	0.23	61.3	7.2	54	9

Notes:
S_{TOTAL} - Total Sulphur; $S_{SULPHIDE}$ - Sulphide Sulphur; $S_{SULPHIDE}=S_{TOTAL}-S_{SULPHATE}$; $S_{SULPHATE}$ - Sulphate Sulphur;
Carb. NP - Carbonate Neutralization Potential; Carb; $NP=TIC*M(CaCO_3)/M(C)*10$(kg/t from % diff.);
AP - Acid Potential; $AP=S_{SULPHIDE}(\%) \times 31.25$; NNP - Net Neutralization Potential; NPR - Neutralization Potential Ratio;
TIC - Total Inorganic Carbon. Respective samples from Phase I and II are combined.
Values in cells highlighted yellow exceed either median or average value for the material;
Values in cells highlighted green are between the 25th percentile and average value for the material.

Table IR-21.2 Comparison of trace element statistics for individual samples to composite samples (ID is in bold).

	Ag	Al	As	Be	Cd	Co	Cr	Cu	Fe	Hg	Mn	Mo	Ni	P	Pb	Se	Tl	U	V	Zn
ACUCx10	530	407639	48	21	0.90	173	920	280	320415	0.5	774.5	11	470	654.3	170	0.9	9	27	970	670
Units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
1. Trondhjemite and Granodiorite (TRJ), 54 samples																				
25th, %ile	0.050	6205	0.5	0.50	0.050	1.3	44	3.5	833	0.025	403	0.20	1.4	12	10.5	0.50	0.250	0.100	6.0	24
Median	0.050	6420	1.0	0.50	0.050	1.9	50	4.8	1025	0.025	465	0.30	1.7	14	12	0.50	0.25	0.20	9.0	32
Average	0.044	6323	1.4	0.59	0.044	3.5	53	8.3	2721	0.025	486	0.35	3.0	23	12	0.48	0.21	0.20	21	33
L TRJ	< 0.01	5600	0.8	0.12	0.030	3.3	54	6.9	12000	< 0.05	430	2.7	3.2	280	3.4	< 0.7	0.02	0.12	8.0	27
2. QZ - Trondhjemite + QTP and QZ - Granodiorite + QTP (QZ-TQTP), 33 samples																				
25th, %ile	0.050	6120	0.5	0.50	0.050	1.3	50	4.3	780	0.025	389	0.20	1.4	11.5	6.0	0.50	0.250	0.20	8.0	23
Median	0.050	6710	1.0	0.50	0.050	3.1	54	8.8	1180	0.025	446	0.30	1.7	18	8.7	0.50	0.25	0.30	10	33
Average	0.043	6674	1.1	0.69	0.049	3.8	55	14.1	3913	0.025	496	1.48	2.6	27	8.9	0.47	0.21	0.31	25	32
L QZ-TQTP	0.01	6300	0.8	0.13	0.030	4.0	59	10.0	13000	< 0.05	490	3.0	3.4	260	2.5	< 0.7	< 0.02	0.16	12.0	35
3. Conglomerate and Sediments (CG and SED), 17 samples																				
25th, %ile	0.005	6870	3.4	0.15	0.040	13.7	55	1.2	3690	0.025	773	0.05	20	67	1.1	0.35	0.010	0.53	41	65
Median	0.050	7250	5.0	0.50	0.050	15.2	68	3.9	4120	0.025	**877**	0.20	26	73	13	0.50	0.25	1.3	95	70
Average	0.037	9268	4.7	0.57	0.053	15.1	64	14.0	11032	0.025	**938**	0.74	24	75	10	0.46	0.18	1.1	81	69
L SED	< 0.01	14000	3.2	0.16	0.030	14.0	50	2.5	31000	< 0.05	750	0.8	24.0	810	1.2	< 0.7	0.02	0.47	46.0	61
5. Mafic Dike (MD), 19 samples																				
25th, %ile	0.050	7000	4.0	0.50	0.050	29.5	46	51.8	6580	0.025	**1060**	0.35	19.8	83	3.9	0.50	0.250	0.15	197	75
Median	0.050	7520	10	0.50	0.050	36.3	81	58.0	7570	0.025	**1400**	0.60	28	91	6.6	0.50	0.25	0.40	250	83
Average	0.041	11038	11	0.65	0.101	31.7	77	56.9	17397	0.025	**1264**	0.83	24	88	6.3	0.47	0.20	0.34	225	78
L MD	0.01	22000	2.2	0.17	0.070	29.0	70	50.0	59000	< 0.05	1100	1.1	22.0	610	2.0	< 0.7	< 0.02	0.12	170.0	70
7. QZ-QTP, 3 samples																				
25th, %ile	0.005	5100	1.4	0.13	0.010	3.6	55	5.6	5660	0.025	495	0.20	2.8	52	1.6	0.35	0.010	0.20	8.5	35
Median	0.005	6000	2.0	0.13	0.010	4.8	59	8.0	9900	0.025	530	0.20	3.5	52	1.7	0.35	0.01	0.20	12	36
Average	0.020	5403	1.9	0.42	0.023	4.2	60	16.7	9773	0.025	527	0.63	3.2	52	3.9	0.40	0.09	0.22	20	39
L QZ-QTP	< 0.01	5900	0.5	0.14	0.020	4.6	38	10.0	15000	< 0.05	460	1.9	3.2	440	1.6	< 0.7	< 0.02	0.17	11.0	42
8. Low-Grade Ore, 10 samples																				
25th, %ile	0.050	4780	1.10	0.16	0.043	3.8	61	8.0	1260	0.025	337	0.13	2.8	25	4.2	0.35	0.010	0.20	9.5	17
Median	0.050	6515	1.8	0.50	0.050	5.0	69	11.1	5975	0.025	414	0.40	4.3	39	6.4	0.50	0.25	0.22	23	33
Average	0.115	6547	2.2	0.45	0.048	10.5	81	42.1	10457	0.040	512	0.83	12	47	9.9	0.44	0.15	0.51	56	41
L LGO	0.03	4100	2.0	0.10	0.070	4.1	70	20.0	13000	< 0.05	340	1.7	5.3	390	1.8	< 0.7	< 0.02	0.15	8.0	26
LLGO-Met	0.04	5300	1.3	0.12	0.030	5.5	29	8.1	14000	0	430	0.8	3.8	-	7.3	< 0.7	< 0.02	0.80	8.0	33

Notes:
Respective samples from Phase I and II are combined.
ACUC - Average Concentration in the Upper Crust of the Earth based on Rudnick and Gao (2004); Values exceeding 10x the Average Concentration in the Upper Crust are double underlined and bold;
For the values less than Reportable Detection Limit (RDLs) values, 1/2 of RDLs are used to calculate statistical parameters.
Values in cells highlighted yellow exceed either median or average value for the material. Values in cells highlighted green are between the 25th percentile and average value for the material.

Table IR-21.3 Comparison of ABA statistics for individual samples to composite samples (ID is in bold).

Parameter	Paste pH	S_{TOTAL}	$S_{SULPHATE}$	$S_{SULPHIDE}$	Carb. NP	AP	NNP	Carb. NPR
Units	**pH Units**	**wt.%**			**kg $CaCO_3$/t**			
1. Qtz-eye Porphyry and Qtz-Porphyry Breccia (QE-POR and QE-POR-BX), 66 samples								
25th, %ile	9.39	0.018	0.010	0.01	23.2	0.6	24	37
Median	9.52	0.100	0.020	0.07	36.8	2.0	48	18
Average	9.47	0.17	0.051	0.12	48.4	3.9	61	13
M QE-POR	8.74	0.08	0.030	0.05	62.5	1.6	61	40
2. Aphanitic Qtz Porphyry (AQPOR), 19 samples								
25th, %ile	9.45	0.037	0.010	0.03	13.0	0.8	9	17
Median	9.69	0.076	0.030	0.05	18.5	1.6	22	12
Average	9.60	0.27	0.062	0.22	31.5	6.9	30	5
M AQPOR	9.48	0.33	0.090	0.24	48.6	7.5	41	6
3. Conglomerate (CG), 9 samples								
25th, %ile	9.36	0.003	0.010	0.01	75.2	0.3	75	251
Median	9.56	0.003	0.010	0.01	84.2	0.6	99	136
Average	9.50	0.01	0.009	0.01	101.1	0.5	116	212
M CG	9.53	< 0.005	< 0.02	< 0.02	87.3	0.6	87	141
5. Mafic Dike (MD), 19 samples								
25th, %ile	8.82	0.030	0.010	0.01	44.9	0.6	77	72
Median	9.03	0.090	0.030	0.04	93.3	1.3	105	72
Average	9.05	0.12	0.051	0.08	96.4	2.5	118	38
M MD	8.96	0.27	0.080	0.19	88.7	5.9	82.7	15
6. QZ - Qtz-eye Porphyry + Minor QTP (QZ-QE-POR-QTP-MIN), 10 samples								
25th, %ile	9.61	0.041	0.015	0.03	17.3	1.0	13	17
Median	9.64	0.157	0.045	0.11	26.3	3.3	20	8
Average	9.67	0.25	0.056	0.20	32.9	6.2	27	5
M QZ-QE-POR-QTP-MIN	9.71	0.38	0.100	0.28	22.7	8.8	14	2.6
7. QZ - Qtz-eye Porphyry + QTP (QZ-QE-POR-QTP), 11 samples								
25th, %ile	9.45	0.161	0.010	0.14	16.2	4.2	24	4
Median	9.59	0.310	0.010	0.30	18.3	9.4	33	**2.0**
Average	9.57	0.33	0.028	0.30	30.8	9.6	35	3.2
8. Low-Grade Ore, 8 samples								
25th, %ile	9.35	0.433	0.009	0.36	17.4	11.1	4	**1.6**
Median	9.48	0.506	0.050	0.42	24.1	13.2	27	**1.8**
Average	9.50	0.55	0.066	0.49	26.2	15.3	21	**1.7**
M LGO	9.48	0.28	0.090	0.19	49.2	5.9	43	8
MLGO-Met	9.16	0.59	< 0.02	0.60	28.9	18.8	10	1.5

Notes:
S_{TOTAL} - Total Sulphur; $S_{SULPHATE}$ - Sulphate Sulphur; AP - Acid Potential; AP=$S_{SULPHIDE}$(%) x 31.25.
NNP - Net Neutralization Potential; NPR - Neutralization Potential Ratio;
TIC - Total Inorganic Carbon; Overburden AP is calculated using S_{TOTAL} x 31.25.
Respective samples from Phase I and II are combined.

Table IR-21.4 Comparison of trace element statistics for individual samples to composite samples (ID is in bold).

	Ag	Al	As	B	Be	Cd	Co	Cr	Cu	Fe	Hg	Mn	Mo	Ni	P	Pb	Se	Tl	U	V	Zn
ACUCx10	530	407639	48	-	21	0.90	173	920	280	320415	0.5	774.5	11	470	654	170	0.9	9	27	970	670
Units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
1. Qtz-eye Porphyry and Qtz-Porphyry Breccia (QE-POR and QE-POR-BX), 66 samples																					
25th, %ile	0.006	5785	0.50	-	0.050	0.010	2.7	46.5	2.5	2860	0.025	320	0.53	1.9	19	0.37	0.35	0.010	0.085	7.0	8
Median	0.025	6345	0.60	-	0.070	0.010	4.5	73	4.7	13000	0.025	418	0.90	2.4	25	0.86	0.35	0.01	0.13	17.0	16
Average	0.029	9000	0.87	-	0.25	0.027	7.0	75	11.3	16551	0.025	537	1.4	6.0	28	1.5	0.42	0.10	0.21	38	21
M QE-POR	0.02	11000	< 0.5	-	0.06	< 0.02	6.3	100	14.0	25000	< 0.05	580	2.2	13.0	190	0.9	< 0.7	< 0.02	0.09	31.0	17
2. Aphanitic Qtz Porphyry (AQPOR), 19 samples																					
25th, %ile	0.005	6800	0.38	-	0.045	0.010	3.1	48.0	2.1	17500	0.025	295	1.05	1.55	21	0.22	0.35	0.010	0.093	5.5	15
Median	0.010	8700	0.60	-	0.060	0.010	4.7	82	4.3	23000	0.025	400	1.80	2.2	25	0.60	0.35	0.01	0.12	10.0	22
Average	0.029	11093	0.80	-	0.14	0.023	7.2	76	12.0	22955	0.025	494	1.8	7.7	23	0.93	0.49	0.05	0.15	18	28
M AQPOR	0.05	14000	0.7	-	0.10	< 0.02	8.4	110	15.0	33000	< 0.05	680	3.5	22.0	380	0.7	< 0.7	< 0.02	0.10	28.0	42
3. Conglomerate (CG), 9 samples																					
25th, %ile	0.050	5400	1.2	-	0.18	0.050	10.0	23	9.4	4420	0.025	**881**	0.30	16	56	2.1	0.35	0.010	0.400	30.0	40
Median	0.050	6470	1.6	-	0.23	0.050	11.0	66	22.0	22000	0.025	**918**	0.30	20	61	3.0	0.35	0.02	0.67	36.0	48
Average	0.058	7119	2.0	-	0.49	0.069	14.2	53	30.6	15193	0.025	**962**	0.43	20	59	4.9	0.42	0.12	0.75	69	49
M CG	0.05	6500	1.3	-	0.16	0.070	11.0	53	30.0	24000	< 0.05	1100	1.1	18.0	400	2.3	< 0.7	0.03	0.50	27.0	46
5. Mafic Dike (MD), 19 samples																					
25th, %ile	0.020	7540	0.50	-	0.060	0.030	18.7	30	11.3	7305	0.025	**1300**	0.20	4.5	22	0.49	0.35	0.010	0.032	146.0	52
Median	0.040	27000	0.80	-	0.090	0.050	32.0	56	55.1	65000	0.025	**1650**	0.30	7.1	25	0.84	0.35	0.01	0.06	250.0	81
Average	0.036	22793	1.2	-	0.26	0.040	27.4	109	67.3	47647	0.025	**1507**	0.44	26	28	1.9	0.41	0.11	0.15	223	67
M MD	0.03	35000	1.4	-	0.18	0.040	36.0	120	69.0	84000	< 0.05	1800	0.9	38.0	200	0.7	< 0.7	< 0.02	0.10	280.0	90
6. QZ - Qtz-eye Porphyry + Minor QTP (QZ-QE-POR-QTP-MIN), 10 samples																					
25th, %ile	0.005	4425	0.25	-	0.040	0.010	1.3	3.2	2.9	10050	0.025	248	1.03	0.60	-	0.27	0.35	0.010	0.072	3.5	6
Median	0.010	5200	0.38	-	0.045	0.010	2.1	93	4.7	17500	0.025	270	1.4	2.5	-	0.39	0.35	0.01	0.11	7.0	8
Average	0.015	5520	0.45	-	0.053	0.010	2.7	67	4.6	15480	0.025	322	1.6	1.8	-	0.63	0.35	0.01	0.11	8	8
M QZ-QE-POR-QTP-MIN	0.02	8100	0.5	-	0.07	< 0.02	3.5	95	13.0	20000	< 0.05	310	5.4	4.1	120	0.3	< 0.7	< 0.02	0.11	12.0	12
8. Low-Grade Ore, 8 samples																					
25th, %ile	0.028	5360	0.50	-	0.058	0.010	2.1	74	8.1	1503	0.025	245	1.33	1.7	4.5	0.81	0.35	0.010	0.100	3.5	7
Median	0.050	6020	0.50	-	0.11	0.040	3.5	89	11.3	14500	0.025	455	2.1	2.4	5.0	1.4	0.35	0.01	0.14	5.5	14
Average	0.121	6533	1.1	-	0.24	0.15	3.1	83	26.6	11976	0.025	401	3.7	2.5	7.7	2.6	0.41	0.10	0.22	5	12
M LGO	0.02	15000	3.0	-	0.09	0.030	9.9	98	11.0	33000	< 0.05	900	15.0	11.0	190	1.9	< 0.7	< 0.02	0.13	70.0	42
MLGO-Met	0.23	6800	2.6	-	0.08	0.100	4.0	57	19.0	21000	< 0.05	430	2.1	5.0	-	5.3	< 0.7	< 0.02	0.52	10.0	21

Notes:
Respective samples from Phase I and II are combined.
ACUC - Average Concentration in the Upper Crust of the Earth based on Rudnick and Gao (2004); Values exceeding 10x the Average Concentration in the Upper Crust are double underlined and bold.
For the values less than Reportable Detection Limit (RDLs) values, 1/2 of RDLs are used to calculate statistical parameters.
Values in cells highlighted yellow exceed either median or average value for the material. Values in cells highlighted green are between the 25th percentile and average value for the material.

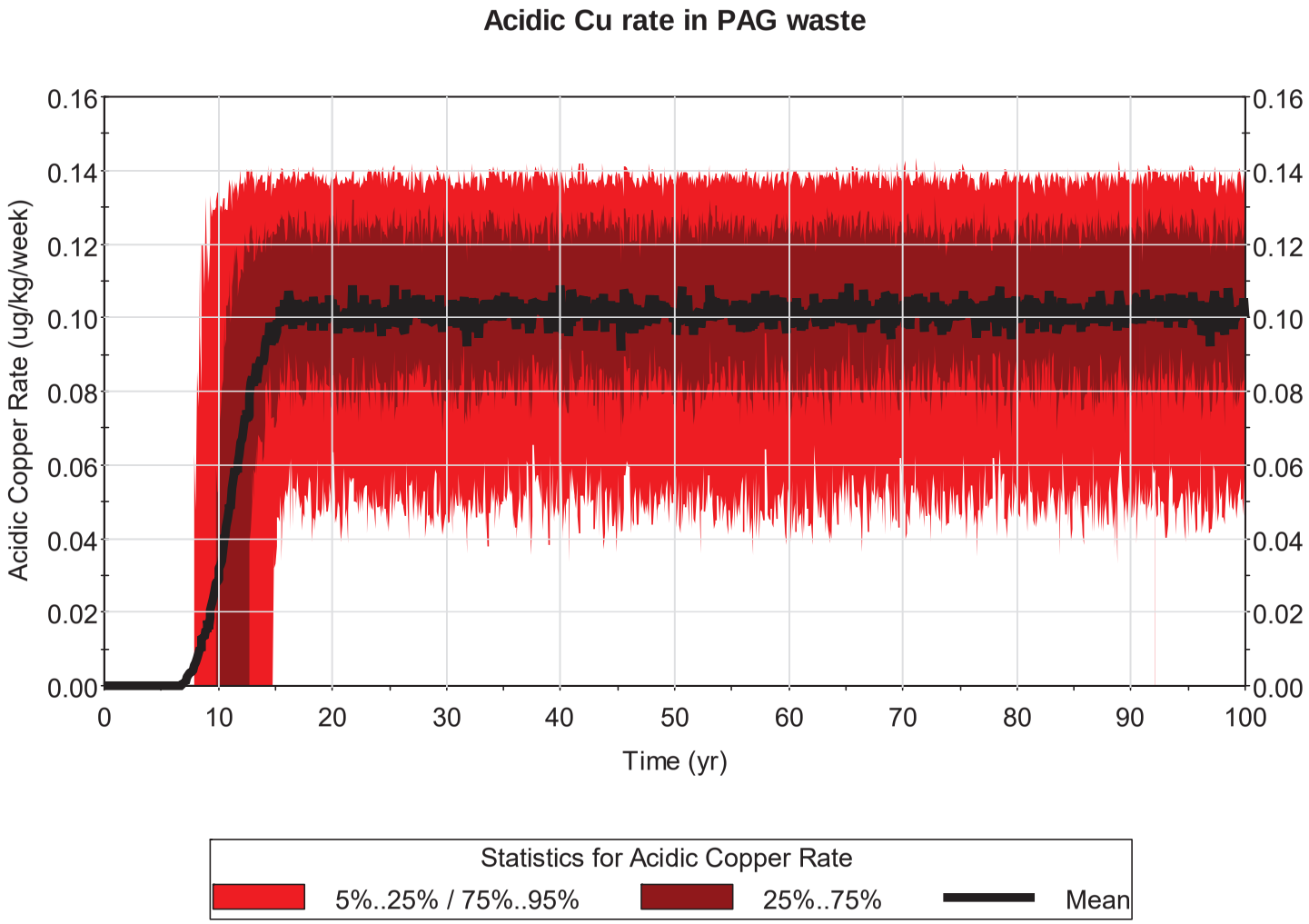

Figure IR-21.1 Probability of acidic Cu rate applied to mass of PAG waste rock

RESPONSE TO IR-22

ID:	**IR-22**
Expert Department or Group:	NRCan-17 MW-45
Guideline Reference:	Section 7.2.2
EIS Reference:	Baseline Study Appendix 5 Attachment 5-A and 5- B
Context and Rationale:	The EIS Guidelines require the proponent to evaluate the effects of imperfect segregation of waste rock. The proponent proposes the development of an ARD block model to identify the location of discrete acid generating pockets of waste rock material and the sequence in which it will be mined. The objective of this is to support the management of potentially acid generating (PAG) waste rock through blending or encapsulation. The success of this approach is dependent in part on the effectiveness of locating and segregating this material. A detailed summary of the ARD block model evaluation was not provided, including an approach to PAG rock segregation.
Information Request:	a. Provide a detailed approach to locate and segregate waste rock for the management of acid generating rock. This can be in the form of an ARD/ML Management Plan. b. Provide a detailed summary of the ARD block model evaluation. c. Provide images presenting the distribution of acid generating waste rock.
Response:	a. The future Acid Rock Drainage (ARD) block model for Marathon pit will provide production schedules for ARD classes of rock and ore and will to help to map potentially acid generating (PAG) materials on pit walls. The model will be verified by operational sampling and managed using the following procedures, which are subject to further refinement as the Acid Rock Drainage/Metal Leaching (ARD/ML) Management Plan is developed: • Samples of drill cuttings from blast holes representing each mine block will be collected. • The samples will be tested for total carbon and sulphur using LECO furnace or similar method. Average neutralization potential (NP) will be calculated from total carbon and average Acid Potential (AP) will be calculated from total sulphur using standard conversions per the Mine Environment Neutral Drainage (MEND) guidelines. If NP/AP ratios indicate the mine block rock is below 2, the block will be classified as PAG.

ID:	IR-22
	• PAG rock will be marked after the blast, excavated, and dispatched to the waste rock stockpile. PAG rock would only be deposited within a specified distance (to be defined) of the final stockpile shell and preferably next to a non-PAG truck load. Piled PAG rock will be marked and the geospatial coordinates recorded. • A portion of PAG and non-PAG rock loads will be mixed during grading each lift of the stockpile. • This mixture will be encapsulated with non-PAG rock deposited within a specified distance (to be defined) from the lift face and forming the topmost lift(s) on the final of the stockpile. Non-PAG rock will reduce oxygen flux into interior of the pile and provide alkalinity to infiltrating water. This approach has been successfully applied for waste rock piles in other mine sites as referenced in Sections 6.6.3.5 and 6.6.3.6 of Global ARD management guide (http://www.gardguide.com/index.php/Chapter) and would be applicable to ARD/ML management at the Valentine Gold Project. Additional details describing the location and management of acid generating rock will be presented in the ARD/ML Management Plan, however, the approach is expected to be much the same as described above. The ARD/ML Management Plan will be prepared using additional ARD/ML test results as described in Appendix IR-19.A. b./c. The ARD block model for Marathon pit has not yet been developed and will be completed as part of additional ARD/ML work described in Appendix IR-19.A. A summary of the ARD block model evaluation and images presenting the distribution of acid generating waste rock in the pit will be provided to regulators, including NRCan, for review and comment through the proposed ARD/ML Management Plan.
Appendix:	None

RESPONSE TO IR-23

ID:	**IR-23**
Expert Department or Group:	NRCan-18
Guideline Reference:	Section 7.2.2
EIS Reference:	Baseline Study Appendix 5 Attachment 5-A and 5- B Section 2.0 Project Description Chapter 7 Appendix 7A and 7B
Context and Rationale:	The EIS Guidelines require the proponent to evaluate the pit water chemistry during operation and post-closure, and pit closure management measures (e.g., flooding). This will include geochemical modelling of pit water quality in the post-closure period. In the geochemical baseline study, four samples were collected and tested from the gabbro unit at the Marathon Pit, suggesting it is a nominal unit in terms of overall tonnage. However, it appears to constitute a portion of the exposed pit wall based on cross-sections provided in Appendix A, and Figure 2.7-a of the Project Description, and is considered to represent 12% of the pit rubble and walls in the water quality model. This sample count is not considered sufficient to capture the potential variability of this unit with respect to ARD/ML, particularly considering that one of the four samples was classified as potentially acid generating (PAG). Additionally, a composite sample was not generated and tested for this unit, so the long-term ARD/ML potential is not known. NRCan considers this to be a significant data gap with respect to evaluating the quality of pit water discharge during operations and long-term pit lake water quality. Further, the low grade ore and ore at the Marathon Pit are assigned 5% of the area of the pit rubble and walls in the water quality model. Based on the same cross sections, this value appears to underrepresent the likely exposed surface area of these units. In total, 50% and 67% of samples of low grade ore and ore, respectively, have been classified as PAG. PAG samples of low grade ore and ore were not subjected to kinetic testing, and as such the long-term ARD/ML potential of these units is not known, nor their potential impacts to pit water quality during operations and long-term closure. The potential for Marathon Pit water to be acidic with an elevated metal load has not been sufficiently evaluated for operations, closure, and post-closure phases of the Project.
Information Request:	a. Provide a detailed plan to address the data gap in the program on how to allow for the conservative evaluation of the ARD/ML potential of the gabbro waste rock unit, low grade ore, and ore, including plans for additional sample collection, static and kinetic tests.

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	b. Provide proportions of exposed gabbro, low grade ore, and ore for each year of operation, and the final pit shell. c. Complete an evaluation of the pit water chemistry during operations, pit filling, and post-closure, and the potential for the development of acidic drainage. This must include timing to onset of ARD and acidic loading rates from new humidity cell tests on PAG material from the gabbro, low grade ore, and ore as well as the exposed pit shell proportions during the life of the mine.
Response:	a. Marathon recognizes that further Acid Rock Drainage/Metal Leaching (ARD/ML) work is required and further assessment and associated refinement of Project mitigation as design of the Project proceeds (refer to Appendix IR-19.A for further information). Specifically, Marathon is committed to completing additional work to address testing gaps identified in the program completed to date, and as noted by NRCan, within the next 6 to 8 months and prior to construction. This information is required for final design and permitting under the NL *Mines Act* (NL Department of Industry, Energy, and Technology), and will be shared with NRCan as it becomes available: 1. Continuation of laboratory tests include two humidity cells containing carbonate depleted low-grade ore (LGO) and tailings from the Marathon deposit. Continuation of field bin tests of composite materials include nine composite samples representing major waste rock lithologies and low-grade ores from both deposits. In 2021, a subaqueous column, an aging test and a humidity cell has started on samples generated from on-going metallurgical work. Additional kinetic testing of PAG materials (waste rock, ore and low-grade ore) from major lithologies of the Marathon pit including a composite sample of gabbro. These samples will also be submitted for static tests including net acid generating (NAG) tests, mineralogy and particle size distribution similar to characterization of composite samples described in the EIS. 2. Additional static testing: • To address spatial distribution and sampling requirements per lithology (refer to Tables IR-18.2 and IR-18.3) • To provide the data inputs required for ARD block models for Marathon pit • To better define the location and volumes of non-potentially acid generating (non-PAG) rock, which is required for construction, in Leprechaun and Marathon starter pits

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	b. Proportions of non-exposed PAG and PAG materials on pit walls including gabbro, low-grade ore, and ore are provided in Table IR-23.1. c. Predicted pit water chemistry presented in the EIS is considered to be conservative based on the discussion and additional sensitivity analysis provided in response to IR-21d and e. Pit water chemistry will be revaluated if additional kinetic testing of gabbro, ore and low-grade ore indicate that leaching rates for parameters of concern are higher than and/or ARD onset time is shorter than currently applied as model inputs.
Appendix:	None

Table IR-23.1 Marathon - Pit Shell Lithology Exposure - B632 (Post PFS)

Marathon										
Cumulative Pit Wall Exposure (m^2)										
Year	**-1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Gabbro Waste	0	0	15,600	83,400	85,700	93,500	98,600	98,800	98,800	98,800
Low Grade Ore	28,700	31,700	34,300	37,600	31,800	32,400	31,500	32,400	34,000	29,700
High Grade Ore	4,300	15,200	16,000	26,100	27,800	27,600	27,100	23,800	21,700	18,000
Total Pit Walls	298,800	490,300	579,000	877,000	927,000	966,100	983,700	1,029,700	1,067,900	1,105,900
Leprechaun										
Cumulative Pit Wall Exposure (m^2)										
Year	-1	1	2	3	4	5	6	7	8	9
Low Grade Ore	13,900	18,900	19,300	23,200	22,300	22,700	29,100	22,000	24,800	24,700
High Grade Ore	11,200	18,100	25,300	28,700	24,200	32,800	35,300	35,400	32,900	30,500
Total Pit Walls	224,400	280,700	470,500	662,000	700,200	749,000	789,500	821,500	841,000	854,100

Reference:

Gabbro Lithology Solids from JTBoyd, January 2020 (VLMA_GAB.dxf)

Pit Shells and End of Period timing from 2020 PFS Engineering (M613 SURF CLP.msr, L623 SURF CLIP.msr, and mine schedule scd10b)

Mineralized Ore measued by any block with definition above 0.33 g/t (Au in model from JT Boyd, 'VLMA_January_2020_Hybrid_Diluted.csv', 'VLLP_January_2020_Dil.csv'). Low grade ore dfined with grades between 0.33 and 0.80 g/t.

Areas in m^2, measured on the surface orientation

RESPONSE TO IR-24

ID:	IR-24
Expert Department or Group:	NRCan-19 MFN-16
Guideline Reference:	Section 7.2.2
EIS Reference:	Baseline Study Appendix 5 Attachment 5-A and 5- Band Project Description and Chapter 7 Appendix 7A and 7B
Context and Rationale:	The EIS Guidelines require the proponent to evaluate the longer term rates of acid generation and metal leaching, and estimates of the potential time to onset of acid rock drainage or metal leaching. Of the low grade ore, approximately 10% from the Leprechaun Pit and 50% from the Marathon Pit have been classified as potentially acid generating. Per NRCan-16, all tested composite samples, including low grade ore, are non-potentially acid generating. As such, the long-term ARD potential of problematic low grade ore and ore cannot be evaluated, nor the associated metal load. The Proponent has assumed that the Low Grade Ore stockpile will not be acidic during the tie in which it is stockpiled. This is not a reasonably conservative assumption for the sake of assessing potential for ARD/ML (and downstream impacts to fish and fish habitat/water quality) Low grade ore will be stockpiled adjacent to both pits for blending with higher grade ore or processing towards the end of mine life. At the Marathon Pit, the lag time to generation of ARD is considered to be within the expected residency time of material in the low grade ore stockpile. The timing to onset of acidic conditions was determined based on non-acid generating kinetic tests per NRCan-16 and NRCan does not consider this a reasonably conservative estimate of timing to ARD/ML production in the low grade ore stockpile. Further, the reactivity of the material in the stockpile depends in part on the sequence in which material is mined.
Information Request:	a. Provide an evaluation of the sequencing of low grade ore from the Marathon Pit and the ARD/ML potential of material during the life of the mine. b. Evaluate the sensitivity of the water quality model predictions to the sequencing of low grade ore in the stockpile at the Marathon Pit during the life of the mine. c. Provide mitigation options for the management and treatment of ARD/ML generated from the low grade ore stockpiles. Describe the preventative measures that would be taken to reduce ARD/ML from the low grade ore stockpile, the monitoring plan and if the stockpile and

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	effluent will be hydrologically segregated to ensure the effluent can be monitored and treated prior to ARD/ML onset.
Response:	a. The sequencing of potentially acid generating (PAG) and non-PAG low grade ore from the Marathon pit will be provided in the Acid Rock Drainage/Metal Leaching (ARD/ML) Management Plan, which will be developed and submitted during the permitting stage of the Project (refer to Appendix IR-19.A for further information). ARD potential will be identified and managed during the mine life as discussed in part c) of the response to this IR (IR-24). b. The sensitivity of the water quality model to the variability and sequencing of PAG and non-PAG low grade ore from the Marathon pit in the stockpile was assessed by assigning a triangular probability distribution function to the percentage of PAG ore in the stockpile with the following parameters: minimum 0% of PAG, most likely 50% of PAG and maximum 100% of PAG. The results of sensitivity runs are provided in Tables IR-24.1 to IR-24.3 including: 1) original results from the EIS model; 2) new results from the sensitivity model, and 3) ratios of new results to the original results, respectively. The results indicate that 95% probability concentrations may increase up to 4.8x for Ni, up to 1.9x for Fe, up to 1.6x for Cd, and up to 1.4x for Pb compared to the original results. These concentrations are below *Metal and Diamond Mining Effluent Regulations* (MDMER) limits. Therefore, treatment of discharge from low grade ore is not warranted, which is consistent with the conclusion presented in the EIS. c. All PAG materials including low grade ore will be identified and tracked as discussed in the response to IR-22, part a). To limit exposure of PAG low grade ore in the Marathon low-grade ore (LGO) stockpile, this material will be preferentially directed to the mill feed, while non-PAG ores will be allocated to the stockpiles, as long as the grade requirement for the mill feed is met. The preliminary target is to maintain over 15% of non-PAG ore on annual basis to produce enough alkalinity for neutralization of PAG ore as discussed in Appendix IR-21.B. This target will be reviewed and updated (as required) as ARD/ML testing and mine planning proceed. Seepage from the LGO stockpiles will be monitored separately from the final discharge points identified in the EIS. If the seepage water quality approaches MDMER limits, water management of LGO stockpile seepage will be adapted and additional mitigation(s) will be introduced to maintain water quality at the stockpile, likely in the form of specific water treatment. The plan is that all low grade ore will be milled,

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	however, if factors arise whereby the ore is not milled, any remaining low grade ore will be relocated to the open pit and flooded to avoid the need for water treatment after mine closure. Additional details related to water management of drainage from the low grade ore are discussed in Section 7.4.1.1 of the EIS.
Appendix:	None

Table IR-24.1: The highest value of the monthly mean and 95th %-ile for each project phase in seepage from the low grade ore stockpile in the EIS model

Parameter	Units	MDMER	CWQG	**CWQG**	Baseline		Construction		Operation	
Statistics			Short-term	Long-term	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	µg/L	-	-	100	16	22	86	100	**600**	**600**
Antimony	µg/L	-	-	-	0.5	0.5	0.97	1.10	20	25
Arsenic	µg/L	100	-	5	0.5	0.5	0.8	0.9	**13**	**15**
Barium	µg/L	-	-	-	2.3	3	3.7	4.1	62	73
Boron	µg/L	-	29000	1500	25	25	30	31	220	270
Cadmium	µg/L	-	0.13	0.04	0.01	0.01	0.009	0.011	**0.18**	**0.21**
Calcium	µg/L	-	-	-	2800	2900	6300	7200	150000	180000
Chromium	µg/L	-	-	1	1.1	1.9	**1.2**	**1.8**	**3.3**	**4.0**
Copper	µg/L	100	-	2	0.6	0.9	0.86	0.97	**13**	**15**
Iron	µg/L	-	-	300	25	25	28	29	180	270
Lead	µg/L	80	-	1	0.25	0.25	0.27	0.27	0.92	**1.10**
Magnesium	µg/L	-	-	-	340	350	720	800	16000	19000
Manganese	µg/L	-	596	210	5.5	6.8	19	23	**610**	**740**
Mercury	µg/L	-	-	0.026	0.007	0.007	0.010	0.010	**0.15**	**0.19**
Molybdenum	µg/L	-	-	73	1.0	1.0	3.7	4.5	**110**	**140**
Nickel	µg/L	250	-	25	1.0	1.0	1.2	1.2	7.9	10
Phosphorus	µg/L	-	-	4	50	50	**50**	**50**	**50**	**50**
Potassium	µg/L	-	-	-	95	130	570	700	20000	24000
Selenium	µg/L	-	-	1	0.25	0.25	0.39	0.44	**6.1**	**7.4**
Silver	µg/L	-	-	0.25	0.05	0.05	0.066	0.070	**0.69**	**0.83**
Sodium	µg/L	-	-	-	1400	1500	3600	4300	91000	110000
Thallium	µg/L	-	-	0.8	0.05	0.05	0.056	0.059	0.31	0.40
Uranium	µg/L	-	33	15	0.05	0.05	0.86	1.20	**31**	**42**
Zinc	µg/L	400	11.3	2.2	2.5	2.5	**3.1**	**3.3**	**88**	**250**
Chloride	µg/L	-	640000	120000	2400	2600	2400	2600	2400	2600
Nitrate + Nitrite (as Nitrogen)	µg/L	-	-	-	38	53	4800	12000	12000	15000
Nitrite (as Nitrogen)	µg/L	-	-	60	9.9	14	**120**	**280**	**270**	**350**
Nitrate (as Nitrogen)	µg/L	-	550000	13000	25	25	4600	12000	11000	**15000**
Total Ammonia (as Nitrogen)	µg/L	-	-	689	25	25	610	**1500**	**1500**	**1900**
Un-ionized Ammonia (as Nitrogen)	µg/L	500	-	19	0.064	0.097	**23.0**	**57**	**57**	**72**
Cyanide, Total	µg/L	500	-	-	10	10	10	10	10	10
Cyanide, WAD	µg/L	-	-	5	1.0	1.0	1.0	1.0	1.0	1.0
Sulphate	µg/L	-	-	-	1000	1000	5400	6800	180000	220000
Fluoride	µg/L	-	-	120	60	60	85	93	**1100**	**1300**
Radium-226	Bq/L	0.37	-	-	0.005	0.005	0.0067	0.0071	0.074	0.088
Temperature	°C	-	-	-	12.0	17.0	9	17	9	18
Total Alkalinity (as $CaCO_3$)	mg/L	-	-	-	8.8	9.7	12000	15000	510000	610000
pH (mean or 5 %ile)	pH Unit	6.0-9.5	-	6.5-9.0	7.0	6.9	8.0	8.0	8.0	8.0
Hardness (as $CaCO_3$)	mg/L	-	-	-	8.4	8.7	19	21	440	530
Dissolved Organic Carbon	mg/L	-	-	-	1.0	1.0	1.3	1.4	15	18

Notes:
MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Table 1 of Schedule 4, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).
CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, short-term and long-term (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).
Concentrations exceeding MDMER are highlighted gray, CWQG short-term are double underlined, and CWQG long-term are bold.
For further details on the parameters and guidelines see Table C-1 notes in Appendix 7B of the EIS.

Table IR-24.2: The highest value of the monthly mean and 95th %-ile for each project phase in seepage from the low grade ore stockpile in the sensitivity model

Parameter	Units	MDMER	CWQG	**CWQG**	Baseline		Construction		Operation	
Statistics			Short-term	Long-term	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	µg/L	-	-	100	16	22	86	100	**600**	**600**
Antimony	µg/L	-	-	-	0.5	0.5	0.97	1.10	20	25
Arsenic	µg/L	100	-	5	0.5	0.5	0.8	0.9	**13**	**15**
Barium	µg/L	-	-	-	2.3	3	3.7	4.1	62	73
Boron	µg/L	-	29000	1500	25	25	30	31	220	270
Cadmium	µg/L	-	0.13	0.04	0.01	0.01	0.009	0.011	**0.26**	**0.33**
Calcium	µg/L	-	-	-	2800	2900	6300	7200	150000	180000
Chromium	µg/L	-	-	1	1.1	1.9	**1.2**	**1.8**	**3.3**	**4.0**
Copper	µg/L	100	-	2	0.6	0.9	0.86	0.97	**14**	**17**
Iron	µg/L	-	-	300	25	25	28	29	**340**	**500**
Lead	µg/L	80	-	1	0.25	0.25	0.27	0.27	**1.10**	**1.50**
Magnesium	µg/L	-	-	-	340	350	720	800	16000	19000
Manganese	µg/L	-	596	210	5.5	6.8	19	23	**610**	**740**
Mercury	µg/L	-	-	0.026	0.007	0.007	0.010	0.010	**0.15**	**0.19**
Molybdenum	µg/L	-	-	73	1.0	1.0	3.7	4.5	**110**	**140**
Nickel	µg/L	250	-	25	1.0	1.0	1.2	1.2	**29.0**	**48**
Phosphorus	µg/L	-	-	4	50	50	**50**	**50**	**50**	**50**
Potassium	µg/L	-	-	-	95	130	570	700	20000	24000
Selenium	µg/L	-	-	1	0.25	0.25	0.39	0.44	**6.1**	**7.4**
Silver	µg/L	-	-	0.25	0.05	0.05	0.066	0.070	**0.69**	**0.83**
Sodium	µg/L	-	-	-	1400	1500	3600	4300	91000	110000
Thallium	µg/L	-	-	0.8	0.05	0.05	0.056	0.059	0.31	0.40
Uranium	µg/L	-	33	15	0.05	0.05	0.86	1.20	**31**	**42**
Zinc	µg/L	400	11.3	2.2	2.5	2.5	**3.1**	**3.3**	**180**	**280**
Chloride	µg/L	-	640000	120000	2400	2600	2400	2600	2400	2600
Nitrate + Nitrite (as Nitrogen)	µg/L	-	-	-	38	53	4800	12000	12000	15000
Nitrite (as Nitrogen)	µg/L	-	-	60	9.9	14	**120**	**280**	**270**	**350**
Nitrate (as Nitrogen)	µg/L	-	550000	13000	25	25	4600	12000	11000	**15000**
Total Ammonia (as Nitrogen)	µg/L	-	-	689	25	25	610	**1500**	**1500**	**1900**
Un-ionized Ammonia (as Nitrogen)	µg/L	500	-	19	0.064	0.097	**23.0**	**57**	**57**	**72**
Cyanide, Total	µg/L	500	-	-	10	10	10	10	10	10
Cyanide, WAD	µg/L	-	-	5	1.0	1.0	1.0	1.0	1.0	1.0
Sulphate	µg/L	-	-	-	1000	1000	5400	6800	200000	240000
Fluoride	µg/L	-	-	120	60	60	85	93	**1100**	**1300**
Radium-226	Bq/L	0.37	-	-	0.005	0.005	0.0067	0.0071	0.074	0.088
Temperature	°C	-	-	-	12.0	17.0	9	17	9	18
Total Alkalinity (as $CaCO_3$)	mg/L	-	-	-	8.8	9.7	12000	15000	510000	610000
pH (mean or 5 %ile)	pH Unit	6.0-9.5	-	6.5-9.0	7.0	6.9	8.0	8.1	8.0	8.1
Hardness (as $CaCO_3$)	mg/L	-	-	-	8.4	8.7	19	21	440	530
Dissolved Organic Carbon	mg/L	-	-	-	1.0	1.0	1.3	1.4	15	18

Notes:

MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Table 1 of Schedule 4, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).

CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, short-term and long-term (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).

Concentrations exceeding MDMER are highlighted gray, CWQG short-term are double underlined, and CWQG long-term are bold.

For further details on the parameters and guidelines see Table C-1 notes in Appendix 7B of the EIS.

Table IR-24.3: Concentration ratios between the sensitivity and EIS models for the low grade ore stockpile

Parameter	Construction		Operation	
Statistics	mean	95 %ile	mean	95 %ile
Aluminum	1.0	1.0	1.0	1.0
Antimony	1.0	1.0	1.0	1.0
Arsenic	1.0	1.0	1.0	1.0
Barium	1.0	1.0	1.0	1.0
Boron	1.0	1.0	1.0	1.0
Cadmium	1.0	1.0	**1.4**	**1.6**
Calcium	1.0	1.0	1.0	1.0
Chromium	1.0	1.0	1.0	1.0
Copper	1.0	1.0	1.1	1.1
Iron	1.0	1.0	**1.9**	**1.9**
Lead	1.0	1.0	1.2	**1.4**
Magnesium	1.0	1.0	1.0	1.0
Manganese	1.0	1.0	1.0	1.0
Mercury	1.0	1.0	1.0	1.0
Molybdenum	1.0	1.0	1.0	1.0
Nickel	1.0	1.0	**3.7**	**4.8**
Phosphorus	1.0	1.0	1.0	1.0
Potassium	1.0	1.0	1.0	1.0
Selenium	1.0	1.0	1.0	1.0
Silver	1.0	1.0	1.0	1.0
Sodium	1.0	1.0	1.0	1.0
Thallium	1.0	1.0	1.0	1.0
Uranium	1.0	1.0	1.0	1.0
Zinc	1.0	1.0	**2.0**	1.1
Chloride	1.0	1.0	1.0	1.0
Nitrate + Nitrite (as Nitrogen)	1.0	1.0	1.0	1.0
Nitrite (as Nitrogen)	1.0	1.0	1.0	1.0
Nitrate (as Nitrogen)	1.0	1.0	1.0	1.0
Total Ammonia (as Nitrogen)	1.0	1.0	1.0	1.0
Un-ionized Ammonia (as Nitrogen)	1.0	1.0	1.0	1.0
Cyanide, Total	1.0	1.0	1.0	1.0
Cyanide, WAD	1.0	1.0	1.0	1.0
Sulphate	1.0	1.0	1.1	1.1
Fluoride	1.0	1.0	1.0	1.0
Radium-226	1.0	1.0	1.0	1.0
Temperature	1.0	1.0	1.0	1.0
Total Alkalinity (as $CaCO_3$)	1.0	1.0	1.0	1.0
pH (mean or 5 %ile)	1.0	1.0	1.0	1.0
Hardness (as $CaCO_3$)	1.0	1.0	1.0	1.0
Dissolved Organic Carbon	1.0	1.0	1.0	1.0

Note: Ratios above 1.2 are bold and highlighted gray.

RESPONSE TO IR-25

ID:	**IR-25**
Expert Department or Group:	NRCan-20
Guideline Reference:	Section 7.2.2
EIS Reference:	Baseline Study Appendix 5 Attachment 5-A and 5- Band Chapter 7 Appendix 7A and 7B
Context and Rationale:	Section 7.2.2 of the EIS Guidelines require the proponent to complete a geochemical characterization of tailings in order to predict metal leaching and acid rock drainage (ARD/ML). Insufficient information was provided on the origin of the tailings samples analyzed to understand whether they are representative of the anticipated thickened tailings composition to be managed on the property. Previous testing of tailings demonstrate that it could be potentially acid generating. Any deviation from the head ore composition or methods used to generate these samples could result in a different ARD potential and concentrations of cyanide species and associated nitrogen by-products from cyanide degradation, which has implications for tailings runoff, seepage quality and water treatment design.
Information Request:	a. Provide additional information on the source of the contaminated neutral drainage tailings samples, including the head ore composition used to generate these samples relative to the anticipated average ore feed to the plant, and the metallurgical process and cyanide destruction method used to generate these samples relative to the anticipated process to be used during mine operations. b. Complete an analysis of the sensitivity of the water quality model to the generation of ARD/ML from the low grade ore stockpiles.
Response:	a. Figure IR-25.1 shows the average annual grade of ore feed for the plant. Tailings samples CND1 and CND2 were generated from head samples having the composition shown in Table IR-25.1. Tables IR-25.2 and IR-25.3 show the composition of additional head samples prepared to address lateral and vertical variability of ore. The sample preparatory work and cyanide destruction work are detailed in Section 3 of the SGS report entitled "GOLD RECOVERY FROM VALENTINE LAKE PROJECT ORES" prepared for Marathon Gold Project 16863-01 – Report 2 of 3 - Milling" and dated April 15, 2020 (excerpt provided in Appendix IR-25.A). This work can be summarized as follows. The feed sample for each CND test was generated by leaching flotation tailings via mixing the tailings with cyanide-bearing flotation concentrate tailings. The CND product slurries from the gravity-

ID:	IR-25
	flotation-leach circuit were evaluated for the extent of cyanide destruction by sulfur dioxide-air - sometimes referred to as the INCO process. The CN destruction target was 1 mg/L of Weak Acid Dissociable (WAD) CN. The plan is to use the same method and targets for cyanide destruction during Project operation. Additional geochemical testing is being conducted on materials from the gravity-leach circuit and the same method for cyanide destruction. Static testing shows that newly generated tailings are non-PAG with NPR values ranging between 4.0 and 5.9. The kinetic testing includes two subaqueous columns, an aging test and a humidity cell and provide additional results on water quality of the TMF pond and seepage. The results will be considered and reported in the ARD/ML Management Plan. b. The sensitivity of the water quality model to the generation of ARD/ML from the low grade ore stockpile is discussed in responses to IR-21, parts c), d), e) and to IR-24, part b).
Appendix:	Appendix IR-25.A

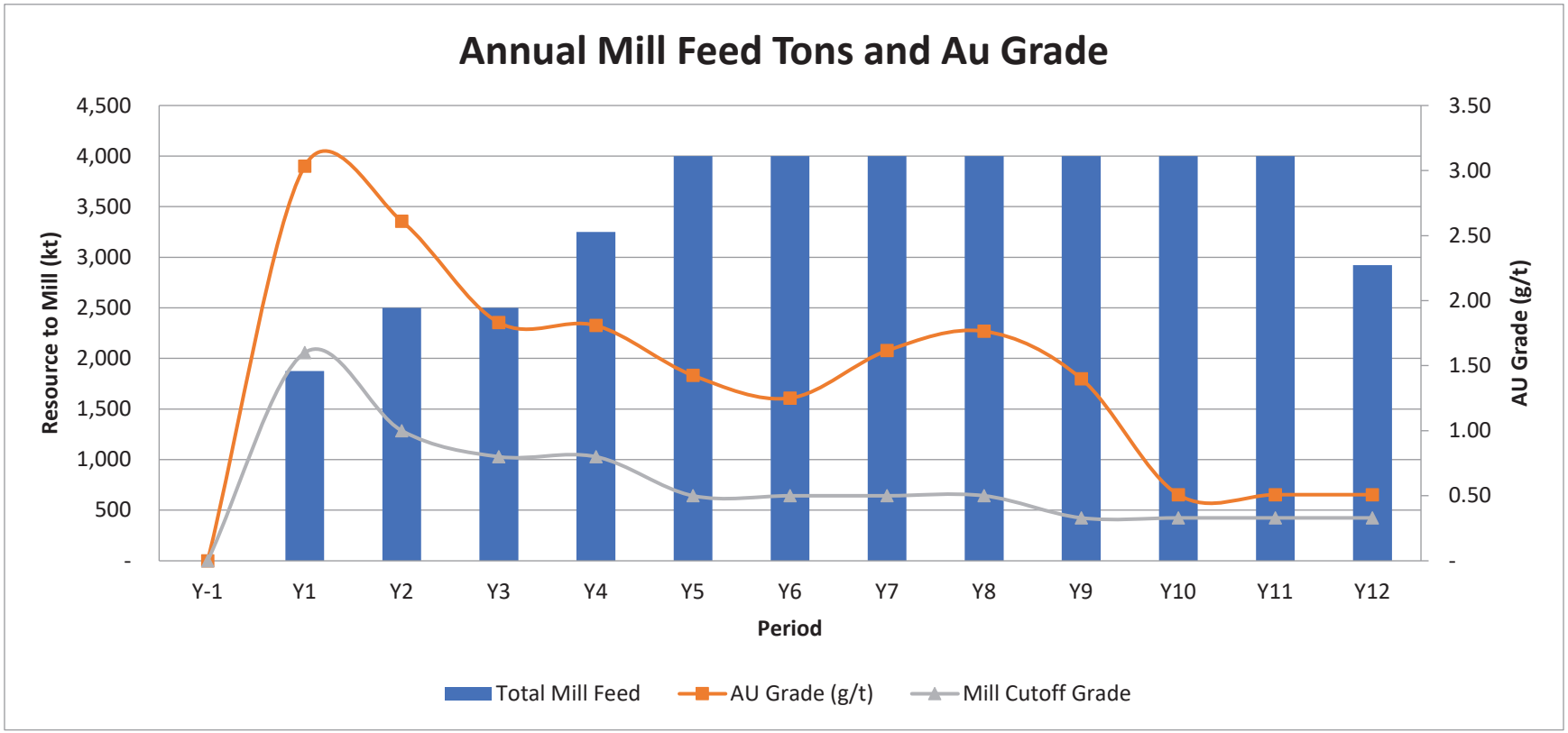


Figure IR-25.1 Annual Mill Feed Tons and Au Grade

IR-25.1 Head Analysis, Quantitative and Semi-quantitative Analysis, Marathon and Leprechaun Zones

Element	LGO Composites						Milling Composites									
	Marathon (MLGO-Met)			Leprechaun (LLGO-Met)			Marathon Comps (tailings CND-1)					Leprechaun Comps (tailings CND-2)				
	A	B	C	D	E	F	MZA	MZB	MZC	MZD	MZE	LZA	LZB	LZC	LZD	LZE
% composite sample	33.3	33.3	33.3	33.3	33.3	33.3	15.7	21.8	21.6	23.6	17.3	27.9	17.3	14.5	20.4	19.9
Quantitative Analyses																
[1] Au, g/t	0.49	0.73	0.90	0.35	0.50	0.76	2.89	4.08	3.25	1.98	3.94	2.69	2.61	5.19	3.82	2.75
Cu, %	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
As, %	<0.001	0.003	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Hg g/t	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
S, %	0.44	0.45	0.66	0.19	0.21	0.31	0.68	0.68	0.79	0.70	0.51	0.30	0.28	0.43	0.34	0.36
$S^{=}$, %	0.30	0.42	0.59	0.15	0.20	0.30	0.68	0.60	0.74	0.64	0.47	0.28	0.25	0.37	0.34	0.33
C(t), %	0.39	0.41	0.22	0.69	0.75	0.85	0.48	0.41	0.38	0.33	0.38	0.80	0.64	1.40	0.93	0.84
C(g), %	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TOC Leco, %	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CO_2, %	1.7	1.8	1.1	2.5	2.7	3.0	1.81	1.52	1.46	1.24	1.49	2.98	2.44	5.12	3.47	3.09
MAP	13.8	14.1	20.6	5.9	6.6	9.7	21.3	21.3	24.7	21.9	15.9	9.4	8.8	13.4	10.6	11.3
NP carb	32.5	34.2	18.3	57.5	62.5	70.8	40.0	34.2	31.7	27.5	31.7	66.7	53.3	116.7	77.1	70.0
Carb NPR	2.4	2.4	0.9	9.7	9.5	7.3	1.9	1.6	1.3	1.3	2.0	7.1	6.1	8.7	7.3	6.2
Spec. Grav	2.71	2.71	2.70	2.72	2.71	2.73	--	--	2.71	--	2.71	--	2.71	--	2.74	--

Table 25-2: Head Assays

Sample ID		Hole	Au	S	SO_4^{2-}	S^{2-}	C	TOC	Cg	Te	NP	AP	NNP	NPR
Method		depth	FAAS	LECO	GRAV	GRAV	LECO	LECO	LECO	ICP				
Units		m	g/t	%	%	%	%	%	%	ppm	kg $CaCO_3$/t			unit less
Zone Comps	MAA	-	1.61	0.69	0.45	0.24	0.49	0.02	<0.01	25	32.9	7.41	25.5	4
	MAB	-	1.86	0.81	0.20	0.61	0.29	0.01	<0.01	22	19.2	19.0	0.2	1.0
	MAC	-	2.18	0.73	0.04	0.70	0.32	<0.01	<0.01	22	21.5	21.8	-0.3	1.0
	MAD	-	1.31	0.57	0.05	0.53	0.29	<0.01	<0.01	32	19.1	16.4	2.7	1.2
	MAE	-	1.99	0.72	0.05	0.67	0.34	<0.01	<0.01	23	22.6	20.8	1.8	1.1
	LPA	-	2.15	0.38	0.02	0.35	0.65	0.03	0.01	24	43.2	11.1	32.1	4
	LPB	-	3.19	0.37	0.01	0.35	0.87	0.02	<0.01	22	57.9	11.1	46.8	5
	LPC	-	1.74	0.49	0.02	0.47	0.87	<0.01	0.01	26	58.1	14.7	43.4	4
	LPD	-	1.69	0.35	0.23	0.12	0.85	<0.01	0.01	25	56.8	3.91	52.9	15
	LPE	-	1.72	0.33	0.02	0.31	1.02	<0.01	0.01	21	68.0	9.71	58.3	7
Master Comps	MAMC	-	4.01	0.74	0.06	0.68	0.33	<0.01	0.01	20	21.8	21.2	0.6	1.0
	LPMC	-	2.18	0.61	0.01	0.60	0.50	0.01	<0.01	21	33.4	18.6	14.8	1.8
Ma Grade Bins	MG1	-	0.55	0.53	0.04	0.49	0.33	0.01	<0.01	19	21.9	15.3	6.6	1.4
	MG2	-	2.10	0.60	0.03	0.57	0.34	<0.01	<0.01	23	22.5	17.8	4.8	1.3
	MG3	-	1.96	0.64	0.28	0.36	0.22	<0.01	<0.01	28	14.5	11.3	3.2	1.3
	MG4	-	2.11	0.47	0.03	0.44	0.28	<0.01	<0.01	25	18.5	13.7	4.8	1.3
	MG5	-	1.87	0.73	0.05	0.68	0.36	<0.01	0.01	20	24.3	21.3	2.9	1.1
	MG6	-	3.63	0.81	0.07	0.74	0.40	<0.01	0.01	38	26.5	23.2	3.3	1.1
Ma Depth Bins	MD1	<50	1.70	0.74	0.04	0.71	0.34	<0.01	<0.01	22	22.3	22.0	0.3	1.0
	MD2	50-120	1.68	0.51	0.08	0.43	0.41	0.01	<0.01	22	27.0	13.6	13.4	2.0
	MD3	120-190	2.17	0.77	0.03	0.73	0.32	0.01	<0.01	20	21.5	22.9	-1.4	0.9
	MD4	190-260	2.45	0.80	0.05	0.75	0.28	0.01	<0.01	24	18.9	23.5	-4.6	0.8
	MD5	>260	2.16	0.32	0.07	0.26	0.83	<0.01	<0.01	25	55.3	8.03	47.3	7
Lp Grade Comps	LG1	-	1.27	0.39	0.01	0.38	0.98	<0.01	<0.01	21	65.3	11.7	53.6	6
	LG2	-	2.02	0.19	0.01	0.18	0.84	<0.01	<0.01	24	55.9	5.57	50.3	10
	LG3	-	3.03	0.25	<.01	0.25	0.75	0.01	<0.01	28	49.9	7.82	42.0	6
	LG4	-	4.85	0.30	0.05	0.25	0.75	<0.01	<0.01	29	49.7	7.90	41.8	6
	LG5	-	3.28	0.24	<.01	0.26	1.06	<0.01	<0.01	29	70.7	8.22	62.5	9
	LG6	-	4.35	0.24	0.01	0.23	0.66	<0.01	<0.01	30	43.7	7.09	36.6	6
Lp Depth Bins	LD1	<50	2.25	0.23	0.01	0.23	0.90	<0.01	<0.01	24	59.8	7.11	52.7	8
	LD2	50-120	1.59	0.24	0.02	0.22	0.76	<0.01	<0.01	31	50.3	6.88	43.5	7
	LD3	120-190	2.57	0.42	0.02	0.40	0.96	<0.01	<0.01	26	63.7	12.4	51.2	5
	LD4	190-260	1.20	0.50	0.05	0.45	1.03	<0.01	0.01	26	68.7	14.0	54.7	5
	LD5	>260	3.06	0.25	0.01	0.23	0.75	<0.01	<0.01	27	50.1	7.31	42.8	7
Ma Comp A		-	1.33	0.87	0.04	0.83	0.29	0.01	0.01	-	19.1	25.9	-6.8	0.7
Ma Comp C		-	1.35	0.94	0.03	0.91	0.39	0.03	0.01	-	25.9	28.3	-2.4	0.9

Table 25-3: Elemental

Analyte Symbol	Hg	Co_3O_4	CuO	NiO	SiO_2	Al_2O_3	$Fe_2O_{3(T)}$	MnO	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	Cr_2O_3	V_2O_5	LOI	Total	Al	As	B	Ba	Be	Bi
Unit Symbol	ppb	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm
Detection Limit	5	0.005	0.005	0.003	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.003	-	0.01	0.01	5	10	3	3	2
Analysis Method	1G	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	FUS-XRF	GRAV	FUS-XRF	FUS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2
MAA Hd	23	< 0.005	< 0.005	< 0.003	73.6	12.24	2.99	0.053	0.87	2.43	4.53	0.49	0.21	0.04	0.02	0.004	2.55	100	6.5	5	630	202	< 3	< 2
MAB Hd	145	< 0.005	0.007	< 0.003	76.3	11.52	2.7	0.039	0.44	1.54	4.3	0.6	0.15	0.03	0.01	< 0.003	1.77	99.41	6.32	21	330	186	< 3	< 2
MAC Hd	9	< 0.005	0.005	< 0.003	74.18	12.47	2.87	0.048	0.53	1.55	5.13	0.56	0.15	0.02	0.01	< 0.003	1.83	99.35	6.63	10	360	172	< 3	< 2
MAD Hd	19	< 0.005	< 0.005	< 0.003	76.03	11.91	2.12	0.043	0.4	1.43	5.19	0.41	0.13	0.02	0.01	0.004	1.54	99.25	6.4	6	430	144	< 3	< 2
MAE Hd	6	< 0.005	< 0.005	< 0.003	74.86	11.84	2.49	0.054	0.55	1.72	4.92	0.44	0.15	0.02	0.01	< 0.003	1.82	98.88	6.32	< 5	410	148	< 3	< 2
LPA Hd	15	< 0.005	< 0.005	< 0.003	69.47	14.9	2.03	0.058	0.81	2.91	5.58	1.26	0.21	0.08	0.01	0.007	2.85	100.2	7.95	< 5	290	1110	< 3	< 2
LPB Hd	10	< 0.005	< 0.005	< 0.003	65.7	14.54	2.75	0.061	1.02	3.44	5.45	1.15	0.36	0.09	0.01	0.009	3.45	98.04	7.94	< 5	400	794	< 3	< 2
LPC Hd	13	< 0.005	< 0.005	< 0.003	65.51	15.32	2.96	0.06	1.07	3.68	6.17	0.9	0.44	0.11	0.01	0.008	3.46	99.7	8.47	< 5	320	622	< 3	< 2
LPD Hd	8	< 0.005	< 0.005	0.003	64.18	15.65	2.73	0.057	1.27	3.95	6.02	0.93	0.32	0.11	0.01	0.008	3.59	98.84	8.46	< 5	530	641	< 3	< 2
LPE Hd	11	< 0.005	< 0.005	0.004	63.64	15.31	3.67	0.079	1.38	4.5	5.09	1.12	0.54	0.12	0.01	0.009	4.23	99.71	8.33	< 5	250	635	< 3	< 2
MAMC Hd	88	< 0.005	< 0.005	< 0.003	74.94	11.85	2.73	0.048	0.53	1.76	4.78	0.52	0.16	0.02	0.02	< 0.003	2.11	99.46	6.35	8	420	168	< 3	< 2
LPMC Hd	7	< 0.005	< 0.005	< 0.003	65.28	15.22	2.8	0.062	1.1	3.7	5.65	1.07	0.35	0.1	0.01	0.007	3.46	98.81	8.21	< 5	370	784	< 3	< 2
MG1 Hd	10	< 0.005	0.006	< 0.003	72.94	11.79	3.35	0.067	0.96	2.42	4.33	0.46	0.22	0.04	0.01	0.007	2.43	99.04	6.31	< 5	440	168	< 3	< 2
MG2 Hd	12	< 0.005	< 0.005	< 0.003	75.06	11.79	2.27	0.046	0.49	1.7	4.82	0.49	0.16	0.02	0.01	< 0.003	1.71	98.57	6.51	< 5	330	183	< 3	< 2
MG3 Hd	7	< 0.005	< 0.005	< 0.003	74.85	11.93	2.75	0.051	0.64	1.77	4.94	0.42	0.16	0.02	0.01	0.003	1.88	99.43	6.46	< 5	400	145	< 3	< 2
MG4 Hd	29	< 0.005	< 0.005	< 0.003	76.25	11.85	2.51	0.036	0.36	1.28	4.79	0.63	0.13	0.02	0.01	< 0.003	1.54	99.42	6.4	7	400	202	< 3	< 2
MG5 Hd	50	< 0.005	< 0.005	< 0.003	76.93	11.19	2.32	0.045	0.47	1.56	4.49	0.48	0.14	0.02	0.01	< 0.003	1.66	99.32	6	21	400	155	< 3	< 2
MG6 Hd	25	< 0.005	< 0.005	< 0.003	71.97	13.26	2.24	0.039	0.44	1.78	5.97	0.42	0.14	0.02	0.01	0.003	1.79	98.06	7.34	7	630	176	< 3	5
MD1 Hd	9	< 0.005	< 0.005	< 0.003	71.07	13.38	3.83	0.06	0.8	2.04	5.57	0.45	0.23	0.04	0.01	0.006	2.2	99.7	7.16	< 5	420	167	< 3	< 2
MD2 Hd	33	< 0.005	< 0.005	< 0.003	75.7	11.68	2.49	0.049	0.46	1.69	4.81	0.5	0.15	0.02	0.02	0.003	1.8	99.39	6.33	< 5	450	166	< 3	< 2
MD3 Hd	28	< 0.005	0.005	< 0.003	74.71	11.67	2.53	0.049	0.72	2.02	4.55	0.47	0.17	0.02	0.01	< 0.003	2.05	98.98	6.26	9	370	138	< 3	< 2
MD4 Hd	9	< 0.005	< 0.005	< 0.003	75.94	11.67	2.37	0.041	0.46	1.68	4.77	0.47	0.16	0.03	0.01	< 0.003	1.74	99.33	6.17	17	430	201	< 3	< 2
MD5 Hd	9	< 0.005	< 0.005	0.008	75.19	11.8	2.77	0.045	0.53	1.65	4.79	0.54	0.15	0.02	0.03	0.004	1.76	99.31	6.44	< 5	380	188	< 3	< 2
LG1 Hd	< 5	< 0.005	< 0.005	< 0.003	63.76	15.15	3.01	0.067	1.13	3.93	5.72	1.01	0.43	0.1	< 0.01	0.01	3.7	98.02	8.22	< 5	320	718	< 3	< 2
LG2 Hd	< 5	< 0.005	< 0.005	< 0.003	63.91	15.68	3.21	0.07	1.17	3.93	5.65	1.13	0.43	0.12	0.01	0.011	3.68	98.99	8.45	< 5	420	676	< 3	< 2
LG3 Hd	< 5	< 0.005	< 0.005	< 0.003	67.29	15	2.47	0.057	0.98	3.26	5.51	1.17	0.28	0.08	0.01	0.007	3.04	99.14	7.97	< 5	320	947	< 3	< 2
LG4 Hd	6	< 0.005	< 0.005	< 0.003	66.84	15.07	2.2	0.054	0.88	3.19	6.02	0.99	0.26	0.08	0.01	0.006	2.88	98.5	8.24	< 5	310	777	< 3	< 2
LG5 Hd	< 5	< 0.005	< 0.005	0.006	63.55	14.67	3.45	0.078	2.45	4.11	4.92	0.95	0.37	0.08	0.02	0.011	4.71	99.37	7.78	< 5	560	675	< 3	< 2
LG6 Hd	< 5	< 0.005	< 0.005	0.007	68.61	14.62	2.11	0.043	0.75	3.13	5.59	1.07	0.25	0.09	0.01	0.005	2.69	98.98	7.91	< 5	330	625	< 3	< 2
LD1 Hd	< 5	< 0.005	< 0.005	< 0.003	65.23	15.47	3.07	0.067	1.36	3.68	5.47	1.11	0.37	0.1	0.01	0.009	3.74	99.7	8.1	< 5	340	798	< 3	< 2
LD2 Hd	< 5	< 0.005	< 0.005	< 0.003	66.12	15.55	2.25	0.054	0.86	3.55	5.62	1.16	0.28	0.1	0.01	0.006	3.14	98.71	8.36	< 5	380	716	< 3	< 2
LD3 Hd	< 5	< 0.005	< 0.005	< 0.003	65.37	14.99	2.84	0.063	1.06	3.9	5.78	1.04	0.41	0.1	< 0.01	0.008	3.63	99.2	8.11	< 5	330	731	< 3	< 2
LD4 Hd	< 5	< 0.005	< 0.005	< 0.003	62.6	15.44	3.39	0.072	1.28	4.13	6.08	0.99	0.51	0.11	0.01	0.011	3.93	98.55	8.15	< 5	300	607	< 3	< 2
LD5 Hd	< 5	< 0.005	< 0.005	0.013	67.94	14.86	2.43	0.05	0.99	3.19	5.69	1.03	0.3	0.08	0.02	0.007	2.97	99.58	7.97	< 5	390	792	< 3	< 2

Table 25-3: Elemental

Analyte Symbol	Ca	Cd	Ce	Co	Cr	Cs	Cu	Dy	Er	Eu	Fe	Ga	Gd	Ge	Ho	Hf	In	K	La	Li	Mg	Mn	Mo
Unit Symbol	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm
Detection Limit	0.01	2	0.8	0.2	30	0.1	2	0.3	0.1	0.1	0.05	0.2	0.1	0.7	0.2	10	0.2	0.1	0.4	3	0.01	3	1
Analysis Method	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2
MAA Hd	1.67	< 2	10.2	5.9	110	0.1	24	5	4.3	0.8	2.17	13.3	4.8	2.4	1.3	< 10	< 0.2	0.5	3.6	19	0.46	460	3
MAB Hd	1.06	< 2	10.9	2.4	110	0.4	55	5.6	4.5	0.5	2.07	12.8	4.6	2	1.5	< 10	0.3	0.6	4.6	14	0.23	350	5
MAC Hd	1.06	< 2	13.4	3.9	100	0.3	39	6.8	5.4	0.8	2.15	11.1	5.6	1.9	1.7	< 10	< 0.2	0.5	4.2	14	0.29	379	< 1
MAD Hd	1.01	< 2	12.7	3.3	110	0.6	42	5.9	4.4	1	1.59	11.8	4	1.8	1.5	< 10	< 0.2	0.4	4.9	16	0.21	330	< 1
MAE Hd	1.19	< 2	12.9	2.4	100	1.9	35	6.6	5.2	0.6	1.9	9.9	4.5	1.8	1.5	< 10	0.3	0.4	5.5	13	0.3	430	3
LPA Hd	2.03	< 2	22.5	3.6	80	0.9	22	0.8	0.4	0.8	1.47	17.2	1.2	1.5	< 0.2	< 10	< 0.2	1.1	11.1	13	0.44	456	< 1
LPB Hd	2.5	< 2	26	6.6	90	0.4	30	1.2	0.7	0.6	2.04	17.9	1.9	1.4	0.3	< 10	< 0.2	1	12.7	12	0.59	488	< 1
LPC Hd	2.67	< 2	30.3	5.3	70	0.8	27	1.1	0.6	0.9	2.22	15.8	2.1	1.5	< 0.2	< 10	< 0.2	0.8	15.3	12	0.61	474	< 1
LPD Hd	2.87	< 2	33.6	5.7	90	0.5	20	0.8	0.4	1	1.97	16.7	2.1	1.3	0.2	< 10	< 0.2	0.8	17.9	17	0.73	476	< 1
LPE Hd	3.19	< 2	33.4	6.5	80	0.7	27	1.5	0.8	0.9	2.59	18.5	1.5	1.4	0.3	< 10	< 0.2	1	15.6	14	0.79	591	2
MAMC Hd	1.11	< 2	13.2	4.6	170	0.3	74	6.1	4.9	0.9	2.32	13.9	4.4	1.7	1.5	< 10	< 0.2	0.5	4.7	17	0.3	435	3
LPMC Hd	2.65	< 2	28.9	7.5	100	0.8	41	0.9	0.7	1.1	2.06	15.6	2	1.4	< 0.2	< 10	< 0.2	0.9	13.6	34	0.63	523	1
MG1 Hd	1.71	< 2	10.7	4.1	110	0.2	87	5.4	3.8	1	2.62	14.6	3.7	2.2	1.2	< 10	< 0.2	0.4	3.7	20	0.53	511	2
MG2 Hd	1.2	< 2	12.3	2.3	110	< 0.1	37	6.3	5.1	0.7	1.83	11.9	5	1.8	1.7	20	0.2	0.5	4.4	9	0.26	372	< 1
MG3 Hd	1.25	< 2	12.9	3.5	140	< 0.1	29	6.2	4.5	0.7	2.28	11.2	4.2	1.8	1.6	< 10	< 0.2	0.4	4.7	9	0.35	424	2
MG4 Hd	0.86	< 2	11.9	2.5	130	< 0.1	33	5.7	5.2	0.6	1.88	10	4.2	1.8	1.2	< 10	< 0.2	0.6	5.2	8	0.19	290	2
MG5 Hd	1.04	< 2	11.5	1.8	210	0.5	30	5.7	4.6	0.6	1.87	11.8	3.8	2	1.4	< 10	< 0.2	0.5	5	7	0.24	378	10
MG6 Hd	1.3	< 2	13.1	2.5	470	0.3	17	7.4	5.7	0.9	1.74	13.2	5.3	1.8	1.7	< 10	< 0.2	0.4	4.9	7	0.23	364	< 1
MD1 Hd	1.41	< 2	12.3	6.2	100	0.4	29	5.5	3.7	0.8	3.07	12.7	5.1	1.8	1.3	< 10	< 0.2	0.4	4.3	7	0.45	501	2
MD2 Hd	1.03	< 2	11.7	3	390	0.4	23	5.7	4.8	0.5	1.89	12.2	4.2	1.4	1.2	< 10	< 0.2	0.4	4.2	6	0.24	346	3
MD3 Hd	1.38	< 2	10.2	3.5	120	0.2	45	5.6	4	0.7	1.92	12.8	3.1	2.2	1.4	< 10	< 0.2	0.4	4.2	9	0.4	413	4
MD4 Hd	1.11	< 2	11.4	3	150	0.1	28	6.4	4.4	0.6	1.9	9.9	4.5	1.8	1.5	< 10	0.3	0.5	4.8	13	0.23	351	3
MD5 Hd	1.06	< 2	13.4	1.9	100	0.3	30	7.1	4.6	0.7	2.12	10.9	4.5	1.7	1.5	< 10	< 0.2	0.5	5.2	8	0.28	379	2
LG1 Hd	2.65	< 2	26.1	7.6	90	0.6	20	1.2	0.7	0.9	2.15	15.8	2.1	1	0.2	< 10	< 0.2	0.9	14.3	7	0.63	511	< 1
LG2 Hd	2.65	< 2	30	7.2	100	0.5	25	1.6	0.6	0.8	2.47	17.7	1.8	1.1	0.3	< 10	< 0.2	1	14.5	9	0.65	555	2
LG3 Hd	2.2	< 2	25.1	6.4	140	0.5	21	0.9	0.3	0.7	1.9	18.1	1.5	1.4	0.2	< 10	< 0.2	1	12.5	8	0.51	465	< 1
LG4 Hd	2.14	< 2	25.4	3.9	110	0.6	18	0.7	0.5	0.7	1.81	15.9	1.8	1	< 0.2	< 10	< 0.2	0.9	13.4	6	0.46	438	1
LG5 Hd	2.82	< 2	23.6	11.4	180	0.9	24	1.3	0.8	0.9	2.45	18.8	1.9	1.7	0.3	< 10	< 0.2	0.8	10.4	9	1.38	576	< 1
LG6 Hd	2.18	< 2	25.9	4.7	110	0.4	19	0.6	0.3	0.8	1.66	14.5	1.6	1.3	< 0.2	< 10	< 0.2	0.9	14.5	6	0.4	385	2
LD1 Hd	2.47	< 2	27.1	7.6	120	0.5	20	1.3	1	0.8	2.35	16.9	1.3	1.2	< 0.2	< 10	< 0.2	0.9	14.8	8	0.76	533	< 1
LD2 Hd	2.48	< 2	28.2	3.6	100	0.5	21	0.9	0.5	1.2	1.76	18.6	1.7	1.1	< 0.2	< 10	< 0.2	1	14.4	6	0.47	464	< 1
LD3 Hd	2.79	< 2	27.1	4.5	100	0.7	24	1.1	0.6	0.9	2.05	15	2.2	1.1	0.3	< 10	< 0.2	0.9	15.6	7	0.6	520	< 1
LD4 Hd	2.87	< 2	26.5	7.5	100	0.6	24	1.6	1	0.9	2.58	16.4	1.8	1.6	0.3	< 10	< 0.2	0.9	14.3	7	0.72	592	2
LD5 Hd	2.22	< 2	23.7	7.2	110	0.8	30	1	0.7	0.7	1.87	15.7	1.4	1.6	< 0.2	< 10	< 0.2	0.9	12	7	0.53	458	1

Table 25-3: Elemental

Analyte Symbol	Nb	Nd	Ni	Pb	Pr	Rb	S	Sb	Se	Si	Sm	Sn	Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm
Detection Limit	2.4	0.4	10	0.8	0.1	0.4	0.01	2	8	0.01	0.1	0.5	3	0.2	0.1	6	0.1	0.01	0.1	0.1	0.1	5	0.7
Analysis Method	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2
MAA Hd	< 2.4	8.1	20	9.2	1.2	10.1	0.68	< 2	< 8	> 30.0	3.8	5.8	99	< 0.2	0.8	25	1	0.12	< 0.1	0.5	0.6	29	5.7
MAB Hd	< 2.4	8.6	20	20.5	1.9	11.8	0.71	2	< 8	> 30.0	2.4	6.6	80	< 0.2	1	22	1.1	0.09	0.1	0.7	0.6	9	9.7
MAC Hd	< 2.4	10.1	20	7.6	1.6	7.7	0.68	< 2	< 8	> 30.0	3.6	5.8	63	0.3	1.1	22	1.4	0.09	< 0.1	0.9	0.7	15	3.9
MAD Hd	< 2.4	9.1	40	9.8	1.9	7.3	0.56	< 2	13	> 30.0	2.3	6.3	71	< 0.2	0.9	32	1.2	0.08	< 0.1	0.7	0.7	13	5.9
MAE Hd	< 2.4	8.6	10	4.7	1.8	7.9	0.69	< 2	< 8	> 30.0	3	5.4	70	< 0.2	0.9	23	1.1	0.09	< 0.1	0.8	0.6	15	13.8
LPA Hd	< 2.4	8.9	10	12.3	2.7	27.5	0.22	2	< 8	> 30.0	1.5	5.1	410	< 0.2	0.1	24	0.7	0.12	0.1	< 0.1	0.3	34	3.9
LPB Hd	< 2.4	11.3	10	7.5	2.6	26.6	0.31	< 2	< 8	> 30.0	1.9	4.8	344	< 0.2	0.2	22	1	0.22	0.1	< 0.1	0.4	52	19.8
LPC Hd	< 2.4	11.8	10	8.6	3.6	20.8	0.36	< 2	< 8	> 30.0	1.4	5.2	438	< 0.2	0.3	26	1	0.25	< 0.1	0.2	0.4	56	13.5
LPD Hd	< 2.4	13.9	30	8.7	3.4	17.8	0.34	< 2	< 8	> 30.0	2.1	5.2	511	< 0.2	0.3	25	1.1	0.19	< 0.1	< 0.1	0.4	49	51.3
LPE Hd	< 2.4	13.5	20	9.4	4.1	22.8	0.27	2	< 8	29.5	2.6	3.6	436	< 0.2	0.3	21	1.8	0.3	0.1	0.1	0.5	71	12.6
MAMC Hd	< 2.4	8.4	30	13.9	1.8	9.6	0.69	3	< 8	> 30.0	1.9	5.8	78	< 0.2	0.9	20	1.1	0.09	< 0.1	0.8	0.5	21	8.6
LPMC Hd	< 2.4	10.6	20	9.6	2.9	25.9	0.29	< 2	< 8	> 30.0	2	4.6	417	< 0.2	0.2	21	1	0.21	0.1	0.1	0.4	46	16.3
MG1 Hd	< 2.4	8.8	30	45.8	1.7	8.9	0.56	< 2	< 8	> 30.0	3.9	4.8	85	< 0.2	1	19	1	0.13	0.2	0.6	0.5	33	5.8
MG2 Hd	< 2.4	8.2	20	19.5	1.9	7.5	0.55	< 2	< 8	> 30.0	2.9	5.9	86	< 0.2	1	23	1.2	0.1	< 0.1	0.7	0.7	17	4.7
MG3 Hd	< 2.4	9.8	20	33.6	1.8	8.7	0.72	< 2	< 8	> 30.0	3.5	5.7	73	< 0.2	1	28	1.3	0.09	< 0.1	0.8	0.7	21	12.4
MG4 Hd	< 2.4	9.5	20	15.5	1.6	13.5	0.78	< 2	14	> 30.0	2.8	6	60	0.3	0.9	25	1.3	0.08	< 0.1	0.8	0.5	13	4.6
MG5 Hd	< 2.4	9.6	10	19.7	1.5	9.8	0.6	3	< 8	> 30.0	3.1	6	64	< 0.2	0.9	20	1.2	0.08	< 0.1	0.6	0.6	16	22.5
MG6 Hd	< 2.4	10.5	30	15.8	2.1	8.8	0.71	< 2	< 8	> 30.0	4.2	6.3	79	0.3	1.2	38	1.4	0.09	< 0.1	0.7	0.6	13	4.2
MD1 Hd	< 2.4	12.4	20	6.1	1.9	7.3	0.74	< 2	< 8	> 30.0	3.8	4	76	0.3	1	22	1.2	0.14	< 0.1	0.7	0.6	35	7.1
MD2 Hd	< 2.4	7.7	20	6.1	1.3	9	0.73	2	< 8	> 30.0	2.9	3	66	0.3	0.9	22	1	0.09	< 0.1	0.8	0.5	20	6.4
MD3 Hd	< 2.4	7.4	10	7.9	1.7	7.6	0.55	< 2	< 8	> 30.0	2.7	3.9	82	0.3	0.8	20	1.1	0.1	< 0.1	0.7	0.5	29	5.7
MD4 Hd	< 2.4	8	20	16.7	1.6	8.7	0.7	< 2	< 8	> 30.0	3.3	30.2	68	0.2	0.9	24	1.1	0.09	< 0.1	0.7	0.5	17	5.6
MD5 Hd	< 2.4	10.3	10	10.9	1.9	8.4	0.76	< 2	14	> 30.0	3.1	2.8	77	< 0.2	1	25	1.3	0.09	< 0.1	0.8	0.7	19	18.7
LG1 Hd	< 2.4	13.4	40	8.8	2.7	25.3	0.31	< 2	< 8	> 30.0	1.6	4.5	420	0.4	0.2	21	0.9	0.25	< 0.1	0.1	0.4	65	61.3
LG2 Hd	< 2.4	13.5	20	9.6	3.4	25.7	0.32	< 2	< 8	> 30.0	2.5	3.1	411	0.2	0.3	24	1.1	0.26	< 0.1	0.1	0.5	64	20.8
LG3 Hd	< 2.4	10.8	180	13.3	3	23.2	0.29	< 2	< 8	> 30.0	1.5	2.5	370	< 0.2	0.2	28	0.7	0.17	0.2	< 0.1	0.4	48	10.2
LG4 Hd	< 2.4	11.1	10	10.8	2.7	20.5	0.27	< 2	< 8	> 30.0	1.8	4.2	389	< 0.2	0.2	29	0.8	0.15	< 0.1	< 0.1	0.4	44	10.5
LG5 Hd	< 2.4	10.8	50	12.5	2.3	23.6	0.21	< 2	< 8	29.6	2.2	3.2	399	0.4	0.2	29	0.7	0.21	0.1	< 0.1	0.3	70	6.5
LG6 Hd	< 2.4	11.5	< 10	11	3.3	23.8	0.21	< 2	< 8	> 30.0	2.3	2.8	394	0.4	0.2	30	0.9	0.15	< 0.1	< 0.1	0.4	40	4.8
LD1 Hd	< 2.4	10.7	20	10.4	2.7	25.5	0.22	< 2	< 8	29.9	1.7	3.1	410	< 0.2	0.2	24	1.1	0.21	< 0.1	< 0.1	0.4	64	7.3
LD2 Hd	< 2.4	12.6	20	9.9	2.7	23.2	0.18	< 2	< 8	> 30.0	1.6	4.6	416	0.3	0.2	31	0.9	0.16	< 0.1	< 0.1	0.4	41	6.1
LD3 Hd	< 2.4	12.1	20	10.3	3.1	22.9	0.34	< 2	< 8	> 30.0	2.4	2.4	431	< 0.2	0.3	26	1.1	0.25	0.1	0.1	0.4	56	47.7
LD4 Hd	< 2.4	13.4	20	7.4	3.1	24.2	0.42	< 2	< 8	29.2	2.7	4.1	391	0.2	0.3	26	1	0.31	0.1	0.2	0.4	70	22.4
LD5 Hd	< 2.4	11.1	10	10.5	2.5	20.9	0.3	< 2	< 8	> 30.0	1.8	4.3	379	< 0.2	0.2	27	0.8	0.17	< 0.1	< 0.1	0.3	45	14.2

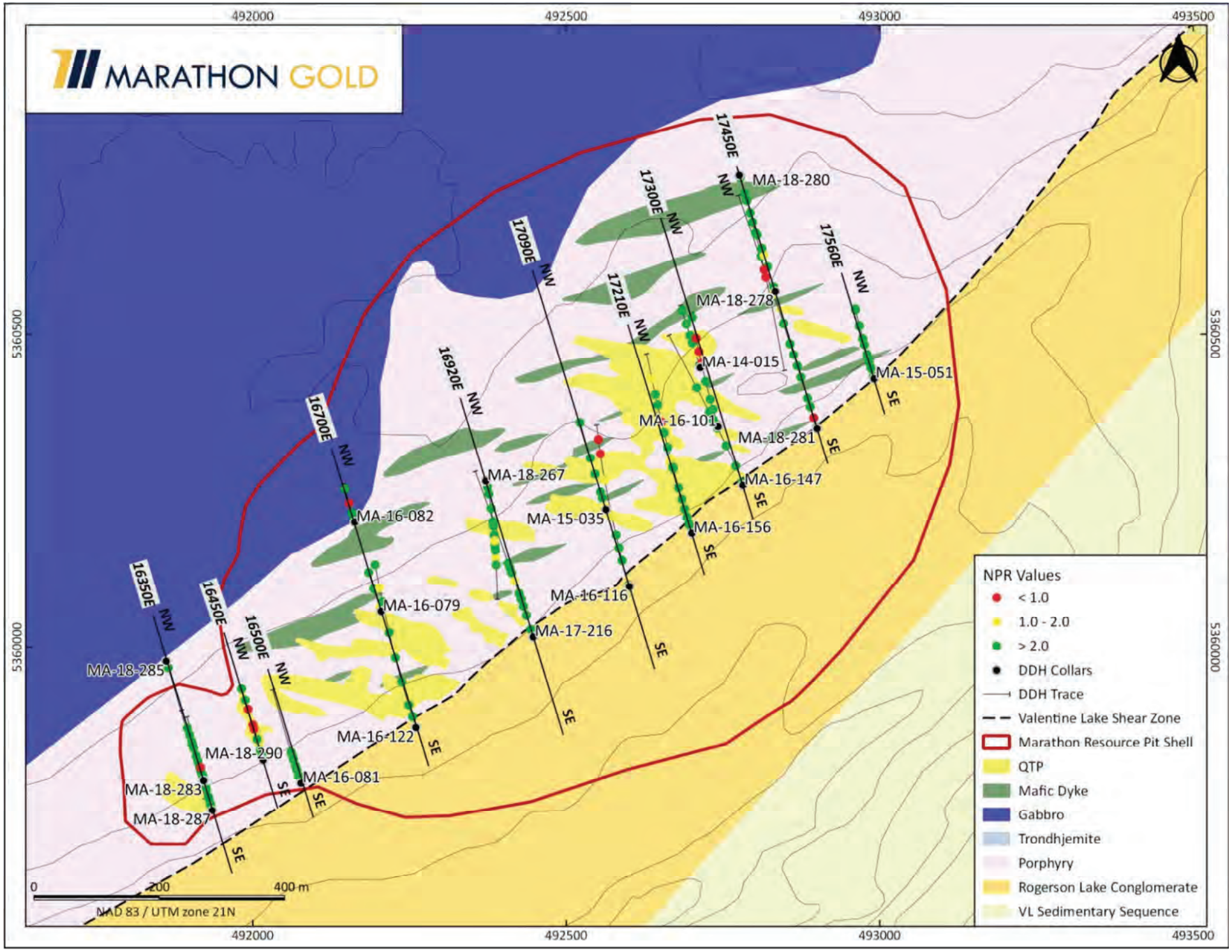
Table 25-3: Elemental

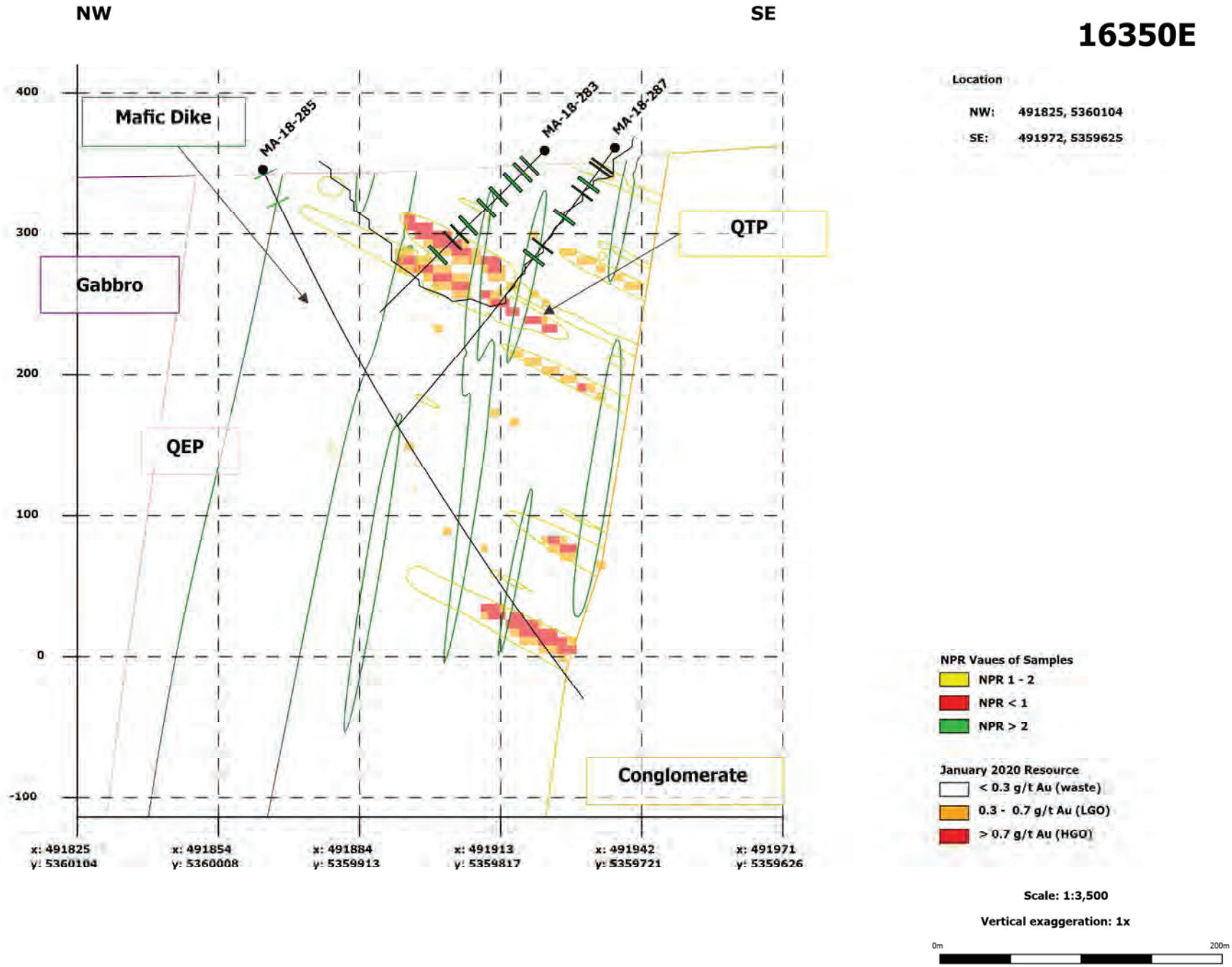
Analyte Symbol	Y	Yb	Zn
Unit Symbol	ppm	ppm	ppm
Detection Limit	0.1	0.1	30
Analysis Method	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2	FUS-MS-Na_2O_2
MAA Hd	34.6	4.3	40
MAB Hd	37.3	4.1	30
MAC Hd	47.9	4.8	< 30
MAD Hd	38.9	4.4	30
MAE Hd	43.3	4.3	< 30
LPA Hd	6	0.4	30
LPB Hd	6.8	0.8	40
LPC Hd	6.3	0.8	40
LPD Hd	5.1	0.4	40
LPE Hd	8.6	1.2	40
MAMC Hd	39.6	4.1	40
LPMC Hd	7.4	0.5	40
MG1 Hd	33.5	3.5	100
MG2 Hd	37.4	4.4	< 30
MG3 Hd	41.6	4.7	< 30
MG4 Hd	42.4	5.2	30
MG5 Hd	39.2	4.8	30
MG6 Hd	42.6	5.3	< 30
MD1 Hd	37	4.8	< 30
MD2 Hd	38	4	< 30
MD3 Hd	36.3	4.9	< 30
MD4 Hd	34.8	4	< 30
MD5 Hd	44	5	< 30
LG1 Hd	7.2	0.8	40
LG2 Hd	7.5	0.5	60
LG3 Hd	5.3	0.6	70
LG4 Hd	4.7	0.3	< 30
LG5 Hd	7.6	0.5	70
LG6 Hd	3.7	< 0.1	30
LD1 Hd	6.5	0.6	40
LD2 Hd	3.9	0.4	40
LD3 Hd	8.2	0.8	60
LD4 Hd	9.9	0.9	70
LD5 Hd	6.9	0.7	40

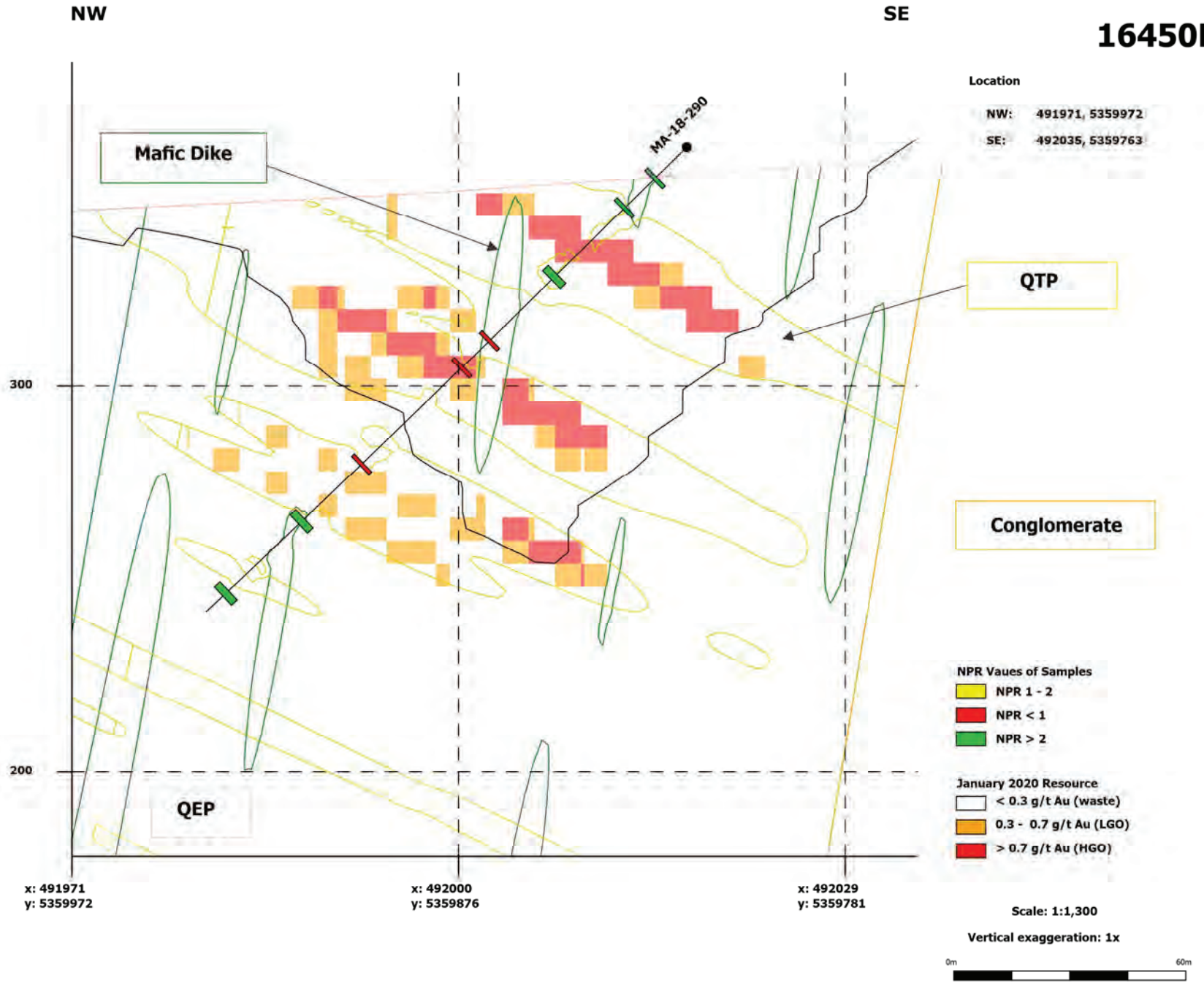
RESPONSE TO IR-26

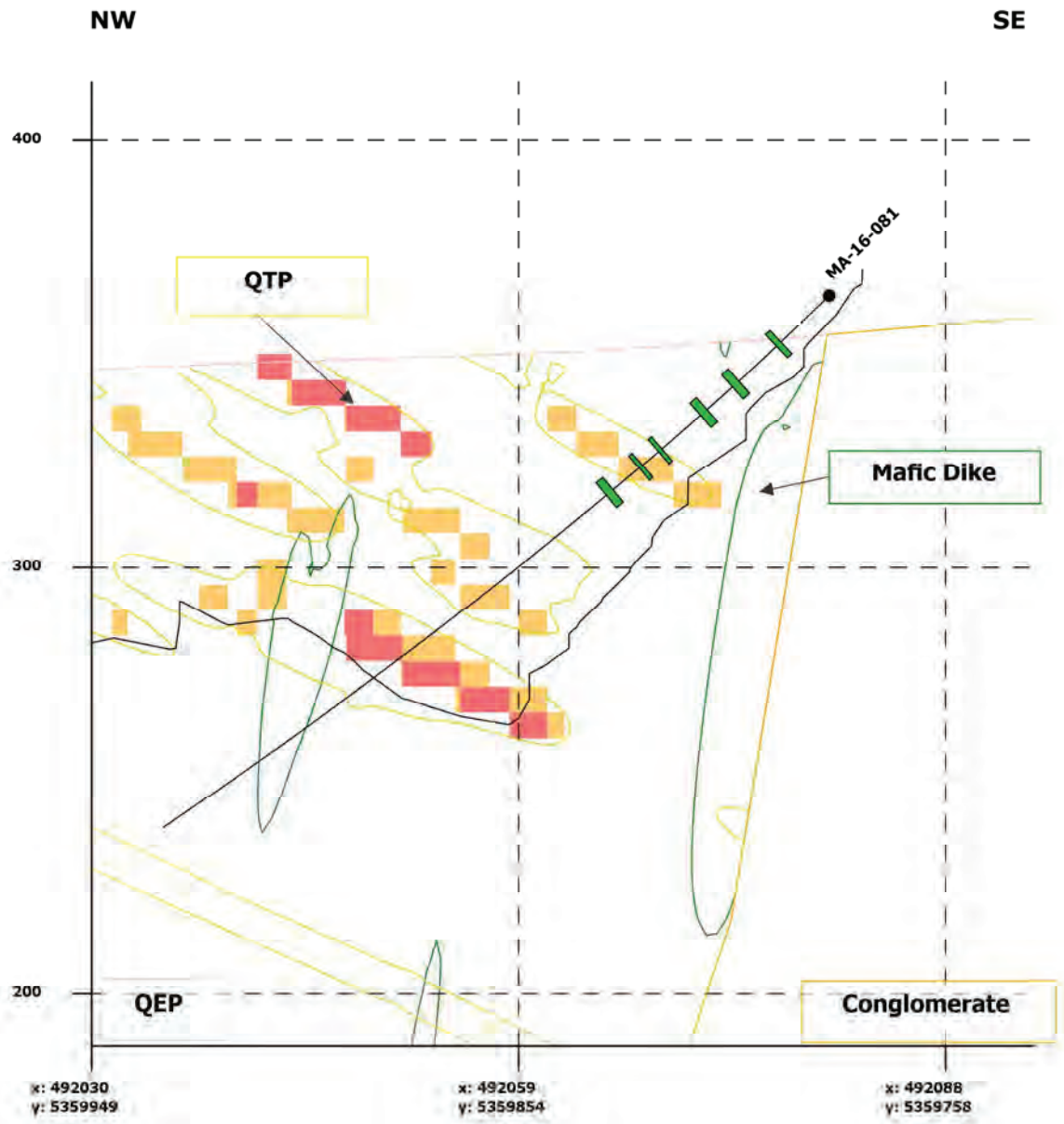
ID:	IR-26
Expert Department or Group:	NRCan-21
Guideline Reference:	Section 7.1
EIS Reference:	Chapter 7 and Baseline hydrology and surface water quality monitoring program (Appendix D Local water quality tables)
Context and Rationale:	Section 7.1 of the EIS Guidelines states that the EIS will present information in sufficient detail to enable the identification of how the project could affect the VCs and the analysis of those effects. Baseline water quality has been monitored at the site since 2011. Upon review of table 7.24 of Chapter 7 of the EIS, the baseline concentrations for a number of elements (including chromium) are high compared to the regional water quality monitoring stations. Currently, the proponent derived local baseline concentrations by pooling all water quality monitoring stations together and calculated a 75th percentile value as baseline water quality. Upon review of Appendix D of the baseline document, high chromium levels appear to have occurred predominantly in 2011 and have often been below the detection limit of 1ppb ever since. The variability in metal concentration depends on many factors and it is likely not appropriate to use baseline metal data in streams to derive a baseline for Valentine and Victoria Lakes.
Information Request:	a. Set baseline metal concentrations for Valentine Lake, Victoria Lake and Victoria River based only on measurements in the given water bodies that will receive effluent discharge. Discuss the baseline water quality for chromium in comparison to the Canadian Water Quality guideline for the protection of aquatic life of 1pbb for hexavalent chromium and 8ppb for trivalent chromium. Assess the need to include chromium as a contaminant of potential concern in the EIS given its toxicity to fish and fish habitat.
Response:	a. As indicated by the reviewer, pooled water quality data was used to describe local Project Area baseline conditions; however, in the assessment of effects on water quality (please refer to the Assimilative Capacity Study presented in Appendix 7C of the EIS and associated effects assessment for surface water quality in Section 7.5.2.3 of the EIS), water quality data was discretized for the small tributaries and ponds from the larger receivers (i.e., Victoria Lake Reservoir, Valentine Lake and Victoria River). As described in the Assimilative Capacity Study, local waterbody/watercourse water quality was used to model the effluent mixing and assimilation at the final discharge point and in the

APPENDIX IR-18.A
IR-18 MAPS AND CROSS-SECTIONS


MARATHON GOLD
492000
492500
493000
493500
5360500
5360000
16350E
16450E
16500E
16700E
16920E
17090E
17210E
17300E
17450E
17560E
NW
SE
MA-18-285
MA-18-290
MA-18-283
MA-18-287
MA-16-081
MA-16-122
MA-16-079
MA-16-082
MA-18-267
MA-17-216
MA-16-116
MA-15-035
MA-16-156
MA-16-147
MA-18-281
MA-16-101
MA-14-015
MA-18-278
MA-18-280
MA-15-051
0
200
400 m
NAD 83 / UTM zone 21N
NPR Values
< 1.0
1.0 - 2.0
> 2.0
DDH Collars
DDH Trace
Valentine Lake Shear Zone
Marathon Resource Pit Shell
QTP
Mafic Dyke
Gabbro
Trondhjemite
Porphyry
Rogerson Lake Conglomerate
VL Sedimentary Sequence


NW
SE
16350E
Location
NW: 491825, 5360104
SE: 491972, 5359625
400
300
200
100
0
-100
Mafic Dike
Gabbro
QEP
QTP
Conglomerate
MA-18-285
MA-18-283
MA-18-287
x: 491825
y: 5360104
x: 491854
y: 5360008
x: 491884
y: 5359913
x: 491913
y: 5359817
x: 491942
y: 5359721
x: 491971
y: 5359626
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,500
Vertical exaggeration: 1x
0m
200m


NW
SE
16450E
Location
NW: 491971, 5359972
SE: 492035, 5359763
Mafic Dike
MA-18-290
QTP
Conglomerate
QEP
300
200
x: 491971
y: 5359972
x: 492000
y: 5359876
x: 492029
y: 5359781
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:1,300
Vertical exaggeration: 1x
0m
60m



16500E

Location

NW: 492030, 5359949

SE: 492095, 5359738

NPR Vaues of Samples

- NPR 1 - 2
- NPR < 1
- NPR > 2

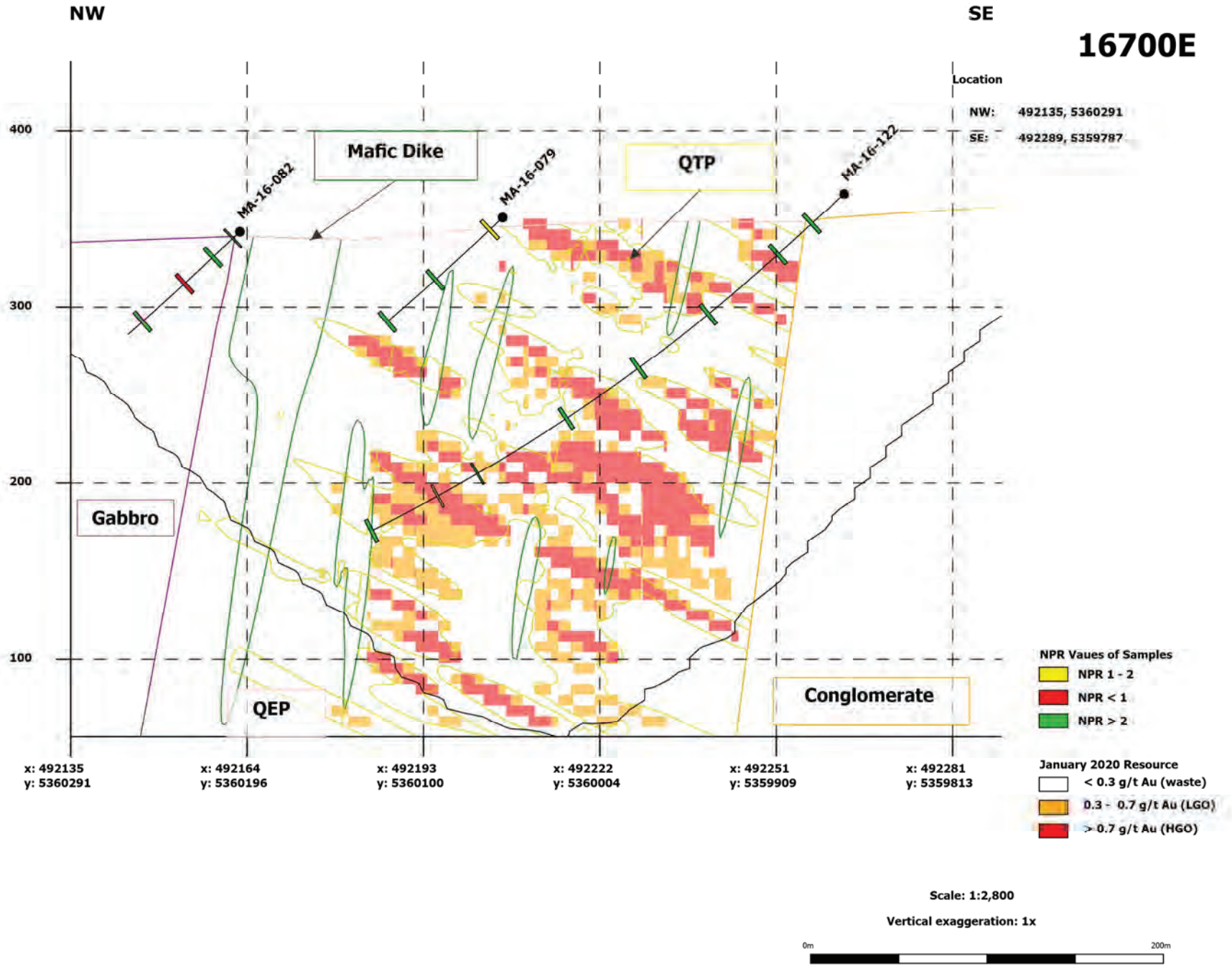
January 2020 Resource

- < 0.3 g/t Au (waste)
- 0.3 - 0.7 g/t Au (LGO)
- > 0.7 g/t Au (HGO)

Scale: 1:1,500

Vertical exaggeration: 1x

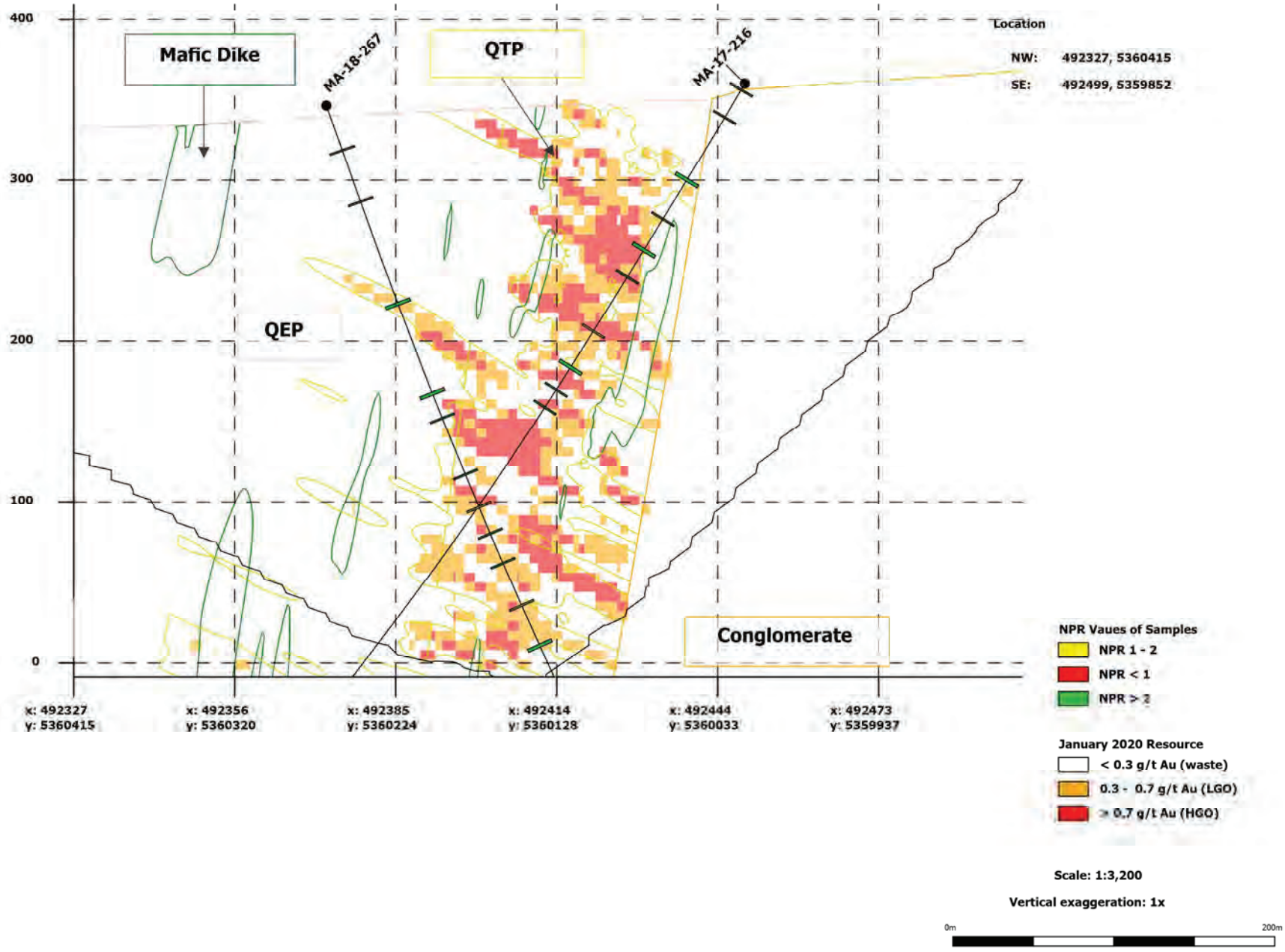
0m 80m

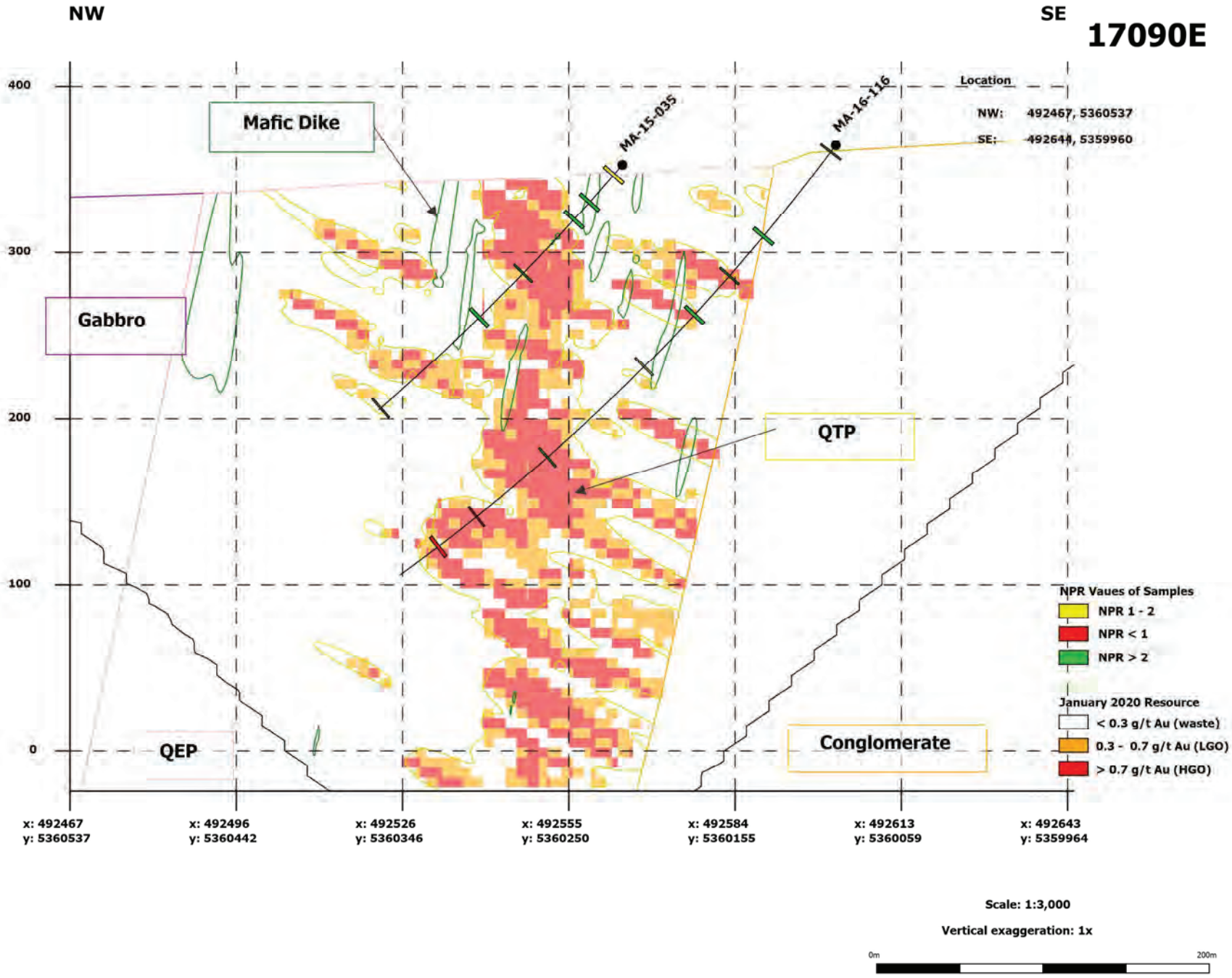

NW
SE
16700E
Location
NW: 492135, 5360291
SE: 492289, 5359787
400
300
200
100
Mafic Dike
QTP
MA-16-082
MA-16-079
MA-16-122
Gabbro
QEP
Conglomerate
x: 492135
y: 5360291
x: 492164
y: 5360196
x: 492193
y: 5360100
x: 492222
y: 5360004
x: 492251
y: 5359909
x: 492281
y: 5359813
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:2,800
Vertical exaggeration: 1x
0m
200m

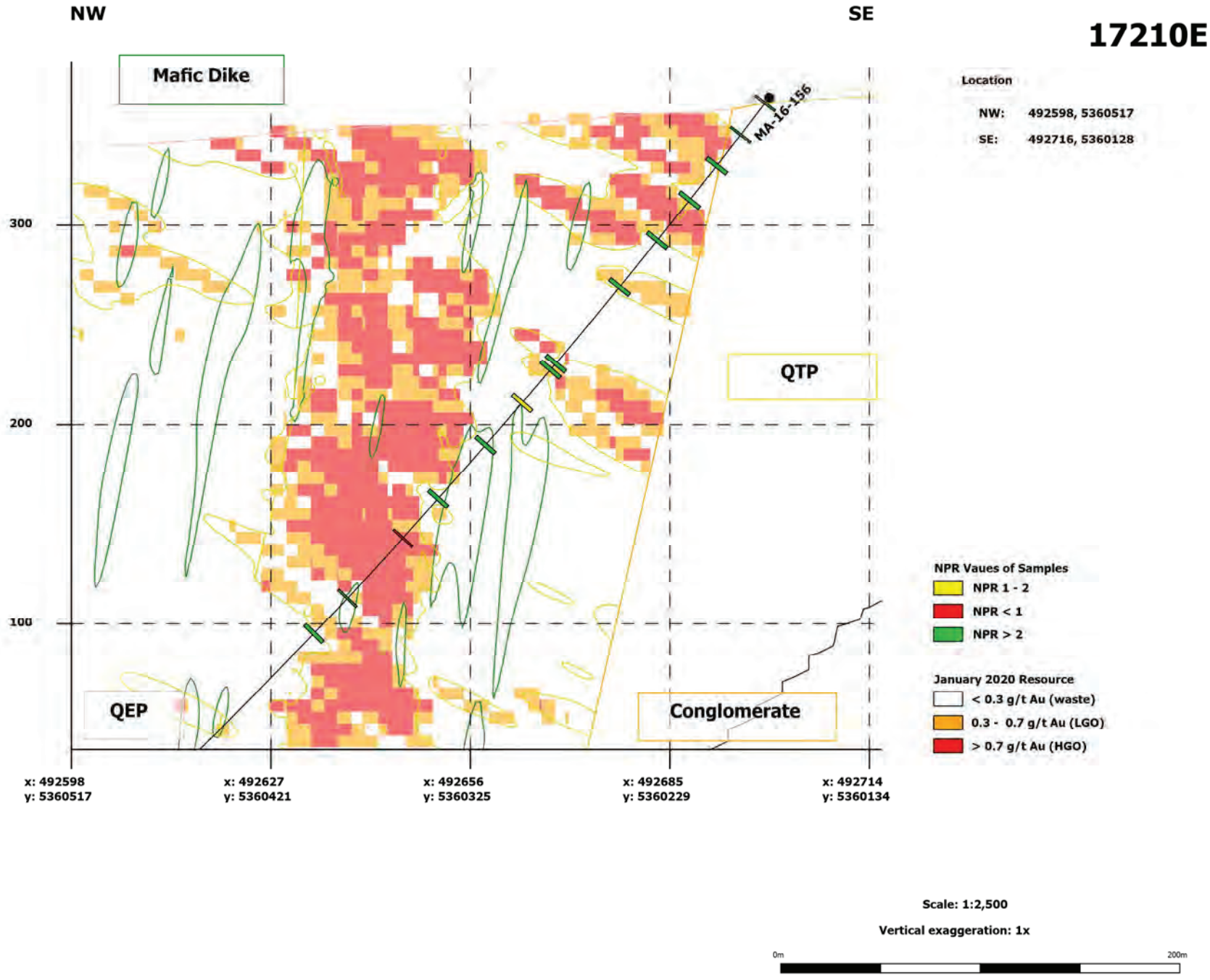
NW

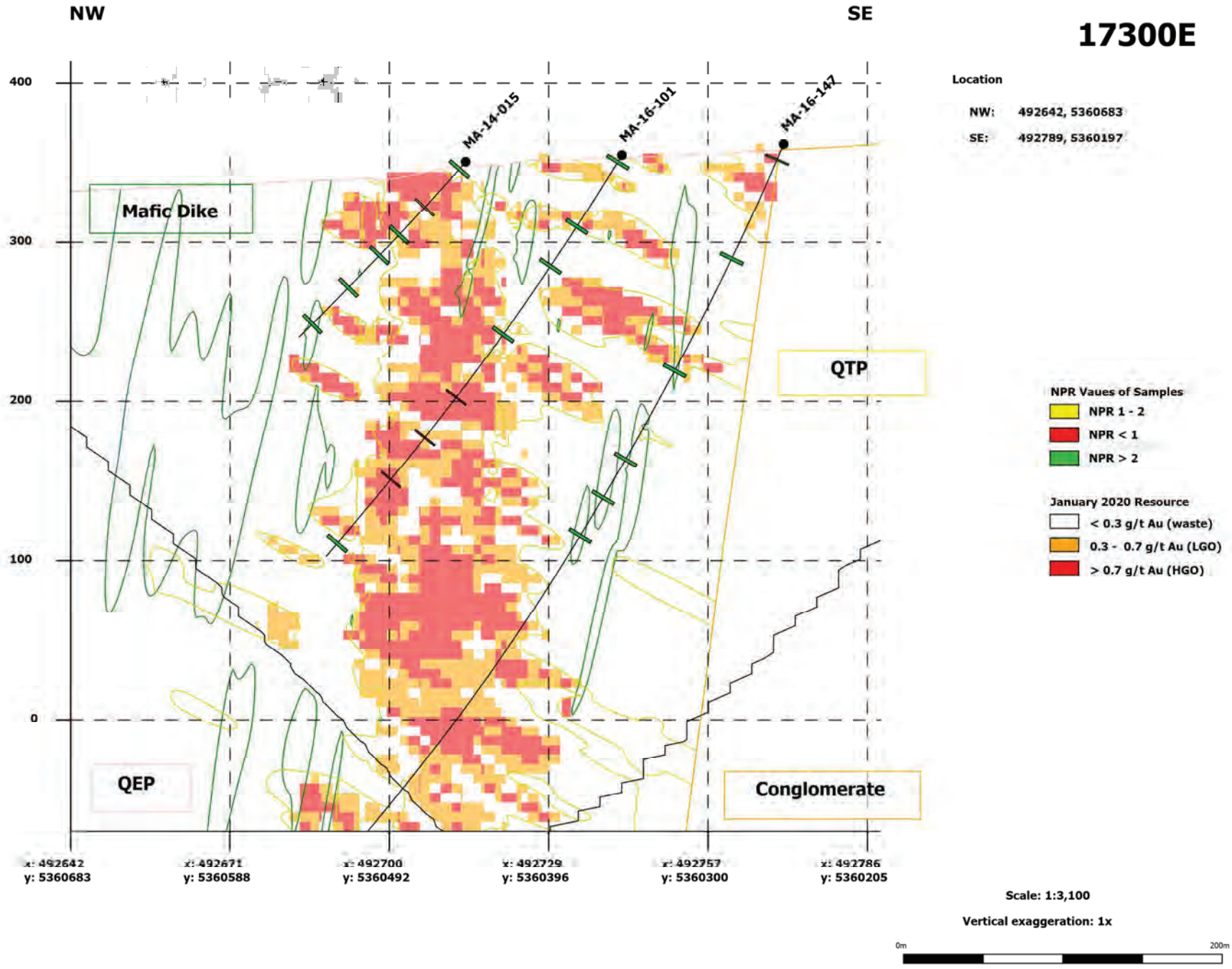
SE

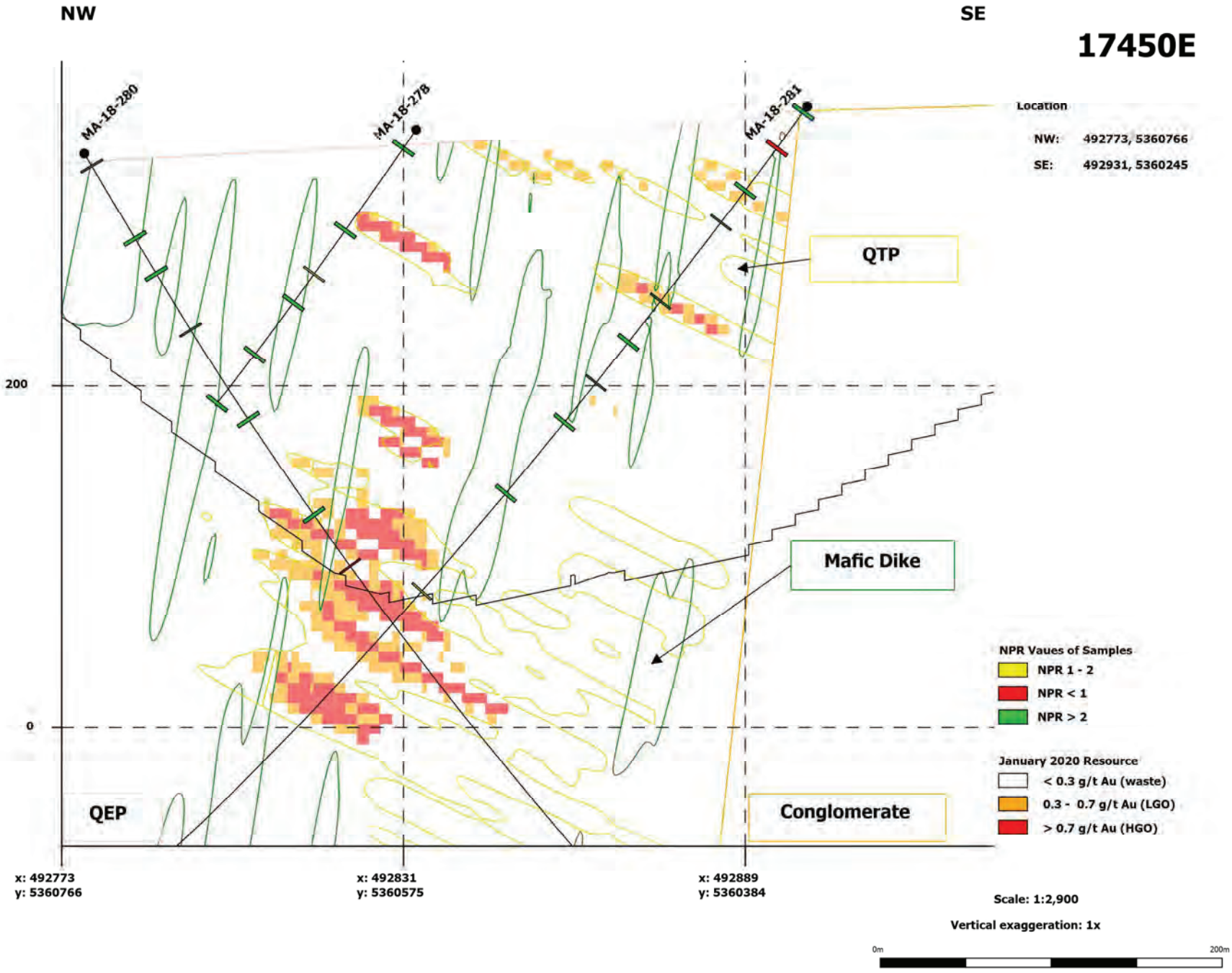
16920E

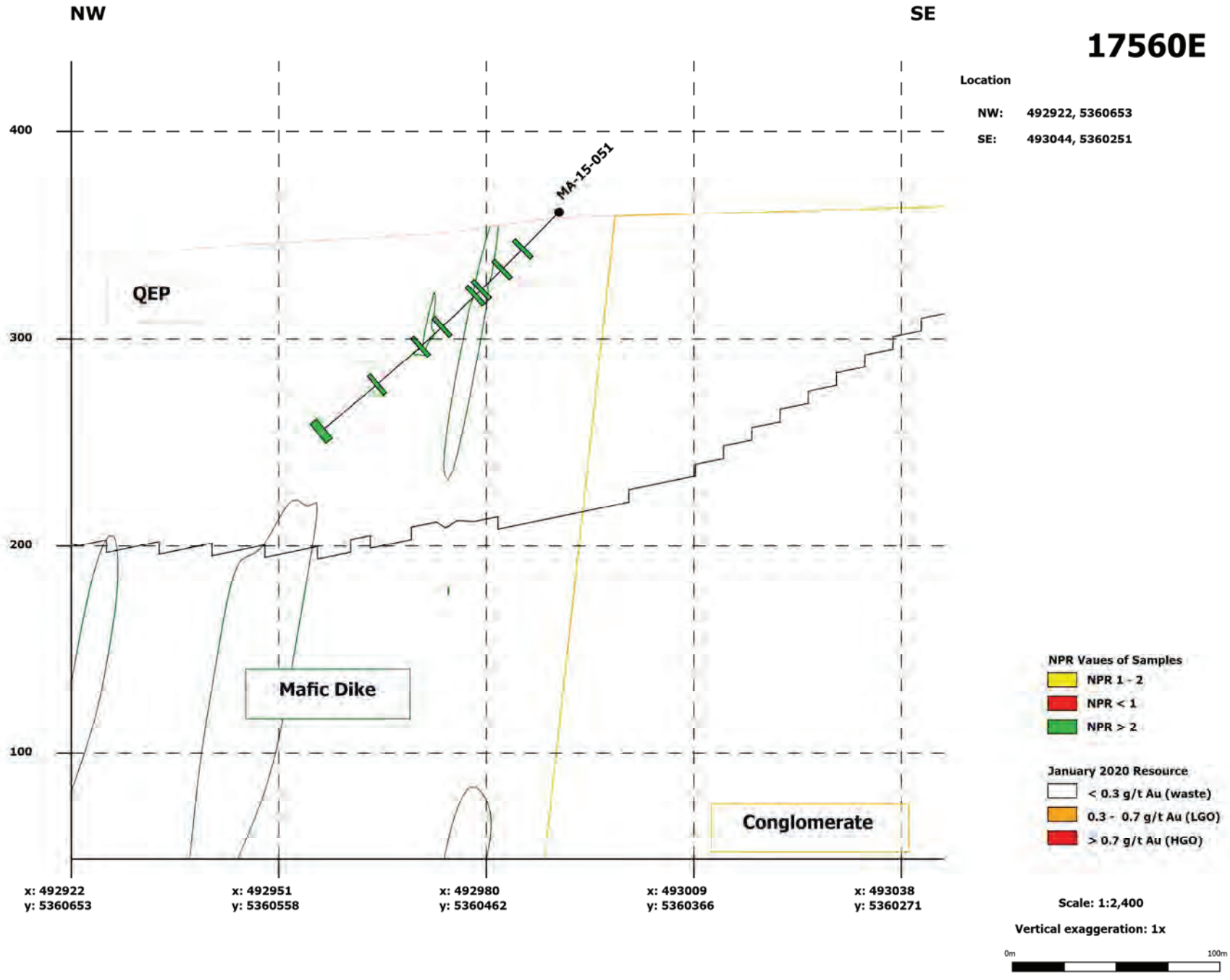

400
300
200
100
0
Mafic Dike
QTP
QEP
Conglomerate
MA-18-267
MA-17-216
Location
NW: 492327, 5360415
SE: 492499, 5359852
x: 492327
y: 5360415
x: 492356
y: 5360320
x: 492385
y: 5360224
x: 492414
y: 5360128
x: 492444
y: 5360033
x: 492473
y: 5359937
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,200
Vertical exaggeration: 1x
0m
200m

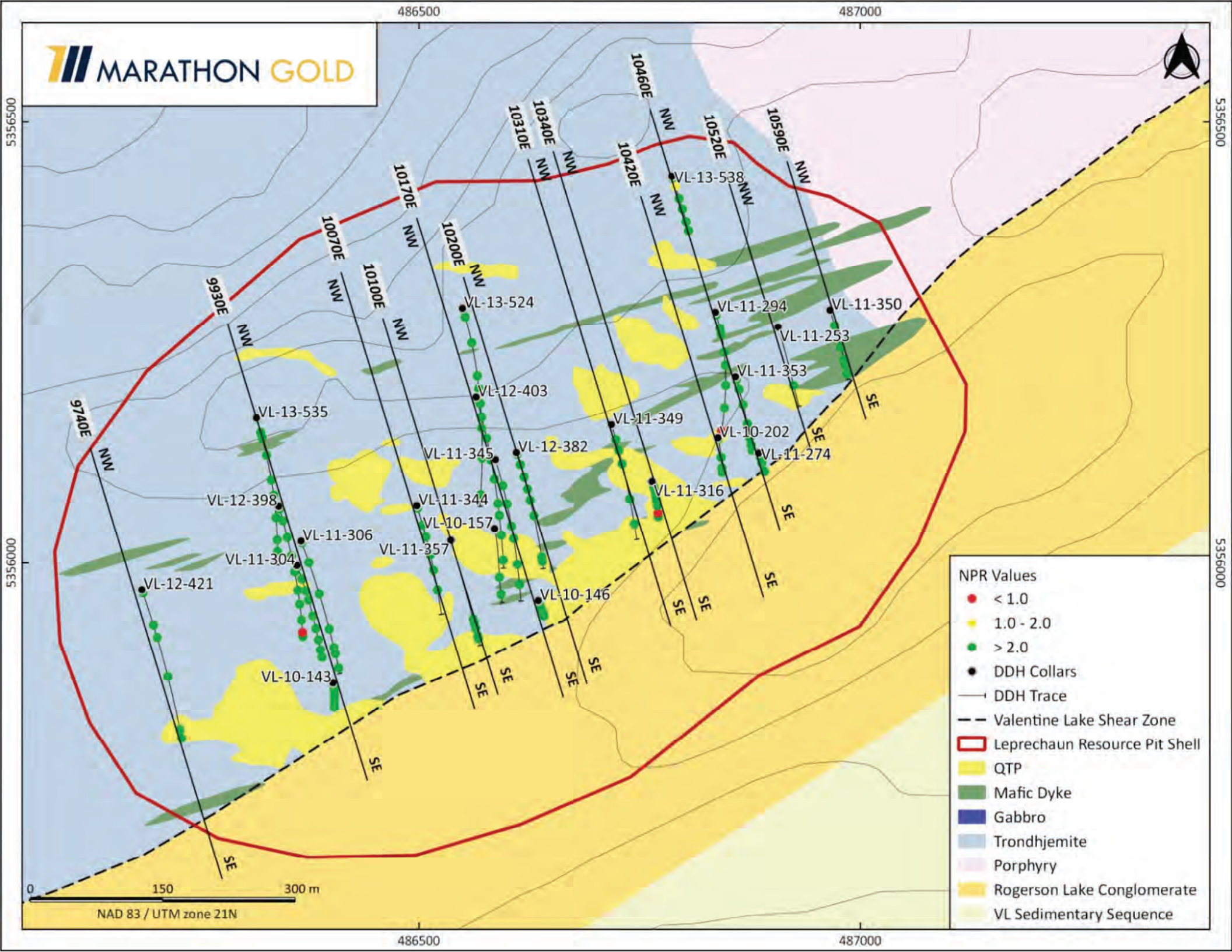

NW
SE
17090E
Location
NW: 492467, 5360537
SE: 492643, 5359960
MA-15-035
MA-16-116
Mafic Dike
Gabbro
QTP
QEP
Conglomerate
400
300
200
100
0
x: 492467
y: 5360537
x: 492496
y: 5360442
x: 492526
y: 5360346
x: 492555
y: 5360250
x: 492584
y: 5360155
x: 492613
y: 5360059
x: 492643
y: 5359964
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,000
Vertical exaggeration: 1x
0m
200m

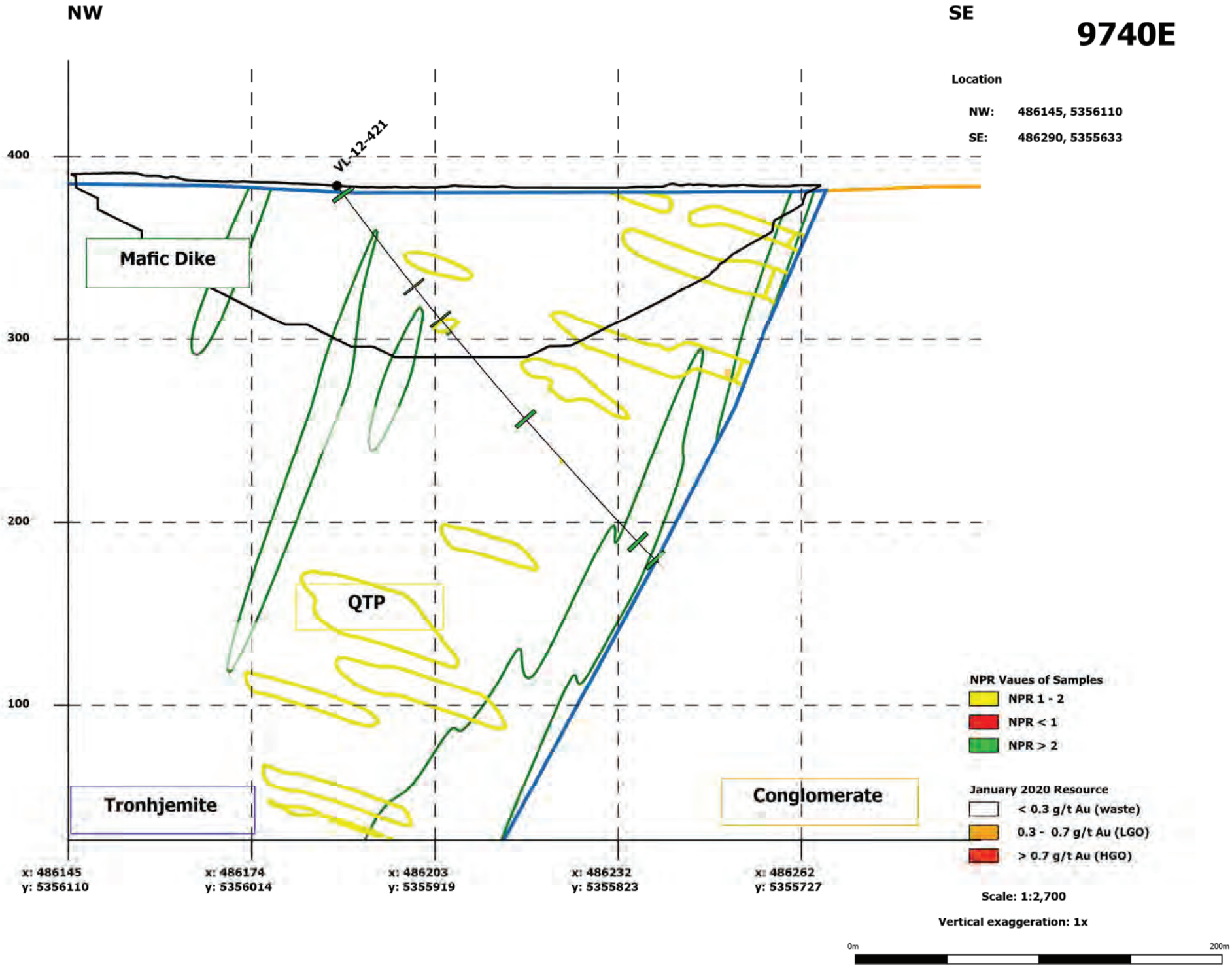

NW
SE
17210E
Mafic Dike
MA-16-156
Location
NW: 492598, 5360517
SE: 492716, 5360128
300
200
100
QTP
QEP
Conglomerate
x: 492598
y: 5360517
x: 492627
y: 5360421
x: 492656
y: 5360325
x: 492685
y: 5360229
x: 492714
y: 5360134
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:2,500
Vertical exaggeration: 1x
0m
200m

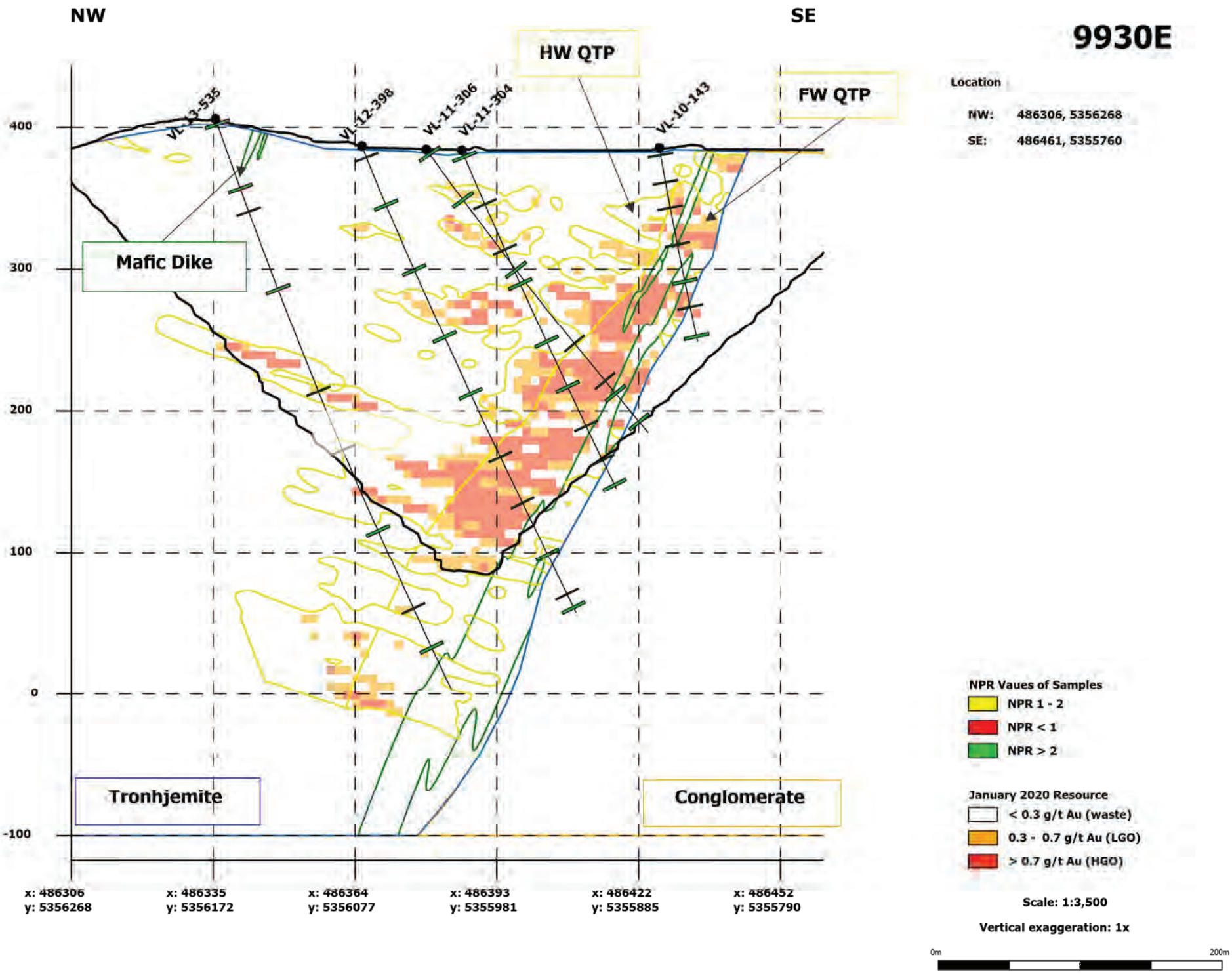

NW
SE
17300E
400
300
200
100
0
MA-14-015
MA-16-101
MA-16-147
Mafic Dike
QTP
QEP
Conglomerate
x: 492642
y: 5360683
x: 492671
y: 5360588
x: 492700
y: 5360492
x: 492729
y: 5360396
x: 492757
y: 5360300
x: 492786
y: 5360205
Location
NW: 492642, 5360683
SE: 492789, 5360197
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,100
Vertical exaggeration: 1x
0m
200m

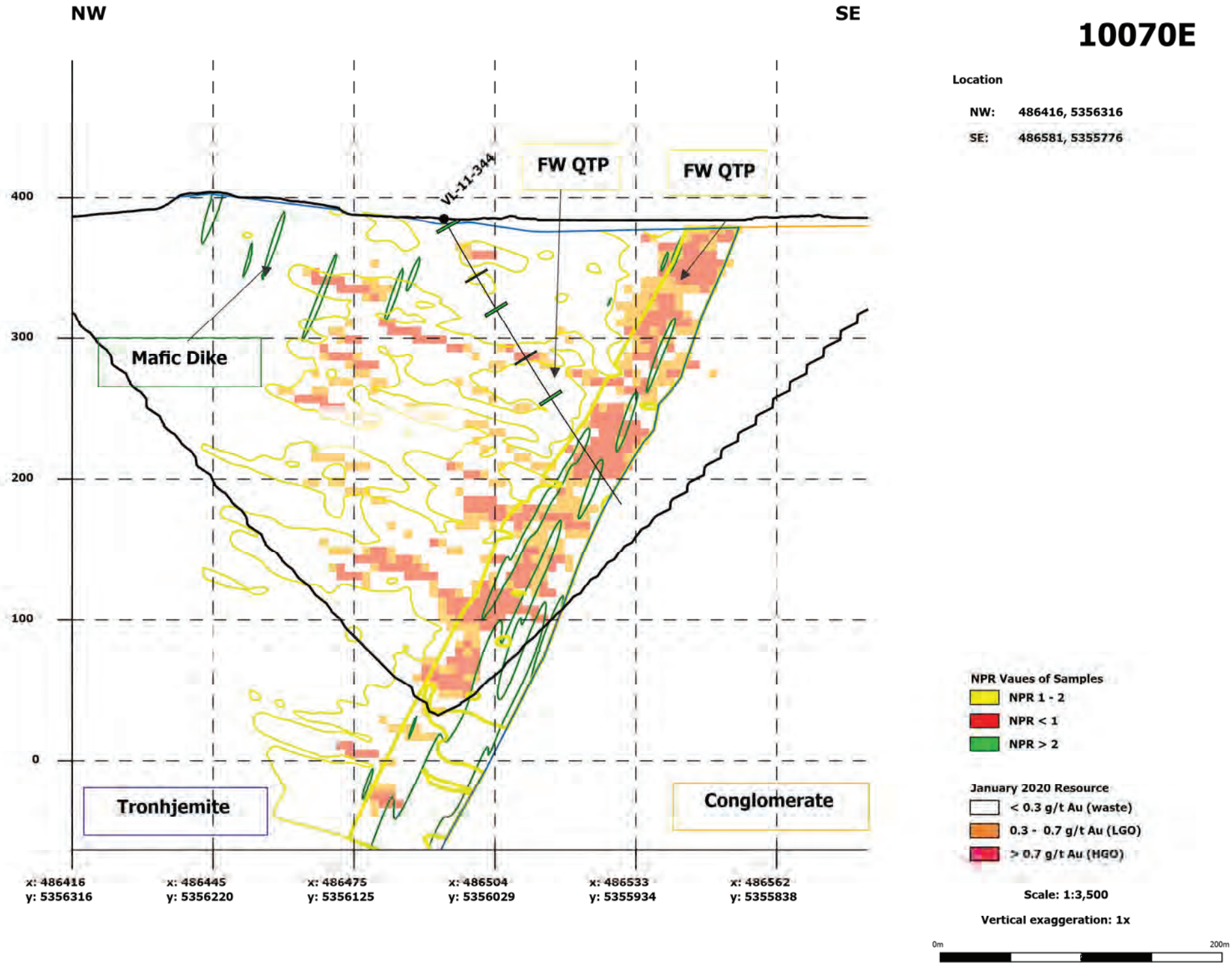

NW
SE
17450E
MA-18-280
MA-18-278
MA-18-281
Location
NW: 492773, 5360766
SE: 492931, 5360245
QTP
200
Mafic Dike
0
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
QEP
Conglomerate
x: 492773
y: 5360766
x: 492831
y: 5360575
x: 492889
y: 5360384
Scale: 1:2,900
Vertical exaggeration: 1x
0m
200m

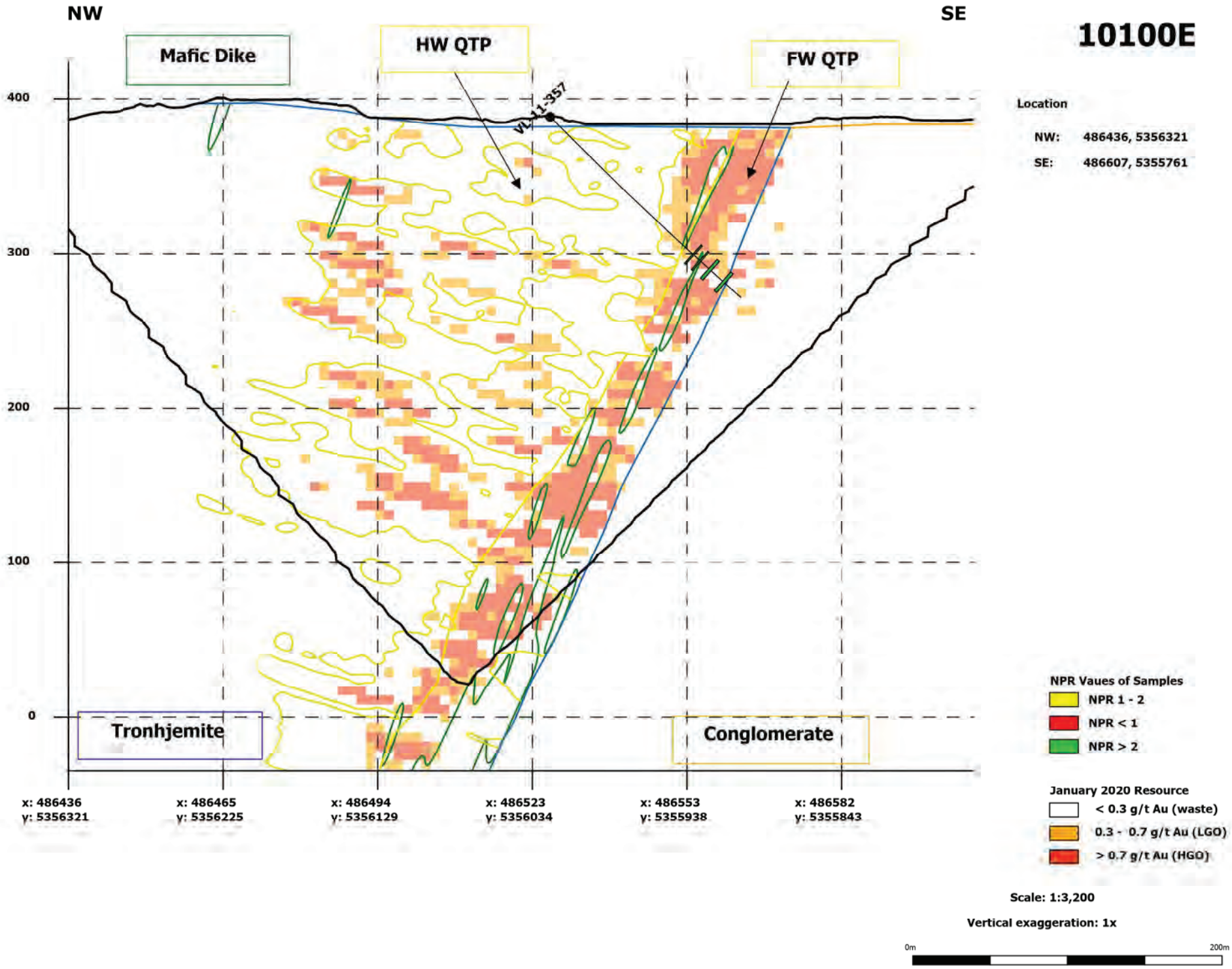

NW
SE
17560E
Location
NW: 492922, 5360653
SE: 493044, 5360251
400
300
200
100
MA-15-051
QEP
Mafic Dike
Conglomerate
x: 492922
y: 5360653
x: 492951
y: 5360558
x: 492980
y: 5360462
x: 493009
y: 5360366
x: 493038
y: 5360271
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:2,400
Vertical exaggeration: 1x
0m
100m

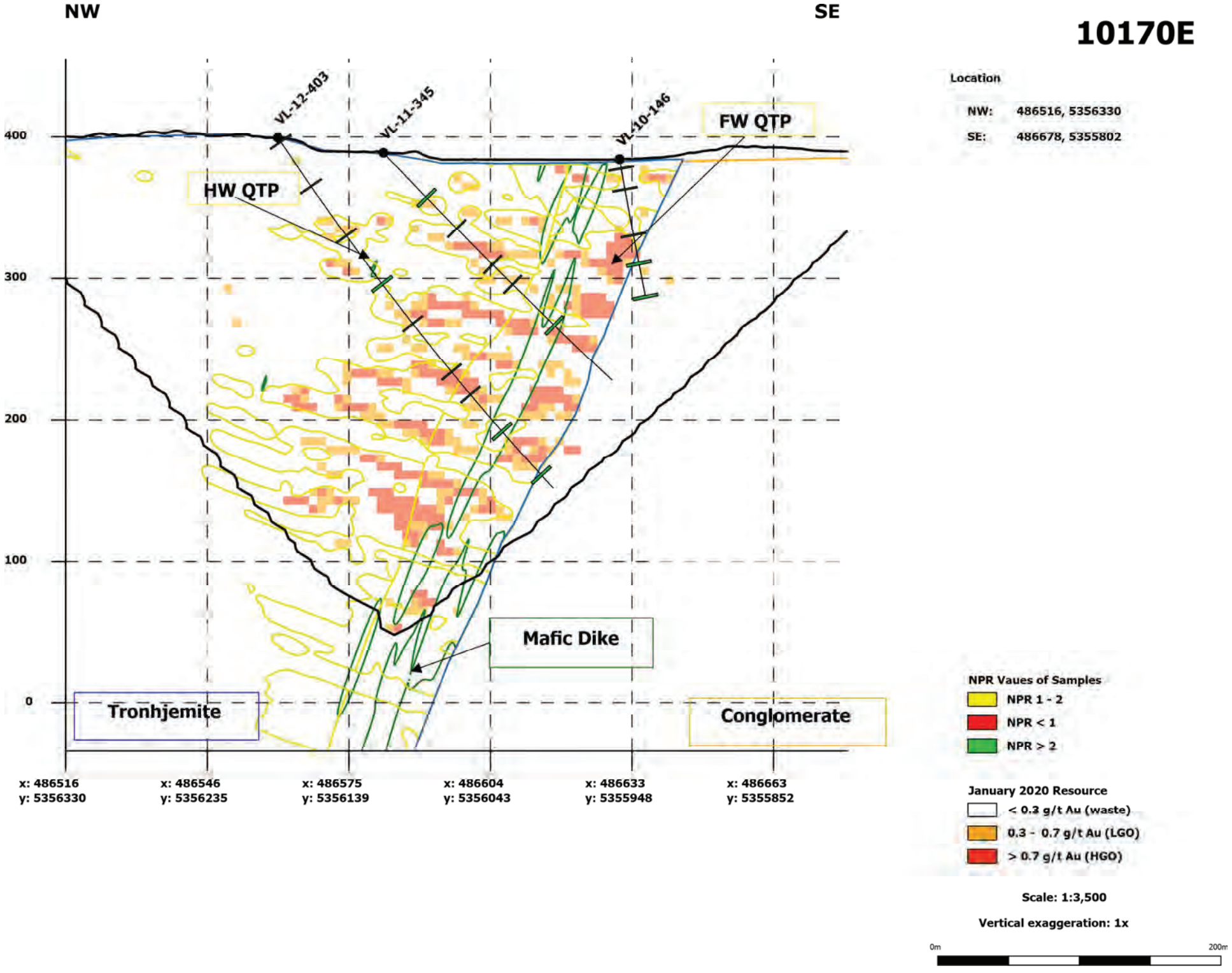

MARATHON GOLD
486500
487000
5356500
5356000
9740E
9930E
10070E
10100E
10170E
10200E
10310E
10340E
10420E
10460E
10520E
10590E
NW
SE
VL-13-538
VL-13-524
VL-13-535
VL-12-403
VL-12-382
VL-11-294
VL-11-350
VL-11-253
VL-11-353
VL-11-349
VL-10-202
VL-11-274
VL-11-345
VL-11-316
VL-12-398
VL-11-344
VL-10-157
VL-11-306
VL-11-357
VL-11-304
VL-12-421
VL-10-146
VL-10-143
0
150
300 m
NAD 83 / UTM zone 21N
NPR Values
< 1.0
1.0 - 2.0
> 2.0
DDH Collars
DDH Trace
Valentine Lake Shear Zone
Leprechaun Resource Pit Shell
QTP
Mafic Dyke
Gabbro
Trondhjemite
Porphyry
Rogerson Lake Conglomerate
VL Sedimentary Sequence

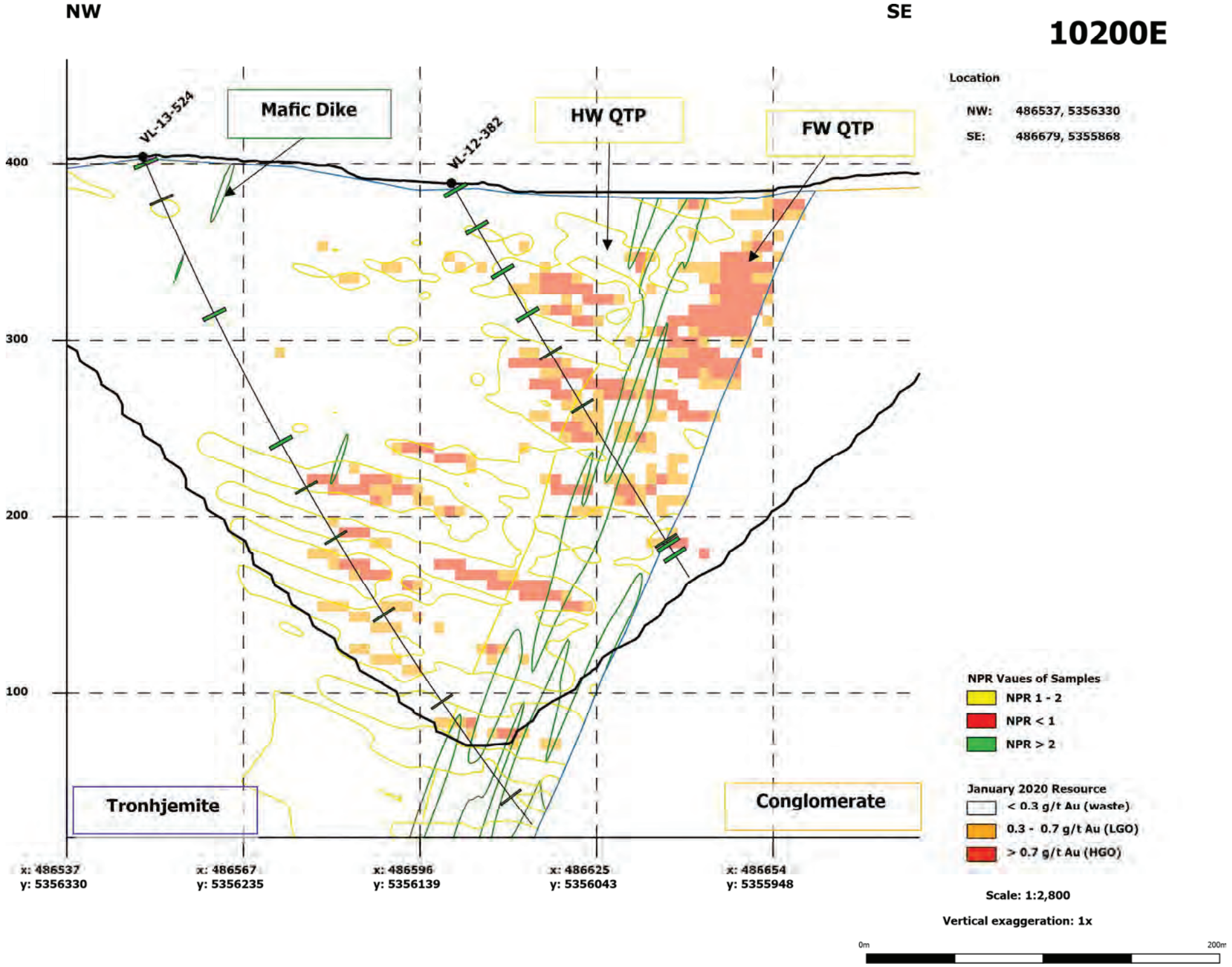

NW
SE
9740E
Location
NW: 486145, 5356110
SE: 486290, 5355633
400
300
200
100
VL-12-421
Mafic Dike
QTP
Tronhjemite
Conglomerate
x: 486145
y: 5356110
x: 486174
y: 5356014
x: 486203
y: 5355919
x: 486232
y: 5355823
x: 486262
y: 5355727
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:2,700
Vertical exaggeration: 1x
0m
200m


NW
SE
9930E
HW QTP
FW QTP
VL-13-535
VL-12-398
VL-11-306
VL-11-304
VL-10-143
Mafic Dike
Tronhjemite
Conglomerate
400
300
200
100
0
-100
x: 486306
y: 5356268
x: 486335
y: 5356172
x: 486364
y: 5356077
x: 486393
y: 5355981
x: 486422
y: 5355885
x: 486452
y: 5355790
Location
NW: 486306, 5356268
SE: 486461, 5355760
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,500
Vertical exaggeration: 1x
0m
200m


NW
SE
10070E
Location
NW: 486416, 5356316
SE: 486581, 5355776
VL-11-344
FW QTP
FW QTP
Mafic Dike
Tronhjemite
Conglomerate
400
300
200
100
0
x: 486416
y: 5356316
x: 486445
y: 5356220
x: 486475
y: 5356125
x: 486504
y: 5356029
x: 486533
y: 5355934
x: 486562
y: 5355838
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,500
Vertical exaggeration: 1x
0m
200m


NW
SE
10100E
Mafic Dike
HW QTP
FW QTP
VL-11-357
400
300
200
100
0
Tronhjemite
Conglomerate
x: 486436
y: 5356321
x: 486465
y: 5356225
x: 486494
y: 5356129
x: 486523
y: 5356034
x: 486553
y: 5355938
x: 486582
y: 5355843
Location
NW: 486436, 5356321
SE: 486607, 5355761
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,200
Vertical exaggeration: 1x
0m
200m

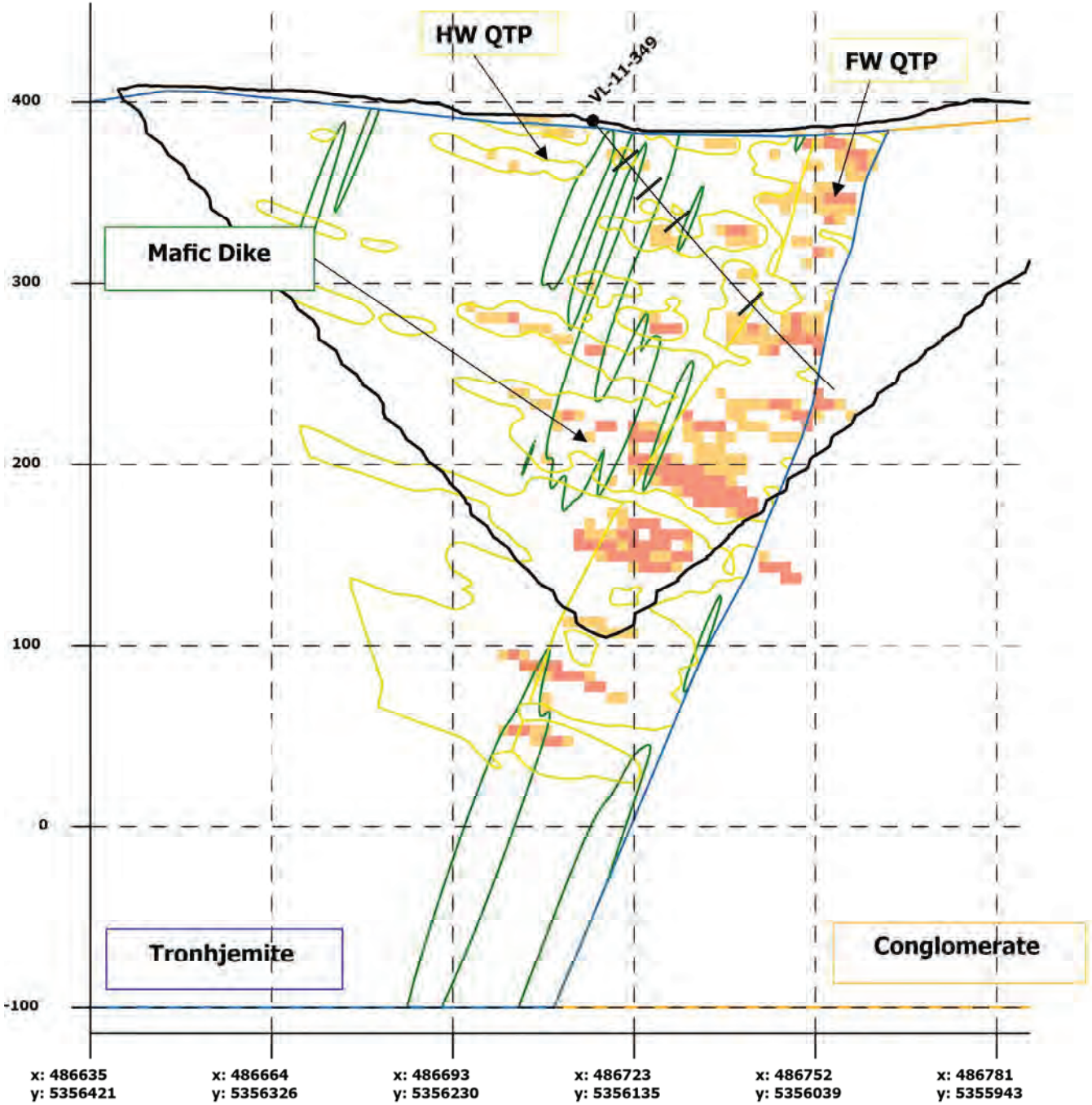

NW
SE
10170E
VL-12-403
VL-11-345
VL-10-146
FW QTP
HW QTP
Mafic Dike
Tronhjemite
Conglomerate
400
300
200
100
0
x: 486516
y: 5356330
x: 486546
y: 5356235
x: 486575
y: 5356139
x: 486604
y: 5356043
x: 486633
y: 5355948
x: 486663
y: 5355852
Location
NW: 486516, 5356330
SE: 486678, 5355802
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,500
Vertical exaggeration: 1x
0m
200m


NW
SE
10200E
Location
NW: 486537, 5356330
SE: 486679, 5355868
Mafic Dike
HW QTP
FW QTP
VL-13-524
VL-12-382
400
300
200
100
Tronhjemite
Conglomerate
x: 486537
y: 5356330
x: 486567
y: 5356235
x: 486596
y: 5356139
x: 486625
y: 5356043
x: 486654
y: 5355948
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:2,800
Vertical exaggeration: 1x
0m
200m

NW

SE

10310E



Location

NW: 486635, 5356421

SE: 486787, 5355926

NPR Vaues of Samples

- NPR 1 - 2
- NPR < 1
- NPR > 2

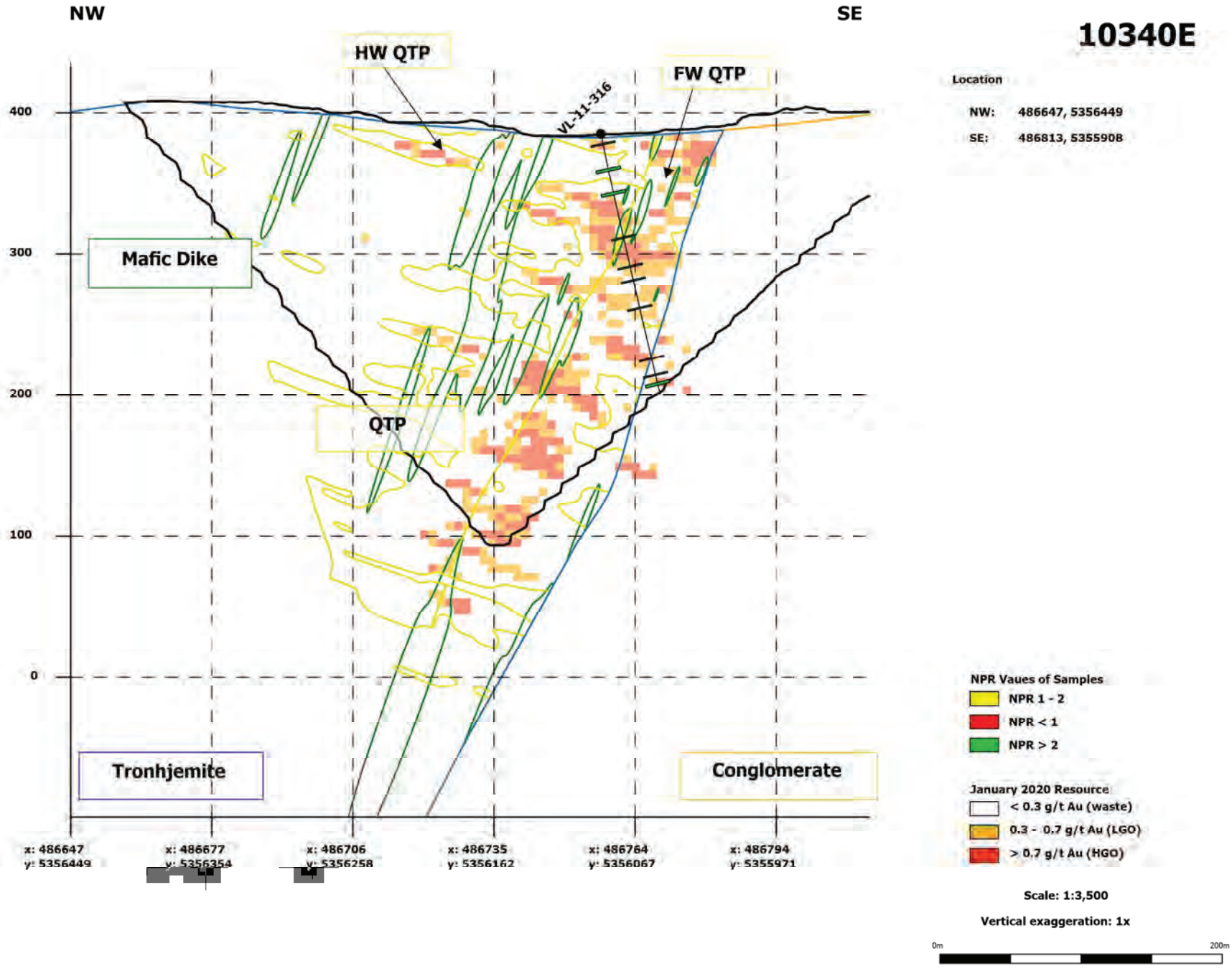
January 2020 Resource

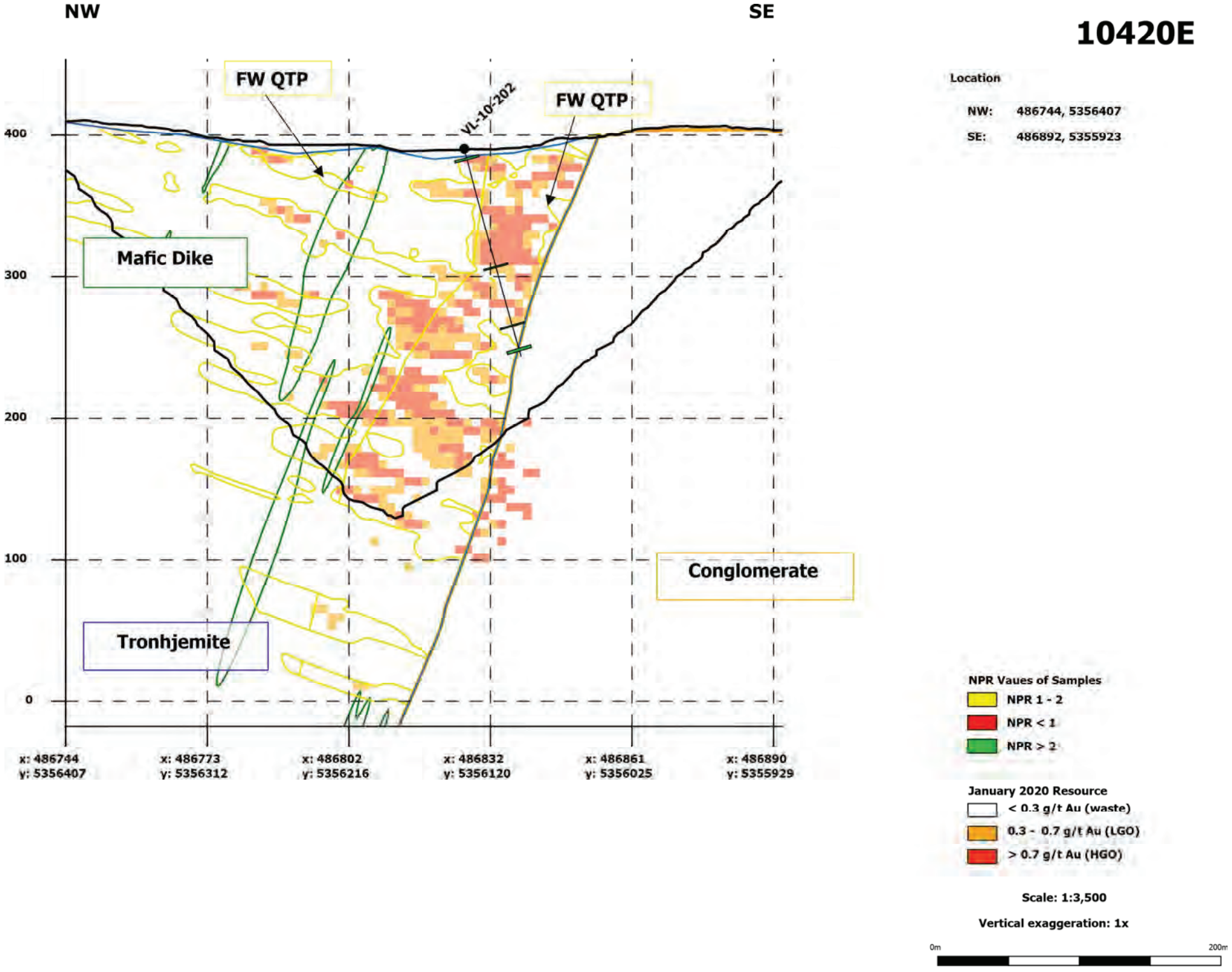
- < 0.3 g/t Au (waste)
- 0.3 - 0.7 g/t Au (LGO)
- > 0.7 g/t Au (HGO)

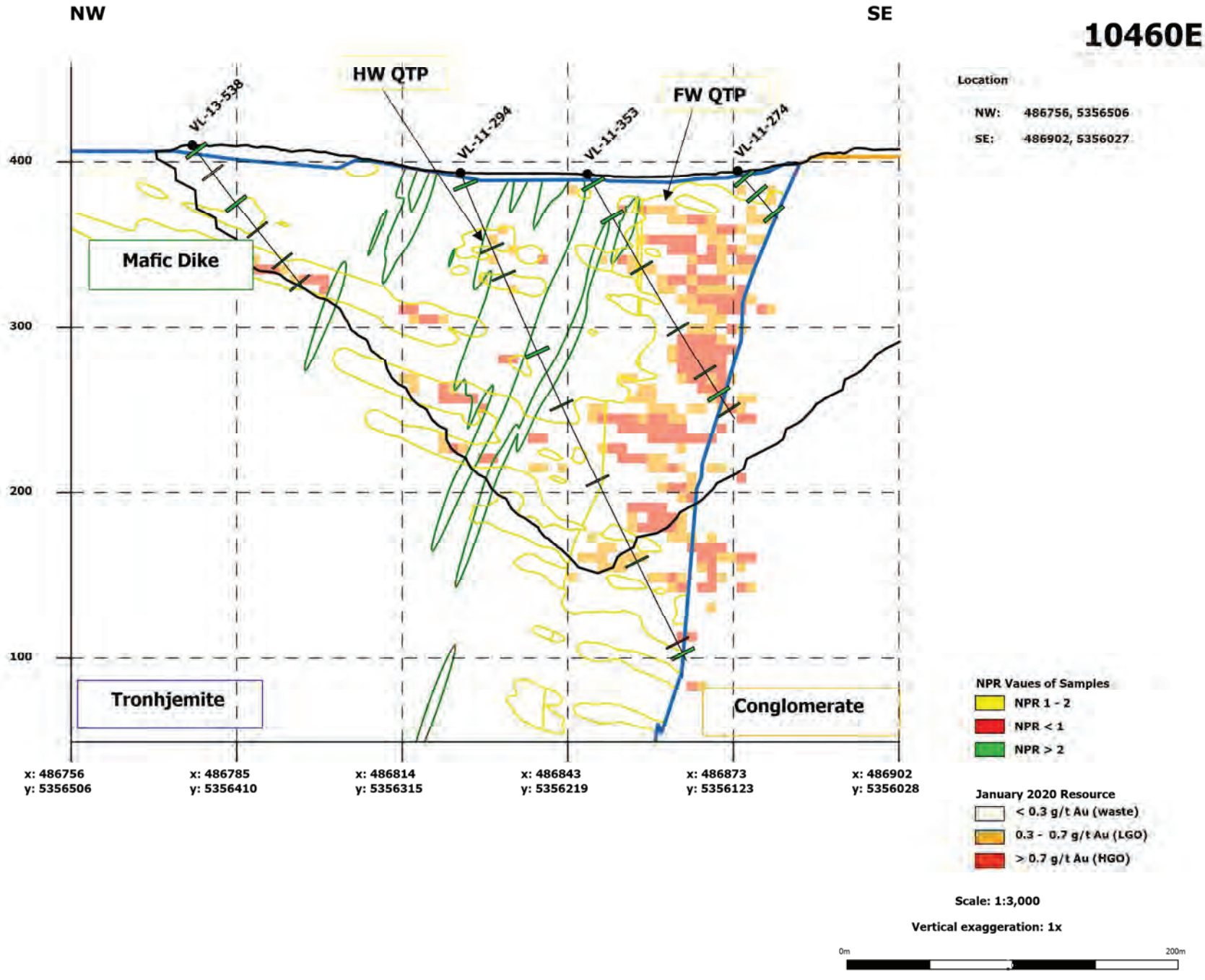
Scale: 1:3,500

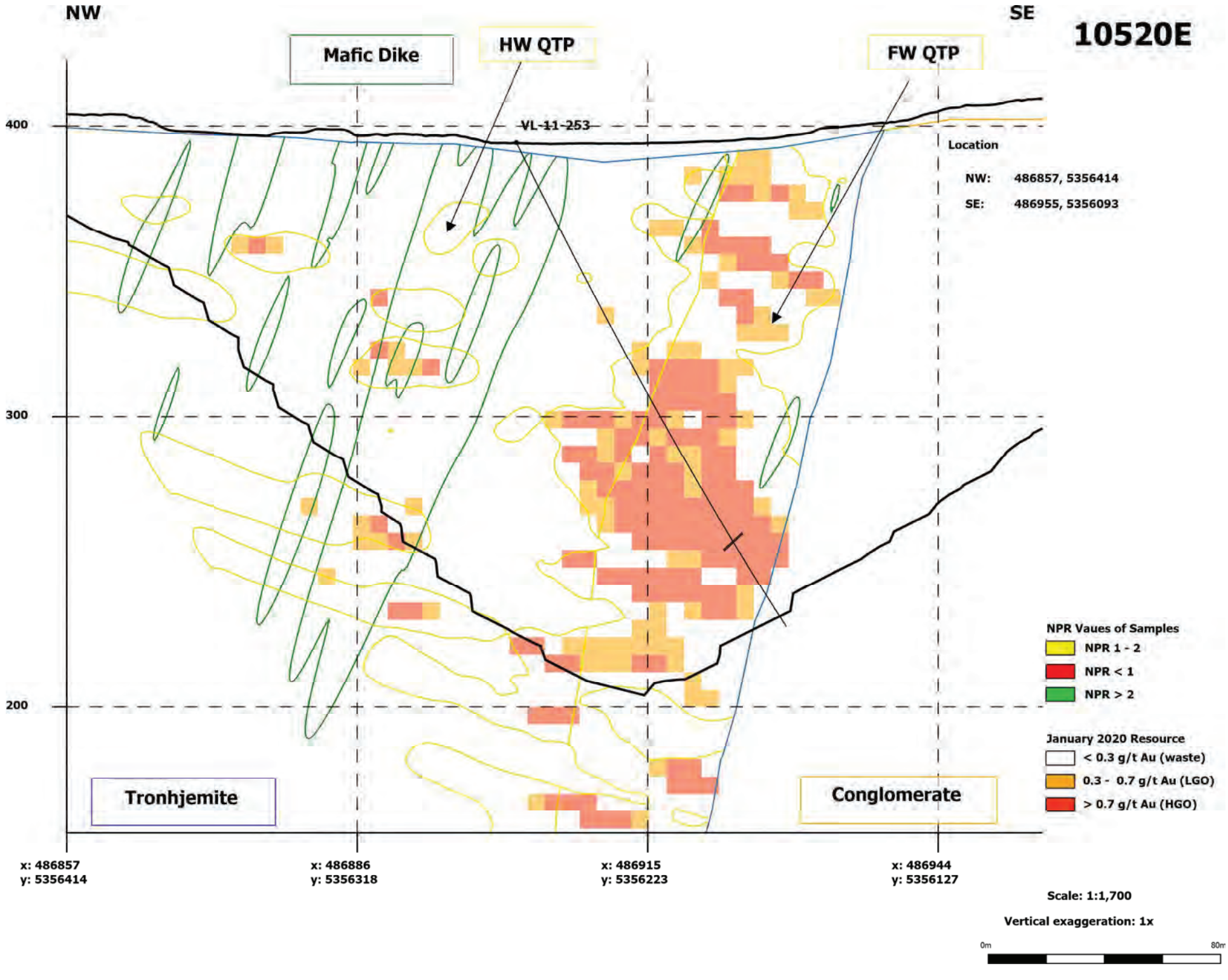
Vertical exaggeration: 1x

0m 200m


NW
SE
10340E
HW QTP
FW QTP
VL-11-316
400
300
200
100
0
Mafic Dike
QTP
Tronhjemite
Conglomerate
x: 486647
y: 5356449
x: 486677
y: 5356354
x: 486706
y: 5356258
x: 486735
y: 5356162
x: 486764
y: 5356067
x: 486794
y: 5355971
Location
NW: 486647, 5356449
SE: 486813, 5355908
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,500
Vertical exaggeration: 1x
0m
200m


NW
SE
10420E
FW QTP
FW QTP
VL-10-202
Mafic Dike
Conglomerate
Tronhjemite
400
300
200
100
0
x: 486744
y: 5356407
x: 486773
y: 5356312
x: 486802
y: 5356216
x: 486832
y: 5356120
x: 486861
y: 5356025
x: 486890
y: 5355929
Location
NW: 486744, 5356407
SE: 486892, 5355923
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,500
Vertical exaggeration: 1x
0m
200m

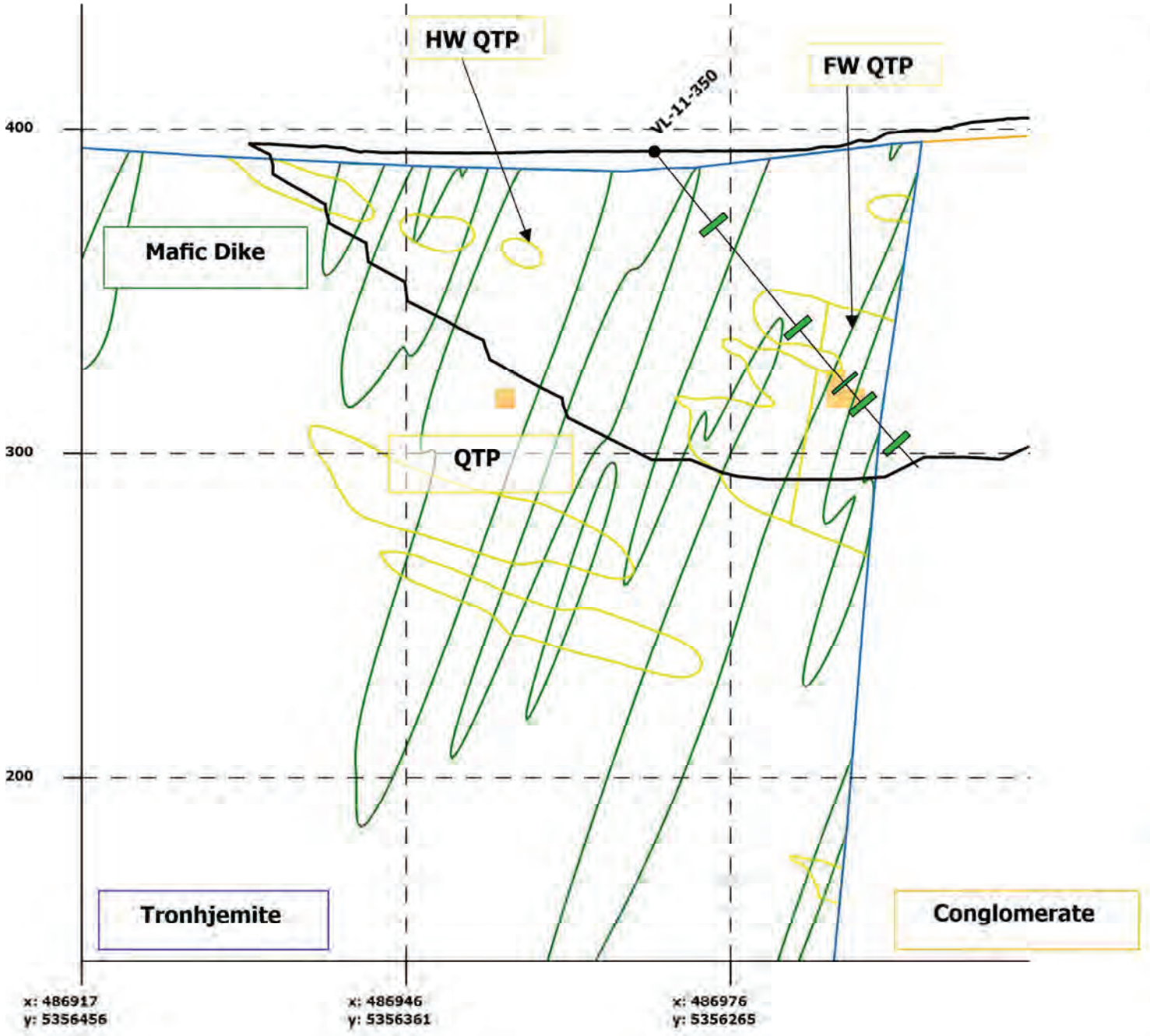

NW
SE
10460E
HW QTP
FW QTP
VL-13-538
VL-11-294
VL-11-353
VL-11-274
400
300
200
100
Mafic Dike
Tronhjemite
Conglomerate
x: 486756
y: 5356506
x: 486785
y: 5356410
x: 486814
y: 5356315
x: 486843
y: 5356219
x: 486873
y: 5356123
x: 486902
y: 5356028
Location
NW: 486756, 5356506
SE: 486902, 5356027
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Scale: 1:3,000
Vertical exaggeration: 1x
0m
200m


NW
SE
10520E
Mafic Dike
HW QTP
FW QTP
VL-11-253
400
300
200
Location
NW: 486857, 5356414
SE: 486955, 5356093
NPR Vaues of Samples
NPR 1 - 2
NPR < 1
NPR > 2
January 2020 Resource
< 0.3 g/t Au (waste)
0.3 - 0.7 g/t Au (LGO)
> 0.7 g/t Au (HGO)
Tronhjemite
Conglomerate
x: 486857
y: 5356414
x: 486886
y: 5356318
x: 486915
y: 5356223
x: 486944
y: 5356127
Scale: 1:1,700
Vertical exaggeration: 1x
0m
80m

NW

SE

10590E



Location

NW: 486917, 5356456

SE: 487002, 5356177

NPR Vaues of Samples

- NPR 1 - 2
- NPR < 1
- NPR > 2

January 2020 Resource

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- 0.3 - 0.7 g/t Au (LGO)
- > 0.7 g/t Au (HGO)

Scale: 1:1,900

Vertical exaggeration: 1x

0m 100m

APPENDIX IR-19.A
ARD/ML MANAGEMENT PLAN

Appendix IR-19.A

ARD/ML Assessment and Management

Marathon completed a Phase 1 and 2 Acid Rock Drainage/Metal Leaching (ARD/ML) assessment prior to submission of the EIS, using methods that followed the Mine Environment Neutral Drainage (MEND) publication entitled “Prediction Manual for Characterizing Drainage Chemistry from Sulphidic Geologic Materials” (Price 2009). These geochemistry baseline programs included:

- Static testing of approximately 350 samples of waste rock, ore, overburden, and tailings for Acid-Base Accounting (ABA), Shake Flask Extraction (SFE), and total metals
- Characterization of composite samples using the static tests and mineralogical methods
- Kinetic testing of composite samples including 14 humidity cells, two ageing tests and two subaqueous columns tests

As a result of this test work, the following key geochemical characterization information has been determined, which has informed the environmental assessment, as well as the ongoing and follow-up phases of sampling, testing, and assessment work:

Leprechaun Deposit

Approximately 1.9 Mm^3 of overburden will be excavated from the Leprechaun open pit. Overburden is classified as non-PAG material with no exceedances of the MDMER limits in leach testing.

Less than 0.5% of the approximately 50 Mm^3 of Leprechaun waste rock is classified as PAG. Overall, the waste rock pile is not expected to generate ARD due to the small amount of PAG material and significant excess of NP. Therefore, specific ARD management of waste rock is not required. Furthermore, there are no exceedances of MDMER limits observed in humidity cell leachates.

About 10% of low-grade ore is estimated to be PAG, but overall is not expected to generate ARD within the relatively short residence time of low-grade ore in the stockpile. While kinetic testing suggests moderate leaching potential for Al and P, there are no exceedances of MDMER limits observed in these tests.

Marathon Deposit

Approximately 4.4 Mm^3 of overburden will be generated from the Marathon open pit. Overburden is classified as non-PAG material. There are no exceedances of MDMER limits observed in SFE leachates from overburden. Based on current materials balance over the life of mine, all of the stockpiled overburden will be used during rehabilitation and closure.

Approximately 14% of the 60 Mm^3 of waste rock is conservatively estimated to be PAG. Blending PAG and non-PAG rock with excess of neutralization potential and/or encapsulation of PAG waste by non-PAG rock is recommended to neutralize acidity potentially generated in isolated pockets of PAG material. The waste rock pile will be covered by growth medium / overburden during rehabilitation, further reducing the

risk of ARD/ML. There are no exceedances of MDMER limits observed in leachates from the waste rock humidity cells.

Approximately one-half of the low-grade ore is conservatively classified as PAG. The ARD onset time in PAG low-grade ore is conservatively estimated at six years based on maximum laboratory leaching rates. There are no exceedances of MDMER limits observed in leachates from low-grade ore under neutral conditions. In the mine plan, the Marathon low-grade ore stockpile runoff and toe seepage has been segregated from other mine component flow streams to facilitate collection and further ARD treatment, if required.

Plant Site

High-grade ore from the Leprechaun and Marathon deposits will be stockpiled together with 30% of the material originating from Leprechaun and the reminder from Marathon, on average. Approximately 13% and 67% of ore samples from Leprechaun and Marathon pits, respectively, are conservatively classified as PAG. The overall mixture of Leprechaun and Marathon high-grade ores classifies as non-PAG and the high-grade ore stockpile is not expected to generate ARD. Drainage from the high-grade ore stockpile flows by gravity to the TMF and any potential acidity will be neutralized in the decant pond or in the mill during pH adjustment required as a part of the gold recovery by cyanide process. No exceedances of MDMER are observed in SFE extracts.

Approximately 41 Mt of tailings will be produced from both high-grade ore and low-grade ore with about 38% of the tailing originating from the Leprechaun pit and the remainder from the Marathon pit. Composite samples of tailings from both deposits are non-PAG and are not expected to generate ARD. During operation, TMF pond and seepage will likely exceed the MDMER limits for $CN_{(T)}$, un-ionized NH_3, and Cu sourced from process water. After closure, tailings beaches covered by soil are not expected to produce acidic runoff and/or have high metal leaching. Seepage from the TMF is conservatively predicted to exceed MDMER limits for $CN_{(T)}$, un-ionized NH_3, and Cu in post-closure and will be addressed in the long term through passive treatment methods.

Marathon is confident, based on the results of the testing and analysis conducted to date and as outlined above, that employing the following mitigation measures will address the potential geochemical effects associated with planned Project components and activities:

- PAG rock will not be used in construction
- Preferential milling of PAG ore and stockpiling non-PAG ore
- Blending PAG and non-PAG materials and encapsulation of blended material with non-PAG rock within the waste rock piles
- Use of soil covers and revegetation to limit infiltration and oxygen flux as part of progressive and final rehabilitation and closure
- Relocation of any excess of PAG rock (waste rock or low-grade ore) remaining at closure to the mined-out pit, where it will be permanently flooded
- Collection and monitoring of contact water during operation, and treatment if required (adaptive management).

As outlined in the EIS, and further addressed in the IR responses provided, as a result of having a less than ideal number of tests completed to date Marathon has utilized a very conservative approach in the assessment of effects from potential geochemical conditions. The limitations in the sampling and test work are a result of several factors, including an exploration focus on mineralized targets and impacts to Marathon's drilling programs over the past year due to COVID-19. Marathon recognizes that further ARD/ML work is required to fully conform to the MEND guidelines and further refinement of Project mitigation is progressing as design of the Project proceeds. Additional ARD/ML testing, as outlined below, will refine the results obtained to date and the associated mitigation measures identified that will be incorporated into the mine plans, waste rock management, stockpile management, and tailings management via the ARD/ML Management Plan such that PAG materials are managed to minimize any potential long-term effects.

Marathon is committed to completing the work necessary to address testing gaps identified in the program completed to date, and as noted by NRCan, within the next 6 to 8 months and prior to construction. The results of this work are required for final design and permitting under the *NL Mines Act* (NL Department of Industry, Energy, and Technology), and will be shared with NRCan as it becomes available:

- Continuation of on-going laboratory and field tests started in 2020. Laboratory tests include two humidity cells containing carbonate depleted LGO and tailings from the Marathon deposit. Field bin tests of composite materials including nine composite samples representing major waste rock lithologies and low-grade ores from both deposits. In 2021, a subaqueous column, an aging test and a humidity cell will be started on samples from on-going metallurgical work.
- Additional static testing of samples:
  - to address spatial distribution and sampling requirements per lithology (see attached Tables 1 and 2)
  - to provide the data inputs required to develop an ARD block model for the Marathon pit
  - to better define the location and volumes of non-Potentially Acid Generating (non-PAG) rock, which is required for construction, in Leprechaun and Marathon starter pits
- Additional kinetic testing of Potentially Acid Generating (PAG) materials (waste rock, ore, and low-grade ore) from major lithologies of the Marathon pit including a composite sample of gabbro. These samples will also be submitted for static tests including Net Acid Generating (NAG) tests, mineralogy, and particle size distribution similar to characterization of composite samples as described in Section 3.2.2 of Attachment 5-B of the EIS.
- Generate an ARD block model for the Marathon pit to provide production schedules for ARD classes of rock and ore and to improve the estimates of PAG material exposures on pit walls.
- Update water quality predictions based on available results of kinetic tests, if required.

Marathon will provide the above information and analysis to regulators, including NRCan, for review and comment via the proposed ARD/ML Management Plan. This plan will be considered 'live' and will continue to be updated as required as additional ARD/ML information is obtained through the construction and operational phases of the Project. The ARD/ML Management Plan would contain the following sections:

Introduction

- **General Introduction**: Company and Project introduction.
- **Objective:** The objective of the ARD/ML management plan is to provide the most recent information and actions required to reduce the risks associated with ARD/ML during all phases of the Project.
- **Related Plans and Documents, Document Management:** List any related plans and documents, and describe document control for the ARD/ML document.

Background

- **Project Components and Activities:** This section will summarize Project components and activities which pose potential ARD/ML risks. This section will also describe the high-level development timelines and phases for each Project component and activity.
- **ARD/ML Assessment Summary:** This section will focus on the current understanding of ARD/ML potential related to each relevant component of the Project: Marathon and Leprechaun pits, two waste rock stockpiles, two low grade ore (LGO) stockpiles, high grade ore (HGO) stockpile, tailings management facility (TMF) and any rock quarries. The potential ARD/ML risks associated with these components will be (re)assessed for each phase of the Project based on the most recent results of geochemical testing, the ARD block model for the Marathon pit and any updated predictions of water quality.
- **Regulations and Management:** Outline regulatory documents that are applicable and will be followed as part of this Plan. Outline management requirements, personnel responsible, and their responsibilities under the Plan.

ARD/ML Management

- **Project Development:** Describe relevant development components, activities and phases in detail including mine waste material volumes and pit wall exposure for each Project component.
- **ARD/ML Management:** provide data and methods, and mitigation measures to be employed to manage PAG material generated from Project components and activities, separated by phases as appropriate.

  The following is an example method for the identification and the management of PAG rock and ore, which will be subject to further refinement as the ARD/ML Management Plan is developed:

  - Samples of drill cuttings from blast holes representing each mine block will be collected.
  - The samples will be tested for total carbon and sulphur using LECO furnace or similar method. Average neutralization potential (NP) will be calculated from total carbon and average Acid Potential (AP) will be calculated from total sulphur using standard conversions per the MEND guidelines. If NP/AP ratios indicate the mine block rock is below 2, the block will be classified as PAG.
  - PAG rock will be marked after the blast, excavated, and dispatched to the waste rock stockpile. PAG rock would only be deposited within a specified distance (to be defined) of the final stockpile shell and preferably next to a non-PAG truck load. Piled PAG rock will be marked, and the geospatial coordinates recorded.

- A portion of PAG and non-PAG rock loads will be mixed during grading each lift of the stockpile.
- This mixture will be encapsulated with non-PAG rock deposited within a specified distance (to be defined) from the lift face and forming the topmost lift(s) on the final of the stockpile. Non-PAG rock will reduce oxygen flux into interiors of the pile and provide alkalinity to infiltrating water. This approach has been successfully applied for waste rock piles in other mine sites as referenced in Sections 6.6.3.5 and 6.6.3.6 of Global ARD management guide (http://www.gardguide.com/index.php/Chapter) and would be applicable to ARD/ML management at the Valentine Gold Project.
- To limit exposure of PAG high grade ore, this material will be preferentially directed to the mill feed, while non-PAG high grade ore will be allocated to the stockpile, as long as the grade requirement for the mill feed is met.
- LGO stockpiles will be constructed to maximize non-PAG material in the feed in the last year of tailings deposition in the TMF to the extent practicable. This approach will create a non-PAG layer of tailings on the surface of the TMF prior to placement of the soil cover. This non-PAG layer will consume oxygen, reducing oxygen diffusion into tailings deposited earlier. In the last three years of operation, tailings will be deposited in the Leprechaun pit and immediately flooded limiting further oxidation and ARD/ML.

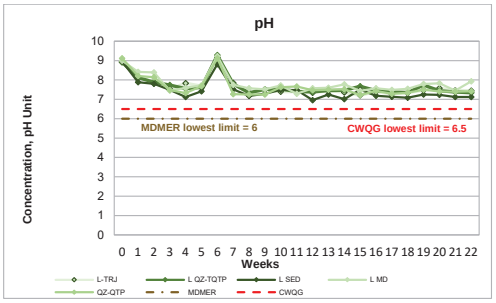
  This section will also detail progressive rehabilitation planned for waste rock and ARD/ML mitigation activities planned for the closure.

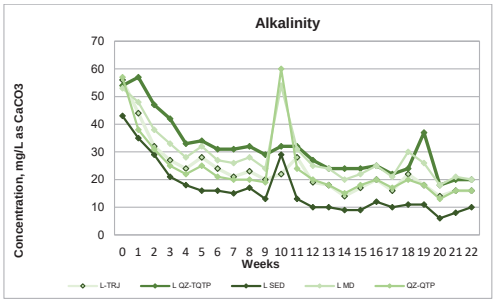
- **Monitoring, Ongoing Testing and Analysis:** This section will provide procedures for monitoring of contact water (e.g., the LGO seepage) and solids (e.g., tailings). This section will include details on monitoring locations, lists of monitoring parameters and sampling frequencies for each phase of the Project. Any further testing or analysis work (e.g., cover trials) related to ARD/ML will be described here.
- **Adaptive Management:** The adaptive management section will discuss additional mitigations that may be triggered by monitoring and/or by results of the future updates to the ARD/ML data. For example, if a certain volume of PAG waste rock cannot be accommodated within the waste rock stockpile at the Marathon pit at the end of operation, that volume could be stored within LGO stockpile footprint or west of the LGO. Another approach might be to build a seepage collection system and connect to the LGO sedimentation pond.

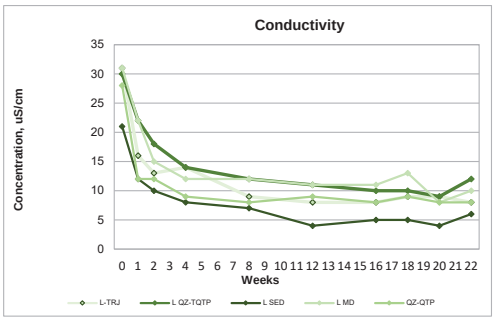
The ARD/ML management plan will be a “live” document, which will be updated and revised as information is gathered during the Project and in consultation with regulators.

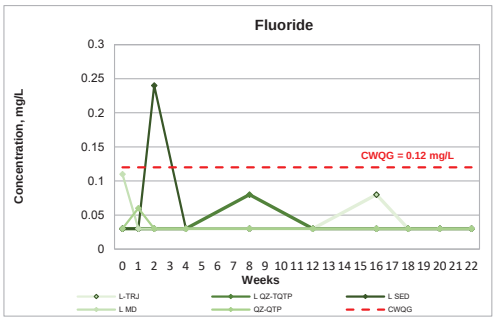
APPENDIX IR-20.A
TIME-SERIES GRAPHS

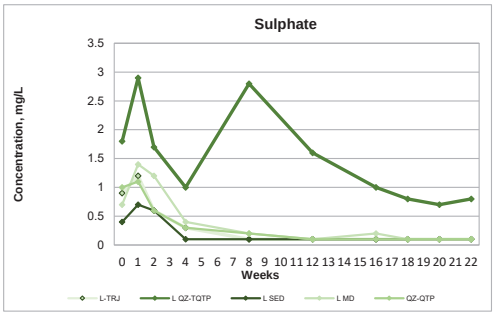
Leprechaun waste rock humidity cells

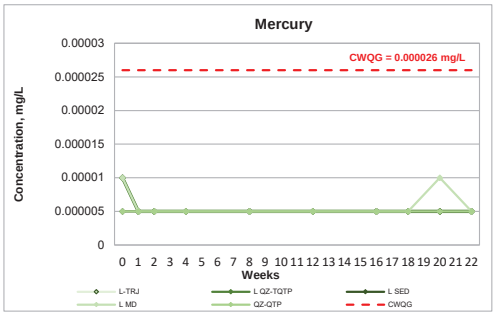


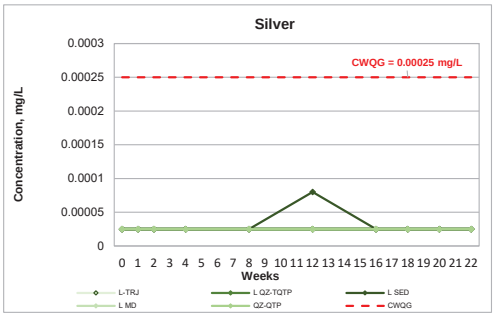


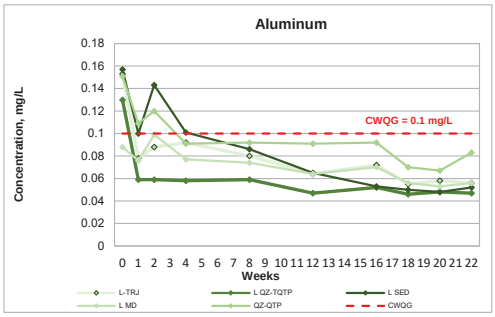


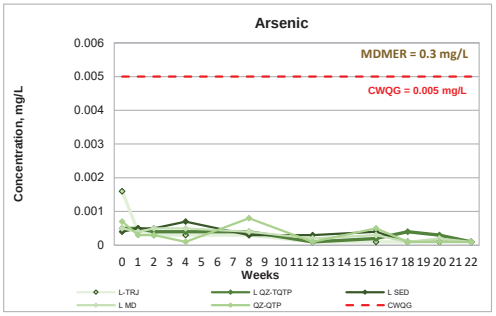


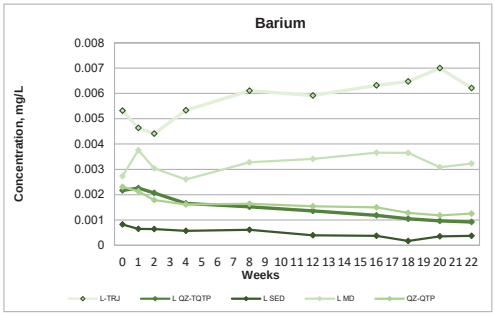


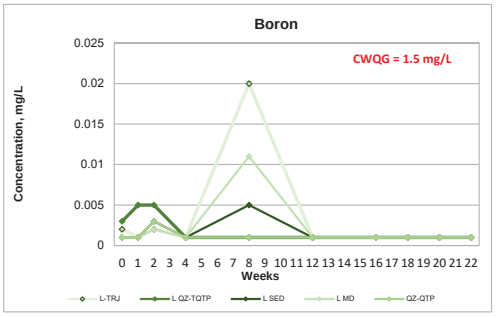


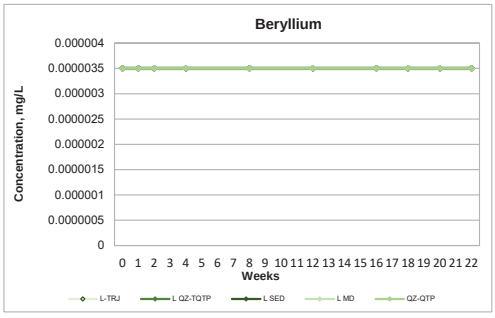






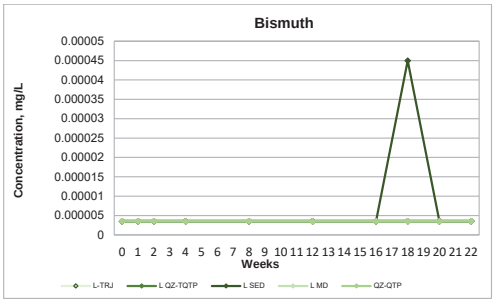


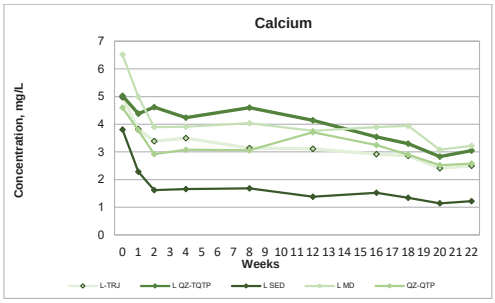


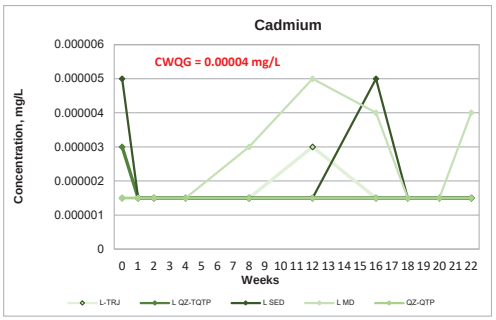


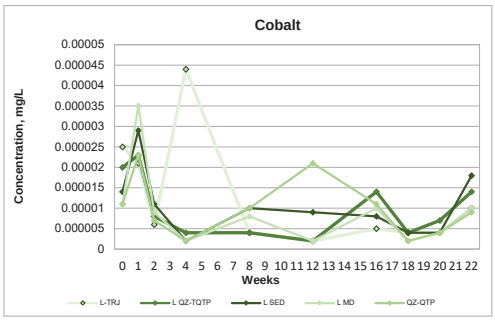
Note: Values below the respective detection limits (DLs) are shown as half DLs. CNWAD - weak acid dissociable cyanide.

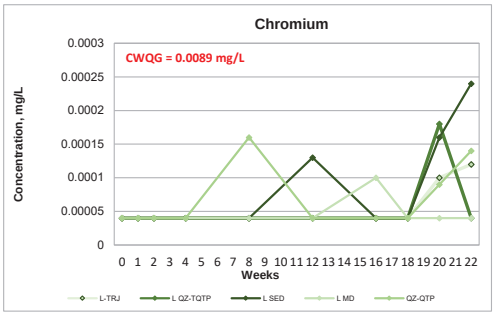
Leprechaun waste rock humidity cells

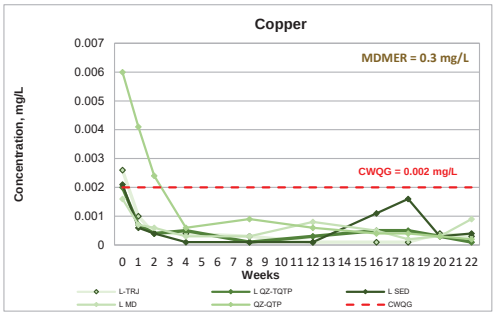


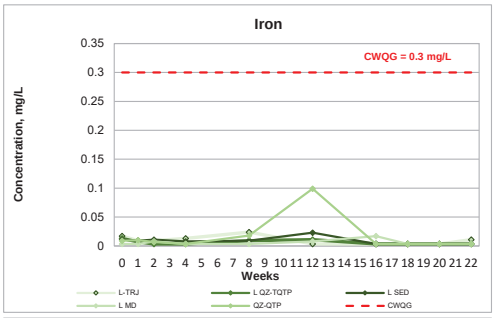


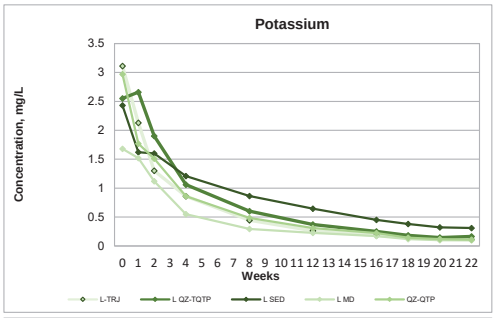


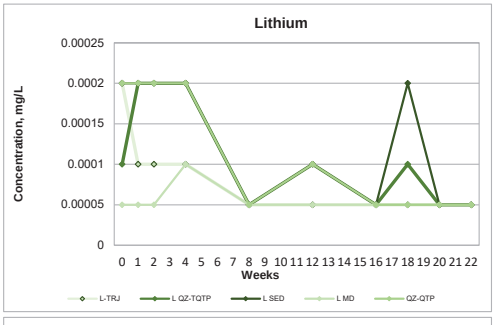


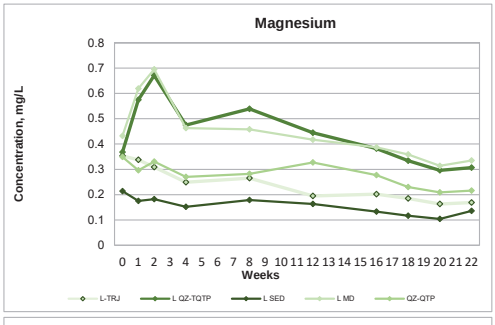


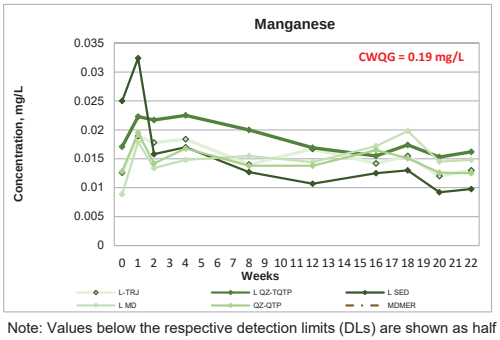


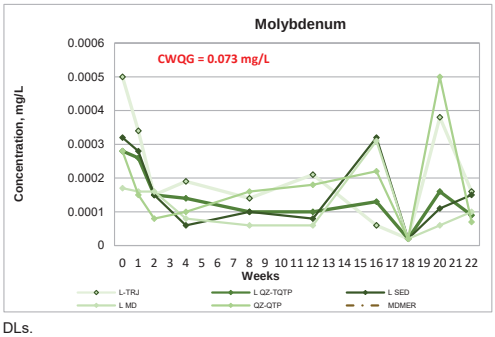






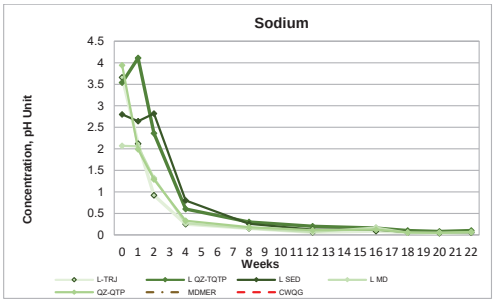


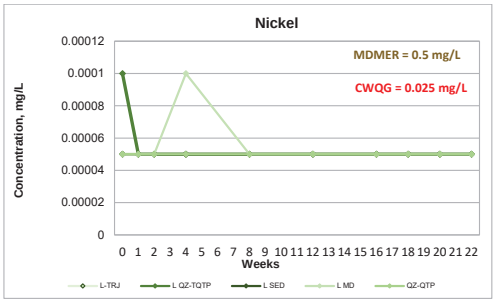


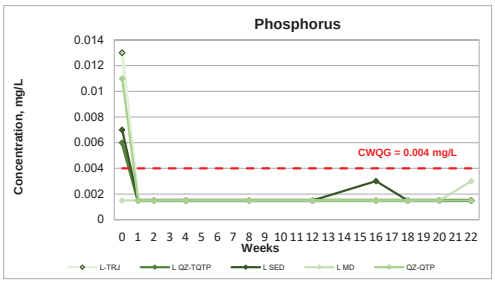


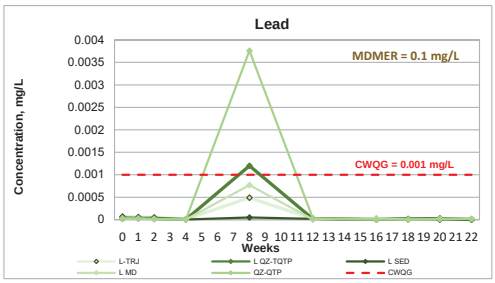
Note: Values below the respective detection limits (DLs) are shown as half DLs.

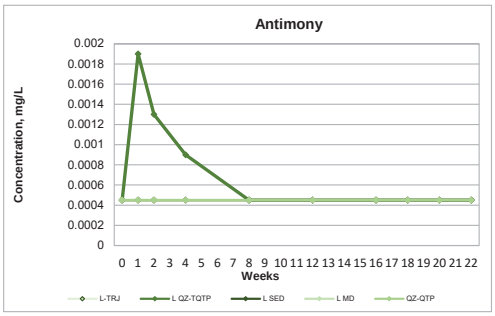
Leprechaun waste rock humidity cells

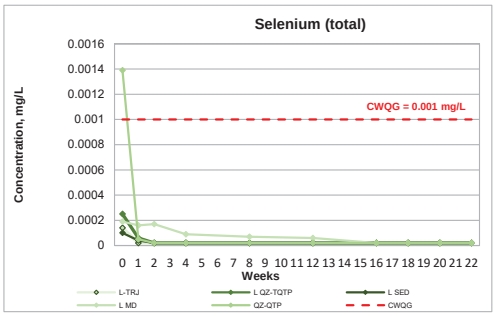


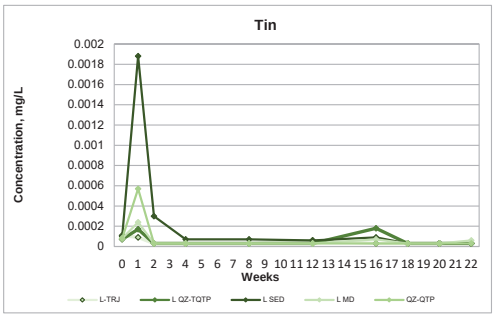


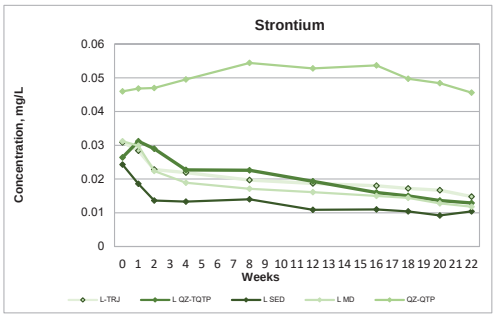


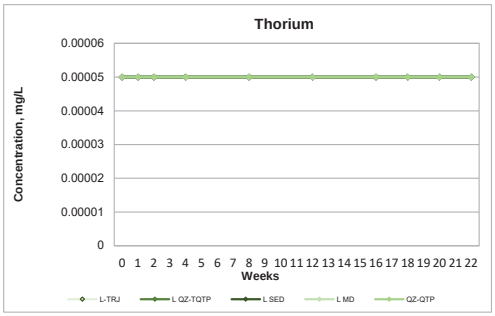


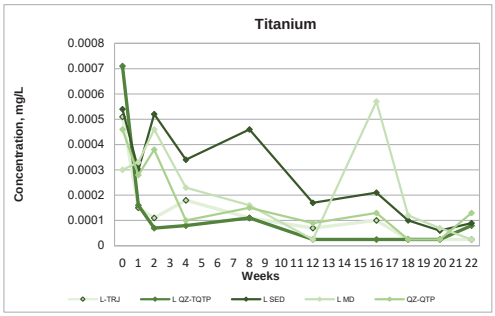


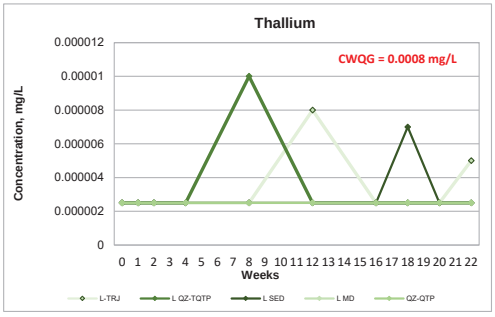


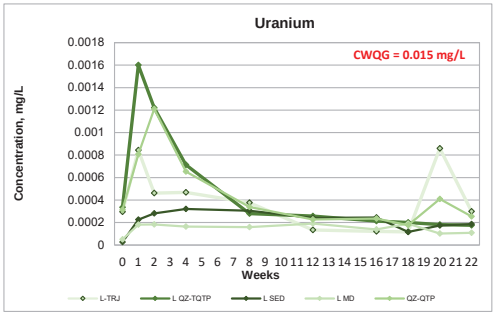






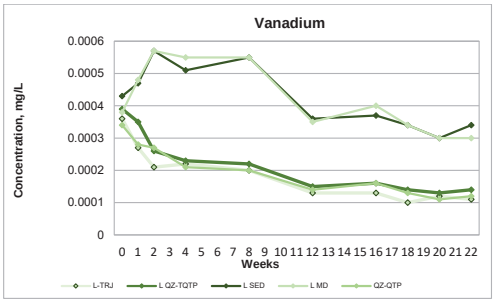


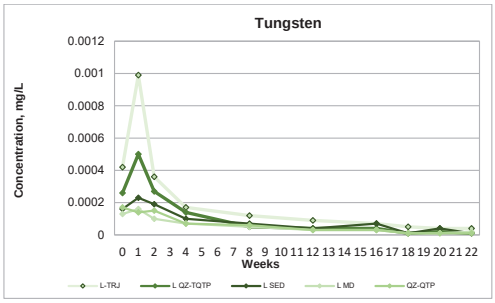


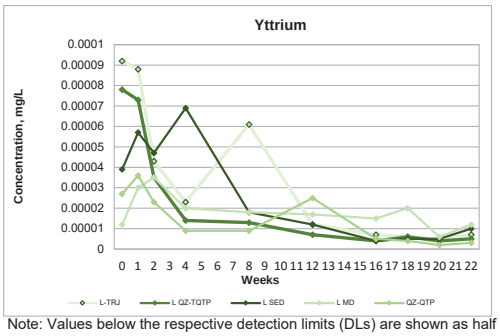


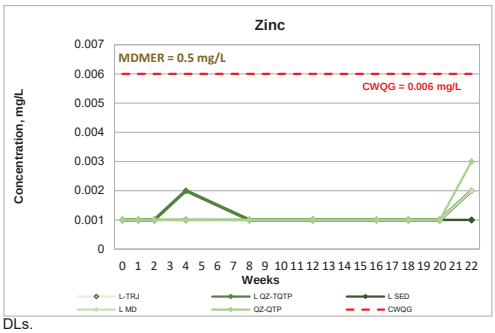
Note: Values below the respective detection limits (DLs) are shown as half DLs.

Leprechaun waste rock humidity cells



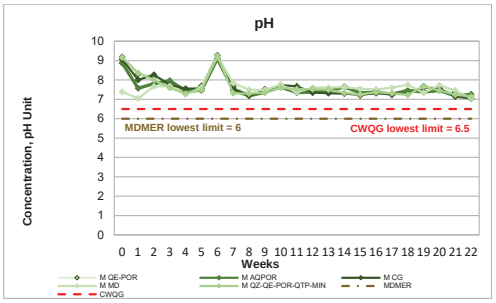


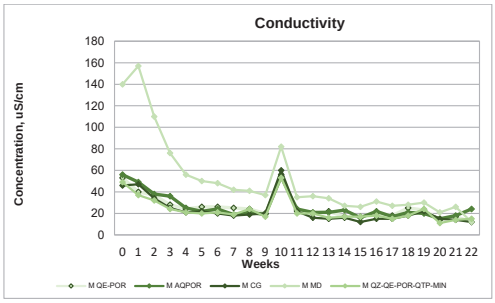


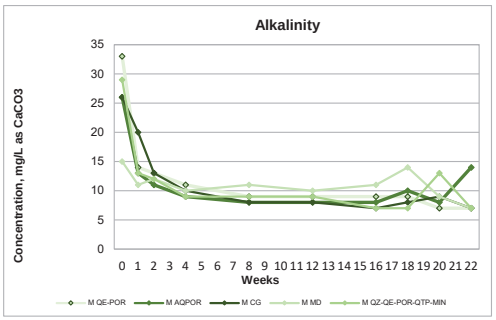


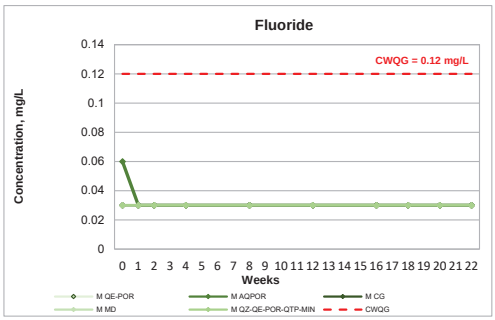
Note: Values below the respective detection limits (DLs) are shown as half DLs.

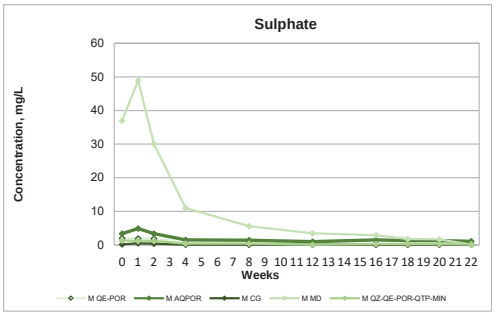
Marathon waste rock humidity cells

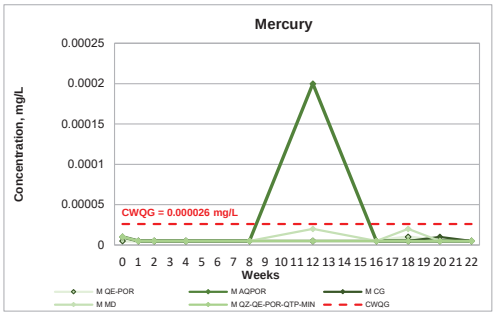


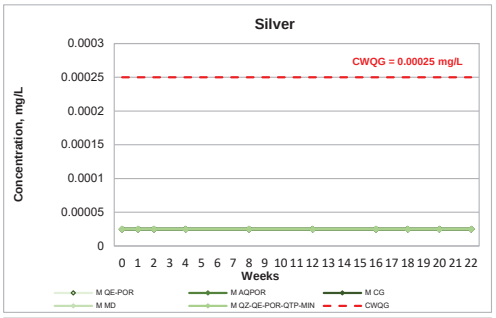


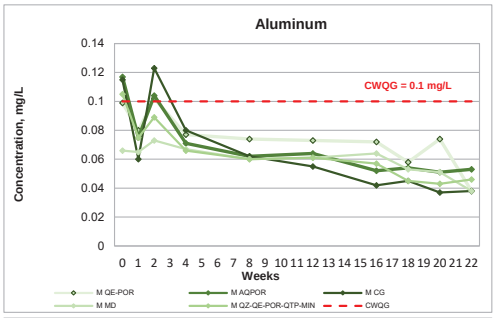


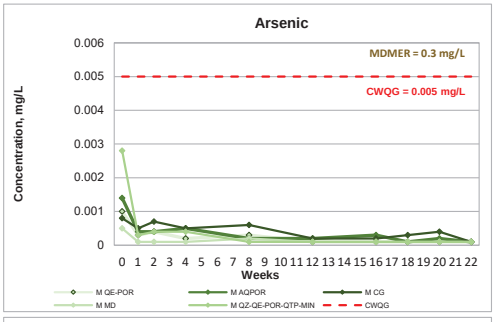


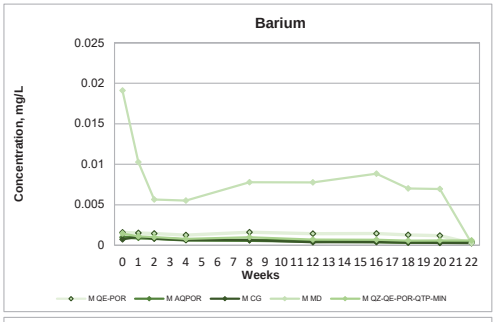


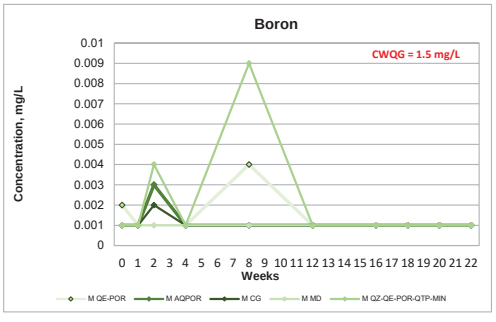


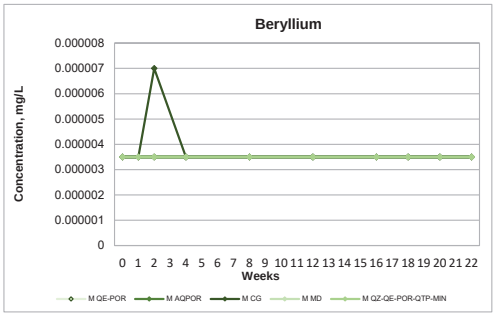






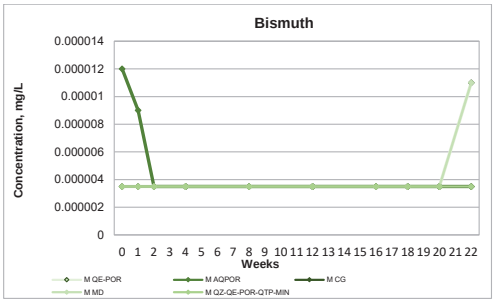


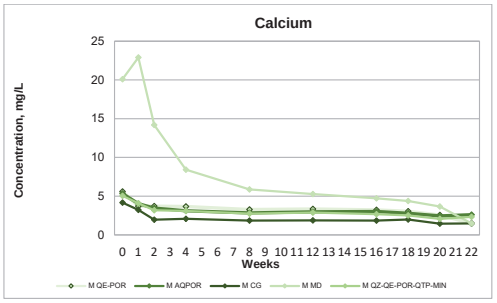


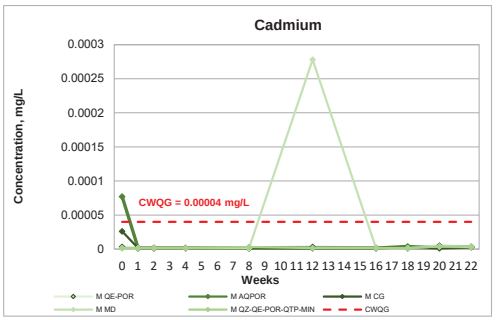


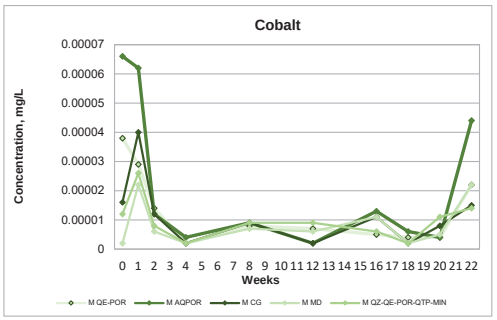
Note: Values below the respective detection limits (DLs) are shown as half DLs. CNWAD - weak acid dissociable cyanide.

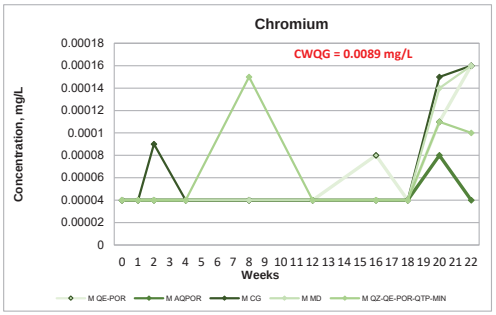
Marathon waste rock humidity cells

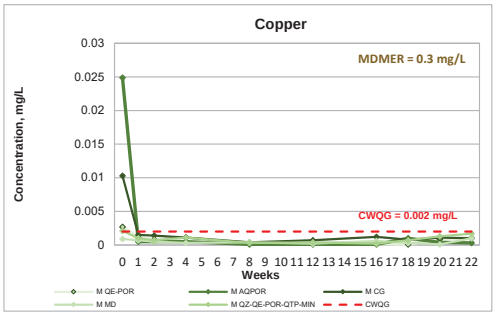


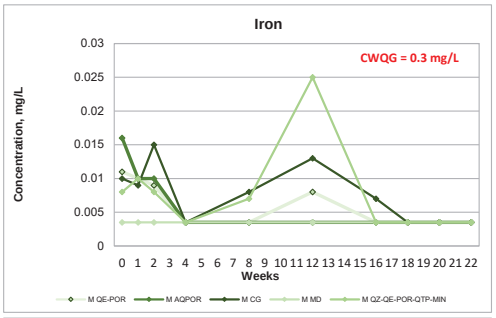


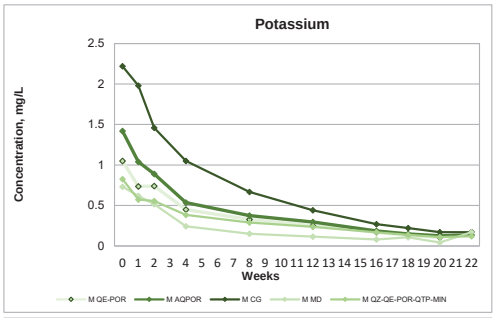


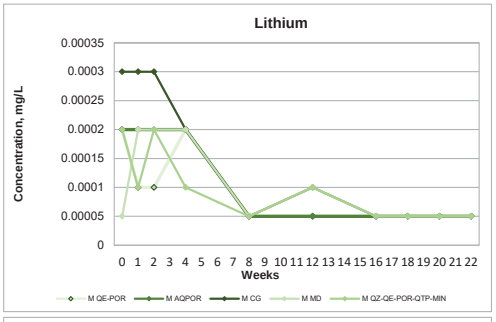


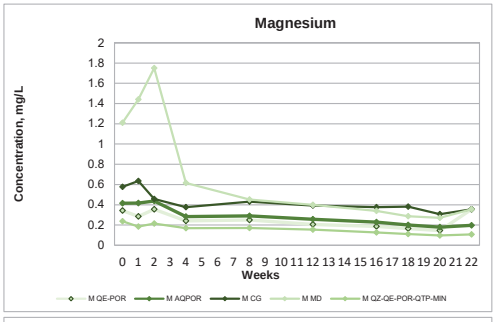


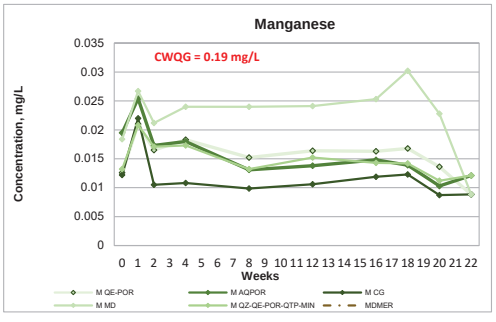


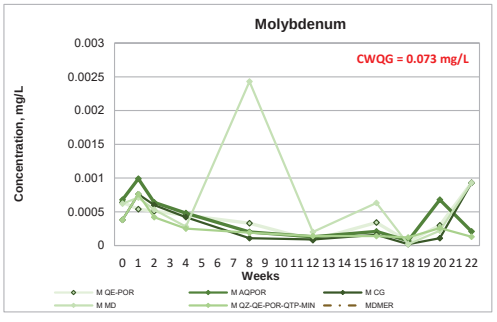






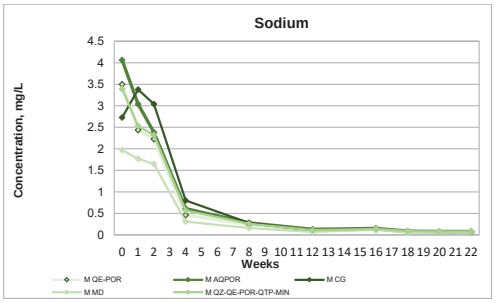


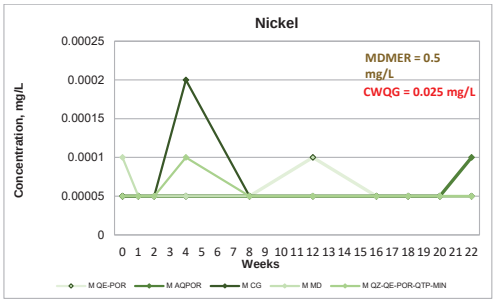


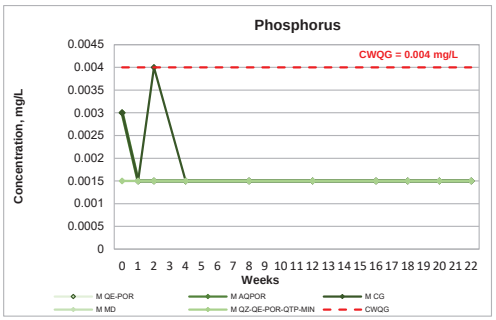


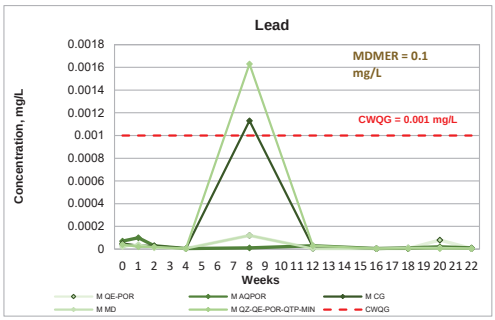
Note: Values below the respective detection limits (DLs) are shown as half DLs.

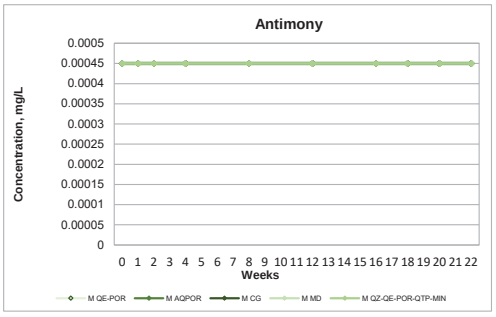
Marathon waste rock humidity cells

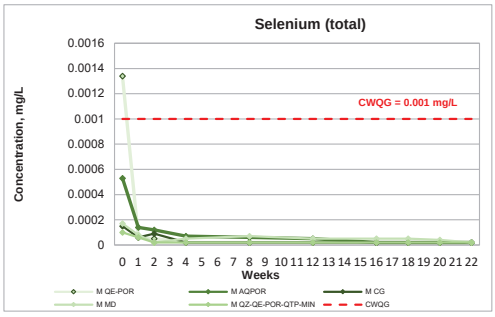


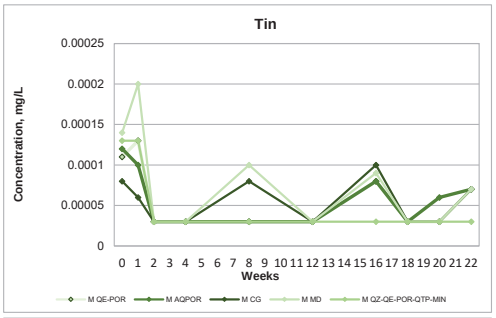


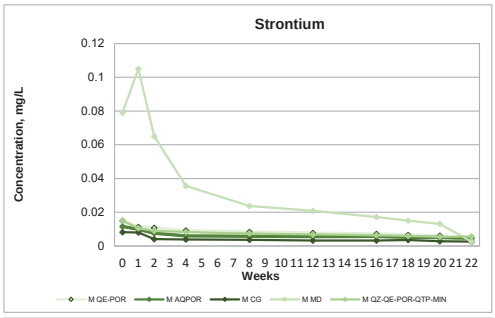


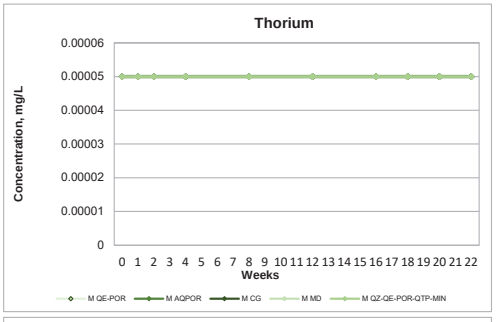


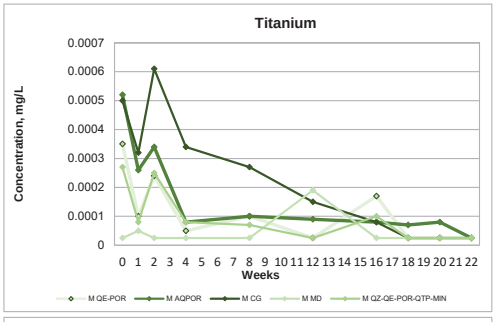


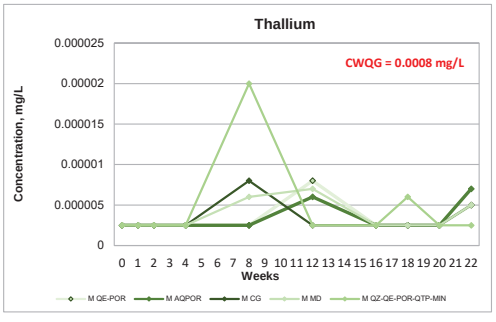


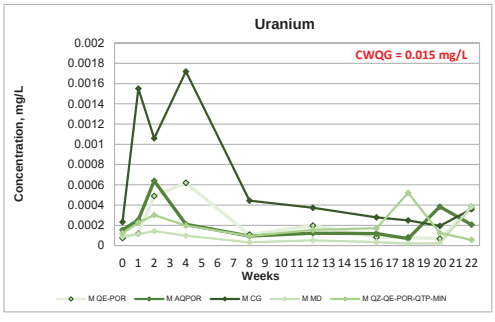






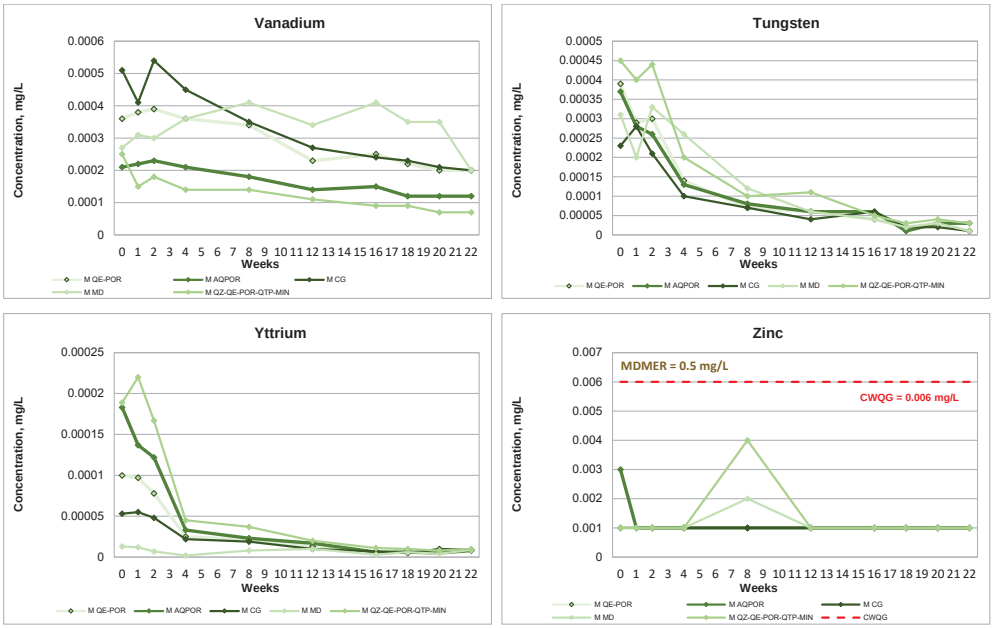






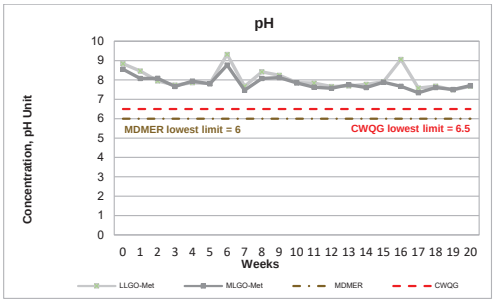
Note: Values below the respective detection limits (DLs) are shown as half DLs.

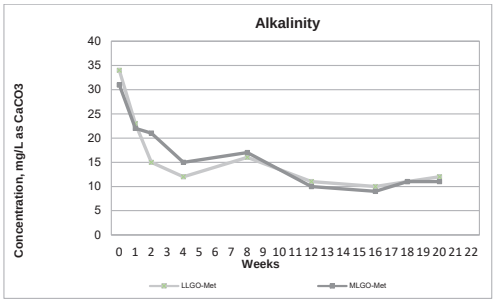
Marathon waste rock humidity cells

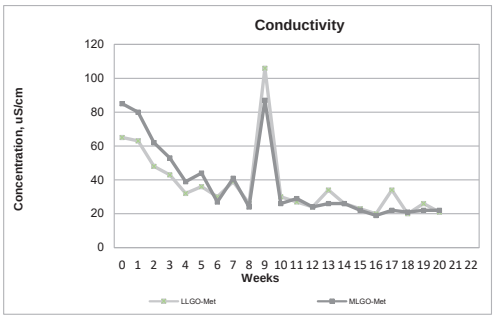


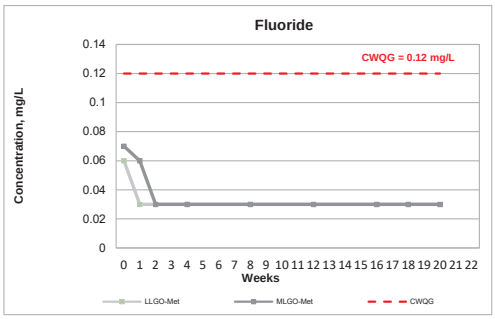
Note: Values below the respective detection limits (DLs) are shown as half DLs.

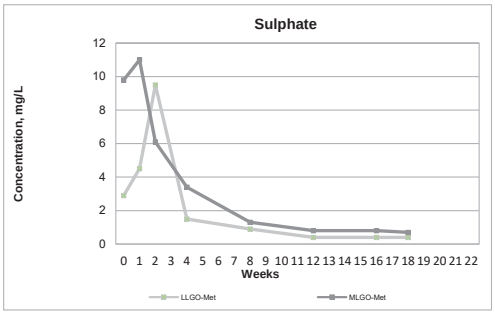
Marathon and Leprechaun low grade ore humidity cells

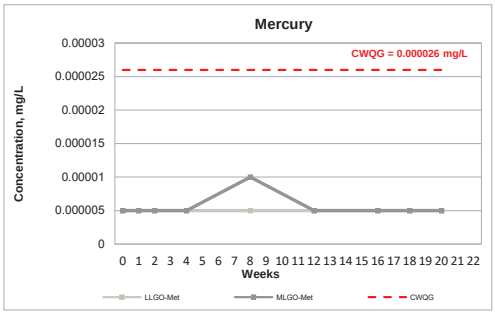


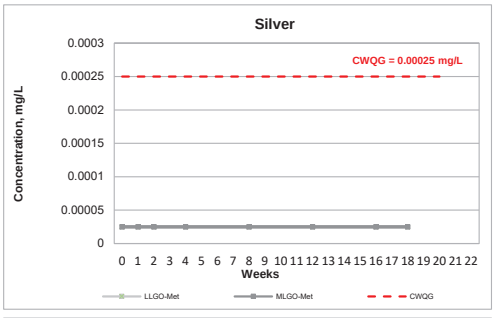


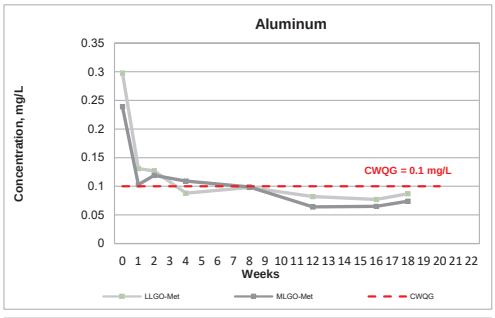


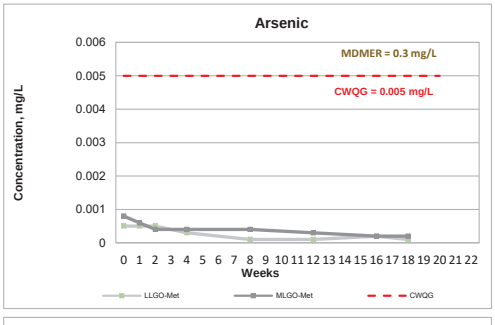


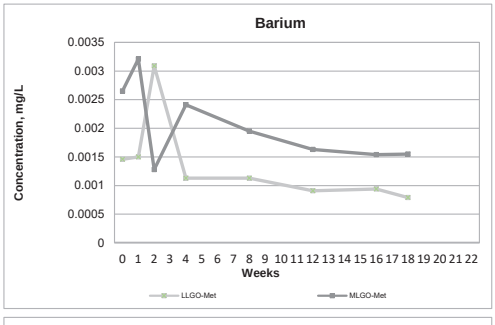


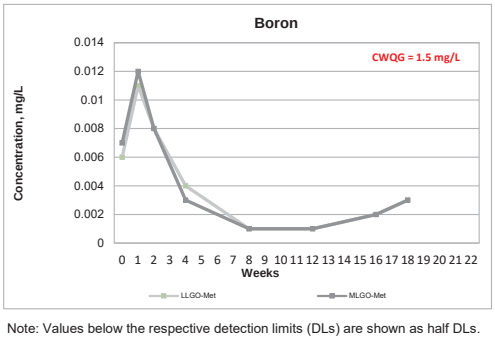


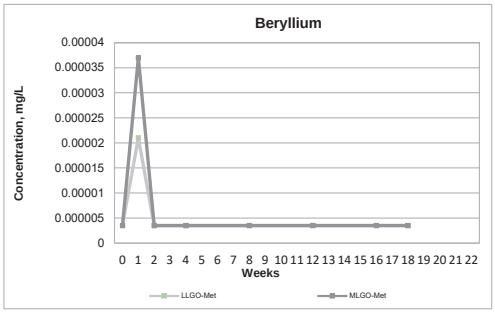






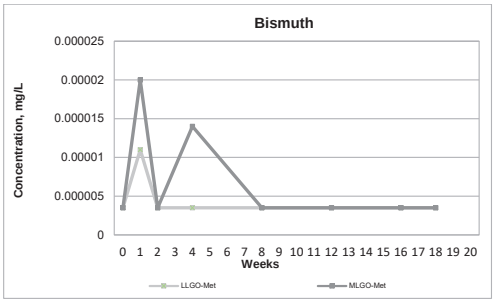


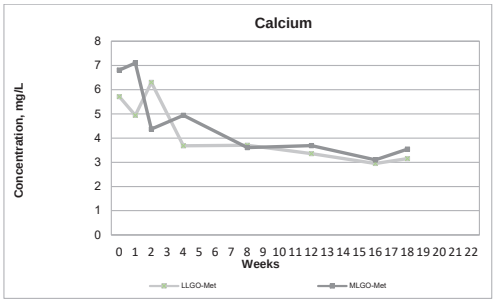


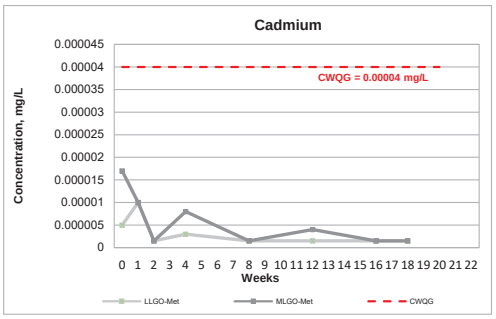


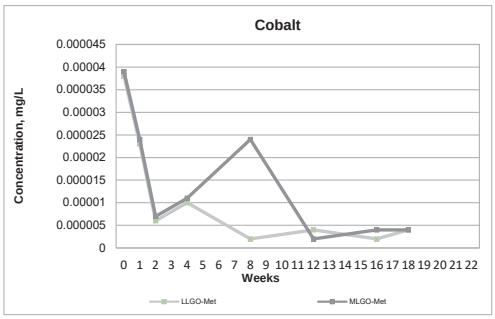
Note: Values below the respective detection limits (DLs) are shown as half DLs.

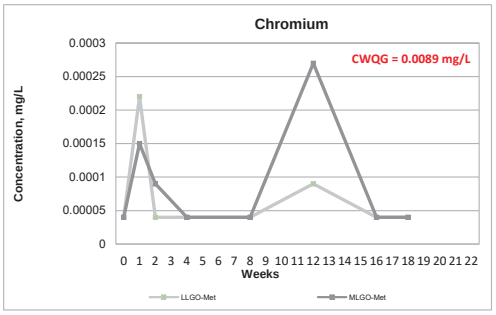
Marathon and Leprechaun low grade ore humidity cells

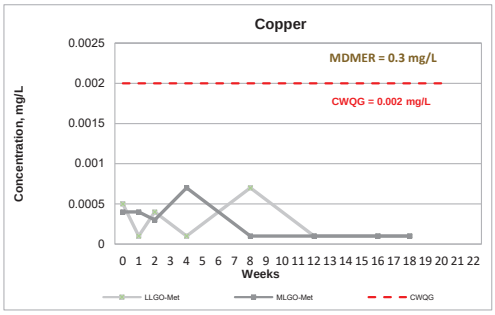


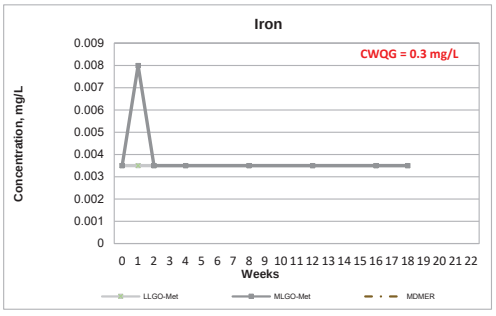


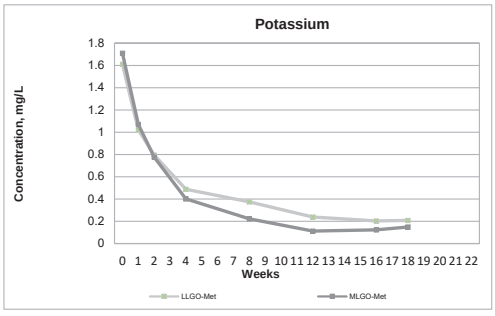


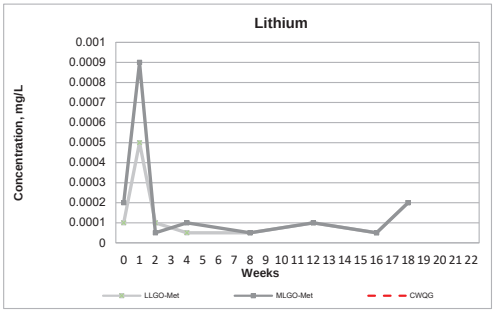


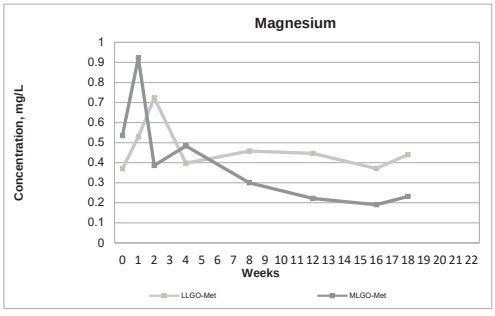


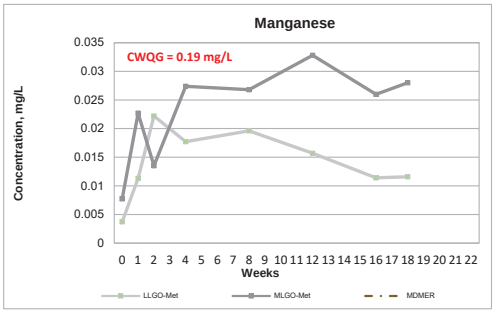


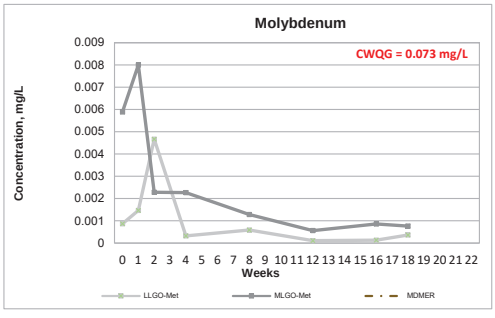






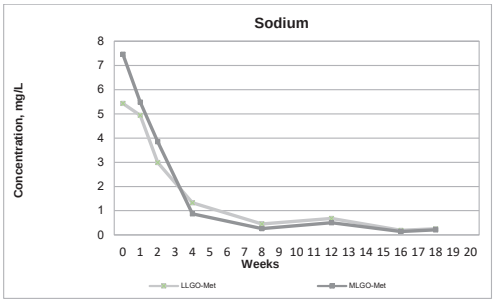


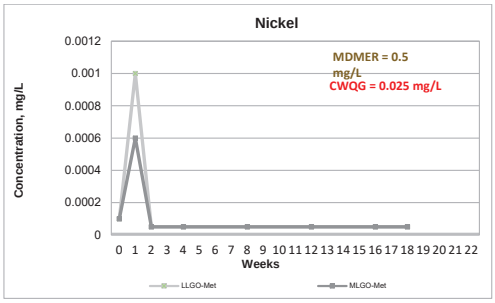


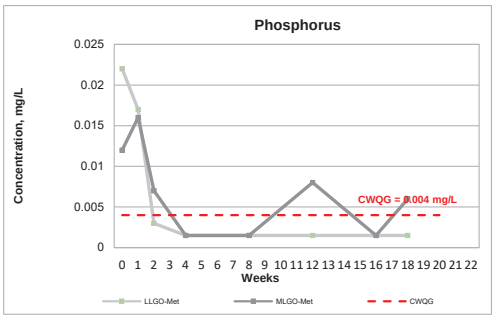


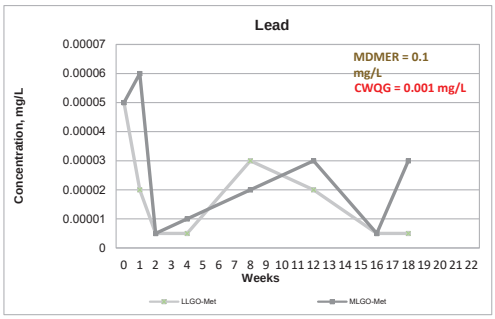
Note: Values below the respective detection limits (DLs) are shown as half DLs.

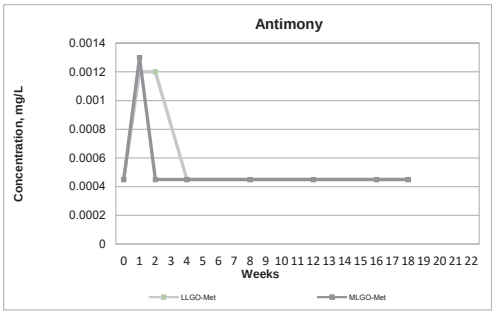
Marathon and Leprechaun low grade ore humidity cells

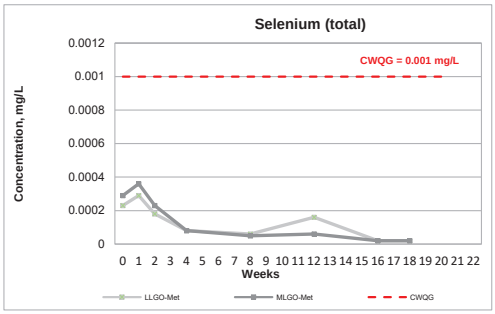


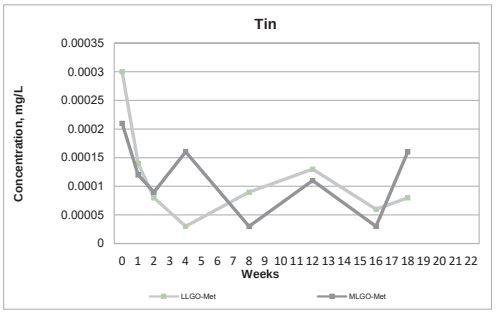


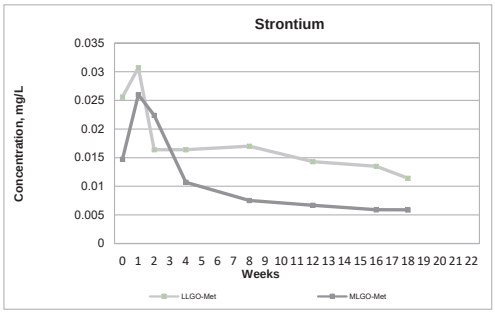


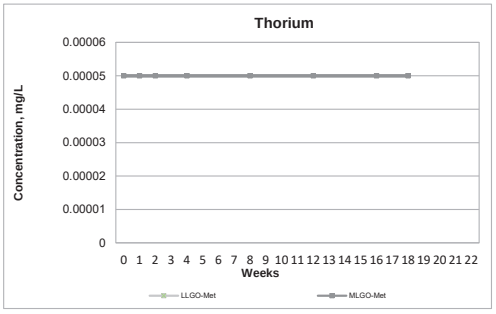


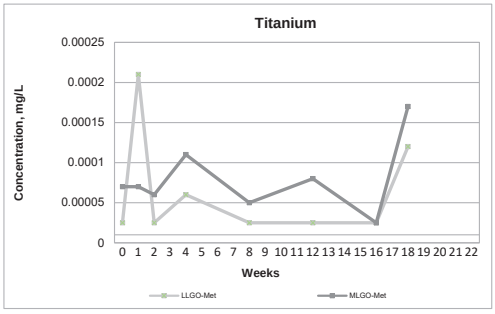


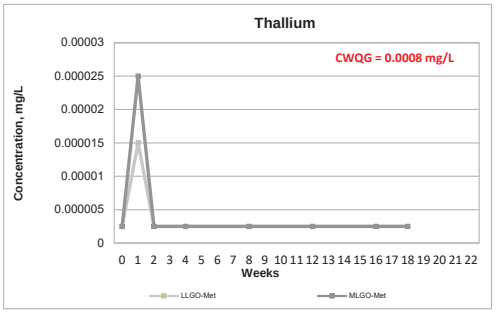


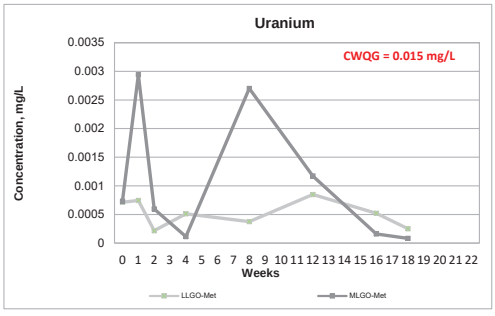






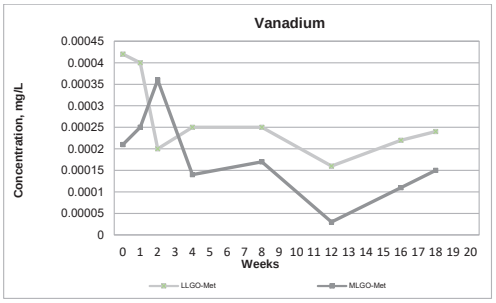


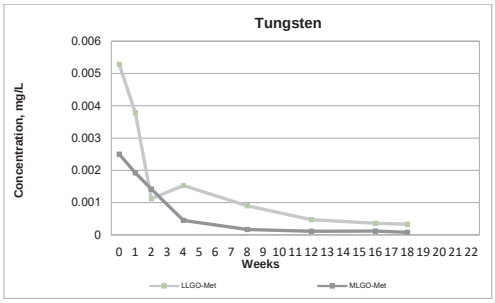


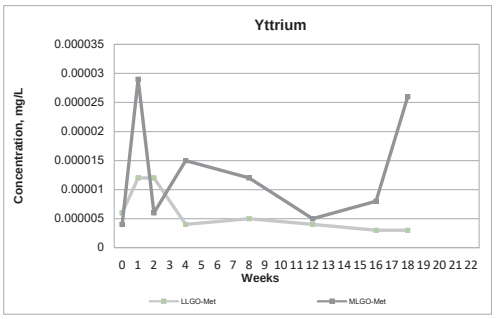


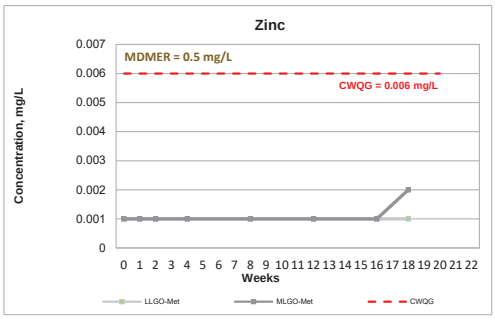
Note: Values below the respective detection limits (DLs) are shown as half DLs.

Marathon and Leprechaun low grade ore humidity cells



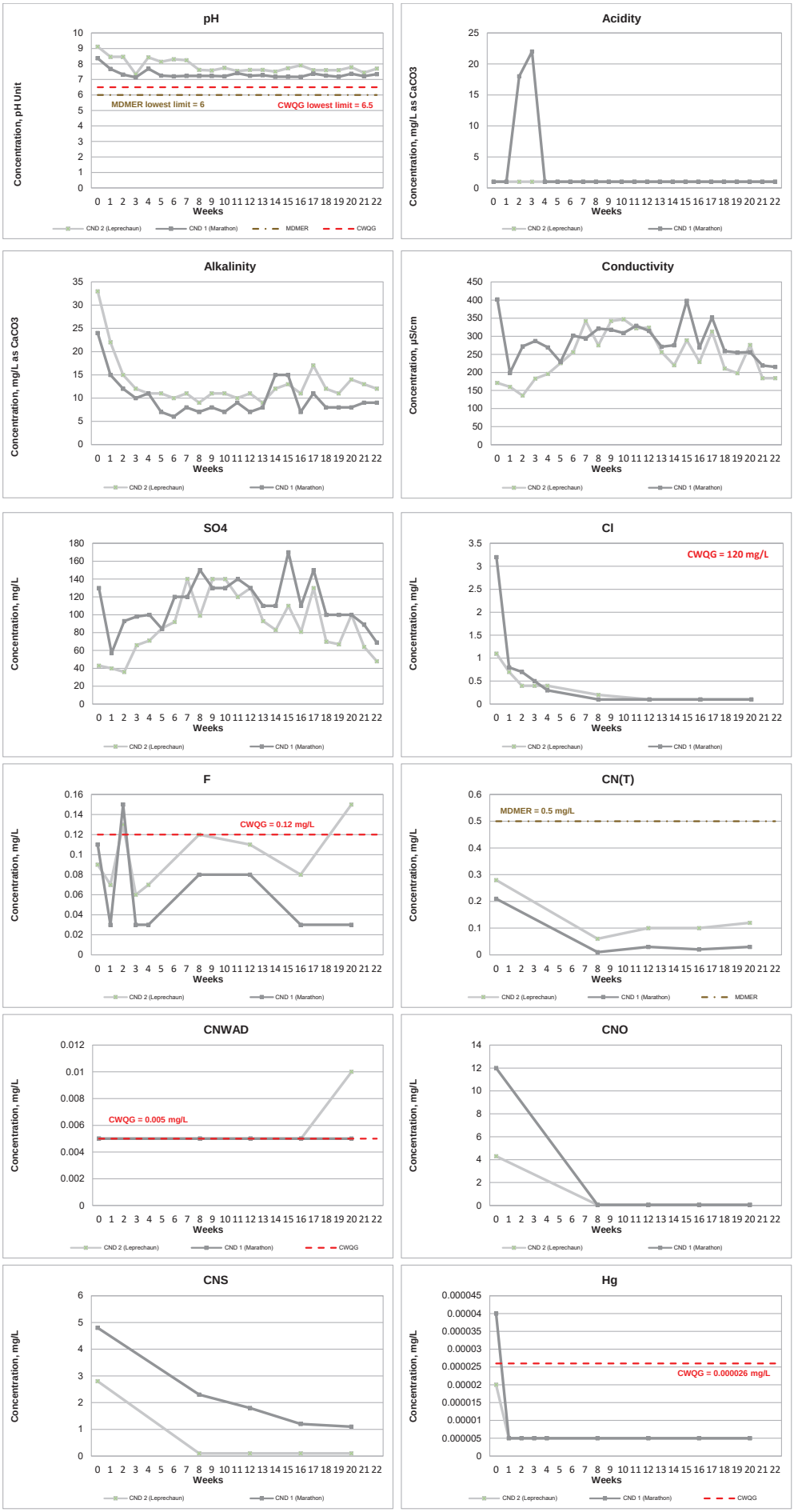






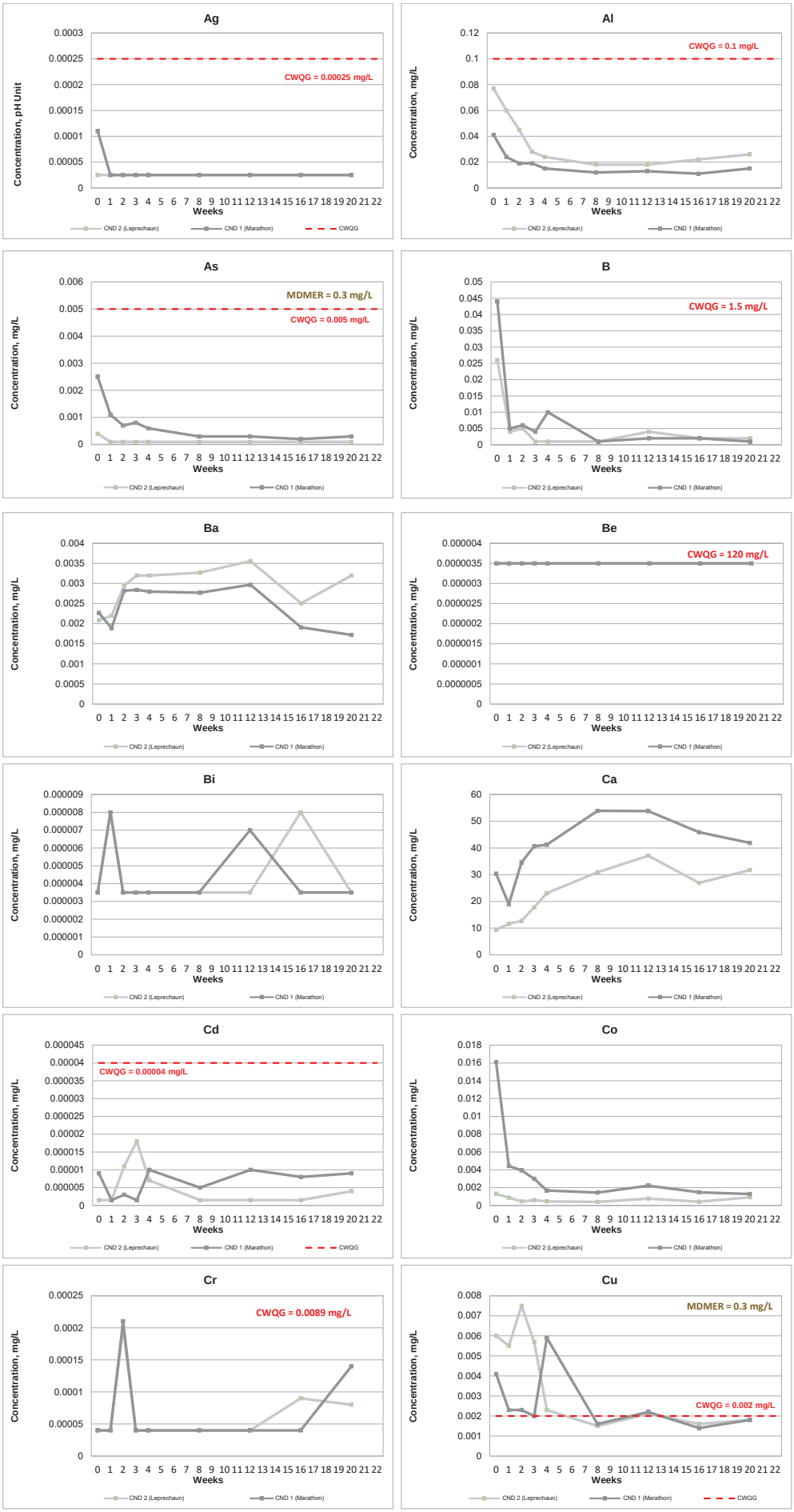
Note: Values below the respective detection limits (DLs) are shown as half DLs.

Marathon and Leprechaun tailings humidity cells



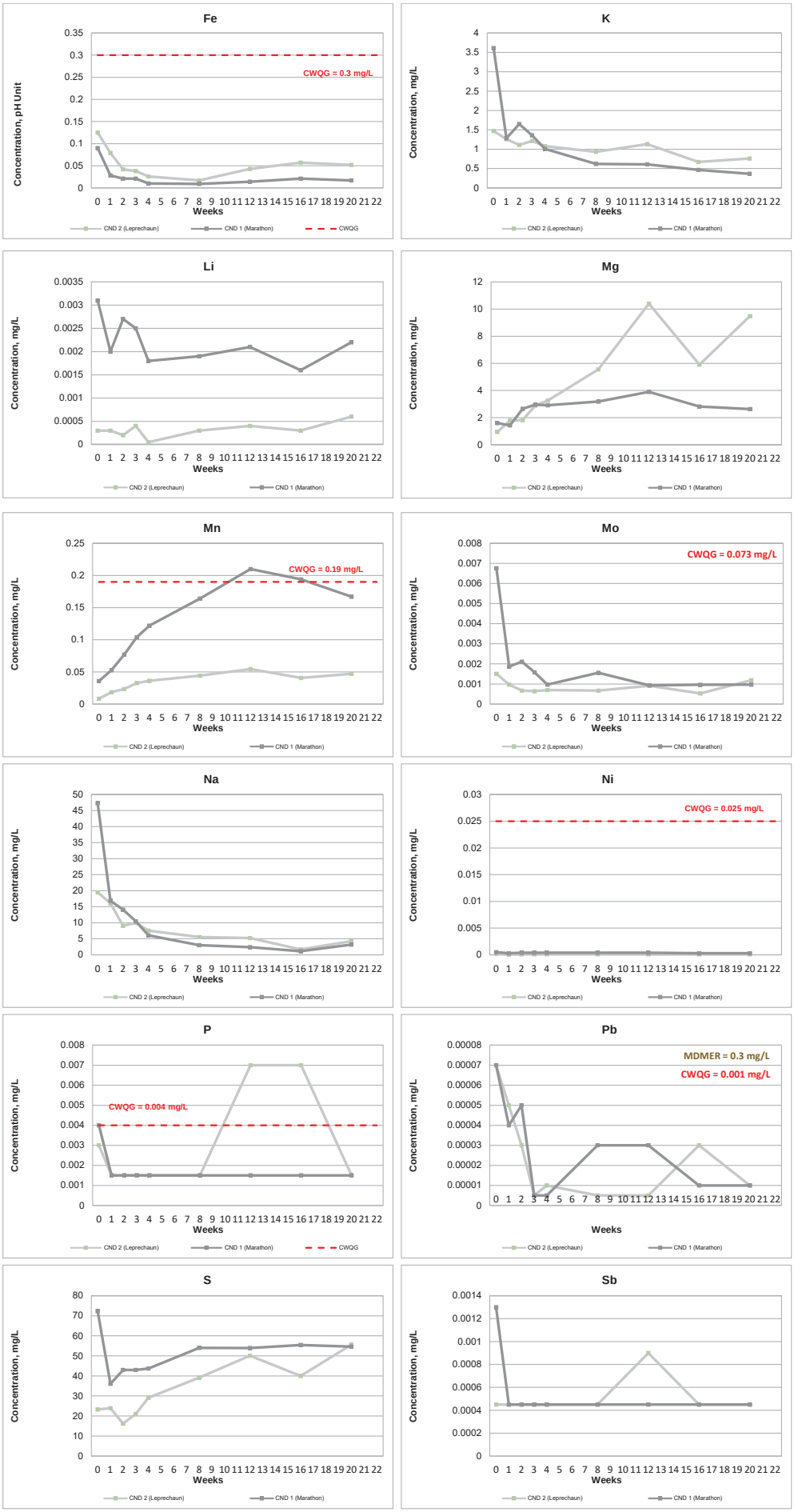
Note: Values below the respective detection limits (DLs) are shown as half DLs. CNWAD - weak acid dissociable cyanide.

Marathon and Leprechaun tailings humidity cells



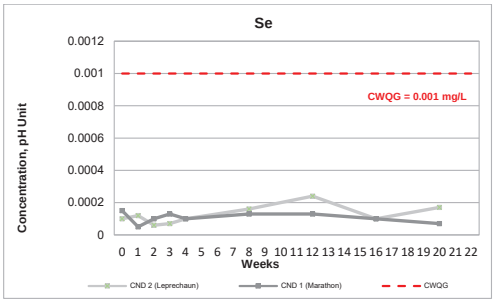
Note: Values below the respective detection limits (DLs) are shown as half DLs.

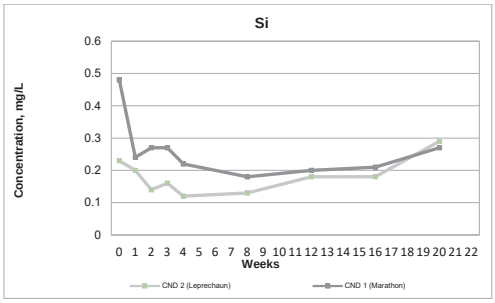
Marathon and Leprechaun tailings humidity cells

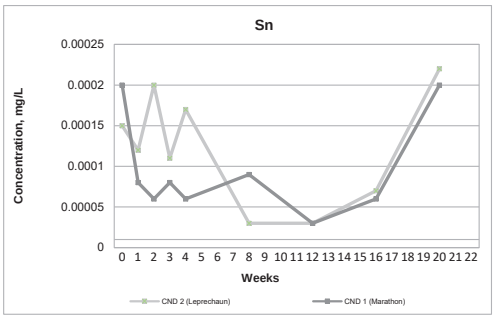


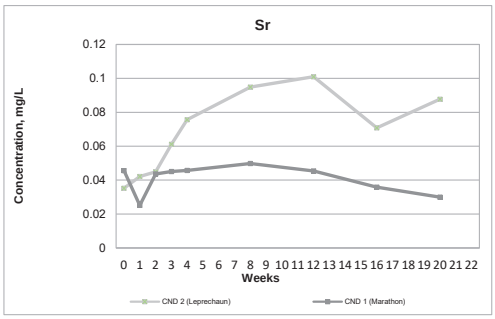
Note: Values below the respective detection limits (DLs) are shown as half DLs.

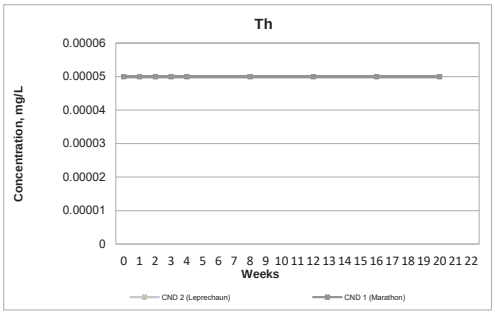
Marathon and Leprechaun tailings humidity cells

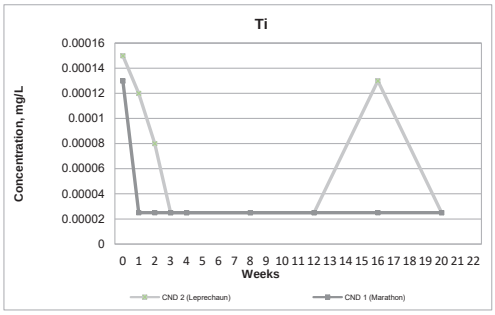


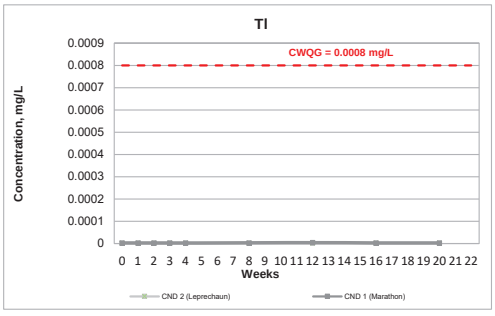


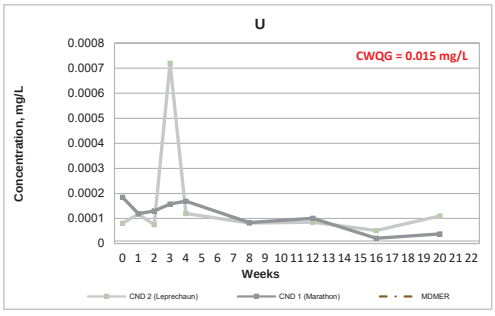


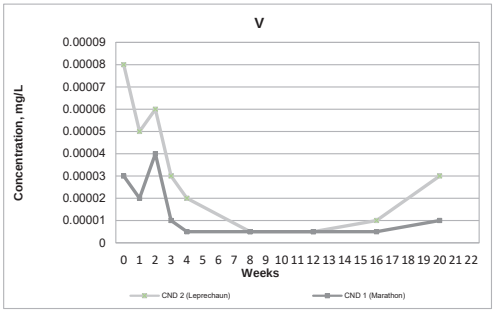


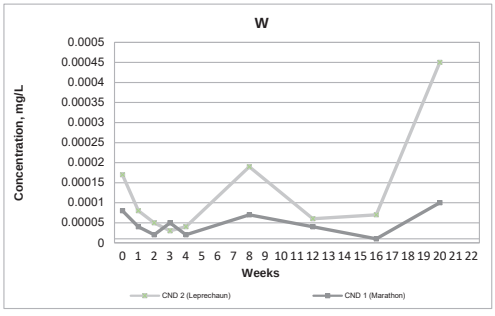


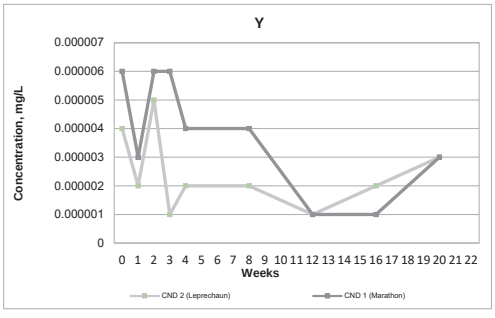


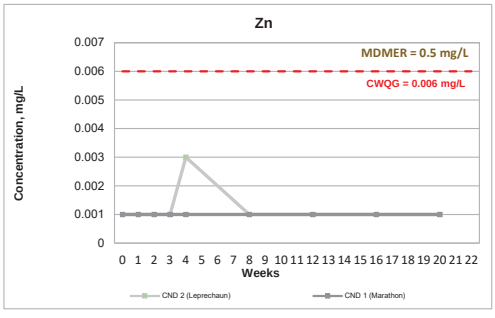












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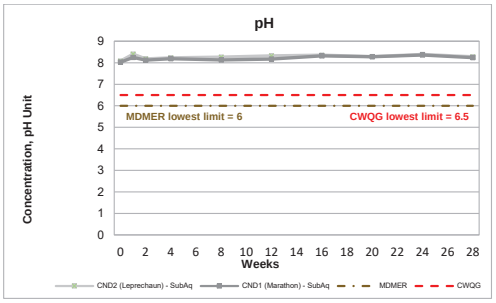

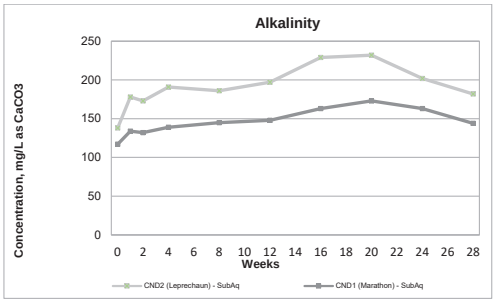

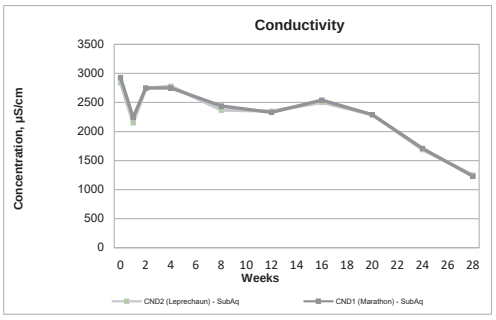

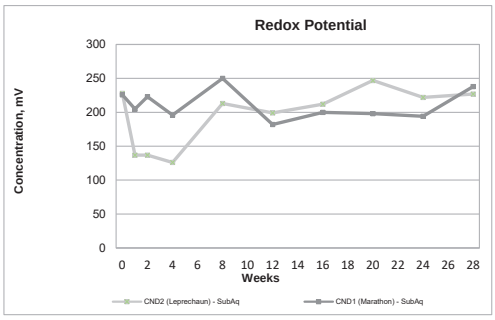

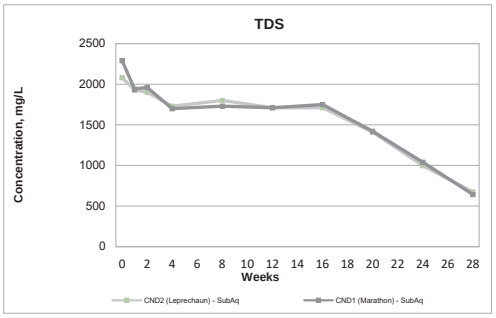

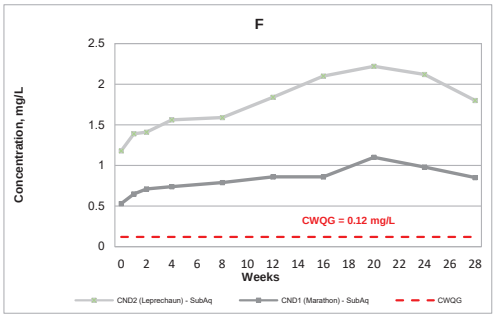

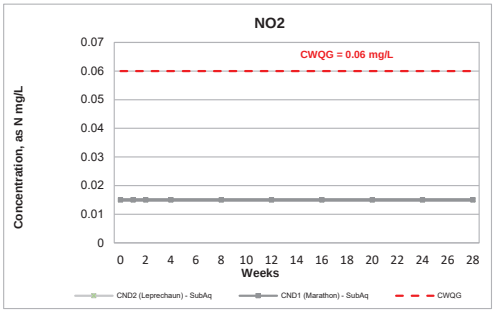

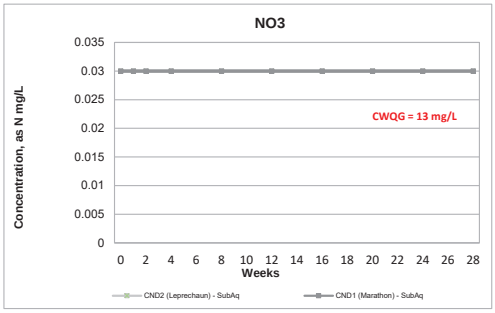

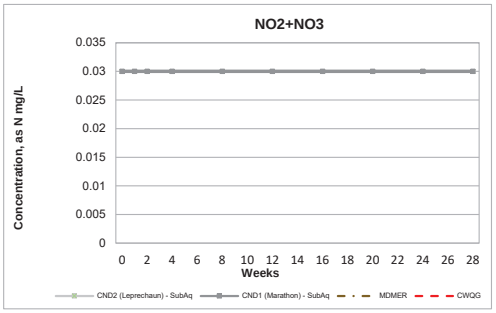

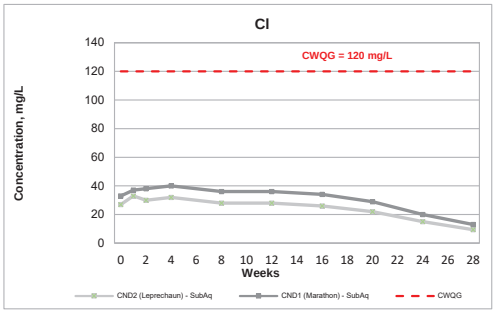

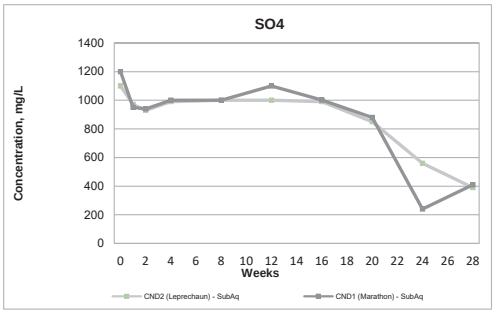

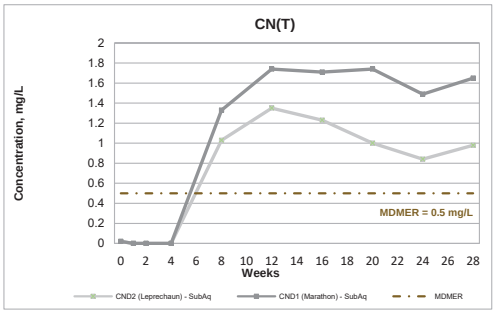

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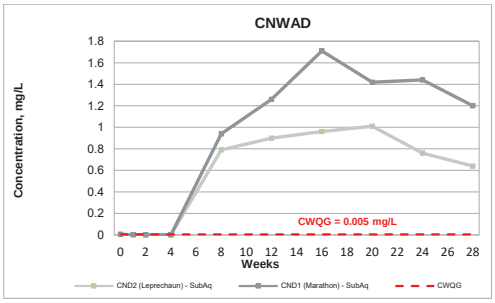
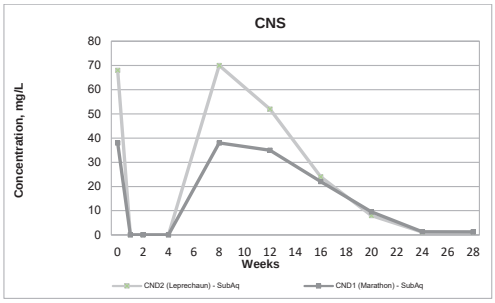
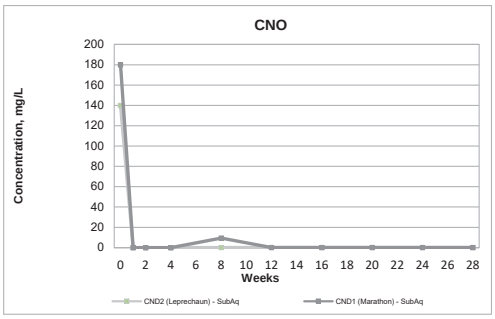
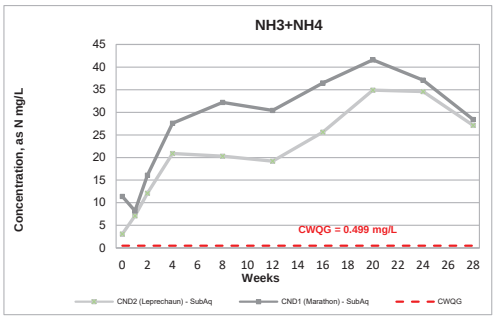
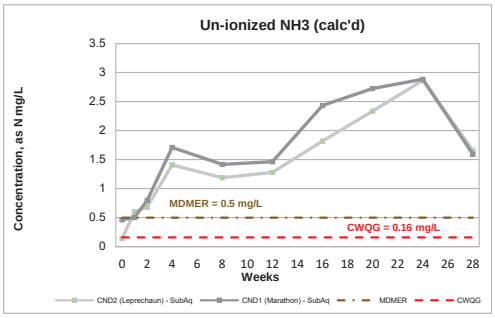
Marathon and Leprechaun tailings sub-aqueous columns

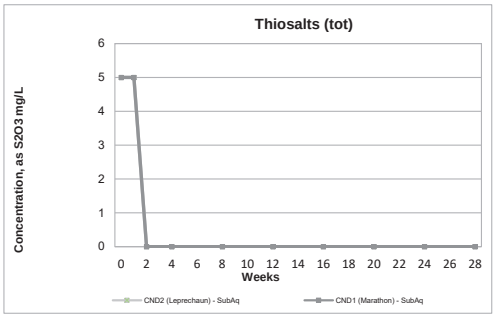


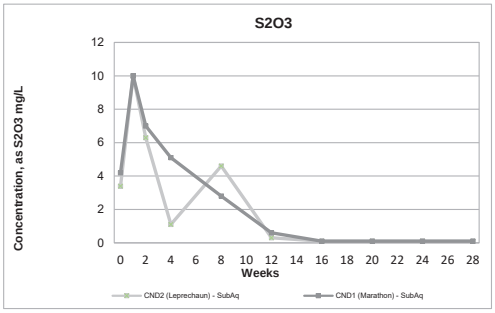


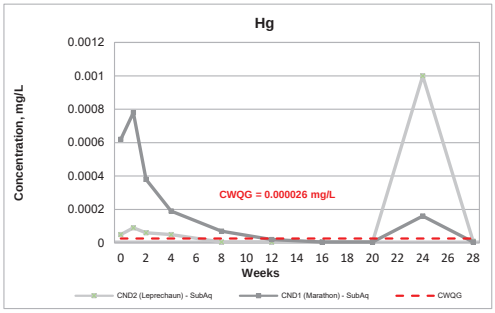


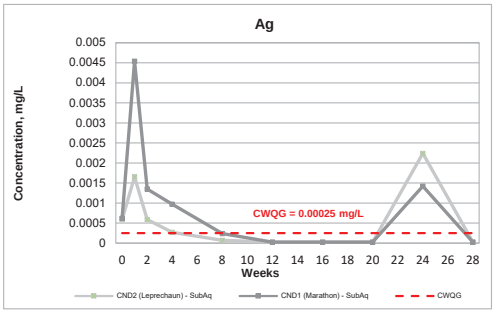


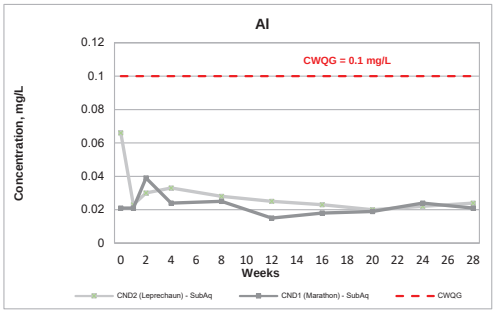


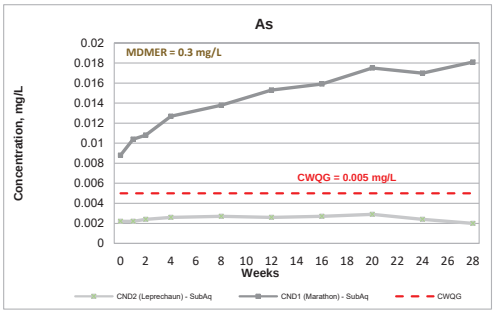


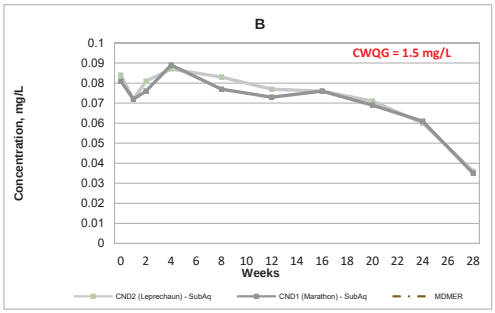






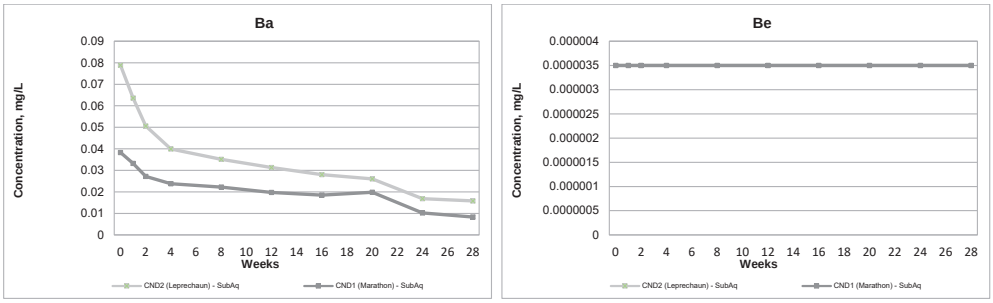


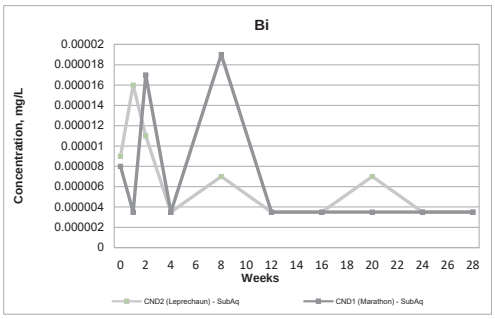


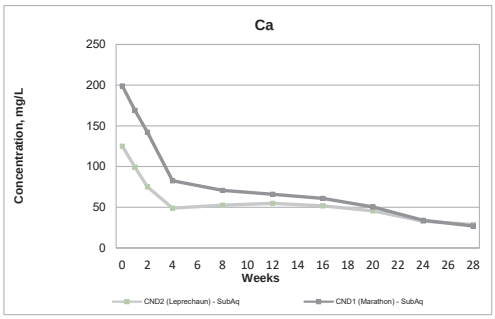


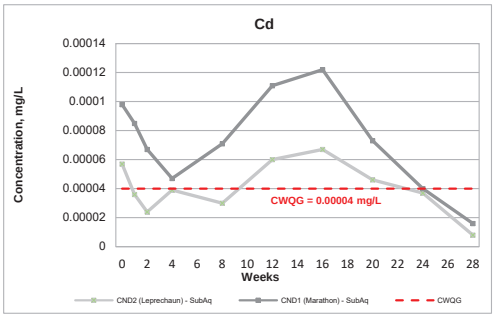
Note: Values below the respective detection limits (DLs) are shown as half DLs. CNWAD - weak acid dissociable cyanide.

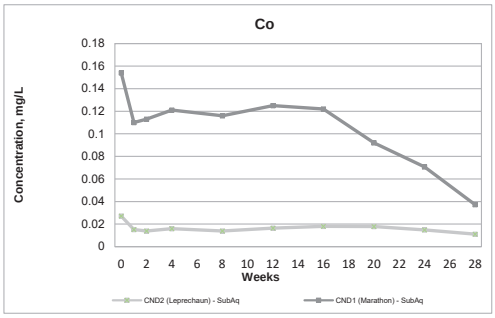
Marathon and Leprechaun tailings sub-aqueous columns

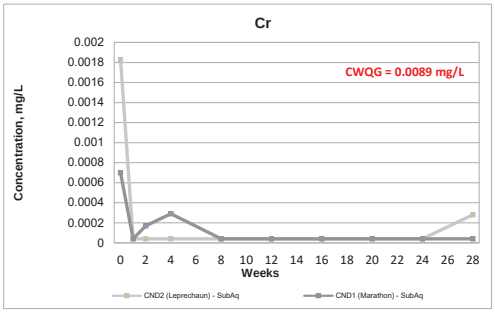


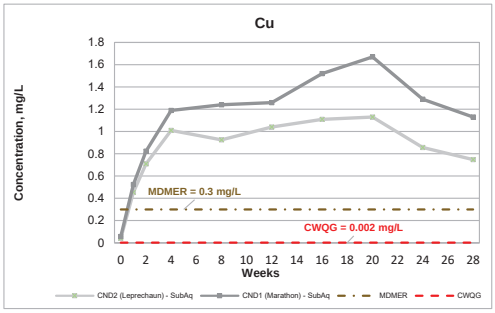


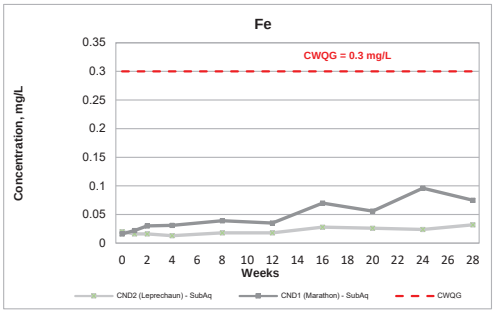


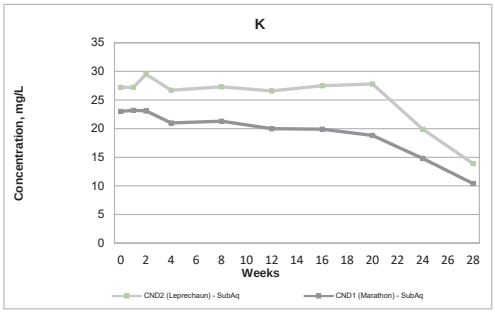


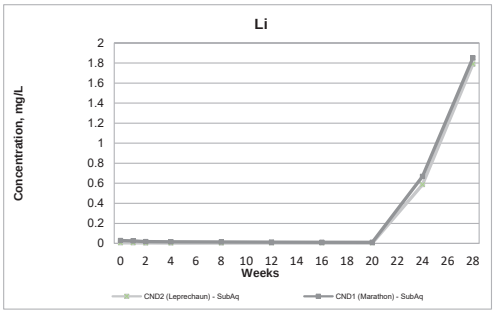


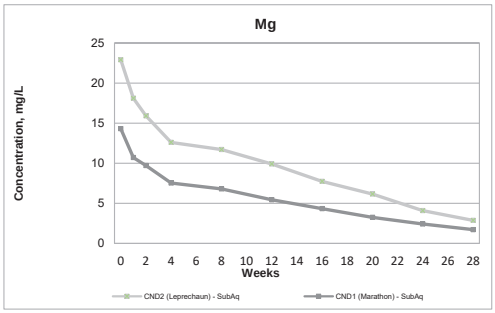






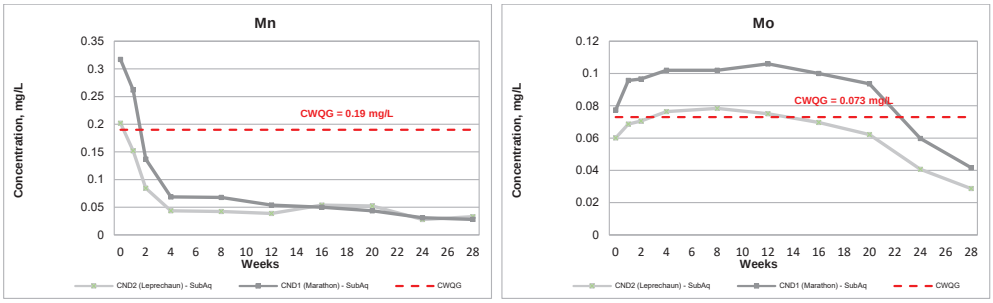


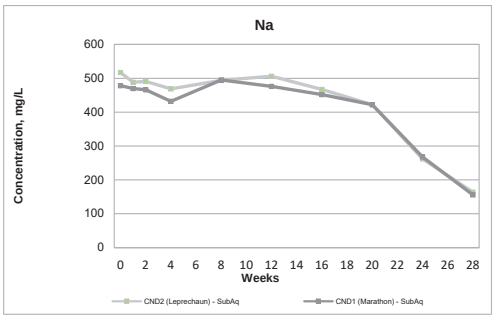


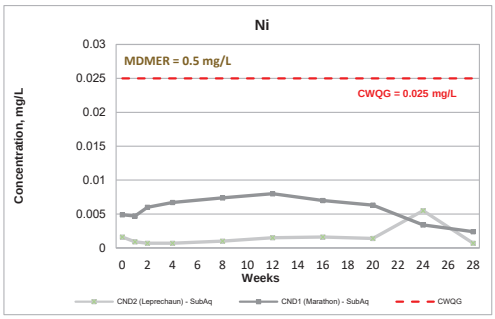


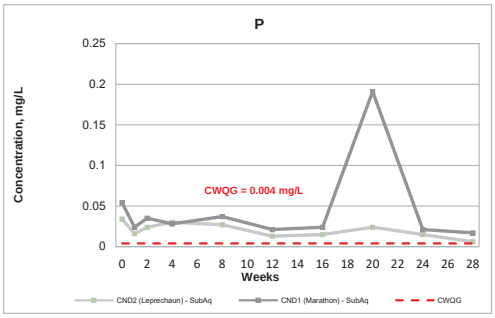
Note: Values below the respective detection limits (DLs) are shown as half DLs.

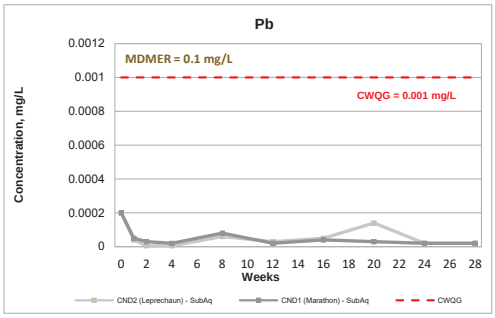
Marathon and Leprechaun tailings sub-aqueous columns

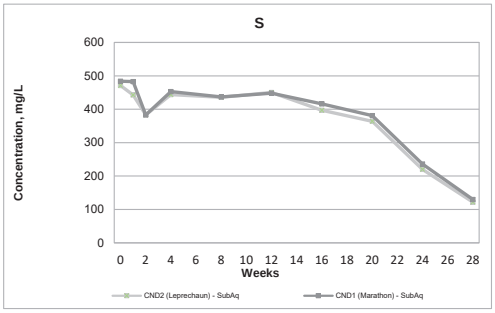


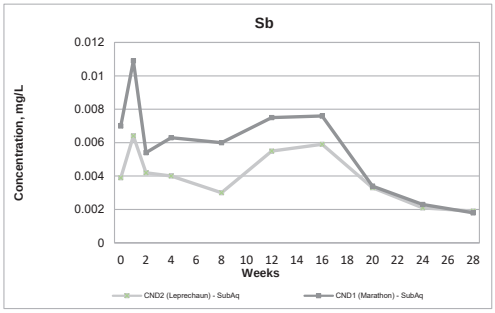


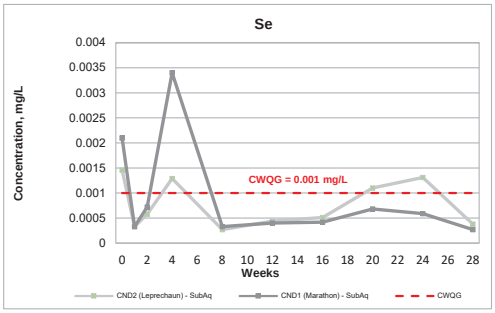


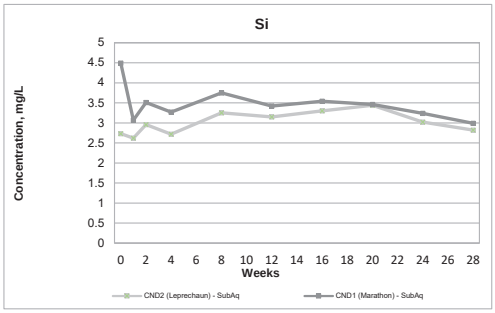


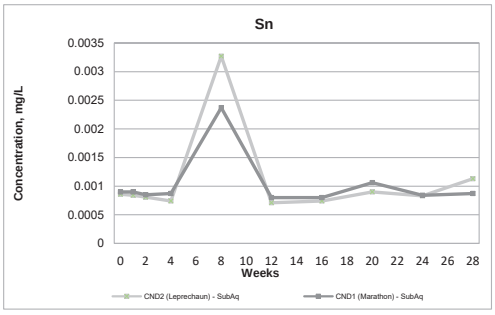


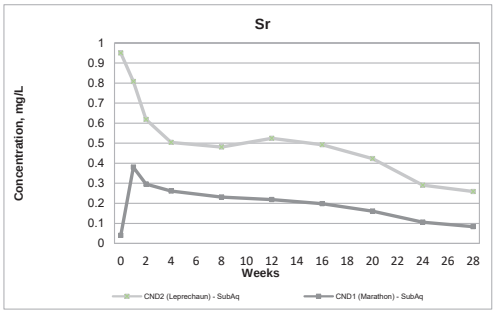






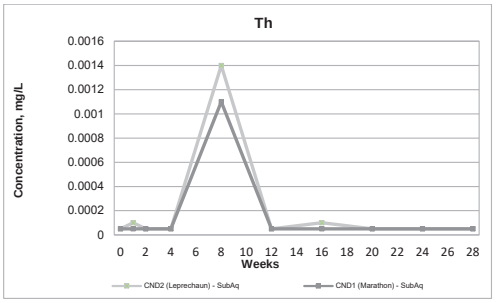


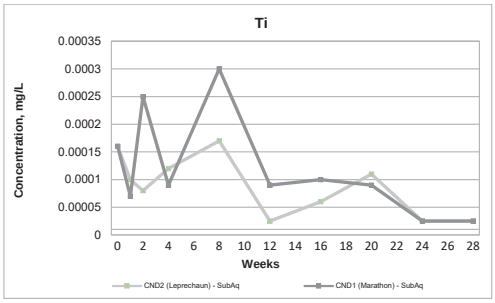


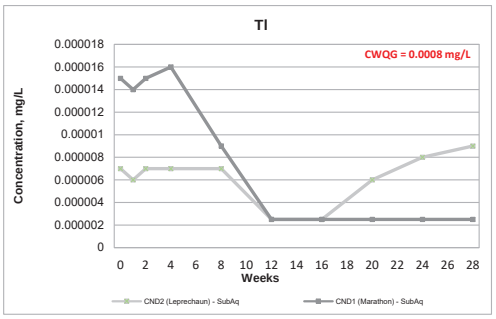


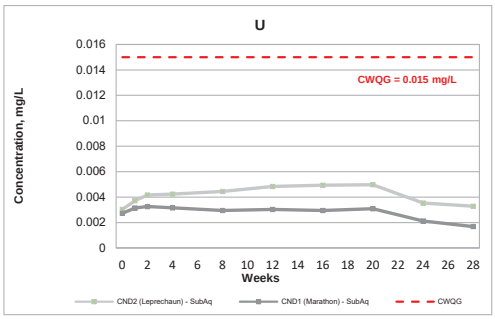
Note: Values below the respective detection limits (DLs) are shown as half DLs.

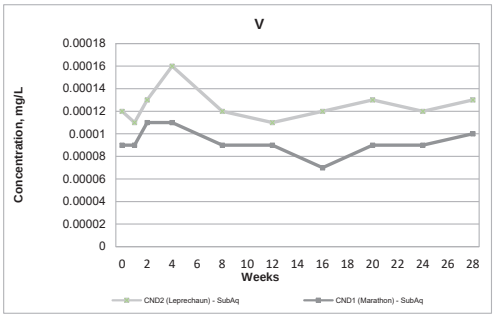
Marathon and Leprechaun tailings sub-aqueous columns

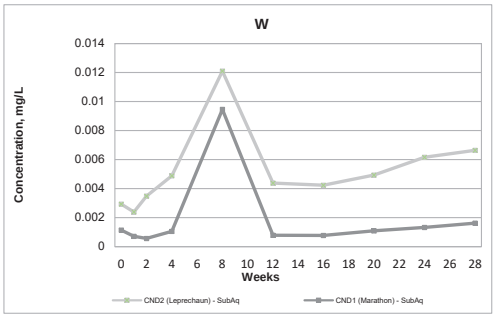


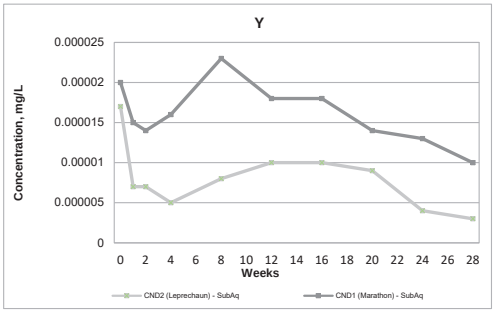


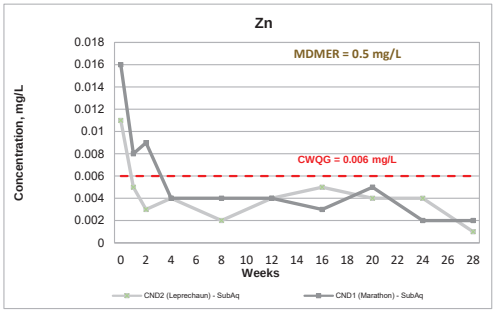






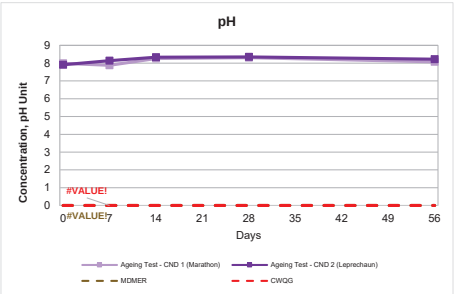


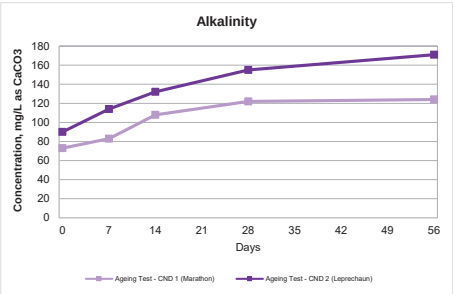


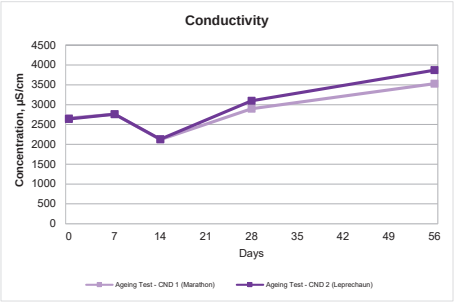


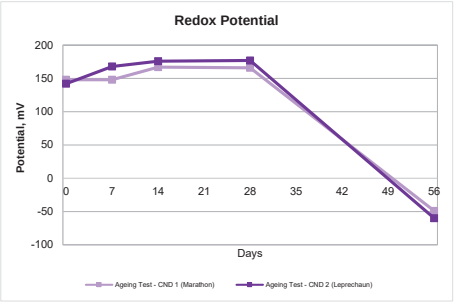
Note: Values below the respective detection limits (DLs) are shown as half DLs.

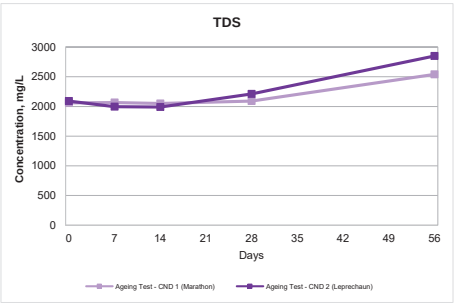
Marathon and Leprechaun process water ageing tests

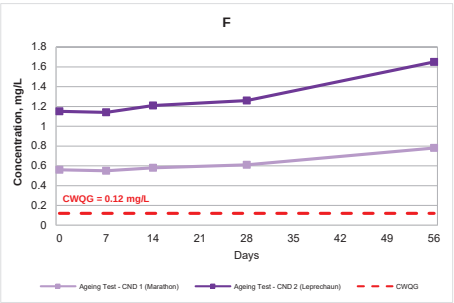


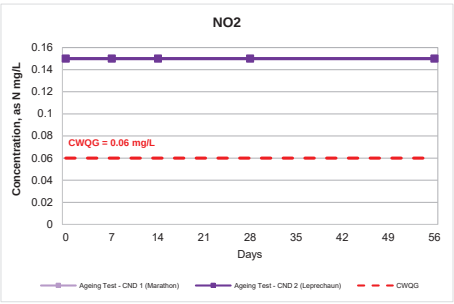


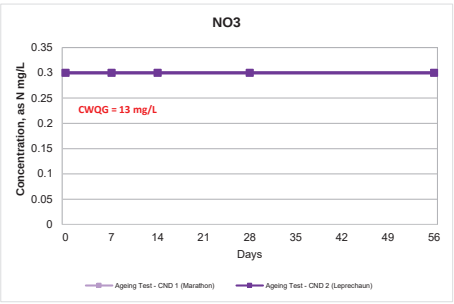


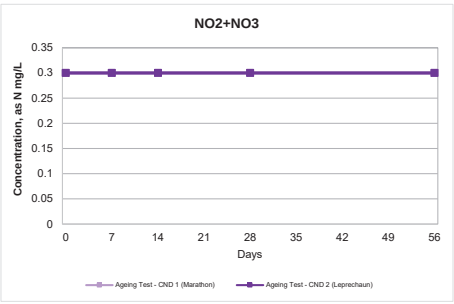


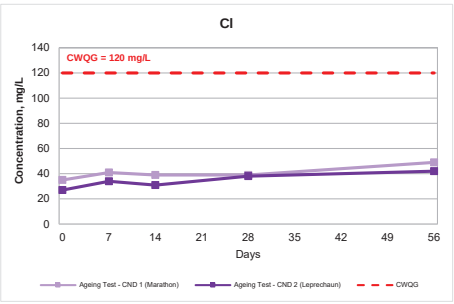


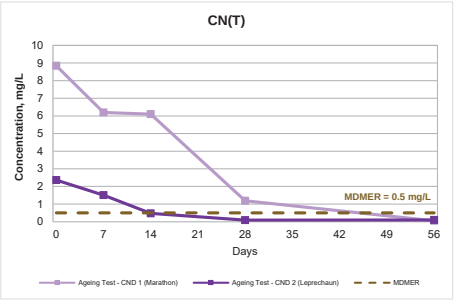






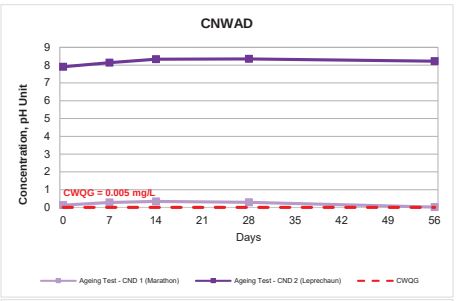


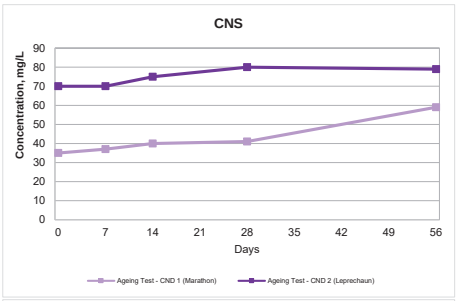


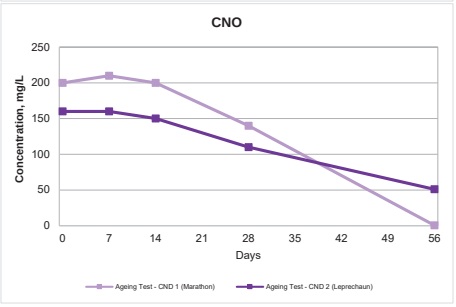


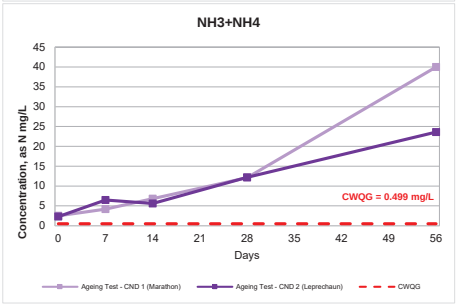
Note: Values below the respective detection limits (DLs) are shown as half DLs.

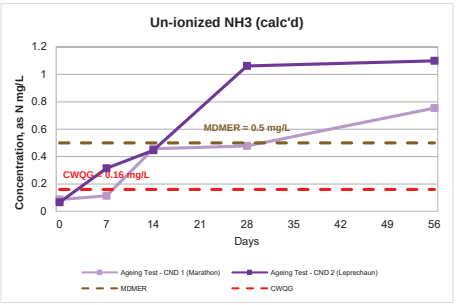
Marathon and Leprechaun process water ageing tests

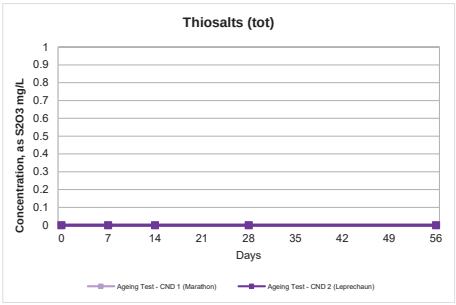


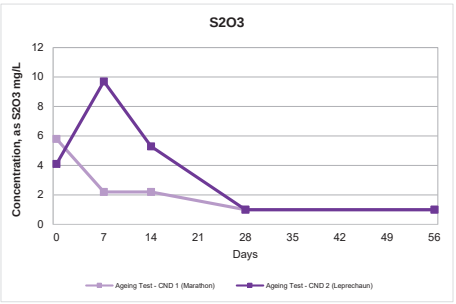


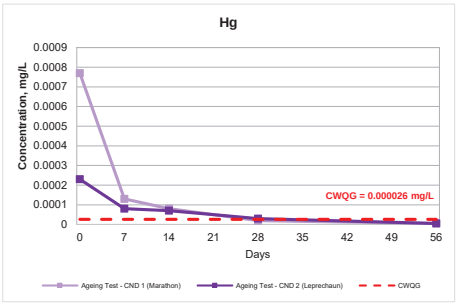


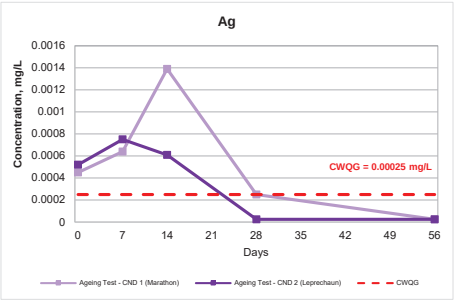


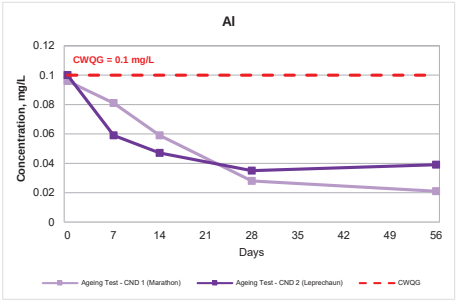


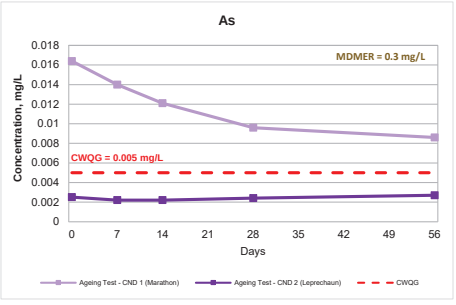


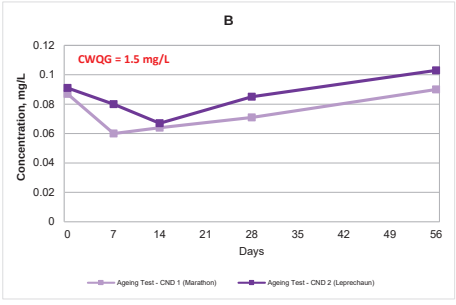






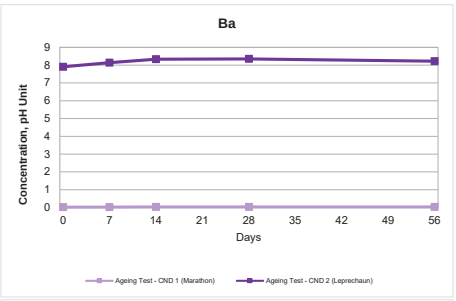


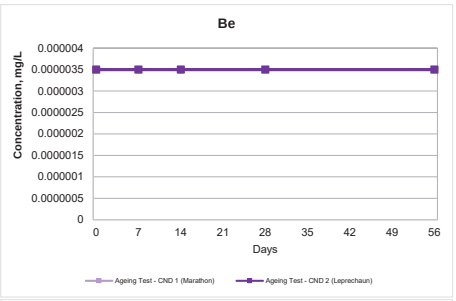


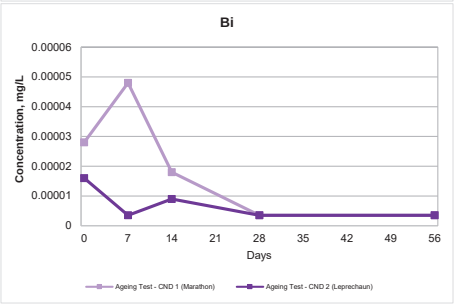


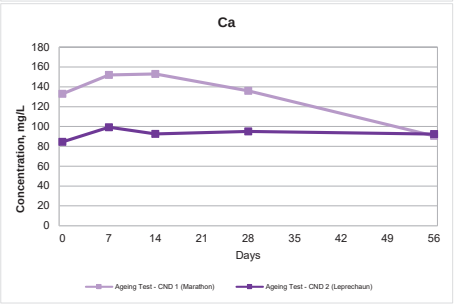
Note: Values below the respective detection limits (DLs) are shown as half DLs. CNWAD - weak acid dissociable cyanide.

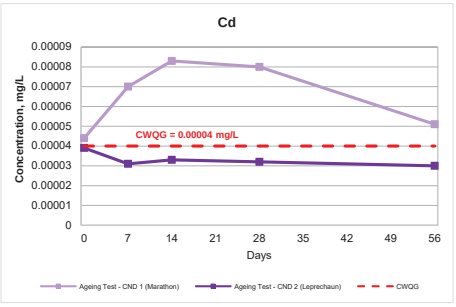
Marathon and Leprechaun process water ageing tests

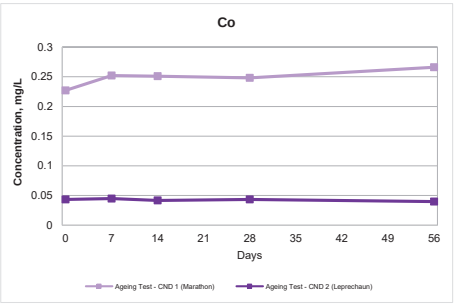


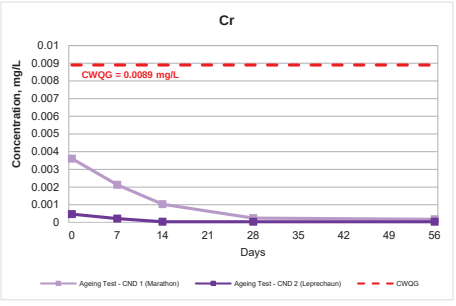


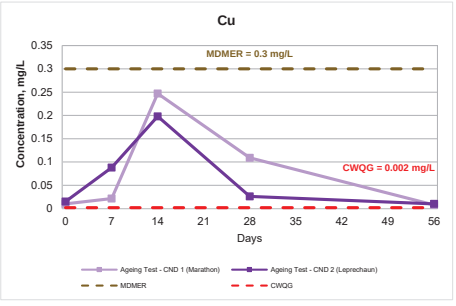


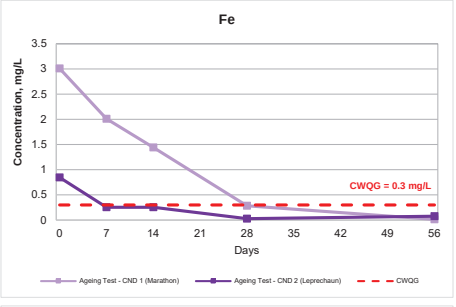


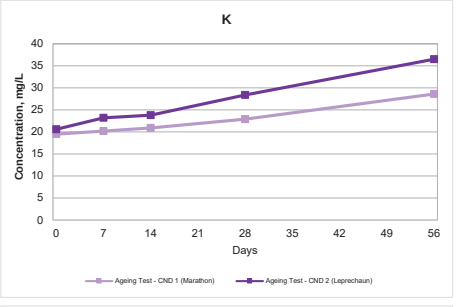


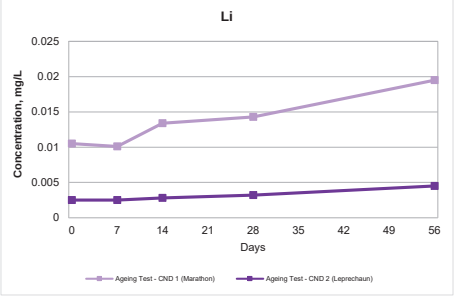


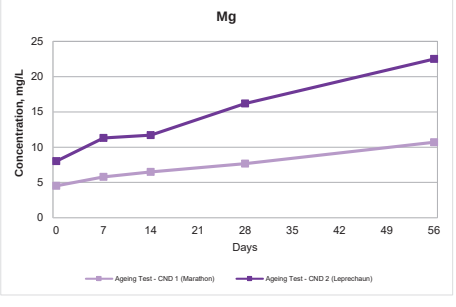






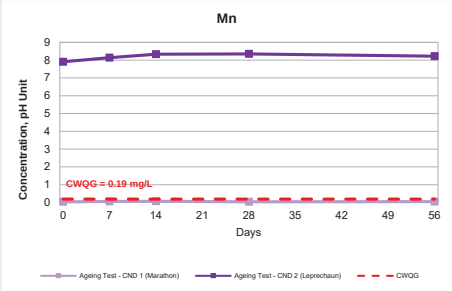


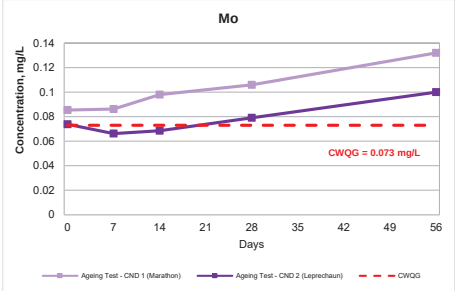


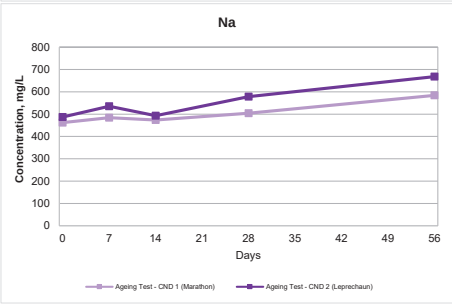


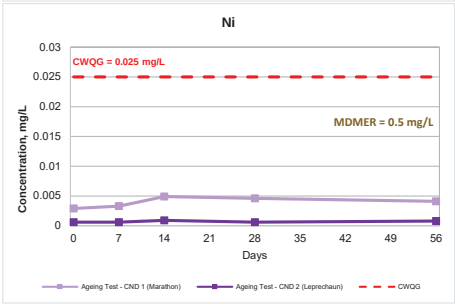
Note: Values below the respective detection limits (DLs) are shown as half DLs.

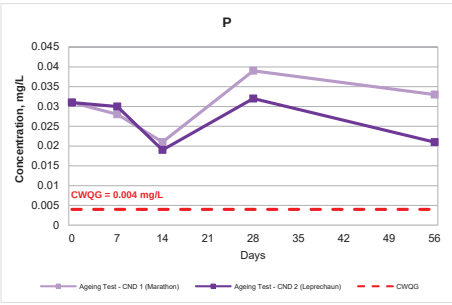
Marathon and Leprechaun process water ageing tests

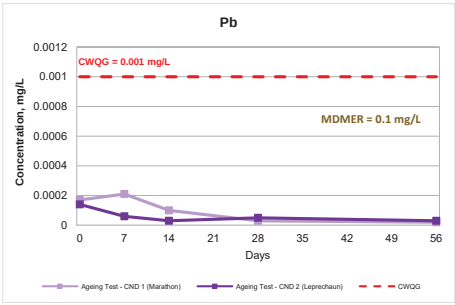


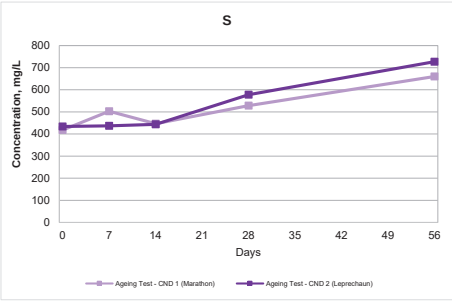


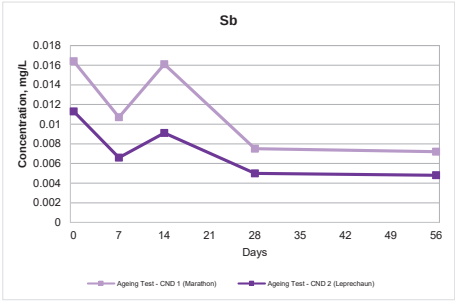


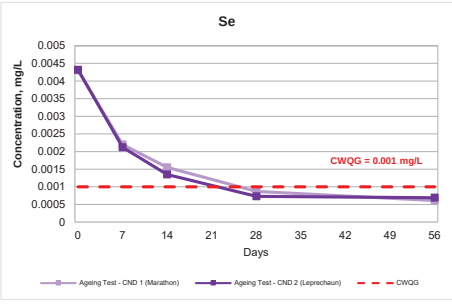


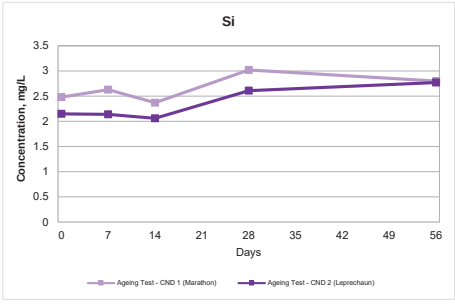


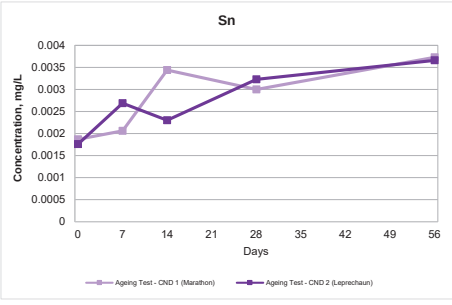


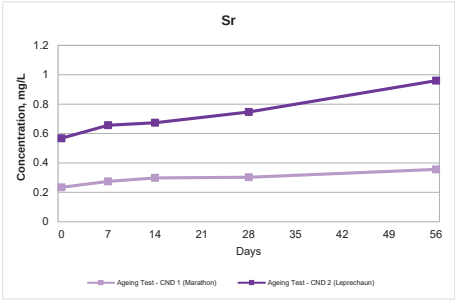






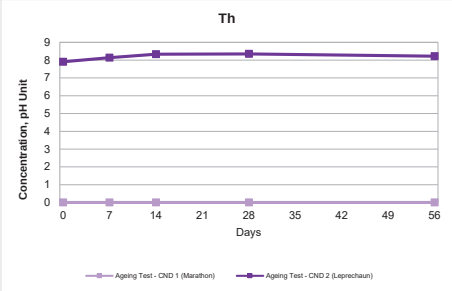


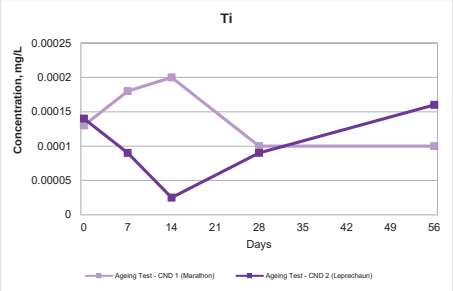


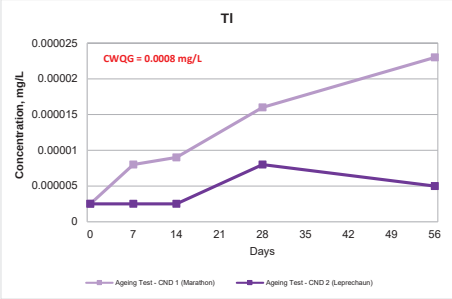


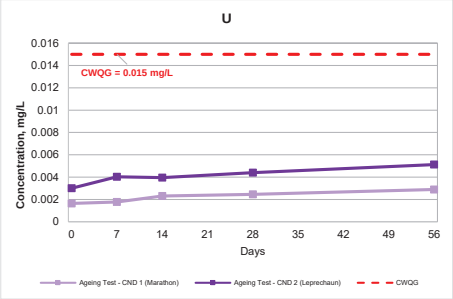
Note: Values below the respective detection limits (DLs) are shown as half DLs.

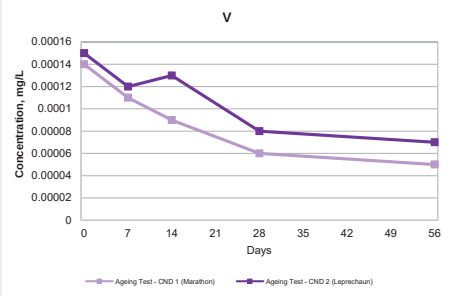
Marathon and Leprechaun process water ageing tests

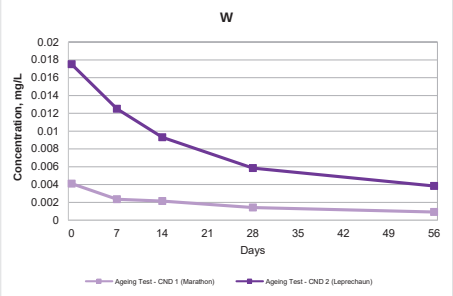


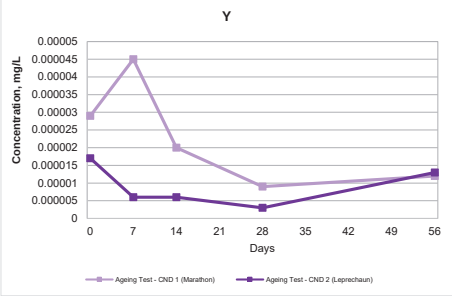


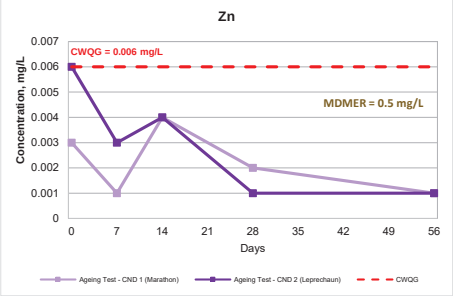












Note: Values below the respective detection limits (DLs) are shown as half DLs.

APPENDIX IR-21.A
KINETIC TESTING RESULTS

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	3	4	5	6	7	8	9	10
Date			Effective	12-Aug-20	19-Aug-20	26-Aug-20	02-Sep-20	09-Sep-20	16-Sep-20	23-Sep-20	30-Sep-20	07-Oct-20	14-Oct-20	21-Oct-20
LIMS			01-Jun-2021	10106-AUG20	10145-AUG20	10223-AUG20	10008-SEP20	10092-SEP20	10154-SEP20	10233-SEP20	10315-SEP20	10022-OCT20	10133-OCT20	10197-OCT20
Hum Cell Leachate Vol	mL	-	-	568	846	859	813	890	899	831	486	394	502	319
pH	no unit	6.0-9.5	-	**5.73**	**5.96**	**5.42**	**5.66**	**5.52**	**5.45**	**5.18**	**4.98**	**4.84**	**4.41**	**4.36**
Acidity	mg/L as $CaCO_3$	-	-	15	9	6	3	3	4	4	14	15	18	8
Alkalinity	mg/L as $CaCO_3$	-	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	110	32	42	54	54	71	85	66	68	177	61
SO_4	mg/L	-	-	33	10	15	24	21	28	48	31	28	74	19
F	mg/L	0.12	-	< 0.06	< 0.06	< 0.06	---	< 0.06	---	---	---	< 0.06	---	---
NH_3+NH_4	as N mg/L	-	-	0.1	<0.1	<0.1	---	<0.1	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	0.000	0.000	0.000	---	0.000	---	---	---	---	---	---
CN_T	mg/L	-	0.50	0.004	0.002	0.002	---	< 0.002	---	---	---	< 0.002	---	---
CN_{WAD}	mg/L	0.005 as CNF	-	0.003	0.002	0.002	---	< 0.002	---	---	---	< 0.002	---	---
Hg	mg/L	0.000026	-	< 0.00001	< 0.00001	0.00001	---	< 0.00001	---	---	---	< 0.00001	---	---
Ag	mg/L	0.00025	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---	---
Al	mg/L	0.005@pH<6.5	-	0.001	0.016	0.002	---	0.006	---	---	---	**0.077**	---	---
As	mg/L	0.005	0.10	< 0.0002	< 0.0002	< 0.0002	---	< 0.0002	---	---	---	0.0002	---	---
Ba	mg/L	-	-	0.00100	0.00074	0.00031	---	0.00140	---	---	---	0.00470	---	---
Be	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	< 0.000007	---	---	---	0.000034	---	---
B	mg/L	1.5	-	0.011	0.010	0.004	---	0.009	---	---	---	0.007	---	---
Bi	mg/L	-	-	< 0.000007	< 0.000007	0.000024	---	< 0.000007	---	---	---	< 0.000007	---	---
Ca	mg/L	-	-	10.1	3.03	4.18	---	6.32	---	---	---	6.74	---	---
Cd	mg/L	0.00009	-	0.000043	0.000004	0.000026	---	0.000050	---	---	---	**0.000283**	---	---
Co	mg/L	-	-	0.00113	0.000272	0.000743	---	0.00218	---	---	---	0.00648	---	---
Cr	mg/L	-	-	< 0.00008	< 0.00008	< 0.00008	---	< 0.00008	---	---	---	< 0.00008	---	---
Cu	mg/L	0.002	0.10	**0.0024**	0.0003	0.0009	---	**0.0028**	---	---	---	**0.0388**	---	---
Fe	mg/L	0.3	-	< 0.007	< 0.007	0.011	---	0.007	---	---	---	0.147	---	---
K	mg/L	-	-	0.322	0.335	0.052	---	0.088	---	---	---	0.081	---	---
Li	mg/L	-	-	0.0009	0.0011	0.0003	---	0.0004	---	---	---	0.0007	---	---
Mg	mg/L	-	-	3.76	0.926	1.24	---	1.52	---	---	---	1.33	---	---
Mn	mg/L	-	-	0.227	0.0657	0.117	---	0.159	---	---	---	0.198	---	---
Mo	mg/L	0.073	-	< 0.00004	0.00091	< 0.00004	---	0.00011	---	---	---	< 0.00004	---	---
Na	mg/L	-	-	2.61	2.98	0.52	---	0.51	---	---	---	0.48	---	---
Ni	mg/L	0.03	0.25	0.0021	0.0005	0.0013	---	0.0037	---	---	---	0.0133	---	---
P	mg/L	-	-	0.019	< 0.003	< 0.003	---	< 0.003	---	---	---	< 0.003	---	---
Pb	mg/L	0.001	0.08	0.00008	< 0.00001	< 0.00001	---	0.00003	---	---	---	0.00027	---	---
Sb	mg/L	-	-	0.0009	< 0.0009	< 0.0009	---	< 0.0009	---	---	---	< 0.0009	---	---
Se	mg/L	0.001	-	0.00034	0.00007	0.00009	---	0.00008	---	---	---	0.00009	---	---
Si	mg/L	-	-	0.89	0.33	0.40	---	0.57	---	---	---	0.88	---	---
Sn	mg/L	-	-	0.00034	0.00006	0.00024	---	< 0.00006	---	---	---	0.00006	---	---
Sr	mg/L	-	-	0.00887	0.0330	0.00312	---	0.00636	---	---	---	0.0126	---	---
Th	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	---	< 0.0001	---	---	---	< 0.0001	---	---
Ti	mg/L	-	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---	---
Tl	mg/L	0.0008	-	< 0.000005	< 0.000005	< 0.000005	---	< 0.000005	---	---	---	< 0.000005	---	---
U	mg/L	0.015	-	< 0.000002	0.000004	< 0.000002	---	< 0.000002	---	---	---	0.000034	---	---
V	mg/L	-	-	< 0.00001	0.00002	< 0.00001	---	< 0.00001	---	---	---	< 0.00001	---	---
W	mg/L	-	-	0.00005	0.00009	< 0.00002	---	< 0.00002	---	---	---	0.00025	---	---
Y	mg/L	-	-	0.000016	< 0.000002	0.000006	---	0.000066	---	---	---	0.000901	---	---
Zn	mg/L	0.007	0.40	**0.016**	0.003	0.008	---	**0.019**	---	---	---	**0.064**	---	---

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	11	12	13	14	15	16	17	18	19	20	21
Date			Effective	28-Oct-20	04-Nov-20	11-Nov-20	18-Nov-20	25-Nov-20	02-Dec-20	09-Dec-20	16-Dec-20	23-Dec-20	30-Dec-20	06-Jan-21
LIMS			01-Jun-2021	10255-OCT20	10020-NOV20	10078-NOV20	10125-NOV20	10163-NOV20	10019-DEC20	10071-DEC20	10163-DEC20	10186-DEC20	10241-DEC20	10026-JAN21
Hum Cell Leachate Vol	mL	-	-	673	755	420	304	308	298	289	353	282	250	304
pH	no unit	6.0-9.5	-	**4.28**	**4.02**	**3.70**	**3.76**	**3.21**	**3.02**	**2.98**	**2.84**	**2.73**	**2.70**	**2.75**
Acidity	mg/L as $CaCO_3$	-	-	14	49	101	112	174	198	373	454	547	585	556
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	243	336	561	498	602	691	970	1160	1400	1460	1380
SO_4	mg/L	-	-	100	130	240	180	220	290	420	470	630	650	560
F	mg/L	0.12	-	---	**0.29**	---	---	---	**0.21**	---	---	---	**0.16**	---
NH_3+NH_4	as N mg/L	-	-	---	---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---	---
CN_T	mg/L	-	0.50	---	< 0.002	---	---	---	< 0.002	---	---	---	< 0.002	---
CN_{WAD}	mg/L	0.005 as CNF	-	---	< 0.002	---	---	---	< 0.002	---	---	---	0.002	---
Hg	mg/L	0.000026	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001	---
Ag	mg/L	0.00025	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	0.00005	---
Al	mg/L	0.005@pH<6.5	-	---	**4.50**	---	---	---	**27.8**	---	---	---	**51.8**	---
As	mg/L	0.005	0.10	---	0.0038	---	---	---	0.0043	---	---	---	0.0046	---
Ba	mg/L	-	-	---	0.0338	---	---	---	0.0637	---	---	---	0.0555	---
Be	mg/L	-	-	---	0.000852	---	---	---	0.00236	---	---	---	0.00233	---
B	mg/L	1.5	-	---	0.004	---	---	---	0.004	---	---	---	0.007	---
Bi	mg/L	-	-	---	< 0.000007	---	---	---	< 0.000007	---	---	---	0.000080	---
Ca	mg/L	-	-	---	14.4	---	---	---	11.1	---	---	---	5.10	---
Cd	mg/L	0.00009	-	---	**0.00454**	---	---	---	**0.00459**	---	---	---	**0.00530**	---
Co	mg/L	-	-	---	0.0851	---	---	---	0.0567	---	---	---	0.0901	---
Cr	mg/L	-	-	---	0.00073	---	---	---	0.0276	---	---	---	0.166	---
Cu	mg/L	0.002	0.10	---	**0.688**	---	---	---	**1.67**	---	---	---	**1.20**	---
Fe	mg/L	0.3	-	---	**3.06**	---	---	---	**13.9**	---	---	---	**69.3**	---
K	mg/L	-	-	---	0.612	---	---	---	0.853	---	---	---	0.830	---
Li	mg/L	-	-	---	0.0072	---	---	---	0.0083	---	---	---	0.0295	---
Mg	mg/L	-	-	---	13.6	---	---	---	4.36	---	---	---	10.1	---
Mn	mg/L	-	-	---	1.83	---	---	---	0.506	---	---	---	0.727	---
Mo	mg/L	0.073	-	---	0.00024	---	---	---	0.00022	---	---	---	0.00031	---
Na	mg/L	-	-	---	4.79	---	---	---	3.75	---	---	---	4.71	---
Ni	mg/L	0.03	0.25	---	**0.187**	---	---	---	**0.0906**	---	---	---	**0.0997**	---
P	mg/L	-	-	---	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	---	**0.00138**	---	---	---	**0.0134**	---	---	---	**0.0580**	---
Sb	mg/L	-	-	---	< 0.0009	---	---	---	< 0.0009	---	---	---	0.0011	---
Se	mg/L	0.001	-	---	0.00093	---	---	---	**0.00105**	---	---	---	0.00085	---
Si	mg/L	-	-	---	3.84	---	---	---	15.4	---	---	---	18.5	---
Sn	mg/L	-	-	---	0.00007	---	---	---	0.00016	---	---	---	0.00041	---
Sr	mg/L	-	-	---	0.0501	---	---	---	0.0378	---	---	---	0.0266	---
Th	mg/L	-	-	---	< 0.0001	---	---	---	0.0028	---	---	---	0.0108	---
Ti	mg/L	-	-	---	0.00008	---	---	---	< 0.00005	---	---	---	0.00014	---
Tl	mg/L	0.0008	-	---	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005	---
U	mg/L	0.015	-	---	0.00105	---	---	---	0.00328	---	---	---	0.00420	---
V	mg/L	-	-	---	0.00002	---	---	---	< 0.00001	---	---	---	0.00025	---
W	mg/L	-	-	---	0.00054	---	---	---	0.00006	---	---	---	0.00055	---
Y	mg/L	-	-	---	0.0365	---	---	---	0.105	---	---	---	0.0851	---
Zn	mg/L	0.007	0.40	---	**0.793**	---	---	---	**0.603**	---	---	---	**0.606**	---

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	22	23	24	25
Date			Effective	13-Jan-21	20-Jan-21	27-Jan-21	03-Feb-21
LIMS			01-Jun-2021	10067-JAN21	10143-JAN21	10208-JAN21	10019-FEB21
Hum Cell Leachate Vol	mL	-	-	307	398	372	302
pH	no unit	6.0-9.5	-	**2.71**	**2.74**	**2.77**	**2.69**
Acidity	mg/L as $CaCO_3$	-	-	589	492	450	468
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	1510	1330	1320	1400
SO_4	mg/L	-	-	660	520	500	540
F	mg/L	0.12	-	---	---	< 0.06	---
NH_3+NH_4	as N mg/L	-	-	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---
CN_T	mg/L	-	0.50	---	---	< 0.002	---
CN_{WAD}	mg/L	0.005 as CNF	-	---	---	< 0.002	---
Hg	mg/L	0.000026	-	---	---	< 0.00001	---
Ag	mg/L	0.00025	-	---	---	< 0.00005	---
Al	mg/L	0.005@pH<6.5	-	---	---	**37.6**	---
As	mg/L	0.005	0.10	---	---	0.0026	---
Ba	mg/L	-	-	---	---	0.0398	---
Be	mg/L	-	-	---	---	0.00117	---
B	mg/L	1.5	-	---	---	0.003	---
Bi	mg/L	-	-	---	---	< 0.000007	---
Ca	mg/L	-	-	---	---	4.60	---
Cd	mg/L	0.00009	-	---	---	**0.00399**	---
Co	mg/L	-	-	---	---	0.0616	---
Cr	mg/L	-	-	---	---	0.110	---
Cu	mg/L	0.002	0.10	---	---	**0.558**	---
Fe	mg/L	0.3	-	---	---	**59.7**	---
K	mg/L	-	-	---	---	0.544	---
Li	mg/L	-	-	---	---	0.0126	---
Mg	mg/L	-	-	---	---	6.89	---
Mn	mg/L	-	-	---	---	0.543	---
Mo	mg/L	0.073	-	---	---	0.00012	---
Na	mg/L	-	-	---	---	3.11	---
Ni	mg/L	0.03	0.25	---	---	**0.0639**	---
P	mg/L	-	-	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	---	---	**0.0574**	---
Sb	mg/L	-	-	---	---	< 0.0009	---
Se	mg/L	0.001	-	---	---	0.00059	---
Si	mg/L	-	-	---	---	32.5	---
Sn	mg/L	-	-	---	---	0.00026	---
Sr	mg/L	-	-	---	---	0.0184	---
Th	mg/L	-	-	---	---	0.0111	---
Ti	mg/L	-	-	---	---	0.00020	---
Tl	mg/L	0.0008	-	---	---	< 0.000005	---
U	mg/L	0.015	-	---	---	0.00191	---
V	mg/L	-	-	---	---	0.00029	---
W	mg/L	-	-	---	---	0.00005	---
Y	mg/L	-	-	---	---	0.0389	---
Zn	mg/L	0.007	0.40	---	---	**0.332**	---

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Summary of ABA Test Data

Parameter	Units	Ref No.: 10141-JUL20
Sulphur (S)	%	0.408
Sulphide (S^-)	%	0.42
NP	t $CaCO_3$/1000 t	3.5
CO_3 NP	t $CaCO_3$/1000 t	3.3

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
0	568	5.73	15	2	110	33
1	846	5.96	9	<2	32	10
2	859	5.42	6	<2	42	15
3	813	5.66	3	<2	54	24
4	890	5.52	3	<2	54	21
5	899	5.45	4	<2	71	28
6	831	5.18	4	<2	85	48
7	486	4.98	14	<2	66	31
8	394	4.84	15	<2	68	28
9	502	4.41	18	<2	177	74
10	319	4.36	8	<2	61	19
11	673	4.28	14	<2	243	100
12	755	4.02	49	<2	336	130
13	420	3.70	101	<2	561	240
14	304	3.76	112	<2	498	180
15	308	3.21	174	<2	602	220
16	298	3.02	198	<2	691	290
17	289	2.98	373	<2	970	420
18	353	2.84	454	<2	1160	470
19	282	2.73	547	<2	1400	630
20	250	2.70	585	<2	1460	650

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^=$ Depletion %	Cumulative $S^=$ Depletion %
18.7	18.7	0.15	0.15
8.5	27.2	0.07	0.22
12.9	40.1	0.10	0.32
19.5	59.6	0.15	0.47
18.7	78.3	0.15	0.62
25.2	103.5	0.20	0.82
39.9	143.4	0.32	1.14
15.1	158.4	0.12	1.26
11.0	169.4	0.09	1.34
37.1	206.6	0.29	1.64
6.1	212.7	0.05	1.69
67.3	280.0	0.53	2.22
98.2	378.1	0.78	3.00
100.8	478.9	0.80	3.80
54.7	533.6	0.43	4.24
67.8	601.4	0.54	4.77
86.4	687.8	0.69	5.46
121.4	809.2	0.96	6.42
165.9	975.1	1.32	7.74
177.7	1152.8	1.41	9.15
162.5	1315.3	1.29	10.44

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
19.53	0.56	0.59
8.81	0.81	0.86
13.42	1.19	1.27
20.33	1.77	1.88
19.47	2.33	2.47
26.22	3.08	3.27
41.55	4.27	4.52
15.69	4.71	5.00
11.49	5.04	5.35
38.70	6.15	6.52
6.31	6.33	6.71
70.10	8.33	8.84
102.24	11.25	11.94
105.00	14.25	15.12
57.00	15.88	16.84
70.58	17.90	18.98
90.02	20.47	21.71
126.44	24.08	25.54
172.82	29.02	30.78
185.06	34.31	36.39
169.27	39.14	41.52

** Initial Week 0 leachate may included soluble sulphate, and may not indicate oxidation of sulphide in the sample material has occurred.*

[1] *Calculated values*

Summary - Weeks 0 to 20

	pH	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^=$ Depletion %	Cumulative $S^=$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
Maximum Value	5.96	585	2	1460	650	177.7	-	1.41	-	185.06	-	-
Minimum Value	2.70	3	<2	32	10	6.1	-	0.05	-	6.31	-	-
Average Value	3.39	129	2	416	174	62.6	-	0.50	-	65.24	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Changes to Head Sample after 20 Weeks [1]

Parameter	Units	Ref No.: 10141-JUL20
Sulphide ($S^{=}$) Remaining	%	0.38
NP Remaining	t $CaCO_3$/1000 t	2.1
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.9

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
21	304	2.75	556	<2	1380	560
22	307	2.71	589	<2	1510	660
23	398	2.74	492	<2	1330	520
24	372	2.77	450	<2	1320	500
25	302	2.69	468	<2	1400	540

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %
170.2	1485.5	1.35	11.79
202.6	1688.1	1.61	13.40
207.0	1895.1	1.64	15.04
186.0	2081.1	1.48	16.52
163.1	2244.2	1.29	17.81

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
177.33	44.21	46.89
211.06	50.24	53.29
215.58	56.40	59.82
193.75	61.94	65.69
169.88	66.79	70.84

[1] *Calculated values*

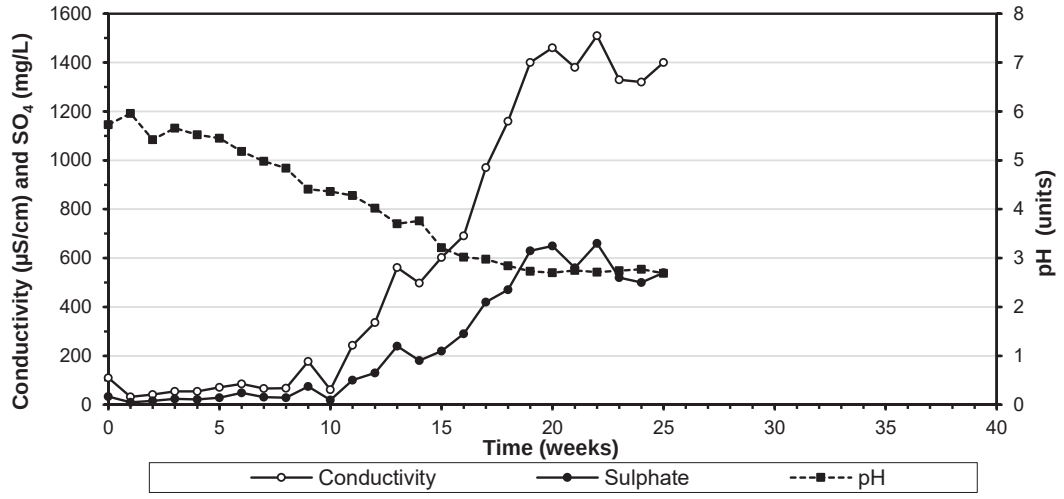
Summary - Weeks 0 to 40

Maximum Value	5.96	589	2	1510	660	207.0	-	1.64	-	216	-	-
Minimum Value	2.69	3	<2	32	10	6.1	-	0.05	-	6.3	-	-
Average Value	3.16	202	2	603	248	86.3	-	0.69	-	89.91	-	-

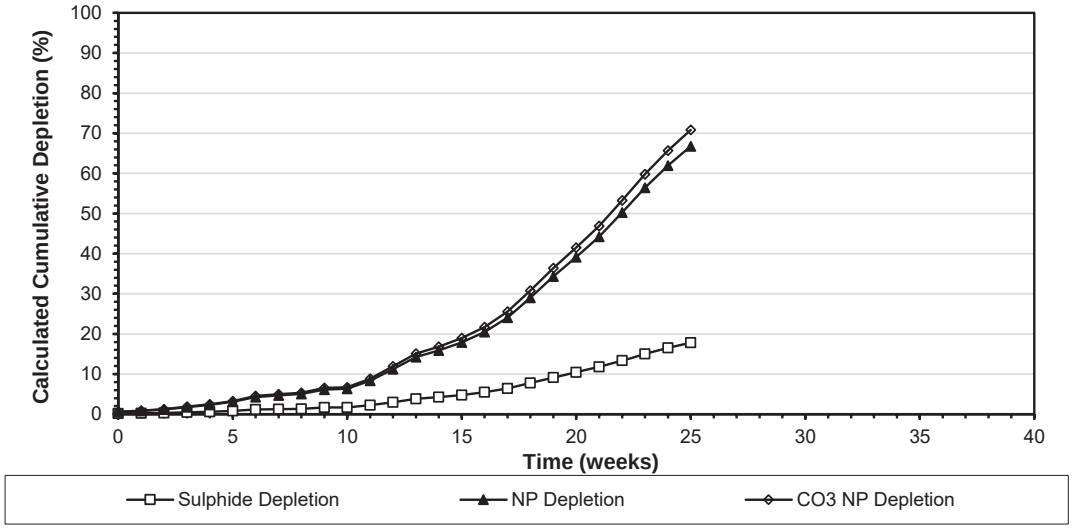
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Conductivity, Sulphate, and pH in Weekly Humidity Cell Leachate - CND 1 Residue CNP DPL



Cumulative Sulphide and NP Depletion CND 1 Residue CNP DPL

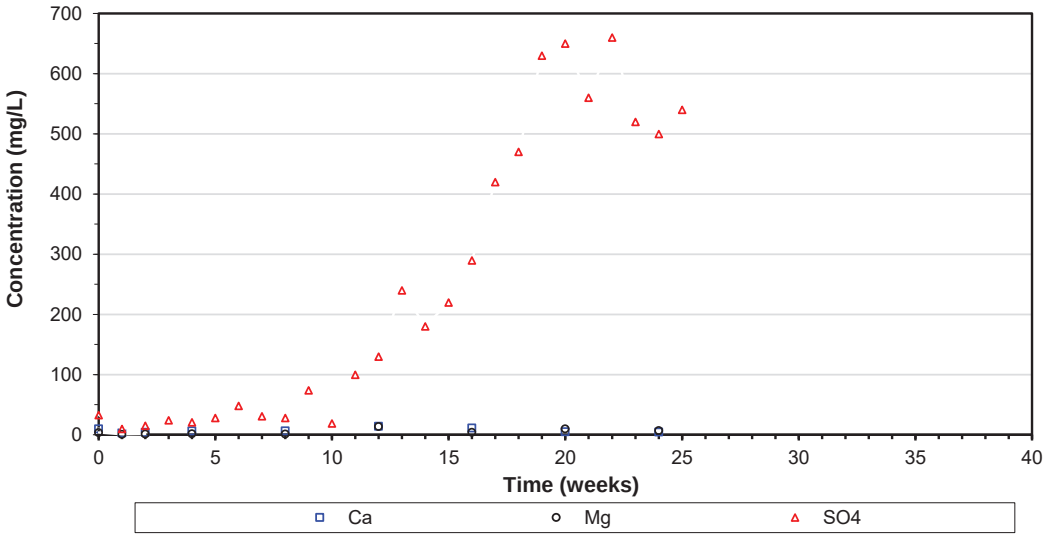


Note: NP depletion calculated based on sulphate assay.

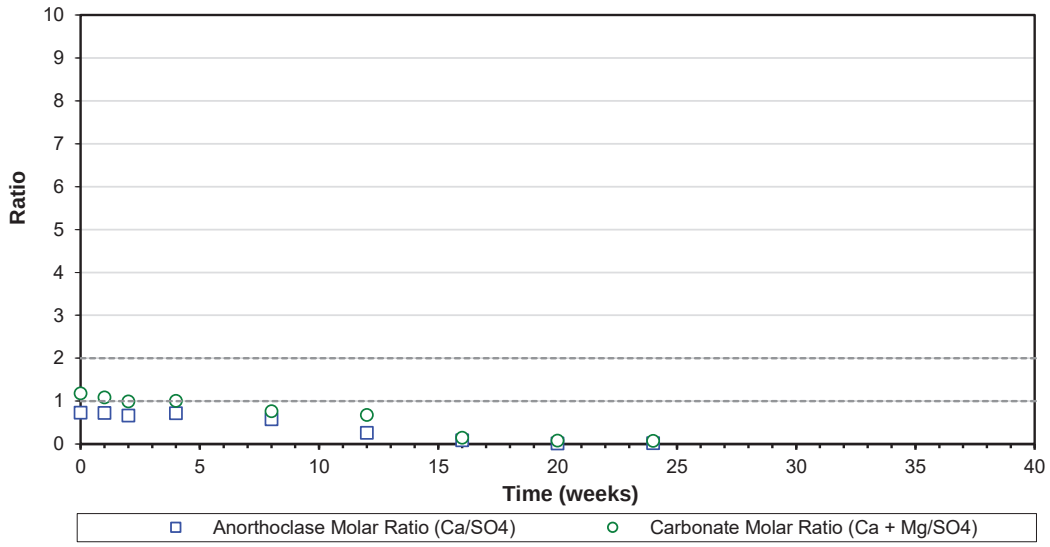
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL



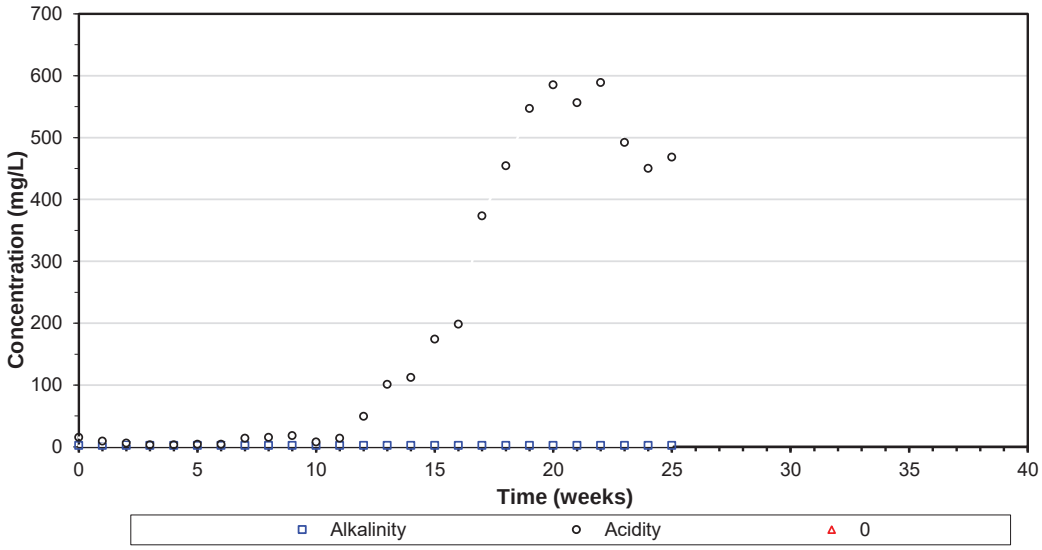
Carbonate (Ca + Mg/SO$_4$) and Anorthoclase (Ca/SO$_4$) Molar Ratios CND 1 Residue CNP DPL



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

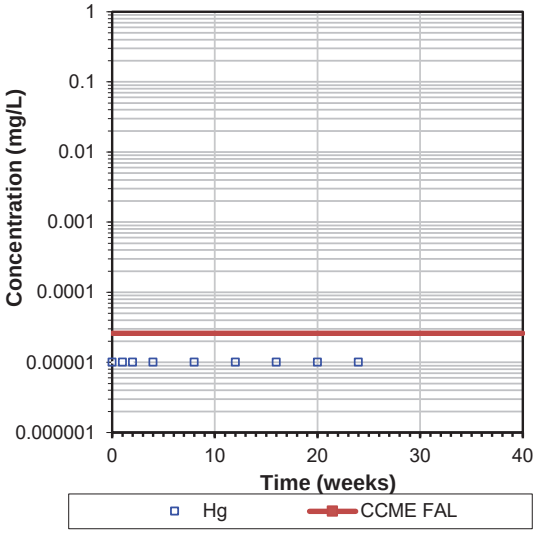
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

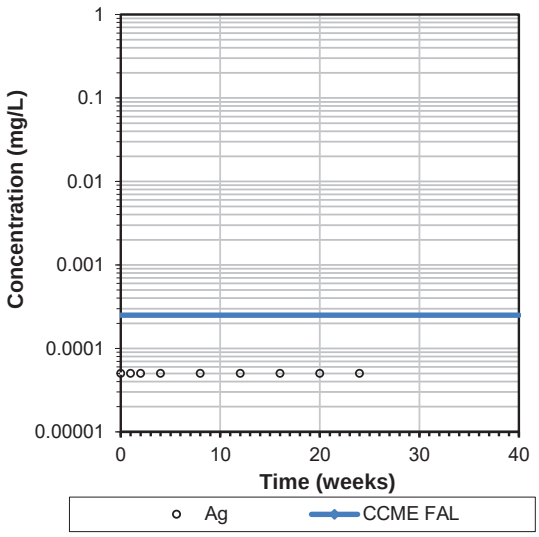


TEST REPORT

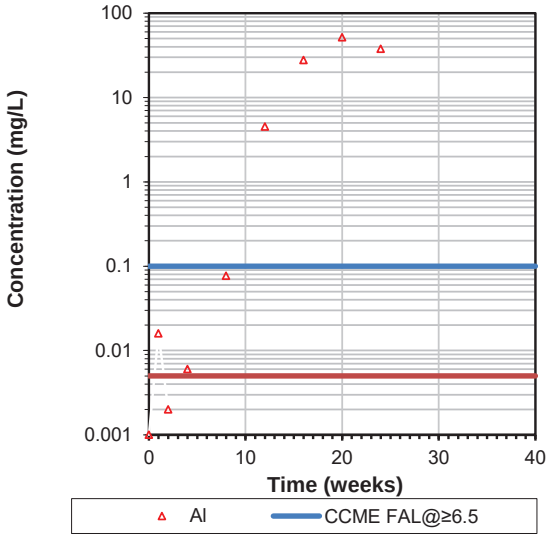
Humidity Cell Test (ASTM D 5744-96)

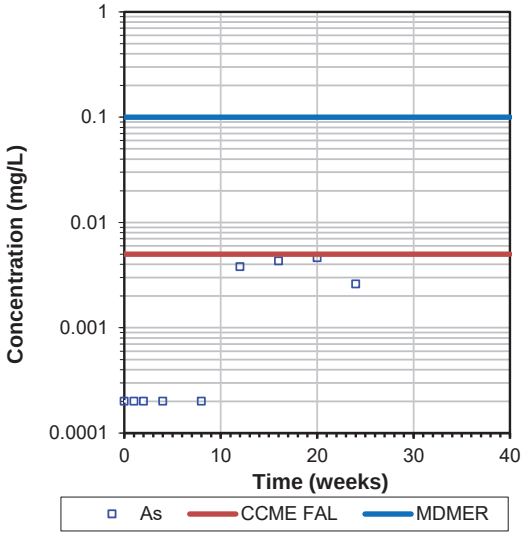
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

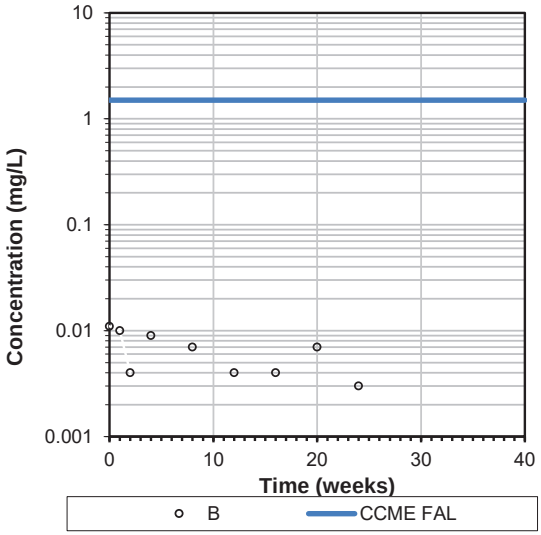


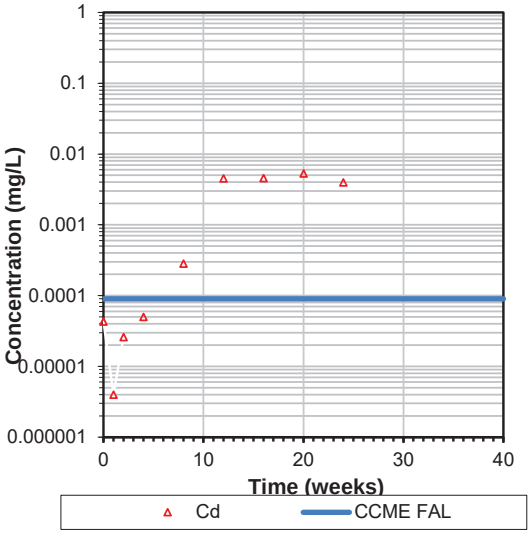


TEST REPORT

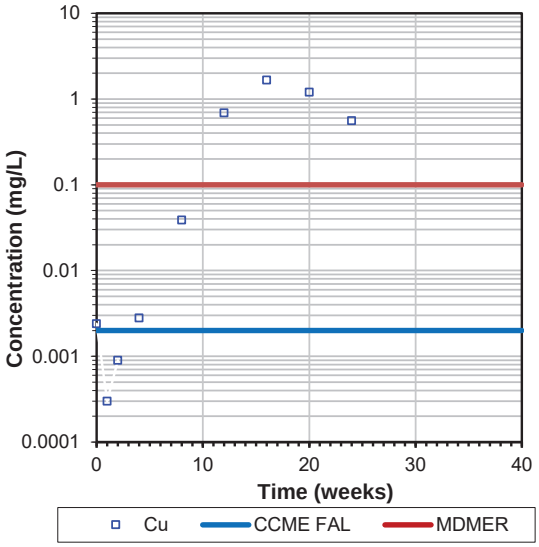
Humidity Cell Test (ASTM D 5744-96)

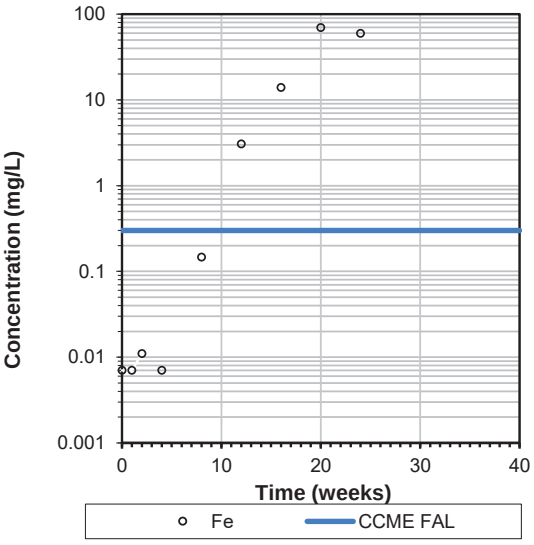
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

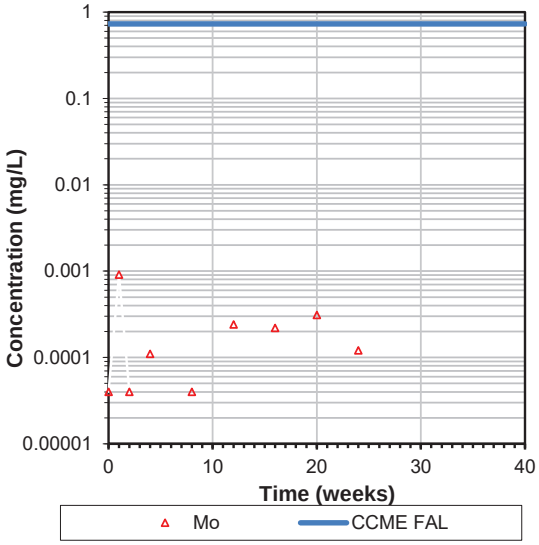


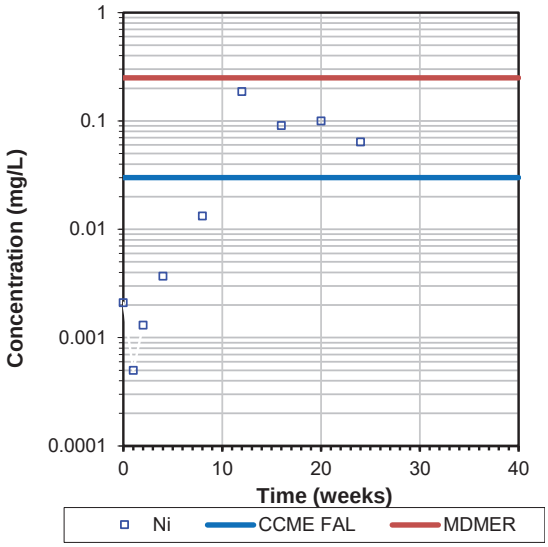


TEST REPORT

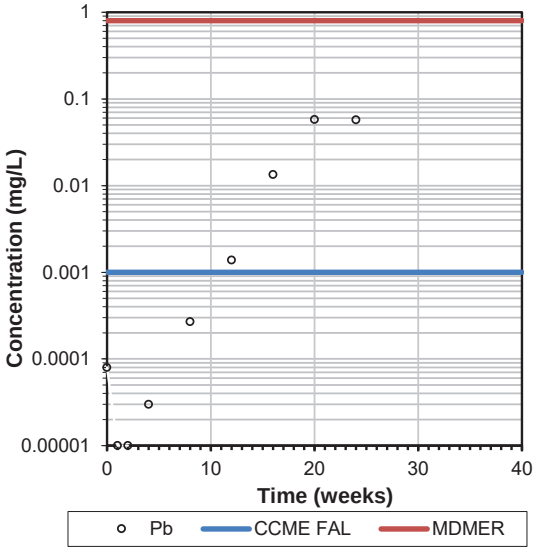
Humidity Cell Test (ASTM D 5744-96)

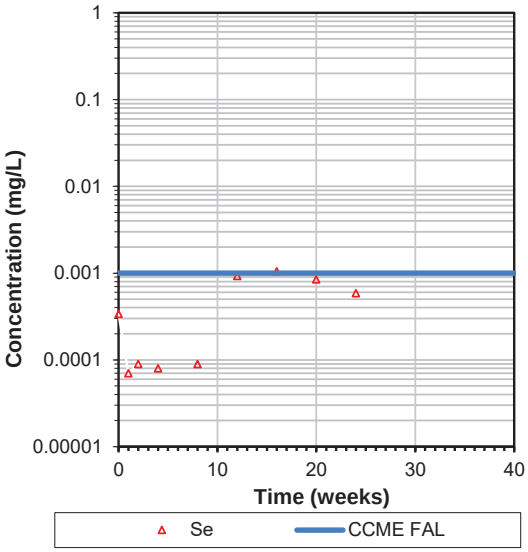
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

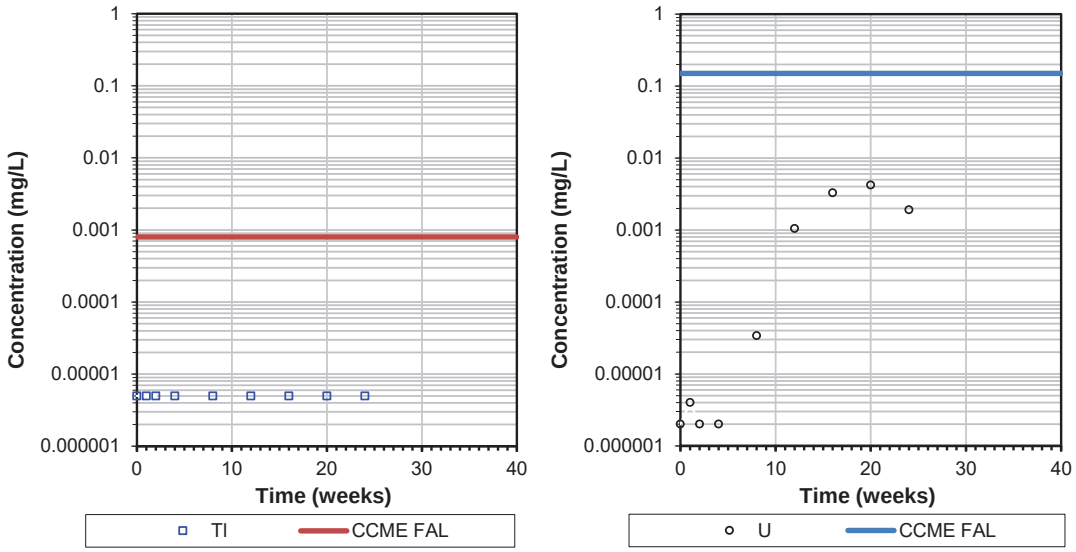




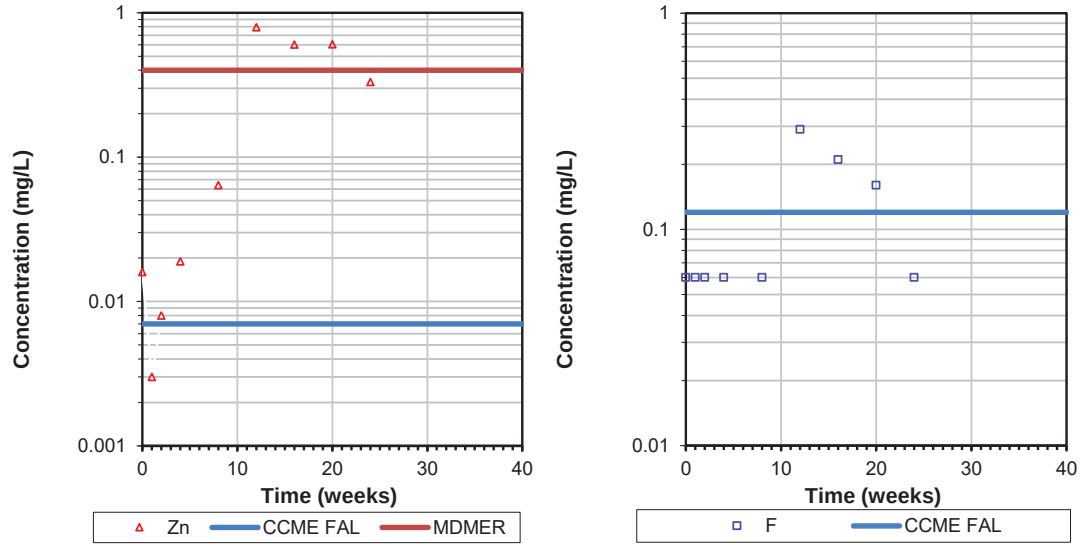
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL



Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL



Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	3	4	5	6	7	8	9
Date			Effective	12-Aug-20	19-Aug-20	26-Aug-20	02-Sep-20	09-Sep-20	16-Sep-20	23-Sep-20	30-Sep-20	07-Oct-20	14-Oct-20
LIMS			01-Jun-2021	10105-AUG20	10144-AUG20	10222-AUG20	10007-SEP20	10091-SEP20	10154-SEP20	10232-SEP20	10315-SEP20	10021-OCT20	10132-OCT20
Hum Cell Leachate Vo	mL	-	-	975	969	818	984	995	1018	1007	476	512	550
pH	no unit	6.0-9.5	-	**5.49**	**4.64**	**5.30**	**5.96**	**4.95**	**5.86**	**5.11**	**4.77**	**5.19**	**5.36**
Acidity	mg/L as $CaCO_3$	-	-	7	10	7	3	4	2	4	5	5	4
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	5	22	20	26	26	24	27	43	46	42
SO_4	mg/L	-	-	1.6	6.7	6.9	10	9.6	9.2	9.3	24	20	15
F	mg/L	0.12	-	< 0.06	< 0.06	< 0.06	---	< 0.06	---	---	---	< 0.06	---
NH_3+NH_4	as N mg/L			<0.1	<0.1	<0.1	---	<0.1	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	0.000	0.000	0.000	---	0.000	---	---	---	---	---
Hg	mg/L	0.000026	-	< 0.00001	< 0.00001	0.00001	---	< 0.00001	---	---	---	< 0.00001	---
Ag	mg/L	0.00025	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---
Al	mg/L	0.005@pH<6.5	-	**0.007**	**0.039**	**0.006**	---	**0.022**	---	---	---	**0.058**	---
As	mg/L	0.005	0.10	< 0.0002	0.0002	< 0.0002	---	< 0.0002	---	---	---	< 0.0002	---
Ba	mg/L	-	-	0.00018	0.00021	0.00028	---	0.00056	---	---	---	0.00115	---
Be	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	< 0.000007	---	---	---	0.000019	---
B	mg/L	1.5	-	0.004	< 0.002	0.004	---	0.002	---	---	---	0.004	---
Bi	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	0.000020	---	---	---	< 0.000007	---
Ca	mg/L	-	-	0.20	0.80	1.45	---	2.41	---	---	---	4.60	---
Cd	mg/L	0.00009	-	0.000009	0.000007	0.000025	---	0.000055	---	---	---	**0.000203**	---
Co	mg/L	-	-	0.000038	0.000123	0.000306	---	0.000653	---	---	---	0.00177	---
Cr	mg/L	-	-	0.00014	< 0.00008	< 0.00008	---	< 0.00008	---	---	---	< 0.00008	---
Cu	mg/L	0.002	0.10	0.0003	0.0006	0.0004	---	0.0013	---	---	---	**0.0059**	---
Fe	mg/L	0.3	-	0.008	0.010	0.017	---	0.033	---	---	---	0.106	---
K	mg/L	-	-	0.056	0.082	0.077	---	0.083	---	---	---	0.138	---
Li	mg/L	-	-	0.0001	< 0.0001	0.0001	---	0.0001	---	---	---	0.0002	---
Mg	mg/L	-	-	0.027	0.093	0.174	---	0.274	---	---	---	0.457	---
Mn	mg/L	-	-	0.00421	0.0167	0.0345	---	0.0581	---	---	---	0.117	---
Mo	mg/L	0.073	-	0.00017	0.00020	0.00009	---	0.00005	---	---	---	0.00013	---
Na	mg/L	-	-	0.85	1.34	1.46	---	1.13	---	---	---	1.28	---
Ni	mg/L	0.03	0.25	0.0002	0.0003	0.0005	---	0.0008	---	---	---	0.0017	---
P	mg/L	-	-	< 0.003	< 0.003	< 0.003	---	< 0.003	---	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	0.00001	< 0.00001	0.00003	---	0.00004	---	---	---	0.00003	---
Sb	mg/L	-	-	< 0.0009	< 0.0009	< 0.0009	---	< 0.0009	---	---	---	< 0.0009	---
Se	mg/L	0.001	-	< 0.00004	< 0.00004	0.00005	---	0.00004	---	---	---	0.00007	---
Si	mg/L	-	-	0.35	1.44	1.92	---	2.48	---	---	---	2.07	---
Sn	mg/L	-	-	0.00014	0.00013	0.00016	---	0.00014	---	---	---	0.00009	---
Sr	mg/L	-	-	0.00159	0.00135	0.00142	---	0.00298	---	---	---	0.00547	---
Th	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	---	< 0.0001	---	---	---	< 0.0001	---
Ti	mg/L	-	-	0.00009	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	0.00006	---
Tl	mg/L	0.0008	-	< 0.000005	< 0.000005	< 0.000005	---	< 0.000005	---	---	---	< 0.000005	---
U	mg/L	0.015	-	0.000002	0.000006	0.000022	---	0.000007	---	---	---	0.000040	---
V	mg/L	-	-	0.00006	0.00003	< 0.00001	---	< 0.00001	---	---	---	< 0.00001	---
W	mg/L	-	-	0.00003	0.00007	0.00003	---	< 0.00002	---	---	---	0.00004	---
Y	mg/L	-	-	0.000017	0.000006	0.000014	---	0.000047	---	---	---	0.000500	---
Zn	mg/L	0.007	0.40	0.005	**0.012**	**0.013**	---	**0.016**	---	---	---	**0.049**	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	10	11	12	13	14	15	16	17	18	19
Date			Effective	21-Oct-20	28-Oct-20	04-Nov-20	11-Nov-20	18-Nov-20	25-Nov-20	02-Dec-20	09-Dec-20	16-Dec-20	23-Dec-20
LIMS			01-Jun-2021	10196-OCT20	10254-OCT20	10019-NOV20	10077-NOV20	10124-NOV20	10162-NOV20	10018-DEC20	10070-DEC20	10162-DEC20	10185-DEC20
Hum Cell Leachate Vol	mL	-	-	471	386	490	498	422	386	465	511	510	512
pH	no unit	6.0-9.5	-	**4.73**	**5.00**	**4.96**	**4.82**	**5.28**	**4.75**	**5.22**	**4.73**	**4.73**	**4.64**
Acidity	mg/L as $CaCO_3$	-	-	6	6	5	5	6	8	6	6	5	6
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	53	60	35	33	39	53	34	37	37	40
SO_4	mg/L	-	-	19	21	12	9.7	13	16	10	11	11	12
F	mg/L	0.12	-	---	---	< 0.06	---	---	---	< 0.06	---	---	---
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	---	---	< 0.00001	---	---	---	< 0.00001	---	---	---
Ag	mg/L	0.00025	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---
Al	mg/L	0.005@pH<6.5	-	---	---	**0.064**	---	---	---	**0.059**	---	---	---
As	mg/L	0.005	0.10	---	---	0.0004	---	---	---	< 0.0002	---	---	---
Ba	mg/L	-	-	---	---	0.00122	---	---	---	0.00166	---	---	---
Be	mg/L	-	-	---	---	0.000027	---	---	---	0.000029	---	---	---
B	mg/L	1.5	-	---	---	0.003	---	---	---	0.002	---	---	---
Bi	mg/L	-	-	---	---	< 0.000007	---	---	---	< 0.000007	---	---	---
Ca	mg/L	-	-	---	---	3.06	---	---	---	2.99	---	---	---
Cd	mg/L	0.00009	-	---	---	**0.000180**	---	---	---	**0.000143**	---	---	---
Co	mg/L	-	-	---	---	0.00168	---	---	---	0.00172	---	---	---
Cr	mg/L	-	-	---	---	< 0.00008	---	---	---	< 0.00008	---	---	---
Cu	mg/L	0.002	0.10	---	---	**0.0094**	---	---	---	**0.0095**	---	---	---
Fe	mg/L	0.3	-	---	---	0.118	---	---	---	0.110	---	---	---
K	mg/L	-	-	---	---	0.139	---	---	---	0.143	---	---	---
Li	mg/L	-	-	---	---	< 0.0001	---	---	---	0.0002	---	---	---
Mg	mg/L	-	-	---	---	0.324	---	---	---	0.311	---	---	---
Mn	mg/L	-	-	---	---	0.0833	---	---	---	0.0775	---	---	---
Mo	mg/L	0.073	-	---	---	0.00069	---	---	---	< 0.00004	---	---	---
Na	mg/L	-	-	---	---	0.84	---	---	---	0.75	---	---	---
Ni	mg/L	0.03	0.25	---	---	0.0013	---	---	---	0.0011	---	---	---
P	mg/L	-	-	---	---	< 0.003	---	---	---	< 0.003	---	---	---
Pb	mg/L	0.001	0.08	---	---	0.00011	---	---	---	< 0.00001	---	---	---
Sb	mg/L	-	-	---	---	< 0.0009	---	---	---	< 0.0009	---	---	---
Se	mg/L	0.001	-	---	---	0.00010	---	---	---	0.00008	---	---	---
Si	mg/L	-	-	---	---	2.54	---	---	---	1.09	---	---	---
Sn	mg/L	-	-	---	---	0.00007	---	---	---	< 0.00006	---	---	---
Sr	mg/L	-	-	---	---	0.00492	---	---	---	0.00557	---	---	---
Th	mg/L	-	-	---	---	< 0.0001	---	---	---	< 0.0001	---	---	---
Ti	mg/L	-	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---
Tl	mg/L	0.0008	-	---	---	< 0.000005	---	---	---	< 0.000005	---	---	---
U	mg/L	0.015	-	---	---	0.000069	---	---	---	0.000023	---	---	---
V	mg/L	-	-	---	---	0.00003	---	---	---	< 0.00001	---	---	---
W	mg/L	-	-	---	---	0.00012	---	---	---	< 0.00002	---	---	---
Y	mg/L	-	-	---	---	0.000537	---	---	---	0.000158	---	---	---
Zn	mg/L	0.007	0.40	---	---	**0.048**	---	---	---	**0.044**	---	---	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	20	21	22	23	24	25	26	27	28	29	30
Date			Effective	30-Dec-20	06-Jan-21	13-Jan-21	20-Jan-21	27-Jan-21	03-Feb-21	10-Feb-21	17-Feb-21	24-Feb-21	03-Mar-21	10-Mar-21
LIMS			01-Jun-2021	10240-DEC20	10025-JAN21	10066-JAN21	10142-JAN21	10207-JAN21	10018-FEB21	10044-FEB21	10166-FEB21	10262-FEB21	10020-MAR21	10120-MAR21
Hum Cell Leachate Vol	mL	-	-	517	498	515	472	507	513	502	502	490	519	535
pH	no unit	6.0-9.5	-	**4.51**	**4.56**	**4.67**	**4.58**	**4.55**	**4.82**	**4.59**	**4.74**	**4.55**	**4.77**	**4.42**
Acidity	mg/L as $CaCO_3$	-	-	7	7	6	5	8	5	6	6	7	7	9
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	47	44	43	36	44	38	41	38	41	41	49
SO_4	mg/L	-	-	12	12	13	13	13	11	12	13	12	12	12
F	mg/L	0.12	-	< 0.06	---	---	---	< 0.06	---	---	---	< 0.06	---	---
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001	---	---
Ag	mg/L	0.00025	-	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005	---	---
Al	mg/L	0.005@pH<6.5	-	**0.132**	---	---	---	**0.251**	---	---	---	**0.298**	---	---
As	mg/L	0.005	0.10	< 0.0002	---	---	---	< 0.0002	---	---	---	< 0.0002	---	---
Ba	mg/L	-	-	0.00222	---	---	---	0.00301	---	---	---	0.00302	---	---
Be	mg/L	-	-	0.000055	---	---	---	0.000081	---	---	---	0.000084	---	---
B	mg/L	1.5	-	0.003	---	---	---	0.005	---	---	---	< 0.002	---	---
Bi	mg/L	-	-	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.000007	---	---
Ca	mg/L	-	-	2.93	---	---	---	3.34	---	---	---	3.01	---	---
Cd	mg/L	0.00009	-	**0.000242**	---	---	---	**0.000407**	---	---	---	**0.000433**	---	---
Co	mg/L	-	-	0.00203	---	---	---	0.00235	---	---	---	0.00205	---	---
Cr	mg/L	-	-	< 0.00008	---	---	---	< 0.00008	---	---	---	0.00032	---	---
Cu	mg/L	0.002	0.10	**0.0253**	---	---	---	**0.0500**	---	---	---	**0.0655**	---	---
Fe	mg/L	0.3	-	0.295	---	---	---	**0.431**	---	---	---	**0.437**	---	---
K	mg/L	-	-	0.158	---	---	---	0.145	---	---	---	0.182	---	---
Li	mg/L	-	-	0.0002	---	---	---	0.0003	---	---	---	0.0003	---	---
Mg	mg/L	-	-	0.308	---	---	---	0.270	---	---	---	0.209	---	---
Mn	mg/L	-	-	0.0880	---	---	---	0.0965	---	---	---	0.0875	---	---
Mo	mg/L	0.073	-	0.00028	---	---	---	0.00016	---	---	---	0.00601	---	---
Na	mg/L	-	-	0.64	---	---	---	0.65	---	---	---	0.83	---	---
Ni	mg/L	0.03	0.25	0.0010	---	---	---	0.0011	---	---	---	0.0007	---	---
P	mg/L	-	-	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003	---	---
Pb	mg/L	0.001	0.08	0.00013	---	---	---	0.00050	---	---	---	0.00040	---	---
Sb	mg/L	-	-	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009	---	---
Se	mg/L	0.001	-	0.00009	---	---	---	0.00017	---	---	---	0.00016	---	---
Si	mg/L	-	-	4.66	---	---	---	5.06	---	---	---	4.12	---	---
Sn	mg/L	-	-	< 0.00006	---	---	---	0.00007	---	---	---	< 0.00006	---	---
Sr	mg/L	-	-	0.00718	---	---	---	0.00704	---	---	---	0.00917	---	---
Th	mg/L	-	-	< 0.0001	---	---	---	< 0.0001	---	---	---	< 0.0001	---	---
Ti	mg/L	-	-	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005	---	---
Tl	mg/L	0.0008	-	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005	---	---
U	mg/L	0.015	-	0.000130	---	---	---	0.000150	---	---	---	0.000169	---	---
V	mg/L	-	-	< 0.00001	---	---	---	< 0.00001	---	---	---	0.00010	---	---
W	mg/L	-	-	< 0.00002	---	---	---	0.00002	---	---	---	< 0.00002	---	---
Y	mg/L	-	-	0.00122	---	---	---	0.00238	---	---	---	0.00288	---	---
Zn	mg/L	0.007	0.40	**0.055**	---	---	---	**0.079**	---	---	---	**0.082**	---	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	31	32	33	34	35	36	37	38	39	40
Date			Effective	17-Mar-21	24-Mar-21	31-Mar-21	07-Apr-21	14-Apr-21	21-Apr-21	28-Apr-21	05-May-21	12-May-21	19-May-21
LIMS			01-Jun-2021	10150-MAR21	10256-MAR21	10314-MAR21	10031-APR21	10114-APR21	10171-APR21	10199-APR21	10023-MAY21	10057-MAY21	10155-MAY21
Hum Cell Leachate Vol	mL	-	-	533	512	488	534	520	504	499	538	509	526
pH	no unit	6.0-9.5	-	**4.68**	**4.60**	**4.58**	**4.48**	**4.52**	**4.56**	**4.64**	**4.35**	**4.51**	**4.53**
Acidity	mg/L as $CaCO_3$	-	-	8	9	7	6	9	8	7	8	8	7
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	37	40	42	42	39	36	35	38	40	40
SO_4	mg/L	-	-	11	12	12	11	11	11	14	14	17	13
F	mg/L	0.12	-	---	< 0.06	---	---	---	< 0.06	---	---	---	< 0.06
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	0.00001
Ag	mg/L	0.00025	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Al	mg/L	0.005@pH<6.5	-	---	**0.431**	---	---	---	**0.370**	---	---	---	**0.393**
As	mg/L	0.005	0.10	---	< 0.0002	---	---	---	0.0002	---	---	---	< 0.0002
Ba	mg/L	-	-	---	0.0041	---	---	---	0.00329	---	---	---	0.00325
Be	mg/L	-	-	---	0.00011	---	---	---	0.000076	---	---	---	0.000078
B	mg/L	1.5	-	---	0.003	---	---	---	< 0.002	---	---	---	< 0.002
Bi	mg/L	-	-	---	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.00001
Ca	mg/L	-	-	---	3.33	---	---	---	2.45	---	---	---	2.00
Cd	mg/L	0.00009	-	---	**0.00060**	---	---	---	**0.000434**	---	---	---	**0.00037**
Co	mg/L	-	-	---	0.0023	---	---	---	0.001809	---	---	---	0.00171
Cr	mg/L	-	-	---	< 0.00008	---	---	---	< 0.00008	---	---	---	< 0.00008
Cu	mg/L	0.002	0.10	---	**0.101**	---	---	---	**0.0930**	---	---	---	**0.102**
Fe	mg/L	0.3	-	---	**0.554**	---	---	---	**0.427**	---	---	---	**0.351**
K	mg/L	-	-	---	0.129	---	---	---	0.131	---	---	---	0.083
Li	mg/L	-	-	---	0.0003	---	---	---	0.0005	---	---	---	0.0002
Mg	mg/L	-	-	---	0.222	---	---	---	0.146	---	---	---	0.123
Mn	mg/L	-	-	---	0.0979	---	---	---	0.0694	---	---	---	0.0626
Mo	mg/L	0.073	-	---	< 0.00004	---	---	---	< 0.00004	---	---	---	0.00013
Na	mg/L	-	-	---	0.59	---	---	---	0.75	---	---	---	0.34
Ni	mg/L	0.03	0.25	---	0.0009	---	---	---	0.0010	---	---	---	0.0004
P	mg/L	-	-	---	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003
Pb	mg/L	0.001	0.08	---	0.00058	---	---	---	0.00045	---	---	---	0.00054
Sb	mg/L	-	-	---	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009
Se	mg/L	0.001	-	---	0.00013	---	---	---	0.00008	---	---	---	0.00011
Si	mg/L	-	-	---	5.97	---	---	---	4.40	---	---	---	3.64
Sn	mg/L	-	-	---	0.00007	---	---	---	< 0.00006	---	---	---	< 0.00006
Sr	mg/L	-	-	---	0.0070	---	---	---	0.00561	---	---	---	0.00454
Th	mg/L	-	-	---	< 0.0001	---	---	---	< 0.0001	---	---	---	< 0.0001
Ti	mg/L	-	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Tl	mg/L	0.0008	-	---	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005
U	mg/L	0.015	-	---	0.00023	---	---	---	0.000162	---	---	---	0.000166
V	mg/L	-	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001
W	mg/L	-	-	---	< 0.00002	---	---	---	0.00002	---	---	---	< 0.00002
Y	mg/L	-	-	---	0.0041	---	---	---	0.00342	---	---	---	0.00373
Zn	mg/L	0.007	0.40	---	**0.096**	---	---	---	**0.066**	---	---	---	**0.061**

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	41
Date			Effective	26-May-21
LIMS			01-Jun-2021	10230-MAY21
Hum Cell Leachate Vo	mL	-	-	501
pH	no unit	6.0-9.5	-	**4.58**
Acidity	mg/L as $CaCO_3$	-	-	10
Alkalinity	mg/L as $CaCO_3$	-	-	< 2
Conductivity	µS/cm	-	-	38
SO_4	mg/L	-	-	15
F	mg/L	0.12	-	---
NH_3+NH_4	as N mg/L			---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---
Hg	mg/L	0.000026	-	---
Ag	mg/L	0.00025	-	---
Al	mg/L	0.005@pH<6.5	-	---
As	mg/L	0.005	0.10	---
Ba	mg/L	-	-	---
Be	mg/L	-	-	---
B	mg/L	1.5	-	---
Bi	mg/L	-	-	---
Ca	mg/L	-	-	---
Cd	mg/L	0.00009	-	---
Co	mg/L	-	-	---
Cr	mg/L	-	-	---
Cu	mg/L	0.002	0.10	---
Fe	mg/L	0.3	-	---
K	mg/L	-	-	---
Li	mg/L	-	-	---
Mg	mg/L	-	-	---
Mn	mg/L	-	-	---
Mo	mg/L	0.073	-	---
Na	mg/L	-	-	---
Ni	mg/L	0.03	0.25	---
P	mg/L	-	-	---
Pb	mg/L	0.001	0.08	---
Sb	mg/L	-	-	---
Se	mg/L	0.001	-	---
Si	mg/L	-	-	---
Sn	mg/L	-	-	---
Sr	mg/L	-	-	---
Th	mg/L	-	-	---
Ti	mg/L	-	-	---
Tl	mg/L	0.0008	-	---
U	mg/L	0.015	-	---
V	mg/L	-	-	---
W	mg/L	-	-	---
Y	mg/L	-	-	---
Zn	mg/L	0.007	0.40	---

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Summary of ABA Test Data

Parameter	Units	Ref No.: 10139-JUL20
Sulphur (S)	%	0.536
Sulphide (S^{-})	%	0.50
NP	t $CaCO_3$/1000 t	4.5
CO_3 NP	t $CaCO_3$/1000 t	1.5

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
0	975	5.49	7	<2	5	1.6
1	969	4.64	10	<2	22	6.7
2	818	5.30	7	<2	20	6.9
3	984	5.96	3	<2	26	10
4	995	4.95	4	<2	26	9.6
5	1018	5.86	2	<2	24	9.2
6	1007	5.11	4	<2	27	9.3
7	476	4.77	5	<2	43	24
8	512	5.19	5	<2	46	20
9	550	5.36	4	<2	42	15
10	471	4.73	6	<2	53	19
11	386	5.00	6	<2	60	21
12	490	4.96	5	<2	35	12
13	498	4.82	5	<2	33	9.7
14	422	5.28	6	<2	39	13
15	386	4.75	8	<2	53	16
16	465	5.22	6	<2	34	10
17	511	4.73	6	<2	37	11
18	510	4.73	5	<2	37	11
19	512	4.64	6	<2	40	12
20	517	4.51	7	<2	47	12

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %
1.6	1.6	0.01	0.01
6.5	8.1	0.04	0.05
5.6	13.7	0.04	0.09
9.8	23.5	0.07	0.16
9.6	33.1	0.06	0.22
9.4	42.5	0.06	0.28
9.4	51.8	0.06	0.35
11.4	63.2	0.08	0.42
10.2	73.5	0.07	0.49
8.3	81.7	0.06	0.54
8.9	90.7	0.06	0.60
8.1	98.8	0.05	0.66
5.9	104.7	0.04	0.70
4.8	109.5	0.03	0.73
5.5	115.0	0.04	0.77
6.2	121.2	0.04	0.81
4.7	125.8	0.03	0.84
5.6	131.4	0.04	0.88
5.6	137.0	0.04	0.91
6.1	143.2	0.04	0.95
6.2	149.4	0.04	1.00

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
1.63	0.04	0.11
6.76	0.19	0.56
5.88	0.32	0.95
10.25	0.54	1.63
9.95	0.77	2.30
9.76	0.98	2.95
9.76	1.20	3.60
11.90	1.46	4.39
10.67	1.70	5.10
8.59	1.89	5.68
9.32	2.10	6.30
8.44	2.29	6.86
6.13	2.42	7.27
5.03	2.53	7.60
5.71	2.66	7.99
6.43	2.80	8.41
4.84	2.91	8.74
5.86	3.04	9.13
5.84	3.17	9.52
6.40	3.31	9.94
6.46	3.46	10.37

** Initial Week 0 leachate may included soluble sulphate, and may not indicate oxidation of sulphide in the sample material has occurred.*

[1] *Calculated values*

Summary - Weeks 0 to 20

Maximum Value	5.96	10	2	60	24	11.4	-	0.08	-	11.90	-	-
Minimum Value	4.51	2	<2	5	1.6	1.6	-	0.01	-	1.63	-	-
Average Value	4.92	6	2	36	12	7.1	-	0.05	-	7.41	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Changes to Head Sample after 20 Weeks [1]

Parameter	Units	Ref No.: 10139-JUL20
Sulphide ($S^{=}$) Remaining	%	0.50
NP Remaining	t $CaCO_3$/1000 t	4.3
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.3

Leachate Parameters Measured | ***Acid Generation*** [1] | ***Acid Neutralization*** [1]

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
21	498	4.56	7	<2	44	12	6.0	155.4	0.04	1.04	6.23	3.60	10.79
22	515	4.67	6	<2	43	13	6.7	162.1	0.04	1.08	6.97	3.75	11.25
23	472	4.58	5	<2	36	13	6.1	168.2	0.04	1.12	6.39	3.89	11.68
24	507	4.55	8	<2	44	13	6.6	174.8	0.04	1.17	6.87	4.05	12.14
25	513	4.82	5	<2	38	11	5.6	180.4	0.04	1.20	5.88	4.18	12.53
26	502	4.59	6	<2	41	12	6.0	186.5	0.04	1.24	6.28	4.32	12.95
27	502	4.74	6	<2	38	13	6.5	193.0	0.04	1.29	6.80	4.47	13.40
28	490	4.55	7	<2	41	12	5.9	198.9	0.04	1.33	6.13	4.60	13.81
29	519	4.77	7	<2	41	12	6.2	205.1	0.04	1.37	6.49	4.75	14.24
30	535	4.42	9	<2	49	12	6.4	211.5	0.04	1.41	6.69	4.90	14.69
31	533	4.68	8	<2	37	11	5.9	217.4	0.04	1.45	6.11	5.03	15.10
32	512	4.60	9	<2	40	12	6.1	223.5	0.04	1.49	6.40	5.17	15.52
33	488	4.58	7	<2	42	12	5.9	229.4	0.04	1.53	6.10	5.31	15.93
34	534	4.48	6	<2	42	11	5.9	235.2	0.04	1.57	6.12	5.45	16.34
35	520	4.52	9	<2	39	11	5.7	241.0	0.04	1.61	5.96	5.58	16.73
36	504	4.56	8	<2	36	11	5.5	246.5	0.04	1.64	5.78	5.71	17.12
37	499	4.64	7	<2	35	14	7.0	253.5	0.05	1.69	7.28	5.87	17.60
38	538	4.35	8	<2	38	14	7.5	261.0	0.05	1.74	7.85	6.04	18.13
39	509	4.51	8	<2	40	17	8.7	269.7	0.06	1.80	9.01	6.24	18.73
40	526	4.53	7	<2	40	13	6.8	276.5	0.05	1.84	7.12	6.40	19.20

[1] *Calculated values*

Summary - Weeks 0 to 40

Maximum Value	5.96	10	2	60	24	11.4	-	0.06	-	12	-	-
Minimum Value	4.35	2	<2	5	1.6	1.6	-	0.01	-	1.6	-	-
Average Value	4.71	6	2	38	12	6.7	-	0.04	-	7.03	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Changes to Head Sample after 40 Weeks [1]

Parameter	Units	Ref No.: 10139-JUL20
Sulphide ($S^{=}$) Remaining	%	0.49
NP Remaining	t $CaCO_3$/1000 t	4.2
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.2

Leachate Parameters Measured

Weekly Leach	Volume Collected	pH	Acidity	Alkalinity	Conductivity	SO_4
No.	mL	units	$CaCO_3$ eq. mg/L	$CaCO_3$ eq. mg/L	µS/cm	mg/L
41	501	4.58	10	<2	38	15

Acid Generation [1]

SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^{=}$ Depletion	Cumulative $S^{=}$ Depletion
g/t/wk	g/t	%	%
7.5	284.0	0.05	1.89

Acid Neutralization [1]

NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
$CaCO_3$, g/t/wk	%	%
7.83	6.57	19.72

[1] *Calculated values*

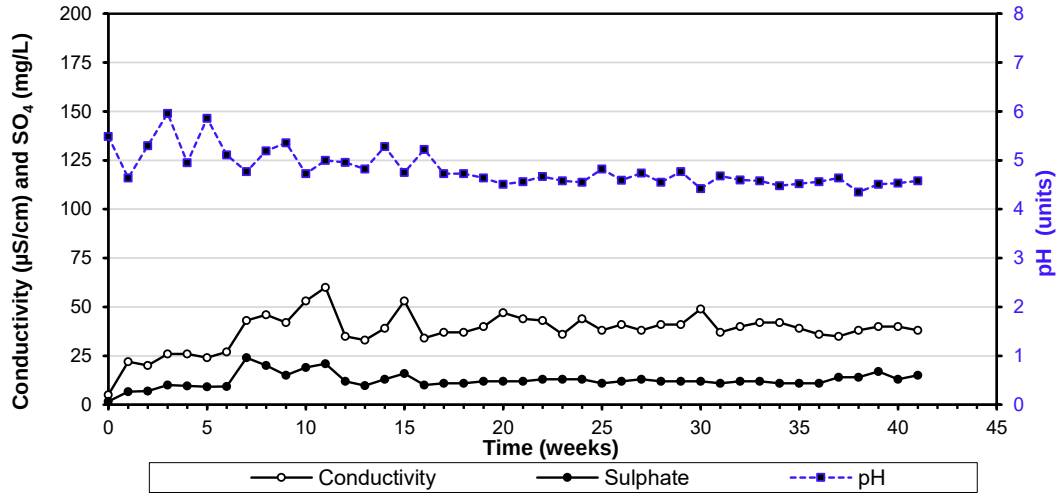
Summary - Weeks 0 to 60

Maximum Value	5.96	10	2	60	24	11.4	-	0.06	-	11.90	-	-
Minimum Value	4.35	2	<2	5	1.6	1.6	-	0.01	-	1.63	-	-
Average Value	4.57	6	2	38	12	6.8	-	0.05	-	7.04	-	-

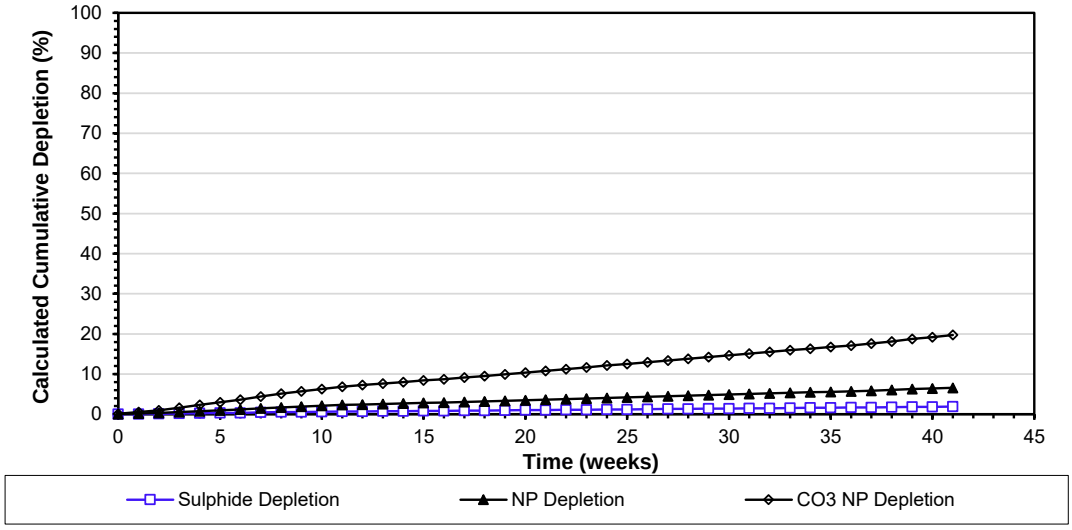
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Conductivity, Sulphate, and pH in Weekly Humidity Cell Leachate - M-LGO CNP DPL



Cumulative Sulphide and NP Depletion M-LGO CNP DPL

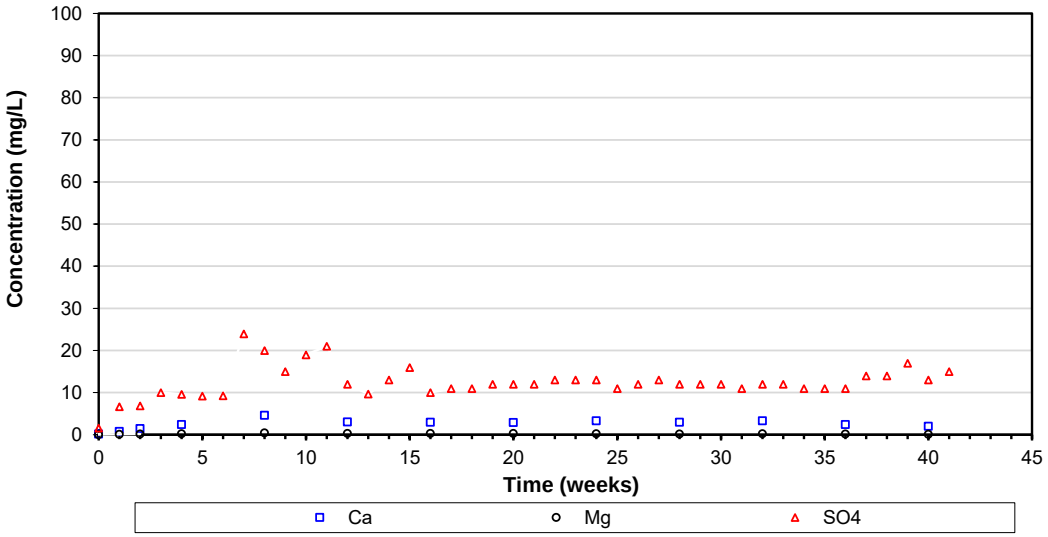


Note: NP depletion calculated based on sulphate assay.

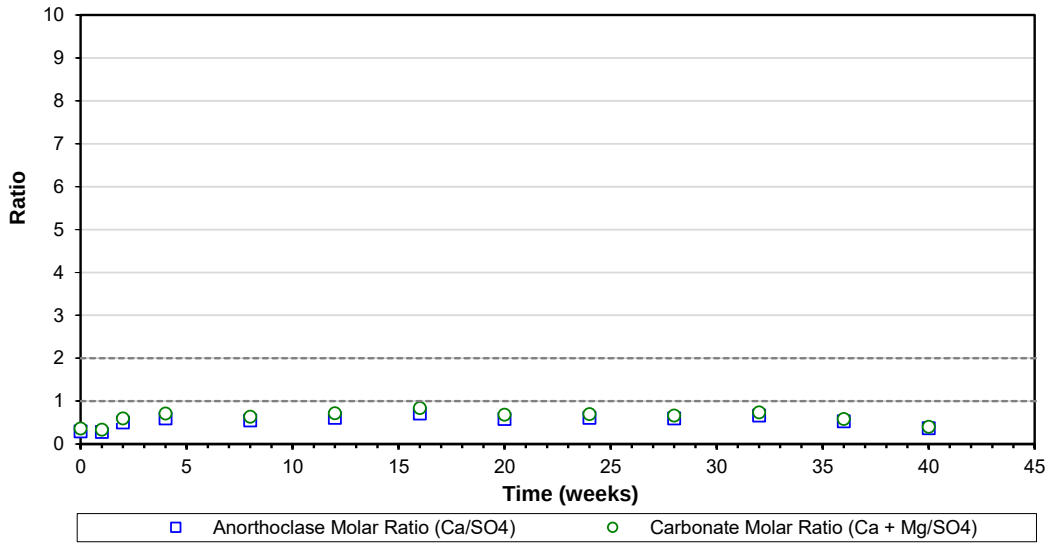
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL



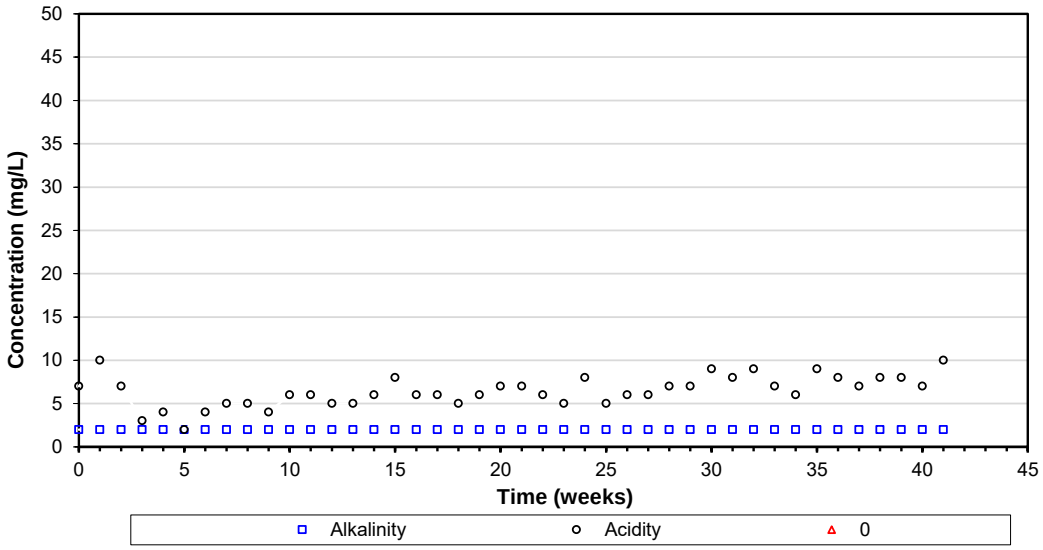
Carbonate (Ca + Mg/SO$_4$) and Anorthoclase (Ca/SO$_4$) Molar Ratios M-LGO CNP DPL



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

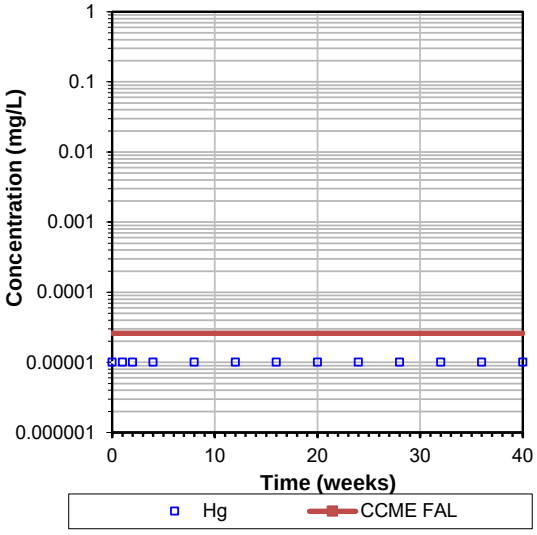
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

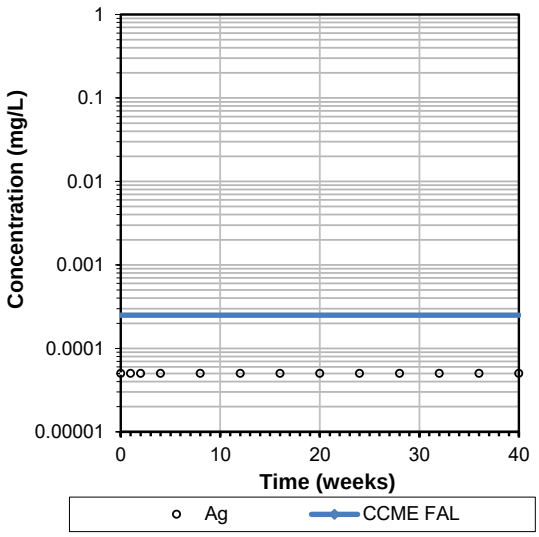


TEST REPORT

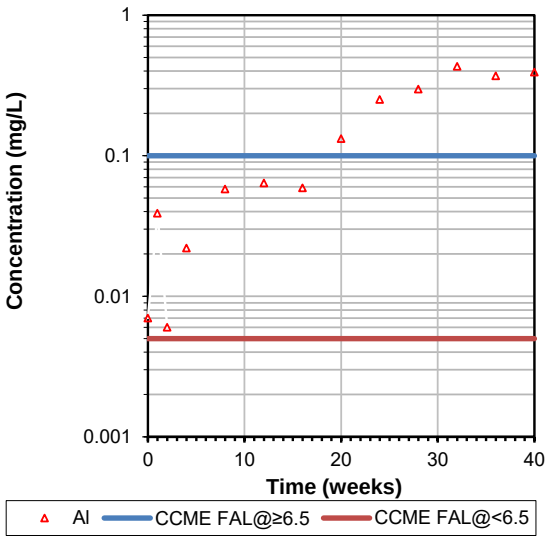
Humidity Cell Test (ASTM D 5744-96)

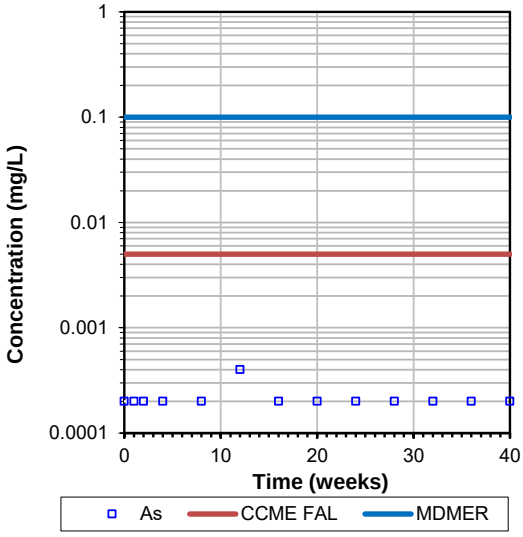
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

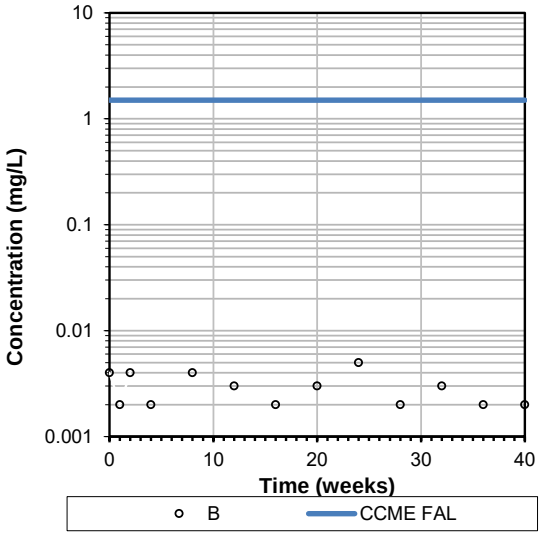


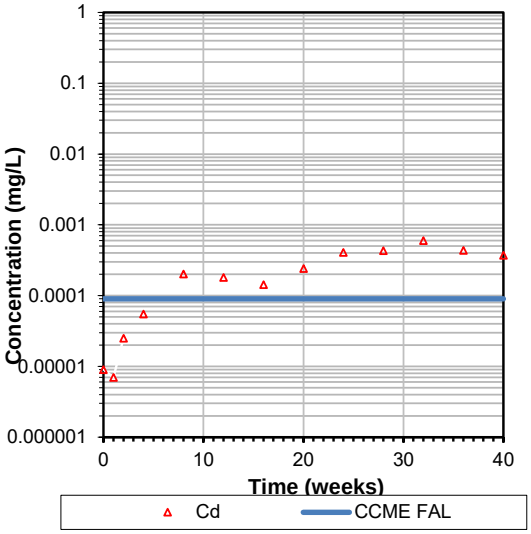


TEST REPORT

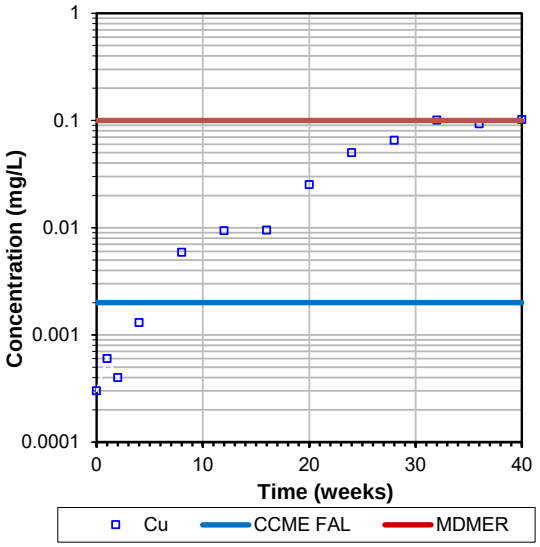
Humidity Cell Test (ASTM D 5744-96)

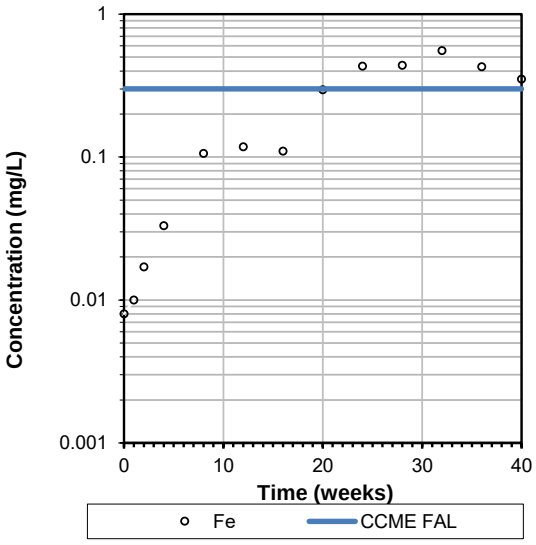
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

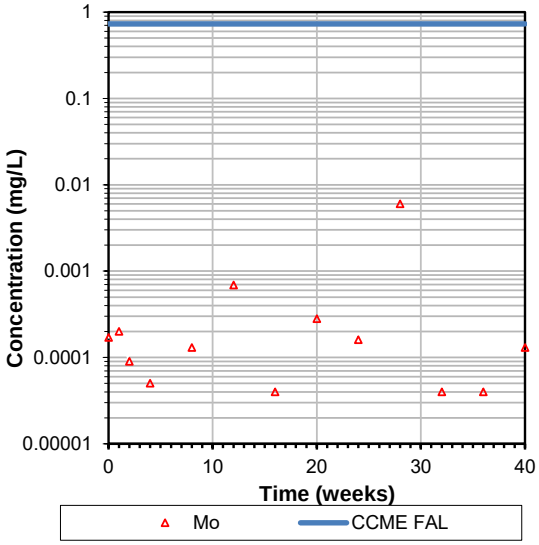


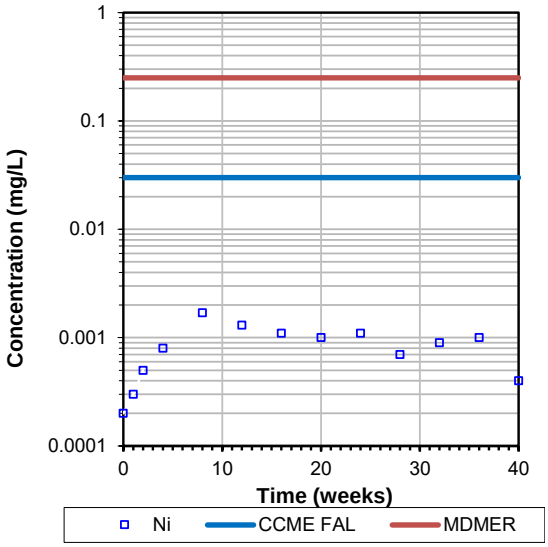


TEST REPORT

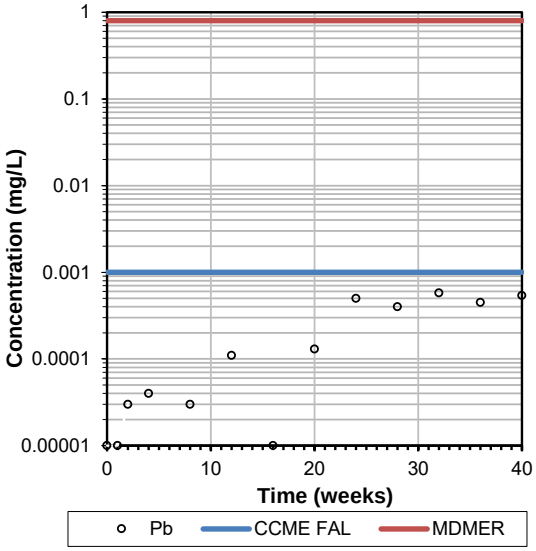
Humidity Cell Test (ASTM D 5744-96)

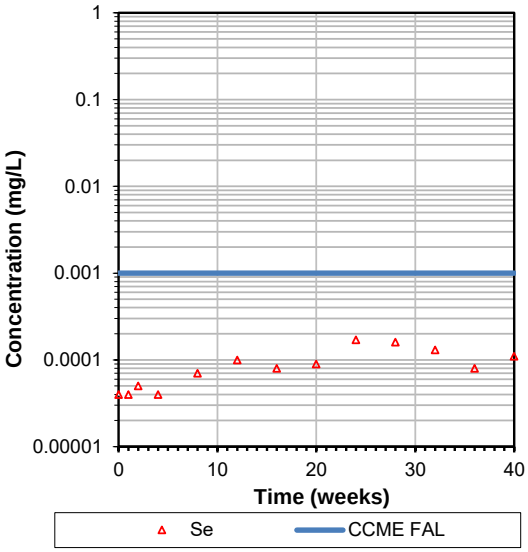
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

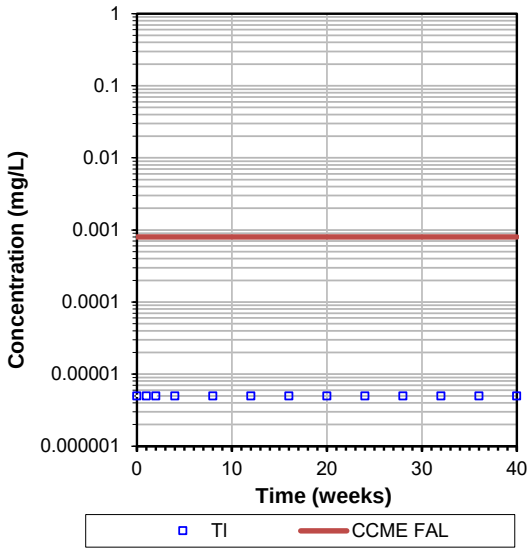


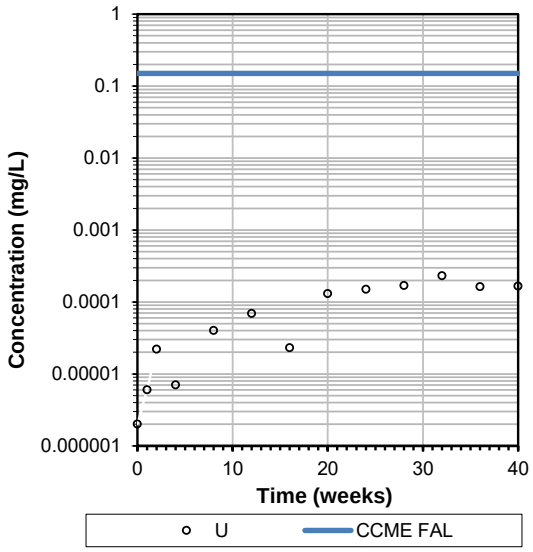


TEST REPORT

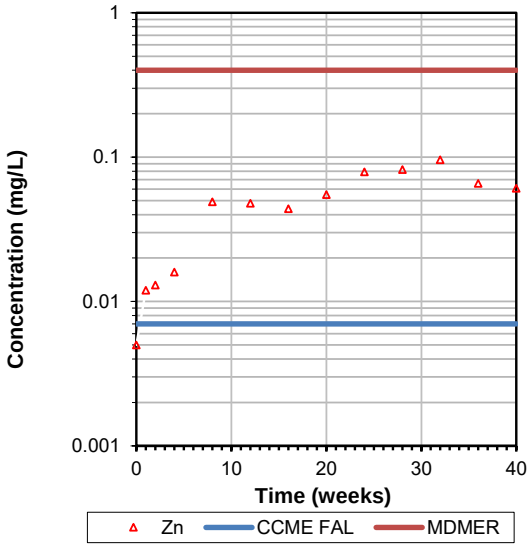
Humidity Cell Test (ASTM D 5744-96)

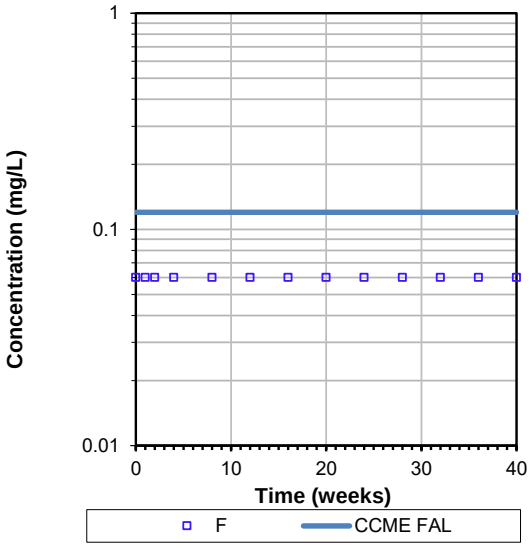
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





April 2021

APPENDIX IR-21.B
ARD ONSET

Appendix IR-21.B

Model Sensitivity to Acid Rock Drainage (ARD) Lag Time

Natural Resources Canada (NRCan), in IR-21, requested that Marathon "provide rationale for the methods used to determine the lag time to acidic conditions, and a discussion around the sensitivity of the water quality model to the assumptions related to this assumed lag time". In a call on (March 22, 2021), NRCan expressed concerns about estimates of lag time to acidic conditions without kinetic tests being conducted on several potentially acid generating (PAG) samples. The objectives of this memorandum are to:

- provide rationale for the methods used to determine the lag time to acidic conditions and estimate on the possible ranges of ARD onset lag time for exposed PAG materials
- assess and discuss sensitivity of the water quality model to ranges of ARD onset lag time

ARD Onset Time

The determination of the lag time to acidic conditions is based on Equations (1) and (2), which are consistent with the Mine Environment Neutral Drainage (MEND) Manual (2009).

Neutralization Potential (NP) Depletion Rate = Sulphate Leaching Rate*100.09/96.06 + Alkalinity Production Rate – Acidity Production Rate (1)

ARD onset time = (Carb. NP/ NP Depletion Rate) x 1000/(365.25/7) (2)

The following steps were used to derive conservative inputs from existing humidity cell tests (HCT) tests for use in Equations (1) and (2).

a. Leaching rates calculation

Sulphate leaching and alkalinity production rates are required for inputs into Equation 1. These rates are straight calculations from laboratory humidity cell testing results without any scaling to field conditions. The calculation of sulphate leaching rate for a specific week is shown as an example in Equation 3:

Sulphate Leaching Rate (mg/kg/week) = Sulphate Concentration (mg/L) x Leachate volume (L)/Samples mass (1kg)/Leaching time (1 week) (3)

The maximum concentrations from the first month (weeks 1 to 4) of testing were used as inputs to Equation 3 resulting in the highest sulphate leaching rates listed in Table 1 (attached). The highest sulphate production and NP depletion rates using direct HCT data result in the shortest lag time estimates for ARD, which is a conservative approach.

b. Leaching rate regressions with sulfur and NP

The next step was to evaluate the correlation between maxima sulphate and maxima alkalinity leaching rates with sulphur contents and NPs, respectively.

A linear regression for maximum sulphate leaching rates versus sulphur contents results in a R^2 considered to be acceptable for general predictive use. Note that the reported R^2 was obtained after removal of one outlier, sample M MD (Figure 1). This sample showed an order of magnitude higher sulphate production rate likely due to over crushing of the sample resulting in higher reactive surface area. The regression equation (Equation 4) was used to estimate sulphate leaching rates from PAG samples with known sulphur content, which are provided in Table 2 (attached). A similar approach has been presented in Environmental Impact Statements (EISs) for other Canadian mine projects (e.g., SRK 2006, 2013).

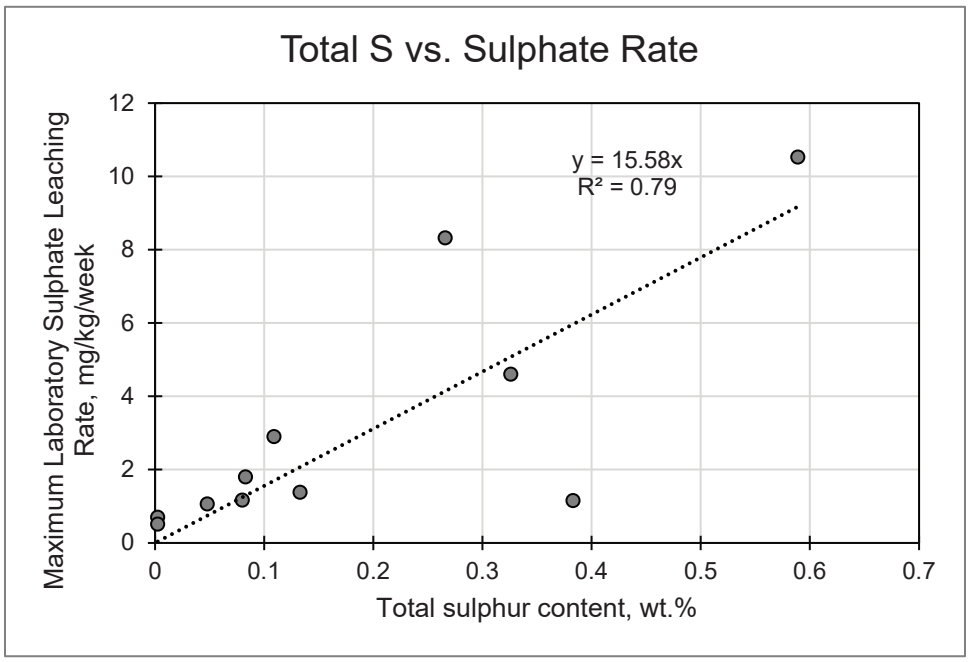


Figure 1. Regression of total sulphur vs. maximum sulphate leaching rate from laboratory humidity cells.

Sulphate Leaching Rate (mg/kg/week) = 15.6*Sulphur Content (wt%) (4)

Maximum alkalinity leaching rates show poor correlation with NP even after removal of apparent outliers shown in red on Figure 2. Therefore, the 95th percentile of maximum alkalinity leaching rates (67.7 mg$CaCO_3$/kg/week) was conservatively selected for input into Equation 1 regardless of NP of the PAG sample.

The Acidity Production Rate was ignored in Equation 1 resulting in shorter lag time estimates for ARD, which is a an additionally conservative assumption. Considering the inputs and assumptions discussed above, the resulting calculation of NP depletion rate for each PAG sample was done using Equation 5.

NP Depletion Rate (mg$CaCO_3$/kg/week) = 15.6*Sulphur Content (wt%)*100.09/96.06 + 67.7 (5)

Examination of the sulphur inputs to this equation clearly shows than the first term of Equation 5 is an order of magnitude lower than the second term, alkalinity production rate. The second term is a constant and the NP Depletion Rate does not vary much between samples as shown in Table 2 (attached). Therefore, the NP of a sample becomes the key factor determining ARD onset time in the sample per Equation 2.

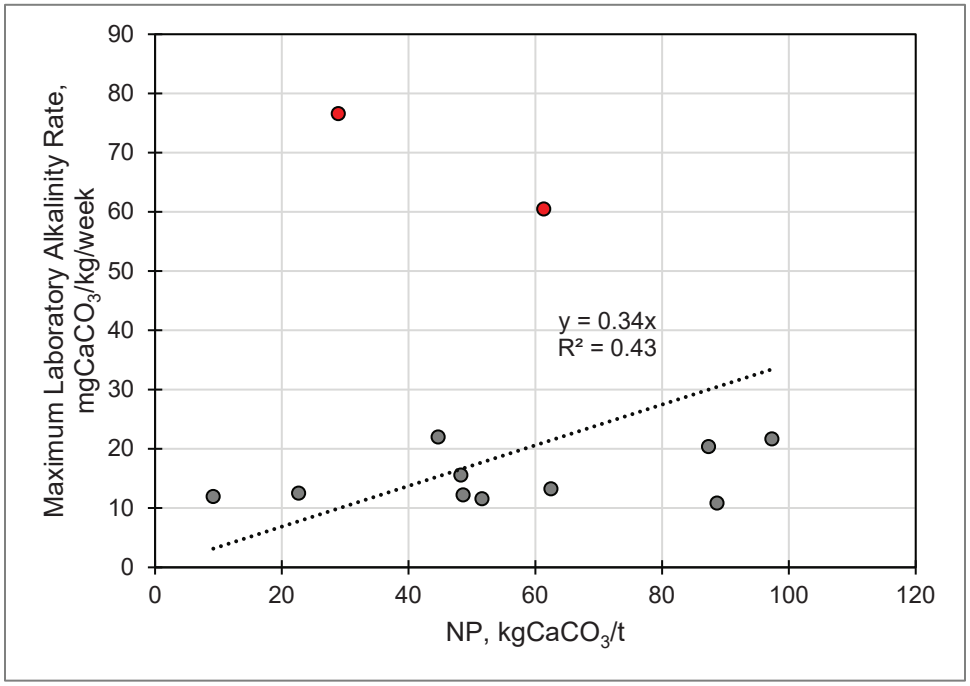


Figure 2. Regression of NP vs. maximum alkalinity rates from laboratory humidity cells.

c. Calculation of ARD onset time

Time to onset of ARD was calculated for all PAG samples from the Marathon deposit using Equation 2 (Table 1). Minimum, median, and maximum values are shown in Table 3 (attached) for the following three groups of samples:

- high grade ore
- low grade ore
- waste rock

The estimates of ARD onset time are conservative because the estimates are based on the laboratory rates. Laboratory derived rates are faster than the respective field rates, which, if field rates were applied, could result in a more realistic estimation of the ARD lag time. This is demonstrated in Table 1 (attached) by comparison of the recent field test results to the laboratory results for the same sample of low-grade ore (MLGO-Met) with an uncertain ARD potential. Field based ARD onset time (200 years) is

approximately 30 times longer than the ARD onset time (6.3 years) calculated using laboratory-based inputs for this sample. Nevertheless, the conservative ranges of ARD onset time were used for sensitivity analysis of the water quality model.

Water Quality Model Sensitivity

ARD onset time lags were considered a probabilistic input parameter with triangular probability distributions in both the EIS (original) and sensitivity (models). In the original GoldSim model, one probability distribution was used to represent acidic rates in all mine components (Figure 3). In the sensitivity model for Marathon site, a separate probability distribution of ARD onset was assigned to ore, low grade ore and waste rock in accordance with statistics from Table 3 (attached).

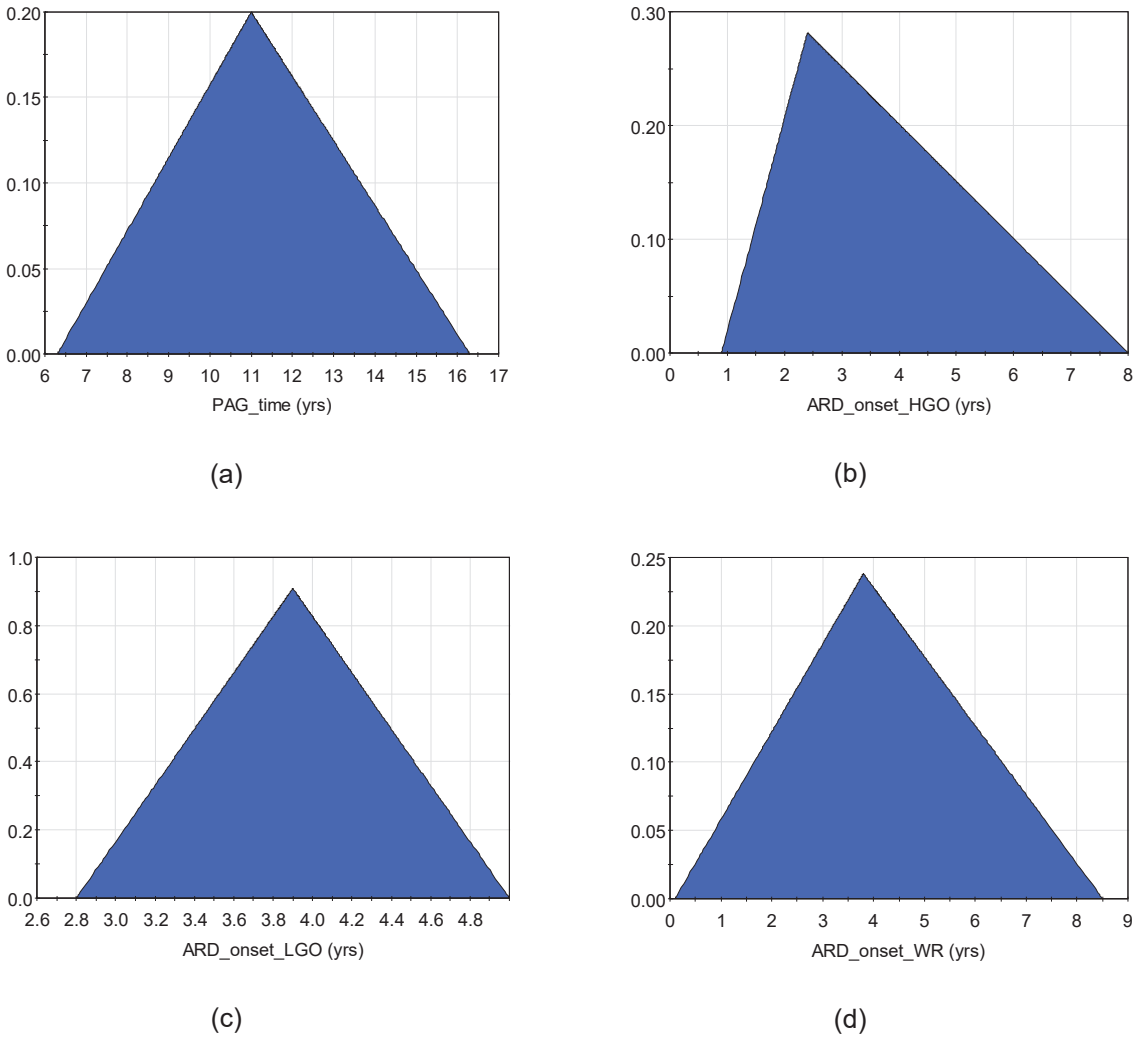


Figure 3. Probability distributions for ARD onset time in the EIS model for all materials (a) and the sensitivity model for ore (b), low grade ore (c), and waste rock (d).

The results obtained for the low-grade ore stockpile, waste rock, and open pit are provided in Tables 4 to 12 (attached). For each of these mine components, three tables are presented: 1) original results from the EIS model; 2) new results from the sensitivity model, and 3) ratios of new results to the original results. Ratios greater than 1.2 are highlighted in gray in the tables indicating a substantial increase from the original result. The key increases can be summarized as follows:

- In the LGO stockpile, increases of up to 3.1x for Zn and 1.5x for Ni concentrations are predicted during operation. Concentrations of these metals remain below MDMER limits at 95% confidence levels.
- In the waste rock stockpile, increases of up to 1.4x for Zn and 1.3x for Ni concentrations are predicted during operation and up to 1.3x for Zn during closure. In both phases of the mine life cycle, concentrations of these metals remain below MDMER limits at 95% confidence levels.
- In mine water from the pit, increases up to 2.4x for Ni, up to 2.2x for Zn, and 1.3x for Cd concentrations are predicted during operation. In the pit lake, an increase in concentration up to 1.21x for Zn is predicted during closure. In both phases of the mine life cycle, concentrations of Ni and Zn are below MDMER limits and Cd concentration remains below the short-term Canadian Water Quality guideline at 95% confidence levels.

Overall model results show that faster ARD onset times result in an increase of average concentrations of Zn, Ni, and Cd generally during operation, and to a lesser degree post-closure. Other parameters were less influenced by ARD onset because there was either a lower or no multiplier used for acidic leaching rates as noted in Section 5.3.1.1 in Appendix 7B of the EIS.

pH of LGO Seepage

The water quality GoldSim model probabilistically assumes that pH in the low-grade ore stockpile will be between 7.5 and 8.5, based on pH measured in the M-LGO humidity cell in the first week (Figure 3). The validity of this assumption can be tested by comparing alkalinity and acidity rates measured in normal (M-LGO) and carbonate depleted (M-LGO CNP DPL) humidity cells, respectively. The alkalinity rate is always greater than the acidity rate over the testing period (Figure 3). On average, the alkalinity production rate (22.5 mg $CaCO_3$/kg/week) is almost 8x higher than the acidity production rate (2.9 mg $CaCO_3$/kg/week) between weeks 10 and 20, when rates stabilized in both cells (Figure 3). This observation indicates that there is more than enough alkalinity produced from 50% of the non-PAG ore to neutralize acidity generated from 50% of the PAG material. Therefore, a reduction of pH below 6.5 in seepage from LGO stockpile is not expected.

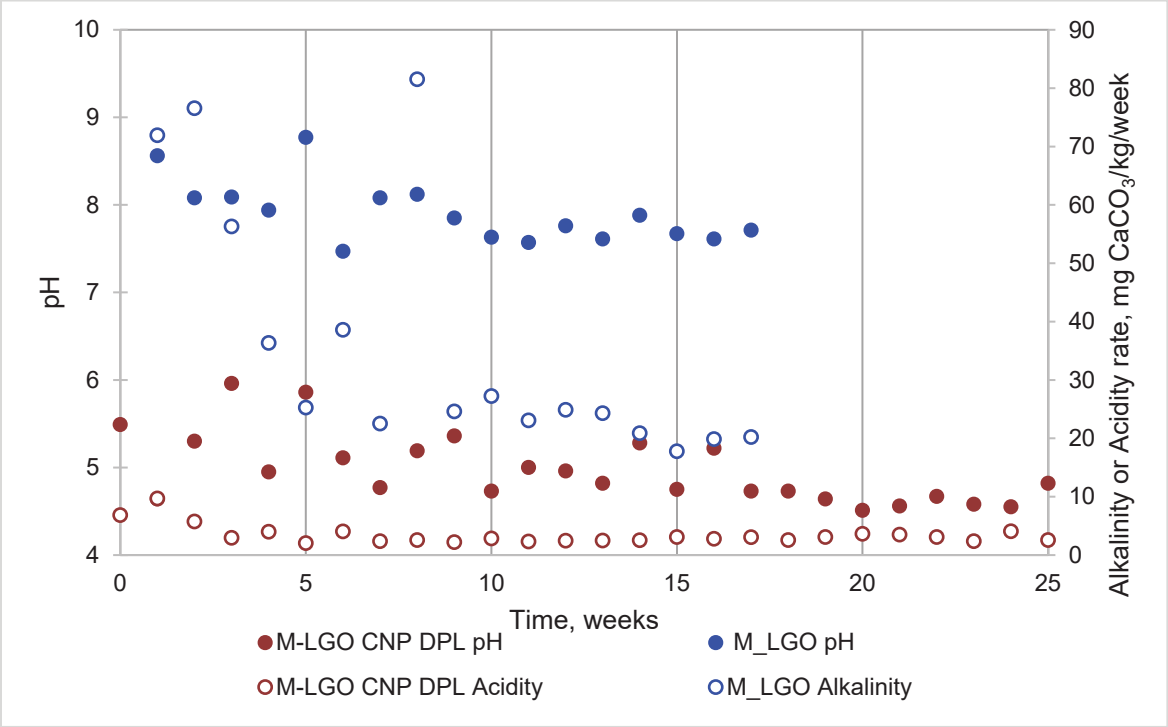


Figure 3. Alkalinity and acidity rates and pH from normal (M-LGO) and carbonate depleted (M-LGO CNP DPL) humidity cells

Summary

Conservative assumptions were used to calculate ARD onset time for PAG samples from the Marathon deposit. These calculations produced conservative (shorter) ARD onset time lags, which were subsequently used to evaluate the sensitivity of the water quality model predictions. Using a stochastic sampling of these inputs, the model predictions did not exceed the MDMER limits in discharges from the LGO stockpile, waste rock, or open pit over the life of the proposed mine. Therefore, treatment of these discharges is not required, which is the same conclusion presented in the EIS.

References:

Mine Environment Neutral Drainage Program (MEND), 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, MEND Report 1.20.1, p. 1-579.

SRK Consulting. 2006. Galore Creek Project ML/ARD Characterization Report. Report prepared for Novagold Resources Inc. SRK Project. 1CR003.002. May 2006.

SRK 2013. Metal Leaching and Acid Rock Drainage Potential Characterization Sisson Project. August 2013.

TABLES 1 TO 12

Table 1: Estimates of rates and NP depletion time in kinetic tets

Parameter	Unit	Leprechaun composite samples						Marathon composite samples						
		Laboratory Humididty cells						Laboratory Humididty cells						Field bin
		L TRJ	L QZ-TQTP	L SED	L MD	L QZ-QTP	LLGO - Met	M QE-POR	M AQPOR	M CG	M MD	M QZ-QE-POR-QTP-MIN	MLGO - Met	MLGO - Met
S_{TOTAL}	wt.%	0.080	0.11	0.003	0.13	0.048	0.27	0.083	0.33	0.003	0.27	0.38	0.59	0.59
Carb. NP	kg $CaCO_3$/t	48.3	44.7	9.2	97.3	51.6	61.3	62.5	48.6	87.3	88.7	22.7	28.9	28.9
AP	kg $CaCO_3$/t	0.94	1.88	0.62	2.19	0.62	7.19	1.56	7.50	0.62	5.94	8.75	18.8	18.8
Carb. NPR	unitless	51	24	15	44	83	8.5	40	6.5	141	15	2.6	1.5	1.5
Max Sulphate Rate	mg/kg/week	1.17	2.9	0.70	1.38	1.06	8.3	1.8	4.6	0.51	46.7	1.15	10.5	0.45
Max Alkalinity Rate	mg $CaCO_3$/kg/week	16	22	11.9	22	12	60	13	12	20	11	12	77	2.3
NP Depletion Rate	mg $CaCO_3$/kg/week	17	25	13	23	13	69	15	17	21	59	14	88	3
NP Depletion Time	year	55	34	14	81	78	17	79	55	80	29	32	6.3	200
AP Depletion Time	year	15	12	16	29	11	16	16	30	22	2.3	140	33	768

Notes:

NP Depetion Rate = Max Sulphate Rate*100.09/96.06 + Max Alkalinity Rate

NP Depletion Time = (Carb. NP/Max NP Depetion Rate) x 1000/(365.25/7)

Table 2: Inputs and results of ARD onset time calculation for PAG samples from Marathon deposit.

Sample ID	Lithocode and material	Au	Total S	Carb. NP	AP from total S	Carb NPR	Sulfate rate	Alkalinity rate	NP depletion rate	ARD onset time
Units	Lithocode and material	ppb	wt.%	kg $CaCO_3$/t		unitless	mg/kg/week			years
MA-16-116	1. QE-POR	102	0.30	6.1	8.8	0.7	4.7	67.7	72.6	1.6
MA-16-079	1. QE-POR	9	0.35	14.6	10.9	1.3	5.5	67.7	73.4	3.8
MA-15-035	1. QE-POR	5	0.59	28.0	18.4	1.5	9.2	67.7	77.3	6.9
MA-18-281 177251	1. QE-POR	14	0.580	23.2	14.4	1.6	9.0	67.7	77.1	5.8
MA-18-278 167699	1. QE-POR	5	0.811	33.8	19.1	1.8	12.7	67.7	80.9	8.0
MA-18-290 178278	2. AQPOR	28	2.52	0.4	67.2	0.0	39.3	67.7	108.7	0.1
MA-18-281 177047	2. AQPOR	23	1.08	18.5	26.6	0.7	16.8	67.7	85.3	4.2
MA-16-156 108817	2. AQPOR	14	0.202	5.1	3.75	1.4	3.2	67.7	71.0	1.4
MA-16-082	4. GB	5	3.04	12.3	94.7	0.1	47.4	67.7	117.1	2.0
MA-18-280 167924	6. QZ-QE-POR-QTP-MIN	88	0.808	12.5	21.2	0.6	12.6	67.7	80.8	3.0
MA-18-290 178314	6. QZ-QE-POR-QTP-MIN	5	0.654	15.3	17.2	0.9	10.2	67.7	78.3	3.7
MA-16-101	7. QZ-QE-POR-QTP	238	0.54	14.3	16.9	0.8	8.4	67.7	76.5	3.6
MA-16-116	7. QZ-QE-POR-QTP	15	1.04	37.7	32.2	1.2	16.2	67.7	84.6	8.5
MA-14-015	7. QZ-QE-POR-QTP	171	0.35	16.8	10.6	1.6	5.5	67.7	73.4	4.4
MA-18-267 175269	7. QZ-QE-POR-QTP	276	0.266	10.4	6.25	1.7	4.1	67.7	72.0	2.8
MA-16-156 108949	7. QZ-QE-POR-QTP	24	0.370	18.3	9.38	2.0	5.8	67.7	73.7	4.8
MA-16-101	Low Grade Ore	539	1.18	14.1	36.9	0.4	18.4	67.7	86.9	3.1
MA-18-287 177901	Low Grade Ore	637	0.655	11.4	18.1	0.6	10.2	67.7	78.3	2.8
MA-18-267 175199	Low Grade Ore	387	0.492	18.5	11.6	1.6	7.7	67.7	75.7	4.7
MA-16-122	Low Grade Ore	352	0.32	18.9	9.7	1.9	5.0	67.7	72.9	5.0
MA-16-156 108866	Ore	1115	1.16	4.1	29.1	0.1	18.1	67.7	86.6	0.9
MA-16-116	Ore	3272	0.80	5.9	25.0	0.2	12.5	67.7	80.7	1.4
MA-18-280 167946	Ore	2517	0.674	7.9	17.8	0.4	10.5	67.7	78.7	1.9
MA-16-101	Ore	4465	0.71	10.0	22.2	0.5	11.1	67.7	79.2	2.4
MA-18-290 178287	Ore	1531	0.790	12.3	20.9	0.6	12.3	67.7	80.5	2.9
MA-17-216 145319	Ore	2177	0.944	30.7	25.6	1.2	14.7	67.7	83.0	7.1
MA-16-116	Ore	14388	0.51	31.6	15.6	2.0	8.0	67.7	76.0	8.0

Table 3: Ranges of ARD onset time for selected PAG materials from Marathon deposit.

Material	Statistic	Au	Total S	Carb. NP	AP from total S	Carb NPR	Sulfate rate	Alkalinity rate	NP depletion rate	ARD onset time
Units		ppb	wt.%	kg $CaCO_3$/t		unitless	mg/kg/week			years
Ore (High Grade Ore)	Min	5	0.20	0.4	3.8	0.01	3.2	67.7	71.0	0.9
	Median	171	0.66	14.3	18.1	0.9	10.2	67.7	78.3	2.4
	Max	14388	3.04	37.7	94.7	2.0	47.4	67.7	117.1	8.0
Low Grade Ore (LGO)	Min	352	0.32	11.4	9.7	0.4	5.0	67.7	72.9	2.8
	Median	463	0.57	16.3	14.9	1.1	8.9	67.7	77.0	3.9
	Max	637	1.18	18.9	36.9	1.9	18.4	67.7	86.9	5.0
Waste Rock	Min	5	0.20	0.4	3.8	0.0	3.2	67.7	71.0	0.1
	Median	19	0.59	14.9	17.1	1.3	9.1	67.7	77.2	3.8
	Max	276	3.04	37.7	94.7	2.0	47.4	67.7	117.1	8.5

Table 4: The highest value of the monthly mean and 95th %-ile for each project phase in seepage from the low grade ore stockpile in the EIS model.

Parameter	Units	MDMER	CWQG	**CWQG**	Baseline		Construction		Operation	
Statistics			Short-term	Long-term	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	µg/L	-	-	100	16	22	86	100	**600**	**600**
Antimony	µg/L	-	-	-	0.5	0.5	0.97	1.10	20	25
Arsenic	µg/L	100	-	5	0.5	0.5	0.8	0.9	**13**	**15**
Barium	µg/L	-	-	-	2.3	3	3.7	4.1	62	73
Boron	µg/L	-	29000	1500	25	25	30	31	220	270
Cadmium	µg/L	-	0.13	0.04	0.01	0.01	0.009	0.011	**0.18**	**0.21**
Calcium	µg/L	-	-	-	2800	2900	6300	7200	150000	180000
Chromium	µg/L	-	-	1	1.1	1.9	**1.2**	**1.8**	**3.3**	**4.0**
Copper	µg/L	100	-	2	0.6	0.9	0.86	0.97	**13**	**15**
Iron	µg/L	-	-	300	25	25	28	29	180	270
Lead	µg/L	80	-	1	0.25	0.25	0.27	0.27	0.92	**1.10**
Magnesium	µg/L	-	-	-	340	350	720	800	16000	19000
Manganese	µg/L	-	596	210	5.5	6.8	19	23	**610**	**740**
Mercury	µg/L	-	-	0.026	0.007	0.007	0.010	0.010	**0.15**	**0.19**
Molybdenum	µg/L	-	-	73	1.0	1.0	3.7	4.5	**110**	**140**
Nickel	µg/L	250	-	25	1.0	1.0	1.2	1.2	7.9	10
Phosphorus	µg/L	-	-	4	50	50	**50**	**50**	**50**	**50**
Potassium	µg/L	-	-	-	95	130	570	700	20000	24000
Selenium	µg/L	-	-	1	0.25	0.25	0.39	0.44	**6.1**	**7.4**
Silver	µg/L	-	-	0.25	0.05	0.05	0.066	0.070	**0.69**	**0.83**
Sodium	µg/L	-	-	-	1400	1500	3600	4300	91000	110000
Thallium	µg/L	-	-	0.8	0.05	0.05	0.056	0.059	0.31	0.40
Uranium	µg/L	-	33	15	0.05	0.05	0.86	1.20	**31**	**42**
Zinc	µg/L	400	11.3	2.2	2.5	2.5	**3.1**	**3.3**	**88**	**250**
Chloride	µg/L	-	640000	120000	2400	2600	2400	2600	2400	2600
Nitrate + Nitrite (as Nitrogen)	µg/L	-	-	-	38	53	4800	12000	12000	15000
Nitrite (as Nitrogen)	µg/L	-	-	60	9.9	14	**120**	**280**	**270**	**350**
Nitrate (as Nitrogen)	µg/L	-	550000	13000	25	25	4600	12000	11000	**15000**
Total Ammonia (as Nitrogen)	µg/L	-	-	689	25	25	610	**1500**	**1500**	**1900**
Un-ionized Ammonia (as Nitrogen)	µg/L	500	-	19	0.064	0.097	**23.0**	**57**	**57**	**72**
Cyanide, Total	µg/L	500	-	-	10	10	10	10	10	10
Cyanide, WAD	µg/L	-	-	5	1.0	1.0	1.0	1.0	1.0	1.0
Sulphate	µg/L	-	-	-	1000	1000	5400	6800	180000	220000
Fluoride	µg/L	-	-	120	60	60	85	93	**1100**	**1300**
Radium-226	Bq/L	0.37	-	-	0.005	0.005	0.0067	0.0071	0.074	0.088
Temperature	°C	-	-	-	12.0	17.0	9	17	9	18
Total Alkalinity (as $CaCO_3$)	mg/L	-	-	-	8.8	9.7	12000	15000	510000	610000
pH (mean or 5 %ile)	pH Unit	6.0-9.5	-	6.5-9.0	7.0	6.9	8.0	8.0	8.0	8.0
Hardness (as $CaCO_3$)	mg/L	-	-	-	8.4	8.7	19	21	440	530
Dissolved Organic Carbon	mg/L	-	-	-	1.0	1.0	1.3	1.4	15	18

Notes:
MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Table 1 of Schedule 4, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).
CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, short-term and long-term (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).
Concentrations exceeding MDMER are highlighted gray, CWQG short-term are double underlined, and CWQG long-term are bold.
For further details on the parameters and guidelines see Table C-1 notes in Appendix 7B of the EIS.

Table 5: The highest value of the monthly mean and 95th %-ile for each project phase in seepage from the low grade ore stockpile in the sensitivity model.

Parameter	Units	MDMER	CWQG	**CWQG**	Baseline		Construction		Operation	
Statistics			Short-term	Long-term	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	µg/L	-	-	100	16	22	86	100	**600**	**600**
Antimony	µg/L	-	-	-	0.5	0.5	0.97	1.10	20	25
Arsenic	µg/L	100	-	5	0.5	0.5	0.8	0.9	**13**	**15**
Barium	µg/L	-	-	-	2.3	3	3.7	4.1	62	73
Boron	µg/L	-	29000	1500	25	25	30	31	220	270
Cadmium	µg/L	-	0.13	0.04	0.01	0.01	0.009	0.011	**0.18**	**0.21**
Calcium	µg/L	-	-	-	2800	2900	6300	7200	150000	180000
Chromium	µg/L	-	-	1	1.1	1.9	**1.2**	**1.8**	**3.3**	**4.0**
Copper	µg/L	100	-	2	0.6	0.9	0.86	0.97	**13**	**15**
Iron	µg/L	-	-	300	25	25	28	29	270	**310**
Lead	µg/L	80	-	1	0.25	0.25	0.27	0.27	0.92	**1.10**
Magnesium	µg/L	-	-	-	340	350	720	800	16000	19000
Manganese	µg/L	-	596	210	5.5	6.8	19	23	**610**	**740**
Mercury	µg/L	-	-	0.026	0.007	0.007	0.010	0.010	**0.17**	**0.20**
Molybdenum	µg/L	-	-	73	1.0	1.0	3.7	4.5	**110**	**140**
Nickel	µg/L	250	-	25	1.0	1.0	1.2	1.2	9.4	11
Phosphorus	µg/L	-	-	4	50	50	**50**	**50**	**50**	**50**
Potassium	µg/L	-	-	-	95	130	570	700	20000	24000
Selenium	µg/L	-	-	1	0.25	0.25	0.39	0.44	**6.1**	**7.4**
Silver	µg/L	-	-	0.25	0.05	0.05	0.066	0.070	**0.69**	**0.83**
Sodium	µg/L	-	-	-	1400	1500	3600	4300	91000	110000
Thallium	µg/L	-	-	0.8	0.05	0.05	0.056	0.059	0.31	0.40
Uranium	µg/L	-	33	15	0.05	0.05	0.86	1.20	**31**	**42**
Zinc	µg/L	400	11.3	2.2	2.5	2.5	**3.1**	**3.3**	**270**	**310**
Chloride	µg/L	-	640000	120000	2400	2600	2400	2600	2400	2600
Nitrate + Nitrite (as Nitrogen)	µg/L	-	-	-	38	53	4800	12000	12000	15000
Nitrite (as Nitrogen)	µg/L	-	-	60	9.9	14	**120**	**280**	**270**	**350**
Nitrate (as Nitrogen)	µg/L	-	550000	13000	25	25	4600	12000	11000	**15000**
Total Ammonia (as Nitrogen)	µg/L	-	-	689	25	25	610	**1500**	**1500**	**1900**
Un-ionized Ammonia (as Nitrogen)	µg/L	500	-	19	0.064	0.097	**23.0**	**57**	**57**	**72**
Cyanide, Total	µg/L	500	-	-	10	10	10	10	10	10
Cyanide, WAD	µg/L	-	-	5	1.0	1.0	1.0	1.0	1.0	1.0
Sulphate	µg/L	-	-	-	1000	1000	5400	6800	180000	220000
Fluoride	µg/L	-	-	120	60	60	85	93	**1100**	**1300**
Radium-226	Bq/L	0.37	-	-	0.005	0.005	0.0067	0.0071	0.074	0.088
Temperature	°C	-	-	-	12.0	17.0	9	17	9	18
Total Alkalinity (as $CaCO_3$)	mg/L	-	-	-	8.8	9.7	12000	15000	510000	610000
pH (mean or 5 %ile)	pH Unit	6.0-9.5	-	6.5-9.0	7.0	6.9	8.0	8.0	8.0	8.0
Hardness (as $CaCO_3$)	mg/L	-	-	-	8.4	8.7	19	21	440	530
Dissolved Organic Carbon	mg/L	-	-	-	1.0	1.0	1.3	1.4	15	18

Notes:

MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Table 1 of Schedule 4, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).

CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, short-term and long-term (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).

Concentrations exceeding MDMER are highlighted gray, CWQG short-term are double underlined, and CWQG long-term are bold.

For further details on the parameters and guidelines see Table C-1 notes in Appendix 7B of the EIS.

Table 6: Concentration ratios between the sensitivity and EIS models for LGO.

Parameter	Baseline		Construction		Operation	
Statistics	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	1.0	1.0	1.0	1.0	1.0	1.0
Antimony	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic	1.0	1.0	1.0	1.0	1.0	1.0
Barium	1.0	1.0	1.0	1.0	1.0	1.0
Boron	1.0	1.0	1.0	1.0	1.0	1.0
Cadmium	1.0	1.0	1.0	1.0	1.0	1.0
Calcium	1.0	1.0	1.0	1.0	1.0	1.0
Chromium	1.0	1.0	1.0	1.0	1.0	1.0
Copper	1.0	1.0	1.0	1.0	1.0	1.0
Iron	1.0	1.0	1.0	1.0	**1.5**	1.1
Lead	1.0	1.0	1.0	1.0	1.0	1.0
Magnesium	1.0	1.0	1.0	1.0	1.0	1.0
Manganese	1.0	1.0	1.0	1.0	1.0	1.0
Mercury	1.0	1.0	1.0	1.0	1.1	1.1
Molybdenum	1.0	1.0	1.0	1.0	1.0	1.0
Nickel	1.0	1.0	1.0	1.0	1.2	1.1
Phosphorus	1.0	1.0	1.0	1.0	1.0	1.0
Potassium	1.0	1.0	1.0	1.0	1.0	1.0
Selenium	1.0	1.0	1.0	1.0	1.0	1.0
Silver	1.0	1.0	1.0	1.0	1.0	1.0
Sodium	1.0	1.0	1.0	1.0	1.0	1.0
Thallium	1.0	1.0	1.0	1.0	1.0	1.0
Uranium	1.0	1.0	1.0	1.0	1.0	1.0
Zinc	1.0	1.0	1.0	1.0	**3.1**	**1.2**
Chloride	1.0	1.0	1.0	1.0	1.0	1.0
Nitrate + Nitrite (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0
Nitrite (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0
Nitrate (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0
Total Ammonia (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0
Un-ionized Ammonia (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0
Cyanide, Total	1.0	1.0	1.0	1.0	1.0	1.0
Cyanide, WAD	1.0	1.0	1.0	1.0	1.0	1.0
Sulphate	1.0	1.0	1.0	1.0	1.0	1.0
Fluoride	1.0	1.0	1.0	1.0	1.0	1.0
Radium-226	1.0	1.0	1.0	1.0	1.0	1.0
Temperature	1.0	1.0	1.0	1.0	1.0	1.0
Total Alkalinity (as $CaCO_3$)	1.0	1.0	1.0	1.0	1.0	1.0
pH (mean or 5 %ile)	1.0	1.0	1.0	1.0	1.0	1.0
Hardness (as $CaCO_3$)	1.0	1.0	1.0	1.0	1.0	1.0
Dissolved Organic Carbon	1.0	1.0	1.0	1.0	1.0	1.0

Note: Ratios above 1.2 are bold and highlighted gray.

Table 7: The highest value of the monthly mean and 95th %-ile for each project phase in seepage from the waste rock stockpile in the EIS model.

Parameter	Units	MDMER	CWQG	**CWQG**	Baseline		Construction		Operation		Closure		Post-closure	
Statistics			Short-term	Long-term	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	µg/L	-	-	100	16	22	20	21	**600**	**600**	**600**	**600**	**600**	**600**
Antimony	µg/L	-	-	-	0.5	0.5	0.52	0.53	34	39	30	35	17	20
Arsenic	µg/L	100	-	5	0.5	0.5	0.5	0.5	**24**	**28**	**10.0**	**12**	**5.6**	**6.6**
Barium	µg/L	-	-	-	2.3	3	2.4	2.9	120	140	80	93	46	54
Boron	µg/L	-	29000	1500	25	25	25	25	130	150	93	100	63	70
Cadmium	µg/L	-	0.13	0.04	0.01	0.01	0.01	0.01	**0.23**	**0.27**	**0.22**	**0.26**	**0.14**	**0.17**
Calcium	µg/L	-	-	-	2800	2900	3000	3100	290000	340000	200000	240000	110000	140000
Chromium	µg/L	-	-	1	1.1	1.9	1.2	1.8	**7.8**	**9.2**	**7.4**	**9**	**4.8**	**5.5**
Copper	µg/L	100	-	2	0.6	0.9	0.7	0.9	**74**	**88**	**54**	**60**	**32**	**38**
Iron	µg/L	-	-	300	25	25	25	25	**570**	**680**	**350**	**420**	230	270
Lead	µg/L	80	-	1	0.25	0.25	0.25	0.25	**2.2**	**2.8**	**2.10**	**2.7**	**1.40**	**1.80**
Magnesium	µg/L	-	-	-	340	350	350	360	28000	33000	21000	24000	12000	14000
Manganese	µg/L	-	596	210	5.5	6.8	6.3	6.9	**1300**	**1300**	**980**	**1100**	**580**	**690**
Mercury	µg/L	-	-	0.026	0.007	0.007	0.007	0.007	**0.52**	**0.61**	**0.48**	**0.55**	**0.30**	**0.36**
Molybdenum	µg/L	-	-	73	1.0	1.0	1.0	1.0	38	44	28	34	17.0	20.0
Nickel	µg/L	250	-	25	1.0	1.0	1.0	1.0	6.8	8.8	6.7	8.5	5.0	5.9
Phosphorus	µg/L	-	-	4	50	50	50	50	**50**	**50**	**50**	**50**	**50**	**50**
Potassium	µg/L	-	-	-	95	130	130	140	56000	67000	14000	17000	6600	7800
Selenium	µg/L	-	-	1	0.25	0.25	0.25	0.25	**3.5**	**4.1**	**1.8**	**2.0**	**1.1**	**1.2**
Silver	µg/L	-	-	0.25	0.05	0.05	0.051	0.052	**1.9**	**2.2**	**1.7**	**1.9**	**1.0**	**1.2**
Sodium	µg/L	-	-	-	1400	1500	1500	1500	130000	160000	19000	24000	7400	9200
Thallium	µg/L	-	-	0.8	0.05	0.05	0.05	0.05	0.28	0.32	0.26	0.30	0.17	0.20
Uranium	µg/L	-	33	15	0.05	0.05	0.081	0.089	**42**	**52**	14	**17**	8	9
Zinc	µg/L	400	11.3	2.2	2.5	2.5	2.5	2.6	**140**	**200**	**140**	**200**	**110**	**130**
Chloride	µg/L	-	640000	120000	2400	2600	2400	2600	2400	2600	2400	2600	2400	2600
Nitrate + Nitrite (as Nitrogen)	µg/L	-	-	-	38	53	5900	15000	23000	30000	470	910	83	160
Nitrite (as Nitrogen)	µg/L	-	-	60	9.9	14	140	340	**530**	**670**	19	29	11.0	14
Nitrate (as Nitrogen)	µg/L	-	550000	13000	25	25	5800	15000	**23000**	**29000**	450	880	71	150
Total Ammonia (as Nitrogen)	µg/L	-	-	689	25	25	750	1900	**2900**	**3700**	80	130	32	41
Un-ionized Ammonia (as Nitrogen)	µg/L	500	-	19	0.064	0.097	29	72	**110**	**140**	3.0	4.9	1.2	1.6
Cyanide, Total	µg/L	500	-	-	10	10	10	10	10	10	10	10	10	10
Cyanide, WAD	µg/L	-	-	5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sulphate	µg/L	-	-	-	1000	1000	1100	1200	210000	260000	160000	190000	96000	120000
Fluoride	µg/L	-	-	120	60	60	61	62	**1600**	**1600**	**1600**	**1600**	**1600**	**1600**
Radium-226	Bq/L	0.37	-	-	0.005	0.005	0.0051	0.0052	0.20	0.23	0.18	0.21	0.10	0.12
Temperature	°C	-	-	-	12.0	17.0	11.0	17.0	12.0	17	11.0	17	12	17
Total Alkalinity (as $CaCO_3$)	mg/L	-	-	-	8.8	9.7	660	820	900000	1100000	540000	620000	300000	350000
pH (mean or 5 %ile)	pH Unit	6.0-9.5	-	6.5-9.0	7.0	6.9	7.9	7.7	8.0	7.7	7.3	7.2	7.3	7.2
Hardness (as $CaCO_3$)	mg/L	-	-	-	8.4	8.7	8.9	9.2	840	980	590	700	320	410
Dissolved Organic Carbon	mg/L	-	-	-	1.0	1.0	1.0	1.0	40	47	36	42	21	25

Notes:
MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Table 1 of Schedule 4, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).
CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, short-term and long-term (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).
Concentrations exceeding MDMER are highlighted gray, CWQG short-term are double underlined, and CWQG long-term are bold.
For further details on the parameters and guidelines see Table C-1 notes in Appendix 7B of the EIS.

Table 8: The highest value of the monthly mean and 95th %-ile for each project phase in seepage from the waste rock stockpile in the sensitivity model.

Parameter	Units	MDMER	CWQG	**CWQG**	Baseline		Construction		Operation		Closure		Post-closure	
Statistics			Short-term	Long-term	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	µg/L	-	-	100	16	22	20	21	**600**	**600**	**600**	**600**	**600**	**600**
Antimony	µg/L	-	-	-	0.5	0.5	0.52	0.53	36	41	33	37	20	24
Arsenic	µg/L	100	-	5	0.5	0.5	0.5	0.5	**22**	**26**	**11.0**	**12**	**6.2**	**7.2**
Barium	µg/L	-	-	-	2.3	3	2.4	2.9	120	140	91	110	55	65
Boron	µg/L	-	29000	1500	25	25	25	25	130	150	99	110	68	76
Cadmium	µg/L	-	0.13	0.04	0.01	0.01	0.01	0.01	**0.24**	**0.28**	**0.23**	**0.26**	**0.14**	**0.17**
Calcium	µg/L	-	-	-	2800	2900	3000	3100	300000	350000	230000	260000	140000	160000
Chromium	µg/L	-	-	1	1.1	1.9	1.2	1.8	**8.3**	**9.6**	**8.0**	**9**	**5.3**	**6.2**
Copper	µg/L	100	-	2	0.6	0.9	0.7	0.9	**72**	**85**	**54**	**60**	**32**	**38**
Iron	µg/L	-	-	300	25	25	25	25	**610**	**720**	**380**	**430**	230	270
Lead	µg/L	80	-	1	0.25	0.25	0.25	0.25	**2.3**	**3.0**	**2.20**	**2.7**	**1.40**	**1.80**
Magnesium	µg/L	-	-	-	340	350	350	360	28000	33000	23000	26000	14000	16000
Manganese	µg/L	-	596	210	5.5	6.8	6.3	6.9	**1300**	**1300**	**980**	**1100**	**580**	**690**
Mercury	µg/L	-	-	0.026	0.007	0.007	0.007	0.007	**0.53**	**0.62**	**0.49**	**0.57**	**0.30**	**0.36**
Molybdenum	µg/L	-	-	73	1.0	1.0	1.0	1.0	38	44	31	38	19.0	23.0
Nickel	µg/L	250	-	25	1.0	1.0	1.0	1.0	8.6	9.8	7.8	8.7	5.1	5.9
Phosphorus	µg/L	-	-	4	50	50	50	50	**50**	**50**	**50**	**50**	**50**	**50**
Potassium	µg/L	-	-	-	95	130	130	140	52000	61000	15000	17000	7500	8800
Selenium	µg/L	-	-	1	0.25	0.25	0.25	0.25	**3.3**	**3.9**	**1.9**	**2.2**	**1.2**	**1.4**
Silver	µg/L	-	-	0.25	0.05	0.05	0.051	0.052	**2.0**	**2.3**	**1.8**	**2.1**	**1.1**	**1.3**
Sodium	µg/L	-	-	-	1400	1500	1500	1500	120000	140000	19000	24000	8400	10000
Thallium	µg/L	-	-	0.8	0.05	0.05	0.05	0.05	0.30	0.33	0.28	0.32	0.19	0.22
Uranium	µg/L	-	33	15	0.05	0.05	0.081	0.089	**39**	**48**	15	**18**	8	10
Zinc	µg/L	400	11.3	2.2	2.5	2.5	2.5	2.6	**200**	**230**	**180**	**210**	**110**	**130**
Chloride	µg/L	-	640000	120000	2400	2600	2400	2600	2400	2600	2400	2600	2400	2600
Nitrate + Nitrite (as Nitrogen)	µg/L	-	-	-	38	53	5900	15000	23000	30000	470	910	83	160
Nitrite (as Nitrogen)	µg/L	-	-	60	9.9	14	140	340	**530**	**670**	19	29	11.0	14
Nitrate (as Nitrogen)	µg/L	-	550000	13000	25	25	5800	15000	**23000**	**29000**	450	880	71	150
Total Ammonia (as Nitrogen)	µg/L	-	-	689	25	25	750	1900	**2900**	**3700**	80	130	32	42
Un-ionized Ammonia (as Nitrogen)	µg/L	500	-	19	0.064	0.097	29	72	**110**	**140**	3.0	4.9	1.2	1.6
Cyanide, Total	µg/L	500	-	-	10	10	10	10	10	11	10	10	10	10
Cyanide, WAD	µg/L	-	-	5	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0
Sulphate	µg/L	-	-	-	1000	1000	1100	1200	220000	260000	160000	190000	97000	120000
Fluoride	µg/L	-	-	120	60	60	61	62	**1600**	**1600**	**1600**	**1600**	**1600**	**1600**
Radium-226	Bq/L	0.37	-	-	0.005	0.005	0.0051	0.0052	0.21	0.24	0.20	0.22	0.12	0.14
Temperature	°C	-	-	-	12.0	17.0	11.0	17.0	12.0	17	11.0	17	12	17
Total Alkalinity (as $CaCO_3$)	mg/L	-	-	-	8.8	9.7	660	820	870000	1000000	590000	670000	340000	410000
pH (mean or 5 %ile)	pH Unit	6.0-9.5	-	6.5-9.0	7.0	6.9	7.9	8.1	8.0	8.2	7.3	7.5	7.3	7.5
Hardness (as $CaCO_3$)	mg/L	-	-	-	8.4	8.7	8.9	9.2	860	1000	670	760	410	470
Dissolved Organic Carbon	mg/L	-	-	-	1.0	1.0	1.0	1.0	43	49	39	44	24	28

Notes:

MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Table 1 of Schedule 4, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).

CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, short-term and long-term (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).

Concentrations exceeding MDMER are highlighted gray, CWQG short-term are double underlined, and CWQG long-term are bold.

For further details on the parameters and guidelines see Table C-1 notes in Appendix 7B of the EIS.

Table 9: Concentration ratios between the sensitivity and EIS models for waste rock.

Parameter	Construction		Operation		Closure		Post-closure	
Statistics	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Antimony	1.0	1.0	1.1	1.1	1.1	1.1	1.0	1.0
Arsenic	1.0	1.0	0.9	0.9	1.1	1.0	1.0	1.0
Barium	1.0	1.0	1.0	1.0	1.1	1.2	1.0	1.0
Boron	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0
Cadmium	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Calcium	1.0	1.0	1.0	1.0	1.2	1.1	1.0	1.0
Chromium	1.0	1.0	1.1	1.0	1.1	1.1	1.0	1.0
Copper	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Iron	1.0	1.0	1.1	1.1	1.1	1.0	1.0	1.0
Lead	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0
Magnesium	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0
Manganese	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Mercury	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Molybdenum	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0
Nickel	1.0	1.0	**1.3**	1.1	1.2	1.0	1.0	1.0
Phosphorus	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Potassium	1.0	1.0	0.9	0.9	1.1	1.0	1.0	1.0
Selenium	1.0	1.0	0.9	1.0	1.1	1.1	1.0	1.0
Silver	1.0	1.0	1.1	1.0	1.1	1.1	1.0	1.0
Sodium	1.0	1.0	0.9	0.9	1.0	1.0	1.0	1.0
Thallium	1.0	1.0	1.1	1.0	1.1	1.1	1.0	1.0
Uranium	1.0	1.0	0.9	0.9	1.1	1.1	1.0	1.0
Zinc	1.0	1.0	**1.4**	1.2	**1.3**	1.1	1.0	1.0
Chloride	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nitrate + Nitrite (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nitrite (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nitrate (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Ammonia (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Un-ionized Ammonia (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cyanide, Total	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0
Cyanide, WAD	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0
Sulphate	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Fluoride	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Radium-226	1.0	1.0	1.1	1.0	1.1	1.0	1.0	1.0
Temperature	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Alkalinity (as $CaCO_3$)	1.0	1.0	1.0	0.9	1.1	1.1	1.0	1.0
pH (mean or 5 %ile)	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0
Hardness (as $CaCO_3$)	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0
Dissolved Organic Carbon	1.0	1.0	1.1	1.0	1.1	1.0	1.0	1.0

Note: Ratios above 1.2 are bold and highlighted gray.

Table 10: The highest value of the monthly mean and 95th %-ile for each project phase in pit water in the EIS model.

Parameter	Units	MDMER	CWQG	**CWQG**	Baseline		Construction		Operation		Closure		Post-closure	
Statistics			Short-term	Long-term	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	µg/L	-	-	100	16	22	20	29	**210**	**300**	100	**110**	**120**	**120**
Antimony	µg/L	-	-	-	0.5	0.5	0.50	0.50	3.8	4.7	1.0	1.1	0.71	0.77
Arsenic	µg/L	100	-	5	0.5	0.5	1.4	2.1	3.2	3.7	2.2	2.4	2.2	2.3
Barium	µg/L	-	-	-	2.3	3	5.2	7.6	17	22	4	5	4	5
Boron	µg/L	-	29000	1500	25	25	25	25	32	38	25	25	25	25
Cadmium	µg/L	-	0.13	0.04	0.01	0.01	0.010	0.015	0.025	0.030	0.017	0.019	0.015	0.016
Calcium	µg/L	-	-	-	2800	2900	68000	98000	75000	96000	14000	15000	22000	22000
Chromium	µg/L	-	-	1	1.1	1.9	**1.1**	**1.8**	**1.5**	**2.4**	**1.4**	**1.9**	**1.3**	**1.9**
Copper	µg/L	100	-	2	0.6	0.9	1	1.3	**6.5**	**7.8**	1.7	1.8	1.3	1.4
Iron	µg/L	-	-	300	25	25	**480**	**880**	**440**	**800**	210	230	**320**	**330**
Lead	µg/L	80	-	1	0.25	0.25	0.25	0.25	0.27	0.31	0.25	0.25	0.25	0.25
Magnesium	µg/L	-	-	-	340	350	6500	9800	6900	9500	1500	1700	2200	2300
Manganese	µg/L	-	596	210	5.5	6.8	**620**	**1100**	**510**	**840**	160	170	190	200
Mercury	µg/L	-	-	0.026	0.007	0.007	0.007	0.007	**0.04**	**0.05**	0.014	0.015	0.011	0.012
Molybdenum	µg/L	-	-	73	1.0	1.0	5.6	8.0	13	16	3	3	3	3
Nickel	µg/L	250	-	25	1.0	1.0	1.0	1.0	1.3	1.7	1.0	1.1	1.0	1.0
Phosphorus	µg/L	-	-	4	50	50	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**
Potassium	µg/L	-	-	-	95	130	600	860	5500	6700	600	690	400	430
Selenium	µg/L	-	-	1	0.25	0.25	0.38	0.39	0.8	1.0	0.46	0.48	0.41	0.42
Silver	µg/L	-	-	0.25	0.05	0.05	0.050	0.050	0.19	0.23	0.069	0.075	0.058	0.060
Sodium	µg/L	-	-	-	1400	1500	42000	70000	40000	64000	6300	7000	12000	12000
Thallium	µg/L	-	-	0.8	0.05	0.05	0.050	0.050	0.054	0.062	0.050	0.050	0.050	0.050
Uranium	µg/L	-	33	15	0.05	0.05	0.78	0.92	5.3	6.6	0.6	0.7	0.41	0.43
Zinc	µg/L	400	11.3	2.2	2.5	2.5	**2.5**	**2.5**	**13**	**32**	**6.8**	**9.0**	**6.1**	**7.0**
Chloride	µg/L	-	640000	120000	2400	2600	36000	59000	33000	48000	5300	5900	9200	9400
Nitrate + Nitrite (as Nitrogen)	µg/L	-	-	-	38	53	720	1800	4900	9400	100	120	83	91
Nitrite (as Nitrogen)	µg/L	-	-	60	9.9	14	20	43	**110**	**250**	**93**	**110**	**91**	**100**
Nitrate (as Nitrogen)	µg/L	-	550000	13000	25	25	700	1700	4800	9200	100	120	83	92
Total Ammonia (as Nitrogen)	µg/L	-	-	689	25	25	380	610	**790**	**1400**	140	160	130	150
Un-ionized Ammonia (as Nitrogen)	µg/L	500	-	19	0.064	0.097	14	**23**	**30**	**53**	5	6	5	6
Cyanide, Total	µg/L	500	-	-	10	10	10	10	10	10	10	10	10	10
Cyanide, WAD	µg/L	-	-	5	1.0	1.0	1.1	1.2	1	1	1.0	1.0	1.0	1.0
Sulphate	µg/L	-	-	-	1000	1000	170000	290000	160000	260000	21000	24000	46000	47000
Fluoride	µg/L	-	-	120	60	60	60	60	**220**	**260**	80	85	68	70
Radium-226	Bq/L	0.37	-	-	0.005	0.005	0.0050	0.0050	0.021	0.025	0.0073	0.0078	0.0110	0.0110
Temperature	°C	-	-	-	12.0	17.0	9.2	17	9.3	18	9.1	18	10	18
Total Alkalinity (as $CaCO_3$)	mg/L	-	-	-	8.8	9.7	300	480	99000	120000	11000	14000	6800	7800
pH (mean or 5 %ile)	pH Unit	6.0-9.5	-	6.5-9.0	7.0	6.9	7.8	7.6	7.8	7.6	7.3	7.2	7.4	7.3
Hardness (as $CaCO_3$)	mg/L	-	-	-	8.4	8.7	200	290	220	280	41	44	64	64
Dissolved Organic Carbon	mg/L	-	-	-	1.0	1.0	1.0	1.0	4.1	4.9	1.4	1.5	1.2	1.2

Notes:
MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Table 1 of Schedule 4, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).
CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, short-term and long-term (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).
Concentrations exceeding MDMER are highlighted gray, CWQG short-term are double underlined, and CWQG long-term are bold.
For further details on the parameters and guidelines see Table C-1 notes in Appendix 7B of the EIS.

Table 11: The highest value of the monthly mean and 95th %-ile for each project phase in pit water in the sensitivity model.

Parameter	Units	MDMER	CWQG	**CWQG**	Baseline		Construction		Operation		Closure		Post-closure	
Statistics			Short-term	Long-term	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	µg/L	-	-	100	16	22	20	29	**190**	**270**	99	**110**	**120**	**120**
Antimony	µg/L	-	-	-	0.5	0.5	0.50	0.50	2.9	3.5	0.9	0.9	0.68	0.71
Arsenic	µg/L	100	-	5	0.5	0.5	1.4	2.1	2.6	3.4	2.2	2.3	2.2	2.3
Barium	µg/L	-	-	-	2.3	3	5.2	7.6	14	17	4	4	4	5
Boron	µg/L	-	29000	1500	25	25	25	25	26	28	25	25	25	25
Cadmium	µg/L	-	0.13	0.04	0.01	0.01	0.010	0.015	0.033	0.038	0.018	0.020	0.015	0.017
Calcium	µg/L	-	-	-	2800	2900	68000	98000	68000	88000	13000	14000	22000	22000
Chromium	µg/L	-	-	1	1.1	1.9	**1.1**	**1.8**	**1.5**	**2.4**	**1.4**	**1.9**	**1.3**	**1.9**
Copper	µg/L	100	-	2	0.6	0.9	1	1.3	**6.5**	**7.8**	1.7	1.8	1.3	1.4
Iron	µg/L	-	-	300	25	25	**480**	**880**	**440**	**800**	210	230	**320**	**330**
Lead	µg/L	80	-	1	0.25	0.25	0.25	0.25	0.30	0.34	0.25	0.26	0.25	0.25
Magnesium	µg/L	-	-	-	340	350	6500	9800	6300	8900	1500	1600	2200	2200
Manganese	µg/L	-	596	210	5.5	6.8	**620**	**1100**	**510**	**840**	160	170	190	200
Mercury	µg/L	-	-	0.026	0.007	0.007	0.007	0.007	**0.04**	**0.05**	0.014	0.015	0.011	0.012
Molybdenum	µg/L	-	-	73	1.0	1.0	5.6	8.0	9	11	2	2	3	3
Nickel	µg/L	250	-	25	1.0	1.0	1.0	1.0	3.0	3.7	1.2	1.3	1.0	1.1
Phosphorus	µg/L	-	-	4	50	50	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**
Potassium	µg/L	-	-	-	95	130	600	860	4500	5300	510	570	400	420
Selenium	µg/L	-	-	1	0.25	0.25	0.38	0.39	0.6	0.7	0.44	0.46	0.41	0.42
Silver	µg/L	-	-	0.25	0.05	0.05	0.050	0.050	0.16	0.19	0.066	0.069	0.056	0.058
Sodium	µg/L	-	-	-	1400	1500	42000	70000	37000	64000	6000	6600	11000	12000
Thallium	µg/L	-	-	0.8	0.05	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Uranium	µg/L	-	33	15	0.05	0.05	0.78	0.92	4.0	4.8	0.5	0.5	0.40	0.42
Zinc	µg/L	400	11.3	2.2	2.5	2.5	**2.5**	**2.5**	**28**	**33**	**8.2**	**8.9**	**6.6**	**7.0**
Chloride	µg/L	-	640000	120000	2400	2600	36000	59000	33000	48000	5300	5900	9200	9400
Nitrate + Nitrite (as Nitrogen)	µg/L	-	-	-	38	53	720	1800	4900	9400	100	120	83	91
Nitrite (as Nitrogen)	µg/L	-	-	60	9.9	14	20	43	**110**	**250**	**93**	**110**	**91**	**100**
Nitrate (as Nitrogen)	µg/L	-	550000	13000	25	25	700	1700	4800	9200	100	120	83	92
Total Ammonia (as Nitrogen)	µg/L	-	-	689	25	25	380	610	**790**	**1400**	140	160	130	150
Un-ionized Ammonia (as Nitrogen)	µg/L	500	-	19	0.064	0.097	14	**23**	**30**	**53**	5	6	5	6
Cyanide, Total	µg/L	500	-	-	10	10	10	10	10	10	10	10	10	10
Cyanide, WAD	µg/L	-	-	5	1.0	1.0	1.1	1.2	1	1	1.0	1.0	1.0	1.0
Sulphate	µg/L	-	-	-	1000	1000	170000	290000	160000	260000	22000	25000	46000	47000
Fluoride	µg/L	-	-	120	60	60	60	60	**190**	**220**	77	80	67	69
Radium-226	Bq/L	0.37	-	-	0.005	0.005	0.0050	0.0050	0.017	0.020	0.0070	0.0072	0.0110	0.0110
Temperature	°C	-	-	-	12.0	17.0	9.2	17	9.3	18	9.1	18	10	18
Total Alkalinity (as $CaCO_3$)	mg/L	-	-	-	8.8	9.7	290	470	75000	91000	9200	10000	6700	7700
pH (mean or 5 %ile)	pH Unit	6.0-9.5	-	6.5-9.0	7.0	6.9	7.8	8.0	7.8	8.0	7.3	7.5	7.4	7.5
Hardness (as $CaCO_3$)	mg/L	-	-	-	8.4	8.7	200	290	200	260	39	42	64	64
Dissolved Organic Carbon	mg/L	-	-	-	1.0	1.0	1.0	1.0	3.4	4.0	1.3	1.4	1.1	1.2

Notes:

MDMER - Metal and Diamond Mining Effluent Regulations (Canada), Table 1 of Schedule 4, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).

CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, short-term and long-term (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).

Concentrations exceeding MDMER are highlighted gray, CWQG short-term are double underlined, and CWQG long-term are bold.

For further details on the parameters and guidelines see Table C-1 notes in Appendix 7B of the EIS.

Table 12: Concentration ratios between the sensitivity and EIS models for open pit.

Parameter	Baseline		Construction		Operation		Closure		Post-closure	
Statistics	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile	mean	95 %ile
Aluminum	1.0	1.0	1.0	1.0	0.9	0.9	1.0	1.0	1.0	1.0
Antimony	1.0	1.0	1.0	1.0	0.8	0.7	0.9	0.8	1.0	0.9
Arsenic	1.0	1.0	1.0	1.0	0.8	0.9	1.0	1.0	1.0	1.0
Barium	1.0	1.0	1.0	1.0	0.8	0.8	0.9	0.9	1.0	1.0
Boron	1.0	1.0	1.0	1.0	0.8	0.7	1.0	1.0	1.0	1.0
Cadmium	1.0	1.0	1.0	1.0	**1.3**	**1.3**	1.1	1.1	1.0	1.1
Calcium	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	1.0	1.0
Chromium	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Copper	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Iron	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0	1.0	1.0
Magnesium	1.0	1.0	1.0	1.0	0.9	0.9	1.0	0.9	1.0	1.0
Manganese	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Mercury	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0	1.0	1.0
Molybdenum	1.0	1.0	1.0	1.0	0.7	0.7	0.9	0.8	1.0	1.0
Nickel	1.0	1.0	1.0	1.0	**2.3**	**2.2**	1.2	1.2	1.0	1.1
Phosphorus	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Potassium	1.0	1.0	1.0	1.0	0.8	0.8	0.9	0.8	1.0	1.0
Selenium	1.0	1.0	1.0	1.0	0.8	0.7	1.0	1.0	1.0	1.0
Silver	1.0	1.0	1.0	1.0	0.8	0.8	1.0	0.9	1.0	1.0
Sodium	1.0	1.0	1.0	1.0	0.9	1.0	1.0	0.9	0.9	1.0
Thallium	1.0	1.0	1.0	1.0	0.9	0.8	1.0	1.0	1.0	1.0
Uranium	1.0	1.0	1.0	1.0	0.8	0.7	0.8	0.7	1.0	1.0
Zinc	1.0	1.0	1.0	1.0	**2.2**	1.0	**1.2**	1.0	1.1	1.0
Chloride	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nitrate + Nitrite (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nitrite (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nitrate (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Ammonia (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Un-ionized Ammonia (as Nitrogen)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cyanide, Total	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cyanide, WAD	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sulphate	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Fluoride	1.0	1.0	1.0	1.0	0.9	0.8	1.0	0.9	1.0	1.0
Radium-226	1.0	1.0	1.0	1.0	0.8	0.8	1.0	0.9	1.0	1.0
Temperature	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Alkalinity (as $CaCO_3$)	1.0	1.0	1.0	1.0	0.8	0.8	0.8	0.7	1.0	1.0
pH (mean or 5 %ile)	1.0	1.0	1.0	1.1	1.0	1.1	1.0	1.0	1.0	1.0
Hardness (as $CaCO_3$)	1.0	1.0	1.0	1.0	0.9	0.9	1.0	1.0	1.0	1.0
Dissolved Organic Carbon	1.0	1.0	1.0	1.0	0.8	0.8	0.9	0.9	0.9	1.0

Note: Ratios above 1.2 are bold and highlighted gray.

April 2021

APPENDIX IR-25.A
IR-25 SGS REPORT

Excerpt from Report

An Investigation of

GOLD RECOVERY FROM VALENTINE LAKE PROJECT ORES

prepared for

MARATHON GOLD

Project 16863-01 (includes 16863-03) – Report 2 of 3 - Milling
April 15, 2020

NOTES

ACCREDITATION: SGS Minerals Services Lakefield is accredited to the requirements of ISO/IEC 17025 for specific tests as listed on our scope of accreditation, including geochemical, mineralogical, and trade mineral tests. To view a list of the accredited methods, please visit the following website and search SGS Lakefield: *http://palcan.scc.ca/SpecsSearch/GLSearchForm.do*.

Table 67: Comparison of the Overall Metallurgy Achieved in FS-1 and FS-2, VLMC Tests

Flowsheet 1		**Comp VLMC**	**Difference Between Flowsheets**
Primary Grind P_{80}, µm	=	153	--
Direct Head, Au g/t	=	2.35	0.00
Calc Head, Au g/t	=	2.81	-0.20
Au Recovery / Extraction			
Gravity Separation (G25), %	=	**72.9**	14.1
Flotation Concentrate, %	=	*20.1*	--
Flotation Tailing, %	=	*7.0*	--
Flotation Concentrate CN (Avg. of CN3 and 4), %	=	**17.0**	--
Flotation Tailing CN (Avg. of CN5 and 6), %	=	**5.1**	--
Combined FS-1 Circuit Au Recovery, %	=	**94.9**	**0.1**
NORM. to DIRECT Head, %	=	***94.1***	**0.7**
NORM. to AVG. Calc Head, %	=	***95.3***	**0.6**
Final Comb FS-1 Tailing (Avg. of CN3-6), Au, g/t	=	0.14	-0.02
Flowsheet 2		**VLMC**	**Difference Between Flowsheets**
Primary Grind P_{80}, µm	=	73	--
Direct Head, Au g/t	=	2.35	0.00
Calc Head, Au g/t	=	3.01	0.20
Au Recovery / Extraction			
Gravity Separation (G26), %	=	***58.8***	**-14.1**
Gravity Tailing CN (Avg. of CN7 and 8), %	=	***36.0***	
Combined FS-2 Circuit Au Recovery, %	=	**94.8**	**-0.1**
NORM. to DIRECT Head, %	=	***93.4***	**-0.7**
NORM. to AVG. Calc Head, %	=	***94.7***	**-0.6**
Final Comb FS-2 Tailing (Avg. of CN7 and 8), Au, g/t	=	0.16	0.02

The average gold recovery advantage shown for FS-1 in the above table is less than that calculated for the tests on the Low- Grade Variability samples (Table 56) although the difference in tailings grade remains at 0.02 g/t.

3. Cyanide Detoxification Testwork

3.1. Bulk Cyanide Leaching

Two cyanide detoxification (CND) tests were performed on combined tailing representing the gravity-flotation + leach flowsheet (FS-1) bulk cyanide leached (CIL) tailing pulps from tests FCN25b and FCN26b. Cyanide leach test FCN25a was completed on 500 g of Marathon pilot plant flotation concentrate, while FCN25b was completed on 16 kg combined Marathon pilot plant flotation tailing (15.52 kg) and 0.48 kg (dry equivalent) leached residue from test FCN25a. This is equivalent to 3% reground flotation concentrate (P_{80} = 13 µm) and 97% flotation tailing (P_{80} = 147 µm).

The same mass proportions of Leprechaun deposit pilot plant products were used to generate the FCN26b CIL tailing used in the corresponding CND testwork. Reground flotation concentrate and "as-is" flotation tailing P_{80}'s were 12 µm and 154 µm, respectively.

Cyanide detoxification tests were not undertaken on tailings representing the gravity + tailing cyanide leach process option.

Final CIL barren pulps were subsampled to generate a metallurgical balance and to provide the required analyses (Cu, Fe, CN_T, and CN_{WAD}) for the subsequent detoxification testing. Leach test conditions applied were as follows:

Table 68: CN Leach Conditions, Flot Concentrate, and Combined Flot Conc + Tail

		Flot Conc CN's, FCN25a and FCN26a	Flot Conc + Flot Tail. FCN25b and FCN26b	
Pulp Density	=	40	50	% Solids (w/w)
Pulp pH	=	11-11.5	10.5-11	Maintained with lime
Cyanide Concentration	=	10	--	g/L NaCN, maintained for 12 hours
Cyanide Concentration	=	--	0.3	g/L NaCN maintained @ 0.2 g/L
Carbon Concentration	=	20	5	g/L, Preattritioned Calgon GRC 22
Leach Retention Time	=	36	24	hours

Test results are presented in Table 69 and Table 70 for the concentrate and combined tailing + concentrate leaches, respectively.

Table 69: Bulk PP Flotation Concentrate CIL Results

PP Flot Conc	Test	Feed Size P_{80}, µm	Reagents (kg/t of CN Feed)				36 h Au Extraction %	Leach Residue Au, g/t	Head Grade, Au, g/t	
			Added		Consumed					
			NaCN	CaO	NaCN	CaO			Calc.	Direct
Marathon	FCN25a	13	23.8	0.88	10.5	0.43	**97.9**	0.56	26.8	27.3
Leprechaun	FCN26a	12	28.4	0.83	18.4	0.05	**97.8**	0.68	31.5	59.3

Table 70: Bulk PP Flotation Tailing + Preleached PP Concentrate CIL Results

PP Flot Tail + (leached) Flot Conc	Test	Feed Size P_{80}, µm	Reagents (kg/t of CN Feed)				24 h Au Extraction %	Leach Residue Au, g/t	Head Grade, Au, g/t, Calc.
			Added		Consumed				
			NaCN	CaO	NaCN	CaO			
Marathon	FCN25b	153	0.30	0.27	0.08	0.27	**52.3**	0.09	0.19
Leprechaun	FCN26b	142	0.3	0.21	0.10	0.21	**59.2**	0.10	0.25

In all respects, the bulk leaching to generate feed for cyanide detoxification tests presented above, performed as expected and confirms the results of the development work presented earlier.

3.2. SO_2/Air Cyanide Destruction

Conventional SO_2/air cyanide detoxification was applied to barren leached tailing slurries generated as described above.

3.2.1. Background

The chemical reaction for the oxidation of weak-acid dissociable cyanide (CN_{WAD}) using sodium metabisulphite ($Na_2S_2O_5$) as the source of SO_2, and air as the source of oxygen, proceeds as follows:

$$2\ CN^- + Na_2S_2O_5 + 2\ O_2 + 2\ OH^- \rightarrow 2\ CNO^- + Na_2SO_4 + SO_4^{2-} + H_2O$$

This reaction is catalyzed by the presence of copper. The feed usually contains some copper (as the copper cyano complexes), and if required, additional copper is added as copper sulphate. Hydrated lime is added to the reactor to provide the hydroxide ion for the above reaction.

The base metals (such as copper, zinc and nickel) that previously complexed with the cyanide are liberated and precipitated as metal hydroxides:

$$Cu^{2+} + 2OH^- \rightarrow Cu(OH)_2$$

Ferrocyanide is not destroyed in the process and is instead precipitated with other base metals such as copper, zinc and nickel as mixed metal ferrocyanide solids:

$$Fe(CN)_6^{4-} + 2Cu^{2+} \rightarrow Cu_2Fe(CN)_6$$

$$Fe(CN)_6^{4-} + 2Zn^{2+} \rightarrow Zn_2Fe(CN)_6$$

Thiocyanate, if present, is partially oxidized to cyanate and sulphate:

$$SCN^- + Na_2S_2O_5 + 3O_2 + 4OH^- \rightarrow CNO^- + Na_2SO_4 + 2SO_4^{2-} + 2H_2O$$

The cyanate ion is unstable, and slowly hydrolyzes to ammonium and carbonate ions:

$$CNO^- + 2\ H_2O \rightarrow CO_3^{2-} + NH_4^+$$

The rate of hydrolysis of the cyanate ion increases with decreasing pH. The carbonate ion precipitates as calcium carbonate. A small amount of the ammonium ion is found to form ammonia (NH_3) and eventually escapes from the solution as NH_3 gas.

The standard procedure for cyanide detoxification using SO_2/air in a bulk-batch mode was applied. A 1 L reactor equipped with baffles and air sparger was first filled with the feed pulp. The required amount of copper sulphate was added based on the analysis completed prior to testing. The pulp was treated in batch mode with $Na_2S_2O_5$ and air to reduce the concentration of CN_{WAD} in solution to approximately 1 mg/L.

The oxidation reduction potential (ORP) of the pulp was monitored with a Pt/Ag/AgCl combination electrode, while the residual CN_{WAD} concentration in the solution phase was monitored during the test using the picric acid method. At the end of each test, a solution sample was taken for analysis of CN_T, CN_{WAD}, copper and iron.

Once the batch of pulp has been treated and cyanide destroyed to the target level, the continuous test commenced. Slurry was pumped to the vessel (1 L reactor) at a rate determined by the target residence time requirement (typically, and in this case, ~60 minutes), and reagents ($Na_2S_2O_5$ and lime) and air were added continuously. Samples of solution phase of the slurry discharge were taken periodically and analysed for CN_T, CN_{WAD}, copper and iron to determine the efficiency of the CND reaction.

It should be noted that batch tests are inefficient and should only be used for determining the amenability of the sample to treatment using SO_2/air and providing a rather conservative indication of reagent requirements. Continuous testing is required for optimization of parameters such as retention time and reagent dosages. In addition, sodium metabisulphite, a partially neutralized form of SO_2, is generally used in laboratory testing to allow accurate addition of the reagent. It is anticipated that in a commercial plant using SO_2 gas, the lime requirement for pH control may require an additional 0.5 mole lime per mole SO_2, or 0.58 g lime per g SO_2 as suggested by the following chemical reactions:

$$2SO_2 + 2NaOH \rightarrow Na_2S_2O_5 + H_2O$$

$$Na_2S_2O_5 + Ca(OH)_2 \rightarrow CaSO_3 + Na_2SO_3 + H_2O$$

$$2SO_2 + 2Ca(OH)_2 \rightarrow 2CaSO_3 + 2H_2O$$

3.2.2. Results

Results are presented in Table 71 and details are included in Appendix C.

Table 71: SO_2/Air Cyanide Detoxification Summary

Test Number	Test Dur., min.	Reten. Time, min	Product (Solution Phase) Analysis, mg/L pH	CN_T	CN_{WAD} by Ana. Lab	CN_{WAD} by Picric Acid	Cu	Fe	Reagent Addition g/g CN_{WAD} SO_2 Equiv.	Lime (CaO)	$Cu^{(1)}$	g/L Feed Slurry SO_2 Equiv.	Lime (CaO)	$Cu^{(1)}$	kg/t Solids SO_2 Equiv.	Lime (CaO)	$Cu^{(1)}$
Marathon, *Feed from FCN25b*			*9.8*	*200*	*137*		*15.7*	*30.5*									
CND 1 Batch Test	130	130	8.5	--	--	0.69	--	--	4.75	7.11	0.47	0.48	0.72	0.05	0.65	0.97	0.06
Continuous Tests																	
1-1	410	57	8.6	5.00	0.10	0.54	0.1	1.8	4.68	3.66	0.46	0.47	0.38	0.05	0.64	0.50	0.06
1-2	240	52	8.6	9.24	0.14	0.63	0.3	3.4	4.80	3.21	**0.36**	0.48	0.33	0.04	0.66	0.44	0.05
1-3	185	59	8.5	19.8	0.08	1.03	0.6	6.3	4.82	2.80	**0.22**	0.49	0.29	0.02	0.66	0.38	0.03
1-4	430	54	8.5	29.7	0.10	1.69	1.8	10.7	**4.39**	3.02	0.23	0.44	0.31	0.02	0.60	0.41	0.03
Leprechaun, *Feed from FCN26b*		--	*10.3*	*300*	*112*		*15.6*	*72.7*									
CND 2 Batch Test	230	230	8.5	--	--	0.79	--	--	8.55	13.8	1.50	0.71	1.14	0.12	0.96	1.54	0.17
Continuous Tests																	
2-1	410	60	8.5	0.2	<0.01	0.32	0.4	0.2	**4.25**	3.83	1.75	0.35	0.32	0.14	0.48	0.43	0.20
2-2	240	57	8.5	4.02	<0.01	0.67	0.2	1.5	4.32	2.69	**1.39**	0.36	0.23	0.11	0.48	0.30	0.16
2-3	190	54	8.8	24.9	<0.01	1.40	0.3	9.1	4.28	2.30	**0.88**	0.35	0.19	0.07	0.48	0.26	0.10
2-4	370	56	8.8	6.90	<0.1	2.19	0.1	0.2	4.46	1.94	1.00	0.37	0.16	0.08	0.50	0.22	0.11

-- No sample submitted for assays

(1) Cu added as copper sulphate ($CuSO_4 \cdot 5H_2O$), SO_2 added as sodium metabisulphite ($Na_2S_2O_5$)

The 4.75 g SO_2/g CN_{WAD}, added in CND 1 batch test, and similarly added in all but the last trial on FCN25b (Marathon) feed (CND 1-4) is the fairly standard starting dosage (ratio) after initial batch treatment to the approximate detoxification target. Running at that concentration in the batch treatment stage and in the initial three (of four) continuous runs resulted consistently in CN_{WAD} contents of less than the target of ~1 mg/L (CN_{WAD} analyses by the higher precision methods applied in the SGS Minerals analytical laboratory). Reducing the SO_2 dosage somewhat, to ~4.4 g SO_2/g CN_{WAD}, in the final trial (CND 1-4) yielded similarly low CN_{WAD} after only 54 minutes of retention (less than the reporting limit of 0.1 mg/L CN_{WAD}).

While a considerably higher SO_2 dosage (8.55 g SO_2/g CN_{WAD}) was required to batch treat FCN26b (Leprechaun) pulp to the target range, dosages in the continuous phase were consistently <4.5 g SO_2/g CN_{WAD} in the continuous trials. The CN_{WAD} analyses by the higher precision methods applied in the SGS Minerals analytical laboratory indicated that all trials yielded CN_{WAD} values less than the detection limit (= 0.01 or 0.1 mg/L depending on unspecified interferences).

The principal parameter examined in this testwork was copper dosage. Copper, as explained in the preamble above, is required at a certain concentration to catalyse the detoxification reaction. In both cases, copper addition (as copper sulphate) was reduced by a factor of two without negatively impacting the principal reaction. Copper addition was reduced from 0.46 to 0.23 g/g CN_{WAD} in CND1 and from 1.75 to 0.88 g/g CN_{WAD} in CND2. The reduction in copper sulphate addition had a positive impact on reducing lime requirement.

Cyanide detoxification testwork clearly indicated that the CN_{WAD} present in the CIL barren slurries was easily destroyed to levels below the typical effluent discharge requirement of <1 mg/L CN_{WAD} (to the environment). On all accounts these results must be considered as excellent. As the primary purpose of these tests was to generate material for environmental analysis, SGS did not determine absolute minimal dosage requirements for either SO_2 or copper. Future testwork, if undertaken, should examine further reducing SO_2 dosage, copper dosage and retention time. Based on the data presented here, further reductions are probable.

The final detoxified slurries were turned over to the custody of the SGS Mining Environmental group for a series of short and long term tests. That work was administered, and has been reported, under a separate test program (16863-02) and is not included in this report.

Valentine Gold Project: Round Two Federal Information Requirements

Response to IR(2)-18, IR (2)-19, IR(2)-21, IR(2)-23, IR(2)-26 and IR(2)-41

Marathon Gold Corporation
36 Lombard Street, Suite 600
Toronto, ON M5C 2X3

October 18, 2021

RESPONSE TO IR(2)-18

IR 2 Reference#:	**IR(2)-18**
IR 1 Reference #:	IR-18
EIS Reference:	Baseline Study Appendix 5 Attachment 5-B Section 3.1.1, 4.1.1, and 4.3.1 and Appendix A
Context and Rationale:	a. Cross-sections provided in Appendix IR-18.A are sufficient to demonstrate the locations of sample reported in BSA-5 of the EIS; however, some samples are represented with a black line (e.g. Section 16350E borehole MA-18-287, various samples) rather than the three colours (yellow, red, green) used to denote Net Potential Ratio (NPR) value ranges. Due to this potential formatting issue, it is difficult to confirm if there are spatial trends associated with potentially acid generating samples. Significant spatial gaps are noted at depth and in some areas of the pit walls. Per IR-23a, it is understood that spatial data gaps are being addressed in a new sampling program and that these samples have been collected; per IR(2)-23a, provision of this additional information would facilitate a more efficient review. b. It is agreed that longer sample intervals (i.e., greater than anticipated bench heights) can mask variability in mineral properties. However discreet sample intervals do not capture the overall composition of material at a block model and operational management level, especially when narrow intervals such as the mafic dykes and quartz porphyries, are grouped with other lithologies in the block model. It is understood that sample selection was, at least in part, based on gold grades, which are demonstrated to be variable along borehole MA-18-281 (Table IR-18.1). Per IR-19c the proponent states "gold mineralization correlates with sulphide content indicating that under sampled lithological units are likely to have lower acid rock drainage /metal leaching potential". Considering gold is hosted in quartz-tourmaline-pyrite veins, this assumption is not unreasonable. However, it does not preclude the possibility that sulphide mineralization is present in waste rock outside of the gold mineralized zones at lower levels that could cause either acid rock drainage or neutral mine drainage.
Information Request:	a. Provide updated cross sections that correct the formatting issue for some samples reported in Appendix IR-18.a, and include the sample locations and Net Potential Ratio values (if available) for the static test samples described in IR-23.

VALENTINE GOLD PROJECT: ROUND TWO FEDERAL INFORMATION REQUIREMENTS

October 2021

IR 2 Reference#:	**IR(2)-18**
	b. For all waste rock, low grade ore and ore samples, provide a correlation analysis between gold grades and Acid Rock Drainage potential, sulphur, carbonate, and parameters of concern listed in Table 5-1 (except cyanide and nitrogen species) to support the use of gold grade for sample interval selection.
Response:	a. The updated cross-sections are provided in Appendix IR(2)-18.A. The appendix also shows additional samples selected for testing to address the statistical and spatial limitations of the testing completed to date, noting that this does not include the several thousand samples that will be tested to support development of the Acid Rock Drainage (ARD) block model. Testing of these additional samples is currently underway. The Acid Rock Drainage / Metal Leaching (ARD/ML) sampling and testing program described in the original response to IR-18 (in the response to Federal Information Requirements issued on February 10, 2021) has incurred delays for several reasons, including staffing limitations due to Covid-19 and more substantially, all testing labs conducting work for the mining industry are overwhelmed with lab testing requests due to high levels of exploration and development. Marathon is currently working with the SGS laboratory to complete testing on the remainder of the samples as soon as possible. When results from all additional static tests become available, Marathon will update the summary tables and assess the information with regard to the ARD/ML Management Plan. b. Analysis of gold grade correlation with the requested parameters is presented in Tables IR(2)-18.1 and IR(2)-18.2. The statistically significant correlations are highlighted. Gold shows significant correlation with sulphur in Leprechaun waste rock, while for the Marathon pit, this correlation, while positive, is not significant. Therefore, exploration test work (e.g., gold grades) can guide initial sampling for ARD/ML in some materials, and as previously noted, this is only one of the criteria used for sample selection. It is agreed that averaging of samples needs to be completed for ARD block model inputs (e.g., samples will be averaged within a block before use in the block model).
Appendix:	Appendix IR(2)-18.A Updated Cross-Sections

Table IR(2)-18.1 Marathon Deposit Correlation Analysis Results

High Grade Ore, Au (g/t) compared to:																	
	Carb.	**S_{Tot}**	**AP**	**NPR**	**Ag**	**Al**	**As**	**Cd**	**Cu**	**Fe**	**Hg**	**Mg**	**Mo**	**P**	**Pb**	**Se**	**Zn**
r^2	0.13	0.01	0.00	0.00	0.76	0.26	0.04	0.39	0.05	0.29	-	0.43	0.27	0.38	0.00	0.37	0.00
r	0.36	-0.11	-0.01	-0.02	0.87	-0.51	-0.21	0.62	0.23	-0.54	-	0.65	0.52	0.61	-0.02	0.61	-0.03
n	9	9	9	9	9	9	9	9	9	9	-	9	9	3	9	9	9
T stat	1.03	-0.28	-0.02	-0.06	4.71	-1.56	-0.57	2.10	0.61	-1.70	-	2.28	1.62	0.78	-0.06	2.02	-0.08
DF	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	-	7.00	7.00	1.00	7.00	7.00	7.00
p value	0.336	0.785	0.988	0.952	0.002	0.163	0.587	0.074	0.559	0.133	-	0.056	0.150	0.580	0.953	0.083	0.941
Low Grade Ore, Au (g/t) compared to:																	
	Carb.	**S_{Tot}**	**AP**	**NPR**	**Ag**	**Al**	**As**	**Cd**	**Cu**	**Fe**	**Hg**	**Mg**	**Mo**	**P**	**Pb**	**Se**	**Zn**
r^2	0.01	0.23	0.29	0.01	0.02	0.07	0.46	0.01	0.00	0.24	-	0.01	0.01	0.93	0.53	0.24	0.65
r	0.10	0.48	0.54	-0.09	0.15	-0.26	0.68	-0.08	0.04	-0.49	-	-0.10	-0.07	-0.96	0.73	0.49	-0.80
n	6	6	6	6	6	6	6	6	6	6	-	6	6	3	6	6	6
T stat	0.20	1.09	1.28	-0.18	0.30	-0.55	1.84	-0.16	0.08	-1.12	-	-0.20	-0.15	-3.62	2.12	1.14	-2.70
DF	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	-	4.00	4.00	1.00	4.00	4.00	4.00
p value	0.853	0.336	0.270	0.865	0.776	0.614	0.139	0.881	0.938	0.326	-	0.855	0.890	0.172	0.102	0.319	0.054
Waste Rock, Au (g/t) compared to:																	
	Carb.	**S_{Tot}**	**AP**	**NPR**	**Ag**	**Al**	**As**	**Cd**	**Cu**	**Fe**	**Hg**	**Mg**	**Mo**	**P**	**Pb**	**Se**	**Zn**
r^2	0.00	0.02	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	-	0.00	0.09	0.05	0.00	0.00	0.00
r	-0.04	0.14	0.14	-0.09	0.06	-0.01	0.09	-0.03	-0.07	0.05	-	0.04	0.30	-0.22	0.04	-0.04	0.05
n	129	129	129	129	129	129	129	129	129	129	-	129	129	45	129	129	129
T stat	-0.40	1.63	1.63	-1.05	0.72	-0.09	0.97	-0.31	-0.75	0.59	-	0.50	3.50	-1.48	0.49	-0.50	0.62
DF	127.00	127.00	127.00	127.00	127.00	127.00	127.00	127.00	127.00	127.00	-	127.00	127.00	43.00	127.00	127.00	127.00
p value	0.693	0.106	0.106	0.296	0.472	0.926	0.335	0.755	0.454	0.553	-	0.615	0.001	0.146	0.627	0.619	0.538

Parameters with a significant correlation (p value < 0.05) to Au (g/t) are flagged with green fill.

" - " denotes all samples were at detection limit or parameter was not analyzed.

Carb. – Carbonate

S_{Tot} – Total Sulphur

AP – Acid Potential

NPR - Neutralization Potential Ratio

Ag – Silver, Al – Aluminum, As – Arsenic, Cd – Cadmium, Cu – Copper, Fe – Iron, Hg – Mercury, Mg – Magnesium, Mo – Molybdenum, P – Phosphorus, Pb – Lead, Se – Selenium, Zn - Zinc

Table IR(2)-18.2 Leprechaun Deposit Correlation Analysis Results

High Grade Ore, Au (g/t) compared to:																	
	Carb.	**S_{Tot}**	**AP**	**NPR**	**Ag**	**Al**	**As**	**Cd**	**Cu**	**Fe**	**Hg**	**Mg**	**Mo**	**P**	**Pb**	**Se**	**Zn**
r^2	0.00	0.28	0.19	0.07	0.04	0.08	0.43	0.15	0.06	0.04	-	0.08	0.13	0.06	0.01	0.01	0.25
r	-0.06	0.53	0.43	-0.27	-0.21	0.29	0.66	0.38	-0.25	0.21	-	0.27	0.36	0.24	-0.08	0.07	0.50
n	11	11	11	11	11	11	11	11	11	11	-	11	11	6	11	11	11
T stat	-0.19	1.86	1.43	-0.84	-0.65	0.91	2.63	1.24	-0.77	0.65	-	0.86	1.15	0.49	-0.23	0.22	1.72
DF	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	-	9.00	9.00	4.00	9.00	9.00	9.00
p value	0.851	0.097	0.185	0.421	0.534	0.389	0.027	0.246	0.462	0.532	-	0.414	0.280	0.649	0.820	0.828	0.120
Low Grade Ore, Au (g/t) compared to:																	
	Carb.	**S_{Tot}**	**AP**	**NPR**	**Ag**	**Al**	**As**	**Cd**	**Cu**	**Fe**	**Hg**	**Mg**	**Mo**	**P**	**Pb**	**Se**	**Zn**
r^2	0.00	0.15	0.15	0.21	-	0.18	0.20	0.79	0.00	0.00	-	0.11	0.00	0.01	0.80	-	0.79
r	0.05	0.39	0.39	-0.46	-	0.43	0.45	0.89	0.00	0.01	-	0.32	-0.07	0.08	0.90	-	0.89
n	5	5	5	5	-	5	5	5	5	5	-	5	5	5	5	-	5
T stat	0.09	0.73	0.73	-0.90	-	0.82	0.87	3.34	-0.01	0.02	-	0.60	-0.12	0.14	3.49	-	3.37
DF	3.00	3.00	3.00	3.00	-	3.00	3.00	3.00	3.00	3.00	-	3.00	3.00	3.00	3.00	-	3.00
p value	0.932	0.520	0.519	0.435	-	0.471	0.448	0.044	0.996	0.989	-	0.594	0.912	0.896	0.040	-	0.044
Waste Rock, Au (g/t) compared to:																	
	Carb.	**S_{Tot}**	**AP**	**NPR**	**Ag**	**Al**	**As**	**Cd**	**Cu**	**Fe**	**Hg**	**Mg**	**Mo**	**P**	**Pb**	**Se**	**Zn**
r^2	0.01	0.10	0.10	0.05	0.00	0.00	0.01	0.01	0.01	0.00	-	0.05	0.00	0.02	0.05	0.00	0.06
r	-0.10	0.31	0.32	-0.22	0.06	-0.06	-0.12	-0.08	-0.12	-0.03	-	-0.22	-0.02	-0.14	-0.21	-0.03	-0.25
n	135	135	135	135	135	135	135	135	135	135	-	135	135	104	135	135	135
T stat	-1.19	3.80	3.86	-2.64	0.70	-0.69	-1.38	-0.91	-1.37	-0.32	-	-2.62	-0.17	-1.38	-2.52	-0.33	-2.96
DF	133.00	133.00	133.00	133.00	133.00	133.00	133.00	133.00	133.00	133.00	-	133.00	133.00	102.00	133.00	133.00	133.00
p value	0.237	0.0002	0.0002	0.009	0.484	0.490	0.170	0.366	0.174	0.752	-	0.010	0.862	0.172	0.013	0.745	0.004

Parameters with a significant correlation (p value < 0.05) to Au (g/t) are flagged with green fill.

" - " denotes all samples were at detection limit or parameter was not analyzed.

Carb. – Carbonate

S_{Tot} – Total Sulphur

AP – Acid Potential

NPR - Neutralization Potential Ratio

Ag – Silver, Al – Aluminum, As – Arsenic, Cd – Cadmium, Cu – Copper, Fe – Iron, Hg – Mercury, Mg – Magnesium, Mo – Molybdenum, P – Phosphorus, Pb – Lead, Se – Selenium, Zn - Zinc

RESPONSE TO IR(2)-19

IR 2 Reference#:	**IR(2)-19**
IR 1 Reference #:	IR-19a
EIS Reference:	Baseline Study Appendix 5 Attachment 5-B Section 3.1.1, 4.1.1, and 4.3.1 and Appendix A
Context and Rationale:	In IR19a, Marathon provided a detailed description of the source of construction materials to be used on the property, as well as an Acid Rock Drainage/Metals Leaching Management Plan. Testing of geological materials is required prior to their use for construction purposes on the site to confirm their suitability and low risk of developing acid rock drainage/metals leaching, and Marathon has initiated additional testing to address data gaps for some geological units. The preliminary Acid Rock Drainage/Metals Leaching Management Plan (Appendix IR-19A) provides a high-level approach to testing and management of geological materials during site operations. It is proposed that acid rock drainage will be determined using total sulphur and total carbon tested on blast hole chips, as surrogates for acid potential and neutralization potential, respectively. However, details were not provided in terms of the frequency of blast chip testing, nor confirmatory testing at an independent laboratory using more advanced geochemical testing methods including acid base accounting and short term leaching tests. Further, no description was provided of how the Acid Rock Drainage/Metals Leaching block model will be integrated into operational testing and segregation of mine rock, and potentially acid generating rock sequencing to ensure that the proposed encapsulation of potentially acid generating rock within the stockpile is feasible. It is understood that the Acid Rock Drainage/Metals Leaching Management Plan is a live document that will be refined as the project advances and new information becomes available. In the Appendix IR-19A section titled “Adaptive Management”, it is stated “For example, if a certain volume of PAG (potentially acid generating) waste rock cannot be accommodated within the waste rock stockpile at the Marathon pit at the end of operation, that volume could be stored within LGO (low grade ore) stockpile footprint or west of the LGO”. However, in IR-24c, Marathon stated, “The plan is that all low grade ore will be milled, however, if factors arise whereby the ore is not milled, any remaining low grade ore will be relocated to the open pit and flooded to avoid the need for water treatment after mine closure.” The approach to managing potentially acid generating waste rock at closure is not consistent with the plan for unmilled low-grade ore. Further, the suitability of the low grade ore stockpile footprint for long-term storage of potentially acid generating waste rock is not demonstrated.

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Information Request:	a. Provide an updated Acid Rock Drainage/Metal Leaching Management Plan that considers testing and results completed subsequent to Appendix 5 Attached 5-A and 5-B. Include a preliminary conceptual approach to sampling and testing of mine rock, and how Marathon intends to integrate this information in the acid rock drainage/metal leaching block model. b. Justify the long-term approach to managing potentially acid generating waste rock should it not be accommodated within the waste rock stockpile at Marathon, particularly why this material would not be backfilled in Marathon Pit. Provide details on the approach to managing this material within the low grade ore footprint or to the west of it at the end of mine life to limit acid rock drainage/metals leaching in post-closure.
Response:	a. Marathon is committed to completing the work necessary to address the Acid Rock Drainage / Metal Leaching (ARD/ML) testing gaps identified in the EIS program prior to mine development, as noted in the original Appendix IR-19.A (provided in response to Federal Information Requirements issued on February 10, 2021), which outlines the approach to ARD/ML management. The progress on these commitments is shown in italics in Appendix IR(2)-19.A, which includes the most recent results. When the test work is complete, Marathon will provide an ARD/ML Management Plan, as committed. Marathon is confident, based on the results of the testing and analysis conducted to date, and the conservative approach taken with respect to ARD/ML prediction and effects assessment, that employing the mitigation measures outlined in Appendix IR(2)-19.A will address the potential geochemical effects associated with planned Project components and activities. During construction and operation, sampling of cuttings from a reverse circulation (RC) drilling program used for mine planning will be collected from 5 m depth intervals of approximately 20 m deep to 40 m holes spaced 25 m by 25 m. These samples will be tested at the on-site laboratory for sulphur, inorganic carbon, and trace elements. A split of one in every ten samples will be analyzed at an external laboratory for standard static tests (ABA [acid-base accounting], SFE [Shake Flask Extraction] and trace elements). The split sampling frequency may change depending on the results compared with the on-site test results (reconciliation). This additional data will be integrated with the ARD block model to improve the accuracy (quantity and delineation) of PAG (potentially acid generating) and non-PAG rock 3 to 4 months ahead of mining. As mining progresses, samples will also be collected from blast

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	hole cuttings for testing to reconcile the data within the ARD block model. The ARD block model will be integrated with the mine block model to forecast the ARD potential for mine rock within the pit, and plan for ARD management at the waste rock stockpile (planning and creation of areas for encapsulation, etc.). ARD data will be incorporated in the mine block model to support planning of mining block size, drill hole patterns, and tracking of materials during excavation, such that PAG materials can be managed. The final ARD/ML data collected from the blast holes will confirm the rock handling plan for that specific mining block and will be used within the ARD and mining block models to better understand and predict the requirements for ARD/ML management as mining progresses. b. It is acknowledged that the statement in the Adaptive Management section of Appendix IR-19.A is not clearly defined or demonstrated, noting that this was only intended to be a high-level example of something that could be considered <u>if</u> determined to be a suitable adaptive management approach in the event planned mitigations are found to be unsuitable. As previously noted, the planned mitigation for PAG waste rock will be to properly encapsulate/blend these materials within the waste rock pile to prevent acid generation long-term. If in the later years of operation, mined PAG waste cannot be properly encapsulated/blended within the waste rock pile, the excess of PAG material will be stockpiled separately (with drainage management) and moved back to the pit for closure. In the event this scenario develops, the most likely option for the temporary storage of the PAG waste rock (that cannot be properly encapsulated/blended) is at a designated location on the waste rock pile. Secondary options for temporary storage, expected to be only two to three years (maximum), may include material stockpile areas that are no longer required (e.g., if sufficient low-grade ore has been processed to create space on the pad) or expansion of an existing stockpile area specifically for this purpose, noting waste rock generated in the later years of mining operations are significantly lower. Regardless of where the PAG waste rock is temporarily stored, the preferred closure option is to return the waste to the pit to be permanently submerged. Alternative closure scenarios may be considered (such as engineered covers) as the final closure plan is reviewed (internally and by regulators) prior to closure.
Appendix:	Appendix IR(2)-19.A ARD/ML Management Approach

RESPONSE TO IR(2)-21

IR 2 Reference#:	**IR(2)-21**
IR 1 Reference #:	IR-21
EIS Reference:	Baseline Study Appendix 5 Attachment 5-B Section 3.1.2, 3.2.2,3.2.3, 4.0, 5.0Chapter 7 Appendix 7A and 7B
Context and Rationale:	a. It is agreed that the composite samples presented in Tables IR-21.1 to IR-21.4 sufficiently represent the average chemical composition of each lithology, assuming that the sample population for each lithology that was used to generate the sample composites captures the chemical variability of the unit as a whole across the deposit. Per IR-21b, new samples were collected for static testing and humidity cell tests are underway on potentially acid generating samples. To allow for a complete understanding of the updated geochemistry testing program, and to address concerns on the reactivity of potentially acid generating material, this information should be provided. b. The results for the two carbonate-depleted samples in Appendix IR-21.A were provided, and were not included in BSA-5. However, the sample pre-treatment method to deplete carbonate minerals was not provided. Depending on the method used, this can influence the initial results, as reagents are flushed from the sample material (Herrell *et al.,* 2008)[1]. Since test weeks 1-4 were used by the proponent for various calculations, this should be evaluated. c. A conservative estimate of the lag time until potentially acid generating material could generate acid rock drainage is critical for mine waste and water management planning. Standard practice is to calculate the lag time from laboratory kinetic test results on potentially acid generating samples by applying various assumptions; this approach is theoretical and does not consider the increasing rate of acid production once acid rock drainage has commenced. It is agreed, that, based on non-potentially acid generating kinetic test samples available at the time of reporting in BSA-5, the proponent has applied a reasonably conservative approach to estimate the lag time for low-grade ore, as detailed in Appendix IR- 21B. Discussion is provided comparing laboratory and field depletion rates and field bin depletion estimates are provided in Table 1 of Appendix IR-21B; however, field bin test methods and results have not been provided to date. Calculations should be updated when kinetic test data is available from potentially acid generating samples described in IR-23. Consideration should be given to the results reported by Sexsmith et al. (2015)2: when comparing calculated and observed lag times for 30 potentially acid

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	generating kinetic test samples, it was noted that actual lag times are shorter than calculated times for the same sample. d. It is agreed that the proponent's approach to develop surrogate metal leaching rates for potentially acid generating materials, in lieu of metal loading rates from acidic kinetic test leachate, is adequate. However, the inflation factors, which were calculated using weeks 1-4 of the low-grade ore standard and carbonate-depleted humidity cells, cannot be replicated. Additionally, as discussed in IR(2)-21b, the reagent used to pre-treat the sample was documented to influence initial test results, resulting in lower initial metal loading rates in one case study (Herrell et al., 2008). The authors recommend calculating loading rates using later test weeks to flush residual reagents and deplete any remaining neutralization potential (Herrell et al., 2008). The rationale for using weeks 1-4 was not provided, considering metal loading rates in the carbonate-depleted test are up to two orders of magnitude higher after week 10 compared with week 1-4 for the standard humidity cell, which are the maximum observed concentrations throughout the duration of testing. Justification for this approach is required if the loading rates will not be replaced with results from the current test program on potentially acid generating samples (IR-23), should acidic leachate be realized in these samples.
Information Request:	a. Provide updated versions of Tables IR-21.1 to IR-21.4 that include the new kinetic testing samples, with lithology statistics including all new samples collected to date in 2021. Include above median percentiles to facilitate evaluation of the conservativeness of the potentially acid generating samples. Note that these tables are also requested in IR-23. b. Provide a summary of the method used to deplete carbonate minerals from both carbonate-depleted humidity cell samples, and how this may have influenced the initial test results. c. Provide a summary of the methods and results to date for all field bin tests. Additionally, provide updated estimates of lag times for the generation of acid rock drainage based on the test work described in IR- 23, and a discussion of how this may affect mine waste management planning and assumptions in the water quality model. d. Provide justification for using weeks 1-4 to develop the inflation factors and to calculate the metal loads from potentially acid generating materials for the water quality model. If acidic leachate has been achieved in the new humidity cell tests, develop new loading rates for potentially acid generating material. Otherwise, provide updated inflation rates using the longer-term concentrations from the carbonate-depleted humidity cell. In either case, provide results from sensitivity analyses using these new rates for potentially acid generating material.

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Response:	a. Marathon has collected an additional 246 samples from the Marathon pit and 85 samples from the Leprechaun pit for static tests (ABA [acid-base accounting], SFE [Shake Flask Extraction] and trace element). The sample locations are shown on the geological cross sections included in the response to IR(2)-18 (Appendix IR(2)-18.A). Static testing has been completed on 29 samples of ore and low-grade ore (LGO), and the results provided in Appendix IR(2)-19.A. As described in the response to IR(2)-18, delays have been incurred during collection of the additional samples and in the laboratory turn-around-times, and as a result, the remaining test work is not available for inclusion in this response. When results from all additional static tests become available, Marathon will select samples for kinetic tests and update Tables IR-21.1 to IR-21.4, which will be considered in the Acid Rock Drainage / Metal Leaching (ARD/ML) Management Plan. b. The carbonate depletion of samples was conducted using sodium acetate solution buffered with acetic acid at a pH of approximately 4.5 and allowing the reaction to occur for approximately a month with periodic agitation/mixing. The material was sampled periodicity and tested for total inorganic carbon (TIC) by pyrolysis to verify completion of carbonate dissolution. The depletion was continued until TIC became undetectable (below 0.025 wt%). However, a carbonate Neutralization Potential (NP) of 1.5 $CaCO_3$ kg/t was detected by an evolution test done before the humidity cell test (HCT) started. This residual carbonate NP is unlikely present in the form of Ca-Mg carbonates based on the pH of HCT leachate being below 6 during the first month, but siderite could buffer pH at that time. Presence of acetate, a carbonate depleting reagent, could also cause complexation of acetate with metals resulting in higher apparent metal solubility compared to actual expected conditions (i.e., no acetate). Because of the potential additional metal solubility in the presence of acetate, there is additional conservatism in the laboratory results. Sodium concentrations from the addition of the sodium acetate in the first month of the test were lower relative to the end of the test, indicating low influence of this reagent on the results. c. The field bin tests consist of 45-gallon plastic barrels containing known masses of composite samples. Rainwater/snowmelt percolates through the solids and drains into a leachate collection container. The leachate samples are collected by Marathon staff on a monthly basis (or more often when containers filled) during the snow-free period. Leachates are subject to field measurement of volume, temperature, pH, and conductivity at the time of sample collection. Marathon ships the leachate samples in coolers with ice to Bureau Veritas Laboratory, St. John's, Newfoundland. The leachates are analysed by the

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	laboratory for pH, total dissolved solids (TDS), alkalinity, sulphate, fluoride and dissolved metals. Concentrations of parameters below the corresponding laboratory detection limits are set at the value of the detection limit for leaching rate and statistical calculations. Based on the results of the laboratory and field measurements, leaching rates (L) are calculated using the following formula: L (mg/kg/week) = C (mg/L) x V (mL) / (m (kg) x 1000 x t(weeks)), where C – concentration of a parameter (mg/L), V – volume (mL) of a leachate, m – mass (kg) of a sample susceptible to leaching, and t – time-period (weeks) between leachate sampling. Concentration statistics for each test are summarized in Table IR(2)-21.1. The estimates of lag times for the generation of acid rock drainage for field bins are provided in Table IR(2)-21.2. These time lags are longer than the respective estimates previously provided, which would improve water quality predictions if applied in the water quality model. Thus, this new information indicates that the approach proposed for ARD management is based on water quality model results that are conservative. d. The inflation factors were developed using weeks 1-4 data based on results available at the time for the water quality predictions presented in the EIS. There are no new tests that result in generation of acidic leachate and therefore a carbonate depleted LGO sample is still considered the best surrogate for estimation of leaching rates under acidic conditions. It is acknowledged that metal leaching rates in this test increased with time. However, development of acidic conditions in the waste rock stockpile are not expected because Marathon will be managing deposition of potentially acid generating (PAG) rock specifically to eliminate ARD as discussed on pages 5 and 6 of Appendix IR(2)-19.A. As described in the original response to IR-21.A, acidic drainage from LGO is unlikely to occur. Although acidic conditions are not expected, the EIS water quality model conservatively uses inflated metal leaching rates to account for development of ARD in 14% of waste rock and 50% of ore when ARD onset time occurs. Based on NRCan's response provided in the context/rationale, it is Marathon's understanding that NRCan agrees with this conservative approach. The original IR-21 requested that Marathon complete sensitivity analysis on ARD onset time; this was completed, making water quality

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	predictions more conservative and resulting in an increase in metal concentrations as reported in Appendix IR-19.A (provided in response to Federal Information Requirements issued on February 10, 2021). IR(2)-21 requests additional sensitivity analysis using updated inflation rates, which would result in water quality predictions that are even more conservative. The requested sensitivity runs are likely to produce unrealistically high (i.e., overly conservative) concentrations compared to base case, which is used for engineering of mitigations, and the analysis provided in response to the original IR-21 is considered sufficient for the purposes of the environmental assessment process. Marathon will update the water quality model, including the requested sensitivity analysis, upon completion of the ARD block model for Marathon pit and analysis of the first full year of field bin testing.
Appendix:	None

Table IR(2)-21.1 Summary of Leachate Chemistries from Field Bin Tests

Material	Parameter	pH	F	SO_4	Hg†	Ag	Al	As	B	Cd	Cr	Cu	Fe	Mn	Mo	Ni	P	Pb	Se	Tl	U	Zn
	Unit	pH Unit	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	MDMER	6.0-9.5	n/v	n/v	n/v	n/v	n/v	100	n/v	n/v	n/v	100	n/v	n/v	n/v	250	n/v	80	n/v	n/v	n/v	400
	CWQG	6.5-9.0	120	n/v	0.026	0.25	5/100	5	1500	0.05	8.9	2	300	100	73	25	Guidance Framework	1	1	0.8	15	1.74
Waste Rock	**M QE-POR**																					
	Min	7.7	0.027	71	0.0065	0.05	29	0.49	5.9	0.005	0.5	0.25	25	13	1.0	0.043	50	0.25	0.052	0.05	0.39	0.91
	Max	7.9	0.050	390	0.0065	0.05	78	0.66	25	0.005	0.5	1.8	25	57	6.5	1.0	50	0.25	0.25	0.05	2.7	**2.5**
	Average	7.9	0.043	160	0.0065	0.05	60	0.53	23	0.005	0.5	0.87	25	30	2.9	0.65	50	0.25	0.18	0.05	1.0	**2.1**
	M AQPOR																					
	Min	7.8	0.011	1.0	0.0065	0.05	43	0.25	25	0.005	0.5	0.25	1.0	2	0.3	0.026	50	0.25	0.046	0.05	0.17	0.65
	Max	8.2	0.050	10	0.0065	0.05	**110**	0.50	25	0.005	0.5	0.74	25	58	2.6	1	50	0.25	0.25	0.05	0.98	**2.5**
	Average	8.0	0.039	7	0.0065	0.05	75	0.43	25	0.005	0.5	0.47	19	30	1.1	0.76	50	0.25	0.20	0.05	0.41	**2.0**
	M QZ-QE-POR-QTP-MIN																					
	Min	7.8	0.013	1.0	0.0065	0.05	63	0.22	25	0.005	0.5	0.25	2	5	0.1	0.032	50	0.25	0.053	0.05	0.05	0.69
	Max	8.3	0.050	10	0.0065	0.05	**160**	0.50	25	0.005	0.5	1.2	25	58	1.0	1.0	50	0.25	0.25	0.05	0.75	**2.5**
	Average	8.0	0.042	5	0.0065	0.05	100	0.43	25	0.005	0.5	0.58	22	29	0.7	0.88	50	0.25	0.23	0.05	0.25	**1.9**
	M+L SED																					
	Min	7.8	0.020	1.0	0.0065	0.05	53	0.50	25	0.005	0.5	0.68	2	7	0.2	0.028	50	0.01	0.045	0.05	0.75	0.96
	Max	8.4	0.050	5	0.0065	0.05	**130**	1.5	25	0.005	0.5	1.5	25	63	2.1	1.0	50	0.25	0.25	0.05	4.7	**2.5**
	Average	8.0	0.040	2	0.0065	0.05	83	0.78	25	0.005	0.5	0.98	19	35	0.9	0.64	50	0.22	0.18	0.05	2	**2.0**
	M+L MD																					
	Min	7.8	0.011	0.26	0.0065	0.05	79	0.13	25	0.005	0.5	0.25	25	33	0.1	0.024	50	0.02	0.053	0.00	0.05	1.00
	Max	8.0	0.050	6	0.0065	0.05	**130**	0.50	25	0.005	0.5	0.90	25	57	1.0	1.0	50	0.25	0.25	0.05	0.65	**2.5**
	Average	7.9	0.038	2	0.0065	0.05	99	0.39	25	0.005	0.5	0.65	25	45	0.7	0.64	50	0.22	0.18	0.04	0.18	**2.1**
	L TRJ																					
	Min	7.9	0.017	1.0	0.0065	0.05	77	0.37	25	0.005	0.5	0.25	1.4	10	0.1	0.038	50	0.01	0.063	0.05	0.33	0.77
	Max	8.2	0.050	8	0.0065	0.05	**250**	1.1	25	0.005	0.5	1.3	25	46	1.0	1.0	50	0.25	0.25	0.05	2.5	**2.5**
	Average	8.0	0.042	5	0.0065	0.05	**130**	0.55	25	0.005	0.5	0.82	19	24	0.7	0.65	50	0.16	0.23	0.05	0.85	**2.0**
	L QZ-TQTP+QZ-QTP																					
	Min	7.2	0.010	1.0	0.0065	0.05	72	0.26	25	0.005	0.5	0.25	1.1	6	0.1	0.020	50	0.01	0.043	0.05	0.12	0.79
	Max	8.2	0.050	6	0.0065	0.05	**150**	0.63	25	0.005	0.5	1.1	25	58	1.0	1.0	50	0.25	0.25	0.05	1.2	**2.5**
	Average	7.9	0.041	3	0.0065	0.05	**110**	0.46	25	0.005	0.5	0.64	19	37	0.9	0.64	50	0.16	0.20	0.05	0.37	**2.0**

Table IR(2)-21.1 Summary of Leachate Chemistries from Field Bin Tests

Material	Parameter	pH	F	SO_4	Hg†	Ag	Al	As	B	Cd	Cr	Cu	Fe	Mn	Mo	Ni	P	Pb	Se	Tl	U	Zn
	Unit	pH Unit	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	MDMER	6.0-9.5	n/v	n/v	n/v	n/v	n/v	100	n/v	n/v	n/v	100	n/v	n/v	n/v	250	n/v	80	n/v	n/v	n/v	400
	CWQG	6.5-9.0	120	n/v	0.026	0.25	5/100	5	1500	0.05	8.9	2	300	100	73	25	Guidance Framework	1	1	0.8	15	1.74
Low-Grade Ore	**Mar HL (M + LGO)***																					
	Min	7.9	0.028	4	0.0065	0.05	56	0.50	7.9	0.005	0.5	0.25	2	21	2.4	0.028	50	0.01	0.083	0.00	0.26	1.20
	Max	8.2	0.120	84	0.0065	0.05	**140**	1.6	25	0.007	0.5	1.1	25	39	20	1.0	50	0.25	**1.3**	0.05	1.8	**2.5**
	Average	8.0	0.054	19	0.0065	0.05	99	1.1	19	0.005	0.5	0.58	22	30	7.6	0.76	50	0.16	0.33	0.04	0.98	**2.1**
	Lep HL (L + LGO)*																					
	Min	7.6	0.024	1.0	0.0065	0.05	57	0.47	10	0.005	0.1	0.25	1.4	13	0.5	0.021	50	0.01	0.24	0.05	1.80	0.78
	Max	8.4	0.120	38	0.0065	0.05	**170**	0.88	25	0.005	0.5	1.3	25	27	4.4	1.0	50	0.25	**1.3**	0.05	4.7	**2.5**
	Average	8.0	0.051	13	0.0065	0.05	**110**	0.57	20	0.005	0.5	0.46	22	23	1.3	0.76	50	0.16	0.4	0.05	3	**1.9**

Notes:
MDMER - *Metal and Diamond Mining Effluent Regulations* (Canada), Table 1 of Schedule 4, Maximum Authorized Monthly Mean Concentrations (SOR/2002-222 2020).
CWQG - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life, long-term (CWQG-FAL referred to as CWQG) by Canadian Council of Ministers of the Environment (CCME 2020).
Concentrations exceeding CWQG are bold and MDMER are highlighted orange and double underlined.
For the values less than Reportable Detection Limit (RDLs) values, 1/2 of RDLs are used to calculate statistical parameters.
All metal parameters are dissolved unless otherwise indicated.
* metallurgical composite.
† total metals

Table IR(2)-21.2 Estimates of Rates and NP Depletion Time in Kinetic Test

Parameter	Unit	Leprechaun Composite Samples						Marathon Composite Samples					
		Laboratory Humidity Cells						Laboratory Humidity Cells					
		L TRJ	L QZ-TQTP	L SED	L MD	L QZ-QTP	LLGO - Met	M QE-POR	M AQPOR	M CG	M MD	M QZ-QE-POR-QTP-MIN	MLGO - Met
S_{TOTAL}	wt.%	0.08	0.11	0.003	0.13	0.048	0.27	0.083	0.33	0.003	0.27	0.38	0.59
Carb. NP	kg $CaCO_3$/t	48.3	44.7	9.2	97.3	51.6	61.3	62.5	48.6	87.3	88.7	22.7	28.9
AP	kg $CaCO_3$/t	0.94	1.9	0.62	2.19	0.62	7.19	1.56	7.50	0.62	5.94	8.75	18.8
Carb. NPR	unitless	51	24	15	44	83	8.5	40	6.5	141	15	2.6	1.5
Max Sulphate Rate	mg/kg/week	1.17	2.9	0.70	1.38	1.06	8.3	1.8	4.6	0.51	46.7	1.15	10.5
Max Alkalinity Rate	mg $CaCO_3$/kg/week	16	22	11.9	22	12	60	13	12	20	11	12	77
NP Depletion Rate	mg $CaCO_3$/kg/week	17	25	13	23	13	69	15	17	21	59	14	88
NP Depletion Time	year	55	34	14	81	78	17	79	55	80	29	32	6.3
		Field Bin Tests											
		L TRJ	*L QZ-TQTP + QZ-QTP*	*M+L SED*	*M+L MD*	L QZ-QTP	LLGO - Met	M QE-POR	M AQPOR	M CG	M MD	M QZ-QE-POR-QTP-MIN	MLGO - Met
Test mass	kg	30	18	36	31	-	95	79	30	-	-	18.6	95
S_{TOTAL}	wt.%	0.08	0.10	0.003	0.22	-	0.27	0.083	0.33	-	-	0.38	0.59
Carb. NP	kg $CaCO_3$/t	48.3	45.6	45.1	91.7	-	61.3	62.5	48.6	-	-	22.7	28.9
AP	kg $CaCO_3$/t	0.94	1.7	0.62	4.6	-	7.19	1.56	7.50	-	-	8.75	18.8
Carb. NPR	kg $CaCO_3$/t	51	27	73	20	-	8.5	40	6.5	-	-	2.6	1.5
Sulphate Rate	mg/kg/week	0.30	0.33	0.10	0.77	-	0.23	3.9	0.45	-	-	0.60	0.45
Alkalinity Rate	mg $CaCO_3$/kg/week	3.9	5.1	2.8	2.6	-	1.3	1.4	3.4	-	-	5.0	1.0
NP Depletion Rate	mg $CaCO_3$/kg/week	4.2	5.4	2.9	3.4	-	1.6	5.5	3.9	-	-	5.7	1.4
NP Depletion Time	year	221	160	296	513	-	740	218	239	-	-	77	391

Notes:
NP Depletion Rate = Sulphate Rate*100.09/96.06 + Alkalinity Rate
NP Depletion Time = (Carb. NP/NP Depletion Rate) x 1000/(365.25/7); Maximum rates were used for calculations for humidity cells
Samples of field bins shown in italics (e.g., M+L SED) are mixture of two composite used for humidity cells with similar lithologies (L SED and M CG).

RESPONSE TO IR(2)-23

IR 2 Reference#:	**IR(2)-23**
IR 1 Reference #:	IR-23
EIS Reference:	Baseline Study Appendix 5 Attachment 5-A and 5- B Section 2.0 Project Description Chapter 7 Appendix 7A and 7B
Context and Rationale:	a. It is acknowledged that Marathon is committed to addressing data gaps in the baseline geochemistry program. These data gaps impart uncertainty to the calculated loading rates, timing to onset of Acid Rock Drainage, and mine waste management assumptions used in the water quality predictions (Chapter 7 of the EIS), and thus reduce the certainty of conclusions regarding mine impacts to the receiving environment and sufficiency of proposed mitigation measures. As indicated by Marathon, new test results will contribute to the refinement of the Acid Rock Drainage/Metals Leaching Management Plan, which will be shared with NRCan in future. However, the response to IR-23a is insufficiently detailed in terms of sample selection to confirm that all data gaps have been addressed. It is anticipated that the provision of additional information, including test data available to date, would facilitate a more efficient review process to ensure the testing plan is sufficiently robust to support the project design moving forward, especially in consideration of the long lead time required to complete geochemical sampling and testing programs. b. In Table IR-23.1, the pit wall exposure for the gabbro unit is 0 m2 in the first two years, which suggests that this unit will not be mined in the first two years. As indicated in Appendix IR-19.A, potentially acid generating waste rock will not be used for construction purposes. Depending on the volumetric requirements and timing of construction rock needs, it appears that the gabbro unit, which may have potential to generate acid rock drainage based on test results in BSA-5 of the EIS, may not be mined early in the mine life, and thus not at a time of demand for construction materials.
Information Request:	a. Provide the following information: • Updated Tables B-1 and B-2 from BSA-5 of the EIS, including all new composite and kinetic test samples. • Re-issue Tables IR21.1 to IR21.4, adding the new kinetic test samples referred to in IR-23a, with updated statistics per rock type based on all static testing to date, including samples collected and tested as indicated in Tables IR-18.2 and IR-18.3). Note that these tables are also requested in IR-21.

IR 2 Reference#:	IR(2)-23
	• Ensure that the gabbro composite was generated by using the four samples reported in BSA-5 of the EIS, or use samples collected in 2021. • Ensure that the new kinetic test samples will be tested for ABA, SFE and trace metals, in addition to net acid generating, mineralogy, and particle size distribution as indicated. • Ensure that net-acid generating leachate will be analyzed to provide additional data to support the development of acidic loading rates, as discussed in IR(2)-21d. • Ensure that the static and kinetic test results for the new samples will be provided prior to an update to the ARD/ML Management Plan during the permitting stage (IR-24a), and re-issue Appendix IR-20.A including preliminary data available to date for the new kinetic tests underway, as well as updated results for continued tests. b. Indicate that based on mine sequencing, the timing of excavation of the gabbro unit will coincide with demand for construction rock. c. Update the results of the sensitivity analysis per IR(2)-21.d.
Response:	a. Marathon is committed to gathering the requested information and is currently progressing on additional testing per NRCan's recommendations (see responses to IR(2)-18, part a) and IR(2)-19, part a)). This information will be used in development of the Acid Rock Drainage (ARD) block model and updates to the water quality model to develop the Acid Rock Drainage/Metal Leaching (ARD/ML) Management Plan, which will be completed for the permitting under the Newfoundland and Labrador (NL) *Mining Act* (NL Department of Industry, Energy, and Technology) and will be shared with NRCan as it becomes available. Overall progress on the requested information is presented in Appendix IR(2)-19.A, with specific responses provided in bullet points below. • Marathon's progress on additional static testing is discussed in the response to IR(2)-21, part a). New samples for kinetic tests will be selected/composed and characterized once static testing is complete. At that time, Marathon will update Tables B-1 and B-2 from Baseline Study Appendix (BSA) 5 of the EIS and Tables IR-21.1 to IR-21.4 (provided in response to Federal Information Requirements issued on February 10, 2021), adding the new kinetic test samples with updated statistics per rock type based on all static testing. • Marathon will generate gabbro composites from samples collected in 2021. Samples of gabbro collected previously (i.e., from the 2017

IR 2 Reference#:	IR(2)-23
	testing program) are no longer available and therefore cannot be used for kinetic testing. • Marathon commits to analyze new kinetic test samples for ABA (acid-base accounting), SFE (Shake Flask Extraction) and trace metals, net acid generating test, mineralogy, and particle size distribution. The leachates from net-acid generating testing will be analyzed for metals and sulfate. • Marathon will provide static and kinetic test results for the new samples prior to development of the Acid Rock Drainage / Metal Leaching (ARD/ML) Management Plan during the permitting stage and update Appendix IR-20.A (provided in response to Federal Information Requirements issued on February 10, 2021). Partial static test results are attached to Appendix IR(2)-19.A (Attachment 3). b. Marathon will not use the gabbro unit as construction rock; this commitment is supported by the pit development schedule, as the gabbro unit will not be mined in the pre-production period (Table IR(2)-23.1). Non-potentially acid generating (non-PAG) metasedimentary rock, excavated from the south end of each pit, will be used for construction. All samples of metasedimentary rock with lithoscodes CG and SED were non-PAG based on Neutralization Potential Ratio (NPR) values being above 2 in both deposits (Tables B-4 and B-16 of Baseline Study Appendix (BSA) 5 of the EIS). The sampling and testing of construction rock will be similar to that described in the second paragraph of the response to IR(2)-19, part a). c. Marathon will update the water quality model upon completion of the additional static tests and analysis of the first full year of field bin testing (started in Sept 2020). The requested sensitivity analysis is discussed in detail in the response to IR(2)-21, part d).
Appendix:	None

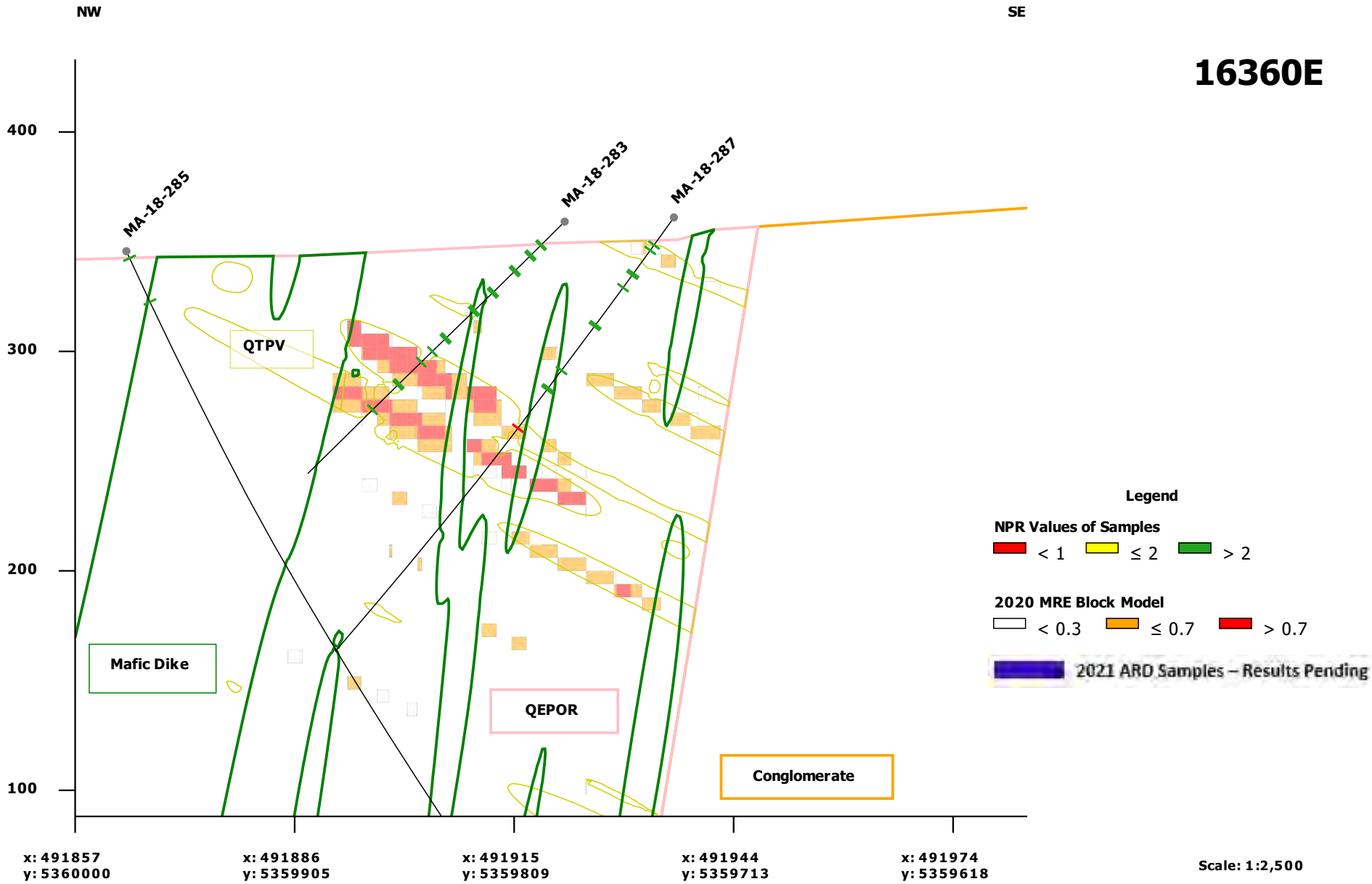
Table IR(2)-23.1 Mine Schedule per Lithology

Selective Mined:	Year	LOM	PP (to Q2 23)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Marathon Sediment Waste	ktonnes	33,347	1,344	1,132	727	3,096	591	5,681	6,523	8,880	5,480	1,228	10	0	0	0	0	0	0	0
Marathon Gabbro Waste	ktonnes	8,301	0	0	0	148	286	29	3,946	3,433	458	0	0	0	0	0	0	0	0	0
Marathon OVB Waste	ktonnes	7,637	2,600	972	2,292	1,529	0	2,338	505	0	0	0	0	0	0	0	0	0	0	0
Marathon QEPOR Waste	ktonnes	128,968	1,080	91	2,697	15,428	16,608	16,372	12,183	15,746	19,542	18,104	7,411	3,517	1,269	0	0	0	0	0
Marathon QEPOR Ore	ktonnes	36,885	299	0	818	4,661	5,393	4,535	3,962	1,587	2,279	4,111	3,810	3,235	2,495	0	0	0	0	0
Leprechaun Sediment Waste	ktonnes	40,344	1,565	1,393	1,227	5,204	10,016	9,686	6,899	3,106	1,161	1,289	323	38	0	0	0	0	0	0
Leprechaun Trondhjemite Waste	ktonnes	105,906	1,551	472	4,150	11,506	12,175	17,856	18,386	16,836	11,876	8,614	3,211	825	0	0	0	0	0	0
Leprechaun Overburden Waste	ktonnes	4,197	1,685	1,124	649	1,157	140	1,128	0	0	0	0	0	0	0	0	0	0	0	0
Leprechaun Sediment Ore	ktonnes	442	0	0	10	119	69	11	74	9	93	52	6	0	0	0	0	0	0	0
Leprechaun Trondhjemite Ore	ktonnes	20,844	336	77	1,054	3,795	1,570	1,222	2,838	2,033	1,926	2,679	2,259	1,391	0	0	0	0	0	0
Total Mined	ktonnes	386,871	10,461	5,261	13,623	46,644	46,847	58,858	55,316	51,630	42,816	36,076	17,029	9,007	3,764	0	0	0	0	0

RESPONSE TO IR(2)-26

IR 2 Reference#:	**IR(2)-26**
IR 1 Reference #:	IR-26
EIS Reference:	Chapter 7 and Baseline hydrology and surface water quality monitoring program (Appendix D Local water quality tables)
Context and Rationale:	Per Table IR-24.3, mean and 95th percentile cadmium, iron, nickel, and zinc concentrations increased by more than a factor of 1.0 compared with the EIS model predictions. Table IR-24.2, which is supposed to present results of the sensitivity analysis, appears to be a repeat of Table IR-24.1, which is the original EIS predictions. Therefore, it is not possible to ascertain how close the predicted concentrations are to the Metal and Diamond Mining Effluent Regulations limits. Increases to metal loading rates discussed in IR(2)-21.d for potential acid generating low-grade ore could result in predicted concentrations above the Metal and Diamond Mining Effluent Regulations limits. If so, it would be critical to understand the threshold proportion of potential acid generating low-grade ore in the low grade ore stockpile to ensure this threshold is not exceeded over mine life.
Information Request:	Update the results of the sensitivity analysis per IR(2)-21.d and if applicable, determine the threshold proportion of potential acid generation low-grade ore in the stockpile required to maintain water quality predictions below the potential acid generating limits.
Response:	Table IR-24.2 (provided in response to Federal Information Requirements issued on February 10, 2021) presents results of the sensitivity analysis that are different from Table IR-24.1, which shows the original EIS predictions. Concentrations of cadmium, iron, nickel, and zinc listed in Table IR-24.2 (sensitivity results) are higher than values in Table IR-24.1 (i.e., the original EIS predictions), which is consistent with the increase of more than a factor of 1.0 between these tables. For example, 95th percentile concentration for nickel is 10 ug/l in Table IR-24.1, while the corresponding concentration is 48 ug/l in Table IR-24.2. The results are correct, and no updates of tables are needed. The proportion of potentially acid generating (PAG) low-grade ore (LGO) in the stockpile should not exceed 87% in a moving average in a 2.8-year period, which is the minimum acid rock drainage (ARD) onset time for LGO. This threshold is based on rates of acidity and alkalinity discussed in the section “pH and LGO seepage” and the ARD onset time shown in Table 2 of Appendix IR-21.B (provided in response to Federal Information Requirements issued on February 10, 2021).
Appendix:	None

APPENDIX IR(2)-18.A UPDATED CROSS-SECTIONS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SE
16360E
400
300
200
100
MA-18-285
MA-18-283
MA-18-287
QTPV
Mafic Dike
QEPOR
Conglomerate
x: 491857
y: 5360000
x: 491886
y: 5359905
x: 491915
y: 5359809
x: 491944
y: 5359713
x: 491974
y: 5359618
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
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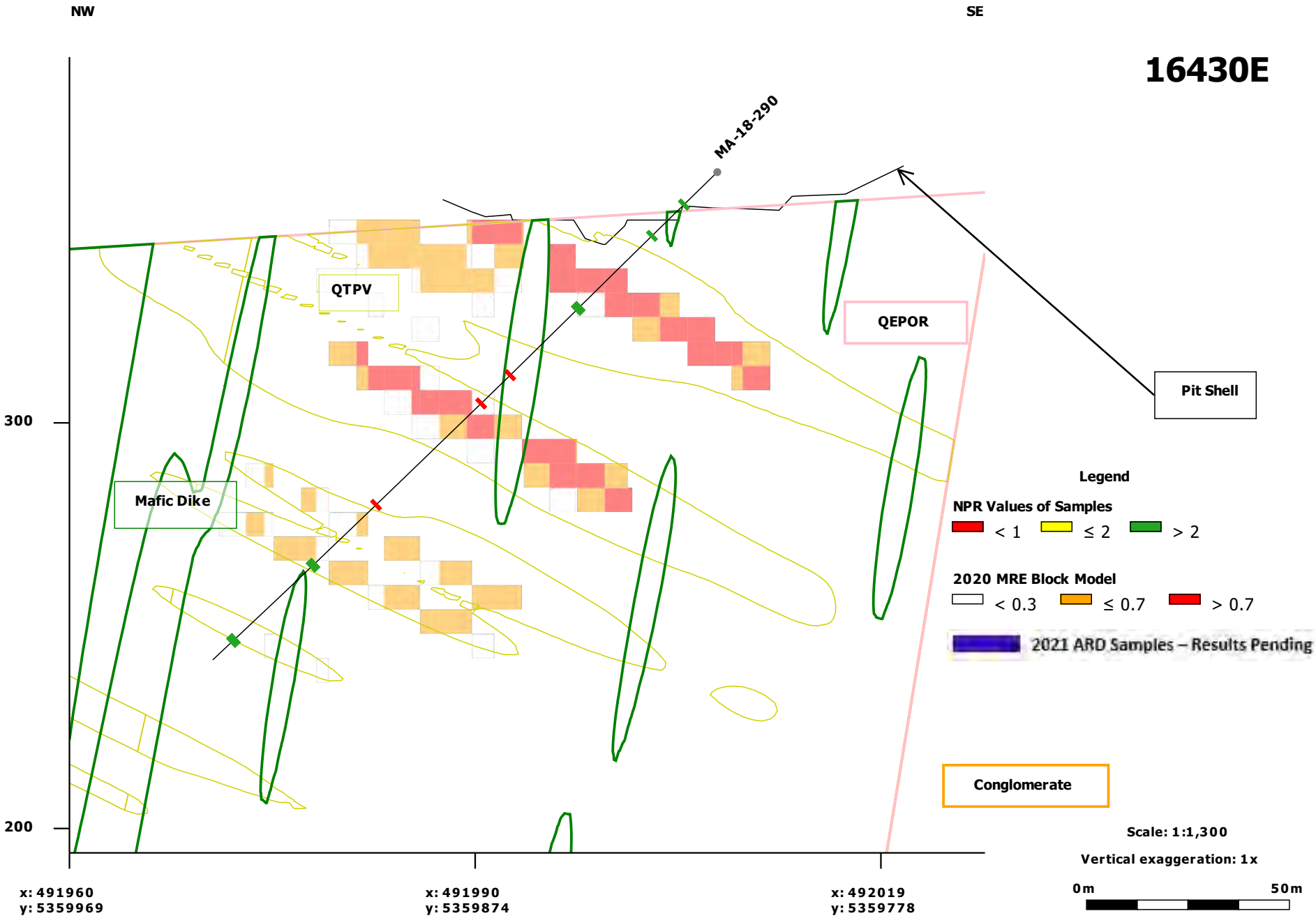
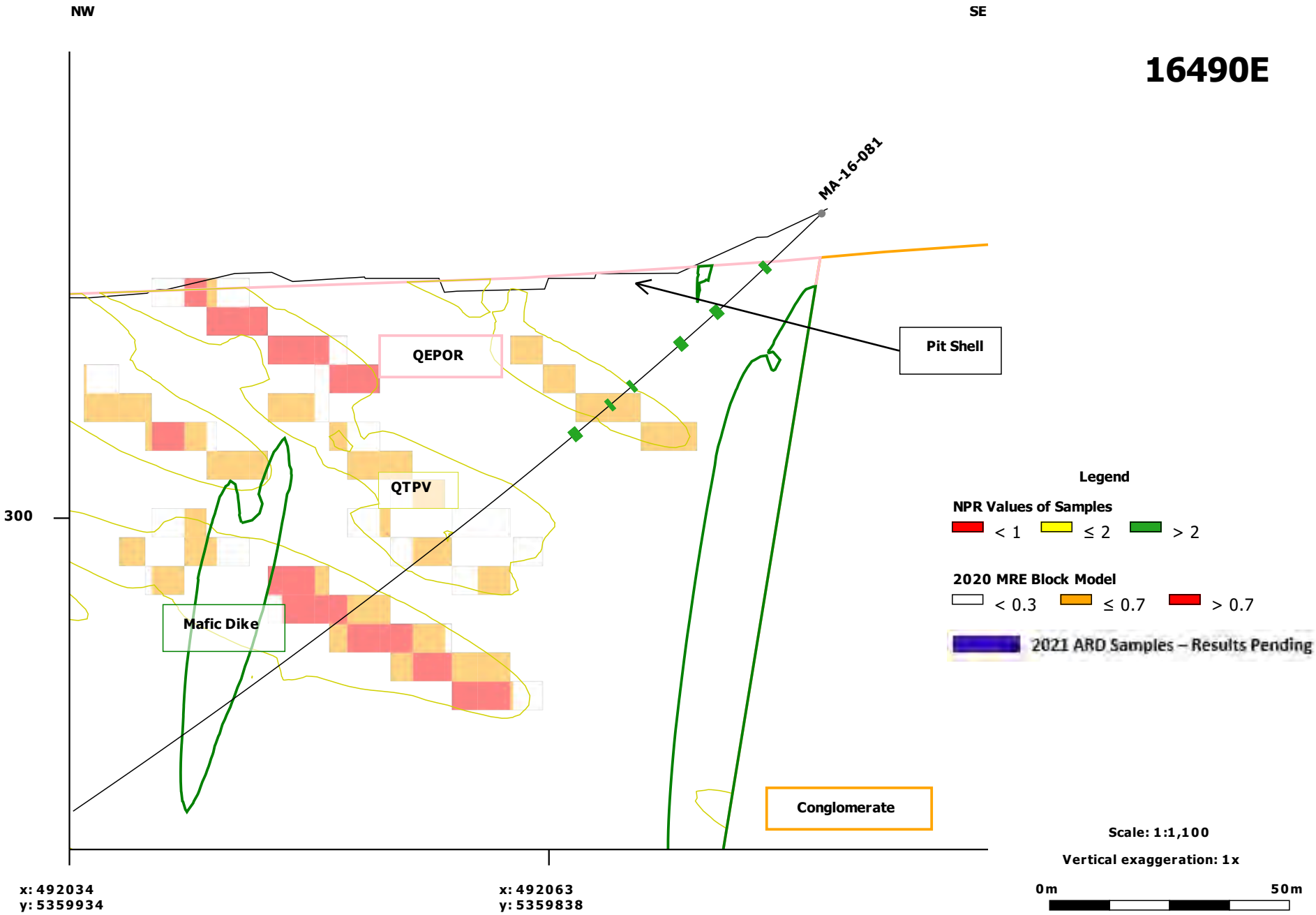
SE: 491984, 5359586

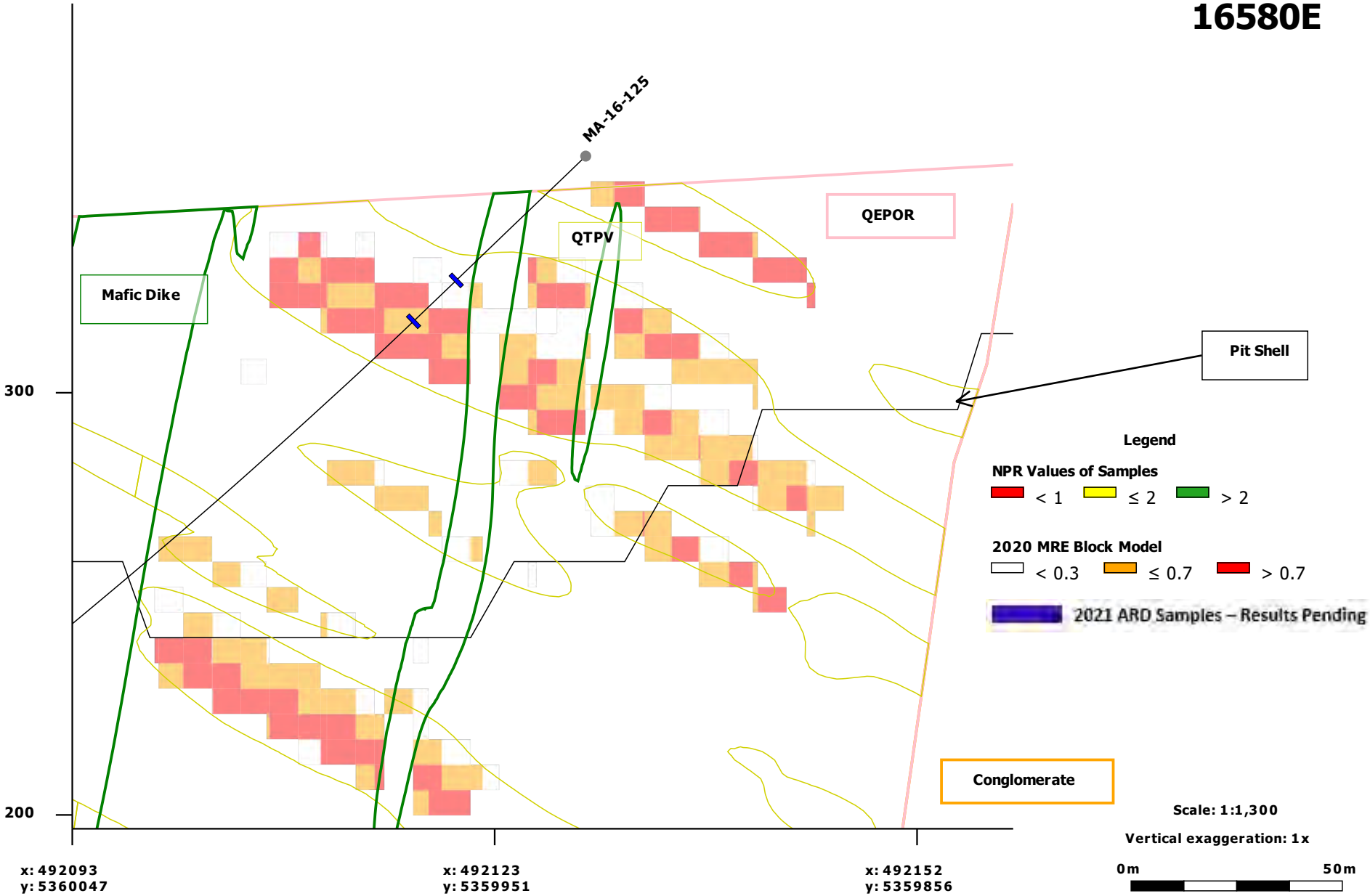

NW
SE
16430E
MA-18-290
QTPV
QEPOR
Pit Shell
Mafic Dike
300
200
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Conglomerate
x: 491960
y: 5359969
x: 491990
y: 5359874
x: 492019
y: 5359778
Scale: 1:1,300
Vertical exaggeration: 1x
0m
50m
Location
NW: 491960, 5359969
SE: 492026, 5359754


NW
SE
16490E
MA-16-081
Pit Shell
QEPOR
QTPV
Mafic Dike
Conglomerate
300
x: 492034
y: 5359934
x: 492063
y: 5359838
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:1,100
Vertical exaggeration: 1x
0m
50m
Location
NW: 492034, 5359934
SE: 492090, 5359751

NW

SE

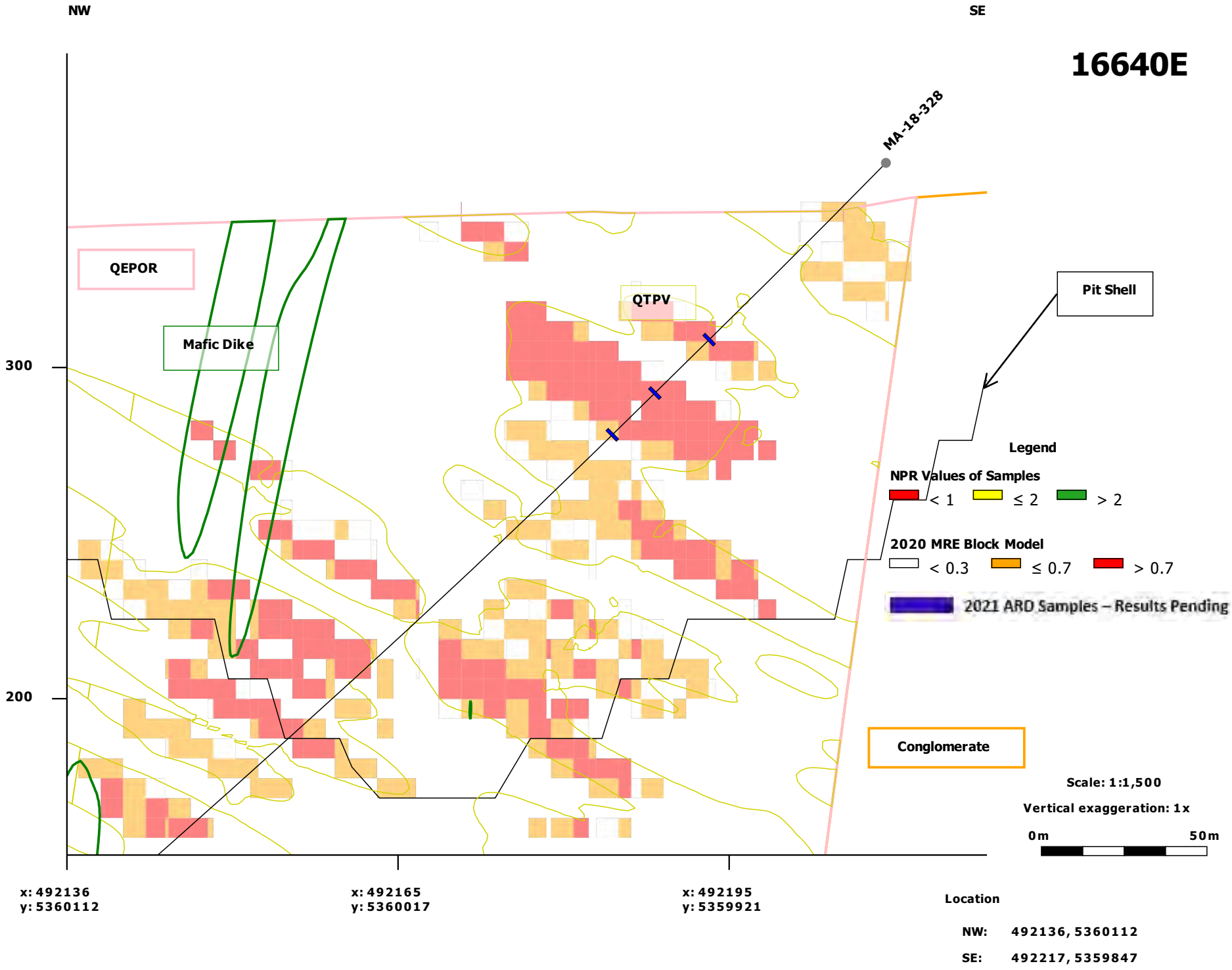
16580E



Location

NW: 492093, 5360047

SE: 492159, 5359834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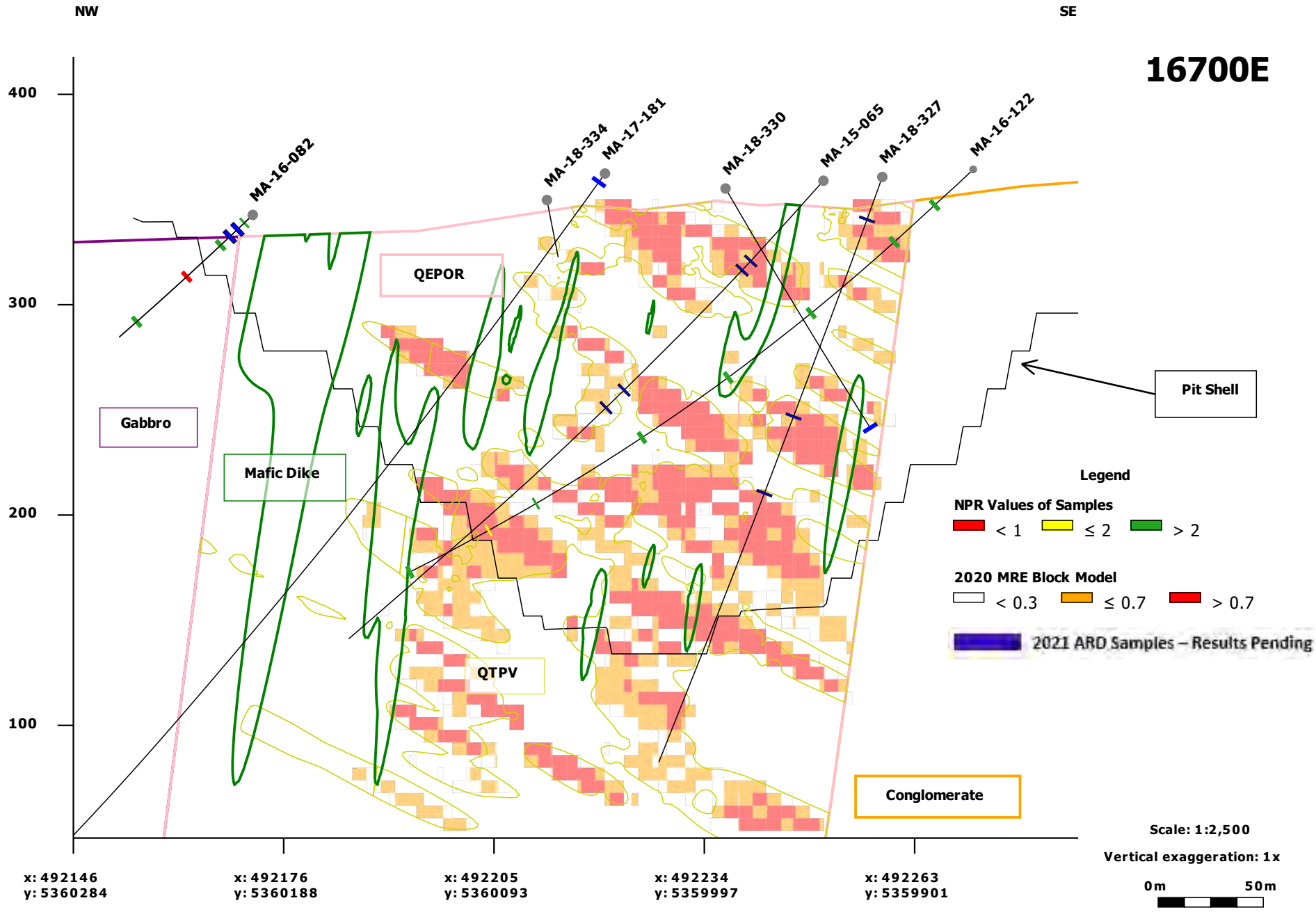
SE
16640E
MA-18-328
QEPOR
QTPV
Mafic Dike
Pit Shell
300
200
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Conglomerate
Scale: 1:1,500
Vertical exaggeration: 1x
0m
50m
x: 492136
y: 5360112
x: 492165
y: 5360017
x: 492195
y: 5359921
Location
NW: 492136, 5360112
SE: 492217, 5359847


NW
SE
16700E
400
300
200
100
MA-16-082
MA-18-334
MA-17-181
MA-18-330
MA-15-065
MA-18-327
MA-16-122
QEPOR
Gabbro
Mafic Dike
QTPV
Conglomerate
Pit Shell
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
x: 492146
y: 5360284
x: 492176
y: 5360188
x: 492205
y: 5360093
x: 492234
y: 5359997
x: 492263
y: 5359901
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
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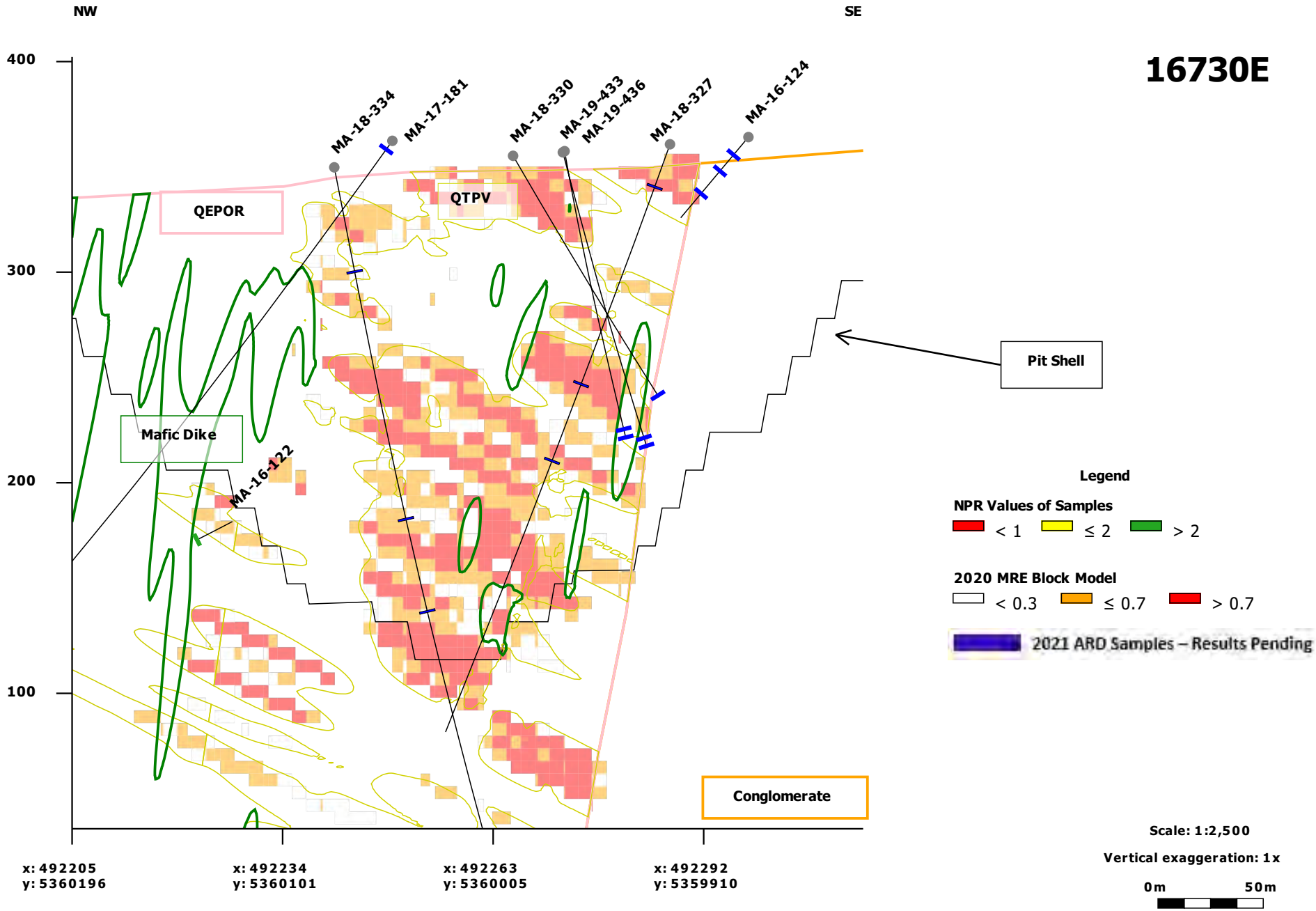
SE: 492286, 5359827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SE
16730E
400
300
200
100
MA-18-334
MA-17-181
MA-18-330
MA-19-433
MA-19-436
MA-18-327
MA-16-124
QEPOR
QTPV
Mafic Dike
MA-16-122
Pit Shell
Conglomerate
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
x: 492205
y: 5360196
x: 492234
y: 5360101
x: 492263
y: 5360005
x: 492292
y: 5359910
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
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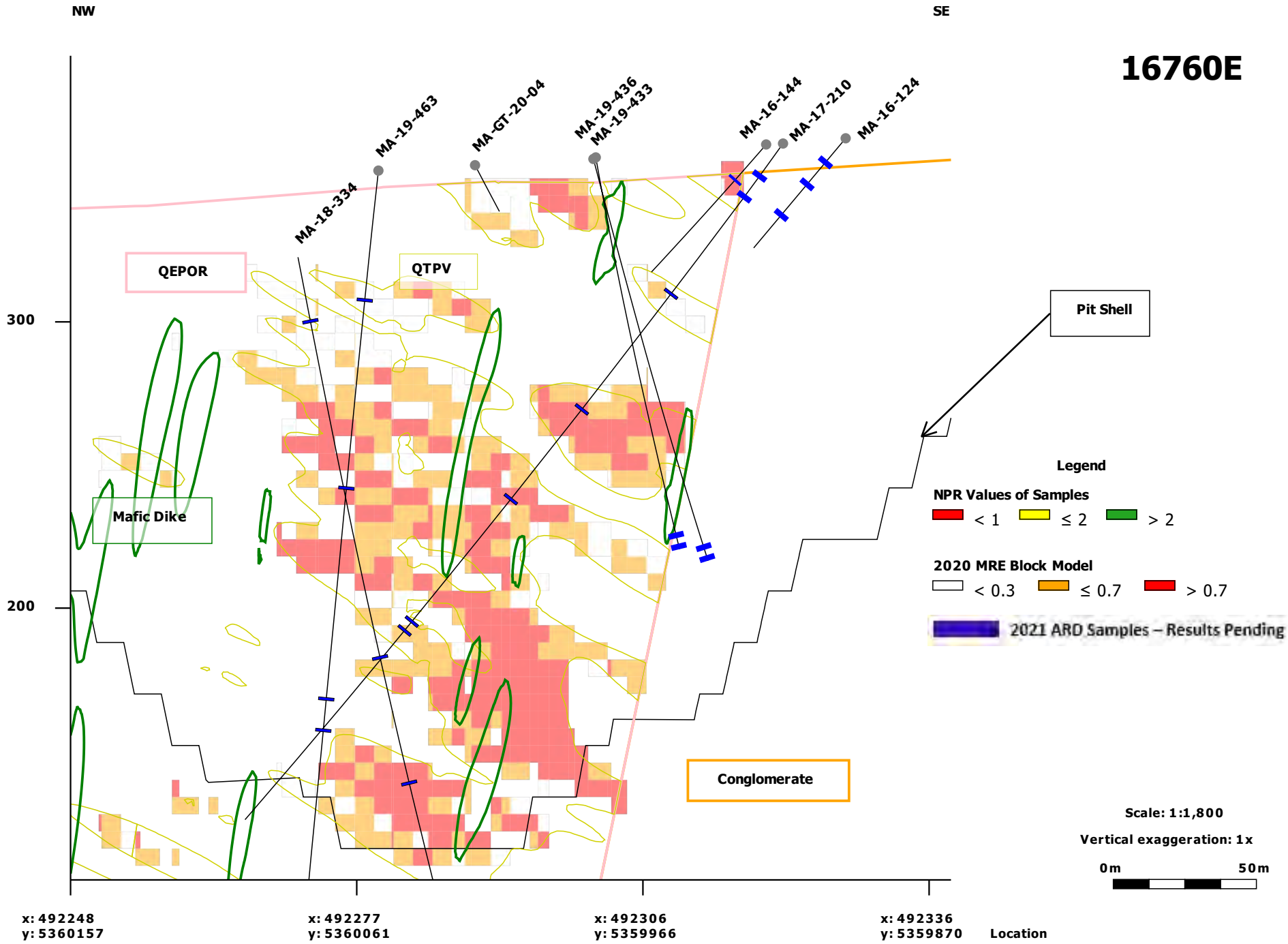
SE: 492314, 5359837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SE
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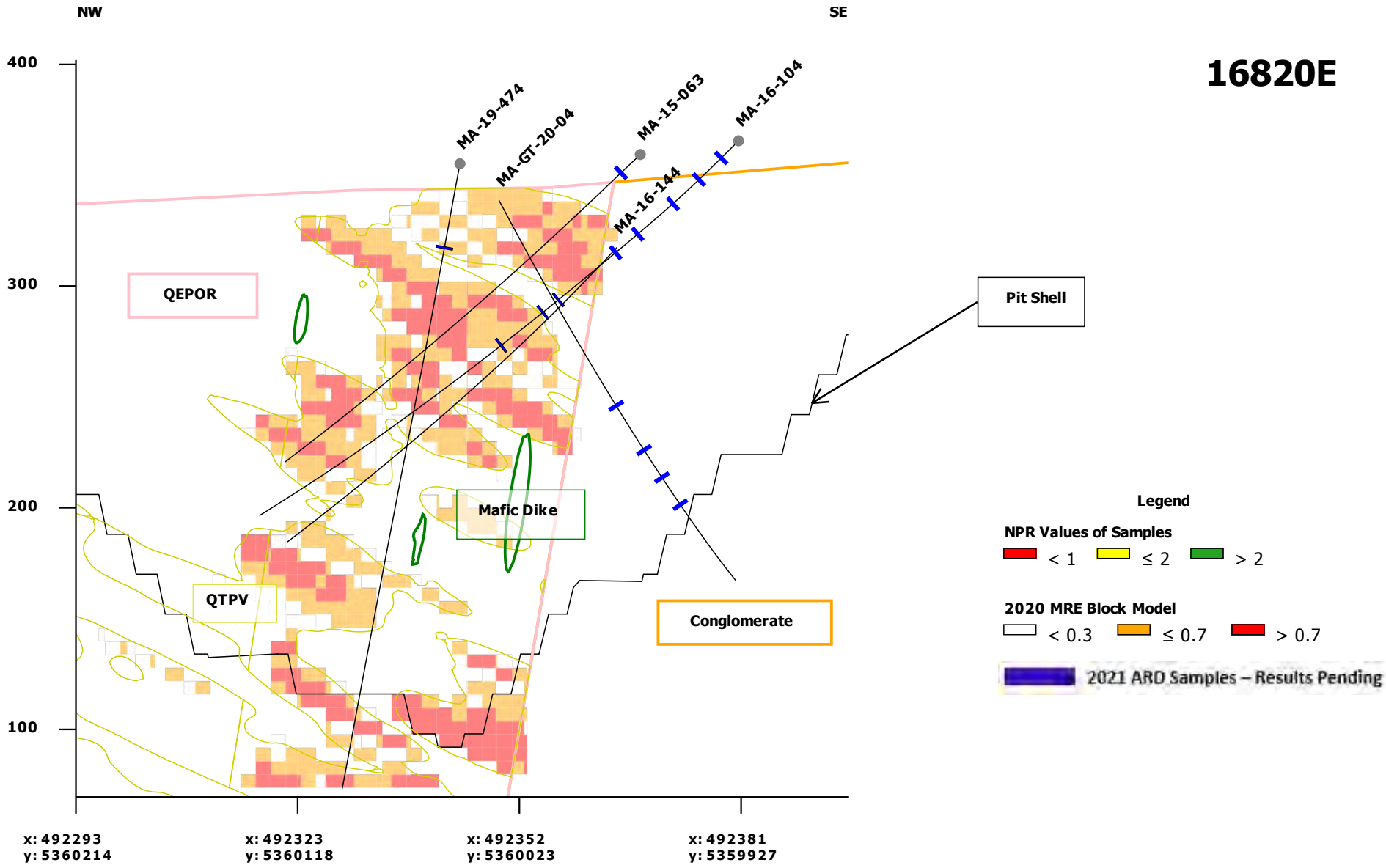
MA-GT-20-04
MA-19-436
MA-19-433
MA-16-144
MA-17-210
MA-16-124
QEPOR
QTPV
Mafic Dike
Conglomerate
Pit Shell
300
200
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:1,800
Vertical exaggeration: 1x
0m
50m
x: 492248
y: 5360157
x: 492277
y: 5360061
x: 492306
y: 5359966
x: 492336
y: 5359870
Location
NW: 492248, 5360157
SE: 492338, 5359863



16820E

Legend

NPR Values of Samples

< 1 ≤ 2 > 2

2020 MRE Block Model

< 0.3 ≤ 0.7 > 0.7

2021 ARD Samples – Results Pending

Scale: 1:2,500

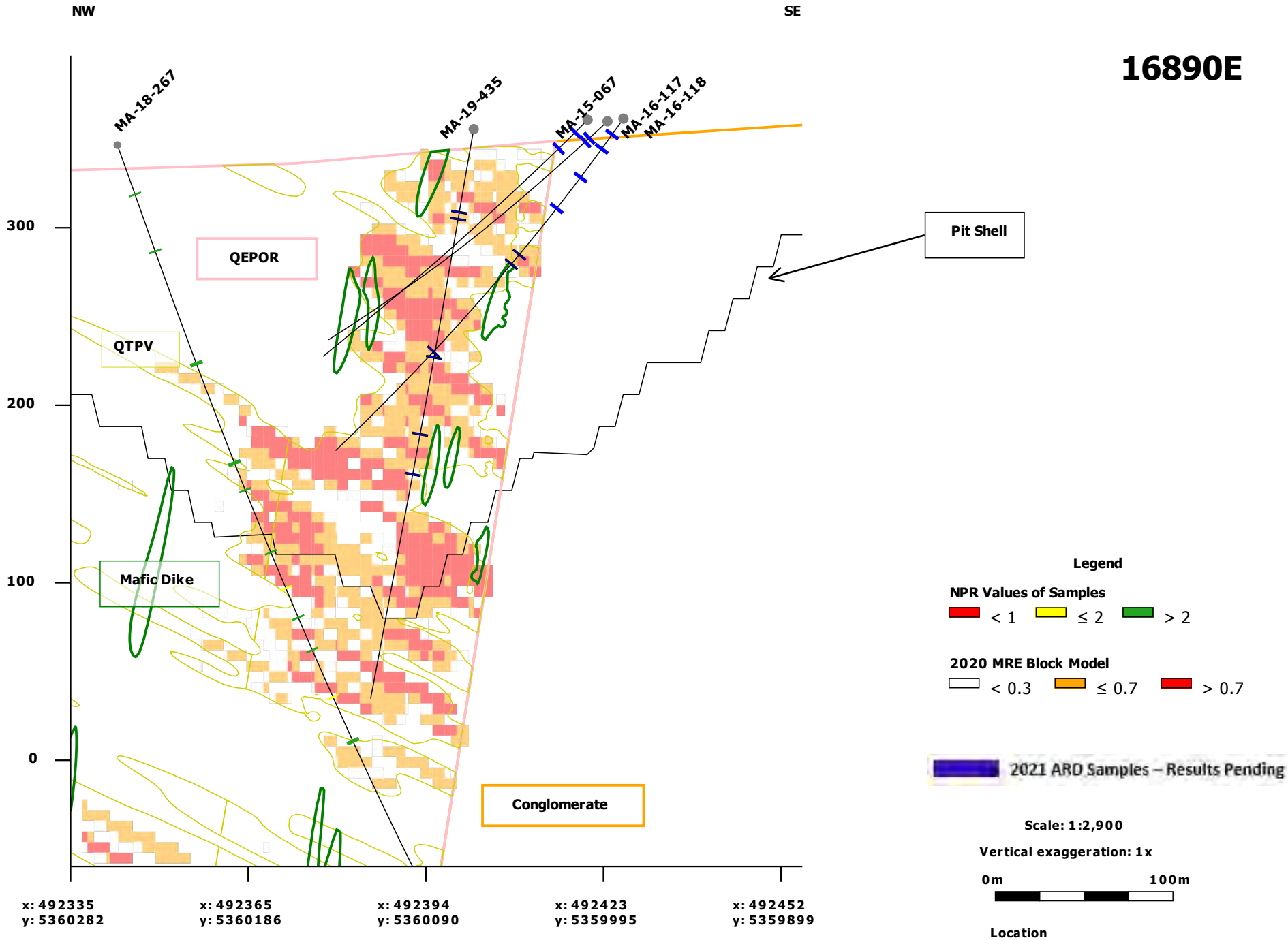
Vertical exaggeration: 1x

0m 50m

Location

NW: 492293, 5360214

SE: 492395, 5359880


NW
SE
16890E
MA-18-267
MA-19-435
MA-15-067
MA-16-117
MA-16-118
300
200
100
0
QEPOR
QTPV
Mafic Dike
Conglomerate
Pit Shell
x: 492335
y: 5360282
x: 492365
y: 5360186
x: 492394
y: 5360090
x: 492423
y: 5359995
x: 492452
y: 5359899
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,900
Vertical exaggeration: 1x
0m
100m
Location
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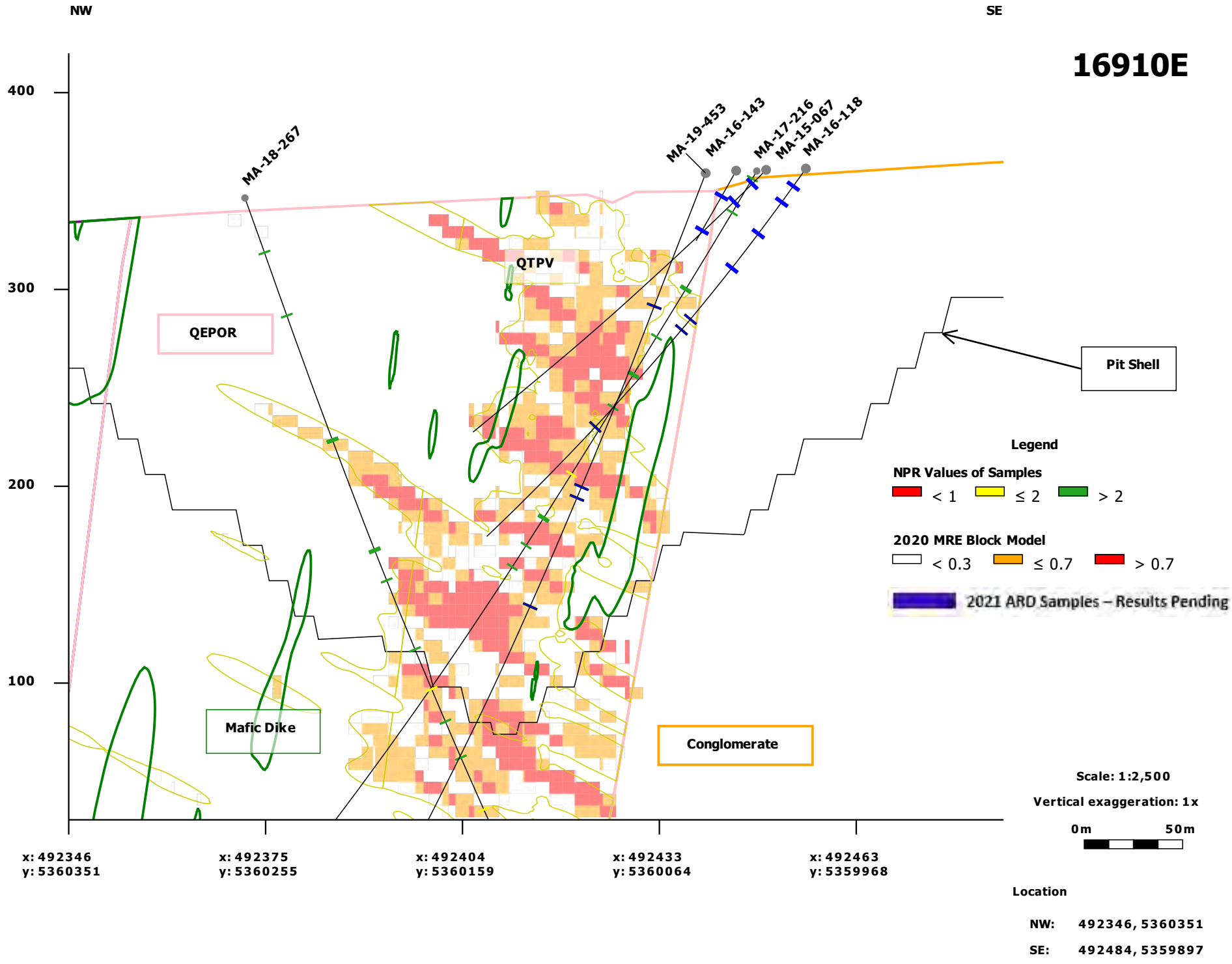
SE: 492456, 5359888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SE
16910E
400
300
200
100
MA-18-267
MA-19-453
MA-16-143
MA-17-216
MA-15-067
MA-16-118
QTPV
QEPOR
Pit Shell
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Mafic Dike
Conglomerate
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
x: 492346
y: 5360351
x: 492375
y: 5360255
x: 492404
y: 5360159
x: 492433
y: 5360064
x: 492463
y: 5359968
Location
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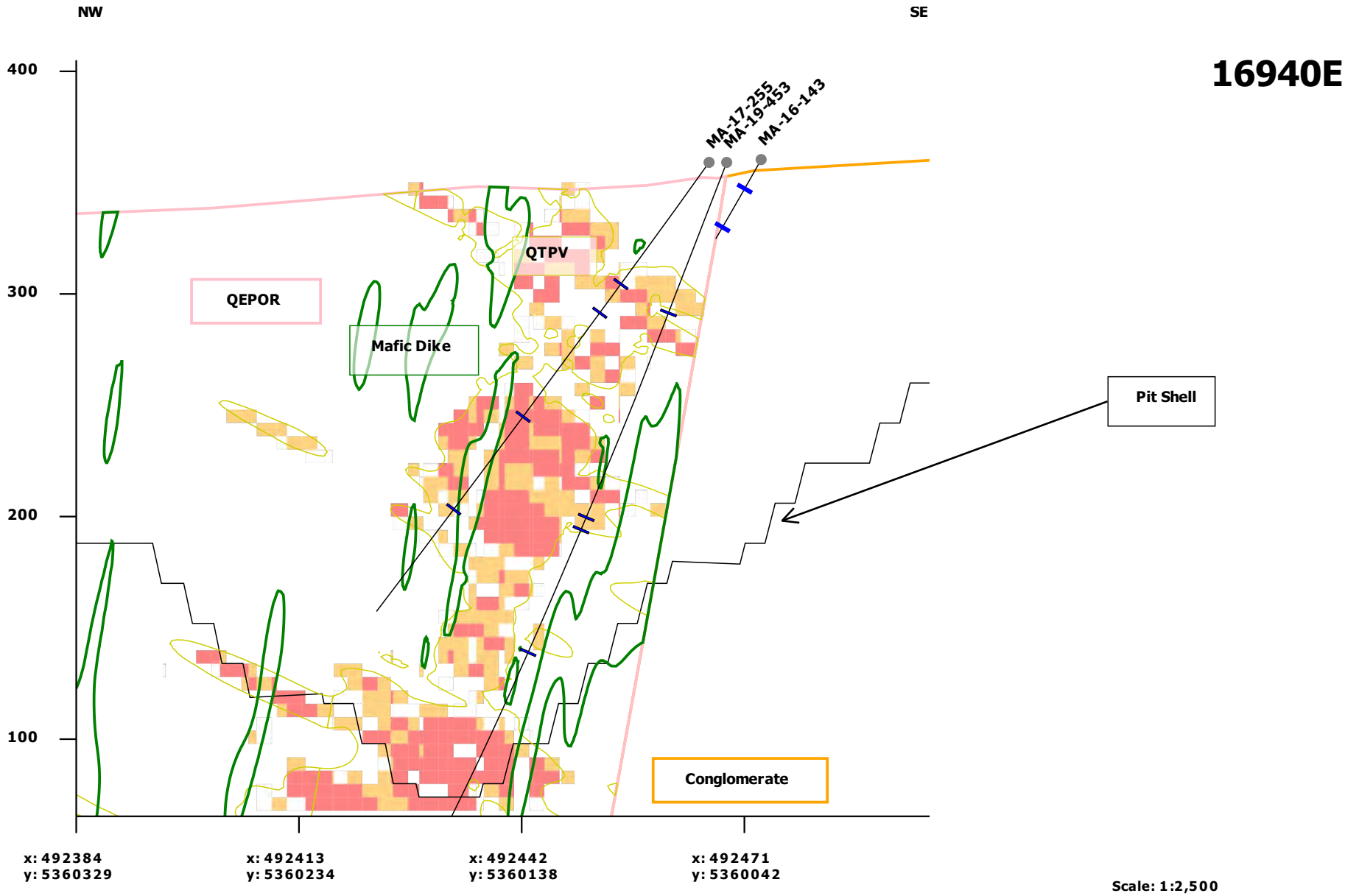
SE: 492484, 5359897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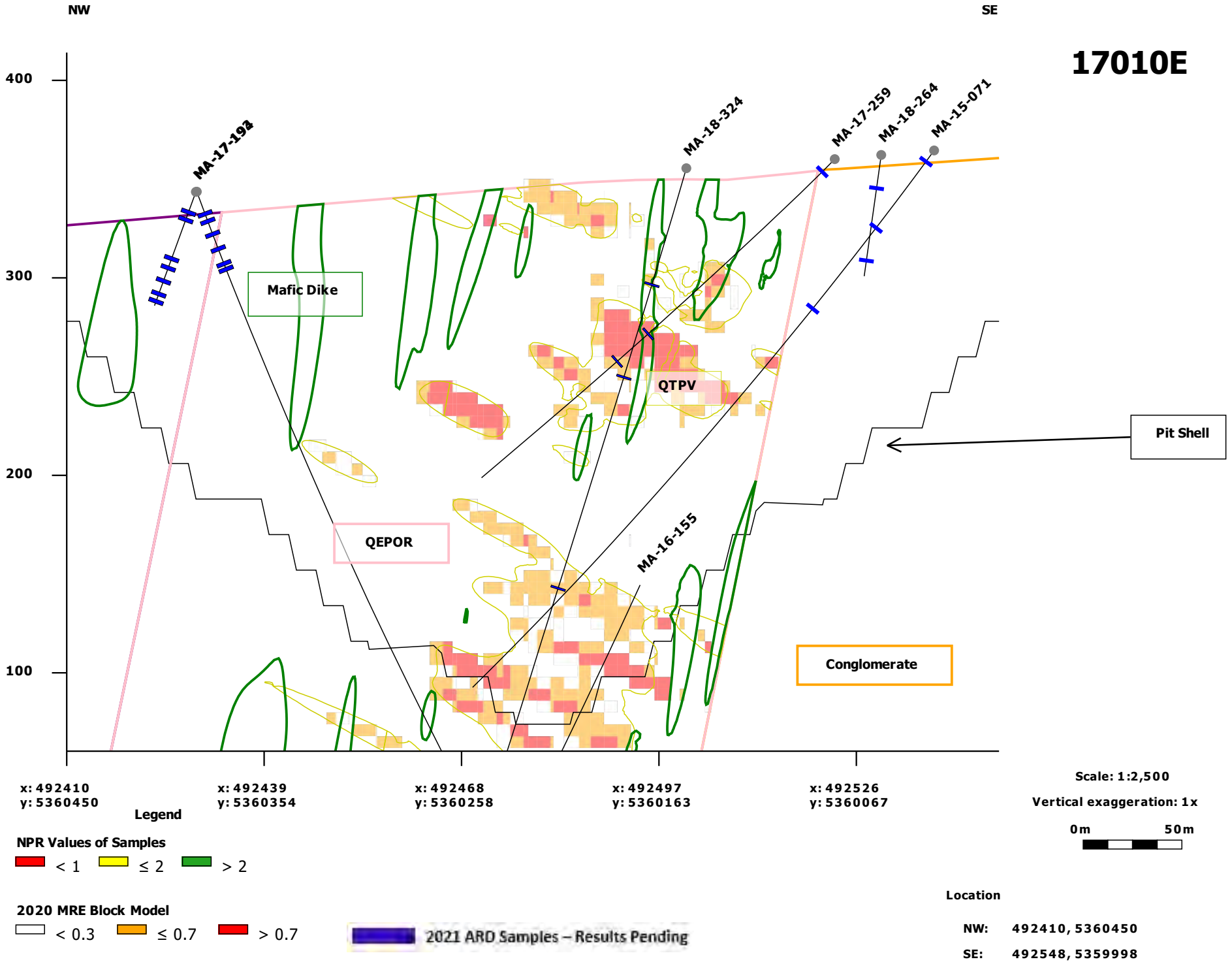
SE
16940E
400
300
200
100
MA-17-255
MA-19-453
MA-16-143
QTPV
QEPOR
Mafic Dike
Pit Shell
Conglomerate
x: 492384
y: 5360329
x: 492413
y: 5360234
x: 492442
y: 5360138
x: 492471
y: 5360042
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
NW: 492384, 5360329
SE: 492496, 5359963


NW
SE
17010E
400
300
200
100
MA-17-192
MA-18-324
MA-17-259
MA-18-264
MA-15-071
MA-16-155
Mafic Dike
QTPV
QEPOR
Conglomerate
Pit Shell
x: 492410
y: 5360450
x: 492439
y: 5360354
x: 492468
y: 5360258
x: 492497
y: 5360163
x: 492526
y: 5360067
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
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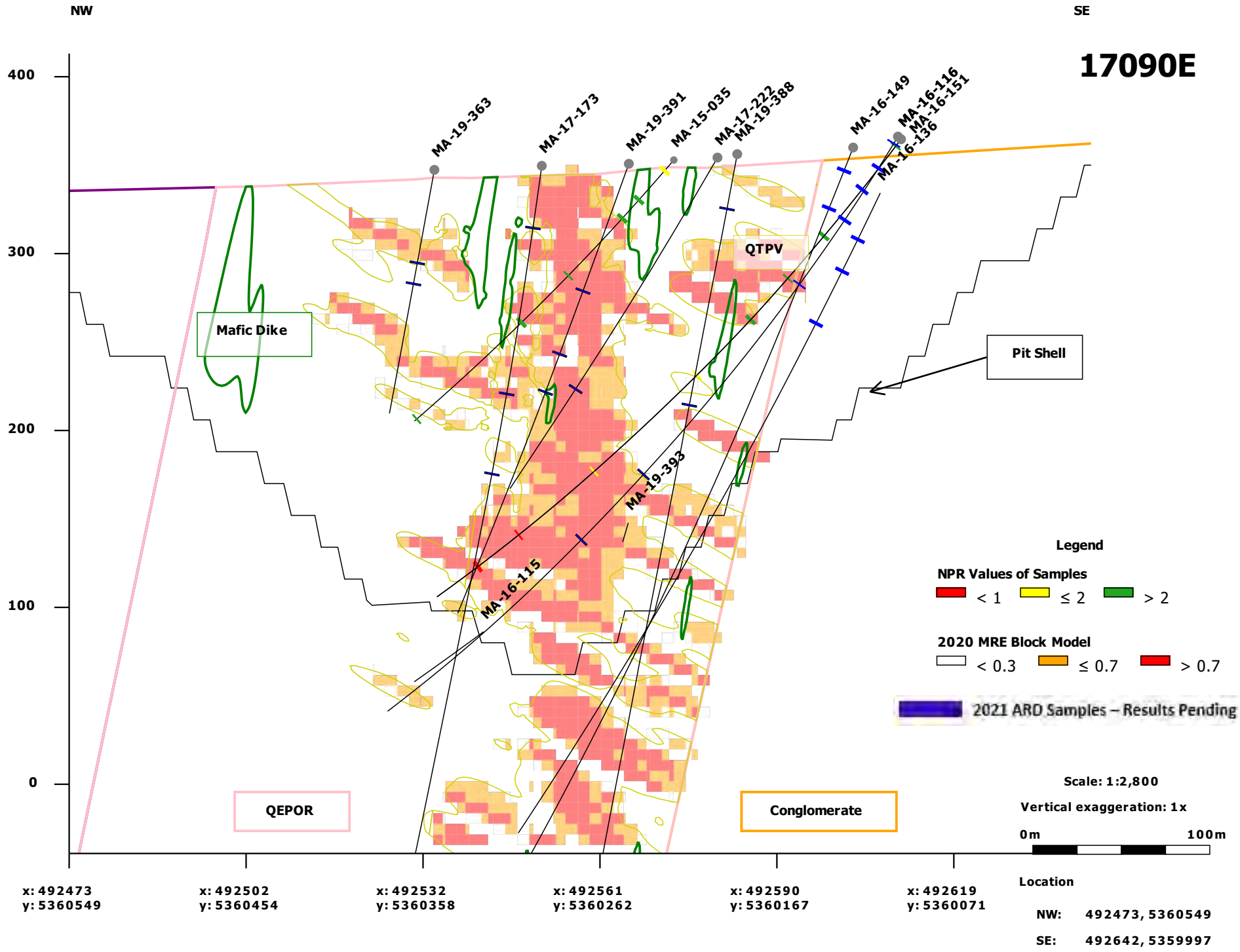
SE: 492548, 5359998


NW
SE
17090E
400
300
200
100
0
MA-19-363
MA-17-173
MA-19-391
MA-15-035
MA-17-222
MA-19-388
MA-16-149
MA-16-116
MA-16-151
MA-16-136
QTPV
Mafic Dike
Pit Shell
MA-19-393
MA-16-115
QEPOR
Conglomerate
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,800
Vertical exaggeration: 1x
0m
100m
Location
NW: 492473, 5360549
SE: 492642, 5359997
x: 492473
y: 5360549
x: 492502
y: 5360454
x: 492532
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x: 492561
y: 5360262
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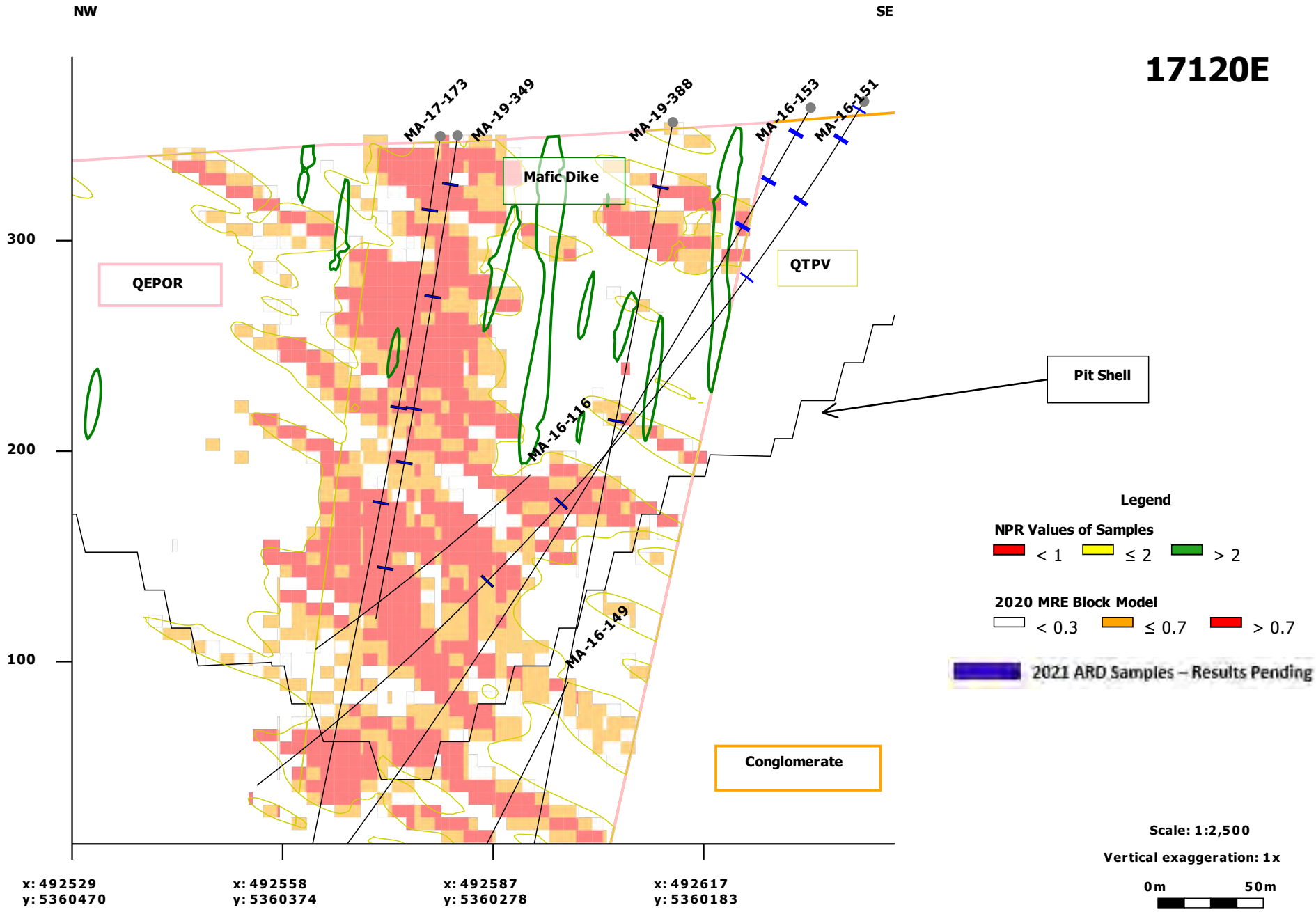
y: 5360071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Mafic Dike
QEPOR
QTPV
Conglomerate
Pit Shell
300
200
100
x: 492529
y: 5360470
x: 492558
y: 5360374
x: 492587
y: 5360278
x: 492617
y: 5360183
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
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Location
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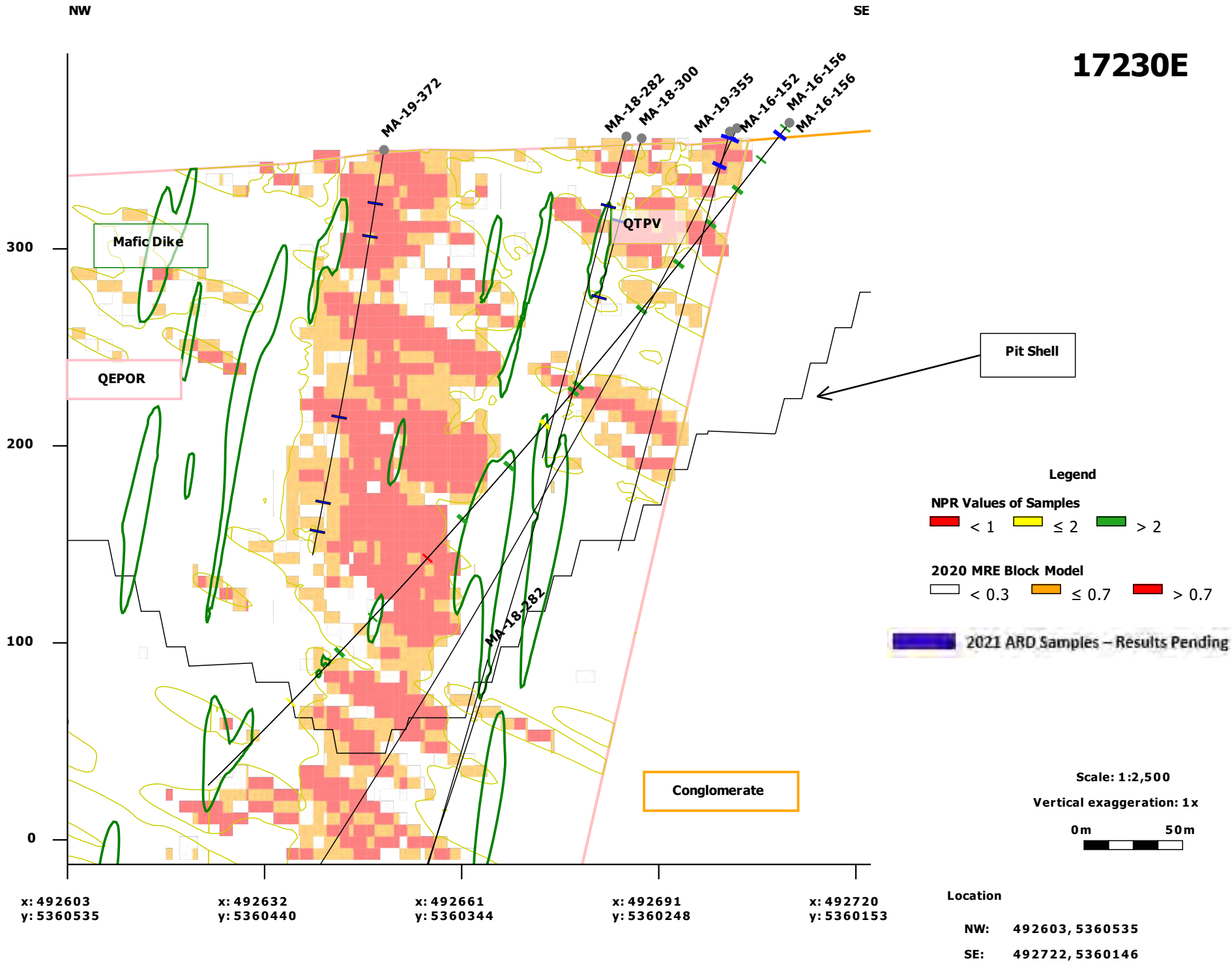
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QTPV
QEPOR
Pit Shell
MA-18-282
Conglomerate
300
200
100
0
x: 492603
y: 5360535
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y: 5360440
x: 492661
y: 5360344
x: 492691
y: 5360248
x: 492720
y: 5360153
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NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
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Vertical exaggeration: 1x
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Location
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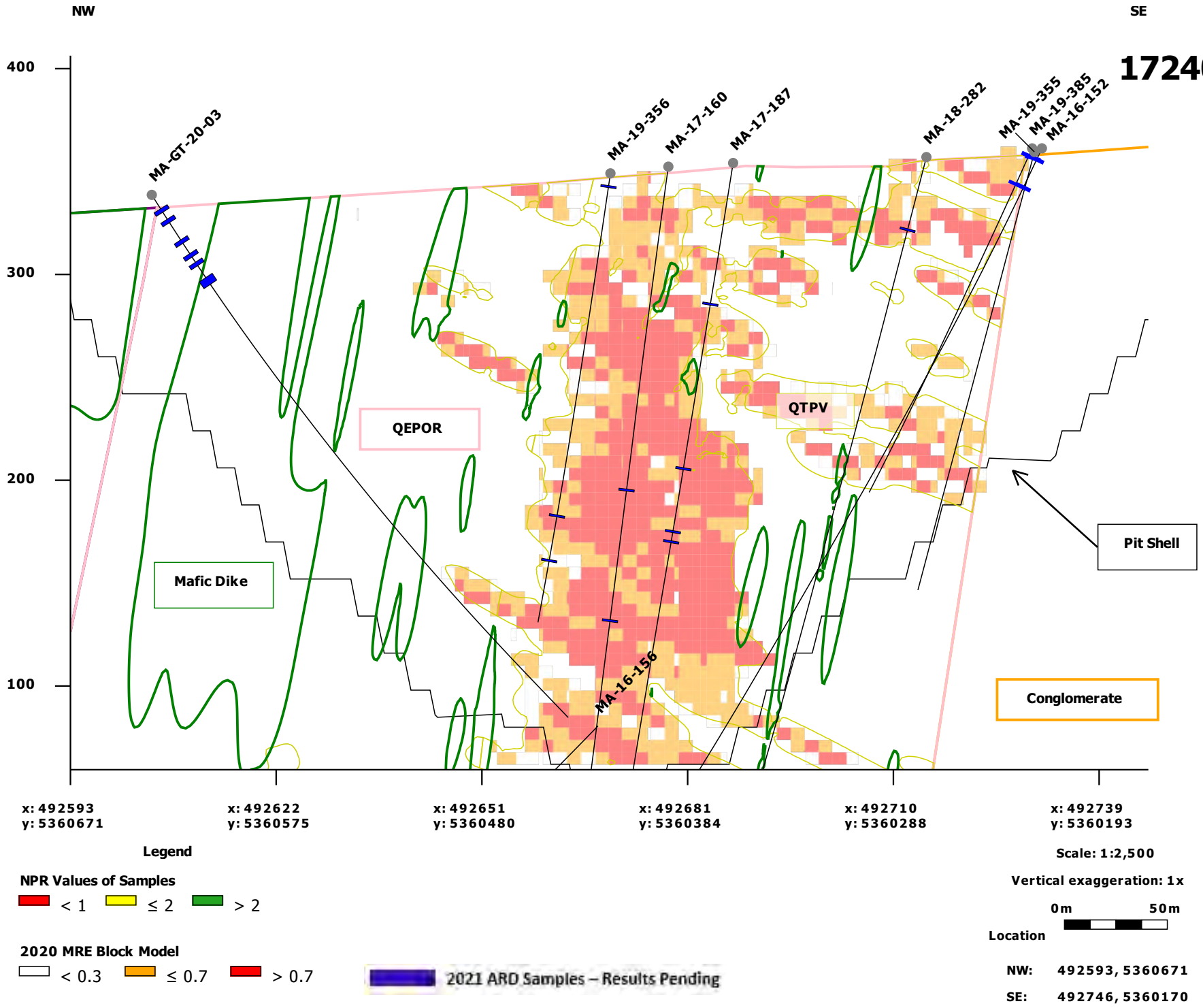
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MA-19-385
MA-16-152
MA-16-156
QEPOR
QTPV
Mafic Dike
Pit Shell
Conglomerate
x: 492593
y: 5360671
x: 492622
y: 5360575
x: 492651
y: 5360480
x: 492681
y: 5360384
x: 492710
y: 5360288
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y: 5360193
Legend
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< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
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Vertical exaggeration: 1x
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Location
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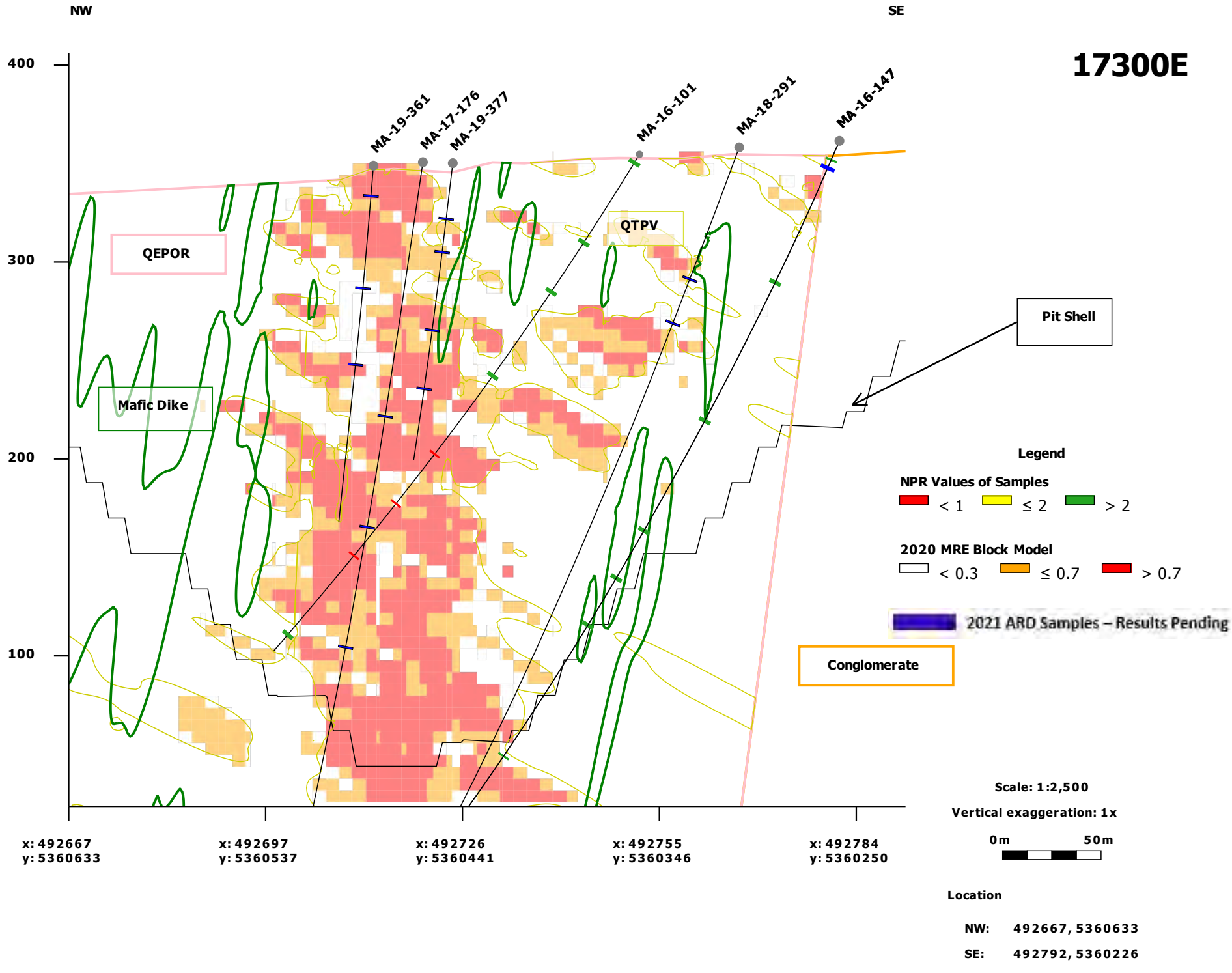
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QTPV
Mafic Dike
Pit Shell
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Conglomerate
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x: 492697
y: 5360537
x: 492726
y: 5360441
x: 492755
y: 5360346
x: 492784
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Vertical exaggeration: 1x
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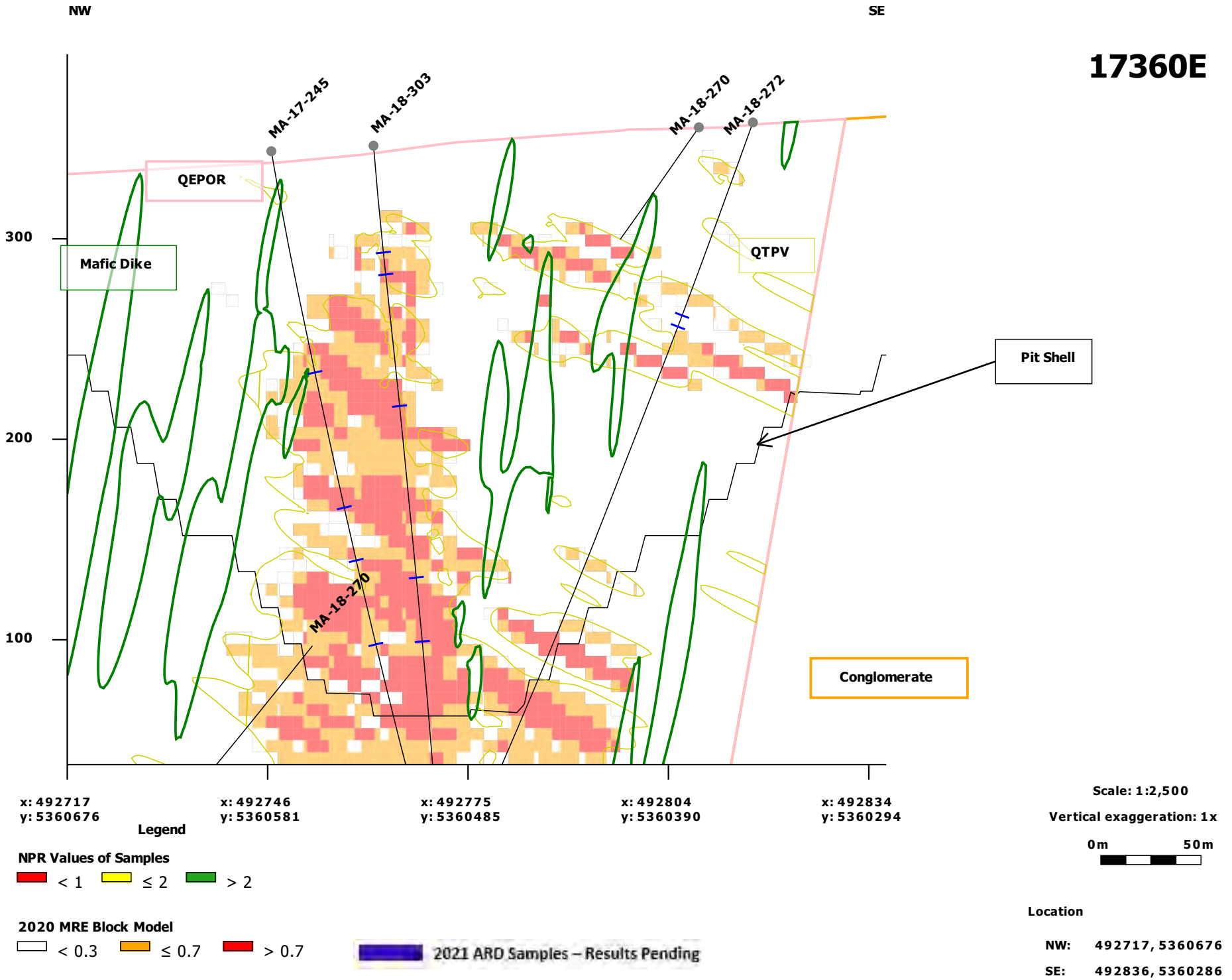
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QTPV
Mafic Dike
Pit Shell
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300
200
100
x: 492717
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x: 492775
y: 5360485
x: 492804
y: 5360390
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Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
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Vertical exaggeration: 1x
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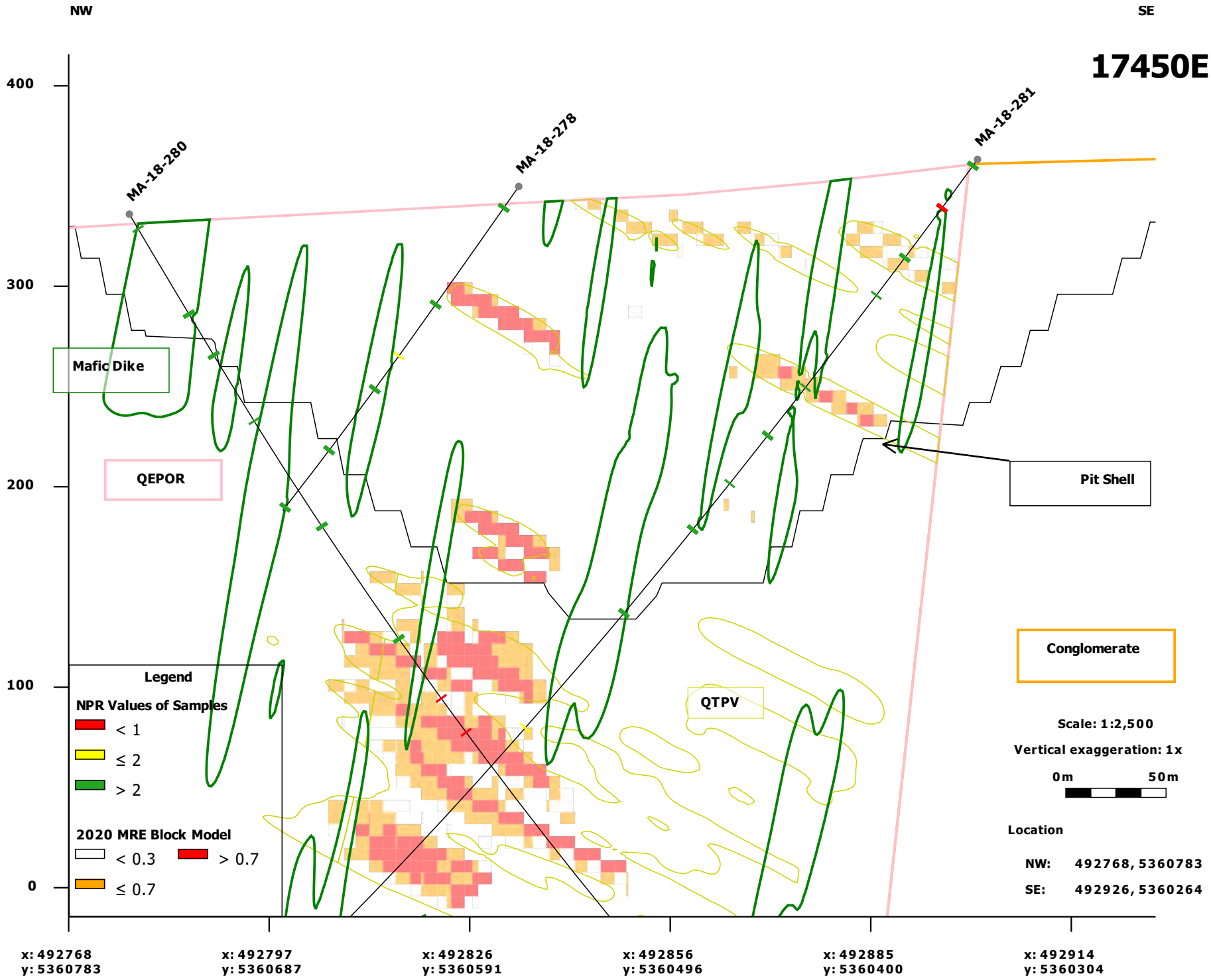
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0
MA-18-280
MA-18-278
MA-18-281
Mafic Dike
QEPOR
Pit Shell
Conglomerate
QTPV
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
> 0.7
≤ 0.7
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
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SE: 492926, 5360264
x: 492768
y: 5360783
x: 492797
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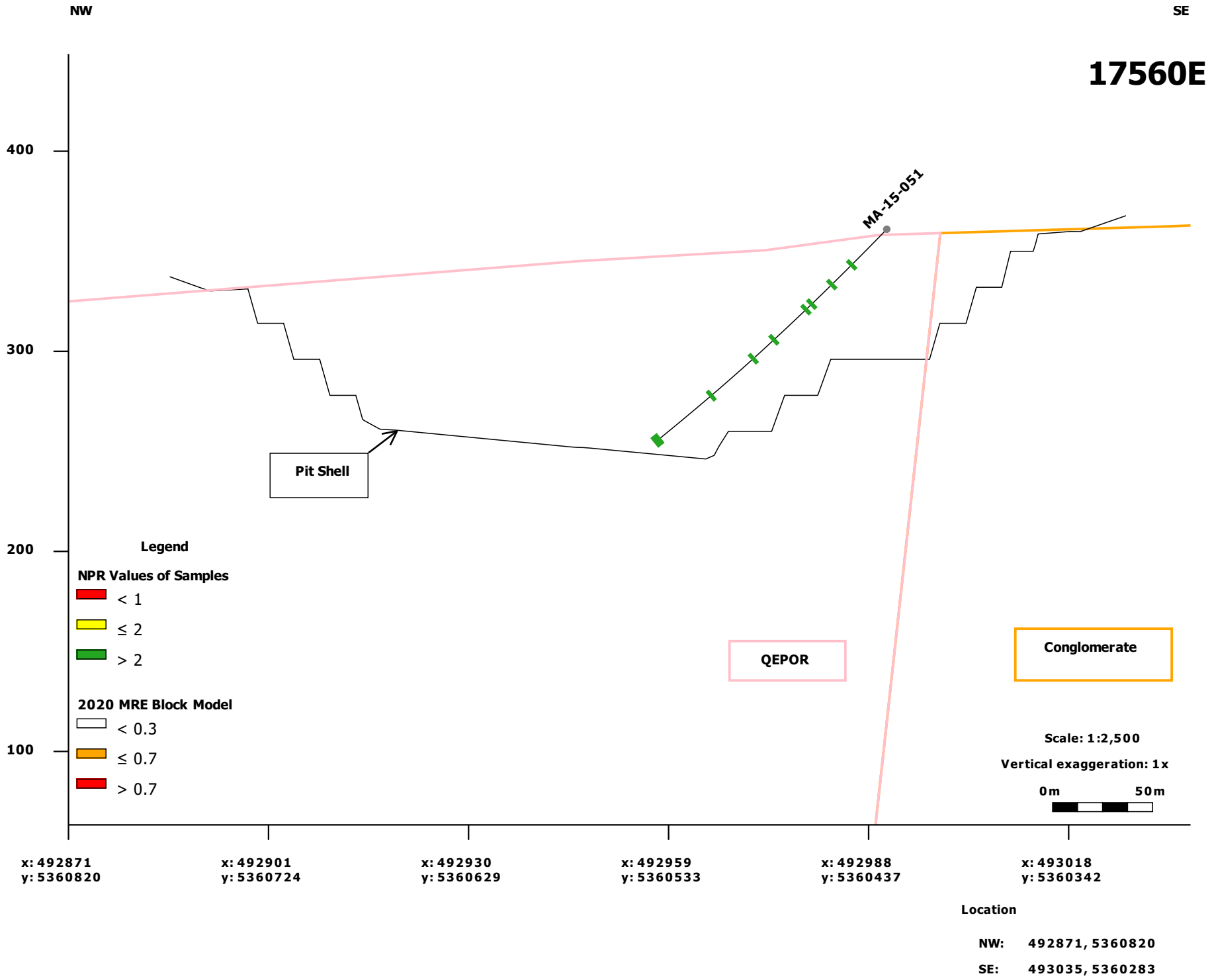
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200
100
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Pit Shell
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
QEPOR
Conglomerate
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
x: 492871
y: 5360820
x: 492901
y: 5360724
x: 492930
y: 5360629
x: 492959
y: 5360533
x: 492988
y: 5360437
x: 493018
y: 5360342
Location
NW: 492871, 5360820
SE: 493035, 5360283

APPENDIX IR(2)-19.A ARD/ML MANAGEMENT APPROACH

Appendix IR-19 (2).A: ARD/ML Management Approach

This appendix first summarizes findings of the Acid Rock Drainage/Metal Leaching (ARD/ML) assessment and the current approach to management of ARD/ML risks. The next section titled "Additional Work" discusses Marathon's commitments to complete work requested by NRCan, including the current status on the relevant test work and analysis. The last section provides an outline and initial content for the proposed ARD/ML Management Plan, including examples of procedures on testing and handling of potentially acid generating (PAG) materials. Updates provided below relative to the original Appendix IR-19.A (provided in response to Federal Information Requirements issued on February 10, 2021) are presented in italic font.

1) ARD/ML Assessment and Management

Marathon completed a Phase 1 and 2 ARD/ML assessment prior to submission of the EIS, using methods that followed the Mine Environment Neutral Drainage (MEND) publication entitled "Prediction Manual for Characterizing Drainage Chemistry from Sulphidic Geologic Materials" (Price 2009). These geochemistry baseline programs included:

- Static testing of approximately 350 samples of waste rock, ore, overburden, and tailings for Acid-Base Accounting (ABA), Shake Flask Extraction (SFE), and total metals
- Characterization of composite samples using the static tests and mineralogical methods
- Kinetic testing of composite samples including 14 humidity cells, two ageing tests and two subaqueous columns tests

As a result of this test work, the following key geochemical characterization information has been determined, which has informed the environmental assessment, as well as the ongoing and follow-up phases of sampling, testing, and assessment work:

Leprechaun Deposit

Approximately 1.9 Mm^3 of overburden will be excavated from the Leprechaun open pit. Overburden is classified as non-PAG material with no exceedances of the *Metals and Diamond Mining Effluent Regulations* (MDMER) limits in leach testing.

Less than 0.5% of the approximately 50 Mm^3 of Leprechaun waste rock is classified as PAG. Overall, the waste rock pile is not expected to generate ARD due to the small amount of PAG material and significant excess of Neutralization Potential (NP). Therefore, specific ARD management of waste rock is not required. Furthermore, there are no exceedances of MDMER limits observed in humidity cell leachates.

About 10% of low-grade ore is estimated to be PAG, but overall is not expected to generate ARD within the relatively short residence time of low-grade ore in the stockpile. While kinetic testing suggests moderate leaching potential for Al and P, there are no exceedances of MDMER limits observed in these tests.

Marathon Deposit

Approximately 4.4 Mm^3 of overburden will be generated from the Marathon open pit. Overburden is classified as non-PAG material. There are no exceedances of MDMER limits observed in SFE leachates from overburden. Based on current materials balance over the life of mine, all of the stockpiled overburden will be used during rehabilitation and closure.

Approximately 14% of the 60 Mm^3 of waste rock is conservatively estimated to be PAG. Blending PAG and non-PAG rock with excess of neutralization potential and/or encapsulation of PAG waste by non-PAG rock is recommended to neutralize acidity potentially generated in isolated pockets of PAG material. The waste rock pile will be covered by growth medium / overburden during rehabilitation, further reducing the risk of ARD/ML. There are no exceedances of MDMER limits observed in leachates from the waste rock humidity cells.

Approximately one-half of the low-grade ore (LGO) is conservatively classified as PAG. The ARD onset time in PAG low-grade ore is conservatively estimated at six years based on maximum laboratory leaching rates. There are no exceedances of MDMER limits observed in leachates from low-grade ore under neutral conditions. In the mine plan, the Marathon low-grade ore stockpile runoff and toe seepage has been segregated from other mine component flow streams to facilitate collection and further ARD treatment, if required.

Plant Site

High-grade ore (HGO) from the Leprechaun and Marathon deposits will be stockpiled together with 30% of the material originating from Leprechaun and the reminder from Marathon, on average. Approximately 13% and 67% of ore samples from Leprechaun and Marathon pits, respectively, are conservatively classified as PAG. The overall mixture of Leprechaun and Marathon high-grade ores classifies as non-PAG and the high-grade ore stockpile is not expected to generate ARD. Drainage from the high-grade ore stockpile flows by gravity to the TMF and any potential acidity will be neutralized in the decant pond or in the mill during pH adjustment required as a part of the gold recovery by cyanide process. No exceedances of MDMER are observed in SFE extracts.

Approximately 41 Mt of tailings will be produced from both high-grade ore and low-grade ore with about 38% of the tailing originating from the Leprechaun pit and the remainder from the Marathon pit. Composite samples of tailings from both deposits are non-PAG and are not expected to generate ARD. During operation, TMF pond and seepage will likely exceed the MDMER limits for $CN_{(T)}$, un-ionized NH_3, and Cu sourced from process water. After closure, tailings beaches covered by soil are not expected to produce acidic runoff and/or have high metal leaching. Seepage from the TMF is conservatively predicted to exceed MDMER limits for $CN_{(T)}$, un-ionized NH_3, and Cu in post-closure and will be addressed in the long term through passive treatment methods.

Marathon is confident, based on the results of the testing and analysis conducted to date and as outlined above, that employing the following mitigation measures will address the potential geochemical effects associated with planned Project components and activities:

- PAG rock will not be used in construction
- Preferential milling of PAG ore and stockpiling non-PAG ore
- Blending PAG and non-PAG materials and encapsulation of blended material with non-PAG rock within the waste rock piles
- Use of soil covers and revegetation to limit infiltration and oxygen flux as part of progressive and final rehabilitation and closure
- Relocation of any excess of PAG rock (waste rock or low-grade ore) remaining at closure to the mined-out pit, where it will be permanently flooded
- Collection and monitoring of contact water during operation, and treatment if required (adaptive management).

2) Additional Work

As outlined in the EIS, and further addressed in the Information Requirements (IR) responses provided to date, Marathon has utilized a very conservative approach in the assessment of effects from potential geochemical conditions. The limitations in the sampling and test work to date are a result of several factors, including an exploration focus on mineralized targets and impacts to Marathon's drilling programs due to COVID-19. Marathon recognizes that further ARD/ML work is required to fully conform to the MEND guidelines and further refinement of Project mitigation is progressing as design of the Project proceeds. Additional ARD/ML testing, as outlined below, will refine the results obtained to date and the associated mitigation measures identified that will be incorporated into the mine plans, waste rock management, stockpile management, and tailings management via the ARD/ML Management Plan such that PAG materials are managed to minimize any potential long-term effects.

Marathon has committed to completing the work necessary to address testing gaps identified in the EIS prior to mine development. The results of this work are required for final design and permitting under the Newfoundland and Labrador (NL) *Mining Act* (NL Department of Industry, Energy, and Technology), and will be shared with NRCan as they become available.

- Continuation of on-going laboratory and field tests started in 2020.
  - Laboratory tests include two humidity cells containing carbonate depleted LGO and tailings from the Marathon deposit. *Results of these tests are presented in **Attachment 1** of this Appendix. While these results do not change the current ARD/ML management approach, this additional information will be considered in the next iteration of water quality model update.*
  - Field bin tests of composite materials including nine composite samples representing major waste rock lithologies and low-grade ores from both deposits. *The results of bin tests are summarized in the response to **IR(2)-21, part c).** These results will be processed and incorporated into the next iteration of water quality model update.*
  - *In 2021, subaqueous columns and a humidity cell tests have commenced on samples from on-going metallurgical work. These results support on-going engineering design of a water treatment plant for TMF discharge and are presented in **Attachment 2** of this Appendix.*

- Additional static testing of samples:
  - *The sampling and testing program has incurred delays for several reasons, including staffing limitations due to Covid-19 and more substantially, all testing labs conducting work for the mining industry are overwhelmed with lab testing requests due to very high levels of mineral exploration and mine development activities across Canada. Despite these challenges, Marathon has collected 246 additional samples from the Marathon pit and 85 samples from the Leprechaun pit for static (ABA, SFE and trace element) tests. Test results are available only for 29 samples of HGO and LGO and are provided in* ***Attachment 3*** *of this Appendix. Marathon is currently working with the SGS laboratory to complete testing on the remainder of the samples as soon as possible. When results from all additional static tests become available Marathon will update the summary tables and assess the information with regard to the ARD/ML Management Plan.*
  - to provide the data inputs required to develop an ARD block model for the Marathon pit. *Samples have been selected and sent to the laboratory, and testing is underway to support the development of the block model.*
  - to better define the location and volumes of non-PAG rock, which is required for initial construction and subsequent TMF dam raises, in Leprechaun and Marathon pits.
- Additional kinetic testing of PAG materials (waste rock, ore, and low-grade ore) from major lithologies of the Marathon pit, including a composite sample of gabbro. These samples will also be submitted for static tests including Net Acid Generating (NAG) tests, mineralogy, and particle size distribution similar to characterization of composite samples as described in Section 3.2.2 of Attachment 5-B of the EIS. *As results from all additional static tests become available, Marathon will select and make composites of representative PAG samples for kinetic testing and conduct detailed static characterization of the composite samples.*
- Generate an ARD block model for the Marathon pit to provide production schedules for ARD classes of rock and ore and to improve the estimates of PAG material exposures on pit walls.
- Update water quality predictions based on available results of kinetic tests, if required.

3) Content of ARD/ML Management Plan

Marathon will provide the above information and analysis to regulators, including NRCan, for review and comment via the proposed ARD/ML Management Plan. This plan will be a living document and will continue to be updated as required as additional ARD/ML information is obtained through the construction and operational phases of the Project. The ARD/ML Management Plan would contain the following sections with updated information shown in the italics:

Introduction

- **General Introduction**: Company and Project introduction.
- **Objective:** The objective of the ARD/ML management plan is to provide the most recent information and actions required to reduce the risks associated with ARD/ML during all phases of the Project.
- **Related Plans and Documents, Document Management:** List any related plans and documents, and describe document control for the ARD/ML document.

Background

- **Project Components and Activities:** This section will summarize Project components and activities which pose potential ARD/ML risks. This section will also describe the high-level development timelines and phases for each Project component and activity.
- **ARD/ML Assessment Summary:** This section will focus on the current understanding of ARD/ML potential related to each relevant component of the Project: Marathon and Leprechaun pits, two waste rock stockpiles, two LGO stockpiles, HGO stockpile, TMF and any rock quarries. The potential ARD/ML risks associated with these components will be (re)assessed for each phase of the Project based on the most recent results of geochemical testing, the ARD block model for the Marathon pit and any updated predictions of water quality.
- **Regulations and Management:** Outline regulatory documents that are applicable and will be followed as part of this Plan. Outline management requirements, personnel responsible, and their responsibilities under the Plan.

ARD/ML Management

- **Project Development:** Describe relevant development components, activities and phases in detail including mine waste material volumes and pit wall exposure for each Project component.
- **ARD/ML Management:** provide data and methods, and mitigation measures to be employed to manage PAG material generated from Project components and activities, separated by phases as appropriate.

  The following is an example method for the identification and the management of PAG rock and ore, which will be subject to further refinement as the ARD/ML Management Plan is developed:

  - During construction and operation, sampling of cuttings from reverse circulation (RC) drilling will be collected from 5 m depth intervals of approximately 20 m to 40 m deep holes spaced 25 m by 25 m. These samples will be tested at the on-site laboratory for sulphur, inorganic carbon, and trace elements. A split of one in every ten samples will be analyzed at an external laboratory for standard static tests (ABA, SFE and trace elements). The split sampling frequency may change depending on the results compared with the on-site test results (reconciliation). This additional data will be integrated with the ARD block model to improve the accuracy (quantity and delineation) of PAG (potentially acid generating) and non-PAG rock 3 to 4 months ahead of mining. As mining progresses, samples will also be collected from blast hole cuttings for additional testing to confirm the data within the block model prior to mining.
  - Average neutralization potential (NP) will be calculated from total carbon and average Acid Potential (AP) will be calculated from total sulphur using standard conversions per the MEND guidelines. If NP/AP ratios indicate the mining block rock is below 2, the block will be classified as PAG and managed accordingly.
  - PAG rock will be marked after the blast, excavated, and dispatched to the waste rock stockpile. PAG rock would only be deposited within a specified distance (to be defined) of the final stockpile shell and preferably next to a non-PAG truck load. Piled PAG rock will be marked, and the geospatial coordinates recorded.
  - A portion of PAG and non-PAG rock loads will be mixed during grading each lift of the stockpile.

- This mixture will be encapsulated with non-PAG rock deposited within a specified distance (to be defined) from the lift face and forming the topmost lift(s) on the final of the stockpile. Non-PAG rock will reduce oxygen flux into interiors of the pile and provide alkalinity to infiltrating water. This approach has been successfully applied for waste rock piles in other mine sites as referenced in Sections 6.6.3.5 and 6.6.3.6 of Global ARD management guide (http://www.gardguide.com/index.php/Chapter) and would be applicable to ARD/ML management at the Valentine Gold Project.
- To limit exposure of PAG high grade ore, this material will be preferentially directed to the mill feed, while non-PAG high grade ore will be allocated to the stockpile, as long as the grade requirement for the mill feed is met.
- LGO stockpiles will be constructed to maximize non-PAG material in the feed in the last year of tailings deposition in the TMF to the extent practicable. This approach will create a non-PAG layer of tailings on the surface of the TMF prior to placement of the soil cover. This non-PAG layer will consume oxygen, reducing oxygen diffusion into tailings deposited earlier. In the last three years of operation, tailings will be deposited in the Leprechaun pit and immediately flooded limiting further oxidation and ARD/ML.

  This section will also detail progressive rehabilitation planned for waste rock and ARD/ML mitigation activities planned for the closure.

- **Monitoring, Ongoing Testing and Analysis:** This section will provide procedures for monitoring of contact water (e.g., the LGO seepage) and solids (e.g., tailings). This section will include details on monitoring locations, lists of monitoring parameters and sampling frequencies for each phase of the Project. Any further testing or analysis work (e.g., cover trials) related to ARD/ML will be described here. *This section will also include a summary of the results from water quality model updates (typically done every 5 years in support of the Closure Plan update).*
- **Adaptive Management:** The adaptive management section will discuss additional mitigations that may be triggered by monitoring and/or by results of the future updates to the ARD/ML data. For example*, if in the later years of mining PAG waste cannot be properly encapsulated/blended within the waste rock pile, these materials will be stockpiled separately (with drainage management) and moved back to the pit for closure. In the event this scenario develops, the likely place for the temporary storage of the PAG waste rock (that cannot be properly encapsulated/blended) is at a designated location on the waste rock pile. Secondary options for temporary storage, expected to be only two to three years (maximum), may include material stockpile areas that are no longer required (e.g., if sufficient low-grade ore has been processed to create space on the pad) or expansion of an existing stockpile area specifically for this purpose, noting waste rock generated in the later years of mining operations are significantly lower. Regardless of where the PAG waste rock is temporarily stored, the preferred closure option is to return the waste to the pit to be permanently submerged. Alternative closure scenarios may be considered (such as engineered covers) as the final closure plan is reviewed (internally and by regulators) prior to closure.*

The ARD/ML management plan will be a “live” document, which will be updated and revised as information is gathered during the Project and in consultation with regulators.

ATTACHMENT 1

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	3	4	5	6	7	8	9
Date			Effective	12-Aug-20	19-Aug-20	26-Aug-20	02-Sep-20	09-Sep-20	16-Sep-20	23-Sep-20	30-Sep-20	07-Oct-20	14-Oct-20
LIMS			01-Jun-2021	10105-AUG20	10144-AUG20	10222-AUG20	10007-SEP20	10091-SEP20	10154-SEP20	10232-SEP20	10315-SEP20	10021-OCT20	10132-OCT20
Hum Cell Leachate Vo	mL	-	-	975	969	818	984	995	1018	1007	476	512	550
pH	no unit	6.0-9.5	-	**5.49**	**4.64**	**5.30**	**5.96**	**4.95**	**5.86**	**5.11**	**4.77**	**5.19**	**5.36**
Acidity	mg/L as $CaCO_3$	-	-	7	10	7	3	4	2	4	5	5	4
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	5	22	20	26	26	24	27	43	46	42
SO_4	mg/L	-	-	1.6	6.7	6.9	10	9.6	9.2	9.3	24	20	15
F	mg/L	0.12	-	< 0.06	< 0.06	< 0.06	---	< 0.06	---	---	---	< 0.06	---
NH_3+NH_4	as N mg/L			<0.1	<0.1	<0.1	---	<0.1	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	0.000	0.000	0.000	---	0.000	---	---	---	---	---
Hg	mg/L	0.000026	-	< 0.00001	< 0.00001	0.00001	---	< 0.00001	---	---	---	< 0.00001	---
Ag	mg/L	0.00025	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---
Al	mg/L	0.005@pH<6.5	-	**0.007**	**0.039**	**0.006**	---	**0.022**	---	---	---	**0.058**	---
As	mg/L	0.005	0.10	< 0.0002	0.0002	< 0.0002	---	< 0.0002	---	---	---	< 0.0002	---
Ba	mg/L	-	-	0.00018	0.00021	0.00028	---	0.00056	---	---	---	0.00115	---
Be	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	< 0.000007	---	---	---	0.000019	---
B	mg/L	1.5	-	0.004	< 0.002	0.004	---	0.002	---	---	---	0.004	---
Bi	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	0.000020	---	---	---	< 0.000007	---
Ca	mg/L	-	-	0.20	0.80	1.45	---	2.41	---	---	---	4.60	---
Cd	mg/L	0.00009	-	0.000009	0.000007	0.000025	---	0.000055	---	---	---	**0.000203**	---
Co	mg/L	-	-	0.000038	0.000123	0.000306	---	0.000653	---	---	---	0.00177	---
Cr	mg/L	-	-	0.00014	< 0.00008	< 0.00008	---	< 0.00008	---	---	---	< 0.00008	---
Cu	mg/L	0.002	0.10	0.0003	0.0006	0.0004	---	0.0013	---	---	---	**0.0059**	---
Fe	mg/L	0.3	-	0.008	0.010	0.017	---	0.033	---	---	---	0.106	---
K	mg/L	-	-	0.056	0.082	0.077	---	0.083	---	---	---	0.138	---
Li	mg/L	-	-	0.0001	< 0.0001	0.0001	---	0.0001	---	---	---	0.0002	---
Mg	mg/L	-	-	0.027	0.093	0.174	---	0.274	---	---	---	0.457	---
Mn	mg/L	-	-	0.00421	0.0167	0.0345	---	0.0581	---	---	---	0.117	---
Mo	mg/L	0.073	-	0.00017	0.00020	0.00009	---	0.00005	---	---	---	0.00013	---
Na	mg/L	-	-	0.85	1.34	1.46	---	1.13	---	---	---	1.28	---
Ni	mg/L	0.03	0.25	0.0002	0.0003	0.0005	---	0.0008	---	---	---	0.0017	---
P	mg/L	-	-	< 0.003	< 0.003	< 0.003	---	< 0.003	---	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	0.00001	< 0.00001	0.00003	---	0.00004	---	---	---	0.00003	---
Sb	mg/L	-	-	< 0.0009	< 0.0009	< 0.0009	---	< 0.0009	---	---	---	< 0.0009	---
Se	mg/L	0.001	-	< 0.00004	< 0.00004	0.00005	---	0.00004	---	---	---	0.00007	---
Si	mg/L	-	-	0.35	1.44	1.92	---	2.48	---	---	---	2.07	---
Sn	mg/L	-	-	0.00014	0.00013	0.00016	---	0.00014	---	---	---	0.00009	---
Sr	mg/L	-	-	0.00159	0.00135	0.00142	---	0.00298	---	---	---	0.00547	---
Th	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	---	< 0.0001	---	---	---	< 0.0001	---
Ti	mg/L	-	-	0.00009	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	0.00006	---
Tl	mg/L	0.0008	-	< 0.000005	< 0.000005	< 0.000005	---	< 0.000005	---	---	---	< 0.000005	---
U	mg/L	0.015	-	0.000002	0.000006	0.000022	---	0.000007	---	---	---	0.000040	---
V	mg/L	-	-	0.00006	0.00003	< 0.00001	---	< 0.00001	---	---	---	< 0.00001	---
W	mg/L	-	-	0.00003	0.00007	0.00003	---	< 0.00002	---	---	---	0.00004	---
Y	mg/L	-	-	0.000017	0.000006	0.000014	---	0.000047	---	---	---	0.000500	---
Zn	mg/L	0.007	0.40	0.005	**0.012**	**0.013**	---	**0.016**	---	---	---	**0.049**	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	10	11	12	13	14	15	16	17	18	19
Date			Effective	21-Oct-20	28-Oct-20	04-Nov-20	11-Nov-20	18-Nov-20	25-Nov-20	02-Dec-20	09-Dec-20	16-Dec-20	23-Dec-20
LIMS			01-Jun-2021	10196-OCT20	10254-OCT20	10019-NOV20	10077-NOV20	10124-NOV20	10162-NOV20	10018-DEC20	10070-DEC20	10162-DEC20	10185-DEC20
Hum Cell Leachate Vol	mL	-	-	471	386	490	498	422	386	465	511	510	512
pH	no unit	6.0-9.5	-	**4.73**	**5.00**	**4.96**	**4.82**	**5.28**	**4.75**	**5.22**	**4.73**	**4.73**	**4.64**
Acidity	mg/L as $CaCO_3$	-	-	6	6	5	5	6	8	6	6	5	6
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	53	60	35	33	39	53	34	37	37	40
SO_4	mg/L	-	-	19	21	12	9.7	13	16	10	11	11	12
F	mg/L	0.12	-	---	---	< 0.06	---	---	---	< 0.06	---	---	---
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	---	---	< 0.00001	---	---	---	< 0.00001	---	---	---
Ag	mg/L	0.00025	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---
Al	mg/L	0.005@pH<6.5	-	---	---	**0.064**	---	---	---	**0.059**	---	---	---
As	mg/L	0.005	0.10	---	---	0.0004	---	---	---	< 0.0002	---	---	---
Ba	mg/L	-	-	---	---	0.00122	---	---	---	0.00166	---	---	---
Be	mg/L	-	-	---	---	0.000027	---	---	---	0.000029	---	---	---
B	mg/L	1.5	-	---	---	0.003	---	---	---	0.002	---	---	---
Bi	mg/L	-	-	---	---	< 0.000007	---	---	---	< 0.000007	---	---	---
Ca	mg/L	-	-	---	---	3.06	---	---	---	2.99	---	---	---
Cd	mg/L	0.00009	-	---	---	**0.000180**	---	---	---	**0.000143**	---	---	---
Co	mg/L	-	-	---	---	0.00168	---	---	---	0.00172	---	---	---
Cr	mg/L	-	-	---	---	< 0.00008	---	---	---	< 0.00008	---	---	---
Cu	mg/L	0.002	0.10	---	---	**0.0094**	---	---	---	**0.0095**	---	---	---
Fe	mg/L	0.3	-	---	---	0.118	---	---	---	0.110	---	---	---
K	mg/L	-	-	---	---	0.139	---	---	---	0.143	---	---	---
Li	mg/L	-	-	---	---	< 0.0001	---	---	---	0.0002	---	---	---
Mg	mg/L	-	-	---	---	0.324	---	---	---	0.311	---	---	---
Mn	mg/L	-	-	---	---	0.0833	---	---	---	0.0775	---	---	---
Mo	mg/L	0.073	-	---	---	0.00069	---	---	---	< 0.00004	---	---	---
Na	mg/L	-	-	---	---	0.84	---	---	---	0.75	---	---	---
Ni	mg/L	0.03	0.25	---	---	0.0013	---	---	---	0.0011	---	---	---
P	mg/L	-	-	---	---	< 0.003	---	---	---	< 0.003	---	---	---
Pb	mg/L	0.001	0.08	---	---	0.00011	---	---	---	< 0.00001	---	---	---
Sb	mg/L	-	-	---	---	< 0.0009	---	---	---	< 0.0009	---	---	---
Se	mg/L	0.001	-	---	---	0.00010	---	---	---	0.00008	---	---	---
Si	mg/L	-	-	---	---	2.54	---	---	---	1.09	---	---	---
Sn	mg/L	-	-	---	---	0.00007	---	---	---	< 0.00006	---	---	---
Sr	mg/L	-	-	---	---	0.00492	---	---	---	0.00557	---	---	---
Th	mg/L	-	-	---	---	< 0.0001	---	---	---	< 0.0001	---	---	---
Ti	mg/L	-	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---
Tl	mg/L	0.0008	-	---	---	< 0.000005	---	---	---	< 0.000005	---	---	---
U	mg/L	0.015	-	---	---	0.000069	---	---	---	0.000023	---	---	---
V	mg/L	-	-	---	---	0.00003	---	---	---	< 0.00001	---	---	---
W	mg/L	-	-	---	---	0.00012	---	---	---	< 0.00002	---	---	---
Y	mg/L	-	-	---	---	0.000537	---	---	---	0.000158	---	---	---
Zn	mg/L	0.007	0.40	---	---	**0.048**	---	---	---	**0.044**	---	---	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	20	21	22	23	24	25	26	27	28	29	30
Date			Effective	30-Dec-20	06-Jan-21	13-Jan-21	20-Jan-21	27-Jan-21	03-Feb-21	10-Feb-21	17-Feb-21	24-Feb-21	03-Mar-21	10-Mar-21
LIMS			01-Jun-2021	10240-DEC20	10025-JAN21	10066-JAN21	10142-JAN21	10207-JAN21	10018-FEB21	10044-FEB21	10166-FEB21	10262-FEB21	10020-MAR21	10120-MAR21
Hum Cell Leachate Vol	mL	-	-	517	498	515	472	507	513	502	502	490	519	535
pH	no unit	6.0-9.5	-	**4.51**	**4.56**	**4.67**	**4.58**	**4.55**	**4.82**	**4.59**	**4.74**	**4.55**	**4.77**	**4.42**
Acidity	mg/L as $CaCO_3$	-	-	7	7	6	5	8	5	6	6	7	7	9
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	47	44	43	36	44	38	41	38	41	41	49
SO_4	mg/L	-	-	12	12	13	13	13	11	12	13	12	12	12
F	mg/L	0.12	-	< 0.06	---	---	---	< 0.06	---	---	---	< 0.06	---	---
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001	---	---
Ag	mg/L	0.00025	-	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005	---	---
Al	mg/L	0.005@pH<6.5	-	**0.132**	---	---	---	**0.251**	---	---	---	**0.298**	---	---
As	mg/L	0.005	0.10	< 0.0002	---	---	---	< 0.0002	---	---	---	< 0.0002	---	---
Ba	mg/L	-	-	0.00222	---	---	---	0.00301	---	---	---	0.00302	---	---
Be	mg/L	-	-	0.000055	---	---	---	0.000081	---	---	---	0.000084	---	---
B	mg/L	1.5	-	0.003	---	---	---	0.005	---	---	---	< 0.002	---	---
Bi	mg/L	-	-	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.000007	---	---
Ca	mg/L	-	-	2.93	---	---	---	3.34	---	---	---	3.01	---	---
Cd	mg/L	0.00009	-	**0.000242**	---	---	---	**0.000407**	---	---	---	**0.000433**	---	---
Co	mg/L	-	-	0.00203	---	---	---	0.00235	---	---	---	0.00205	---	---
Cr	mg/L	-	-	< 0.00008	---	---	---	< 0.00008	---	---	---	0.00032	---	---
Cu	mg/L	0.002	0.10	**0.0253**	---	---	---	**0.0500**	---	---	---	**0.0655**	---	---
Fe	mg/L	0.3	-	0.295	---	---	---	**0.431**	---	---	---	**0.437**	---	---
K	mg/L	-	-	0.158	---	---	---	0.145	---	---	---	0.182	---	---
Li	mg/L	-	-	0.0002	---	---	---	0.0003	---	---	---	0.0003	---	---
Mg	mg/L	-	-	0.308	---	---	---	0.270	---	---	---	0.209	---	---
Mn	mg/L	-	-	0.0880	---	---	---	0.0965	---	---	---	0.0875	---	---
Mo	mg/L	0.073	-	0.00028	---	---	---	0.00016	---	---	---	0.00601	---	---
Na	mg/L	-	-	0.64	---	---	---	0.65	---	---	---	0.83	---	---
Ni	mg/L	0.03	0.25	0.0010	---	---	---	0.0011	---	---	---	0.0007	---	---
P	mg/L	-	-	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003	---	---
Pb	mg/L	0.001	0.08	0.00013	---	---	---	0.00050	---	---	---	0.00040	---	---
Sb	mg/L	-	-	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009	---	---
Se	mg/L	0.001	-	0.00009	---	---	---	0.00017	---	---	---	0.00016	---	---
Si	mg/L	-	-	4.66	---	---	---	5.06	---	---	---	4.12	---	---
Sn	mg/L	-	-	< 0.00006	---	---	---	0.00007	---	---	---	< 0.00006	---	---
Sr	mg/L	-	-	0.00718	---	---	---	0.00704	---	---	---	0.00917	---	---
Th	mg/L	-	-	< 0.0001	---	---	---	< 0.0001	---	---	---	< 0.0001	---	---
Ti	mg/L	-	-	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005	---	---
Tl	mg/L	0.0008	-	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005	---	---
U	mg/L	0.015	-	0.000130	---	---	---	0.000150	---	---	---	0.000169	---	---
V	mg/L	-	-	< 0.00001	---	---	---	< 0.00001	---	---	---	0.00010	---	---
W	mg/L	-	-	< 0.00002	---	---	---	0.00002	---	---	---	< 0.00002	---	---
Y	mg/L	-	-	0.00122	---	---	---	0.00238	---	---	---	0.00288	---	---
Zn	mg/L	0.007	0.40	**0.055**	---	---	---	**0.079**	---	---	---	**0.082**	---	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	31	32	33	34	35	36	37	38	39	40
Date			Effective	17-Mar-21	24-Mar-21	31-Mar-21	07-Apr-21	14-Apr-21	21-Apr-21	28-Apr-21	05-May-21	12-May-21	19-May-21
LIMS			01-Jun-2021	10150-MAR21	10256-MAR21	10314-MAR21	10031-APR21	10114-APR21	10171-APR21	10199-APR21	10023-MAY21	10057-MAY21	10155-MAY21
Hum Cell Leachate Vol	mL	-	-	533	512	488	534	520	504	499	538	509	526
pH	no unit	6.0-9.5	-	**4.68**	**4.60**	**4.58**	**4.48**	**4.52**	**4.56**	**4.64**	**4.35**	**4.51**	**4.53**
Acidity	mg/L as $CaCO_3$	-	-	8	9	7	6	9	8	7	8	8	7
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	37	40	42	42	39	36	35	38	40	40
SO_4	mg/L	-	-	11	12	12	11	11	11	14	14	17	13
F	mg/L	0.12	-	---	< 0.06	---	---	---	< 0.06	---	---	---	< 0.06
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	0.00001
Ag	mg/L	0.00025	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Al	mg/L	0.005@pH<6.5	-	---	**0.431**	---	---	---	**0.370**	---	---	---	**0.393**
As	mg/L	0.005	0.10	---	< 0.0002	---	---	---	0.0002	---	---	---	< 0.0002
Ba	mg/L	-	-	---	0.0041	---	---	---	0.00329	---	---	---	0.00325
Be	mg/L	-	-	---	0.00011	---	---	---	0.000076	---	---	---	0.000078
B	mg/L	1.5	-	---	0.003	---	---	---	< 0.002	---	---	---	< 0.002
Bi	mg/L	-	-	---	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.00001
Ca	mg/L	-	-	---	3.33	---	---	---	2.45	---	---	---	2.00
Cd	mg/L	0.00009	-	---	**0.00060**	---	---	---	**0.000434**	---	---	---	**0.00037**
Co	mg/L	-	-	---	0.0023	---	---	---	0.001809	---	---	---	0.00171
Cr	mg/L	-	-	---	< 0.00008	---	---	---	< 0.00008	---	---	---	< 0.00008
Cu	mg/L	0.002	0.10	---	**0.101**	---	---	---	**0.0930**	---	---	---	**0.102**
Fe	mg/L	0.3	-	---	**0.554**	---	---	---	**0.427**	---	---	---	**0.351**
K	mg/L	-	-	---	0.129	---	---	---	0.131	---	---	---	0.083
Li	mg/L	-	-	---	0.0003	---	---	---	0.0005	---	---	---	0.0002
Mg	mg/L	-	-	---	0.222	---	---	---	0.146	---	---	---	0.123
Mn	mg/L	-	-	---	0.0979	---	---	---	0.0694	---	---	---	0.0626
Mo	mg/L	0.073	-	---	< 0.00004	---	---	---	< 0.00004	---	---	---	0.00013
Na	mg/L	-	-	---	0.59	---	---	---	0.75	---	---	---	0.34
Ni	mg/L	0.03	0.25	---	0.0009	---	---	---	0.0010	---	---	---	0.0004
P	mg/L	-	-	---	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003
Pb	mg/L	0.001	0.08	---	0.00058	---	---	---	0.00045	---	---	---	0.00054
Sb	mg/L	-	-	---	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009
Se	mg/L	0.001	-	---	0.00013	---	---	---	0.00008	---	---	---	0.00011
Si	mg/L	-	-	---	5.97	---	---	---	4.40	---	---	---	3.64
Sn	mg/L	-	-	---	0.00007	---	---	---	< 0.00006	---	---	---	< 0.00006
Sr	mg/L	-	-	---	0.0070	---	---	---	0.00561	---	---	---	0.00454
Th	mg/L	-	-	---	< 0.0001	---	---	---	< 0.0001	---	---	---	< 0.0001
Ti	mg/L	-	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Tl	mg/L	0.0008	-	---	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005
U	mg/L	0.015	-	---	0.00023	---	---	---	0.000162	---	---	---	0.000166
V	mg/L	-	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001
W	mg/L	-	-	---	< 0.00002	---	---	---	0.00002	---	---	---	< 0.00002
Y	mg/L	-	-	---	0.0041	---	---	---	0.00342	---	---	---	0.00373
Zn	mg/L	0.007	0.40	---	**0.096**	---	---	---	**0.066**	---	---	---	**0.061**

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	41
Date			Effective	26-May-21
LIMS			01-Jun-2021	10230-MAY21
Hum Cell Leachate Vo	mL	-	-	501
pH	no unit	6.0-9.5	-	**4.58**
Acidity	mg/L as $CaCO_3$	-	-	10
Alkalinity	mg/L as $CaCO_3$	-	-	< 2
Conductivity	µS/cm	-	-	38
SO_4	mg/L	-	-	15
F	mg/L	0.12	-	---
NH_3+NH_4	as N mg/L			---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---
Hg	mg/L	0.000026	-	---
Ag	mg/L	0.00025	-	---
Al	mg/L	0.005@pH<6.5	-	---
As	mg/L	0.005	0.10	---
Ba	mg/L	-	-	---
Be	mg/L	-	-	---
B	mg/L	1.5	-	---
Bi	mg/L	-	-	---
Ca	mg/L	-	-	---
Cd	mg/L	0.00009	-	---
Co	mg/L	-	-	---
Cr	mg/L	-	-	---
Cu	mg/L	0.002	0.10	---
Fe	mg/L	0.3	-	---
K	mg/L	-	-	---
Li	mg/L	-	-	---
Mg	mg/L	-	-	---
Mn	mg/L	-	-	---
Mo	mg/L	0.073	-	---
Na	mg/L	-	-	---
Ni	mg/L	0.03	0.25	---
P	mg/L	-	-	---
Pb	mg/L	0.001	0.08	---
Sb	mg/L	-	-	---
Se	mg/L	0.001	-	---
Si	mg/L	-	-	---
Sn	mg/L	-	-	---
Sr	mg/L	-	-	---
Th	mg/L	-	-	---
Ti	mg/L	-	-	---
Tl	mg/L	0.0008	-	---
U	mg/L	0.015	-	---
V	mg/L	-	-	---
W	mg/L	-	-	---
Y	mg/L	-	-	---
Zn	mg/L	0.007	0.40	---

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Summary of ABA Test Data

Parameter	Units	Ref No.: 10139-JUL20
Sulphur (S)	%	0.536
Sulphide (S^{-})	%	0.50
NP	t $CaCO_3$/1000 t	4.5
CO_3 NP	t $CaCO_3$/1000 t	1.5

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
0	975	5.49	7	<2	5	1.6
1	969	4.64	10	<2	22	6.7
2	818	5.30	7	<2	20	6.9
3	984	5.96	3	<2	26	10
4	995	4.95	4	<2	26	9.6
5	1018	5.86	2	<2	24	9.2
6	1007	5.11	4	<2	27	9.3
7	476	4.77	5	<2	43	24
8	512	5.19	5	<2	46	20
9	550	5.36	4	<2	42	15
10	471	4.73	6	<2	53	19
11	386	5.00	6	<2	60	21
12	490	4.96	5	<2	35	12
13	498	4.82	5	<2	33	9.7
14	422	5.28	6	<2	39	13
15	386	4.75	8	<2	53	16
16	465	5.22	6	<2	34	10
17	511	4.73	6	<2	37	11
18	510	4.73	5	<2	37	11
19	512	4.64	6	<2	40	12
20	517	4.51	7	<2	47	12

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %
1.6	1.6	0.01	0.01
6.5	8.1	0.04	0.05
5.6	13.7	0.04	0.09
9.8	23.5	0.07	0.16
9.6	33.1	0.06	0.22
9.4	42.5	0.06	0.28
9.4	51.8	0.06	0.35
11.4	63.2	0.08	0.42
10.2	73.5	0.07	0.49
8.3	81.7	0.06	0.54
8.9	90.7	0.06	0.60
8.1	98.8	0.05	0.66
5.9	104.7	0.04	0.70
4.8	109.5	0.03	0.73
5.5	115.0	0.04	0.77
6.2	121.2	0.04	0.81
4.7	125.8	0.03	0.84
5.6	131.4	0.04	0.88
5.6	137.0	0.04	0.91
6.1	143.2	0.04	0.95
6.2	149.4	0.04	1.00

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
1.63	0.04	0.11
6.76	0.19	0.56
5.88	0.32	0.95
10.25	0.54	1.63
9.95	0.77	2.30
9.76	0.98	2.95
9.76	1.20	3.60
11.90	1.46	4.39
10.67	1.70	5.10
8.59	1.89	5.68
9.32	2.10	6.30
8.44	2.29	6.86
6.13	2.42	7.27
5.03	2.53	7.60
5.71	2.66	7.99
6.43	2.80	8.41
4.84	2.91	8.74
5.86	3.04	9.13
5.84	3.17	9.52
6.40	3.31	9.94
6.46	3.46	10.37

** Initial Week 0 leachate may included soluble sulphate, and may not indicate oxidation of sulphide in the sample material has occurred.*

[1] *Calculated values*

Summary - Weeks 0 to 20

Maximum Value	5.96	10	2	60	24	11.4	-	0.08	-	11.90	-	-
Minimum Value	4.51	2	<2	5	1.6	1.6	-	0.01	-	1.63	-	-
Average Value	4.92	6	2	36	12	7.1	-	0.05	-	7.41	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Changes to Head Sample after 20 Weeks [1]

Parameter	Units	Ref No.: 10139-JUL20
Sulphide ($S^{=}$) Remaining	%	0.50
NP Remaining	t $CaCO_3$/1000 t	4.3
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.3

Leachate Parameters Measured | ***Acid Generation*** [1] | ***Acid Neutralization*** [1]

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
21	498	4.56	7	<2	44	12	6.0	155.4	0.04	1.04	6.23	3.60	10.79
22	515	4.67	6	<2	43	13	6.7	162.1	0.04	1.08	6.97	3.75	11.25
23	472	4.58	5	<2	36	13	6.1	168.2	0.04	1.12	6.39	3.89	11.68
24	507	4.55	8	<2	44	13	6.6	174.8	0.04	1.17	6.87	4.05	12.14
25	513	4.82	5	<2	38	11	5.6	180.4	0.04	1.20	5.88	4.18	12.53
26	502	4.59	6	<2	41	12	6.0	186.5	0.04	1.24	6.28	4.32	12.95
27	502	4.74	6	<2	38	13	6.5	193.0	0.04	1.29	6.80	4.47	13.40
28	490	4.55	7	<2	41	12	5.9	198.9	0.04	1.33	6.13	4.60	13.81
29	519	4.77	7	<2	41	12	6.2	205.1	0.04	1.37	6.49	4.75	14.24
30	535	4.42	9	<2	49	12	6.4	211.5	0.04	1.41	6.69	4.90	14.69
31	533	4.68	8	<2	37	11	5.9	217.4	0.04	1.45	6.11	5.03	15.10
32	512	4.60	9	<2	40	12	6.1	223.5	0.04	1.49	6.40	5.17	15.52
33	488	4.58	7	<2	42	12	5.9	229.4	0.04	1.53	6.10	5.31	15.93
34	534	4.48	6	<2	42	11	5.9	235.2	0.04	1.57	6.12	5.45	16.34
35	520	4.52	9	<2	39	11	5.7	241.0	0.04	1.61	5.96	5.58	16.73
36	504	4.56	8	<2	36	11	5.5	246.5	0.04	1.64	5.78	5.71	17.12
37	499	4.64	7	<2	35	14	7.0	253.5	0.05	1.69	7.28	5.87	17.60
38	538	4.35	8	<2	38	14	7.5	261.0	0.05	1.74	7.85	6.04	18.13
39	509	4.51	8	<2	40	17	8.7	269.7	0.06	1.80	9.01	6.24	18.73
40	526	4.53	7	<2	40	13	6.8	276.5	0.05	1.84	7.12	6.40	19.20

[1] *Calculated values*

Summary - Weeks 0 to 40

Maximum Value	5.96	10	2	60	24	11.4	-	0.06	-	12	-	-
Minimum Value	4.35	2	<2	5	1.6	1.6	-	0.01	-	1.6	-	-
Average Value	4.71	6	2	38	12	6.7	-	0.04	-	7.03	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Changes to Head Sample after 40 Weeks [1]

Parameter	Units	Ref No.: 10139-JUL20
Sulphide ($S^{=}$) Remaining	%	0.49
NP Remaining	t $CaCO_3$/1000 t	4.2
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.2

Leachate Parameters Measured

Weekly Leach	Volume Collected	pH	Acidity	Alkalinity	Conductivity	SO_4
No.	mL	units	$CaCO_3$ eq. mg/L	$CaCO_3$ eq. mg/L	µS/cm	mg/L
41	501	4.58	10	<2	38	15

Acid Generation [1]

SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^{=}$ Depletion	Cumulative $S^{=}$ Depletion
g/t/wk	g/t	%	%
7.5	284.0	0.05	1.89

Acid Neutralization [1]

NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
$CaCO_3$, g/t/wk	%	%
7.83	6.57	19.72

[1] *Calculated values*

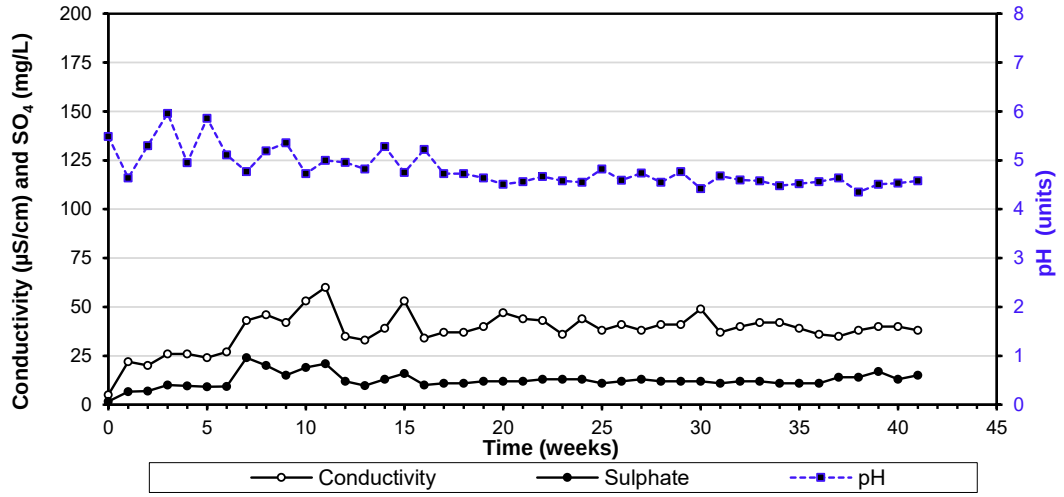
Summary - Weeks 0 to 60

Maximum Value	5.96	10	2	60	24	11.4	-	0.06	-	11.90	-	-
Minimum Value	4.35	2	<2	5	1.6	1.6	-	0.01	-	1.63	-	-
Average Value	4.57	6	2	38	12	6.8	-	0.05	-	7.04	-	-

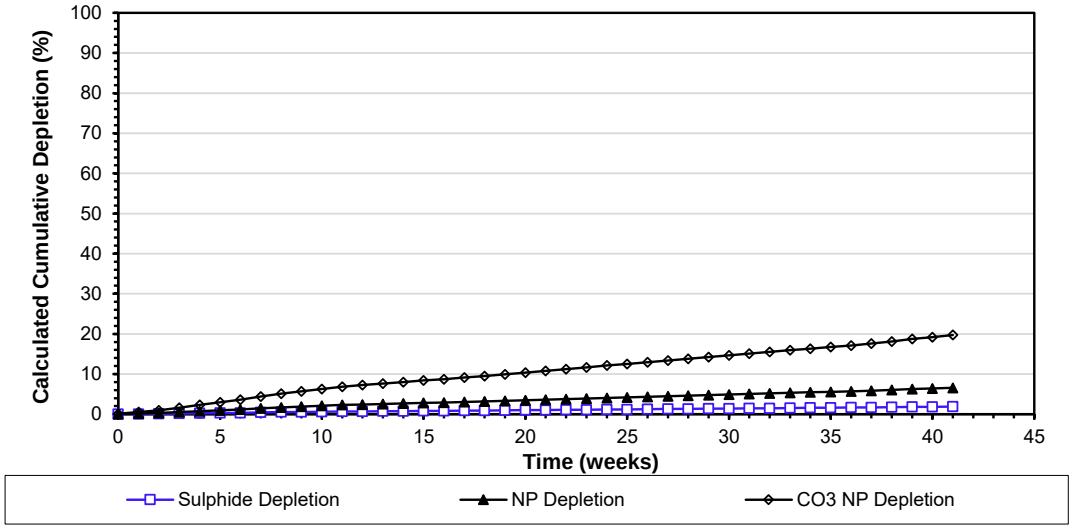
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Conductivity, Sulphate, and pH in Weekly Humidity Cell Leachate - M-LGO CNP DPL



Cumulative Sulphide and NP Depletion M-LGO CNP DPL

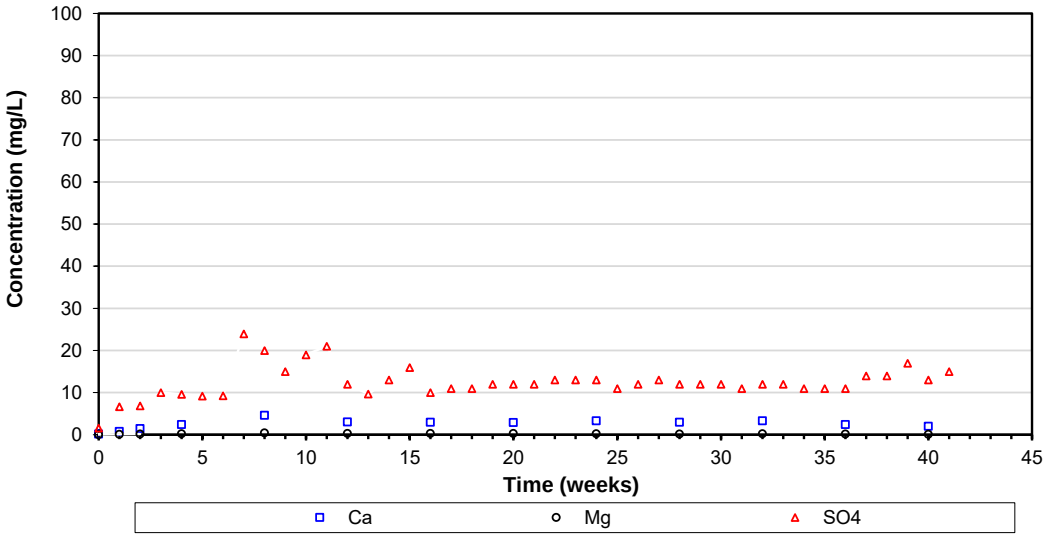


Note: NP depletion calculated based on sulphate assay.

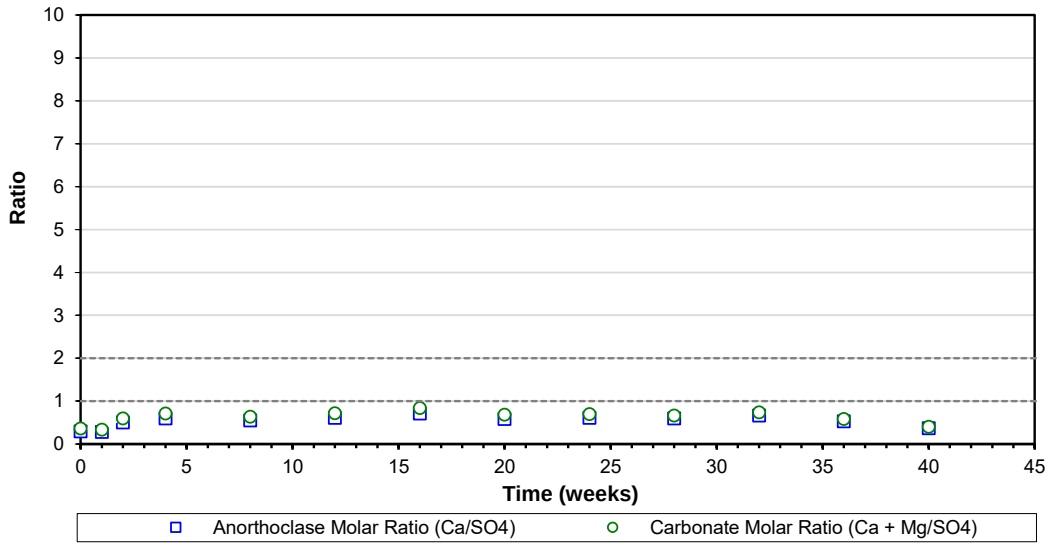
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL



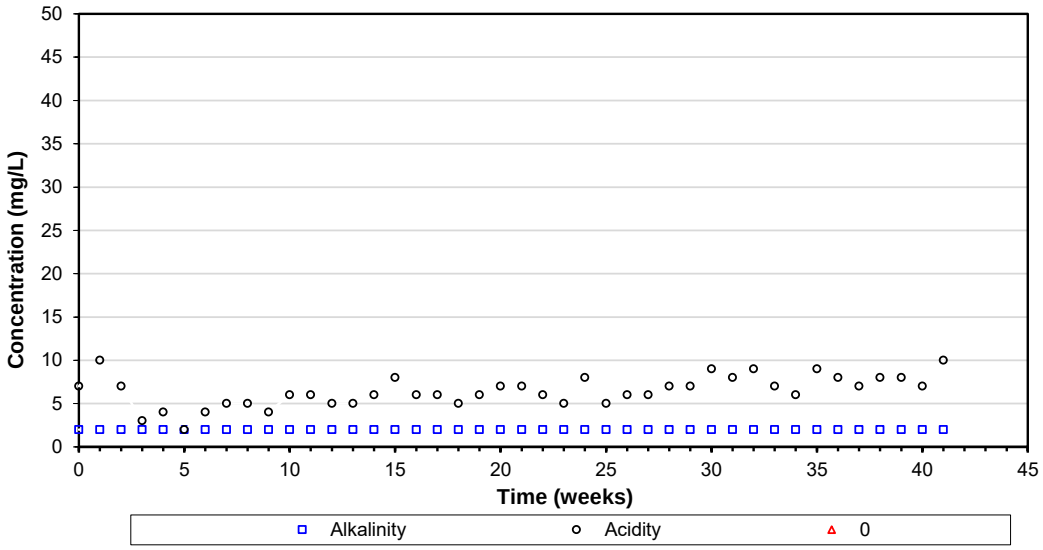
Carbonate (Ca + Mg/SO$_4$) and Anorthoclase (Ca/SO$_4$) Molar Ratios M-LGO CNP DPL



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

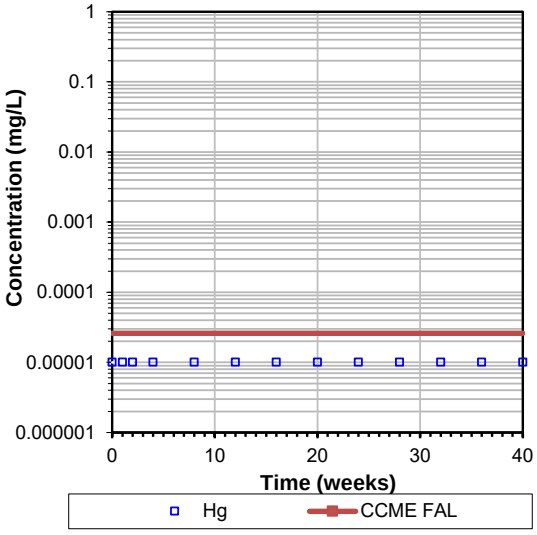
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

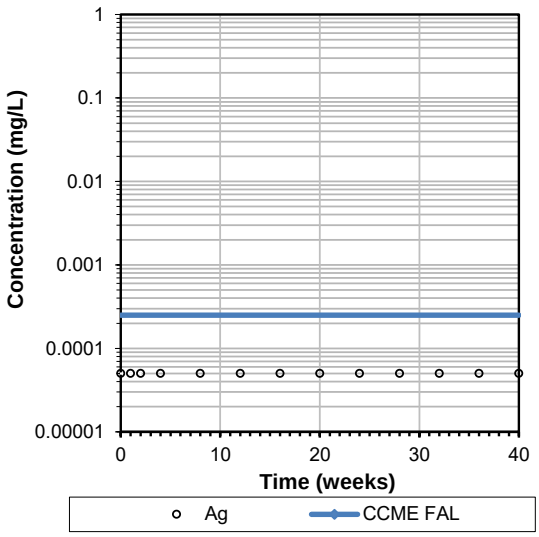


TEST REPORT

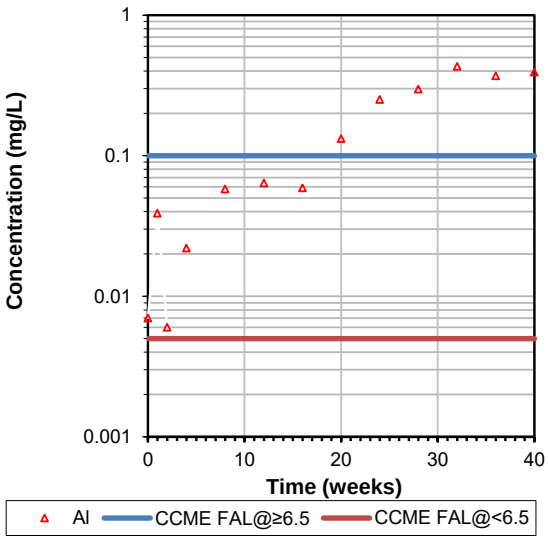
Humidity Cell Test (ASTM D 5744-96)

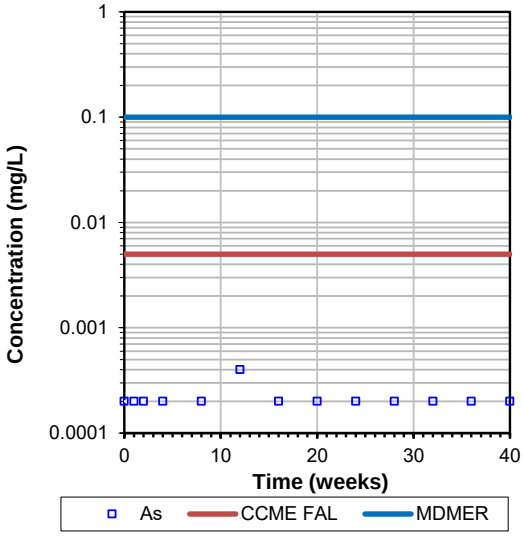
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

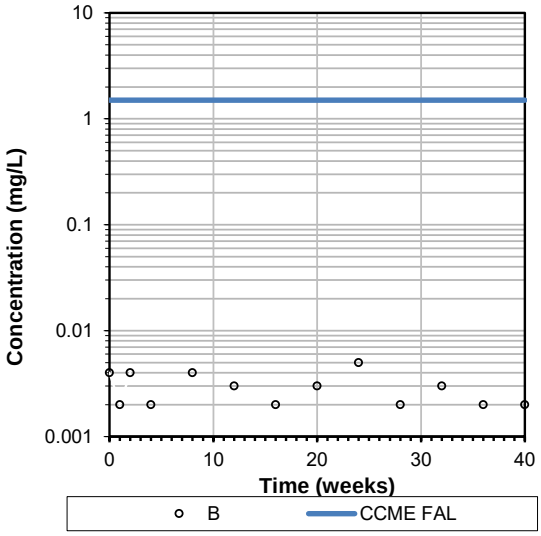


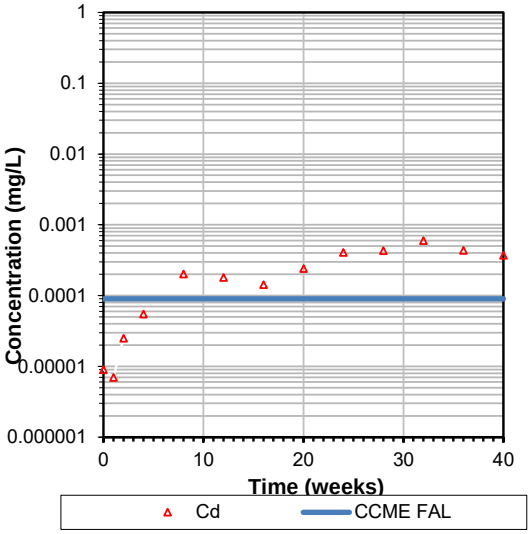


TEST REPORT

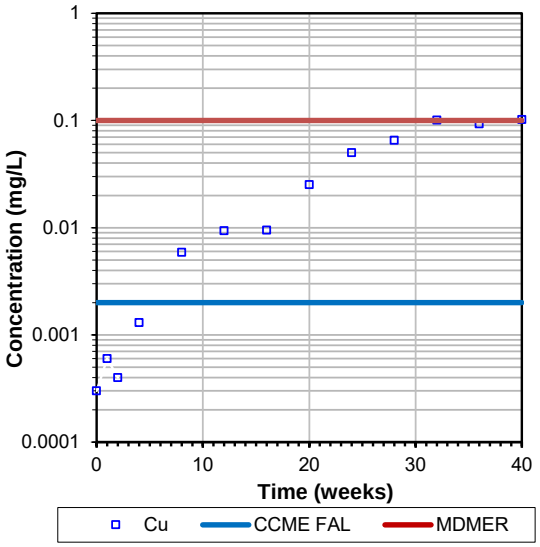
Humidity Cell Test (ASTM D 5744-96)

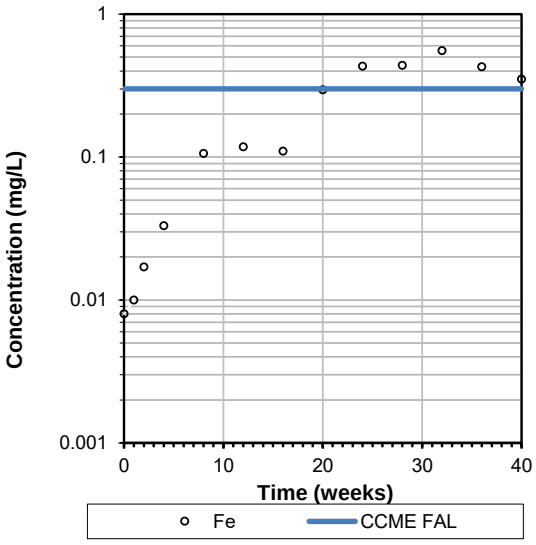
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

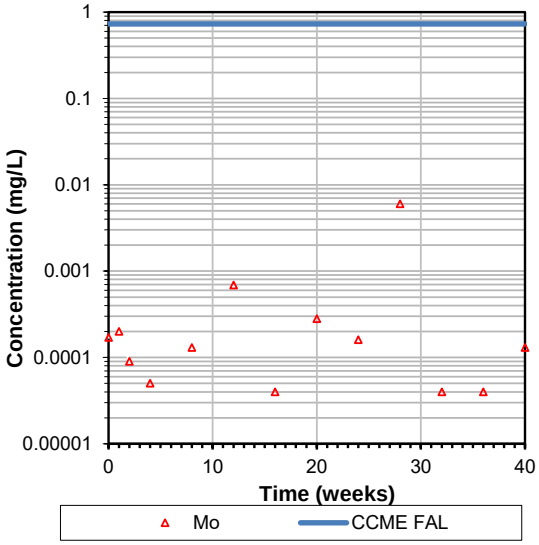


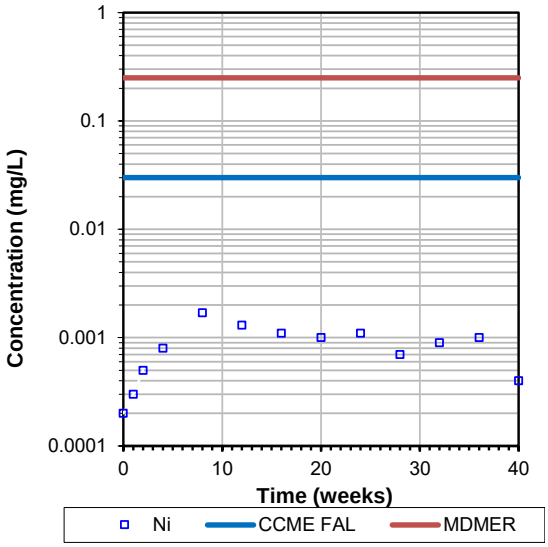


TEST REPORT

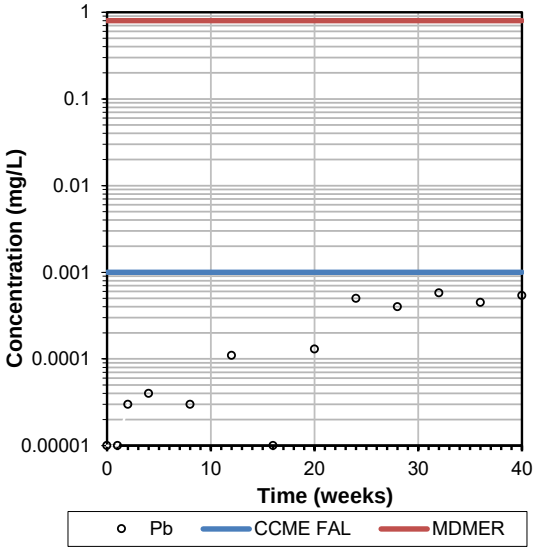
Humidity Cell Test (ASTM D 5744-96)

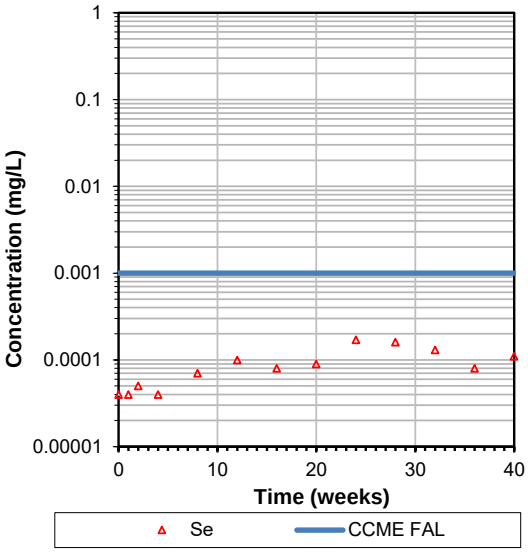
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

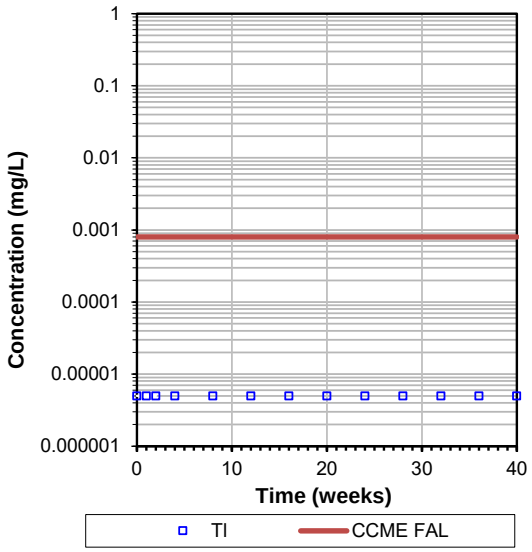


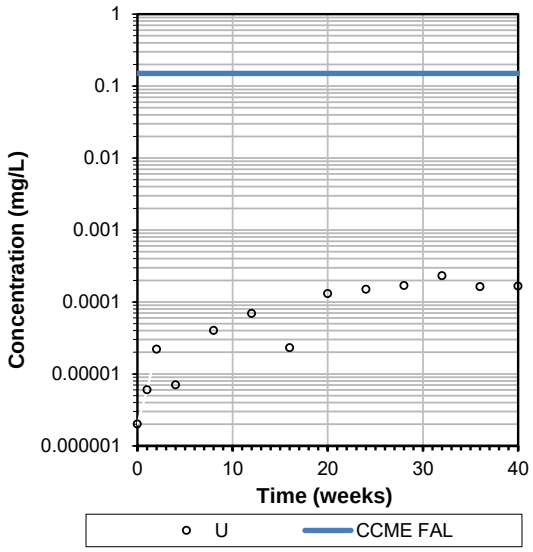


TEST REPORT

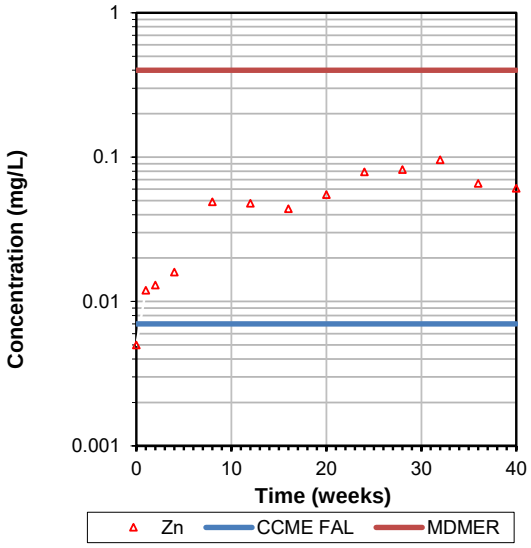
Humidity Cell Test (ASTM D 5744-96)

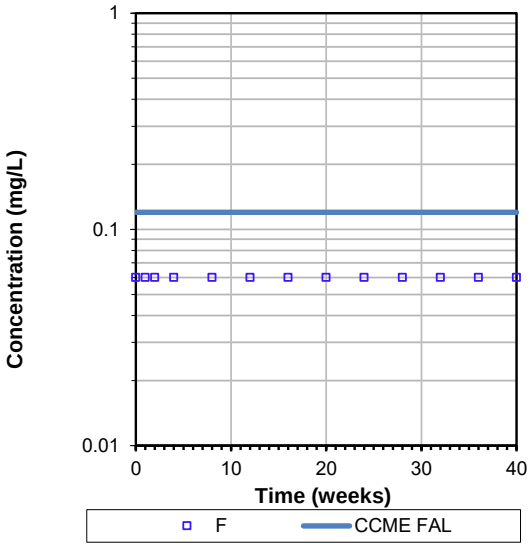
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	3	4	5	6	7	8	9	10
Date			Effective	12-Aug-20	19-Aug-20	26-Aug-20	02-Sep-20	09-Sep-20	16-Sep-20	23-Sep-20	30-Sep-20	07-Oct-20	14-Oct-20	21-Oct-20
LIMS			01-Jun-2021	10106-AUG20	10145-AUG20	10223-AUG20	10008-SEP20	10092-SEP20	10154-SEP20	10233-SEP20	10315-SEP20	10022-OCT20	10133-OCT20	10197-OCT20
Hum Cell Leachate Vol	mL	-	-	568	846	859	813	890	899	831	486	394	502	319
pH	no unit	6.0-9.5	-	**5.73**	**5.96**	**5.42**	**5.66**	**5.52**	**5.45**	**5.18**	**4.98**	**4.84**	**4.41**	**4.36**
Acidity	mg/L as $CaCO_3$	-	-	15	9	6	3	3	4	4	14	15	18	8
Alkalinity	mg/L as $CaCO_3$	-	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	110	32	42	54	54	71	85	66	68	177	61
SO_4	mg/L	-	-	33	10	15	24	21	28	48	31	28	74	19
F	mg/L	0.12	-	< 0.06	< 0.06	< 0.06	---	< 0.06	---	---	---	< 0.06	---	---
NH_3+NH_4	as N mg/L	-	-	0.1	<0.1	<0.1	---	<0.1	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	0.000	0.000	0.000	---	0.000	---	---	---	---	---	---
CN_T	mg/L	-	0.50	0.004	0.002	0.002	---	< 0.002	---	---	---	< 0.002	---	---
CN_{WAD}	mg/L	0.005 as CNF	-	0.003	0.002	0.002	---	< 0.002	---	---	---	< 0.002	---	---
Hg	mg/L	0.000026	-	< 0.00001	< 0.00001	0.00001	---	< 0.00001	---	---	---	< 0.00001	---	---
Ag	mg/L	0.00025	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---	---
Al	mg/L	0.005@pH<6.5	-	0.001	0.016	0.002	---	0.006	---	---	---	**0.077**	---	---
As	mg/L	0.005	0.10	< 0.0002	< 0.0002	< 0.0002	---	< 0.0002	---	---	---	0.0002	---	---
Ba	mg/L	-	-	0.00100	0.00074	0.00031	---	0.00140	---	---	---	0.00470	---	---
Be	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	< 0.000007	---	---	---	0.000034	---	---
B	mg/L	1.5	-	0.011	0.010	0.004	---	0.009	---	---	---	0.007	---	---
Bi	mg/L	-	-	< 0.000007	< 0.000007	0.000024	---	< 0.000007	---	---	---	< 0.000007	---	---
Ca	mg/L	-	-	10.1	3.03	4.18	---	6.32	---	---	---	6.74	---	---
Cd	mg/L	0.00009	-	0.000043	0.000004	0.000026	---	0.000050	---	---	---	**0.000283**	---	---
Co	mg/L	-	-	0.00113	0.000272	0.000743	---	0.00218	---	---	---	0.00648	---	---
Cr	mg/L	-	-	< 0.00008	< 0.00008	< 0.00008	---	< 0.00008	---	---	---	< 0.00008	---	---
Cu	mg/L	0.002	0.10	**0.0024**	0.0003	0.0009	---	**0.0028**	---	---	---	**0.0388**	---	---
Fe	mg/L	0.3	-	< 0.007	< 0.007	0.011	---	0.007	---	---	---	0.147	---	---
K	mg/L	-	-	0.322	0.335	0.052	---	0.088	---	---	---	0.081	---	---
Li	mg/L	-	-	0.0009	0.0011	0.0003	---	0.0004	---	---	---	0.0007	---	---
Mg	mg/L	-	-	3.76	0.926	1.24	---	1.52	---	---	---	1.33	---	---
Mn	mg/L	-	-	0.227	0.0657	0.117	---	0.159	---	---	---	0.198	---	---
Mo	mg/L	0.073	-	< 0.00004	0.00091	< 0.00004	---	0.00011	---	---	---	< 0.00004	---	---
Na	mg/L	-	-	2.61	2.98	0.52	---	0.51	---	---	---	0.48	---	---
Ni	mg/L	0.03	0.25	0.0021	0.0005	0.0013	---	0.0037	---	---	---	0.0133	---	---
P	mg/L	-	-	0.019	< 0.003	< 0.003	---	< 0.003	---	---	---	< 0.003	---	---
Pb	mg/L	0.001	0.08	0.00008	< 0.00001	< 0.00001	---	0.00003	---	---	---	0.00027	---	---
Sb	mg/L	-	-	0.0009	< 0.0009	< 0.0009	---	< 0.0009	---	---	---	< 0.0009	---	---
Se	mg/L	0.001	-	0.00034	0.00007	0.00009	---	0.00008	---	---	---	0.00009	---	---
Si	mg/L	-	-	0.89	0.33	0.40	---	0.57	---	---	---	0.88	---	---
Sn	mg/L	-	-	0.00034	0.00006	0.00024	---	< 0.00006	---	---	---	0.00006	---	---
Sr	mg/L	-	-	0.00887	0.0330	0.00312	---	0.00636	---	---	---	0.0126	---	---
Th	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	---	< 0.0001	---	---	---	< 0.0001	---	---
Ti	mg/L	-	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---	---
Tl	mg/L	0.0008	-	< 0.000005	< 0.000005	< 0.000005	---	< 0.000005	---	---	---	< 0.000005	---	---
U	mg/L	0.015	-	< 0.000002	0.000004	< 0.000002	---	< 0.000002	---	---	---	0.000034	---	---
V	mg/L	-	-	< 0.00001	0.00002	< 0.00001	---	< 0.00001	---	---	---	< 0.00001	---	---
W	mg/L	-	-	0.00005	0.00009	< 0.00002	---	< 0.00002	---	---	---	0.00025	---	---
Y	mg/L	-	-	0.000016	< 0.000002	0.000006	---	0.000066	---	---	---	0.000901	---	---
Zn	mg/L	0.007	0.40	**0.016**	0.003	0.008	---	**0.019**	---	---	---	**0.064**	---	---

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	11	12	13	14	15	16	17	18	19	20	21
Date			Effective	28-Oct-20	04-Nov-20	11-Nov-20	18-Nov-20	25-Nov-20	02-Dec-20	09-Dec-20	16-Dec-20	23-Dec-20	30-Dec-20	06-Jan-21
LIMS			01-Jun-2021	10255-OCT20	10020-NOV20	10078-NOV20	10125-NOV20	10163-NOV20	10019-DEC20	10071-DEC20	10163-DEC20	10186-DEC20	10241-DEC20	10026-JAN21
Hum Cell Leachate Vol	mL	-	-	673	755	420	304	308	298	289	353	282	250	304
pH	no unit	6.0-9.5	-	**4.28**	**4.02**	**3.70**	**3.76**	**3.21**	**3.02**	**2.98**	**2.84**	**2.73**	**2.70**	**2.75**
Acidity	mg/L as $CaCO_3$	-	-	14	49	101	112	174	198	373	454	547	585	556
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	243	336	561	498	602	691	970	1160	1400	1460	1380
SO_4	mg/L	-	-	100	130	240	180	220	290	420	470	630	650	560
F	mg/L	0.12	-	---	**0.29**	---	---	---	**0.21**	---	---	---	**0.16**	---
NH_3+NH_4	as N mg/L	-	-	---	---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---	---
CN_T	mg/L	-	0.50	---	< 0.002	---	---	---	< 0.002	---	---	---	< 0.002	---
CN_{WAD}	mg/L	0.005 as CNF	-	---	< 0.002	---	---	---	< 0.002	---	---	---	0.002	---
Hg	mg/L	0.000026	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001	---
Ag	mg/L	0.00025	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	0.00005	---
Al	mg/L	0.005@pH<6.5	-	---	**4.50**	---	---	---	**27.8**	---	---	---	**51.8**	---
As	mg/L	0.005	0.10	---	0.0038	---	---	---	0.0043	---	---	---	0.0046	---
Ba	mg/L	-	-	---	0.0338	---	---	---	0.0637	---	---	---	0.0555	---
Be	mg/L	-	-	---	0.000852	---	---	---	0.00236	---	---	---	0.00233	---
B	mg/L	1.5	-	---	0.004	---	---	---	0.004	---	---	---	0.007	---
Bi	mg/L	-	-	---	< 0.000007	---	---	---	< 0.000007	---	---	---	0.000080	---
Ca	mg/L	-	-	---	14.4	---	---	---	11.1	---	---	---	5.10	---
Cd	mg/L	0.00009	-	---	**0.00454**	---	---	---	**0.00459**	---	---	---	**0.00530**	---
Co	mg/L	-	-	---	0.0851	---	---	---	0.0567	---	---	---	0.0901	---
Cr	mg/L	-	-	---	0.00073	---	---	---	0.0276	---	---	---	0.166	---
Cu	mg/L	0.002	0.10	---	**0.688**	---	---	---	**1.67**	---	---	---	**1.20**	---
Fe	mg/L	0.3	-	---	**3.06**	---	---	---	**13.9**	---	---	---	**69.3**	---
K	mg/L	-	-	---	0.612	---	---	---	0.853	---	---	---	0.830	---
Li	mg/L	-	-	---	0.0072	---	---	---	0.0083	---	---	---	0.0295	---
Mg	mg/L	-	-	---	13.6	---	---	---	4.36	---	---	---	10.1	---
Mn	mg/L	-	-	---	1.83	---	---	---	0.506	---	---	---	0.727	---
Mo	mg/L	0.073	-	---	0.00024	---	---	---	0.00022	---	---	---	0.00031	---
Na	mg/L	-	-	---	4.79	---	---	---	3.75	---	---	---	4.71	---
Ni	mg/L	0.03	0.25	---	**0.187**	---	---	---	**0.0906**	---	---	---	**0.0997**	---
P	mg/L	-	-	---	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	---	**0.00138**	---	---	---	**0.0134**	---	---	---	**0.0580**	---
Sb	mg/L	-	-	---	< 0.0009	---	---	---	< 0.0009	---	---	---	0.0011	---
Se	mg/L	0.001	-	---	0.00093	---	---	---	**0.00105**	---	---	---	0.00085	---
Si	mg/L	-	-	---	3.84	---	---	---	15.4	---	---	---	18.5	---
Sn	mg/L	-	-	---	0.00007	---	---	---	0.00016	---	---	---	0.00041	---
Sr	mg/L	-	-	---	0.0501	---	---	---	0.0378	---	---	---	0.0266	---
Th	mg/L	-	-	---	< 0.0001	---	---	---	0.0028	---	---	---	0.0108	---
Ti	mg/L	-	-	---	0.00008	---	---	---	< 0.00005	---	---	---	0.00014	---
Tl	mg/L	0.0008	-	---	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005	---
U	mg/L	0.015	-	---	0.00105	---	---	---	0.00328	---	---	---	0.00420	---
V	mg/L	-	-	---	0.00002	---	---	---	< 0.00001	---	---	---	0.00025	---
W	mg/L	-	-	---	0.00054	---	---	---	0.00006	---	---	---	0.00055	---
Y	mg/L	-	-	---	0.0365	---	---	---	0.105	---	---	---	0.0851	---
Zn	mg/L	0.007	0.40	---	**0.793**	---	---	---	**0.603**	---	---	---	**0.606**	---

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	22	23	24	25	26	27	28	29	30	31	32
Date			Effective	13-Jan-21	20-Jan-21	27-Jan-21	03-Feb-21	10-Feb-21	17-Feb-21	24-Feb-21	03-Mar-21	10-Mar-21	17-Mar-21	24-Mar-21
LIMS			01-Jun-2021	10067-JAN21	10143-JAN21	10208-JAN21	10019-FEB21	10045-FEB21	10167-FEB21	10263-FEB21	10021-MAR21	10121-MAR21	10151-MAR21	10257-MAR21
Hum Cell Leachate Vol	mL	-	-	307	398	372	302	386	269	319	347	313	418	345
pH	no unit	6.0-9.5	-	**2.71**	**2.74**	**2.77**	**2.69**	**2.75**	**2.74**	**2.68**	**2.77**	**2.81**	**2.80**	**2.82**
Acidity	mg/L as $CaCO_3$	-	-	589	492	450	468	430	512	448	424	423	339	334
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	1510	1330	1320	1400	1270	1390	1370	1260	1290	1110	1080
SO_4	mg/L	-	-	660	520	500	540	490	560	530	470	460	360	410
F	mg/L	0.12	-	---	---	< 0.06	---	---	---	< 0.06	---	---	---	**0.29**
NH_3+NH_4	as N mg/L	-	-	---	---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---	---
CN_T	mg/L	-	0.50	---	---	< 0.002	---	---	---	< 0.002	---	---	---	< 0.002
CN_{WAD}	mg/L	0.005 as CNF	-	---	---	< 0.002	---	---	---	< 0.002	---	---	---	< 0.002
Hg	mg/L	0.000026	-	---	---	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001
Ag	mg/L	0.00025	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Al	mg/L	0.005@pH<6.5	-	---	---	**37.6**	---	---	---	**40.8**	---	---	---	**31.3**
As	mg/L	0.005	0.10	---	---	0.0026	---	---	---	0.0019	---	---	---	0.0010
Ba	mg/L	-	-	---	---	0.0398	---	---	---	0.0305	---	---	---	0.0310
Be	mg/L	-	-	---	---	0.00117	---	---	---	0.00146	---	---	---	0.0012
B	mg/L	1.5	-	---	---	0.003	---	---	---	0.003	---	---	---	0.004
Bi	mg/L	-	-	---	---	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.000007
Ca	mg/L	-	-	---	---	4.60	---	---	---	5.79	---	---	---	7.24
Cd	mg/L	0.00009	-	---	---	**0.00399**	---	---	---	**0.00369**	---	---	---	**0.0024**
Co	mg/L	-	-	---	---	0.0616	---	---	---	0.0679	---	---	---	0.0514
Cr	mg/L	-	-	---	---	0.110	---	---	---	0.133	---	---	---	0.0821
Cu	mg/L	0.002	0.10	---	---	**0.558**	---	---	---	**0.461**	---	---	---	**0.311**
Fe	mg/L	0.3	-	---	---	**59.7**	---	---	---	**68.8**	---	---	---	**55.2**
K	mg/L	-	-	---	---	0.544	---	---	---	0.490	---	---	---	0.419
Li	mg/L	-	-	---	---	0.0126	---	---	---	0.0152	---	---	---	0.0132
Mg	mg/L	-	-	---	---	6.89	---	---	---	9.42	---	---	---	7.59
Mn	mg/L	-	-	---	---	0.543	---	---	---	0.648	---	---	---	0.472
Mo	mg/L	0.073	-	---	---	0.00012	---	---	---	0.00673	---	---	---	0.00006
Na	mg/L	-	-	---	---	3.11	---	---	---	3.86	---	---	---	3.54
Ni	mg/L	0.03	0.25	---	---	**0.0639**	---	---	---	**0.0716**	---	---	---	**0.0516**
P	mg/L	-	-	---	---	< 0.003	---	---	---	0.003	---	---	---	< 0.003
Pb	mg/L	0.001	0.08	---	---	**0.0574**	---	---	---	**0.0662**	---	---	---	**0.0599**
Sb	mg/L	-	-	---	---	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009
Se	mg/L	0.001	-	---	---	0.00059	---	---	---	0.00048	---	---	---	0.00041
Si	mg/L	-	-	---	---	32.5	---	---	---	26.5	---	---	---	35.4
Sn	mg/L	-	-	---	---	0.00026	---	---	---	0.00021	---	---	---	0.00036
Sr	mg/L	-	-	---	---	0.0184	---	---	---	0.0217	---	---	---	0.0188
Th	mg/L	-	-	---	---	0.0111	---	---	---	0.0151	---	---	---	0.0055
Ti	mg/L	-	-	---	---	0.00020	---	---	---	0.00020	---	---	---	0.00022
Tl	mg/L	0.0008	-	---	---	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005
U	mg/L	0.015	-	---	---	0.00191	---	---	---	0.00223	---	---	---	0.0015
V	mg/L	-	-	---	---	0.00029	---	---	---	0.00047	---	---	---	0.00023
W	mg/L	-	-	---	---	0.00005	---	---	---	0.00002	---	---	---	0.00002
Y	mg/L	-	-	---	---	0.0389	---	---	---	0.0400	---	---	---	0.0321
Zn	mg/L	0.007	0.40	---	---	**0.332**	---	---	---	**0.283**	---	---	---	**0.174**

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	33	34	35	36	37	38	39	40	41
Date			Effective	31-Mar-21	07-Apr-21	14-Apr-21	21-Apr-21	28-Apr-21	05-May-21	12-May-21	19-May-21	26-May-21
LIMS			01-Jun-2021	10315-MAR21	10032-APR21	10115-APR21	10172-APR21	10200-APR21	10024-MAY21	10058-MAY21	10151-MAY21	10231-MAY21
Hum Cell Leachate Vol	mL	-	-	409	409	427	404	399	398	412	453	468
pH	no unit	6.0-9.5	-	**2.79**	**2.87**	**2.89**	**2.92**	**2.90**	**2.88**	**2.93**	**2.94**	**2.98**
Acidity	mg/L as $CaCO_3$	-	-	339	326	275	251	249	239	251	209	196
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	1160	1030	978	916	919	916	884	832	772
SO_4	mg/L	-	-	390	360	290	290	290	280	400	240	220
F	mg/L	0.12	-	---	---	---	**0.35**	---	---	---	**0.37**	---
NH_3+NH_4	as N mg/L	-	-	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---
CN_T	mg/L	-	0.50	---	---	---	< 0.002	---	---	---	< 0.002	---
CN_{WAD}	mg/L	0.005 as CNF	-	---	---	---	< 0.002	---	---	---	< 0.002	---
Hg	mg/L	0.000026	-	---	---	---	< 0.00001	---	---	---	0.00001	---
Ag	mg/L	0.00025	-	---	---	---	< 0.00005	---	---	---	< 0.00005	---
Al	mg/L	0.005@pH<6.5	-	---	---	---	**22.9**	---	---	---	**16.0**	---
As	mg/L	0.005	0.10	---	---	---	0.0007	---	---	---	0.0005	---
Ba	mg/L	-	-	---	---	---	0.0217	---	---	---	0.0230	---
Be	mg/L	-	-	---	---	---	0.000711	---	---	---	0.00065	---
B	mg/L	1.5	-	---	---	---	< 0.002	---	---	---	< 0.002	---
Bi	mg/L	-	-	---	---	---	0.000007	---	---	---	< 0.00001	---
Ca	mg/L	-	-	---	---	---	6.72	---	---	---	5.73	---
Cd	mg/L	0.00009	-	---	---	---	**0.00128**	---	---	---	**0.000964**	---
Co	mg/L	-	-	---	---	---	0.0356	---	---	---	0.0276	---
Cr	mg/L	-	-	---	---	---	0.0471	---	---	---	0.0299	---
Cu	mg/L	0.002	0.10	---	---	---	**0.193**	---	---	---	**0.138**	---
Fe	mg/L	0.3	-	---	---	---	**35.3**	---	---	---	**22.9**	---
K	mg/L	-	-	---	---	---	0.326	---	---	---	0.209	---
Li	mg/L	-	-	---	---	---	0.0085	---	---	---	0.0075	---
Mg	mg/L	-	-	---	---	---	6.02	---	---	---	4.31	---
Mn	mg/L	-	-	---	---	---	0.317	---	---	---	0.238	---
Mo	mg/L	0.073	-	---	---	---	0.00004	---	---	---	0.00005	---
Na	mg/L	-	-	---	---	---	3.18	---	---	---	2.37	---
Ni	mg/L	0.03	0.25	---	---	---	**0.0350**	---	---	---	0.0263	---
P	mg/L	-	-	---	---	---	0.012	---	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	---	---	---	**0.0344**	---	---	---	**0.0345**	---
Sb	mg/L	-	-	---	---	---	< 0.0009	---	---	---	< 0.0009	---
Se	mg/L	0.001	-	---	---	---	0.00028	---	---	---	0.00025	---
Si	mg/L	-	-	---	---	---	24.8	---	---	---	23.8	---
Sn	mg/L	-	-	---	---	---	0.00014	---	---	---	0.00015	---
Sr	mg/L	-	-	---	---	---	0.0154	---	---	---	0.0131	---
Th	mg/L	-	-	---	---	---	0.0025	---	---	---	0.0015	---
Ti	mg/L	-	-	---	---	---	0.00013	---	---	---	0.00014	---
Tl	mg/L	0.0008	-	---	---	---	< 0.000005	---	---	---	< 0.000005	---
U	mg/L	0.015	-	---	---	---	0.00121	---	---	---	0.000585	---
V	mg/L	-	-	---	---	---	0.00012	---	---	---	0.00007	---
W	mg/L	-	-	---	---	---	< 0.00002	---	---	---	< 0.00002	---
Y	mg/L	-	-	---	---	---	0.0225	---	---	---	0.0202	---
Zn	mg/L	0.007	0.40	---	---	---	**0.098**	---	---	---	**0.075**	---

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Summary of ABA Test Data

Parameter	Units	Ref No.: 10141-JUL20
Sulphur (S)	%	0.408
Sulphide (S^-)	%	0.42
NP	t $CaCO_3$/1000 t	3.5
CO_3 NP	t $CaCO_3$/1000 t	3.3

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
0	568	5.73	15	2	110	33
1	846	5.96	9	<2	32	10
2	859	5.42	6	<2	42	15
3	813	5.66	3	<2	54	24
4	890	5.52	3	<2	54	21
5	899	5.45	4	<2	71	28
6	831	5.18	4	<2	85	48
7	486	4.98	14	<2	66	31
8	394	4.84	15	<2	68	28
9	502	4.41	18	<2	177	74
10	319	4.36	8	<2	61	19
11	673	4.28	14	<2	243	100
12	755	4.02	49	<2	336	130
13	420	3.70	101	<2	561	240
14	304	3.76	112	<2	498	180
15	308	3.21	174	<2	602	220
16	298	3.02	198	<2	691	290
17	289	2.98	373	<2	970	420
18	353	2.84	454	<2	1160	470
19	282	2.73	547	<2	1400	630
20	250	2.70	585	<2	1460	650

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^=$ Depletion %	Cumulative $S^=$ Depletion %
18.7	18.7	0.15	0.15
8.5	27.2	0.07	0.22
12.9	40.1	0.10	0.32
19.5	59.6	0.15	0.47
18.7	78.3	0.15	0.62
25.2	103.5	0.20	0.82
39.9	143.4	0.32	1.14
15.1	158.4	0.12	1.26
11.0	169.4	0.09	1.34
37.1	206.6	0.29	1.64
6.1	212.7	0.05	1.69
67.3	280.0	0.53	2.22
98.2	378.1	0.78	3.00
100.8	478.9	0.80	3.80
54.7	533.6	0.43	4.24
67.8	601.4	0.54	4.77
86.4	687.8	0.69	5.46
121.4	809.2	0.96	6.42
165.9	975.1	1.32	7.74
177.7	1152.8	1.41	9.15
162.5	1315.3	1.29	10.44

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
19.53	0.56	0.59
8.81	0.81	0.86
13.42	1.19	1.27
20.33	1.77	1.88
19.47	2.33	2.47
26.22	3.08	3.27
41.55	4.27	4.52
15.69	4.71	5.00
11.49	5.04	5.35
38.70	6.15	6.52
6.31	6.33	6.71
70.10	8.33	8.84
102.24	11.25	11.94
105.00	14.25	15.12
57.00	15.88	16.84
70.58	17.90	18.98
90.02	20.47	21.71
126.44	24.08	25.54
172.82	29.02	30.78
185.06	34.31	36.39
169.27	39.14	41.52

** Initial Week 0 leachate may included soluble sulphate, and may not indicate oxidation of sulphide in the sample material has occurred.*

[1] *Calculated values*

Summary - Weeks 0 to 20

	pH	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^=$ Depletion %	Cumulative $S^=$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
Maximum Value	5.96	585	2	1460	650	177.7	-	1.41	-	185.06	-	-
Minimum Value	2.70	3	<2	32	10	6.1	-	0.05	-	6.31	-	-
Average Value	3.39	129	2	416	174	62.6	-	0.50	-	65.24	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Changes to Head Sample after 20 Weeks [1]

Parameter	Units	Ref No.: 10141-JUL20
Sulphide ($S^{=}$) Remaining	%	0.38
NP Remaining	t $CaCO_3$/1000 t	2.1
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.9

Leachate Parameters Measured | ***Acid Generation*** [1] | ***Acid Neutralization*** [1]

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
21	304	2.75	556	<2	1380	560	170.2	1485.5	1.35	11.79	177.33	44.21	46.89
22	307	2.71	589	<2	1510	660	202.6	1688.1	1.61	13.40	211.06	50.24	53.29
23	398	2.74	492	<2	1330	520	207.0	1895.1	1.64	15.04	215.58	56.40	59.82
24	372	2.77	450	<2	1320	500	186.0	2081.1	1.48	16.52	193.75	61.94	65.69
25	302	2.69	468	<2	1400	540	163.1	2244.2	1.29	17.81	169.88	66.79	70.84
26	386	2.75	430	<2	1270	490	189.1	2433.3	1.50	19.31	197.02	72.42	76.81
27	269	2.74	512	<2	1390	560	150.6	2583.9	1.20	20.51	156.92	76.90	81.56
28	319	2.68	448	<2	1370	530	169.1	2753.0	1.34	21.85	176.11	81.93	86.90
29	347	2.77	424	<2	1260	470	163.1	2916.1	1.29	23.14	169.89	86.79	92.05
30	313	2.81	423	<2	1290	460	144.0	3060.1	1.14	24.29	149.98	91.07	96.59
31	418	2.80	339	<2	1110	360	150.5	3210.6	1.19	25.48	156.75	95.55	101.34
32	345	2.82	334	<2	1080	410	141.5	3352.0	1.12	26.60	147.34	99.76	105.81
33	409	2.79	339	<2	1160	390	159.5	3511.5	1.27	27.87	166.16	104.51	110.84
34	409	2.87	326	<2	1030	360	147.2	3658.8	1.17	29.04	153.38	108.89	115.49
35	427	2.89	275	<2	978	290	123.8	3782.6	0.98	30.02	128.99	112.58	119.40
36	404	2.92	251	<2	916	290	117.2	3899.7	0.93	30.95	122.04	116.06	123.10
37	399	2.90	249	<2	919	290	115.7	4015.5	0.92	31.87	120.53	119.51	126.75
38	398	2.88	239	<2	916	280	111.4	4126.9	0.88	32.75	116.08	122.82	130.27
39	412	2.93	251	<2	884	400	164.8	4291.7	1.31	34.06	171.67	127.73	135.47
40	453	2.94	209	<2	832	240	108.7	4400.4	0.86	34.92	113.25	130.96	138.90

[1] *Calculated values*

Summary - Weeks 0 to 40

Maximum Value	5.96	589	2	1510	660	207.0	-	1.64	-	216	-	-
Minimum Value	2.68	3	<2	32	10	6.1	-	0.05	-	6.3	-	-
Average Value	3.01	251	2	783	299	107.3	-	0.85	-	111.80	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Changes to Head Sample after 40 Weeks [1]

Parameter	Units	Ref No.: 10141-JUL20
Sulphide ($S^{=}$) Remaining	%	0.27
NP Remaining	t $CaCO_3$/1000 t	-1.1
CO_3 NP Remaining	t $CaCO_3$/1000 t	-1.3

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
41	468	2.98	196	<2	772	220

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %
103.0	4503.4	0.82	35.74

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
107.25	134.03	142.15

[1] *Calculated values*

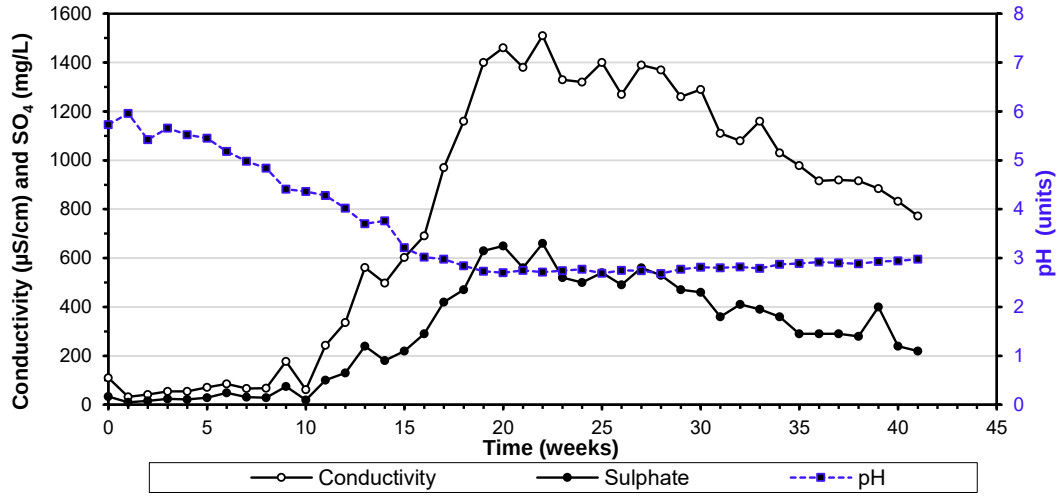
Summary - Weeks 0 to 60

Maximum Value	5.96	589	2	1510	660	207.0	-	1.64	-	215.58	-	-
Minimum Value	2.68	3	<2	32	10	6.1	-	0.05	-	6.31	-	-
Average Value	2.80	250	2	782	297	107.2	-	0.85	-	111.69	-	-

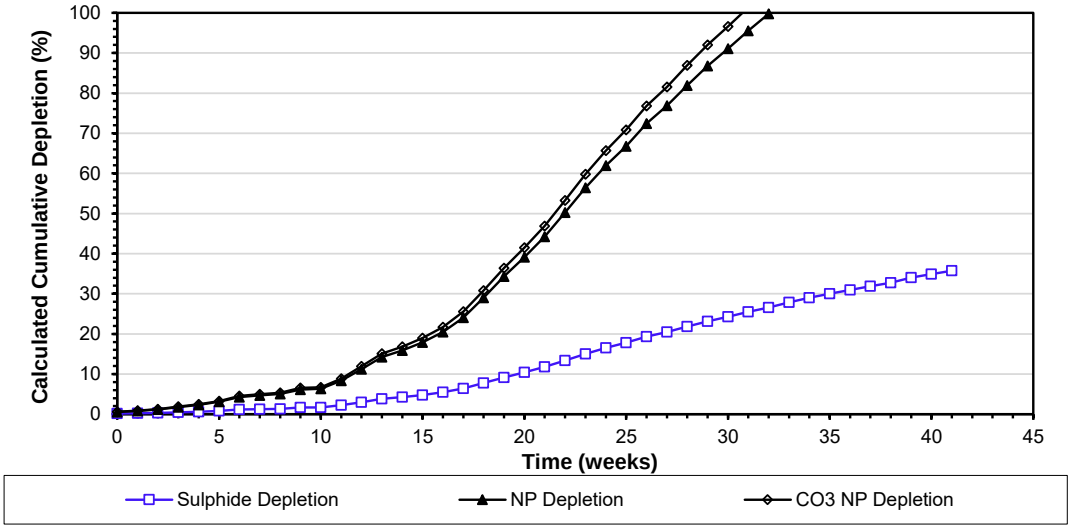
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Conductivity, Sulphate, and pH in Weekly Humidity Cell Leachate - CND 1 Residue CNP DPL



Cumulative Sulphide and NP Depletion CND 1 Residue CNP DPL

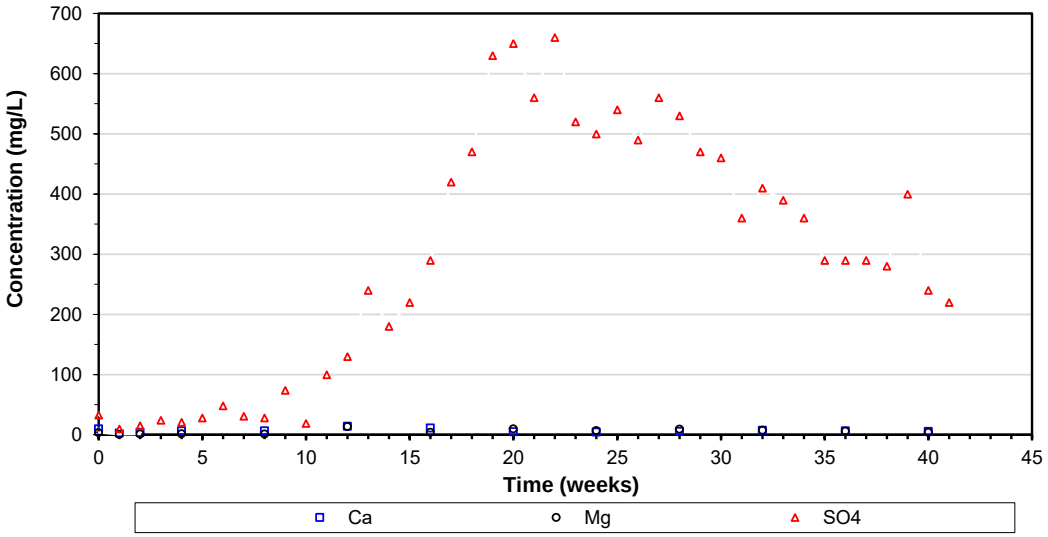


Note: NP depletion calculated based on sulphate assay.

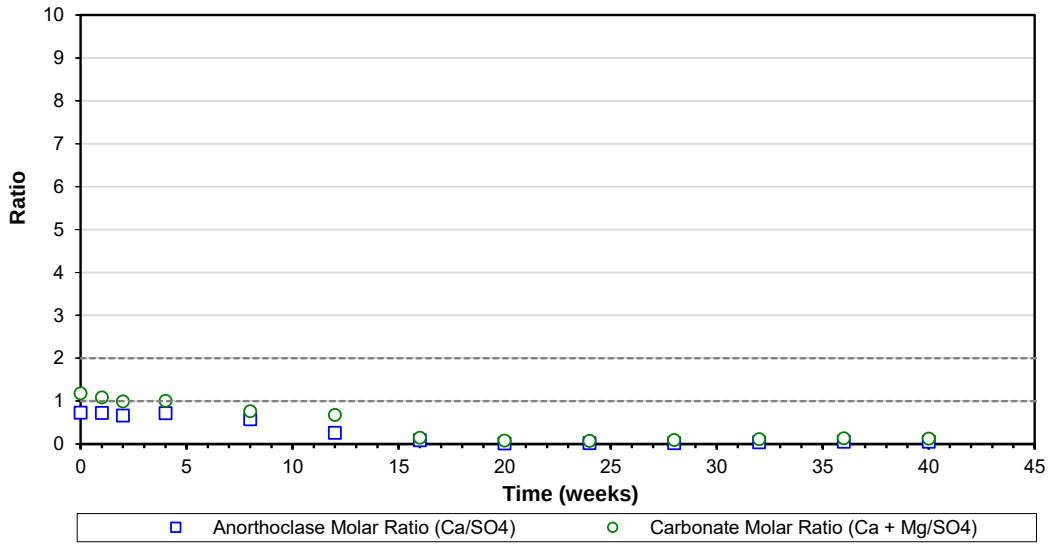
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL



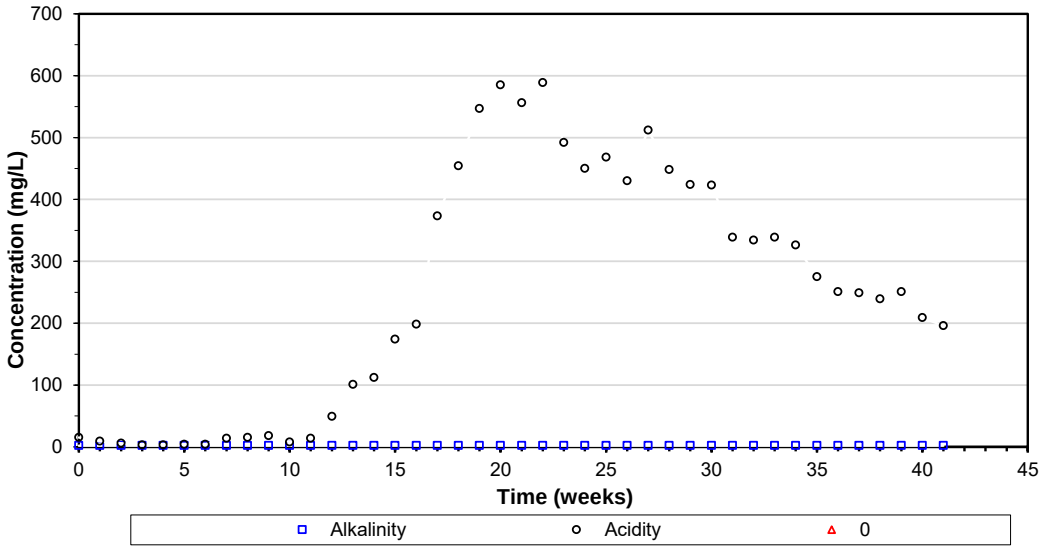
Carbonate (Ca + Mg/SO 4) and Anorthoclase (Ca/SO 4) Molar Ratios CND 1 Residue CNP DPL



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

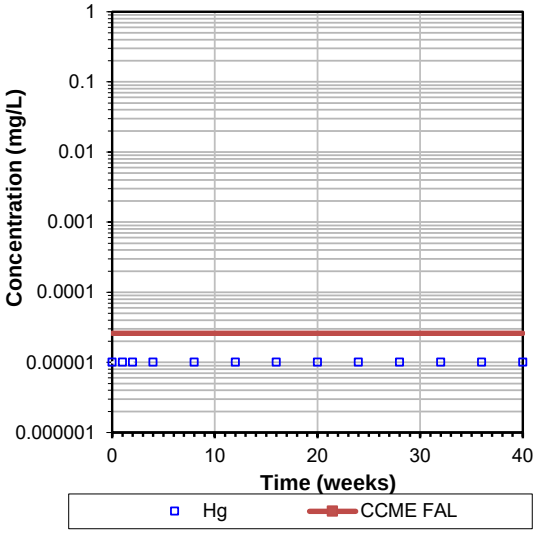
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

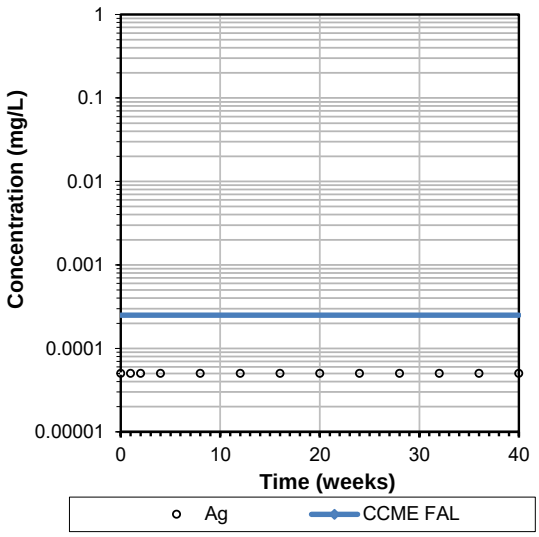


TEST REPORT

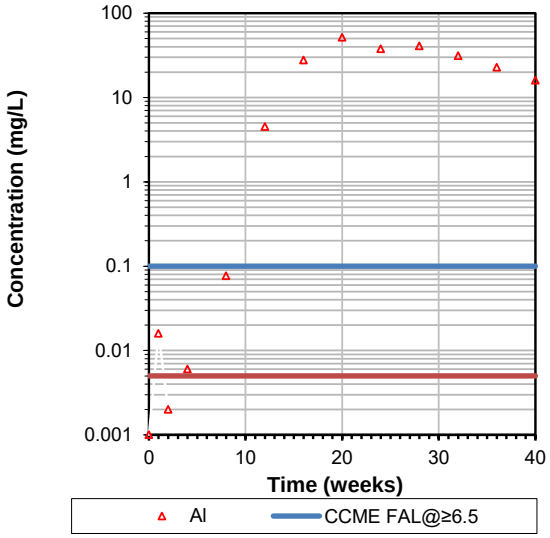
Humidity Cell Test (ASTM D 5744-96)

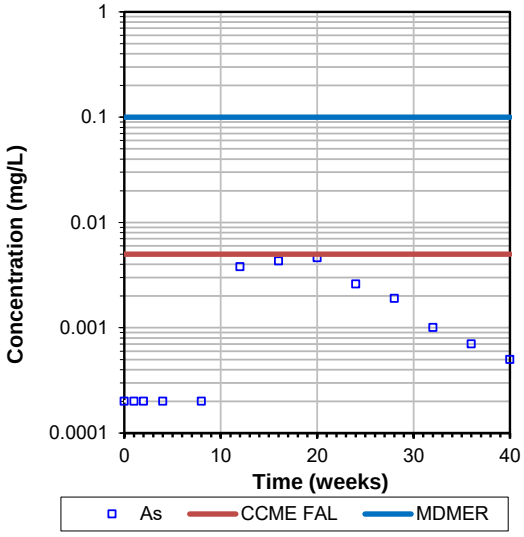
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

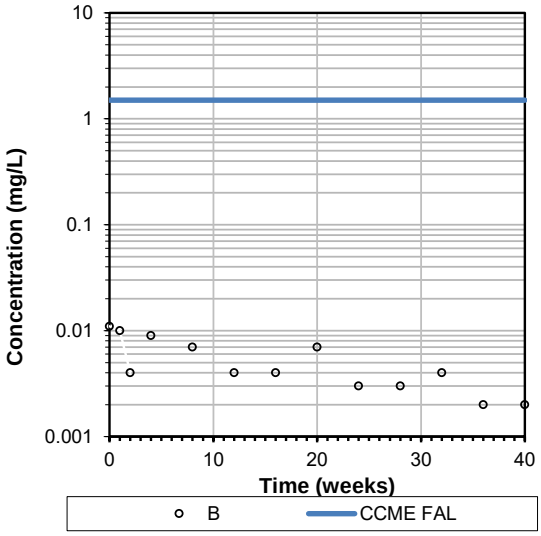


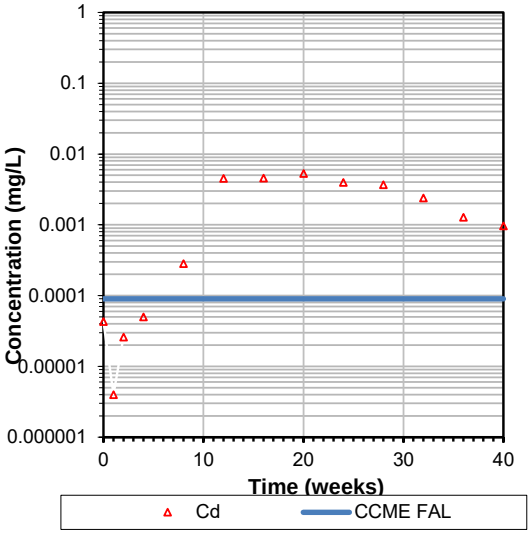


TEST REPORT

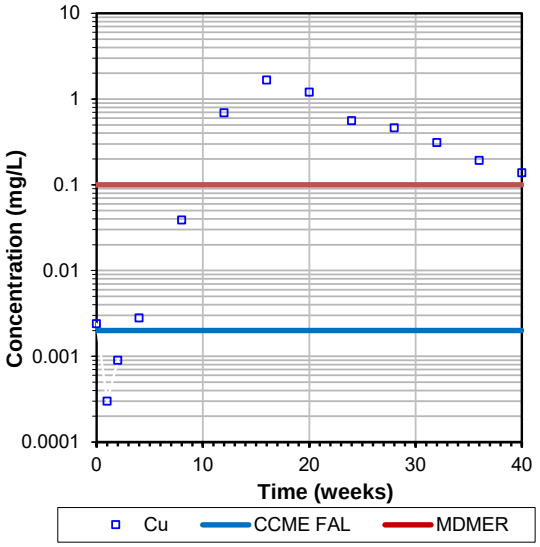
Humidity Cell Test (ASTM D 5744-96)

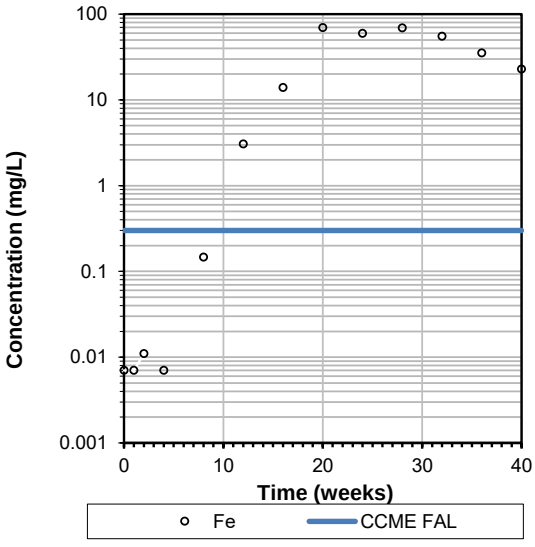
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

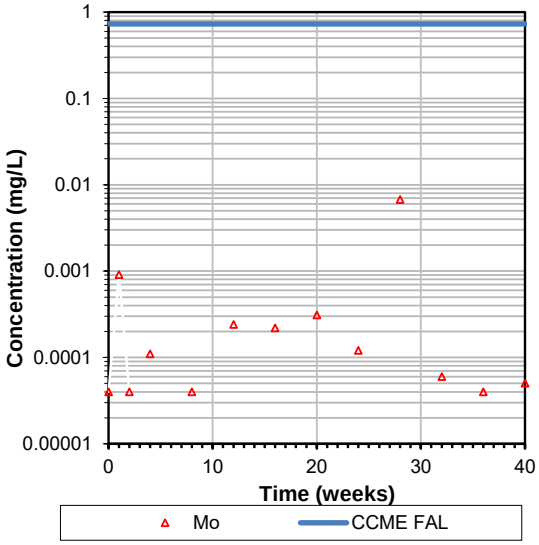


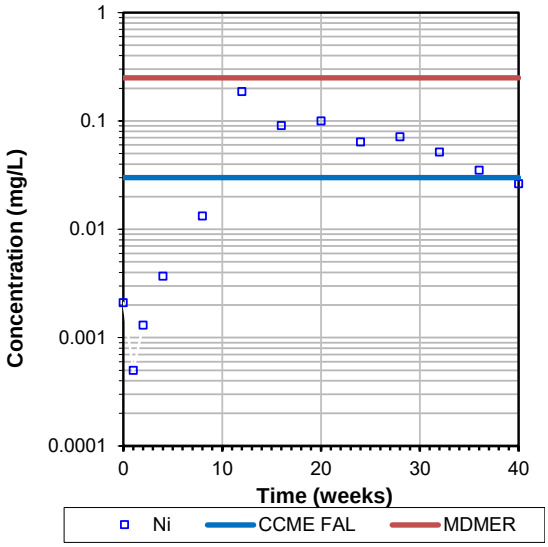


TEST REPORT

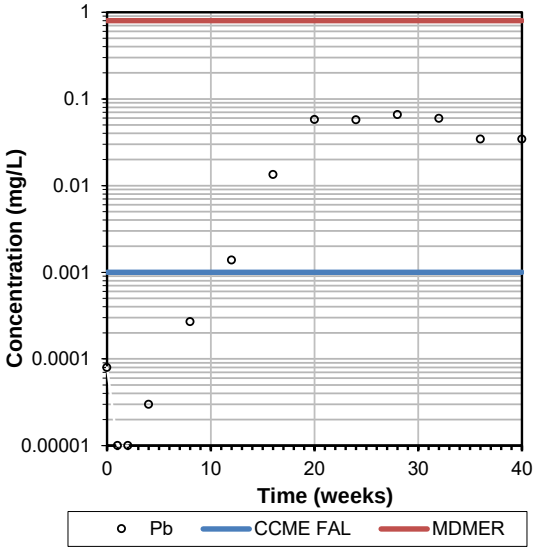
Humidity Cell Test (ASTM D 5744-96)

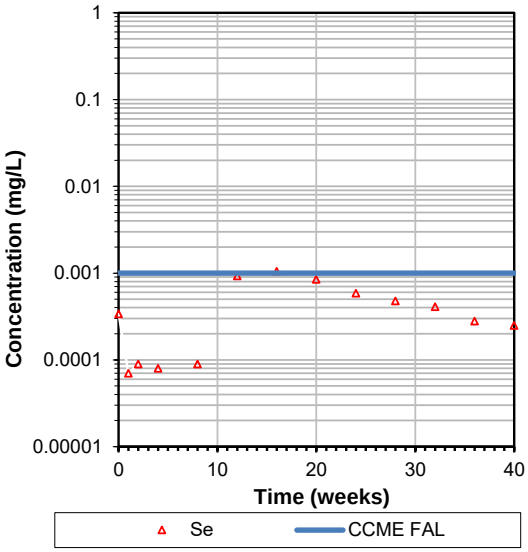
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

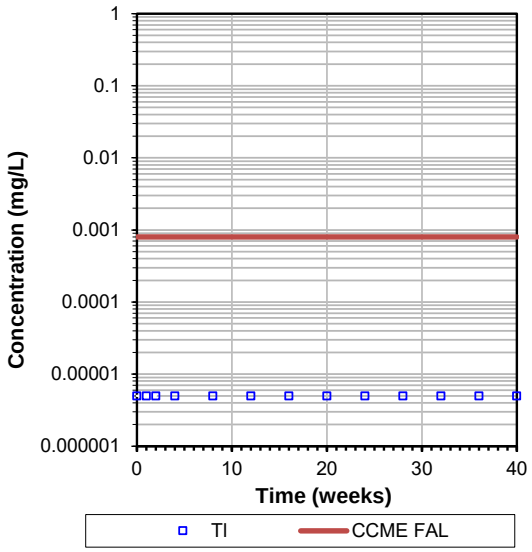


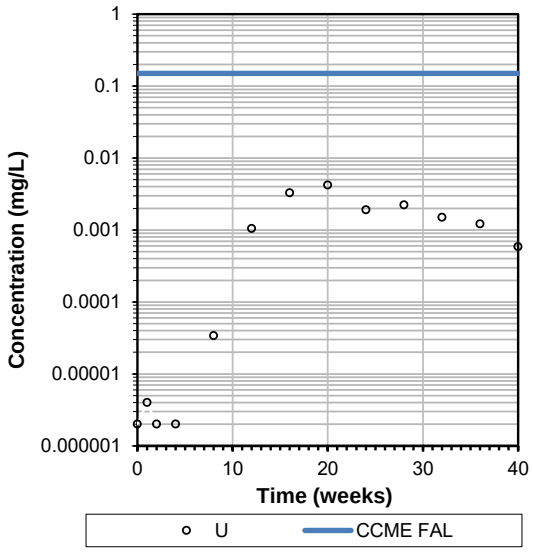


TEST REPORT

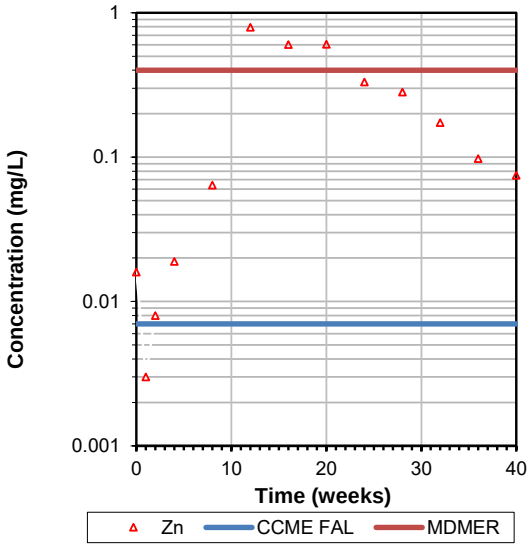
Humidity Cell Test (ASTM D 5744-96)

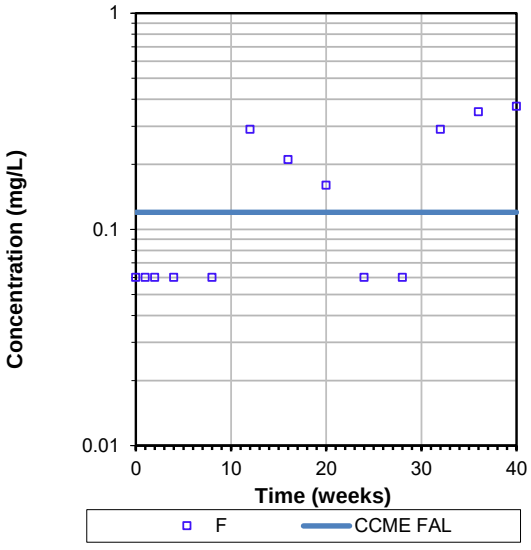
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





ATTACHMENT 2

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	3	4	5	6	7	8	9
Date			Effective	12-Jan-21	19-Jan-21	26-Jan-21	02-Feb-21	09-Feb-21	16-Feb-21	23-Feb-21	02-Mar-21	09-Mar-21	16-Mar-21
LIMS			01-Jun-2021	10061-JAN21	10137-JAN21	10202-JAN21	10013-FEB21	10037-FEB21	10159-FEB21	10256-FEB21	10013-MAR21	10113-MAR21	10142-MAR21
Hum Cell Leachate Vo	mL	-	-	650	732	899	911	663	914	811	782	829	815
pH	no unit	6.0-9.5	-	7.84	7.74	7.91	8.02	8.22	8.12	8.18	8.13	8.14	8.24
Acidity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity	mg/L as $CaCO_3$	-	-	53	29	57	39	36	47	43	44	44	48
Conductivity	µS/cm	-	-	2950	820	496	144	118	124	114	115	116	111
SO_4	mg/L	-	-	1500	380	180	28	18	17	15	16	13	11
F	mg/L	0.12	-	**0.12**	< 0.06	0.07	--	< 0.06	--	--	--	< 0.06	--
NH_3+NH_4	as N mg/L			38.4	2.2	0.6	--	0.1	--	--	--	<0.1	--
Un-Ionized NH_3	as N mg/L	0.020	0.50	**1.02**	**0.05**	**0.02**	--	0.01	--	--	--	0.01	--
Hg	mg/L	0.000026	-	< 0.00001	0.00003	**0.00033**	--	**0.00013**	--	--	--	< 0.00001	--
Ag	mg/L	0.00025	-	< 0.00005	0.00020	**0.00060**	--	**0.00041**	--	--	--	< 0.00005	--
Al	mg/L	0.1@pH>6.5	-	0.055	0.063	**0.125**	--	**0.178**	--	--	--	**0.272**	--
As	mg/L	0.005	0.10	0.0030	0.0017	0.0026	--	0.0023	--	--	--	0.0028	--
Ba	mg/L	-	-	0.0278	0.0167	0.0128	--	0.00306	--	--	--	0.00248	--
Be	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	--	< 0.000007	--	--	--	< 0.000007	--
B	mg/L	1.5	-	0.037	0.016	0.012	--	0.009	--	--	--	0.011	--
Bi	mg/L	-	-	< 0.000007	< 0.000007	0.000023	--	0.000013	--	--	--	< 0.000007	--
Ca	mg/L	-	-	478	161	81.4	--	16.0	--	--	--	14.4	--
Cd	mg/L	0.00009	-	0.000024	0.000008	< 0.000003	--	0.000004	--	--	--	0.000004	--
Co	mg/L	-	-	0.00275	0.000421	0.000215	--	0.000094	--	--	--	0.000119	--
Cr	mg/L	-	-	0.00024	0.00012	< 0.00008	--	< 0.00008	--	--	--	0.00014	--
Cu	mg/L	0.002	0.10	**0.0106**	**0.0027**	**0.0022**	--	**0.0029**	--	--	--	0.0008	--
Fe	mg/L	0.3	-	0.015	< 0.007	< 0.007	--	0.024	--	--	--	0.010	--
K	mg/L	-	-	6.67	1.07	0.566	--	0.173	--	--	--	0.198	--
Li	mg/L	-	-	0.0010	0.0005	0.0005	--	0.0002	--	--	--	0.0002	--
Mg	mg/L	-	-	7.06	5.02	5.71	--	3.00	--	--	--	3.44	--
Mn	mg/L	-	-	0.117	0.0730	0.0587	--	0.0235	--	--	--	0.0169	--
Mo	mg/L	0.073	-	0.0116	0.00219	0.00154	--	0.00248	--	--	--	0.00080	--
Na	mg/L	-	-	273	27.2	10.1	--	2.05	--	--	--	1.42	--
Ni	mg/L	0.03	0.25	0.0014	0.0007	0.0003	--	0.0001	--	--	--	< 0.0001	--
P	mg/L	-	-	< 0.003	< 0.003	< 0.003	--	< 0.003	--	--	--	< 0.003	--
Pb	mg/L	0.001	0.08	0.00006	0.00001	0.00002	--	0.00008	--	--	--	0.00002	--
Sb	mg/L	-	-	0.0106	0.0055	0.0059	--	0.0030	--	--	--	0.0021	--
Se	mg/L	0.001	-	0.00053	0.00020	0.00036	--	0.00026	--	--	--	0.00008	--
Si	mg/L	-	-	3.97	2.02	2.72	--	1.98	--	--	--	2.34	--
Sn	mg/L	-	-	0.00039	0.00024	0.00010	--	0.00012	--	--	--	0.00008	--
Sr	mg/L	-	-	1.32	0.412	0.216	--	0.0474	--	--	--	0.0416	--
Th	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	--	0.0003	--	--	--	< 0.0001	--
Ti	mg/L	-	-	< 0.00005	< 0.00005	< 0.00005	--	0.00011	--	--	--	< 0.00005	--
Tl	mg/L	0.0008	-	0.000043	< 0.000005	< 0.000005	--	< 0.000005	--	--	--	< 0.000005	--
U	mg/L	0.015	-	0.00236	0.000520	0.000251	--	0.000216	--	--	--	0.000070	--
V	mg/L	-	-	0.00053	0.00032	0.00063	--	0.00053	--	--	--	0.00091	--
W	mg/L	-	-	0.00155	0.00061	0.00069	--	0.00083	--	--	--	0.00132	--
Y	mg/L	-	-	0.000010	0.000008	0.000003	--	0.000014	--	--	--	< 0.00002	--
Zn	mg/L	0.007	0.40	**0.007**	0.003	< 0.002	--	< 0.002	--	--	--	< 0.002	--

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	10	11	12	13	14	15	16	17	18	19
Date			Effective	23-Mar-21	30-Mar-21	06-Apr-21	13-Apr-21	20-Apr-21	27-Apr-21	04-May-21	11-May-21	18-May-21	25-May-21
LIMS			01-Jun-2021	10246-MAR21	10301-MAR21	10021-APR21	10102-APR21	10160-APR21	10188-APR21	10012-MAY21	10045-MAY21	10138-MAY21	10217-MAY21
Hum Cell Leachate Vol	mL	-	-	833	698	807	933	797	846	929	841	831	840
pH	no unit	6.0-9.5	-	7.96	8.30	8.12	8.15	8.10	8.12	8.27	8.01	8.05	7.99
Acidity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity	mg/L as $CaCO_3$	-	-	46	49	45	47	43	47	48	43	44	48
Conductivity	µS/cm	-	-	110	102	102	96	99	97	96	90	91	89
SO_4	mg/L	-	-	9.6	8.6	7.0	5.1	5.6	5.0	3.6	3.8	3.5	3.0
F	mg/L	0.12	-	--	--	< 0.06	--	--	--	< 0.06	--	--	--
NH_3+NH_4	as N mg/L			--	--	<0.1	--	--	--	<0.1	--	--	--
Un-Ionized NH_3	as N mg/L	0.020	0.50	--	--	0.005	--	--	--	0.007	--	--	--
Hg	mg/L	0.000026	-	--	--	< 0.00001	--	--	--	0.00001	--	--	--
Ag	mg/L	0.00025	-	--	--	< 0.00005	--	--	--	< 0.00005	--	--	--
Al	mg/L	0.1@pH>6.5	-	--	--	**0.358**	--	--	--	**0.344**	--	--	--
As	mg/L	0.005	0.10	--	--	0.0029	--	--	--	0.0031	--	--	--
Ba	mg/L	-	-	--	--	0.0033	--	--	--	0.00214	--	--	--
Be	mg/L	-	-	--	--	< 0.000007	--	--	--	< 0.000007	--	--	--
B	mg/L	1.5	-	--	--	0.004	--	--	--	0.003	--	--	--
Bi	mg/L	-	-	--	--	< 0.000007	--	--	--	< 0.00001	--	--	--
Ca	mg/L	-	-	--	--	14.8	--	--	--	13.8	--	--	--
Cd	mg/L	0.00009	-	--	--	0.000005	--	--	--	< 0.000003	--	--	--
Co	mg/L	-	-	--	--	0.000073	--	--	--	0.000044	--	--	--
Cr	mg/L	-	-	--	--	< 0.00008	--	--	--	< 0.00008	--	--	--
Cu	mg/L	0.002	0.10	--	--	0.0016	--	--	--	0.0004	--	--	--
Fe	mg/L	0.3	-	--	--	0.01	--	--	--	< 0.007	--	--	--
K	mg/L	-	-	--	--	0.177	--	--	--	0.158	--	--	--
Li	mg/L	-	-	--	--	0.0002	--	--	--	0.0002	--	--	--
Mg	mg/L	-	-	--	--	3.48	--	--	--	3.02	--	--	--
Mn	mg/L	-	-	--	--	0.017	--	--	--	0.0145	--	--	--
Mo	mg/L	0.073	-	--	--	0.00048	--	--	--	0.00029	--	--	--
Na	mg/L	-	-	--	--	1.08	--	--	--	0.84	--	--	--
Ni	mg/L	0.03	0.25	--	--	0.0001	--	--	--	< 0.0001	--	--	--
P	mg/L	-	-	--	--	0.003	--	--	--	< 0.003	--	--	--
Pb	mg/L	0.001	0.08	--	--	0.00003	--	--	--	< 0.00009	--	--	--
Sb	mg/L	-	-	--	--	0.0019	--	--	--	0.0012	--	--	--
Se	mg/L	0.001	-	--	--	0.00008	--	--	--	0.00005	--	--	--
Si	mg/L	-	-	--	--	2.54	--	--	--	2.21	--	--	--
Sn	mg/L	-	-	--	--	< 0.00006	--	--	--	< 0.00006	--	--	--
Sr	mg/L	-	-	--	--	0.0439	--	--	--	0.0381	--	--	--
Th	mg/L	-	-	--	--	< 0.0001	--	--	--	< 0.0001	--	--	--
Ti	mg/L	-	-	--	--	< 0.00005	--	--	--	< 0.00005	--	--	--
Tl	mg/L	0.0008	-	--	--	< 0.000005	--	--	--	< 0.000005	--	--	--
U	mg/L	0.015	-	--	--	0.000068	--	--	--	0.000069	--	--	--
V	mg/L	-	-	--	--	0.00092	--	--	--	0.00099	--	--	--
W	mg/L	-	-	--	--	0.00069	--	--	--	0.00053	--	--	--
Y	mg/L	-	-	--	--	< 0.00002	--	--	--	< 0.00002	--	--	--
Zn	mg/L	0.007	0.40	--	--	< 0.002	--	--	--	< 0.002	--	--	--

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	20	21	22	23	24	25	26	27	28	29	30
Date			Effective	01-Jun-21	08-Jun-21	15-Jun-21	22-Jun-21	29-Jun-21	06-Jul-21	13-Jul-21	20-Jul-21	27-Jul-21	03-Aug-21	10-Aug-21
LIMS			01-Jun-2021	10012-JUN21	10046-JUN21	10142-JUN21	10203-JUN21	10237-JUN21	10008-JUL21	10048-JUL21	10147-JUL21	10203-JUL21	10007-AUG21	10045-AGU21
Hum Cell Leachate Vol	mL	-	-	870	920	878	886	845	874	878	847	872	802	867
pH	no unit	6.0-9.5	-	8.07	8.14	8.21	8.09	8.16	8.20	8.16	8.07	8.05	7.84	8.20
Acidity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity	mg/L as $CaCO_3$	-	-	43	48	43	45	48	52	45	44	46	40	45
Conductivity	µS/cm	-	-	93	90	85	87	92	93	84	85	88	75	87
SO_4	mg/L	-	-	2.8	2.7	2.4	2.1	2.2	2.2	2.1	2.1	2.1	1.8	3.3
F	mg/L	0.12	-	< 0.06	--	--	--	< 0.06	--	--	--	--	--	< 0.06
NH_3+NH_4	as N mg/L			<0.1	--	--	--	0.1	--	--	--	--	--	<0.1
Un-Ionized NH_3	as N mg/L	0.020	0.50	0.004	--	--	--	0.005	--	--	--	--	--	0.006
Hg	mg/L	0.000026	-	< 0.00001	--	--	--	< 0.00001	--	--	--	--	--	0.00002
Ag	mg/L	0.00025	-	< 0.00005	--	--	--	< 0.00005	--	--	--	--	--	< 0.00005
Al	mg/L	0.1@pH>6.5	-	**0.316**	--	--	--	**0.274**	--	--	--	--	--	**0.299**
As	mg/L	0.005	0.10	0.0026	--	--	--	0.0024	--	--	--	--	--	0.0024
Ba	mg/L	-	-	0.00231	--	--	--	0.00241	--	--	--	--	--	0.00229
Be	mg/L	-	-	< 0.000007	--	--	--	< 0.000007	--	--	--	--	--	< 0.000007
B	mg/L	1.5	-	0.002	--	--	--	< 0.002	--	--	--	--	--	0.003
Bi	mg/L	-	-	< 0.00001	--	--	--	< 0.00001	--	--	--	--	--	< 0.00001
Ca	mg/L	-	-	13.9	--	--	--	13.6	--	--	--	--	--	14.2
Cd	mg/L	0.00009	-	< 0.000003	--	--	--	< 0.000003	--	--	--	--	--	< 0.000003
Co	mg/L	-	-	0.000029	--	--	--	0.000023	--	--	--	--	--	0.000025
Cr	mg/L	-	-	< 0.00008	--	--	--	< 0.00008	--	--	--	--	--	0.00008
Cu	mg/L	0.002	0.10	0.0003	--	--	--	0.0004	--	--	--	--	--	0.0004
Fe	mg/L	0.3	-	< 0.007	--	--	--	< 0.007	--	--	--	--	--	0.008
K	mg/L	-	-	0.142	--	--	--	0.105	--	--	--	--	--	0.137
Li	mg/L	-	-	0.0001	--	--	--	0.0002	--	--	--	--	--	0.0019
Mg	mg/L	-	-	2.78	--	--	--	2.14	--	--	--	--	--	2.28
Mn	mg/L	-	-	0.01761	--	--	--	0.0187	--	--	--	--	--	0.0206
Mo	mg/L	0.073	-	0.00038	--	--	--	0.00023	--	--	--	--	--	0.00029
Na	mg/L	-	-	0.61	--	--	--	0.54	--	--	--	--	--	0.60
Ni	mg/L	0.03	0.25	< 0.0001	--	--	--	< 0.0001	--	--	--	--	--	< 0.0001
P	mg/L	-	-	< 0.003	--	--	--	< 0.003	--	--	--	--	--	< 0.003
Pb	mg/L	0.001	0.08	< 0.00009	--	--	--	< 0.00009	--	--	--	--	--	< 0.00009
Sb	mg/L	-	-	0.0011	--	--	--	0.0011	--	--	--	--	--	< 0.0009
Se	mg/L	0.001	-	< 0.00004	--	--	--	< 0.00004	--	--	--	--	--	< 0.00004
Si	mg/L	-	-	2.18	--	--	--	1.71	--	--	--	--	--	2.50
Sn	mg/L	-	-	< 0.00006	--	--	--	< 0.00006	--	--	--	--	--	< 0.00006
Sr	mg/L	-	-	0.03914	--	--	--	0.0408	--	--	--	--	--	0.0348
Th	mg/L	-	-	< 0.0001	--	--	--	< 0.0001	--	--	--	--	--	< 0.0001
Ti	mg/L	-	-	< 0.00005	--	--	--	< 0.00005	--	--	--	--	--	< 0.00005
Tl	mg/L	0.0008	-	< 0.000005	--	--	--	< 0.000005	--	--	--	--	--	< 0.000005
U	mg/L	0.015	-	0.000057	--	--	--	0.000064	--	--	--	--	--	0.000047
V	mg/L	-	-	0.00070	--	--	--	0.00063	--	--	--	--	--	0.00060
W	mg/L	-	-	0.00050	--	--	--	0.00037	--	--	--	--	--	0.00036
Y	mg/L	-	-	< 0.00002	--	--	--	< 0.00002	--	--	--	--	--	< 0.00002
Zn	mg/L	0.007	0.40	< 0.002	--	--	--	< 0.002	--	--	--	--	--	< 0.002

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	31	32	33	34	35	36	37
Date			Effective	17-Aug-21	24-Aug-21	31-Aug-21	07-Sep-21	14-Sep-21	21-Sep-21	28-Sep-21
LIMS			01-Jun-2021	10081-AGU21	10211-AGU21	10280-AUG21	10018-SEP21	10058-SEP21	10108-SEP21	10174-SEP21
Hum Cell Leachate Vol	mL	-	-	866	888	811	898	953	895	860
pH	no unit	6.0-9.5	-	7.74	8.16	8.00	8.13	8.06	8.21	8.08
Acidity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity	mg/L as $CaCO_3$	-	-	44	46	43	48	48	47	42
Conductivity	µS/cm	-	-	87	84	83	88	93	85	90
SO_4	mg/L	-	-	2.0	8.0	2.0	1.5	1.5	1.5	1.7
F	mg/L	0.12	-	--	< 0.06	--	--	--	< 0.06	--
NH_3+NH_4	as N mg/L			--	<0.1	--	--	--	<0.1	--
Un-Ionized NH_3	as N mg/L	0.020	0.50	--	0.005	--	--	--	0.006	--
Hg	mg/L	0.000026	-	--	0.00001	--	--	--	< 0.00001	--
Ag	mg/L	0.00025	-	--	< 0.00005	--	--	--	< 0.00005	--
Al	mg/L	0.1@pH>6.5	-	--	**0.305**	--	--	--	**0.313**	--
As	mg/L	0.005	0.10	--	0.0021	--	--	--	0.0016	--
Ba	mg/L	-	-	--	0.00217	--	--	--	0.00215	--
Be	mg/L	-	-	--	< 0.000007	--	--	--	< 0.000007	--
B	mg/L	1.5	-	--	0.003	--	--	--	0.031	--
Bi	mg/L	-	-	--	< 0.00001	--	--	--	< 0.00001	--
Ca	mg/L	-	-	--	13.3	--	--	--	13.8	--
Cd	mg/L	0.00009	-	--	< 0.000003	--	--	--	< 0.000003	--
Co	mg/L	-	-	--	0.000055	--	--	--	0.000029	--
Cr	mg/L	-	-	--	0.00009	--	--	--	< 0.00008	--
Cu	mg/L	0.002	0.10	--	0.0003	--	--	--	0.0003	--
Fe	mg/L	0.3	-	--	< 0.007	--	--	--	< 0.007	--
K	mg/L	-	-	--	0.126	--	--	--	0.106	--
Li	mg/L	-	-	--	0.0001	--	--	--	0.0001	--
Mg	mg/L	-	-	--	2.22	--	--	--	2.10	--
Mn	mg/L	-	-	--	0.0212	--	--	--	0.0228	--
Mo	mg/L	0.073	-	--	0.00041	--	--	--	0.00042	--
Na	mg/L	-	-	--	0.54	--	--	--	0.49	--
Ni	mg/L	0.03	0.25	--	< 0.0001	--	--	--	< 0.0001	--
P	mg/L	-	-	--	< 0.003	--	--	--	< 0.003	--
Pb	mg/L	0.001	0.08	--	< 0.00009	--	--	--	< 0.00009	--
Sb	mg/L	-	-	--	< 0.0009	--	--	--	< 0.0009	--
Se	mg/L	0.001	-	--	0.00005	--	--	--	< 0.00004	--
Si	mg/L	-	-	--	1.99	--	--	--	1.68	--
Sn	mg/L	-	-	--	< 0.00006	--	--	--	0.00041	--
Sr	mg/L	-	-	--	0.0349	--	--	--	0.0341	--
Th	mg/L	-	-	--	< 0.0001	--	--	--	< 0.0001	--
Ti	mg/L	-	-	--	0.00011	--	--	--	0.00006	--
Tl	mg/L	0.0008	-	--	< 0.000005	--	--	--	< 0.000005	--
U	mg/L	0.015	-	--	0.000059	--	--	--	0.000049	--
V	mg/L	-	-	--	0.00057	--	--	--	0.00044	--
W	mg/L	-	-	--	0.00048	--	--	--	0.00031	--
Y	mg/L	-	-	--	< 0.00002	--	--	--	< 0.00002	--
Zn	mg/L	0.007	0.40	--	< 0.002	--	--	--	< 0.002	--

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Summary of ABA Test Data **Averages**

Parameter	Units	Ref No.: 14221-JAN21
Sulphur (S)	%	0.396
Sulphide (S^{-})	%	0.27
NP	t $CaCO_3$/1000 t	37.5
CO_3 NP	t $CaCO_3$/1000 t	44.7

Leachate Parameters Measured | ***Acid Generation*** [1] | ***Acid Neutralization*** [1]

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
0	650	7.84	<2	53	2950	1500	975.0	975.0	12.04	12.04	1015.63	2.71	2.27
1	732	7.74	<2	29	820	380	278.2	1253.2	3.43	15.47	289.75	3.48	2.92
2	899	7.91	<2	57	496	180	161.8	1415.0	2.00	17.47	168.56	3.93	3.30
3	911	8.02	<2	39	144	28	25.5	1440.5	0.31	17.78	26.57	4.00	3.36
4	663	8.22	<2	36	118	18	11.9	1452.4	0.15	17.93	12.43	4.03	3.38
5	914	8.12	<2	47	124	17	15.5	1468.0	0.19	18.12	16.19	4.08	3.42
6	811	8.18	<2	43	114	15	12.2	1480.1	0.15	18.27	12.67	4.11	3.45
7	782	8.13	<2	44	115	16	12.5	1492.6	0.15	18.43	13.03	4.15	3.48
8	829	8.14	<2	44	116	13	10.8	1503.4	0.13	18.56	11.23	4.18	3.50
9	815	8.24	<2	48	111	11	9.0	1512.4	0.11	18.67	9.34	4.20	3.52
10	833	7.96	<2	46	110	9.6	8.0	1520.4	0.10	18.77	8.33	4.22	3.54
11	698	8.30	<2	49	102	8.6	6.0	1526.4	0.07	18.84	6.25	4.24	3.56
12	807	8.12	<2	45	102	7.0	5.6	1532.0	0.07	18.91	5.88	4.26	3.57
13	933	8.15	<2	47	96	5.1	4.8	1536.8	0.06	18.97	4.96	4.27	3.58
14	797	8.10	<2	43	99	5.6	4.5	1541.2	0.06	19.03	4.65	4.28	3.59
15	846	8.12	<2	47	97	5.0	4.2	1545.5	0.05	19.08	4.41	4.29	3.60
16	929	8.27	<2	48	96	3.6	3.3	1548.8	0.04	19.12	3.48	4.30	3.61
17	841	8.01	<2	43	90	3.8	3.2	1552.0	0.04	19.16	3.33	4.31	3.62
18	831	8.05	<2	44	91	3.5	2.9	1554.9	0.04	19.20	3.03	4.32	3.62
19	840	7.99	<2	48	89	3.0	2.5	1557.4	0.03	19.23	2.63	4.33	3.63
20	870	8.07	<2	43	93	2.8	2.4	1559.9	0.03	19.26	2.54	4.33	3.64

** Initial Week 0 leachate may included soluble sulphate, and may not indicate oxidation of sulphide in the sample material has occurred.*

[1] *Calculated values*

Summary - Weeks 0 to 20

Maximum Value	8.30	2	57	2950	1500	975.0	-	12.04	-	1015.63	-	-
Minimum Value	7.74	<2	29	89	2.8	2.4	-	0.03	-	2.54	-	-
Average Value	8.06	2	45	294	106	74.3	-	0.92	-	77.38	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Changes to Head Sample after 20 Weeks [1]

Parameter	Units	Ref No.: 14221-JAN21
Sulphide ($S^{=}$) Remaining	%	0.22
NP Remaining	t $CaCO_3$/1000 t	35.9
CO_3 NP Remaining	t $CaCO_3$/1000 t	43.1

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
21	920	8.14	<2	48	90	2.7
22	878	8.21	<2	43	85	2.4
23	886	8.09	<2	45	87	2.1
24	845	8.16	<2	48	92	2.2
25	874	8.20	<2	52	93	2.2
26	878	8.16	<2	45	84	2.1
27	847	8.07	<2	44	85	2.1
28	872	8.05	<2	46	88	2.1
29	802	7.84	<2	40	75	1.8
30	867	8.20	<2	45	87	3.3
31	866	7.74	<2	44	87	2.0
32	888	8.16	<2	46	84	8.0
33	811	8.00	<2	43	83	2.0
34	898	8.13	<2	48	88	1.5
35	953	8.06	<2	48	93	1.5
36	895	8.21	<2	47	85	1.5
37	860	8.08	<2	42	90	1.7

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %
2.5	1562.4	0.03	19.29
2.1	1564.5	0.03	19.31
1.9	1566.3	0.02	19.34
1.9	1568.2	0.02	19.36
1.9	1570.1	0.02	19.38
1.8	1572.0	0.02	19.41
1.8	1573.7	0.02	19.43
1.8	1575.6	0.02	19.45
1.4	1577.0	0.02	19.47
2.9	1579.9	0.04	19.50
1.7	1581.6	0.02	19.53
7.1	1588.7	0.09	19.61
1.6	1590.3	0.02	19.63
1.3	1591.7	0.02	19.65
1.4	1593.1	0.02	19.67
1.3	1594.5	0.02	19.68
1.5	1595.9	0.02	19.70

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
2.59	4.34	3.64
2.20	4.35	3.65
1.94	4.35	3.65
1.94	4.36	3.65
2.00	4.36	3.66
1.92	4.37	3.66
1.85	4.37	3.67
1.91	4.38	3.67
1.50	4.38	3.67
2.98	4.39	3.68
1.80	4.39	3.69
7.40	4.41	3.70
1.69	4.42	3.71
1.40	4.42	3.71
1.49	4.43	3.71
1.40	4.43	3.72
1.52	4.43	3.72

[1] *Calculated values*

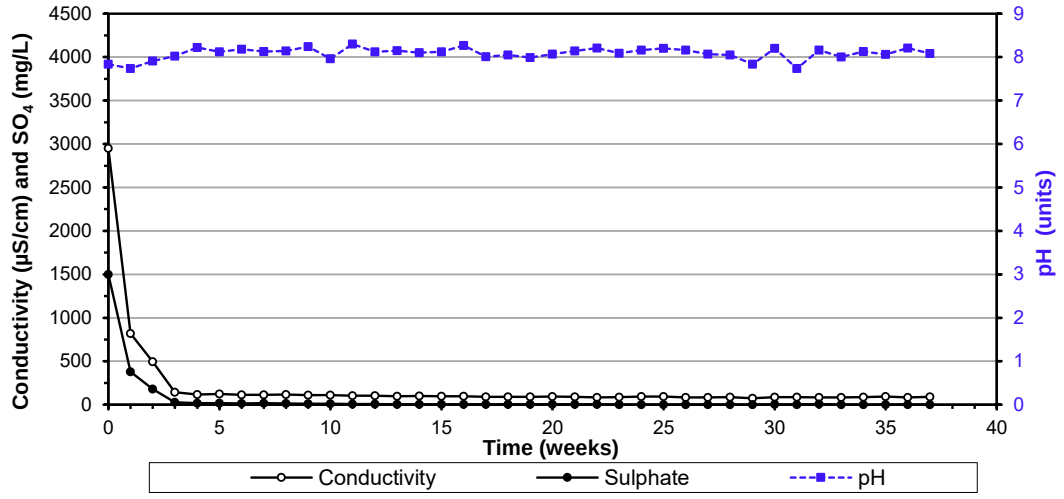
Summary - Weeks 0 to 40

Maximum Value	8.30	2	57	2950	1500	975.0	-	0.09	-	1016	-	-
Minimum Value	7.74	<2	29	75	1.5	1.3	-	0.02	-	1.4	-	-
Average Value	8.06	2	45	201	59.9	42.0	-	0.52	-	43.75	-	-

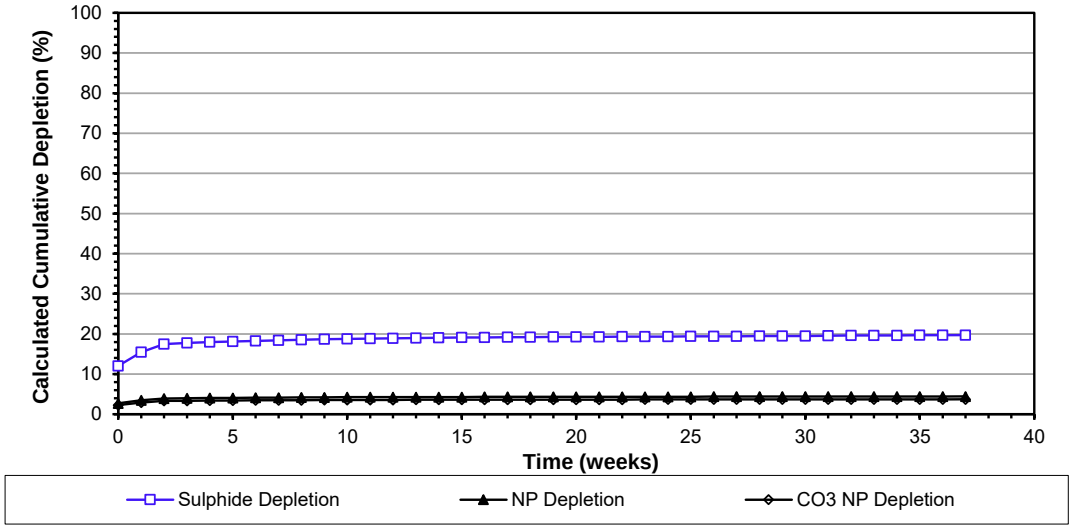
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Conductivity, Sulphate, and pH in Weekly Humidity Cell Leachate - BL639-83D Detox Tls



Cumulative Sulphide and NP Depletion BL639-83D Detox Tls

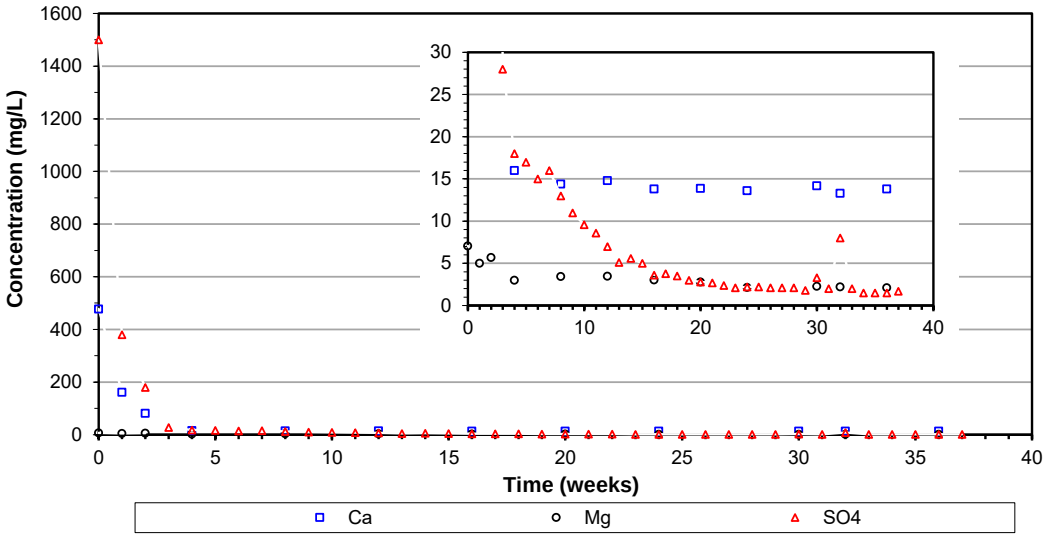


Note: NP depletion calculated based on sulphate assay.

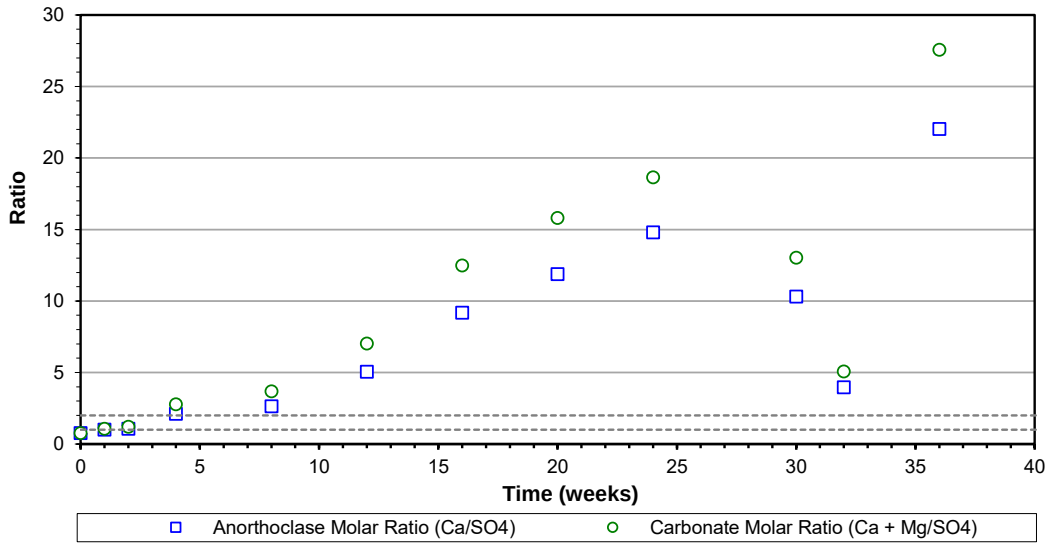
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls



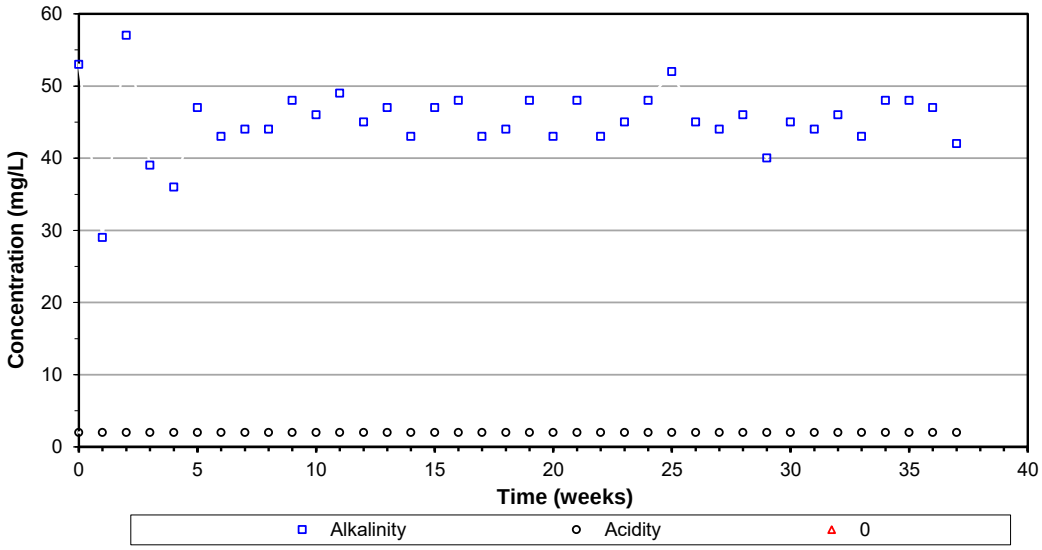
Carbonate (Ca + Mg/SO 4) and Anorthoclase (Ca/SO 4) Molar Ratios BL639-83D Detox Tls



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

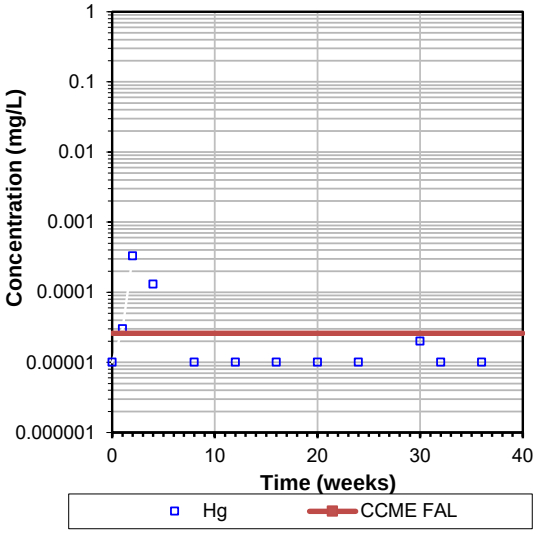
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls

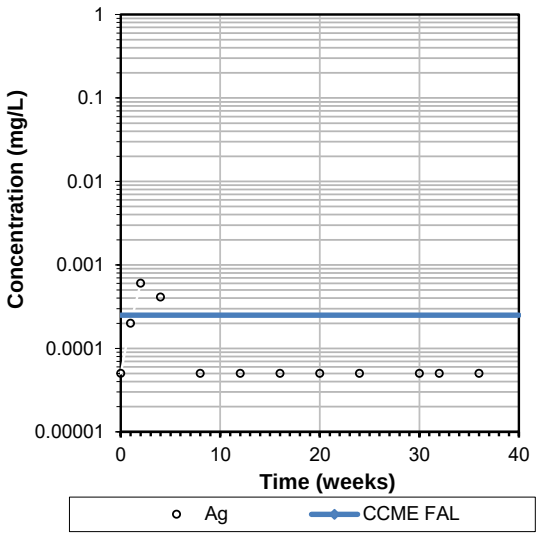


TEST REPORT

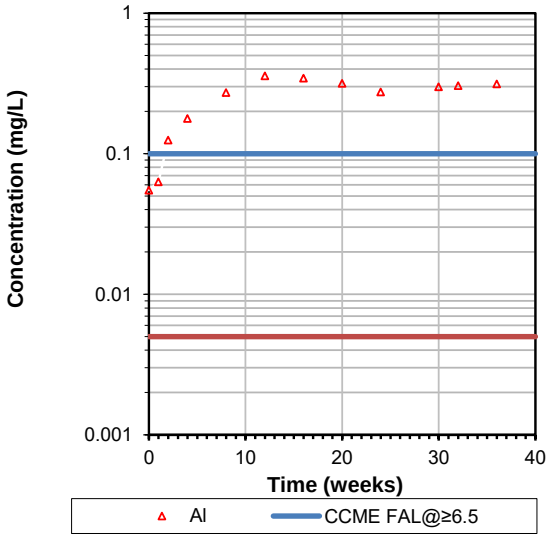
Humidity Cell Test (ASTM D 5744-96)

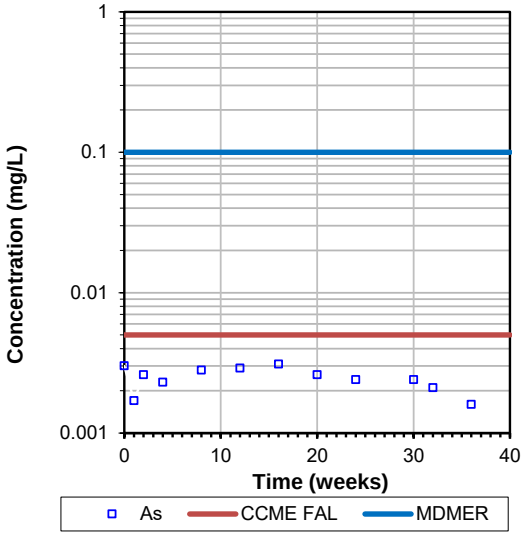
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls

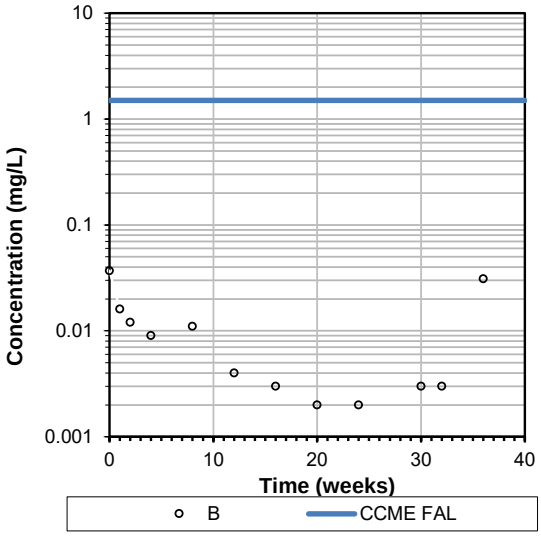


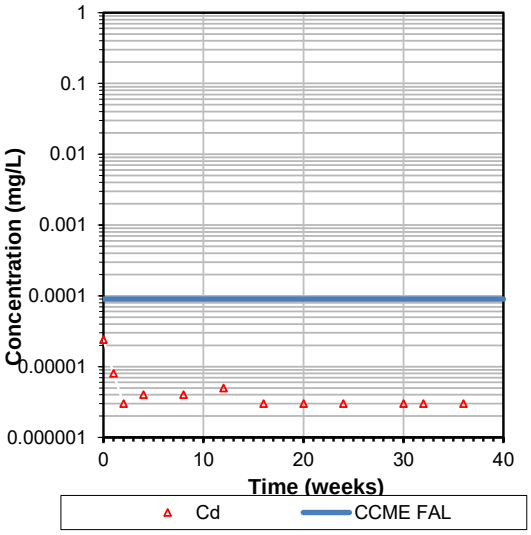


TEST REPORT

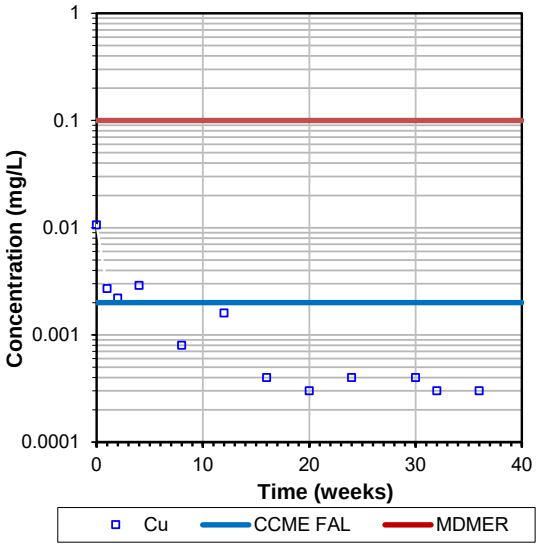
Humidity Cell Test (ASTM D 5744-96)

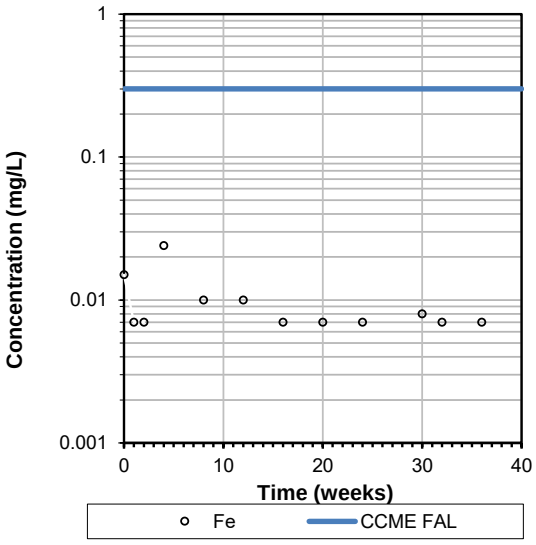
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls

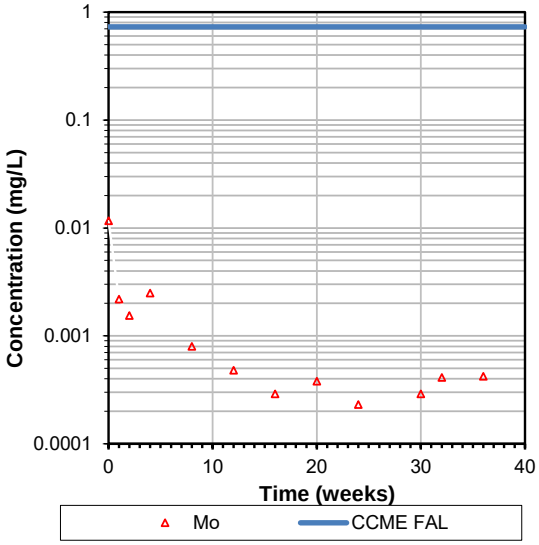


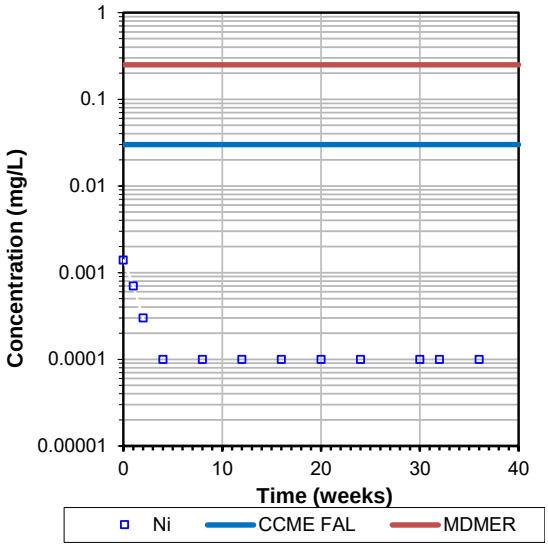


TEST REPORT

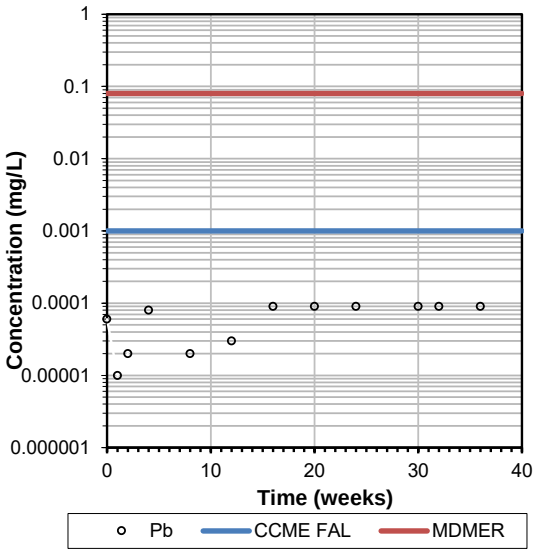
Humidity Cell Test (ASTM D 5744-96)

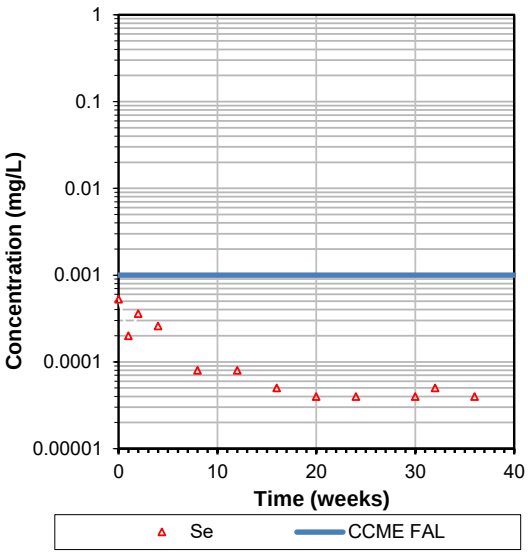
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls

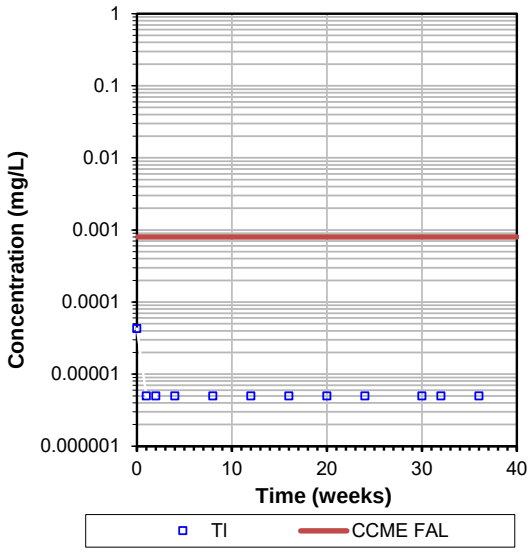


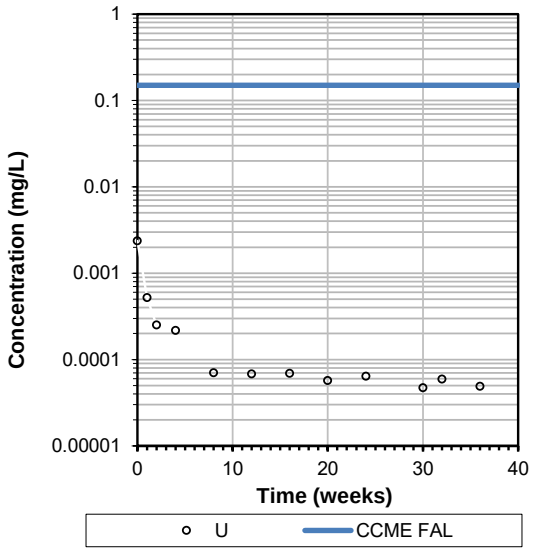


TEST REPORT

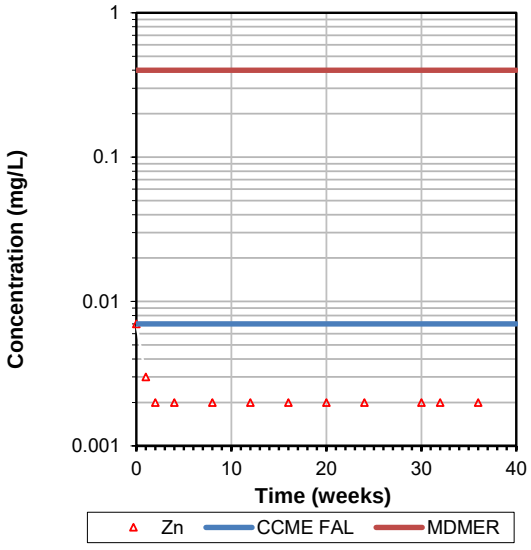
Humidity Cell Test (ASTM D 5744-96)

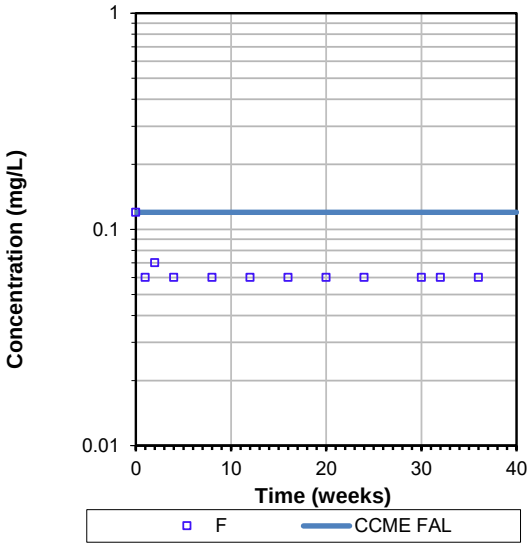
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





TEST REPORT
Sub-Aqueous Column

Sample Properties

BL639-83D Detox Tls (Column 1)	2000	g
Process Water Cover	3170	mL
Initital Height of Tailings in Column	17.5	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	4	6	8
Date			Effective	19-Jan-21	26-Jan-21	02-Feb-21	16-Feb-21	02-Mar-21	16-Mar-21
LIMS			01-Jun-2021	14364-JAN21	14499-JAN21	14069-FEB21	14457-FEB21	n/a	14311-MAR21
Volume Collected	mL	-	-	450	450	450	450	450	460
Temp Upon Receipt	°C	-	-	16.0	19.0	19.0	18.0	-	17.0
pH	no unit	6.0-9.5	-	8.10	8.12	8.11	7.96	-	8.08
Alkalinity	mg/L as $CaCO_3$	-	-	151	169	163	165	-	168
Conductivity	µS/cm	-	-	7340	6810	7410	7420	-	6700
Redox Potential	mV	-	-	226	186	206	167	-	209
TDS	mg/L	-	-	6040	6240	6130	6200	-	5700
F	mg/L	0.12	-	0.11	0.11	0.11	0.09	-	0.06
NO_2	as N mg/L	0.06	-	**1.51**	**1.55**	**1.69**	**1.69**	-	**1.85**
NO_3	as N mg/L	13	-	< 0.6	< 0.6	< 0.6	< 0.6	-	< 0.6
NO_2+NO_3	as N mg/L	-	-	1.51	1.55	1.69	1.69	-	1.85
Cl	mg/L	120	-	13	14	13	15	-	12
SO_4	mg/L	-	-	4000	3600	3700	3800	-	3700
$CN_{(T)}$	mg/L	-	0.50	0.10	0.07	0.06	0.09	-	0.11
CN_{WAD}	mg/L	0.005 as CNF	-	**0.024**	**0.021**	**0.020**	**0.057**	-	**0.093**
CNS	mg/L	-	-	5.2	5.5	5.3	5.1	-	5.6
CNO	mg/L	-	-	690	540	560	390	-	300
NH_3+NH_4	as N mg/L	-	-	14.7	39.1	43.8	66.2	-	73.9
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	**0.70**	**1.94**	**2.13**	**2.31**	-	**3.36**
S_2O_3	as S_2O_3 mg/L	-	-	< 2	< 2	< 2	< 2	-	< 2
Hg	mg/L	0.000026	-	**0.00002**	**0.00013**	0.00001	**0.00004**	-	**0.00022**
Ag	mg/L	0.00025	-	< 0.0005	0.00019	0.00008	**0.00034**	-	**0.00033**
Al	mg/L	0.1@pH>6.5	-	0.04	0.029	0.025	0.026	-	0.020
As	mg/L	0.005	0.10	**0.016**	0.0043	0.0042	0.0039	-	0.0038
B	mg/L	1.5	-	0.14	0.101	0.099	0.101	-	0.098
Ba	mg/L	-	-	0.0343	0.0210	0.0204	0.0178	-	0.0176
Be	mg/L	-	-	< 0.00007	< 0.000007	< 0.000007	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	< 0.00007	0.000011	0.000008	< 0.000007	-	< 0.000007
Ca	mg/L	-	-	491	511	506	424	-	421
Cd	mg/L	0.00009	-	0.00006	0.000085	0.000052	0.000047	-	0.000037
Co	mg/L	-	-	0.0190	0.0183	0.01740	0.0171	-	0.0163
Cr	mg/L	-	-	< 0.0008	0.00075	0.00088	0.00035	-	0.00023
Cu	mg/L	0.002	0.10	**0.109**	**0.0974**	**0.0919**	**0.155**	-	**0.268**
Fe	mg/L	0.3	-	0.09	0.036	0.025	0.028	-	0.017
K	mg/L	-	-	18.6	21.0	18.2	18.8	-	17.6
Li	mg/L	-	-	0.006	0.0031	0.0029	0.0034	-	0.0025
Mg	mg/L	-	-	18.3	19.3	18.7	19.1	-	19.2
Mn	mg/L	-	-	0.283	0.225	0.190	0.133	-	0.111
Mo	mg/L	0.073	-	0.0563	0.0612	0.0539	0.0549	-	0.0584
Na	mg/L	-	-	1340	1430	1310	1290	-	1390
Ni	mg/L	0.03	0.25	0.006	0.0073	0.0055	0.0049	-	0.0031
P	mg/L	-	-	< 0.03	0.014	0.017	0.008	-	< 0.003
Pb	mg/L	0.001	0.08	0.0006	0.00003	0.00003	< 0.00001	-	0.00004
S	mg/L	-	-	1310	1310	1320	1240	-	1300
Sb	mg/L	-	-	0.037	0.0319	0.0351	0.0335	-	0.0287
Se	mg/L	0.001	-	**0.0021**	**0.00123**	**0.00152**	**0.00304**	-	**0.0013**
Si	mg/L	-	-	3.8	4.56	4.53	4.19	-	4.29
Sn	mg/L	-	-	0.0012	0.00086	0.00088	0.00092	-	0.00093
Sr	mg/L	-	-	2.94	2.96	3.15	2.75	-	2.69
Th	mg/L	-	-	< 0.001	0.0002	< 0.0001	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	0.00089	0.00020	0.00023	0.00015	-	0.00015
Tl	mg/L	0.0008	-	0.00031	0.000239	0.000126	0.00012	-	0.00011
U	mg/L	0.015	-	0.00584	0.00577	0.00545	0.00488	-	0.00620
V	mg/L	-	-	< 0.0001	0.00059	0.00052	0.00052	-	0.00047
W	mg/L	-	-	0.0087	0.00528	0.00577	0.00503	-	0.0056
Y	mg/L	-	-	0.00004	0.000010	0.000013	< 0.00002	-	< 0.00002
Zn	mg/L	0.007	0.40	**0.03**	**0.047**	0.004	0.003	-	0.003

Parameters outside the CCME/MDMER guidelines are indicated in bold type.
Column top-ups with Li spiked DI water (5 mg/L) starting upon completion of the Week 8 sampling event

TEST REPORT

Sub-Aqueous Column

Sample Properties

BL639-83D Detox Tls (Column 1)	2000	g
Process Water Cover	3170	mL
Initital Height of Tailings in Column	17.5	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	10	12	14	16	18	20
Date			Effective	30-Mar-21	13-Apr-21	27-Apr-21	11-May-21	25-May-21	08-Jun-21
LIMS			01-Jun-2021	n/a	14352-APR21	n/a	14154-MAY21	n/a	14170-JUN21
Volume Collected	mL	-	-	460	450	450	480	500	500
Temp Upon Receipt	°C	-	-	-	18.0	-	18.0	-	18.0
pH	no unit	6.0-9.5	-	-	8.11	-	8.14	-	8.16
Alkalinity	mg/L as $CaCO_3$	-	-	-	160	-	124	-	124
Conductivity	µS/cm	-	-	-	5960	-	3620	-	2160
Redox Potential	mV	-	-	-	194	-	180	-	168
TDS	mg/L	-	-	-	5180	-	2630	-	1320
F	mg/L	0.12	-	-	< 0.06	-	0.06	-	< 0.06
NO_2	as N mg/L	0.06	-	-	**1.88**	-	**1.59**	-	**0.92**
NO_3	as N mg/L	13	-	-	3.67	-	8.06	-	11.2
NO_2+NO_3	as N mg/L	-	-	-	5.55	-	9.65	-	12.1
Cl	mg/L	120	-	-	12	-	5.6	-	2.9
SO_4	mg/L	-	-	-	3200	-	1700	-	830
$CN_{(T)}$	mg/L	-	0.50	-	0.14	-	0.13	-	0.10
CN_{WAD}	mg/L	0.005 as CNF	-	-	**0.134**	-	**0.109**	-	**0.073**
CNS	mg/L	-	-	-	< 2	-	2.4	-	< 2
CNO	mg/L	-	-	-	160	-	36	-	7.4
NH_3+NH_4	as N mg/L	-	-	-	73.9	-	45.5	-	30.6
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**3.59**	-	**2.36**	-	**1.66**
S_2O_3	as S_2O_3 mg/L	-	-	-	< 1	-	< 20	-	< 2
Hg	mg/L	0.000026	-	-	**0.00024**	-	**0.00023**	-	**0.00014**
Ag	mg/L	0.00025	-	-	< 0.0005	-	0.00015	-	**0.00033**
Al	mg/L	0.1@pH>6.5	-	-	0.02	-	0.029	-	0.046
As	mg/L	0.005	0.10	-	0.004	-	0.0045	-	**0.0053**
B	mg/L	1.5	-	-	0.11	-	0.063	-	0.044
Ba	mg/L	-	-	-	0.0179	-	0.0197	-	0.0177
Be	mg/L	-	-	-	< 0.00007	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	< 0.00007	-	0.00001	-	< 0.00001
Ca	mg/L	-	-	-	393	-	167	-	53.0
Cd	mg/L	0.00009	-	-	0.00005	-	0.000027	-	0.000009
Co	mg/L	-	-	-	0.0116	-	0.00750	-	0.00428
Cr	mg/L	-	-	-	< 0.0008	-	< 0.00008	-	0.00009
Cu	mg/L	0.002	0.10	-	**0.414**	-	**0.292**	-	**0.190**
Fe	mg/L	0.3	-	-	< 0.07	-	0.009	-	0.011
K	mg/L	-	-	-	14.8	-	9.48	-	5.82
Li	mg/L	-	-	-	0.565	-	2.30	-	3.00
Mg	mg/L	-	-	-	16.8	-	14.6	-	11.4
Mn	mg/L	-	-	-	0.0945	-	0.0402	-	0.0186
Mo	mg/L	0.073	-	-	0.0430	-	0.0275	-	0.0153
Na	mg/L	-	-	-	1050	-	589	-	346
Ni	mg/L	0.03	0.25	-	0.002	-	0.0008	-	0.0003
P	mg/L	-	-	-	< 0.03	-	0.016	-	0.006
Pb	mg/L	0.001	0.08	-	0.0002	-	< 0.00009	-	< 0.00009
S	mg/L	-	-	-	1190	-	675	-	285
Sb	mg/L	-	-	-	0.026	-	0.0228	-	0.0167
Se	mg/L	0.001	-	-	**0.0011**	-	0.00062	-	0.00055
Si	mg/L	-	-	-	5.3	-	4.91	-	4.63
Sn	mg/L	-	-	-	0.0008	-	0.00050	-	0.00043
Sr	mg/L	-	-	-	2.07	-	1.11	-	0.565
Th	mg/L	-	-	-	< 0.001	-	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	-	< 0.0005	-	< 0.00005	-	0.00009
Tl	mg/L	0.0008	-	-	0.00007	-	0.000061	-	0.000031
U	mg/L	0.015	-	-	0.00460	-	0.000718	-	0.000117
V	mg/L	-	-	-	0.0003	-	0.00051	-	0.00066
W	mg/L	-	-	-	0.0045	-	0.00574	-	0.00564
Y	mg/L	-	-	-	< 0.0002	-	< 0.00002	-	< 0.00002
Zn	mg/L	0.007	0.40	-	< 0.02	-	0.005	-	0.003

Parameters outside the CCME/MDMER guidelines are indicated in bold type.
Column top-ups with Li spiked DI water (5 mg/L) starting upon completion of the Week 8 sampling event

Note: Raised DL's (10x) due to samlpe matrix

TEST REPORT

Sub-Aqueous Column

Sample Properties

BL639-83D Detox Tls (Column 1)	2000	g
Process Water Cover	3170	mL
Initital Height of Tailings in Column	17.5	cm

Analysis of Column Leachate

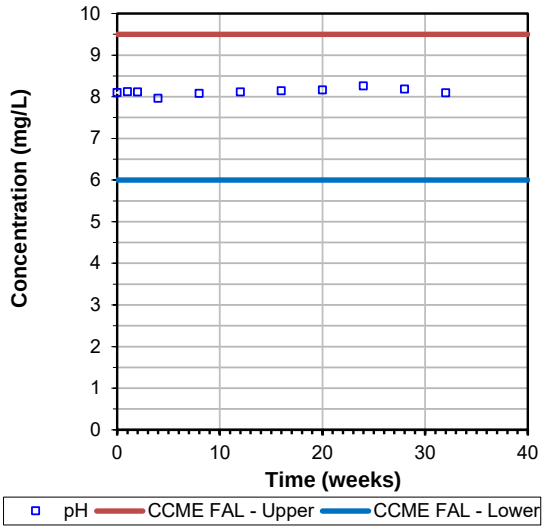
Parameter	Units	CCME FAL	MDMER	22	24	26	28	30	32
Date			Effective	22-Jun-21	06-Jul-21	20-Jul-21	03-Aug-21	17-Aug-21	29-Aug-21
LIMS			01-Jun-2021	n/a	14041-JUL21	n/a	14007-AUG21	n/a	14530-AUG21
Volume Collected	mL	-	-	500	500	450	450	450	410
Temp Upon Receipt	°C	-	-	-	20.0	-	14.0	-	15.0
pH	no unit	6.0-9.5	-	-	8.26	-	8.18	-	8.09
Alkalinity	mg/L as $CaCO_3$	-	-	-	112	-	109	-	82
Conductivity	µS/cm	-	-	-	1340	-	1110	-	307
Redox Potential	mV	-	-	-	148	-	276	-	194
TDS	mg/L	-	-	-	826	-	600	-	174
F	mg/L	0.12	-	-	< 0.06	-	< 0.06	-	< 0.06
NO_2	as N mg/L	0.06	-	-	**0.64**	-	0.06	-	**0.48**
NO_3	as N mg/L	13	-	-	**12.9**	-	1.24	-	**13.8**
NO_2+NO_3	as N mg/L	-	-	-	13.6	-	1.30	-	14.3
Cl	mg/L	120	-	-	3.0	-	< 2	-	< 2
SO_4	mg/L	-	-	-	490	-	330	-	16
$CN_{(T)}$	mg/L	-	0.50	-	0.10	-	0.10	-	0.02
CN_{WAD}	mg/L	0.005 as CNF	-	-	**0.091**	-	**0.084**	-	**0.020**
CNS	mg/L	-	-	-	1.1	-	< 2	-	< 2
CNO	mg/L	-	-	-	2.0	-	< 1	-	< 1
NH_3+NH_4	as N mg/L	-	-	-	19.6	-	15.6	-	4.6
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**1.32**	-	**0.88**	-	**0.21**
S_2O_3	as S_2O_3 mg/L	-	-	-	< 2	-	< 2	-	1.8
Hg	mg/L	0.000026	-	-	*** 0.00034**	-	**0.00012**	-	**0.00066**
Ag	mg/L	0.00025	-	-	**0.00175**	-	**0.00083**	-	**0.00106**
Al	mg/L	0.1@pH>6.5	-	-	0.043	-	0.045	-	**0.071**
As	mg/L	0.005	0.10	-	**0.0053**	-	0.0046	-	0.0045
B	mg/L	1.5	-	-	0.032	-	0.027	-	0.020
Ba	mg/L	-	-	-	0.0149	-	0.0150	-	0.00630
Be	mg/L	-	-	-	< 0.000007	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	< 0.00001	-	0.00001	-	< 0.00001
Ca	mg/L	-	-	-	35.7	-	33.5	-	16.4
Cd	mg/L	0.00009	-	-	0.000012	-	0.000003	-	< 0.000003
Co	mg/L	-	-	-	0.00242	-	0.00159	-	0.000114
Cr	mg/L	-	-	-	0.00101	-	0.00014	-	< 0.00008
Cu	mg/L	0.002	0.10	-	**0.144**	-	**0.125**	-	**0.0604**
Fe	mg/L	0.3	-	-	0.016	-	< 0.007	-	0.164
K	mg/L	-	-	-	4.68	-	2.50	-	0.570
Li	mg/L	-	-	-	3.96	-	3.57	-	2.77
Mg	mg/L	-	-	-	9.90	-	10.2	-	4.44
Mn	mg/L	-	-	-	0.0164	-	0.0166	-	0.0112
Mo	mg/L	0.073	-	-	0.00891	-	0.00634	-	0.00059
Na	mg/L	-	-	-	187	-	148	-	16.6
Ni	mg/L	0.03	0.25	-	0.0012	-	0.0025	-	0.0003
P	mg/L	-	-	-	< 0.003	-	0.004	-	< 0.003
Pb	mg/L	0.001	0.08	-	< 0.00009	-	< 0.00009	-	0.00011
S	mg/L	-	-	-	147	-	120	-	5
Sb	mg/L	-	-	-	0.0114	-	0.0089	-	0.0043
Se	mg/L	0.001	-	-	0.00033	-	0.00025	-	0.00008
Si	mg/L	-	-	-	3.68	-	3.88	-	3.46
Sn	mg/L	-	-	-	0.00016	-	0.00013	-	0.00007
Sr	mg/L	-	-	-	0.348	-	0.311	-	0.118
Th	mg/L	-	-	-	< 0.0001	-	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	-	0.00006	-	0.00007	-	0.00005
Tl	mg/L	0.0008	-	-	0.000018	-	0.000019	-	0.000006
U	mg/L	0.015	-	-	0.000058	-	0.000050	-	< 0.000002
V	mg/L	-	-	-	0.00063	-	0.00058	-	0.00069
W	mg/L	-	-	-	0.00469	-	0.00424	-	0.00268
Y	mg/L	-	-	-	< 0.00002	-	< 0.00002	-	< 0.00002
Zn	mg/L	0.007	0.40	-	**0.013**	-	0.004	-	**0.009**

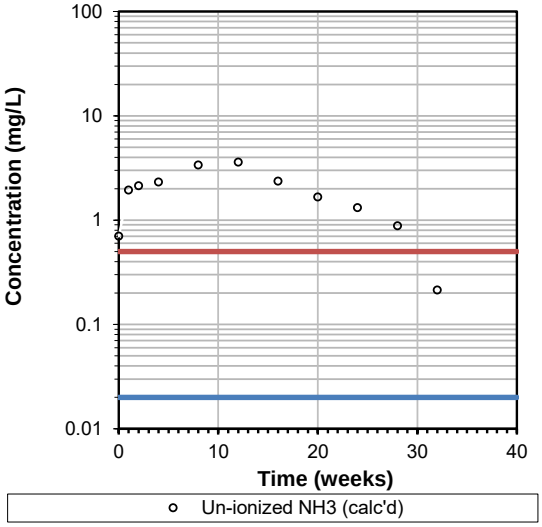
Parameters outside the CCME/MDMER guidelines are indicated in bold type.
Column top-ups with Li spiked DI water (5 mg/L) starting upon completion of the Week 8 sampling event

*Reassay LIMS 15135-AUG21

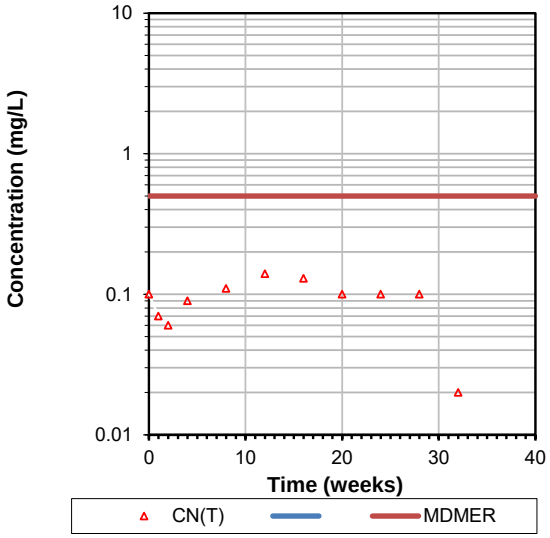
TEST REPORT
Sub-Aqueous Column

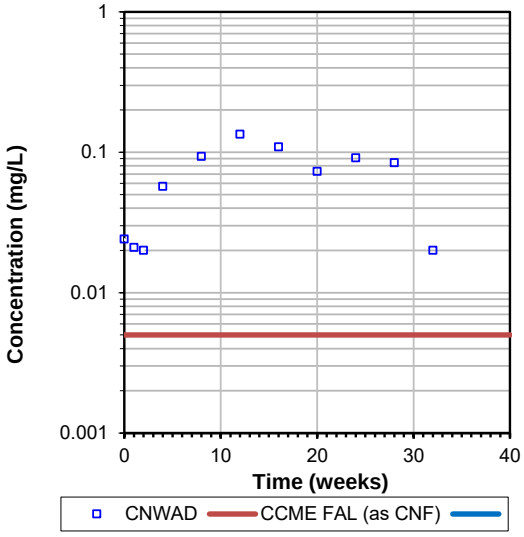
Selected Parameters - BL639-83D Detox Tls (Column 1)





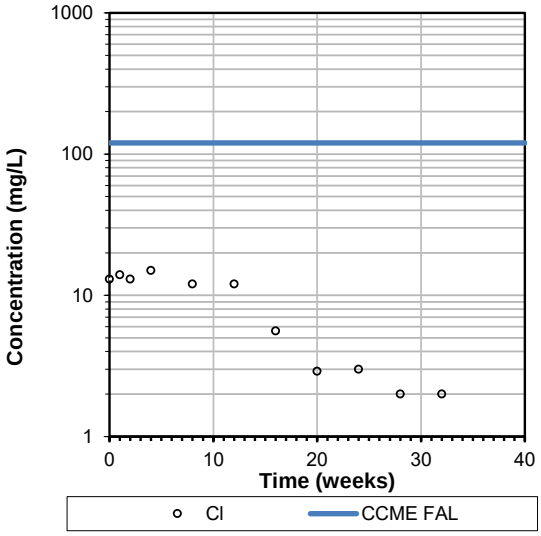
Selected Parameters - BL639-83D Detox Tls (Column 1)

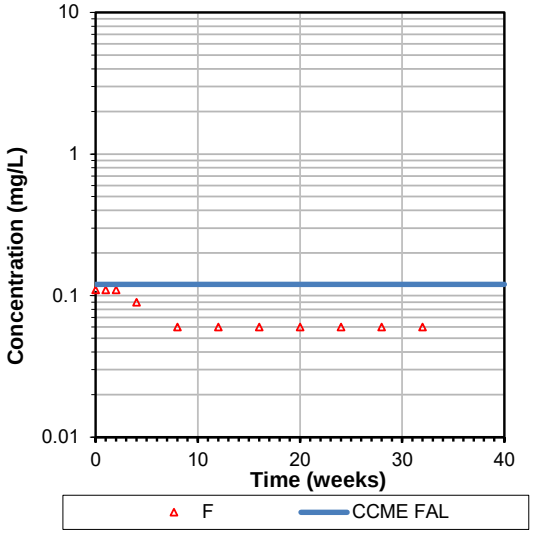




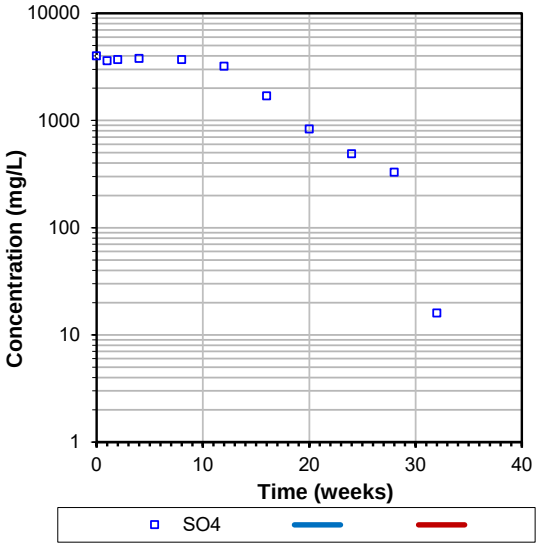
TEST REPORT
Sub-Aqueous Column

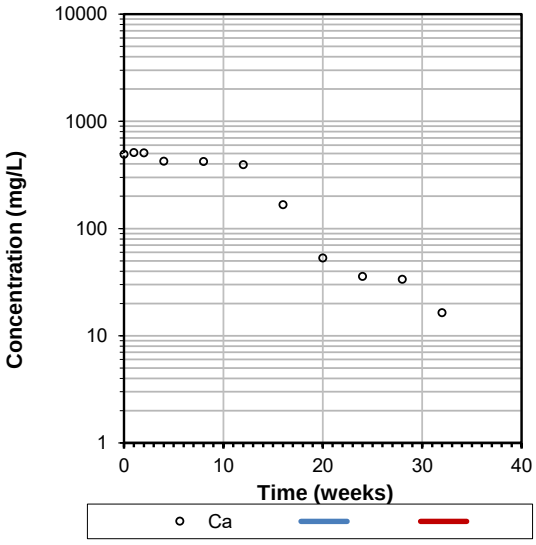
Selected Parameters - BL639-83D Detox Tls (Column 1)





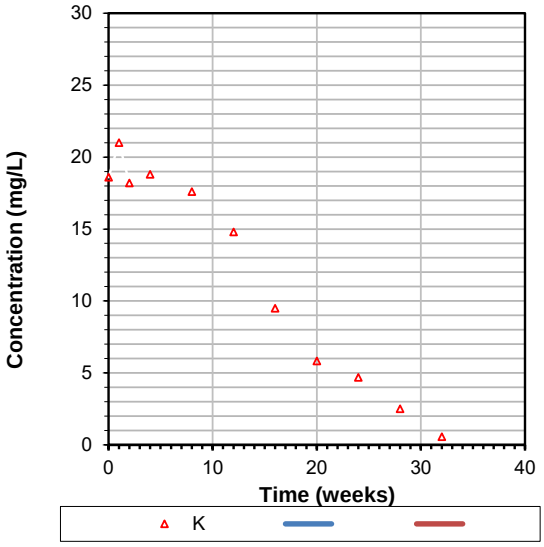
Selected Parameters - BL639-83D Detox Tls (Column 1)

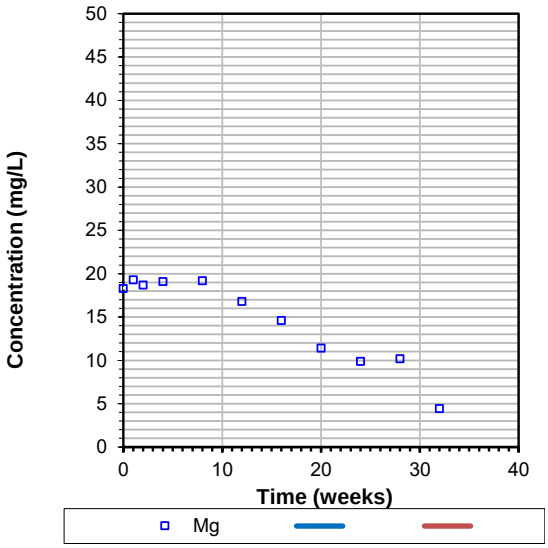




TEST REPORT
Sub-Aqueous Column

Selected Parameters - BL639-83D Detox Tls (Column 1)





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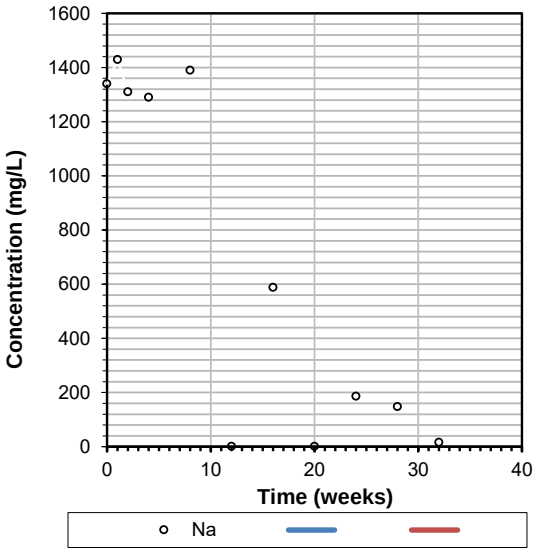
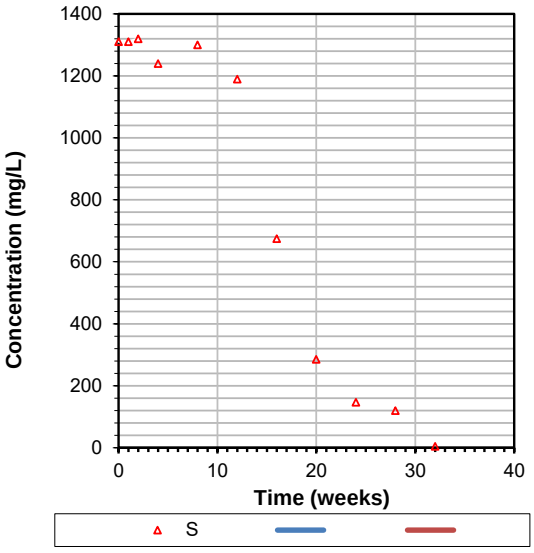
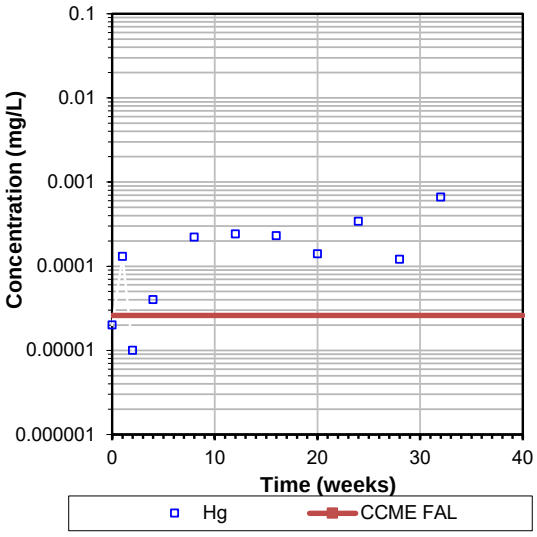
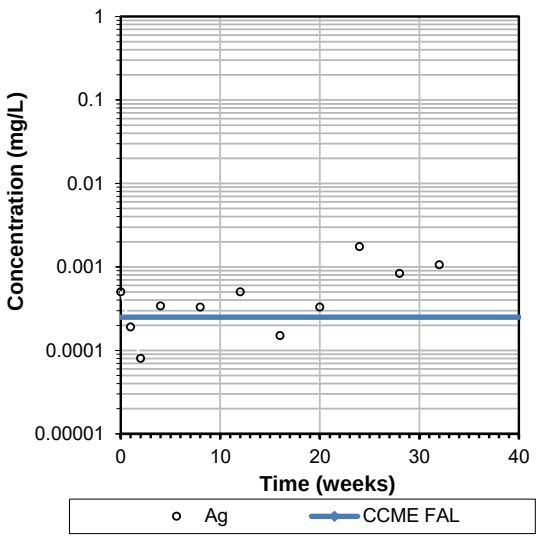




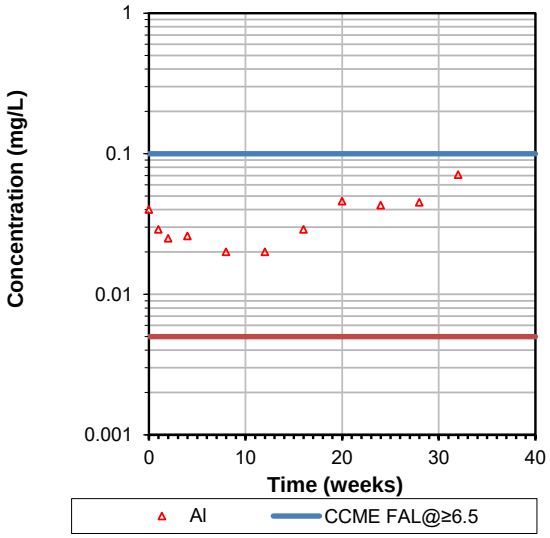
TEST REPORT
Sub-Aqueous Column

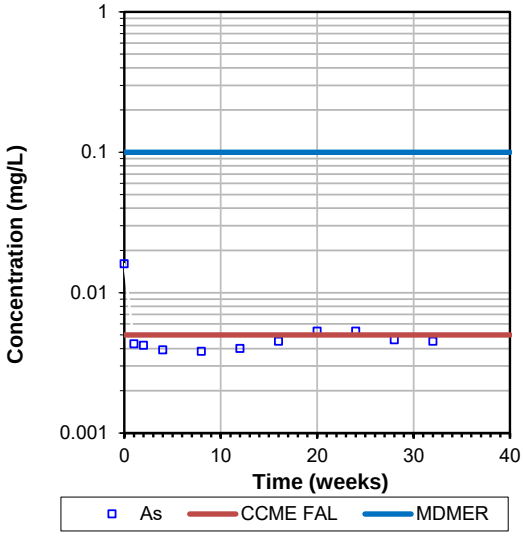
Selected Parameters - BL639-83D Detox Tls (Column 1)





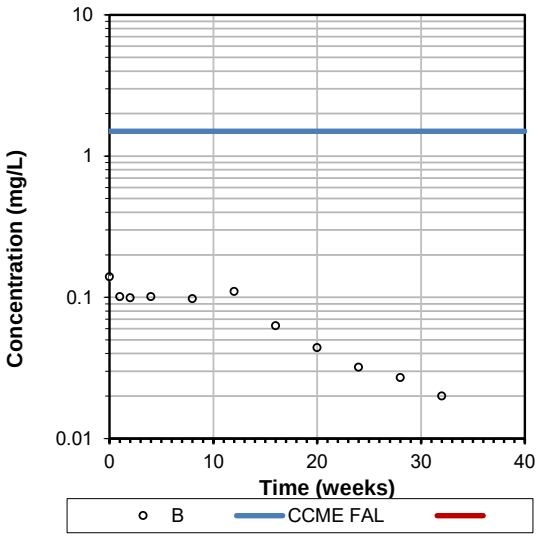
Selected Parameters - BL639-83D Detox Tls (Column 1)

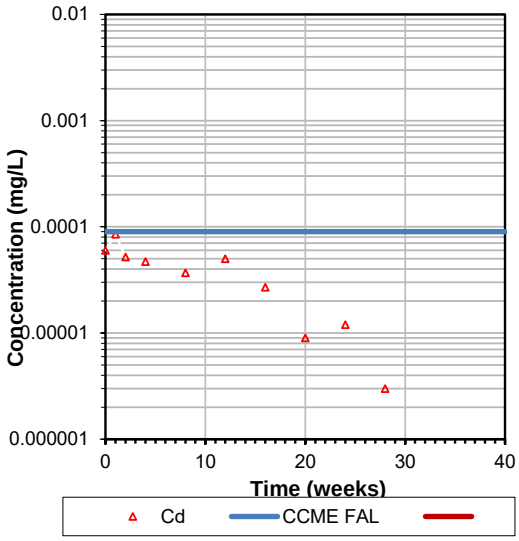




TEST REPORT
Sub-Aqueous Column

Selected Parameters - BL639-83D Detox Tls (Column 1)





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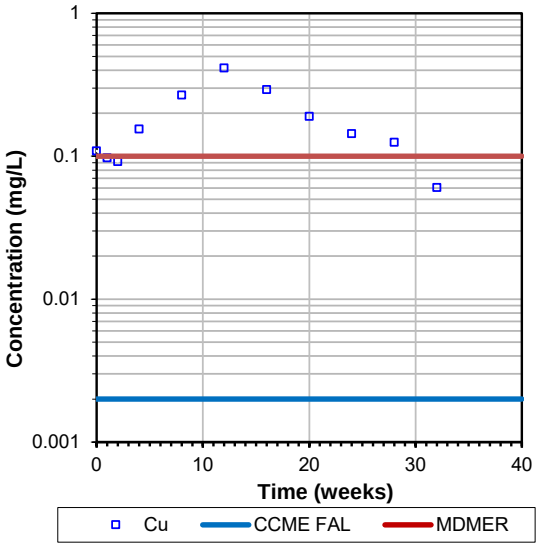
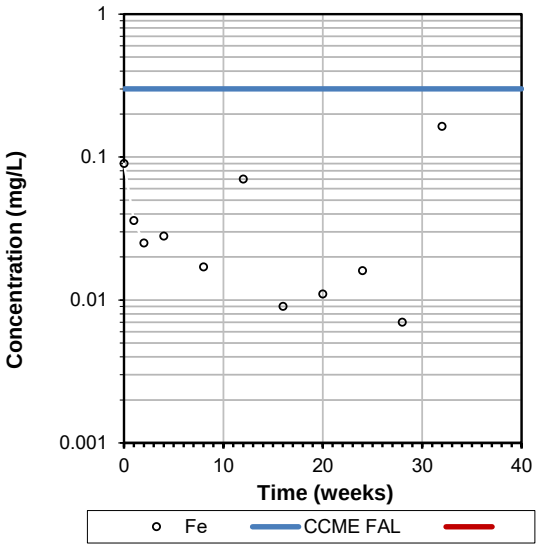
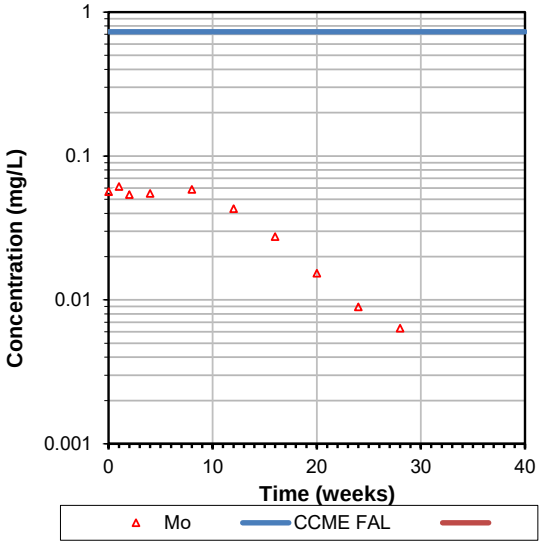
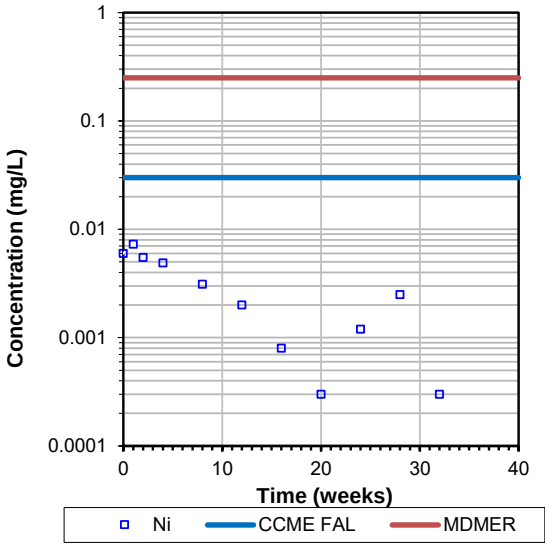




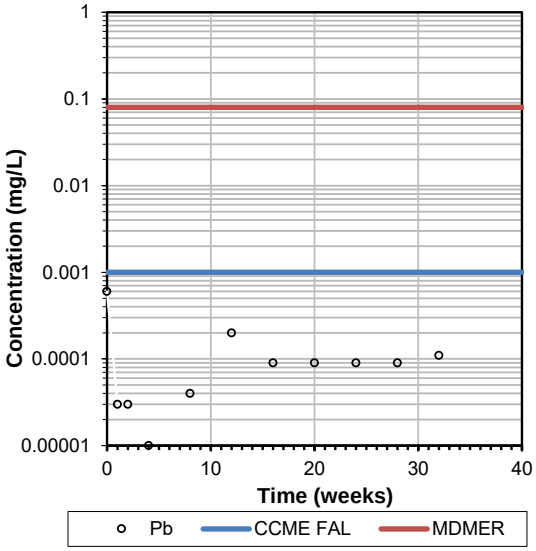
TEST REPORT
Sub-Aqueous Column

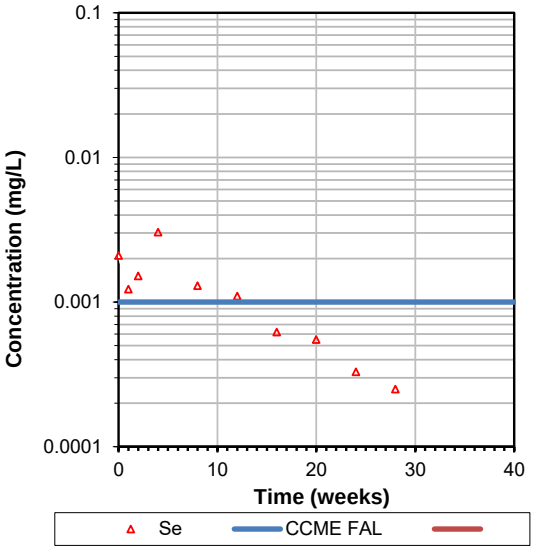
Selected Parameters - BL639-83D Detox Tls (Column 1)





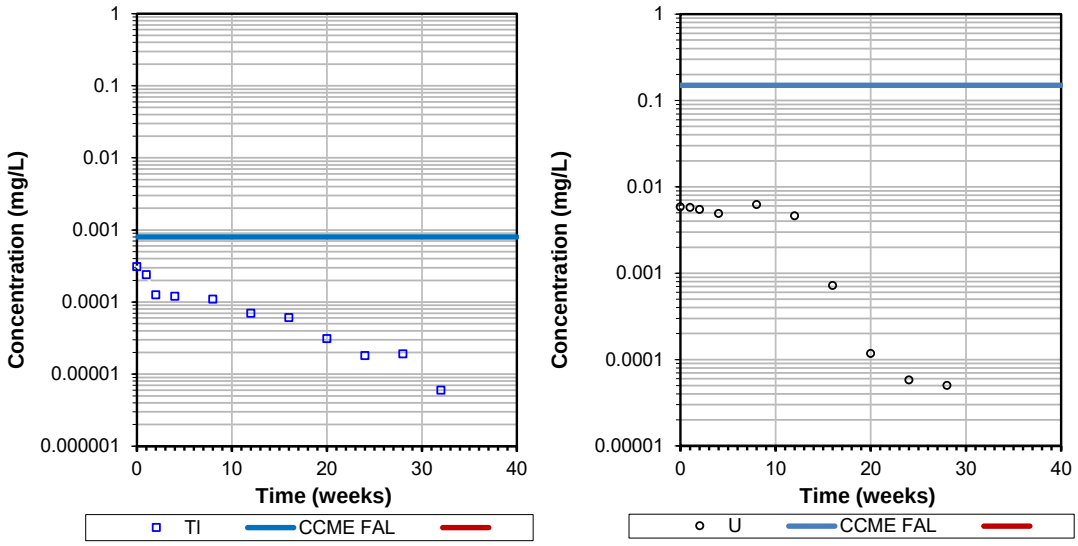
Selected Parameters - BL639-83D Detox Tls (Column 1)



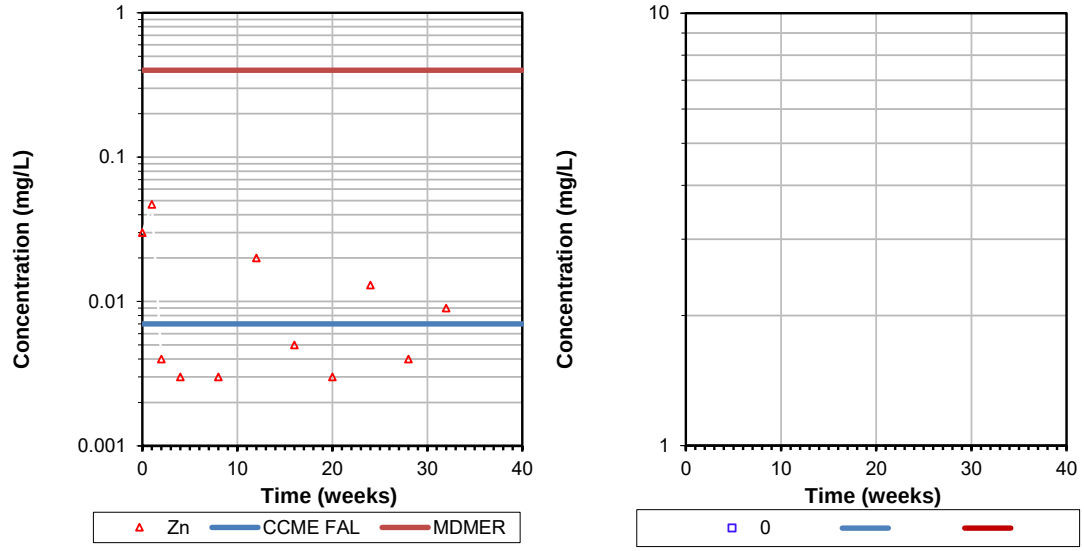


TEST REPORT
Sub-Aqueous Column

Selected Parameters - BL639-83D Detox Tls (Column 1)



Selected Parameters - BL639-83D Detox Tls (Column 1)



TEST REPORT
Sub-Aqueous Column

Sample Properties

19-TP-7 BS1+2 (Column 2)	900	g
Process Water Cover	n/a	mL
Initital Height of Tailings in Column	n/a	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	4	6	8
Date			Effective	20-Jan-21	27-Jan-21	03-Feb-21	17-Feb-21	03-Mar-21	17-Mar-21
LIMS			01-Jun-2021	14439-JAN2'	14506-JAN21	14084-FEB11	14474-FEB11	n/a	14328-MAR21
Volume Collected	mL	-	-	400	400	400	400	400	400
Temp Upon Receipt	°C	-	-	16.0	18.0	20.0	15.5	-	18.0
pH	no unit	6.0-9.5	-	7.48	7.96	8.15	8.18	-	8.17
Alkalinity	mg/L as $CaCO_3$	-	-	182	362	420	421	-	376
Conductivity	µS/cm	-	-	6010	6860	7100	7200	-	6650
Redox Potential	mV	-	-	174	188	169	184	-	187
TDS	mg/L	-	-	5630	6000	5960	5920	-	5880
F	mg/L	0.12	-	0.08	**0.15**	**0.23**	**0.20**	-	**0.45**
NO_2	as N mg/L	0.06	-	**1.48**	**1.51**	**1.55**	**1.72**	-	**1.86**
NO_3	as N mg/L	13	-	1.57	0.80	< 0.6	< 0.6	-	< 0.6
NO_2+NO_3	as N mg/L	-	-	3.05	2.31	1.55	1.72	-	1.86
Cl	mg/L	120	-	18	29	12	14	-	12
SO_4	mg/L	-	-	3300	3700	3500	3600	-	3700
$CN_{(T)}$	mg/L	-	0.50	0.06	0.05	0.07	0.06	-	0.05
CN_{WAD}	mg/L	0.005 as CNF	-	**0.026**	**0.016**	**0.015**	**0.015**	-	**0.026**
CNS	mg/L	-	-	4.4	4.6	< 2	5.1	-	5.3
CNO	mg/L	-	-	400	200	170	83	-	64
NH_3+NH_4	as N mg/L	-	-	6.7	23.4	35.4	65.4	-	118
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	**0.08**	**0.82**	**1.88**	**3.70**	-	**6.53**
S_2O_3	as S_2O_3 mg/L	-	-	< 2	< 2	< 2	< 2	-	< 2
Hg	mg/L	0.000026	-	**0.00012**	**0.00065**	0.00002	**0.00003**	-	0.00001
Ag	mg/L	0.00025	-	< 0.0005	**0.00105**	< 0.00005	< 0.00005	-	0.00012
Al	mg/L	0.1@pH>6.5	-	0.02	0.003	0.006	0.027	-	0.004
As	mg/L	0.005	0.10	**0.009**	**0.0061**	**0.0061**	**0.0064**	-	**0.0073**
B	mg/L	1.5	-	0.03	0.033	0.031	0.036	-	0.045
Ba	mg/L	-	-	0.0974	0.0360	0.0472	0.045	-	0.0359
Be	mg/L	-	-	< 0.00007	< 0.000007	< 0.000007	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	0.00035	0.000020	0.000015	0.00001	-	0.000008
Ca	mg/L	-	-	538	500	472	411	-	319
Cd	mg/L	0.00009	-	**0.00738**	**0.000104**	**0.000370**	**0.00046**	-	**0.00018**
Co	mg/L	-	-	0.0459	0.0234	0.0209	0.0177	-	0.0167
Cr	mg/L	-	-	< 0.0008	0.00127	0.00127	0.00100	-	0.00056
Cu	mg/L	0.002	0.10	**0.119**	**0.0294**	**0.0235**	**0.0204**	-	**0.0173**
Fe	mg/L	0.3	-	< 0.07	0.027	0.027	0.067	-	0.019
K	mg/L	-	-	6.81	27.7	7.38	10.9	-	14.4
Li	mg/L	-	-	0.010	0.0042	0.0026	0.0016	-	0.0015
Mg	mg/L	-	-	45.4	35.1	23.1	16.0	-	9.45
Mn	mg/L	-	-	4.10	1.32	1.07	0.751	-	0.262
Mo	mg/L	0.073	-	0.00416	0.00515	0.00551	0.00640	-	0.0340
Na	mg/L	-	-	1010	1290	1300	1230	-	1430
Ni	mg/L	0.03	0.25	**0.044**	0.0148	0.0065	0.0035	-	0.0014
P	mg/L	-	-	0.07	0.011	0.028	0.030	-	0.032
Pb	mg/L	0.001	0.08	< 0.00001	< 0.00001	0.00002	0.00004	-	0.00004
S	mg/L	-	-	1040	1250	1270	1140	-	1320
Sb	mg/L	-	-	< 0.009	0.0010	0.0024	< 0.0009	-	0.0016
Se	mg/L	0.001	-	**0.0025**	**0.00223**	**0.00234**	**0.0026**	-	**0.0020**
Si	mg/L	-	-	5.7	6.23	4.94	4.52	-	2.50
Sn	mg/L	-	-	< 0.0006	0.00043	0.00056	0.00076	-	0.0021
Sr	mg/L	-	-	1.63	1.34	1.59	1.51	-	1.49
Th	mg/L	-	-	< 0.001	0.0007	0.0001	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	0.0011	0.00013	0.00020	0.00110	-	0.00006
Tl	mg/L	0.0008	-	< 0.00005	< 0.000005	< 0.000005	0.000007	-	0.000018
U	mg/L	0.015	-	0.00127	0.00922	**0.0229**	**0.0334**	-	**0.0332**
V	mg/L	-	-	0.0003	0.00040	0.00033	0.00044	-	0.00030
W	mg/L	-	-	< 0.0002	0.00019	0.00019	0.00017	-	0.00027
Y	mg/L	-	-	0.00241	0.000013	0.000105	0.0004	-	0.00018
Zn	mg/L	0.007	0.40	**0.11**	< 0.002	< 0.002	0.003	-	0.003

Parameters outside the CCME/MDMER guidelines are indicated in bold type.

TEST REPORT
Sub-Aqueous Column

Sample Properties

19-TP-7 BS1+2 (Column 2)	900	g
Process Water Cover	n/a	mL
Initital Height of Tailings in Column	n/a	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	10	12	14	16	18	20
Date			Effective	31-Mar-21	14-Apr-21	28-Apr-21	12-May-21	26-May-21	09-Jun-21
LIMS			01-Jun-2021	n/a	14365-APR21	n/a	14167-MAY21	n/a	14174-JUN21
Volume Collected	mL	-	-	400	400	400	400	420	410
Temp Upon Receipt	°C	-	-	-	18.0	-	18.0	-	18.0
pH	no unit	6.0-9.5	-	-	8.18	-	8.25	-	8.28
Alkalinity	mg/L as $CaCO_3$	-	-	-	282	-	212	-	170
Conductivity	µS/cm	-	-	-	6500	-	4160	-	2430
Redox Potential	mV	-	-	-	184	-	187	-	186
TDS	mg/L	-	-	-	5140	-	2680	-	1580
F	mg/L	0.12	-	-	**0.67**	-	**0.83**	-	**0.98**
NO_2	as N mg/L	0.06	-	-	**1.82**	-	**1.78**	-	**1.04**
NO_3	as N mg/L	13	-	-	1.83	-	6.80	-	10.5
NO_2+NO_3	as N mg/L	-	-	-	3.65	-	8.58	-	11.6
Cl	mg/L	120	-	-	13	-	7.7	-	4.0
SO_4	mg/L	-	-	-	3300	-	1900	-	930
$CN_{(T)}$	mg/L	-	0.50	-	0.04	-	0.03	-	0.03
CN_{WAD}	mg/L	0.005 as CNF	-	-	**0.015**	-	**0.007**	-	**0.005**
CNS	mg/L	-	-	-	< 2	-	2.7	-	< 2
CNO	mg/L	-	-	-	12	-	1.2	-	< 1
NH_3+NH_4	as N mg/L	-	-	-	124	-	82.9	-	50.1
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**7.01**	-	**5.45**	-	**3.52**
S_2O_3	as S_2O_3 mg/L	-	-	-	< 1	-	< 20	-	< 2
Hg	mg/L	0.000026	-	-	0.00002	-	0.00001	-	< 0.00001
Ag	mg/L	0.00025	-	-	< 0.0005	-	0.00010	-	< 0.00005
Al	mg/L	0.1@pH>6.5	-	-	< 0.01	-	0.007	-	0.012
As	mg/L	0.005	0.10	-	**0.0076**	-	**0.0090**	-	**0.0095**
B	mg/L	1.5	-	-	0.08	-	0.076	-	0.069
Ba	mg/L	-	-	-	0.0277	-	0.0262	-	0.0254
Be	mg/L	-	-	-	< 0.00007	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	< 0.00007	-	< 0.00001	-	< 0.00001
Ca	mg/L	-	-	-	251	-	163	-	59.9
Cd	mg/L	0.00009	-	-	0.00003	-	0.000071	-	0.00005
Co	mg/L	-	-	-	0.0124	-	0.00863	-	0.00488
Cr	mg/L	-	-	-	< 0.0008	-	0.00037	-	0.00035
Cu	mg/L	0.002	0.10	-	**0.0114**	-	**0.0099**	-	**0.0083**
Fe	mg/L	0.3	-	-	< 0.07	-	0.011	-	0.016
K	mg/L	-	-	-	14.6	-	11.9	-	7.39
Li	mg/L	-	-	-	0.0025	-	0.0387	-	0.659
Mg	mg/L	-	-	-	7.26	-	3.81	-	1.49
Mn	mg/L	-	-	-	0.151	-	0.0802	-	0.0291
Mo	mg/L	0.073	-	-	0.0563	-	0.0632	-	0.0492
Na	mg/L	-	-	-	1130	-	678	-	397
Ni	mg/L	0.03	0.25	-	< 0.001	-	0.0006	-	0.0005
P	mg/L	-	-	-	0.04	-	0.045	-	0.038
Pb	mg/L	0.001	0.08	-	0.0002	-	< 0.00009	-	0.00012
S	mg/L	-	-	-	1180	-	774	-	327
Sb	mg/L	-	-	-	< 0.009	-	0.0017	-	0.0019
Se	mg/L	0.001	-	-	**0.0015**	-	**0.00115**	-	0.00084
Si	mg/L	-	-	-	2.8	-	2.35	-	2.44
Sn	mg/L	-	-	-	0.0051	-	0.0083	-	0.00896
Sr	mg/L	-	-	-	1.31	-	0.884	-	0.359
Th	mg/L	-	-	-	< 0.001	-	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	-	< 0.0005	-	0.00012	-	0.00011
Tl	mg/L	0.0008	-	-	< 0.00005	-	0.000013	-	0.000007
U	mg/L	0.015	-	-	**0.0191**	-	0.00990	-	0.00416
V	mg/L	-	-	-	0.0003	-	0.00037	-	0.00038
W	mg/L	-	-	-	0.0003	-	0.00057	-	0.00046
Y	mg/L	-	-	-	< 0.0002	-	0.00006	-	0.00004
Zn	mg/L	0.007	0.40	-	< 0.02	-	< 0.002	-	0.002

Parameters outside the CCME/MDMER guidelines are indicated in bold type.

Note: Raised DL's (10x) due to samlpe matrix

TEST REPORT
Sub-Aqueous Column

Sample Properties

19-TP-7 BS1+2 (Column 2)	900	g
Process Water Cover	n/a	mL
Initital Height of Tailings in Column	n/a	cm

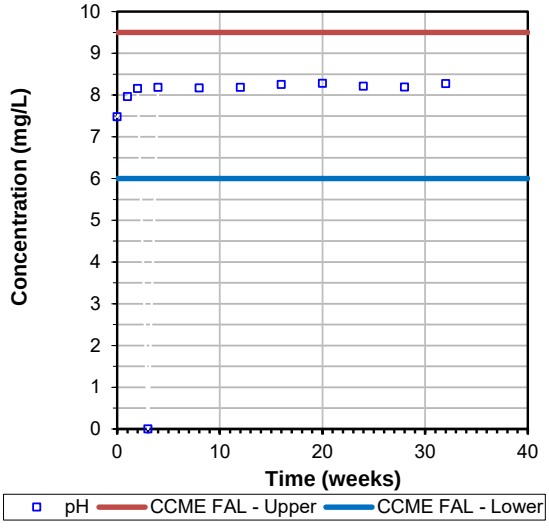
Analysis of Column Leachate

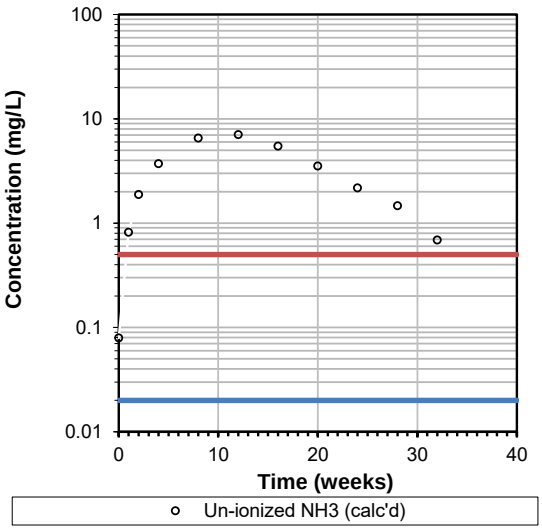
Parameter	Units	CCME FAL	MDMER	22	24	26	28	30	32
Date			Effective	23-Jun-21	07-Jul-21	21-Jul-21	04-Aug-21	18-Aug-21	30-Aug-21
LIMS			01-Jun-2021	n/a	14067-JUL21	n/a	14008-AUG21	n/a	I4530-AUG2
Volume Collected	mL	-	-	400	400	400	450	425	400
Temp Upon Receipt	°C	-	-	-	18.0	-	21.0	-	15.0
pH	no unit	6.0-9.5	-	-	8.21	-	8.19	-	8.27
Alkalinity	mg/L as $CaCO_3$	-	-	-	147	-	124	-	109
Conductivity	µS/cm	-	-	-	1590	-	1190	-	475
Redox Potential	mV	-	-	-	184	-	155	-	255
TDS	mg/L	-	-	-	926	-	611	-	263
F	mg/L	0.12	-	-	**0.90**	-	**0.69**	-	**0.39**
NO_2	as N mg/L	0.06	-	-	**0.66**	-	0.04	-	**0.39**
NO_3	as N mg/L	13	-	-	12.5	-	1.26	-	**14.2**
NO_2+NO_3	as N mg/L	-	-	-	13.2	-	1.30	-	14.6
Cl	mg/L	120	-	-	2.0	-	< 2	-	< 2
SO_4	mg/L	-	-	-	530	-	350	-	61
$CN_{(T)}$	mg/L	-	0.50	-	0.02	-	0.01	-	0.01
CN_{WAD}	mg/L	0.005 as CNF	-	-	< 0.004	-	0.004	-	<0.004
CNS	mg/L	-	-	-	< 2	-	< 2	-	< 2
CNO	mg/L	-	-	-	< 1	-	< 1	-	< 1
NH_3+NH_4	as N mg/L	-	-	-	35.9	-	25.3	-	10.0
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**2.17**	-	**1.46**	-	**0.69**
S_2O_3	as S_2O_3 mg/L	-	-	-	< 2	-	< 2	-	< 1
Hg	mg/L	0.000026	-	-	* 0.00001	-	< 0.00001	-	**0.00044**
Ag	mg/L	0.00025	-	-	< 0.00005	-	0.00006	-	**0.00059**
Al	mg/L	0.1@pH>6.5	-	-	0.009	-	0.010	-	0.054
As	mg/L	0.005	0.10	-	**0.0099**	-	**0.0098**	-	**0.0075**
B	mg/L	1.5	-	-	0.060	-	0.052	-	0.021
Ba	mg/L	-	-	-	0.0183	-	0.0121	-	0.00665
Be	mg/L	-	-	-	< 0.000007	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	0.00006	-	0.00004	-	0.00003
Ca	mg/L	-	-	-	27.1	-	22.2	-	15.6
Cd	mg/L	0.00009	-	-	0.000025	-	0.000011	-	0.000006
Co	mg/L	-	-	-	0.00290	-	0.00173	-	0.000210
Cr	mg/L	-	-	-	0.00033	-	0.00021	-	0.00016
Cu	mg/L	0.002	0.10	-	**0.0058**	-	**0.0051**	-	**0.0363**
Fe	mg/L	0.3	-	-	0.013	-	0.008	-	< 0.007
K	mg/L	-	-	-	4.79	-	3.52	-	1.17
Li	mg/L	-	-	-	1.51	-	2.24	-	3.11
Mg	mg/L	-	-	-	0.705	-	0.683	-	3.00
Mn	mg/L	-	-	-	0.0136	-	0.0125	-	0.00990
Mo	mg/L	0.073	-	-	0.0389	-	0.0241	-	0.00571
Na	mg/L	-	-	-	236	-	172	-	37.6
Ni	mg/L	0.03	0.25	-	0.0002	-	0.0030	-	0.0026
P	mg/L	-	-	-	0.026	-	0.035	-	< 0.003
Pb	mg/L	0.001	0.08	-	0.00066	-	< 0.00009	-	< 0.00009
S	mg/L	-	-	-	163	-	117	-	12
Sb	mg/L	-	-	-	0.0024	-	0.0023	-	0.0042
Se	mg/L	0.001	-	-	0.00055	-	0.00041	-	0.00018
Si	mg/L	-	-	-	1.82	-	1.77	-	3.64
Sn	mg/L	-	-	-	0.00748	-	0.00670	-	0.00146
Sr	mg/L	-	-	-	0.173	-	0.137	-	0.108
Th	mg/L	-	-	-	0.0004	-	< 0.0001	-	0.0001
Ti	mg/L	-	-	-	0.00010	-	0.00010	-	< 0.00005
Tl	mg/L	0.0008	-	-	0.000010	-	< 0.000005	-	0.000007
U	mg/L	0.015	-	-	0.00219	-	0.00145	-	0.000372
V	mg/L	-	-	-	0.00042	-	0.00036	-	0.00060
W	mg/L	-	-	-	0.00036	-	0.00036	-	0.00189
Y	mg/L	-	-	-	0.00003	-	0.00003	-	< 0.00002
Zn	mg/L	0.007	0.40	-	**0.007**	-	**0.047**	-	**0.017**

Parameters outside the CCME/MDMER guidelines are indicated in bold type. *Reassay LIMS 15136-AUG21

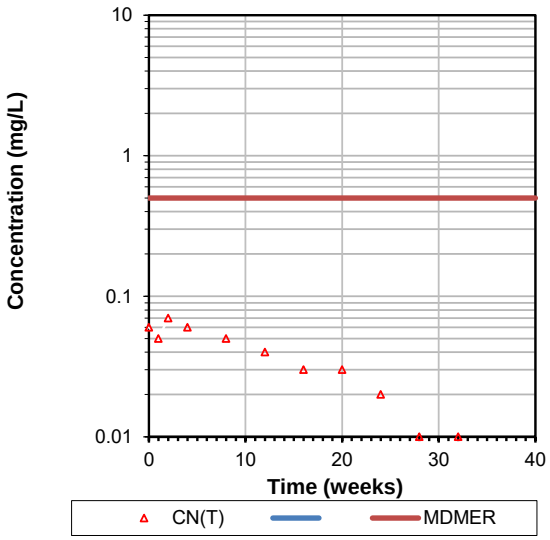
TEST REPORT
Sub-Aqueous Column

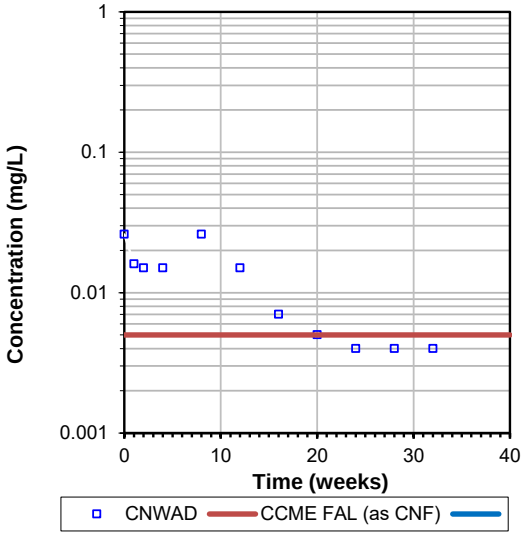
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





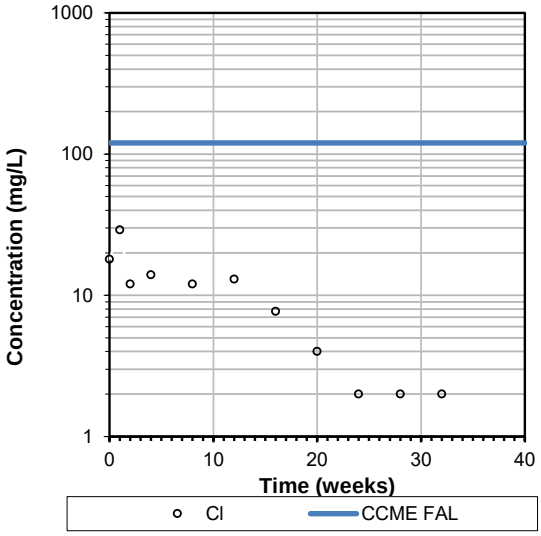
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

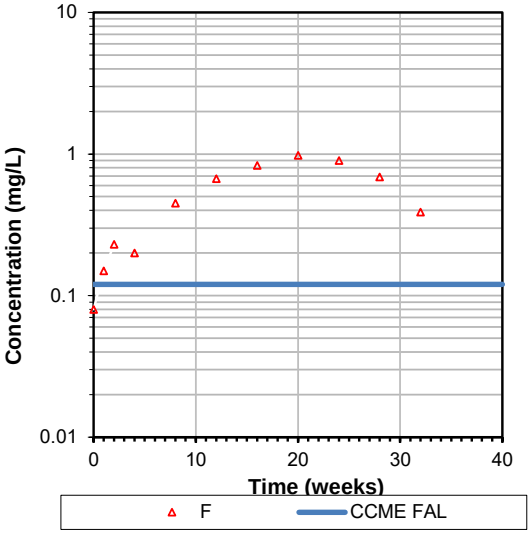




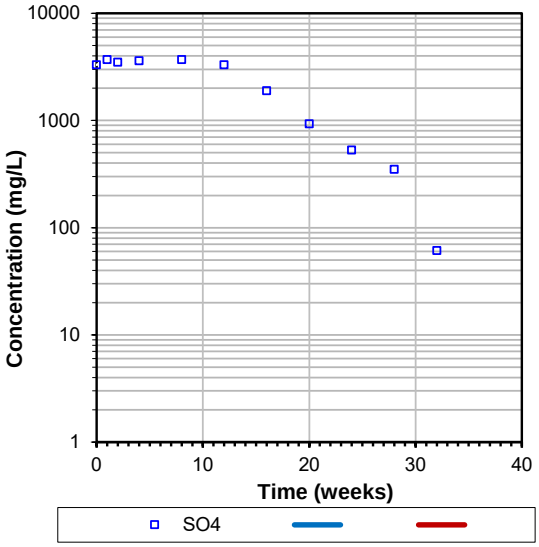
TEST REPORT
Sub-Aqueous Column

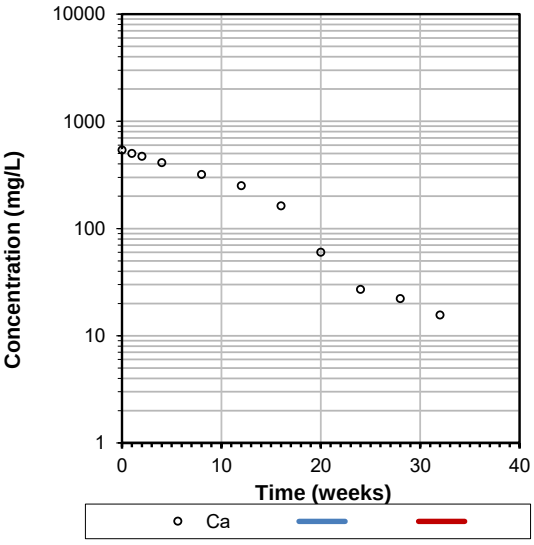
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





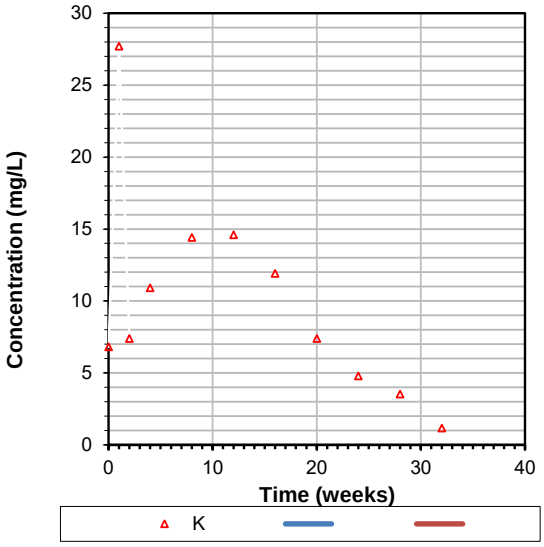
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

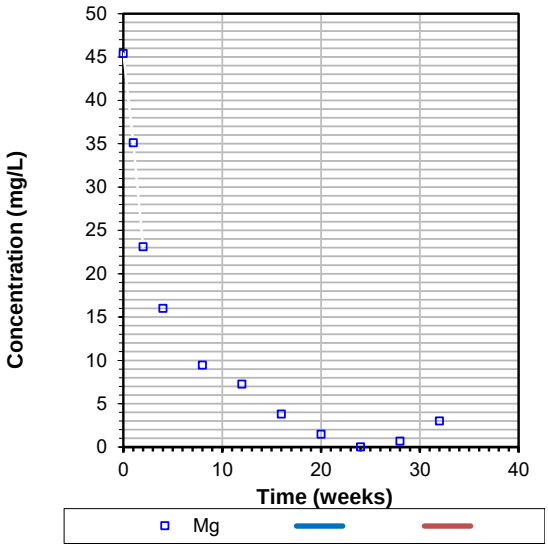




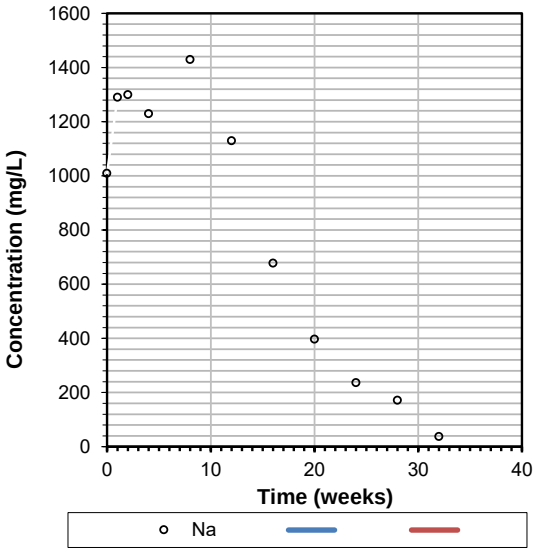
TEST REPORT
Sub-Aqueous Column

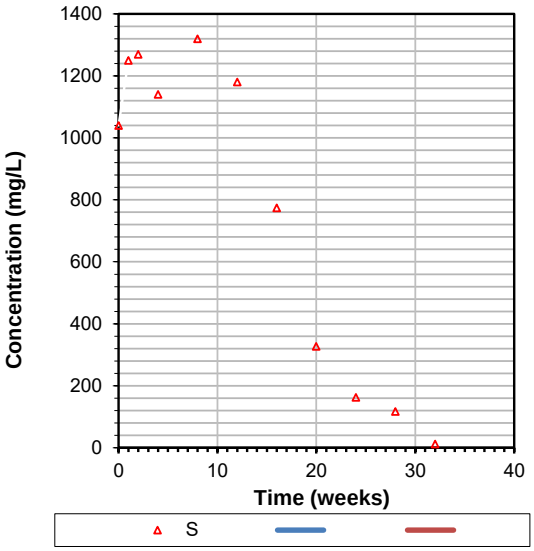
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





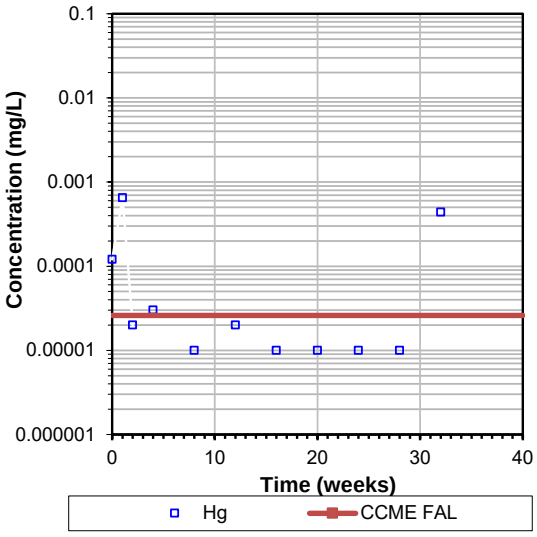
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

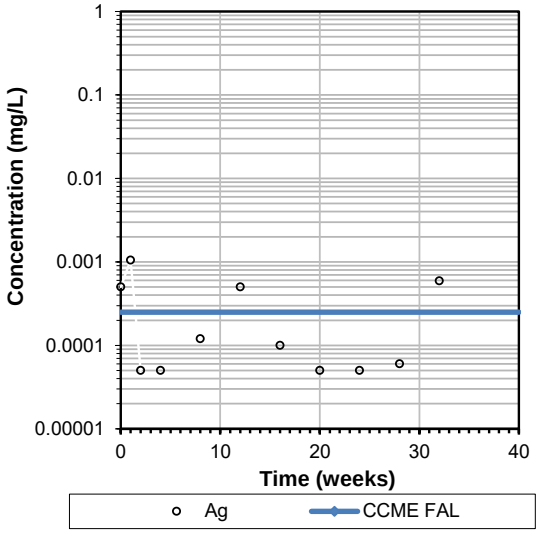




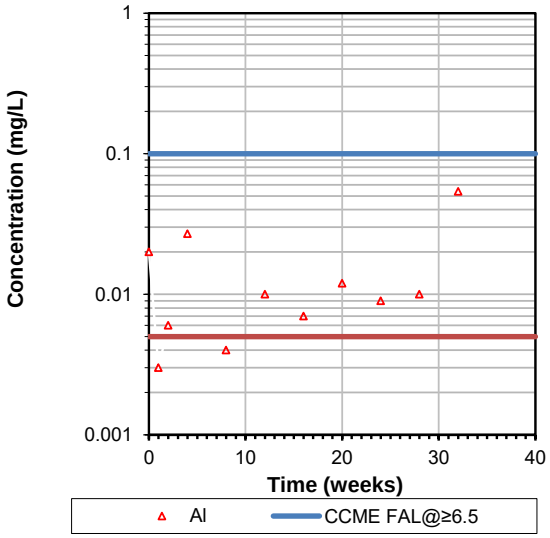
TEST REPORT
Sub-Aqueous Column

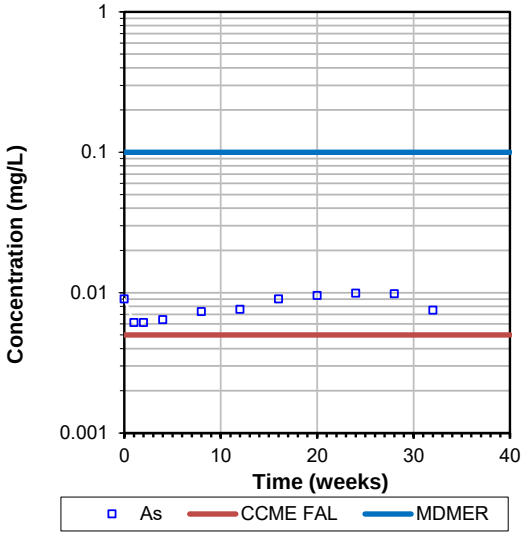
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





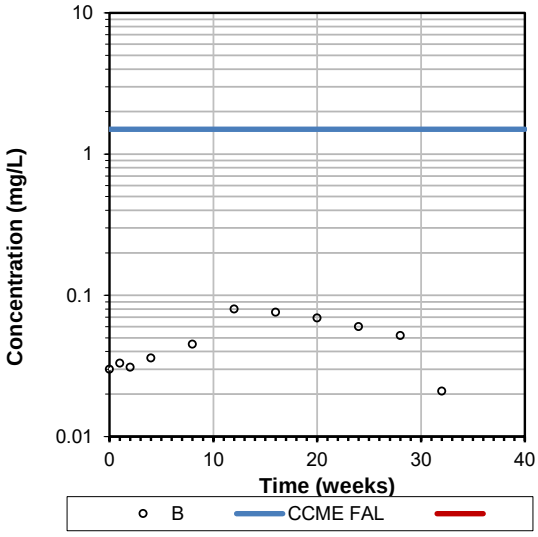
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

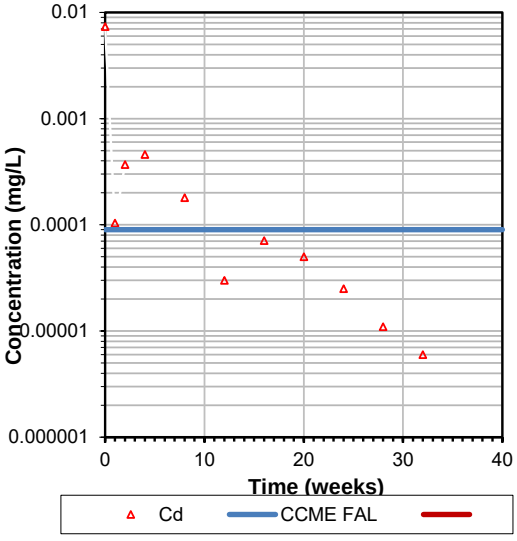




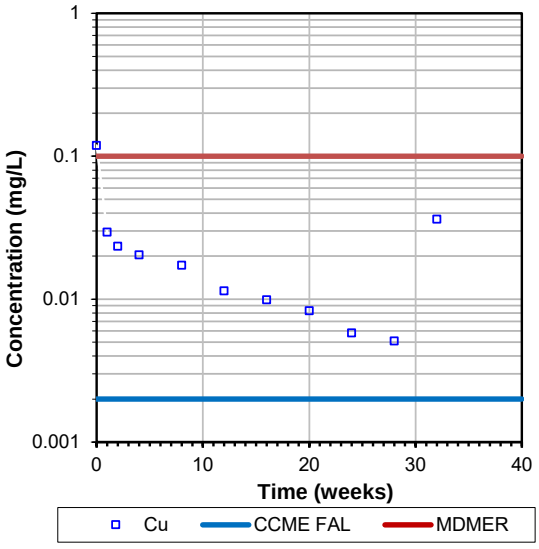
TEST REPORT
Sub-Aqueous Column

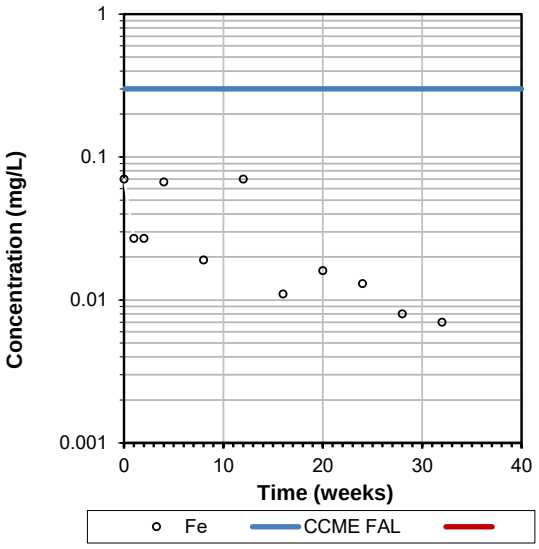
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





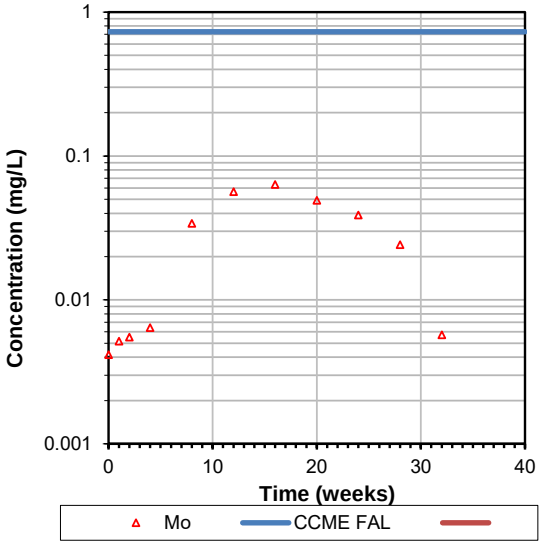
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

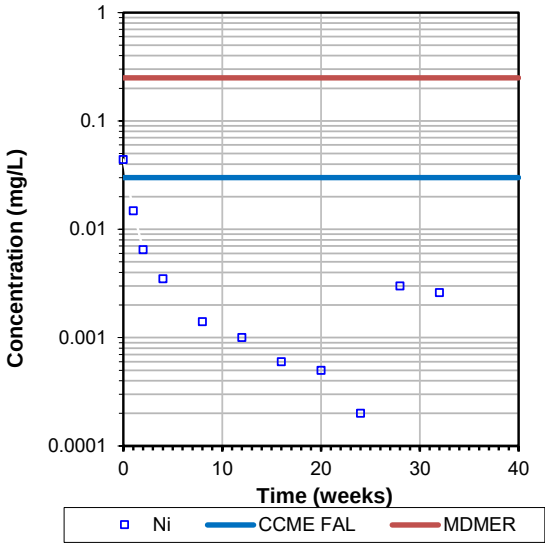




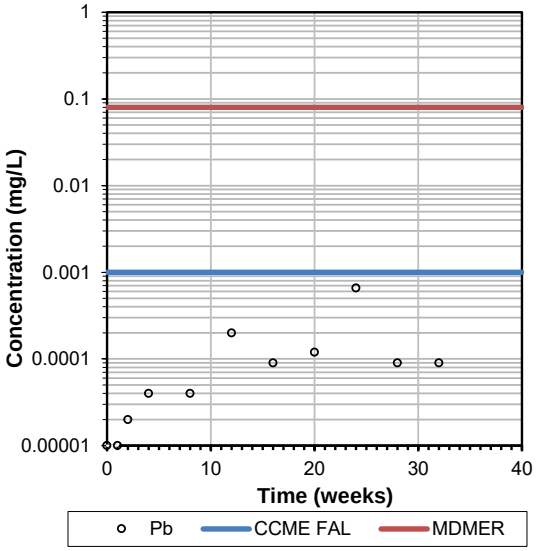
TEST REPORT
Sub-Aqueous Column

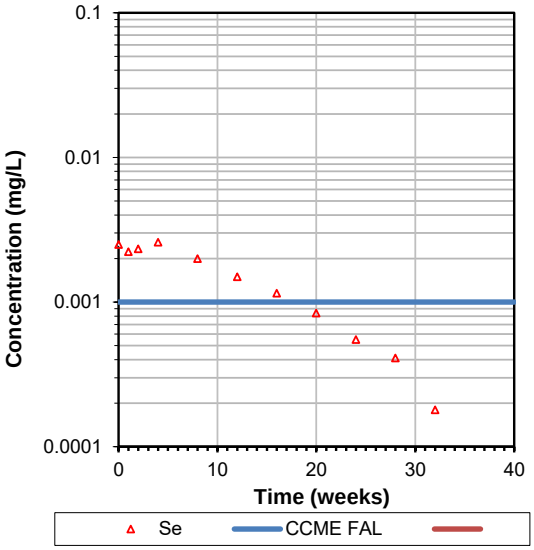
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





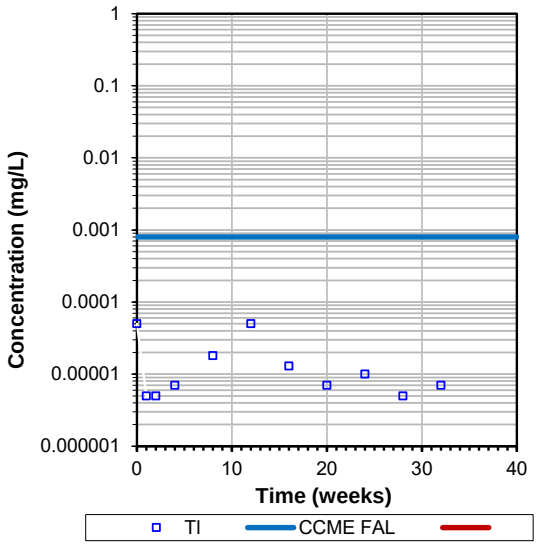
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

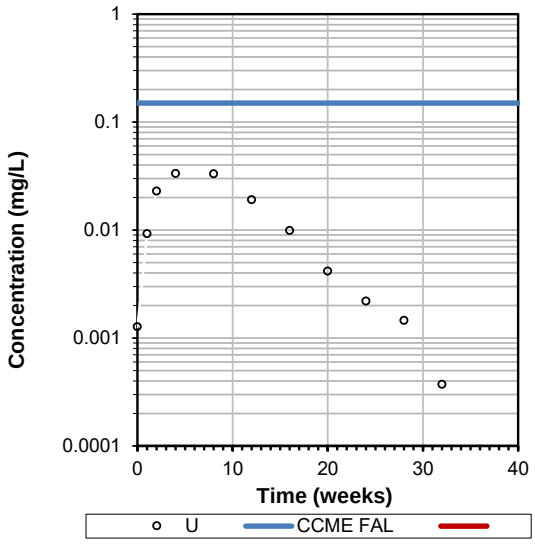




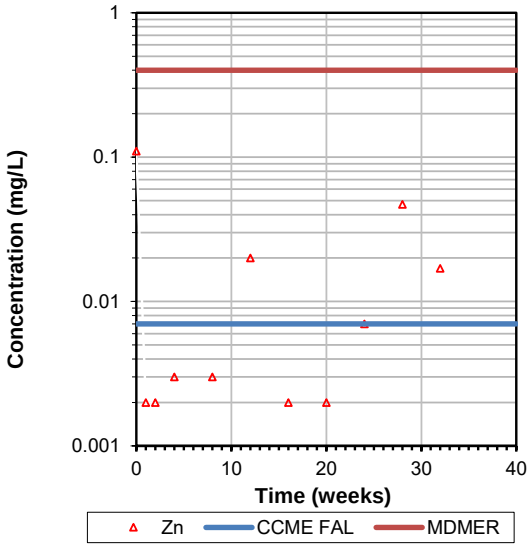
TEST REPORT
Sub-Aqueous Column

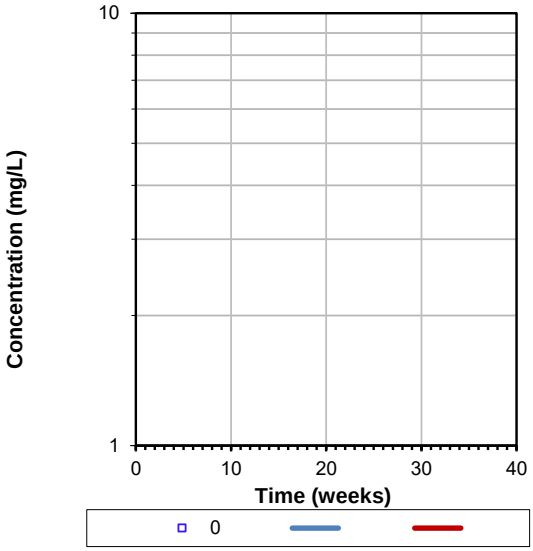
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





Selected Parameters - 19-TP-7 BS1+2 (Column 2)





ATTACHMENT 3

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
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Phone: 705-652-2000 FAX: 705-652-6365

ABA - Modified Sobek

08-September-2021

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO
Mt. Pearl, NL
A1N 0A1, Canada

Phone: 709-730-5046
Fax:

Date Rec. : 21 July 2021
LR Report: **CA14785-JUL21**

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10	11: MHQC-11	12: MHQC-12	13: MHQC-13
Sample Date & Time					NA	NA	NA	NA	NA	NA	NA	NA	NA
Paste pH [no unit]	03-Aug-21	08:00	05-Aug-21	14:52	9.16	9.37	9.54	8.40	9.40	9.58	9.49	9.37	8.90
Fizz Rate [no unit]	03-Aug-21	08:00	05-Aug-21	14:52	2	2	2	2	2	2	3	2	2
Sample weight [g]	03-Aug-21	08:00	05-Aug-21	14:52	1.99	2.06	2.02	2.00	2.00	2.08	2.01	2.02	2.01
HCl_add [mL]	04-Aug-21	06:11	05-Aug-21	14:52	20.00	20.00	20.00	20.00	20.00	20.00	29.80	20.00	20.00
HCl [Normality]	03-Aug-21	08:00	05-Aug-21	14:52	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	03-Aug-21	08:00	05-Aug-21	14:52	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	04-Aug-21	08:00	05-Aug-21	14:52	13.93	8.53	8.43	9.83	12.64	10.96	11.07	14.27	14.80
Final pH [no unit]	04-Aug-21	08:00	05-Aug-21	14:52	1.26	1.55	1.54	1.72	1.31	1.40	1.62	1.26	1.22
NP [t CaCO3/1000 t]	04-Aug-21	08:00	05-Aug-21	14:52	15.3	27.8	28.6	25.4	18.4	21.7	46.6	14.2	12.9
AP [t CaCO3/1000 t]	06-Aug-21	17:42	06-Aug-21	17:42	12.8	20.9	12.8	52.5	24.7	15.6	9.06	27.8	62.5
Net NP [t CaCO3/1000 t]	06-Aug-21	17:42	06-Aug-21	17:42	2.49	6.86	15.8	-27.10	-6.29	6.08	37.5	-13.61	-49.60
NP/AP [ratio]	06-Aug-21	17:42	06-Aug-21	17:42	1.19	1.33	2.23	0.48	0.75	1.39	5.14	0.51	0.21
S [%]	05-Aug-21	11:14	06-Aug-21	17:42	0.571	0.890	0.523	2.00	0.919	0.686	0.421	1.10	2.30
Acid Leachable SO4-S [%]	06-Aug-21	17:42	06-Aug-21	17:42	0.16	0.22	0.11	0.32	0.13	0.19	0.13	0.21	0.30
Sulphide [%]	06-Aug-21	13:22	06-Aug-21	17:42	0.41	0.67	0.41	1.68	0.79	0.50	0.29	0.89	2.00
C [%]	05-Aug-21	11:14	05-Aug-21	17:41	0.180	0.365	0.358	0.314	0.213	0.259	0.596	0.167	0.169
CO3 (pyro) [%]	05-Aug-21	13:53	05-Aug-21	17:41	0.620	1.23	1.32	0.984	0.784	0.994	2.48	0.305	0.410
TIC [%]	05-Aug-21	13:53	05-Aug-21	17:41	0.124	0.247	0.265	0.197	0.157	0.199	0.497	0.061	0.082

SGS Canada Inc.
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ABA - Modified Sobek

LR Report : **CA14785-JUL21**

Analysis	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12	30: MHQC-1
Sample Date & Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Paste pH [no unit]	9.73	9.50	9.89	9.80	8.84	9.83	9.79	9.76	9.70	9.81	9.90	9.57	9.74	9.80	9.19
Fizz Rate [no unit]	2	2	2	2	4	2	3	3	3	3	3	3	3	3	3
Sample weight [g]	2.02	1.97	1.96	2.01	2.01	1.99	1.97	2.01	1.96	2.05	2.06	2.03	1.96	2.09	2.01
HCl_add [mL]	20.00	20.00	20.00	20.00	118.10	31.80	31.10	30.90	44.80	31.20	39.70	45.50	42.20	48.50	20.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	12.08	13.59	10.74	8.24	47.59	14.07	11.34	12.92	18.42	10.87	16.11	12.28	16.03	19.72	8.64
Final pH [no unit]	1.34	1.25	1.39	1.63	1.58	1.55	1.71	1.63	1.57	1.74	1.61	1.79	1.58	1.56	1.53
NP [t CaCO3/1000 t]	19.6	16.3	23.6	29.2	175	44.5	50.2	44.7	67.3	49.6	57.3	81.8	66.8	68.9	28.3
AP [t CaCO3/1000 t]	11.6	24.4	16.6	11.2	6.88	5.31	9.38	11.2	9.69	7.50	3.12	10.3	9.69	10.6	24.4
Net NP [t CaCO3/1000 t]	8.04	-8.08	7.04	18.0	169	39.2	40.8	33.4	57.6	42.1	54.2	71.5	57.1	58.3	3.92
NP/AP [ratio]	1.70	0.67	1.42	2.60	25.5	8.38	5.35	3.97	6.95	6.61	18.3	7.93	6.90	6.48	1.16
S [%]	0.411	0.890	0.680	0.513	0.305	0.250	0.372	0.492	0.390	0.336	0.160	0.481	0.405	0.447	0.936
Acid Leachable SO4-S [%]	0.04	0.11	0.15	0.15	0.08	0.08	0.07	0.13	0.08	0.10	0.06	0.15	0.10	0.11	0.16
Sulphide [%]	0.37	0.78	0.53	0.36	0.22	0.17	0.30	0.36	0.31	0.24	0.10	0.33	0.31	0.34	0.78
C [%]	0.226	0.187	0.290	0.378	2.30	0.586	0.694	0.616	0.920	0.635	0.754	1.03	0.859	0.891	0.360
CO3 (pyro) [%]	0.904	0.639	1.00	1.34	10.4	2.41	2.77	2.41	3.82	2.53	3.24	4.53	3.78	3.84	1.31
TIC [%]	0.181	0.128	0.201	0.268	2.08	0.483	0.554	0.482	0.764	0.506	0.649	0.907	0.756	0.769	0.262

Analysis	31: MHQC-2	32: MHQC-3	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C
Sample Date & Time	NA	NA	NA	NA	NA
Paste pH [no unit]	9.37	9.55	9.41	9.55	9.44
Fizz Rate [no unit]	3	3	3	3	3
Sample weight [g]	1.97	2.08	1.98	1.97	2.01
HCl_add [mL]	20.00	20.00	20.00	20.00	20.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	13.35	5.96	9.98	10.52	8.63
Final pH [no unit]	1.25	1.87	1.48	1.39	1.56
NP [t CaCO3/1000 t]	16.9	33.8	25.3	24.1	28.3
AP [t CaCO3/1000 t]	29.7	14.7	20.0	16.9	25.9
Net NP [t CaCO3/1000 t]	-12.79	19.1	5.30	7.22	2.36
NP/AP [ratio]	0.57	2.30	1.26	1.43	1.09
S [%]	1.16	0.574	0.812	0.754	0.969

OnLine LIMS

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Analysis	31: MHQC-2	32: MHQC-3	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C
Acid Leachable SO4-S [%]	0.21	0.10	0.17	0.21	0.14
Sulphide [%]	0.95	0.47	0.64	0.54	0.83
C [%]	0.207	0.428	0.318	0.303	0.356
CO3 (pyro) [%]	0.644	1.70	1.14	1.17	1.31
TIC [%]	0.129	0.341	0.228	0.235	0.262

*NP (Neutralization Potential)
= 50 x (N of HCL x Total HCL added - N NaOH x NaOH added)

Weight of Sample

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.04 will be calculated using a 0.04 value.

<Original signed by>

CHARTERED CATHARINE ARNOLD CHEMIST

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

000263245

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08-September-2021

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO
Mt. Pearl, NL
A1N 0A1, Canada

Phone: 709-730-5046
Fax:

Date Rec. : 21 July 2021
LR Report: **CA14786-JUL21**
Reference: Leprechaun (121414740-180.300)

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10	11: MHQC-11	12: MHQC-12	13: MHQC-13
Sample Date & Time					NA	NA	NA	NA	NA	NA	NA	NA	NA
Pending Decision	***	***	***	***	***	***	***	***	***	***	***	***	***
Hg [ug/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Prep-Env AR [Prep]	04-Aug-21	08:00	06-Aug-21	15:09	1	1	1	1	1	1	1	1	1
Ag [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	2.3	1.0	0.7	1.1	2.5	0.9	0.8	0.7	2.5
Al [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	2400	1500	1500	12000	2300	2700	6400	1600	1800
Ba [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	5.2	3.7	6.0	16	9.0	5.8	5.3	4.7	6.7
Be [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.04	0.03	0.04	0.04	0.05	0.04	0.05	0.04	0.04
Bi [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.48	2.1	0.23	0.73	0.89	0.15	0.25	3.2	2.1
Ca [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	4700	8500	9000	7500	5800	6800	15000	4600	4300
Cd [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.03	0.06	< 0.02	0.08	< 0.02	< 0.02	0.03	0.76	0.19
Co [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	1.00	1.8	2.3	6.9	1.6	1.9	3.8	1.4	1.0
Cr [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	3.0	3.4	3.5	8.9	3.5	2.7	32	3.4	1.6
Cu [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	23	52	14	290	17	21	24	3100	9.7
Fe [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	10000	11000	7600	46000	12000	12000	15000	12000	20000

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LR Report : **CA14786-JUL21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10	11: MHQC-11	12: MHQC-12	13: MHQC-13
K [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	120	85	130	320	210	150	93	120	150
Li [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Mg [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	670	660	500	5000	640	1000	4200	740	520
Mn [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	208	316	217	612	248	282	600	204	213
Mo [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	1.1	2.3	0.6	0.5	1.6	0.7	1.1	1.6	1.3
Ni [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.6	0.9	0.5	4.5	1.1	1.2	7.6	1.2	1.6
Pb [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.57	0.87	0.44	0.39	0.84	0.43	0.92	2.8	1.3
Sb [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	0.5	< 0.5
Sr [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	6.5	8.7	7.7	7.0	6.9	7.3	16	5.6	5.5
Ti [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	5.9	5.6	4.2	51	6.6	6.9	13	3.6	3.8
Tl [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.058	0.046	0.076	0.076	0.070	0.12	0.072	0.047	0.086
V [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 1	< 1	< 1	23	< 1	1	20	2	< 1
Y [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	1.7	1.5	2.5	4.0	2.0	2.5	4.6	1.6	1.9
Zn [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	10	7.7	5.7	38	5.4	8.6	21	73	14

Analysis	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12
Sample Date & Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pending Decision	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Hg [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.23	< 0.05
Prep-Env AR [Prep]	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	1.5	0.5	1.0	4.1	6.4	1.2	1.8	1.1	1.2	1.4	3.9	1.2	1.7	1.2
Al [µg/g]	2700	2000	3700	2100	22000	2200	1500	2000	2200	4600	3900	5100	3600	3700

OnLine LIMS

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SGS Canada Inc.
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LR Report : **CA14786-JUL21**

Analysis	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12
Ba [µg/g]	4.7	11	1.7	18	7.8	24	16	20	17	13	12	18	29	29
Be [µg/g]	0.06	0.04	0.02	0.09	0.14	0.10	0.10	0.09	0.11	0.16	0.18	0.13	0.16	0.11
Bi [µg/g]	0.28	0.81	1.6	4.8	0.14	1.7	0.93	3.2	0.29	0.76	< 0.09	0.60	0.27	0.53
Ca [µg/g]	6400	5200	7500	9200	49000	13000	13000	11000	19000	15000	17000	26000	21000	21000
Cd [µg/g]	< 0.02	< 0.02	0.03	0.05	0.18	0.04	0.03	0.04	0.04	0.03	0.04	0.03	0.05	0.05
Co [µg/g]	0.84	0.98	1.4	2.6	29	2.5	3.1	3.8	4.2	4.8	4.1	6.6	4.5	4.8
Cr [µg/g]	1.8	1.4	1.8	2.1	65	2.0	1.5	2.5	1.7	2.9	2.3	4.7	2.2	2.2
Cu [µg/g]	12	13	13	17	51	13	13	12	8.2	10	12	18	10.0	29
Fe [µg/g]	9300	11000	13000	8800	53000	8200	9500	11000	9700	13000	12000	14000	11000	13000
K [µg/g]	120	140	43	250	56	380	250	280	320	240	250	250	280	260
Li [µg/g]	< 2	< 2	< 2	< 2	6	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2
Mg [µg/g]	930	500	1500	1000	20000	1600	2200	2400	2100	3200	3300	4100	2700	2900
Mn [µg/g]	277	241	395	250	1045	285	342	302	390	363	365	471	380	425
Mo [µg/g]	2.2	1.5	3.2	0.3	0.5	0.6	0.8	1.0	0.3	4.1	0.3	0.4	0.4	0.7
Ni [µg/g]	0.3	0.3	0.5	0.8	20	1.7	1.6	2.0	2.3	2.7	2.6	4.7	2.0	3.2
Pb [µg/g]	0.60	1.1	0.96	4.2	3.7	1.9	1.2	2.0	1.5	1.7	3.6	5.0	2.3	2.6
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5
Sr [µg/g]	8.8	6.8	9.8	28	98	37	38	29	49	55	70	98	79	69
Ti [µg/g]	5.5	6.1	9.0	8.7	453	17	12	21	9.4	13	20	15	16	25
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.079	0.065	0.099	0.17	0.077	0.31	0.15	0.18	0.18	0.24	0.36	0.12	0.17	0.19
V [µg/g]	< 1	< 1	1	2	170	3	2	4	3	8	7	11	5	7
Y [µg/g]	1.7	2.2	2.1	1.9	16	2.1	2.0	1.8	2.7	2.6	2.9	3.4	3.3	2.8
Zn [µg/g]	7.4	5.2	12	18	80	19	13	20	15	28	29	22	19	25

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LR Report : **CA14786-JUL21**

Analysis	30: MHQC-1	31: MHQC-2	32: MHQC-3	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C
Sample Date & Time	NA	NA	NA	NA	NA	NA
Pending Decision	***	***	***	***	***	***
Hg [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Prep-Env AR [Prep]	1	1	1	1	1	1
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	1.5	1.9	3.5	5.7	9.2	0.9
Al [µg/g]	2600	1600	6100	4900	2800	5000
Ba [µg/g]	5.9	10	5.3	7.1	6.8	6.5
Be [µg/g]	0.03	0.03	0.04	0.06	0.04	0.03
Bi [µg/g]	0.73	4.6	0.82	3.2	1.4	0.94
Ca [µg/g]	9100	5300	11000	8200	7800	8900
Cd [µg/g]	0.03	< 0.02	0.03	0.53	0.07	0.04
Co [µg/g]	2.0	1.9	4.2	2.9	1.9	3.3
Cr [µg/g]	3.3	5.1	3.7	3.5	2.9	4.7
Cu [µg/g]	12	17	14	170	20	78
Fe [µg/g]	13000	12000	17000	17000	12000	19000
K [µg/g]	100	140	110	180	140	130
Li [µg/g]	< 2	< 2	< 2	< 2	< 2	< 2
Mg [µg/g]	1100	480	3200	2000	1200	2200
Mn [µg/g]	304	178	393	418	291	420
Mo [µg/g]	1.2	1.4	0.9	17	1.5	1.1
Ni [µg/g]	0.8	1.9	1.5	0.9	0.7	1.8
Pb [µg/g]	1.6	2.0	0.64	3.0	9.3	0.83
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	9.0	7.3	9.2	7.4	8.6	8.4
Ti [µg/g]	5.1	2.7	12	11	5.9	16
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

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LR Report : **CA14786-JUL21**

Analysis	30: MHQC-1	31: MHQC-2	32: MHQC-3	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C
U [µg/g]	0.061	0.046	0.073	0.081	0.072	0.080
V [µg/g]	1	< 1	25	10	3	8
Y [µg/g]	2.1	1.3	2.5	2.4	2.7	2.7
Zn [µg/g]	8.3	5.2	17	35	15	17

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

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08-September-2021

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO
Mt. Pearl, NL
A1N 0A1, Canada

Phone: 709-730-5046
Fax:

Date Rec. : 21 July 2021
LR Report: **CA14787-JUL21**

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10
Sample Date & Time					NA	NA	NA	NA	NA	NA
Sample weight [g]	04-Aug-21	08:26	05-Aug-21	14:37	250	250	250	250	250	250
Volume D.I. Water [mL]	04-Aug-21	08:26	05-Aug-21	14:37	750	750	750	750	750	750
Final pH [no unit]	05-Aug-21	06:31	05-Aug-21	14:37	9.11	9.26	9.41	8.72	9.26	9.19
pH [No unit]	05-Aug-21	14:52	06-Aug-21	12:06	8.01	8.24	8.38	7.97	8.32	8.16
Alkalinity [mg/L as CaCO3]	05-Aug-21	14:52	06-Aug-21	12:06	27	34	31	36	34	37
Conductivity [uS/cm]	05-Aug-21	14:52	06-Aug-21	12:06	126	100	97	214	104	111
SO4 [mg/L]	06-Aug-21	09:44	10-Aug-21	14:38	33	11	15	67	14	14
Hg [mg/L]	06-Aug-21	15:00	09-Aug-21	13:00	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.830	0.582	0.804	0.736	0.780	0.451
As [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.0028	0.0021	0.0019	< 0.0002	0.0069	0.0012
Ba [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.00119	0.00061	0.00080	0.00282	0.00141	0.00088
B [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.018	0.033	0.022	0.008	0.019	0.029
Be [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	< 0.00001	0.00003	< 0.00001	< 0.00001	0.00001	< 0.00001
Ca [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	12.3	9.19	8.06	24.8	8.54	8.77

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LR Report : **CA14787-JUL21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10
Cd [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.000009	< 0.000003	< 0.000003	< 0.000003	0.000004	< 0.000003
Co [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.000056	0.000031	0.000005	0.000019	0.000009	0.000084
Cr [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	< 0.00008	< 0.00008	0.00014	< 0.00008	< 0.00008	0.00011
Cu [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.0004	0.0003	0.0003	0.0003	0.0003	< 0.0002
Fe [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.015	0.010	< 0.007	0.007	0.007	0.032
K [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	1.01	0.603	1.07	4.01	2.61	1.02
Li [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.0004	0.0004	0.0003	0.0002	0.0006	0.0004
Mg [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.741	0.941	0.629	2.86	0.788	0.754
Mn [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00632	0.00715	0.00315	0.0106	0.00332	0.00606
Mo [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.0190	0.00460	0.00329	0.00116	0.00460	0.00166
Na [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	9.10	9.21	9.62	7.26	9.18	11.6
Ni [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.0005	0.0006	0.0001	0.0004	0.0003	0.0010
Pb [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.0021	0.0105	0.0016	0.0014	0.0023	0.0034
Se [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00027	0.00011	0.00008	0.00014	0.00019	0.00011
Si [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	2.21	3.21	3.39	0.89	2.58	3.17
Sn [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00015	0.00021	0.00010	0.00023	0.00008	< 0.00006
Sr [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.0321	0.0298	0.0323	0.0597	0.0176	0.0170
Ti [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00011	0.00013	0.00007	< 0.00005	0.00016	0.00014
Tl [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.000115	0.000137	0.000194	0.000031	0.000177	0.000123
V [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00035	0.00072	0.00046	0.00024	0.00063	0.00062
Zn [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	11: MHQC-11	12: MHQC-12	13: MHQC-13	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4
Sample Date & Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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SFE 3:1 ratio 24hr (MEND) prefilter pH

LR Report : **CA14787-JUL21**

Analysis	11: MHQC-11	12: MHQC-12	13: MHQC-13	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4
Sample weight [g]	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.34	9.31	9.29	9.49	9.10	9.44	9.40	8.91	9.39	9.33
pH [No unit]	8.30	8.50	8.23	8.63	7.89	8.46	8.57	8.24	8.39	8.53
Alkalinity [mg/L as CaCO3]	34	32	33	35	28	35	31	56	37	42
Conductivity [uS/cm]	86	92	95	85	139	99	105	125	103	115
SO4 [mg/L]	4	6	7	3	34	8	18	6	10	10
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00002	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.666	0.462	0.502	0.726	0.521	0.702	0.969	0.394	1.05	1.01
As [mg/L]	0.0010	0.0015	0.0022	0.0024	0.0004	0.0017	0.0031	0.0011	0.0043	0.0013
Ba [mg/L]	0.00074	0.00068	0.00071	0.00048	0.00316	0.00026	0.00204	0.00256	0.00163	0.00148
B [mg/L]	0.022	0.099	0.052	0.030	0.029	0.019	0.038	0.009	0.036	0.070
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	0.00061	< 0.00001	< 0.00001	0.00001	0.00001	0.00002	< 0.00001	0.00004	0.00002
Ca [mg/L]	6.92	7.04	7.60	5.46	12.6	5.74	7.87	11.3	6.73	7.38
Cd [mg/L]	< 0.000003	0.000004	< 0.000003	0.000005	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000003
Co [mg/L]	0.000006	0.000038	0.000008	0.000035	0.000177	0.000049	0.000013	0.000021	0.000016	0.000021
Cr [mg/L]	< 0.00008	0.00017	0.00009	< 0.00008	0.00011	0.00010	0.00010	< 0.00008	0.00010	< 0.00008
Cu [mg/L]	0.0002	0.0004	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0002	< 0.0002	0.0010	0.0002
Fe [mg/L]	< 0.007	0.008	0.009	0.009	< 0.007	0.028	0.007	< 0.007	< 0.007	< 0.007
K [mg/L]	0.910	0.781	1.01	0.799	1.28	0.067	3.14	0.594	5.05	4.04
Li [mg/L]	0.0003	0.0003	0.0003	0.0003	0.0003	0.0001	0.0003	0.0002	0.0003	0.0003
Mg [mg/L]	0.909	0.286	0.253	0.263	0.544	0.279	0.887	4.23	1.07	1.52
Mn [mg/L]	0.00269	0.00401	0.00539	0.00229	0.00976	0.00374	0.00346	0.00223	0.00212	0.00349
Mo [mg/L]	0.00096	0.00215	0.00571	0.00250	0.00098	0.00137	0.00444	0.00166	0.00173	0.00152
Na [mg/L]	9.17	10.8	11.0	11.6	11.7	15.3	10.1	8.52	9.57	11.4
Ni [mg/L]	0.0003	0.0006	0.0003	0.0005	0.0004	0.0008	0.0007	0.0005	0.0007	0.0006
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009

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LR Report : **CA14787-JUL21**

Analysis	11: MHQC-11	12: MHQC-12	13: MHQC-13	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4
Sb [mg/L]	0.0015	0.0209	< 0.0009	< 0.0009	< 0.0009	0.0017	0.0092	0.0011	0.0079	0.0083
Se [mg/L]	< 0.00004	0.00018	0.00006	0.00005	0.00012	0.00008	0.00031	0.00026	0.00027	0.00020
Si [mg/L]	2.24	4.35	3.96	3.68	2.88	3.79	2.98	1.17	2.53	2.44
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	0.00013	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0217	0.0138	0.0143	0.0124	0.0401	0.0100	0.0341	0.157	0.0583	0.0547
Ti [mg/L]	0.00008	0.00014	0.00022	0.00018	0.00005	0.00010	0.00012	0.00005	0.00021	< 0.00005
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000025	0.000101	0.000147	0.000070	0.000123	0.000106	0.000548	0.000010	0.000721	0.000449
V [mg/L]	0.00229	0.00047	0.00038	0.00050	0.00029	0.00037	0.00289	0.00067	0.00324	0.00363
Zn [mg/L]	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12	30: MHQC-1	31: MHQC-2	32: MHQC-3
Sample Date & Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sample weight [g]	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.43	9.28	9.56	9.43	9.29	9.43	9.47	9.31	9.31	9.36
pH [No unit]	8.63	8.66	8.95	8.84	8.52	8.78	8.72	8.40	8.14	8.49
Alkalinity [mg/L as CaCO3]	41	43	39	40	38	39	39	29	30	32
Conductivity [uS/cm]	103	110	91	98	98	95	94	115	101	99
SO4 [mg/L]	7	9	4	6	7	6	4	26	15	14
Hg [mg/L]	< 0.00001	0.00002	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00050	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.965	1.14	1.16	1.22	0.823	0.983	0.921	0.838	0.788	0.986
As [mg/L]	0.0012	0.0013	0.0031	0.0037	0.0009	0.0022	0.0015	0.0020	0.0039	0.0017
Ba [mg/L]	0.00167	0.00128	0.00069	0.00142	0.00154	0.00208	0.00184	0.00136	0.00292	0.00067
B [mg/L]	0.048	0.072	0.071	0.015	0.084	0.079	0.072	0.036	0.031	0.010

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Analysis	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12	30: MHQC-1	31: MHQC-2	32: MHQC-3
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00008	< 0.00001
Ca [mg/L]	6.87	7.69	5.18	6.14	7.66	6.38	5.74	10.4	8.78	8.05
Cd [mg/L]	0.000003	< 0.000003	< 0.000003	0.000007	0.000006	0.000004	< 0.000003	< 0.000003	0.000004	0.000008
Co [mg/L]	0.000021	0.000009	0.000004	0.000008	0.000007	0.000008	0.000008	0.000007	0.000021	0.000011
Cr [mg/L]	< 0.00008	0.00010	0.00009	0.00009	0.00010	0.00012	< 0.00008	< 0.00008	0.00014	< 0.00008
Cu [mg/L]	0.0072	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0004	0.0006	< 0.0002
Fe [mg/L]	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.007	0.018	< 0.007
K [mg/L]	3.06	5.72	2.09	3.48	3.03	2.84	1.93	0.799	1.22	0.731
Li [mg/L]	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0005	0.0002
Mg [mg/L]	1.26	1.25	0.650	1.22	1.04	0.705	0.855	0.918	0.619	1.03
Mn [mg/L]	0.00274	0.00245	0.00125	0.00148	0.00193	0.00169	0.00174	0.00398	0.00331	0.00199
Mo [mg/L]	0.00042	0.00097	0.00156	0.00377	0.00068	0.00289	0.00194	0.0134	0.00987	0.00598
Na [mg/L]	10.6	9.56	12.2	10.2	9.01	10.7	12.4	9.63	9.92	9.77
Ni [mg/L]	0.0004	0.0003	0.0003	0.0001	0.0001	0.0007	0.0010	0.0005	0.0003	0.0002
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	0.00012	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.00010	< 0.00009
Sb [mg/L]	0.0100	0.0035	0.0029	0.0121	0.0131	0.0015	0.0011	0.0139	0.0045	0.0015
Se [mg/L]	0.00016	0.00025	0.00025	0.00030	0.00016	0.00010	0.00008	0.00059	0.00028	0.00013
Si [mg/L]	2.75	1.86	2.91	1.91	1.85	2.62	2.79	2.66	2.78	1.68
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	0.00035	< 0.00006	< 0.00006	< 0.00006	0.00019	0.00012	0.00014
Sr [mg/L]	0.0502	0.0377	0.0403	0.0636	0.0718	0.0669	0.0584	0.0245	0.0337	0.0199
Ti [mg/L]	0.00008	< 0.00005	0.00008	0.00008	0.00008	0.00023	0.00015	0.00012	0.00018	< 0.00005
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	0.000019	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000375	0.000399	0.000240	0.000681	0.000091	0.000186	0.000156	0.000103	0.000182	0.000055
V [mg/L]	0.00381	0.00310	0.00534	0.00488	0.00243	0.00392	0.00382	0.00073	0.00077	0.00415
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

SGS Canada Inc.
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LR Report : **CA14787-JUL21**

Analysis	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C	36: LPHQ-3	37: BL639 MA Comp C	38:BLK: $D.I. Leachate Blank
Sample Date & Time	NA	NA	NA			
Sample weight [g]	250	250	250	250	250	---
Volume D.I. Water [mL]	750	750	750	750	750	750
Final pH [no unit]	9.21	9.41	9.28	9.41	9.29	5.60
pH [No unit]	8.13	8.62	8.48	8.76	8.26	6.07
Alkalinity [mg/L as CaCO3]	34	33	36	40	31	2
Conductivity [uS/cm]	111	100	104	104	100	< 2
SO4 [mg/L]	17	10	13	10	13	< 2
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.867	0.855	1.16	1.10	1.12	0.003
As [mg/L]	0.0041	0.0141	0.0007	0.0039	0.0006	< 0.0002
Ba [mg/L]	0.00105	0.00087	0.00083	0.00157	0.00076	0.00003
B [mg/L]	0.018	0.032	0.016	0.042	0.013	0.004
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	0.00002	0.00003	< 0.00001	0.00002	< 0.00001	< 0.00001
Ca [mg/L]	9.18	8.31	8.84	6.89	8.82	0.03
Cd [mg/L]	0.000012	0.000007	0.000004	0.000010	0.000003	< 0.000003
Co [mg/L]	0.000005	0.000014	< 0.000004	0.000010	0.000009	0.000006
Cr [mg/L]	< 0.00008	0.00011	< 0.00008	0.00010	< 0.00008	< 0.00008
Cu [mg/L]	0.0002	0.0004	< 0.0002	0.0010	< 0.0002	< 0.0002
Fe [mg/L]	0.010	0.015	< 0.007	< 0.007	< 0.007	< 0.007
K [mg/L]	1.43	1.90	1.35	5.80	1.33	0.004
Li [mg/L]	0.0028	0.0002	0.0002	0.0004	0.0002	< 0.0001
Mg [mg/L]	0.997	0.527	0.938	1.07	0.928	< 0.001
Mn [mg/L]	0.00462	0.00241	0.00390	0.00176	0.00395	0.00019
Mo [mg/L]	0.0244	0.00664	0.00131	0.0179	0.00168	0.00042
Na [mg/L]	10.6	10.5	9.59	9.67	9.48	0.03
Ni [mg/L]	0.0004	0.0003	0.0003	0.0004	0.0003	0.0004

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LR Report : **CA14787-JUL21**

Analysis	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C	36: LPHQ-3	37: BL639 MA Comp C	38:BLK: $D.I. Leachate Blank
Pb [mg/L]	0.00011	0.00023	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0049	0.0056	0.0015	0.0085	0.0017	< 0.0009
Se [mg/L]	0.00022	0.00009	0.00006	0.00032	0.00005	< 0.00004
Si [mg/L]	1.78	2.76	1.46	2.32	1.46	< 0.02
Sn [mg/L]	0.00060	0.00008	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0181	0.0263	0.0272	0.0573	0.0266	0.00012
Ti [mg/L]	0.00011	0.00013	< 0.00005	0.00015	0.00008	< 0.00005
Tl [mg/L]	< 0.000005	0.000020	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000123	0.000221	0.000052	0.000737	0.000042	0.000016
V [mg/L]	0.00186	0.00181	0.00146	0.00345	0.00146	< 0.00001
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

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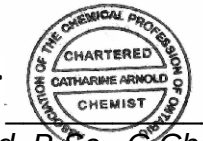

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

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Valentine Gold Project:
Amendment to the EIS, Part 2

Marathon Gold Corporation
36 Lombard Street, Suite 600
Toronto, ON M5C 2X3

August 3, 2021

RESPONSE TO DIET-05

ID:	DIET-05
Expert Department or Group:	Mines Branch
Guideline Reference:	Section 4.1.10 Environmental Management: The entire project should be designed with closure in mind.
EIS Reference:	Section 2.6.3.3. Tailings Management Facility
Context and Rationale:	-
Information Request:	The tailings management facility (specifically the tailings dams) are structures requiring long term monitoring and maintenance (50 years+). At some point, the dams ultimately become the responsibility of the province to maintain. As it is stated the tailings will be non-PAG, the EIS must present a detailed plan for the closure of the TMF that includes the potential reclassification and decommissioning of the tailings dams.
Response:	The tailings that are produced from the milling process will be deposited in the tailings management facility (TMF) for the first nine years of the Project operation phase using a thickened tailings process. Once the Leprechaun open pit is exhausted in Year 9, the tailings will be pumped to and deposited in this open pit. The composite tailings from the Marathon and Leprechaun pits are considered non-potentially acid generating (non-PAG) and therefore require no special measures for long-term chemical stability (e.g., permanent water or geomembrane liner cover). As such, the current closure concept focuses on long-term physical stability of the TMF. It should be noted that if the geochemical classification of the tailings changes, the TMF design is flexible enough to accommodate alternative closure measures as required, including a more robust cover design. The TMF is being designed for closure in accordance with the guidance provided by the Canadian Dam Association (CDA), such that the geometry of the dams will not require modification during the mine closure phase to provide long-term stability of the facility (see Appendix 2-B in the EIS). When the tailings deposition shifts to the Leprechaun open pit in Year 9, the process of closure and rehabilitation of the TMF will commence, prior to final mine closure scheduled in Year 12. Additional information is provided below on the rehabilitation and closure concepts for the TMF. As the Project progresses, Marathon will evaluate the tailings impoundment with the objective of further dewatering the stored tailings, working towards classifying the TMF as a landform (under the CDA closure guidelines) and therefore removing the requirements to maintain and inspect the dams

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	post-closure. To be conservative, it will be assumed the dams will be required post-closure, and Marathon will work with the Newfoundland and Labrador of Department of Industry, Energy and Technology (NLDIET) and Newfoundland and Labrador Department of Environment and Climate Change (NLDECC) - Water Resources Division, and use the guidance established by the CDA and Mining Association of Canada (MAC), and Global Industry Standards on Tailings Management (GISTM) to establish a plan for long-term inspection and maintenance of the dams. In 2020, Marathon engaged a third-party, independent reviewer for the ongoing TMF engineering and design program. Mr. Mark E. Smith, M.Sc., P.E., P.Eng., G.E, D.GE, S.E., who is the Chief Advisor – Geotechnical for Piteau Associates USA Ltd., has over 40 years of experience including the design, construction, operation and closure of more than 100 tailings management facilities. He has directed detailed investigations and design studies, performed peer reviews and forensic analyses, designed retrofits, provided resident engineering and construction management services, and conducted training seminars and short courses. He has worked as a consultant, designer, resident engineer, independent reviewer, and on the owner's team for every phase of project development from discovery through development to closure. His North American tailings experience includes projects in Newfoundland and Labrador, British Columbia, and the Yukon; ten projects in the USA; seven in Chile; twelve in Peru; eight in Brazil; and other projects ranging from Indonesia and the Philippines to Saudi Arabia. He also led the post-failure analyses of the five other impacted dams in the aftermath of the Samarco failure and provided remote consulting following the Brumadinho failure. The regulatory landscape regarding tailings management has been changing as a result of significant dam failures in recent years, and it is anticipated that regulation and guidance will continue to change with respect to tailings management, closure of tailings facilities, and climate change adaptation. Marathon is committed to working with provincial regulators and conforming with CDA and MAC guidelines (MAC guidelines have been updated in 2021 to incorporate GISTM) such that the TMF is designed, constructed, operated, and ultimately rehabilitated, in a safe and responsible manner that will protect the environment in the long term. <u>Surface Water</u> The major closure and reclamation activities planned for the TMF are expected to occur during the first two years of closure. To reduce the tailings pond depth, the final year of tailings deposition will be strategically carried out to fill the lowest elevations of the TMF with tailings.

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	The water treatment plant and polishing pond components of the TMF will operate for the remainder of the operation phase of the Project, and the water collecting within the tailings pond (seepage drainage from the tailings and runoff) will continue to be pumped to the mill as reclaim water. As water quality and flows reach equilibrium within the facility, a larger closure spillway will be constructed to lower the water level within the tailings impoundment. The decant pump system, water treatment plant and polishing pond will then be decommissioned and water flowing from the tailings impoundment will be channelled to release directly to the environment once testing confirms that water quality meets the appropriate guidelines for release. Subsequently, the emergency spillway will be breached / lowered to allow for passive drainage of the facility and complete removal of the supernatant pond. Note that the spillway will be located to the north of the northern abutment of the dam, and not within the dam itself. For closure, the spillway channel will remain in the same location, however, will require widening. Following closure, covered tailings beaches are not expected to produce acidic runoff nor have high or moderate leaching other than phosphorus (P). However, this water is not expected to require treatment (passive or active). Runoff over the covered tailings surface will be considered non-contact water and will drain overland via the post-closure spillway. <u>Tailings Cover</u> Regrading and contouring of the tailings surface will be carried out where necessary to ensure drainage towards the closure spillway. Excavation of a defined channel within the tailings may be required to ensure drainage to the lowered spillway. Exposed tailings will be covered with overburden and organic soil materials and revegetated. The main objective of the closure cover will be to limit the migration of contaminants, limit infiltration into the tailings, and prevent wind and runoff erosion of the tailings. The proposed closure cover will be minimum of 0.3 m thick and will consist of overburden (mixture of organics / peat and mineral soil reclaimed from mining activities). The top surface area of the cover will be seeded, based on recommendations from an agronomist, consultation with regulators, and input from the Indigenous groups. It is expected that over time saturated tailings will undergo consolidation and surficial desiccation, which will improve material strength and trafficability of construction equipment. Cover materials may need to be placed in the softer areas during the winter if sufficient frost penetration exists to support construction traffic, or that waste rock may used to create access if and where required.

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	Dams and Infrastructure The TMF dams have been designed for long-term physical stability in accordance with the criteria set in the CDA guidelines. Thus, no additional regrading of the side slopes will be required at closure. The downstream slopes of the TMF dam will be left as exposed rockfill to permit drainage of the downstream shell and to permit inspection and monitoring in the long term should landform status not be achieved, or not achieved in the short-term. Once the tailings pond decant system, water treatment plant and polishing pond are no longer required, these will be decommissioned, including removing all pumps, pipelines, powerlines and other associated infrastructure. Disturbed areas will be regraded and revegetated. Sediment collected within the polishing pond will be tested and characterized and disposed of within the TMF or open pit (to be flooded or covered), if required. The dams will be breached, and the area regraded to re-establish local drainage patterns, then revegetated. Seepage Toe seepage from the TMF is predicted to exceed *Metal and Dimond Mining Effluent Regulations* (MDMER) limits for total cyanide (CNT), un-ionised ammonia (NH3), and copper (Cu) post-closure. The seepage water collection system, including the pumps, will be kept in service until monitoring demonstrates that water quality collected in the system has stabilized. At that time, the pumping systems will be removed. Based on the prediction of MDMER exceedances post-closure, two seepage treatment options may be employed: (1) conversion of the perimeter conveyance ditches into subsurface flow Permeable Reactive Barrier (PRB) trenches; and/or (2) conversion of the perimeter conveyance ditches into subsurface “French Drains” to convey effluent to an engineered wetland treatment system. Please refer to Figures DIET-05.1 and DIET-05.2 for an illustration of these two options, which are further discussed below. The seepage from the TMF is expected to require passive treatment for decades and the proposed treatment options can be designed to last for similar periods. The selection of the best option will be based upon predicted water quality (from operational monitoring) and testing. To support the design of the PRB and the engineered wetland system, pilot scale treatment studies will be conducted to evaluate the treatment efficiency and to better define the systems’ design parameters. While the summary below was first developed to describe the installation of the PRB and engineered wetland system in the ditching and ponds surrounding the waste rock piles, the same process will be used for, and tailored to, the TMF.

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	Seepage Treatment Option #1 (Figure DIET-05.1) The collection ditches would be plugged at intervals to prevent flow down the ditch and converted to sub-surface PRB trenches. In closure, the TMF will be covered with soil and vegetation and therefore shed rain/runoff with non-contact water. However, a portion of precipitation will infiltrate and form seepage. The subsurface PRB would backfill the rock-lined ditches with carbon-rich organic material (e.g., compost) to promote sulfate reducing conditions and subsequent precipitation of metal sulfide solid phases. Groundwater would passively flow through the compost mixture where dissolved metals would be removed via iron sulfide precipitation reactions. Under reducing conditions, sulfate-reducing bacteria convert sulfate to sulfide by catalyzing the oxidation of organic carbon producing hydrogen sulfide. Divalent metals would precipitate in the presence of high concentrations of hydrogen sulfide to form the highly insoluble iron sulfide precipitate. A soil cap (minimum 30-cm) would be installed over the surface of the PRB trench to prevent oxygen diffusion into and water flow out of the reactive mixture. Rip rap would be installed over the surface, where necessary, surrounding the PRB collection chamber to prevent scouring and erosion from the conveyance of non-contact runoff to the surrounding undisturbed ground. The subsurface PRB would continue to receive contact seepage, albeit at a reduced seepage rate due to the presence of the soil and vegetation cover over the tailings. The contact seepage would migrate through the subsurface zone of the trench (smallest proposed ditch class is trapezoidal with 1 m depth, 1 m base width, and 2:1 side slopes), through the PRB under anaerobic conditions where metals removal through sulphidic precipitation can occur. Seepage water would then outlet through the opposite side of the trench to the downgradient and outside receiving groundwater environment. Soil for the trench cover and soil plugs that would be placed in the existing ditches to promote transverse seepage migration across the trench would be available as ditch excavation sidecast material proposed in operation as shallow earthen berms. The rate of seepage migration across the subsurface trench is constrained by the seepage inflow and outflow rates which are based on local soils characteristics, hydraulic conductivity and gradients. The average linear groundwater velocity is estimated at between 0.126 m/year to 12.61 m/year. Thus, the seepage residence time through the subsurface trench would range from a few days to weeks, which is sufficient retention time to promote sulphate reducing conditions and the subsequent metal sulphide

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	precipitation reactions. Due to the predictions that seepage quality would not be substantially elevated above the MDMER or Canadian Water Quality Guidelines for Freshwater Aquatic Life, the PRB would be sized based on a minimum hydraulic retention time (HRT) of 24 hours, which is expected to be sufficient. Seepage Treatment Option #2 (Figure DIET-05.2) For this scenario, the perimeter collection ditches would be converted to subsurface French drains to allow contact seepage from the covered stockpiles to passively intercept seepage and convey seepage downgradient to the collection pond. The collection pond would be converted to an engineered wetland or subsurface passive bioreactor, essentially creating treatment with greater capacity and HRT than the PRB. Metals entering the engineered wetland would be initially removed via sedimentation and filtration processes. Following these physical processes, metals would be buried and sequestered in the wetland sediments via adsorption and chemical precipitation reactions. Within the wetland substrates, anaerobic conditions promote the growth of sulfate-reducing bacteria. The substrates are designed to be rich in organic matter and sulfates. Under anaerobic conditions, sulfate-reducing bacteria convert sulfate to sulfide by catalyzing the oxidation of organic carbon producing hydrogen sulfide. Divalent metals (e.g., iron, silver, copper, zinc, cadmium, manganese and lead) would precipitate in the presence of high concentrations of hydrogen sulfide to form insoluble metal sulfide precipitates. These precipitates would be removed from the water and permanently sequestered within the substrate. The average HRT in the collection ponds would be in the range of 24 hours, which is expected to be sufficient, and also may be improved using outlet controls. Seepage water would be monitored and would not be discharged to the environment until such time that water quality has been shown to consistently meet closure effluent criteria. The engineered wetland would use existing outlet infrastructure to the extent feasible. Once the contact water collection system is retrofitted to an engineered wetland treatment system, monitoring frequencies would be adjusted based on site conditions and performance objectives. Monitoring and Maintenance Monitoring and maintenance of the rehabilitated facilities will be carried out during operations and into closure. It is anticipated that monitoring and maintenance will be carried out during the active closure stage at frequencies similar to those required during operations. Post-closure monitoring and maintenance will be carried out at a reduced frequency

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	depending on the results of the monitoring and the measures of success selected for closure. The proposed closure monitoring and maintenance activities include conducting visual inspections of reclaimed areas to identify unstable areas; maintaining facilities and equipment to be used during active closure until they are no longer required; installing instrumentation at selected locations for monitoring of the rehabilitated areas; and testing surface and groundwater quality and measuring water volumes at select locations to confirm that the closure measures are performing as predicted and are not adversely affecting the environment, as required by the Newfoundland and Labrador Mine Regulation 42/00. The extent and frequency of monitoring will depend on the final closure design, and the ability or potential to achieve landform status for the impoundment. In the event that landform status is not achieved, Marathon will consult with NLDIET - Mines Branch, NLDECC - Water Resources, and other regulators to establish a schedule of Dam Safety Inspections and Reviews, as well as maintenance cycles (e.g., vegetation removal) that are commensurate with the policies and guidelines in place at that time.
Appendix:	None

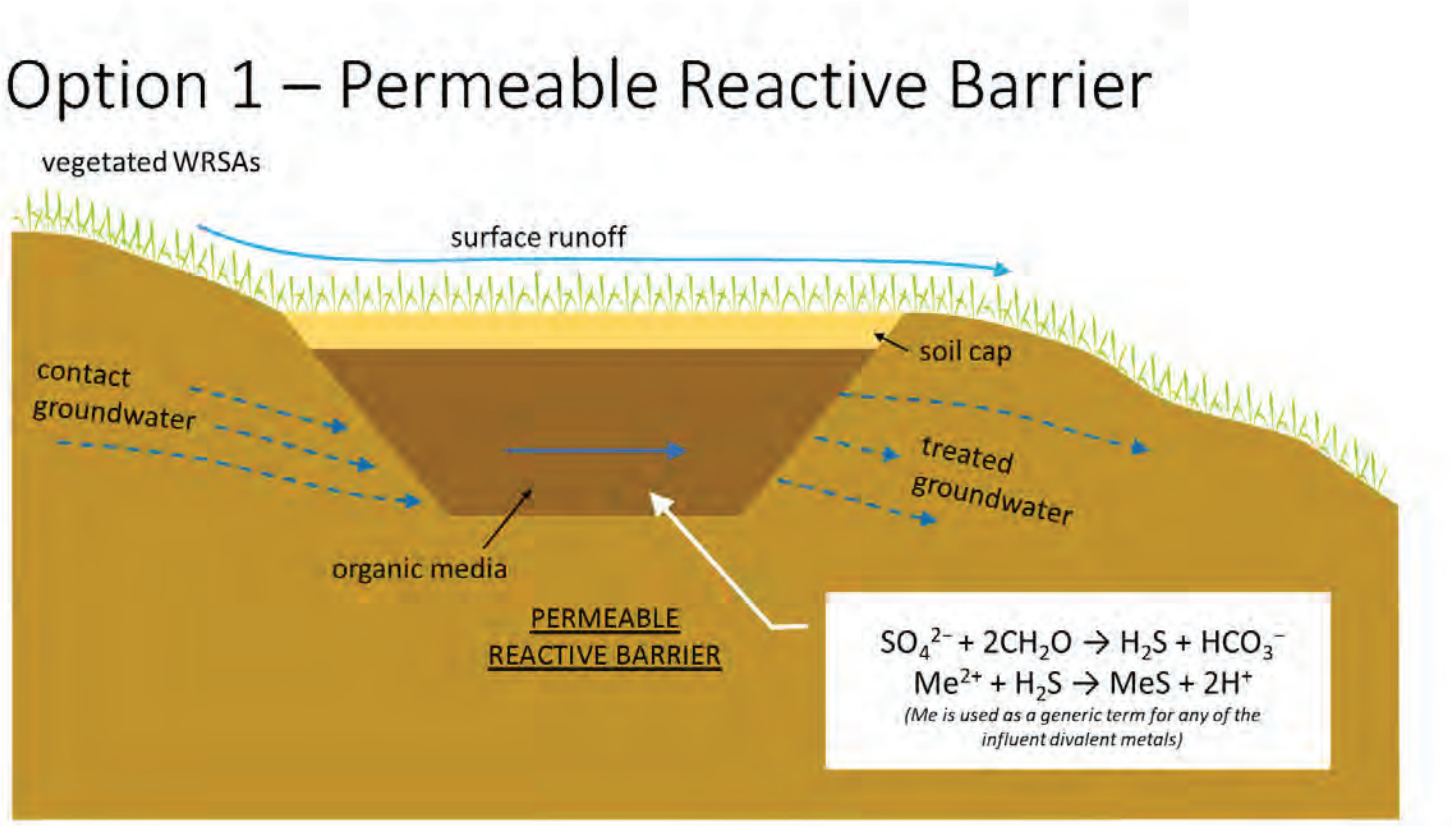


Figure DIET-05.1 Option 1 – Permeable Reactive Barrier

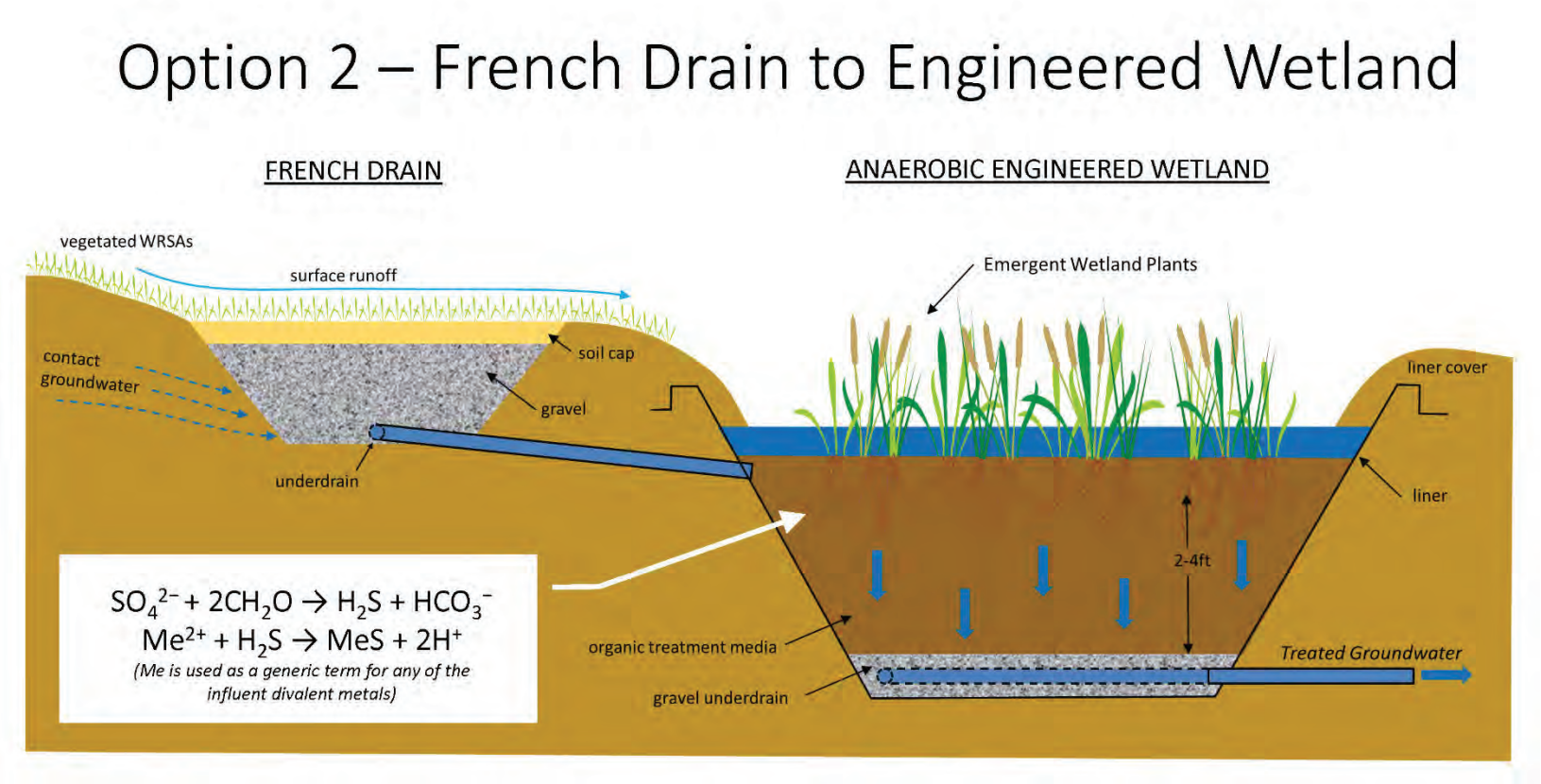


Figure DIET-05.2 Option 2 – French Drain to Engineered Wetland

RESPONSE TO DIET-06

ID:	DIET-06
Expert Department or Group:	Mines Branch
Guideline Reference:	Sections 4.1.4.5 / 4.1.7.1 A/ 4.2.1.5
EIS Reference:	-
Context and Rationale:	-
Information Request:	Potential acid generating (PAG) waste rock has been identified in both the Marathon and Leprechaun deposits. The current proposal is to mitigate the ARD potential by blending PAG and non-PAG rock in the waste dump. The EIS must evaluate the feasibility of segregating PAG and non-PAG waste rock during operation with the intent of relocating the PAG waste to the mined-out pit for final deposition under water cover.
Response:	The placement of potentially acid generating (PAG) rock in the open pit under water cover was considered. The volume of waste rock considered to be PAG is approximately 0.5% and 14% for Leprechaun and Marathon, respectively. Separating PAG rock from non-potentially acid generating (non-PAG) rock for storage is feasible, and the process for testing and identifying PAG rock is described in the response to DIET-11. For Marathon pit, the volume of PAG waste rock is 10 Mm^3. While relatively small compared with the total volume of waste rock, stockpiling PAG material would require a separate stockpile approximately twice the footprint size of the Marathon overburden stockpile, plus water management ditching and water management pond. Due to the storage inefficiencies associated with the separate stockpile for PAG rock, the permanent non-PAG waste rock pile would only be reduced in size (footprint) by an estimated 5 to 8%. Unless located at significant distance from the Marathon pit, in addition to the direct environmental footprint, the separate PAG stockpile will create further environmental footprint within the caribou migration corridor and will likely impact some wetlands and habitat for avifauna and other wildlife. Other environmental effects that are anticipated include increased dust generation (additional surface area due to separate stockpile), increased contact water runoff during storage, and additional fuel usage and associated air emissions (including dust generation) during relocation to the open pit at closure. The Acid Rock Drainage/Metal Leaching (ARD/ML) management approach proposed by Marathon has been successfully applied to waste rock piles at other mine sites as referenced in sections 6.6.3.5 and 6.6.3.6 of the Global ARD management guide (http://www.gardguide.com/index.php/Chapter_6).

ID:	DIET-06
	Marathon will use the proposed ARD block model and PAG testing protocols (see response to DIET-11) to plan / design areas within the waste rock pile to place blended PAG and non-PAG materials and subsequently encapsulate these materials within non-PAG rock. As part of rehabilitation and closure, the waste rock pile will be covered with soil and revegetated. If the ARD block model indicates there are PAG materials near the base of the open pit that cannot be adequately encapsulated within the waste rock pile, the materials (expected to be relatively small volume as waste rock production decreases significantly with pit depth) will be stockpiled within the pit, or in a designated location for relocation to the pit during closure activities.
Appendix:	None

RESPONSE TO DIET-07

ID:	DIET-07
Expert Department or Group:	Mines Branch
Guideline Reference:	Sections 4.1.7.1 / 4.2.1.5
EIS Reference:	-
Context and Rationale:	-
Information Request:	Stantec Report 2020: The report uses the phrase “not expected to generate ARD” in numerous locations when describing the results of the ARD/ML testing. The conclusions from the ARD/ML testing must be definitive and clearly state whether ARD/ML will or will not be generated.
Response:	The language used in the referenced report was not intended to give the impression that the results obtained from geochemical testing were not conclusive and definitive. That is, results of the geochemical characterization program indicate that none of the materials sampled generate Acid Rock Drainage/Metal Leaching (ARD/ML) even though some samples from the material classify as potentially acid generating (PAG), based to conservative criteria. The sample size tested to date is adequate to draw the conclusion that the materials will not generate ARD/ML and to use those results in preparation of the EIS for the Project. Marathon and its consultants also acknowledge that additional test work and monitoring is needed to further support the work completed to date, and there is some uncertainty simply because the mine has not been built / operated. Thus, Marathon has committed to continuing the ARD/ML test work program and to continuing with rock characterization throughout the mining process as well as the following strategies to limit the potential for development of ARD/ML, including the following: • PAG rock will not be used in construction (see response to ECCC-24) • Preferential milling of PAG ore and stockpiling non-potentially acid generating (non-PAG) ore • Blending PAG and non-PAG materials and encapsulation of blended material with non-PAG rock within the waste rock piles (see response to DIET-06) • Use of soil covers and revegetation to limit infiltration and oxygen flux as part of progressive and final rehabilitation and closure • Relocation of any excess PAG rock (waste rock or low-grade ore) remaining at closure to the mined-out pit, where it will be permanently flooded (see response to DIET-06) • Collection and monitoring of contact water.

ID:	DIET-07
	On-going and future ARD/ML testing, including operational monitoring, will expand the results obtained to date and refine the associated mitigation measures identified that will be incorporated into the mine plans via the ARD/ML Management Plan. Details on additional testing and on the content of ARD/ML Management Plan are provided in Appendix B.
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO DIET-08

ID:	DIET-08
Expert Department or Group:	Mines Branch
Guideline Reference:	Section 4.1.10 E / 4.1.7.1 / 4.2.1.5
EIS Reference:	Section 2.5.1.4 Mine Production: Table 2.13; Stantec Report – Section 5.3.1 Leprechaun; Stantec Report – Section 5.3.2 Marathon
Context and Rationale:	Production Schedule indicates the combined low-grade ore stockpiles could contain over 11 million tonnes of low-grade ore by year 9 of the project. Stantec Report – Section 5.3.1 Leprechaun: "Analysis of a composite low-grade ore created using individual samples from Leprechaun site classified the material as non-PAG. Based on the analysis of individual samples, about 10% of low-grade ore is classified as PAG. The low-grade ore composite is classified as non-PAG and produces neutral leachate in humidity cell testing. The composite analysis was used to estimate an NP depletion time of approximately 17 years for laboratory conditions (Table 5-2). Therefore, isolated PAG pockets in the low-grade stockpile are not expected to generate ARD before the stockpile is processed in the mill. No exceedances of the MDMER limits are observed. Kinetic testing suggests Al and P are PoPCs with moderate ML potential (Table 5-1)". Stantec Report – Section 5.3.2 Marathon: "Based on the analysis of individual samples, about 50% of the low-grade ore is conservatively classified as PAG. The composite sample of low-grade ore, created as part of metallurgical studies, has uncertain ARD potential (Table 5-2). Humidity cell leachate pH from this sample was near neutral throughout the test period. The minimum ARD onset time for discrete zones of PAG materials (i.e., PAG pockets) is approximately six years based on the first month leaching rates from the humidity cell."
Information Request:	a. The results of the kinetic testing appear based on one composite sample from Leprechaun and one composite sample from Marathon. As per the Stantec recommendations, additional kinetic field testing to refine the ARD onset time estimates and identify the need for mitigation measures related to ARD is required. The testing must consider the extremes in the blending that may occur in the stockpile (i.e., all PAG) and the impact this would have on the ARD/ML potential. b. The EIS must also include the full design of the low-grade stockpile (stockpile base, effluent collection and treatment system) and the plans to rehabilitate the LGO stockpile areas upon closure.

ID:	DIET-08
Response:	a. Additional field tests including samples of low-grade ore were started in September of 2020. Recent results for Marathon potentially acid generating (PAG) low-grade ore (MLGO-Met) demonstrate that field derived acid rock drainage (ARD) onset time (200 years) is approximately 30x longer than the neutralization potential (NP) depletion time (6.3 years) based on laboratory humidity cells, indicating estimates presented in the EIS using the NP depletion time are conservative (refer to Appendix C). Therefore, recent results of field tests confirm that the low-grade ore (LGO) stockpile will be processed and/or rehabilitated before it becomes acidic even if all the LGO stockpile is PAG. Kinetic testing of the PAG samples indicates that multiple years would pass before the NP is depleted and acidic leachate generated. To avoid the long testing time, a carbonate-depleted humidity cell was established using the composite sample of Marathon low-grade ore. The first month leaching rates for select constituents in this cell were higher than rates from the initial (non-depleted) sample of LGO as follows: 11.9x for Zn, 7.5x for Ni, 3.5x for Fe, 1.8x for Cd, 1.6x for Pb 1.2x for Cu, and 1.1 for SO_4. These acidic condition leaching rates were used in the water quality model presented in the EIS to predict the increase in metal loading from a PAG mass of LGO at the conservative ARD onset time (see Section 5.3.1.1 in Appendix 7B of the EIS). The water quality model used conservative inputs such as maximum leaching rates, shortest ARD onset time based on laboratory data, and dry climate conditions. In addition, the PAG ore mass used in water quality modeling conservatively includes “uncertain” ore with NPR values between 1 and 2. Probabilistic combinations of conservative inputs produced conservative results for water quality presented in the EIS (Appendix 7B of the EIS). Additional sensitivity analyses related to the effect of ARD onset on metal loading for low-grade ore PAG is presented in Appendix C. The results of this analysis show that even with a reduction of ARD onset time there is only a minor increase in predicted metals concentrations in LGO seepage. Marathon is committed to initiating additional kinetic testing of PAG low-grade ore from the Marathon pit, as indicated in Appendix B. For this testing, Marathon will consider selection of samples that further consider extreme parameters such as lowest Net Potential Ratios and high concentrations of sulphur and metals.

ID:	DIET-08
	b. The design of the LGO stockpiles is described as follows and shown with their maximum potential volumes and heights in Figures DIET-08.1 to DIET-08.6. The foundation base will be on natural ground which consists of a blanket of glacial till. The natural till is of low permeability and will reduce seepage from the base of the pile. The base will be prepared by removing all organic materials and grading of the base to direct drainage from the stockpile to ditching constructed around the perimeter of the stockpile pad. If required, additional glacial till (excavated as part of pre-stripping for the open pits) will be placed, graded and compacted to provide the required grading for positive drainage to the ditching. The stockpile base (pad) will be constructed from non-PAG waste rock and will provide the working platform for the placement of LGO. The LGO stockpiles will be placed on prepared pads using 15 m lift heights with 19 m wide benches from lift crests to toes, to form overall slope angles of 2.6 horizontal: 1 vertical. A 25 m wide haul road will be incorporated into each stockpile to access each lift. The drainage from the stockpile will be collected in ditches which are designed to convey the average and peak flows from the stockpile (1:100 year return event considering climate change) to the downstream sedimentation pond. As described above, no *Metal and Diamond Mining Effluent Regulations* (MDMER) exceedances are predicted in the drainage from the stockpile, and therefore there is no active water treatment required. A downstream sedimentation pond will receive the drainage and allow sufficient settling time to remove TSS prior to release to the environment. Approximately one-half of the Marathon's LGO is conservatively classified as PAG. The minimum ARD onset time in PAG LGO is approximately six years based on maximum laboratory leaching rates; however, the field bin tests indicate a much longer onset time. There were no exceedances of MDMER limits observed in humidity cell leachates from LGO under neutral conditions. Based on kinetic testing, Al, P and Zn have moderate leaching potential. The Marathon LGO stockpile effluent has been segregated from other mine component flow streams in the overall mine design to facilitate collection and further ARD treatment, if required. About 10% of LGO from Leprechaun pit is estimated to be PAG. The LGO stockpile PAG materials are not expected to generate ARD before all the LGO has been processed at

ID:	DIET-08
	the mill. Kinetic testing suggests moderate leaching potential for Al and P and no exceedances of MDMER limits. It is planned that all LGO material will be milled, however, it is understood that for rehabilitation and closure planning it must be assumed that the material is not milled and remains on the stockpile at closure. The following scenarios are considered for closure: On the basis that all LGO material is milled prior to closure, the non-PAG waste rock pad will be excavated and placed on the waste rock pile or back to the open pit. The glacial till base will be tested to confirm there is no ARD/ML concerns and then regraded, covered with topsoil/organics and revegetated. In the event there are ARD/ML impacts to the upper portions of the glacial till base (and then likely the waste rock pad as well, though the pad should be acid-buffering), these materials will be excavated and disposed of in the open pit and permanently flooded. On the basis that all or some of the LGO remains at closure, the LGO material can either be left in place and covered using an engineered cover or returned to the open pit for long term disposal. The design and costing associated with these scenarios will be addressed in the Rehabilitation and Closure Plan which will be submitted to NLDIET, Mines Branch who also refer the plan to other provincial and federal regulators for review.
Appendix:	See Appendix B: ARD/ML Management Approach and Appendix C: ARD Onset and Tables

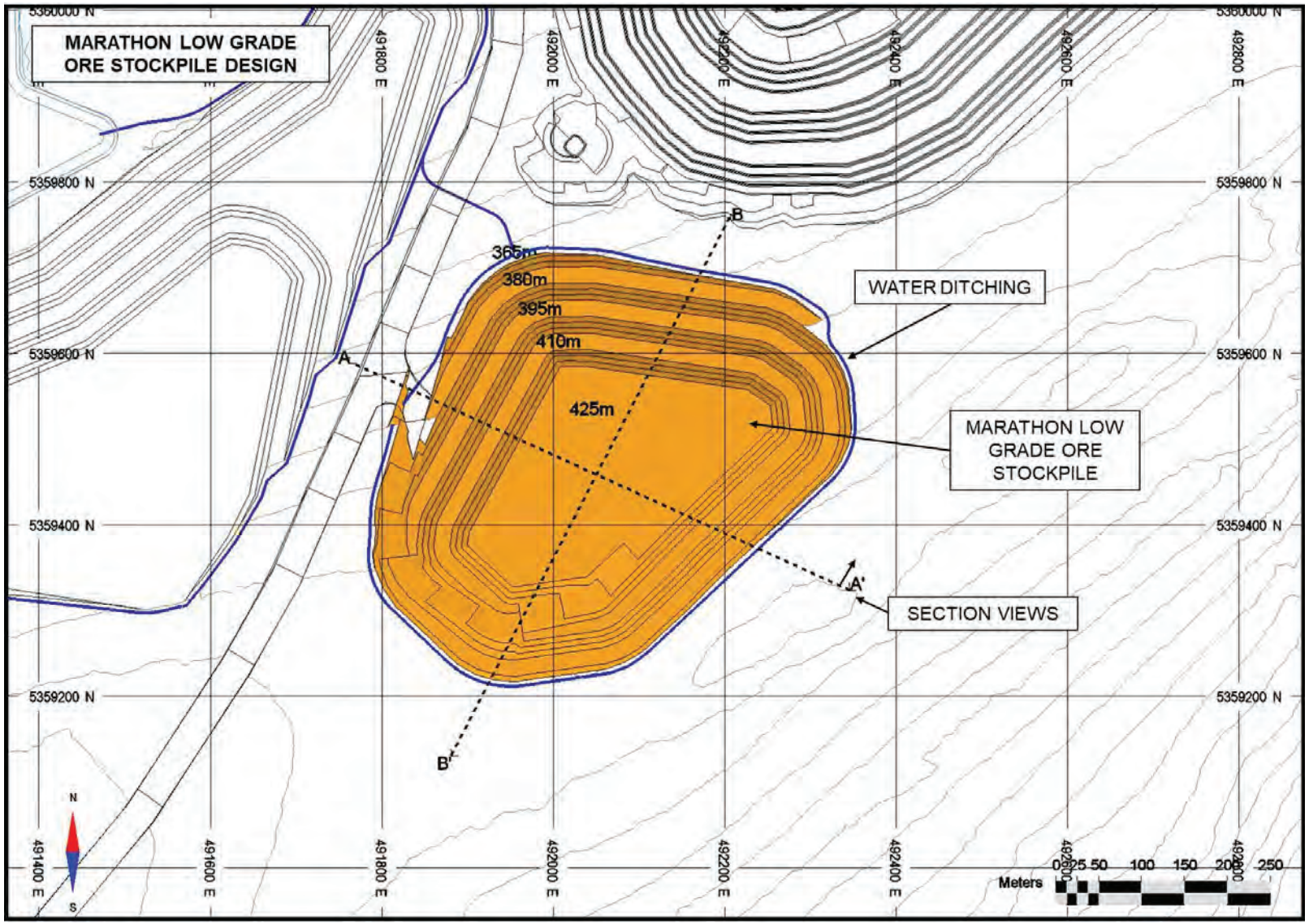


Figure DIET-08.1 Marathon Low-grade Ore Stockpile Design

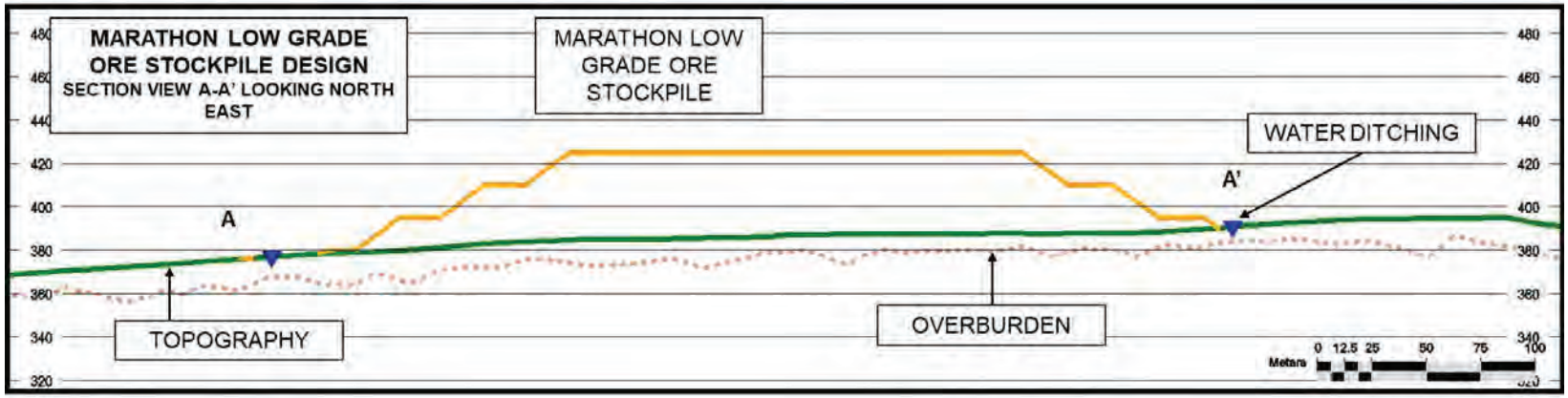


Figure DIET-08.2 Marathon Low-grade Ore Stockpile Design – Section View A-A' Looking Northeast

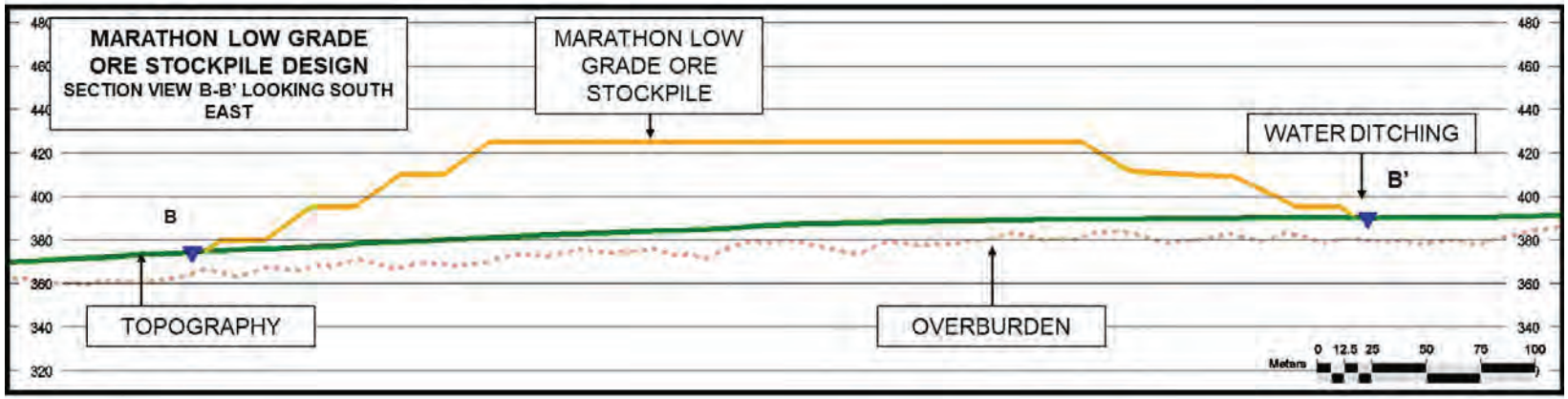


Figure DIET-08.3 Marathon Low-grade Ore Stockpile Design – Section View B-B' Looking Southeast

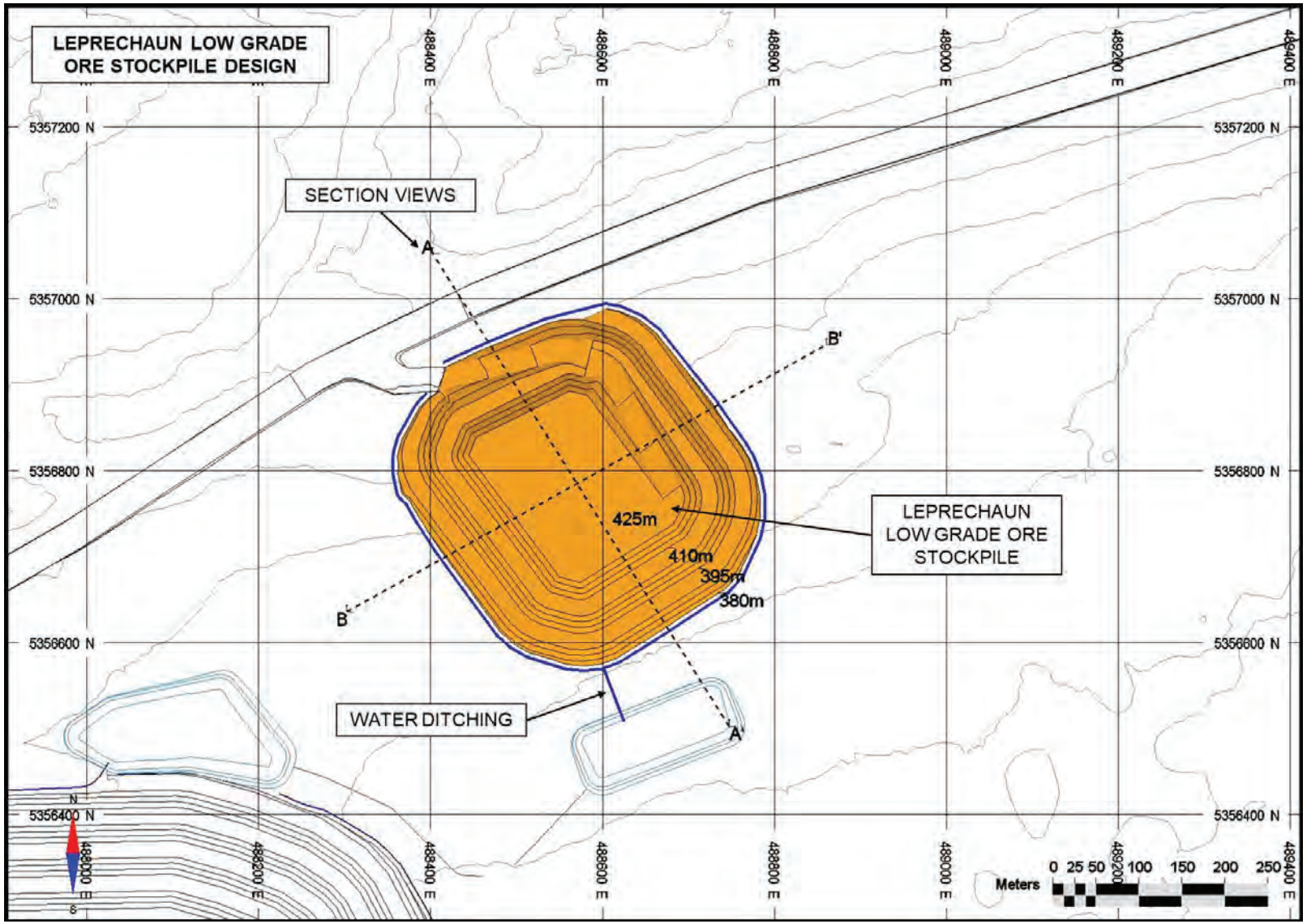


Figure DIET-08.4 Leprechaun Low-Grade Ore Stockpile Design

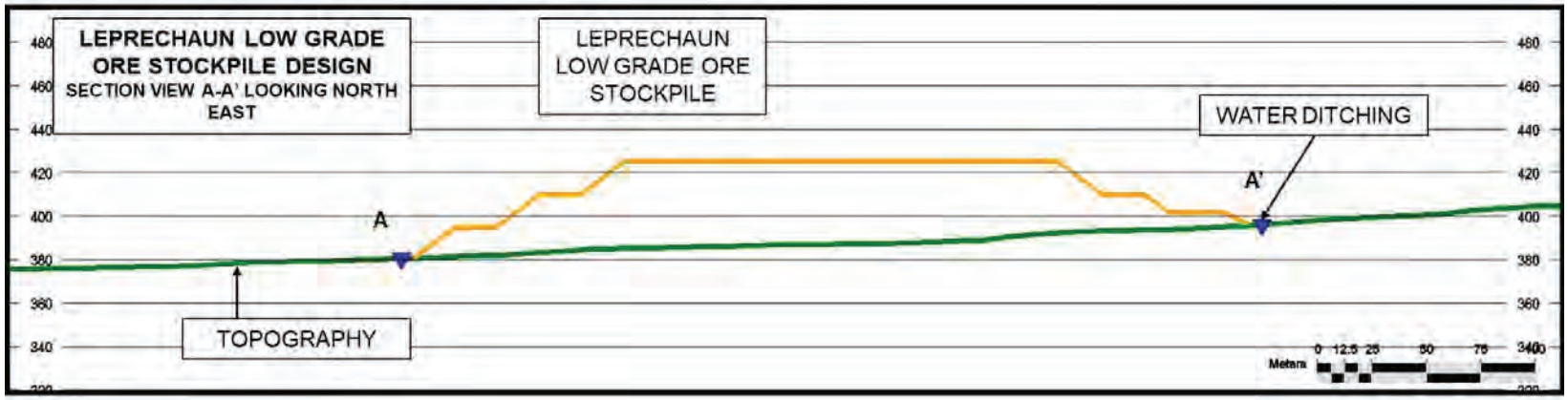


Figure DIET-08.5 Leprechaun Low-grade Ore Stockpile Design – Section View A-A' Looking Northeast

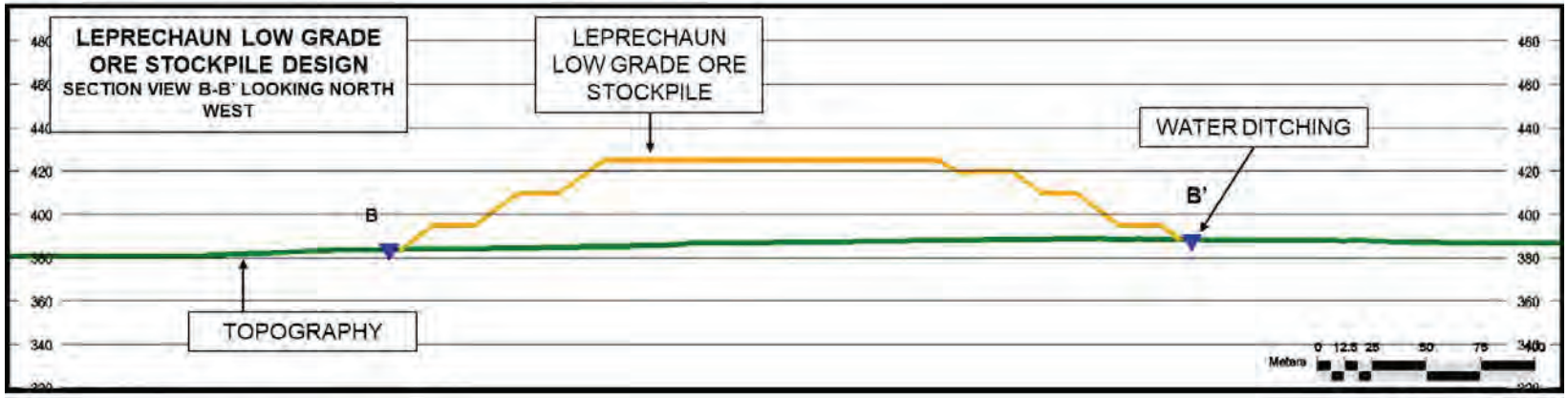


Figure DIET-08.6 Leprechaun Low-grade Ore Stockpile Design – Section View B-B' Looking Northwest

RESPONSE TO DIET-09

ID:	DIET-09
Expert Department or Group:	Mines Branch
Guideline Reference:	Sections 4.1.7.1 / 4.2.1.5
EIS Reference:	Stantec Report 2020 - Section 5.4; 5.5
Context and Rationale:	The analysis of the ARD potential for the high-grade stockpile appears based on the blending of a percentage of Leprechaun (30%) ore with Marathon (70%) ore and the assumption that 13% of Leprechaun ore and 67% of Marathon ore is PAG. The conclusion that the high-grade stockpile is not expected to generate ARD is based on the ideal blending of PAG and non- PAG ore. During production, there is a high probability of operational issues that could result in an imperfect blending of the appropriate portions of Leprechaun and Marathon ore in the high-grade stockpile. The operations issues could range from pit flooding events to weather events to occurrences of low equipment availability to improper ore/waste sequencing.
Information Request:	The EIS must address the extremes in the ore blending that may occur (i.e., all PAG rock from Marathon and Leprechaun) and the impact this would have on the ARD/ML potential for the high-grade ore stockpile. Additionally, the EIS must address the operational criteria that must be developed to mitigate the ARD/ML potential for the high-grade stockpile.
Response:	It is important to note that blending of the ores from Leprechaun and Marathon pits is a requirement, not an option, for the operation, and the mine plan and processing plant design rely on the grade and characteristics generated from mining both pits simultaneously and blending of ore as it is delivered to the mill. Further blending will take place within the milling and gold extraction process, and further still as the tailings are thickened, delivered, and deposited within the tailings management facility (TMF). While the operational issues noted (pit flooding, weather events, equipment issues) could impact mining operations in the short term, there is sufficient flexibility within the overall mining, stockpiling, crushing and milling system to address these issues on a short-term basis. If any of these issues were to persist longer-term, more significant adaptation to these processes would be required to deliver the needed blend of ores to the process circuit and to subsequently address potential acid rock drainage/metal leaching (ARD/ML) related issues downstream. The ARD/ML Management Plan will consider these potential issues, and the ARD block model will enable better

ID:	DIET-09
	understanding of the ARD potential and nature of blending within the mining plan (Appendix B). As noted in the rationale for this information request, ore from Marathon has higher Maximum Acid Potential (MAP, referred to as acid potential in the EIS), than Leprechaun ore, which has higher Neutralization Potential (NP) and buffers excess MAP in the ore blend. A case for extreme blending (or low probability case) was assessed by using the composite sample of Marathon ore MZC with the highest MAP and the composite sample of Leprechaun ore LZB, which has the lowest NP among ore composites (Table DIET-09.1). For additional sensitivity assessment, the percent of Leprechaun ore in the blend was varied based on the annual mill feed from the mine plan (Table DIET-09.2). Results of sensitivity analysis demonstrates that neutralization potential NP will be in excess of maximum acid potential MAP in the ore blend throughout the first 5 years (life-span of high-grade ore stockpile) considering the low probability case (Table DIET-09.2). Therefore, based on the available information, ore in the stockpile will not generate ARD. Operational ARD monitoring and testing of mined materials, including high grade ore, will be conducted as discussed in response to DIET-07. The monitoring will allow for determination of the NP and MAP balance in the stockpile at any time during the 5 year operational life of the stockpile. The preliminary criteria for ore stockpile acid-base accounting is that NP should be above MAP using moving annual averages for these values. When MAP starts to approach NP, the proposed criteria can be maintained by adding non-PAG ore and withdrawing stockpiled ore. In the low probability event that the high-grade ore stockpile generates ARD, the drainage from this stockpile already flows to the TMF. Any acidity in the stockpile drainage would be neutralized in the pond, in the mill during the normal pH adjustment required as part of the cyanide-based gold recovery process, or in the water treatment plant prior to discharge to the environment. Groundwater impacts are also not expected due to the low impermeability of the glacial till beneath the stockpile foundation (which are continuous to the TMF area) over the relatively short lifespan of the stockpile (5 years).
Appendix:	See Appendix B: ARD/ML Management Approach

Table DIET-09.1 Acid Base Accounting on Ore Composites from Marathon and Leprechaun Zones and on Tailings

Element	Milling Composites									
	Marathon Comps (tailings CND-1)					Leprechaun Comps (tailings CND-2)				
	MZA	MZB	MZC	MZD	MZE	LZA	LZB	LZC	LZD	LZE
% ore sample in tailings composite	15.7	21.8	21.6	23.6	17.3	27.9	17.3	14.5	20.4	19.9
S (t), %	0.68	0.68	0.79	0.70	0.51	0.30	0.28	0.43	0.34	0.36
$S^{=}$, %	0.68	0.60	0.74	0.64	0.47	0.28	0.25	0.37	0.34	0.33
C(t), %	0.48	0.41	0.38	0.33	0.38	0.80	0.64	1.40	0.93	0.84
C(g), %	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TOC Leco, %	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CO_2, %	1.8	1.5	1.5	1.2	1.5	3.0	2.4	5.1	3.5	3.1
MAP, kg $CaCO_3$/t	21.3	21.3	24.7	21.9	15.9	9.4	8.8	13.4	10.6	11.3
NP Carb, kg $CaCO_3$/t	40.0	34.2	31.7	27.5	31.7	66.7	53.3	116.7	77.1	70.0
Carb NPR, unitless	1.9	1.6	1.3	1.3	2.0	7.1	6.1	8.7	7.3	6.2
MAP, kg $CaCO_3$/t	21.2					10.5				
NP Carb, kg $CaCO_3$/t	32.5					74.4				
Carb NPR, unitless	1.53					7.10				

Notes:
MAP (Maximum Acid Potential) = S(t) wt,% ×31.25
NP Carb (Carbonate Neutralization Potential) = C(t) wt.% × 83.3
Carb NPR (Carbonate Net Potential Ratio) = NP carb /MAP

Table DIET-09.2 Sensitivity Analysis for Acid Base Accounting in Ore Blend Based on Variability in Ore Zone Composites

Year	% of Leprechaun ore in mill feed (LP%)	Average case: MAP and NP Carb inputs from CND1 and CND2			Low probability case: MAP and NP Carb inputs from sample MZC and LZB		
		MAP	NP Carb	NP carb /MAP	MAP	NP Carb	NP Carb /MAP
-1	41.0	16.1	49.8	3.09	18.1	40.6	2.23
1	42.2	16.0	50.3	3.15	18.0	40.8	2.27
2	16.7	19.1	39.5	2.07	22.0	35.3	1.60
3	32.4	17.2	46.1	2.68	19.5	38.7	1.98
4	41.7	16.0	50.0	3.12	18.0	40.7	2.26
5	55.9	14.2	56.0	3.93	15.8	43.8	2.78

Notes:
Example of equations for annual calculation of ore blends is presented below
$MAP = MAP_{CND1} \times (1\text{-}LP\%/100) + MAP_{CND2} \times LP\%/100$
$NP = NP_{CND1} \times (1\text{-}LP\%/100) + NP_{CND2} \times LP\%/100$
MAP and NP under Low probability case is calculated in same way substituting MZC and LZB for CND1 and CND2.

RESPONSE TO DIET-10

ID:	DIET-10
Expert Department or Group:	Mines Branch
Guideline Reference:	Sections 4.1.7.1 / 4.2.1.5
EIS Reference:	Section 2.5.3 TMF Operation
Context and Rationale:	Exposed tailings beach that slopes 3% to the tailings pond. The high point of the tailings beach is up to 25 meters higher than the crest of the dam and 26 m higher than the pond elevation upon closure. The 2018 Stantec Report states: • ARD is not anticipated from tailings, unless Marathon ore is processed separately from Leprechaun ore and resulting solids are left exposed after closure. The 2020 Stantec Report states: • Section 5.4 - The high-grade stockpile will drain to the TMF and any acidity would be neutralized in the pond or in the mill during the pH adjustment required as a part of the gold recovery by cyanide process. • Section 5.5 - The “preferential settling of denser minerals, such as sulphides, near spigots may result in formation of patches of PAG tailings, which may create localized ARD. • Section 6.0 - Composite samples of tailings are classified as non-PAG and are not expected to generate ARD. • Section 6.0 -The TMF pond and pore water in tailings will likely exceed the MDMER limits for CN(T), unionized NH3, and Cu sourced from process water and collected seepage. In addition, high leaching potential is also predicted for NH3+NH4, CNWAD (surrogate for CN free), F, Hg, P, and Fe. After closure, covered tailings beaches are not expected to produce acidic runoff and/or have high or moderate leaching except for P, which shows moderate potential. The seepage from the TMF is conservatively predicted to exceed the MDMER limits for CN(T), un-ionized NH3, and Cu in post-closure.
Information Request:	The EIS must evaluate all sources of ARD/ML and incorporate the appropriate mitigation measures into the design of the TMF and the closure of the TMF.
Response:	The following sources and associated mitigation measures have been considered in the acid rock drainage/metal leaching (ARD/ML) prediction and water quality models that are included in tailings management facility (TMF) design:

ID:	DIET-10
	• TMF dams: No potentially acid generating (PAG) rock will be used for construction of TMF dams. The rock will be tested for ARD/ML and classified prior to use in construction using procedures similar to those presented in Appendix B. • Process water: approximately 95% of the process water discharged to the TMF will be recycled back to the process plant to minimize use of fresh water and discharge to the environment. The output from the process will be adjusted for pH and treated for cyanide at the plant to maintain discharge water quality to TMF. Discharge from the TMF will be treated during operation via the water treatment plant for cyanide species, total ammonia and copper to comply with the provincial and federal regulations. During treatment, concentrations of mercury, phosphorous, and iron will be also reduced. The parameters mentioned above, and fluoride will be further managed using an assimilative capacity approach and are predicted to be below Canadian Water Quality Guidelines at the edge of the mixing zone (Appendix 7C of the EIS). • TMF beaches: Tailings beaches will not produce acidic runoff during operation based on the assessment completed which shows that tailings samples are non-potentially acid generating (non-PAG) as discussed in detail in response to ECC-07. Humidity cell testing of tailings (samples CND-1 and CND2) show no exceedances of the *Metals and Diamond Mining Effluent Regulations* limits as shown in Table 5-1 and discussed in Sections 4.1.3.2 and 4.3.3.3 in Baseline Study Appendix 5, Attachment 5-B of the EIS. These results indicate that no treatment is required for this source (Table 5-1 of the EIS). At closure, tailings beaches will be covered, further minimizing risk of ARD/ML as discussed in more detail in Section 7.4 of the EIS and in the response to ECC-07. • TMF toe seepage: During operation, toe seepage will be collected and pumped back to the TMF pond. Discharge from the TMF pond will be treated as indicated in Sections 2.3.4 and 2.3.5 of the EIS. Seepage quality will be monitored throughout the life of mine to confirm parameters requiring treatment prior to discharge to the environment. Passive treatments systems to remediate toe seepage from the TMF will be designed and implemented during closure and post-closure, respectively. Marathon will develop a passive treatment assessment program as part of its Rehabilitation and Closure Plan that will be submitted to the Newfoundland and Labrador Department of Industry, Energy and Technology. The final Plan (finalized toward the end of the mine life) is subject to a provincial regulatory approval prior to implementation.

ID:	DIET-10
	• High Grade Ore (HGO) stockpile seepage: The HGO stockpile will not generate ARD as discussed in response to DIET-09. The metal leaching potential of the ore is also low for all parameters as discussed in Section 5.4 of BSA.5, Attachment 5-B of the EIS. In the unlikely case ARD/ML occurs in the HGO stockpile, the ARD/ML will be addressed via pH adjustment in the processing plant or at the water treatment plant, over the 5-year life of the HGO stockpile. On-going and future ARD/ML testing, including operational monitoring, will expand the results obtained to date and refine the associated mitigation measures identified that will be incorporated into the mine plans via the ARD/ML Management Plan. Details on additional testing and on the content of the ARD/ML Management Plan are provided in Appendix B.
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO DIET-11

ID:	DIET-11
Expert Department or Group:	Mines Branch
Guideline Reference:	Sections 4.1.7.1 / 4.2.1.5
EIS Reference:	-
Context and Rationale:	-
Information Request:	The initial ARD/ML assessment indicated ARD/ML would not be a concern. The results of the ARD/ML program however show ARD/ML is going to be an ongoing concern during and after the completion of the project. The ARD/ML sampling program did not follow the MEND guidelines with respect to sample interval length, spatial distribution and minimum sampling frequency per lithology. Additional deficiencies are noted with respect to the composite samples and the conclusions derived from the samples. The deficiencies in the ARD/ML report must be corrected before the report is acceptable. Additionally, the EIS must also present the procedure / method for the identification and the management of PAG rock (ore and waste) which will be used during development and operational phase of the project.
Response:	The results of the second phase of acid rock drainage (ARD/ML) assessment show limited ARD/ML potential for some project components, however, with appropriate management and mitigations the potential for ARD/ML will be reduced and drainage from the site will meet regulatory requirements during operations and post-closure. Further ARD/ML assessment including testing of additional samples and longer-term testing (field bins), is ongoing and will continue, to confirm the results of the assessment to date. The collective results will be used to support the ARD/ML Management Plan which will provide operational management procedures and monitoring requirements. The approach taken in Marathon's geochemical characterization program is based on the geological interpretation and understanding of the gold mineralization and distribution / association of sulphide minerals specific to the deposits. Based on the mineralization characteristics at the Project, the one-meter sample interval is considered appropriate for evaluating the variability in geochemistry and mineralogy of materials and capturing appropriately the natural variability in distribution of ARD/ML properties of the mine rock. An example of the selection table for drill hole MA-18-281 is shown in Table DIET-11.1. The gold content is different in the sampled intervals (i.e., 84-85, 142-143, 203-204, 286-287, 362-363) as compared to the adjacent 1 m; this indicates variability in mineralization of the deposit.

ID:	DIET-11
	Longer sample intervals or compositing samples will mask the variability in material properties as indicated on page 8-9 of Mine Environment Neutral Drainage (MEND) Manual (2009). The tonnage estimates and number of samples tested are provided in Tables DIET-11.2 and DIET-11.3 for each lithology identified within the geologic block model. Some lithologies, such as mafic dykes and varieties of quartz porphyry are narrow and are therefore not represented in the block model based on the block sizes; these have been lumped in with larger geologic units containing these lithologies in models for both deposits. Additional sampling and testing of units with low mineralization, such as the gabbro and metasediments, is required. These units were not well covered by exploration drill programs targeting gold anomalies. Overall, gold mineralization correlates with sulphide content indicating that undersampled lithological units are likely to have lower ARD/ML potential. Therefore, additional sampling and testing of these units is expected to result in an increase in the estimated tonnage of non-potentially acid generating rock. The additional sampling and testing targets, according to MEND (2009) are presented in Tables DIET-11.3 and DIET-11.3. Composite samples of major lithologies were used for kinetic testing. The composite samples were prepared for each lithology using crushed residual material from individual samples used in the second phase of the ARD/ML program. The residual materials were mixed in approximately the same proportions to produce a composite sample representative of the average composition of each lithology. Tables DIET-11.4 to DIET-11.7 provide a quantitative comparison of parameters measured in the composite to select statistics (average, median and 25th percentile) determined from results of individual samples of the same lithology. The summary tables demonstrate that the majority of parameters of potential concern in composite samples (Table 5-1 of Baseline Study Appendix 5, Attachment 5-B of the EIS) have an equal or greater value than the average or/and median reported for the lithology. Therefore, the composite samples generated for kinetic tests are considered to be a conservative representation of each lithology. <u>Ongoing and Additional Assessment and Reporting</u> Kinetic testing of potentially acid generating (PAG) samples are anticipated to take years before the neutralization potential (NP) is depleted and acidic leachate is generated. To reduce the testing time, humidity cells were started on a carbonate-depleted tailings from Marathon ore (Sample CND-1) and on low-grade ore (sample MLGO-Met) from Marathon in August of 2020. Carbonate depletion transforms material into PAG, prior to testing.

ID:	DIET-11
	The results of these tests are presented in the Attachment DIET-11, following Table DIET-11.7, below. Additional kinetic testing of PAG materials (waste rock, ore and low-grade ore) from major lithologies of the Marathon pit and a composite sample of gabbro material have been started. These samples have also been submitted for static tests including net acid generating (NAG) tests, mineralogy and particle size distribution similar to the characterization of composite samples described in Attachment 5-B of the EIS. The results of this test work will be included in the ARD/ML Management Plan (see Appendix B for more information) which will be provided to the Newfoundland and Labrador Department of Industry, Energy and Technology, Mines Brach, for review and comment. Marathon recognizes that further ARD/ML work is required as well as further assessment and associated refinement of Project mitigation as design of the Project proceeds (refer to Appendix B for further information). Specifically, Marathon is committed to completing additional work to address testing gaps identified in the program completed to date. This information is required for final design and permitting under the Newfoundland and Labrador *Mining Act* (Newfoundland and Labrador Department of Industry, Energy, and Technology). Specifically, Marathon is committed to completing the following additional work within the indicated timeframes: Continue collection of results from on-going laboratory and field tests in 2021. Continuation of laboratory tests include two humidity cells containing carbonate depleted low-grade ore (LGO) and tailings from the Marathon deposit. Continuation of field bin tests of composite materials include nine composite samples representing major waste rock lithologies and low-grade ores from both deposits. In 2021, a subaqueous column, an aging test and a humidity cell has started on samples generated from on-going metallurgical work. It is expected that updated analysis will be conducted in Q4 of 2021. Additional static testing of samples in Q2 and Q3 of 2021. Additional static testing to be conducted: To address spatial distribution and sampling requirements per lithology (refer to Tables DIET-11.2 and DIET-11.3) To provide the data inputs required for ARD block models for Marathon pit

ID:	DIET-11
	To better define the location and volumes of non-potentially acid generating (non-PAG) rock, which is required for construction, in Leprechaun and Marathon starter pits Additional kinetic testing of PAG materials (waste rock, ore and low-grade ore) from major lithologies of the Marathon pit including a composite sample of gabbro. These samples have also been submitted for static tests including NAG tests, mineralogy and particle size distribution similar to characterization of composite samples described in the EIS. It is expected that updated analysis will be conducted in Q4 of 2021. PAG Rock Management The future ARD block model for Marathon pit will provide production schedules for ARD classes of rock and ore and will to help to map PAG materials on pit walls. The model will be verified by operational sampling and managed using the following procedures, which are subject to further refinement as the ARD/ML Management Plan is developed. The following procedure will be employed for all PAG rock excavated for the Project: Samples of drill cuttings from blast holes representing each mine block will be collected. The samples will be tested for total carbon and sulphur using LECO furnace or similar method. Average NP will be calculated from total carbon and average Acid Potential (AP) will be calculated from total sulphur using standard conversions per the MEND guidelines. If NP/AP ratios indicate the mine block rock is below 2, the block will be classified as PAG. PAG rock will be marked after the blast, excavated, and dispatched to the waste rock stockpile. PAG rock would only be deposited within a specified distance (to be defined) of the final stockpile shell and preferably next to a non-PAG truck load. Piled PAG rock will be marked and the geospatial coordinates recorded. A portion of PAG and non-PAG rock loads will be mixed during grading each lift of the stockpile. This mixture will be encapsulated with non-PAG rock deposited within a specified distance (to be defined) from the lift face and forming the topmost lift(s) on the final of the stockpile. Non-PAG rock will reduce oxygen flux into interior of the pile and provide alkalinity to infiltrating water. This approach has been successfully applied for waste rock piles in other mine sites as referenced in sections 6.6.3.5 and 6.6.3.6 of Global ARD management guide (http://www.gardguide.com/index.php/Chapter) and would be applicable to ARD/ML management at the Valentine Gold Project.

ID:	DIET-11
	Additional details describing the location and management of acid generating rock will be presented in the ARD/ML Management Plan, however, the approach is expected to be much the same as described above. The ARD/ML Management Plan will be prepared using additional ARD/ML test results as described in Appendix B. Reference: Mine Environment Neutral Drainage Program (MEND). 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, MEND Report 1.20.1, p. 1-579.
Appendix:	See Appendix B: ARD/ML Management Approach

Table DIET-11.1 Logs and Assays of MA-18-281 Drill Hole used for Sample Selection.

Hole_ID	From_m	To_m	Au g/t	Lithology
MA-18-281	2.89	4		Conglomerate
MA-18-281	6	7		Conglomerate
MA-18-281	7	9	0.005	Mafic Dike
MA-18-281	9	11	0.005	Qtz-eye Porphyry
MA-18-281	11	13	0.009	Qtz-eye Porphyry
MA-18-281	13	15	0.015	Qtz-eye Porphyry
MA-18-281	15	17	0.005	Qtz-eye Porphyry
MA-18-281	17	19	0.022	Qtz-eye Porphyry
MA-18-281	19	21	0.060	Qtz-eye Porphyry
MA-18-281	21	23	0.011	Mafic Dike
MA-18-281	25	27	0.005	Aphanitic Qtz Porphyry
MA-18-281	27	29	0.005	Aphanitic Qtz Porphyry
MA-18-281	29	30	0.023	Aphanitic Qtz Porphyry
MA-18-281	30	31		Aphanitic Qtz Porphyry
MA-18-281	31	33	0.005	Qtz-eye Porphyry
MA-18-281	49	50	0.010	QZ - Qtz-eye Porphyry + QTP
MA-18-281	52	53	0.005	Qtz-eye Porphyry
MA-18-281	53	54	0.005	Qtz-eye Porphyry
MA-18-281	54	56	0.005	Qtz-eye Porphyry
MA-18-281	56	58	1.027	Qtz-eye Porphyry
MA-18-281	58	60	0.023	Qtz-eye Porphyry
MA-18-281	60	61	0.005	Qtz-eye Porphyry
MA-18-281	61	62	0.005	Qtz-eye Porphyry
MA-18-281	62	64	0.005	Qtz-eye Porphyry
MA-18-281	64	66	1.141	Aphanitic Qtz Porphyry
MA-18-281	68	70	0.005	Qtz-eye Porphyry
MA-18-281	82	83	0.016	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	83	84	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	84	85	0.123	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	85	86	0.341	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	86	87	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	87	88	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	88	89	0.135	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	89	90	0.083	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	90	91	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	91	92	0.005	Qtz-eye Porphyry
MA-18-281	94	96	0.005	Aphanitic Qtz Porphyry
MA-18-281	102	104	0.005	Qtz-eye Porphyry
MA-18-281	122	124	0.005	Aphanitic Qtz Porphyry
MA-18-281	134	136	0.012	Qtz-eye Porphyry
MA-18-281	136	138	0.069	Qtz-eye Porphyry
MA-18-281	138	139	0.201	Qtz-eye Porphyry
MA-18-281	139	140	1.091	Qtz-eye Porphyry
MA-18-281	140	141	0.526	Qtz-eye Porphyry
MA-18-281	141	142	2.028	Qtz-eye Porphyry
MA-18-281	142	143	0.504	Qtz-eye Porphyry
MA-18-281	143	145	0.724	Qtz-eye Porphyry
MA-18-281	145	147	0.015	Aphanitic Qtz Porphyry
MA-18-281	155	157	0.005	Qtz-eye Porphyry
MA-18-281	170	172	0.005	Aphanitic Qtz Porphyry

Note: Intervals highlighted in grey were selected for ARD/ML Testing Program

Table DIET-11.1 Logs and Assays of MA-18-281 Drill Hole used for Sample Selection.

Hole_ID	From_m	To_m	Au g/t	Lithology
MA-18-281	172	173	0.005	Aphanitic Qtz Porphyry
MA-18-281	173	174	0.005	Aphanitic Qtz Porphyry
MA-18-281	174	176	0.005	Aphanitic Qtz Porphyry
MA-18-281	176	177	0.005	Aphanitic Qtz Porphyry
MA-18-281	177	178	0.005	Aphanitic Qtz Porphyry
MA-18-281	178	179	0.005	Qtz-eye Porphyry
MA-18-281	191	193	0.005	Aphanitic Qtz Porphyry
MA-18-281	197	199	0.005	Qtz-eye Porphyry
MA-18-281	200	201	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	201	202	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	202	203	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	203	204	0.019	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	204	205	0.014	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	205	206	0.019	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	206	207	0.039	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	207	208	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	208	209	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	209	210	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	210	211	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	211	212	0.005	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	212	213	0.005	Qtz-eye Porphyry
MA-18-281	218	220	0.005	Aphanitic Qtz Porphyry
MA-18-281	228	230	0.011	Qtz-eye Porphyry
MA-18-281	230	232	0.005	Qtz-eye Porphyry
MA-18-281	232	233	0.005	Qtz-eye Porphyry
MA-18-281	233	235		Qtz-eye Porphyry
MA-18-281	234	236	0.005	Qtz-eye Porphyry
MA-18-281	236	238	0.005	Qtz-eye Porphyry
MA-18-281	238	240	0.005	Qtz-eye Porphyry
MA-18-281	240	242	0.005	Qtz-eye Porphyry
MA-18-281	242	244	0.005	Qtz-eye Porphyry
MA-18-281	244	246	0.016	Qtz-eye Porphyry
MA-18-281	246	248	0.005	Qtz-eye Porphyry
MA-18-281	248	250	0.012	Qtz-eye Porphyry
MA-18-281	250	252	0.005	Qtz-eye Porphyry
MA-18-281	252	254	0.005	Qtz-eye Porphyry
MA-18-281	254	256	0.005	Qtz-eye Porphyry
MA-18-281	256	258	0.005	Aphanitic Qtz Porphyry
MA-18-281	262	264	0.005	Qtz-eye Porphyry
MA-18-281	282	284	0.005	Mafic Dike
MA-18-281	284	286	0.005	Mafic Dike
MA-18-281	286	287	0.012	Mafic Dike
MA-18-281	287	288	0.012	Mafic Dike
MA-18-281	288	290	0.005	Mafic Dike
MA-18-281	290	292	0.005	Mafic Dike
MA-18-281	292	294	0.005	Mafic Dike
MA-18-281	294	296	0.005	Mafic Dike
MA-18-281	296	298	0.005	Mafic Dike
MA-18-281	298	300	0.005	Mafic Dike
MA-18-281	300	302	0.005	Mafic Dike
MA-18-281	302	304	0.005	Mafic Dike
MA-18-281	304	306	0.005	Aphanitic Qtz Porphyry

Note: Intervals highlighted in grey were selected for ARD/ML Testing Program

Table DIET-11.1 Logs and Assays of MA-18-281 Drill Hole used for Sample Selection.

Hole_ID	From_m	To_m	Au g/t	Lithology
MA-18-281	318	320	0.005	Qtz-eye Porphyry
MA-18-281	324	326	0.005	Mafic Dike
MA-18-281	342	344	0.007	Qtz-eye Porphyry
MA-18-281	344	346	0.007	Qtz-eye Porphyry
MA-18-281	346	348	0.008	Qtz-eye Porphyry
MA-18-281	348	350	0.007	Qtz-eye Porphyry
MA-18-281	350	352	0.026	Qtz-eye Porphyry
MA-18-281	352	354	0.050	Qtz-eye Porphyry
MA-18-281	354	356	0.009	Qtz-eye Porphyry
MA-18-281	356	357	0.005	Qtz-eye Porphyry
MA-18-281	357	358	0.005	Qtz-eye Porphyry
MA-18-281	358	359	0.060	Qtz-eye Porphyry
MA-18-281	359	360	0.005	Qtz-eye Porphyry
MA-18-281	360	361	0.005	Qtz-eye Porphyry
MA-18-281	361	362	0.006	Qtz-eye Porphyry
MA-18-281	362	363	0.014	Qtz-eye Porphyry
MA-18-281	363	364	0.019	Qtz-eye Porphyry
MA-18-281	364	365	0.007	Qtz-eye Porphyry
MA-18-281	365	367	0.005	Qtz-eye Porphyry
MA-18-281	367	369	0.005	Qtz-eye Porphyry
MA-18-281	369	371	0.005	Qtz-eye Porphyry
MA-18-281	371	373	0.005	Qtz-eye Porphyry
MA-18-281	373	375	0.007	Qtz-eye Porphyry
MA-18-281	375	377	0.005	Qtz-eye Porphyry
MA-18-281	377	379	0.005	Qtz-eye Porphyry
MA-18-281	379	381	0.005	Qtz-eye Porphyry
MA-18-281	381	383	0.005	Qtz-eye Porphyry
MA-18-281	383	385	0.005	Qtz-eye Porphyry
MA-18-281	385	387	1.229	Qtz-eye Porphyry
MA-18-281	387	388	0.038	QZ - Qtz-eye Porphyry + QTP
MA-18-281	395	396	0.309	Qtz-eye Porphyry
MA-18-281	402	403	0.088	QZ - Qtz-eye Porphyry + QTP
MA-18-281	408	409	1.200	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	409	410	0.026	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	410	411	5.069	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	411	412	0.007	QZ - Qtz-eye Porphyry + Minor QTP
MA-18-281	412	413	0.219	QZ - Qtz-eye Porphyry + QTP
MA-18-281	413	414	0.107	QZ - Qtz-eye Porphyry + QTP
MA-18-281	414	415	0.251	QZ - Qtz-eye Porphyry + QTP
MA-18-281	415	416	0.196	QZ - Qtz-eye Porphyry + QTP
MA-18-281	416	417	2.454	QZ - Qtz-eye Porphyry + QTP
MA-18-281	417	418	0.584	QZ - Qtz-eye Porphyry + QTP
MA-18-281	418	419	0.114	QZ - Qtz-eye Porphyry + QTP
MA-18-278	10.51	12	0.005	Qtz-eye Porphyry

Note: Intervals highlighted in grey were selected for ARD/ML Testing Program

Table IDIET-11.2 Tonnages of lithological units from geological block model and numbers of samples per unit for the Marathon Deposit

Block Model Lithology	Material type	Tonnage, Mt	# of samples tested to date	Suggested initial frequency per Table 8-2, MEND 2009	# of additional of samples to be tested per Table 8-2 MEND 2009
Metasediments	Waste Rock	30.3	9	80	71
Gabbro	Waste Rock	8.0	4	26	22
QEPOR	Waste Rock	106.7	125	80	0
High Grade Ore	Ore	14.6	28	80	52
Low Grade Ore	Ore	11.1	15	80	65
Overburden	Waste	7.5	14	26	12

Table DIET-11.3 Tonnages of lithological units from geological block model and numbers of samples per unit for the Leprechaun Deposit

Block Model Lithology	Material type	Tonnage, Mt	# of samples tested to date	Suggested initial frequency per Table 8-2, MEND 2009	# of additional of samples to be tested per Table 8-2 MEND 2009
Metasediments	Waste Rock	33	21	80	59
Trondhjemite	Waste Rock	105	93	80	0
High Grade Ore	Ore	8.6	24	26	2
Low Grade Ore	Ore	6.7	13	26	13
Overburden	Waste	3.8	6	26	20

Table DIET-11.4 Comparison of ABA statistics for individual samples to composite samples (ID is in bold).

Parameter	S_{TOTAL}	$S_{SULPHATE}$	$S_{SULPHIDE}$	Carb. NP	AP	NNP	Carb. NPR
Units	**wt.%**			**kg $CaCO_3$/t**			
1. Trondhjemite and Granodiorite (TRJ), 54 samples							
25th, %ile	0.020	0.010	0.01	28.7	0.3	54	96
Median	0.035	0.010	0.02	36.6	0.6	61	59
Average	0.06	0.013	0.05	42.4	1.5	65	29
L TRJ	0.08	0.050	0.03	48.3	0.9	47	**51**
2. QZ - Trondhjemite + QTP and QZ - Granodiorite + QTP (QZ-TQTP), 33 samples							
25th, %ile	0.056	0.005	0.04	27.7	1.3	54	21
Median	0.110	0.010	0.09	36.1	2.8	65	13
Average	0.15	0.017	0.13	45.2	4.1	69	11
L QZ-QTP	0.11	0.050	0.06	44.7	1.9	43	24
3. Conglomerate and Sediments (CG and SED), 17 samples							
25th, %ile	0.003	0.010	0.01	5.0	0.3	13	17
Median	0.010	0.010	0.01	12.5	0.3	21	42
Average	0.01	0.015	0.01	15.0	0.4	28	38
L SED	< 0.005	< 0.02	< 0.02	9.2	0.6	8.6	**15**
5. Mafic Dike (MD), 19 samples							
25th, %ile	0.076	0.025	0.05	72.1	1.4	113	51
Median	0.120	0.040	0.06	125.7	1.9	171	66
Average	0.19	0.039	0.15	116.3	4.8	159	24
L MD	0.13	0.060	0.07	97.3	2.2	95	**44**
7. QZ-QTP, 3 samples							
25th, %ile	0.049	0.020	0.02	54.1	0.8	53	69
Median	0.068	0.030	0.03	69.8	0.9	69	74
Average	0.06	0.027	0.03	69.7	1.2	90	60
L QZ-QTP	0.05	0.030	0.02	51.6	0.62	51	83
8. Low-Grade Ore, 10 samples							
25th, %ile	0.096	0.010	0.08	15.4	2.5	27	6.1
Median	0.213	0.015	0.15	34.1	4.5	52	8
Average	0.25	0.039	0.22	45.4	6.8	67	7
L LGO	0.16	0.060	0.10	37.9	3.1	35	12
LLGO-Met	0.27	0.040	0.23	61.3	7.2	54	9

Notes:
S_{TOTAL} - Total Sulphur; $S_{SULPHIDE}$ - Sulphide Sulphur; $S_{SULPHIDE}=S_{TOTAL}-S_{SULPHATE}$; $S_{SULPHATE}$ - Sulphate Sulphur;
Carb. NP - Carbonate Neutralization Potential; Carb; $NP=TIC*M(CaCO_3)/M(C)*10$(kg/t from % diff.);
AP - Acid Potential; $AP=S_{SULPHIDE}(\%) \times 31.25$; NNP - Net Neutralization Potential; NPR - Neutralization Potential Ratio;
TIC - Total Inorganic Carbon. Respective samples from Phase I and II are combined.
Values in cells highlighted yellow exceed either median or average value for the material;
Values in cells highlighted green are between the 25th percentile and average value for the material.

Table DIET-11.5 Comparison of trace element statistics for individual samples to composite samples (ID is in bold).

	Ag	Al	As	Be	Cd	Co	Cr	Cu	Fe	Hg	Mn	Mo	Ni	P	Pb	Se	Tl	U	V	Zn
ACUCx10	530	407639	48	21	0.90	173	920	280	320415	0.5	774.5	11	470	654.3	170	0.9	9	27	970	670
Units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
1. Trondhjemite and Granodiorite (TRJ), 54 samples																				
25th, %ile	0.050	6205	0.5	0.50	0.050	1.3	44	3.5	833	0.025	403	0.20	1.4	12	10.5	0.50	0.250	0.100	6.0	24
Median	0.050	6420	1.0	0.50	0.050	1.9	50	4.8	1025	0.025	465	0.30	1.7	14	12	0.50	0.25	0.20	9.0	32
Average	0.044	6323	1.4	0.59	0.044	3.5	53	8.3	2721	0.025	486	0.35	3.0	23	12	0.48	0.21	0.20	21	33
L TRJ	< 0.01	5600	0.8	0.12	0.030	3.3	54	6.9	12000	< 0.05	430	2.7	3.2	280	3.4	< 0.7	0.02	0.12	8.0	27
2. QZ - Trondhjemite + QTP and QZ - Granodiorite + QTP (QZ-TQTP), 33 samples																				
25th, %ile	0.050	6120	0.5	0.50	0.050	1.3	50	4.3	780	0.025	389	0.20	1.4	11.5	6.0	0.50	0.250	0.20	8.0	23
Median	0.050	6710	1.0	0.50	0.050	3.1	54	8.8	1180	0.025	446	0.30	1.7	18	8.7	0.50	0.25	0.30	10	33
Average	0.043	6674	1.1	0.69	0.049	3.8	55	14.1	3913	0.025	496	1.48	2.6	27	8.9	0.47	0.21	0.31	25	32
L QZ-TQTP	0.01	6300	0.8	0.13	0.030	4.0	59	10.0	13000	< 0.05	490	3.0	3.4	260	2.5	< 0.7	< 0.02	0.16	12.0	35
3. Conglomerate and Sediments (CG and SED), 17 samples																				
25th, %ile	0.005	6870	3.4	0.15	0.040	13.7	55	1.2	3690	0.025	773	0.05	20	67	1.1	0.35	0.010	0.53	41	65
Median	0.050	7250	5.0	0.50	0.050	15.2	68	3.9	4120	0.025	**877**	0.20	26	73	13	0.50	0.25	1.3	95	70
Average	0.037	9268	4.7	0.57	0.053	15.1	64	14.0	11032	0.025	**938**	0.74	24	75	10	0.46	0.18	1.1	81	69
L SED	< 0.01	14000	3.2	0.16	0.030	14.0	50	2.5	31000	< 0.05	750	0.8	24.0	810	1.2	< 0.7	0.02	0.47	46.0	61
5. Mafic Dike (MD), 19 samples																				
25th, %ile	0.050	7000	4.0	0.50	0.050	29.5	46	51.8	6580	0.025	**1060**	0.35	19.8	83	3.9	0.50	0.250	0.15	197	75
Median	0.050	7520	10	0.50	0.050	36.3	81	58.0	7570	0.025	**1400**	0.60	28	91	6.6	0.50	0.25	0.40	250	83
Average	0.041	11038	11	0.65	0.101	31.7	77	56.9	17397	0.025	**1264**	0.83	24	88	6.3	0.47	0.20	0.34	225	78
L MD	0.01	22000	2.2	0.17	0.070	29.0	70	50.0	59000	< 0.05	1100	1.1	22.0	610	2.0	< 0.7	< 0.02	0.12	170.0	70
7. QZ-QTP, 3 samples																				
25th, %ile	0.005	5100	1.4	0.13	0.010	3.6	55	5.6	5660	0.025	495	0.20	2.8	52	1.6	0.35	0.010	0.20	8.5	35
Median	0.005	6000	2.0	0.13	0.010	4.8	59	8.0	9900	0.025	530	0.20	3.5	52	1.7	0.35	0.01	0.20	12	36
Average	0.020	5403	1.9	0.42	0.023	4.2	60	16.7	9773	0.025	527	0.63	3.2	52	3.9	0.40	0.09	0.22	20	39
L QZ-QTP	< 0.01	5900	0.5	0.14	0.020	4.6	38	10.0	15000	< 0.05	460	1.9	3.2	440	1.6	< 0.7	< 0.02	0.17	11.0	42
8. Low-Grade Ore, 10 samples																				
25th, %ile	0.050	4780	1.10	0.16	0.043	3.8	61	8.0	1260	0.025	337	0.13	2.8	25	4.2	0.35	0.010	0.20	9.5	17
Median	0.050	6515	1.8	0.50	0.050	5.0	69	11.1	5975	0.025	414	0.40	4.3	39	6.4	0.50	0.25	0.22	23	33
Average	0.115	6547	2.2	0.45	0.048	10.5	81	42.1	10457	0.040	512	0.83	12	47	9.9	0.44	0.15	0.51	56	41
L LGO	0.03	4100	2.0	0.10	0.070	4.1	70	20.0	13000	< 0.05	340	1.7	5.3	390	1.8	< 0.7	< 0.02	0.15	8.0	26
LLGO-Met	0.04	5300	1.3	0.12	0.030	5.5	29	8.1	14000	0	430	0.8	3.8	-	7.3	< 0.7	< 0.02	0.80	8.0	33

Notes:
Respective samples from Phase I and II are combined.
ACUC - Average Concentration in the Upper Crust of the Earth based on Rudnick and Gao (2004); Values exceeding 10x the Average Concentration in the Upper Crust are double underlined and bold;
For the values less than Reportable Detection Limit (RDLs) values, 1/2 of RDLs are used to calculate statistical parameters.
Values in cells highlighted yellow exceed either median or average value for the material. Values in cells highlighted green are between the 25th percentile and average value for the material.

Table DIET-11.6 Comparison of ABA statistics for individual samples to composite samples (ID is in bold).

Parameter	Paste pH	S_{TOTAL}	$S_{SULPHATE}$	$S_{SULPHIDE}$	Carb. NP	AP	NNP	Carb. NPR
Units	**pH Units**	**wt.%**			**kg $CaCO_3$/t**			
1. Qtz-eye Porphyry and Qtz-Porphyry Breccia (QE-POR and QE-POR-BX), 66 samples								
25th, %ile	9.39	0.018	0.010	0.01	23.2	0.6	24	37
Median	9.52	0.100	0.020	0.07	36.8	2.0	48	18
Average	9.47	0.17	0.051	0.12	48.4	3.9	61	13
M QE-POR	8.74	0.08	0.030	0.05	62.5	1.6	61	40
2. Aphanitic Qtz Porphyry (AQPOR), 19 samples								
25th, %ile	9.45	0.037	0.010	0.03	13.0	0.8	9	17
Median	9.69	0.076	0.030	0.05	18.5	1.6	22	12
Average	9.60	0.27	0.062	0.22	31.5	6.9	30	5
M AQPOR	9.48	0.33	0.090	0.24	48.6	7.5	41	6
3. Conglomerate (CG), 9 samples								
25th, %ile	9.36	0.003	0.010	0.01	75.2	0.3	75	251
Median	9.56	0.003	0.010	0.01	84.2	0.6	99	136
Average	9.50	0.01	0.009	0.01	101.1	0.5	116	212
M CG	9.53	< 0.005	< 0.02	< 0.02	87.3	0.6	87	141
5. Mafic Dike (MD), 19 samples								
25th, %ile	8.82	0.030	0.010	0.01	44.9	0.6	77	72
Median	9.03	0.090	0.030	0.04	93.3	1.3	105	72
Average	9.05	0.12	0.051	0.08	96.4	2.5	118	38
M MD	8.96	0.27	0.080	0.19	88.7	5.9	82.7	15
6. QZ - Qtz-eye Porphyry + Minor QTP (QZ-QE-POR-QTP-MIN), 10 samples								
25th, %ile	9.61	0.041	0.015	0.03	17.3	1.0	13	17
Median	9.64	0.157	0.045	0.11	26.3	3.3	20	8
Average	9.67	0.25	0.056	0.20	32.9	6.2	27	5
M QZ-QE-POR-QTP-MIN	9.71	0.38	0.100	0.28	22.7	8.8	14	2.6
7. QZ - Qtz-eye Porphyry + QTP (QZ-QE-POR-QTP), 11 samples								
25th, %ile	9.45	0.161	0.010	0.14	16.2	4.2	24	4
Median	9.59	0.310	0.010	0.30	18.3	9.4	33	**2.0**
Average	9.57	0.33	0.028	0.30	30.8	9.6	35	3.2
8. Low-Grade Ore, 8 samples								
25th, %ile	9.35	0.433	0.009	0.36	17.4	11.1	4	**1.6**
Median	9.48	0.506	0.050	0.42	24.1	13.2	27	**1.8**
Average	9.50	0.55	0.066	0.49	26.2	15.3	21	**1.7**
M LGO	9.48	0.28	0.090	0.19	49.2	5.9	43	8
MLGO-Met	9.16	0.59	< 0.02	0.60	28.9	18.8	10	1.5

Notes:

S_{TOTAL} - Total Sulphur; $S_{SULPHATE}$ - Sulphate Sulphur; AP - Acid Potential; AP=$S_{SULPHIDE}$(%) x 31.25.

NNP - Net Neutralization Potential; NPR - Neutralization Potential Ratio;

TIC - Total Inorganic Carbon; Overburden AP is calculated using S_{TOTAL} x 31.25.

Respective samples from Phase I and II are combined.

Table DIET-11.7 Comparison of trace element statistics for individual samples to composite samples (ID is in bold).

	Ag	Al	As	B	Be	Cd	Co	Cr	Cu	Fe	Hg	Mn	Mo	Ni	P	Pb	Se	Tl	U	V	Zn
ACUCx10	530	407639	48	-	21	0.90	173	920	280	320415	0.5	774.5	11	470	654	170	0.9	9	27	970	670
Units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
1. Qtz-eye Porphyry and Qtz-Porphyry Breccia (QE-POR and QE-POR-BX), 66 samples																					
25th, %ile	0.006	5785	0.50	-	0.050	0.010	2.7	46.5	2.5	2860	0.025	320	0.53	1.9	19	0.37	0.35	0.010	0.085	7.0	8
Median	0.025	6345	0.60	-	0.070	0.010	4.5	73	4.7	13000	0.025	418	0.90	2.4	25	0.86	0.35	0.01	0.13	17.0	16
Average	0.029	9000	0.87	-	0.25	0.027	7.0	75	11.3	16551	0.025	537	1.4	6.0	28	1.5	0.42	0.10	0.21	38	21
M QE-POR	0.02	11000	< 0.5	-	0.06	< 0.02	6.3	100	14.0	25000	< 0.05	580	2.2	13.0	190	0.9	< 0.7	< 0.02	0.09	31.0	17
2. Aphanitic Qtz Porphyry (AQPOR), 19 samples																					
25th, %ile	0.005	6800	0.38	-	0.045	0.010	3.1	48.0	2.1	17500	0.025	295	1.05	1.55	21	0.22	0.35	0.010	0.093	5.5	15
Median	0.010	8700	0.60	-	0.060	0.010	4.7	82	4.3	23000	0.025	400	1.80	2.2	25	0.60	0.35	0.01	0.12	10.0	22
Average	0.029	11093	0.80	-	0.14	0.023	7.2	76	12.0	22955	0.025	494	1.8	7.7	23	0.93	0.49	0.05	0.15	18	28
M AQPOR	0.05	14000	0.7	-	0.10	< 0.02	8.4	110	15.0	33000	< 0.05	680	3.5	22.0	380	0.7	< 0.7	< 0.02	0.10	28.0	42
3. Conglomerate (CG), 9 samples																					
25th, %ile	0.050	5400	1.2	-	0.18	0.050	10.0	23	9.4	4420	0.025	**881**	0.30	16	56	2.1	0.35	0.010	0.400	30.0	40
Median	0.050	6470	1.6	-	0.23	0.050	11.0	66	22.0	22000	0.025	**918**	0.30	20	61	3.0	0.35	0.02	0.67	36.0	48
Average	0.058	7119	2.0	-	0.49	0.069	14.2	53	30.6	15193	0.025	**962**	0.43	20	59	4.9	0.42	0.12	0.75	69	49
M CG	0.05	6500	1.3	-	0.16	0.070	11.0	53	30.0	24000	< 0.05	1100	1.1	18.0	400	2.3	< 0.7	0.03	0.50	27.0	46
5. Mafic Dike (MD), 19 samples																					
25th, %ile	0.020	7540	0.50	-	0.060	0.030	18.7	30	11.3	7305	0.025	**1300**	0.20	4.5	22	0.49	0.35	0.010	0.032	146.0	52
Median	0.040	27000	0.80	-	0.090	0.050	32.0	56	55.1	65000	0.025	**1650**	0.30	7.1	25	0.84	0.35	0.01	0.06	250.0	81
Average	0.036	22793	1.2	-	0.26	0.040	27.4	109	67.3	47647	0.025	**1507**	0.44	26	28	1.9	0.41	0.11	0.15	223	67
M MD	0.03	35000	1.4	-	0.18	0.040	36.0	120	69.0	84000	< 0.05	1800	0.9	38.0	200	0.7	< 0.7	< 0.02	0.10	280.0	90
6. QZ - Qtz-eye Porphyry + Minor QTP (QZ-QE-POR-QTP-MIN), 10 samples																					
25th, %ile	0.005	4425	0.25	-	0.040	0.010	1.3	3.2	2.9	10050	0.025	248	1.03	0.60	-	0.27	0.35	0.010	0.072	3.5	6
Median	0.010	5200	0.38	-	0.045	0.010	2.1	93	4.7	17500	0.025	270	1.4	2.5	-	0.39	0.35	0.01	0.11	7.0	8
Average	0.015	5520	0.45	-	0.053	0.010	2.7	67	4.6	15480	0.025	322	1.6	1.8	-	0.63	0.35	0.01	0.11	8	8
M QZ-QE-POR-QTP-MIN	0.02	8100	0.5	-	0.07	< 0.02	3.5	95	13.0	20000	< 0.05	310	5.4	4.1	120	0.3	< 0.7	< 0.02	0.11	12.0	12
8. Low-Grade Ore, 8 samples																					
25th, %ile	0.028	5360	0.50	-	0.058	0.010	2.1	74	8.1	1503	0.025	245	1.33	1.7	4.5	0.81	0.35	0.010	0.100	3.5	7
Median	0.050	6020	0.50	-	0.11	0.040	3.5	89	11.3	14500	0.025	455	2.1	2.4	5.0	1.4	0.35	0.01	0.14	5.5	14
Average	0.121	6533	1.1	-	0.24	0.15	3.1	83	26.6	11976	0.025	401	3.7	2.5	7.7	2.6	0.41	0.10	0.22	5	12
M LGO	0.02	15000	3.0	-	0.09	0.030	9.9	98	11.0	33000	< 0.05	900	15.0	11.0	190	1.9	< 0.7	< 0.02	0.13	70.0	42
MLGO-Met	0.23	6800	2.6	-	0.08	0.100	4.0	57	19.0	21000	< 0.05	430	2.1	5.0	-	5.3	< 0.7	< 0.02	0.52	10.0	21

Notes:
Respective samples from Phase I and II are combined.
ACUC - Average Concentration in the Upper Crust of the Earth based on Rudnick and Gao (2004); Values exceeding 10x the Average Concentration in the Upper Crust are double underlined and bold.
For the values less than Reportable Detection Limit (RDLs) values, 1/2 of RDLs are used to calculate statistical parameters.
Values in cells highlighted yellow exceed either median or average value for the material. Values in cells highlighted green are between the 25th percentile and average value for the material.

August 2021

ATTACHMENT DIET-11

Results of Testing

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	3	4	5	6	7	8	9
Date			Effective	12-Aug-20	19-Aug-20	26-Aug-20	02-Sep-20	09-Sep-20	16-Sep-20	23-Sep-20	30-Sep-20	07-Oct-20	14-Oct-20
LIMS			01-Jun-2021	10105-AUG20	10144-AUG20	10222-AUG20	10007-SEP20	10091-SEP20	10154-SEP20	10232-SEP20	10315-SEP20	10021-OCT20	10132-OCT20
Hum Cell Leachate Vo	mL	-	-	975	969	818	984	995	1018	1007	476	512	550
pH	no unit	6.0-9.5	-	**5.49**	**4.64**	**5.30**	**5.96**	**4.95**	**5.86**	**5.11**	**4.77**	**5.19**	**5.36**
Acidity	mg/L as $CaCO_3$	-	-	7	10	7	3	4	2	4	5	5	4
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	5	22	20	26	26	24	27	43	46	42
SO_4	mg/L	-	-	1.6	6.7	6.9	10	9.6	9.2	9.3	24	20	15
F	mg/L	0.12	-	< 0.06	< 0.06	< 0.06	---	< 0.06	---	---	---	< 0.06	---
NH_3+NH_4	as N mg/L			<0.1	<0.1	<0.1	---	<0.1	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	0.000	0.000	0.000	---	0.000	---	---	---	---	---
Hg	mg/L	0.000026	-	< 0.00001	< 0.00001	0.00001	---	< 0.00001	---	---	---	< 0.00001	---
Ag	mg/L	0.00025	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---
Al	mg/L	0.005@pH<6.5	-	**0.007**	**0.039**	**0.006**	---	**0.022**	---	---	---	**0.058**	---
As	mg/L	0.005	0.10	< 0.0002	0.0002	< 0.0002	---	< 0.0002	---	---	---	< 0.0002	---
Ba	mg/L	-	-	0.00018	0.00021	0.00028	---	0.00056	---	---	---	0.00115	---
Be	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	< 0.000007	---	---	---	0.000019	---
B	mg/L	1.5	-	0.004	< 0.002	0.004	---	0.002	---	---	---	0.004	---
Bi	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	0.000020	---	---	---	< 0.000007	---
Ca	mg/L	-	-	0.20	0.80	1.45	---	2.41	---	---	---	4.60	---
Cd	mg/L	0.00009	-	0.000009	0.000007	0.000025	---	0.000055	---	---	---	**0.000203**	---
Co	mg/L	-	-	0.000038	0.000123	0.000306	---	0.000653	---	---	---	0.00177	---
Cr	mg/L	-	-	0.00014	< 0.00008	< 0.00008	---	< 0.00008	---	---	---	< 0.00008	---
Cu	mg/L	0.002	0.10	0.0003	0.0006	0.0004	---	0.0013	---	---	---	**0.0059**	---
Fe	mg/L	0.3	-	0.008	0.010	0.017	---	0.033	---	---	---	0.106	---
K	mg/L	-	-	0.056	0.082	0.077	---	0.083	---	---	---	0.138	---
Li	mg/L	-	-	0.0001	< 0.0001	0.0001	---	0.0001	---	---	---	0.0002	---
Mg	mg/L	-	-	0.027	0.093	0.174	---	0.274	---	---	---	0.457	---
Mn	mg/L	-	-	0.00421	0.0167	0.0345	---	0.0581	---	---	---	0.117	---
Mo	mg/L	0.073	-	0.00017	0.00020	0.00009	---	0.00005	---	---	---	0.00013	---
Na	mg/L	-	-	0.85	1.34	1.46	---	1.13	---	---	---	1.28	---
Ni	mg/L	0.03	0.25	0.0002	0.0003	0.0005	---	0.0008	---	---	---	0.0017	---
P	mg/L	-	-	< 0.003	< 0.003	< 0.003	---	< 0.003	---	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	0.00001	< 0.00001	0.00003	---	0.00004	---	---	---	0.00003	---
Sb	mg/L	-	-	< 0.0009	< 0.0009	< 0.0009	---	< 0.0009	---	---	---	< 0.0009	---
Se	mg/L	0.001	-	< 0.00004	< 0.00004	0.00005	---	0.00004	---	---	---	0.00007	---
Si	mg/L	-	-	0.35	1.44	1.92	---	2.48	---	---	---	2.07	---
Sn	mg/L	-	-	0.00014	0.00013	0.00016	---	0.00014	---	---	---	0.00009	---
Sr	mg/L	-	-	0.00159	0.00135	0.00142	---	0.00298	---	---	---	0.00547	---
Th	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	---	< 0.0001	---	---	---	< 0.0001	---
Ti	mg/L	-	-	0.00009	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	0.00006	---
Tl	mg/L	0.0008	-	< 0.000005	< 0.000005	< 0.000005	---	< 0.000005	---	---	---	< 0.000005	---
U	mg/L	0.015	-	0.000002	0.000006	0.000022	---	0.000007	---	---	---	0.000040	---
V	mg/L	-	-	0.00006	0.00003	< 0.00001	---	< 0.00001	---	---	---	< 0.00001	---
W	mg/L	-	-	0.00003	0.00007	0.00003	---	< 0.00002	---	---	---	0.00004	---
Y	mg/L	-	-	0.000017	0.000006	0.000014	---	0.000047	---	---	---	0.000500	---
Zn	mg/L	0.007	0.40	0.005	**0.012**	**0.013**	---	**0.016**	---	---	---	**0.049**	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	10	11	12	13	14	15	16	17	18	19
Date			Effective	21-Oct-20	28-Oct-20	04-Nov-20	11-Nov-20	18-Nov-20	25-Nov-20	02-Dec-20	09-Dec-20	16-Dec-20	23-Dec-20
LIMS			01-Jun-2021	10196-OCT20	10254-OCT20	10019-NOV20	10077-NOV20	10124-NOV20	10162-NOV20	10018-DEC20	10070-DEC20	10162-DEC20	10185-DEC20
Hum Cell Leachate Vo	mL	-	-	471	386	490	498	422	386	465	511	510	512
pH	no unit	6.0-9.5	-	**4.73**	**5.00**	**4.96**	**4.82**	**5.28**	**4.75**	**5.22**	**4.73**	**4.73**	**4.64**
Acidity	mg/L as $CaCO_3$	-	-	6	6	5	5	6	8	6	6	5	6
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	53	60	35	33	39	53	34	37	37	40
SO_4	mg/L	-	-	19	21	12	9.7	13	16	10	11	11	12
F	mg/L	0.12	-	---	---	< 0.06	---	---	---	< 0.06	---	---	---
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	---	---	< 0.00001	---	---	---	< 0.00001	---	---	---
Ag	mg/L	0.00025	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---
Al	mg/L	0.005@pH<6.5	-	---	---	**0.064**	---	---	---	**0.059**	---	---	---
As	mg/L	0.005	0.10	---	---	0.0004	---	---	---	< 0.0002	---	---	---
Ba	mg/L	-	-	---	---	0.00122	---	---	---	0.00166	---	---	---
Be	mg/L	-	-	---	---	0.000027	---	---	---	0.000029	---	---	---
B	mg/L	1.5	-	---	---	0.003	---	---	---	0.002	---	---	---
Bi	mg/L	-	-	---	---	< 0.000007	---	---	---	< 0.000007	---	---	---
Ca	mg/L	-	-	---	---	3.06	---	---	---	2.99	---	---	---
Cd	mg/L	0.00009	-	---	---	**0.000180**	---	---	---	**0.000143**	---	---	---
Co	mg/L	-	-	---	---	0.00168	---	---	---	0.00172	---	---	---
Cr	mg/L	-	-	---	---	< 0.00008	---	---	---	< 0.00008	---	---	---
Cu	mg/L	0.002	0.10	---	---	**0.0094**	---	---	---	**0.0095**	---	---	---
Fe	mg/L	0.3	-	---	---	0.118	---	---	---	0.110	---	---	---
K	mg/L	-	-	---	---	0.139	---	---	---	0.143	---	---	---
Li	mg/L	-	-	---	---	< 0.0001	---	---	---	0.0002	---	---	---
Mg	mg/L	-	-	---	---	0.324	---	---	---	0.311	---	---	---
Mn	mg/L	-	-	---	---	0.0833	---	---	---	0.0775	---	---	---
Mo	mg/L	0.073	-	---	---	0.00069	---	---	---	< 0.00004	---	---	---
Na	mg/L	-	-	---	---	0.84	---	---	---	0.75	---	---	---
Ni	mg/L	0.03	0.25	---	---	0.0013	---	---	---	0.0011	---	---	---
P	mg/L	-	-	---	---	< 0.003	---	---	---	< 0.003	---	---	---
Pb	mg/L	0.001	0.08	---	---	0.00011	---	---	---	< 0.00001	---	---	---
Sb	mg/L	-	-	---	---	< 0.0009	---	---	---	< 0.0009	---	---	---
Se	mg/L	0.001	-	---	---	0.00010	---	---	---	0.00008	---	---	---
Si	mg/L	-	-	---	---	2.54	---	---	---	1.09	---	---	---
Sn	mg/L	-	-	---	---	0.00007	---	---	---	< 0.00006	---	---	---
Sr	mg/L	-	-	---	---	0.00492	---	---	---	0.00557	---	---	---
Th	mg/L	-	-	---	---	< 0.0001	---	---	---	< 0.0001	---	---	---
Ti	mg/L	-	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---
Tl	mg/L	0.0008	-	---	---	< 0.000005	---	---	---	< 0.000005	---	---	---
U	mg/L	0.015	-	---	---	0.000069	---	---	---	0.000023	---	---	---
V	mg/L	-	-	---	---	0.00003	---	---	---	< 0.00001	---	---	---
W	mg/L	-	-	---	---	0.00012	---	---	---	< 0.00002	---	---	---
Y	mg/L	-	-	---	---	0.000537	---	---	---	0.000158	---	---	---
Zn	mg/L	0.007	0.40	---	---	**0.048**	---	---	---	**0.044**	---	---	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	20	21	22	23	24	25	26	27	28	29	30
Date			Effective	30-Dec-20	06-Jan-21	13-Jan-21	20-Jan-21	27-Jan-21	03-Feb-21	10-Feb-21	17-Feb-21	24-Feb-21	03-Mar-21	10-Mar-21
LIMS			01-Jun-2021	10240-DEC20	10025-JAN21	10066-JAN21	10142-JAN21	10207-JAN21	10018-FEB21	10044-FEB21	10166-FEB21	10262-FEB21	10020-MAR21	10120-MAR21
Hum Cell Leachate Vo	mL	-	-	517	498	515	472	507	513	502	502	490	519	535
pH	no unit	6.0-9.5	-	**4.51**	**4.56**	**4.67**	**4.58**	**4.55**	**4.82**	**4.59**	**4.74**	**4.55**	**4.77**	**4.42**
Acidity	mg/L as $CaCO_3$	-	-	7	7	6	5	8	5	6	6	7	7	9
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	47	44	43	36	44	38	41	38	41	41	49
SO_4	mg/L	-	-	12	12	13	13	13	11	12	13	12	12	12
F	mg/L	0.12	-	< 0.06	---	---	---	< 0.06	---	---	---	< 0.06	---	---
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001	---	---
Ag	mg/L	0.00025	-	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005	---	---
Al	mg/L	0.005@pH<6.5	-	**0.132**	---	---	---	**0.251**	---	---	---	**0.298**	---	---
As	mg/L	0.005	0.10	< 0.0002	---	---	---	< 0.0002	---	---	---	< 0.0002	---	---
Ba	mg/L	-	-	0.00222	---	---	---	0.00301	---	---	---	0.00302	---	---
Be	mg/L	-	-	0.000055	---	---	---	0.000081	---	---	---	0.000084	---	---
B	mg/L	1.5	-	0.003	---	---	---	0.005	---	---	---	< 0.002	---	---
Bi	mg/L	-	-	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.000007	---	---
Ca	mg/L	-	-	2.93	---	---	---	3.34	---	---	---	3.01	---	---
Cd	mg/L	0.00009	-	**0.000242**	---	---	---	**0.000407**	---	---	---	**0.000433**	---	---
Co	mg/L	-	-	0.00203	---	---	---	0.00235	---	---	---	0.00205	---	---
Cr	mg/L	-	-	< 0.00008	---	---	---	< 0.00008	---	---	---	0.00032	---	---
Cu	mg/L	0.002	0.10	**0.0253**	---	---	---	**0.0500**	---	---	---	**0.0655**	---	---
Fe	mg/L	0.3	-	0.295	---	---	---	**0.431**	---	---	---	**0.437**	---	---
K	mg/L	-	-	0.158	---	---	---	0.145	---	---	---	0.182	---	---
Li	mg/L	-	-	0.0002	---	---	---	0.0003	---	---	---	0.0003	---	---
Mg	mg/L	-	-	0.308	---	---	---	0.270	---	---	---	0.209	---	---
Mn	mg/L	-	-	0.0880	---	---	---	0.0965	---	---	---	0.0875	---	---
Mo	mg/L	0.073	-	0.00028	---	---	---	0.00016	---	---	---	0.00601	---	---
Na	mg/L	-	-	0.64	---	---	---	0.65	---	---	---	0.83	---	---
Ni	mg/L	0.03	0.25	0.0010	---	---	---	0.0011	---	---	---	0.0007	---	---
P	mg/L	-	-	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003	---	---
Pb	mg/L	0.001	0.08	0.00013	---	---	---	0.00050	---	---	---	0.00040	---	---
Sb	mg/L	-	-	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009	---	---
Se	mg/L	0.001	-	0.00009	---	---	---	0.00017	---	---	---	0.00016	---	---
Si	mg/L	-	-	4.66	---	---	---	5.06	---	---	---	4.12	---	---
Sn	mg/L	-	-	< 0.00006	---	---	---	0.00007	---	---	---	< 0.00006	---	---
Sr	mg/L	-	-	0.00718	---	---	---	0.00704	---	---	---	0.00917	---	---
Th	mg/L	-	-	< 0.0001	---	---	---	< 0.0001	---	---	---	< 0.0001	---	---
Ti	mg/L	-	-	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005	---	---
Tl	mg/L	0.0008	-	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005	---	---
U	mg/L	0.015	-	0.000130	---	---	---	0.000150	---	---	---	0.000169	---	---
V	mg/L	-	-	< 0.00001	---	---	---	< 0.00001	---	---	---	0.00010	---	---
W	mg/L	-	-	< 0.00002	---	---	---	0.00002	---	---	---	< 0.00002	---	---
Y	mg/L	-	-	0.00122	---	---	---	0.00238	---	---	---	0.00288	---	---
Zn	mg/L	0.007	0.40	**0.055**	---	---	---	**0.079**	---	---	---	**0.082**	---	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	31	32	33	34	35	36	37	38	39	40
Date			Effective	17-Mar-21	24-Mar-21	31-Mar-21	07-Apr-21	14-Apr-21	21-Apr-21	28-Apr-21	05-May-21	12-May-21	19-May-21
LIMS			01-Jun-2021	10150-MAR21	10256-MAR21	10314-MAR21	10031-APR21	10114-APR21	10171-APR21	10199-APR21	10023-MAY21	10057-MAY21	10155-MAY21
Hum Cell Leachate Vo	mL	-	-	533	512	488	534	520	504	499	538	509	526
pH	no unit	6.0-9.5	-	**4.68**	**4.60**	**4.58**	**4.48**	**4.52**	**4.56**	**4.64**	**4.35**	**4.51**	**4.53**
Acidity	mg/L as $CaCO_3$	-	-	8	9	7	6	9	8	7	8	8	7
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	37	40	42	42	39	36	35	38	40	40
SO_4	mg/L	-	-	11	12	12	11	11	11	14	14	17	13
F	mg/L	0.12	-	---	< 0.06	---	---	---	< 0.06	---	---	---	< 0.06
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	0.00001
Ag	mg/L	0.00025	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Al	mg/L	0.005@pH<6.5	-	---	**0.431**	---	---	---	**0.370**	---	---	---	**0.393**
As	mg/L	0.005	0.10	---	< 0.0002	---	---	---	0.0002	---	---	---	< 0.0002
Ba	mg/L	-	-	---	0.0041	---	---	---	0.00329	---	---	---	0.00325
Be	mg/L	-	-	---	0.00011	---	---	---	0.000076	---	---	---	0.000078
B	mg/L	1.5	-	---	0.003	---	---	---	< 0.002	---	---	---	< 0.002
Bi	mg/L	-	-	---	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.00001
Ca	mg/L	-	-	---	3.33	---	---	---	2.45	---	---	---	2.00
Cd	mg/L	0.00009	-	---	**0.00060**	---	---	---	**0.000434**	---	---	---	**0.00037**
Co	mg/L	-	-	---	0.0023	---	---	---	0.001809	---	---	---	0.00171
Cr	mg/L	-	-	---	< 0.00008	---	---	---	< 0.00008	---	---	---	< 0.00008
Cu	mg/L	0.002	0.10	---	**0.101**	---	---	---	**0.0930**	---	---	---	**0.102**
Fe	mg/L	0.3	-	---	**0.554**	---	---	---	**0.427**	---	---	---	**0.351**
K	mg/L	-	-	---	0.129	---	---	---	0.131	---	---	---	0.083
Li	mg/L	-	-	---	0.0003	---	---	---	0.0005	---	---	---	0.0002
Mg	mg/L	-	-	---	0.222	---	---	---	0.146	---	---	---	0.123
Mn	mg/L	-	-	---	0.0979	---	---	---	0.0694	---	---	---	0.0626
Mo	mg/L	0.073	-	---	< 0.00004	---	---	---	< 0.00004	---	---	---	0.00013
Na	mg/L	-	-	---	0.59	---	---	---	0.75	---	---	---	0.34
Ni	mg/L	0.03	0.25	---	0.0009	---	---	---	0.0010	---	---	---	0.0004
P	mg/L	-	-	---	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003
Pb	mg/L	0.001	0.08	---	0.00058	---	---	---	0.00045	---	---	---	0.00054
Sb	mg/L	-	-	---	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009
Se	mg/L	0.001	-	---	0.00013	---	---	---	0.00008	---	---	---	0.00011
Si	mg/L	-	-	---	5.97	---	---	---	4.40	---	---	---	3.64
Sn	mg/L	-	-	---	0.00007	---	---	---	< 0.00006	---	---	---	< 0.00006
Sr	mg/L	-	-	---	0.0070	---	---	---	0.00561	---	---	---	0.00454
Th	mg/L	-	-	---	< 0.0001	---	---	---	< 0.0001	---	---	---	< 0.0001
Ti	mg/L	-	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Tl	mg/L	0.0008	-	---	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005
U	mg/L	0.015	-	---	0.00023	---	---	---	0.000162	---	---	---	0.000166
V	mg/L	-	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001
W	mg/L	-	-	---	< 0.00002	---	---	---	0.00002	---	---	---	< 0.00002
Y	mg/L	-	-	---	0.0041	---	---	---	0.00342	---	---	---	0.00373
Zn	mg/L	0.007	0.40	---	**0.096**	---	---	---	**0.066**	---	---	---	**0.061**

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	41
Date			Effective	26-May-21
LIMS			01-Jun-2021	10230-MAY21
Hum Cell Leachate Vo	mL	-	-	501
pH	no unit	6.0-9.5	-	**4.58**
Acidity	mg/L as $CaCO_3$	-	-	10
Alkalinity	mg/L as $CaCO_3$	-	-	< 2
Conductivity	µS/cm	-	-	38
SO_4	mg/L	-	-	15
F	mg/L	0.12	-	---
NH_3+NH_4	as N mg/L			---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---
Hg	mg/L	0.000026	-	---
Ag	mg/L	0.00025	-	---
Al	mg/L	0.005@pH<6.5	-	---
As	mg/L	0.005	0.10	---
Ba	mg/L	-	-	---
Be	mg/L	-	-	---
B	mg/L	1.5	-	---
Bi	mg/L	-	-	---
Ca	mg/L	-	-	---
Cd	mg/L	0.00009	-	---
Co	mg/L	-	-	---
Cr	mg/L	-	-	---
Cu	mg/L	0.002	0.10	---
Fe	mg/L	0.3	-	---
K	mg/L	-	-	---
Li	mg/L	-	-	---
Mg	mg/L	-	-	---
Mn	mg/L	-	-	---
Mo	mg/L	0.073	-	---
Na	mg/L	-	-	---
Ni	mg/L	0.03	0.25	---
P	mg/L	-	-	---
Pb	mg/L	0.001	0.08	---
Sb	mg/L	-	-	---
Se	mg/L	0.001	-	---
Si	mg/L	-	-	---
Sn	mg/L	-	-	---
Sr	mg/L	-	-	---
Th	mg/L	-	-	---
Ti	mg/L	-	-	---
Tl	mg/L	0.0008	-	---
U	mg/L	0.015	-	---
V	mg/L	-	-	---
W	mg/L	-	-	---
Y	mg/L	-	-	---
Zn	mg/L	0.007	0.40	---

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Summary of ABA Test Data

Parameter	Units	Ref No.: 10139-JUL20
Sulphur (S)	%	0.536
Sulphide (S^{-})	%	0.50
NP	t $CaCO_3$/1000 t	4.5
CO_3 NP	t $CaCO_3$/1000 t	1.5

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
0	975	5.49	7	<2	5	1.6
1	969	4.64	10	<2	22	6.7
2	818	5.30	7	<2	20	6.9
3	984	5.96	3	<2	26	10
4	995	4.95	4	<2	26	9.6
5	1018	5.86	2	<2	24	9.2
6	1007	5.11	4	<2	27	9.3
7	476	4.77	5	<2	43	24
8	512	5.19	5	<2	46	20
9	550	5.36	4	<2	42	15
10	471	4.73	6	<2	53	19
11	386	5.00	6	<2	60	21
12	490	4.96	5	<2	35	12
13	498	4.82	5	<2	33	9.7
14	422	5.28	6	<2	39	13
15	386	4.75	8	<2	53	16
16	465	5.22	6	<2	34	10
17	511	4.73	6	<2	37	11
18	510	4.73	5	<2	37	11
19	512	4.64	6	<2	40	12
20	517	4.51	7	<2	47	12

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %
1.6	1.6	0.01	0.01
6.5	8.1	0.04	0.05
5.6	13.7	0.04	0.09
9.8	23.5	0.07	0.16
9.6	33.1	0.06	0.22
9.4	42.5	0.06	0.28
9.4	51.8	0.06	0.35
11.4	63.2	0.08	0.42
10.2	73.5	0.07	0.49
8.3	81.7	0.06	0.54
8.9	90.7	0.06	0.60
8.1	98.8	0.05	0.66
5.9	104.7	0.04	0.70
4.8	109.5	0.03	0.73
5.5	115.0	0.04	0.77
6.2	121.2	0.04	0.81
4.7	125.8	0.03	0.84
5.6	131.4	0.04	0.88
5.6	137.0	0.04	0.91
6.1	143.2	0.04	0.95
6.2	149.4	0.04	1.00

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
1.63	0.04	0.11
6.76	0.19	0.56
5.88	0.32	0.95
10.25	0.54	1.63
9.95	0.77	2.30
9.76	0.98	2.95
9.76	1.20	3.60
11.90	1.46	4.39
10.67	1.70	5.10
8.59	1.89	5.68
9.32	2.10	6.30
8.44	2.29	6.86
6.13	2.42	7.27
5.03	2.53	7.60
5.71	2.66	7.99
6.43	2.80	8.41
4.84	2.91	8.74
5.86	3.04	9.13
5.84	3.17	9.52
6.40	3.31	9.94
6.46	3.46	10.37

** Initial Week 0 leachate may included soluble sulphate, and may not indicate oxidation of sulphide in the sample material has occurred.*

[1] *Calculated values*

Summary - Weeks 0 to 20

Maximum Value	5.96	10	2	60	24	11.4	-	0.08	-	11.90	-	-
Minimum Value	4.51	2	<2	5	1.6	1.6	-	0.01	-	1.63	-	-
Average Value	4.92	6	2	36	12	7.1	-	0.05	-	7.41	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Changes to Head Sample after 20 Weeks [1]

Parameter	Units	Ref No.: 10139-JUL20
Sulphide ($S^{=}$) Remaining	%	0.50
NP Remaining	t $CaCO_3$/1000 t	4.3
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.3

Leachate Parameters Measured | ***Acid Generation*** [1] | ***Acid Neutralization*** [1]

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
21	498	4.56	7	<2	44	12	6.0	155.4	0.04	1.04	6.23	3.60	10.79
22	515	4.67	6	<2	43	13	6.7	162.1	0.04	1.08	6.97	3.75	11.25
23	472	4.58	5	<2	36	13	6.1	168.2	0.04	1.12	6.39	3.89	11.68
24	507	4.55	8	<2	44	13	6.6	174.8	0.04	1.17	6.87	4.05	12.14
25	513	4.82	5	<2	38	11	5.6	180.4	0.04	1.20	5.88	4.18	12.53
26	502	4.59	6	<2	41	12	6.0	186.5	0.04	1.24	6.28	4.32	12.95
27	502	4.74	6	<2	38	13	6.5	193.0	0.04	1.29	6.80	4.47	13.40
28	490	4.55	7	<2	41	12	5.9	198.9	0.04	1.33	6.13	4.60	13.81
29	519	4.77	7	<2	41	12	6.2	205.1	0.04	1.37	6.49	4.75	14.24
30	535	4.42	9	<2	49	12	6.4	211.5	0.04	1.41	6.69	4.90	14.69
31	533	4.68	8	<2	37	11	5.9	217.4	0.04	1.45	6.11	5.03	15.10
32	512	4.60	9	<2	40	12	6.1	223.5	0.04	1.49	6.40	5.17	15.52
33	488	4.58	7	<2	42	12	5.9	229.4	0.04	1.53	6.10	5.31	15.93
34	534	4.48	6	<2	42	11	5.9	235.2	0.04	1.57	6.12	5.45	16.34
35	520	4.52	9	<2	39	11	5.7	241.0	0.04	1.61	5.96	5.58	16.73
36	504	4.56	8	<2	36	11	5.5	246.5	0.04	1.64	5.78	5.71	17.12
37	499	4.64	7	<2	35	14	7.0	253.5	0.05	1.69	7.28	5.87	17.60
38	538	4.35	8	<2	38	14	7.5	261.0	0.05	1.74	7.85	6.04	18.13
39	509	4.51	8	<2	40	17	8.7	269.7	0.06	1.80	9.01	6.24	18.73
40	526	4.53	7	<2	40	13	6.8	276.5	0.05	1.84	7.12	6.40	19.20

[1] *Calculated values*

Summary - Weeks 0 to 40

Maximum Value	5.96	10	2	60	24	11.4	-	0.06	-	12	-	-
Minimum Value	4.35	2	<2	5	1.6	1.6	-	0.01	-	1.6	-	-
Average Value	4.71	6	2	38	12	6.7	-	0.04	-	7.03	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Changes to Head Sample after 40 Weeks [1]

Parameter	Units	Ref No.: 10139-JUL20
Sulphide ($S^{=}$) Remaining	%	0.49
NP Remaining	t $CaCO_3$/1000 t	4.2
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.2

Leachate Parameters Measured

Weekly Leach	Volume Collected	pH	Acidity	Alkalinity	Conductivity	SO_4
No.	mL	units	$CaCO_3$ eq. mg/L	$CaCO_3$ eq. mg/L	µS/cm	mg/L
41	501	4.58	10	<2	38	15

Acid Generation [1]

SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^{=}$ Depletion	Cumulative $S^{=}$ Depletion
g/t/wk	g/t	%	%
7.5	284.0	0.05	1.89

Acid Neutralization [1]

NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
$CaCO_3$, g/t/wk	%	%
7.83	6.57	19.72

[1] *Calculated values*

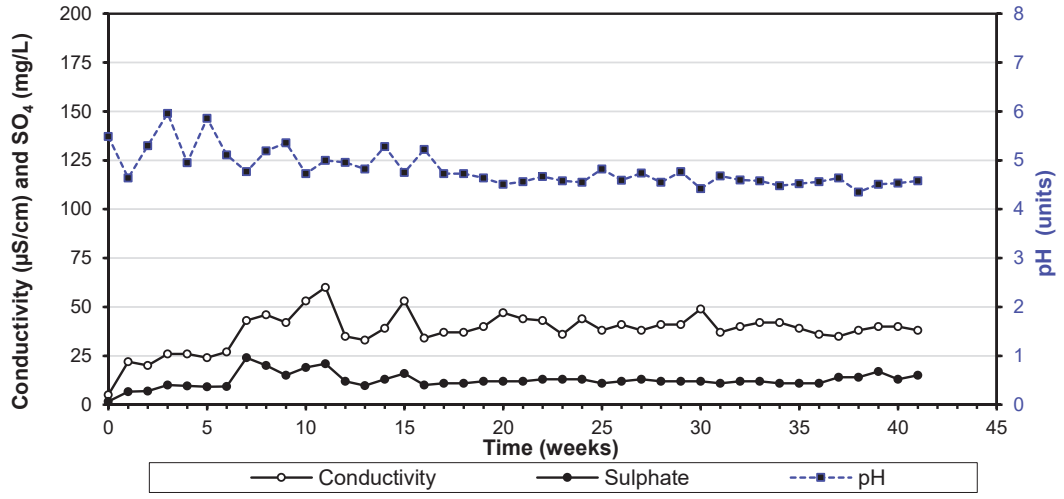
Summary - Weeks 0 to 60

Maximum Value	5.96	10	2	60	24	11.4	-	0.06	-	11.90	-	-
Minimum Value	4.35	2	<2	5	1.6	1.6	-	0.01	-	1.63	-	-
Average Value	4.57	6	2	38	12	6.8	-	0.05	-	7.04	-	-

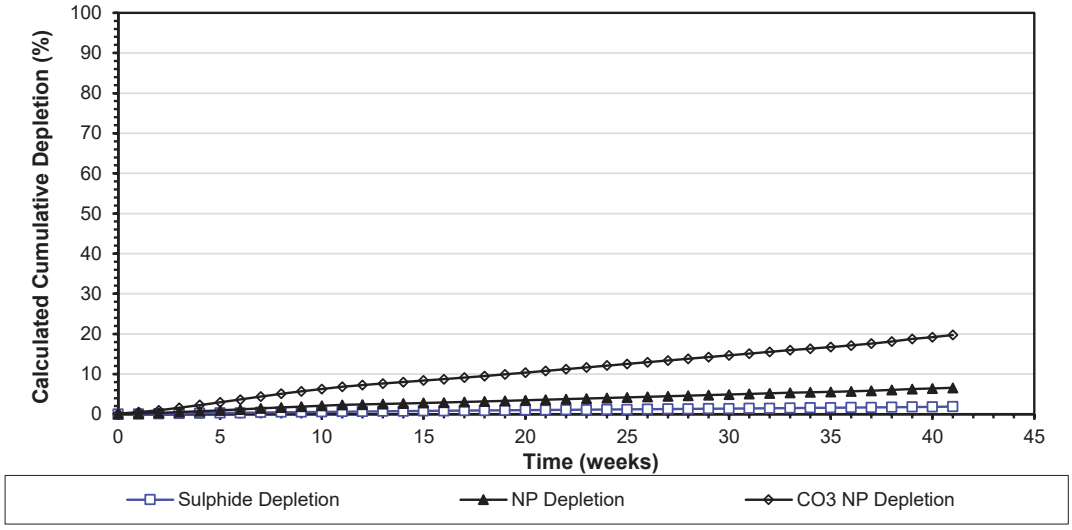
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Conductivity, Sulphate, and pH in Weekly Humidity Cell Leachate - M-LGO CNP DPL



Cumulative Sulphide and NP Depletion M-LGO CNP DPL

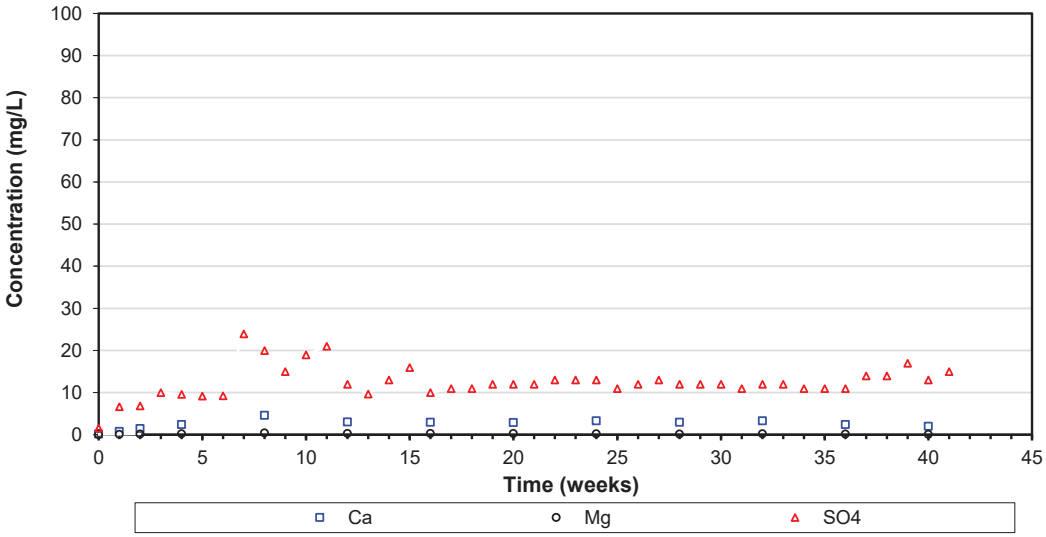


Note: NP depletion calculated based on sulphate assay.

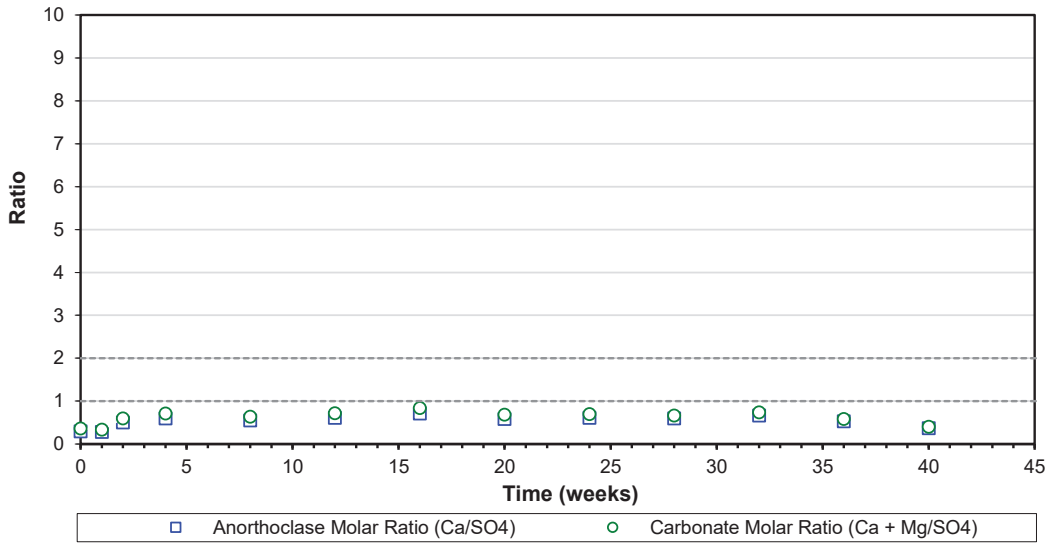
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL



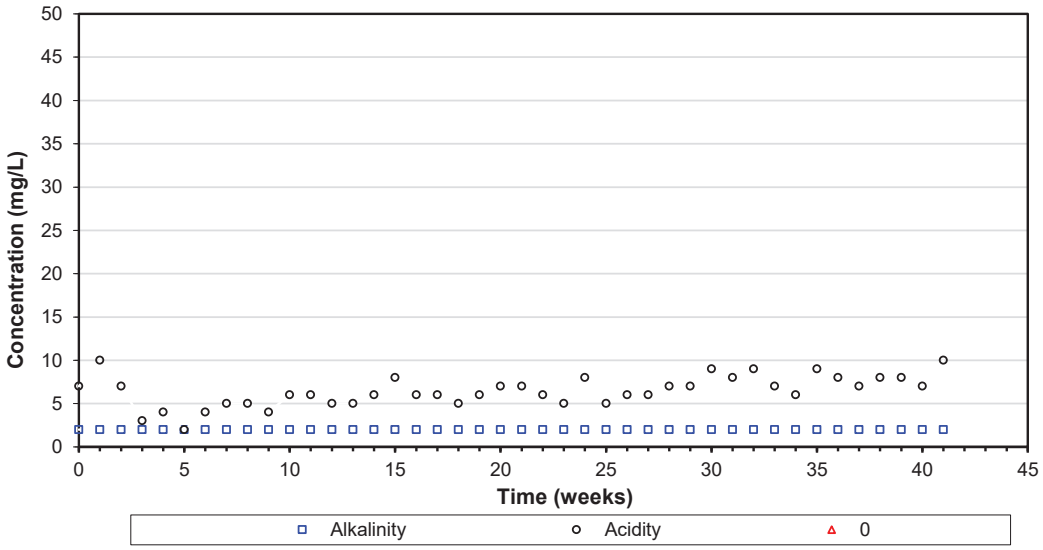
Carbonate (Ca + Mg/SO$_4$) and Anorthoclase (Ca/SO$_4$) Molar Ratios M-LGO CNP DPL



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

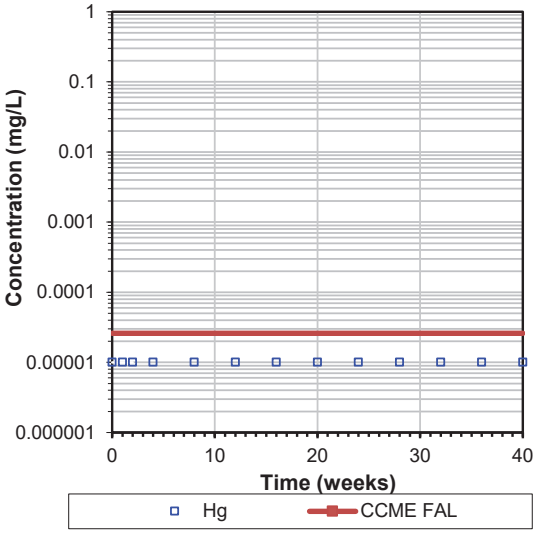
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

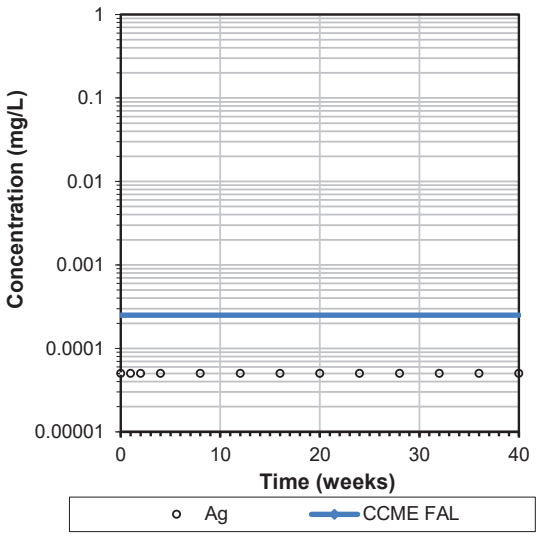


TEST REPORT

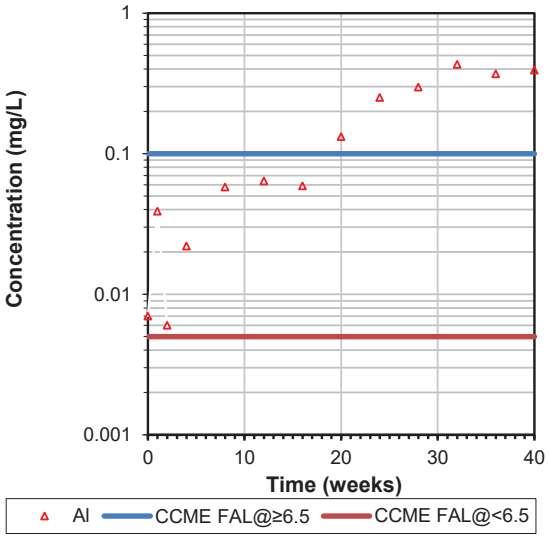
Humidity Cell Test (ASTM D 5744-96)

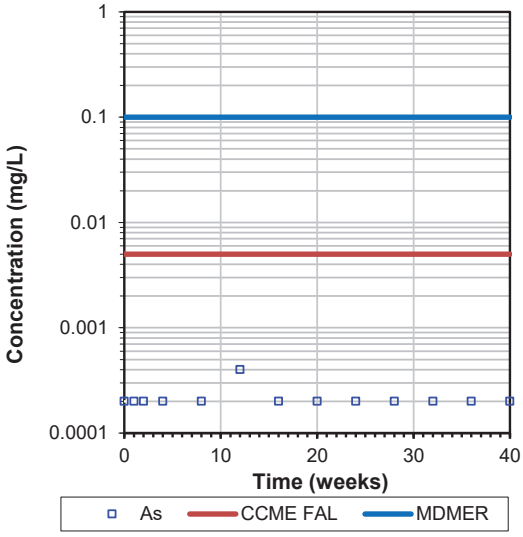
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

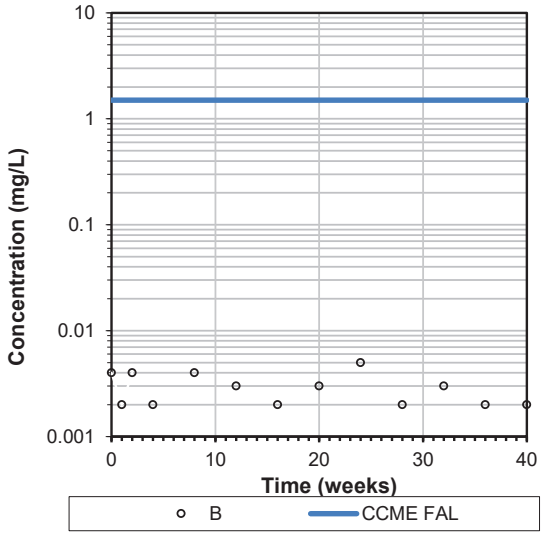


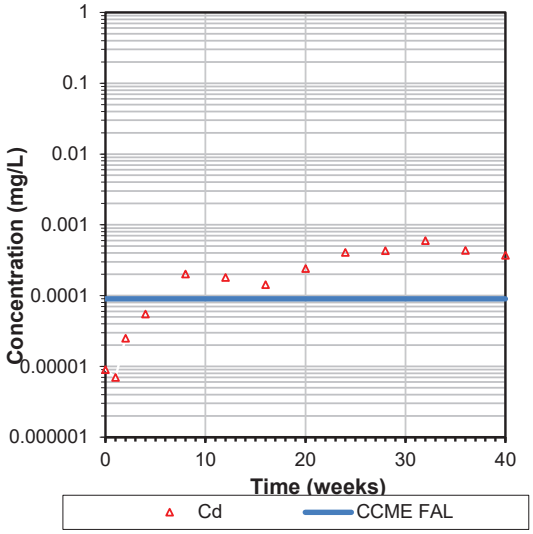


TEST REPORT

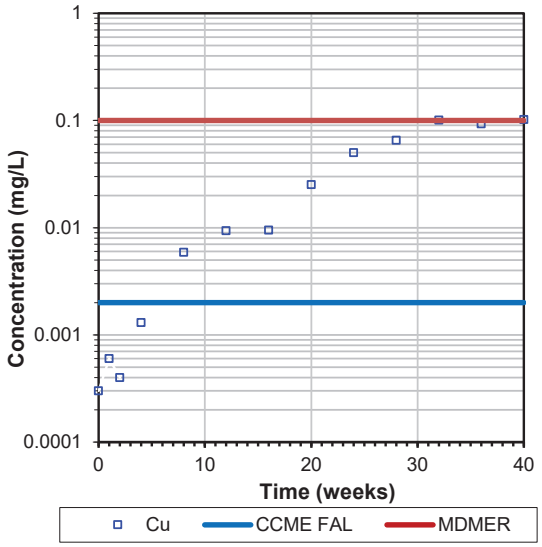
Humidity Cell Test (ASTM D 5744-96)

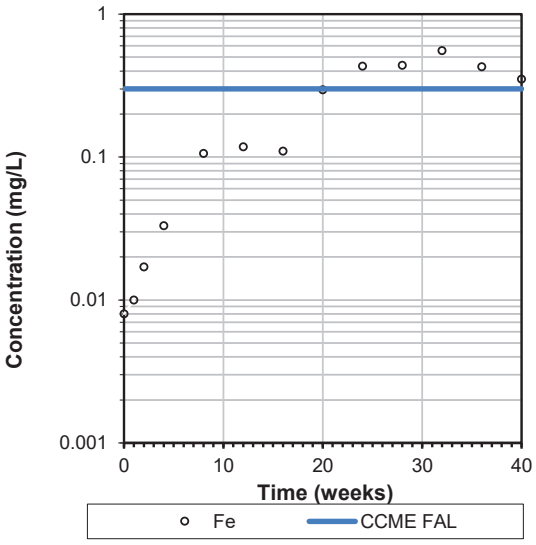
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

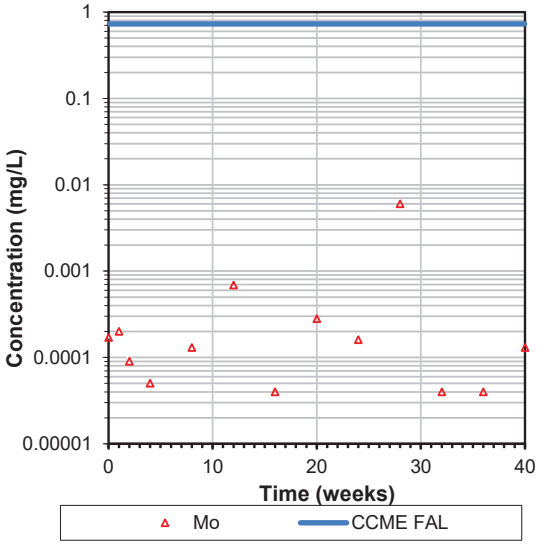


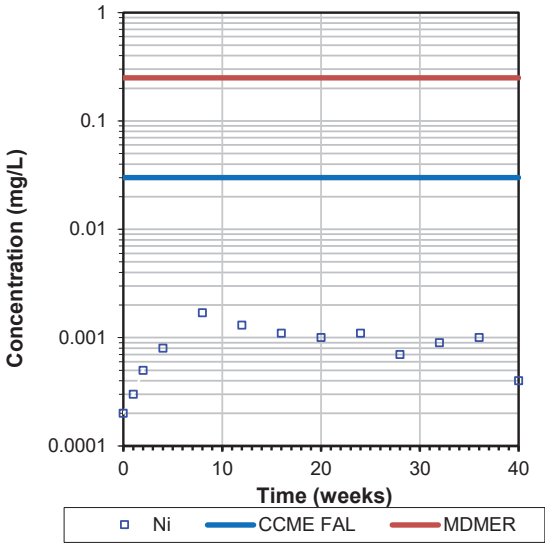


TEST REPORT

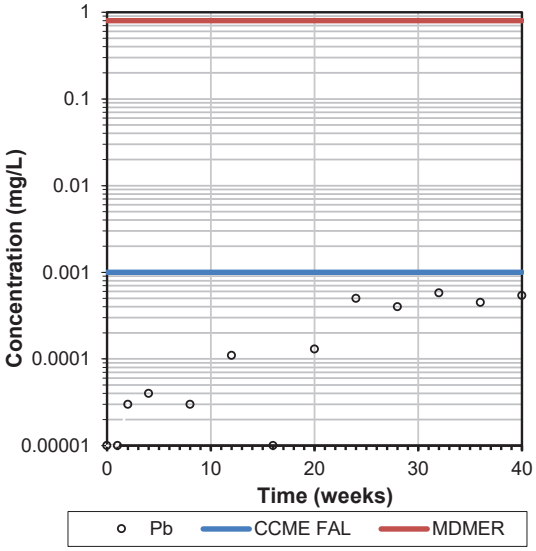
Humidity Cell Test (ASTM D 5744-96)

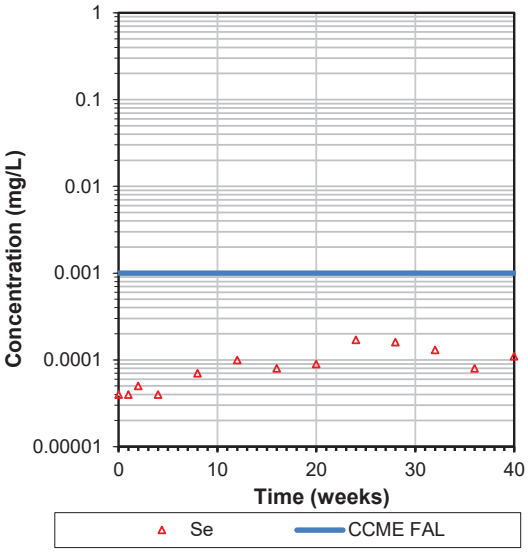
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

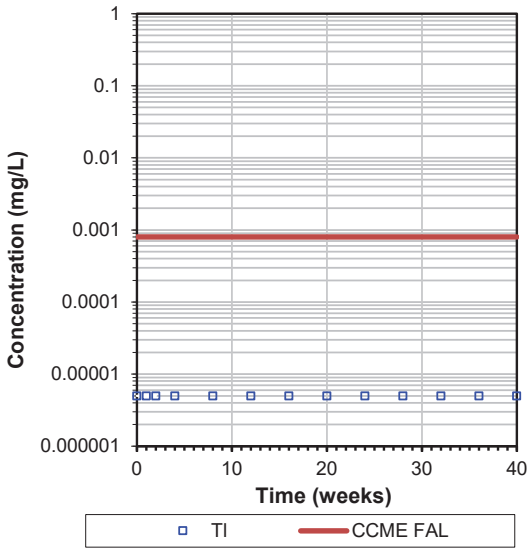


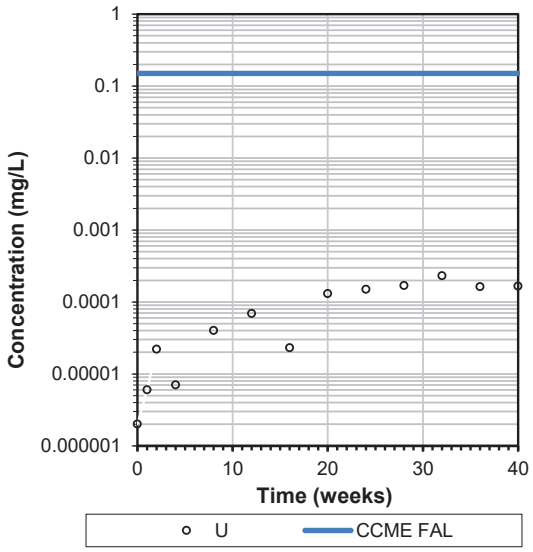


TEST REPORT

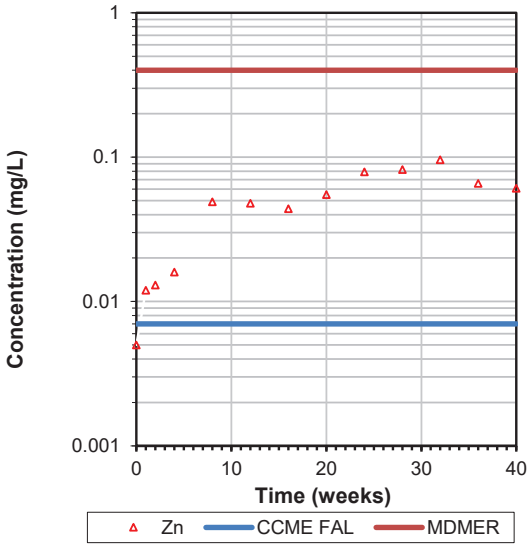
Humidity Cell Test (ASTM D 5744-96)

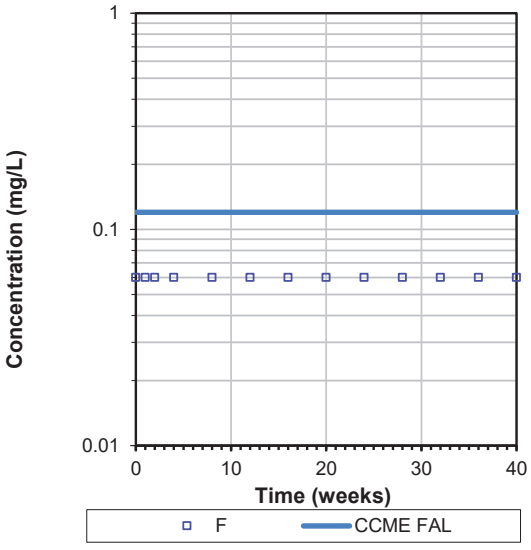
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





RESPONSE TO DIET-12

ID:	DIET-12
Expert Department or Group:	Mines Branch
Guideline Reference:	Section 4.2.1.5
EIS Reference:	-
Context and Rationale:	-
Information Request:	A source of construction aggregate (overburden, rock quarry or mine waste) will be required for the development of the site. The TMF will be constructed from mine waste rock. The EIS does not include a discussion on the criteria for determining what material is suitable or is planned for construction purposes. The EIS must evaluate the ARD/ML potential for all materials used for site construction.
Response:	It is currently planned that nearly all earthworks construction will use waste rock developed from the open pits. All bulk earthworks, including roads, building and stockpile pads, embankments for ditching and water management ponds and dams for the tailings management facility (TMF) will be constructed using waste rock. The waste rock has been characterized as described in Section 5.2 of Valentine Gold Project: Acid Rock Drainage/Metal Leaching (ARD/ML) Assessment Report (Baseline Study Appendix 5, Attachment 5B in the EIS). This report provides the basis for distinguishing between potentially acid generating (PAG) and non-potentially acid generating (non-PAG) rock using an Neutralization Potential to Acid Potential ratio of 2 as the classification criterion. Additional ARD/ML testing of waste rock will be completed prior to and during construction, to ensure that only non-PAG rock is used for construction, as discussed in response DIET-11. It is expected that a relatively small amount of quarried rock will be required to commence construction, prior to waste rock being available from the open pits, to develop temporary access roads and construction laydown areas. As part of the advancing engineering for the Project, Marathon will be investigating several potential quarry sites that exist within the footprints of future mine infrastructure (e.g., the Leprechaun waste rock pile area) in order to reduce environmental impacts overall. Any potential quarry sources will be sampled, and geochemical testing completed as part of this investigation and prior to use in earthworks. The Mine Plan also includes use of small amounts of overburden (glacial till) materials for embankment construction of water management infrastructure.

ID:	DIET-12
	The only construction material not sourced to date is sand for concrete. The current plan is to obtain sand from local suppliers who have existing, permitted sand quarries. If necessary, non-PAG waste rock will be crushed and screened to provide the sand required. These materials will also be tested to ensure only non-PAG materials are used.
Appendix:	None

RESPONSE TO ECC-07

ID:	ECC-07
Expert Department or Group:	Department of Environment and Climate Change- Water Resources Management Division
Guideline Reference:	Section 4.2.1.1- Dam Safety
EIS Reference:	-
Context and Rationale:	Section 2.3.4.1, pg. 2.58 “Composite samples of tailings from both deposits are classified as non-PAG and are not expected to generate ARD.” Appendix 2-B, Section 3.6.3, pg. 6 “overall the LGO stockpile at Marathon is non-PAG and not expected to generate ARD” “To date, ARD/ML test work has shown potential for some high-grade ore (HGO) to be potentially acid generating; however, based on the geology, further metallurgical testing and ARD/ML testing on source rock, and lab-scale process tailings, it is expected that the combined tailings will not generate ARD.” Section 2.6.1, pg. 2.111 “ARD/ML test results are presented in detail in Baseline Study Appendix 5. Overall, the soils and rock materials at the site have a low risk of being acid generating, with some ore materials having an increased risk and are currently classified as PAG. However, with appropriate mitigation (mixing and blending of PAG and non-PAG materials), none of the permanent site waste features (waste rock piles and TMF) are expected to generate acidic drainage. As such, the site design and development, as well as the plans for rehabilitation and closure, do not include measures to address ARD/ML issues. In the unlikely event that further testing determines that ARD/ML may present a risk post-closure, the Project design, as well as the rehabilitation and closure plans will be adapted. ”Section 2.6.3.3, pg. 2.114 “After closure, covered tailings beaches are not expected to produce acidic runoff and/or have high or moderate leaching except for P.” Section, pg. 7.100 “Accelerated pit filling will mitigate potential residual effects in that it will act to improve the water quality of the pit lake, reduce long term liability related to an extended period of natural pit filling, and expedites the submergence of PAG materials possibly exposed on the pit walls.”
Information Request:	The closure plan for the TMF is dependent on the ARD/ML test results which do not seem definitive. Based on various statements in the reports, it is not clear if tailings are conclusively acid generating or not. If there is some doubt on this, TMF closure with planned options for both PAG and non-PAG material should be looked at, or there needs to be a definitive answer on if the tailing are PAG or non-PAG. If tailings are PAG, the current TMF design is inadequate and any TMF will have to remain long-term and cannot be decommissioned.

ID:	ECC-07
Response:	It is important to note that blending of the ores from Leprechaun and Marathon pits is not optional for the operation, and the mine plan and processing plant design rely on the grade and characteristics generated from mining both pits simultaneously and blending of ore as it is delivered to the mill. Further blending will take place within the milling and gold extraction process, and further still as the tailings are thickened, delivered, and deposited within the tailings management facility (TMF). Therefore, the use of composite samples for the assessment for acid rock drainage (ARD) potential of tailings is considered the best approach. As indicated in Section 6 of Baseline Study Appendix 5, Attachment 5-B (The Valentine Gold Project: Acid Rock Drainage/Metal Leaching [ARD/ML] Assessment Report), composite samples of tailings classify as non-potentially acid generating (non-PAG) and are not expected to generate ARD. These results are conclusive given that the ratio of Neutralization Potential to Acid Potential (NP/AP), also referred to as Net Potential ratio (NPR) is above 2 in all samples of composite tailings analyzed, including the most recent tests as presented in Table ECC-07.1. Materials with NPR>2 are non-PAG based on classification presented in Mine Environment Neutral Drainage Program (MEND 2009). ARD/ML monitoring of tailings during operation will be conducted to verify this conclusion. In the unlikely presence of potentially acid generating (PAG) on the tailings surface, mitigation such as lime addition and/or cover with a layer of tailings generated from non-PAG mixture of low-grade ores would be implemented. These types of covers have been constructed in other tailing systems to reduce oxidation of underlying PAG tailings and have been monitored for over 20 years showing continued effectiveness of the mitigation (Dobchuk 2013). In addition to these potential mitigations implemented during operations, tailings will be covered with soil at closure, which will work as a diffusive barrier to oxygen increases to further reduce the risk of ARD/ML. As noted in the response to ECC-18, it is important to consider that facilities storing PAG do not always require permanent flooding. Should tailings be PAG, the design could accommodate a permanent engineered cover system (i.e., soil cover, geomembrane or geosynthetic clay liner) to isolate the tailings from oxidation and reduce infiltration. It is noted that removal of a permanent pond of water from the facility is inherently safer from a dam safety perspective and lowers overall long-term risk, requiring less monitoring and maintenance/management in closure.

ID:	ECC-07
	Reference: Dobchuk B., Nichol C., Wilson G.W., Aubertin M. 2013. Evaluation of a single-layer desulphurized tailings cover. Canadian Geotechnical Journal. Vol. 50, # 7, pp. 777 – 792. Mine Environment Neutral Drainage Program (MEND). 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, MEND Report 1.20.1, p. 1-579.
Appendix:	None

ECC-07.1 Modified Acid Base Accounting of Tailings Samples (CO_3 by HCl Evolution)

Parameter	Unit	CND 1 Residue A	CND 1 Residue B (reassay)	CND 2 Residue	BL639-83D Detox Tls	BL639-83D-2 Detox Tls (reassay)
Sample Description		**Marathon Tail**	**Marathon Tail**	**Leprechaun Tail**	**Gravity leach tailings**	
Paste pH	standard unit	8.25	8.31	8.78	8.56	8.59
Fizz Rate	no unit	2	2	3	3	3
NP	t $CaCO_3$/1000 t	33.1	32.8	68.5	40.3	34.7
AP	t $CaCO_3$/1000 t	15.6	15.3	8.75	7.81	8.75
Net NP	t $CaCO_3$/1000 t	17.5	17.5	59.8	32.5	26.0
NP/AP (NPR)	ratio	2.12	2.14	7.83	5.16	3.97
S	% as S	0.509	0.536	0.314	0.391	0.401
Acid Leachable SO_4-S	% as S	< 0.02	0.05	0.03	0.14	0.12
Sulphide	% as S	0.50	0.49	0.28	0.25	0.28
C	% as C	0.388	0.411	0.919	0.559	0.530
CO_3	% as CO_3	1.91	2.02	4.49	2.77	2.62
CO_3 NP (calc'd)	t $CaCO_3$/1000 t	31.7	33.5	74.5	46.0	43.5
CO_3 Net NP (calc'd)	t $CaCO_3$/1000 t	16.1	18.2	65.8	38.2	34.7
CO_3 NP/AP (NPR)	ratio	2.03	2.19	8.5	5.89	4.97
NP Attributed to CO_3	%	96	102	109	114	125

Notes:
CO_3 NP calculated based on measured carbonate content (not total carbon).
NPR ratios used for classification are highlighted.

RESPONSE TO ECCC-24

ID:	ECCC-24
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 5: Acid Rock Drainage / Metal Leaching (ARD/ML)
Context and Rationale:	The report states that “Tailings from Leprechaun deposits, are expected to be non-PAG and have excess of NP. This excess of NP can be used to offset ARD potential of tailings from Marathon if ores from Marathon and Leprechaun deposit are processed at the same time and mixed. Therefore, the mixed tailings are not expected to show ARD potential, unless Marathon ore is processed separately from Leprechaun ore and resulting solids are left exposed after the closure. Approximately 14% of the waste rock from the Marathon pit is conservatively estimated to be PAG. Blending PAG and non-PAG rock with excess of neutralization potential and/or encapsulation of PAG waste by non-PAG rock is recommended to neutralize acidity potentially generated in PAG pockets.”
Information Request:	With regard to plans to manage ARD for this project, confirm that mitigative measures (e.g., blending to maintain Neutralization Potential Ratios) to avoid ARD generation will be employed when waste rock is used in onsite infrastructure (e.g., road beds).
Response:	As currently planned, nearly all earthworks construction will utilize waste rock developed from the open pits. All bulk earthworks, including roads, building and stockpile pads, embankments for ditching and water management ponds, and dams for the tailings management facility (TMF) will be constructed using waste rock. Also, non-potentially acid generating (non-PAG) waste rock would be crushed and screened for use in more detailed earthworks. Additional geochemical testing will be completed during excavation of waste rock materials from the open pits for use in construction, to ensure that only non-PAG rock is used. All potentially acid generating (PAG) rock will be placed and managed within the waste rock piles in accordance with the Acid Rock Drainage/Metal Leaching Management Plan (see Appendix B for more information). A relatively small amount of quarried rock will be required to commence construction, prior to waste rock being available from the open pits, to develop temporary access roads and construction laydown areas. As part of the advancing engineering for the Project, Marathon will be investigating several potential quarry sites that exist within the footprints of future mine infrastructure (e.g., the Leprechaun waste rock pile area) to reduce overall

ID:	ECCC-24
	environmental impacts. Any potential quarry sources will be sampled, and geochemical testing completed, as part of this investigation and prior to use of borrow material in earthworks. The only construction material not sourced to date is sand for concrete. The current plan is to source sand from local suppliers who have existing sand quarries; alternatively, non-PAG waste rock will be crushed and screened to provide the sand required.
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO PC-73

ID:	PC-73
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	Leprechaun Complex According to the EIS, Overall, the waste rock pile is not expected to generate ARD due to the small amount of PAG material and significant excess of NP. Therefore, it is not anticipated that specific ARD management of waste rock will be required. However, also according to the EIS, Waste rock lithologies show moderate ML potential for aluminum, phosphorous, copper, selenium, and zinc.
Information Request:	This suggests specific ML management of waste rock will be required, or at least should be considered from a contingency and adaptive management standpoint. The EIS should explain why only “high leaching potential” is being addressed and why concentrations that exceed Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL) between the CWQG-FAL and ten times the CWQG-FAL value, were arbitrarily assigned to moderate leaching potential. Further, the EIS should explain why moderate leaching potential is being treated in the EIS as having no impacts or consequences.
Response:	Metal leaching (ML) potentials were qualitatively determined to screen for contaminants of potential concern (COPC). ML potentials, whether classified as high or moderate, were not intended to determine if there would be a requirement for management of ML from mine materials. The initial assessment of ML should be put in the context of the overall water and chemical mass balance of the mining system and receiving environment before addressing ML management. Therefore, the requirement for management of ML was based on the quantitative water quality assessment at discharge points (Appendix 7A and 7B of the EIS) and in the receiving environment (Appendix 7C the EIS). This assessment shows that specific ML management of waste rock is not required as summarized Chapter 7 (Surface Water Resources) of the EIS. Monitoring and potential mitigation of ML from waste rock will be considered as part of an adaptive management process that will be included in the Acid Rock Drainage/Metal Leaching (ARD/ML) Management Plan. The plan will be developed and submitted to regulators as part of the permitting stage of the Project (refer to the response to DIET-07 and Appendix B for further details on the proposed plan).
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO PC-74

ID:	PC-74
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	Marathon Complex According to the EIS, approximately 14% of the 60 Mm^3 of waste rock is conservatively estimated to be PAG. Blending PAG and non-PAG rock with excess of neutralization potential and/or encapsulation of PAG waste by non-PAG rock will be conducted to neutralize acidity potentially generated in PAG pockets and as a result, the final drainage from waste rock is not expected to be acidic. The waste rock pile will be covered by growth medium / overburden during rehabilitation, further reducing the risk of ARD/ML. There are no exceedances of MDMER limits observed in leachates from the waste rock humidity cells. Overall, waste rock lithologies show moderate ML potential for aluminum, mercury, selenium, and zinc.
Information Request:	Blending and encapsulation of PAG can be effective; however, actual implementation has been shown to require planning and diligence. The EIS should be supported by a conceptual waste rock management plan (WRMP). The conceptual WRMP should be developed based on the geochemical characterization program that has been completed to-date. This conceptual WRMP should be closely integrated with other management plans that have, or will be, developed as part of the Project. The EIS should note that geochemical characterization will continue during the life of mine (LOM) and the results will be used to inform adaptive management and update the WRMP.
Response:	An Acid Rock Drainage / Meal Leaching (ARD/ML) Management Plan will be developed for the Project as described in the response to DIET-07 and Appendix B. This plan will describe the strategy for managing waste rock, including initial plans to address the need for blending and encapsulation. The ARD/ML Management Plan will be based on the existing ARD/ML data, results from ongoing test work, and the ARD/ML Block Model that will be developed for the Marathon pit. The ARD/ML Management Plan will be integrated with the mining and processing plans, and appropriate environmental management plans. ARD/ML testing will continue through construction and operations and results obtained will be used to update the ARD/ML database and block model, and to inform adaptive management and update the ARD/ML Management Plan.
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO PC-75

ID:	PC-75
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	Processing Plant and Tailings Management Facility Complex According to the EIS, • Approximately 13% and 67% of ore samples from Leprechaun and Marathon pits, respectively, are conservatively classified as PAG. • Approximately 41 Mt of tailings will be produced from both high-grade ore and low-grade ore with about 38% of the material originating from the Leprechaun pit and the remainder from the Marathon pit. • Composite samples of tailings from both deposits are classified as non-PAG and are not expected to generate ARD.
Information Request:	The information provided in the EIS with respect to acid drainage accounting is confusing and requires additional analysis by the reviewer, as well as additional information, to be comprehensible or meaningful. Based on the information in the EIS, an estimated 46% of the tailings would be PAG, and 54% would be non-PAG. It is unclear in the EIS if the basis of "composite samples" is from a similar mass balance, or from actual composite samples of tailings. Regardless, the relatively small difference between the quantity of PAG and non-PAG in this instance does not demonstrate or suggest that the tailings overall will not be acid drainage generating. The EIS should provide additional information for the tailings that demonstrates if neutralization potential (NP) is in excess of acid potential (AP). Additionally, the EIS should discuss and address the potential for lenses of acid-generating material to occur in the TMF. Finally, the EIS should address as a potential mitigation measure the isolation of acid-generating flotation concentrate material in the tailings stream and location within the TMF. The EIS should also address the possibility of using the mined-out Leprechaun Pit as a submerged repository for flotation concentrate, albeit requiring re-handling of the first 9 years of concentrate stored separately for later deposition.
Response:	Additional information is provided in Tables PC-75.1 and PC-75.2 demonstrating that neutralization potential (NP) is in excess of maximum acid potential (MAP) in tailings during the first nine years, when deposited to the tailings management facility (TMF). After the first nine years of operation, the tailings will be deposited in the Leprechaun pit and submerged during closure. The potential for the formation of lenses of potentially acid generating (PAG) material will be addressed in the Acid Rock Drainage / Metal Leaching (ARD/ML) Management Plan described in Appendix B. The ARD

ID:	PC-75
	Block Model, mine plan, and process / TMF plans will be used to maximize blending and avoid the development of lenses or pockets of PAG materials in the TMF. The ARD/ML and TMF management plans will address the need to plan, monitor, and address this potential, and if required, mitigate through non-potentially acid generating (non-PAG) tailings and soil cover, lime addition, and other mitigations to manage drainage water quality in the short and long term. Tailings are predicted to be non-PAG on an annual basis, as noted above, and therefore, isolation of PAG concentrate from tailings is not warranted. Concentrate isolation would require an additional cyanide destruction unit and a separate containment cell, as well as re-handling of concentrate accumulated in the first nine years. These additional measures would result in unnecessary complications in ore processing and water management.
Appendix:	See Appendix B: ARD/ML Management Approach

Table PC-75.1 Acid Base Accounting on Ore Composites from Marathon and Leprechaun Zones and on Tailings

Element	Milling Composites									
	Marathon Comps (tailings CND-1)					Leprechaun Comps (tailings CND-2)				
	MZA	MZB	MZC	MZD	MZE	LZA	LZB	LZC	LZD	LZE
% ore sample in tailings composite	15.7	21.8	21.6	23.6	17.3	27.9	17.3	14.5	20.4	19.9
S (t), %	0.68	0.68	0.79	0.70	0.51	0.30	0.28	0.43	0.34	0.36
$S^{=}$, %	0.68	0.60	0.74	0.64	0.47	0.28	0.25	0.37	0.34	0.33
C(t), %	0.48	0.41	0.38	0.33	0.38	0.80	0.64	1.40	0.93	0.84
C(g), %	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TOC Leco, %	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CO_2, %	1.8	1.5	1.5	1.2	1.5	3.0	2.4	5.1	3.5	3.1
MAP, kg $CaCO_3$/t	21.3	21.3	24.7	21.9	15.9	9.4	8.8	13.4	10.6	11.3
NP Carb, kg $CaCO_3$/t	40.0	34.2	31.7	27.5	31.7	66.7	53.3	116.7	77.1	70.0
Carb NPR, unitless	1.9	1.6	1.3	1.3	2.0	7.1	6.1	8.7	7.3	6.2
MAP, kg $CaCO_3$/t	21.2					10.5				
NP Carb, kg $CaCO_3$/t	32.5					74.4				
Carb NPR, unitless	1.53					7.10				

Notes:
MAP (maximum Acid Potential) = S(t) wt, % ×31.25
NP Carb (Carbonate Neutralization Potential) = C(t) wt.% × 83.3
Carb NPR (Carbonate Net Potential Ratio) = NP carb /MAP

Table PC-75.2 Sensitivity Analysis for Acid Base Accounting in Tailings based on Variability in Ore Zone Composites

Year	% of Leprechaun ore in mill feed (LP%)	Average case: MAP and NP Carb inputs from CND1 and CND2			Low probability case: MAP and NP Carb inputs from sample MZC and LZB		
		MAP	NP Carb	NP carb /MAP	MAP	NP Carb	NP carb /MAP
-1	41.0	16.1	49.8	3.09	18.1	40.6	2.23
1	42.2	16.0	50.3	3.15	18.0	40.8	2.27
2	16.7	19.1	39.5	2.07	22.0	35.3	1.60
3	32.4	17.2	46.1	2.68	19.5	38.7	1.98
4	41.7	16.0	50.0	3.12	18.0	40.7	2.26
5	55.9	14.2	56.0	3.93	15.8	43.8	2.78
6	44.4	15.7	51.2	3.26	17.6	41.3	2.34
7	35.7	16.8	47.5	2.83	19.0	39.4	2.07
8	28.6	17.7	44.5	2.52	20.1	37.9	1.88
9	37.5	16.5	48.3	2.92	18.7	39.8	2.13

Notes:
Equation of annual tailings MAP calculation is presented below.
$MAP = MAP_{CND1} \times (1\text{-}LP\%/100) + MAP_{CND2} \times LP\%/100$
NP was calculated the same way using NP Carb inputs instead of MAP.

APPENDIX B
ARD/ML MANAGEMENT APPROACH

VALENTINE GOLD PROJECT: AMENDMENT TO THE ENVIRONMENTAL IMPACT STATEMENT

August 2021

IR Response Re: ARD/ML Assessment and Management:

Prior to submission of the EIS and to meet the requirements of the Federal and Provincial EIS guidelines, Marathon completed a Phase 1 and 2 Acid Rock Drainage (ARD)/Metal Leaching (ML) assessment, using methods that generally followed the Mine Environment Neutral Drainage (MEND) publication entitled “Prediction Manual for Characterizing Drainage Chemistry from Sulphidic Geologic Materials” (Price 2009). The geochemistry baseline program included:

- Static testing of approximately 350 samples of waste rock, ore, overburden and tailings for Acid-Base Accounting (ABA), Shake Flask Extraction (SFE), and total metals
- Characterization of composite samples using the static tests and a mineralogical methods
- Kinetic testing of composite samples including 14 humidity cells, two ageing tests and two subaqueous columns tests

Marathon recognizes that further ARD/ML work is required and is committed to completing further assessment and associated refinement of Project mitigation as design of the Project progresses. Note that the schedule for this additional work has been delayed by Covid-19 and resulting health and safety protocols that have limited the number of personnel allowed on site.

Specifically, Marathon is committed to completing the following additional work within the indicated timeframes:

- Continue collection of results from on-going laboratory and field tests in 2021. This work was started in 2020 and will continue until concentrations stabilize. It is expected that updated analysis will be conducted in Q4 of 2021.
- Additional static testing of samples in Q2 and Q3 of 2021:
  - to address deficiencies related to spatial distribution
  - to provide input required for ARD block models for Marathon Pit
  - to define availability and location of non-Potentially Acid Generating (non-PAG) rock, which is required for construction in Leprechaun and Marathon starter pits
- Initiate additional kinetic testing of Potentially Acid Generating (PAG) materials (waste rock, ore and low-grade ore) from major lithologies of the Marathon pit and composite sample of gabbro in Q2 of 2021. These samples will be submitted for static tests including Net Acid Generating (NAG) tests, mineralogy and particle size distribution similar to characterization of composite samples described in the EIS.
- Generate an ARD block model for Marathon pit to provide production schedules for ARD classes of rock and ore and to forecast location of PAG materials on pit walls; this will be completed in Q4 of 2021.
- Update water quality predictions based on available results of kinetic tests in Q4 of 2021.

Marathon will provide the above information and analysis to regulators for discussion and input through the proposed ARD/ML Management Plan. The ARD/ML Management Plan would contain the following sections:

- **Objective:** The objective of the ARD/ML management plan is to provide the most recent information and actions required to reduce the risks of ARD/ML during all phases of the Project.

- **Project Components and activities:** This section will summarize Project components and activities which pose a potential ARD/ML risk.
- **ARD/ML Assessment Summary:** This section will focus on current understanding of ARD/ML potentials related to each relevant component of the Project: the Marathon and Leprechaun pits, two waste rock stockpiles, two low grade ore (LGO) stockpiles, high grade ore (HGO) stockpile, tailings management facility (TMF) and rock quarries. The potential ARD/ML risks in these components will be (re)assessed for each phase of the Project based on the most recent results of geochemical testing, the ARD block model for the Marathon pit and updated predictions of water quality.
- **Mitigation:** Mitigation of ARD/ML risks will be provided for each component and for each phase of the Project in the form of procedures. The following provide example procedures for the identification and the management of PAG rock and ore, but are subject to further refinement as the ARD/ML Management Plan is developed:
  - Samples of drill cuttings from blast holes representing each mine block will be collected.
  - The samples will be tested for total carbon and sulphur using LECO furnace or similar method. Average neutralization potential (NP) will be calculated from total carbon and average Acid Potential (AP) will be calculated from total sulphur using standard conversions per the MEND guidelines. If NP/AP ratios indicate the mine block rock is below 2, the block will be classified as PAG.
  - PAG rock will be marked after the blast, excavated, and dispatched to the waste rock stockpile. PAG rock would only be deposited within a specified distance (to be defined) of the final stockpile shell and preferably next to a non-PAG truck load. Truck load PAG rock will be marked and the coordinates recorded.
  - A portion of PAG and non-PAG rock loads will be mixed during grading each lift of the stockpile.
  - This mixture will be encapsulated with non-PAG rock deposited within a specified distance (to be defined) from the lift face and forming the topmost lift(s) on the final of the stockpile. Non-PAG rock will reduce oxygen flux into interiors of the pile and provide alkalinity to infiltrating water. This approach has been successfully applied for waste rock piles in other mine sites as referenced in Sections 6.6.3.5 and 6.6.3.6 of Global ARD management guide (http://www.gardguide.com/index.php/Chapter) and would be applicable to ARD/ML management at the Valentine Gold Project.
  - To limit exposure of PAG high grade ore, this material will be preferentially directed to the mill feed, while non-PAG high grade ore will be allocated to the stockpile, as long as the grade requirement for the mill feed is met.
  - LGO stockpiles will be constructed to maximize non-PAG material in the feed in the two last years of tailings deposition in the TMF, while simultaneously meeting the grade requirement for the mill. This approach will create a non-PAG layer of tailings on the surface of the TMF prior to placement of the soil cover. This layer will consume oxygen, reducing oxygen diffusion into tailings deposited earlier. In the last three years of operation, tailings will be deposited in the Leprechaun pit and immediately flooded limiting further oxidation and ARD/ML.

    This section will also detail progressive rehabilitation planned for waste rock and ARD/ML mitigation activities planned for the closure, such as dry and wet covers.

- **Monitoring:** This section will provide procedures for monitoring of contact water (e.g., the pit lakes) and solids (e.g., tailings). This section will include details on monitoring locations, lists of monitoring parameters and sampling frequencies for each phase of the Project.

- **Adaptive Management:** The adaptive management section will discuss additional mitigations triggered by monitoring and/or by results of the updated water quality and ARD block model for Marathon pit. This section will describe how the current design of the Project can accommodate these mitigations. For example, if a certain volume of PAG waste rock cannot be accommodated within the waste rock stockpile at the Marathon pit at the end of operation, that volume could be stored within LGO stockpile footprint or west of the LGO. Another approach would be to build a seepage collection system and connect to the LGO sedimentation pond.

While the further analysis described above will allow refinement of the mitigation and adaptive management approaches to ARD/ML for the Project, Marathon is confident based on the analysis conducted to date that future work will not identify issues that cannot be addressed through the overall approach of:

- Preferential milling of PAG ore and stockpiling non-PAG ore
- Blending PAG and non-PAG materials
- Encapsulation of blended material within non-PAG rock
- Use of soil covers to limit infiltration and oxygen flux at closure
- Relocation of any excess of PAG rock remaining at closure to the mined-out pit, where it will be flooded
- Collection and treatment of contact water during operation

The ARD/ML management plan will be updated and revised as information is gathered during the permitting phase of the Project and in consultation with regulators.

APPENDIX C
ARD ONSET AND TABLES

Model Sensitivity to ARD Lag Time

NRCan requested that Marathon "provide rationale for the methods used to determine the lag time to acidic conditions, and a discussion around the sensitivity of the water quality model to the assumptions related to this assumed lag time". In a call on (March 22, 2021), NRCan expressed concerns about estimates of lag time to acidic conditions without kinetic tests being conducted on several potentially acid generating (PAG) samples. The objectives of this memorandum are to:

- provide rationale for the methods used to determine the lag time to acidic conditions and estimate on the possible ranges of ARD onset lag time for exposed PAG materials
- assess and discuss sensitivity of the water quality model to ranges of ARD onset lag time

ARD Onset Time

The determination of the lag time to acidic conditions is based on Equations (1) and (2), which are consistent with MEND (2009).

Neutralization Potential (NP) Depletion Rate = Sulphate Leaching Rate*100.09/96.06 + Alkalinity Production Rate – Acidity Production Rate (1)

ARD onset time = (Carb. NP/ NP Depletion Rate) x 1000/(365.25/7) (2)

The following steps were used to derive conservative inputs from existing humidity cell tests (HCT) tests for use in Equations (1) and (2).

a. Leaching Rates Calculation

Sulphate leaching and alkalinity production rates are required for inputs into Equation 1. These rates are straight calculations from laboratory humidity cell testing results without any scaling to field conditions. The calculation of sulphate leaching rate for a specific week is shown as an example in Equation 3:

Sulphate Leaching Rate (mg/kg/week) = Sulphate Concentration (mg/L) x Leachate volume (L)/Samples mass (1kg)/Leaching time (1 week) (3)

The maximum concentrations from the first month (week 1 to 4) of testing were used as inputs to Equation 3 resulting in the highest rates listed in Table 1 (attached). The highest sulphate production and NP depletion rates using direct HCT data result in the shortest lag time estimates for ARD, which is a conservative approach.

b. Leaching Rate Regressions with Sulfur and NP

The next step was to evaluate the correlation between maxima sulphate and maxima alkalinity leaching rates with sulphur contents and NPs, respectively.

A linear regression for maximum sulphate leaching rates versus sulphur contents results in an good R^2 considered valid for general predictive use. Note that the reported R^2 was obtained after removal of one outlier, sample M MD (Figure 1). This sample showed an order of magnitude higher sulphate production

rate likely due to over crushing of the sample resulting in higher reactive area. The regression equation (Equation 4) was used to estimate sulphate leaching rates from PAG samples with known sulphur content, which are provided in Table 2 (attached). A similar approach has been presented in Environmental Impact Statements (EISs) for other Canadian mine projects (e.g., SRK 2006, 2013).

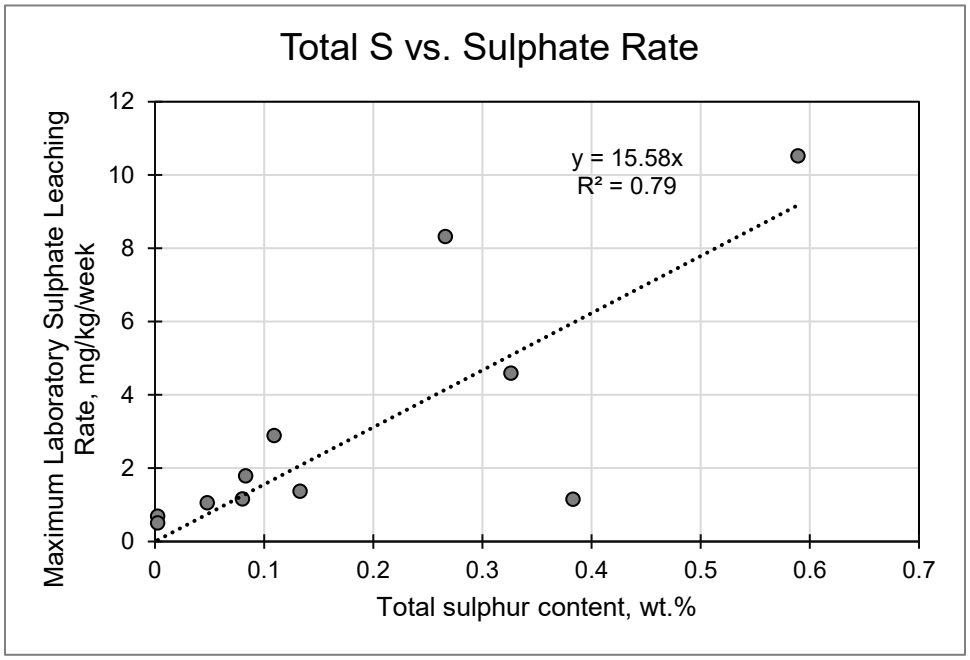


Figure 1 Regression of total sulphur vs. maximum sulphate leaching rate from laboratory humidity cells.

Sulphate Leaching Rate (mg/kg/week) = 15.6*Sulphur Content (wt%) (4)

Maximum alkalinity leaching rates do not show good correlation with NP even after removal of apparent outliers shown in red on Figure 2. Therefore, the 95th percentile of maximum alkalinity leaching rates (67.7 mg$CaCO_3$/kg/week) was conservatively selected for input into Equation 1 regardless of NP of a PAG sample.

The Acidity Production Rate was ignored in Equation 1 resulting in the shortening lag time estimates for ARD, which is a an additionally conservative assumption. Considering inputs and assumptions discussed above, the resulting calculation of NP depletion rate for each PAG sample was done using Equation 5.

NP Depletion Rate (mg$CaCO_3$/kg/week) = 15.6*Sulphur Content (wt%)*100.09/96.06 + 67.7 (5)

Examination of the sulphur inputs into this equation clearly shows than the first term of Equation 5 is an order of magnitude lower than the second term, alkalinity production rate. The second term is a constant and the NP Depletion Rate does not vary much between samples as shown in Table 2 (attached).

Therefore, the NP of a sample becomes the key factor determining ARD onset time in the sample per Equation 2.

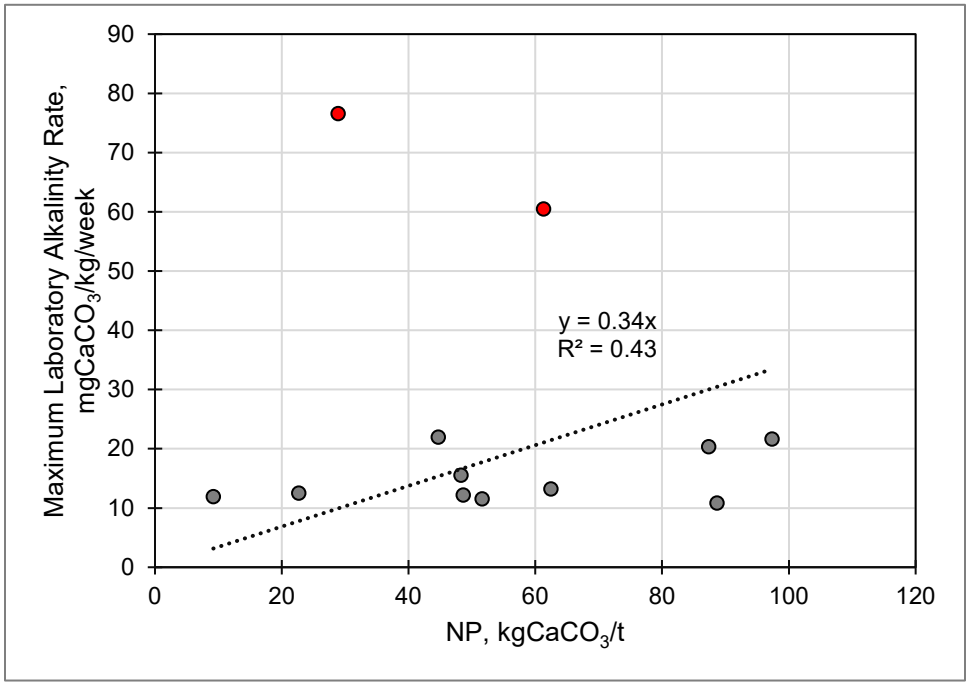


Figure 2 Regression of NP vs. maximum alkalinity rates from laboratory humidity cells.

c. Calculation of ARD Onset Time

Time to onset of ARD was calculated for all PAG samples from the Marathon deposit using Equation 2 (Table 1). Minimum, median, and maximum values are shown in Table 3 (attached) for the following three groups of samples:

- high grade ore
- low grade ore
- waste rock

The estimates of ARD onset time determined are conservative because the estimates are based on the laboratory rates. Laboratory derived rates are faster than the respective field rates, which, if field rates were applied, could result in a more realistic estimation of the ARD lag time. This is demonstrated in Table 1 (attached) by comparison of the recent field test results to the laboratory results for the same sample of low grade ore (MLGO-Met) with an uncertain ARD potential. Field based ARD onset time (200 years) is approximately 30x longer than the ARD onset time (6.3 years) calculated using laboratory-based inputs for this sample. Nevertheless, the conservative ranges of ARD onset time were used for sensitivity analysis of the water quality model.

Water Quality Model Sensitivity

ARD onset time lags were considered a probabilistic input parameter with triangular probability distributions in both the EIS (original) and sensitivity (models). In the original GoldSim model, one probability distribution was used to represent acidic rates in all mine components (Figure 3). In the sensitivity model for Marathon site, a separate probability distribution of ARD onset was assigned to ore, low grade ore and waste rock in accordance with statistics from Table 3 (attached).

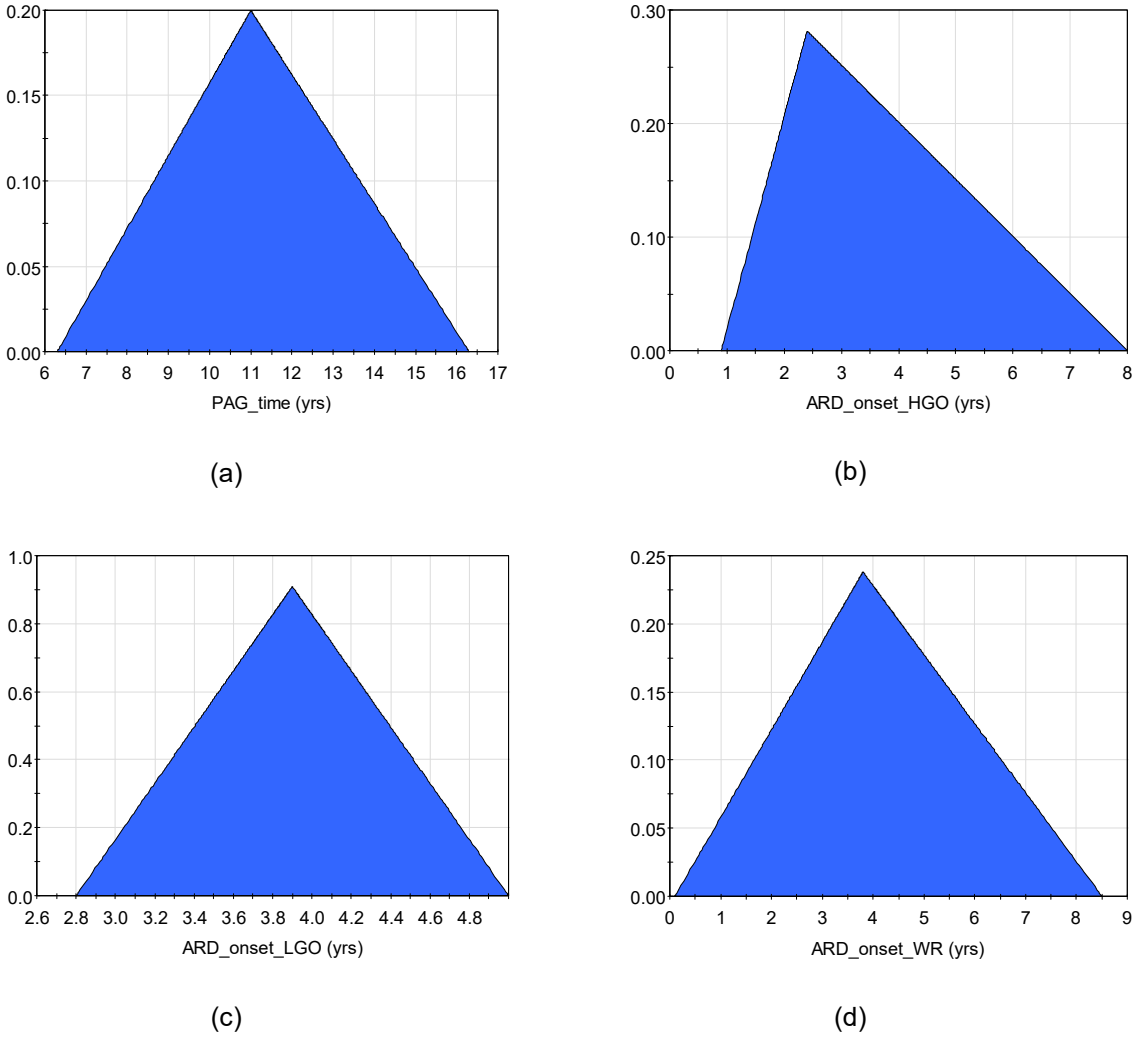


Figure 3 **Probability distributions for ARD onset time in the EIS model for all materials (a) and the sensitivity model for ore (b), low grade ore (c), and waste rock (d).**

The results obtained for the low-grade ore stockpile, waste rock, and open pit are provided in Tables 4 to 12 (attached). For each of these mine facilities, three tables are presented: 1) original results from the EIS model; 2) new results from the sensitivity model, and 3) ratios of new results to the original results. Ratios greater than 1.2 are highlighted in gray in the tables indicating a substantial increase from the original result. The key increases can be summarized as follows:

- In the LGO stockpile, up to 3.1x for Zn and 1.5x for Ni during operation. Concentrations of these metals were below MDMER limits at 95% confidence levels.
- In the waste rock stockpile, up to 1.4x for Zn and 1.3x for Ni during operation and up to 1.3x for Zn during closure. In both phases of the mine life cycle, concentrations of these metals were below MDMER limits at 95% confidence levels.
- In mine water from the pit, up to 2.4x for Ni, up to 2.2x for Zn, and 1.3x for Cd is predicted during operation. In the pit lake, an increase in concentration up to 1.21x for Zn during closure. In both phases of the mine life cycle, concentrations of Ni and Zn were below MDMER limits and Cd concentration was below the short-term Canadian Water Quality guideline at 95% confidence levels.

Overall model results show that faster ARD onset times result in an increase of average concentrations of Zn, Ni, and Cd generally during operation and less so in closure. Other parameters were less impacted because of lower or no multiplier for acidic leaching rates as noted in Section 5.3.1.1 in Appendix 7B of the EIS.

pH of LGO Seepage

The water quality GoldSim model probabilistically assumes that pH in the low grade ore stockpile will be between 7.5 and 8.5, based on pH measured in humidity cell M-LGO in first week (Figure 3). The validity of this assumption can be tested using alkalinity and acidity rates measured in LGO in normal (M-LGO) and carbonate depleted (M-LGO CNP DPL) humidity cells, respectively. The alkalinity rate is always greater than acidity rate over the testing period (Figure 3). On average, the alkalinity production rate (22.5 mg $CaCO_3$/kg/week) is almost 8x higher than the acidity production rate (2.9 mg $CaCO_3$/kg/week) between weeks 10 and 20, when rates had stabilized in both cells (Figure 3). This observation indicates that there is more than enough alkalinity produced from 50 percent of the non-PAG ore to neutralize acidity generated from 50% of the PAG material. Therefore, a reduction of pH below 6.5 in seepage from LGO stockpile is not expected.

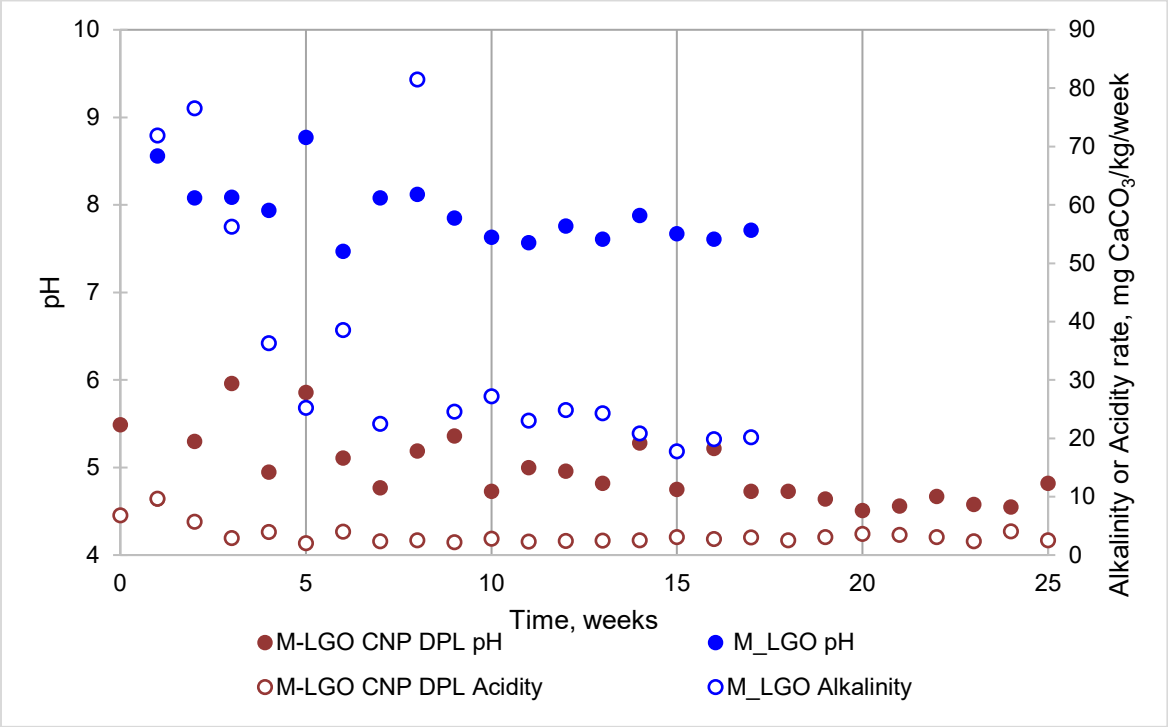


Figure 3 **Alkalinity and acidity rates and pH from normal (M-LGO) and carbonate depleted (M-LGO CNP DPL) humidity cells**

Summary

Conservative assumptions were made to calculate ARD onset time for PAG samples from the Marathon deposit. These calculations produced conservative (shorter) ARD onset time lags, which were used to address sensitivity of the water quality model predictions. Using a stochastic sampling of these inputs, the model predictions did not exceed the MDMER limits in discharges from the LGO stockpile, waste rock, and open pit over the life of the proposed mine. Therefore, treatment of these discharges is not warranted, which is similar to the conclusion presented in the EIS.

References:

Mine Environment Neutral Drainage Program (MEND), 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, MEND Report 1.20.1, p. 1-579.

SRK Consulting. 2006. Galore Creek Project ML/ARD Characterization Report. Report prepared for Novagold Resources Inc. SRK Project. 1CR003.002. May 2006.

SRK 2013. Metal Leaching and Acid Rock Drainage Potential Characterization Sisson Project. August 2013.

APPENDIX B

Results of Additional (Post EIS) Static and Kinetic Tests

APPENDIX B.1

New Static Tests

SGS Canada Inc.
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ABA - Modified Sobek

Project : Martathon Project - Leprechuan (121414740-180.300)

02-November-2021

Date Rec. : 04 October 2021
LR Report: **CA14041-OCT21**

Copy: #1

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO
Mt. Pearl, NL
A1N 0A1, Canada

Phone: 709-730-5046
Fax:

CERTIFICATE OF ANALYSIS

Final Report

Sample ID	Sample Date & Time	Paste pH no unit	Fizz Rate no unit	Sample weight g	HCl_add mL	HCl Normality	NaOH Normality	Vol NaOH to pH=8.3 mL
1: Analysis Start Date		26-Oct-21	26-Oct-21	26-Oct-21	27-Oct-21	26-Oct-21	26-Oct-21	27-Oct-21
2: Analysis Start Time		08:30	08:30	08:30	06:30	08:30	08:30	08:31
3: Analysis Completed Date		28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21	28-Oct-21
4: Analysis Completed Time		16:34	16:34	16:34	16:34	16:34	16:34	16:34
5: 89125	N/A	8.88	3	1.99	111.30	0.10	0.10	51.93
6: 89126	N/A	8.91	3	1.99	95.00	0.10	0.10	46.76
7: 89128	N/A	9.09	3	1.98	181.00	0.10	0.10	81.65
8: 150771	N/A	8.75	3	2.00	110.00	0.10	0.10	63.20
9: 150772	N/A	8.66	3	1.98	100.00	0.10	0.10	54.33
10: 150785	N/A	9.04	3	2.01	100.00	0.10	0.10	60.60
11: 150786	N/A	8.87	3	2.01	85.80	0.10	0.10	44.23
12: 150769	N/A	8.74	3	2.01	108.10	0.10	0.10	69.98
13: 150770	N/A	8.67	3	1.99	97.00	0.10	0.10	59.64
14: 150783	N/A	8.95	3	1.99	69.20	0.10	0.10	46.87
15: 150789	N/A	8.98	3	2.00	75.00	0.10	0.10	49.31
16: 150792	N/A	8.99	3	2.02	72.00	0.10	0.10	44.00
17: 150793	N/A	9.08	3	2.02	64.60	0.10	0.10	39.62
18: 150794	N/A	9.05	3	1.98	71.30	0.10	0.10	44.94
19: 150795	N/A	8.76	3	2.00	118.00	0.10	0.10	72.80
20: 150797	N/A	8.70	3	1.99	118.40	0.10	0.10	56.52
21: 150807	N/A	8.51	3	2.01	140.00	0.10	0.10	50.87
22: 150808	N/A	8.52	3	2.02	140.00	0.10	0.10	49.13
23: 150799	N/A	8.74	3	2.01	134.20	0.10	0.10	77.00
24: 150802	N/A	8.80	3	2.01	140.80	0.10	0.10	74.17
25: 150803	N/A	8.73	3	1.99	160.00	0.10	0.10	67.58
26: 150811	N/A	9.10	3	2.02	60.00	0.10	0.10	22.19
27: 150812	N/A	9.57	3	1.98	58.30	0.10	0.10	35.60
28: 150813	N/A	9.16	3	2.01	60.00	0.10	0.10	30.77
29: 138513	N/A	8.85	3	2.02	30.50	0.10	0.10	14.90
30: 138552	N/A	8.78	3	1.99	60.00	0.10	0.10	19.01
31: 138523	N/A	9.74	2	2.01	20.00	0.10	0.10	17.62

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ABA - Modified Sobek

Project : Martathon Project - Leprechuan
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Sample ID	Sample Date & Time	Paste pH no unit	Fizz Rate no unit	Sample weight g	HCl_add mL	HCl Normality	NaOH Normality	Vol NaOH to pH=8.3 mL
32: 138558	N/A	8.94	3	1.99	68.60	0.10	0.10	27.07
33: 138532	N/A	8.91	3	1.98	20.00	0.10	0.10	8.59
34: 139538	N/A	8.75	3	2.01	80.00	0.10	0.10	25.97
35: 158533	N/A	8.69	3	1.99	60.00	0.10	0.10	23.73
36: 87002	N/A	8.82	3	2.00	60.00	0.10	0.10	26.93
37: 86924	N/A	9.39	3	1.99	57.30	0.10	0.10	35.41
38: 101688	N/A	9.46	2	2.00	20.00	0.10	0.10	8.61
39: 104281	N/A	9.39	2	1.99	20.00	0.10	0.10	9.41
40: 104880	N/A	9.34	2	2.00	58.30	0.10	0.10	35.22
41: 115536	N/A	9.47	2	1.98	20.00	0.10	0.10	15.35
42: 124020	N/A	9.53	2	1.98	20.00	0.10	0.10	9.07
43: 119823	N/A	9.54	2	2.01	20.00	0.10	0.10	11.17
44: 119736	N/A	8.99	3	1.99	60.00	0.10	0.10	24.68
45: 129434	N/A	9.90	3	2.00	46.00	0.10	0.10	16.43
46: 129357	N/A	9.60	3	2.02	36.30	0.10	0.10	13.14
47: 129502	N/A	9.37	3	2.01	20.00	0.10	0.10	11.02
48: 129712	N/A	9.79	2	1.98	20.00	0.10	0.10	9.78
49: 164784	N/A	9.59	2	1.98	20.00	0.10	0.10	7.84
50: 164850	N/A	9.95	2	2.02	20.00	0.10	0.10	11.91
51: 173996	N/A	9.76	2	2.01	20.00	0.10	0.10	9.18
52: 166350	N/A	8.53	3	2.01	65.00	0.10	0.10	21.32
53: 175778	N/A	9.76	2	2.00	30.60	0.10	0.10	12.88
54: 185159	N/A	9.66	2	1.99	20.00	0.10	0.10	12.76
55: 147866	N/A	9.73	2	2.00	20.00	0.10	0.10	14.79
56: 147990	N/A	9.95	2	2.01	20.00	0.10	0.10	13.61
57: 147796	N/A	9.05	3	2.01	80.20	0.10	0.10	26.12
58: 189279	N/A	9.37	3	2.02	40.00	0.10	0.10	13.98
59: 189407	N/A	9.42	2	2.00	25.70	0.10	0.10	14.02
60: 196617	N/A	9.67	2	1.99	20.00	0.10	0.10	18.94
61: 170862	N/A	9.87	2	2.01	20.00	0.10	0.10	8.95
62: 197485	N/A	9.62	2	2.00	28.00	0.10	0.10	13.75
63: 193364	N/A	9.30	2	2.00	20.00	0.10	0.10	12.66
64: 193495	N/A	9.79	2	1.98	20.00	0.10	0.10	13.30
65: 193421	N/A	9.37	2	1.99	20.00	0.10	0.10	16.42
66: 194613	N/A	9.78	2	2.00	20.00	0.10	0.10	11.57
67: 900035	N/A	9.81	2	2.02	31.00	0.10	0.10	12.29
68: 901207	N/A	9.19	2	2.00	20.00	0.10	0.10	13.02
69: 901254	N/A	9.56	2	1.98	20.00	0.10	0.10	16.03
70: 901091	N/A	9.41	2	1.99	20.00	0.10	0.10	14.75
71: 920325	N/A	9.67	2	1.98	20.00	0.10	0.10	6.01
72: 920385	N/A	9.75	2	2.02	20.00	0.10	0.10	13.99
73: 903490	N/A	8.72	3	1.98	50.00	0.10	0.10	14.45
74: 904316	N/A	9.62	3	1.98	20.00	0.10	0.10	10.38
75: 904361	N/A	8.76	3	2.03	43.50	0.10	0.10	19.10
76: 919040	N/A	9.73	2	2.00	20.00	0.10	0.10	15.41

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Sample ID	Sample Date & Time	Paste pH no unit	Fizz Rate no unit	Sample weight g	HCl_add mL	HCl Normality	NaOH Normality	Vol NaOH to pH=8.3 mL
77: 919112	N/A	9.56	2	2.00	27.20	0.10	0.10	12.36
78: 919182	N/A	10.00	2	1.99	20.00	0.10	0.10	12.54
79: 941432	N/A	9.60	2	1.99	29.00	0.10	0.10	13.86
80: 941369	N/A	8.38	2	2.02	20.00	0.10	0.10	13.05
81: 946206	N/A	9.99	2	2.01	20.00	0.10	0.10	16.28
82: 946282	N/A	10.01	2	1.98	20.00	0.10	0.10	15.22
83: 903997	N/A	9.72	2	2.01	20.00	0.10	0.10	11.71
84: 127326	N/A	9.69	2	2.00	20.00	0.10	0.10	12.00
85: 175587	N/A	9.78	2	2.00	20.00	0.10	0.10	14.20
86: 173930	N/A	9.72	2	2.01	31.70	0.10	0.10	15.78
87: 946968	N/A	9.74	2	2.00	27.70	0.10	0.10	14.56
88: 86989	N/A	9.66	3	1.99	20.00	0.10	0.10	8.54
89: 86917	N/A	9.46	3	1.99	49.00	0.10	0.10	18.58
90: 101679	N/A	9.75	3	2.01	20.00	0.10	0.10	7.83
91: 101710	N/A	9.21	3	2.00	35.00	0.10	0.10	14.13
92: 104288	N/A	9.68	3	2.01	29.60	0.10	0.10	14.52
93: 104335	N/A	9.65	3	1.99	31.10	0.10	0.10	11.59
94: 104865	N/A	9.24	3	2.00	20.00	0.10	0.10	12.95
95: 108072	N/A	9.06	3	2.00	41.30	0.10	0.10	15.92
96: 108110	N/A	9.64	3	2.00	31.60	0.10	0.10	15.62
97: 109862	N/A	9.82	3	1.99	20.00	0.10	0.10	11.80
98: 109930	N/A	9.80	3	2.00	20.00	0.10	0.10	11.32
99: 115436	N/A	9.73	3	2.00	20.00	0.10	0.10	14.16
100: 115584	N/A	9.93	2	2.01	20.00	0.10	0.10	12.58
101: 124077	N/A	9.65	2	1.99	28.00	0.10	0.10	13.67
102: 124142	N/A	10.12	2	2.00	40.00	0.10	0.10	17.24
103: 119790	N/A	9.81	3	2.01	20.00	0.10	0.10	11.80
104: 119828	N/A	9.83	3	2.01	20.00	0.10	0.10	11.39
105: 129313	N/A	9.80	2	2.00	20.00	0.10	0.10	8.62
106: 129391	N/A	9.42	3	2.00	30.00	0.10	0.10	14.10
107: 129438	N/A	9.82	3	1.99	20.00	0.10	0.10	7.70
108: 129738	N/A	9.79	3	2.00	20.00	0.10	0.10	14.67
109: 129497	N/A	9.83	3	2.00	20.00	0.10	0.10	11.82
110: 164713	N/A	9.68	3	2.00	20.00	0.10	0.10	12.46
111: 164809	N/A	9.65	3	1.99	40.00	0.10	0.10	18.71
112: 174046	N/A	9.65	3	2.01	28.20	0.10	0.10	14.88
113: 173942	N/A	9.67	3	2.01	33.20	0.10	0.10	14.02
114: 166329	N/A	9.74	3	2.00	34.60	0.10	0.10	15.18
115: 175772	N/A	9.52	3	2.00	33.40	0.10	0.10	13.06

Sample ID	Final pH no unit	NP t CaCO3/1000 t	AP t CaCO3/1000 t	Net NP t CaCO3/1000 t	NP/AP ratio	S %	Acid Leachable SO4-S %
1: Analysis Start Date	27-Oct-21	27-Oct-21	01-Nov-21	01-Nov-21	01-Nov-21	29-Oct-21	01-Nov-21

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0002699015

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ABA - Modified Sobek

Project : Martathon Project - Leprechuan
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Sample ID	Final pH no unit	NP t CaCO3/1000 t	AP t CaCO3/1000 t	Net NP t CaCO3/1000 t	NP/AP ratio	S %	Acid Leachable SO4-S %
2: Analysis Start Time	08:31	08:31	13:45	13:45	13:45	08:55	11:20
3: Analysis Completed Date	28-Oct-21	28-Oct-21	01-Nov-21	01-Nov-21	01-Nov-21	01-Nov-21	01-Nov-21
4: Analysis Completed Time	16:34	16:34	16:07	16:07	16:07	16:05	16:05
5: 89125	1.81	149	1.25	148	119	< 0.005	<0.04
6: 89126	1.90	121	5.62	116	21.5	0.240	0.06
7: 89128	1.61	251	2.19	249	115	0.130	< 0.04
8: 150771	1.78	117	16.9	100	6.93	0.629	0.09
9: 150772	1.87	115	1.25	114	92.2	0.060	< 0.04
10: 150785	1.64	98.0	1.25	96.8	78.4	0.027	< 0.04
11: 150786	1.68	103	1.88	102	55.1	0.070	< 0.04
12: 150769	1.65	94.8	12.2	82.6	7.78	0.424	< 0.04
13: 150770	1.81	93.9	12.5	81.4	7.51	0.453	0.05
14: 150783	1.72	56.1	2.81	53.3	19.9	0.107	< 0.04
15: 150789	1.57	64.2	2.81	61.4	22.8	0.121	< 0.04
16: 150792	1.62	69.3	3.44	65.9	20.2	0.126	< 0.04
17: 150793	1.85	61.8	4.38	57.4	14.1	0.187	0.05
18: 150794	1.66	66.6	1.25	65.4	53.3	0.022	< 0.04
19: 150795	1.66	113	1.25	112	90.4	0.025	< 0.04
20: 150797	1.73	156	1.56	154	99.5	0.048	< 0.04
21: 150807	1.81	222	1.25	220	177	< 0.005	< 0.04
22: 150808	1.85	225	1.25	224	180	< 0.005	< 0.04
23: 150799	1.66	142	1.25	141	114	0.007	< 0.04
24: 150802	1.68	166	1.25	164	133	0.015	< 0.04
25: 150803	1.67	232	2.50	230	92.9	0.078	< 0.04
26: 150811	1.66	93.6	2.19	91.4	42.8	0.086	< 0.04
27: 150812	1.33	57.3	4.06	53.2	14.1	0.158	< 0.04
28: 150813	1.51	72.7	3.75	69.0	19.4	0.190	0.07
29: 138513	1.62	38.6	1.25	37.4	30.9	0.047	< 0.04
30: 138552	1.74	103	2.50	100	41.2	0.089	< 0.04
31: 138523	1.20	5.9	1.25	4.65	4.72	0.019	< 0.04
32: 138558	1.62	104	2.50	102	41.8	0.120	0.04
33: 138532	1.83	28.8	1.25	27.6	23.0	< 0.005	< 0.04
34: 139538	1.71	134	3.12	131	43.0	0.126	< 0.04
35: 158533	1.63	91.1	1.25	89.8	72.9	< 0.005	< 0.04
36: 87002	1.49	82.7	66.2	16.4	1.25	2.52	0.40
37: 86924	1.30	55.0	36.9	18.1	1.49	1.41	0.23
38: 101688	1.51	28.5	8.12	20.4	3.51	0.278	< 0.04
39: 104281	1.50	26.6	29.7	-3.09	0.90	1.08	0.14
40: 104880	1.36	57.7	60.0	-2.30	0.96	2.11	0.19
41: 115536	1.10	11.7	17.8	-6.11	0.66	0.635	0.06
42: 124020	1.54	27.6	17.8	9.79	1.55	0.657	0.09
43: 119823	1.34	22.0	23.8	-1.75	0.93	1.03	0.27
44: 119736	1.52	88.8	69.1	19.7	1.29	2.50	0.30
45: 129434	1.68	73.9	13.4	60.5	5.50	0.436	< 0.04
46: 129357	1.65	57.3	24.7	32.6	2.32	1.04	0.25

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Sample ID	Final pH no unit	NP t CaCO3/1000 t	AP t CaCO3/1000 t	Net NP t CaCO3/1000 t	NP/AP ratio	S %	Acid Leachable SO4-S %
47: 129502	1.48	22.4	34.4	-11.98	0.65	1.44	0.34
48: 129712	1.59	25.8	14.4	11.4	1.79	0.747	0.29
49: 164784	1.55	30.7	21.2	9.45	1.44	0.970	0.29
50: 164850	1.38	20.0	10.3	9.69	1.94	0.524	0.19
51: 173996	1.37	26.9	23.1	3.78	1.16	1.00	0.26
52: 166350	1.78	109	154	-45.36	0.71	5.98	1.05
53: 175778	1.64	44.3	6.88	37.4	6.44	0.299	0.08
54: 185159	1.45	18.2	5.94	12.3	3.07	0.294	0.10
55: 147866	1.26	13.0	16.9	-3.88	0.77	0.630	0.09
56: 147990	1.36	15.9	2.81	13.1	5.65	0.136	0.05
57: 147796	1.82	134	18.8	116	7.17	0.814	0.21
58: 189279	1.84	64.4	54.1	10.3	1.19	2.06	0.33
59: 189407	1.56	29.2	29.1	0.14	1.00	1.18	< 0.04
60: 196617	1.15	2.7	1.25	1.45	2.16	0.309	0.31
61: 170862	1.61	27.5	8.44	19.1	3.26	0.350	0.08
62: 197485	1.52	35.6	26.6	9.04	1.34	1.06	0.20
63: 193364	1.43	18.4	21.9	-3.48	0.84	0.885	0.18
64: 193495	1.36	16.9	15.3	1.59	1.10	0.658	0.17
65: 193421	1.20	9.0	20.6	-11.62	0.44	0.793	0.13
66: 194613	1.41	21.1	12.5	8.60	1.69	0.490	0.09
67: 900035	1.65	46.3	7.19	39.1	6.44	0.273	0.04
68: 901207	1.26	17.5	59.1	-41.56	0.30	2.44	0.54
69: 901254	1.15	10.0	15.0	-5.00	0.67	0.614	0.13
70: 901091	1.22	13.2	41.2	-28.05	0.32	1.60	0.28
71: 920325	1.90	35.3	19.1	16.2	1.85	0.793	0.18
72: 920385	1.22	14.9	24.1	-9.16	0.62	0.920	0.15
73: 903490	1.83	89.8	90.0	-0.20	1.00	3.59	0.71
74: 904316	1.36	24.3	8.75	15.6	2.78	0.390	0.11
75: 904361	1.66	60.1	119	-58.65	0.51	5.43	1.63
76: 919040	1.13	11.5	10.9	0.56	1.05	0.389	< 0.04
77: 919112	1.50	37.1	20.6	16.5	1.80	0.835	0.18
78: 919182	1.31	18.7	4.38	14.3	4.27	0.177	< 0.04
79: 941432	1.55	38.0	9.69	28.3	3.92	0.573	0.26
80: 941369	1.79	17.2	150	-133.11	0.11	6.43	1.62
81: 946206	1.16	9.3	8.12	1.18	1.14	0.483	0.22
82: 946282	1.18	12.1	9.38	2.72	1.29	0.375	0.08
83: 903997	1.29	20.6	12.5	8.10	1.65	0.417	< 0.04
84: 127326	1.36	20.0	20.3	-0.31	0.98	0.970	0.32
85: 175587	1.24	14.5	15.6	-1.12	0.93	0.671	0.17
86: 173930	1.46	39.6	12.2	27.4	3.25	0.518	0.13
87: 946968	1.53	32.9	7.19	25.7	4.58	0.289	0.06
88: 86989	1.55	28.8	21.2	7.55	1.36	0.940	0.26
89: 86917	1.58	76.4	16.6	59.8	4.61	0.669	0.14
90: 101679	1.76	30.3	14.4	15.9	2.11	0.647	0.19
91: 101710	1.64	52.2	21.9	30.3	2.39	0.793	0.09

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0002699015

SGS Canada Inc.
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ABA - Modified Sobek

Project : Martathon Project - Leprechuan
LR Report : CA14041-OCT21 (121414740-180.300)

Sample ID	Final pH no unit	NP t CaCO3/1000 t	AP t CaCO3/1000 t	Net NP t CaCO3/1000 t	NP/AP ratio	S %	Acid Leachable SO4-S %
92: 104288	1.51	37.5	10.3	27.2	3.64	0.361	< 0.04
93: 104335	1.58	49.0	8.75	40.2	5.60	0.415	0.14
94: 104865	1.36	17.6	33.1	-15.52	0.53	1.20	0.14
95: 108072	1.56	63.4	48.1	15.3	1.32	1.88	0.34
96: 108110	1.51	39.9	11.6	28.3	3.45	2.05	1.68
97: 109862	1.38	20.6	10.0	10.6	2.06	0.484	0.16
98: 109930	1.45	21.7	11.6	10.1	1.88	0.370	< 0.04
99: 115436	1.26	14.6	20.0	-5.40	0.73	0.770	0.13
100: 115584	1.31	18.5	6.56	11.9	2.82	0.745	0.54
101: 124077	1.51	36.0	5.62	30.4	6.40	0.196	< 0.04
102: 124142	1.51	56.9	4.38	52.5	13.0	0.345	0.20
103: 119790	1.42	20.4	12.2	8.21	1.67	0.524	0.13
104: 119828	1.41	21.4	10.3	11.1	2.08	0.515	0.18
105: 129313	1.68	28.5	10.9	17.6	2.61	0.462	0.11
106: 129391	1.55	39.8	31.2	8.55	1.27	1.173	0.17
107: 129438	1.84	30.9	8.75	22.2	3.53	1.28	1.00
108: 129738	1.19	13.3	25.9	-12.64	0.51	1.074	0.24
109: 129497	1.34	20.4	8.12	12.3	2.51	0.369	0.11
110: 164713	1.34	18.9	17.5	1.40	1.08	0.718	0.16
111: 164809	1.51	53.5	29.7	23.8	1.80	1.27	0.32
112: 174046	1.50	33.1	16.2	16.8	2.04	0.762	0.24
113: 173942	1.51	47.7	8.12	39.6	5.87	0.358	0.10
114: 166329	1.55	48.6	9.06	39.5	5.36	0.477	0.19
115: 175772	1.65	50.9	15.9	35.0	3.19	0.639	0.13

Sample ID	Sulphide %	C %	CO3 (HCl) %
1: Analysis Start Date	28/ 29 Oct 21	25-Oct-21	27-Oct-21
2: Analysis Start Time	08:34	06:55	13:44
3: Analysis Completed Date	01-Nov-21	29-Oct-21	29-Oct-21
4: Analysis Completed Time	16:05	14:59	14:59
5: 89125	< 0.04	1.45	7.17
6: 89126	0.18	1.18	5.84
7: 89128	0.07	2.79	13.9
8: 150771	0.54	1.11	5.48
9: 150772	< 0.04	1.17	5.81
10: 150785	< 0.04	0.775	3.82
11: 150786	0.06	0.897	4.47
12: 150769	0.39	0.955	4.75
13: 150770	0.40	0.987	4.88
14: 150783	0.09	0.203	0.994
15: 150789	0.09	0.400	1.92
16: 150792	0.11	0.455	2.23

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ABA - Modified Sobek

Project : Martathon Project - Leprechuan
LR Report : CA14041-OCT21 (121414740-180.300)

Sample ID	Sulphide %	C %	CO3 (HCl) %
17: 150793	0.14	0.410	2.00
18: 150794	< 0.04	0.372	1.81
19: 150795	< 0.04	1.02	5.00
20: 150797	0.05	1.73	8.59
21: 150807	< 0.04	2.60	12.9
22: 150808	< 0.04	2.64	13.2
23: 150799	< 0.04	1.59	7.90
24: 150802	< 0.04	1.67	8.33
25: 150803	0.08	2.32	11.6
26: 150811	0.07	1.16	5.72
27: 150812	0.13	0.745	3.68
28: 150813	0.12	0.862	4.22
29: 138513	0.04	0.372	1.78
30: 138552	0.08	1.21	6.01
31: 138523	< 0.04	0.018	0.045
32: 138558	0.08	1.32	6.46
33: 138532	< 0.04	0.269	1.28
34: 139538	0.10	1.65	8.24
35: 158533	< 0.04	1.02	5.07
36: 87002	2.12	1.01	4.95
37: 86924	1.18	0.762	3.73
38: 101688	0.26	0.304	1.45
39: 104281	0.95	0.310	1.49
40: 104880	1.92	0.746	3.64
41: 115536	0.57	0.127	0.595
42: 124020	0.57	0.315	1.53
43: 119823	0.76	0.262	1.26
44: 119736	2.21	1.14	5.60
45: 129434	0.43	0.922	4.56
46: 129357	0.79	0.678	3.32
47: 129502	1.10	0.252	1.15
48: 129712	0.46	0.309	1.44
49: 164784	0.68	0.351	1.65
50: 164850	0.33	0.223	1.04
51: 173996	0.74	0.239	1.11
52: 166350	4.93	1.32	6.49
53: 175778	0.22	0.539	2.60
54: 185159	0.19	0.188	0.859
55: 147866	0.54	0.156	0.689
56: 147990	0.09	0.179	0.819
57: 147796	0.60	1.74	8.58
58: 189279	1.73	0.781	3.81
59: 189407	0.93	0.020	< 0.025
60: 196617	< 0.04	0.300	1.40
61: 170862	0.27	0.300	1.37

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Sample ID	Sulphide %	C %	CO3 (HCl) %
62: 197485	0.85	0.396	1.89
63: 193364	0.70	0.207	0.949
64: 193495	0.49	0.205	0.944
65: 193421	0.66	0.094	0.375
66: 194613	0.40	0.235	1.07
67: 900035	0.23	0.563	2.71
68: 901207	1.89	0.207	0.859
69: 901254	0.48	0.130	0.520
70: 901091	1.32	0.156	0.669
71: 920325	0.61	0.438	2.11
72: 920385	0.77	0.179	0.814
73: 903490	2.88	1.18	5.75
74: 904316	0.28	0.325	1.52
75: 904361	3.80	0.695	3.37
76: 919040	0.35	0.139	0.610
77: 919112	0.66	0.434	2.06
78: 919182	0.14	0.218	0.989
79: 941432	0.31	0.553	2.69
80: 941369	4.81	0.191	0.894
81: 946206	0.26	0.143	0.615
82: 946282	0.30	0.141	0.610
83: 903997	0.40	0.227	1.04
84: 127326	0.65	0.252	1.17
85: 175587	0.50	0.169	0.754
86: 173930	0.39	0.470	2.26
87: 946968	0.23	0.394	1.88
88: 86989	0.68	0.336	1.57
89: 86917	0.53	0.886	4.22
90: 101679	0.46	0.338	1.54
91: 101710	0.70	0.612	2.96
92: 104288	0.33	0.367	1.74
93: 104335	0.28	0.632	3.02
94: 104865	1.06	0.198	0.829
95: 108072	1.54	0.781	3.79
96: 108110	0.37	0.822	3.99
97: 109862	0.32	0.477	2.25
98: 109930	0.37	0.211	0.939
99: 115436	0.64	0.271	1.23
100: 115584	0.21	0.161	0.699
101: 124077	0.18	0.181	0.774
102: 124142	0.14	0.408	1.89
103: 119790	0.39	0.623	2.96
104: 119828	0.33	0.226	0.989
105: 129313	0.35	0.267	1.22
106: 129391	1.00	0.283	1.30

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ABA - Modified Sobek

Project : Martathon Project - Leprechuan
LR Report : CA14041-OCT21 (121414740-180.300)

Sample ID	Sulphide %	C %	CO3 (HCl) %
107: 129438	0.28	0.489	2.33
108: 129738	0.83	0.307	1.45
109: 129497	0.26	0.234	1.05
110: 164713	0.56	0.231	1.05
111: 164809	0.95	0.639	3.07
112: 174046	0.52	0.432	2.01
113: 173942	0.26	0.558	2.68
114: 166329	0.29	0.588	2.84
115: 175772	0.51	0.636	3.05

*NP (Neutralization Potential)
= 50 x (N of HCL x Total HCL added - N NaOH x NaOH added)

Weight of Sample

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.04 will be calculated using a 0.04 value.

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0002699015

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Project : Martathon Project - Leprechuan (121414740-180.300)

29-October-2021

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO
Mt. Pearl, NL
A1N 0A1, Canada

Phone: 709-730-5046
Fax:

Date Rec. : 04 October 2021
LR Report: **CA14042-OCT21**

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 89125	6: 89126	7: 89128	8: 150771	9: 150772	10: 150785	11: 150786	12: 150769	13: 150770	14: 150783	15: 150789
Sample Date & Time					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	20-Oct-21	18:09	26-Oct-21	17:00	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	20-Oct-21	18:09	26-Oct-21	17:00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	20-Oct-21	18:09	26-Oct-21	17:00	1.2	1.4	0.7	3.2	1.6	1.6	3.6	2.9	3.4	2.7	2.9
Al [µg/g]	20-Oct-21	18:09	26-Oct-21	17:00	39000	39000	38000	37000	46000	31000	36000	43000	41000	41000	34000
Au [µg/g]	25-Oct-21	18:09	26-Oct-21	17:00	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	20-Oct-21	18:09	26-Oct-21	17:00	3.2	4.7	124	3.0	3.4	2.1	2.1	1.6	3.9	1.8	1.3
Be [µg/g]	20-Oct-21	18:09	26-Oct-21	17:00	0.02	0.03	< 0.02	0.04	0.05	< 0.02	0.02	0.05	0.06	< 0.02	< 0.02
Bi [µg/g]	20-Oct-21	18:09	26-Oct-21	17:00	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	20-Oct-21	18:09	26-Oct-21	17:00	52000	46000	100000	47000	47000	33000	39000	40000	42000	14000	22000
Cd [µg/g]	20-Oct-21	18:09	26-Oct-21	17:00	0.08	0.06	0.05	0.02	0.04	0.06	0.02	< 0.02	0.03	< 0.02	0.04
Co [µg/g]	20-Oct-21	18:09	26-Oct-21	17:00	30	32	29	55	40	30	38	53	63	45	40
Cr [µg/g]	20-Oct-21	18:09	26-Oct-21	17:01	130	180	130	22	130	160	200	46	21	67	260
Cu [µg/g]	20-Oct-21	18:09	26-Oct-21	17:01	12	140	82	300	290	230	210	330	320	56	170
Fe [µg/g]	20-Oct-21	18:09	26-Oct-21	17:01	31000	33000	36000	86000	64000	31000	37000	56000	88000	39000	36000
K [µg/g]	20-Oct-21	18:09	26-Oct-21	17:01	88	120	2800	110	190	84	65	73	150	71	67
Li [µg/g]	20-Oct-21	18:09	26-Oct-21	17:01	3	3	2	< 2	< 2	< 2	2	< 2	< 2	2	< 2
Mg [µg/g]	20-Oct-21	18:09	26-Oct-21	17:01	44000	43000	38000	33000	42000	34000	39000	42000	36000	43000	37000

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Project : Martathon Project - Leprechuan (121414740,180,300)
LR Report : CA14042-OCT21

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 89125	6: 89126	7: 89128	8: 150771	9: 150772	10: 150785	11: 150786	12: 150769	13: 150770	14: 150783	15: 150789
Mn [µg/g]	20-Oct-21	18:09	26-Oct-21	17:01	810	780	990	820	910	680	770	820	810	720	650
Mo [µg/g]	20-Oct-21	18:09	26-Oct-21	17:01	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.4
Na [µg/g]	20-Oct-21	18:09	26-Oct-21	17:01	370	400	250	99	120	510	270	140	120	480	280
Ni [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	46	44	37	55	81	45	66	35	51	68	73
P [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	12	180	23	< 3	7.7	4.9	< 3	15	5.1	24	< 3
Pb [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	0.55	0.34	0.38	0.22	0.23	0.11	0.12	0.22	0.27	0.08	0.07
Sb [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	< 0.7	< 0.7	< 0.7	1.5	< 0.7	< 0.7	< 0.7	1.5	1.3	< 0.7	< 0.7
Sn [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	29	27	29	37	48	25	30	40	38	20	20
Ti [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	540	720	160	2200	1500	590	820	1300	1900	690	670
Tl [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	< 0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	0.032	0.079	0.015	0.007	0.010	0.008	0.008	0.008	0.023	0.002	< 0.002
V [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	74	87	56	500	300	63	64	230	550	41	66
Y [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	0.98	1.3	0.72	0.56	0.82	0.40	0.43	0.76	1.7	0.30	0.36
Zn [µg/g]	20-Oct-21	18:09	26-Oct-21	17:02	29	32	29	42	49	29	34	41	44	38	31

Analysis	16: 150792	17: 150793	18: 150794	19: 150795	20: 150797	21: 150807	22: 150808	23: 150799	24: 150802	25: 150803	26: 150811	27: 150812	28: 150813	29: 138513	30: 138552	31: 138523
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	2.6	3.7	1.8	1.9	0.9	< 0.5	< 0.5	0.6	0.5	0.7	0.6	< 0.5	0.7	1.0	0.7	1.0
Al [µg/g]	31000	29000	30000	48000	50000	56000	54000	57000	50000	48000	17000	12000	19000	25000	31000	10000
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	1.2	1.3	1.3	1.3	1.5	22	25	0.88	0.93	0.83	30	49	37	1.1	9.2	0.97
Be [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	0.05	0.20	0.16	0.03	0.03	0.03	0.29	0.10	0.24	< 0.02	0.05	0.03
Bi [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09
Ca [µg/g]	25000	24000	24000	41000	63000	99000	95000	61000	59000	83000	42000	26000	32000	19000	45000	4100

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Project : Martathon Project - Leprechuan (121414740-180,300)
LR Report : CA14042-OCT21

Analysis	16: 150792	17: 150793	18: 150794	19: 150795	20: 150797	21: 150807	22: 150808	23: 150799	24: 150802	25: 150803	26: 150811	27: 150812	28: 150813	29: 138513	30: 138552	31: 138523
Cd [µg/g]	0.03	0.02	< 0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.05	0.02	< 0.02	0.04	0.04	< 0.02	< 0.02
Co [µg/g]	34	36	29	49	46	38	38	50	45	46	8.6	9.2	11	30	31	7.0
Cr [µg/g]	270	270	110	210	160	160	160	170	140	140	3.8	3.0	4.2	69	97	4.7
Cu [µg/g]	170	150	120	140	200	5.7	22	85	130	520	14	10	23	250	2.8	14
Fe [µg/g]	34000	33000	30000	51000	50000	54000	50000	49000	45000	52000	30000	22000	31000	32000	42000	14000
K [µg/g]	55	59	58	51	96	790	660	76	66	48	620	770	670	27	50	33
Li [µg/g]	< 2	< 2	< 2	3	4	7	6	4	5	4	< 2	< 2	< 2	< 2	< 2	< 2
Mg [µg/g]	33000	31000	30000	52000	53000	46000	45000	62000	52000	47000	7600	6200	9800	25000	30000	6500
Mn [µg/g]	620	580	560	1000	1100	1400	1400	1000	930	1200	830	670	890	570	1000	250
Mo [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1	0.4	< 0.1	< 0.1	2.2	0.7	< 0.1	0.2	0.3	0.2	0.3	< 0.1	0.8
Na [µg/g]	250	310	230	160	87	170	170	120	310	68	460	530	430	65	84	440
Ni [µg/g]	40	37	19	29	93	22	25	89	47	49	4.7	3.5	5.0	29	44	2.1
P [µg/g]	< 3	< 3	5.2	< 3	18	6.6	6.4	3.5	< 3	290	590	690	910	< 3	240	130
Pb [µg/g]	0.12	0.09	0.08	0.07	0.29	0.63	0.54	0.19	0.23	0.28	0.89	0.51	0.81	0.06	0.23	0.35
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	25	22	22	21	39	110	95	41	41	53	58	34	55	20	24	16
Ti [µg/g]	840	800	960	1000	730	56	40	620	140	240	20	20	19	670	620	680
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.002	< 0.002	< 0.002	< 0.002	0.032	0.008	0.006	< 0.002	< 0.002	0.024	0.15	0.28	0.18	< 0.002	0.012	0.094
V [µg/g]	67	69	80	140	170	120	110	110	130	210	31	20	33	75	69	14
Y [µg/g]	0.36	0.37	0.41	0.46	0.68	2.7	2.6	0.60	0.35	5.8	9.7	5.2	7.5	0.21	0.60	6.8
Zn [µg/g]	31	29	32	52	57	63	59	41	42	45	46	37	61	38	65	20

Analysis	32: 138558	33: 138532	34: 139538	35: 158533	36: 87002	37: 86924	38: 101688	39: 104281	40: 104880	41: 115536	42: 124020	43: 119823	44: 119736	45: 129434	46: 129357	47: 129502
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05

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Project : Martathon Project - Leprechuan (121414740-180,300)
LR Report : CA14042-OCT21

Analysis	32: 138558	33: 138532	34: 139538	35: 158533	36: 87002	37: 86924	38: 101688	39: 104281	40: 104880	41: 115536	42: 124020	43: 119823	44: 119736	45: 129434	46: 129357	47: 129502
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	0.8	0.8	0.8	0.7	0.9	0.6	< 0.5	0.8	0.9	< 0.5	5.0	0.6	0.8	< 0.5	0.8	1.0
Al [µg/g]	40000	19000	36000	39000	6400	5500	3900	4900	9800	2600	4800	2800	4500	6200	5700	5600
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	---	---	---	---	---	---	---	---	---	---	---	---
Ba [µg/g]	2.7	0.63	2.6	0.82	15	21	8.6	47	61	8.9	10.0	13	11	77	12	13
Be [µg/g]	0.04	< 0.02	0.04	0.04	0.09	0.05	0.04	0.05	0.16	0.05	0.08	0.06	0.11	0.09	0.05	0.05
Bi [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09	0.60	2.6	0.65	8.3	0.82	0.34	1.5	1.1	0.65	0.31	1.1	5.3
Ca [µg/g]	47000	15000	60000	41000	36000	27000	12000	12000	27000	4600	12000	9800	39000	32000	24000	8900
Cd [µg/g]	0.03	< 0.02	0.05	< 0.02	0.06	0.03	< 0.02	0.02	0.04	0.05	0.07	0.02	0.05	0.03	0.03	< 0.02
Co [µg/g]	30	21	34	38	15	7.6	2.4	5.3	14	1.4	1.4	1.7	3.3	1.3	5.8	5.9
Cr [µg/g]	15	44	20	72	7.0	1.7	2.2	1.7	2.3	2.2	4.3	2.3	1.4	0.8	1.7	2.3
Cu [µg/g]	57	5.8	70	4.4	25	2.2	8.3	4.6	150	5.7	24	16	3.2	7.7	14	80
Fe [µg/g]	71000	23000	74000	45000	30000	22000	11000	17000	31000	11000	14000	14000	28000	13000	21000	23000
K [µg/g]	53	22	29	23	330	310	210	420	1000	310	360	420	420	870	270	410
Li [µg/g]	3	< 2	3	2	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Mg [µg/g]	28000	18000	26000	41000	3800	2000	1400	2200	4700	550	1600	490	1400	1900	1900	1800
Mn [µg/g]	1600	470	1700	1000	820	800	370	320	810	230	530	360	700	500	590	380
Mo [µg/g]	0.1	0.7	0.2	< 0.1	77	2.3	17	1.2	11	1.8	2.7	3.0	0.5	0.6	0.8	1.2
Na [µg/g]	300	51	250	42	370	790	510	650	920	680	790	870	770	1100	760	840
Ni [µg/g]	12	23	12	44	8.0	0.8	0.6	1.2	3.8	0.6	1.2	0.6	1.2	0.4	0.5	0.9
P [µg/g]	130	11	240	< 3	130	310	81	110	320	20	17	31	36	81	170	57
Pb [µg/g]	0.28	0.11	0.31	0.20	0.87	1.6	1.1	8.0	12	0.49	1.7	3.4	0.59	0.84	6.1	6.6
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.3	< 0.5	< 0.5	< 0.5
Sr [µg/g]	31	25	38	26	34	32	14	12	40	6.6	14	13	28	30	28	12
Ti [µg/g]	130	640	140	630	18	18	13	12	13	7.2	9.8	6.9	7.7	16	15	12
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.014	0.030	0.026	0.012	0.056	0.090	0.057	0.088	0.13	0.047	0.053	0.067	0.32	0.059	0.074	0.10
V [µg/g]	310	44	290	100	11	6	2	3	7	1	1	< 1	3	4	4	2
Y [µg/g]	2.5	0.91	2.4	0.49	5.0	8.7	3.1	4.2	8.2	1.6	2.6	2.5	11	8.2	8.1	4.8

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Project : Martathon Project - Leprechuan (121414740-180 300)
LR Report : CA14042-OCT21

Analysis	32: 138558	33: 138532	34: 139538	35: 158533	36: 87002	37: 86924	38: 101688	39: 104281	40: 104880	41: 115536	42: 124020	43: 119823	44: 119736	45: 129434	46: 129357	47: 129502
Zn [µg/g]	73	32	70	66	14	18	7.7	7.1	16	5.7	12	2.6	3.5	6.3	11	15

Analysis	48: 129712	49: 164784	50: 164850	51: 173996	52: 166350	53: 175778	54: 185159	55: 147866	56: 147990	57: 147796	58: 189279	59: 189407	60: 196617	61: 170862	62: 197485	63: 193364
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	3.2	< 0.5	0.8	1.0	1.5	< 0.5	< 0.5	1.5	< 0.5	0.8	0.7	0.6	< 0.5	< 0.5	0.6	26
Al [µg/g]	4100	1200	5400	2300	31000	6300	8700	3200	5900	37000	16000	11000	5000	5700	7300	7500
Au [µg/g]	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ba [µg/g]	13	2.2	17	6.9	24	7.5	16	11	18	8.2	22	25	25	23	25	24
Be [µg/g]	0.07	< 0.02	0.06	0.03	0.11	0.04	0.06	0.06	0.07	0.17	0.06	0.15	0.04	0.07	0.08	0.10
Bi [µg/g]	0.61	20	0.35	1.1	2.3	0.60	0.35	2.5	1.2	13	0.65	3.1	0.48	0.16	2.3	0.26
Ca [µg/g]	11000	13000	8200	8800	47000	18000	8100	5600	6500	51000	27000	13000	650	11000	15000	8000
Cd [µg/g]	0.03	0.02	< 0.02	< 0.02	0.07	< 0.02	0.02	< 0.02	0.03	0.09	0.03	< 0.02	< 0.02	< 0.02	< 0.02	0.75
Co [µg/g]	0.98	1.4	1.1	2.4	9.7	2.5	2.9	1.4	1.0	29	17	5.3	1.7	2.4	3.5	3.0
Cr [µg/g]	2.0	1.9	2.0	3.1	3.0	1.8	2.8	1.9	2.3	130	1.7	5.6	1.7	1.9	2.1	4.1
Cu [µg/g]	47	1.7	17	4.3	98	1.1	2.4	14	18	24	2.8	120	7.1	9.9	21	17
Fe [µg/g]	14000	11000	14000	13000	110000	15000	17000	11000	16000	71000	44000	28000	14000	13000	23000	22000
K [µg/g]	380	98	360	200	490	450	530	410	390	260	400	700	420	350	420	790
Li [µg/g]	< 2	< 2	< 2	< 2	6	< 2	2	< 2	< 2	8	4	2	< 2	< 2	< 2	< 2
Mg [µg/g]	860	100	1700	500	17000	3300	3600	640	1300	26000	8600	4200	1500	2200	2800	2000
Mn [µg/g]	430	370	370	270	2000	280	310	230	550	2400	670	510	170	340	530	340
Mo [µg/g]	1.2	1.1	1.8	1.9	0.4	0.8	0.7	1.6	2.2	0.6	2.7	5.5	1.1	2.2	1.2	1.6
Na [µg/g]	920	760	980	910	280	650	710	770	990	330	630	740	800	790	760	650
Ni [µg/g]	0.4	0.7	0.5	0.4	2.6	0.5	0.8	0.3	0.3	35	1.3	2.5	0.3	0.3	0.5	0.3
P [µg/g]	40	21	42	8.9	450	190	300	31	45	310	490	170	200	96	270	39
Pb [µg/g]	0.79	0.36	0.68	0.63	1.2	0.41	2.8	4.2	0.42	1.4	0.94	4.1	2.2	0.58	4.7	62
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6

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Project : Martathon Project - Leprechuan (121414740-180,300)
LR Report : CA14042-OCT21

Analysis	48: 129712	49: 164784	50: 164850	51: 173996	52: 166350	53: 175778	54: 185159	55: 147866	56: 147990	57: 147796	58: 189279	59: 189407	60: 196617	61: 170862	62: 197485	63: 193364
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	14	13	9.6	11	40	13	12	9.1	7.9	34	17	19	5.0	16	16	6.2
Ti [µg/g]	8.8	2.6	21	5.7	74	19	31	7.7	38	71	34	18	11	14	20	13
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.068	0.027	0.10	0.050	0.12	0.064	0.22	0.091	0.13	0.12	0.060	0.12	0.14	0.056	0.094	0.14
V [µg/g]	< 1	< 1	< 1	< 1	20	7	9	< 1	< 1	200	12	9	2	2	7	< 1
Y [µg/g]	2.8	1.8	6.0	2.3	9.9	6.7	14	2.2	9.6	7.5	7.1	4.2	5.5	3.2	4.9	2.4
Zn [µg/g]	8.5	< 0.7	11	2.7	87	5.4	9.7	4.3	24	115	26	25	8.9	9.3	14	40

Analysis	64: 193495	65: 193421	66: 194613	67: 900035	68: 901207	69: 901254	70: 901091	71: 920325	72: 920385	73: 903490	74: 904316	75: 904361	76: 919040	77: 919112	78: 919182	79: 941432
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	3	< 1	< 1	< 1
As [µg/g]	1.4	3.3	1.9	< 0.5	1.3	< 0.5	7.7	0.6	0.7	2.2	< 0.5	1.5	0.9	1.7	0.8	< 0.5
Al [µg/g]	3800	5800	4600	7200	2400	1300	2800	3300	2600	9000	2300	28000	1600	4500	3400	7900
Au [µg/g]	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ba [µg/g]	12	12	15	9.8	10	10	16	5.8	8.4	31	6.6	2.7	13	16	7.6	43
Be [µg/g]	0.07	0.07	0.07	0.09	0.04	0.04	0.06	0.06	0.04	0.10	0.04	0.14	0.03	0.05	0.04	0.05
Bi [µg/g]	0.27	1.2	0.71	0.14	11	0.32	5.1	0.66	0.47	4.3	0.58	52	4.7	2.2	0.38	0.27
Ca [µg/g]	7000	3300	8600	20000	7700	4100	5700	15000	6400	35000	10000	21000	4200	14000	6600	14000
Cd [µg/g]	0.04	< 0.02	0.04	0.03	< 0.02	< 0.02	7.4	0.06	0.02	0.07	0.04	0.03	< 0.02	< 0.02	< 0.02	0.04
Co [µg/g]	0.93	3.3	1.7	2.4	3.8	1.3	2.9	2.5	2.0	10	2.0	32	0.86	2.8	0.96	8.0
Cr [µg/g]	2.2	2.1	2.5	1.7	2.3	1.8	1.9	2.0	2.1	1.5	2.3	1.5	2.6	2.0	2.2	1.2
Cu [µg/g]	34	10	9.9	4.4	7.6	1.8	18	3.4	5.3	18	3.4	12	8.0	9.7	5.6	4.3
Fe [µg/g]	14000	17000	13000	16000	25000	7200	18000	14000	12000	45000	8900	89000	7500	16000	8900	18000
K [µg/g]	370	450	380	260	330	300	570	200	310	1100	220	120	180	300	130	860
Li [µg/g]	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	9	< 2	< 2	< 2	2

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Project : Martathon Project - Leprechuan (121414740-180 300)
LR Report : CA14042-OCT21

Analysis	64: 193495	65: 193421	66: 194613	67: 900035	68: 901207	69: 901254	70: 901091	71: 920325	72: 920385	73: 903490	74: 904316	75: 904361	76: 919040	77: 919112	78: 919182	79: 941432
Mg [µg/g]	690	2000	1200	3200	310	74	400	1400	440	5400	500	18000	210	1400	1100	3800
Mn [µg/g]	330	200	300	560	240	120	220	390	250	1200	320	930	150	440	210	310
Mo [µg/g]	2.0	1.4	1.4	1.1	1.6	2.4	3.8	1.0	2.6	1.0	1.3	4.3	0.8	0.8	1.5	2.4
Na [µg/g]	920	770	940	770	940	560	700	740	1000	240	640	240	640	490	720	350
Ni [µg/g]	0.2	0.6	0.3	0.4	4.8	0.4	0.5	0.6	0.7	2.3	0.6	3.0	0.6	0.6	0.5	0.7
P [µg/g]	21	47	42	160	43	39	21	43	32	44	97	210	39	140	63	140
Pb [µg/g]	0.49	3.0	1.9	1.3	4.5	0.47	44	1.9	0.76	2.9	1.9	2.9	1.7	26	1.7	0.64
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	0.8	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	11	4.9	9.3	20	9.5	5.8	7.4	14	7.8	27	10	21	8.1	19	12	12
Ti [µg/g]	9.9	12	15	17	7.4	4.7	6.1	7.7	6.8	17	6.6	56	5.5	24	10	29
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.11	0.078	0.11	0.080	0.087	0.042	0.096	0.052	0.067	0.11	0.037	0.095	0.072	0.092	0.13	0.099
V [µg/g]	< 1	1	1	4	< 1	< 1	< 1	< 1	< 1	14	< 1	220	< 1	4	1	3
Y [µg/g]	3.6	2.2	6.7	4.8	2.3	1.4	2.0	2.9	2.2	5.4	2.3	3.0	3.2	3.3	2.2	5.2
Zn [µg/g]	6.9	10	7.8	15	4.8	< 0.7	329	9.2	1.8	23	3.6	91	2.2	11	7.3	14

Analysis	80: 941369	81: 946206	82: 946282	83: 903997	84: 127326	85: 175587	86: 173930	87: 946968	88: 86989	89: 86917	90: 101679	91: 101710	92: 104288	93: 104335	94: 104865	95: 108072
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.28	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	3.4	1.1	0.7	0.7	1.6	0.5	< 0.5	< 0.5	< 0.5	0.6	0.5	0.7	0.7	0.6	1.4	0.7
Al [µg/g]	20000	2700	2600	3600	3000	2700	6900	6600	2800	14000	4800	7700	5400	3400	4600	3900
Au [µg/g]	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ba [µg/g]	67	11	11	15	10	11	19	23	20	27	20	15	14	26	26	41
Be [µg/g]	0.10	0.03	0.03	0.03	0.05	0.04	0.05	0.04	0.04	0.09	0.06	0.04	0.05	0.07	0.06	0.05
Bi [µg/g]	2.6	1.8	0.55	0.68	1.4	0.65	7.2	0.13	0.50	1.0	0.33	0.38	0.31	0.21	0.29	0.36

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Project : Martathon Project - Leprechuan (121414740-180,300)
LR Report : CA14042-OCT21

Analysis	80: 941369	81: 946206	82: 946282	83: 903997	84: 127326	85: 175587	86: 173930	87: 946968	88: 86989	89: 86917	90: 101679	91: 101710	92: 104288	93: 104335	94: 104865	95: 108072
Ca [µg/g]	5700	3100	4700	7400	7200	5100	14000	12000	11000	29000	12000	20000	14000	18000	6900	24000
Cd [µg/g]	< 0.02	< 0.02	< 0.02	0.08	0.02	< 0.02	< 0.02	0.05	0.02	0.05	0.02	0.02	0.04	0.03	< 0.02	0.04
Co [µg/g]	12	2.1	0.79	2.0	1.8	0.78	4.6	3.8	3.8	8.8	2.7	2.8	3.1	0.93	12	10
Cr [µg/g]	1.1	2.4	2.0	2.6	1.8	1.2	4.8	2.2	3.0	2.0	1.9	1.4	2.4	1.8	3.2	3.5
Cu [µg/g]	230	12	8.1	20	5.2	44	1.1	69	4.7	11	6.8	5.9	9.1	8.0	4.2	12
Fe [µg/g]	110000	9200	8000	12000	13000	11000	17000	17000	12000	31000	14000	25000	15000	10000	17000	21000
K [µg/g]	1200	96	170	290	250	200	210	330	300	380	240	270	200	330	440	300
Li [µg/g]	4	< 2	< 2	< 2	< 2	< 2	2	< 2	< 2	4	< 2	< 2	< 2	< 2	< 2	< 2
Mg [µg/g]	5500	650	500	1200	950	780	3900	2400	830	7900	1500	2400	2700	950	1800	1700
Mn [µg/g]	450	120	110	290	310	260	290	350	270	860	340	440	340	340	210	300
Mo [µg/g]	0.3	2.4	0.5	1.1	1.9	1.7	0.5	6.6	1.6	0.3	4.0	1.1	1.1	0.3	1.2	3.6
Na [µg/g]	290	770	870	470	680	560	540	540	620	390	680	300	540	490	490	400
Ni [µg/g]	0.6	0.6	0.5	0.5	0.5	0.4	2.1	0.4	0.7	4.1	0.8	1.6	1.3	0.5	1.3	1.2
P [µg/g]	48	34	32	130	51	59	130	130	110	250	180	230	100	65	130	100
Pb [µg/g]	1.8	5.3	0.66	0.82	3.1	1.3	4.2	0.44	1.0	3.6	3.3	0.63	6.0	1.3	0.58	0.52
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5
Sr [µg/g]	9.5	5.7	8.6	6.2	8.6	9.2	14	13	16	32	22	21	17	24	14	18
Ti [µg/g]	47	11	8.3	72	9.0	9.4	16	22	8.8	28	14	130	15	12	8.9	26
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.14	0.16	0.22	0.094	0.092	0.089	0.11	0.11	0.041	0.065	0.11	0.086	0.10	0.090	0.079	0.097
V [µg/g]	8	< 1	< 1	2	< 1	< 1	5	3	1	51	3	9	4	< 1	2	4
Y [µg/g]	3.6	6.0	5.4	4.8	2.4	2.8	7.1	5.8	2.6	5.5	4.5	7.2	2.9	5.3	2.5	6.1
Zn [µg/g]	53	6.0	3.5	13	5.6	6.5	13	17	5.9	38	10	16	21	5.8	8.4	4.3

Analysis	96: 108110	97: 109862	98: 109930	99: 115436	100: 115584	101: 124077	102: 124142	103: 119790	104: 119828	105: 129313	106: 129391	107: 129438	108: 129738	109: 129497	110: 164713	111: 164809
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Project : Martathon Project - Leprechuan (121414740-180,300)
LR Report : CA14042-OCT21

Analysis	96: 108110	97: 109862	98: 109930	99: 115436	100: 115584	101: 124077	102: 124142	103: 119790	104: 119828	105: 129313	106: 129391	107: 129438	108: 129738	109: 129497	110: 164713	111: 164809
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.19	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	< 0.5	1.2	1.8	8.2	1.0	0.7	1.0	2.8	1.6	< 0.5	0.7	< 0.5	0.9	< 0.5	0.7	0.6
Al [µg/g]	6000	4200	4100	3200	2700	6300	1900	3700	3600	6300	7900	6700	1800	2900	3600	2000
Au [µg/g]	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ba [µg/g]	17	10	13	19	12	15	4.8	9.4	12	21	28	31	9.5	8.7	32	9.9
Be [µg/g]	0.08	0.05	0.06	0.07	0.06	0.09	0.03	0.06	0.04	0.04	0.08	0.04	0.04	0.03	0.06	0.05
Bi [µg/g]	0.49	0.31	0.34	2.9	0.17	1.4	0.67	0.22	0.30	0.20	0.32	0.33	0.48	0.15	0.30	0.19
Ca [µg/g]	16000	7900	8200	5800	7100	14000	22000	7600	8300	10000	15000	12000	4700	7300	7000	20000
Cd [µg/g]	0.03	0.09	0.04	0.25	0.03	< 0.02	0.04	0.09	0.07	0.02	0.02	< 0.02	0.02	0.04	0.02	0.03
Co [µg/g]	2.8	0.91	1.0	1.3	0.72	2.9	0.68	1.3	1.1	3.7	4.6	2.4	1.1	0.97	2.4	2.1
Cr [µg/g]	1.5	1.8	1.5	2.5	2.4	4.5	1.2	2.3	2.5	1.7	1.6	2.9	2.9	1.7	2.2	1.2
Cu [µg/g]	6.1	17	16	9.5	11	11	2.4	15	17	18	7.1	4.3	5.4	26	25	4.4
Fe [µg/g]	15000	12000	13000	13000	8000	14000	6600	12000	11000	18000	23000	16000	12000	9700	13000	13000
K [µg/g]	340	230	160	410	180	270	70	300	290	230	440	230	180	180	670	160
Li [µg/g]	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2
Mg [µg/g]	2400	1600	1200	610	420	3000	280	1400	1100	2500	3600	3500	220	990	710	240
Mn [µg/g]	380	380	460	330	230	630	710	330	380	310	450	330	180	280	240	620
Mo [µg/g]	1.1	3.2	0.8	2.1	0.9	1.5	1.6	2.2	1.0	1.5	0.6	0.4	1.1	1.2	1.1	3.8
Na [µg/g]	670	590	680	660	830	540	1200	690	740	640	530	560	860	640	640	920
Ni [µg/g]	0.3	0.3	0.3	0.5	0.4	1.5	0.3	0.7	0.6	0.5	0.5	0.5	0.3	0.3	0.4	0.3
P [µg/g]	180	59	61	53	31	62	140	53	59	140	240	260	40	57	73	62
Pb [µg/g]	0.98	1.00	2.0	3.5	0.45	0.46	0.66	7.6	6.7	1.4	0.74	0.79	0.64	0.52	0.43	0.38
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	20	9.1	14	9.7	9.0	18	25	10	9.8	11	21	12	6.9	8.3	9.3	19
Ti [µg/g]	18	14	14	10	8.7	15	6.2	12	13	28	20	36	5.7	12	14	6.2
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.10	0.084	0.10	0.096	0.21	0.077	0.069	0.086	0.10	0.074	0.10	0.051	0.095	0.14	0.14	0.080
V [µg/g]	3	1	< 1	< 1	< 1	10	< 1	1	< 1	3	9	10	< 1	1	< 1	< 1

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Project : Martathon Project - Leprechuan (121414740-180,300)
LR Report : CA14042-OCT21

Analysis	96: 108110	97: 109862	98: 109930	99: 115436	100: 115584	101: 124077	102: 124142	103: 119790	104: 119828	105: 129313	106: 129391	107: 129438	108: 129738	109: 129497	110: 164713	111: 164809
Y [µg/g]	4.6	2.9	3.0	2.8	3.3	3.2	3.9	2.5	2.9	4.0	7.3	7.0	2.2	6.4	4.6	3.8
Zn [µg/g]	12	15	17	26	7.1	20	2.1	10	9.9	15	18	13	2.9	9.6	6.7	2.5

Analysis	112: 174046	113: 173942	114: 166329	115: 175772
Sample Date & Time	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1
As [µg/g]	2.8	0.6	< 0.5	< 0.5
Al [µg/g]	4800	6200	6700	6600
Au [µg/g]	---	---	---	---
Ba [µg/g]	18	19	11	8.5
Be [µg/g]	0.05	0.04	0.05	0.04
Bi [µg/g]	0.45	0.76	0.19	0.36
Ca [µg/g]	14000	18000	17000	17000
Cd [µg/g]	0.02	0.03	0.03	0.03
Co [µg/g]	9.5	2.8	3.1	6.3
Cr [µg/g]	3.2	2.8	2.0	2.2
Cu [µg/g]	9.1	3.0	12	2.0
Fe [µg/g]	16000	15000	17000	21000
K [µg/g]	240	150	170	320
Li [µg/g]	< 2	< 2	< 2	< 2
Mg [µg/g]	2000	3500	4000	4200
Mn [µg/g]	370	400	500	370
Mo [µg/g]	4.8	1.0	0.4	0.6
Na [µg/g]	760	510	580	430
Ni [µg/g]	0.5	0.8	1.5	0.5
P [µg/g]	130	150	110	210
Pb [µg/g]	0.74	9.5	6.8	0.41

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Analysis	112: 174046	113: 173942	114: 166329	115: 175772
Sb [µg/g]	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	18	13	15	14
Ti [µg/g]	12	15	20	28
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.073	0.092	0.072	0.098
V [µg/g]	3	7	5	8
Y [µg/g]	5.2	8.6	3.9	6.9
Zn [µg/g]	8.0	14	11	12

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

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Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO
Mt. Pearl, NL
A1N 0A1, Canada

Phone: 709-730-5046
Fax:

SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

29-October-2021

Date Rec. : 04 October 2021
LR Report: **CA14043-OCT21**

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 89125	6: 89126	7: 89128	8: 150771	9: 150772	10: 150785	11: 150786
Sample Date & Time					N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	21-Oct-21	07:58	15-Oct-21	09:16	250	250	250	250	250	250	250
Volume D.I. Water [mL]	21-Oct-21	07:58	15-Oct-21	09:16	750	750	750	750	750	750	750
Final pH [no unit]	21-Oct-21	06:15	15-Oct-21	09:16	9.59	9.60	9.31	9.11	9.39	9.94	9.75
pH [No unit]	16-Oct-21	13:20	27-Oct-21	09:56	7.71	7.71	8.08	7.72	7.91	9.21	7.74
Conductivity [uS/cm]	16-Oct-21	13:20	27-Oct-21	09:56	50	58	80	83	64	48	46
Alkalinity [mg/L as CaCO3]	16-Oct-21	13:20	27-Oct-21	09:56	24	23	32	25	27	25	23
SO4 [mg/L]	19-Oct-21	10:09	26-Oct-21	11:54	< 2	3	< 2	6	2	< 2	< 2
Hg [mg/L]	26-Oct-21	12:00	26-Oct-21	16:00	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.609	0.715	0.683	0.841	0.734	0.494	0.367
As [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.0007	0.0008	0.0005	0.0003	0.0003	0.0009	0.0013
Ba [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.00063	0.00043	0.00131	0.00251	0.00049	0.00026	0.00042
B [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.006	0.005	0.012	0.004	0.002	0.005	0.003
Be [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	6.20	6.67	6.12	11.4	7.69	5.62	5.84
Cd [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.000003	< 0.000003	0.000004	< 0.000003	< 0.000003	< 0.000003	< 0.000003

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : ~~CA14043-OCT21~~

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 89125	6: 89126	7: 89128	8: 150771	9: 150772	10: 150785	11: 150786
Co [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.000004	< 0.000004	< 0.000004	0.000011	0.000007	< 0.000004	0.000005
Cr [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.00023	< 0.00008	0.00014	0.00026	0.00016	0.00012	< 0.00008
Cu [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.0003	0.0003	0.0004	0.0003	0.0002	0.0006	0.0008
Fe [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
K [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.687	0.356	9.91	1.16	1.09	0.307	1.68
Li [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Mg [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.593	0.556	0.577	1.25	0.724	0.356	0.448
Mn [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.00041	0.00037	0.00046	0.00049	0.00031	0.00013	0.00013
Mo [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.00489	0.00033	0.00157	0.00030	0.00027	0.00159	0.00021
Na [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	2.50	3.43	2.83	0.66	0.84	3.45	1.55
Ni [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.0023	0.0025	< 0.0009	0.0015	0.0017	0.0016	0.0022
Se [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.00004	0.00006	< 0.00004	0.00031	< 0.00004	0.00004	0.00015
Si [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	1.72	1.90	1.77	1.00	1.08	5.30	3.19
Sn [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.0173	0.0175	0.00847	0.0325	0.0227	0.0132	0.0156
Ti [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.00009	< 0.00005	0.00008	< 0.00005	< 0.00005	0.00007	< 0.00005
Tl [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.000006	0.000008	< 0.000005	0.000005	0.000005	< 0.000005	0.000006
U [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.000002	0.000002	< 0.000002	< 0.000002	< 0.000002	< 0.000002	< 0.000002
V [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	0.00300	0.00526	0.00288	0.00436	0.00534	0.0119	0.00897
Zn [mg/L]	19-Oct-21	10:30	27-Oct-21	09:12	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	12: 150769	13: 150770	14: 150783	15: 150789	16: 150792	17: 150793	18: 150794	19: 150795	20: 150797	21: 150807	22: 150808
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.32	9.24	9.88	9.93	10.08	10.02	10.03	9.87	9.36	9.05	9.10

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180,300)

LR Report : CA14043-OCT21

Analysis	12: 150769	13: 150770	14: 150783	15: 150789	16: 150792	17: 150793	18: 150794	19: 150795	20: 150797	21: 150807	22: 150808
pH [No unit]	7.66	7.87	7.95	7.94	9.24	8.06	7.68	8.75	7.66	7.87	7.90
Conductivity [uS/cm]	70	81	56	63	60	61	53	47	59	82	72
Alkalinity [mg/L as CaCO3]	23	25	26	23	24	24	23	21	26	38	35
SO4 [mg/L]	4	6	< 2	3	< 2	3	< 2	< 2	< 2	< 2	< 2
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.788	0.797	0.390	0.225	0.641	0.412	0.496	0.810	0.453	0.220	0.221
As [mg/L]	0.0008	0.0008	0.0027	0.0028	0.0017	0.0024	0.0018	0.0007	< 0.0002	< 0.0002	< 0.0002
Ba [mg/L]	0.00113	0.00224	0.00048	0.00039	0.00026	0.00033	0.00030	0.00033	0.00061	0.00354	0.01604
B [mg/L]	0.005	0.005	0.004	0.006	0.007	0.006	0.005	0.005	< 0.002	0.005	0.007
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00001	< 0.00001	< 0.00001	0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	9.47	11.4	6.00	8.35	8.98	8.79	7.88	6.52	7.82	8.61	8.90
Cd [mg/L]	< 0.000003	0.000004	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003
Co [mg/L]	0.000005	< 0.000004	0.000030	0.000011	< 0.000004	0.000007	< 0.000004	< 0.000004	0.000005	< 0.000004	< 0.000004
Cr [mg/L]	0.00009	0.00010	0.00027	0.00039	0.00026	0.00020	0.00019	0.00017	0.00013	0.00009	< 0.00008
Cu [mg/L]	0.0003	0.0003	0.0005	0.0005	0.0005	0.0003	0.0005	0.0002	0.0005	0.0005	0.0002
Fe [mg/L]	< 0.007	< 0.007	0.021	0.009	< 0.007	0.009	< 0.007	0.007	< 0.007	< 0.007	< 0.007
K [mg/L]	1.60	1.46	0.677	1.96	1.25	1.00	1.09	1.47	2.08	2.77	2.30
Li [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0002	0.0001
Mg [mg/L]	0.946	1.14	0.442	0.683	0.396	0.518	0.418	0.353	0.878	1.45	1.59
Mn [mg/L]	0.00050	0.00035	0.00053	0.00021	0.00013	0.00024	0.00014	0.00013	0.00040	0.00118	0.00099
Mo [mg/L]	0.00035	0.00064	0.00018	0.00271	0.00157	0.00009	0.00012	0.00046	0.00108	0.00142	0.00095
Na [mg/L]	1.38	0.75	2.73	1.27	1.36	1.00	0.91	1.21	0.63	1.89	2.14
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0017	0.0012	0.0039	0.0026	0.0029	0.0023	0.0020	0.0019	0.0011	< 0.0009	< 0.0009
Se [mg/L]	0.00050	0.00187	< 0.00004	0.00010	0.00013	0.00014	< 0.00004	< 0.00004	0.00007	< 0.00004	< 0.00004
Si [mg/L]	1.30	1.23	4.01	5.34	5.54	4.83	4.24	2.58	1.13	1.65	1.94
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0276	0.0296	0.0120	0.0191	0.0212	0.0186	0.0155	0.0171	0.0238	0.0373	0.0428

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Analysis	12: 150769	13: 150770	14: 150783	15: 150789	16: 150792	17: 150793	18: 150794	19: 150795	20: 150797	21: 150807	22: 150808
Ti [mg/L]	0.00017	0.00011	0.00038	0.00009	0.00010	0.00009	0.00018	0.00007	0.00028	< 0.00005	< 0.00005
Tl [mg/L]	< 0.000005	< 0.000005	0.000006	0.000008	< 0.000005	0.000005	< 0.000005	< 0.000005	0.000005	0.000006	< 0.000005
U [mg/L]	< 0.000002	< 0.000002	0.000003	0.000002	0.000003	< 0.000002	< 0.000002	< 0.000002	< 0.000002	< 0.000002	0.000004
V [mg/L]	0.00509	0.00647	0.0104	0.0158	0.0277	0.0229	0.0222	0.0120	0.00188	0.00091	0.00102
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	23: 150799	24: 150802	25: 150803	26: 150811	27: 150812	28: 150813	29: 138513	30: 138552	31: 138523	32: 138558	33: 138532
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.44	9.49	9.39	9.16	9.38	9.26	9.82	9.47	9.66	9.30	9.79
pH [No unit]	7.71	7.90	7.86	7.95	7.97	8.22	7.80	7.81	8.46	8.19	7.93
Conductivity [uS/cm]	50	63	55	94	97	89	47	54	49	63	50
Alkalinity [mg/L as CaCO3]	24	30	25	42	41	41	18	23	24	35	21
SO4 [mg/L]	< 2	< 2	< 2	2	2	2	< 2	3	< 2	< 2	< 2
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.492	0.603	0.513	0.615	1.12	0.812	0.505	0.698	0.530	0.835	0.602
As [mg/L]	< 0.0002	< 0.0002	< 0.0002	0.0007	0.0021	0.0009	0.0008	< 0.0002	0.0041	< 0.0002	0.0017
Ba [mg/L]	0.00036	0.00030	0.00056	0.00155	0.00141	0.00145	0.00029	0.07690	0.00033	0.00034	0.00015
B [mg/L]	< 0.002	0.005	0.003	0.033	0.007	0.008	0.006	0.017	0.004	0.003	0.007
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	6.80	6.30	8.06	7.43	5.62	6.64	6.37	6.54	4.56	5.99	6.08
Cd [mg/L]	0.000022	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003
Co [mg/L]	< 0.000004	0.000005	< 0.000004	< 0.000004	0.000013	< 0.000004	0.000007	0.000014	0.000073	0.000009	0.000005
Cr [mg/L]	0.00016	0.00016	0.00010	< 0.00008	0.00009	< 0.00008	0.00020	< 0.00008	0.00020	0.00010	< 0.00008
Cu [mg/L]	< 0.0002	< 0.0002	0.0007	< 0.0002	0.0005	< 0.0002	0.0004	0.0004	0.0010	0.0008	0.0003

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180 300)

LR Report : ~~CA14043-OCT21~~

Analysis	23: 150799	24: 150802	25: 150803	26: 150811	27: 150812	28: 150813	29: 138513	30: 138552	31: 138523	32: 138558	33: 138532
Fe [mg/L]	< 0.007	< 0.007	< 0.007	< 0.007	0.007	< 0.007	0.009	< 0.007	0.100	< 0.007	0.009
K [mg/L]	1.70	1.28	1.28	4.02	5.32	4.01	0.248	0.423	0.055	0.187	0.165
Li [mg/L]	< 0.0001	< 0.0001	< 0.0001	0.0003	< 0.0001	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Mg [mg/L]	0.692	0.592	0.877	0.894	0.417	0.693	0.570	0.584	0.494	0.680	0.500
Mn [mg/L]	0.00025	0.00031	0.00067	0.00141	0.00080	0.00109	0.00019	0.00048	0.00221	0.00075	0.00028
Mo [mg/L]	0.00044	0.00026	0.00551	0.00090	0.00724	0.00222	0.00413	0.00392	0.00047	0.00126	0.00028
Na [mg/L]	1.11	2.34	0.64	8.33	9.84	8.72	0.82	2.42	4.76	6.75	0.67
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0011	0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.0030	0.0016	0.0013	< 0.0009	0.0029
Se [mg/L]	< 0.00004	< 0.00004	< 0.00004	0.00020	0.00007	0.00009	0.00006	< 0.00004	< 0.00004	0.00016	< 0.00004
Si [mg/L]	1.45	1.23	1.45	1.88	2.05	2.04	2.69	1.14	5.14	1.05	2.81
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0251	0.0247	0.0343	0.0300	0.0140	0.0230	0.0151	0.0341	0.00736	0.0194	0.0191
Ti [mg/L]	0.00009	0.00019	0.00006	0.00009	0.00009	0.00006	< 0.00005	< 0.00005	0.00485	< 0.00005	0.00019
Tl [mg/L]	0.000005	< 0.000005	< 0.000005	0.000005	0.000006	< 0.000005	0.000008	0.000007	< 0.000005	0.000006	< 0.000005
U [mg/L]	< 0.000002	< 0.000002	0.000003	0.000192	0.000230	0.000065	< 0.000002	< 0.000002	0.000023	< 0.000002	0.000002
V [mg/L]	0.00128	0.00239	0.00290	0.00451	0.00737	0.00370	0.0166	0.00296	0.00685	0.00297	0.0125
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	34: 139538	35: 158533	36: 87002	38: 101688	39: 104281	41: 115536	42: 124020	44: 119736	45: 129434	47: 129502	48: 129712
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.36	9.53	8.85	9.26	9.21	9.23	9.26	8.86	9.29	8.90	9.28
pH [No unit]	7.96	7.57	7.81	7.65	7.72	7.52	7.89	8.09	8.09	7.83	8.22
Conductivity [uS/cm]	65	41	163	91	100	84	99	275	112	116	95
Alkalinity [mg/L as CaCO3]	30	22	41	34	38	32	39	70	50	38	39

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : ~~CA14043-OCT21~~

Analysis	34: 139538	35: 158533	36: 87002	38: 101688	39: 104281	41: 115536	42: 124020	44: 119736	45: 129434	47: 129502	48: 129712
SO4 [mg/L]	< 2	< 2	20	6	5	3	5	< 20	3	10	3
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.00008	< 0.00005
Al [mg/L]	0.734	0.635	0.473	0.449	0.775	0.447	0.722	0.769	2.50	0.549	1.01
As [mg/L]	0.0002	0.0003	0.0011	0.0010	0.0017	0.0012	0.0043	< 0.0002	0.0005	0.0006	0.0042
Ba [mg/L]	0.00056	0.00025	0.00219	0.00075	0.00366	0.00074	0.00087	0.00068	0.00153	0.00093	0.00097
B [mg/L]	0.003	0.003	0.136	0.087	0.031	0.043	0.028	0.061	0.016	0.012	0.023
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	< 0.00001	0.00001	0.00002	0.00005	0.00003	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00001
Ca [mg/L]	6.22	6.10	18.6	8.93	8.17	8.41	9.11	16.3	5.81	11.5	7.08
Cd [mg/L]	< 0.000003	< 0.000003	0.000011	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000003	< 0.000003
Co [mg/L]	< 0.000004	< 0.000004	0.000022	0.000009	0.000029	0.000023	0.000007	0.000004	< 0.000004	0.000007	0.000011
Cr [mg/L]	0.00008	< 0.00008	0.00019	0.00016	< 0.00008	0.00010	0.00016	0.00010	< 0.00008	0.00013	0.00016
Cu [mg/L]	< 0.0002	0.0003	0.0007	0.0007	0.0005	0.0005	0.0009	< 0.0002	0.0002	0.0005	0.0005
Fe [mg/L]	< 0.007	< 0.007	< 0.007	0.010	0.018	0.047	0.030	0.008	0.007	0.013	0.036
K [mg/L]	0.177	0.272	3.73	2.09	3.81	2.06	4.20	3.13	2.94	2.28	3.04
Li [mg/L]	< 0.0001	< 0.0001	0.0013	0.0003	0.0003	0.0004	0.0003	0.0005	0.0004	0.0003	0.0004
Mg [mg/L]	0.682	0.556	1.75	0.727	0.577	0.384	0.577	1.01	0.342	0.583	0.312
Mn [mg/L]	0.00073	0.00020	0.00622	0.00306	0.00231	0.00781	0.00393	0.00674	0.00178	0.00501	0.00410
Mo [mg/L]	0.00058	0.00313	0.0533	0.0186	0.00170	0.00511	0.01196	0.00036	0.00903	0.00092	0.0101
Na [mg/L]	5.88	0.60	5.45	6.13	8.35	5.87	7.94	11.6	15.8	9.74	10.5
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.00016	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0009	0.0011	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.0013	< 0.0009	< 0.0009	< 0.0009	0.0030
Se [mg/L]	0.00008	< 0.00004	0.00052	0.00020	0.00027	< 0.00004	0.00009	0.00015	< 0.00004	0.00017	0.00014
Si [mg/L]	1.37	1.06	1.38	3.00	2.34	3.34	2.24	1.36	1.46	1.92	2.38
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0205	0.0214	0.0379	0.0162	0.0121	0.0166	0.0293	0.0257	0.0124	0.0136	0.0153
Ti [mg/L]	< 0.00005	0.00009	0.00009	0.00009	0.00028	0.00019	0.00018	0.00009	0.00009	0.00009	0.00038
Tl [mg/L]	< 0.000005	< 0.000005	0.000005	0.000007	0.000006	0.000006	< 0.000005	< 0.000005	< 0.000005	0.000005	0.000007
U [mg/L]	< 0.000002	< 0.000002	0.000057	0.000154	0.000231	0.000167	0.000125	0.000537	0.000049	0.000173	0.000213

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Analysis	34: 139538	35: 158533	36: 87002	38: 101688	39: 104281	41: 115536	42: 124020	44: 119736	45: 129434	47: 129502	48: 129712
V [mg/L]	0.00373	0.00248	0.00061	0.00130	0.00240	0.00072	0.00057	0.00049	0.00153	0.00058	0.00045
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	50: 164850	51: 173996	53: 175778	54: 185159	56: 147990	57: 147796	59: 189407	60: 196617	62: 197485	63: 193364	65: 193421
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.27	9.21	9.34	9.22	9.52	8.71	8.99	9.01	9.03	8.90	8.79
pH [No unit]	8.47	7.80	8.52	8.05	8.93	8.11	8.05	7.19	8.26	7.62	7.54
Conductivity [uS/cm]	88	99	82	81	74	139	127	39	112	128	130
Alkalinity [mg/L as CaCO3]	36	36	37	37	36	62	46	11	41	36	38
SO4 [mg/L]	5	6	2	4	< 2	5	8	< 2	5	16	13
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.827	0.614	0.916	0.610	0.901	0.410	0.927	0.680	0.878	0.658	0.558
As [mg/L]	0.0038	0.0027	0.0007	0.0007	0.0012	< 0.0002	0.0004	0.0015	0.0004	0.0050	0.0045
Ba [mg/L]	0.00061	0.00095	0.00019	0.00058	0.00052	0.00114	0.00087	0.00303	0.00167	0.00133	0.00147
B [mg/L]	0.014	0.094	0.016	0.025	0.007	0.013	0.031	0.057	0.073	0.032	0.019
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	0.000008	< 0.000007	0.000010
Bi [mg/L]	< 0.00001	0.00034	< 0.00001	< 0.00001	0.00002	0.00007	0.00001	0.00003	0.00001	< 0.00001	0.00027
Ca [mg/L]	7.69	9.67	7.65	8.26	5.42	14.8	10.6	0.24	10.6	12.2	12.2
Cd [mg/L]	< 0.000003	0.000003	< 0.000003	< 0.000003	< 0.000003	0.000003	< 0.000003	0.000006	< 0.000003	< 0.000003	0.000003
Co [mg/L]	0.000011	0.000071	0.000011	0.000007	0.000009	0.000007	< 0.000004	0.000084	< 0.000004	0.000009	0.000179
Cr [mg/L]	< 0.00008	0.00013	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00028	0.00013	< 0.00008	< 0.00008
Cu [mg/L]	0.0004	0.0015	< 0.0002	0.0006	0.0003	< 0.0002	< 0.0002	0.0013	< 0.0002	0.0004	0.0071
Fe [mg/L]	0.016	0.077	0.008	0.015	0.021	0.007	0.009	0.152	0.007	0.023	0.121
K [mg/L]	1.24	1.83	1.82	1.74	1.47	3.20	4.36	1.28	2.80	5.02	5.58
Li [mg/L]	0.0002	0.0002	0.0002	0.0001	0.0002	0.0004	0.0004	0.0002	0.0003	0.0004	0.0004

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : CA14043-OCT21

Analysis	50: 164850	51: 173996	53: 175778	54: 185159	56: 147990	57: 147796	59: 189407	60: 196617	62: 197485	63: 193364	65: 193421
Mg [mg/L]	0.360	0.335	0.641	0.389	0.187	3.55	0.596	0.076	0.548	0.741	1.23
Mn [mg/L]	0.00307	0.0107	0.00129	0.00358	0.00270	0.00756	0.00326	0.0186	0.00448	0.00486	0.0112
Mo [mg/L]	0.00054	0.00733	0.00064	0.00086	0.00051	0.00585	0.00085	0.00951	0.00045	0.0208	0.00341
Na [mg/L]	9.71	9.68	7.63	7.83	9.83	7.44	13.0	7.92	10.3	9.48	9.91
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	< 0.00009	0.00022	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.00040	< 0.00009	0.00074	0.00194
Sb [mg/L]	< 0.0009	0.0009	< 0.0009	< 0.0009	< 0.0009	0.0021	< 0.0009	< 0.0009	< 0.0009	0.0040	0.0051
Se [mg/L]	0.00015	0.00011	< 0.00004	0.00006	0.00006	0.00009	0.00015	< 0.00004	0.00008	0.00012	0.00009
Si [mg/L]	3.03	3.39	2.49	2.50	2.91	0.97	1.54	3.69	2.05	1.76	2.08
Sn [mg/L]	< 0.00006	0.00010	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	0.00019
Sr [mg/L]	0.0138	0.0127	0.0124	0.0155	0.0121	0.0334	0.0418	0.00083	0.0292	0.0134	0.0325
Ti [mg/L]	< 0.00005	0.00018	0.00019	0.00037	0.00064	0.00018	< 0.00005	0.00155	0.00019	0.00009	0.00027
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	0.000006	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	0.000005	< 0.000005
U [mg/L]	0.000079	0.000167	0.000058	0.000620	0.000153	0.000006	0.000131	0.000292	0.000261	0.000589	0.000248
V [mg/L]	0.00044	0.00070	0.00242	0.00246	0.00027	0.00049	0.00138	0.00118	0.00156	0.00006	0.00021
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	66: 194613	68: 901207	69: 901254	71: 920325	72: 920385	74: 904316	75: 904361	77: 919112	78: 919182	80: 941369	81: 946206
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.23	9.03	9.17	9.31	9.27	9.48	8.67	9.28	9.56	8.30	9.54
pH [No unit]	7.60	7.60	7.88	7.96	8.19	8.48	8.07	8.10	8.84	7.94	7.93
Conductivity [uS/cm]	93	110	85	93	98	82	186	101	84	240	92
Alkalinity [mg/L as CaCO3]	33	36	32	36	35	36	53	38	36	58	32
SO4 [mg/L]	8	5	5	5	5	< 2	16	5	3	34	3
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	Error!	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.00006	< 0.00005

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180,300)

LR Report : ~~CA14043-OCT21~~

Analysis	66: 194613	68: 901207	69: 901254	71: 920325	72: 920385	74: 904316	75: 904361	77: 919112	78: 919182	80: 941369	81: 946206
Al [mg/L]	0.673	0.541	0.554	0.692	0.578	0.681	0.459	0.766	0.845	0.322	0.578
As [mg/L]	0.0043	0.0022	0.0011	0.0010	0.0015	0.0014	< 0.0002	0.0047	0.0028	< 0.0002	0.0018
Ba [mg/L]	0.00091	0.00115	0.00136	0.00063	0.00091	0.00063	0.00051	0.00130	0.00067	0.00453	0.00108
B [mg/L]	0.011	0.043	0.160	0.051	0.054	0.136	0.103	0.167	0.048	0.010	0.057
Be [mg/L]	< 0.000007	0.000012	0.000008	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	0.00003	0.00074	0.00007	0.00001	0.00007	0.00004	0.00006	0.00011	0.00002	< 0.00001	0.00020
Ca [mg/L]	8.60	9.32	9.14	8.84	8.27	8.54	22.5	9.77	6.36	27.8	5.98
Cd [mg/L]	< 0.000003	< 0.000003	0.000006	< 0.000003	< 0.000003	0.000006	< 0.000003	< 0.000003	< 0.000003	0.000006	< 0.000003
Co [mg/L]	0.000004	0.000030	0.000056	0.000009	0.000024	0.000020	0.000025	0.000016	0.000016	0.000005	0.000025
Cr [mg/L]	< 0.00008	0.00012	0.00016	0.00025	< 0.00008	0.00013	0.00027	< 0.00008	< 0.00008	0.00010	0.00023
Cu [mg/L]	0.0004	0.0007	0.0014	0.0005	0.0009	0.0016	< 0.0002	0.0004	0.0006	0.0003	0.0010
Fe [mg/L]	0.019	0.080	0.045	0.015	0.043	0.056	< 0.007	0.013	0.030	< 0.007	0.057
K [mg/L]	1.83	2.01	2.76	2.13	2.71	2.20	0.930	2.34	1.66	10.7	0.830
Li [mg/L]	0.0003	0.0004	0.0004	0.0004	0.0004	0.0002	0.0003	0.0002	0.0001	0.0003	0.0002
Mg [mg/L]	0.381	0.399	0.385	0.561	0.442	0.389	2.73	0.511	0.296	1.55	0.262
Mn [mg/L]	0.00344	0.00855	0.00915	0.00388	0.00914	0.0138	0.00549	0.00265	0.00162	0.0176	0.00300
Mo [mg/L]	0.00361	0.00226	0.00206	0.00099	0.00322	0.00244	0.00194	0.0174	0.00190	0.00024	0.00388
Na [mg/L]	9.23	10.3	6.22	8.42	9.82	6.78	8.93	9.10	10.5	9.09	9.53
Ni [mg/L]	< 0.0001	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	< 0.00009	0.00024	0.00017	< 0.00009	0.00012	0.00050	< 0.00009	0.00068	0.00019	0.00014	0.00070
Sb [mg/L]	0.0021	0.0145	0.0011	< 0.0009	< 0.0009	< 0.0009	0.0013	0.0024	< 0.0009	0.0009	< 0.0009
Se [mg/L]	0.00006	0.00012	0.00011	0.00014	0.00006	0.00020	0.00017	0.00022	0.00009	0.00010	0.00033
Si [mg/L]	2.66	3.17	3.10	2.70	3.31	3.16	0.93	2.28	2.95	1.17	4.44
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0166	0.0184	0.0186	0.0111	0.0160	0.0102	0.0360	0.0240	0.0207	0.0421	0.00859
Ti [mg/L]	0.00064	0.00055	0.00129	0.00056	0.00093	0.00104	< 0.00005	0.00029	0.00028	0.00009	0.00077
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	0.000005	< 0.000005	< 0.000005	0.000005	0.000007	< 0.000005
U [mg/L]	0.000186	0.000348	0.000160	0.000163	0.000241	0.000887	0.000042	0.000330	0.000467	0.000047	0.000317
V [mg/L]	0.00038	0.00053	0.00123	0.00043	0.00054	0.00114	0.00056	0.00103	0.00095	0.00004	0.00036
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : CA14043-OCT21

Analysis	83: 903997	84: 127326	86: 173930	87: 946968	89: 86917	90: 101679	92: 104288	93: 104335	95: 108072	96: 108110	98: 109930
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.54	9.19	9.30	9.50	9.23	9.38	9.37	9.37	8.83	9.37	9.51
pH [No unit]	8.81	7.87	8.45	7.97	8.31	8.06	7.93	8.48	7.81	7.80	7.79
Conductivity [uS/cm]	81	112	98	86	103	102	102	106	1530	111	86
Alkalinity [mg/L as CaCO3]	35	36	38	41	45	42	43	43	47	42	35
SO4 [mg/L]	3	7	4	2	4	5	3	4	17	6	3
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.617	0.532	0.772	1.01	0.811	0.950	0.820	1.17	0.373	0.898	0.657
As [mg/L]	0.0013	0.0014	0.0009	0.0006	0.0007	0.0017	0.0018	0.0007	0.0002	0.0022	0.0040
Ba [mg/L]	0.00084	0.00079	0.00084	0.00078	0.00115	0.00066	0.00137	0.00122	0.00360	0.00096	0.00060
B [mg/L]	0.060	0.080	0.035	0.005	0.038	0.076	0.014	0.014	0.012	0.062	0.012
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	0.00003	0.00002	0.00008	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00002
Ca [mg/L]	7.83	10.8	8.88	6.79	8.33	6.75	8.26	8.00	20.8	7.64	6.34
Cd [mg/L]	< 0.000003	< 0.000003	0.000006	< 0.000003	< 0.000003	0.000012	0.000006	< 0.000003	< 0.000003	< 0.000003	0.000004
Co [mg/L]	0.000009	0.000027	0.000012	0.000007	< 0.000004	0.000025	0.000048	0.000032	0.000038	< 0.000004	0.000007
Cr [mg/L]	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00014	0.00020	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Cu [mg/L]	0.0002	0.0002	< 0.0002	0.0005	0.0002	0.0025	0.0006	0.0003	< 0.0002	0.0006	0.0005
Fe [mg/L]	0.015	0.011	< 0.007	0.012	< 0.007	0.009	0.012	0.012	< 0.007	0.010	0.010
K [mg/L]	1.72	1.88	1.05	2.67	4.08	1.75	1.95	4.04	2.43	3.90	0.899
Li [mg/L]	0.0002	0.0005	0.0003	0.0002	0.0002	0.0003	0.0002	0.0003	0.0008	0.0003	0.0002
Mg [mg/L]	0.265	0.605	0.679	0.431	1.06	0.498	0.918	0.335	1.08	0.423	0.280
Mn [mg/L]	0.00318	0.00988	0.00161	0.00153	0.00212	0.00273	0.00179	0.00182	0.00710	0.00106	0.00399
Mo [mg/L]	0.00176	0.00191	0.00054	0.00202	0.00251	0.00486	0.00185	0.00037	0.00107	0.00511	0.00083
Na [mg/L]	7.69	9.58	9.38	9.70	9.55	13.3	10.7	11.5	6.75	11.8	9.59
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	< 0.00009	0.00009	< 0.00009	< 0.00009	< 0.00009	0.00011	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0091	0.0034	0.0010	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.0010	0.0010	< 0.0009

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : CA14043-OCT21

Analysis	83: 903997	84: 127326	86: 173930	87: 946968	89: 86917	90: 101679	92: 104288	93: 104335	95: 108072	96: 108110	98: 109930
Se [mg/L]	0.00020	0.00010	0.00028	0.00015	0.00008	0.00010	0.00018	< 0.00004	0.00005	0.00006	0.00006
Si [mg/L]	3.55	2.51	2.35	2.40	1.10	2.41	2.23	2.04	1.98	2.15	3.12
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0119	0.0202	0.0115	0.00870	0.0157	0.0120	0.0141	0.0148	0.0358	0.0284	0.0155
Ti [mg/L]	0.00067	0.00019	< 0.00005	0.00019	< 0.00005	0.00019	0.00009	0.00030	0.00009	0.00037	0.00038
Tl [mg/L]	0.000006	0.000008	0.000007	0.000006	< 0.000005	< 0.000005	0.000006	0.000008	0.000006	0.000008	0.000006
U [mg/L]	0.000178	0.000352	0.000109	0.000107	0.000016	0.000288	0.000183	0.000312	0.000067	0.000303	0.000106
V [mg/L]	0.00141	0.00034	0.00132	0.00086	0.00175	0.00202	0.00179	0.00047	0.00033	0.00177	0.00036
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	99: 115436	101: 124077	102: 124142	104: 119828	105: 129313	107: 129438	108: 129738	110: 164713	111: 164809	113: 173942	114: 166329
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.30	9.58	9.75	9.46	9.41	9.49	9.29	9.29	9.57	9.49	9.36
pH [No unit]	7.77	7.82	7.82	7.76	7.86	7.80	7.72	7.85	9.10	8.10	7.85
Conductivity [uS/cm]	101	93	87	91	98	83	104	114	103	86	101
Alkalinity [mg/L as CaCO3]	36	39	36	35	42	35	34	43	35	35	43
SO4 [mg/L]	5	2	3	3	3	2	6	5	5	3	3
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.881	0.903	0.859	0.815	0.849	0.779	0.484	0.895	0.799	0.629	0.743
As [mg/L]	0.0049	0.0007	0.0008	0.0023	0.0024	0.0004	0.0021	0.0006	0.0009	0.0004	0.0002
Ba [mg/L]	0.00138	0.00096	0.00117	0.00055	0.00084	0.00117	0.00094	0.00118	0.00047	0.00089	0.00052
B [mg/L]	0.030	0.057	0.027	0.021	0.045	0.032	0.060	0.037	0.075	0.023	0.061
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	0.00025	0.00008	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00004	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	7.74	6.20	5.29	7.32	6.83	7.20	8.88	8.36	8.30	7.09	8.33

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Analysis	99: 115436	101: 124077	102: 124142	104: 119828	105: 129313	107: 129438	108: 129738	110: 164713	111: 164809	113: 173942	114: 166329
Cd [mg/L]	0.000052	< 0.000003	< 0.000003	0.000003	< 0.000003	< 0.000003	0.000004	0.000003	< 0.000003	< 0.000003	< 0.000003
Co [mg/L]	0.000033	0.000017	0.000015	0.000007	0.000014	0.000005	0.000020	0.000011	0.000045	0.000012	0.000007
Cr [mg/L]	0.00013	0.00015	0.00010	0.00013	< 0.00008	0.00010	0.00016	< 0.00008	0.00020	0.00010	< 0.00008
Cu [mg/L]	0.0006	0.0013	0.0008	0.0003	0.0004	< 0.0002	0.0005	0.0004	0.0018	0.0002	0.0004
Fe [mg/L]	0.087	0.046	0.007	0.013	0.009	0.007	0.035	0.012	0.013	< 0.007	0.007
K [mg/L]	3.18	4.14	0.561	2.24	2.10	1.19	1.28	4.73	1.30	1.33	1.42
Li [mg/L]	0.0004	0.0001	0.0002	0.0002	0.0004	0.0002	0.0004	0.0002	0.0006	0.0003	0.0004
Mg [mg/L]	0.364	0.352	0.145	0.290	0.594	0.467	0.287	0.426	0.282	0.554	1.10
Mn [mg/L]	0.00932	0.00228	0.00356	0.00421	0.00182	0.00183	0.00685	0.00410	0.00449	0.00193	0.00289
Mo [mg/L]	0.0269	0.00434	0.00163	0.00222	0.00220	0.00162	0.00056	0.00208	0.00814	0.00239	0.00246
Na [mg/L]	8.73	9.02	11.6	8.95	11.2	7.83	9.46	10.0	10.9	9.62	10.0
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	0.00038	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0071	0.0025	< 0.0009	0.0015	< 0.0009	< 0.0009	0.0015	< 0.0009	< 0.0009	< 0.0009	< 0.0009
Se [mg/L]	0.00013	0.00007	< 0.00004	0.00005	0.00019	0.00012	0.00012	0.00012	< 0.00004	0.00021	< 0.00004
Si [mg/L]	2.42	2.48	4.38	2.80	2.56	2.95	3.72	2.25	3.44	3.27	2.05
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	0.00008	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	0.00010
Sr [mg/L]	0.00957	0.0159	0.0135	0.0112	0.0109	0.0137	0.0180	0.0152	0.0246	0.0142	0.0147
Ti [mg/L]	0.00056	0.00072	< 0.00005	0.00019	0.00010	0.00010	0.00142	< 0.00005	0.00019	0.00010	< 0.00005
Tl [mg/L]	0.000007	0.000006	0.000006	0.000006	< 0.000005	0.000007	0.000009	0.000006	0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000309	0.000147	0.000068	0.000170	0.000326	0.000023	0.000254	0.000508	0.000173	0.000098	0.000053
V [mg/L]	0.00043	0.00387	0.00060	0.00049	0.00138	0.00282	0.00051	0.00055	0.00052	0.00261	0.00077
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	116: 147990	117: 920325	118:BLK: $D.I. Leachate Blank	119: 115436	121:BLK: $D.I. Leachate Blank
Sample Date & Time					
Sample weight [g]	250	250	---	250	---
Volume D.I. Water [mL]	750	750	750	750	750

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : CA14043-OCT21

Analysis	116: 147990	117: 920325	118:BLK: $D.I. Leachate Blank	119: 115436	121:BLK: $D.I. Leachate Blank
Final pH [no unit]	9.51	9.16	5.79	9.32	5.82
pH [No unit]	8.58	8.12	6.12	7.85	5.35
Conductivity [uS/cm]	70	112	< 2	93	4
Alkalinity [mg/L as CaCO3]	35	40	< 2	35	< 2
SO4 [mg/L]	< 2	7	< 2	4	< 2
Hg [mg/L]	< 0.00001	< 0.00001	0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.949	0.452	< 0.001	0.899	< 0.001
As [mg/L]	0.0007	0.0008	< 0.0002	0.0045	< 0.0002
Ba [mg/L]	0.00068	0.00060	< 0.00002	0.00116	0.00003
B [mg/L]	0.010	0.056	< 0.002	0.027	< 0.002
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	0.00002	0.00001	< 0.00001	0.00009	< 0.00001
Ca [mg/L]	5.30	10.4	< 0.01	7.62	< 0.01
Cd [mg/L]	< 0.000003	< 0.000003	< 0.000003	0.000027	< 0.000003
Co [mg/L]	< 0.000004	0.000014	< 0.000004	0.000004	0.000011
Cr [mg/L]	0.00026	0.00010	0.00012	< 0.00008	0.00012
Cu [mg/L]	0.0003	0.0004	< 0.0002	0.0005	< 0.0002
Fe [mg/L]	0.026	0.008	< 0.007	0.028	< 0.007
K [mg/L]	1.38	2.14	0.006	3.26	0.349
Li [mg/L]	0.0002	0.0004	< 0.0001	0.0004	< 0.0001
Mg [mg/L]	0.189	0.682	0.002	0.338	0.003
Mn [mg/L]	0.00372	0.00530	0.00014	0.00650	0.00036
Mo [mg/L]	0.00031	0.00116	0.00011	0.0412	0.00259
Na [mg/L]	9.44	10.00	< 0.01	9.47	< 0.01
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	0.00014	< 0.00009
Sb [mg/L]	< 0.0009	0.0009	< 0.0009	0.0057	< 0.0009
Se [mg/L]	< 0.00004	0.00038	< 0.00004	0.00012	< 0.00004
Si [mg/L]	3.25	2.76	< 0.02	2.28	< 0.02
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006

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Analysis	116: 147990	117: 920325	118:BLK: $D.I. Leachate Blank	119: 115436	121:BLK: $D.I. Leachate Blank
Sr [mg/L]	0.0111	0.0134	< 0.00002	0.00833	< 0.00002
Ti [mg/L]	0.00084	< 0.00005	< 0.00005	0.00073	< 0.00005
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000140	0.000196	< 0.000002	0.000246	< 0.000002
V [mg/L]	0.00017	0.00027	< 0.00001	0.00053	0.00001
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

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Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO, Mt. Pearl
Canada, A1N 0A1
Phone: 709-730-5046, Fax:

ABA - Modified Sobek

Project : Martathon Project - Leprechuan (121414740-180.300)

29-October-2021

Date Rec. : 04 October 2021
LR Report: **CA14044-OCT21**

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 180089	6: 181497	7: 181475	8: 185196	9: 147785	10: 147956	11: 189327	12: 196709	13: 196750	14: 170838
Sample Date & Time					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	14-Oct-21	08:50	21-Oct-21	10:47	9.81	9.73	9.32	9.35	9.82	9.87	9.57	9.76	9.72	9.25
Fizz Rate [no unit]	14-Oct-21	08:50	21-Oct-21	10:47	3	3	3	3	3	3	3	3	3	3
Sample weight [g]	21-Oct-21	08:00	22-Oct-21	14:36	1.90	1.97	1.99	2.01	2.03	1.98	1.99	1.98	2.01	2.00
HCl_add [mL]	22-Oct-21	06:06	22-Oct-21	14:36	20.00	30.00	84.00	32.00	20.00	20.00	20.00	20.00	55.00	32.00
HCl [Normality]	21-Oct-21	08:00	22-Oct-21	14:36	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	21-Oct-21	08:00	22-Oct-21	14:36	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	22-Oct-21	08:00	22-Oct-21	14:36	10.32	18.35	38.04	15.06	13.46	13.56	11.21	9.52	23.13	19.74
Final pH [no unit]	22-Oct-21	08:00	22-Oct-21	14:36	1.83	1.67	1.58	1.65	1.51	1.54	1.82	1.92	1.53	1.62
NP [t CaCO3/1000 t]	22-Oct-21	08:00	22-Oct-21	14:36	25.5	29.6	116	42.1	16.1	16.3	22.1	26.5	79.3	30.7
AP [t CaCO3/1000 t]	22-Oct-21	14:36	25-Oct-21	12:01	6.56	11.6	66.9	16.2	12.8	11.6	23.8	13.8	11.9	70.3
Net NP [t CaCO3/1000 t]	22-Oct-21	14:36	25-Oct-21	12:01	18.9	18.0	48.6	25.8	3.29	4.74	-1.65	12.8	67.4	-39.61
NP/AP [ratio]	22-Oct-21	14:36	25-Oct-21	12:01	3.89	2.56	1.73	2.59	1.26	1.41	0.93	1.93	6.68	0.44
S [%]	14-Oct-21	12:28	25-Oct-21	11:59	0.344	0.440	2.46	0.579	0.440	0.406	0.838	0.484	0.417	2.31
Acid Leachable SO4-S [%]	22-Oct-21	15:06	25-Oct-21	11:59	0.13	0.07	0.32	0.06	< 0.04	< 0.04	0.08	0.04	< 0.04	0.06
Sulphide [%]	15-Oct-21	13:03	25-Oct-21	11:56	0.21	0.37	2.14	0.52	0.41	0.37	0.76	0.44	0.38	2.25
C [%]	14-Oct-21	12:28	22-Oct-21	15:09	0.298	0.348	1.43	0.514	0.209	0.190	0.255	0.321	0.991	0.380
CO3 (HCl) [%]	26-Oct-21	07:37	26-Oct-21	13:32	1.41	1.66	7.00	2.45	0.984	0.859	1.07	1.53	4.86	1.80

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ABA - Modified Sobek

Project : Martathon Project - Leprechuan (121414740-180,300)

LR Report : ~~CA14044-OCT21~~

Analysis	15: 170881	16: 197387	17: 197528	18: 193310	19: 193448	20: 194446	21: 194591	22: 198863	23: 198912	24: 198953	25: 900047	26: 901109	27: 901269	28: 920343	29: 920417	30: 902665
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9.65	9.77	10.12	9.58	9.74	9.71	9.99	9.89	9.83	9.76	9.68	9.67	9.78	9.33	9.69	9.71
Fizz Rate [no unit]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Sample weight [g]	1.96	2.02	2.02	2.01	2.00	2.02	1.95	1.99	2.01	1.99	2.00	2.02	1.98	2.01	2.02	1.99
HCl_add [mL]	30.50	31.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	31.00	20.00	20.00	20.00	20.00	32.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	19.40	16.43	14.53	13.93	16.04	16.60	11.33	12.81	14.98	12.49	17.48	14.89	11.47	11.47	14.48	16.68
Final pH [no unit]	1.56	1.62	1.34	1.43	1.31	1.33	1.57	1.49	1.34	1.49	1.62	1.50	1.59	1.70	1.45	1.55
NP [t CaCO3/1000 t]	28.3	36.1	13.5	15.1	9.9	8.4	22.2	18.1	12.5	18.9	33.8	12.6	21.6	21.2	13.7	38.5
AP [t CaCO3/1000 t]	24.4	14.1	10.6	13.8	27.2	15.6	7.19	8.44	10.6	16.6	9.38	10.9	9.38	21.6	12.2	2.81
Net NP [t CaCO3/1000 t]	3.92	22.0	2.88	1.35	-17.29	-7.22	15.0	9.66	1.88	2.34	24.4	1.66	12.2	-0.36	1.51	35.7
NP/AP [ratio]	1.16	2.57	1.27	1.10	0.36	0.54	3.09	2.15	1.18	1.14	3.61	1.15	2.30	0.98	1.12	13.7
S [%]	0.808	0.517	0.409	0.463	0.962	0.556	0.243	0.279	0.434	0.653	0.367	0.415	0.372	0.879	0.466	0.130
Acid Leachable SO4-S [%]	< 0.04	0.07	0.07	< 0.04	0.09	0.06	< 0.04	< 0.04	0.09	0.12	0.07	0.06	0.07	0.19	0.08	0.04
Sulphide [%]	0.78	0.45	0.34	0.44	0.87	0.50	0.23	0.27	0.34	0.53	0.30	0.35	0.30	0.69	0.39	0.09
C [%]	0.347	0.449	0.154	0.173	0.120	0.109	0.274	0.204	0.142	0.211	0.410	0.144	0.249	0.270	0.142	0.460
CO3 (HCl) [%]	1.66	2.17	0.694	0.754	0.510	0.460	1.27	0.924	0.620	0.959	1.94	0.570	1.11	1.22	0.590	2.18

Analysis	31: 902763	32: 903459	33: 903514	34: 904315	35: 919036	36: 919158	37: 941285	38: 941375	39: 946271	40: 946143	41: 171238	42: 86665	43: 86666	44: 87691	45: 87684	46: 87685
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9..72	9.65	9.56	9.51	9.47	9.67	9.45	9.72	9.47	9.26	9.87	9.35	9.41	9.33	9.62	9.61
Fizz Rate [no unit]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Sample weight [g]	2.01	2.00	1.99	1.99	2.00	2.00	2.01	1.99	2.02	2.00	1.99	2.02	2.02	2.01	1.98	1.98
HCl_add [mL]	34.00	20.00	38.00	32.00	20.00	20.00	36.00	20.00	42.00	33.00	20.00	173.40	155.00	140.00	70.90	57.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	15.23	10.75	13.07	15.84	9.59	13.56	14.20	10.99	16.62	18.14	13.82	81.18	59.87	45.62	36.13	33.14

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Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : CA14044-OCT21

Analysis	31: 902763	32: 903459	33: 903514	34: 904315	35: 919036	36: 919158	37: 941285	38: 941375	39: 946271	40: 946143	41: 171238	42: 86665	43: 86666	44: 87691	45: 87684	46: 87685
Final pH [no unit]	1.61	1.68	1.89	1.66	1.90	1.36	1.63	1.62	1.73	1.66	1.40	1.65	1.73	1.80	1.56	1.53
NP [t CaCO3/1000 t]	46.7	23.1	62.6	40.6	26.0	16.1	54.2	22.6	62.8	37.2	15.5	228	236	235	87.8	60.2
AP [t CaCO3/1000 t]	4.06	11.6	7.81	9.06	17.5	21.2	25.9	10.9	15.6	66.9	17.8	19.1	49.7	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	42.6	11.5	54.8	31.5	8.50	-5.15	28.3	11.7	47.2	-29.68	-2.31	209	186	234	86.6	59.0
NP/AP [ratio]	11.5	2.00	8.01	4.48	1.49	0.76	2.09	2.07	4.02	0.56	0.87	12.0	4.74	188	70.2	48.2
S [%]	0.165	0.431	0.295	0.324	0.647	0.768	0.930	0.417	0.610	2.61	0.632	0.644	1.84	< 0.005	< 0.005	< 0.005
Acid Leachable SO4-S [%]	< 0.04	0.06	0.04	< 0.04	0.09	0.09	0.10	0.07	0.11	0.47	0.06	< 0.04	0.25	0.04	0.04	0.04
Sulphide [%]	0.13	0.37	0.25	0.29	0.56	0.68	0.83	0.35	0.50	2.14	0.57	0.61	1.59	< 0.04	< 0.04	< 0.04
C [%]	0.592	0.282	0.812	0.502	0.316	0.192	0.684	0.261	0.781	0.407	0.175	2.68	2.99	3.07	1.15	0.797
CO3 (HCl) [%]	2.90	1.33	3.99	2.43	1.54	0.874	3.35	1.22	3.84	1.95	0.814	13.3	14.8	15.3	5.67	3.92

Analysis	47: 138504	48: 138506	49: 138505	50: 138509	51: 138510	52: 101660	53: 101661	54: 138511	55: 101647	56: 138512	57: 138514	58: 138515	59: 138516	60: 138521	61: 138517	62: 138518
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9.65	9.67	9.69	9.68	9.65	9.20	9.25	9.68	9.51	9.61	9.61	9.66	9.61	9.67	9.62	9.65
Fizz Rate [no unit]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Sample weight [g]	1.99	2.00	1.99	2.01	1.98	2.01	2.01	2.02	2.00	2.01	1.98	2.00	1.99	1.98	2.00	2.02
HCl_add [mL]	53.50	55.70	60.60	61.50	58.60	102.50	138.60	60.20	63.50	83.10	70.00	60.20	63.00	76.50	57.10	58.50
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	32.42	28.42	26.04	32.56	31.96	50.97	70.76	34.62	29.53	44.28	37.47	29.40	34.66	42.22	30.57	32.07
Final pH [no unit]	1.52	1.66	1.76	1.56	1.62	1.53	1.56	1.66	1.75	1.61	1.54	1.71	1.59	1.53	1.62	1.60
NP [t CaCO3/1000 t]	53.0	68.2	86.8	72.0	67.3	128	169	63.3	84.9	96.6	82.2	77.0	71.2	86.6	66.3	65.4
AP [t CaCO3/1000 t]	1.25	1.25	1.25	1.25	1.25	22.8	21.9	1.25	30.0	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	51.8	67.0	85.6	70.8	66.0	105	147	62.0	54.9	95.4	81.0	75.8	70.0	85.4	65.0	64.2
NP/AP [ratio]	42.4	54.6	69.4	57.6	53.8	5.62	7.72	50.6	2.83	77.3	65.8	61.6	57.0	69.3	53.0	52.3
S [%]	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.823	0.792	< 0.005	1.14	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acid Leachable SO4-S [%]	0.04	0.04	0.04	0.04	0.04	0.09	0.09	0.04	0.18	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Sulphide [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.73	0.70	< 0.04	0.96	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04

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Project : Martathon Project - Leprechuan (121414740-180.300)

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Analysis	47: 138504	48: 138506	49: 138505	50: 138509	51: 138510	52: 101660	53: 101661	54: 138511	55: 101647	56: 138512	57: 138514	58: 138515	59: 138516	60: 138521	61: 138517	62: 138518
C [%]	0.682	0.916	1.20	0.980	0.910	1.75	2.29	0.874	1.15	1.59	1.30	1.17	1.00	1.32	1.03	0.844
CO3 (HCl) [%]	3.33	4.49	5.88	4.85	4.50	8.68	11.4	4.33	5.71	7.89	6.42	5.78	4.95	6.54	5.09	4.15

Analysis	63: 138519	64: 138520	65: 138522	66: 104142	67: 104144	68: 138525	69: 138526	70: 138527	71: 138528	72: 104143	73: 138501	74: 138530	75: 138531	76: 138335	77: 138560	78: 138561
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	8.93	9.61	9.65	9.59	9.45	9.62	9.63	9.50	9.61	9.48	9.59	9.50	9.62	9.15	9.61	9.04
Fizz Rate [no unit]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Sample weight [g]	2.02	1.99	2.00	2.00	2.01	1.98	1.98	2.01	1.99	2.01	1.98	2.01	2.00	2.02	2.00	2.00
HCl_add [mL]	58.50	61.20	81.30	34.50	93.10	69.20	95.00	99.40	38.10	78.40	91.00	145.00	91.60	80.30	60.00	61.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	24.24	30.76	37.23	21.00	32.28	35.75	51.07	46.54	21.23	37.92	44.40	49.58	48.79	31.86	29.26	33.42
Final pH [no unit]	1.82	1.63	1.65	1.81	1.74	1.60	1.54	1.63	1.77	1.59	1.57	1.75	1.63	1.74	1.73	1.60
NP [t CaCO3/1000 t]	84.8	76.5	110	33.7	151	84.5	111	132	42.4	101	118	237	107	120	76.8	69.0
AP [t CaCO3/1000 t]	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	83.6	75.2	109	32.4	150	83.2	110	130	41.2	99.4	116	236	106	119	75.6	67.8
NP/AP [ratio]	67.8	61.2	88.2	27.0	121	67.6	88.7	105	33.9	80.6	94.2	190	85.6	95.9	61.4	55.2
S [%]	0.016	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.010
Acid Leachable SO4-S [%]	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Sulphide [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
C [%]	1.16	1.03	1.53	0.384	2.10	1.21	1.63	1.82	0.608	1.36	1.57	3.03	1.73	1.42	1.05	0.903
CO3 (HCl) [%]	5.73	5.10	7.56	1.87	10.4	5.97	8.09	9.02	2.99	6.74	7.75	15.0	8.56	7.00	5.18	4.43

Analysis	79: 138559	80: 138536	81: 138537	82: 107412	83: 107413	84: 138529	85: 138539	86: 138540	87: 138541	88: 138542	89: 138543	90: 138544	91: 138545	92: 111136	93: 138547	94: 138548
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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LR Report : ~~CA14044-OCT21~~

Analysis	79: 138559	80: 138536	81: 138537	82: 107412	83: 107413	84: 138529	85: 138539	86: 138540	87: 138541	88: 138542	89: 138543	90: 138544	91: 138545	92: 111136	93: 138547	94: 138548
Paste pH [no unit]	9.62	9.43	9.65	9.53	9.54	9.27	9.52	9.41	9.56	9.61	9.55	9.56	9.60	9.55	9.71	9.76
Fizz Rate [no unit]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Sample weight [g]	1.99	1.98	2.00	1.99	1.99	2.01	1.99	1.98	2.00	1.98	1.98	1.99	2.01	2.01	2.01	2.00
HCl_add [mL]	40.00	85.40	106.00	178.30	160.00	120.00	80.00	100.00	76.40	82.20	84.40	54.80	93.20	42.50	73.00	75.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	22.45	42.35	58.99	73.15	71.88	51.90	38.74	46.63	41.45	47.37	49.02	36.23	57.91	27.21	40.35	40.23
Final pH [no unit]	1.79	1.56	1.53	1.66	1.61	1.66	1.69	1.68	1.57	1.60	1.56	1.65	1.51	1.53	1.63	1.60
NP [t CaCO3/1000 t]	44.1	109	118	264	221	169	104	135	87.4	88.0	89.3	46.7	87.8	38.0	81.2	86.9
AP [t CaCO3/1000 t]	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	42.8	107	116	263	220	168	102	134	86.2	86.8	88.0	45.4	86.6	36.8	80.0	85.6
NP/AP [ratio]	35.3	87.0	94.0	211	177	136	83.0	108	69.9	70.4	71.4	37.4	70.2	30.4	65.0	69.5
S [%]	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acid Leachable SO4-S [%]	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Sulphide [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
C [%]	0.607	1.48	1.80	3.64	3.14	2.24	1.41	1.94	1.18	1.23	1.17	0.511	1.40	0.463	1.10	1.21
CO3 (HCl) [%]	2.97	7.30	8.93	18.1	15.6	11.1	6.96	9.63	5.84	6.09	5.78	2.49	6.89	2.23	5.41	5.96

Analysis	95: 138549	96: 138550	97: 138334	98: 138524	99: 138551	100: 138554	101: 138553	102: 129276	103: 129277	104: 138502	105: 166245	106: 166246	107: 138503	108: 138507	109: 197133	110: 194288
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9.35	9.82	9.51	9.77	9.23	9.70	9.76	9.44	9.50	9.71	9.54	9.55	9.75	9.65	9.56	9.58
Fizz Rate [no unit]	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Sample weight [g]	1.99	2.01	1.99	2.01	2.00	2.00	2.01	2.00	2.01	1.99	1.99	2.00	2.01	2.01	2.00	1.99
HCl_add [mL]	72.00	73.00	54.20	96.00	60.00	102.80	60.00	172.10	155.20	150.00	72.80	72.00	85.00	140.00	222.20	44.20
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	28.84	35.16	29.99	57.48	25.67	52.43	32.63	82.63	72.56	68.31	36.28	38.96	44.16	77.24	101	31.70
Final pH [no unit]	1.79	1.71	1.78	1.50	1.85	1.66	1.66	1.63	1.62	1.58	1.63	1.67	1.56	1.55	1.60	1.53

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Analysis	95: 138549	96: 138550	97: 138334	98: 138524	99: 138551	100: 138554	101: 138553	102: 129276	103: 129277	104: 138502	105: 166245	106: 166246	107: 138503	108: 138507	109: 197133	110: 194288
NP [t CaCO3/1000 t]	108	94.1	60.8	95.8	85.8	126	68.1	224	206	205	91.7	82.6	102	156	304	31.4
AP [t CaCO3/1000 t]	1.25	1.25	1.25	1.25	1.25	1.25	1.25	21.6	15.9	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	107	92.8	59.6	94.6	84.6	125	66.8	202	190	204	90.4	81.4	100	155	303	30.2
NP/AP [ratio]	86.8	75.3	48.6	76.6	68.6	101	54.5	10.4	12.9	164	73.4	66.1	81.3	125	243	25.1
S [%]	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.729	0.600	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acid Leachable SO4-S [%]	0.04	0.04	0.04	0.04	0.04	0.04	0.04	< 0.04	0.09	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Sulphide [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.69	0.51	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
C [%]	1.22	1.44	0.686	1.43	1.01	1.64	0.920	3.15	2.78	2.80	1.08	0.970	1.44	2.39	4.23	0.325
CO3 (HCl) [%]	6.05	7.13	3.39	7.08	4.99	8.16	4.55	15.7	13.8	13.9	5.32	4.75	7.13	11.9	21.1	1.52

Analysis	111: 138508	112: 902411	113: 931608	114: 931605	115: 931606	116: 930688	117: 930690	118: 138546	119: 138555	120: 138557	121: 138556
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9.72	9.32	9.85	9.56	9.45	9.39	9.67	9.74	9.76	9.71	9.76
Fizz Rate [no unit]	3	3	3	3	3	3	3	3	3	3	3
Sample weight [g]	2.01	2.01	1.99	1.99	2.00	1.99	2.01	1.99	2.00	2.00	1.99
HCl_add [mL]	64.60	80.00	75.00	200.00	150.20	170.00	100.00	80.00	80.00	100.00	60.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	10.19	39.80	37.87	93.83	65.70	76.33	52.38	40.64	40.66	63.62	30.98
Final pH [no unit]	1.58	1.58	1.63	1.59	1.70	1.66	1.61	1.53	1.61	1.51	1.69
NP [t CaCO3/1000 t]	135	100	93.3	267	211	235	118	98.9	98.3	91.0	72.9
AP [t CaCO3/1000 t]	1.25	1.25	1.25	2.50	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	134	98.8	92.0	264	210	234	117	97.6	97.0	89.8	71.6
NP/AP [ratio]	108	80.0	74.6	107	169	188	94.8	79.1	78.6	72.8	58.3
S [%]	< 0.005	< 0.005	< 0.005	0.101	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acid Leachable SO4-S [%]	0.04	0.04	0.04	< 0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Sulphide [%]	< 0.04	< 0.04	< 0.04	0.08	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
C [%]	0.901	1.18	1.27	3.65	2.99	3.32	1.71	1.36	1.41	1.50	1.02

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Analysis	111: 138508	112: 902411	113: 931608	114: 931605	115: 931606	116: 930688	117: 930690	118: 138546	119: 138555	120: 138557	121: 138556
CO3 (HCl) [%]	4.39	5.83	6.28	18.1	14.9	16.5	8.47	6.73	6.99	7.42	5.02

*NP (Neutralization Potential)
= 50 x (N of HCL x Total HCL added - N NaOH x NaOH added)

Weight of Sample

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.04 will be calculated using a 0.04 value.

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0002694927

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
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Phone: 705-652-2000 FAX: 705-652-6365

09-December-2021

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO, Mt. Pearl
Canada, A1N 0A1
Phone: 709-730-5046, Fax:

Date Rec. : 04 October 2021
LR Report: **CA14045-OCT21**
Reference: Marathon Leprechaun (121414740-180-300)

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 180089	6: 181497	7: 181475	8: 185196	9: 147785	10: 147956	11: 189327	12: 196709
Sample Date & Time					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	14-Oct-21	16:09	15-Oct-21	11:57	< 0.05	< 0.05	0.44	5.2	0.06	< 0.05	0.06	< 0.05
Ag [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	0.7	0.6	1.2	2.2	0.7	< 0.5	2.8	0.6
Al [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	8500	14000	25000	9600	4300	6100	11000	8700
Au [µg/g]	08-Dec-21	22:57	09-Dec-21	12:51	---	---	---	---	---	---	---	---
Ba [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	8.7	16	17	33	12	20	24	37
Be [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	0.076	0.087	0.18	0.074	0.057	0.091	0.093	0.074
Bi [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	0.36	0.14	2.1	1.0	0.57	0.25	0.31	0.16
Ca [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	13000	15000	55000	20000	7600	8000	11000	14000
Cd [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	< 0.02	< 0.02	0.03	0.02	< 0.02	0.06	< 0.02	< 0.02
Co [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	4.6	5.5	12	3.8	1.8	0.93	4.1	3.2
Cr [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	4.8	4.0	3.1	3.0	3.7	5.8	2.3	3.1
Cu [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	3.3	2.3	1.3	3.7	9.2	14	16	5.0
Fe [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	17000	28000	62000	22000	12000	15000	24000	17000
K [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	430	810	630	490	460	570	670	770
Li [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	2	3	6	2	< 2	< 2	< 2	< 2
Mg [µg/g]	14-Oct-21	16:09	15-Oct-21	11:57	3900	6600	15000	4400	1300	1300	3900	3100
Mn [µg/g]	14-Oct-21	16:09	15-Oct-21	12:02	210	290	920	310	260	500	390	430
Mo [µg/g]	14-Oct-21	16:09	15-Oct-21	12:02	5.4	0.6	0.6	1.1	1.8	1.1	1.3	0.8
Na [µg/g]	14-Oct-21	16:09	15-Oct-21	12:02	1500	1700	1500	1800	1500	1900	1700	1800
Ni [µg/g]	14-Oct-21	16:09	15-Oct-21	12:02	0.9	0.7	0.9	0.8	0.4	0.3	0.4	0.7
P [µg/g]	14-Oct-21	16:09	15-Oct-21	12:02	150	260	290	230	39	60	160	240
Pb [µg/g]	14-Oct-21	16:09	15-Oct-21	12:03	0.95	0.46	3.7	6.8	0.69	0.34	0.61	1.9
Sb [µg/g]	14-Oct-21	16:09	15-Oct-21	12:03	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	14-Oct-21	16:09	15-Oct-21	12:03	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	14-Oct-21	16:09	15-Oct-21	12:03	< 0.5	< 0.5	0.6	1.8	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	14-Oct-21	16:09	15-Oct-21	12:03	14	15	38	19	8.8	10	13	17
Ti [µg/g]	14-Oct-21	16:09	15-Oct-21	12:03	36	39	31	41	16	29	35	20
Tl [µg/g]	14-Oct-21	16:09	15-Oct-21	12:03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	14-Oct-21	16:09	15-Oct-21	12:03	0.15	0.12	0.13	0.19	0.082	0.13	0.14	0.090
V [µg/g]	14-Oct-21	16:09	15-Oct-21	12:03	7.1	13	43	9.9	1.1	1.0	3.9	4.0
Y [µg/g]	14-Oct-21	16:09	15-Oct-21	12:04	10	10	13	8.4	3.4	9.3	7.5	7.0

OnLine LIMS

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LR Report : **CA14045-OCT21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 180089	6: 181497	7: 181475	8: 185196	9: 147785	10: 147956	11: 189327	12: 196709
Zn [µg/g]	14-Oct-21	16:09	15-Oct-21	12:04	7.0	16	32	9.6	5.6	22	14	14

Analysis	13: 196750	14: 170838	15: 170881	16: 197387	17: 197528	18: 193310	19: 193448	20: 194446	21: 194591	22: 198863	23: 198912	24: 198953	25: 900047
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	0.7	1.0	0.6	1.6	< 0.5	1.0	1.1	0.9	0.6	1.5	0.6	1.1	< 0.5
Al [µg/g]	3700	16000	9700	11000	2800	4900	3500	4600	5700	6300	4500	6300	10000
Au [µg/g]	---	---	---	---	---	---	---	---	---	---	---	---	---
Ba [µg/g]	28	58	30	16	7.1	18	16	18	15	13	6.7	14	24
Be [µg/g]	0.071	0.14	0.081	0.067	0.043	0.084	0.066	0.078	0.058	0.081	0.070	0.057	0.082
Bi [µg/g]	0.26	0.55	0.47	0.39	0.32	0.23	0.51	11	0.15	0.60	0.21	1.1	0.23
Ca [µg/g]	39000	15000	14000	18000	6600	7700	5000	4700	11000	8500	6100	8900	16000
Cd [µg/g]	0.05	0.04	0.02	0.03	< 0.02	< 0.02	< 0.02	0.11	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Co [µg/g]	2.7	4.9	3.2	4.9	0.87	1.5	2.4	1.7	0.82	0.92	0.86	0.95	2.5
Cr [µg/g]	2.1	2.6	2.8	3.0	3.0	2.0	2.0	2.9	4.0	1.9	2.4	2.4	2.2
Cu [µg/g]	2.6	220	13	5.8	2.6	15	4.0	28	15	8.8	8.4	17	8.0
Fe [µg/g]	9000	43000	23000	22000	6900	11000	13000	13000	12000	14000	11000	16000	20000
K [µg/g]	470	1100	720	430	160	810	470	770	450	420	260	450	730
Li [µg/g]	< 2	4	< 2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Mg [µg/g]	930	6200	3500	4700	200	1000	350	670	1300	1500	730	1700	3400
Mn [µg/g]	780	530	470	520	140	230	180	230	410	380	220	430	490
Mo [µg/g]	0.8	0.7	3.2	3.4	2.7	1.2	2.2	1.0	0.9	1.9	0.7	3.5	0.6
Na [µg/g]	1300	1500	1700	1700	2200	1500	2000	1600	1900	2300	2100	1500	1800
Ni [µg/g]	0.6	1.4	0.5	0.7	0.3	0.6	0.5	0.6	0.4	0.3	0.3	0.2	0.5
P [µg/g]	170	230	200	290	60	32	52	46	44	45	14	51	160
Pb [µg/g]	0.44	29	20	0.89	1.4	1.2	0.61	2.1	0.25	1.3	0.21	1.1	0.19
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	39	24	16	16	8.7	6.4	8.2	9.3	12	12	7.4	11	18
Ti [µg/g]	11	27	32	42	17	13	12	8.5	14	11	12	14	22
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.10	0.097	0.077	0.079	0.060	0.071	0.092	0.082	0.11	0.070	0.13	0.069	0.080
V [µg/g]	1.4	7.4	4.8	13	< 1	1.2	< 1	< 1	< 1	1.1	< 1	1.0	3.7
Y [µg/g]	6.8	6.7	5.0	7.8	2.8	2.2	3.6	2.9	4.7	3.8	4.3	3.1	5.0
Zn [µg/g]	1.6	20	13	17	< 0.7	1.4	< 0.7	7.4	8.1	6.5	2.6	10	16

Analysis	26: 901109	27: 901269	28: 920343	29: 920417	30: 902665	31: 902763	32: 903459	33: 903514	34: 904315	35: 919036	36: 919158	37: 941285	38: 941375
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	1.6	< 0.5	2.4	0.9	0.6	< 0.5	0.8	0.5	2.1	2.5	1.2	0.9	1.0
Al [µg/g]	6900	7400	5800	6900	7800	5200	4800	13000	9400	11000	3900	5700	7000
Au [µg/g]	---	---	---	---	---	---	---	---	---	---	---	---	---
Ba [µg/g]	33	34	36	17	24	19	22	15	20	30	240	23	22

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Analysis	26: 901109	27: 901269	28: 920343	29: 920417	30: 902665	31: 902763	32: 903459	33: 903514	34: 904315	35: 919036	36: 919158	37: 941285	38: 941375
Be [µg/g]	0.11	0.085	0.11	0.10	0.070	0.063	0.067	0.084	0.15	0.12	0.042	0.069	0.076
Bi [µg/g]	0.64	0.24	0.44	0.12	0.27	0.16	0.32	0.28	0.19	0.48	0.56	1.5	0.31
Ca [µg/g]	6000	10000	9700	6000	18000	22000	11000	29000	19000	13000	8000	26000	11000
Cd [µg/g]	< 0.02	0.03	0.27	< 0.02	0.02	0.02	0.06	0.03	0.40	0.02	< 0.02	< 0.02	< 0.02
Co [µg/g]	1.0	0.75	1.8	1.9	1.9	1.0	1.4	5.0	3.0	3.3	1.3	3.1	1.8
Cr [µg/g]	2.2	2.0	2.3	2.3	2.5	3.7	1.9	8.3	2.1	2.1	3.3	4.6	3.9
Cu [µg/g]	8.8	83	13	11	1.5	1.7	22	89	31	19	22	3.5	16
Fe [µg/g]	14000	13000	17000	16000	12000	8500	11000	22000	19000	24000	14000	17000	16000
K [µg/g]	970	1200	1500	580	420	420	900	490	640	910	310	340	670
Li [µg/g]	< 2	< 2	< 2	< 2	3	< 2	< 2	2	< 2	2	< 2	< 2	< 2
Mg [µg/g]	1100	1800	1300	1900	4100	2200	1200	8400	3500	3200	850	2900	2100
Mn [µg/g]	270	340	420	330	220	220	360	670	670	390	230	340	340
Mo [µg/g]	1.7	2.0	3.3	1.0	0.4	1.2	2.0	0.4	0.8	0.7	1.3	0.5	1.2
Na [µg/g]	1800	1700	1200	1800	1500	1500	1400	1300	1400	1500	1700	1100	1400
Ni [µg/g]	0.2	0.3	0.6	0.5	1.0	1.0	0.5	2.2	0.8	1.4	0.7	1.6	0.4
P [µg/g]	38	87	48	45	260	120	30	220	180	64	42	65	31
Pb [µg/g]	0.28	0.49	0.64	0.25	1.2	0.82	0.33	0.27	0.45	0.77	37	0.99	0.88
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	11	12	12	8.4	18	17	12	22	20	18	13	26	16
Ti [µg/g]	23	31	11	14	17	14	11	21	24	16	11	9.3	15
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.19	0.10	0.15	0.11	0.14	0.17	0.092	0.069	0.076	0.35	0.11	0.11	0.19
V [µg/g]	< 1	1.8	1.3	< 1	9.4	2.6	1.5	20	3.8	10	< 1	2.0	1.7
Y [µg/g]	4.9	5.3	4.1	3.7	12	11	3.2	4.5	4.5	18	3.0	6.2	4.0
Zn [µg/g]	7.8	9.8	19	11	5.1	2.6	7.2	19	31	17	4.1	4.4	11

Analysis	39: 946271	40: 946143	41: 171238	42: 86665	43: 86666	44: 87691	45: 87684	46: 87685	47: 138504	48: 138506	49: 138505	50: 138509	51: 138510	52: 101660
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	0.06	< 0.05	0.78	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	0.6	1.6	0.8	1.7	2.3	1.7	1.6	1.7	1.1	1.6	2.1	2.2	0.9	1.3
Al [µg/g]	14000	17000	4100	38000	26000	16000	13000	15000	15000	13000	10000	13000	14000	16000
Au [µg/g]	---	---	---	0.02	0.16	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03
Ba [µg/g]	19	31	10	78	66	85	97	120	93	96	88	94	110	86
Be [µg/g]	0.11	0.10	0.055	0.26	0.27	0.16	0.27	0.27	0.26	0.30	0.22	0.25	0.28	0.27
Bi [µg/g]	0.17	0.99	0.40	< 0.09	0.28	0.09	0.16	0.19	0.23	0.23	0.16	0.16	0.22	0.11
Ca [µg/g]	30000	17000	7200	90000	110000	92000	29000	22000	16000	22000	26000	23000	21000	53000
Cd [µg/g]	0.03	0.02	< 0.02	0.09	0.15	0.07	0.09	0.08	0.04	0.06	0.05	0.10	0.07	0.03
Co [µg/g]	8.6	21	1.8	25	17	20	11	12	11	11	10	11	11	17
Cr [µg/g]	37	1.3	4.2	50	20	34	18	20	19	18	19	22	21	21
Cu [µg/g]	6.3	14	19	30	13	5.1	23	31	35	47	20	23	30	130
Fe [µg/g]	29000	49000	12000	56000	40000	46000	31000	32000	30000	28000	27000	31000	30000	40000
K [µg/g]	530	1000	370	1300	1600	1200	2900	2800	3400	2900	2800	2700	3400	1400
Li [µg/g]	3	3	< 2	12	8	6	5	6	13	5	6	9	7	6
Mg [µg/g]	7800	6500	1100	30000	17000	24000	15000	12000	14000	12000	13000	15000	13000	15000
Mn [µg/g]	720	570	210	1000	1100	1100	1100	860	990	910	1100	850	1000	770
Mo [µg/g]	0.4	2.1	1.2	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1

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LR Report : **CA14045-OCT21**

Analysis	39: 946271	40: 946143	41: 171238	42: 86665	43: 86666	44: 87691	45: 87684	46: 87685	47: 138504	48: 138506	49: 138505	50: 138509	51: 138510	52: 101660
Na [µg/g]	1500	1400	1700	2400	2700	1800	1400	1400	1100	1400	1200	1200	1200	1200
Ni [µg/g]	9.2	1.0	1.5	28	16	25	18	19	20	20	17	21	21	20
P [µg/g]	40	350	33	510	680	660	610	570	560	440	490	540	510	430
Pb [µg/g]	0.70	0.47	0.12	2.4	6.5	2.2	2.6	2.4	3.8	2.9	3.3	3.1	3.7	38
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	31	17	9.5	89	140	81	51	43	48	52	50	40	60	65
Ti [µg/g]	27	40	9.2	31	21	270	440	450	410	390	470	440	340	100
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.042	0.038	0.058	0.045	0.047	0.044	0.055	< 0.02
U [µg/g]	0.23	0.10	0.067	0.20	0.25	0.27	0.71	0.56	0.60	0.79	0.77	0.62	0.75	0.34
V [µg/g]	38	16	< 1	100	31	78	41	44	41	38	37	44	41	45
Y [µg/g]	5.5	7.0	2.8	8.0	11	8.1	5.1	4.8	3.9	4.1	4.2	3.8	4.3	9.7
Zn [µg/g]	24	22	3.3	47	26	40	50	57	57	52	44	58	51	33

Analysis	53: 101661	54: 138511	55: 101647	56: 138512	57: 138514	58: 138515	59: 138516	60: 138521	61: 138517	62: 138518	63: 138519	64: 138520	65: 138522
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	1.4	1.0	1.8	1.4	1.0	1.0	1.3	1.6	1.1	1.9	2.2	1.7	1.6
Al [µg/g]	19000	16000	15000	15000	10000	14000	13000	13000	12000	14000	10000	12000	9900
Au [µg/g]	< 0.02	< 0.02	0.08	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	45	120	110	95	94	100	130	95	86	100	97	87	110
Be [µg/g]	0.20	0.30	0.32	0.31	0.24	0.26	0.30	0.28	0.27	0.28	0.18	0.30	0.26
Bi [µg/g]	< 0.09	0.15	0.27	0.31	0.11	0.18	0.20	0.17	0.19	0.12	0.18	0.16	0.14
Ca [µg/g]	67000	19000	27000	33000	29000	24000	22000	30000	20000	20000	26000	24000	33000
Cd [µg/g]	0.04	0.04	0.07	0.09	0.09	0.06	0.07	0.06	0.07	0.06	0.06	0.06	0.09
Co [µg/g]	22	12	14	12	11	11	11	11	10	11	9.8	10	12
Cr [µg/g]	18	20	21	20	19	20	21	22	17	23	18	17	23
Cu [µg/g]	26	18	56	140	16	28	25	35	24	17	42	20	21
Fe [µg/g]	45000	31000	37000	37000	30000	30000	28000	30000	27000	29000	26000	27000	31000
K [µg/g]	1300	3900	3300	2800	2800	3100	4000	2600	3100	3300	2700	2900	2800
Li [µg/g]	7	7	5	5	7	13	8	4	10	11	6	6	5
Mg [µg/g]	23000	12000	15000	15000	9400	14000	13000	13000	13000	13000	14000	13000	15000
Mn [µg/g]	900	900	840	1100	1200	910	1200	1100	1100	980	1100	1100	1400
Mo [µg/g]	< 0.1	0.1	0.2	0.3	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Na [µg/g]	1400	1500	1300	1400	1300	1200	1200	1500	1100	1100	1100	1100	1200
Ni [µg/g]	20	19	27	17	18	20	20	17	18	19	16	18	17
P [µg/g]	740	500	630	660	520	510	500	550	500	510	490	460	550
Pb [µg/g]	1.9	3.3	7.5	2.6	3.5	3.2	4.6	2.5	3.8	2.5	3.1	2.7	3.2
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	68	66	54	61	54	58	59	53	51	36	46	46	55
Ti [µg/g]	22	270	40	170	370	370	410	450	380	430	380	390	470
Tl [µg/g]	< 0.02	0.060	0.048	0.039	0.042	0.047	0.068	0.037	0.052	0.052	0.042	0.048	0.044
U [µg/g]	0.21	0.73	1.0	0.78	0.65	0.59	0.80	0.76	0.75	0.73	0.73	0.84	0.63
V [µg/g]	56	43	32	50	39	37	40	46	36	40	34	36	43
Y [µg/g]	7.2	4.2	5.1	4.6	4.9	4.9	4.4	5.4	3.9	4.8	4.9	4.8	4.7

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LR Report : **CA14045-OCT21**

Analysis	53: 101661	54: 138511	55: 101647	56: 138512	57: 138514	58: 138515	59: 138516	60: 138521	61: 138517	62: 138518	63: 138519	64: 138520	65: 138522
Zn [µg/g]	38	52	48	52	49	61	49	48	52	55	45	48	46

Analysis	66: 104142	67: 104144	68: 138525	69: 138526	70: 138527	71: 138528	72: 104143	73: 138501	74: 138530	75: 138531	76: 138335	77: 138560	78: 138561
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	1.3	1.5	1.3	1.9	2.0	1.3	1.7	1.8	1.3	1.9	1.6	1.5	1.8
Al [µg/g]	19000	11000	11000	9800	12000	16000	13000	15000	10000	8800	36000	12000	14000
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	100	45	94	120	98	81	82	59	47	100	49	98	120
Be [µg/g]	0.25	0.19	0.26	0.24	0.26	0.33	0.26	0.30	0.12	0.21	0.17	0.25	0.24
Bi [µg/g]	0.14	< 0.09	0.20	0.13	0.17	0.15	0.15	< 0.09	< 0.09	< 0.09	0.15	0.18	0.14
Ca [µg/g]	11000	50000	28000	40000	45000	17000	37000	41000	88000	45000	55000	22000	21000
Cd [µg/g]	0.03	0.04	0.06	0.09	0.08	0.05	0.04	0.05	0.06	0.05	0.04	0.06	0.05
Co [µg/g]	12	18	12	12	11	13	13	21	19	11	21	10	12
Cr [µg/g]	24	30	19	15	17	26	23	43	27	16	46	16	19
Cu [µg/g]	34	2.8	32	19	29	24	29	2.7	22	6.0	100	26	25
Fe [µg/g]	33000	37000	30000	33000	29000	33000	31000	40000	38000	31000	51000	28000	28000
K [µg/g]	2700	770	2800	2800	2700	2500	1900	1400	880	1000	760	2800	2700
Li [µg/g]	6	5	5	4	5	6	4	7	4	3	15	9	8
Mg [µg/g]	14000	22000	12000	14000	17000	13000	14000	19000	17000	12000	23000	14000	14000
Mn [µg/g]	520	800	1000	1200	1500	630	790	780	970	880	860	1100	970
Mo [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Na [µg/g]	1400	890	1400	1700	1300	1400	1500	1900	2300	2000	1400	1100	1100
Ni [µg/g]	22	22	18	14	15	26	23	32	20	14	29	15	18
P [µg/g]	550	530	540	720	530	570	530	470	470	660	690	500	530
Pb [µg/g]	1.8	2.0	3.1	3.6	3.2	2.4	2.3	2.1	1.9	1.7	1.2	2.9	2.8
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	31	51	50	61	74	39	47	49	62	42	59	47	43
Ti [µg/g]	370	440	440	600	320	390	330	450	430	520	54	370	340
Tl [µg/g]	0.035	< 0.02	0.047	0.044	0.041	0.030	0.023	< 0.02	< 0.02	< 0.02	< 0.02	0.049	0.045
U [µg/g]	0.59	0.26	0.55	0.64	0.65	0.78	0.50	0.42	0.31	0.57	0.23	0.75	0.84
V [µg/g]	48	53	38	47	33	46	45	67	63	47	70	35	37
Y [µg/g]	3.7	5.5	3.9	5.7	5.6	4.2	4.7	3.8	7.1	6.8	11	4.1	5.0
Zn [µg/g]	61	55	53	43	51	66	55	73	32	45	51	50	53

Analysis	79: 138559	80: 138536	81: 138537	82: 107412	83: 107413	84: 138529	85: 138539	86: 138540	87: 138541	88: 138542	89: 138543	90: 138544	91: 138545
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	1.1	1.9	1.8	1.7	1.2	1.3	1.3	1.5	2.4	1.1	1.7	1.6	1.0
Al [µg/g]	12000	11000	10000	15000	15000	21000	15000	19000	11000	14000	16000	23000	16000
Au [µg/g]	0.03	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	110	95	65	38	40	44	100	65	97	130	140	150	140

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LR Report : **CA14045-OCT21**

Analysis	79: 138559	80: 138536	81: 138537	82: 107412	83: 107413	84: 138529	85: 138539	86: 138540	87: 138541	88: 138542	89: 138543	90: 138544	91: 138545
Be [µg/g]	0.28	0.31	0.32	0.15	0.15	0.41	0.23	0.18	0.23	0.32	0.27	0.42	0.34
Bi [µg/g]	0.39	0.27	0.10	< 0.09	< 0.09	< 0.09	0.17	< 0.09	0.19	0.11	0.24	0.18	0.13
Ca [µg/g]	14000	40000	40000	85000	72000	83000	34000	55000	27000	27000	26000	18000	35000
Cd [µg/g]	0.03	0.10	0.04	0.07	0.06	0.03	0.07	0.06	0.11	0.06	0.08	0.02	0.08
Co [µg/g]	8.9	12	12	25	22	20	13	22	12	10	12	13	13
Cr [µg/g]	20	17	22	34	47	38	19	42	16	16	19	20	18
Cu [µg/g]	56	41	14	1.1	1.1	6.4	18	2.4	20	12	29	30	14
Fe [µg/g]	26000	32000	34000	48000	46000	42000	33000	46000	30000	28000	29000	36000	33000
K [µg/g]	3000	2500	1800	1100	1100	1200	2900	1100	3100	4000	4300	3800	4000
Li [µg/g]	8	5	3	5	5	10	5	7	7	6	9	7	7
Mg [µg/g]	8500	12000	17000	36000	30000	17000	15000	20000	12000	12000	14000	14000	16000
Mn [µg/g]	640	1500	730	1400	1300	1100	1100	850	1400	1000	1100	580	1400
Mo [µg/g]	< 0.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.6	< 0.1	< 0.1	< 0.1	< 0.1
Na [µg/g]	1400	1300	2100	2400	2300	1400	1800	2100	1400	2200	1600	2000	1600
Ni [µg/g]	15	16	19	34	32	24	18	26	18	15	20	18	19
P [µg/g]	490	560	750	800	570	540	640	720	470	480	490	890	550
Pb [µg/g]	2.9	3.1	2.6	2.1	1.8	1.7	2.2	2.2	5.6	4.8	3.7	2.5	3.6
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	47	65	69	77	67	110	51	67	64	74	53	44	72
Ti [µg/g]	380	360	460	120	60	300	430	400	330	360	380	440	360
Tl [µg/g]	0.044	0.036	0.020	< 0.02	< 0.02	< 0.02	0.040	< 0.02	0.050	0.060	0.069	0.054	0.058
U [µg/g]	0.62	0.85	0.39	0.12	0.13	0.36	0.46	0.37	0.74	0.73	0.68	0.65	0.59
V [µg/g]	35	40	53	77	70	73	45	69	34	41	38	58	45
Y [µg/g]	4.1	4.4	4.8	6.1	5.2	9.3	4.2	7.0	4.6	5.0	4.5	4.7	4.3
Zn [µg/g]	40	53	38	55	49	38	68	43	49	46	55	61	62

Analysis	92: 111136	93: 138547	94: 138548	95: 138549	96: 138550	97: 138334	98: 138524	99: 138551	100: 138554	101: 138553	102: 129276	103: 129277	104: 138502
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	1.2	1.3	1.0	1.9	1.3	1.8	1.5	3.1	2.4	1.5	1.1	1.0	1.1
Al [µg/g]	16000	16000	13000	26000	13000	33000	11000	22000	23000	16000	22000	27000	16000
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	100	130	120	76	110	69	110	92	84	130	39	39	41
Be [µg/g]	0.28	0.34	0.26	0.54	0.29	0.24	0.31	0.49	0.25	0.37	0.19	0.26	0.12
Bi [µg/g]	0.15	0.14	0.21	< 0.09	0.28	0.30	0.15	0.09	< 0.09	0.14	< 0.09	< 0.09	< 0.09
Ca [µg/g]	14000	28000	26000	44000	31000	29000	31000	38000	43000	22000	78000	84000	74000
Cd [µg/g]	0.04	0.07	0.07	0.05	0.08	< 0.02	0.08	0.06	0.04	0.06	0.06	0.07	0.06
Co [µg/g]	10	12	10	17	11	21	12	14	22	12	26	25	26
Cr [µg/g]	19	21	18	39	17	37	19	22	46	23	28	38	27
Cu [µg/g]	14	18	35	1.9	56	78	19	11	1.0	17	7.9	11	5.4
Fe [µg/g]	30000	31000	28000	39000	28000	44000	29000	29000	42000	31000	50000	45000	46000
K [µg/g]	3000	4100	3400	2000	3400	1400	3600	2200	2300	3900	1200	1100	1000
Li [µg/g]	6	8	5	10	5	14	4	13	11	9	9	12	6
Mg [µg/g]	8900	12000	14000	20000	15000	19000	13000	18000	28000	13000	31000	28000	25000
Mn [µg/g]	850	1200	1200	790	1300	520	1400	1100	880	1100	1600	1500	1400
Mo [µg/g]	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

OnLine LIMS

0002739016

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LR Report : **CA14045-OCT21**

Analysis	92: 111136	93: 138547	94: 138548	95: 138549	96: 138550	97: 138334	98: 138524	99: 138551	100: 138554	101: 138553	102: 129276	103: 129277	104: 138502
Na [µg/g]	1400	1900	1400	1600	1800	2400	1700	1100	2300	1400	2500	2500	2800
Ni [µg/g]	18	19	17	30	15	28	17	19	30	22	22	23	31
P [µg/g]	520	480	440	640	440	830	620	590	540	490	730	440	420
Pb [µg/g]	1.9	3.7	3.1	2.3	6.9	1.8	3.9	2.5	2.6	3.3	1.0	1.2	1.7
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	33	58	63	79	83	65	60	47	60	50	78	95	65
Ti [µg/g]	160	410	350	410	310	240	400	240	400	340	23	18	130
Tl [µg/g]	0.040	0.067	0.053	0.026	0.053	< 0.02	0.063	0.031	0.030	0.060	< 0.02	< 0.02	< 0.02
U [µg/g]	0.64	0.54	0.57	0.65	0.68	0.35	0.54	0.31	0.43	0.72	0.19	0.20	0.20
V [µg/g]	38	45	34	56	36	64	42	47	76	41	62	44	66
Y [µg/g]	5.3	4.3	3.9	6.3	4.1	8.8	4.2	10	5.5	4.6	6.5	6.8	5.9
Zn [µg/g]	51	53	48	58	48	57	46	54	55	57	48	49	52

Analysis	105: 166245	106: 166246	107: 138503	108: 138507	109: 197133	110: 194288	111: 138508	112: 902411	113: 931608	114: 931605	115: 931606	116: 930688	117: 930690
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	2.7	1.9	1.8	1.7	1.2	1.0	1.1	0.9	1.6	1.0	0.9	1.2	2.0
Al [µg/g]	33000	37000	13000	11000	16000	20000	15000	16000	15000	17000	19000	34000	22000
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.44	< 0.02	< 0.02	< 0.02
Ba [µg/g]	81	84	150	130	38	120	140	93	78	52	300	51	72
Be [µg/g]	0.24	0.23	0.27	0.32	0.17	0.36	0.33	0.53	0.31	0.16	0.17	0.32	0.42
Bi [µg/g]	< 0.09	< 0.09	0.12	0.11	0.24	0.28	0.25	< 0.09	0.12	0.20	< 0.09	< 0.09	< 0.09
Ca [µg/g]	38000	36000	32000	52000	110000	12000	21000	45000	32000	89000	73000	120000	55000
Cd [µg/g]	0.04	0.03	0.14	0.16	0.05	0.03	0.04	0.04	0.04	0.06	0.05	0.08	0.06
Co [µg/g]	27	27	11	12	27	11	10	8.9	10	27	26	28	14
Cr [µg/g]	49	57	16	19	23	29	17	11	31	34	41	47	42
Cu [µg/g]	1.9	0.7	12	13	43	13	34	24	25	150	2.1	11	7.9
Fe [µg/g]	50000	51000	29000	30000	46000	36000	27000	29000	38000	46000	46000	52000	47000
K [µg/g]	1700	2000	3700	3700	1200	4000	3700	2600	2200	1500	1300	1300	1800
Li [µg/g]	15	15	6	4	6	9	7	6	4	7	9	15	7
Mg [µg/g]	27000	25000	13000	21000	39000	9600	12000	8800	12000	36000	30000	36000	19000
Mn [µg/g]	800	640	1400	2100	2400	660	1000	1200	840	1900	1400	2000	1100
Mo [µg/g]	0.1	< 0.1	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Na [µg/g]	2000	2600	2000	1500	2400	1400	1600	1100	3100	2500	2200	2400	3200
Ni [µg/g]	32	34	15	12	26	21	16	13	16	27	32	35	22
P [µg/g]	820	640	540	430	490	470	480	520	690	590	540	710	840
Pb [µg/g]	2.1	2.8	4.7	4.9	1.8	2.0	3.2	1.8	2.3	2.1	2.0	3.1	2.6
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	55	73	80	90	98	32	53	61	62	100	110	140	77
Ti [µg/g]	300	320	290	210	210	120	270	31	640	99	140	370	990
Tl [µg/g]	< 0.02	0.022	0.062	0.063	< 0.02	0.051	0.057	0.035	0.023	< 0.02	< 0.02	< 0.02	0.020
U [µg/g]	0.26	0.20	0.67	0.70	0.11	0.66	0.63	0.50	0.75	0.12	0.14	0.28	0.92
V [µg/g]	87	92	37	31	64	49	37	33	53	65	73	95	76
Y [µg/g]	7.6	6.3	5.0	4.3	5.4	5.1	4.0	6.2	5.0	4.8	5.3	10	8.7

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LR Report : **CA14045-OCT21**

Analysis	105: 166245	106: 166246	107: 138503	108: 138507	109: 197133	110: 194288	111: 138508	112: 902411	113: 931608	114: 931605	115: 931606	116: 930688	117: 930690
Zn [µg/g]	84	66	47	54	55	56	47	40	41	53	57	58	57

Analysis	118: 138546	119: 138555	120: 138557	121: 138556
Sample Date & Time	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1
As [µg/g]	1.3	1.1	1.0	0.8
Al [µg/g]	19000	17000	19000	18000
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	110	140	170	160
Be [µg/g]	0.39	0.37	0.48	0.38
Bi [µg/g]	0.20	0.15	0.09	0.18
Ca [µg/g]	37000	35000	38000	25000
Cd [µg/g]	0.06	0.07	0.13	0.07
Co [µg/g]	12	14	14	12
Cr [µg/g]	25	19	30	26
Cu [µg/g]	80	29	12	26
Fe [µg/g]	42000	36000	40000	32000
K [µg/g]	2400	3800	4600	4400
Li [µg/g]	5	7	9	10
Mg [µg/g]	16000	17000	17000	15000
Mn [µg/g]	910	1300	1400	1200
Mo [µg/g]	< 0.1	< 0.1	< 0.1	< 0.1
Na [µg/g]	2900	2200	2200	1700
Ni [µg/g]	15	21	24	22
P [µg/g]	840	530	560	540
Pb [µg/g]	2.6	4.0	5.5	4.1
Sb [µg/g]	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	2	< 0.5
Sr [µg/g]	76	95	100	73
Ti [µg/g]	670	580	540	510
Tl [µg/g]	0.031	0.060	0.071	0.069
U [µg/g]	1.0	0.90	1.1	1.0
V [µg/g]	69	51	55	44
Y [µg/g]	7.0	4.8	6.9	5.2
Zn [µg/g]	49	59	54	59

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

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Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO, Mt. Pearl
Canada, A1N 0A1
Phone: 709-730-5046, Fax:

SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

18-November-2021

Date Rec. : 04 October 2021
LR Report: **CA14046-OCT21**

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 180089	6: 181497	8: 185196	9: 147785	11: 189327	12: 196709	14: 170838	15: 170881	17: 197528
Sample weight [g]	04-Nov-21	08:50	05-Nov-21	10:08	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	04-Nov-21	08:50	05-Nov-21	10:08	750	750	750	750	750	750	750	750	750
Final pH [no unit]	05-Nov-21	08:43	05-Nov-21	10:08	9.36	9.33	9.35	9.31	9.01	9.32	8.52	9.09	9.46
pH [No unit]	20-Oct-21	09:58	15-Nov-21	11:04	8.07	8.10	8.33	8.50	8.24	8.35	8.28	8.36	8.75
Conductivity [uS/cm]	20-Oct-21	09:58	15-Nov-21	11:04	90	87	90	91	122	104	186	110	83
Alkalinity [mg/L as CaCO3]	20-Oct-21	09:58	15-Nov-21	11:04	39	37	37	43	41	42	59	43	37
Sulphate [mg/L]	20-Oct-21	16:22	09-Nov-21	16:39	3	4	3	3	8	4	20	5	2
Mercury [mg/L]	12-Nov-21	08:00	11-Nov-21	14:14	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.481	0.875	1.000	0.484	0.545	0.820	0.360	0.650	0.560
Arsenic [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.0009	0.0008	0.0009	0.0025	0.0011	0.0018	0.0002	0.0005	0.0010
Barium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.00102	0.00042	0.00033	0.00116	0.00138	0.00159	0.00240	0.00104	0.00135
Boron [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.016	0.016	0.008	0.034	0.013	0.052	0.040	0.042	0.104
Beryllium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.000014	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	0.000012
Bismuth [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.00001	< 0.00001	< 0.00001	0.00002	0.00002	0.00001	< 0.00001	0.00001	0.00022
Calcium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	7.08	6.89	6.90	8.93	11.3	7.72	18.0	9.54	6.05
Cadmium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.000003	0.000004	0.000004	< 0.000003	< 0.000003	0.000016	< 0.000003	< 0.000003	< 0.000003
Cobalt [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.000004	0.000008	0.000017	0.000011	0.000011	0.000019	< 0.000004	0.000015	0.000032
Chromium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00012	0.00009	< 0.00008	< 0.00008	0.00011
Copper [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.0002	< 0.0002	0.0005	0.0005	0.0003	0.0003	< 0.0002	0.0007	0.0008
Iron [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.007	< 0.007	< 0.007	0.017	0.012	0.016	< 0.007	< 0.007	0.057

OnLine LIMS

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180300)

LR Report : ~~CA14046-OCT21~~

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 180089	6: 181497	8: 185196	9: 147785	11: 189327	12: 196709	14: 170838	15: 170881	17: 197528
Potassium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	1.61	1.29	1.10	2.12	2.13	3.09	3.55	1.88	0.386
Lithium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Magnesium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.484	0.478	0.567	0.808	0.782	0.536	2.06	0.682	0.171
Manganese [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.00126	0.00103	0.00132	0.00806	0.00480	0.00266	0.0114	0.00367	0.00763
Molybdenum [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.00130	0.00045	0.00069	0.00078	0.00075	0.00101	0.00190	0.00319	0.00057
Sodium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	8.36	9.17	9.75	8.02	9.95	11.6	12.7	11.0	11.4
Nickel [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Lead [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.00080
Antimony [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	< 0.0009	< 0.0009	< 0.0009	0.0012	0.0010	< 0.0009	0.0009	< 0.0009	< 0.0009
Selenium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	0.00008	< 0.00004	< 0.00004	< 0.00004	0.00012	0.00009	0.00007	< 0.00004	0.00008
Silicon [mg/L]	21-Oct-21	13:30	11-Nov-21	14:14	3.41	2.65	2.49	3.68	2.27	3.02	1.80	2.42	6.05
Tin [mg/L]	21-Oct-21	13:30	11-Nov-21	14:19	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	0.00072	< 0.00006	0.00010
Strontium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:19	0.00894	0.00847	0.0124	0.00868	0.0182	0.0132	0.0320	0.0145	0.00928
Titanium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:19	0.00014	0.00085	< 0.00005	0.00071	0.00027	0.00043	< 0.00005	0.00015	0.00243
Thallium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:19	0.000016	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
Uranium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:19	0.000205	0.000079	0.000049	0.000340	0.000201	0.000242	0.000097	0.000233	0.000188
Vanadium [mg/L]	21-Oct-21	13:30	11-Nov-21	14:19	0.00203	0.00228	0.00301	0.00081	0.00031	0.00197	0.00016	0.00078	0.00048
Zinc [mg/L]	21-Oct-21	13:30	11-Nov-21	14:19	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002

Analysis	18: 193310	20: 194446	21: 194591	23: 198912	24: 198953	26: 901109	27: 901269	29: 920417	30: 902665	32: 903459	33: 903514	35: 919036	36: 919158
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	8.96	9.26	9.52	9.32	9.39	9.38	9.43	9.49	9.59	9.33	9.37	9.23	9.39
pH [No unit]	8.16	7.86	8.67	7.85	8.48	8.00	7.96	8.36	8.90	8.54	8.50	8.39	8.48
Conductivity [uS/cm]	116	102	84	93	92	86	93	78	70	98	92	101	98
Alkalinity [mg/L as CaCO3]	38	36	37	34	38	35	41	35	37	48	44	42	36
Sulphate [mg/L]	17	4	< 2	4	4	3	4	2	< 2	4	3	4	7
Mercury [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum [mg/L]	0.390	0.572	0.756	0.464	0.824	0.915	1.23	0.594	0.964	0.929	1.11	1.05	0.675
Arsenic [mg/L]	0.0016	0.0016	0.0013	0.0013	0.0026	0.0037	0.0011	0.0015	0.0011	0.0028	0.0011	0.0021	0.0020
Barium [mg/L]	0.00081	0.00126	0.00091	0.00072	0.00078	0.00115	0.00083	0.00064	0.00072	0.00080	0.00033	0.00138	0.123
Boron [mg/L]	0.074	0.035	0.022	0.016	0.012	0.021	0.006	0.015	0.009	0.043	0.012	0.010	0.052

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180300)

LR Report : CA14046-OCT21

Analysis	18: 193310	20: 194446	21: 194591	23: 198912	24: 198953	26: 901109	27: 901269	29: 920417	30: 902665	32: 903459	33: 903514	35: 919036	36: 919158
Beryllium [mg/L]	< 0.000007	0.000009	< 0.000007	0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	0.000007	< 0.000007	0.000007	0.000016
Bismuth [mg/L]	< 0.00001	0.00003	< 0.00001	< 0.00001	< 0.00001	0.00004	< 0.00001	< 0.00001	< 0.00001	0.00001	< 0.00001	< 0.00001	0.00011
Calcium [mg/L]	11.7	7.36	6.12	7.11	6.20	5.26	5.78	5.14	5.30	8.31	7.23	7.10	9.33
Cadmium [mg/L]	< 0.000003	0.000004	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000004	< 0.000003	0.000004	< 0.000003	< 0.000003	< 0.000003	< 0.000003
Cobalt [mg/L]	0.000019	0.000018	0.000008	0.000015	0.000018	< 0.000004	< 0.000004	< 0.000004	< 0.000004	< 0.000004	0.000027	0.000015	0.000082
Chromium [mg/L]	< 0.00008	< 0.00008	0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00011	< 0.00008
Copper [mg/L]	0.0005	0.0029	0.0002	0.0003	0.0002	< 0.0002	0.0002	0.0006	< 0.0002	0.0003	< 0.0002	< 0.0002	0.0028
Iron [mg/L]	< 0.007	0.058	0.048	0.032	0.033	0.028	0.015	0.031	< 0.007	0.008	< 0.007	0.025	0.093
Potassium [mg/L]	2.86	4.05	1.57	0.986	1.49	3.02	3.13	1.48	0.871	3.88	1.42	5.08	1.90
Lithium [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Magnesium [mg/L]	0.523	0.264	0.245	0.429	0.315	0.244	0.240	0.356	0.307	0.429	0.746	0.548	0.335
Manganese [mg/L]	0.00622	0.0129	0.00365	0.00464	0.00483	0.00301	0.00167	0.00364	0.00092	0.00443	0.00129	0.00227	0.0139
Molybdenum [mg/L]	0.00146	0.00063	0.00047	0.00294	0.00217	0.00043	0.00053	0.00233	0.00055	0.00200	0.00020	0.00060	0.00244
Sodium [mg/L]	7.98	11.1	10.6	10.4	11.6	11.2	11.3	9.86	8.67	8.86	11.7	10.4	10.6
Nickel [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0001
Lead [mg/L]	< 0.00009	0.00010	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.01273
Antimony [mg/L]	< 0.0009	0.0011	< 0.0009	< 0.0009	< 0.0009	0.0049	< 0.0009	< 0.0009	< 0.0009	0.0024	0.0010	< 0.0009	0.0017
Selenium [mg/L]	0.00056	0.00036	0.00004	0.00012	0.00004	0.00007	0.00009	0.00004	< 0.00004	0.00008	< 0.00004	0.00007	0.00011
Silicon [mg/L]	3.05	3.98	3.97	4.19	3.14	3.12	2.65	3.71	3.72	2.84	2.19	2.24	4.41
Tin [mg/L]	< 0.00006	< 0.00006	0.00021	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	0.00019
Strontium [mg/L]	0.0105	0.00616	0.00821	0.00853	0.0160	0.00456	0.00894	0.0116	0.00646	0.00674	0.0132	0.0102	0.03895
Titanium [mg/L]	0.00014	0.00070	0.00083	0.00028	0.00223	0.00085	0.00066	0.00041	0.00013	0.00014	< 0.00005	0.00056	0.00269
Thallium [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
Uranium [mg/L]	0.000317	0.000336	0.000263	0.000333	0.000136	0.000439	0.000141	0.000204	0.000231	0.000309	0.000043	0.000388	0.000412
Vanadium [mg/L]	0.00034	0.00034	0.00032	0.00016	0.00052	0.00025	0.00104	0.00025	0.00376	0.00166	0.00303	0.00218	0.00024
Zinc [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	38: 941375	39: 946271	41: 171238	42: 86665	43: 86666	44: 87691	45: 87684	46: 87685	47: 138504	48: 138506	49: 138505	50: 138509	51: 138510
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.30	9.20	9.28	9.06	8.79	9.03	9.45	9.42	9.52	9.45	9.42	9.48	9.46
pH [No unit]	8.48	7.99	8.09	8.24	8.12	8.33	9.20	8.61	8.36	8.91	8.63	8.70	8.72
Conductivity [uS/cm]	87	99	90	111	156	140	96	99	89	98	108	91	93

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180300)

LR Report : ~~CA14046-OCT21~~

Analysis	38: 941375	39: 946271	41: 171238	42: 86665	43: 86666	44: 87691	45: 87684	46: 87685	47: 138504	48: 138506	49: 138505	50: 138509	51: 138510
Alkalinity [mg/L as CaCO3]	40	38	33	53	53	61	48	44	42	56	54	46	51
Sulphate [mg/L]	4	4	4	5	9	8	< 2	3	< 2	< 2	< 2	< 2	2
Mercury [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum [mg/L]	0.969	1.05	0.482	0.590	0.584	0.325	0.608	0.574	0.753	0.999	0.901	0.698	0.728
Arsenic [mg/L]	0.0019	0.0003	0.0012	0.0005	0.0002	0.0007	0.0027	0.0042	0.0050	0.0060	0.0148	0.0070	0.0039
Barium [mg/L]	0.00080	0.00088	0.00080	0.00252	0.00167	0.02414	0.00126	0.00358	0.00100	0.00165	0.00128	0.00108	0.00474
Boron [mg/L]	0.007	0.096	0.117	0.028	0.046	0.019	0.008	0.009	0.007	0.008	0.008	0.005	0.008
Beryllium [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bismuth [mg/L]	< 0.00001	< 0.00001	0.00002	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium [mg/L]	6.42	8.22	8.76	7.61	14.1	7.82	5.63	6.24	5.34	5.11	6.03	4.79	5.58
Cadmium [mg/L]	< 0.000003	0.000004	0.000008	0.000004	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000004	0.000004	< 0.000003	< 0.000003	< 0.000003
Cobalt [mg/L]	0.000008	0.000012	0.000045	0.000012	0.000008	0.000025	0.000008	0.000004	0.000019	0.000032	0.000015	0.000016	0.000005
Chromium [mg/L]	0.00009	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00012	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Copper [mg/L]	< 0.0002	< 0.0002	0.0006	0.0003	< 0.0002	0.0005	0.0013	0.0017	0.0009	0.0010	0.0006	0.0010	0.0016
Iron [mg/L]	0.008	< 0.007	0.043	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.008	< 0.007
Potassium [mg/L]	2.35	1.55	1.19	1.75	2.25	7.42	6.72	6.06	7.98	7.30	7.56	6.10	7.48
Lithium [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0007	0.0006	< 0.0001	0.0007	0.0002	< 0.0001	0.0012	< 0.0001	< 0.0001
Magnesium [mg/L]	0.271	0.702	0.388	1.80	2.52	2.30	1.49	1.12	1.08	1.16	1.64	0.899	1.28
Manganese [mg/L]	0.00303	0.00731	0.00545	0.00116	0.00260	0.00176	0.00207	0.00140	0.00219	0.00158	0.00210	0.00116	0.00167
Molybdenum [mg/L]	0.00081	0.00042	0.00858	0.00582	0.00052	0.00267	0.00116	0.00779	0.00082	0.00054	0.00047	0.00481	0.00311
Sodium [mg/L]	9.24	9.12	7.64	13.3	11.4	14.0	8.72	8.89	7.00	11.0	9.52	10.00	7.74
Nickel [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Lead [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Antimony [mg/L]	0.0016	< 0.0009	0.0017	< 0.0009	< 0.0009	< 0.0009	0.0019	0.0014	0.0011	0.0020	0.0017	0.0015	0.0015
Selenium [mg/L]	0.00005	0.00009	0.00011	< 0.00004	0.00007	< 0.00004	0.00004	0.00007	0.00007	0.00009	0.00010	0.00011	0.00012
Silicon [mg/L]	2.84	1.73	4.07	1.52	1.37	2.91	3.32	3.30	2.78	2.74	2.74	3.06	2.85
Tin [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Strontium [mg/L]	0.0129	0.0258	0.0108	0.0303	0.0331	0.0467	0.0124	0.0177	0.00916	0.0246	0.0201	0.00801	0.0185
Titanium [mg/L]	0.00043	0.00069	0.00141	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.00020	0.00057	0.00015	0.00008	0.00056	< 0.00005
Thallium [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	0.000007	0.000007	< 0.000005	< 0.000005	0.000005
Uranium [mg/L]	0.000224	0.000082	0.000161	0.000024	0.000058	0.000120	0.000553	0.000765	0.000625	0.00198	0.00123	0.000668	0.000732
Vanadium [mg/L]	0.00100	0.00188	0.00072	0.00136	0.00057	0.00173	0.00592	0.00532	0.00706	0.00954	0.00809	0.00620	0.00601
Zinc [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180300)

LR Report : CA14046-OCT21

Analysis	52: 101660	53: 101661	54: 138511	55: 101647	56: 138512	57: 138514	58: 138515	59: 138516	60: 138521	61: 138517	62: 138518	63: 138519	64: 138520
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	8.97	8.99	9.48	9.08	9.37	9.27	9.45	9.48	9.43	9.46	9.45	8.95	9.46
pH [No unit]	8.22	8.22	8.62	8.35	8.70	8.54	8.69	7.86	8.76	8.72	8.85	7.75	8.42
Conductivity [uS/cm]	148	146	99	140	105	105	99	119	99	90	95	391	98
Alkalinity [mg/L as CaCO3]	57	62	52	57	53	48	45	59	49	43	50	30	48
Sulphate [mg/L]	11	6	3	6	< 2	< 2	< 2	2	< 2	< 2	< 2	160	< 2
Mercury [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum [mg/L]	0.479	0.509	0.696	0.772	0.788	0.502	0.951	0.627	0.798	0.830	0.743	0.454	0.922
Arsenic [mg/L]	0.0013	0.0005	0.0027	0.0015	0.0023	0.0013	0.0029	0.0061	0.0061	0.0044	0.0069	0.0034	0.0067
Barium [mg/L]	0.01839	0.00176	0.00125	0.00283	0.00093	0.00082	0.00217	0.00427	0.00101	0.00084	0.00107	0.00746	0.00174
Boron [mg/L]	0.049	0.023	0.007	0.090	0.008	< 0.002	0.011	< 0.002	0.011	0.009	0.015	0.009	0.009
Beryllium [mg/L]	< 0.000007	< 0.000007	0.000009	< 0.000007	0.000009	< 0.000007	< 0.000007	< 0.000007	0.000007	< 0.000007	0.000010	0.000007	0.000008
Bismuth [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium [mg/L]	10.1	9.79	5.39	9.12	5.35	7.07	5.91	6.23	5.12	4.98	5.04	50.7	5.90
Cadmium [mg/L]	< 0.000003	0.000004	0.000004	< 0.000003	< 0.000003	0.000008	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003
Cobalt [mg/L]	0.000014	0.000041	< 0.000004	0.000010	0.000021	0.000034	0.000016	0.000050	0.000019	0.000029	0.000018	0.000068	0.000601
Chromium [mg/L]	0.00009	< 0.00008	< 0.00008	0.00009	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00008	0.00010	< 0.00008	< 0.00008	< 0.00008
Copper [mg/L]	0.0010	0.0002	0.0012	0.0006	0.0013	0.0007	0.0015	0.0017	0.0007	0.0013	0.0005	0.0005	0.0069
Iron [mg/L]	< 0.007	0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.051
Potassium [mg/L]	6.67	5.50	6.98	9.92	6.28	6.32	6.71	7.86	4.95	6.96	7.34	9.59	7.01
Lithium [mg/L]	0.0007	< 0.0001	< 0.0001	0.0004	< 0.0001	0.0006	0.0012	0.0005	< 0.0001	0.0010	< 0.0001	0.0014	0.0007
Magnesium [mg/L]	2.79	3.55	1.22	2.46	1.40	1.14	1.10	1.63	1.41	1.16	1.28	6.18	1.47
Manganese [mg/L]	0.00161	0.00206	0.00166	0.00200	0.00181	0.00273	0.00127	0.00236	0.00255	0.00128	0.00154	0.0208	0.00250
Molybdenum [mg/L]	0.00106	0.00070	0.00029	0.00065	0.00271	0.00905	0.00288	0.00062	0.00028	0.00054	0.00062	0.00065	0.00037
Sodium [mg/L]	12.5	12.9	9.15	9.85	11.2	10.6	9.28	7.75	11.3	7.96	8.40	9.01	9.85
Nickel [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0011	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0105
Lead [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Antimony [mg/L]	0.0016	< 0.0009	0.0015	0.0019	0.0013	0.0009	0.0010	0.0011	0.0014	0.0011	0.0015	0.0012	0.0014
Selenium [mg/L]	0.00012	0.00006	0.00008	0.00014	0.00019	0.00006	0.00011	0.00010	< 0.00004	0.00006	0.00006	< 0.00004	0.00019
Silicon [mg/L]	2.07	1.78	3.04	1.91	2.47	3.20	2.52	3.14	2.95	2.85	3.13	2.15	2.64
Tin [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Strontium [mg/L]	0.0575	0.0353	0.0142	0.0213	0.0137	0.0114	0.0159	0.0169	0.0230	0.0112	0.0114	0.215	0.0231
Titanium [mg/L]	0.00010	< 0.00005	0.00029	0.00010	0.00042	< 0.00005	0.00031	< 0.00005	0.00014	0.00023	0.00041	< 0.00005	< 0.00005
Thallium [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	0.000007	< 0.000005	< 0.000005	< 0.000005	0.000005	< 0.000005

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : ~~CA14046-OCT21~~

Analysis	52: 101660	53: 101661	54: 138511	55: 101647	56: 138512	57: 138514	58: 138515	59: 138516	60: 138521	61: 138517	62: 138518	63: 138519	64: 138520
Uranium [mg/L]	0.000245	0.000053	0.000743	0.000490	0.00116	0.00148	0.000829	0.000932	0.00127	0.00106	0.000589	0.00220	0.001175
Vanadium [mg/L]	0.00415	0.00173	0.00710	0.00358	0.00592	0.00222	0.00743	0.00655	0.00655	0.00747	0.00716	0.00186	0.00777
Zinc [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	65: 138522	66: 104142	67: 104144	68: 138525	69: 138526	70: 138527	71: 138528	72: 104143	73: 138501	74: 138530	75: 138531	77: 138560	78: 138561
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.42	9.46	9.19	9.43	9.41	9.35	9.51	9.29	9.33	9.26	9.47	9.47	9.01
pH [No unit]	8.50	8.88	8.63	8.61	8.82	8.79	8.49	7.99	8.70	8.57	8.72	8.24	8.08
Conductivity [uS/cm]	118	86	139	93	110	112	85	111	107	112	108	94	255
Alkalinity [mg/L as CaCO3]	61	42	58	49	51	54	46	48	52	59	56	52	30
Sulphate [mg/L]	< 2	< 2	4	< 2	3	< 2	< 2	< 2	< 2	< 2	3	< 2	99
Mercury [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum [mg/L]	0.794	0.864	0.610	0.975	0.917	0.746	0.875	0.572	0.621	0.611	1.07	0.862	0.551
Arsenic [mg/L]	0.0029	0.0025	0.0008	0.0012	0.0036	0.0043	0.0043	0.0010	0.0012	0.0005	0.0024	0.0051	0.0030
Barium [mg/L]	0.00184	0.00172	0.00650	0.00075	0.00274	0.00119	0.00079	0.00094	0.00045	0.00026	0.00202	0.00130	0.00474
Boron [mg/L]	0.006	0.008	0.015	0.006	0.006	0.008	0.008	0.012	0.010	0.009	0.011	0.007	0.007
Beryllium [mg/L]	< 0.000007	0.000012	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	0.000009	< 0.000007	< 0.000007	0.000016	< 0.000007	< 0.000007
Bismuth [mg/L]	< 0.00001	< 0.00001	0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00002	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium [mg/L]	7.82	5.15	8.19	6.05	6.04	6.58	5.02	6.99	5.12	5.56	4.62	5.97	32.3
Cadmium [mg/L]	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000004	0.000005	0.000004	< 0.000003	< 0.000003	0.000004
Cobalt [mg/L]	0.000027	0.000041	0.000015	0.000008	0.000004	0.000009	0.000011	0.000033	0.000171	0.000051	0.000010	0.000042	0.000024
Chromium [mg/L]	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00008	< 0.00008	< 0.00008	0.00013	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Copper [mg/L]	0.0007	0.0021	0.0005	0.0011	0.0008	0.0012	0.0004	0.0018	0.0008	0.0009	0.0007	0.0006	0.0004
Iron [mg/L]	< 0.007	0.023	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Potassium [mg/L]	8.21	7.11	3.56	6.32	6.07	6.64	5.28	7.67	2.28	0.310	0.624	8.09	9.30
Lithium [mg/L]	0.0004	< 0.0001	0.0004	< 0.0001	0.0004	0.0005	< 0.0001	< 0.0001	0.0004	0.0003	< 0.0001	< 0.0001	0.0002
Magnesium [mg/L]	2.27	0.798	2.43	1.27	1.83	1.73	0.949	1.25	1.28	1.80	1.10	1.51	3.68
Manganese [mg/L]	0.00370	0.00167	0.00134	0.00156	0.00207	0.00188	0.00084	0.00154	0.00095	0.00139	0.00115	0.00170	0.00637
Molybdenum [mg/L]	0.00043	0.00159	0.00179	0.00379	0.00060	0.00110	0.00424	0.01060	0.00753	0.00865	0.00349	0.00436	0.00091
Sodium [mg/L]	12.6	10.7	16.0	11.3	14.9	10.1	13.0	12.4	15.1	21.7	20.4	10.4	11.0
Nickel [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0001	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : CA14046-OCT21

Analysis	65: 138522	66: 104142	67: 104144	68: 138525	69: 138526	70: 138527	71: 138528	72: 104143	73: 138501	74: 138530	75: 138531	77: 138560	78: 138561
Lead [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Antimony [mg/L]	0.0015	0.0015	< 0.0009	0.0016	0.0023	0.0014	0.0020	0.0009	0.0010	0.0018	0.0017	0.0019	0.0017
Selenium [mg/L]	0.00016	< 0.00004	< 0.00004	< 0.00004	0.00006	0.00004	0.00006	< 0.00004	< 0.00004	0.00005	< 0.00004	0.00004	< 0.00004
Silicon [mg/L]	3.25	3.25	2.40	2.82	2.99	2.56	2.85	3.12	2.84	2.82	2.98	3.03	2.29
Tin [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Strontium [mg/L]	0.0175	0.00815	0.0302	0.0108	0.0142	0.0197	0.0119	0.0150	0.0114	0.0100	0.00883	0.0151	0.182
Titanium [mg/L]	0.00014	0.00095	0.00009	0.00028	0.00043	0.00009	0.00016	0.00013	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Thallium [mg/L]	< 0.000005	0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
Uranium [mg/L]	0.00138	0.000603	0.000354	0.00111	0.00107	0.000479	0.000810	0.000733	0.000392	0.000625	0.00183	0.000756	0.000750
Vanadium [mg/L]	0.00708	0.00753	0.00316	0.00614	0.00636	0.00569	0.00877	0.00311	0.00350	0.00229	0.00591	0.00739	0.00336
Zinc [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	79: 138559	80: 138536	81: 138537	83: 107413	84: 138529	86: 138540	87: 138541	88: 138542	89: 138543	90: 138544	91: 138545	92: 111136	93: 138547
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.54	9.32	9.46	9.14	9.33	9.31	9.19	9.49	9.46	9.48	9.30	9.32	9.43
pH [No unit]	8.49	8.51	8.62	8.39	8.74	8.24	8.64	9.29	9.14	8.92	8.69	8.65	9.08
Conductivity [uS/cm]	85	99	117	131	89	104	110	95	91	78	99	86	90
Alkalinity [mg/L as CaCO3]	42	53	68	73	48	56	58	50	51	40	47	45	48
Sulphate [mg/L]	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Mercury [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum [mg/L]	1.08	0.723	1.12	0.681	0.699	0.494	0.372	0.663	0.822	0.859	0.594	0.486	0.808
Arsenic [mg/L]	0.0045	0.0019	0.0070	0.0002	0.0003	0.0016	0.0027	0.0046	0.0080	0.0014	0.0012	0.0014	0.0013
Barium [mg/L]	0.00176	0.00076	0.00065	0.00062	0.00048	0.00460	0.00173	0.00167	0.00101	0.00083	0.00103	0.00121	0.00053
Boron [mg/L]	0.010	0.007	0.008	0.010	0.007	0.014	0.006	0.008	0.007	0.004	0.009	0.009	0.005
Beryllium [mg/L]	0.000008	< 0.000007	< 0.000007	< 0.000007	< 0.000007	0.000012	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bismuth [mg/L]	0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium [mg/L]	4.28	6.29	5.04	7.08	4.65	5.79	9.63	7.09	5.32	4.87	6.59	7.11	5.34
Cadmium [mg/L]	< 0.000003	0.000007	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000019	0.000004	< 0.000003	< 0.000003	0.000003	< 0.000003	< 0.000003
Cobalt [mg/L]	0.000020	0.000020	0.000007	0.000021	< 0.000004	0.000015	0.000215	0.000016	< 0.000004	0.000007	0.000006	0.000019	0.000010
Chromium [mg/L]	0.00013	0.00008	0.00009	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00008	< 0.00008
Copper [mg/L]	0.0018	0.0012	0.0007	< 0.0002	< 0.0002	< 0.0002	0.0032	0.0006	0.0011	< 0.0002	0.0007	0.0011	0.0005

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : CA14046-OCT21

Analysis	79: 138559	80: 138536	81: 138537	83: 107413	84: 138529	86: 138540	87: 138541	88: 138542	89: 138543	90: 138544	91: 138545	92: 111136	93: 138547
Iron [mg/L]	0.029	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.015	< 0.007	< 0.007	< 0.007	< 0.007	0.008	< 0.007
Potassium [mg/L]	5.31	7.15	2.94	2.25	2.21	3.28	7.32	5.55	6.62	4.66	6.19	6.09	5.34
Lithium [mg/L]	0.0008	0.0002	< 0.0001	< 0.0001	< 0.0001	0.0003	0.0014	0.0013	0.0004	< 0.0001	0.0008	< 0.0001	0.0002
Magnesium [mg/L]	0.660	1.18	1.51	3.07	0.610	1.83	1.60	1.86	1.44	0.732	1.29	0.971	1.30
Manganese [mg/L]	0.00183	0.00138	0.00081	0.00170	0.00101	0.00115	0.00351	0.00251	0.00151	0.00056	0.00251	0.00206	0.00200
Molybdenum [mg/L]	0.00081	0.01721	0.00066	0.00093	0.00149	0.00050	0.01564	0.00652	0.00057	0.00282	0.00117	0.01032	0.00165
Sodium [mg/L]	9.58	12.8	23.3	19.9	15.7	14.7	10.5	10.6	10.0	11.5	8.52	8.90	11.1
Nickel [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Lead [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Antimony [mg/L]	0.0012	0.0012	0.0026	0.0009	< 0.0009	0.0014	0.0011	0.0015	0.0019	0.0012	< 0.0009	< 0.0009	0.0011
Selenium [mg/L]	0.00011	< 0.00004	0.00004	0.00006	< 0.00004	0.00011	0.00017	0.00016	0.00015	0.00013	< 0.00004	< 0.00004	< 0.00004
Silicon [mg/L]	3.02	2.78	2.71	2.08	2.39	2.79	3.29	3.46	3.52	3.10	2.75	3.11	3.42
Tin [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Strontium [mg/L]	0.00944	0.0157	0.0123	0.0143	0.00978	0.0222	0.0152	0.0259	0.0203	0.0196	0.0145	0.0112	0.00958
Titanium [mg/L]	0.00116	< 0.00005	< 0.00005	0.00012	< 0.00005	< 0.00005	< 0.00005	0.00014	< 0.00005	< 0.00005	0.00008	0.00043	< 0.00005
Thallium [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	0.000012	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
Uranium [mg/L]	0.000781	0.00152	0.00103	0.000030	0.000102	0.000230	0.00165	0.000850	0.000756	0.000234	0.000428	0.000700	0.000510
Vanadium [mg/L]	0.00763	0.00344	0.0105	0.00246	0.00358	0.00851	0.00106	0.00592	0.00692	0.00592	0.00431	0.00364	0.00560
Zinc [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	95: 138549	96: 138550	98: 138524	99: 138551	100: 138554	101: 138553	102: 129276	104: 138502	105: 166245	106: 166246	107: 138503	108: 138507	109: 197133
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.21	9.45	9.40	9.30	9.39	9.48	8.86	9.18	9.40	9.37	9.29	9.28	9.02
pH [No unit]	8.31	8.72	8.75	8.16	8.82	8.54	8.29	8.29	8.28	8.63	8.67	8.43	8.53
Conductivity [uS/cm]	106	100	91	94	99	85	161	117	99	111	127	120	149
Alkalinity [mg/L as CaCO3]	48	52	49	42	52	49	73	65	49	47	61	63	68
Sulphate [mg/L]	< 2	< 2	< 2	3	< 2	< 2	6	< 2	< 2	< 2	14	< 2	2
Mercury [mg/L]	< 0.00001	< 0.00001	< 0.00001	0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum [mg/L]	0.347	0.857	0.705	0.536	0.638	0.902	0.375	0.536	0.827	0.798	0.603	0.639	0.577
Arsenic [mg/L]	0.0007	0.0047	0.0018	0.0020	0.0024	0.0044	0.0003	0.0003	0.0030	0.0013	0.0042	0.0046	0.0015
Barium [mg/L]	0.00147	0.00102	0.00080	0.00106	0.00109	0.00088	0.00083	0.00026	0.00083	0.00073	0.180	0.00151	0.00081

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180,300)

LR Report : CA14046-OCT21

Analysis	95: 138549	96: 138550	98: 138524	99: 138551	100: 138554	101: 138553	102: 129276	104: 138502	105: 166245	106: 166246	107: 138503	108: 138507	109: 197133
Boron [mg/L]	0.009	0.007	< 0.002	0.003	0.008	0.007	0.041	0.006	0.005	0.010	0.003	0.006	0.025
Beryllium [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bismuth [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium [mg/L]	7.68	6.36	6.69	8.90	4.40	5.15	12.0	5.96	5.87	5.64	8.54	8.35	8.58
Cadmium [mg/L]	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000007	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000008	< 0.000003	< 0.000003
Cobalt [mg/L]	0.000004	0.000017	0.000020	0.000004	0.000004	0.000008	0.000035	0.000016	0.000017	0.000007	0.000035	< 0.000004	0.000013
Chromium [mg/L]	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Copper [mg/L]	0.0003	0.0011	0.0005	0.0007	< 0.0002	0.0007	< 0.0002	0.0003	0.0009	0.0004	0.0009	0.0007	0.0006
Iron [mg/L]	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Potassium [mg/L]	4.66	6.80	5.45	5.43	2.73	7.48	3.25	0.604	4.99	5.74	6.72	8.16	2.19
Lithium [mg/L]	< 0.0001	0.0005	0.0003	< 0.0001	0.0004	0.0001	0.0003	0.0001	< 0.0001	0.0003	0.0012	0.0010	0.0009
Magnesium [mg/L]	1.97	1.74	1.42	0.478	1.56	1.15	5.33	2.70	0.716	0.712	2.96	3.89	3.86
Manganese [mg/L]	0.00127	0.00217	0.00197	0.00288	0.00064	0.00169	0.00374	0.00166	0.00106	0.00068	0.00396	0.00530	0.00328
Molybdenum [mg/L]	0.00051	0.00037	0.00103	0.00433	0.00688	0.00228	0.00548	0.00552	0.00146	0.00094	0.00383	0.00152	0.00023
Sodium [mg/L]	12.2	11.9	11.1	10.7	13.3	8.91	16.7	18.9	14.0	13.6	11.6	10.0	16.7
Nickel [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Lead [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Antimony [mg/L]	0.0009	0.0020	0.0009	< 0.0009	0.0017	0.0013	0.0010	0.0011	0.0012	0.0011	0.0011	0.0012	0.0012
Selenium [mg/L]	0.00005	0.00006	< 0.00004	< 0.00004	< 0.00004	0.00007	0.00010	< 0.00004	< 0.00004	< 0.00004	0.00010	0.00008	< 0.00004
Silicon [mg/L]	2.98	3.02	3.54	2.94	2.63	3.14	2.23	2.56	2.33	2.05	2.71	2.59	1.84
Tin [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Strontium [mg/L]	0.0288	0.0168	0.00928	0.0103	0.0182	0.0107	0.0279	0.0123	0.0103	0.0121	0.238	0.0223	0.0426
Titanium [mg/L]	0.00013	< 0.00005	< 0.00005	0.00013	< 0.00005	0.00027	0.00014	< 0.00005	0.00012	0.00013	< 0.00005	0.00028	< 0.00005
Thallium [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
Uranium [mg/L]	0.000143	0.001131	0.000811	0.000206	0.000051	0.000480	0.000063	0.000051	0.000111	0.000065	0.000525	0.000866	0.000086
Vanadium [mg/L]	0.00525	0.00786	0.00382	0.00275	0.00460	0.00669	0.00150	0.00179	0.00390	0.00424	0.00319	0.00421	0.00279
Zinc [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	110: 194288	111: 138508	112: 902411	113: 931608	114: 931605	116: 930688	117: 930690	119: 138555	120: 138557
Sample weight [g]	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.27	9.41	9.32	9.34	9.02	9.18	9.37	9.37	9.28
pH [No unit]	7.93	8.42	7.79	8.25	8.46	8.08	8.74	8.60	8.63

OnLine LIMS

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Martathon Project - Leprechuan (121414740-180.300)

LR Report : CA14046-OCT21

Analysis	110: 194288	111: 138508	112: 902411	113: 931608	114: 931605	116: 930688	117: 930690	119: 138555	120: 138557
Conductivity [uS/cm]	87	91	97	104	140	102	100	112	112
Alkalinity [mg/L as CaCO3]	40	45	38	55	73	54	53	58	61
Sulphate [mg/L]	< 2	< 2	2	< 2	< 2	< 2	< 2	< 2	< 2
Mercury [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Silver [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum [mg/L]	0.515	0.619	0.559	0.765	0.537	0.736	0.808	0.926	0.844
Arsenic [mg/L]	0.0005	0.0024	0.0008	0.0044	0.0007	0.0003	0.0020	0.0036	0.0046
Barium [mg/L]	0.00118	0.00087	0.00082	0.00072	0.00161	0.00071	0.00047	0.00273	0.00202
Boron [mg/L]	0.011	0.007	0.021	0.017	0.013	0.011	0.013	0.007	0.124
Beryllium [mg/L]	< 0.000007	0.000009	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bismuth [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Calcium [mg/L]	6.64	6.91	7.21	6.62	9.33	6.40	6.04	6.37	6.38
Cadmium [mg/L]	0.000004	0.000007	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000004
Cobalt [mg/L]	0.000024	0.000026	0.000012	0.000016	0.000018	0.000009	0.000019	0.000027	0.000037
Chromium [mg/L]	0.00008	< 0.00008	0.00009	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Copper [mg/L]	0.0007	0.0009	0.0015	0.0006	0.0003	< 0.0002	0.0003	0.0005	< 0.0002
Iron [mg/L]	0.019	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.008	< 0.007	< 0.007
Potassium [mg/L]	6.45	6.95	4.79	4.12	4.36	2.69	2.50	5.51	6.57
Lithium [mg/L]	< 0.0001	< 0.0001	0.0003	0.0004	0.0006	0.0005	0.0002	0.0007	0.0009
Magnesium [mg/L]	0.670	1.23	0.577	1.64	4.21	1.84	1.36	2.12	2.28
Manganese [mg/L]	0.00305	0.00223	0.00165	0.00266	0.00343	0.00175	0.00194	0.00246	0.00329
Molybdenum [mg/L]	0.00624	0.00774	0.00426	0.00040	0.00239	0.00119	0.00055	0.00552	0.00034
Sodium [mg/L]	7.49	10.3	8.39	14.4	15.2	16.2	16.7	15.9	11.6
Nickel [mg/L]	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Lead [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Antimony [mg/L]	< 0.0009	0.0010	< 0.0009	0.0021	0.0011	< 0.0009	0.0014	0.0018	0.0012
Selenium [mg/L]	0.00004	0.00007	0.00005	< 0.00004	< 0.00004	< 0.00004	0.00005	< 0.00004	< 0.00004
Silicon [mg/L]	3.42	3.43	2.77	2.90	2.28	1.80	2.89	2.55	2.25
Tin [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Strontium [mg/L]	0.0103	0.0117	0.0122	0.0330	0.0910	0.0462	0.0314	0.0335	0.0471
Titanium [mg/L]	0.00047	0.00014	0.00018	< 0.00005	< 0.00005	0.00024	0.00026	< 0.00005	< 0.00005
Thallium [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	0.000005
Uranium [mg/L]	0.000529	0.000633	0.000431	0.001566	0.000052	0.000019	0.00156	0.00138	0.000640
Vanadium [mg/L]	0.00268	0.00456	0.00516	0.00710	0.00249	0.00189	0.00630	0.00712	0.00491
Zinc [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

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<Original signed by>

Chris Sullivan, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

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ABA - Modified Sobek

Project : Martathon Project - Leprechuan (121414740-180.300)

09-December-2021

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO, Mt. Pearl
Canada, A1N 0A1
Phone: 709-730-5046, Fax:

Date Rec. : 06 November 2021
LR Report: **CA14114-NOV21**
Reference: Martathon Project - Leprechuan (121414740-180.300)

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 62723	6: 62731	7: 62740	8: 238043	9: 238255	10: 238949	11: 239015
Sample Date & Time					N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	03-Dec-21	09:05	06-Dec-21	09:36	9.48	9.45	9.50	9.56	9.58	9.52	9.39
Fizz Rate [no unit]	03-Dec-21	09:05	06-Dec-21	09:36	3	3	3	2	3	2	2
Sample weight [g]	03-Dec-21	09:05	06-Dec-21	09:36	2.01	2.00	1.99	2.00	2.01	2.00	1.99
HCl_add [mL]	04-Dec-21	09:05	06-Dec-21	09:36	30.00	29.00	37.00	20.00	33.00	20.00	20.00
HCl [Normality]	03-Dec-21	09:05	06-Dec-21	09:36	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	03-Dec-21	09:05	06-Dec-21	09:36	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	04-Dec-21	09:05	06-Dec-21	09:36	13.62	14.85	12.04	11.36	12.73	13.42	10.27
Final pH [no unit]	04-Dec-21	09:05	06-Dec-21	09:36	1.54	1.62	1.87	1.68	1.81	1.60	1.76
NP [t CaCO3/1000 t]	04-Dec-21	09:05	06-Dec-21	09:36	40.8	35.4	62.7	21.6	50.4	16.5	24.4
AP [t CaCO3/1000 t]	07-Dec-21	10:10	07-Dec-21	10:10	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	07-Dec-21	10:10	07-Dec-21	10:10	39.6	34.2	61.4	20.4	49.2	15.2	23.2
NP/AP [ratio]	07-Dec-21	10:10	07-Dec-21	10:10	32.6	28.3	50.2	17.3	40.3	13.2	19.5
S [%]	03-Dec-21	12:10	07-Dec-21	10:10	0.005	0.005	0.008	0.006	0.006	< 0.005	< 0.005
Acid Leachable SO4-S [%]	07-Dec-21	10:09	07-Dec-21	10:10	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Sulphide [%]	03-Dec-21	15:18	07-Dec-21	10:10	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
C [%]	03-Dec-21	12:10	06-Dec-21	12:00	0.438	0.381	0.788	0.232	0.601	0.147	0.240
CO3 (HCl) [%]	03-Dec-21	16:35	06-Dec-21	12:00	2.10	1.75	3.78	1.03	2.85	0.535	1.03

Analysis	12: 818474	13: 818532	14: 818680	15: 818766	16: 818767	17: 239673	18: 819008	19: 819202	20: 819210	21: 819601	22: 7230	23: 731	24: 1435
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9.61	9.53	9.37	9.64	9.65	9.51	9.61	9.64	9.71	9.67	9.54	9.52	9.58
Fizz Rate [no unit]	2	2	3	2	3	3	3	2	2	3	3	2	3
Sample weight [g]	2.00	1.99	2.00	1.99	2.01	2.00	2.01	2.00	2.00	2.00	2.00	2.00	2.00
HCl_add [mL]	20.00	20.00	44.00	20.00	20.00	35.00	20.00	20.00	20.00	31.00	32.00	20.00	30.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	14.87	14.54	24.26	13.54	12.28	13.20	9.86	11.90	15.54	15.70	15.25	10.47	15.76
Final pH [no unit]	1.47	1.42	1.56	1.48	1.56	1.84	1.83	1.56	1.35	1.59	1.70	1.73	1.65
NP [t CaCO3/1000 t]	12.8	13.7	49.4	16.2	19.2	54.5	25.2	20.2	11.2	38.2	41.9	23.8	35.6

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ABA - Modified Sobek

Project : Martathon Project - Leprechuan
LR Report : CA14114-NOV21 (121414740-180.300)

Analysis	12: 818474	13: 818532	14: 818680	15: 818766	16: 818767	17: 239673	18: 819008	19: 819202	20: 819210	21: 819601	22: 7230	23: 731	24: 1435
AP [t CaCO3/1000 t]	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	11.6	12.4	48.2	15.0	18.0	53.2	24.0	19.0	9.95	37.0	40.6	22.6	34.4
NP/AP [ratio]	10.2	11.0	39.5	13.0	15.4	43.6	20.2	16.2	8.96	30.6	33.5	19.0	28.5
S [%]	< 0.005	< 0.005	0.006	0.006	0.008	0.009	0.005	0.006	< 0.005	0.023	< 0.005	< 0.005	< 0.005
Acid Leachable SO4-S [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Sulphide [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
C [%]	0.097	0.120	0.495	0.157	0.177	0.656	0.264	0.190	0.081	0.465	0.524	0.241	0.371
CO3 (HCl) [%]	0.375	0.480	2.27	0.530	0.729	3.11	1.16	0.809	0.275	2.19	2.50	1.06	1.72

Analysis	25: 1550	26: 3398	27: 3440	28: 3534	29: 5216	30: 5778	31: 11158	32: 11279	33: 8099	34: 11522	35: 11680	36: 30915
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9.45	9.53	9.49	9.47	9.49	9.52	9.57	9.57	9.56	9.54	9.58	9.61
Fizz Rate [no unit]	2	2	3	3	2	3	3	3	3	2	2	2
Sample weight [g]	2.00	2.00	2.00	2.01	2.00	2.01	2.01	1.99	2.00	1.99	1.99	2.00
HCl_add [mL]	20.00	27.00	20.00	28.00	20.00	27.00	20.00	20.00	31.50	28.50	20.00	20.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	13.64	15.43	15.71	17.15	13.61	16.40	14.31	11.04	17.86	16.28	14.02	14.94
Final pH [no unit]	1.46	1.56	1.31	1.59	1.45	1.53	1.62	1.72	1.56	1.53	1.58	1.39
NP [t CaCO3/1000 t]	15.9	28.9	10.7	27.0	16.0	26.4	14.2	22.5	34.1	30.7	15.0	12.6
AP [t CaCO3/1000 t]	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	14.6	27.6	9.45	25.8	14.8	25.2	13.0	21.2	32.8	29.4	13.8	11.4
NP/AP [ratio]	12.7	23.1	8.56	21.6	12.8	21.1	11.4	18.0	27.3	24.6	12.0	10.1
S [%]	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acid Leachable SO4-S [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Sulphide [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
C [%]	0.131	0.291	0.072	0.287	0.146	0.253	0.105	0.236	0.344	0.309	0.109	0.098
CO3 (HCl) [%]	0.560	1.35	0.250	1.32	0.624	1.17	0.405	1.07	1.62	1.40	0.445	0.355

Analysis	37: 32108	38: 40516	39: 40636	40: 33592	41: 41901	42: 41905	43: 41908	44: 34544	45: 42868	46: 35013	47: 35022	48: 35098	49: 43492
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9.66	9.61	9.57	9.63	9.32	9.58	9.29	9.71	9.54	9.60	9.47	9.49	9.53
Fizz Rate [no unit]	2	2	2	2	2	2	2	2	2	2	2	3	3
Sample weight [g]	1.99	2.02	2.01	2.02	2.02	2.01	2.00	2.00	2.00	1.98	1.98	1.97	1.97
HCl_add [mL]	20.00	20.00	25.00	20.00	29.50	20.00	20.00	20.00	30.00	20.00	20.00	29.00	33.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	12.00	13.29	15.41	14.24	18.01	12.45	13.08	12.90	15.92	14.33	14.43	16.41	15.09
Final pH [no unit]	1.62	1.49	1.56	1.58	1.64	1.62	1.69	1.60	1.68	1.35	1.48	1.52	1.65
NP [t CaCO3/1000 t]	20.1	16.6	23.9	14.2	28.4	18.8	17.3	17.7	35.2	14.3	14.1	31.9	45.5
AP [t CaCO3/1000 t]	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	5.62
Net NP [t CaCO3/1000 t]	18.8	15.4	22.6	13.0	27.2	17.6	16.0	16.4	34.0	13.0	12.8	30.6	39.9
NP/AP [ratio]	16.1	13.3	19.1	11.4	22.7	15.0	13.8	14.2	28.2	11.4	11.3	25.5	8.09
S [%]	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.284
Acid Leachable SO4-S [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.10
Sulphide [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.18

OnLine LIMS

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Analysis	37: 32108	38: 40516	39: 40636	40: 33592	41: 41901	42: 41905	43: 41908	44: 34544	45: 42868	46: 35013	47: 35022	48: 35098	49: 43492
C [%]	0.193	0.174	0.235	0.117	0.283	0.172	0.160	0.153	0.359	0.123	0.139	0.404	0.602
CO3 (HCl) [%]	0.854	0.694	1.05	0.505	1.25	0.719	0.639	0.659	1.70	0.510	0.560	1.77	2.90

Analysis	50: 47686	51: 48000	52: 48167	53: 51518	54: 48318	55: 51643	56: 7259	57: 5384	58: 3816	59: 6957	60: 40275	61: 53505
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9.50	9.55	9.59	9.46	9.66	9.45	9.54	9.58	9.44	9.50	9.54	9.44
Fizz Rate [no unit]	3	3	2	3	3	3	2	3	3	2	3	3
Sample weight [g]	1.84	1.99	1.98	2.00	1.83	1.91	1.89	1.96	1.88	2.01	1.96	2.01
HCl_add [mL]	20.00	20.00	20.00	28.00	20.00	34.00	20.00	44.00	34.00	20.00	33.00	45.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	13.06	12.28	15.36	16.60	11.29	15.02	15.44	22.53	12.40	15.26	13.07	23.18
Final pH [no unit]	1.47	1.50	1.44	1.53	1.61	1.67	1.35	1.52	1.83	1.48	1.79	1.52
NP [t CaCO3/1000 t]	18.9	19.4	11.7	28.5	23.8	49.7	12.1	54.8	57.5	11.8	50.8	54.3
AP [t CaCO3/1000 t]	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Net NP [t CaCO3/1000 t]	17.6	18.2	10.4	27.2	22.6	48.4	10.8	53.6	56.2	10.6	49.6	53.0
NP/AP [ratio]	15.1	15.5	9.36	22.8	19.0	39.8	9.68	43.8	46.0	9.44	40.6	43.4
S [%]	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acid Leachable SO4-S [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Sulphide [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
C [%]	0.172	0.193	0.093	0.290	0.225	0.616	0.103	0.649	0.689	0.090	0.600	0.676
CO3 (HCl) [%]	0.814	0.869	0.335	1.37	1.04	2.94	0.420	3.16	3.37	0.375	2.84	3.25

Analysis	62: 3812	63: 238297	64: 32547	65: 70726	66: 70301	67: 66023	68: 143334	69: 14692	70: 41409	71: 46443	72: 7021	73: 30951	74: 6487	75: 923414
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paste pH [no unit]	9.46	9.59	8.64	9.64	9.55	9.81	9.58	9.72	9.63	9.47	9.01	9.41	8.65	9.46
Fizz Rate [no unit]	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Sample weight [g]	1.97	1.86	1.99	1.98	1.93	2.00	1.98	1.92	2.03	1.95	1.88	1.95	1.89	1.95
HCl_add [mL]	20.00	33.00	193.00	36.00	29.00	20.00	20.00	28.00	36.00	44.00	82.00	44.00	170.00	49.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	13.82	15.47	81.52	14.55	16.83	11.16	9.36	15.54	11.96	19.45	35.28	14.36	74.83	22.33
Final pH [no unit]	1.39	1.63	1.54	1.61	1.52	1.49	1.46	1.54	1.78	1.53	1.59	1.73	1.53	1.55
NP [t CaCO3/1000 t]	15.7	47.1	280	54.2	31.5	22.1	26.9	32.4	59.2	62.9	124	76.0	252	68.4
AP [t CaCO3/1000 t]	1.25	1.25	34.1	10.3	2.19	3.12	1.25	2.50	5.94	2.81	14.4	6.56	49.1	3.75
Net NP [t CaCO3/1000 t]	14.4	45.8	246	43.9	29.3	19.0	25.6	29.9	53.3	60.1	110	69.4	203	64.6
NP/AP [ratio]	12.6	37.7	8.22	5.26	14.4	7.07	21.5	13.0	9.97	22.4	8.65	11.6	5.13	18.2
S [%]	< 0.005	< 0.005	1.28	0.392	0.083	0.131	0.072	0.101	0.262	0.126	0.628	0.322	2.08	0.162
Acid Leachable SO4-S [%]	< 0.04	< 0.04	0.19	0.06	< 0.04	< 0.04	< 0.04	< 0.04	0.07	< 0.04	0.17	0.11	0.51	0.04
Sulphide [%]	< 0.04	< 0.04	1.09	0.33	0.07	0.10	0.04	0.08	0.19	0.09	0.46	0.21	1.57	0.12
C [%]	0.131	0.526	3.56	0.689	0.422	0.255	0.347	0.413	0.766	0.798	1.37	0.936	3.51	0.843
CO3 (HCl) [%]	0.580	2.55	17.7	3.32	1.99	1.20	1.64	1.99	3.75	3.89	6.72	4.59	17.5	4.13

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ABA - Modified Sobek

Project : Martathon Project - Leprechuan
LR Report : CA14114-NOV21 (121414740-180.300)

Analysis	76: 2149	77: 71992	78: 911332
Sample Date & Time	N/A	N/A	N/A
Paste pH [no unit]	9.21	9.70	9.43
Fizz Rate [no unit]	3	3	3
Sample weight [g]	1.94	1.98	1.89
HCl_add [mL]	68.00	20.00	38.00
HCl [Normality]	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	33.00	9.22	12.64
Final pH [no unit]	1.51	1.55	1.70
NP [t CaCO3/1000 t]	90.2	27.2	67.1
AP [t CaCO3/1000 t]	18.8	5.62	8.12
Net NP [t CaCO3/1000 t]	71.4	21.6	59.0
NP/AP [ratio]	4.81	4.84	8.26
S [%]	0.865	0.257	0.396
Acid Leachable SO4-S [%]	0.26	0.08	0.14
Sulphide [%]	0.60	0.18	0.26
C [%]	1.22	0.320	0.831
CO3 (HCl) [%]	5.99	1.54	4.09

*NP (Neutralization Potential)

$$= \frac{50 \times (N \text{ of HCL} \times \text{Total HCL added} - N \text{ NaOH} \times \text{NaOH added})}{\text{Weight of Sample}}$$

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.04 will be calculated using a 0.04 value.

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

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Project : Marathon Project - Leprechuan (121414740-180.300)

19-December-2021

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO
Mt. Pearl, NL
A1N 0A1, Canada

Phone: 709-730-5046
Fax:

Date Rec. : 06 November 2021
LR Report: **CA14115-NOV21**

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 62723	6: 62731	7: 62740	8: 238043	9: 238255	10: 238949	11: 239015	12: 818474
Sample Date & Time					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	13-Dec-21	18:59	14-Dec-21	11:41	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	3.1	4.4	3.2	2.2	1.2	3.0	3.7	6.0
Al [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	11000	15000	12000	13000	11000	19000	16000	15000
Au [µg/g]	13-Dec-21	18:59	17-Dec-21	11:51	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.21	< 0.02	< 0.02
Ba [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	39	51	57	41	36	43	50	54
Be [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	0.074	0.10	0.12	0.17	0.11	0.19	0.27	0.20
Bi [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	< 0.09	< 0.09	0.14	< 0.09	< 0.09	0.090	< 0.09	< 0.09
Ca [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	17000	14000	27000	9700	22000	7700	12000	6300
Cd [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	0.098	0.045	0.11	0.038	0.076	< 0.02	0.039	0.031
Co [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	10	15	11	12	6.8	17	13	14
Cr [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	17	52	14	17	3.0	16	26	36
Cu [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	67	82	100	8.4	58	4.0	47	9.6
Fe [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	21000	29000	24000	30000	19000	36000	30000	31000
K [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	920	1100	1200	1000	770	1100	1300	1200
Li [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	7.3	13	13	5.6	6.3	11	9.6	10
Mg [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	9800	14000	11000	8400	7600	12000	13000	12000
Mn [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	1200	1100	1300	660	540	620	1000	770
Mo [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	0.24	0.18	0.18	0.19	0.12	0.21	0.21	0.20
Na [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	320	320	320	710	670	700	480	540
Ni [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	18	47	19	19	3.9	22	24	26
P [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	590	930	730	750	730	910	930	1100
Pb [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	1.4	1.5	2.5	1.3	1.2	1.3	1.7	1.3
Sb [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	18	15	30	33	29	26	25	20
Ti [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	260	330	280	340	120	170	280	310
Tl [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	0.44	0.27	0.56	0.77	0.098	0.53	0.44	0.37
V [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	28	38	30	39	23	39	37	40
Y [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	4.2	2.8	5.6	10	1.8	7.6	4.8	3.8
Zn [µg/g]	13-Dec-21	18:59	14-Dec-21	11:41	49	63	53	56	51	71	61	58

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Project : Marathon Project - Leprechuan
LR Report : CA14115-NOV21 (121414740-180.300)

Analysis	13: 818532	14: 818680	15: 818766	16: 818767	17: 239673	18: 819008	19: 819202	20: 819210	21: 819601	22: 7230	23: 731	24: 1435	25: 1550	26: 3398
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	3.4	2.4	2.7	2.8	1.9	2.0	3.2	2.8	0.51	2.7	4.8	4.3	3.3	3.0
Al [µg/g]	13000	24000	13000	13000	16000	12000	13000	11000	7300	13000	12000	15000	14000	16000
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	42	31	45	50	58	41	42	38	79	55	48	54	47	41
Be [µg/g]	0.16	0.076	0.16	0.21	0.16	0.16	0.14	0.18	0.074	0.17	0.18	0.22	0.18	0.18
Bi [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	0.11	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	0.10
Ca [µg/g]	6200	23000	6900	7900	25000	11000	9300	5000	16000	16000	11000	16000	7300	13000
Cd [µg/g]	0.034	0.18	0.058	0.040	0.043	0.060	0.027	< 0.02	< 0.02	0.064	0.036	0.041	< 0.02	0.045
Co [µg/g]	11	21	10	10	10	9.9	12	12	4.2	12	13	17	12	12
Cr [µg/g]	20	15	18	17	11	15	16	13	2.2	23	14	42	19	21
Cu [µg/g]	18	110	16	98	64	2.2	10	0.68	4.8	21	3.9	8.2	19	19
Fe [µg/g]	28000	39000	27000	27000	28000	24000	24000	28000	15000	27000	26000	32000	24000	32000
K [µg/g]	1100	680	1100	1200	930	1100	1100	980	900	1200	1200	1200	1200	1100
Li [µg/g]	7.9	13	6.9	7.5	9.9	6.6	7.6	5.8	2.9	7.5	7.8	9.3	11	9.1
Mg [µg/g]	11000	19000	10000	10000	10000	10000	10000	8100	4200	12000	10000	13000	11000	11000
Mn [µg/g]	610	1000	790	820	760	830	730	440	350	1200	880	980	670	820
Mo [µg/g]	0.22	0.12	0.18	0.18	0.14	0.16	< 0.1	0.14	0.16	0.16	0.28	0.16	0.17	0.24
Na [µg/g]	480	470	560	590	660	550	520	700	730	470	450	560	360	610
Ni [µg/g]	19	18	19	18	11	17	19	17	2.6	23	20	36	22	20
P [µg/g]	880	1800	760	820	830	710	860	1000	540	790	990	1300	860	970
Pb [µg/g]	1.4	0.95	1.5	2.4	0.98	1.6	1.2	1.4	0.99	1.7	1.5	1.4	0.99	1.2
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	18	36	20	21	41	20	19	22	38	22	24	26	16	26
Ti [µg/g]	290	180	290	280	47	230	210	300	55	250	260	310	210	230
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.29	0.23	0.64	0.39	0.30	0.62	0.34	0.72	0.26	0.40	0.38	0.27	0.42	0.52
V [µg/g]	37	64	39	36	30	32	31	39	11	34	34	44	30	40
Y [µg/g]	4.7	2.3	8.6	4.8	2.8	7.4	4.2	9.8	2.8	4.9	3.1	3.7	2.5	8.1
Zn [µg/g]	55	83	53	51	59	49	52	50	41	56	52	64	56	59

Analysis	27: 3440	28: 3534	29: 5216	30: 5778	31: 11158	32: 11279	33: 8099	34: 11522	35: 11680	36: 30915	37: 32108	38: 40516	39: 40636	40: 33592	41: 41901
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	3.3	2.1	3.4	3.1	3.1	2.3	2.8	2.3	2.6	4.7	2.1	3.5	3.3	1.7	3.1
Al [µg/g]	17000	18000	13000	15000	18000	14000	16000	15000	19000	14000	16000	14000	14000	17000	23000
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	49	36	44	67	46	39	47	46	43	52	43	51	65	58	54
Be [µg/g]	0.14	0.14	0.19	0.16	0.20	0.16	0.24	0.18	0.19	0.20	0.23	0.16	0.12	0.21	0.17
Bi [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	0.11	< 0.09	< 0.09	0.11	< 0.09
Ca [µg/g]	4600	12000	7400	11000	6400	10000	15000	12000	6700	6000	9400	7400	10000	6200	12000
Cd [µg/g]	< 0.02	0.060	0.026	0.042	< 0.02	0.040	0.052	0.042	0.031	0.029	0.031	0.034	0.068	0.036	< 0.02
Co [µg/g]	14	15	10	13	15	13	13	14	17	13	13	13	13	15	17
Cr [µg/g]	19	21	18	18	20	14	16	15	21	21	22	25	15	24	23

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Project : Marathon Project - Leprechuan
LR Report : CA14115-NOV21 (121414740-180.300)

Analysis	27: 3440	28: 3534	29: 5216	30: 5778	31: 11158	32: 11279	33: 8099	34: 11522	35: 11680	36: 30915	37: 32108	38: 40516	39: 40636	40: 33592	41: 41901
Cu [µg/g]	0.56	2.2	2.9	100	1.5	0.76	13	1.3	3.3	34	0.90	0.47	13	0.34	13
Fe [µg/g]	29000	37000	24000	26000	37000	29000	27000	29000	39000	29000	34000	29000	25000	34000	48000
K [µg/g]	1400	1100	1300	1600	1300	1200	1400	1200	1300	1300	1300	1300	1600	1400	1500
Li [µg/g]	10	8.6	8.9	9.5	12	9.5	11	9.3	10	9.3	8.2	9.0	8.3	8.9	12
Mg [µg/g]	13000	13000	11000	12000	13000	10000	12000	13000	13000	11000	12000	11000	12000	12000	14000
Mn [µg/g]	790	1100	700	1000	700	820	980	920	750	750	860	780	870	960	750
Mo [µg/g]	0.24	0.42	0.24	0.23	0.63	0.27	0.22	0.19	0.15	0.29	0.13	0.36	0.41	0.19	0.96
Na [µg/g]	400	500	450	450	750	660	630	540	610	670	830	630	480	700	520
Ni [µg/g]	25	24	18	23	21	20	22	20	22	24	23	23	20	24	28
P [µg/g]	840	890	710	770	1100	810	810	810	1100	1000	980	850	720	860	760
Pb [µg/g]	0.93	1.1	1.2	1.3	1.1	1.3	1.4	1.3	0.83	1.2	1.5	1.1	1.3	1.3	0.67
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	15	24	14	24	26	19	22	21	19	16	25	20	20	29	23
Ti [µg/g]	200	160	210	260	310	230	190	270	360	290	280	300	280	340	41
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.020	< 0.02	< 0.02
U [µg/g]	0.32	0.70	0.30	0.39	0.60	0.60	0.40	0.45	0.53	0.29	0.67	0.46	0.50	0.86	0.81
V [µg/g]	34	48	30	35	47	35	34	39	51	42	46	39	34	47	48
Y [µg/g]	4.9	10	3.7	4.1	8.4	8.2	3.8	6.1	6.5	4.4	10	7.7	5.3	12	8.7
Zn [µg/g]	64	65	53	60	61	61	58	61	71	56	58	58	58	68	76

Analysis	42: 41905	43: 41908	44: 34544	45: 42868	46: 35013	47: 35022	48: 35098	49: 43492	50: 47686	51: 48000	52: 48167	53: 51518	54: 48318	55: 51643	56: 7259
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	3.7	3.4	4.2	4.0	3.5	3.4	2.8	2.5	3.1	2.7	4.0	1.5	4.8	3.8	1.6
Al [µg/g]	17000	24000	15000	16000	13000	15000	14000	7300	15000	14000	15000	17000	14000	13000	11000
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Ba [µg/g]	45	52	48	70	50	62	48	53	43	36	42	36	37	30	32
Be [µg/g]	0.17	0.18	0.16	0.18	0.19	0.16	0.19	0.16	0.13	0.16	0.15	0.15	0.20	0.13	0.14
Bi [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	0.14	< 0.09	< 0.09	< 0.09	0.25	< 0.09	< 0.09	< 0.09
Ca [µg/g]	8500	8500	8000	16000	6500	6400	13000	18000	8500	8700	5300	12000	11000	20000	4000
Cd [µg/g]	< 0.02	0.030	0.028	0.084	0.046	0.023	0.076	0.13	0.030	0.034	< 0.02	0.052	0.044	0.089	0.025
Co [µg/g]	15	18	13	15	11	13	13	6.2	13	14	12	14	12	11	9.0
Cr [µg/g]	19	28	18	20	21	20	19	4.6	20	13	17	16	19	26	14
Cu [µg/g]	7.4	1.2	0.46	29	3.2	21	26	26	6.3	4.3	4.5	84	0.45	3.9	0.62
Fe [µg/g]	33000	48000	27000	30000	28000	26000	27000	20000	31000	30000	26000	30000	29000	27000	21000
K [µg/g]	1100	1300	1300	1800	1300	1600	1200	610	1100	980	1100	1000	1000	580	1000
Li [µg/g]	11	14	12	9.9	6.8	9.8	7.6	2.7	9.0	9.5	11	8.5	9.2	8.3	5.9
Mg [µg/g]	12000	15000	12000	13000	9600	12000	12000	5500	12000	11000	12000	13000	10000	13000	9100
Mn [µg/g]	820	820	700	1100	710	740	1100	420	860	760	600	1000	790	1800	490
Mo [µg/g]	0.21	0.19	0.25	0.25	0.17	0.33	0.14	0.35	0.15	0.27	0.20	0.25	0.11	0.23	0.13
Na [µg/g]	530	460	780	490	750	440	510	890	400	600	620	520	630	470	550
Ni [µg/g]	21	30	22	26	18	26	22	2.8	21	19	17	21	22	20	14
P [µg/g]	830	1000	850	970	940	710	900	610	890	820	740	700	1100	920	560
Pb [µg/g]	1.0	0.82	1.4	1.6	1.5	1.1	1.6	2.5	1.0	1.2	1.0	1.4	1.3	1.4	1.0
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7

OnLine LIMS

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Project : Marathon Project - Leprechuan
LR Report : CA14115-NOV21 (121414740-180.300)

Analysis	42: 41905	43: 41908	44: 34544	45: 42868	46: 35013	47: 35022	48: 35098	49: 43492	50: 47686	51: 48000	52: 48167	53: 51518	54: 48318	55: 51643	56: 7259
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	22	22	28	27	26	16	23	54	17	23	20	22	27	21	13
Ti [µg/g]	240	76	240	320	260	210	260	34	270	230	220	200	270	270	190
Tl [µg/g]	< 0.02	< 0.02	< 0.02	0.021	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.43	0.41	0.41	0.55	0.50	0.32	0.48	0.23	0.48	0.47	0.38	0.76	0.39	0.43	0.43
V [µg/g]	40	51	37	40	37	31	36	17	40	37	35	36	41	38	29
Y [µg/g]	6.1	4.7	4.5	6.8	7.0	3.9	5.3	2.9	6.8	6.9	4.7	9.5	5.3	6.6	7.2
Zn [µg/g]	63	79	60	64	50	60	57	51	60	59	56	67	53	52	44

Analysis	57: 5384	58: 3816	59: 6957	60: 40275	61: 53505	62: 3812	63: 238297	64: 32547	65: 70726	66: 70301	67: 66023	68: 143334	69: 14692	70: 41409
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.18	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	2.7	2.8	2.7	2.1	2.3	3.4	2.6	3.0	1.1	< 0.5	0.64	0.63	0.55	0.67
Al [µg/g]	13000	12000	19000	15000	13000	15000	13000	9800	3100	3000	3300	2600	3100	3600
Au [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.52	0.32	0.31	0.15	< 0.02	0.05	0.02
Ba [µg/g]	34	52	33	32	45	47	37	57	140	210	130	320	250	120
Be [µg/g]	0.21	0.10	0.18	0.18	0.18	0.11	0.19	0.18	0.099	0.10	0.12	0.094	0.11	0.14
Bi [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	0.29	0.31	0.27	0.16	< 0.09	< 0.09	< 0.09
Ca [µg/g]	23000	24000	5800	22000	22000	6700	21000	74000	24000	13000	10000	12000	15000	25000
Cd [µg/g]	0.13	0.072	0.021	0.031	0.084	0.020	0.078	0.68	0.040	0.025	0.034	0.027	< 0.02	0.027
Co [µg/g]	14	11	20	11	14	12	9.5	36	1.4	0.68	0.96	0.74	0.89	1.9
Cr [µg/g]	22	15	29	14	20	18	12	39	1.7	1.6	2.2	1.9	1.7	2.0
Cu [µg/g]	68	29	62	1.6	1.8	7.0	90	260	6.2	6.3	17	4.4	11	5.7
Fe [µg/g]	30000	23000	39000	29000	31000	31000	27000	84000	9300	5100	5600	5100	4900	9400
K [µg/g]	1200	1400	1000	740	1200	1200	980	1000	1200	1400	1100	1100	1400	1200
Li [µg/g]	9.2	11	13	10	7.6	8.1	7.8	3.2	< 2	< 2	< 2	< 2	< 2	< 2
Mg [µg/g]	10000	11000	14000	10000	12000	11000	8600	28000	750	960	550	530	720	1700
Mn [µg/g]	1600	950	740	890	1400	740	820	1700	610	490	380	450	390	830
Mo [µg/g]	0.27	0.14	0.15	0.16	0.26	0.20	0.18	0.79	0.54	0.28	0.69	0.43	0.38	0.45
Na [µg/g]	830	360	580	660	560	410	840	410	950	720	870	660	820	840
Ni [µg/g]	24	18	29	15	25	23	13	28	0.29	0.28	0.25	0.31	0.24	0.99
P [µg/g]	960	640	1000	710	880	1000	910	930	110	73	100	79	84	160
Pb [µg/g]	1.7	1.7	1.1	1.3	1.6	0.92	1.5	3.4	3.6	12	2.4	2.5	2.6	3.0
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	27	19	15	42	29	18	36	200	89	56	38	47	51	67
Ti [µg/g]	330	240	390	96	300	190	290	230	17	16	10	17	13	13
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.42	0.40	0.34	0.51	0.54	0.43	0.41	0.15	0.20	0.060	0.064	0.081	0.068	0.056
V [µg/g]	43	27	57	31	42	35	38	84	1.1	1.0	< 1	< 1	< 1	1.3
Y [µg/g]	6.2	3.6	6.0	5.5	7.9	6.1	6.6	12	3.1	1.9	2.1	2.3	2.6	3.7
Zn [µg/g]	61	54	75	54	55	56	50	250	12	20	7.4	16	16	14

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Project : Marathon Project - Leprechuan
LR Report : CA14115-NOV21 (121414740-180.300)

Analysis	71: 46443	72: 7021	73: 30951	74: 6487	75: 923414	76: 2149	77: 71992	78: 911332
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.10	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	< 0.5	2.1	1.2	7.1	0.73	1.9	1.2	1.1
Al [µg/g]	3800	35000	8000	7900	7600	5500	2900	5400
Au [µg/g]	< 0.02	0.47	0.29	0.82	0.26	2	0.22	3
Ba [µg/g]	340	18	48	33	42	51	340	120
Be [µg/g]	0.15	0.30	0.20	0.14	0.18	0.10	0.091	0.15
Bi [µg/g]	< 0.09	0.41	0.16	0.30	0.20	1.2	< 0.09	1.2
Ca [µg/g]	22000	50000	32000	73000	29000	33000	12000	29000
Cd [µg/g]	< 0.02	0.044	0.036	0.23	0.039	0.045	0.12	0.041
Co [µg/g]	1.2	36	6.5	37	5.3	9.1	0.80	3.2
Cr [µg/g]	1.9	28	2.3	29	2.8	6.2	1.6	1.6
Cu [µg/g]	7.1	93	10	44	7.7	6.1	7.5	23
Fe [µg/g]	5400	79000	20000	77000	18000	26000	5300	14000
K [µg/g]	1300	380	1200	760	1000	1000	1300	1300
Li [µg/g]	< 2	15	2.4	2.2	2.1	< 2	< 2	< 2
Mg [µg/g]	1200	23000	5000	26000	4800	6800	460	2400
Mn [µg/g]	550	1100	450	1500	470	520	390	530
Mo [µg/g]	0.33	0.35	0.30	1.7	0.22	0.51	1.3	0.48
Na [µg/g]	550	330	750	420	850	730	850	660
Ni [µg/g]	0.37	26	2.9	28	2.8	12	0.16	0.67
P [µg/g]	130	1000	590	790	610	630	67	270
Pb [µg/g]	5.3	2.1	2.2	4.0	2.0	2.2	2.5	2.2
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	79	140	90	190	97	78	48	67
Ti [µg/g]	9.1	81	29	230	30	28	10	26
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.14	0.20	0.16	0.16	0.18	0.15	0.37	0.19
V [µg/g]	< 1	130	8.8	55	10	8.6	< 1	3.3
Y [µg/g]	3.3	10	3.6	9.0	2.8	3.5	1.7	3.2
Zn [µg/g]	17	170	43	100	37	40	55	27

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

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Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO, Mt. Pearl
Canada, A1N 0A1
Phone: 709-730-5046, Fax:

SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Marathon Project - Leprechuan (121414740-180.300)

09-December-2021

Date Rec. : 06 November 2021
LR Report: **CA14116-NOV21**

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 62723	6: 62731	7: 62740	8: 238043	9: 238255	10: 238949	11: 239015	12: 818474	13: 818532
Sample Date & Time					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	26-Nov-21	09:00	29-Nov-21	10:17	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	26-Nov-21	09:00	29-Nov-21	10:17	750	750	750	750	750	750	750	750	750
Final pH [no unit]	27-Nov-21	07:10	29-Nov-21	10:17	9.60	9.56	9.59	9.41	9.57	9.52	9.53	9.59	9.49
pH [No unit]	26-Nov-21	15:35	02-Dec-21	11:32	8.05	8.18	8.07	8.02	8.32	8.02	7.87	7.98	8.01
Conductivity [uS/cm]	26-Nov-21	15:35	02-Dec-21	11:32	74	79	75	96	75	82	82	75	88
Alkalinity [mg/L as CaCO3]	26-Nov-21	15:35	02-Dec-21	11:32	37	42	39	47	42	41	37	39	44
SO4 [mg/L]	30-Nov-21	08:15	02-Dec-21	06:31	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Hg [mg/L]	29-Nov-21	12:20	30-Nov-21	10:18	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	1.01	0.962	0.896	1.17	1.89	1.31	0.894	1.47	1.10
As [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.0116	0.0113	0.0052	0.0048	0.0040	0.0021	0.0015	0.0092	0.0077
Ba [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.00170	0.00221	0.00319	0.00184	0.00093	0.00128	0.00151	0.00154	0.00146
B [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.007	0.006	0.007	0.015	0.008	0.028	0.007	0.009	0.014
Be [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	5.20	5.86	5.66	5.32	5.49	4.06	4.80	3.82	4.64
Cd [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003
Co [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.000027	0.000075	0.000004	0.000073	0.000008	0.000020	0.000007	0.000022	0.000022
Cr [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.00008	0.00032	< 0.00008	< 0.00008	< 0.00008	0.00008	0.00013	0.00014	0.00009
Cu [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.0044	0.0034	0.0030	0.0034	0.0059	0.0008	0.0042	0.0040	0.0053

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Marathon Project - Leprechuan (121414740-180.300)

LR Report : ~~CA14116-NOV21~~

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 62723	6: 62731	7: 62740	8: 238043	9: 238255	10: 238949	11: 239015	12: 818474	13: 818532
Fe [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.023	0.029	0.011	0.029	< 0.007	0.036	0.024	0.027	0.023
K [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	6.10	7.91	6.13	5.58	3.89	4.55	4.60	6.04	6.82
Li [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.0003	0.0002	0.0004	0.0004	0.0004	0.0002	0.0002	0.0004	0.0005
Mg [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.462	0.614	0.508	0.582	0.476	0.349	0.516	0.359	0.535
Mn [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.00246	0.00204	0.00152	0.00402	0.00085	0.00173	0.00180	0.00215	0.00287
Mo [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.00041	0.00048	0.00030	0.00075	0.00026	0.00047	0.00047	0.00079	0.00165
Na [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	6.13	5.34	6.92	12.6	8.92	11.7	10.2	9.86	9.45
Ni [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.0002	0.0002	< 0.0001	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.0009	< 0.0009	< 0.0009	0.0014	< 0.0009	0.0014	< 0.0009	0.0010	< 0.0009
Se [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.00004	0.00004	0.00012	0.00005	< 0.00004	< 0.00004	< 0.00004	0.00004	< 0.00004
Si [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	3.06	2.68	3.40	2.45	2.48	2.06	2.24	2.50	2.39
Sn [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.0145	0.0137	0.0198	0.0187	0.0168	0.0107	0.0129	0.0102	0.0111
Ti [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.00108	0.00089	0.00088	0.00092	0.00022	0.00082	0.00056	0.00129	0.00062
Tl [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.000172	0.000095	0.000220	0.000376	0.000035	0.000205	0.000113	0.000149	0.000202
V [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	0.00926	0.00806	0.00968	0.00618	0.00654	0.00659	0.00720	0.0107	0.00759
Zn [mg/L]	29-Nov-21	11:00	30-Nov-21	15:20	< 0.002	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	14: 818680	15: 818766	16: 818767	17: 239673	18: 819008	19: 819202	20: 819210	21: 819601	22: 7230	23: 731	24: 1435	25: 1550	26: 3398
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.62	9.52	9.54	9.49	9.50	9.62	9.54	9.58	9.48	9.57	9.55	9.63	9.55
pH [No unit]	8.14	7.91	7.86	8.19	7.96	8.09	8.05	8.36	8.10	8.03	7.98	7.91	8.02
Conductivity [uS/cm]	68	80	74	89	86	87	91	87	85	89	89	76	85
Alkalinity [mg/L as CaCO3]	39	43	40	43	44	44	47	45	45	42	48	36	44
SO4 [mg/L]	< 2	< 2	< 2	3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	1.60	1.18	1.24	1.66	1.07	1.42	1.87	1.72	1.05	1.24	1.40	1.03	1.25
As [mg/L]	0.0026	0.0100	0.0092	0.0021	0.0064	0.0047	0.0066	0.0021	0.0060	0.0097	0.0064	0.0046	0.0030

OnLine LIMS

0002739151

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Marathon Project - Leprechuan (121414740-180.300)

LR Report : CA14116-NOV21

Analysis	14: 818680	15: 818766	16: 818767	17: 239673	18: 819008	19: 819202	20: 819210	21: 819601	22: 7230	23: 731	24: 1435	25: 1550	26: 3398
Ba [mg/L]	0.00075	0.00231	0.00228	0.00150	0.00279	0.00249	0.00233	0.00471	0.00155	0.00217	0.00166	0.00210	0.00245
B [mg/L]	0.010	0.013	0.011	0.016	0.014	0.072	0.028	0.026	0.016	0.016	0.016	0.011	0.013
Be [mg/L]	< 0.000007	0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	4.44	4.34	3.85	5.58	4.18	3.53	2.55	5.30	5.11	4.86	4.40	4.78	4.22
Cd [mg/L]	< 0.000003	< 0.000003	0.000007	< 0.000003	< 0.000003	0.000004	0.000007	0.000004	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000004
Co [mg/L]	0.000010	0.000025	0.000370	< 0.000004	0.000027	0.000015	0.000008	0.000004	0.000018	0.000028	0.000025	0.000028	0.000015
Cr [mg/L]	0.00009	0.00009	< 0.00008	< 0.00008	0.00013	< 0.00008	0.00023	< 0.00008	0.00009	< 0.00008	0.00013	0.00018	0.00017
Cu [mg/L]	0.0041	0.0033	0.0024	0.0021	0.0012	0.0015	0.0012	0.0015	0.0028	0.0017	0.0018	0.0028	0.0019
Fe [mg/L]	0.021	0.024	0.031	< 0.007	0.036	0.038	0.035	0.028	0.022	0.034	0.014	0.038	0.042
K [mg/L]	3.75	5.46	5.22	5.74	6.16	6.53	5.55	5.61	7.23	6.81	8.14	6.70	5.55
Li [mg/L]	0.0002	0.0026	0.0004	0.0003	0.0004	0.0006	0.0003	0.0004	0.0004	0.0005	0.0004	0.0004	0.0003
Mg [mg/L]	0.339	0.555	0.596	0.394	0.470	0.340	0.292	0.541	0.698	0.514	0.513	0.399	0.436
Mn [mg/L]	0.00084	0.00298	0.00329	0.00086	0.00255	0.00291	0.00250	0.00117	0.00253	0.00317	0.00129	0.00238	0.00255
Mo [mg/L]	0.00032	0.00340	0.00075	0.00015	0.00065	0.00084	0.00044	0.00018	0.00091	0.00521	0.00138	0.00081	0.00052
Na [mg/L]	8.17	9.99	9.47	11.5	10.0	11.1	14.6	10.7	8.06	9.79	9.93	6.94	11.9
Ni [mg/L]	< 0.0001	0.0002	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	< 0.0001	< 0.0001
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0010	< 0.0009	< 0.0009	0.0011	0.0011	0.0021	0.0022	< 0.0009	< 0.0009	< 0.0009	0.0014	0.0011	0.0026
Se [mg/L]	0.00013	0.00009	< 0.00004	< 0.00004	0.00009	< 0.00004	< 0.00004	< 0.00004	< 0.00004	0.00005	< 0.00004	< 0.00004	< 0.00004
Si [mg/L]	2.35	2.32	2.37	1.92	2.52	2.15	2.55	2.66	2.43	2.53	2.06	2.89	1.90
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0161	0.0125	0.0113	0.0998	0.0118	0.00833	0.00755	0.0302	0.0116	0.0101	0.0120	0.00806	0.0189
Ti [mg/L]	0.00022	0.00051	0.00114	0.00041	0.00097	0.00102	0.00160	0.00071	0.00062	0.00131	0.00062	0.00224	0.00280
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000066	0.000323	0.000199	0.000081	0.000287	0.000225	0.000684	0.000563	0.000223	0.000244	0.000178	0.000154	0.000223
V [mg/L]	0.00950	0.00949	0.00967	0.00799	0.00874	0.00996	0.0123	0.00711	0.00766	0.0109	0.00960	0.00887	0.00897
Zn [mg/L]	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	27: 3440	28: 3534	29: 5216	30: 5778	31: 11158	32: 11279	33: 8099	34: 11522	35: 11680	36: 30915	37: 32108	38: 40516	39: 40636
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750

OnLine LIMS

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Marathon Project - Leprechuan (121414740-180.300)

LR Report : CA14116-NOV21

Analysis	27: 3440	28: 3534	29: 5216	30: 5778	31: 11158	32: 11279	33: 8099	34: 11522	35: 11680	36: 30915	37: 32108	38: 40516	39: 40636
Final pH [no unit]	9.50	9.43	9.52	9.61	9.49	9.59	9.57	9.55	9.58	9.56	9.56	9.49	9.57
pH [No unit]	8.06	8.10	8.01	8.02	8.11	8.31	8.14	8.14	8.07	8.15	8.06	7.99	8.55
Conductivity [uS/cm]	68	80	77	64	76	78	79	73	64	76	82	75	71
Alkalinity [mg/L as CaCO3]	36	32	36	33	35	39	40	38	27	41	43	40	39
SO4 [mg/L]	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	1.46	1.49	1.06	1.22	1.45	1.41	1.21	1.31	1.72	1.94	1.47	1.53	1.10
As [mg/L]	0.0056	0.0019	0.0037	0.0039	0.0043	0.0025	0.0041	0.0048	0.0103	0.0150	0.0039	0.0053	0.0075
Ba [mg/L]	0.00240	0.00120	0.00178	0.00181	0.00187	0.00248	0.00164	0.00165	0.00122	0.00419	0.00136	0.00253	0.00164
B [mg/L]	0.008	0.018	0.009	0.004	0.012	0.009	0.010	0.008	0.009	0.011	0.010	0.007	0.007
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	3.50	5.29	4.92	4.86	4.38	3.64	5.20	4.84	4.01	2.95	4.02	4.79	4.53
Cd [mg/L]	0.000004	0.000004	0.000003	< 0.000003	< 0.000003	0.000007	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000004	< 0.000003	< 0.000003
Co [mg/L]	0.000027	0.000005	0.000017	< 0.000004	0.000031	0.000027	0.000012	0.000016	< 0.000004	0.000034	0.000019	0.000065	< 0.000004
Cr [mg/L]	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00018	0.00008	< 0.00008	< 0.00008	0.00021	< 0.00008	0.00016	< 0.00008
Cu [mg/L]	0.0006	0.0009	0.0012	0.0027	0.0011	0.0009	0.0018	0.0009	0.0006	0.0012	0.0005	0.0016	0.0024
Fe [mg/L]	0.035	0.007	0.028	0.020	0.037	0.043	0.016	0.019	0.021	0.049	0.025	0.037	0.017
K [mg/L]	7.01	6.36	6.12	5.98	5.46	8.30	6.69	6.74	6.22	6.90	5.08	5.06	6.82
Li [mg/L]	0.0002	0.0002	0.0004	0.0003	0.0002	0.0003	0.0003	0.0003	0.0002	0.0006	0.0003	0.0005	0.0003
Mg [mg/L]	0.338	0.549	0.433	0.481	0.411	0.428	0.562	0.608	0.376	0.337	0.357	0.508	0.410
Mn [mg/L]	0.00206	0.00159	0.00232	0.00195	0.00262	0.00327	0.00153	0.00145	0.00137	0.00384	0.00192	0.00323	0.00076
Mo [mg/L]	0.00030	0.00038	0.00114	0.00030	0.00060	0.00060	0.00021	0.00295	0.00024	0.00102	0.00033	0.00082	0.00033
Na [mg/L]	7.42	8.08	8.30	4.76	8.62	8.97	7.35	7.24	6.84	10.8	13.2	10.4	6.18
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0001	< 0.0001	< 0.0001	< 0.0001	0.0001	< 0.0001	0.0002	< 0.0001
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0010	0.0012	< 0.0009	< 0.0009	< 0.0009	0.0011	0.0010	0.0013	< 0.0009	0.0010	0.0017	0.0009	< 0.0009
Se [mg/L]	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	0.00004	0.00006	0.00004	< 0.00004	0.00004	< 0.00004	< 0.00004
Si [mg/L]	2.47	1.80	2.56	2.43	2.04	2.45	2.03	2.10	1.84	2.68	2.41	2.28	3.08
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.00870	0.0166	0.00791	0.00825	0.0101	0.00829	0.0208	0.0121	0.00967	0.00790	0.0112	0.0128	0.0329
Ti [mg/L]	0.00080	0.00029	0.00121	0.00148	0.00067	0.00151	0.00041	0.00060	0.00139	0.00273	0.00110	0.00135	0.00062
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000082	0.000115	0.000072	0.000094	0.000196	0.000222	0.000141	0.000191	0.000167	0.000160	0.000295	0.000171	0.000128
V [mg/L]	0.00839	0.00659	0.00596	0.00637	0.00577	0.00534	0.00614	0.00626	0.00633	0.0108	0.00964	0.00858	0.0103

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Analysis	27: 3440	28: 3534	29: 5216	30: 5778	31: 11158	32: 11279	33: 8099	34: 11522	35: 11680	36: 30915	37: 32108	38: 40516	39: 40636
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.008	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	40: 33592	41: 41901	42: 41905	43: 41908	44: 34544	45: 42868	46: 35013	47: 35022	48: 35098	49: 43492	50: 47686	51: 48000	52: 48167
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.59	9.43	9.55	9.34	9.63	9.63	9.56	9.49	9.39	9.29	9.49	9.46	9.57
pH [No unit]	8.09	8.13	8.08	7.96	8.15	8.20	8.15	8.03	7.94	8.11	8.04	8.04	8.03
Conductivity [uS/cm]	69	76	72	80	74	75	85	74	80	116	82	85	73
Alkalinity [mg/L as CaCO3]	38	41	40	38	40	39	45	40	45	49	41	41	40
SO4 [mg/L]	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	10	< 2	< 2	< 2
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	1.60	1.51	1.52	1.28	1.73	1.14	1.66	1.34	1.14	1.20	1.46	1.48	1.60
As [mg/L]	0.0070	0.0026	0.0035	0.0011	0.0089	0.0049	0.0077	0.0057	0.0091	0.0027	0.0032	0.0046	0.0082
Ba [mg/L]	0.00212	0.00093	0.00170	0.00177	0.00142	0.00127	0.00299	0.00325	0.00221	0.00344	0.00187	0.00120	0.00157
B [mg/L]	0.012	0.027	0.011	0.017	0.012	0.005	0.012	0.011	0.007	0.024	0.012	0.014	0.012
Be [mg/L]	0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	2.93	5.17	4.17	6.61	3.68	4.38	2.84	4.36	4.86	7.89	4.88	4.64	3.66
Cd [mg/L]	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000003	< 0.000003	< 0.000003	< 0.000003	0.000003	0.000003	< 0.000003	< 0.000003
Co [mg/L]	< 0.000004	0.000011	< 0.000004	0.000013	0.000021	< 0.000004	0.000041	0.000030	0.000031	0.000031	< 0.000004	< 0.000004	0.000008
Cr [mg/L]	< 0.00008	0.00021	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00012	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Cu [mg/L]	0.0004	0.0004	0.0017	0.0022	0.0007	0.0014	0.0023	0.0033	0.0186	0.0027	0.0005	0.0007	0.0014
Fe [mg/L]	0.032	0.008	0.026	0.031	0.020	0.011	0.041	0.047	0.027	0.007	0.023	0.009	0.026
K [mg/L]	6.47	5.90	4.66	5.41	4.70	7.35	5.05	7.80	5.18	5.57	7.55	5.44	5.13
Li [mg/L]	0.0003	0.0001	0.0002	0.0001	0.0006	0.0002	0.0005	0.0002	0.0004	0.0002	0.0002	0.0004	0.0004
Mg [mg/L]	0.317	0.451	0.361	0.634	0.315	0.449	0.401	0.531	0.675	1.39	0.544	0.594	0.331
Mn [mg/L]	0.00195	0.00038	0.00130	0.00162	0.00150	0.00111	0.00378	0.00270	0.00264	0.00145	0.00135	0.00122	0.00131
Mo [mg/L]	0.00022	0.00023	0.00029	0.00014	0.00022	0.00206	0.00059	0.00049	0.00549	0.00131	0.00526	0.00030	0.00019
Na [mg/L]	10.3	8.01	9.42	7.86	11.2	7.00	13.3	6.80	9.34	13.9	7.63	12.2	9.17
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	0.0001	0.0001	< 0.0001	0.0001	0.0001	< 0.0001	0.0002	< 0.0001	< 0.0001	0.0001
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Marathon Project - Leprechuan (121414740-180.300)

LR Report : CA14116-NOV21

Analysis	40: 33592	41: 41901	42: 41905	43: 41908	44: 34544	45: 42868	46: 35013	47: 35022	48: 35098	49: 43492	50: 47686	51: 48000	52: 48167
Sb [mg/L]	0.0012	0.0011	0.0012	< 0.0009	0.0014	< 0.0009	0.0014	< 0.0009	< 0.0009	0.0010	0.0014	0.0017	0.0011
Se [mg/L]	0.00004	< 0.00004	< 0.00004	0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	0.00009	0.00016	< 0.00004	< 0.00004	< 0.00004
Si [mg/L]	3.11	1.58	2.01	1.61	2.31	2.77	2.53	2.07	2.70	2.21	1.98	2.07	2.30
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0108	0.0275	0.0116	0.0197	0.0101	0.00993	0.0102	0.00758	0.0109	0.0418	0.0205	0.0162	0.0135
Ti [mg/L]	0.00188	0.00031	0.00066	0.00040	0.00095	0.00019	0.00176	0.00127	0.00119	0.00010	0.00065	0.00047	0.00077
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000233	0.000081	0.000155	0.000116	0.000165	0.000153	0.000402	0.000109	0.000217	0.000295	0.000166	0.000237	0.000148
V [mg/L]	0.00891	0.00603	0.00800	0.00562	0.0112	0.00947	0.0101	0.00778	0.00811	0.00512	0.00829	0.00767	0.00877
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	53: 51518	54: 48318	55: 51643	56: 7259	57: 5384	58: 3816	59: 6957	60: 40275	61: 53505	62: 3812	63: 238297	64: 32547	65: 70726
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.48	9.50	9.50	9.51	9.52	9.55	9.48	9.45	9.42	9.48	9.52	8.79	9.43
pH [No unit]	7.93	7.98	8.41	7.86	8.14	8.30	7.93	8.08	7.92	7.89	7.98	8.25	7.95
Conductivity [uS/cm]	76	82	76	78	82	82	82	92	91	80	94	202	96
Alkalinity [mg/L as CaCO3]	41	42	40	37	44	42	43	48	45	40	46	103	45
SO4 [mg/L]	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	6	3
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	1.49	1.84	1.36	1.22	1.56	1.03	1.70	2.03	1.08	1.31	1.76	0.368	1.12
As [mg/L]	0.0036	0.0071	0.0086	0.0068	0.0052	0.0076	0.0064	0.0060	0.0044	0.0053	0.0075	0.0002	0.0030
Ba [mg/L]	0.00174	0.00142	0.00143	0.00149	0.00053	0.00156	0.00160	0.00084	0.00114	0.00216	0.00101	0.00512	0.02200
B [mg/L]	0.017	0.015	0.019	0.011	0.010	0.007	0.009	0.024	0.012	0.009	0.021	0.008	0.040
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	0.000010	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	4.19	4.88	5.92	4.14	4.92	6.18	3.11	4.47	5.06	4.73	4.76	14.3	7.05
Cd [mg/L]	0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000003	< 0.000003
Co [mg/L]	0.000013	< 0.000004	< 0.000004	0.000018	0.000004	0.000006	0.000021	0.000007	0.000004	0.000052	0.000041	0.000022	0.000023
Cr [mg/L]	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00010	< 0.00008	< 0.00008
Cu [mg/L]	0.0039	0.0007	0.0007	0.0012	0.0011	0.0022	0.0043	0.0013	0.0015	0.0006	0.0061	0.0006	0.0037

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Marathon Project - Leprechuan (121414740-180.300)

LR Report : CA14116-NOV21

Analysis	53: 51518	54: 48318	55: 51643	56: 7259	57: 5384	58: 3816	59: 6957	60: 40275	61: 53505	62: 3812	63: 238297	64: 32547	65: 70726
Fe [mg/L]	0.029	0.014	< 0.007	0.030	< 0.007	0.016	0.036	< 0.007	0.008	0.038	0.015	< 0.007	0.012
K [mg/L]	5.75	5.87	3.65	5.47	5.50	8.89	8.00	4.93	6.35	7.84	7.64	6.24	6.04
Li [mg/L]	0.0003	0.0004	0.0004	0.0003	0.0010	0.0003	0.0003	0.0004	0.0003	0.0002	0.0005	0.0004	0.0006
Mg [mg/L]	0.500	0.435	0.710	0.513	0.580	0.661	0.344	0.451	0.688	0.547	0.441	10.8	0.528
Mn [mg/L]	0.00197	0.00119	0.00141	0.00244	0.00182	0.00132	0.00173	0.00065	0.00143	0.00194	0.00144	0.00600	0.00386
Mo [mg/L]	0.00111	0.00076	0.00056	0.00192	0.00055	0.00025	0.00033	0.00023	0.00197	0.00044	0.00061	0.00123	0.00025
Na [mg/L]	10.8	11.2	9.60	11.9	10.9	6.03	9.75	16.0	9.73	7.16	12.7	8.46	8.49
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0002	< 0.0001
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0010	0.0022	< 0.0009	0.0012	0.0011	< 0.0009	0.0016	0.0023	0.0012	0.0015	0.0018	0.0011	0.0014
Se [mg/L]	< 0.00004	< 0.00004	0.00008	0.00005	0.00008	< 0.00004	< 0.00004	0.00005	< 0.00004	< 0.00004	< 0.00004	0.00013	0.00012
Si [mg/L]	2.09	1.85	1.98	2.87	2.42	2.63	2.14	1.88	1.92	1.97	2.26	1.50	3.08
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0161	0.0611	0.0228	0.00807	0.0104	0.0124	0.00665	0.0431	0.0141	0.0199	0.0134	0.0725	0.0489
Ti [mg/L]	0.00040	0.00076	0.00031	0.00126	0.00020	0.00114	0.00068	0.00021	0.00027	0.00128	0.00047	0.00009	0.00108
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000297	0.000205	0.000085	0.000243	0.000239	0.000180	0.000151	0.000231	0.000211	0.000156	0.000196	0.000022	0.000692
V [mg/L]	0.00780	0.00957	0.00586	0.00819	0.00880	0.00835	0.00933	0.00785	0.00676	0.00825	0.00754	0.00080	0.00203
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	66: 70301	67: 66023	68: 143334	69: 14692	70: 41409	71: 46443	72: 7021	73: 30951	74: 6487	75: 923414	76: 2149	77: 71992	78: 911332
Sample Date & Time	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sample weight [g]	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.51	9.59	9.42	9.45	9.51	9.42	9.03	9.31	8.65	9.32	9.10	9.44	9.26
pH [No unit]	8.25	7.99	7.89	7.99	7.95	7.87	7.95	8.20	8.28	8.11	8.11	7.84	8.08
Conductivity [uS/cm]	92	80	106	99	95	124	113	105	237	96	129	99	106
Alkalinity [mg/L as CaCO3]	44	39	40	44	40	44	47	51	113	47	61	38	45
SO4 [mg/L]	3	< 2	11	6	3	10	4	< 2	11	< 2	6	9	6
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	1.47	1.11	0.844	1.34	1.39	1.30	1.11	1.45	0.299	1.31	1.05	1.15	1.61
As [mg/L]	0.0014	0.0027	0.0021	0.0014	0.0022	0.0008	0.0004	0.0023	0.0007	0.0024	0.0028	0.0015	0.0040

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SFE 3:1 ratio 24hr (MEND) prefilter pH

Project : Marathon Project - Leprechuan (121414740-180.300)

LR Report : ~~CA14116-NOV21~~

Analysis	66: 70301	67: 66023	68: 143334	69: 14692	70: 41409	71: 46443	72: 7021	73: 30951	74: 6487	75: 923414	76: 2149	77: 71992	78: 911332
Ba [mg/L]	0.01884	0.00637	0.159	0.05795	0.00748	0.121	0.00183	0.00137	0.00433	0.00138	0.00262	0.112	0.00918
B [mg/L]	0.014	0.031	0.012	0.024	0.053	0.021	0.200	0.023	0.009	0.108	0.020	0.013	0.051
Be [mg/L]	0.000007	< 0.000007	< 0.000007	0.000008	< 0.000007	0.000008	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	6.88	4.24	8.20	6.83	5.44	8.31	10.4	6.02	16.7	6.68	9.31	6.80	7.79
Cd [mg/L]	< 0.000003	0.000003	0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003
Co [mg/L]	< 0.000004	0.000006	< 0.000004	0.000227	< 0.000004	0.000043	< 0.000004	< 0.000004	0.000009	< 0.000004	< 0.000004	0.000008	< 0.000004
Cr [mg/L]	< 0.00008	0.00017	0.00022	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Cu [mg/L]	0.0028	0.0046	0.0013	0.0023	0.0017	0.0045	0.0004	0.0004	0.0007	0.0007	0.0006	0.0032	0.0004
Fe [mg/L]	0.017	0.029	0.025	0.022	0.038	0.034	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.032	< 0.007
K [mg/L]	8.08	4.78	8.74	7.96	6.73	10.6	3.66	6.29	5.56	4.28	6.45	6.89	8.88
Li [mg/L]	0.0003	0.0005	0.0004	0.0007	0.0003	0.0003	0.0002	0.0002	0.0003	0.0002	0.0004	0.0008	0.0003
Mg [mg/L]	0.556	0.192	0.385	0.509	0.330	0.606	1.51	0.706	14.7	0.928	2.59	0.458	0.575
Mn [mg/L]	0.00420	0.00351	0.00480	0.00330	0.00483	0.00607	0.00139	0.00129	0.00927	0.00128	0.00301	0.00616	0.00272
Mo [mg/L]	0.00023	0.00534	0.00093	0.00022	0.00260	0.00089	0.00156	0.00048	0.00402	0.00059	0.00020	0.00115	0.00160
Na [mg/L]	7.71	9.84	9.47	9.05	11.2	10.5	9.59	11.0	9.71	10.2	10.2	10.7	9.24
Ni [mg/L]	< 0.0001	< 0.0001	< 0.0001	0.0001	0.0001	0.0003	< 0.0001	< 0.0001	0.0004	< 0.0001	0.0004	0.0002	< 0.0001
Pb [mg/L]	0.00014	0.00011	< 0.00009	< 0.00009	< 0.00009	0.00017	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.00011	< 0.00009
Sb [mg/L]	0.0048	< 0.0009	0.0014	0.0018	0.0015	0.0014	0.0011	0.0012	0.0018	0.0018	0.0029	0.0014	0.0047
Se [mg/L]	0.00009	0.00005	0.00009	0.00007	0.00006	0.00005	0.00013	< 0.00004	0.00017	< 0.00004	0.00004	0.00019	0.00014
Si [mg/L]	2.64	3.66	3.05	3.57	3.76	3.00	1.12	2.35	1.65	2.90	1.94	3.86	2.38
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0584	0.0146	0.146	0.103	0.0272	0.132	0.0714	0.0263	0.0849	0.0407	0.0720	0.102	0.0615
Ti [mg/L]	0.00143	0.00161	0.00109	0.00090	0.00132	0.00252	0.00010	0.00026	< 0.00005	0.00045	0.00065	0.00111	0.00017
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000474	0.000166	0.000318	0.000308	0.000247	0.000782	0.000014	0.000208	0.000063	0.000497	0.000116	0.000631	0.000545
V [mg/L]	0.00105	0.00132	0.00096	0.00169	0.00251	0.00184	0.00136	0.00539	0.00072	0.00507	0.00223	0.00162	0.00325
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	79: 35022	80: 143334$D.I. Leachate Blank	81:BLK:	82: 911332$D.I. Leachate Blank	83:BLK:
Sample Date & Time					
Sample weight [g]	250	250	---	250	---
Volume D.I. Water [mL]	750	750	750	750	750

OnLine LIMS

0002739151

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Analysis	79: 35022	80: 143334$D.I. Leachate Blank	81:BLK:	82: 911332$D.I. Leachate Blank	83:BLK:
Final pH [no unit]	9.51	9.42	5.68	9.27	5.78
pH [No unit]	8.02	7.93	6.03	8.04	5.87
Conductivity [uS/cm]	72	102	7	100	< 2
Alkalinity [mg/L as CaCO3]	39	43	< 2	44	< 2
SO4 [mg/L]	< 2	9	< 2	4	< 2
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	1.41	0.882	< 0.001	1.37	< 0.001
As [mg/L]	0.0066	0.0028	< 0.0002	0.0028	< 0.0002
Ba [mg/L]	0.00362	0.09393	0.00014	0.00672	0.00011
B [mg/L]	0.030	0.014	< 0.002	0.064	< 0.002
Be [mg/L]	0.000012	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	4.06	8.05	0.05	7.52	0.01
Cd [mg/L]	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003
Co [mg/L]	0.000079	< 0.000004	< 0.000004	< 0.000004	< 0.000004
Cr [mg/L]	0.00022	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Cu [mg/L]	0.0037	0.0019	< 0.0002	0.0003	< 0.0002
Fe [mg/L]	0.060	0.033	< 0.007	< 0.007	< 0.007
K [mg/L]	7.75	8.10	0.085	7.31	< 0.009
Li [mg/L]	0.0002	0.0005	< 0.0001	0.0003	< 0.0001
Mg [mg/L]	0.471	0.362	0.004	0.554	0.002
Mn [mg/L]	0.00400	0.00521	0.00119	0.00210	0.00013
Mo [mg/L]	0.00162	0.00083	< 0.00004	0.00162	< 0.00004
Na [mg/L]	6.92	8.65	0.02	9.19	< 0.01
Ni [mg/L]	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	< 0.0009	0.0013	< 0.0009	0.0043	< 0.0009
Se [mg/L]	< 0.00004	0.00008	< 0.00004	0.00011	< 0.00004
Si [mg/L]	2.46	3.22	< 0.02	2.46	< 0.02
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.00686	0.102	0.00016	0.0531	0.00004
Ti [mg/L]	0.00140	0.00081	< 0.00005	0.00055	0.00030
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000131	0.000301	< 0.000002	0.000366	< 0.000002
V [mg/L]	0.00823	0.00094	0.00001	0.00282	< 0.00001

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Analysis	79: 35022	80: 143334$D.I. Leachate Blank	81:BLK:	82: 911332$D.I. Leachate Blank	83:BLK:
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0002739151

SGS Canada Inc.
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Phone: 705-652-2000 FAX: 705-652-6365

08-September-2021

Marathon Gold Corp
Attn : James Powell

Date Rec. : 21 July 2021
LR Report: **CA14785-JUL21**

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P.O. Box 4006, Pearlgate PO
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CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10	11: MHQC-11	12: MHQC-12	13: MHQC-13
Sample Date & Time					NA	NA	NA	NA	NA	NA	NA	NA	NA
Paste pH [no unit]	03-Aug-21	08:00	05-Aug-21	14:52	9.16	9.37	9.54	8.40	9.40	9.58	9.49	9.37	8.90
Fizz Rate [no unit]	03-Aug-21	08:00	05-Aug-21	14:52	2	2	2	2	2	2	3	2	2
Sample weight [g]	03-Aug-21	08:00	05-Aug-21	14:52	1.99	2.06	2.02	2.00	2.00	2.08	2.01	2.02	2.01
HCl_add [mL]	04-Aug-21	06:11	05-Aug-21	14:52	20.00	20.00	20.00	20.00	20.00	20.00	29.80	20.00	20.00
HCl [Normality]	03-Aug-21	08:00	05-Aug-21	14:52	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	03-Aug-21	08:00	05-Aug-21	14:52	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	04-Aug-21	08:00	05-Aug-21	14:52	13.93	8.53	8.43	9.83	12.64	10.96	11.07	14.27	14.80
Final pH [no unit]	04-Aug-21	08:00	05-Aug-21	14:52	1.26	1.55	1.54	1.72	1.31	1.40	1.62	1.26	1.22
NP [t CaCO3/1000 t]	04-Aug-21	08:00	05-Aug-21	14:52	15.3	27.8	28.6	25.4	18.4	21.7	46.6	14.2	12.9
AP [t CaCO3/1000 t]	06-Aug-21	17:42	06-Aug-21	17:42	12.8	20.9	12.8	52.5	24.7	15.6	9.06	27.8	62.5
Net NP [t CaCO3/1000 t]	06-Aug-21	17:42	06-Aug-21	17:42	2.49	6.86	15.8	-27.10	-6.29	6.08	37.5	-13.61	-49.60
NP/AP [ratio]	06-Aug-21	17:42	06-Aug-21	17:42	1.19	1.33	2.23	0.48	0.75	1.39	5.14	0.51	0.21
S [%]	05-Aug-21	11:14	06-Aug-21	17:42	0.571	0.890	0.523	2.00	0.919	0.686	0.421	1.10	2.30
Acid Leachable SO4-S [%]	06-Aug-21	17:42	06-Aug-21	17:42	0.16	0.22	0.11	0.32	0.13	0.19	0.13	0.21	0.30
Sulphide [%]	06-Aug-21	13:22	06-Aug-21	17:42	0.41	0.67	0.41	1.68	0.79	0.50	0.29	0.89	2.00
C [%]	05-Aug-21	11:14	05-Aug-21	17:41	0.180	0.365	0.358	0.314	0.213	0.259	0.596	0.167	0.169
CO3 (pyro) [%]	05-Aug-21	13:53	05-Aug-21	17:41	0.620	1.23	1.32	0.984	0.784	0.994	2.48	0.305	0.410
TIC [%]	05-Aug-21	13:53	05-Aug-21	17:41	0.124	0.247	0.265	0.197	0.157	0.199	0.497	0.061	0.082

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ABA - Modified Sobek

LR Report : **CA14785-JUL21**

Analysis	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12	30: MHQC-1
Sample Date & Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Paste pH [no unit]	9.73	9.50	9.89	9.80	8.84	9.83	9.79	9.76	9.70	9.81	9.90	9.57	9.74	9.80	9.19
Fizz Rate [no unit]	2	2	2	2	4	2	3	3	3	3	3	3	3	3	3
Sample weight [g]	2.02	1.97	1.96	2.01	2.01	1.99	1.97	2.01	1.96	2.05	2.06	2.03	1.96	2.09	2.01
HCl_add [mL]	20.00	20.00	20.00	20.00	118.10	31.80	31.10	30.90	44.80	31.20	39.70	45.50	42.20	48.50	20.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	12.08	13.59	10.74	8.24	47.59	14.07	11.34	12.92	18.42	10.87	16.11	12.28	16.03	19.72	8.64
Final pH [no unit]	1.34	1.25	1.39	1.63	1.58	1.55	1.71	1.63	1.57	1.74	1.61	1.79	1.58	1.56	1.53
NP [t CaCO3/1000 t]	19.6	16.3	23.6	29.2	175	44.5	50.2	44.7	67.3	49.6	57.3	81.8	66.8	68.9	28.3
AP [t CaCO3/1000 t]	11.6	24.4	16.6	11.2	6.88	5.31	9.38	11.2	9.69	7.50	3.12	10.3	9.69	10.6	24.4
Net NP [t CaCO3/1000 t]	8.04	-8.08	7.04	18.0	169	39.2	40.8	33.4	57.6	42.1	54.2	71.5	57.1	58.3	3.92
NP/AP [ratio]	1.70	0.67	1.42	2.60	25.5	8.38	5.35	3.97	6.95	6.61	18.3	7.93	6.90	6.48	1.16
S [%]	0.411	0.890	0.680	0.513	0.305	0.250	0.372	0.492	0.390	0.336	0.160	0.481	0.405	0.447	0.936
Acid Leachable SO4-S [%]	0.04	0.11	0.15	0.15	0.08	0.08	0.07	0.13	0.08	0.10	0.06	0.15	0.10	0.11	0.16
Sulphide [%]	0.37	0.78	0.53	0.36	0.22	0.17	0.30	0.36	0.31	0.24	0.10	0.33	0.31	0.34	0.78
C [%]	0.226	0.187	0.290	0.378	2.30	0.586	0.694	0.616	0.920	0.635	0.754	1.03	0.859	0.891	0.360
CO3 (pyro) [%]	0.904	0.639	1.00	1.34	10.4	2.41	2.77	2.41	3.82	2.53	3.24	4.53	3.78	3.84	1.31
TIC [%]	0.181	0.128	0.201	0.268	2.08	0.483	0.554	0.482	0.764	0.506	0.649	0.907	0.756	0.769	0.262

Analysis	31: MHQC-2	32: MHQC-3	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C
Sample Date & Time	NA	NA	NA	NA	NA
Paste pH [no unit]	9.37	9.55	9.41	9.55	9.44
Fizz Rate [no unit]	3	3	3	3	3
Sample weight [g]	1.97	2.08	1.98	1.97	2.01
HCl_add [mL]	20.00	20.00	20.00	20.00	20.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	13.35	5.96	9.98	10.52	8.63
Final pH [no unit]	1.25	1.87	1.48	1.39	1.56
NP [t CaCO3/1000 t]	16.9	33.8	25.3	24.1	28.3
AP [t CaCO3/1000 t]	29.7	14.7	20.0	16.9	25.9
Net NP [t CaCO3/1000 t]	-12.79	19.1	5.30	7.22	2.36
NP/AP [ratio]	0.57	2.30	1.26	1.43	1.09
S [%]	1.16	0.574	0.812	0.754	0.969

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Analysis	31: MHQC-2	32: MHQC-3	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C
Acid Leachable SO4-S [%]	0.21	0.10	0.17	0.21	0.14
Sulphide [%]	0.95	0.47	0.64	0.54	0.83
C [%]	0.207	0.428	0.318	0.303	0.356
CO3 (pyro) [%]	0.644	1.70	1.14	1.17	1.31
TIC [%]	0.129	0.341	0.228	0.235	0.262

*NP (Neutralization Potential)
= 50 x (N of HCL x Total HCL added - N NaOH x NaOH added)

Weight of Sample

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.04 will be calculated using a 0.04 value.

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

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08-September-2021

Marathon Gold Corp
Attn : James Powell

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Date Rec. : 21 July 2021
LR Report: **CA14786-JUL21**
Reference: Leprechaun (121414740-180.300)

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10	11: MHQC-11	12: MHQC-12	13: MHQC-13
Sample Date & Time					NA	NA	NA	NA	NA	NA	NA	NA	NA
Pending Decision	***	***	***	***	***	***	***	***	***	***	***	***	***
Hg [ug/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Prep-Env AR [Prep]	04-Aug-21	08:00	06-Aug-21	15:09	1	1	1	1	1	1	1	1	1
Ag [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	2.3	1.0	0.7	1.1	2.5	0.9	0.8	0.7	2.5
Al [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	2400	1500	1500	12000	2300	2700	6400	1600	1800
Ba [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	5.2	3.7	6.0	16	9.0	5.8	5.3	4.7	6.7
Be [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.04	0.03	0.04	0.04	0.05	0.04	0.05	0.04	0.04
Bi [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.48	2.1	0.23	0.73	0.89	0.15	0.25	3.2	2.1
Ca [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	4700	8500	9000	7500	5800	6800	15000	4600	4300
Cd [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.03	0.06	< 0.02	0.08	< 0.02	< 0.02	0.03	0.76	0.19
Co [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	1.00	1.8	2.3	6.9	1.6	1.9	3.8	1.4	1.0
Cr [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	3.0	3.4	3.5	8.9	3.5	2.7	32	3.4	1.6
Cu [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	23	52	14	290	17	21	24	3100	9.7
Fe [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	10000	11000	7600	46000	12000	12000	15000	12000	20000

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LR Report : **CA14786-JUL21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10	11: MHQC-11	12: MHQC-12	13: MHQC-13
K [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	120	85	130	320	210	150	93	120	150
Li [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Mg [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	670	660	500	5000	640	1000	4200	740	520
Mn [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	208	316	217	612	248	282	600	204	213
Mo [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	1.1	2.3	0.6	0.5	1.6	0.7	1.1	1.6	1.3
Ni [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.6	0.9	0.5	4.5	1.1	1.2	7.6	1.2	1.6
Pb [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.57	0.87	0.44	0.39	0.84	0.43	0.92	2.8	1.3
Sb [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	0.5	< 0.5
Sr [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	6.5	8.7	7.7	7.0	6.9	7.3	16	5.6	5.5
Ti [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	5.9	5.6	4.2	51	6.6	6.9	13	3.6	3.8
Tl [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	0.058	0.046	0.076	0.076	0.070	0.12	0.072	0.047	0.086
V [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	< 1	< 1	< 1	23	< 1	1	20	2	< 1
Y [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	1.7	1.5	2.5	4.0	2.0	2.5	4.6	1.6	1.9
Zn [µg/g]	05-Aug-21	01:30	06-Aug-21	15:09	10	7.7	5.7	38	5.4	8.6	21	73	14

Analysis	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12
Sample Date & Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pending Decision	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Hg [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.23	< 0.05
Prep-Env AR [Prep]	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	1.5	0.5	1.0	4.1	6.4	1.2	1.8	1.1	1.2	1.4	3.9	1.2	1.7	1.2
Al [µg/g]	2700	2000	3700	2100	22000	2200	1500	2000	2200	4600	3900	5100	3600	3700

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LR Report : **CA14786-JUL21**

Analysis	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12
Ba [µg/g]	4.7	11	1.7	18	7.8	24	16	20	17	13	12	18	29	29
Be [µg/g]	0.06	0.04	0.02	0.09	0.14	0.10	0.10	0.09	0.11	0.16	0.18	0.13	0.16	0.11
Bi [µg/g]	0.28	0.81	1.6	4.8	0.14	1.7	0.93	3.2	0.29	0.76	< 0.09	0.60	0.27	0.53
Ca [µg/g]	6400	5200	7500	9200	49000	13000	13000	11000	19000	15000	17000	26000	21000	21000
Cd [µg/g]	< 0.02	< 0.02	0.03	0.05	0.18	0.04	0.03	0.04	0.04	0.03	0.04	0.03	0.05	0.05
Co [µg/g]	0.84	0.98	1.4	2.6	29	2.5	3.1	3.8	4.2	4.8	4.1	6.6	4.5	4.8
Cr [µg/g]	1.8	1.4	1.8	2.1	65	2.0	1.5	2.5	1.7	2.9	2.3	4.7	2.2	2.2
Cu [µg/g]	12	13	13	17	51	13	13	12	8.2	10	12	18	10.0	29
Fe [µg/g]	9300	11000	13000	8800	53000	8200	9500	11000	9700	13000	12000	14000	11000	13000
K [µg/g]	120	140	43	250	56	380	250	280	320	240	250	250	280	260
Li [µg/g]	< 2	< 2	< 2	< 2	6	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2
Mg [µg/g]	930	500	1500	1000	20000	1600	2200	2400	2100	3200	3300	4100	2700	2900
Mn [µg/g]	277	241	395	250	1045	285	342	302	390	363	365	471	380	425
Mo [µg/g]	2.2	1.5	3.2	0.3	0.5	0.6	0.8	1.0	0.3	4.1	0.3	0.4	0.4	0.7
Ni [µg/g]	0.3	0.3	0.5	0.8	20	1.7	1.6	2.0	2.3	2.7	2.6	4.7	2.0	3.2
Pb [µg/g]	0.60	1.1	0.96	4.2	3.7	1.9	1.2	2.0	1.5	1.7	3.6	5.0	2.3	2.6
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5
Sr [µg/g]	8.8	6.8	9.8	28	98	37	38	29	49	55	70	98	79	69
Ti [µg/g]	5.5	6.1	9.0	8.7	453	17	12	21	9.4	13	20	15	16	25
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
U [µg/g]	0.079	0.065	0.099	0.17	0.077	0.31	0.15	0.18	0.18	0.24	0.36	0.12	0.17	0.19
V [µg/g]	< 1	< 1	1	2	170	3	2	4	3	8	7	11	5	7
Y [µg/g]	1.7	2.2	2.1	1.9	16	2.1	2.0	1.8	2.7	2.6	2.9	3.4	3.3	2.8
Zn [µg/g]	7.4	5.2	12	18	80	19	13	20	15	28	29	22	19	25

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LR Report : **CA14786-JUL21**

Analysis	30: MHQC-1	31: MHQC-2	32: MHQC-3	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C
Sample Date & Time	NA	NA	NA	NA	NA	NA
Pending Decision	***	***	***	***	***	***
Hg [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Prep-Env AR [Prep]	1	1	1	1	1	1
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	1.5	1.9	3.5	5.7	9.2	0.9
Al [µg/g]	2600	1600	6100	4900	2800	5000
Ba [µg/g]	5.9	10	5.3	7.1	6.8	6.5
Be [µg/g]	0.03	0.03	0.04	0.06	0.04	0.03
Bi [µg/g]	0.73	4.6	0.82	3.2	1.4	0.94
Ca [µg/g]	9100	5300	11000	8200	7800	8900
Cd [µg/g]	0.03	< 0.02	0.03	0.53	0.07	0.04
Co [µg/g]	2.0	1.9	4.2	2.9	1.9	3.3
Cr [µg/g]	3.3	5.1	3.7	3.5	2.9	4.7
Cu [µg/g]	12	17	14	170	20	78
Fe [µg/g]	13000	12000	17000	17000	12000	19000
K [µg/g]	100	140	110	180	140	130
Li [µg/g]	< 2	< 2	< 2	< 2	< 2	< 2
Mg [µg/g]	1100	480	3200	2000	1200	2200
Mn [µg/g]	304	178	393	418	291	420
Mo [µg/g]	1.2	1.4	0.9	17	1.5	1.1
Ni [µg/g]	0.8	1.9	1.5	0.9	0.7	1.8
Pb [µg/g]	1.6	2.0	0.64	3.0	9.3	0.83
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	9.0	7.3	9.2	7.4	8.6	8.4
Ti [µg/g]	5.1	2.7	12	11	5.9	16
Tl [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

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LR Report : **CA14786-JUL21**

Analysis	30: MHQC-1	31: MHQC-2	32: MHQC-3	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C
U [µg/g]	0.061	0.046	0.073	0.081	0.072	0.080
V [µg/g]	1	< 1	25	10	3	8
Y [µg/g]	2.1	1.3	2.5	2.4	2.7	2.7
Zn [µg/g]	8.3	5.2	17	35	15	17

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

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08-September-2021

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO
Mt. Pearl, NL
A1N 0A1, Canada

Phone: 709-730-5046
Fax:

Date Rec. : 21 July 2021
LR Report: **CA14787-JUL21**

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10
Sample Date & Time					NA	NA	NA	NA	NA	NA
Sample weight [g]	04-Aug-21	08:26	05-Aug-21	14:37	250	250	250	250	250	250
Volume D.I. Water [mL]	04-Aug-21	08:26	05-Aug-21	14:37	750	750	750	750	750	750
Final pH [no unit]	05-Aug-21	06:31	05-Aug-21	14:37	9.11	9.26	9.41	8.72	9.26	9.19
pH [No unit]	05-Aug-21	14:52	06-Aug-21	12:06	8.01	8.24	8.38	7.97	8.32	8.16
Alkalinity [mg/L as CaCO3]	05-Aug-21	14:52	06-Aug-21	12:06	27	34	31	36	34	37
Conductivity [uS/cm]	05-Aug-21	14:52	06-Aug-21	12:06	126	100	97	214	104	111
SO4 [mg/L]	06-Aug-21	09:44	10-Aug-21	14:38	33	11	15	67	14	14
Hg [mg/L]	06-Aug-21	15:00	09-Aug-21	13:00	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.830	0.582	0.804	0.736	0.780	0.451
As [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.0028	0.0021	0.0019	< 0.0002	0.0069	0.0012
Ba [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.00119	0.00061	0.00080	0.00282	0.00141	0.00088
B [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.018	0.033	0.022	0.008	0.019	0.029
Be [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	< 0.00001	0.00003	< 0.00001	< 0.00001	0.00001	< 0.00001
Ca [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	12.3	9.19	8.06	24.8	8.54	8.77

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LR Report : **CA14787-JUL21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MHQC-5	6: MHQC-6	7: MHQC-7	8: MHQC-8	9: MHQC-9	10: MHQC-10
Cd [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.000009	< 0.000003	< 0.000003	< 0.000003	0.000004	< 0.000003
Co [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.000056	0.000031	0.000005	0.000019	0.000009	0.000084
Cr [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	< 0.00008	< 0.00008	0.00014	< 0.00008	< 0.00008	0.00011
Cu [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.0004	0.0003	0.0003	0.0003	0.0003	< 0.0002
Fe [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.015	0.010	< 0.007	0.007	0.007	0.032
K [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	1.01	0.603	1.07	4.01	2.61	1.02
Li [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.0004	0.0004	0.0003	0.0002	0.0006	0.0004
Mg [mg/L]	11-Aug-21	14:09	12-Aug-21	16:25	0.741	0.941	0.629	2.86	0.788	0.754
Mn [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00632	0.00715	0.00315	0.0106	0.00332	0.00606
Mo [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.0190	0.00460	0.00329	0.00116	0.00460	0.00166
Na [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	9.10	9.21	9.62	7.26	9.18	11.6
Ni [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.0005	0.0006	0.0001	0.0004	0.0003	0.0010
Pb [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.0021	0.0105	0.0016	0.0014	0.0023	0.0034
Se [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00027	0.00011	0.00008	0.00014	0.00019	0.00011
Si [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	2.21	3.21	3.39	0.89	2.58	3.17
Sn [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00015	0.00021	0.00010	0.00023	0.00008	< 0.00006
Sr [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.0321	0.0298	0.0323	0.0597	0.0176	0.0170
Ti [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00011	0.00013	0.00007	< 0.00005	0.00016	0.00014
Tl [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.000115	0.000137	0.000194	0.000031	0.000177	0.000123
V [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	0.00035	0.00072	0.00046	0.00024	0.00063	0.00062
Zn [mg/L]	11-Aug-21	14:09	12-Aug-21	16:26	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	11: MHQC-11	12: MHQC-12	13: MHQC-13	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4
Sample Date & Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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LR Report : **CA14787-JUL21**

Analysis	11: MHQC-11	12: MHQC-12	13: MHQC-13	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4
Sample weight [g]	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.34	9.31	9.29	9.49	9.10	9.44	9.40	8.91	9.39	9.33
pH [No unit]	8.30	8.50	8.23	8.63	7.89	8.46	8.57	8.24	8.39	8.53
Alkalinity [mg/L as CaCO3]	34	32	33	35	28	35	31	56	37	42
Conductivity [uS/cm]	86	92	95	85	139	99	105	125	103	115
SO4 [mg/L]	4	6	7	3	34	8	18	6	10	10
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00002	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.666	0.462	0.502	0.726	0.521	0.702	0.969	0.394	1.05	1.01
As [mg/L]	0.0010	0.0015	0.0022	0.0024	0.0004	0.0017	0.0031	0.0011	0.0043	0.0013
Ba [mg/L]	0.00074	0.00068	0.00071	0.00048	0.00316	0.00026	0.00204	0.00256	0.00163	0.00148
B [mg/L]	0.022	0.099	0.052	0.030	0.029	0.019	0.038	0.009	0.036	0.070
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	< 0.00001	0.00061	< 0.00001	< 0.00001	0.00001	0.00001	0.00002	< 0.00001	0.00004	0.00002
Ca [mg/L]	6.92	7.04	7.60	5.46	12.6	5.74	7.87	11.3	6.73	7.38
Cd [mg/L]	< 0.000003	0.000004	< 0.000003	0.000005	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.000003	0.000003
Co [mg/L]	0.000006	0.000038	0.000008	0.000035	0.000177	0.000049	0.000013	0.000021	0.000016	0.000021
Cr [mg/L]	< 0.00008	0.00017	0.00009	< 0.00008	0.00011	0.00010	0.00010	< 0.00008	0.00010	< 0.00008
Cu [mg/L]	0.0002	0.0004	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0002	< 0.0002	0.0010	0.0002
Fe [mg/L]	< 0.007	0.008	0.009	0.009	< 0.007	0.028	0.007	< 0.007	< 0.007	< 0.007
K [mg/L]	0.910	0.781	1.01	0.799	1.28	0.067	3.14	0.594	5.05	4.04
Li [mg/L]	0.0003	0.0003	0.0003	0.0003	0.0003	0.0001	0.0003	0.0002	0.0003	0.0003
Mg [mg/L]	0.909	0.286	0.253	0.263	0.544	0.279	0.887	4.23	1.07	1.52
Mn [mg/L]	0.00269	0.00401	0.00539	0.00229	0.00976	0.00374	0.00346	0.00223	0.00212	0.00349
Mo [mg/L]	0.00096	0.00215	0.00571	0.00250	0.00098	0.00137	0.00444	0.00166	0.00173	0.00152
Na [mg/L]	9.17	10.8	11.0	11.6	11.7	15.3	10.1	8.52	9.57	11.4
Ni [mg/L]	0.0003	0.0006	0.0003	0.0005	0.0004	0.0008	0.0007	0.0005	0.0007	0.0006
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009	< 0.00009

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LR Report : **CA14787-JUL21**

Analysis	11: MHQC-11	12: MHQC-12	13: MHQC-13	14: MHQC-14	16: MHQC-16	17: MHQC-17	18: LPHQ-1	19: LPHQ-2	20: LPHQ-3	21: LPHQ-4
Sb [mg/L]	0.0015	0.0209	< 0.0009	< 0.0009	< 0.0009	0.0017	0.0092	0.0011	0.0079	0.0083
Se [mg/L]	< 0.00004	0.00018	0.00006	0.00005	0.00012	0.00008	0.00031	0.00026	0.00027	0.00020
Si [mg/L]	2.24	4.35	3.96	3.68	2.88	3.79	2.98	1.17	2.53	2.44
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	0.00013	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0217	0.0138	0.0143	0.0124	0.0401	0.0100	0.0341	0.157	0.0583	0.0547
Ti [mg/L]	0.00008	0.00014	0.00022	0.00018	0.00005	0.00010	0.00012	0.00005	0.00021	< 0.00005
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000025	0.000101	0.000147	0.000070	0.000123	0.000106	0.000548	0.000010	0.000721	0.000449
V [mg/L]	0.00229	0.00047	0.00038	0.00050	0.00029	0.00037	0.00289	0.00067	0.00324	0.00363
Zn [mg/L]	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

Analysis	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12	30: MHQC-1	31: MHQC-2	32: MHQC-3
Sample Date & Time	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sample weight [g]	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750	750
Final pH [no unit]	9.43	9.28	9.56	9.43	9.29	9.43	9.47	9.31	9.31	9.36
pH [No unit]	8.63	8.66	8.95	8.84	8.52	8.78	8.72	8.40	8.14	8.49
Alkalinity [mg/L as CaCO3]	41	43	39	40	38	39	39	29	30	32
Conductivity [uS/cm]	103	110	91	98	98	95	94	115	101	99
SO4 [mg/L]	7	9	4	6	7	6	4	26	15	14
Hg [mg/L]	< 0.00001	0.00002	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00050	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.965	1.14	1.16	1.22	0.823	0.983	0.921	0.838	0.788	0.986
As [mg/L]	0.0012	0.0013	0.0031	0.0037	0.0009	0.0022	0.0015	0.0020	0.0039	0.0017
Ba [mg/L]	0.00167	0.00128	0.00069	0.00142	0.00154	0.00208	0.00184	0.00136	0.00292	0.00067
B [mg/L]	0.048	0.072	0.071	0.015	0.084	0.079	0.072	0.036	0.031	0.010

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LR Report : **CA14787-JUL21**

Analysis	22: LPHQ-5	23: LPHQ-6	24: LPHQ-7	25: LPHQ-8	26: LPHQ-9	28: LPHQ-11	29: LPHQ-12	30: MHQC-1	31: MHQC-2	32: MHQC-3
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	0.00008	< 0.00001
Ca [mg/L]	6.87	7.69	5.18	6.14	7.66	6.38	5.74	10.4	8.78	8.05
Cd [mg/L]	0.000003	< 0.000003	< 0.000003	0.000007	0.000006	0.000004	< 0.000003	< 0.000003	0.000004	0.000008
Co [mg/L]	0.000021	0.000009	0.000004	0.000008	0.000007	0.000008	0.000008	0.000007	0.000021	0.000011
Cr [mg/L]	< 0.00008	0.00010	0.00009	0.00009	0.00010	0.00012	< 0.00008	< 0.00008	0.00014	< 0.00008
Cu [mg/L]	0.0072	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0004	0.0006	< 0.0002
Fe [mg/L]	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.007	0.018	< 0.007
K [mg/L]	3.06	5.72	2.09	3.48	3.03	2.84	1.93	0.799	1.22	0.731
Li [mg/L]	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0005	0.0002
Mg [mg/L]	1.26	1.25	0.650	1.22	1.04	0.705	0.855	0.918	0.619	1.03
Mn [mg/L]	0.00274	0.00245	0.00125	0.00148	0.00193	0.00169	0.00174	0.00398	0.00331	0.00199
Mo [mg/L]	0.00042	0.00097	0.00156	0.00377	0.00068	0.00289	0.00194	0.0134	0.00987	0.00598
Na [mg/L]	10.6	9.56	12.2	10.2	9.01	10.7	12.4	9.63	9.92	9.77
Ni [mg/L]	0.0004	0.0003	0.0003	0.0001	0.0001	0.0007	0.0010	0.0005	0.0003	0.0002
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	0.00012	< 0.00009	< 0.00009	< 0.00009	< 0.00009	0.00010	< 0.00009
Sb [mg/L]	0.0100	0.0035	0.0029	0.0121	0.0131	0.0015	0.0011	0.0139	0.0045	0.0015
Se [mg/L]	0.00016	0.00025	0.00025	0.00030	0.00016	0.00010	0.00008	0.00059	0.00028	0.00013
Si [mg/L]	2.75	1.86	2.91	1.91	1.85	2.62	2.79	2.66	2.78	1.68
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	0.00035	< 0.00006	< 0.00006	< 0.00006	0.00019	0.00012	0.00014
Sr [mg/L]	0.0502	0.0377	0.0403	0.0636	0.0718	0.0669	0.0584	0.0245	0.0337	0.0199
Ti [mg/L]	0.00008	< 0.00005	0.00008	0.00008	0.00008	0.00023	0.00015	0.00012	0.00018	< 0.00005
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	0.000019	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000375	0.000399	0.000240	0.000681	0.000091	0.000186	0.000156	0.000103	0.000182	0.000055
V [mg/L]	0.00381	0.00310	0.00534	0.00488	0.00243	0.00392	0.00382	0.00073	0.00077	0.00415
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

SGS Canada Inc.
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LR Report : **CA14787-JUL21**

Analysis	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C	36: LPHQ-3	37: BL639 MA Comp C	38:BLK: $D.I. Leachate Blank
Sample Date & Time	NA	NA	NA			
Sample weight [g]	250	250	250	250	250	---
Volume D.I. Water [mL]	750	750	750	750	750	750
Final pH [no unit]	9.21	9.41	9.28	9.41	9.29	5.60
pH [No unit]	8.13	8.62	8.48	8.76	8.26	6.07
Alkalinity [mg/L as CaCO3]	34	33	36	40	31	2
Conductivity [uS/cm]	111	100	104	104	100	< 2
SO4 [mg/L]	17	10	13	10	13	< 2
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.867	0.855	1.16	1.10	1.12	0.003
As [mg/L]	0.0041	0.0141	0.0007	0.0039	0.0006	< 0.0002
Ba [mg/L]	0.00105	0.00087	0.00083	0.00157	0.00076	0.00003
B [mg/L]	0.018	0.032	0.016	0.042	0.013	0.004
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007
Bi [mg/L]	0.00002	0.00003	< 0.00001	0.00002	< 0.00001	< 0.00001
Ca [mg/L]	9.18	8.31	8.84	6.89	8.82	0.03
Cd [mg/L]	0.000012	0.000007	0.000004	0.000010	0.000003	< 0.000003
Co [mg/L]	0.000005	0.000014	< 0.000004	0.000010	0.000009	0.000006
Cr [mg/L]	< 0.00008	0.00011	< 0.00008	0.00010	< 0.00008	< 0.00008
Cu [mg/L]	0.0002	0.0004	< 0.0002	0.0010	< 0.0002	< 0.0002
Fe [mg/L]	0.010	0.015	< 0.007	< 0.007	< 0.007	< 0.007
K [mg/L]	1.43	1.90	1.35	5.80	1.33	0.004
Li [mg/L]	0.0028	0.0002	0.0002	0.0004	0.0002	< 0.0001
Mg [mg/L]	0.997	0.527	0.938	1.07	0.928	< 0.001
Mn [mg/L]	0.00462	0.00241	0.00390	0.00176	0.00395	0.00019
Mo [mg/L]	0.0244	0.00664	0.00131	0.0179	0.00168	0.00042
Na [mg/L]	10.6	10.5	9.59	9.67	9.48	0.03
Ni [mg/L]	0.0004	0.0003	0.0003	0.0004	0.0003	0.0004

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LR Report : **CA14787-JUL21**

Analysis	33: MHQC-4	34: BL639 MD4	35: BL639 MA Comp C	36: LPHQ-3	37: BL639 MA Comp C	38:BLK: $D.I. Leachate Blank
Pb [mg/L]	0.00011	0.00023	< 0.00009	< 0.00009	< 0.00009	< 0.00009
Sb [mg/L]	0.0049	0.0056	0.0015	0.0085	0.0017	< 0.0009
Se [mg/L]	0.00022	0.00009	0.00006	0.00032	0.00005	< 0.00004
Si [mg/L]	1.78	2.76	1.46	2.32	1.46	< 0.02
Sn [mg/L]	0.00060	0.00008	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.0181	0.0263	0.0272	0.0573	0.0266	0.00012
Ti [mg/L]	0.00011	0.00013	< 0.00005	0.00015	0.00008	< 0.00005
Tl [mg/L]	< 0.000005	0.000020	< 0.000005	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.000123	0.000221	0.000052	0.000737	0.000042	0.000016
V [mg/L]	0.00186	0.00181	0.00146	0.00345	0.00146	< 0.00001
Zn [mg/L]	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

<Original signed by>

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

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22-October-2021

Marathon Gold Corp
Attn : James Powell

Date Rec. : 30 September 2021
LR Report: **CA19121-SEP21**

Copy: #1

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CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 20BH-18 SS1	6: 20BH-18 SS2	7: 20BH-18 SS3	8: 20BH-18 SS6	9: 20BH-18 GS8
Sample Date & Time									
Sample weight [g]	12-Oct-21	10:00	13-Oct-21	13:39	250	200	250	250	250
Volume D.I. Water [mL]	12-Oct-21	10:00	13-Oct-21	13:39	750	600	750	750	750
Final pH [no unit]	13-Oct-21	08:26	13-Oct-21	13:39	6.69	6.03	6.98	8.80	8.59
pH [No unit]	14-Oct-21	12:45	18-Oct-21	16:55	7.24	6.74	6.54	7.96	7.75
Conductivity [uS/cm]	14-Oct-21	12:45	18-Oct-21	16:55	64	29	32	143	263
Alkalinity [mg/L as CaCO3]	14-Oct-21	12:45	18-Oct-21	16:55	7	3	2	38	32
SO4 [mg/L]	19-Oct-21	11:18	20-Oct-21	07:17	22	7	12	30	89
Hg [mg/L]	15-Oct-21	06:38	15-Oct-21	13:20	< 0.00001	0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.353	0.359	0.271	0.103	0.087
As [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.0073	0.0132	0.0176	0.0268	0.0054
Ba [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.0243	0.00742	0.00811	0.00893	0.0181
B [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.006	0.009	0.005	0.005	0.003
Be [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.000014	0.000007	0.000014	< 0.000007	< 0.000007
Bi [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	2.50	0.68	0.84	15.2	33.4
Cd [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.000035	0.000040	0.000014	0.000018	0.000014
Co [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.000232	0.000539	0.000308	0.000082	0.000080
Cr [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.00051	0.00048	0.00034	0.00011	< 0.00008
Cu [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.0023	0.0025	0.0028	0.0005	0.0004
Fe [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.576	0.488	0.511	0.069	0.024
K [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	2.00	1.53	1.54	3.19	6.17
Li [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.0002	0.0003	0.0005	0.0018	0.0018
Mg [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.875	0.273	0.320	0.897	3.22
Mn [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.01957	0.03020	0.01050	0.00273	0.06488
Mo [mg/L]	15-Oct-21	10:00	22-Oct-21	10:58	0.00476	0.00092	0.00239	0.0272	0.0146
Na [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	4.59	3.77	3.32	5.65	2.90
Ni [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.0007	0.0009	0.0007	0.0003	< 0.0001
Pb [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.00052	0.00046	0.00051	< 0.00009	< 0.00009
Sb [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.0029
Se [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.00046	0.00035	0.00068	0.00274	0.01660
Sn [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.01349	0.00356	0.00399	0.03301	0.07157
Ti [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.01681	0.02467	0.01025	0.00079	0.00096
Tl [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.000006	< 0.000005	< 0.000005	< 0.000005	0.000029

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LR Report : **CA19121-SEP21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 20BH-18 SS1	6: 20BH-18 SS2	7: 20BH-18 SS3	8: 20BH-18 SS6	9: 20BH-18 GS8
U [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.000040	0.000057	0.000048	0.000149	0.00110
V [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.00143	0.00112	0.00174	0.00120	0.00217
Zn [mg/L]	15-Oct-21	10:00	20-Oct-21	14:50	0.006	0.011	0.017	< 0.002	< 0.002

Analysis	10: 20BH-18 GS10	11: 20BH-18 GS13	12: 20BH-18 GS14	13: 20BH-19 SS2	14: 20BH-19 SS3	15: 20BH-20 SS2	16: 20BH-20 SS4	17: 20TP-36 GS2	18: 20TP-37 GS1
Sample Date & Time									
Sample weight [g]	250	250	250	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750	750	750	750
Final pH [no unit]	8.66	8.33	8.67	6.12	6.30	5.84	8.68	7.81	6.16
pH [No unit]	7.63	7.93	7.86	7.30	6.09	5.76	7.87	7.25	5.75
Conductivity [uS/cm]	257	299	280	106	94	71	99	27	13
Alkalinity [mg/L as CaCO3]	31	39	40	8	< 2	< 2	39	9	< 2
SO4 [mg/L]	81	98	86	37	39	29	11	2	< 2
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.123	0.079	0.109	0.013	0.003	0.397	0.193	0.057	0.371
As [mg/L]	0.0063	0.0030	0.0077	0.0003	0.0009	0.0035	0.0240	0.0037	0.0023
Ba [mg/L]	0.0176	0.0156	0.00864	0.0529	0.0588	0.0653	0.00795	0.00110	0.00115
B [mg/L]	0.008	0.007	0.007	0.006	0.007	0.004	0.004	0.005	0.005
Be [mg/L]	< 0.000007	< 0.000007	< 0.000007	0.000009	< 0.000007	0.000011	< 0.000007	< 0.000007	0.000007
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	28.2	36.8	24.2	3.69	7.02	3.47	14.3	0.10	0.04
Cd [mg/L]	0.000013	0.000013	0.000142	0.000144	0.000173	0.000130	0.000003	< 0.000003	0.000015
Co [mg/L]	0.000034	0.000087	0.000051	0.000768	0.000152	0.001896	0.000203	0.000027	0.000945
Cr [mg/L]	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008	0.00049	0.00022	0.00011	0.00045
Cu [mg/L]	0.0004	0.0004	0.0005	0.0007	0.0006	0.0042	0.0009	0.0007	0.0020
Fe [mg/L]	0.026	0.020	0.025	0.022	0.007	0.599	0.191	0.080	0.255
K [mg/L]	11.2	8.15	8.57	3.30	2.74	2.66	0.931	0.844	0.340
Li [mg/L]	0.0017	0.0028	0.0013	0.0005	0.0003	0.0015	0.0026	0.0002	0.0002
Mg [mg/L]	3.60	3.77	5.17	2.73	2.06	1.62	0.516	0.045	0.070
Mn [mg/L]	0.04814	0.09451	0.05545	0.412	0.130	0.230	0.00810	0.00345	0.07718
Mo [mg/L]	0.0276	0.00346	4.51	0.00025	0.00090	0.00817	0.00932	0.00738	0.00087
Na [mg/L]	4.30	3.66	14.1	3.86	3.39	3.03	2.84	2.48	1.88
Ni [mg/L]	0.0002	0.0002	0.0001	0.0037	0.0016	0.0030	0.0004	0.0002	0.0007
Pb [mg/L]	< 0.00009	< 0.00009	< 0.00009	0.00015	< 0.00009	0.00130	0.00015	< 0.00009	0.00045
Sb [mg/L]	0.0026	0.0055	0.0031	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009	< 0.0009
Se [mg/L]	0.00557	0.00731	0.00521	0.00037	0.00028	0.00048	0.00082	0.00004	0.00033
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.06585	0.07124	0.05422	0.02682	0.03219	0.03862	0.02217	0.00038	0.00043
Ti [mg/L]	0.00067	0.00040	0.00128	0.00084	< 0.00005	0.01669	0.00432	0.00203	0.01043
Tl [mg/L]	0.000024	0.000025	0.000011	0.000034	0.000023	0.000014	< 0.000005	< 0.000005	< 0.000005
U [mg/L]	0.00117	0.00120	0.00178	0.000030	0.000011	0.000090	0.000256	0.000011	0.000063
V [mg/L]	0.00160	0.00090	0.00314	0.00016	0.00011	0.00125	0.00114	0.00058	0.00043
Zn [mg/L]	0.004	0.005	< 0.002	0.003	0.007	0.015	0.002	< 0.002	0.004

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LR Report : **CA19121-SEP21**

Analysis	19: 20TP-38 GS1	20: 20TP-39 GS1	21: 20TP-85 S1	22: 20TP-90 S1	23: 20TP-91 S1	24: 20TP-91 S1
Sample Date & Time						
Sample weight [g]	250	250	250	250	250	250
Volume D.I. Water [mL]	750	750	750	750	750	750
Final pH [no unit]	7.44	7.27	6.31	5.85	7.13	7.14
pH [No unit]	7.46	5.76	6.57	6.21	7.31	7.24
Conductivity [uS/cm]	91	18	24	22	34	36
Alkalinity [mg/L as CaCO3]	14	< 2	3	< 2	10	11
SO4 [mg/L]	27	5	4	6	5	5
Hg [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ag [mg/L]	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Al [mg/L]	0.216	0.396	0.491	0.198	0.444	0.558
As [mg/L]	0.0025	0.0228	0.0011	0.0006	0.0038	0.0045
Ba [mg/L]	0.00508	0.00614	0.00262	0.00139	0.00770	0.00783
B [mg/L]	0.003	0.004	0.014	0.005	0.005	0.004
Be [mg/L]	0.000009	0.000027	0.000011	< 0.000007	0.000011	0.000033
Bi [mg/L]	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Ca [mg/L]	7.71	0.31	0.58	0.18	0.12	0.21
Cd [mg/L]	0.000048	< 0.000003	0.000003	< 0.000003	0.000014	0.000022
Co [mg/L]	0.000641	0.000625	0.000329	0.000194	0.000283	0.000313
Cr [mg/L]	0.00027	0.00048	0.00049	0.00034	0.00043	0.00056
Cu [mg/L]	0.0025	0.0038	0.0018	0.0022	0.0074	0.0041
Fe [mg/L]	0.383	0.865	0.306	0.080	0.468	0.558
K [mg/L]	2.95	0.970	1.12	0.500	0.424	0.479
Li [mg/L]	0.0016	0.0013	0.0002	0.0002	0.0001	0.0003
Mg [mg/L]	1.50	0.128	0.313	0.336	0.102	0.140
Mn [mg/L]	1.77	0.03271	0.04977	0.08389	0.01410	0.01335
Mo [mg/L]	0.00083	0.00038	0.00176	0.00005	0.00108	0.00126
Na [mg/L]	2.70	2.16	3.30	2.60	3.67	3.94
Ni [mg/L]	0.0007	0.0010	0.0007	0.0003	0.0011	0.0006
Pb [mg/L]	0.00024	0.00074	0.00047	0.00015	0.00065	0.00066
Sb [mg/L]	< 0.0009	< 0.0009	< 0.0009	< 0.0009	0.0009	0.0010
Se [mg/L]	0.00176	0.00038	0.00029	0.00018	0.00063	0.00027
Sn [mg/L]	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006	< 0.00006
Sr [mg/L]	0.01349	0.00142	0.00240	0.00137	0.00082	0.00207
Ti [mg/L]	0.00478	0.01008	0.00989	0.00671	0.01992	0.02111
Tl [mg/L]	< 0.000005	< 0.000005	< 0.000005	< 0.000005	< 0.000005	0.000027
U [mg/L]	0.000021	0.000045	0.000042	0.000011	0.000085	0.000096
V [mg/L]	0.00066	0.00169	0.00059	0.00038	0.00209	0.00301
Zn [mg/L]	< 0.002	0.009	0.004	< 0.002	< 0.002	< 0.002

<Original signed by>

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Project Specialist,
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20-October-2021

Marathon Gold Corp
Attn : James Powell

Date Rec. : 30 September 2021
LR Report: **CA19122-SEP21**

Copy: #1

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 20BH-18 SS1	6: 20BH-18 SS2	7: 20BH-18 SS3	8: 20BH-18 SS6	9: 20BH-18 GS8	10: 20BH-18 GS10
Sample Date & Time										
Paste pH [no unit]	18-Oct-21	08:30	20-Oct-21	12:01	8.63	8.31	9.03	9.14	8.89	8.97
Fizz Rate [no unit]	18-Oct-21	08:30	20-Oct-21	12:01	1	1	1	2	2	3
Sample weight [g]	18-Oct-21	08:30	20-Oct-21	12:01	1.98	1.98	2.02	1.98	2.01	2.01
HCl_add [mL]	19-Oct-21	06:30	20-Oct-21	12:01	20.00	20.00	20.00	32.00	43.60	53.00
HCl [Normality]	18-Oct-21	08:30	20-Oct-21	12:01	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	18-Oct-21	08:30	20-Oct-21	12:01	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	19-Oct-21	06:30	20-Oct-21	12:01	17.18	17.36	16.59	19.72	26.86	30.28
Final pH [no unit]	19-Oct-21	08:30	20-Oct-21	12:01	1.66	1.84	1.72	1.70	1.56	1.76
NP [t CaCO3/1000 t]	19-Oct-21	06:30	20-Oct-21	12:01	7.1	6.7	8.4	31.0	41.6	56.5
AP [t CaCO3/1000 t]	20-Oct-21	12:02	20-Oct-21	12:02	1.25	1.25	1.25	2.50	3.12	3.75
Net NP [t CaCO3/1000 t]	20-Oct-21	12:02	20-Oct-21	12:02	5.85	5.45	7.15	28.5	38.5	52.8
NP/AP [ratio]	20-Oct-21	12:02	20-Oct-21	12:02	5.68	5.36	6.72	12.4	13.3	15.1
S [%]	13-Oct-21	08:25	20-Oct-21	12:02	0.012	0.006	0.006	0.107	0.132	0.167
Acid Leachable SO4-S [%]	20-Oct-21	12:01	20-Oct-21	12:02	<0.04	<0.04	<0.04	< 0.04	< 0.04	0.05
Sulphide [%]	13-Oct-21	15:26	20-Oct-21	12:02	< 0.04	< 0.04	< 0.04	0.08	0.10	0.12
C [%]	13-Oct-21	08:25	14-Oct-21	13:37	0.158	0.383	0.089	0.405	0.559	0.809
CO3 (HCl) [%]	14-Oct-21	08:08	14-Oct-21	13:37	0.255	0.729	0.115	1.57	2.34	3.60
TIC [%]	13-Oct-21	08:25	13-Oct-21	13:42	0.035	< 0.025	< 0.025	0.206	0.330	0.448

Analysis	11: 20BH-18 GS13	12: 20BH-18 GS14	13: 20BH-19 SS2	14: 20BH-19 SS3	15: 20BH-20 SS2	16: 20BH-20 SS4	17: 20TP-36 GS2	18: 20TP-37 GS1	19: 20TP-38 GS1	20: 20TP-39 GS1
Sample Date & Time										
Paste pH [no unit]	8.54	8.99	7.69	8.42	8.11	8.97	8.76	7.59	8.88	9.02
Fizz Rate [no unit]	2	2	1	1	1	1	1	1	1	1
Sample weight [g]	1.98	2.01	1.99	2.00	2.00	1.98	2.00	2.00	1.98	2.00
HCl_add [mL]	45.00	43.00	20.00	28.00	20.00	29.00	20.00	20.00	20.00	20.00
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	33.87	28.08	18.34	25.68	17.83	20.18	18.03	18.70	16.88	17.68
Final pH [no unit]	1.55	1.73	1.68	1.53	1.61	1.79	1.66	1.88	1.87	1.61
NP [t CaCO3/1000 t]	28.1	37.1	4.2	5.8	5.4	22.3	4.9	3.2	7.9	5.8
AP [t CaCO3/1000 t]	24.1	3.44	1.25	1.25	1.25	1.25	1.25	1.25	1.22	1.25
Net NP [t CaCO3/1000 t]	4.04	33.7	2.95	4.55	4.15	21.0	3.65	1.95	6.68	4.55

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LR Report : **CA19122-SEP21**

Analysis	11: 20BH-18 GS13	12: 20BH-18 GS14	13: 20BH-19 SS2	14: 20BH-19 SS3	15: 20BH-20 SS2	16: 20BH-20 SS4	17: 20TP-36 GS2	18: 20TP-37 GS1	19: 20TP-38 GS1	20: 20TP-39 GS1
NP/AP [ratio]	1.17	10.8	3.36	4.64	4.32	17.8	3.92	2.56	6.45	4.64
S [%]	0.868	0.160	0.020	0.042	0.021	0.020	< 0.005	0.009	0.019	0.015
Acid Leachable SO4-S [%]	0.10	0.05	<0.04	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Sulphide [%]	0.77	0.11	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
C [%]	0.398	0.539	0.261	0.131	0.196	0.286	0.087	0.667	0.268	0.249
CO3 (HCl) [%]	1.44	2.02	0.610	0.195	0.190	1.04	0.065	1.48	0.749	0.220
TIC [%]	0.178	0.293	< 0.025	< 0.025	0.044	0.130	< 0.025	0.061	< 0.025	0.032

Analysis	21: 20TP-85 S1	22: 20TP-90 S1	23: 20TP-91 S1
Sample Date & Time			
Paste pH [no unit]	8.27	7.19	8.57
Fizz Rate [no unit]	1	1	1
Sample weight [g]	2.01	2.00	2.01
HCl_add [mL]	27.00	30.00	20.00
HCl [Normality]	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10
Vol NaOH to pH=8.3 [mL]	24.41	29.48	17.95
Final pH [no unit]	1.56	1.78	1.67
NP [t CaCO3/1000 t]	6.4	1.3	5.1
AP [t CaCO3/1000 t]	2.50	1.25	1.25
Net NP [t CaCO3/1000 t]	3.90	0.05	3.85
NP/AP [ratio]	2.56	1.04	4.08
S [%]	0.115	0.008	0.011
Acid Leachable SO4-S [%]	< 0.04	<0.04	<0.04
Sulphide [%]	0.08	< 0.04	< 0.04
C [%]	0.204	0.875	0.129
CO3 (HCl) [%]	0.724	3.62	0.330
TIC [%]	< 0.025	< 0.025	< 0.025

*NP (Neutralization Potential)
 = 50 x (N of HCL x Total HCL added - N NaOH x NaOH added)

                        Weight of Sample

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.04 will be calculated using a 0.04 value.

<Original signed by>

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Project Specialist,
Environment, Health & Safety

OnLine LIMS

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13-October-2021

Marathon Gold Corp
Attn : James Powell

P.O. Box 4006, Pearlgate PO
Mt. Pearl, NL
A1N 0A1, Canada

Phone: 709-730-5046
Fax:

Date Rec. : 30 September 2021
LR Report: **CA19123-SEP21**

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 20BH-18 SS1	6: 20BH-18 SS2	7: 20BH-18 SS3	8: 20BH-18 SS6	9: 20BH-18 GS8	10: 20BH-18 GS10	11: 20BH-18 GS13	12: 20BH-18 GS14	13: 20BH-19 SS2	14: 20BH-19 SS3
Sample Date & Time														
Hg MS [ug/g]	08-Oct-21	19:42	13-Oct-21	09:16	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	27	< 1	< 1
As [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	51	41	41	49	50	46	51	37	36	51
Al [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	18000	23000	18000	17000	18000	20000	25000	20000	20000	18000
Ba [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	110	73	84	78	73	120	90	91	200	830
Be [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	0.28	0.23	0.30	0.26	0.27	0.36	0.66	0.33	0.35	0.33
Bi [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	0.14	0.09	0.13	0.14	0.16	0.12	0.26	0.17	0.17	0.19
Ca [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	3800	2600	7700	14000	18000	20000	12000	16000	3200	4300
Cd [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	0.09	0.08	0.11	0.14	0.14	0.16	0.15	0.15	0.17	0.31
Co [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	12	19	15	15	17	17	43	18	19	16
Cr [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	29	36	40	29	66	36	39	52	35	36
Cu [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	30	24	38	35	28	36	43	80	39	39
Fe [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	37000	59000	42000	39000	38000	42000	62000	38000	41000	41000
K [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	1700	1100	2000	2600	2500	3700	3500	4600	2000	2200
Li [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	10	12	13	12	12	15	29	19	20	14
Mg [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	9600	13000	9000	10000	13000	15000	12000	12000	12000	9600
Mn [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	590	1200	450	930	1000	1000	1900	990	1200	1200
Mo [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	1.6	1.1	1.3	2.5	1.2	1.1	0.9	38	1.3	1.5
Na [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	1200	1100	1600	1000	1000	860	690	1200	680	1300
Ni [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	18	20	25	24	37	47	51	35	29	28

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LR Report : **CA19123-SEP21**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: 20BH-18 SS1	6: 20BH-18 SS2	7: 20BH-18 SS3	8: 20BH-18 SS6	9: 20BH-18 GS8	10: 20BH-18 GS10	11: 20BH-18 GS13	12: 20BH-18 GS14	13: 20BH-19 SS2	14: 20BH-19 SS3
P [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	660	680	1000	710	680	800	760	780	750	930
Pb [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	5.7	3.9	6.0	5.3	6.7	6.1	8.2	5.3	10	21
Sb [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	1.0	< 0.7	< 0.7	< 0.7
Sn [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	18	19	30	35	42	100	33	37	16	30
Ti [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	1600	730	1600	1100	1200	870	920	1300	1400	1800
Tl [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	0.07	0.05	0.08	0.08	0.07	0.08	0.14	0.12	0.09	0.12
U [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	0.57	0.49	0.62	0.48	0.64	0.97	0.88	0.85	0.85	0.67
V [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	63	95	100	59	68	56	60	84	69	74
Y [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	11	7.7	11	9.9	9.1	9.6	9.1	8.8	9.7	13
Zn [µg/g]	08-Oct-21	19:42	13-Oct-21	09:16	54	62	48	56	57	73	70	58	75	101

Analysis	15: 20BH-20 SS2	16: 20BH-20 SS4	17: 20TP-36 GS2	18: 20TP-37 GS1	19: 20TP-38 GS1	20: 20TP-39 GS1	21: 20TP-85 S1	22: 20TP-90 S1	23: 20TP-91 S1
Sample Date & Time									
Hg MS [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ag [µg/g]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
As [µg/g]	42	59	49	40	22	111	13	25	17
Al [µg/g]	17000	18000	16000	21000	16000	14000	23000	24000	20000
Ba [µg/g]	360	110	86	61	70	96	100	55	87
Be [µg/g]	0.34	0.29	0.32	0.35	0.29	0.39	0.33	0.26	0.25
Bi [µg/g]	0.21	0.15	0.16	0.20	0.15	0.18	0.15	0.11	0.10
Ca [µg/g]	4300	12000	3500	4000	5300	3500	4300	3300	3700
Cd [µg/g]	0.14	0.19	0.22	0.09	0.16	0.20	0.13	0.05	0.11
Co [µg/g]	14	17	17	20	17	15	25	15	14
Cr [µg/g]	31	28	28	28	30	30	84	35	29
Cu [µg/g]	44	31	52	40	34	27	35	26	28
Fe [µg/g]	40000	44000	37000	49000	43000	33000	44000	40000	41000
K [µg/g]	2300	2700	2200	2300	2200	3200	1400	1300	1300
Li [µg/g]	14	14	16	17	12	14	10	11	10
Mg [µg/g]	9100	10000	8700	11000	9600	8500	14000	11000	13000
Mn [µg/g]	730	1400	1100	1100	1300	470	1600	910	540
Mo [µg/g]	2.2	0.9	1.4	1.6	0.9	2.4	1.0	0.9	0.9

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LR Report : **CA19123-SEP21**

Analysis	15: 20BH-20 SS2	16: 20BH-20 SS4	17: 20TP-36 GS2	18: 20TP-37 GS1	19: 20TP-38 GS1	20: 20TP-39 GS1	21: 20TP-85 S1	22: 20TP-90 S1	23: 20TP-91 S1
Na [µg/g]	900	1100	1100	720	1200	870	780	650	980
Ni [µg/g]	27	23	33	23	26	27	61	21	21
P [µg/g]	990	820	760	770	880	740	670	600	670
Pb [µg/g]	13	7.1	7.1	6.4	6.2	7.4	5.3	5.8	4.8
Sb [µg/g]	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Se [µg/g]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sn [µg/g]	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sr [µg/g]	23	33	17	15	21	17	25	18	23
Ti [µg/g]	1500	1600	1300	1800	1700	1200	730	1600	1200
Tl [µg/g]	0.13	0.10	0.11	0.08	0.09	0.13	0.05	0.05	0.05
U [µg/g]	0.99	0.59	0.72	1.7	0.61	0.96	0.44	0.59	0.54
V [µg/g]	68	71	56	79	71	49	63	77	84
Y [µg/g]	12	13	12	9.2	12	11	8.0	7.3	8.5
Zn [µg/g]	78	64	61	62	57	45	68	47	58

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OnLine LIMS

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APPENDIX B.2A

Field Records

Barrel	Date	Time	TDS	Conductivity µs/cm	Temp deg C	pH	Carboy Volume (L)	Comments
M AQPOR	29/Apr/21	2:05	81.4	114.7	12.3	7.91	34.00	
M+L SED	29/Apr/21	10:58	78.4	110.4	20.8	8.39	39.50	
M+L MD	29/Apr/21	1:58	27.9	39.1	12.4	7.99	4.00	seal damaged from freezing - carboy leaked
M QE-POR	29/Apr/21	2:22	210.0	292.0	12.2	7.86	37.25	
M QZ-QE-POR-QTP-MIN	29/Apr/21	1:48	41.0	56.5	13.8	7.76	39.75	
SZ+V QE-POR	29/Apr/21	10:31	19.9	107.8	8.3	7.50	38.25	
L QZ-TQTP-QZ-QTP	29/Apr/21	2:33	61.5	86.5	11.1	7.88	40.00	filled HNO3 botttle with wrong H2O. Replaced w/ spare from previous seasons. Included extra bottle of H20 if needed.
L TRJ	29/Apr/21	2:27	57.3	79.0	11.4	8.02	39.50	
V QE-POR-QTP	29/Apr/21	10:20	0.0	0.1	9.6	7.50	36.25	
Mar HL (M+LGO)	29/Apr/21	3:24	115.0	162.0	14.3	8.02	20.50	seal damaged from freezing - carboy leaked
Lep HL (L+LGO)	29/Apr/21	3:04	0.2	0.3	13.2	8.03	24.50	seal damaged from freezing - carboy leaked
FLBK	29/Apr/21	3:27	12.4	17.4	12.9	7.22	26.00	seal damaged from freezing - carboy leaked
pH Check	Buffer	Reading	Buffer	Reading	Buffer	Reading		
Before Sampling	4.00	4.10	7.00	7.03	10.00	10.09		
After Sampling	4.00	4.04	7.00	7.01	10.00	10.12		

Barrel	Date	Time	TDS	Conductivity µs/cm	Temp deg C	pH	Carboy Volume (L)	Comments
M AQPOR	1-Jun-21	5:16	78.1	109.9	10.8	7.78	17.00	
M+L SED	1-Jun-21	6:50	97.3	136.9	15.8	8.08	12.75	
M+L MD	1-Jun-21	5:27	84.0	119.1	16.9	7.85	17.75	
M QE-POR	1-Jun-21	5:36	241.0	339.0	17.9	7.94	6.00	was leaking but since fixed
M QZ-QE-POR-QTP-MIN	1-Jun-21	7:01	64.1	90.5	14.7	7.90	17.00	
SZ+V QE-POR	1-Jun-21	7:10	86.8	122.5	14.2	7.80	8.00	was leaking but since fixed
L QZ-TQTP-QZ-QTP	1-Jun-21	4:19	79.8	112.5	19.3	8.16	15.50	
L TRJ	1-Jun-21	5:10	91.3	128.6	18.3	7.88	15.50	
V QE-POR-QTP	1-Jun-21	5:00	55.8	78.3	18.9	7.53	19.25	
Mar HL (M+LGO)	1-Jun-21	6:38	110.0	155.5	17.1	8.03	6.75	was leaking but since fixed
Lep HL (L+LGO)	1-Jun-21	6:25	12.5	175.6	17.4	8.09	14.00	
FLBK	1-Jun-21	4:45	13.8	20.2	21.1	7.71	20.00	

pH Check	Buffer	Reading	Buffer	Reading	Buffer	Reading
Before Sampling	4.00	4.01	7.00	6.99	10.00	10.12
After Sampling	4.00	4.15	7.00	7.14	10.00	10.24

Barrel	Date	Time	TDS	Conductivity µs/cm	Temp deg C	pH	Carboy Volume (L)	Comments
M AQPOR	27-Jul-21	3:45	90.1	127.2	24.1	8.17	19.00	
M+L SED	27-Jul-21	3:27	85.8	124.6	23.9	7.95	9.75	
M+L MD	27-Jul-21	3:08	37.7	54.6	23.6	7.78	15.75	
M QE-POR	27-Jul-21	2:54	326.0	459.0	23.7	7.91	13.00	
M QZ-QE-POR-QTP-MIN	27-Jul-21	2:40	66.9	96.6	23.4	7.90	20.00	
SZ+V QE-POR	27-Jul-21	2:22	108.0	152.0	23.4	7.85	16.25	
L QZ-TQTP-QZ-QTP	27-Jul-21	2:07	69.7	97.9	22.6	7.92	16.00	
L TRJ	27-Jul-21	1:51	66.3	96.8	22.8	8.02	15.75	
V QE-POR-QTP	27-Jul-21	1:33	57.5	80.0	22.5	7.98	20.75	
Mar HL (M+LGO)	27-Jul-21	12:09	40.1	55.0	20.6	7.92	7.25	
Lep HL (L+LGO)	27-Jul-21	11:52	115.0	144.2	21	7.63	11.00	
FLBK	27-Jul-21	11:30	2.7	4.0	20.2	8.32	20.00	Retested pH following day with result of 6.22
pH Check	Buffer	Reading	Buffer	Reading	Buffer	Reading		
Before Sampling	4.00	4.06	7.00	7.01	10.00	10.06		
After Sampling	4.00	4.22	7.00	7.15	10.00	10.17		

Barrel	Date	Time	TDS	Conductivity µs/cm	Temp deg C	pH	Carboy Volume (L)	Comments
	Sept/2/21							
M AQPOR							11.25	
M+L SED							11.00	
M+L MD							13.00	
M QE-POR							8.50	
M QZ-QE-POR-QTP-MIN							14.00	
SZ+V QE-POR							12.50	
L QZ-TQTP-QZ-QTP							12.25	
L TRJ							10.00	
V QE-POR-QTP							15.00	
Mar HL (M+LGO)							4.25	Added with DI (1 4L bottle)
Lep HL (L+LGO)							9.50	
FLBK							18.00	
pH Check	Buffer	Reading	Buffer	Reading	Buffer	Reading		
Before Sampling	4.00		7.00	7.01	10.00			
After Sampling	4.00		7.00		10.00			

pH meter malfunction. samples sent without readings

5.85?

8.07?

Barrel	Date	Time	TDS	Conductivity µs/cm	Temp deg C	pH	Carboy Volume (L)	Comments
M AQPOR	SEP 8, 2021	10:06					17.00	
M+L SED	"	9:50					17.25	accidentally filled wrong bottle - re-labelled
M+L MD	"	10:00					17.0	accidentally filled wrong bottle - re-labelled
M QE-POR	"	10:10					17.0	
M QZ-QE-POR-QTP-MIN	"	10.13					16.75	
SZ+V QE-POR	"	10:21					17.75	
L QZ-TQTP-QZ-QTP	"	9:34					15.15	
L TRJ	"	10:24					16:00	
V QE-POR-QTP	"	10:18					17.75	
Mar HL (M+LGO)	"	9:40					14	
Lep HL (L+LGO)	"	9:25					15.0	
FLBK	"	9:15					16.75	

pH Check	Buffer	Reading	Buffer	Reading	Buffer	Reading
Before Sampling	4.00		7.00		10.00	
After Sampling	4.00		7.00		10.00	

Barrel	Date	Time	TDS	Conductivity µs/cm	Temp deg C	pH	Carboy Volume (L)	Comments
M AQPOR	9/15/20	9:40	93.7	133.2	8.9	8.10	16.5325	
M+L SED	9/15/20	10:21	90.3	127.2	8.8	8.10	14.5875	
M+L MD	9/15/20	10:09	175	246	9.3	7.99	14.5875	
M QE-POR	9/15/20	9:34	692	978	8.6	7.90	18.4775	
M QZ-QE-POR-QTP-MIN	9/15/20	9:30	67.5	94.9	85	8.34	19.45	carboy overflowing
SZ+V QE-POR	9/15/20	9:24	94.2	134.5	8.9	8.27	19.45	carboy overflowing
L QZ-TQTP-QZ-QTP	9/15/20	9:44	77.4	107.3	9.1	8.13	19.45	carboy overflowing
L TRJ	9/15/20	9:21	100	140.9	10.1	8.08	15.56	
V QE-POR-QTP	9/15/20	9:27	55.2	77.3	8.9	7.99	17.505	
Mar HL (M+LGO)	9/15/20	10:26	153	216	8.6	8.22	19.45	
Lep HL (L+LGO)	9/15/20	10:28	179	251	8.5	8.36	15.56	
FLBK	9/15/20	10:32	2.7	3.7	9.4	6.18	16.5325	
pH Check	Buffer	Reading	Buffer	Reading	Buffer	Reading		
Before Sampling	4.00	3.99	7.00	7.03	10.00	-		
After Sampling	4.00	3.96	7.00	6.93	10.00	10.11		

Barrel	Date	Time	TDS	Conductivity µs/cm	Temp deg C	pH	Carboy Volume (mL)	Comments
M AQPOR	10/12/20	10:52	87.3	123.2	6.4	7.95	15250	
M+L SED	10/12/20	2:03	92	131.6	7.2	7.82	7250	
M+L MD	10/12/20	2:29	91.8	127.5	8.3	7.80	11250	
M QE-POR	10/12/20	3:10	406	570	15.9	7.70	11750	
M QZ-QE-POR-QTP-MIN	10/12/20	3:32	21.9	106.3	14.9	7.77	15750	
SZ+V QE-POR	10/12/20	3:48	96.3	129	13.1	7.75	16750	
L QZ-TQTP-QZ-QTP	10/12/20	4:35	279	55.1	8.8	7.87	9250	
L TRJ	10/12/20	4:50	47.7	90.5	10.6	7.91	13000	
V QE-POR-QTP	10/12/20	4:59	59.6	84.5	10.8	7.73	16000	
Mar HL (M+LGO)	10/12/20	5:15	143	202	6.7	7.85	7250	
Lep HL (L+LGO)	10/12/20	5:25	134	187.9	6.3	7.93	7000	
FLBK	10/12/20	5:35	8.7	12.7	5.4	6.95	13500	
pH Check	Buffer	Reading	Buffer	Reading	Buffer	Reading		
Before Sampling	4.00	4.00	7.00	6.89	10.00	9.96		
After Sampling	4.00	4.07	7.00	6.91	10.00	9.88		

Barrel	Date	Time	TDS	Conductivity µs/cm	Temp deg C	pH	Carboy Volume (L)	Comments
M AQPOR	25/Oct/21	15:17	75.1	105.9	13.9	7.71	13.10	
M+L SED	25/Oct/21	16:16	77.3	108.9	17.8	7.73	13.20	
M+L MD	25/Oct/21	14:02	85.6	120.6	10.2	7.76	14.10	
M QE-POR	25/Oct/21	14:22	219.0	309.0	12.7	7.80	12.50	
M QZ-QE-POR-QTP-MIN	25/Oct/21	14:40	56.7	80.0	14.2	7.66	13.10	
SZ+V QE-POR	25/Oct/21	14:52	79.0	111.3	15	7.69	13.10	
L QZ-TQTP-QZ-QTP	25/Oct/21	15:04	60.1	84.6	15.6	7.79	14.00	
L TRJ	25/Oct/21	15:25	73.6	103.6	14.6	7.67	12.90	
V QE-POR-QTP	25/Oct/21	15:36	42.7	60.1	16.6	7.52	14.00	
Mar HL (M+LGO)	25/Oct/21	15:47	114.0	160.7	16.9	7.72	13.20	
Lep HL (L+LGO)	25/Oct/21	15:55	118.0	166.3	17.8	7.78	13.20	
FLBK	25/Oct/21	16:03	2.6	3.6	17.6	6.26	16.80	
pH Check	Buffer	Reading	Buffer	Reading	Buffer	Reading		
Before Sampling	4.00	4.13	7.00	6.90	10.00	9.84		
After Sampling	4.00	4.13	7.00	6.75	10.00	10.08		

Barrel	Date	Time	TDS	Conductivity µs/cm	Temp deg C	pH	Carboy Volume (mL)	Comments
M AQPOR	11-07-20	8:36	74	104.3	9.9	7.98	16000	
M+L SED	11-07-20	9:49	85	120.4	9.2	7.92	11500	
M+L MD	11-07-20	9:57	92.9	130.8	10.2	7.97	14250	
M QE-POR	11-07-20	9:00	369	520	10.9	7.89	18250	
M QZ-QE-POR-QTP-MIN	11-07-20	9:06	61.5	87.1	10.2	8.07	20000	
SZ+V QE-POR	11-07-20	8:26	79.1	111.7	11.2	8.10	20500	
L QZ-TQTP-QZ-QTP	11-07-20	10:22	66.8	93.4	13.3	7.20	16000	
L TRJ	11-07-20	8:15	36.9	52.1	12.2	8.21	19000	
V QE-POR-QTP	11-07-20	8:43	42.6	35.3	9.5	8.03	18750	spilled ~20 ml of mixed solution from HNO3 during filling
Mar HL (M+LGO)	11-07-20	10:15	114	157.7	9	8.02	16000	
Lep HL (L+LGO)	11-07-20	9:40	136	192.2	10	8.10	15000	
FLBK	11-07-20	10:07	5	7.2	10.4	5.96	18500	
pH Check	Buffer	Reading	Buffer	Reading	Buffer	Reading		
Before Sampling	4.00	4.11	7.00	7.11	10.00	10.08		
After Sampling	4.00	4.21	7.00	7.13	10.00	10.27		

APPENDIX B.2B

Lab Results

Your C.O.C. #: 791067-01-01, 791067-02-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2020/09/28
Report #: R6348364
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0O3853
Received: 2020/09/17, 10:43

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide (1)	12	N/A	2020/09/23	N/A	SM 23 4500-CO2 D
Alkalinity (1)	10	N/A	2020/09/24	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity (1)	2	N/A	2020/09/25	ATL SOP 00013	EPA 310.2 R1974 m
Chloride (1)	1	N/A	2020/09/23	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride (1)	11	N/A	2020/09/24	ATL SOP 00014	SM 23 4500-Cl- E m
Colour (1)	10	N/A	2020/09/24	ATL SOP 00020	SM 23 2120C m
Colour (1)	2	N/A	2020/09/25	ATL SOP 00020	SM 23 2120C m
Conductance - water (1)	12	N/A	2020/09/23	ATL SOP 00004	SM 23 2510B m
Fluoride (1)	12	N/A	2020/09/23	ATL SOP 00043	SM 23 4500-F- C m
Hardness (calculated as CaCO3) (1)	4	N/A	2020/09/23	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3) (1)	8	N/A	2020/09/24	ATL SOP 00048	Auto Calc
Mercury - Total (CVAA,LL) (1)	12	2020/09/22	2020/09/23	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Diss. MS (as rec'd) (1)	4	N/A	2020/09/22	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (as rec'd) (1)	8	N/A	2020/09/23	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference) (1)	10	N/A	2020/09/24	N/A	Auto Calc.
Ion Balance (% Difference) (1)	2	N/A	2020/09/25	N/A	Auto Calc.
Anion and Cation Sum (1)	1	N/A	2020/09/23	N/A	Auto Calc.
Anion and Cation Sum (1)	11	N/A	2020/09/24	N/A	Auto Calc.
Nitrogen Ammonia - water (1)	4	N/A	2020/09/23	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water (1)	8	N/A	2020/09/24	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite (1)	10	N/A	2020/09/23	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite (1)	2	N/A	2020/09/24	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite (1)	10	N/A	2020/09/23	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrite (1)	2	N/A	2020/09/24	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N) (1)	10	N/A	2020/09/24	ATL SOP 00018	ASTM D3867-16
Nitrogen - Nitrate (as N) (1)	2	N/A	2020/09/25	ATL SOP 00018	ASTM D3867-16
pH (1, 2)	12	N/A	2020/09/23	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho (1)	10	N/A	2020/09/24	ATL SOP 00021	SM 23 4500-P E m
Phosphorus - ortho (1)	2	N/A	2020/09/25	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C) (1)	10	N/A	2020/09/24	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 20C) (1)	2	N/A	2020/09/25	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	10	N/A	2020/09/24	ATL SOP 00049	Auto Calc.

Your C.O.C. #: 791067-01-01, 791067-02-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2020/09/28
Report #: R6348364
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0O3853
Received: 2020/09/17, 10:43

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sat. pH and Langelier Index (@ 4C) (1)	2	N/A	2020/09/25	ATL SOP 00049	Auto Calc.
Reactive Silica (1)	10	N/A	2020/09/23	ATL SOP 00022	EPA 366.0 m
Reactive Silica (1)	2	N/A	2020/09/24	ATL SOP 00022	EPA 366.0 m
Sulphate (1)	10	N/A	2020/09/23	ATL SOP 00023	ASTM D516-16 m
Sulphate (1)	2	N/A	2020/09/24	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc) (1)	10	N/A	2020/09/24	N/A	Auto Calc.
Total Dissolved Solids (TDS calc) (1)	2	N/A	2020/09/25	N/A	Auto Calc.
Organic carbon - Total (TOC) (1, 3)	12	N/A	2020/09/25	ATL SOP 00203	SM 23 5310B m
Turbidity (1)	12	N/A	2020/09/22	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by BV Labs Bedford

(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.

(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Your C.O.C. #: 791067-01-01, 791067-02-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2020/09/28
Report #: R6348364
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0O3853
Received: 2020/09/17, 10:43

<Original signed by>

Sam Sherker
Project Manager Assistant
28 Sep 2020 14:07:09

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB493		NRB494		NRB495		
Sampling Date		2020/09/15 09:40		2020/09/15 10:21		2020/09/15 10:09		
COC Number		791067-01-01		791067-01-01		791067-01-01		
Sample #		M AQPOR		M+L SED		M+L MD		
	UNITS	**M AQPOR**	**QC Batch**	**M+L SED**	**QC Batch**	**M+L MD**	**RDL**	**QC Batch**
Calculated Parameters								
Anion Sum	me/L	1.33	6954747	1.34	6954747	2.44	N/A	6954747
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	54	6954739	58	6954739	53	1.0	6954739
Calculated TDS	mg/L	72	6954758	70	6954758	140	1.0	6954758
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	6954739	ND	6954739	ND	1.0	6954739
Cation Sum	me/L	1.19	6954747	1.13	6954747	2.16	N/A	6954747
Hardness (CaCO3)	mg/L	48	6954742	38	6954742	97	1.0	6954742
Ion Balance (% Difference)	%	5.56	6954746	8.50	6954746	6.09	N/A	6954746
Langelier Index (@ 20C)	N/A	-0.456	6954755	-0.481	6954755	-0.203		6954755
Langelier Index (@ 4C)	N/A	-0.707	6954756	-0.732	6954756	-0.453		6954756
Nitrate (N)	mg/L	0.082	6954749	ND	6954749	0.054	0.050	6954749
Saturation pH (@ 20C)	N/A	8.37	6954755	8.49	6954755	8.15		6954755
Saturation pH (@ 4C)	N/A	8.62	6954756	8.74	6954756	8.40		6954756
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	54	6960138	59	6960138	54	5.0	6960138
Dissolved Chloride (Cl-)	mg/L	1.3	6960149	2.1	6960149	1.9	1.0	6960149
Colour	TCU	ND	6960163	ND	6960163	ND	5.0	6960163
Nitrate + Nitrite (N)	mg/L	0.082	6960166	ND	6960166	0.054	0.050	6960166
Nitrite (N)	mg/L	ND	6960168	ND	6960168	ND	0.010	6960168
Nitrogen (Ammonia Nitrogen)	mg/L	ND	6962301	ND	6960541	ND	0.050	6957609
Total Organic Carbon (C)	mg/L	2.1	6962214	1.8	6962214	1.8	0.50	6962214
Orthophosphate (P)	mg/L	ND	6960165	ND	6960165	ND	0.010	6960165
pH	pH	7.91	6959551	8.01	6959551	7.95		6959551
Reactive Silica (SiO2)	mg/L	3.2	6960154	3.7	6960154	2.5	0.50	6960154
Dissolved Sulphate (SO4)	mg/L	9.9	6960153	5.0	6960153	63	2.0	6960153
Turbidity	NTU	3.2	6957137	9.1	6957137	0.26	0.10	6957137
Conductivity	uS/cm	110	6959549	110	6959549	220	1.0	6959549
Metals								
Dissolved Aluminum (Al)	ug/L	110	6956815	130	6959398	120	5.0	6959398
Dissolved Antimony (Sb)	ug/L	ND	6956815	ND	6959398	ND	1.0	6959398
Dissolved Arsenic (As)	ug/L	ND	6956815	1.5	6959398	ND	1.0	6959398
Dissolved Barium (Ba)	ug/L	2.3	6956815	3.2	6959398	30	1.0	6959398
Dissolved Beryllium (Be)	ug/L	ND	6956815	ND	6959398	ND	1.0	6959398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

Bureau Veritas Laboratories 49-55 Elizabeth Ave, Suite 101A, St.John's, NL, Canada A1A 1W9 Tel: 709-754-0203 Toll Free: 888-492-7227 Fax: 709-754-8612 www.bvlabs.com

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB493		NRB494		NRB495		
Sampling Date		2020/09/15 09:40		2020/09/15 10:21		2020/09/15 10:09		
COC Number		791067-01-01		791067-01-01		791067-01-01		
Sample #		M AQPOR		M+L SED		M+L MD		
	UNITS	**M AQPOR**	**QC Batch**	**M+L SED**	**QC Batch**	**M+L MD**	**RDL**	**QC Batch**
Dissolved Bismuth (Bi)	ug/L	ND	6956815	ND	6959398	ND	2.0	6959398
Dissolved Boron (B)	ug/L	ND	6956815	ND	6959398	ND	50	6959398
Dissolved Cadmium (Cd)	ug/L	ND	6956815	ND	6959398	ND	0.010	6959398
Dissolved Calcium (Ca)	ug/L	17000	6956815	12000	6959398	31000	100	6959398
Dissolved Chromium (Cr)	ug/L	ND	6956815	ND	6959398	ND	1.0	6959398
Dissolved Cobalt (Co)	ug/L	ND	6956815	ND	6959398	ND	0.40	6959398
Dissolved Copper (Cu)	ug/L	ND	6956815	1.0	6959398	0.90	0.50	6959398
Dissolved Iron (Fe)	ug/L	ND	6956815	ND	6959398	ND	50	6959398
Dissolved Lead (Pb)	ug/L	ND	6956815	ND	6959398	ND	0.50	6959398
Dissolved Magnesium (Mg)	ug/L	1500	6956815	2100	6959398	5100	100	6959398
Dissolved Manganese (Mn)	ug/L	44	6956815	53	6959398	50	2.0	6959398
Dissolved Molybdenum (Mo)	ug/L	ND	6956815	ND	6959398	ND	2.0	6959398
Dissolved Nickel (Ni)	ug/L	ND	6956815	ND	6959398	ND	2.0	6959398
Dissolved Phosphorus (P)	ug/L	ND	6956815	ND	6959398	ND	100	6959398
Dissolved Potassium (K)	ug/L	1400	6956815	4200	6959398	1800	100	6959398
Dissolved Selenium (Se)	ug/L	ND	6956815	ND	6959398	ND	0.50	6959398
Dissolved Silver (Ag)	ug/L	ND	6956815	ND	6959398	ND	0.10	6959398
Dissolved Sodium (Na)	ug/L	4400	6956815	6200	6959398	3800	100	6959398
Dissolved Strontium (Sr)	ug/L	56	6956815	75	6959398	180	2.0	6959398
Dissolved Thallium (Tl)	ug/L	ND	6956815	ND	6959398	ND	0.10	6959398
Dissolved Tin (Sn)	ug/L	ND	6956815	ND	6959398	ND	2.0	6959398
Dissolved Titanium (Ti)	ug/L	ND	6956815	ND	6959398	ND	2.0	6959398
Dissolved Uranium (U)	ug/L	0.98	6956815	4.7	6959398	0.65	0.10	6959398
Dissolved Vanadium (V)	ug/L	ND	6956815	ND	6959398	ND	2.0	6959398
Dissolved Zinc (Zn)	ug/L	ND	6956815	ND	6959398	ND	5.0	6959398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB495			NRB496			NRB497		
Sampling Date		2020/09/15 10:09			2020/09/15 09:34			2020/09/15 09:30		
COC Number		791067-01-01			791067-01-01			791067-01-01		
Sample #		M+L MD			M QE-POR			M QZ-QE-POR-QTP-MIN		
	UNITS	M+L MD Lab-Dup	RDL	QC Batch	M QE-POR	RDL	QC Batch	M QZ-QE-POR-QTP-MIN	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L				9.29	N/A	6954747	1.05	N/A	6954747
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				49	1.0	6954739	43	1.0	6954739
Calculated TDS	mg/L				620	1.0	6954758	55	1.0	6954758
Carb. Alkalinity (calc. as CaCO3)	mg/L				ND	1.0	6954739	ND	1.0	6954739
Cation Sum	me/L				9.33	N/A	6954747	0.850	N/A	6954747
Hardness (CaCO3)	mg/L				410	1.0	6954742	35	1.0	6954742
Ion Balance (% Difference)	%				0.210	N/A	6954746	10.5	N/A	6954746
Langelier Index (@ 20C)	N/A				0.169		6954755	-0.594		6954755
Langelier Index (@ 4C)	N/A				-0.0780		6954756	-0.846		6954756
Nitrate (N)	mg/L				0.079	0.050	6954749	ND	0.050	6954749
Saturation pH (@ 20C)	N/A				7.63		6954755	8.58		6954755
Saturation pH (@ 4C)	N/A				7.88		6954756	8.83		6954756
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L				50	5.0	6960138	44	5.0	6960138
Dissolved Chloride (Cl-)	mg/L				6.8	1.0	6960149	1.4	1.0	6960149
Colour	TCU				ND	5.0	6960163	ND	5.0	6960163
Nitrate + Nitrite (N)	mg/L				0.079	0.050	6960166	ND	0.050	6960166
Nitrite (N)	mg/L				ND	0.010	6960168	ND	0.010	6960168
Nitrogen (Ammonia Nitrogen)	mg/L				ND	0.050	6962301	ND	0.050	6957609
Total Organic Carbon (C)	mg/L				5.3	0.50	6962214	1.7	0.50	6962214
Orthophosphate (P)	mg/L				ND	0.010	6960165	ND	0.010	6960165
pH	pH				7.80		6959551	7.98		6959551
Reactive Silica (SiO2)	mg/L				5.8	0.50	6960154	2.8	0.50	6960154
Dissolved Sulphate (SO4)	mg/L				390	10	6960153	7.0	2.0	6960153
Turbidity	NTU	0.32	0.10	6957137	0.97	0.10	6957137	2.1	0.10	6957137
Conductivity	uS/cm				880	1.0	6959549	82	1.0	6959549
Metals										
Dissolved Aluminum (Al)	ug/L				49	5.0	6959398	160	5.0	6956815
Dissolved Antimony (Sb)	ug/L				1.5	1.0	6959398	ND	1.0	6956815
Dissolved Arsenic (As)	ug/L				ND	1.0	6959398	ND	1.0	6956815
Dissolved Barium (Ba)	ug/L				14	1.0	6959398	2.9	1.0	6956815

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB495			NRB496			NRB497		
Sampling Date		2020/09/15 10:09			2020/09/15 09:34			2020/09/15 09:30		
COC Number		791067-01-01			791067-01-01			791067-01-01		
Sample #		M+L MD			M QE-POR			M QZ-QE-POR-QTP-MIN		
	UNITS	M+L MD Lab-Dup	RDL	QC Batch	M QE-POR	RDL	QC Batch	M QZ-QE-POR-QTP-MIN	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L				ND	1.0	6959398	ND	1.0	6956815
Dissolved Bismuth (Bi)	ug/L				ND	2.0	6959398	ND	2.0	6956815
Dissolved Boron (B)	ug/L				ND	50	6959398	ND	50	6956815
Dissolved Cadmium (Cd)	ug/L				ND	0.010	6959398	ND	0.010	6956815
Dissolved Calcium (Ca)	ug/L				150000	100	6959398	13000	100	6956815
Dissolved Chromium (Cr)	ug/L				ND	1.0	6959398	ND	1.0	6956815
Dissolved Cobalt (Co)	ug/L				ND	0.40	6959398	ND	0.40	6956815
Dissolved Copper (Cu)	ug/L				1.8	0.50	6959398	0.67	0.50	6956815
Dissolved Iron (Fe)	ug/L				ND	50	6959398	ND	50	6956815
Dissolved Lead (Pb)	ug/L				ND	0.50	6959398	ND	0.50	6956815
Dissolved Magnesium (Mg)	ug/L				9700	100	6959398	850	100	6956815
Dissolved Manganese (Mn)	ug/L				57	2.0	6959398	20	2.0	6956815
Dissolved Molybdenum (Mo)	ug/L				5.4	2.0	6959398	ND	2.0	6956815
Dissolved Nickel (Ni)	ug/L				ND	2.0	6959398	ND	2.0	6956815
Dissolved Phosphorus (P)	ug/L				ND	100	6959398	ND	100	6956815
Dissolved Potassium (K)	ug/L				3900	100	6959398	920	100	6956815
Dissolved Selenium (Se)	ug/L				ND	0.50	6959398	ND	0.50	6956815
Dissolved Silver (Ag)	ug/L				ND	0.10	6959398	ND	0.10	6956815
Dissolved Sodium (Na)	ug/L				24000	100	6959398	3000	100	6956815
Dissolved Strontium (Sr)	ug/L				530	2.0	6959398	44	2.0	6956815
Dissolved Thallium (Tl)	ug/L				ND	0.10	6959398	ND	0.10	6956815
Dissolved Tin (Sn)	ug/L				ND	2.0	6959398	ND	2.0	6956815
Dissolved Titanium (Ti)	ug/L				ND	2.0	6959398	ND	2.0	6956815
Dissolved Uranium (U)	ug/L				2.7	0.10	6959398	0.75	0.10	6956815
Dissolved Vanadium (V)	ug/L				ND	2.0	6959398	ND	2.0	6956815
Dissolved Zinc (Zn)	ug/L				ND	5.0	6959398	ND	5.0	6956815

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB498		NRB499		NRB500		
Sampling Date		2020/09/15 09:24		2020/09/15 09:44		2020/09/15 09:21		
COC Number		791067-01-01		791067-01-01		791067-01-01		
Sample #		SZ+V QE-POR		L QZ-TQTP+QZ-QTP		L TRJ		
	UNITS	SZ+V QE-POR	QC Batch	L QZ-TQTP+QZ-QTP	QC Batch	L TRJ	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	1.45	6954747	1.17	6954747	1.45	N/A	6954747
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	59	6954739	50	6954739	60	1.0	6954739
Calculated TDS	mg/L	76	6954758	60	6954758	77	1.0	6954758
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	6954739	ND	6954739	ND	1.0	6954739
Cation Sum	me/L	1.17	6954747	0.970	6954747	1.19	N/A	6954747
Hardness (CaCO3)	mg/L	41	6954742	41	6954742	42	1.0	6954742
Ion Balance (% Difference)	%	10.7	6954746	9.35	6954746	9.85	N/A	6954746
Langelier Index (@ 20C)	N/A	-0.441	6954755	-0.621	6954755	-0.347		6954755
Langelier Index (@ 4C)	N/A	-0.693	6954756	-0.873	6954756	-0.598		6954756
Nitrate (N)	mg/L	0.051	6954749	0.12	6954749	ND	0.050	6954749
Saturation pH (@ 20C)	N/A	8.42	6954755	8.46	6954755	8.41		6954755
Saturation pH (@ 4C)	N/A	8.67	6954756	8.72	6954756	8.66		6954756
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	59	6960138	51	6960138	61	5.0	6960138
Dissolved Chloride (Cl-)	mg/L	2.1	6960149	1.0	6960149	1.8	1.0	6960149
Colour	TCU	ND	6960163	ND	6960163	ND	5.0	6960163
Nitrate + Nitrite (N)	mg/L	0.051	6960166	0.12	6960166	ND	0.050	6960166
Nitrite (N)	mg/L	ND	6960168	ND	6960168	ND	0.010	6960168
Nitrogen (Ammonia Nitrogen)	mg/L	ND	6962301	ND	6962301	ND	0.050	6962301
Total Organic Carbon (C)	mg/L	1.5	6962214	1.2	6962214	2.3	0.50	6962209
Orthophosphate (P)	mg/L	ND	6960165	ND	6960165	ND	0.010	6960165
pH	pH	7.98	6959551	7.84	6959559	8.06		6959551
Reactive Silica (SiO2)	mg/L	3.9	6960154	2.6	6960154	4.1	0.50	6960154
Dissolved Sulphate (SO4)	mg/L	9.7	6960153	5.8	6960153	8.3	2.0	6960153
Turbidity	NTU	0.62	6957137	2.7	6957137	0.76	0.10	6957137
Conductivity	uS/cm	110	6959549	92	6959557	120	1.0	6959549
Metals								
Dissolved Aluminum (Al)	ug/L	140	6959398	150	6956815	250	5.0	6959398
Dissolved Antimony (Sb)	ug/L	ND	6959398	1.1	6956815	1.0	1.0	6959398
Dissolved Arsenic (As)	ug/L	ND	6959398	ND	6956815	1.1	1.0	6959398
Dissolved Barium (Ba)	ug/L	1.2	6959398	4.5	6956815	28	1.0	6959398
Dissolved Beryllium (Be)	ug/L	ND	6959398	ND	6956815	ND	1.0	6959398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB498		NRB499		NRB500		
Sampling Date		2020/09/15 09:24		2020/09/15 09:44		2020/09/15 09:21		
COC Number		791067-01-01		791067-01-01		791067-01-01		
Sample #		SZ+V QE-POR		L QZ-TQTP+QZ-QTP		L TRJ		
	UNITS	SZ+V QE-POR	QC Batch	L QZ-TQTP+QZ-QTP	QC Batch	L TRJ	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	6959398	ND	6956815	ND	2.0	6959398
Dissolved Boron (B)	ug/L	ND	6959398	ND	6956815	ND	50	6959398
Dissolved Cadmium (Cd)	ug/L	ND	6959398	ND	6956815	ND	0.010	6959398
Dissolved Calcium (Ca)	ug/L	14000	6959398	14000	6956815	14000	100	6959398
Dissolved Chromium (Cr)	ug/L	ND	6959398	ND	6956815	ND	1.0	6959398
Dissolved Cobalt (Co)	ug/L	ND	6959398	ND	6956815	ND	0.40	6959398
Dissolved Copper (Cu)	ug/L	0.78	6959398	ND	6956815	1.3	0.50	6959398
Dissolved Iron (Fe)	ug/L	ND	6959398	ND	6956815	ND	50	6959398
Dissolved Lead (Pb)	ug/L	ND	6959398	ND	6956815	ND	0.50	6959398
Dissolved Magnesium (Mg)	ug/L	1500	6959398	1400	6956815	1800	100	6959398
Dissolved Manganese (Mn)	ug/L	25	6959398	58	6956815	19	2.0	6959398
Dissolved Molybdenum (Mo)	ug/L	3.4	6959398	ND	6956815	ND	2.0	6959398
Dissolved Nickel (Ni)	ug/L	ND	6959398	ND	6956815	ND	2.0	6959398
Dissolved Phosphorus (P)	ug/L	ND	6959398	ND	6956815	ND	100	6959398
Dissolved Potassium (K)	ug/L	1800	6959398	1900	6956815	4400	100	6959398
Dissolved Selenium (Se)	ug/L	ND	6959398	ND	6956815	ND	0.50	6959398
Dissolved Silver (Ag)	ug/L	ND	6959398	ND	6956815	ND	0.10	6959398
Dissolved Sodium (Na)	ug/L	7300	6959398	2300	6956815	5700	100	6959398
Dissolved Strontium (Sr)	ug/L	23	6959398	82	6956815	140	2.0	6959398
Dissolved Thallium (Tl)	ug/L	ND	6959398	ND	6956815	ND	0.10	6959398
Dissolved Tin (Sn)	ug/L	ND	6959398	ND	6956815	ND	2.0	6959398
Dissolved Titanium (Ti)	ug/L	ND	6959398	ND	6956815	ND	2.0	6959398
Dissolved Uranium (U)	ug/L	1.1	6959398	1.2	6956815	2.5	0.10	6959398
Dissolved Vanadium (V)	ug/L	ND	6959398	ND	6956815	ND	2.0	6959398
Dissolved Zinc (Zn)	ug/L	ND	6959398	ND	6956815	ND	5.0	6959398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB501			NRB502		NRB503		
Sampling Date		2020/09/15 09:27			2020/09/15 10:20		2020/09/15 10:28		
COC Number		791067-01-01			791067-01-01		791067-02-01		
Sample #		V QE-POR-QTP			MAR HL		LEP HL		
	UNITS	V QE-POR-QTP	RDL	QC Batch	Mar HL	QC Batch	Lep HL	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	0.750	N/A	6954747	3.05	6954747	2.64	N/A	6954747
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	34	1.0	6954739	57	6954739	87	1.0	6954739
Calculated TDS	mg/L	39	1.0	6954758	190	6954758	150	1.0	6954758
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	6954739	ND	6954739	1.1	1.0	6954739
Cation Sum	me/L	0.690	N/A	6954747	2.85	6954747	2.27	N/A	6954747
Hardness (CaCO3)	mg/L	32	1.0	6954742	91	6954742	63	1.0	6954742
Ion Balance (% Difference)	%	4.17	N/A	6954746	3.39	6954746	7.54	N/A	6954746
Langelier Index (@ 20C)	N/A	-0.978		6954755	-0.194	6954755	-0.0870		6954755
Langelier Index (@ 4C)	N/A	-1.23		6954756	-0.444	6954756	-0.337		6954756
Nitrate (N)	mg/L	ND	0.050	6954749	ND	6954749	ND	0.050	6954749
Saturation pH (@ 20C)	N/A	8.72		6954755	8.19	6954755	8.21		6954755
Saturation pH (@ 4C)	N/A	8.98		6954756	8.44	6954756	8.46		6954756
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	34	5.0	6962867	57 (1)	6960195	88 (1)	6.0	6960195
Dissolved Chloride (Cl-)	mg/L	ND	1.0	6962874	5.1	6960199	3.2	1.0	6960199
Colour	TCU	ND	5.0	6962904	ND	6960180	ND	5.0	6960180
Nitrate + Nitrite (N)	mg/L	ND	0.050	6962906	ND	6960222	ND	0.050	6960222
Nitrite (N)	mg/L	ND	0.010	6962908	ND	6960229	ND	0.010	6960229
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	6962292	ND	6957609	ND	0.050	6962301
Total Organic Carbon (C)	mg/L	0.99	0.50	6962218	1.4	6962218	1.5	0.50	6962218
Orthophosphate (P)	mg/L	ND	0.010	6962905	ND	6960215	ND	0.010	6960215
pH	pH	7.75		6959551	7.99	6959551	8.12		6959559
Reactive Silica (SiO2)	mg/L	1.7	0.50	6962894	5.6	6960207	5.5	0.50	6960207
Dissolved Sulphate (SO4)	mg/L	3.5	2.0	6962884	84	6960202	38	2.0	6960202
Turbidity	NTU	0.34	0.10	6957137	0.86	6957137	0.27	0.10	6957137
Conductivity	uS/cm	65	1.0	6959549	300	6959549	230	1.0	6959557
Metals									
Dissolved Aluminum (Al)	ug/L	130	5.0	6956815	140	6959398	170	5.0	6959398
Dissolved Antimony (Sb)	ug/L	ND	1.0	6956815	2.6	6959398	2.4	1.0	6959398
Dissolved Arsenic (As)	ug/L	ND	1.0	6956815	1.5	6959398	ND	1.0	6959398
Dissolved Barium (Ba)	ug/L	ND	1.0	6956815	15	6959398	7.2	1.0	6959398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to method blank performance.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB501			NRB502		NRB503		
Sampling Date		2020/09/15 09:27			2020/09/15 10:20		2020/09/15 10:28		
COC Number		791067-01-01			791067-01-01		791067-02-01		
Sample #		V QE-POR-QTP			MAR HL		LEP HL		
	UNITS	V QE-POR-QTP	RDL	QC Batch	Mar HL	QC Batch	Lep HL	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	1.0	6956815	ND	6959398	ND	1.0	6959398
Dissolved Bismuth (Bi)	ug/L	ND	2.0	6956815	ND	6959398	ND	2.0	6959398
Dissolved Boron (B)	ug/L	ND	50	6956815	ND	6959398	ND	50	6959398
Dissolved Cadmium (Cd)	ug/L	ND	0.010	6956815	ND	6959398	ND	0.010	6959398
Dissolved Calcium (Ca)	ug/L	11000	100	6956815	28000	6959398	17000	100	6959398
Dissolved Chromium (Cr)	ug/L	ND	1.0	6956815	ND	6959398	ND	1.0	6959398
Dissolved Cobalt (Co)	ug/L	ND	0.40	6956815	ND	6959398	ND	0.40	6959398
Dissolved Copper (Cu)	ug/L	1.1	0.50	6956815	ND	6959398	ND	0.50	6959398
Dissolved Iron (Fe)	ug/L	ND	50	6956815	ND	6959398	ND	50	6959398
Dissolved Lead (Pb)	ug/L	ND	0.50	6956815	ND	6959398	ND	0.50	6959398
Dissolved Magnesium (Mg)	ug/L	870	100	6956815	5400	6959398	5300	100	6959398
Dissolved Manganese (Mn)	ug/L	24	2.0	6956815	29	6959398	18	2.0	6959398
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	6956815	20	6959398	4.4	2.0	6959398
Dissolved Nickel (Ni)	ug/L	ND	2.0	6956815	ND	6959398	ND	2.0	6959398
Dissolved Phosphorus (P)	ug/L	ND	100	6956815	ND	6959398	ND	100	6959398
Dissolved Potassium (K)	ug/L	510	100	6956815	3000	6959398	3900	100	6959398
Dissolved Selenium (Se)	ug/L	ND	0.50	6956815	1.3	6959398	1.3	0.50	6959398
Dissolved Silver (Ag)	ug/L	ND	0.10	6956815	ND	6959398	ND	0.10	6959398
Dissolved Sodium (Na)	ug/L	1000	100	6956815	22000	6959398	21000	100	6959398
Dissolved Strontium (Sr)	ug/L	19	2.0	6956815	90	6959398	140	2.0	6959398
Dissolved Thallium (Tl)	ug/L	ND	0.10	6956815	ND	6959398	ND	0.10	6959398
Dissolved Tin (Sn)	ug/L	ND	2.0	6956815	ND	6959398	ND	2.0	6959398
Dissolved Titanium (Ti)	ug/L	ND	2.0	6956815	ND	6959398	ND	2.0	6959398
Dissolved Uranium (U)	ug/L	0.28	0.10	6956815	1.8	6959398	4.7	0.10	6959398
Dissolved Vanadium (V)	ug/L	ND	2.0	6956815	ND	6959398	ND	2.0	6959398
Dissolved Zinc (Zn)	ug/L	ND	5.0	6956815	ND	6959398	ND	5.0	6959398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB504		
Sampling Date		2020/09/15 10:32		
COC Number		791067-02-01		
Sample #		FLBK		
	UNITS	**FLBK**	**RDL**	**QC Batch**
Calculated Parameters				
Anion Sum	me/L	0.00	N/A	6954747
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	6954739
Calculated TDS	mg/L	1.0	1.0	6954758
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	6954739
Cation Sum	me/L	0.0600	N/A	6954747
Hardness (CaCO3)	mg/L	1.5	1.0	6954742
Ion Balance (% Difference)	%	100	N/A	6954746
Langelier Index (@ 20C)	N/A	NC		6954755
Langelier Index (@ 4C)	N/A	NC		6954756
Nitrate (N)	mg/L	ND	0.050	6954749
Saturation pH (@ 20C)	N/A	NC		6954755
Saturation pH (@ 4C)	N/A	NC		6954756
Inorganics				
Total Alkalinity (Total as CaCO3)	mg/L	ND	5.0	6962867
Dissolved Chloride (Cl-)	mg/L	ND	1.0	6962874
Colour	TCU	ND	5.0	6962904
Nitrate + Nitrite (N)	mg/L	ND	0.050	6962906
Nitrite (N)	mg/L	ND	0.010	6962908
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	6962301
Total Organic Carbon (C)	mg/L	1.9	0.50	6962218
Orthophosphate (P)	mg/L	ND	0.010	6962905
pH	pH	6.24		6959551
Reactive Silica (SiO2)	mg/L	ND	0.50	6962894
Dissolved Sulphate (SO4)	mg/L	ND	2.0	6962884
Turbidity	NTU	0.96	0.10	6957137
Conductivity	uS/cm	2.5	1.0	6959549
Metals				
Dissolved Aluminum (Al)	ug/L	6.9	5.0	6959398
Dissolved Antimony (Sb)	ug/L	ND	1.0	6959398
Dissolved Arsenic (As)	ug/L	ND	1.0	6959398
Dissolved Barium (Ba)	ug/L	1.1	1.0	6959398
Dissolved Beryllium (Be)	ug/L	ND	1.0	6959398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NRB504		
Sampling Date		2020/09/15 10:32		
COC Number		791067-02-01		
Sample #		FLBK		
	UNITS	FLBK	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	2.0	6959398
Dissolved Boron (B)	ug/L	ND	50	6959398
Dissolved Cadmium (Cd)	ug/L	ND	0.010	6959398
Dissolved Calcium (Ca)	ug/L	420	100	6959398
Dissolved Chromium (Cr)	ug/L	ND	1.0	6959398
Dissolved Cobalt (Co)	ug/L	ND	0.40	6959398
Dissolved Copper (Cu)	ug/L	ND	0.50	6959398
Dissolved Iron (Fe)	ug/L	ND	50	6959398
Dissolved Lead (Pb)	ug/L	ND	0.50	6959398
Dissolved Magnesium (Mg)	ug/L	120	100	6959398
Dissolved Manganese (Mn)	ug/L	4.8	2.0	6959398
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	6959398
Dissolved Nickel (Ni)	ug/L	ND	2.0	6959398
Dissolved Phosphorus (P)	ug/L	ND	100	6959398
Dissolved Potassium (K)	ug/L	120	100	6959398
Dissolved Selenium (Se)	ug/L	ND	0.50	6959398
Dissolved Silver (Ag)	ug/L	ND	0.10	6959398
Dissolved Sodium (Na)	ug/L	540	100	6959398
Dissolved Strontium (Sr)	ug/L	2.6	2.0	6959398
Dissolved Thallium (Tl)	ug/L	ND	0.10	6959398
Dissolved Tin (Sn)	ug/L	ND	2.0	6959398
Dissolved Titanium (Ti)	ug/L	ND	2.0	6959398
Dissolved Uranium (U)	ug/L	ND	0.10	6959398
Dissolved Vanadium (V)	ug/L	ND	2.0	6959398
Dissolved Zinc (Zn)	ug/L	6.6	5.0	6959398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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RESULTS OF ANALYSES OF WATER

BV Labs ID		NRB493	NRB494	NRB495	NRB496	NRB497		
Sampling Date		2020/09/15 09:40	2020/09/15 10:21	2020/09/15 10:09	2020/09/15 09:34	2020/09/15 09:30		
COC Number		791067-01-01	791067-01-01	791067-01-01	791067-01-01	791067-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Inorganics								
Dissolved Fluoride (F-)	mg/L	ND	ND	ND	ND	ND	0.10	6959552

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		NRB498		NRB499		NRB500	NRB501		
Sampling Date		2020/09/15 09:24		2020/09/15 09:44		2020/09/15 09:21	2020/09/15 09:27		
COC Number		791067-01-01		791067-01-01		791067-01-01	791067-01-01		
Sample #		SZ+V QE-POR		L QZ-TQTP+QZ-QTP		L TRJ	V QE-POR-QTP		
	UNITS	**SZ+V QE-POR**	**QC Batch**	**L QZ-TQTP+QZ-QTP**	**QC Batch**	**L TRJ**	**V QE-POR-QTP**	**RDL**	**QC Batch**
Inorganics									
Dissolved Fluoride (F-)	mg/L	ND	6959552	ND	6959561	ND	ND	0.10	6959552

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		NRB502		NRB503		NRB504		
Sampling Date		2020/09/15 10:20		2020/09/15 10:28		2020/09/15 10:32		
COC Number		791067-01-01		791067-02-01		791067-02-01		
Sample #		MAR HL		LEP HL		FLBK		
	UNITS	**Mar HL**	**QC Batch**	**Lep HL**	**QC Batch**	**FLBK**	**RDL**	**QC Batch**
Inorganics								
Dissolved Fluoride (F-)	mg/L	0.12	6959552	0.12	6959561	ND	0.10	6959552

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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MERCURY BY COLD VAPOUR AA (WATER)

BV Labs ID		NRB493	NRB494	NRB495	NRB496	NRB497		
Sampling Date		2020/09/15 09:40	2020/09/15 10:21	2020/09/15 10:09	2020/09/15 09:34	2020/09/15 09:30		
COC Number		791067-01-01	791067-01-01	791067-01-01	791067-01-01	791067-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Metals								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.013	6957515

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		NRB498	NRB499	NRB500	NRB501	NRB502		
Sampling Date		2020/09/15 09:24	2020/09/15 09:44	2020/09/15 09:21	2020/09/15 09:27	2020/09/15 10:20		
COC Number		791067-01-01	791067-01-01	791067-01-01	791067-01-01	791067-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
Metals								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.013	6957515

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		NRB503	NRB504		
Sampling Date		2020/09/15 10:28	2020/09/15 10:32		
COC Number		791067-02-01	791067-02-01		
Sample #		LEP HL	FLBK		
	UNITS	**Lep HL**	**FLBK**	**RDL**	**QC Batch**
Metals					
Total Mercury (Hg)	ug/L	ND	ND	0.013	6957515

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.5°C

Sample NRB493 [M AQPOR] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample NRB494 [M+L SED] : Poor RCAp Ion Balance due to sample matrix.

Sample NRB495 [M+L MD] : Poor RCAp Ion Balance due to sample matrix.

Sample NRB497 [M QZ-QE-POR-QTP-MIN] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample NRB498 [SZ+V QE-POR] : Poor RCAp Ion Balance due to sample matrix.

Sample NRB499 [L QZ-TQTP+QZ-QTP] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample NRB500 [L TRJ] : Poor RCAp Ion Balance due to sample matrix.

Sample NRB503 [Lep HL] : Poor RCAp Ion Balance due to sample matrix.

Sample NRB504 [FLBK] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6956815	BAN	Matrix Spike	Dissolved Aluminum (Al)	2020/09/22		100	%	80 - 120
			Dissolved Antimony (Sb)	2020/09/22		94	%	80 - 120
			Dissolved Arsenic (As)	2020/09/22		95	%	80 - 120
			Dissolved Barium (Ba)	2020/09/22		97	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/22		102	%	80 - 120
			Dissolved Bismuth (Bi)	2020/09/22		91	%	80 - 120
			Dissolved Boron (B)	2020/09/22		96	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/22		99	%	80 - 120
			Dissolved Calcium (Ca)	2020/09/22		NC	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/22		94	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/22		94	%	80 - 120
			Dissolved Copper (Cu)	2020/09/22		93	%	80 - 120
			Dissolved Iron (Fe)	2020/09/22		99	%	80 - 120
			Dissolved Lead (Pb)	2020/09/22		95	%	80 - 120
			Dissolved Magnesium (Mg)	2020/09/22		99	%	80 - 120
			Dissolved Manganese (Mn)	2020/09/22		89	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/22		97	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/22		94	%	80 - 120
			Dissolved Phosphorus (P)	2020/09/22		104	%	80 - 120
			Dissolved Potassium (K)	2020/09/22		97	%	80 - 120
			Dissolved Selenium (Se)	2020/09/22		99	%	80 - 120
			Dissolved Silver (Ag)	2020/09/22		85	%	80 - 120
			Dissolved Sodium (Na)	2020/09/22		95	%	80 - 120
			Dissolved Strontium (Sr)	2020/09/22		98	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/22		96	%	80 - 120
			Dissolved Tin (Sn)	2020/09/22		101	%	80 - 120
			Dissolved Titanium (Ti)	2020/09/22		99	%	80 - 120
			Dissolved Uranium (U)	2020/09/22		103	%	80 - 120
			Dissolved Vanadium (V)	2020/09/22		98	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/22		97	%	80 - 120
6956815	BAN	Spiked Blank	Dissolved Aluminum (Al)	2020/09/22		100	%	80 - 120
			Dissolved Antimony (Sb)	2020/09/22		95	%	80 - 120
			Dissolved Arsenic (As)	2020/09/22		94	%	80 - 120
			Dissolved Barium (Ba)	2020/09/22		97	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/22		101	%	80 - 120
			Dissolved Bismuth (Bi)	2020/09/22		94	%	80 - 120
			Dissolved Boron (B)	2020/09/22		97	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/22		96	%	80 - 120
			Dissolved Calcium (Ca)	2020/09/22		91	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/22		94	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/22		94	%	80 - 120
			Dissolved Copper (Cu)	2020/09/22		93	%	80 - 120
			Dissolved Iron (Fe)	2020/09/22		99	%	80 - 120
			Dissolved Lead (Pb)	2020/09/22		95	%	80 - 120
			Dissolved Magnesium (Mg)	2020/09/22		101	%	80 - 120
			Dissolved Manganese (Mn)	2020/09/22		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/22		95	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/22		94	%	80 - 120
			Dissolved Phosphorus (P)	2020/09/22		103	%	80 - 120
			Dissolved Potassium (K)	2020/09/22		95	%	80 - 120
			Dissolved Selenium (Se)	2020/09/22		99	%	80 - 120
			Dissolved Silver (Ag)	2020/09/22		97	%	80 - 120
			Dissolved Sodium (Na)	2020/09/22		96	%	80 - 120
			Dissolved Strontium (Sr)	2020/09/22		99	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/22		96	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Tin (Sn)	2020/09/22		101	%	80 - 120
			Dissolved Titanium (Ti)	2020/09/22		99	%	80 - 120
			Dissolved Uranium (U)	2020/09/22		103	%	80 - 120
			Dissolved Vanadium (V)	2020/09/22		97	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/22		100	%	80 - 120
6956815	BAN	Method Blank	Dissolved Aluminum (Al)	2020/09/22	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2020/09/22	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2020/09/22	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2020/09/22	ND, RDL=1.0		ug/L	
			Dissolved Beryllium (Be)	2020/09/22	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/09/22	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2020/09/22	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2020/09/22	ND, RDL=0.010		ug/L	
			Dissolved Calcium (Ca)	2020/09/22	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2020/09/22	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2020/09/22	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2020/09/22	ND, RDL=0.50		ug/L	
			Dissolved Iron (Fe)	2020/09/22	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2020/09/22	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/09/22	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2020/09/22	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/09/22	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2020/09/22	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2020/09/22	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2020/09/22	ND, RDL=100		ug/L	
			Dissolved Selenium (Se)	2020/09/22	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2020/09/22	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2020/09/22	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2020/09/22	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2020/09/22	ND, RDL=0.10		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Tin (Sn)	2020/09/22	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2020/09/22	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2020/09/22	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2020/09/22	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2020/09/22	ND, RDL=5.0		ug/L	
6956815	BAN	RPD	Dissolved Aluminum (Al)	2020/09/22	0.50		%	20
			Dissolved Antimony (Sb)	2020/09/22	NC		%	20
			Dissolved Arsenic (As)	2020/09/22	2.2		%	20
			Dissolved Barium (Ba)	2020/09/22	0.090		%	20
			Dissolved Beryllium (Be)	2020/09/22	NC		%	20
			Dissolved Bismuth (Bi)	2020/09/22	NC		%	20
			Dissolved Boron (B)	2020/09/22	NC		%	20
			Dissolved Cadmium (Cd)	2020/09/22	1.0		%	20
			Dissolved Calcium (Ca)	2020/09/22	1.5		%	20
			Dissolved Chromium (Cr)	2020/09/22	NC		%	20
			Dissolved Cobalt (Co)	2020/09/22	NC		%	20
			Dissolved Copper (Cu)	2020/09/22	0.38		%	20
			Dissolved Iron (Fe)	2020/09/22	NC		%	20
			Dissolved Lead (Pb)	2020/09/22	NC		%	20
			Dissolved Magnesium (Mg)	2020/09/22	0.67		%	20
			Dissolved Manganese (Mn)	2020/09/22	1.5		%	20
			Dissolved Molybdenum (Mo)	2020/09/22	NC		%	20
			Dissolved Nickel (Ni)	2020/09/22	NC		%	20
			Dissolved Phosphorus (P)	2020/09/22	NC		%	20
			Dissolved Potassium (K)	2020/09/22	0.53		%	20
			Dissolved Selenium (Se)	2020/09/22	NC		%	20
			Dissolved Silver (Ag)	2020/09/22	NC		%	20
			Dissolved Sodium (Na)	2020/09/22	0.90		%	20
			Dissolved Strontium (Sr)	2020/09/22	3.3		%	20
			Dissolved Thallium (Tl)	2020/09/22	NC		%	20
			Dissolved Tin (Sn)	2020/09/22	NC		%	20
			Dissolved Titanium (Ti)	2020/09/22	NC		%	20
			Dissolved Uranium (U)	2020/09/22	1.4		%	20
			Dissolved Vanadium (V)	2020/09/22	NC		%	20
			Dissolved Zinc (Zn)	2020/09/22	2.5		%	20
6957137	SHW	QC Standard	Turbidity	2020/09/22		106	%	80 - 120
6957137	SHW	Spiked Blank	Turbidity	2020/09/22		100	%	80 - 120
6957137	SHW	Method Blank	Turbidity	2020/09/22	ND, RDL=0.10		NTU	
6957137	SHW	RPD [NRB495-01]	Turbidity	2020/09/22	NC		%	20
6957515	NHU	Matrix Spike	Total Mercury (Hg)	2020/09/23		103	%	80 - 120
6957515	NHU	Spiked Blank	Total Mercury (Hg)	2020/09/23		103	%	80 - 120
6957515	NHU	Method Blank	Total Mercury (Hg)	2020/09/23	ND, RDL=0.013		ug/L	
6957515	NHU	RPD	Total Mercury (Hg)	2020/09/23	NC		%	20
6957609	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/09/23		97	%	80 - 120
6957609	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/09/23		97	%	80 - 120
6957609	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/09/23	ND, RDL=0.050		mg/L	
6957609	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/09/23	5.9		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6959398	BAN	Matrix Spike	Dissolved Aluminum (Al)	2020/09/23		99	%	80 - 120
			Dissolved Antimony (Sb)	2020/09/23		96	%	80 - 120
			Dissolved Arsenic (As)	2020/09/23		94	%	80 - 120
			Dissolved Barium (Ba)	2020/09/23		93	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/23		100	%	80 - 120
			Dissolved Bismuth (Bi)	2020/09/23		97	%	80 - 120
			Dissolved Boron (B)	2020/09/23		96	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/23		96	%	80 - 120
			Dissolved Calcium (Ca)	2020/09/23		87	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/23		96	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/23		94	%	80 - 120
			Dissolved Copper (Cu)	2020/09/23		94	%	80 - 120
			Dissolved Iron (Fe)	2020/09/23		NC	%	80 - 120
			Dissolved Lead (Pb)	2020/09/23		96	%	80 - 120
			Dissolved Magnesium (Mg)	2020/09/23		102	%	80 - 120
			Dissolved Manganese (Mn)	2020/09/23		NC	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/23		99	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/23		97	%	80 - 120
			Dissolved Phosphorus (P)	2020/09/23		99	%	80 - 120
			Dissolved Potassium (K)	2020/09/23		100	%	80 - 120
			Dissolved Selenium (Se)	2020/09/23		97	%	80 - 120
			Dissolved Silver (Ag)	2020/09/23		92	%	80 - 120
			Dissolved Sodium (Na)	2020/09/23		96	%	80 - 120
			Dissolved Strontium (Sr)	2020/09/23		93	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/23		99	%	80 - 120
			Dissolved Tin (Sn)	2020/09/23		101	%	80 - 120
			Dissolved Titanium (Ti)	2020/09/23		97	%	80 - 120
			Dissolved Uranium (U)	2020/09/23		103	%	80 - 120
			Dissolved Vanadium (V)	2020/09/23		99	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/23		98	%	80 - 120
6959398	BAN	Spiked Blank	Dissolved Aluminum (Al)	2020/09/23		100	%	80 - 120
			Dissolved Antimony (Sb)	2020/09/23		93	%	80 - 120
			Dissolved Arsenic (As)	2020/09/23		92	%	80 - 120
			Dissolved Barium (Ba)	2020/09/23		94	%	80 - 120
			Dissolved Beryllium (Be)	2020/09/23		100	%	80 - 120
			Dissolved Bismuth (Bi)	2020/09/23		99	%	80 - 120
			Dissolved Boron (B)	2020/09/23		97	%	80 - 120
			Dissolved Cadmium (Cd)	2020/09/23		94	%	80 - 120
			Dissolved Calcium (Ca)	2020/09/23		91	%	80 - 120
			Dissolved Chromium (Cr)	2020/09/23		95	%	80 - 120
			Dissolved Cobalt (Co)	2020/09/23		93	%	80 - 120
			Dissolved Copper (Cu)	2020/09/23		94	%	80 - 120
			Dissolved Iron (Fe)	2020/09/23		100	%	80 - 120
			Dissolved Lead (Pb)	2020/09/23		95	%	80 - 120
			Dissolved Magnesium (Mg)	2020/09/23		102	%	80 - 120
			Dissolved Manganese (Mn)	2020/09/23		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/09/23		99	%	80 - 120
			Dissolved Nickel (Ni)	2020/09/23		97	%	80 - 120
			Dissolved Phosphorus (P)	2020/09/23		100	%	80 - 120
			Dissolved Potassium (K)	2020/09/23		100	%	80 - 120
			Dissolved Selenium (Se)	2020/09/23		94	%	80 - 120
			Dissolved Silver (Ag)	2020/09/23		94	%	80 - 120
			Dissolved Sodium (Na)	2020/09/23		99	%	80 - 120
			Dissolved Strontium (Sr)	2020/09/23		96	%	80 - 120
			Dissolved Thallium (Tl)	2020/09/23		99	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Tin (Sn)	2020/09/23		100	%	80 - 120
			Dissolved Titanium (Ti)	2020/09/23		98	%	80 - 120
			Dissolved Uranium (U)	2020/09/23		102	%	80 - 120
			Dissolved Vanadium (V)	2020/09/23		99	%	80 - 120
			Dissolved Zinc (Zn)	2020/09/23		99	%	80 - 120
6959398	BAN	Method Blank	Dissolved Aluminum (Al)	2020/09/23	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2020/09/23	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2020/09/23	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2020/09/23	ND, RDL=1.0		ug/L	
			Dissolved Beryllium (Be)	2020/09/23	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/09/23	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2020/09/23	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2020/09/23	ND, RDL=0.010		ug/L	
			Dissolved Calcium (Ca)	2020/09/23	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2020/09/23	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2020/09/23	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2020/09/23	ND, RDL=0.50		ug/L	
			Dissolved Iron (Fe)	2020/09/23	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2020/09/23	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/09/23	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2020/09/23	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/09/23	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2020/09/23	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2020/09/23	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2020/09/23	ND, RDL=100		ug/L	
			Dissolved Selenium (Se)	2020/09/23	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2020/09/23	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2020/09/23	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2020/09/23	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2020/09/23	ND, RDL=0.10		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Tin (Sn)	2020/09/23	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2020/09/23	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2020/09/23	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2020/09/23	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2020/09/23	ND, RDL=5.0		ug/L	
6959398	BAN	RPD	Dissolved Aluminum (Al)	2020/09/23	0.70		%	20
			Dissolved Antimony (Sb)	2020/09/23	NC		%	20
			Dissolved Arsenic (As)	2020/09/23	2.5		%	20
			Dissolved Barium (Ba)	2020/09/23	1.5		%	20
			Dissolved Beryllium (Be)	2020/09/23	NC		%	20
			Dissolved Bismuth (Bi)	2020/09/23	NC		%	20
			Dissolved Boron (B)	2020/09/23	NC		%	20
			Dissolved Cadmium (Cd)	2020/09/23	11		%	20
			Dissolved Calcium (Ca)	2020/09/23	0.042		%	20
			Dissolved Chromium (Cr)	2020/09/23	NC		%	20
			Dissolved Cobalt (Co)	2020/09/23	2.2		%	20
			Dissolved Copper (Cu)	2020/09/23	NC		%	20
			Dissolved Iron (Fe)	2020/09/23	0.92		%	20
			Dissolved Lead (Pb)	2020/09/23	NC		%	20
			Dissolved Magnesium (Mg)	2020/09/23	0.48		%	20
			Dissolved Manganese (Mn)	2020/09/23	0.74		%	20
			Dissolved Molybdenum (Mo)	2020/09/23	NC		%	20
			Dissolved Nickel (Ni)	2020/09/23	NC		%	20
			Dissolved Phosphorus (P)	2020/09/23	0.44		%	20
			Dissolved Potassium (K)	2020/09/23	1.9		%	20
			Dissolved Selenium (Se)	2020/09/23	NC		%	20
			Dissolved Silver (Ag)	2020/09/23	NC		%	20
			Dissolved Sodium (Na)	2020/09/23	1.3		%	20
			Dissolved Strontium (Sr)	2020/09/23	2.6		%	20
			Dissolved Thallium (Tl)	2020/09/23	NC		%	20
			Dissolved Tin (Sn)	2020/09/23	NC		%	20
			Dissolved Titanium (Ti)	2020/09/23	NC		%	20
			Dissolved Uranium (U)	2020/09/23	0.96		%	20
			Dissolved Vanadium (V)	2020/09/23	NC		%	20
			Dissolved Zinc (Zn)	2020/09/23	6.1		%	20
6959549	SHW	Spiked Blank	Conductivity	2020/09/23		102	%	80 - 120
6959549	SHW	Method Blank	Conductivity	2020/09/23	ND, RDL=1.0		uS/cm	
6959549	SHW	RPD	Conductivity	2020/09/23	0		%	10
6959551	SHW	Spiked Blank	pH	2020/09/23		100	%	97 - 103
6959551	SHW	RPD	pH	2020/09/23	0.68		%	N/A
6959552	SHW	Matrix Spike [NRB501-01]	Dissolved Fluoride (F-)	2020/09/23		97	%	80 - 120
6959552	SHW	Spiked Blank	Dissolved Fluoride (F-)	2020/09/23		105	%	80 - 120
6959552	SHW	Method Blank	Dissolved Fluoride (F-)	2020/09/23	ND, RDL=0.10		mg/L	
6959552	SHW	RPD	Dissolved Fluoride (F-)	2020/09/23	NC		%	20
6959557	SHW	Spiked Blank	Conductivity	2020/09/23		101	%	80 - 120
6959557	SHW	Method Blank	Conductivity	2020/09/23	ND, RDL=1.0		uS/cm	
6959557	SHW	RPD	Conductivity	2020/09/23	NC		%	10

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6959559	SHW	Spiked Blank	pH	2020/09/23		100	%	97 - 103
6959559	SHW	RPD	pH	2020/09/23	1.0		%	N/A
6959561	SHW	Matrix Spike	Dissolved Fluoride (F-)	2020/09/23		96	%	80 - 120
6959561	SHW	Spiked Blank	Dissolved Fluoride (F-)	2020/09/23		100	%	80 - 120
6959561	SHW	Method Blank	Dissolved Fluoride (F-)	2020/09/23	ND, RDL=0.10		mg/L	
6959561	SHW	RPD	Dissolved Fluoride (F-)	2020/09/23	NC		%	20
6960138	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2020/09/24		NC	%	80 - 120
6960138	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/09/24		106	%	80 - 120
6960138	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/09/24	ND, RDL=5.0		mg/L	
6960138	EMT	RPD	Total Alkalinity (Total as CaCO3)	2020/09/24	7.9		%	20
6960149	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2020/09/24		NC	%	80 - 120
6960149	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/09/23		97	%	80 - 120
6960149	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/09/23	ND, RDL=1.0		mg/L	
6960149	EMT	RPD	Dissolved Chloride (Cl-)	2020/09/24	0.87		%	20
6960153	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2020/09/23		102	%	80 - 120
6960153	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/09/23		108	%	80 - 120
6960153	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/09/23	ND, RDL=2.0		mg/L	
6960153	EMT	RPD	Dissolved Sulphate (SO4)	2020/09/23	0.99		%	20
6960154	EMT	Matrix Spike	Reactive Silica (SiO2)	2020/09/23		60 (1)	%	80 - 120
6960154	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/09/23		102	%	80 - 120
6960154	EMT	Method Blank	Reactive Silica (SiO2)	2020/09/23	ND, RDL=0.50		mg/L	
6960154	EMT	RPD	Reactive Silica (SiO2)	2020/09/23	7.3		%	20
6960163	EMT	Spiked Blank	Colour	2020/09/24		94	%	80 - 120
6960163	EMT	Method Blank	Colour	2020/09/24	ND, RDL=5.0		TCU	
6960163	EMT	RPD	Colour	2020/09/24	2.9		%	20
6960165	EMT	Matrix Spike	Orthophosphate (P)	2020/09/24		116	%	80 - 120
6960165	EMT	Spiked Blank	Orthophosphate (P)	2020/09/24		94	%	80 - 120
6960165	EMT	Method Blank	Orthophosphate (P)	2020/09/24	ND, RDL=0.010		mg/L	
6960165	EMT	RPD	Orthophosphate (P)	2020/09/24	5.4		%	20
6960166	EMT	Matrix Spike	Nitrate + Nitrite (N)	2020/09/24		NC	%	80 - 120
6960166	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/09/23		101	%	80 - 120
6960166	EMT	Method Blank	Nitrate + Nitrite (N)	2020/09/23	ND, RDL=0.050		mg/L	
6960166	EMT	RPD	Nitrate + Nitrite (N)	2020/09/24	1.6		%	20
6960168	EMT	Matrix Spike	Nitrite (N)	2020/09/24		NC	%	80 - 120
6960168	EMT	Spiked Blank	Nitrite (N)	2020/09/23		112	%	80 - 120
6960168	EMT	Method Blank	Nitrite (N)	2020/09/23	ND, RDL=0.010		mg/L	
6960168	EMT	RPD	Nitrite (N)	2020/09/24	0.59		%	20
6960180	EMT	Spiked Blank	Colour	2020/09/24		98	%	80 - 120
6960180	EMT	Method Blank	Colour	2020/09/24	ND, RDL=5.0		TCU	
6960180	EMT	RPD	Colour	2020/09/24	NC		%	20
6960195	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2020/09/24		93	%	80 - 120
6960195	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/09/24		114	%	80 - 120
6960195	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/09/24	5.0, RDL=5.0		mg/L	
6960195	EMT	RPD	Total Alkalinity (Total as CaCO3)	2020/09/24	0.76 (2)		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6960199	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2020/09/24		94	%	80 - 120
6960199	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/09/24		97	%	80 - 120
6960199	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/09/24	ND, RDL=1.0		mg/L	
6960199	EMT	RPD	Dissolved Chloride (Cl-)	2020/09/24	0.94		%	20
6960202	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2020/09/23		101	%	80 - 120
6960202	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/09/23		110	%	80 - 120
6960202	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/09/23	ND, RDL=2.0		mg/L	
6960202	EMT	RPD	Dissolved Sulphate (SO4)	2020/09/23	19		%	20
6960207	EMT	Matrix Spike	Reactive Silica (SiO2)	2020/09/23		NC	%	80 - 120
6960207	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/09/23		102	%	80 - 120
6960207	EMT	Method Blank	Reactive Silica (SiO2)	2020/09/23	ND, RDL=0.50		mg/L	
6960207	EMT	RPD	Reactive Silica (SiO2)	2020/09/23	2.5		%	20
6960215	EMT	Matrix Spike	Orthophosphate (P)	2020/09/24		120	%	80 - 120
6960215	EMT	Spiked Blank	Orthophosphate (P)	2020/09/24		99	%	80 - 120
6960215	EMT	Method Blank	Orthophosphate (P)	2020/09/24	ND, RDL=0.010		mg/L	
6960215	EMT	RPD	Orthophosphate (P)	2020/09/24	5.8		%	20
6960222	EMT	Matrix Spike	Nitrate + Nitrite (N)	2020/09/23		97	%	80 - 120
6960222	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/09/23		97	%	80 - 120
6960222	EMT	Method Blank	Nitrate + Nitrite (N)	2020/09/23	ND, RDL=0.050		mg/L	
6960222	EMT	RPD	Nitrate + Nitrite (N)	2020/09/23	NC		%	20
6960229	EMT	Matrix Spike	Nitrite (N)	2020/09/23		106	%	80 - 120
6960229	EMT	Spiked Blank	Nitrite (N)	2020/09/23		111	%	80 - 120
6960229	EMT	Method Blank	Nitrite (N)	2020/09/23	ND, RDL=0.010		mg/L	
6960229	EMT	RPD	Nitrite (N)	2020/09/23	NC		%	20
6960541	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/09/24		103	%	80 - 120
6960541	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/09/23		103	%	80 - 120
6960541	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/09/23	ND, RDL=0.050		mg/L	
6960541	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/09/23	NC		%	20
6962209	YLG	Matrix Spike	Total Organic Carbon (C)	2020/09/25		96	%	85 - 115
6962209	YLG	Spiked Blank	Total Organic Carbon (C)	2020/09/25		99	%	80 - 120
6962209	YLG	Method Blank	Total Organic Carbon (C)	2020/09/25	ND, RDL=0.50		mg/L	
6962209	YLG	RPD	Total Organic Carbon (C)	2020/09/25	5.6		%	15
6962214	YLG	Matrix Spike	Total Organic Carbon (C)	2020/09/25		108	%	85 - 115
6962214	YLG	Spiked Blank	Total Organic Carbon (C)	2020/09/25		97	%	80 - 120
6962214	YLG	Method Blank	Total Organic Carbon (C)	2020/09/25	ND, RDL=0.50		mg/L	
6962214	YLG	RPD	Total Organic Carbon (C)	2020/09/25	5.7		%	15
6962218	YLG	Matrix Spike	Total Organic Carbon (C)	2020/09/25		107	%	85 - 115
6962218	YLG	Spiked Blank	Total Organic Carbon (C)	2020/09/25		98	%	80 - 120
6962218	YLG	Method Blank	Total Organic Carbon (C)	2020/09/25	ND, RDL=0.50		mg/L	
6962218	YLG	RPD	Total Organic Carbon (C)	2020/09/25	3.8		%	15
6962292	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/09/24		98	%	80 - 120
6962292	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/09/24		100	%	80 - 120
6962292	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/09/24	ND, RDL=0.050		mg/L	
6962292	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/09/24	NC		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6962301	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/09/24		NC	%	80 - 120
6962301	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/09/24		99	%	80 - 120
6962301	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/09/24	ND, RDL=0.050		mg/L	
6962301	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/09/24	1.5		%	20
6962867	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2020/09/25		106	%	80 - 120
6962867	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/09/25		109	%	80 - 120
6962867	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/09/25	ND, RDL=5.0		mg/L	
6962867	EMT	RPD	Total Alkalinity (Total as CaCO3)	2020/09/25	NC		%	20
6962874	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2020/09/24		101	%	80 - 120
6962874	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/09/24		95	%	80 - 120
6962874	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/09/24	ND, RDL=1.0		mg/L	
6962874	EMT	RPD	Dissolved Chloride (Cl-)	2020/09/24	1.9		%	20
6962884	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2020/09/24		125 (3)	%	80 - 120
6962884	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/09/24		107	%	80 - 120
6962884	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/09/24	ND, RDL=2.0		mg/L	
6962884	EMT	RPD	Dissolved Sulphate (SO4)	2020/09/24	NC		%	20
6962894	EMT	Matrix Spike	Reactive Silica (SiO2)	2020/09/24		96	%	80 - 120
6962894	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/09/24		99	%	80 - 120
6962894	EMT	Method Blank	Reactive Silica (SiO2)	2020/09/24	ND, RDL=0.50		mg/L	
6962894	EMT	RPD	Reactive Silica (SiO2)	2020/09/24	0.0093		%	20
6962904	EMT	Spiked Blank	Colour	2020/09/25		96	%	80 - 120
6962904	EMT	Method Blank	Colour	2020/09/25	ND, RDL=5.0		TCU	
6962904	EMT	RPD	Colour	2020/09/25	0.24		%	20
6962905	EMT	Matrix Spike	Orthophosphate (P)	2020/09/25		85	%	80 - 120
6962905	EMT	Spiked Blank	Orthophosphate (P)	2020/09/25		98	%	80 - 120
6962905	EMT	Method Blank	Orthophosphate (P)	2020/09/25	ND, RDL=0.010		mg/L	
6962905	EMT	RPD	Orthophosphate (P)	2020/09/25	NC		%	20
6962906	EMT	Matrix Spike	Nitrate + Nitrite (N)	2020/09/24		107	%	80 - 120
6962906	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/09/24		108	%	80 - 120
6962906	EMT	Method Blank	Nitrate + Nitrite (N)	2020/09/24	ND, RDL=0.050		mg/L	
6962906	EMT	RPD	Nitrate + Nitrite (N)	2020/09/24	NC		%	20
6962908	EMT	Matrix Spike	Nitrite (N)	2020/09/24		80	%	80 - 120
6962908	EMT	Spiked Blank	Nitrite (N)	2020/09/25		109	%	80 - 120
6962908	EMT	Method Blank	Nitrite (N)	2020/09/24	ND, RDL=0.010		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6962908	EMT	RPD	Nitrite (N)	2020/09/24	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Poor spike recovery due to sample matrix.

(2) Elevated reporting limit due to method blank performance.

(3) Elevated spike recovery due to sample matrix.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

<Original signed by>

Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Your C.O.C. #: 791068-01-01, 791068-02-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2020/10/23
Report #: R6381433
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0R2041
Received: 2020/10/15, 10:12

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	12	N/A	2020/10/21	N/A	SM 23 4500-CO2 D
Alkalinity	12	N/A	2020/10/21	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	12	N/A	2020/10/21	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	12	N/A	2020/10/21	ATL SOP 00020	SM 23 2120C m
Conductance - water	12	N/A	2020/10/21	ATL SOP 00004	SM 23 2510B m
Fluoride	12	N/A	2020/10/21	ATL SOP 00043	SM 23 4500-F- C m
Hardness (calculated as CaCO3)	4	N/A	2020/10/21	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	8	N/A	2020/10/22	ATL SOP 00048	Auto Calc
Mercury - Total (CVAA,LL)	12	2020/10/20	2020/10/21	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Diss. MS (as rec'd)	12	N/A	2020/10/21	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	12	N/A	2020/10/22	N/A	Auto Calc.
Anion and Cation Sum	12	N/A	2020/10/22	N/A	Auto Calc.
Nitrogen Ammonia - water	12	N/A	2020/10/21	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	12	N/A	2020/10/21	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	12	N/A	2020/10/21	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	12	N/A	2020/10/22	ATL SOP 00018	ASTM D3867-16
pH (1)	12	N/A	2020/10/21	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	12	N/A	2020/10/21	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2020/10/21	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 20C)	11	N/A	2020/10/22	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	1	N/A	2020/10/21	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	11	N/A	2020/10/22	ATL SOP 00049	Auto Calc.
Reactive Silica	12	N/A	2020/10/21	ATL SOP 00022	EPA 366.0 m
Sulphate	12	N/A	2020/10/21	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	12	N/A	2020/10/22	N/A	Auto Calc.
Organic carbon - Total (TOC) (2)	12	N/A	2020/10/21	ATL SOP 00203	SM 23 5310B m
Turbidity	12	N/A	2020/10/21	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

Your C.O.C. #: 791068-01-01, 791068-02-01

Attention: James Powel

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CANADA A0L 1K0

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CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0R2041
Received: 2020/10/15, 10:12

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(2) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key <Original signed by>
Sam Sherker
Project Manager Assistant
23 Oct 2020 12:12:10

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF450			NXF450			NXF451		
Sampling Date		2020/10/12			2020/10/12			2020/10/12		
COC Number		791068-01-01			791068-01-01			791068-01-01		
Sample #		M AQPOR			M AQPOR			M+L SED		
	UNITS	M AQPOR	RDL	QC Batch	M AQPOR Lab-Dup	RDL	QC Batch	M+L SED	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	1.10	N/A	7003751				1.16	N/A	7003751
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	47	1.0	7003747				57	1.0	7003747
Calculated TDS	mg/L	58	1.0	7003755				60	1.0	7003755
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7003747				ND	1.0	7003747
Cation Sum	me/L	1.01	N/A	7003751				1.10	N/A	7003751
Hardness (CaCO3)	mg/L	45	1.0	7003748				47	1.0	7003748
Ion Balance (% Difference)	%	4.27	N/A	7003750				2.65	N/A	7003750
Langelier Index (@ 20C)	N/A	-0.410		7003753				-0.414		7003753
Langelier Index (@ 4C)	N/A	-0.661		7003754				-0.666		7003754
Nitrate (N)	mg/L	ND	0.050	7004693				ND	0.050	7004693
Saturation pH (@ 20C)	N/A	8.44		7003753				8.40		7003753
Saturation pH (@ 4C)	N/A	8.69		7003754				8.65		7003754
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	48	5.0	7011590				58	5.0	7011590
Dissolved Chloride (Cl-)	mg/L	1.8	1.0	7011600				ND	1.0	7011600
Colour	TCU	ND	5.0	7011604				ND	5.0	7011604
Nitrate + Nitrite (N)	mg/L	ND	0.050	7011607				ND	0.050	7011607
Nitrite (N)	mg/L	ND	0.010	7011609				ND	0.010	7011609
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7012132	ND	0.050	7012132	0.053	0.050	7012132
Total Organic Carbon (C)	mg/L	0.61	0.50	7011721				0.95	0.50	7011721
Orthophosphate (P)	mg/L	ND	0.010	7011606				ND	0.010	7011606
pH	pH	8.03		7011446				7.98		7011446
Reactive Silica (SiO2)	mg/L	2.4	0.50	7011602				3.0	0.50	7011602
Dissolved Sulphate (SO4)	mg/L	4.7	2.0	7011601				ND	2.0	7011601
Turbidity	NTU	2.5	0.10	7011639				1.5	0.10	7011639
Conductivity	uS/cm	100	1.0	7011444				110	1.0	7011444
Metals										
Dissolved Aluminum (Al)	ug/L	94	5.0	7011579				80	5.0	7011579
Dissolved Antimony (Sb)	ug/L	ND	1.0	7011579				ND	1.0	7011579
Dissolved Arsenic (As)	ug/L	ND	1.0	7011579				ND	1.0	7011579
Dissolved Barium (Ba)	ug/L	2.4	1.0	7011579				2.2	1.0	7011579
Dissolved Beryllium (Be)	ug/L	ND	1.0	7011579				ND	1.0	7011579

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF450			NXF450			NXF451		
Sampling Date		2020/10/12			2020/10/12			2020/10/12		
COC Number		791068-01-01			791068-01-01			791068-01-01		
Sample #		M AQPOR			M AQPOR			M+L SED		
	UNITS	M AQPOR	RDL	QC Batch	M AQPOR Lab-Dup	RDL	QC Batch	M+L SED	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	2.0	7011579				ND	2.0	7011579
Dissolved Boron (B)	ug/L	ND	50	7011579				ND	50	7011579
Dissolved Cadmium (Cd)	ug/L	ND	0.010	7011579				ND	0.010	7011579
Dissolved Calcium (Ca)	ug/L	16000	100	7011579				15000	100	7011579
Dissolved Chromium (Cr)	ug/L	ND	1.0	7011579				ND	1.0	7011579
Dissolved Cobalt (Co)	ug/L	ND	0.40	7011579				ND	0.40	7011579
Dissolved Copper (Cu)	ug/L	0.53	0.50	7011579				0.86	0.50	7011579
Dissolved Iron (Fe)	ug/L	ND	50	7011579				ND	50	7011579
Dissolved Lead (Pb)	ug/L	ND	0.50	7011579				ND	0.50	7011579
Dissolved Magnesium (Mg)	ug/L	1300	100	7011579				2500	100	7011579
Dissolved Manganese (Mn)	ug/L	41	2.0	7011579				63	2.0	7011579
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	7011579				ND	2.0	7011579
Dissolved Nickel (Ni)	ug/L	ND	2.0	7011579				ND	2.0	7011579
Dissolved Phosphorus (P)	ug/L	ND	100	7011579				ND	100	7011579
Dissolved Potassium (K)	ug/L	980	100	7011579				3400	100	7011579
Dissolved Selenium (Se)	ug/L	ND	0.50	7011579				ND	0.50	7011579
Dissolved Silver (Ag)	ug/L	ND	0.10	7011579				ND	0.10	7011579
Dissolved Sodium (Na)	ug/L	1800	100	7011579				1800	100	7011579
Dissolved Strontium (Sr)	ug/L	50	2.0	7011579				89	2.0	7011579
Dissolved Thallium (Tl)	ug/L	ND	0.10	7011579				ND	0.10	7011579
Dissolved Tin (Sn)	ug/L	ND	2.0	7011579				ND	2.0	7011579
Dissolved Titanium (Ti)	ug/L	ND	2.0	7011579				ND	2.0	7011579
Dissolved Uranium (U)	ug/L	0.62	0.10	7011579				3.3	0.10	7011579
Dissolved Vanadium (V)	ug/L	ND	2.0	7011579				ND	2.0	7011579
Dissolved Zinc (Zn)	ug/L	ND	5.0	7011579				ND	5.0	7011579

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF452			NXF452			NXF453		
Sampling Date		2020/10/12			2020/10/12			2020/10/12		
COC Number		791068-01-01			791068-01-01			791068-01-01		
Sample #		M+L MD			M+L MD			M QE-POR		
	UNITS	**M+L MD**	**RDL**	**QC Batch**	**M+L MD Lab-Dup**	**RDL**	**QC Batch**	**M QE-POR**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	1.15	N/A	7003751				5.44	N/A	7003751
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	52	1.0	7003747				56	1.0	7003747
Calculated TDS	mg/L	57	1.0	7003755				340	1.0	7003755
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7003747				ND	1.0	7003747
Cation Sum	me/L	1.07	N/A	7003751				4.96	N/A	7003751
Hardness (CaCO3)	mg/L	51	1.0	7003748				240	1.0	7003748
Ion Balance (% Difference)	%	3.60	N/A	7003750				4.62	N/A	7003750
Langelier Index (@ 20C)	N/A	-0.388		7003753				0.183		7003753
Langelier Index (@ 4C)	N/A	-0.640		7003754				-0.0660		7003754
Nitrate (N)	mg/L	ND	0.050	7004693				ND	0.050	7004693
Saturation pH (@ 20C)	N/A	8.34		7003753				7.74		7003753
Saturation pH (@ 4C)	N/A	8.60		7003754				7.99		7003754
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	53	5.0	7011590	53	5.0	7011590	57	5.0	7011612
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7011600	ND	1.0	7011600	1.9	1.0	7011614
Colour	TCU	ND	5.0	7011604	ND	5.0	7011604	ND	5.0	7011618
Nitrate + Nitrite (N)	mg/L	ND	0.050	7011607	ND	0.050	7011607	ND	0.050	7011620
Nitrite (N)	mg/L	ND	0.010	7011609	ND	0.010	7011609	ND	0.010	7011626
Nitrogen (Ammonia Nitrogen)	mg/L	0.054	0.050	7012132				ND	0.050	7012132
Total Organic Carbon (C)	mg/L	ND	0.50	7011721				1.1	0.50	7011721
Orthophosphate (P)	mg/L	ND	0.010	7011606	ND	0.010	7011606	ND	0.010	7011619
pH	pH	7.96		7011446				7.92		7011446
Reactive Silica (SiO2)	mg/L	ND	0.50	7011602	1.2	0.50	7011602	3.5	0.50	7011617
Dissolved Sulphate (SO4)	mg/L	4.5	2.0	7011601	4.7	2.0	7011601	200	10	7011615
Turbidity	NTU	0.53	0.10	7011639				0.29	0.10	7011639
Conductivity	uS/cm	110	1.0	7011444				520	1.0	7011444
Metals										
Dissolved Aluminum (Al)	ug/L	130	5.0	7011897	130	5.0	7011897	61	5.0	7011897
Dissolved Antimony (Sb)	ug/L	ND	1.0	7011897	ND	1.0	7011897	1.1	1.0	7011897
Dissolved Arsenic (As)	ug/L	ND	1.0	7011897	ND	1.0	7011897	ND	1.0	7011897
Dissolved Barium (Ba)	ug/L	33	1.0	7011897	33	1.0	7011897	11	1.0	7011897
Dissolved Beryllium (Be)	ug/L	ND	1.0	7011897	ND	1.0	7011897	ND	1.0	7011897

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF452			NXF452			NXF453		
Sampling Date		2020/10/12			2020/10/12			2020/10/12		
COC Number		791068-01-01			791068-01-01			791068-01-01		
Sample #		M+L MD			M+L MD			M QE-POR		
	UNITS	M+L MD	RDL	QC Batch	M+L MD Lab-Dup	RDL	QC Batch	M QE-POR	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	2.0	7011897	ND	2.0	7011897	ND	2.0	7011897
Dissolved Boron (B)	ug/L	ND	50	7011897	ND	50	7011897	ND	50	7011897
Dissolved Cadmium (Cd)	ug/L	ND	0.010	7011897	ND	0.010	7011897	ND	0.010	7011897
Dissolved Calcium (Ca)	ug/L	18000	100	7011897	18000	100	7011897	88000	100	7011897
Dissolved Chromium (Cr)	ug/L	ND	1.0	7011897	ND	1.0	7011897	ND	1.0	7011897
Dissolved Cobalt (Co)	ug/L	ND	0.40	7011897	ND	0.40	7011897	ND	0.40	7011897
Dissolved Copper (Cu)	ug/L	0.67	0.50	7011897	0.64	0.50	7011897	0.84	0.50	7011897
Dissolved Iron (Fe)	ug/L	ND	50	7011897	ND	50	7011897	ND	50	7011897
Dissolved Lead (Pb)	ug/L	ND	0.50	7011897	ND	0.50	7011897	ND	0.50	7011897
Dissolved Magnesium (Mg)	ug/L	1600	100	7011897	1600	100	7011897	3900	100	7011897
Dissolved Manganese (Mn)	ug/L	44	2.0	7011897	44	2.0	7011897	32	2.0	7011897
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	7011897	ND	2.0	7011897	ND	2.0	7011897
Dissolved Nickel (Ni)	ug/L	ND	2.0	7011897	ND	2.0	7011897	ND	2.0	7011897
Dissolved Phosphorus (P)	ug/L	ND	100	7011897	ND	100	7011897	ND	100	7011897
Dissolved Potassium (K)	ug/L	490	100	7011897	490	100	7011897	2200	100	7011897
Dissolved Selenium (Se)	ug/L	ND	0.50	7011897	ND	0.50	7011897	ND	0.50	7011897
Dissolved Silver (Ag)	ug/L	ND	0.10	7011897	ND	0.10	7011897	ND	0.10	7011897
Dissolved Sodium (Na)	ug/L	750	100	7011897	740	100	7011897	4500	100	7011897
Dissolved Strontium (Sr)	ug/L	73	2.0	7011897	70	2.0	7011897	290	2.0	7011897
Dissolved Thallium (Tl)	ug/L	ND	0.10	7011897	ND	0.10	7011897	ND	0.10	7011897
Dissolved Tin (Sn)	ug/L	ND	2.0	7011897	ND	2.0	7011897	ND	2.0	7011897
Dissolved Titanium (Ti)	ug/L	ND	2.0	7011897	ND	2.0	7011897	ND	2.0	7011897
Dissolved Uranium (U)	ug/L	0.10	0.10	7011897	ND	0.10	7011897	1.4	0.10	7011897
Dissolved Vanadium (V)	ug/L	ND	2.0	7011897	ND	2.0	7011897	ND	2.0	7011897
Dissolved Zinc (Zn)	ug/L	ND	5.0	7011897	ND	5.0	7011897	ND	5.0	7011897

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF453			NXF454		NXF455		
Sampling Date		2020/10/12			2020/10/12		2020/10/12		
COC Number		791068-01-01			791068-01-01		791068-01-01		
Sample #		M QE-POR			M QZ-QE-POR-QTP-MIN		SZ+V QE-POR		
	UNITS	M QE-POR Lab-Dup	RDL	QC Batch	M QZ-QE-POR-QTP-MIN	QC Batch	SZ+V QE-POR	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L				0.930	7003751	1.25	N/A	7003751
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				41	7003747	54	1.0	7003747
Calculated TDS	mg/L				47	7003755	65	1.0	7003755
Carb. Alkalinity (calc. as CaCO3)	mg/L				ND	7003747	ND	1.0	7003747
Cation Sum	me/L				0.830	7003751	1.14	N/A	7003751
Hardness (CaCO3)	mg/L				37	7003748	49	1.0	7004731
Ion Balance (% Difference)	%				5.68	7003750	4.60	N/A	7003750
Langelier Index (@ 20C)	N/A				-0.695	7003753	-0.386		7003753
Langelier Index (@ 4C)	N/A				-0.947	7003754	-0.637		7003754
Nitrate (N)	mg/L				ND	7004693	ND	0.050	7004693
Saturation pH (@ 20C)	N/A				8.56	7003753	8.37		7003753
Saturation pH (@ 4C)	N/A				8.81	7003754	8.62		7003754
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	57	5.0	7011612	41	7011590	54	5.0	7011590
Dissolved Chloride (Cl-)	mg/L	2.1	1.0	7011614	1.9	7011600	1.9	1.0	7011600
Colour	TCU	ND	5.0	7011618	ND	7011604	ND	5.0	7011604
Nitrate + Nitrite (N)	mg/L	0.085	0.050	7011620	ND	7011607	ND	0.050	7011607
Nitrite (N)	mg/L	ND	0.010	7011626	ND	7011609	ND	0.010	7011609
Nitrogen (Ammonia Nitrogen)	mg/L				0.070	7012132	0.052	0.050	7012132
Total Organic Carbon (C)	mg/L				0.82	7011721	0.69	0.50	7011721
Orthophosphate (P)	mg/L	ND	0.010	7011619	ND	7011606	ND	0.010	7011606
pH	pH				7.87	7011446	7.98		7011446
Reactive Silica (SiO2)	mg/L	3.1	0.50	7011617	1.3	7011602	3.3	0.50	7011602
Dissolved Sulphate (SO4)	mg/L	210	10	7011615	2.4	7011601	4.9	2.0	7011601
Turbidity	NTU				1.4	7011639	1.5	0.10	7011639
Conductivity	uS/cm				84	7011444	110	1.0	7011444
Metals									
Dissolved Aluminum (Al)	ug/L				120	7011897	100	5.0	7011897
Dissolved Antimony (Sb)	ug/L				ND	7011897	ND	1.0	7011897
Dissolved Arsenic (As)	ug/L				ND	7011897	ND	1.0	7011897
Dissolved Barium (Ba)	ug/L				3.1	7011897	1.5	1.0	7011897
Dissolved Beryllium (Be)	ug/L				ND	7011897	ND	1.0	7011897

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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF453			NXF454		NXF455		
Sampling Date		2020/10/12			2020/10/12		2020/10/12		
COC Number		791068-01-01			791068-01-01		791068-01-01		
Sample #		M QE-POR			M QZ-QE-POR-QTP-MIN		SZ+V QE-POR		
	UNITS	M QE-POR Lab-Dup	RDL	QC Batch	M QZ-QE-POR-QTP-MIN	QC Batch	SZ+V QE-POR	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L				ND	7011897	ND	2.0	7011897
Dissolved Boron (B)	ug/L				ND	7011897	ND	50	7011897
Dissolved Cadmium (Cd)	ug/L				ND	7011897	ND	0.010	7011897
Dissolved Calcium (Ca)	ug/L				14000	7011897	17000	100	7011897
Dissolved Chromium (Cr)	ug/L				ND	7011897	ND	1.0	7011897
Dissolved Cobalt (Co)	ug/L				ND	7011897	ND	0.40	7011897
Dissolved Copper (Cu)	ug/L				0.74	7011897	0.86	0.50	7011897
Dissolved Iron (Fe)	ug/L				ND	7011897	ND	50	7011897
Dissolved Lead (Pb)	ug/L				ND	7011897	ND	0.50	7011897
Dissolved Magnesium (Mg)	ug/L				790	7011897	1800	100	7011897
Dissolved Manganese (Mn)	ug/L				32	7011897	21	2.0	7011897
Dissolved Molybdenum (Mo)	ug/L				ND	7011897	ND	2.0	7011897
Dissolved Nickel (Ni)	ug/L				ND	7011897	ND	2.0	7011897
Dissolved Phosphorus (P)	ug/L				ND	7011897	ND	100	7011897
Dissolved Potassium (K)	ug/L				730	7011897	1300	100	7011897
Dissolved Selenium (Se)	ug/L				ND	7011897	ND	0.50	7011897
Dissolved Silver (Ag)	ug/L				ND	7011897	ND	0.10	7011897
Dissolved Sodium (Na)	ug/L				1600	7011897	2700	100	7011897
Dissolved Strontium (Sr)	ug/L				44	7011897	25	2.0	7011897
Dissolved Thallium (Tl)	ug/L				ND	7011897	ND	0.10	7011897
Dissolved Tin (Sn)	ug/L				ND	7011897	ND	2.0	7011897
Dissolved Titanium (Ti)	ug/L				ND	7011897	ND	2.0	7011897
Dissolved Uranium (U)	ug/L				0.38	7011897	0.53	0.10	7011897
Dissolved Vanadium (V)	ug/L				ND	7011897	ND	2.0	7011897
Dissolved Zinc (Zn)	ug/L				ND	7011897	ND	5.0	7011897

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF456	NXF457	NXF458	NXF459		
Sampling Date		2020/10/12	2020/10/12	2020/10/12	2020/10/12		
COC Number		791068-01-01	791068-01-01	791068-01-01	791068-01-01		
Sample #		L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
Calculated Parameters							
Anion Sum	me/L	0.990	1.38	0.800	1.96	N/A	7003751
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	47	60	35	70	1.0	7003747
Calculated TDS	mg/L	49	73	39	110	1.0	7003755
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	ND	ND	ND	1.0	7003747
Cation Sum	me/L	0.900	1.26	0.720	1.75	N/A	7003751
Hardness (CaCO3)	mg/L	42	54	33	68	1.0	7004731
Ion Balance (% Difference)	%	4.76	4.55	5.26	5.66	N/A	7003750
Langelier Index (@ 20C)	N/A	-0.574	-0.265	-0.895	-0.188		7003753
Langelier Index (@ 4C)	N/A	-0.826	-0.515	-1.15	-0.439		7003754
Nitrate (N)	mg/L	ND	ND	ND	ND	0.050	7004693
Saturation pH (@ 20C)	N/A	8.46	8.30	8.69	8.18		7003753
Saturation pH (@ 4C)	N/A	8.71	8.55	8.94	8.43		7003754
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	47	60	36	70	5.0	7011590
Dissolved Chloride (Cl-)	mg/L	ND	2.0	1.2	1.3	1.0	7011600
Colour	TCU	ND	ND	ND	ND	5.0	7011604
Nitrate + Nitrite (N)	mg/L	ND	ND	ND	ND	0.050	7011607
Nitrite (N)	mg/L	ND	ND	ND	ND	0.010	7011609
Nitrogen (Ammonia Nitrogen)	mg/L	ND	ND	ND	0.050	0.050	7012132
Total Organic Carbon (C)	mg/L	0.63	1.0	0.90	0.98	0.50	7011721
Orthophosphate (P)	mg/L	ND	ND	ND	ND	0.010	7011606
pH	pH	7.89	8.03	7.79	7.99		7011446
Reactive Silica (SiO2)	mg/L	0.62	3.1	ND	5.2	0.50	7011602
Dissolved Sulphate (SO4)	mg/L	2.1	5.6	2.5	25	2.0	7011601
Turbidity	NTU	0.87	1.3	1.2	0.26	0.10	7011639
Conductivity	uS/cm	89	130	73	180	1.0	7011444
Metals							
Dissolved Aluminum (Al)	ug/L	130	120	87	100	5.0	7011897
Dissolved Antimony (Sb)	ug/L	ND	ND	ND	1.9	1.0	7011897
Dissolved Arsenic (As)	ug/L	ND	ND	ND	1.2	1.0	7011897
Dissolved Barium (Ba)	ug/L	3.8	39	ND	12	1.0	7011897
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	1.0	7011897
Dissolved Bismuth (Bi)	ug/L	ND	ND	ND	ND	2.0	7011897

RDL = Reportable Detection Limit
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N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF456	NXF457	NXF458	NXF459		
Sampling Date		2020/10/12	2020/10/12	2020/10/12	2020/10/12		
COC Number		791068-01-01	791068-01-01	791068-01-01	791068-01-01		
Sample #		L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
Dissolved Boron (B)	ug/L	ND	ND	ND	ND	50	7011897
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	0.010	7011897
Dissolved Calcium (Ca)	ug/L	15000	18000	12000	21000	100	7011897
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	1.0	7011897
Dissolved Cobalt (Co)	ug/L	ND	ND	ND	ND	0.40	7011897
Dissolved Copper (Cu)	ug/L	0.85	1.0	1.4	0.51	0.50	7011897
Dissolved Iron (Fe)	ug/L	ND	ND	ND	ND	50	7011897
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	0.50	7011897
Dissolved Magnesium (Mg)	ug/L	1200	2200	910	3800	100	7011897
Dissolved Manganese (Mn)	ug/L	58	16	40	39	2.0	7011897
Dissolved Molybdenum (Mo)	ug/L	ND	ND	ND	7.3	2.0	7011897
Dissolved Nickel (Ni)	ug/L	ND	ND	ND	ND	2.0	7011897
Dissolved Phosphorus (P)	ug/L	ND	ND	ND	ND	100	7011897
Dissolved Potassium (K)	ug/L	870	3200	440	1900	100	7011897
Dissolved Selenium (Se)	ug/L	ND	ND	ND	ND	0.50	7011897
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	0.10	7011897
Dissolved Sodium (Na)	ug/L	790	2300	1200	7800	100	7011897
Dissolved Strontium (Sr)	ug/L	75	180	18	66	2.0	7011897
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	ND	0.10	7011897
Dissolved Tin (Sn)	ug/L	ND	ND	ND	ND	2.0	7011897
Dissolved Titanium (Ti)	ug/L	ND	ND	ND	ND	2.0	7011897
Dissolved Uranium (U)	ug/L	0.39	1.4	0.20	0.64	0.10	7011897
Dissolved Vanadium (V)	ug/L	ND	ND	ND	ND	2.0	7011897
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	5.0	7011897

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF460	NXF461		
Sampling Date		2020/10/12	2020/10/12		
COC Number		791068-02-01	791068-02-01		
Sample #		LEP HL	FLBK		
	UNITS	Lep HL	FLBK	RDL	QC Batch
Calculated Parameters					
Anion Sum	me/L	1.83	0.0800	N/A	7004733
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	83	ND	1.0	7004730
Calculated TDS	mg/L	95	5.0	1.0	7004736
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	ND	1.0	7004730
Cation Sum	me/L	1.73	0.0700	N/A	7004733
Hardness (CaCO3)	mg/L	70	1.3	1.0	7004731
Ion Balance (% Difference)	%	2.81	6.67	N/A	7004732
Langelier Index (@ 20C)	N/A	-0.0670	NC		7004734
Langelier Index (@ 4C)	N/A	-0.318	NC		7004735
Nitrate (N)	mg/L	0.053	0.058	0.050	7004693
Saturation pH (@ 20C)	N/A	8.16	NC		7004734
Saturation pH (@ 4C)	N/A	8.41	NC		7004735
Inorganics					
Total Alkalinity (Total as CaCO3)	mg/L	84	ND	5.0	7011590
Dissolved Chloride (Cl-)	mg/L	ND	2.8	1.0	7011600
Colour	TCU	ND	ND	5.0	7011604
Nitrate + Nitrite (N)	mg/L	0.053	0.058	0.050	7011607
Nitrite (N)	mg/L	ND	ND	0.010	7011609
Nitrogen (Ammonia Nitrogen)	mg/L	ND	ND	0.050	7012132
Total Organic Carbon (C)	mg/L	0.72	2.5	0.50	7011721
Orthophosphate (P)	mg/L	ND	ND	0.010	7011606
pH	pH	8.09	6.37		7011446
Reactive Silica (SiO2)	mg/L	4.3	ND	0.50	7011602
Dissolved Sulphate (SO4)	mg/L	7.3	ND	2.0	7011601
Turbidity	NTU	0.21	0.56	0.10	7011639
Conductivity	uS/cm	160	8.5	1.0	7011444
Metals					
Dissolved Aluminum (Al)	ug/L	110	ND	5.0	7011579
Dissolved Antimony (Sb)	ug/L	1.5	ND	1.0	7011579
Dissolved Arsenic (As)	ug/L	ND	ND	1.0	7011579
Dissolved Barium (Ba)	ug/L	6.2	1.4	1.0	7011579
Dissolved Beryllium (Be)	ug/L	ND	ND	1.0	7011579
Dissolved Bismuth (Bi)	ug/L	ND	ND	2.0	7011579

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		NXF460	NXF461		
Sampling Date		2020/10/12	2020/10/12		
COC Number		791068-02-01	791068-02-01		
Sample #		LEP HL	FLBK		
	UNITS	Lep HL	FLBK	RDL	QC Batch
Dissolved Boron (B)	ug/L	ND	ND	50	7011579
Dissolved Cadmium (Cd)	ug/L	ND	0.014	0.010	7011579
Dissolved Calcium (Ca)	ug/L	18000	290	100	7011579
Dissolved Chromium (Cr)	ug/L	ND	ND	1.0	7011579
Dissolved Cobalt (Co)	ug/L	ND	ND	0.40	7011579
Dissolved Copper (Cu)	ug/L	ND	0.60	0.50	7011579
Dissolved Iron (Fe)	ug/L	ND	ND	50	7011579
Dissolved Lead (Pb)	ug/L	ND	ND	0.50	7011579
Dissolved Magnesium (Mg)	ug/L	6000	150	100	7011579
Dissolved Manganese (Mn)	ug/L	26	10	2.0	7011579
Dissolved Molybdenum (Mo)	ug/L	ND	ND	2.0	7011579
Dissolved Nickel (Ni)	ug/L	ND	ND	2.0	7011579
Dissolved Phosphorus (P)	ug/L	ND	ND	100	7011579
Dissolved Potassium (K)	ug/L	2600	110	100	7011579
Dissolved Selenium (Se)	ug/L	ND	ND	0.50	7011579
Dissolved Silver (Ag)	ug/L	ND	ND	0.10	7011579
Dissolved Sodium (Na)	ug/L	6100	990	100	7011579
Dissolved Strontium (Sr)	ug/L	130	ND	2.0	7011579
Dissolved Thallium (Tl)	ug/L	ND	ND	0.10	7011579
Dissolved Tin (Sn)	ug/L	ND	ND	2.0	7011579
Dissolved Titanium (Ti)	ug/L	ND	ND	2.0	7011579
Dissolved Uranium (U)	ug/L	3.6	ND	0.10	7011579
Dissolved Vanadium (V)	ug/L	ND	ND	2.0	7011579
Dissolved Zinc (Zn)	ug/L	ND	6.7	5.0	7011579

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RESULTS OF ANALYSES OF WATER

BV Labs ID		NXF450	NXF451	NXF452	NXF453	NXF454		
Sampling Date		2020/10/12	2020/10/12	2020/10/12	2020/10/12	2020/10/12		
COC Number		791068-01-01	791068-01-01	791068-01-01	791068-01-01	791068-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Inorganics								
Dissolved Fluoride (F-)	mg/L	ND	ND	ND	ND	ND	0.10	7011447

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		NXF455	NXF456	NXF457	NXF458	NXF459	NXF460		
Sampling Date		2020/10/12	2020/10/12	2020/10/12	2020/10/12	2020/10/12	2020/10/12		
COC Number		791068-01-01	791068-01-01	791068-01-01	791068-01-01	791068-01-01	791068-02-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL	LEP HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**Lep HL**	**RDL**	**QC Batch**
Inorganics									
Dissolved Fluoride (F-)	mg/L	ND	ND	ND	ND	ND	ND	0.10	7011447

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		NXF461		
Sampling Date		2020/10/12		
COC Number		791068-02-01		
Sample #		FLBK		
	UNITS	**FLBK**	**RDL**	**QC Batch**
Inorganics				
Dissolved Fluoride (F-)	mg/L	ND	0.10	7011447

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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MERCURY BY COLD VAPOUR AA (WATER)

BV Labs ID		NXF450	NXF451	NXF452	NXF453	NXF454		
Sampling Date		2020/10/12	2020/10/12	2020/10/12	2020/10/12	2020/10/12		
COC Number		791068-01-01	791068-01-01	791068-01-01	791068-01-01	791068-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Metals								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.013	7009338

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		NXF455	NXF456	NXF457	NXF458	NXF459		
Sampling Date		2020/10/12	2020/10/12	2020/10/12	2020/10/12	2020/10/12		
COC Number		791068-01-01	791068-01-01	791068-01-01	791068-01-01	791068-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
Metals								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.013	7009338

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		NXF460	NXF461		
Sampling Date		2020/10/12	2020/10/12		
COC Number		791068-02-01	791068-02-01		
Sample #		LEP HL	FLBK		
	UNITS	**Lep HL**	**FLBK**	**RDL**	**QC Batch**
Metals					
Total Mercury (Hg)	ug/L	ND	ND	0.013	7009338

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.7°C

Sample NXF454 [M QZ-QE-POR-QTP-MIN] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample NXF458 [V QE-POR-QTP] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample NXF459 [Mar HL] : Poor RCAp Ion Balance due to sample matrix.

Sample NXF461 [FLBK] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7009338	NHU	Matrix Spike	Total Mercury (Hg)	2020/10/21		101	%	80 - 120
7009338	NHU	Spiked Blank	Total Mercury (Hg)	2020/10/21		98	%	80 - 120
7009338	NHU	Method Blank	Total Mercury (Hg)	2020/10/21	ND, RDL=0.013		ug/L	
7009338	NHU	RPD	Total Mercury (Hg)	2020/10/21	NC		%	20
7011444	SHW	Spiked Blank	Conductivity	2020/10/21		104	%	80 - 120
7011444	SHW	Method Blank	Conductivity	2020/10/21	ND, RDL=1.0		uS/cm	
7011444	SHW	RPD	Conductivity	2020/10/21	0.60		%	10
7011446	SHW	Spiked Blank	pH	2020/10/21		101	%	97 - 103
7011446	SHW	RPD	pH	2020/10/21	0.74		%	N/A
7011447	SHW	Matrix Spike [NXF453-01]	Dissolved Fluoride (F-)	2020/10/21		99	%	80 - 120
7011447	SHW	Spiked Blank	Dissolved Fluoride (F-)	2020/10/21		105	%	80 - 120
7011447	SHW	Method Blank	Dissolved Fluoride (F-)	2020/10/21	ND, RDL=0.10		mg/L	
7011447	SHW	RPD	Dissolved Fluoride (F-)	2020/10/21	0.54		%	20
7011579	MLB	Matrix Spike	Dissolved Aluminum (Al)	2020/10/21		94	%	80 - 120
			Dissolved Antimony (Sb)	2020/10/21		91	%	80 - 120
			Dissolved Arsenic (As)	2020/10/21		97	%	80 - 120
			Dissolved Barium (Ba)	2020/10/21		NC	%	80 - 120
			Dissolved Beryllium (Be)	2020/10/21		99	%	80 - 120
			Dissolved Bismuth (Bi)	2020/10/21		95	%	80 - 120
			Dissolved Boron (B)	2020/10/21		97	%	80 - 120
			Dissolved Cadmium (Cd)	2020/10/21		96	%	80 - 120
			Dissolved Calcium (Ca)	2020/10/21		NC	%	80 - 120
			Dissolved Chromium (Cr)	2020/10/21		96	%	80 - 120
			Dissolved Cobalt (Co)	2020/10/21		96	%	80 - 120
			Dissolved Copper (Cu)	2020/10/21		96	%	80 - 120
			Dissolved Iron (Fe)	2020/10/21		93	%	80 - 120
			Dissolved Lead (Pb)	2020/10/21		95	%	80 - 120
			Dissolved Magnesium (Mg)	2020/10/21		95	%	80 - 120
			Dissolved Manganese (Mn)	2020/10/21		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/10/21		100	%	80 - 120
			Dissolved Nickel (Ni)	2020/10/21		97	%	80 - 120
			Dissolved Phosphorus (P)	2020/10/21		101	%	80 - 120
			Dissolved Potassium (K)	2020/10/21		97	%	80 - 120
			Dissolved Selenium (Se)	2020/10/21		98	%	80 - 120
			Dissolved Silver (Ag)	2020/10/21		93	%	80 - 120
			Dissolved Sodium (Na)	2020/10/21		93	%	80 - 120
			Dissolved Strontium (Sr)	2020/10/21		NC	%	80 - 120
			Dissolved Thallium (Tl)	2020/10/21		97	%	80 - 120
			Dissolved Tin (Sn)	2020/10/21		98	%	80 - 120
			Dissolved Titanium (Ti)	2020/10/21		100	%	80 - 120
			Dissolved Uranium (U)	2020/10/21		103	%	80 - 120
			Dissolved Vanadium (V)	2020/10/21		97	%	80 - 120
			Dissolved Zinc (Zn)	2020/10/21		98	%	80 - 120
7011579	MLB	Spiked Blank	Dissolved Aluminum (Al)	2020/10/21		98	%	80 - 120
			Dissolved Antimony (Sb)	2020/10/21		92	%	80 - 120
			Dissolved Arsenic (As)	2020/10/21		96	%	80 - 120
			Dissolved Barium (Ba)	2020/10/21		96	%	80 - 120
			Dissolved Beryllium (Be)	2020/10/21		99	%	80 - 120
			Dissolved Bismuth (Bi)	2020/10/21		98	%	80 - 120
			Dissolved Boron (B)	2020/10/21		99	%	80 - 120
			Dissolved Cadmium (Cd)	2020/10/21		96	%	80 - 120
			Dissolved Calcium (Ca)	2020/10/21		99	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Chromium (Cr)	2020/10/21		97	%	80 - 120
			Dissolved Cobalt (Co)	2020/10/21		98	%	80 - 120
			Dissolved Copper (Cu)	2020/10/21		99	%	80 - 120
			Dissolved Iron (Fe)	2020/10/21		100	%	80 - 120
			Dissolved Lead (Pb)	2020/10/21		98	%	80 - 120
			Dissolved Magnesium (Mg)	2020/10/21		102	%	80 - 120
			Dissolved Manganese (Mn)	2020/10/21		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/10/21		101	%	80 - 120
			Dissolved Nickel (Ni)	2020/10/21		100	%	80 - 120
			Dissolved Phosphorus (P)	2020/10/21		102	%	80 - 120
			Dissolved Potassium (K)	2020/10/21		101	%	80 - 120
			Dissolved Selenium (Se)	2020/10/21		98	%	80 - 120
			Dissolved Silver (Ag)	2020/10/21		95	%	80 - 120
			Dissolved Sodium (Na)	2020/10/21		98	%	80 - 120
			Dissolved Strontium (Sr)	2020/10/21		99	%	80 - 120
			Dissolved Thallium (Tl)	2020/10/21		100	%	80 - 120
			Dissolved Tin (Sn)	2020/10/21		97	%	80 - 120
			Dissolved Titanium (Ti)	2020/10/21		102	%	80 - 120
			Dissolved Uranium (U)	2020/10/21		104	%	80 - 120
			Dissolved Vanadium (V)	2020/10/21		98	%	80 - 120
			Dissolved Zinc (Zn)	2020/10/21		101	%	80 - 120
7011579	MLB	Method Blank	Dissolved Aluminum (Al)	2020/10/21	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Beryllium (Be)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2020/10/21	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2020/10/21	ND, RDL=0.010		ug/L	
			Dissolved Calcium (Ca)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2020/10/21	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2020/10/21	ND, RDL=0.50		ug/L	
			Dissolved Iron (Fe)	2020/10/21	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2020/10/21	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/10/21	ND, RDL=2.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Nickel (Ni)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Selenium (Se)	2020/10/21	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2020/10/21	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2020/10/21	ND, RDL=0.10		ug/L	
			Dissolved Tin (Sn)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2020/10/21	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2020/10/21	ND, RDL=5.0		ug/L	
7011579	MLB	RPD	Dissolved Aluminum (Al)	2020/10/21	NC		%	20
			Dissolved Antimony (Sb)	2020/10/21	NC		%	20
			Dissolved Arsenic (As)	2020/10/21	2.3		%	20
			Dissolved Barium (Ba)	2020/10/21	0.040		%	20
			Dissolved Beryllium (Be)	2020/10/21	NC		%	20
			Dissolved Bismuth (Bi)	2020/10/21	NC		%	20
			Dissolved Boron (B)	2020/10/21	NC		%	20
			Dissolved Cadmium (Cd)	2020/10/21	NC		%	20
			Dissolved Calcium (Ca)	2020/10/21	0.71		%	20
			Dissolved Chromium (Cr)	2020/10/21	NC		%	20
			Dissolved Cobalt (Co)	2020/10/21	NC		%	20
			Dissolved Copper (Cu)	2020/10/21	NC		%	20
			Dissolved Iron (Fe)	2020/10/21	0.58		%	20
			Dissolved Lead (Pb)	2020/10/21	NC		%	20
			Dissolved Magnesium (Mg)	2020/10/21	0.079		%	20
			Dissolved Manganese (Mn)	2020/10/21	1.1		%	20
			Dissolved Molybdenum (Mo)	2020/10/21	0.89		%	20
			Dissolved Nickel (Ni)	2020/10/21	NC		%	20
			Dissolved Phosphorus (P)	2020/10/21	NC		%	20
			Dissolved Potassium (K)	2020/10/21	0.26		%	20
			Dissolved Selenium (Se)	2020/10/21	NC		%	20
			Dissolved Silver (Ag)	2020/10/21	NC		%	20
			Dissolved Sodium (Na)	2020/10/21	0.0088		%	20
			Dissolved Strontium (Sr)	2020/10/21	0.21		%	20
			Dissolved Thallium (Tl)	2020/10/21	NC		%	20
			Dissolved Tin (Sn)	2020/10/21	NC		%	20
			Dissolved Titanium (Ti)	2020/10/21	NC		%	20
			Dissolved Uranium (U)	2020/10/21	2.1		%	20
			Dissolved Vanadium (V)	2020/10/21	NC		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Zinc (Zn)	2020/10/21	NC		%	20
7011590	MCN	Matrix Spike [NXF452-01]	Total Alkalinity (Total as CaCO3)	2020/10/21		NC	%	80 - 120
7011590	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/10/21		108	%	80 - 120
7011590	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2020/10/21	ND, RDL=5.0		mg/L	
7011590	MCN	RPD [NXF452-01]	Total Alkalinity (Total as CaCO3)	2020/10/21	0.71		%	20
7011600	MCN	Matrix Spike [NXF452-01]	Dissolved Chloride (Cl-)	2020/10/21		103	%	80 - 120
7011600	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2020/10/21		104	%	80 - 120
7011600	MCN	Method Blank	Dissolved Chloride (Cl-)	2020/10/21	ND, RDL=1.0		mg/L	
7011600	MCN	RPD [NXF452-01]	Dissolved Chloride (Cl-)	2020/10/21	NC		%	20
7011601	MCN	Matrix Spike [NXF452-01]	Dissolved Sulphate (SO4)	2020/10/21		111	%	80 - 120
7011601	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2020/10/21		110	%	80 - 120
7011601	MCN	Method Blank	Dissolved Sulphate (SO4)	2020/10/21	ND, RDL=2.0		mg/L	
7011601	MCN	RPD [NXF452-01]	Dissolved Sulphate (SO4)	2020/10/21	2.9		%	20
7011602	MCN	Matrix Spike [NXF452-01]	Reactive Silica (SiO2)	2020/10/21		103	%	80 - 120
7011602	MCN	Spiked Blank	Reactive Silica (SiO2)	2020/10/21		103	%	80 - 120
7011602	MCN	Method Blank	Reactive Silica (SiO2)	2020/10/21	ND, RDL=0.50		mg/L	
7011602	MCN	RPD [NXF452-01]	Reactive Silica (SiO2)	2020/10/22	NC		%	20
7011604	MCN	Spiked Blank	Colour	2020/10/21		96	%	80 - 120
7011604	MCN	Method Blank	Colour	2020/10/21	ND, RDL=5.0		TCU	
7011604	MCN	RPD [NXF452-01]	Colour	2020/10/21	NC		%	20
7011606	MCN	Matrix Spike [NXF452-01]	Orthophosphate (P)	2020/10/21		90	%	80 - 120
7011606	MCN	Spiked Blank	Orthophosphate (P)	2020/10/21		104	%	80 - 120
7011606	MCN	Method Blank	Orthophosphate (P)	2020/10/21	ND, RDL=0.010		mg/L	
7011606	MCN	RPD [NXF452-01]	Orthophosphate (P)	2020/10/21	NC		%	20
7011607	MCN	Matrix Spike [NXF452-01]	Nitrate + Nitrite (N)	2020/10/21		98	%	80 - 120
7011607	MCN	Spiked Blank	Nitrate + Nitrite (N)	2020/10/21		98	%	80 - 120
7011607	MCN	Method Blank	Nitrate + Nitrite (N)	2020/10/21	ND, RDL=0.050		mg/L	
7011607	MCN	RPD [NXF452-01]	Nitrate + Nitrite (N)	2020/10/21	NC		%	20
7011609	MCN	Matrix Spike [NXF452-01]	Nitrite (N)	2020/10/21		102	%	80 - 120
7011609	MCN	Spiked Blank	Nitrite (N)	2020/10/21		104	%	80 - 120
7011609	MCN	Method Blank	Nitrite (N)	2020/10/21	ND, RDL=0.010		mg/L	
7011609	MCN	RPD [NXF452-01]	Nitrite (N)	2020/10/21	NC		%	20
7011612	MCN	Matrix Spike [NXF453-01]	Total Alkalinity (Total as CaCO3)	2020/10/21		NC	%	80 - 120
7011612	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/10/21		106	%	80 - 120
7011612	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2020/10/21	ND, RDL=5.0		mg/L	
7011612	MCN	RPD [NXF453-01]	Total Alkalinity (Total as CaCO3)	2020/10/21	0.32		%	20
7011614	MCN	Matrix Spike [NXF453-01]	Dissolved Chloride (Cl-)	2020/10/21		102	%	80 - 120
7011614	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2020/10/21		101	%	80 - 120
7011614	MCN	Method Blank	Dissolved Chloride (Cl-)	2020/10/21	ND, RDL=1.0		mg/L	
7011614	MCN	RPD [NXF453-01]	Dissolved Chloride (Cl-)	2020/10/21	7.7		%	20
7011615	MCN	Matrix Spike [NXF453-01]	Dissolved Sulphate (SO4)	2020/10/21		NC	%	80 - 120
7011615	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2020/10/21		109	%	80 - 120
7011615	MCN	Method Blank	Dissolved Sulphate (SO4)	2020/10/21	ND, RDL=2.0		mg/L	
7011615	MCN	RPD [NXF453-01]	Dissolved Sulphate (SO4)	2020/10/21	2.2		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7011617	MCN	Matrix Spike [NXF453-01]	Reactive Silica (SiO2)	2020/10/21		78 (1)	%	80 - 120
7011617	MCN	Spiked Blank	Reactive Silica (SiO2)	2020/10/21		90	%	80 - 120
7011617	MCN	Method Blank	Reactive Silica (SiO2)	2020/10/22	ND, RDL=0.50		mg/L	
7011617	MCN	RPD [NXF453-01]	Reactive Silica (SiO2)	2020/10/21	13		%	20
7011618	MCN	Spiked Blank	Colour	2020/10/21		95	%	80 - 120
7011618	MCN	Method Blank	Colour	2020/10/21	ND, RDL=5.0		TCU	
7011618	MCN	RPD [NXF453-01]	Colour	2020/10/21	NC		%	20
7011619	MCN	Matrix Spike [NXF453-01]	Orthophosphate (P)	2020/10/21		88	%	80 - 120
7011619	MCN	Spiked Blank	Orthophosphate (P)	2020/10/21		102	%	80 - 120
7011619	MCN	Method Blank	Orthophosphate (P)	2020/10/21	ND, RDL=0.010		mg/L	
7011619	MCN	RPD [NXF453-01]	Orthophosphate (P)	2020/10/21	NC		%	20
7011620	MCN	Matrix Spike [NXF453-01]	Nitrate + Nitrite (N)	2020/10/21		104	%	80 - 120
7011620	MCN	Spiked Blank	Nitrate + Nitrite (N)	2020/10/21		105	%	80 - 120
7011620	MCN	Method Blank	Nitrate + Nitrite (N)	2020/10/21	ND, RDL=0.050		mg/L	
7011620	MCN	RPD [NXF453-01]	Nitrate + Nitrite (N)	2020/10/21	NC		%	20
7011626	MCN	Matrix Spike [NXF453-01]	Nitrite (N)	2020/10/21		86	%	80 - 120
7011626	MCN	Spiked Blank	Nitrite (N)	2020/10/21		105	%	80 - 120
7011626	MCN	Method Blank	Nitrite (N)	2020/10/21	ND, RDL=0.010		mg/L	
7011626	MCN	RPD [NXF453-01]	Nitrite (N)	2020/10/21	NC		%	20
7011639	SHW	QC Standard	Turbidity	2020/10/21		100	%	80 - 120
7011639	SHW	Spiked Blank	Turbidity	2020/10/21		93	%	80 - 120
7011639	SHW	Method Blank	Turbidity	2020/10/21	ND, RDL=0.10		NTU	
7011639	SHW	RPD	Turbidity	2020/10/21	NC		%	20
7011721	YLG	Matrix Spike	Total Organic Carbon (C)	2020/10/21		97	%	85 - 115
7011721	YLG	Spiked Blank	Total Organic Carbon (C)	2020/10/21		96	%	80 - 120
7011721	YLG	Method Blank	Total Organic Carbon (C)	2020/10/21	ND, RDL=0.50		mg/L	
7011721	YLG	RPD	Total Organic Carbon (C)	2020/10/21	NC		%	15
7011897	MLB	Matrix Spike [NXF452-02]	Dissolved Aluminum (Al)	2020/10/21		97	%	80 - 120
			Dissolved Antimony (Sb)	2020/10/21		96	%	80 - 120
			Dissolved Arsenic (As)	2020/10/21		96	%	80 - 120
			Dissolved Barium (Ba)	2020/10/21		95	%	80 - 120
			Dissolved Beryllium (Be)	2020/10/21		102	%	80 - 120
			Dissolved Bismuth (Bi)	2020/10/21		96	%	80 - 120
			Dissolved Boron (B)	2020/10/21		101	%	80 - 120
			Dissolved Cadmium (Cd)	2020/10/21		98	%	80 - 120
			Dissolved Calcium (Ca)	2020/10/21		96	%	80 - 120
			Dissolved Chromium (Cr)	2020/10/21		96	%	80 - 120
			Dissolved Cobalt (Co)	2020/10/21		98	%	80 - 120
			Dissolved Copper (Cu)	2020/10/21		94	%	80 - 120
			Dissolved Iron (Fe)	2020/10/21		99	%	80 - 120
			Dissolved Lead (Pb)	2020/10/21		98	%	80 - 120
			Dissolved Magnesium (Mg)	2020/10/21		101	%	80 - 120
			Dissolved Manganese (Mn)	2020/10/21		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/10/21		100	%	80 - 120
			Dissolved Nickel (Ni)	2020/10/21		97	%	80 - 120
			Dissolved Phosphorus (P)	2020/10/21		104	%	80 - 120
			Dissolved Potassium (K)	2020/10/21		96	%	80 - 120
			Dissolved Selenium (Se)	2020/10/21		97	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Silver (Ag)	2020/10/21		96	%	80 - 120
			Dissolved Sodium (Na)	2020/10/21		96	%	80 - 120
			Dissolved Strontium (Sr)	2020/10/21		93	%	80 - 120
			Dissolved Thallium (Tl)	2020/10/21		98	%	80 - 120
			Dissolved Tin (Sn)	2020/10/21		101	%	80 - 120
			Dissolved Titanium (Ti)	2020/10/21		98	%	80 - 120
			Dissolved Uranium (U)	2020/10/21		104	%	80 - 120
			Dissolved Vanadium (V)	2020/10/21		97	%	80 - 120
			Dissolved Zinc (Zn)	2020/10/21		101	%	80 - 120
7011897	MLB	Spiked Blank	Dissolved Aluminum (Al)	2020/10/21		99	%	80 - 120
			Dissolved Antimony (Sb)	2020/10/21		94	%	80 - 120
			Dissolved Arsenic (As)	2020/10/21		96	%	80 - 120
			Dissolved Barium (Ba)	2020/10/21		96	%	80 - 120
			Dissolved Beryllium (Be)	2020/10/21		101	%	80 - 120
			Dissolved Bismuth (Bi)	2020/10/21		96	%	80 - 120
			Dissolved Boron (B)	2020/10/21		100	%	80 - 120
			Dissolved Cadmium (Cd)	2020/10/21		98	%	80 - 120
			Dissolved Calcium (Ca)	2020/10/21		97	%	80 - 120
			Dissolved Chromium (Cr)	2020/10/21		96	%	80 - 120
			Dissolved Cobalt (Co)	2020/10/21		99	%	80 - 120
			Dissolved Copper (Cu)	2020/10/21		98	%	80 - 120
			Dissolved Iron (Fe)	2020/10/21		101	%	80 - 120
			Dissolved Lead (Pb)	2020/10/21		97	%	80 - 120
			Dissolved Magnesium (Mg)	2020/10/21		102	%	80 - 120
			Dissolved Manganese (Mn)	2020/10/21		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/10/21		99	%	80 - 120
			Dissolved Nickel (Ni)	2020/10/21		99	%	80 - 120
			Dissolved Phosphorus (P)	2020/10/21		102	%	80 - 120
			Dissolved Potassium (K)	2020/10/21		97	%	80 - 120
			Dissolved Selenium (Se)	2020/10/21		96	%	80 - 120
			Dissolved Silver (Ag)	2020/10/21		95	%	80 - 120
			Dissolved Sodium (Na)	2020/10/21		98	%	80 - 120
			Dissolved Strontium (Sr)	2020/10/21		98	%	80 - 120
			Dissolved Thallium (Tl)	2020/10/21		97	%	80 - 120
			Dissolved Tin (Sn)	2020/10/21		96	%	80 - 120
			Dissolved Titanium (Ti)	2020/10/21		100	%	80 - 120
			Dissolved Uranium (U)	2020/10/21		103	%	80 - 120
			Dissolved Vanadium (V)	2020/10/21		99	%	80 - 120
			Dissolved Zinc (Zn)	2020/10/21		102	%	80 - 120
7011897	MLB	Method Blank	Dissolved Aluminum (Al)	2020/10/21	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Beryllium (Be)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2020/10/21	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2020/10/21	ND, RDL=0.010		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Calcium (Ca)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2020/10/21	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2020/10/21	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2020/10/21	ND, RDL=0.50		ug/L	
			Dissolved Iron (Fe)	2020/10/21	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2020/10/21	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Selenium (Se)	2020/10/21	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2020/10/21	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2020/10/21	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2020/10/21	ND, RDL=0.10		ug/L	
			Dissolved Tin (Sn)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2020/10/21	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2020/10/21	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2020/10/21	ND, RDL=5.0		ug/L	
7011897	MLB	RPD [NXF452-02]	Dissolved Aluminum (Al)	2020/10/21	0.24		%	20
			Dissolved Antimony (Sb)	2020/10/21	NC		%	20
			Dissolved Arsenic (As)	2020/10/21	NC		%	20
			Dissolved Barium (Ba)	2020/10/21	0.37		%	20
			Dissolved Beryllium (Be)	2020/10/21	NC		%	20
			Dissolved Bismuth (Bi)	2020/10/21	NC		%	20
			Dissolved Boron (B)	2020/10/21	NC		%	20
			Dissolved Cadmium (Cd)	2020/10/21	NC		%	20
			Dissolved Calcium (Ca)	2020/10/21	0.58		%	20
			Dissolved Chromium (Cr)	2020/10/21	NC		%	20
			Dissolved Cobalt (Co)	2020/10/21	NC		%	20
			Dissolved Copper (Cu)	2020/10/21	3.4		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Iron (Fe)	2020/10/21	NC		%	20
			Dissolved Lead (Pb)	2020/10/21	NC		%	20
			Dissolved Magnesium (Mg)	2020/10/21	1.1		%	20
			Dissolved Manganese (Mn)	2020/10/21	0.63		%	20
			Dissolved Molybdenum (Mo)	2020/10/21	NC		%	20
			Dissolved Nickel (Ni)	2020/10/21	NC		%	20
			Dissolved Phosphorus (P)	2020/10/21	NC		%	20
			Dissolved Potassium (K)	2020/10/21	1.1		%	20
			Dissolved Selenium (Se)	2020/10/21	NC		%	20
			Dissolved Silver (Ag)	2020/10/21	NC		%	20
			Dissolved Sodium (Na)	2020/10/21	1.4		%	20
			Dissolved Strontium (Sr)	2020/10/21	3.2		%	20
			Dissolved Thallium (Tl)	2020/10/21	NC		%	20
			Dissolved Tin (Sn)	2020/10/21	NC		%	20
			Dissolved Titanium (Ti)	2020/10/21	NC		%	20
			Dissolved Uranium (U)	2020/10/21	1.5		%	20
			Dissolved Vanadium (V)	2020/10/21	NC		%	20
			Dissolved Zinc (Zn)	2020/10/21	NC		%	20
7012132	MCN	Matrix Spike [NXF450-03]	Nitrogen (Ammonia Nitrogen)	2020/10/21		97	%	80 - 120
7012132	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/10/21		100	%	80 - 120
7012132	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/10/21	ND, RDL=0.050		mg/L	
7012132	MCN	RPD [NXF450-03]	Nitrogen (Ammonia Nitrogen)	2020/10/21	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Poor spike recovery due to probable matrix interference.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

<Original signed by>

Eric Dearman, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Your C.O.C. #: 791063-01-01, 791063-02-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2020/11/23
Report #: R6421963
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0U3323
Received: 2020/11/16, 09:24

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	11	N/A	2020/11/18	N/A	SM 23 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide	1	N/A	2020/11/20	N/A	SM 23 4500-CO2 D
Alkalinity	12	N/A	2020/11/19	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	12	N/A	2020/11/19	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	12	N/A	2020/11/19	ATL SOP 00020	SM 23 2120C m
Conductance - water	11	N/A	2020/11/18	ATL SOP 00004	SM 23 2510B m
Conductance - water	1	N/A	2020/11/20	ATL SOP 00004	SM 23 2510B m
Fluoride	11	N/A	2020/11/18	ATL SOP 00043	SM 23 4500-F- C m
Fluoride	1	N/A	2020/11/20	ATL SOP 00043	SM 23 4500-F- C m
Hardness (calculated as CaCO3)	3	N/A	2020/11/19	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	3	N/A	2020/11/20	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3)	6	N/A	2020/11/23	ATL SOP 00048	Auto Calc
Mercury - Total (CVAA,LL)	12	2020/11/18	2020/11/19	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Diss. MS (as rec'd)	3	N/A	2020/11/18	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (as rec'd)	3	N/A	2020/11/19	ATL SOP 00058	EPA 6020B R2 m
Metals Water Diss. MS (as rec'd)	6	N/A	2020/11/20	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference)	6	N/A	2020/11/20	N/A	Auto Calc.
Ion Balance (% Difference)	6	N/A	2020/11/23	N/A	Auto Calc.
Anion and Cation Sum	6	N/A	2020/11/20	N/A	Auto Calc.
Anion and Cation Sum	6	N/A	2020/11/23	N/A	Auto Calc.
Nitrogen Ammonia - water	11	N/A	2020/11/19	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	1	N/A	2020/11/20	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	12	N/A	2020/11/19	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	12	N/A	2020/11/19	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	12	N/A	2020/11/20	ATL SOP 00018	ASTM D3867-16
pH (1)	11	N/A	2020/11/18	ATL SOP 00003	SM 23 4500-H+ B m
pH (1)	1	N/A	2020/11/20	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	12	N/A	2020/11/20	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	6	N/A	2020/11/20	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 20C)	6	N/A	2020/11/23	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	6	N/A	2020/11/20	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	6	N/A	2020/11/23	ATL SOP 00049	Auto Calc.

Your C.O.C. #: 791063-01-01, 791063-02-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2020/11/23
Report #: R6421963
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0U3323
Received: 2020/11/16, 09:24

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Reactive Silica	12	N/A	2020/11/19	ATL SOP 00022	EPA 366.0 m
Sulphate	12	N/A	2020/11/19	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	6	N/A	2020/11/20	N/A	Auto Calc.
Total Dissolved Solids (TDS calc)	6	N/A	2020/11/23	N/A	Auto Calc.
Organic carbon - Total (TOC) (2)	4	N/A	2020/11/18	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (2)	7	N/A	2020/11/19	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (2)	1	N/A	2020/11/20	ATL SOP 00203	SM 23 5310B m
Turbidity	12	N/A	2020/11/18	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(2) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Your C.O.C. #: 791063-01-01, 791063-02-01

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36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2020/11/23
Report #: R6421963
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0U3323
Received: 2020/11/16, 09:24

<Original signed by>

Sam Sherker
Project Manager Assistant
23 Nov 2020 15:43:03

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bvlabs.com
Phone# (902)420-0203 Ext:226

==========

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA234		OEA235		OEA236		
Sampling Date		2020/11/07		2020/11/07		2020/11/07		
COC Number		791063-01-01		791063-01-01		791063-01-01		
Sample #		M AQPOR		M+L SED		M+L MD		
	UNITS	M AQPOR	QC Batch	M+L SED	QC Batch	M+L MD	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	1.04	7057809	1.13	7057809	1.25	N/A	7057809
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	45	7057806	54	7057806	50	1.0	7057806
Calculated TDS	mg/L	53	7057813	58	7057813	64	1.0	7057813
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7057806	ND	7057806	ND	1.0	7057806
Cation Sum	me/L	0.890	7057809	1.05	7057809	1.11	N/A	7057809
Hardness (CaCO3)	mg/L	42	7057807	46	7057807	54	1.0	7057807
Ion Balance (% Difference)	%	7.77	7057808	3.67	7057808	5.93	N/A	7057808
Langelier Index (@ 20C)	N/A	-0.673	7057811	-0.548	7057811	-0.458		7057811
Langelier Index (@ 4C)	N/A	-0.925	7057812	-0.800	7057812	-0.709		7057812
Nitrate (N)	mg/L	ND	7057810	ND	7057810	ND	0.050	7057810
Saturation pH (@ 20C)	N/A	8.48	7057811	8.42	7057811	8.35		7057811
Saturation pH (@ 4C)	N/A	8.73	7057812	8.68	7057812	8.60		7057812
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	46	7064717	55	7064738	51	5.0	7064738
Dissolved Chloride (Cl-)	mg/L	1.3	7064722	1.2	7064843	1.2	1.0	7064843
Colour	TCU	5.5	7064725	ND	7064856	ND	5.0	7064856
Nitrate + Nitrite (N)	mg/L	ND	7064727	ND	7064860	ND	0.050	7064860
Nitrite (N)	mg/L	ND	7064728	ND	7064863	ND	0.010	7064863
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7065083	ND	7065083	ND	0.050	7065083
Total Organic Carbon (C)	mg/L	1.2	7062910	1.4	7062910	0.71	0.50	7062403
Orthophosphate (P)	mg/L	ND	7064726	ND	7064859	ND	0.010	7064859
pH	pH	7.81	7062026	7.88	7062026	7.89		7062026
Reactive Silica (SiO2)	mg/L	1.9	7064724	2.9	7064849	1.2	0.50	7064849
Dissolved Sulphate (SO4)	mg/L	4.1	7064723	ND	7064846	10	2.0	7064846
Turbidity	NTU	9.1	7062223	15	7062223	1.5	0.10	7062225
Conductivity	uS/cm	84	7062021	97	7062021	110	1.0	7062021
Metals								
Dissolved Aluminum (Al)	ug/L	87	7062166	53	7062166	90	5.0	7062166
Dissolved Antimony (Sb)	ug/L	ND	7062166	ND	7062166	ND	1.0	7062166
Dissolved Arsenic (As)	ug/L	ND	7062166	ND	7062166	ND	1.0	7062166
Dissolved Barium (Ba)	ug/L	1.7	7062166	2.1	7062166	32	1.0	7062166
Dissolved Beryllium (Be)	ug/L	ND	7062166	ND	7062166	ND	1.0	7062166

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA234		OEA235		OEA236		
Sampling Date		2020/11/07		2020/11/07		2020/11/07		
COC Number		791063-01-01		791063-01-01		791063-01-01		
Sample #		M AQPOR		M+L SED		M+L MD		
	UNITS	M AQPOR	QC Batch	M+L SED	QC Batch	M+L MD	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	7062166	ND	7062166	ND	2.0	7062166
Dissolved Boron (B)	ug/L	ND	7062166	ND	7062166	ND	50	7062166
Dissolved Cadmium (Cd)	ug/L	ND	7062166	ND	7062166	ND	0.010	7062166
Dissolved Calcium (Ca)	ug/L	15000	7062166	14000	7062166	19000	100	7062166
Dissolved Chromium (Cr)	ug/L	ND	7062166	ND	7062166	ND	1.0	7062166
Dissolved Cobalt (Co)	ug/L	ND	7062166	ND	7062166	ND	0.40	7062166
Dissolved Copper (Cu)	ug/L	0.74	7062166	1.5	7062166	0.79	0.50	7062166
Dissolved Iron (Fe)	ug/L	ND	7062166	ND	7062166	ND	50	7062166
Dissolved Lead (Pb)	ug/L	ND	7062166	ND	7062166	ND	0.50	7062166
Dissolved Magnesium (Mg)	ug/L	1100	7062166	2600	7062166	1800	100	7062166
Dissolved Manganese (Mn)	ug/L	37	7062166	50	7062166	44	2.0	7062166
Dissolved Molybdenum (Mo)	ug/L	ND	7062166	ND	7062166	ND	2.0	7062166
Dissolved Nickel (Ni)	ug/L	ND	7062166	ND	7062166	ND	2.0	7062166
Dissolved Phosphorus (P)	ug/L	ND	7062166	ND	7062166	ND	100	7062166
Dissolved Potassium (K)	ug/L	740	7062166	2900	7062166	420	100	7062166
Dissolved Selenium (Se)	ug/L	ND	7062166	ND	7062166	ND	0.50	7062166
Dissolved Silver (Ag)	ug/L	ND	7062166	ND	7062166	ND	0.10	7062166
Dissolved Sodium (Na)	ug/L	970	7062166	1200	7062166	620	100	7062166
Dissolved Strontium (Sr)	ug/L	43	7062166	89	7062166	71	2.0	7062166
Dissolved Thallium (Tl)	ug/L	ND	7062166	ND	7062166	ND	0.10	7062166
Dissolved Tin (Sn)	ug/L	ND	7062166	ND	7062166	ND	2.0	7062166
Dissolved Titanium (Ti)	ug/L	ND	7062166	ND	7062166	ND	2.0	7062166
Dissolved Uranium (U)	ug/L	0.46	7062166	2.6	7062166	0.14	0.10	7062166
Dissolved Vanadium (V)	ug/L	ND	7062166	ND	7062166	ND	2.0	7062166
Dissolved Zinc (Zn)	ug/L	ND	7062166	ND	7062166	ND	5.0	7062166

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA237			OEA237			OEA238		
Sampling Date		2020/11/07			2020/11/07			2020/11/07		
COC Number		791063-01-01			791063-01-01			791063-01-01		
Sample #		M QE-POR			M QE-POR			M QZ-QE-POR-QTP-MIN		
	UNITS	M QE-POR	RDL	QC Batch	M QE-POR Lab-Dup	RDL	QC Batch	M QZ-QE-POR-QTP-MIN	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	5.25	N/A	7057809				0.890	N/A	7057809
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	63	1.0	7057806				38	1.0	7057806
Calculated TDS	mg/L	320	1.0	7057813				45	1.0	7057813
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7057806				ND	1.0	7057806
Cation Sum	me/L	4.36	N/A	7057809				0.770	N/A	7057809
Hardness (CaCO3)	mg/L	210	1.0	7057807				36	1.0	7057807
Ion Balance (% Difference)	%	9.26	N/A	7057808				7.23	N/A	7057808
Langelier Index (@ 20C)	N/A	0.155		7057811				-0.785		7057811
Langelier Index (@ 4C)	N/A	-0.0940		7057812				-1.04		7057812
Nitrate (N)	mg/L	ND	0.050	7057810				ND	0.050	7057810
Saturation pH (@ 20C)	N/A	7.73		7057811				8.60		7057811
Saturation pH (@ 4C)	N/A	7.97		7057812				8.85		7057812
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	64	5.0	7064738				38	5.0	7064738
Dissolved Chloride (Cl-)	mg/L	2.0	1.0	7064843				1.7	1.0	7064843
Colour	TCU	ND	5.0	7064856				ND	5.0	7064856
Nitrate + Nitrite (N)	mg/L	ND	0.050	7064860				ND	0.050	7064860
Nitrite (N)	mg/L	ND	0.010	7064863				ND	0.010	7064863
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7065083				ND	0.050	7065083
Total Organic Carbon (C)	mg/L	0.92	0.50	7062395	0.97	0.50	7062395	1.1	0.50	7067029
Orthophosphate (P)	mg/L	ND	0.010	7064859				ND	0.010	7064859
pH	pH	7.88		7062026				7.82		7062026
Reactive Silica (SiO2)	mg/L	3.6	0.50	7064849				1.7	0.50	7064849
Dissolved Sulphate (SO4)	mg/L	190	10	7064846				3.5	2.0	7064846
Turbidity	NTU	6.2	0.10	7062225				1.9	0.10	7062225
Conductivity	uS/cm	490	1.0	7062021				72	1.0	7062021
Metals										
Dissolved Aluminum (Al)	ug/L	70	5.0	7064624				100	5.0	7064624
Dissolved Antimony (Sb)	ug/L	ND	1.0	7064624				ND	1.0	7064624
Dissolved Arsenic (As)	ug/L	ND	1.0	7064624				ND	1.0	7064624
Dissolved Barium (Ba)	ug/L	11	1.0	7064624				2.9	1.0	7064624

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA237			OEA237			OEA238		
Sampling Date		2020/11/07			2020/11/07			2020/11/07		
COC Number		791063-01-01			791063-01-01			791063-01-01		
Sample #		M QE-POR			M QE-POR			M QZ-QE-POR-QTP-MIN		
	UNITS	M QE-POR	RDL	QC Batch	M QE-POR Lab-Dup	RDL	QC Batch	M QZ-QE-POR-QTP-MIN	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	1.0	7064624				ND	1.0	7064624
Dissolved Bismuth (Bi)	ug/L	ND	2.0	7064624				ND	2.0	7064624
Dissolved Boron (B)	ug/L	ND	50	7064624				ND	50	7064624
Dissolved Cadmium (Cd)	ug/L	ND	0.010	7064624				ND	0.010	7064624
Dissolved Calcium (Ca)	ug/L	79000	100	7064624				13000	100	7064624
Dissolved Chromium (Cr)	ug/L	ND	1.0	7064624				ND	1.0	7064624
Dissolved Cobalt (Co)	ug/L	ND	0.40	7064624				ND	0.40	7064624
Dissolved Copper (Cu)	ug/L	1.6	0.50	7064624				1.2	0.50	7064624
Dissolved Iron (Fe)	ug/L	ND	50	7064624				ND	50	7064624
Dissolved Lead (Pb)	ug/L	ND	0.50	7064624				ND	0.50	7064624
Dissolved Magnesium (Mg)	ug/L	3000	100	7064624				660	100	7064624
Dissolved Manganese (Mn)	ug/L	41	2.0	7064624				36	2.0	7064624
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	7064624				ND	2.0	7064624
Dissolved Nickel (Ni)	ug/L	ND	2.0	7064624				ND	2.0	7064624
Dissolved Phosphorus (P)	ug/L	ND	100	7064624				ND	100	7064624
Dissolved Potassium (K)	ug/L	1600	100	7064624				550	100	7064624
Dissolved Selenium (Se)	ug/L	ND	0.50	7064624				ND	0.50	7064624
Dissolved Silver (Ag)	ug/L	ND	0.10	7064624				ND	0.10	7064624
Dissolved Sodium (Na)	ug/L	2400	100	7064624				960	100	7064624
Dissolved Strontium (Sr)	ug/L	250	2.0	7064624				37	2.0	7064624
Dissolved Thallium (Tl)	ug/L	ND	0.10	7064624				ND	0.10	7064624
Dissolved Tin (Sn)	ug/L	ND	2.0	7064624				ND	2.0	7064624
Dissolved Titanium (Ti)	ug/L	ND	2.0	7064624				ND	2.0	7064624
Dissolved Uranium (U)	ug/L	1.2	0.10	7064624				0.28	0.10	7064624
Dissolved Vanadium (V)	ug/L	ND	2.0	7064624				ND	2.0	7064624
Dissolved Zinc (Zn)	ug/L	ND	5.0	7064624				ND	5.0	7064624

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA239			OEA239			OEA240		
Sampling Date		2020/11/07			2020/11/07			2020/11/07		
COC Number		791063-01-01			791063-01-01			791063-01-01		
Sample #		SZ+V QE-POR			SZ+V QE-POR			L QZ-TQTP+QZ-QTP		
	UNITS	SZ+V QE-POR	RDL	QC Batch	SZ+V QE-POR Lab-Dup	RDL	QC Batch	L QZ-TQTP+QZ-QTP	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	1.13	N/A	7057809				0.950	N/A	7057809
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	48	1.0	7057806				42	1.0	7057806
Calculated TDS	mg/L	58	1.0	7057813				47	1.0	7057813
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7057806				ND	1.0	7057806
Cation Sum	me/L	1.00	N/A	7057809				0.810	N/A	7057809
Hardness (CaCO3)	mg/L	46	1.0	7057807				39	1.0	7057807
Ion Balance (% Difference)	%	6.10	N/A	7057808				7.95	N/A	7057808
Langelier Index (@ 20C)	N/A	-0.519		7057811				-0.729		7057811
Langelier Index (@ 4C)	N/A	-0.770		7057812				-0.981		7057812
Nitrate (N)	mg/L	ND	0.050	7057810				ND	0.050	7057810
Saturation pH (@ 20C)	N/A	8.42		7057811				8.54		7057811
Saturation pH (@ 4C)	N/A	8.67		7057812				8.79		7057812
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	49	5.0	7064738	49	5.0	7064738	43	5.0	7064738
Dissolved Chloride (Cl-)	mg/L	1.5	1.0	7064843	1.3	1.0	7064843	1.2	1.0	7064843
Colour	TCU	ND	5.0	7064856	ND	5.0	7064856	ND	5.0	7064856
Nitrate + Nitrite (N)	mg/L	ND	0.050	7064860	ND	0.050	7064860	ND	0.050	7064860
Nitrite (N)	mg/L	ND	0.010	7064863	ND	0.010	7064863	ND	0.010	7064863
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7065083				ND	0.050	7065083
Total Organic Carbon (C)	mg/L	0.90	0.50	7062910				0.93	0.50	7062910
Orthophosphate (P)	mg/L	ND	0.010	7064859	ND	0.010	7064859	ND	0.010	7064859
pH	pH	7.90		7062026				7.81		7062026
Reactive Silica (SiO2)	mg/L	2.5	0.50	7064849	2.5	0.50	7064849	1.3	0.50	7064849
Dissolved Sulphate (SO4)	mg/L	5.2	2.0	7064846	4.9	2.0	7064846	3.2	2.0	7064846
Turbidity	NTU	1.0	0.10	7062225				0.86	0.10	7062225
Conductivity	uS/cm	92	1.0	7062021				76	1.0	7062021
Metals										
Dissolved Aluminum (Al)	ug/L	110	5.0	7064624				96	5.0	7064630
Dissolved Antimony (Sb)	ug/L	ND	1.0	7064624				ND	1.0	7064630
Dissolved Arsenic (As)	ug/L	ND	1.0	7064624				ND	1.0	7064630
Dissolved Barium (Ba)	ug/L	1.0	1.0	7064624				3.3	1.0	7064630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA239			OEA239			OEA240		
Sampling Date		2020/11/07			2020/11/07			2020/11/07		
COC Number		791063-01-01			791063-01-01			791063-01-01		
Sample #		SZ+V QE-POR			SZ+V QE-POR			L QZ-TQTP+QZ-QTP		
	UNITS	**SZ+V QE-POR**	**RDL**	**QC Batch**	**SZ+V QE-POR Lab-Dup**	**RDL**	**QC Batch**	**L QZ-TQTP+QZ-QTP**	**RDL**	**QC Batch**
Dissolved Beryllium (Be)	ug/L	ND	1.0	7064624				ND	1.0	7064630
Dissolved Bismuth (Bi)	ug/L	ND	2.0	7064624				ND	2.0	7064630
Dissolved Boron (B)	ug/L	ND	50	7064624				ND	50	7064630
Dissolved Cadmium (Cd)	ug/L	ND	0.010	7064624				ND	0.010	7064630
Dissolved Calcium (Ca)	ug/L	16000	100	7064624				14000	100	7064630
Dissolved Chromium (Cr)	ug/L	ND	1.0	7064624				ND	1.0	7064630
Dissolved Cobalt (Co)	ug/L	ND	0.40	7064624				ND	0.40	7064630
Dissolved Copper (Cu)	ug/L	0.85	0.50	7064624				0.78	0.50	7064630
Dissolved Iron (Fe)	ug/L	ND	50	7064624				ND	50	7064630
Dissolved Lead (Pb)	ug/L	ND	0.50	7064624				ND	0.50	7064630
Dissolved Magnesium (Mg)	ug/L	1500	100	7064624				940	100	7064630
Dissolved Manganese (Mn)	ug/L	14	2.0	7064624				50	2.0	7064630
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	7064624				ND	2.0	7064630
Dissolved Nickel (Ni)	ug/L	ND	2.0	7064624				ND	2.0	7064630
Dissolved Phosphorus (P)	ug/L	ND	100	7064624				ND	100	7064630
Dissolved Potassium (K)	ug/L	920	100	7064624				590	100	7064630
Dissolved Selenium (Se)	ug/L	ND	0.50	7064624				ND	0.50	7064630
Dissolved Silver (Ag)	ug/L	ND	0.10	7064624				ND	0.10	7064630
Dissolved Sodium (Na)	ug/L	1200	100	7064624				590	100	7064630
Dissolved Strontium (Sr)	ug/L	21	2.0	7064624				67	2.0	7064630
Dissolved Thallium (Tl)	ug/L	ND	0.10	7064624				ND	0.10	7064630
Dissolved Tin (Sn)	ug/L	ND	2.0	7064624				ND	2.0	7064630
Dissolved Titanium (Ti)	ug/L	ND	2.0	7064624				ND	2.0	7064630
Dissolved Uranium (U)	ug/L	0.31	0.10	7064624				0.26	0.10	7064630
Dissolved Vanadium (V)	ug/L	ND	2.0	7064624				ND	2.0	7064630
Dissolved Zinc (Zn)	ug/L	ND	5.0	7064624				ND	5.0	7064630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA241		OEA242		OEA243		
Sampling Date		2020/11/07		2020/11/07		2020/11/07		
COC Number		791063-01-01		791063-01-01		791063-01-01		
Sample #		L TRJ		V QE-POR-QTP		MAR HL		
	UNITS	**L TRJ**	**QC Batch**	**V QE-POR-QTP**	**QC Batch**	**Mar HL**	**RDL**	**QC Batch**
Calculated Parameters								
Anion Sum	me/L	1.13	7057809	0.640	7057809	1.57	N/A	7057809
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	50	7057806	27	7057806	64	1.0	7057806
Calculated TDS	mg/L	58	7057813	32	7057813	83	1.0	7057813
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7057806	ND	7057806	ND	1.0	7057806
Cation Sum	me/L	0.980	7057809	0.530	7057809	1.42	N/A	7057809
Hardness (CaCO3)	mg/L	45	7057807	25	7057807	62	1.0	7057807
Ion Balance (% Difference)	%	7.11	7057808	9.40	7057808	5.02	N/A	7057808
Langelier Index (@ 20C)	N/A	-0.617	7057811	-1.30	7057811	-0.295		7057811
Langelier Index (@ 4C)	N/A	-0.869	7057812	-1.55	7057812	-0.546		7057812
Nitrate (N)	mg/L	ND	7057810	ND	7057810	ND	0.050	7057810
Saturation pH (@ 20C)	N/A	8.44	7057811	8.91	7057811	8.23		7057811
Saturation pH (@ 4C)	N/A	8.69	7057812	9.16	7057812	8.48		7057812
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	50	7064738	27	7064738	65	5.0	7064738
Dissolved Chloride (Cl-)	mg/L	1.5	7064843	1.2	7064843	1.5	1.0	7064843
Colour	TCU	ND	7064856	ND	7064856	5.3	5.0	7064856
Nitrate + Nitrite (N)	mg/L	ND	7064860	ND	7064860	ND	0.050	7064860
Nitrite (N)	mg/L	ND	7064863	ND	7064863	ND	0.010	7064863
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7065083	ND	7065083	ND	0.050	7065083
Total Organic Carbon (C)	mg/L	0.78	7064950	0.70	7062403	0.71	0.50	7062910
Orthophosphate (P)	mg/L	ND	7064859	ND	7064859	ND	0.010	7064859
pH	pH	7.82	7062026	7.60	7062026	7.93		7066868
Reactive Silica (SiO2)	mg/L	2.5	7064849	0.94	7064849	4.1	0.50	7064849
Dissolved Sulphate (SO4)	mg/L	4.3	7064846	3.0	7064846	11	2.0	7064846
Turbidity	NTU	3.4	7062225	0.59	7062225	0.34	0.10	7062225
Conductivity	uS/cm	93	7062021	48	7062021	130	1.0	7066866
Metals								
Dissolved Aluminum (Al)	ug/L	130	7064630	76	7064630	98	5.0	7064630
Dissolved Antimony (Sb)	ug/L	ND	7064630	ND	7064630	1.3	1.0	7064630
Dissolved Arsenic (As)	ug/L	ND	7064630	ND	7064630	ND	1.0	7064630
Dissolved Barium (Ba)	ug/L	34	7064630	ND	7064630	12	1.0	7064630
Dissolved Beryllium (Be)	ug/L	ND	7064630	ND	7064630	ND	1.0	7064630

RDL = Reportable Detection Limit
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N/A = Not Applicable
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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA241		OEA242		OEA243		
Sampling Date		2020/11/07		2020/11/07		2020/11/07		
COC Number		791063-01-01		791063-01-01		791063-01-01		
Sample #		L TRJ		V QE-POR-QTP		MAR HL		
	UNITS	L TRJ	QC Batch	V QE-POR-QTP	QC Batch	Mar HL	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	7064630	ND	7064630	ND	2.0	7064630
Dissolved Boron (B)	ug/L	ND	7064630	ND	7064630	ND	50	7064630
Dissolved Cadmium (Cd)	ug/L	ND	7064630	ND	7064630	ND	0.010	7064630
Dissolved Calcium (Ca)	ug/L	15000	7064630	9000	7064630	20000	100	7064630
Dissolved Chromium (Cr)	ug/L	ND	7064630	ND	7064630	ND	1.0	7064630
Dissolved Cobalt (Co)	ug/L	ND	7064630	ND	7064630	ND	0.40	7064630
Dissolved Copper (Cu)	ug/L	1.0	7064630	1.0	7064630	1.1	0.50	7064630
Dissolved Iron (Fe)	ug/L	ND	7064630	ND	7064630	ND	50	7064630
Dissolved Lead (Pb)	ug/L	ND	7064630	ND	7064630	ND	0.50	7064630
Dissolved Magnesium (Mg)	ug/L	1600	7064630	560	7064630	3000	100	7064630
Dissolved Manganese (Mn)	ug/L	13	7064630	33	7064630	28	2.0	7064630
Dissolved Molybdenum (Mo)	ug/L	ND	7064630	ND	7064630	4.4	2.0	7064630
Dissolved Nickel (Ni)	ug/L	ND	7064630	ND	7064630	ND	2.0	7064630
Dissolved Phosphorus (P)	ug/L	ND	7064630	ND	7064630	ND	100	7064630
Dissolved Potassium (K)	ug/L	1800	7064630	240	7064630	1200	100	7064630
Dissolved Selenium (Se)	ug/L	ND	7064630	ND	7064630	ND	0.50	7064630
Dissolved Silver (Ag)	ug/L	ND	7064630	ND	7064630	ND	0.10	7064630
Dissolved Sodium (Na)	ug/L	1000	7064630	580	7064630	3500	100	7064630
Dissolved Strontium (Sr)	ug/L	140	7064630	12	7064630	58	2.0	7064630
Dissolved Thallium (Tl)	ug/L	ND	7064630	ND	7064630	ND	0.10	7064630
Dissolved Tin (Sn)	ug/L	ND	7064630	ND	7064630	ND	2.0	7064630
Dissolved Titanium (Ti)	ug/L	ND	7064630	ND	7064630	ND	2.0	7064630
Dissolved Uranium (U)	ug/L	0.78	7064630	0.11	7064630	0.44	0.10	7064630
Dissolved Vanadium (V)	ug/L	ND	7064630	ND	7064630	ND	2.0	7064630
Dissolved Zinc (Zn)	ug/L	ND	7064630	12	7064630	ND	5.0	7064630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA244		OEA245		
Sampling Date		2020/11/07		2020/11/07		
COC Number		791063-02-01		791063-02-01		
Sample #		LEP HL		FLBK		
	UNITS	Lep HL	QC Batch	FLBK	RDL	QC Batch
Calculated Parameters						
Anion Sum	me/L	1.86	7057809	0.0300	N/A	7057809
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	80	7057806	ND	1.0	7057806
Calculated TDS	mg/L	95	7057813	2.0	1.0	7057813
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7057806	ND	1.0	7057806
Cation Sum	me/L	1.70	7057809	0.0300	N/A	7057809
Hardness (CaCO3)	mg/L	73	7057807	ND	1.0	7057807
Ion Balance (% Difference)	%	4.49	7057808	0.00	N/A	7057808
Langelier Index (@ 20C)	N/A	-0.196	7057811	NC		7057811
Langelier Index (@ 4C)	N/A	-0.447	7057812	NC		7057812
Nitrate (N)	mg/L	0.059	7057810	ND	0.050	7057810
Saturation pH (@ 20C)	N/A	8.15	7057811	NC		7057811
Saturation pH (@ 4C)	N/A	8.40	7057812	NC		7057812
Inorganics						
Total Alkalinity (Total as CaCO3)	mg/L	81	7064738	ND	5.0	7064738
Dissolved Chloride (Cl-)	mg/L	2.4	7064843	1.1	1.0	7064843
Colour	TCU	ND	7064856	ND	5.0	7064856
Nitrate + Nitrite (N)	mg/L	0.059	7064860	ND	0.050	7064860
Nitrite (N)	mg/L	ND	7064863	ND	0.010	7064863
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7065083	ND	0.050	7065085
Total Organic Carbon (C)	mg/L	0.97	7062910	1.4	0.50	7062403
Orthophosphate (P)	mg/L	ND	7064859	ND	0.010	7064859
pH	pH	7.95	7062026	5.92		7062026
Reactive Silica (SiO2)	mg/L	4.0	7064849	ND	0.50	7064849
Dissolved Sulphate (SO4)	mg/L	8.2	7064846	ND	2.0	7064846
Turbidity	NTU	3.7	7062225	0.26	0.10	7062225
Conductivity	uS/cm	150	7062021	4.8	1.0	7062021
Metals						
Dissolved Aluminum (Al)	ug/L	78	7064630	6.4	5.0	7064630
Dissolved Antimony (Sb)	ug/L	ND	7064630	ND	1.0	7064630
Dissolved Arsenic (As)	ug/L	ND	7064630	ND	1.0	7064630
Dissolved Barium (Ba)	ug/L	6.2	7064630	ND	1.0	7064630
Dissolved Beryllium (Be)	ug/L	ND	7064630	ND	1.0	7064630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		OEA244		OEA245		
Sampling Date		2020/11/07		2020/11/07		
COC Number		791063-02-01		791063-02-01		
Sample #		LEP HL		FLBK		
	UNITS	Lep HL	QC Batch	FLBK	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	7064630	ND	2.0	7064630
Dissolved Boron (B)	ug/L	ND	7064630	ND	50	7064630
Dissolved Cadmium (Cd)	ug/L	ND	7064630	ND	0.010	7064630
Dissolved Calcium (Ca)	ug/L	19000	7064630	150	100	7064630
Dissolved Chromium (Cr)	ug/L	ND	7064630	ND	1.0	7064630
Dissolved Cobalt (Co)	ug/L	ND	7064630	ND	0.40	7064630
Dissolved Copper (Cu)	ug/L	1.3	7064630	ND	0.50	7064630
Dissolved Iron (Fe)	ug/L	ND	7064630	ND	50	7064630
Dissolved Lead (Pb)	ug/L	ND	7064630	ND	0.50	7064630
Dissolved Magnesium (Mg)	ug/L	6000	7064630	ND	100	7064630
Dissolved Manganese (Mn)	ug/L	24	7064630	5.1	2.0	7064630
Dissolved Molybdenum (Mo)	ug/L	ND	7064630	ND	2.0	7064630
Dissolved Nickel (Ni)	ug/L	ND	7064630	ND	2.0	7064630
Dissolved Phosphorus (P)	ug/L	ND	7064630	ND	100	7064630
Dissolved Potassium (K)	ug/L	2000	7064630	ND	100	7064630
Dissolved Selenium (Se)	ug/L	ND	7064630	ND	0.50	7064630
Dissolved Silver (Ag)	ug/L	ND	7064630	ND	0.10	7064630
Dissolved Sodium (Na)	ug/L	4500	7064630	530	100	7064630
Dissolved Strontium (Sr)	ug/L	130	7064630	ND	2.0	7064630
Dissolved Thallium (Tl)	ug/L	ND	7064630	ND	0.10	7064630
Dissolved Tin (Sn)	ug/L	ND	7064630	ND	2.0	7064630
Dissolved Titanium (Ti)	ug/L	ND	7064630	ND	2.0	7064630
Dissolved Uranium (U)	ug/L	3.6	7064630	ND	0.10	7064630
Dissolved Vanadium (V)	ug/L	ND	7064630	ND	2.0	7064630
Dissolved Zinc (Zn)	ug/L	ND	7064630	ND	5.0	7064630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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RESULTS OF ANALYSES OF WATER

BV Labs ID		OEA234	OEA235	OEA236	OEA237	OEA238		
Sampling Date		2020/11/07	2020/11/07	2020/11/07	2020/11/07	2020/11/07		
COC Number		791063-01-01	791063-01-01	791063-01-01	791063-01-01	791063-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Inorganics								
Dissolved Fluoride (F-)	mg/L	ND	ND	ND	ND	ND	0.10	7062027

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		OEA239	OEA240	OEA241	OEA242		OEA243		
Sampling Date		2020/11/07	2020/11/07	2020/11/07	2020/11/07		2020/11/07		
COC Number		791063-01-01	791063-01-01	791063-01-01	791063-01-01		791063-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP		MAR HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**QC Batch**	**Mar HL**	**RDL**	**QC Batch**
Inorganics									
Dissolved Fluoride (F-)	mg/L	ND	ND	ND	ND	7062027	ND	0.10	7066870

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		OEA244	OEA245		
Sampling Date		2020/11/07	2020/11/07		
COC Number		791063-02-01	791063-02-01		
Sample #		LEP HL	FLBK		
	UNITS	**Lep HL**	**FLBK**	**RDL**	**QC Batch**
Inorganics					
Dissolved Fluoride (F-)	mg/L	ND	ND	0.10	7062027

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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MERCURY BY COLD VAPOUR AA (WATER)

BV Labs ID		OEA234	OEA235	OEA236	OEA237	OEA238		
Sampling Date		2020/11/07	2020/11/07	2020/11/07	2020/11/07	2020/11/07		
COC Number		791063-01-01	791063-01-01	791063-01-01	791063-01-01	791063-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Metals								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.013	7062483

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		OEA239	OEA240	OEA241	OEA242	OEA243		
Sampling Date		2020/11/07	2020/11/07	2020/11/07	2020/11/07	2020/11/07		
COC Number		791063-01-01	791063-01-01	791063-01-01	791063-01-01	791063-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
Metals								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.013	7062483

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		OEA244	OEA245		
Sampling Date		2020/11/07	2020/11/07		
COC Number		791063-02-01	791063-02-01		
Sample #		LEP HL	FLBK		
	UNITS	**Lep HL**	**FLBK**	**RDL**	**QC Batch**
Metals					
Total Mercury (Hg)	ug/L	ND	ND	0.013	7062483

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.3°C

Sample OEA234 [M AQPOR] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample OEA236 [M+L MD] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample OEA237 [M QE-POR] : Poor RCAp Ion Balance due to sample matrix.

Sample OEA238 [M QZ-QE-POR-QTP-MIN] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample OEA239 [SZ+V QE-POR] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample OEA240 [L QZ-TQTP+QZ-QTP] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample OEA241 [L TRJ] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample OEA242 [V QE-POR-QTP] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample OEA243 [Mar HL] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7062021	SHW	Spiked Blank	Conductivity	2020/11/18		101	%	80 - 120
7062021	SHW	Method Blank	Conductivity	2020/11/18	ND, RDL=1.0		uS/cm	
7062021	SHW	RPD	Conductivity	2020/11/18	NC		%	10
7062026	SHW	Spiked Blank	pH	2020/11/18		100	%	97 - 103
7062026	SHW	RPD	pH	2020/11/18	1.6		%	N/A
7062027	SHW	Matrix Spike [OEA244-01]	Dissolved Fluoride (F-)	2020/11/18		95	%	80 - 120
7062027	SHW	Spiked Blank	Dissolved Fluoride (F-)	2020/11/18		104	%	80 - 120
7062027	SHW	Method Blank	Dissolved Fluoride (F-)	2020/11/18	ND, RDL=0.10		mg/L	
7062027	SHW	RPD	Dissolved Fluoride (F-)	2020/11/18	NC		%	20
7062166	BAN	Matrix Spike	Dissolved Aluminum (Al)	2020/11/18		97	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/18		94	%	80 - 120
			Dissolved Arsenic (As)	2020/11/18		93	%	80 - 120
			Dissolved Barium (Ba)	2020/11/18		92	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/18		92	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/18		97	%	80 - 120
			Dissolved Boron (B)	2020/11/18		92	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/18		97	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/18		90	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/18		93	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/18		94	%	80 - 120
			Dissolved Copper (Cu)	2020/11/18		95	%	80 - 120
			Dissolved Iron (Fe)	2020/11/18		NC	%	80 - 120
			Dissolved Lead (Pb)	2020/11/18		95	%	80 - 120
			Dissolved Magnesium (Mg)	2020/11/18		102	%	80 - 120
			Dissolved Manganese (Mn)	2020/11/18		NC	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/18		104	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/18		97	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/18		98	%	80 - 120
			Dissolved Potassium (K)	2020/11/18		96	%	80 - 120
			Dissolved Selenium (Se)	2020/11/18		97	%	80 - 120
			Dissolved Silver (Ag)	2020/11/18		92	%	80 - 120
			Dissolved Sodium (Na)	2020/11/18		94	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/18		100	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/18		97	%	80 - 120
			Dissolved Tin (Sn)	2020/11/18		98	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/18		99	%	80 - 120
			Dissolved Uranium (U)	2020/11/18		103	%	80 - 120
			Dissolved Vanadium (V)	2020/11/18		98	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/18		99	%	80 - 120
7062166	BAN	Spiked Blank	Dissolved Aluminum (Al)	2020/11/18		100	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/18		93	%	80 - 120
			Dissolved Arsenic (As)	2020/11/18		92	%	80 - 120
			Dissolved Barium (Ba)	2020/11/18		91	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/18		92	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/18		98	%	80 - 120
			Dissolved Boron (B)	2020/11/18		94	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/18		97	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/18		94	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/18		93	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/18		94	%	80 - 120
			Dissolved Copper (Cu)	2020/11/18		95	%	80 - 120
			Dissolved Iron (Fe)	2020/11/18		100	%	80 - 120
			Dissolved Lead (Pb)	2020/11/18		95	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Magnesium (Mg)	2020/11/18		103	%	80 - 120
			Dissolved Manganese (Mn)	2020/11/18		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/18		101	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/18		97	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/18		101	%	80 - 120
			Dissolved Potassium (K)	2020/11/18		98	%	80 - 120
			Dissolved Selenium (Se)	2020/11/18		94	%	80 - 120
			Dissolved Silver (Ag)	2020/11/18		95	%	80 - 120
			Dissolved Sodium (Na)	2020/11/18		98	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/18		97	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/18		99	%	80 - 120
			Dissolved Tin (Sn)	2020/11/18		101	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/18		98	%	80 - 120
			Dissolved Uranium (U)	2020/11/18		101	%	80 - 120
			Dissolved Vanadium (V)	2020/11/18		97	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/18		99	%	80 - 120
7062166	BAN	Method Blank	Dissolved Aluminum (Al)	2020/11/18	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2020/11/18	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2020/11/18	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2020/11/18	ND, RDL=1.0		ug/L	
			Dissolved Beryllium (Be)	2020/11/18	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/11/18	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2020/11/18	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2020/11/18	ND, RDL=0.010		ug/L	
			Dissolved Calcium (Ca)	2020/11/18	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2020/11/18	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2020/11/18	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2020/11/18	ND, RDL=0.50		ug/L	
			Dissolved Iron (Fe)	2020/11/18	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2020/11/18	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/11/18	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2020/11/18	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/11/18	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2020/11/18	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2020/11/18	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2020/11/18	ND, RDL=100		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Selenium (Se)	2020/11/18	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2020/11/18	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2020/11/18	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2020/11/18	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2020/11/18	ND, RDL=0.10		ug/L	
			Dissolved Tin (Sn)	2020/11/18	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2020/11/18	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2020/11/18	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2020/11/18	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2020/11/18	ND, RDL=5.0		ug/L	
7062166	BAN	RPD	Dissolved Aluminum (Al)	2020/11/18	NC		%	20
			Dissolved Antimony (Sb)	2020/11/18	NC		%	20
			Dissolved Arsenic (As)	2020/11/18	3.0		%	20
			Dissolved Barium (Ba)	2020/11/18	1.6		%	20
			Dissolved Beryllium (Be)	2020/11/18	NC		%	20
			Dissolved Bismuth (Bi)	2020/11/18	NC		%	20
			Dissolved Boron (B)	2020/11/18	NC		%	20
			Dissolved Cadmium (Cd)	2020/11/18	13		%	20
			Dissolved Calcium (Ca)	2020/11/18	0.80		%	20
			Dissolved Chromium (Cr)	2020/11/18	NC		%	20
			Dissolved Cobalt (Co)	2020/11/18	3.1		%	20
			Dissolved Copper (Cu)	2020/11/18	NC		%	20
			Dissolved Iron (Fe)	2020/11/18	1.3		%	20
			Dissolved Lead (Pb)	2020/11/18	NC		%	20
			Dissolved Magnesium (Mg)	2020/11/18	0.85		%	20
			Dissolved Manganese (Mn)	2020/11/18	1.5		%	20
			Dissolved Molybdenum (Mo)	2020/11/18	NC		%	20
			Dissolved Nickel (Ni)	2020/11/18	NC		%	20
			Dissolved Phosphorus (P)	2020/11/18	NC		%	20
			Dissolved Potassium (K)	2020/11/18	1.2		%	20
			Dissolved Selenium (Se)	2020/11/18	NC		%	20
			Dissolved Silver (Ag)	2020/11/18	NC		%	20
			Dissolved Sodium (Na)	2020/11/18	0.84		%	20
			Dissolved Strontium (Sr)	2020/11/18	0.73		%	20
			Dissolved Thallium (Tl)	2020/11/18	NC		%	20
			Dissolved Tin (Sn)	2020/11/18	NC		%	20
			Dissolved Titanium (Ti)	2020/11/18	NC		%	20
			Dissolved Uranium (U)	2020/11/18	3.6		%	20
			Dissolved Vanadium (V)	2020/11/18	NC		%	20
			Dissolved Zinc (Zn)	2020/11/18	NC		%	20
7062223	SHW	QC Standard	Turbidity	2020/11/18		101	%	80 - 120
7062223	SHW	Spiked Blank	Turbidity	2020/11/18		94	%	80 - 120
7062223	SHW	Method Blank	Turbidity	2020/11/18	ND, RDL=0.10		NTU	
7062223	SHW	RPD	Turbidity	2020/11/18	13		%	20

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7062225	SHW	QC Standard	Turbidity	2020/11/18		101	%	80 - 120
7062225	SHW	Spiked Blank	Turbidity	2020/11/18		94	%	80 - 120
7062225	SHW	Method Blank	Turbidity	2020/11/18	ND, RDL=0.10		NTU	
7062225	SHW	RPD	Turbidity	2020/11/18	6.5		%	20
7062395	YLG	Matrix Spike [OEA237-04]	Total Organic Carbon (C)	2020/11/18		94	%	85 - 115
7062395	YLG	Spiked Blank	Total Organic Carbon (C)	2020/11/18		98	%	80 - 120
7062395	YLG	Method Blank	Total Organic Carbon (C)	2020/11/18	ND, RDL=0.50		mg/L	
7062395	YLG	RPD [OEA237-04]	Total Organic Carbon (C)	2020/11/18	4.8		%	15
7062403	YLG	Matrix Spike	Total Organic Carbon (C)	2020/11/18		100	%	85 - 115
7062403	YLG	Spiked Blank	Total Organic Carbon (C)	2020/11/18		98	%	80 - 120
7062403	YLG	Method Blank	Total Organic Carbon (C)	2020/11/18	ND, RDL=0.50		mg/L	
7062403	YLG	RPD	Total Organic Carbon (C)	2020/11/18	4.2		%	15
7062483	NHU	Matrix Spike	Total Mercury (Hg)	2020/11/19		101	%	80 - 120
7062483	NHU	Spiked Blank	Total Mercury (Hg)	2020/11/19		103	%	80 - 120
7062483	NHU	Method Blank	Total Mercury (Hg)	2020/11/19	ND, RDL=0.013		ug/L	
7062483	NHU	RPD	Total Mercury (Hg)	2020/11/19	NC		%	20
7062910	YLG	Matrix Spike	Total Organic Carbon (C)	2020/11/19		94	%	85 - 115
7062910	YLG	Spiked Blank	Total Organic Carbon (C)	2020/11/19		98	%	80 - 120
7062910	YLG	Method Blank	Total Organic Carbon (C)	2020/11/19	ND, RDL=0.50		mg/L	
7062910	YLG	RPD	Total Organic Carbon (C)	2020/11/19	4.0 (1)		%	15
7064624	MLB	Matrix Spike	Dissolved Aluminum (Al)	2020/11/19		104	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/19		98	%	80 - 120
			Dissolved Arsenic (As)	2020/11/19		98	%	80 - 120
			Dissolved Barium (Ba)	2020/11/19		NC	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/19		100	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/19		98	%	80 - 120
			Dissolved Boron (B)	2020/11/19		99	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/19		102	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/19		NC	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/19		97	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/19		100	%	80 - 120
			Dissolved Copper (Cu)	2020/11/19		97	%	80 - 120
			Dissolved Iron (Fe)	2020/11/19		105	%	80 - 120
			Dissolved Lead (Pb)	2020/11/19		101	%	80 - 120
			Dissolved Magnesium (Mg)	2020/11/19		106	%	80 - 120
			Dissolved Manganese (Mn)	2020/11/19		101	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/19		105	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/19		100	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/19		103	%	80 - 120
			Dissolved Potassium (K)	2020/11/19		100	%	80 - 120
			Dissolved Selenium (Se)	2020/11/19		100	%	80 - 120
			Dissolved Silver (Ag)	2020/11/19		98	%	80 - 120
			Dissolved Sodium (Na)	2020/11/19		93	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/19		NC	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/19		100	%	80 - 120
			Dissolved Tin (Sn)	2020/11/19		103	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/19		101	%	80 - 120
			Dissolved Uranium (U)	2020/11/19		107	%	80 - 120
			Dissolved Vanadium (V)	2020/11/19		102	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/19		97	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7064624	MLB	Spiked Blank	Dissolved Aluminum (Al)	2020/11/19		104	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/19		97	%	80 - 120
			Dissolved Arsenic (As)	2020/11/19		95	%	80 - 120
			Dissolved Barium (Ba)	2020/11/19		94	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/19		96	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/19		100	%	80 - 120
			Dissolved Boron (B)	2020/11/19		98	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/19		98	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/19		92	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/19		95	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/19		98	%	80 - 120
			Dissolved Copper (Cu)	2020/11/19		96	%	80 - 120
			Dissolved Iron (Fe)	2020/11/19		102	%	80 - 120
			Dissolved Lead (Pb)	2020/11/19		100	%	80 - 120
			Dissolved Magnesium (Mg)	2020/11/19		107	%	80 - 120
			Dissolved Manganese (Mn)	2020/11/19		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/19		104	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/19		98	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/19		102	%	80 - 120
			Dissolved Potassium (K)	2020/11/19		101	%	80 - 120
			Dissolved Selenium (Se)	2020/11/19		99	%	80 - 120
			Dissolved Silver (Ag)	2020/11/19		98	%	80 - 120
			Dissolved Sodium (Na)	2020/11/19		95	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/19		101	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/19		101	%	80 - 120
			Dissolved Tin (Sn)	2020/11/19		102	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/19		100	%	80 - 120
			Dissolved Uranium (U)	2020/11/19		105	%	80 - 120
			Dissolved Vanadium (V)	2020/11/19		99	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/19		98	%	80 - 120
7064624	MLB	Method Blank	Dissolved Aluminum (Al)	2020/11/19	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2020/11/19	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2020/11/19	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2020/11/19	ND, RDL=1.0		ug/L	
			Dissolved Beryllium (Be)	2020/11/19	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/11/19	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2020/11/19	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2020/11/19	ND, RDL=0.010		ug/L	
			Dissolved Calcium (Ca)	2020/11/19	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2020/11/19	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2020/11/19	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2020/11/19	ND, RDL=0.50		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Iron (Fe)	2020/11/19	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2020/11/19	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/11/19	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2020/11/19	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/11/19	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2020/11/19	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2020/11/19	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2020/11/19	ND, RDL=100		ug/L	
			Dissolved Selenium (Se)	2020/11/19	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2020/11/19	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2020/11/19	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2020/11/19	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2020/11/19	ND, RDL=0.10		ug/L	
			Dissolved Tin (Sn)	2020/11/19	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2020/11/19	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2020/11/19	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2020/11/19	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2020/11/19	ND, RDL=5.0		ug/L	
7064624	MLB	RPD	Dissolved Aluminum (Al)	2020/11/19	NC		%	20
			Dissolved Antimony (Sb)	2020/11/19	NC		%	20
			Dissolved Arsenic (As)	2020/11/19	3.0		%	20
			Dissolved Barium (Ba)	2020/11/19	0.80		%	20
			Dissolved Beryllium (Be)	2020/11/19	NC		%	20
			Dissolved Bismuth (Bi)	2020/11/19	NC		%	20
			Dissolved Boron (B)	2020/11/19	3.5		%	20
			Dissolved Cadmium (Cd)	2020/11/19	NC		%	20
			Dissolved Calcium (Ca)	2020/11/19	3.0		%	20
			Dissolved Chromium (Cr)	2020/11/19	NC		%	20
			Dissolved Cobalt (Co)	2020/11/19	NC		%	20
			Dissolved Copper (Cu)	2020/11/19	NC		%	20
			Dissolved Iron (Fe)	2020/11/19	NC		%	20
			Dissolved Lead (Pb)	2020/11/19	NC		%	20
			Dissolved Magnesium (Mg)	2020/11/19	0.73		%	20
			Dissolved Manganese (Mn)	2020/11/19	0.99		%	20
			Dissolved Molybdenum (Mo)	2020/11/19	NC		%	20
			Dissolved Nickel (Ni)	2020/11/19	NC		%	20
			Dissolved Phosphorus (P)	2020/11/19	NC		%	20
			Dissolved Potassium (K)	2020/11/19	1.7		%	20

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Selenium (Se)	2020/11/19	NC		%	20
			Dissolved Silver (Ag)	2020/11/19	NC		%	20
			Dissolved Sodium (Na)	2020/11/19	0.59		%	20
			Dissolved Strontium (Sr)	2020/11/19	0.44		%	20
			Dissolved Thallium (Tl)	2020/11/19	NC		%	20
			Dissolved Tin (Sn)	2020/11/19	NC		%	20
			Dissolved Titanium (Ti)	2020/11/19	NC		%	20
			Dissolved Uranium (U)	2020/11/19	4.2		%	20
			Dissolved Vanadium (V)	2020/11/19	NC		%	20
			Dissolved Zinc (Zn)	2020/11/19	NC		%	20
7064630	BAN	Matrix Spike	Dissolved Aluminum (Al)	2020/11/20		NC	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/20		89	%	80 - 120
			Dissolved Arsenic (As)	2020/11/20		93	%	80 - 120
			Dissolved Barium (Ba)	2020/11/20		93	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/20		94	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/20		87	%	80 - 120
			Dissolved Boron (B)	2020/11/20		93	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/20		92	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/20		89	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/20		93	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/20		92	%	80 - 120
			Dissolved Copper (Cu)	2020/11/20		88	%	80 - 120
			Dissolved Iron (Fe)	2020/11/20		105	%	80 - 120
			Dissolved Lead (Pb)	2020/11/20		92	%	80 - 120
			Dissolved Magnesium (Mg)	2020/11/20		99	%	80 - 120
			Dissolved Manganese (Mn)	2020/11/20		NC	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/20		96	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/20		94	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/20		100	%	80 - 120
			Dissolved Potassium (K)	2020/11/20		100	%	80 - 120
			Dissolved Selenium (Se)	2020/11/20		94	%	80 - 120
			Dissolved Silver (Ag)	2020/11/20		91	%	80 - 120
			Dissolved Sodium (Na)	2020/11/20		NC	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/20		94	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/20		94	%	80 - 120
			Dissolved Tin (Sn)	2020/11/20		94	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/20		97	%	80 - 120
			Dissolved Uranium (U)	2020/11/20		101	%	80 - 120
			Dissolved Vanadium (V)	2020/11/20		96	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/20		96	%	80 - 120
7064630	BAN	Spiked Blank	Dissolved Aluminum (Al)	2020/11/20		98	%	80 - 120
			Dissolved Antimony (Sb)	2020/11/20		90	%	80 - 120
			Dissolved Arsenic (As)	2020/11/20		94	%	80 - 120
			Dissolved Barium (Ba)	2020/11/20		94	%	80 - 120
			Dissolved Beryllium (Be)	2020/11/20		95	%	80 - 120
			Dissolved Bismuth (Bi)	2020/11/20		96	%	80 - 120
			Dissolved Boron (B)	2020/11/20		93	%	80 - 120
			Dissolved Cadmium (Cd)	2020/11/20		93	%	80 - 120
			Dissolved Calcium (Ca)	2020/11/20		91	%	80 - 120
			Dissolved Chromium (Cr)	2020/11/20		95	%	80 - 120
			Dissolved Cobalt (Co)	2020/11/20		94	%	80 - 120
			Dissolved Copper (Cu)	2020/11/20		93	%	80 - 120
			Dissolved Iron (Fe)	2020/11/20		100	%	80 - 120
			Dissolved Lead (Pb)	2020/11/20		95	%	80 - 120
			Dissolved Magnesium (Mg)	2020/11/20		101	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Manganese (Mn)	2020/11/20		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2020/11/20		99	%	80 - 120
			Dissolved Nickel (Ni)	2020/11/20		97	%	80 - 120
			Dissolved Phosphorus (P)	2020/11/20		99	%	80 - 120
			Dissolved Potassium (K)	2020/11/20		100	%	80 - 120
			Dissolved Selenium (Se)	2020/11/20		96	%	80 - 120
			Dissolved Silver (Ag)	2020/11/20		95	%	80 - 120
			Dissolved Sodium (Na)	2020/11/20		97	%	80 - 120
			Dissolved Strontium (Sr)	2020/11/20		98	%	80 - 120
			Dissolved Thallium (Tl)	2020/11/20		97	%	80 - 120
			Dissolved Tin (Sn)	2020/11/20		100	%	80 - 120
			Dissolved Titanium (Ti)	2020/11/20		98	%	80 - 120
			Dissolved Uranium (U)	2020/11/20		102	%	80 - 120
			Dissolved Vanadium (V)	2020/11/20		96	%	80 - 120
			Dissolved Zinc (Zn)	2020/11/20		99	%	80 - 120
7064630	BAN	Method Blank	Dissolved Aluminum (Al)	2020/11/20	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2020/11/20	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2020/11/20	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2020/11/20	ND, RDL=1.0		ug/L	
			Dissolved Beryllium (Be)	2020/11/20	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2020/11/20	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2020/11/20	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2020/11/20	ND, RDL=0.010		ug/L	
			Dissolved Calcium (Ca)	2020/11/20	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2020/11/20	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2020/11/20	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2020/11/20	ND, RDL=0.50		ug/L	
			Dissolved Iron (Fe)	2020/11/20	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2020/11/20	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2020/11/20	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2020/11/20	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2020/11/20	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2020/11/20	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2020/11/20	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2020/11/20	ND, RDL=100		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Selenium (Se)	2020/11/20	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2020/11/20	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2020/11/20	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2020/11/20	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2020/11/20	ND, RDL=0.10		ug/L	
			Dissolved Tin (Sn)	2020/11/20	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2020/11/20	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2020/11/20	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2020/11/20	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2020/11/20	ND, RDL=5.0		ug/L	
7064630	BAN	RPD	Dissolved Aluminum (Al)	2020/11/23	2.1		%	20
			Dissolved Antimony (Sb)	2020/11/23	NC		%	20
			Dissolved Arsenic (As)	2020/11/23	2.1		%	20
			Dissolved Barium (Ba)	2020/11/23	1.6		%	20
			Dissolved Beryllium (Be)	2020/11/23	NC		%	20
			Dissolved Bismuth (Bi)	2020/11/23	NC		%	20
			Dissolved Boron (B)	2020/11/23	NC		%	20
			Dissolved Cadmium (Cd)	2020/11/23	1.3		%	20
			Dissolved Calcium (Ca)	2020/11/23	0.47		%	20
			Dissolved Chromium (Cr)	2020/11/23	NC		%	20
			Dissolved Cobalt (Co)	2020/11/23	1.1		%	20
			Dissolved Copper (Cu)	2020/11/23	2.4		%	20
			Dissolved Iron (Fe)	2020/11/23	4.3		%	20
			Dissolved Lead (Pb)	2020/11/23	0.79		%	20
			Dissolved Magnesium (Mg)	2020/11/23	6.1		%	20
			Dissolved Manganese (Mn)	2020/11/23	0.38		%	20
			Dissolved Molybdenum (Mo)	2020/11/23	4.9		%	20
			Dissolved Nickel (Ni)	2020/11/23	2.2		%	20
			Dissolved Phosphorus (P)	2020/11/23	NC		%	20
			Dissolved Potassium (K)	2020/11/23	1.5		%	20
			Dissolved Selenium (Se)	2020/11/23	9.3		%	20
			Dissolved Silver (Ag)	2020/11/23	NC		%	20
			Dissolved Sodium (Na)	2020/11/23	1.3		%	20
			Dissolved Strontium (Sr)	2020/11/23	3.0		%	20
			Dissolved Thallium (Tl)	2020/11/23	NC		%	20
			Dissolved Tin (Sn)	2020/11/23	NC		%	20
			Dissolved Titanium (Ti)	2020/11/23	14		%	20
			Dissolved Uranium (U)	2020/11/23	7.2		%	20
			Dissolved Vanadium (V)	2020/11/23	NC		%	20
			Dissolved Zinc (Zn)	2020/11/23	11		%	20
7064717	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2020/11/19		NC	%	80 - 120
7064717	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/11/19		107	%	80 - 120
7064717	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/11/19	ND, RDL=5.0		mg/L	
7064717	EMT	RPD	Total Alkalinity (Total as CaCO3)	2020/11/19	4.1		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7064722	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2020/11/19		101	%	80 - 120
7064722	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/11/19		99	%	80 - 120
7064722	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/11/19	ND, RDL=1.0		mg/L	
7064722	EMT	RPD	Dissolved Chloride (Cl-)	2020/11/19	2.3		%	20
7064723	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2020/11/19		105	%	80 - 120
7064723	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/11/19		108	%	80 - 120
7064723	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/11/19	ND, RDL=2.0		mg/L	
7064723	EMT	RPD	Dissolved Sulphate (SO4)	2020/11/19	6.9		%	20
7064724	EMT	Matrix Spike	Reactive Silica (SiO2)	2020/11/19		90	%	80 - 120
7064724	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/11/19		95	%	80 - 120
7064724	EMT	Method Blank	Reactive Silica (SiO2)	2020/11/19	ND, RDL=0.50		mg/L	
7064724	EMT	RPD	Reactive Silica (SiO2)	2020/11/19	2.9		%	20
7064725	EMT	Spiked Blank	Colour	2020/11/19		98	%	80 - 120
7064725	EMT	Method Blank	Colour	2020/11/19	ND, RDL=5.0		TCU	
7064725	EMT	RPD	Colour	2020/11/19	NC		%	20
7064726	EMT	Matrix Spike	Orthophosphate (P)	2020/11/20		92	%	80 - 120
7064726	EMT	Spiked Blank	Orthophosphate (P)	2020/11/20		101	%	80 - 120
7064726	EMT	Method Blank	Orthophosphate (P)	2020/11/20	ND, RDL=0.010		mg/L	
7064726	EMT	RPD	Orthophosphate (P)	2020/11/20	6.3		%	20
7064727	EMT	Matrix Spike	Nitrate + Nitrite (N)	2020/11/19		104	%	80 - 120
7064727	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/11/19		98	%	80 - 120
7064727	EMT	Method Blank	Nitrate + Nitrite (N)	2020/11/19	ND, RDL=0.050		mg/L	
7064727	EMT	RPD	Nitrate + Nitrite (N)	2020/11/19	1.4		%	20
7064728	EMT	Matrix Spike	Nitrite (N)	2020/11/19		105	%	80 - 120
7064728	EMT	Spiked Blank	Nitrite (N)	2020/11/19		96	%	80 - 120
7064728	EMT	Method Blank	Nitrite (N)	2020/11/19	ND, RDL=0.010		mg/L	
7064728	EMT	RPD	Nitrite (N)	2020/11/19	NC		%	20
7064738	EMT	Matrix Spike [OEA239-01]	Total Alkalinity (Total as CaCO3)	2020/11/19		NC	%	80 - 120
7064738	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2020/11/19		104	%	80 - 120
7064738	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2020/11/19	ND, RDL=5.0		mg/L	
7064738	EMT	RPD [OEA239-01]	Total Alkalinity (Total as CaCO3)	2020/11/19	0.98		%	20
7064843	EMT	Matrix Spike [OEA239-01]	Dissolved Chloride (Cl-)	2020/11/19		96	%	80 - 120
7064843	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2020/11/19		93	%	80 - 120
7064843	EMT	Method Blank	Dissolved Chloride (Cl-)	2020/11/19	ND, RDL=1.0		mg/L	
7064843	EMT	RPD [OEA239-01]	Dissolved Chloride (Cl-)	2020/11/19	11		%	20
7064846	EMT	Matrix Spike [OEA239-01]	Dissolved Sulphate (SO4)	2020/11/19		99	%	80 - 120
7064846	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2020/11/19		99	%	80 - 120
7064846	EMT	Method Blank	Dissolved Sulphate (SO4)	2020/11/20	ND, RDL=2.0		mg/L	
7064846	EMT	RPD [OEA239-01]	Dissolved Sulphate (SO4)	2020/11/19	7.5		%	20
7064849	EMT	Matrix Spike [OEA239-01]	Reactive Silica (SiO2)	2020/11/19		85	%	80 - 120
7064849	EMT	Spiked Blank	Reactive Silica (SiO2)	2020/11/19		94	%	80 - 120
7064849	EMT	Method Blank	Reactive Silica (SiO2)	2020/11/19	ND, RDL=0.50		mg/L	
7064849	EMT	RPD [OEA239-01]	Reactive Silica (SiO2)	2020/11/19	0.52		%	20
7064856	EMT	Spiked Blank	Colour	2020/11/19		92	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7064856	EMT	Method Blank	Colour	2020/11/19	ND, RDL=5.0		TCU	
7064856	EMT	RPD [OEA239-01]	Colour	2020/11/19	NC		%	20
7064859	EMT	Matrix Spike [OEA239-01]	Orthophosphate (P)	2020/11/20		94	%	80 - 120
7064859	EMT	Spiked Blank	Orthophosphate (P)	2020/11/20		98	%	80 - 120
7064859	EMT	Method Blank	Orthophosphate (P)	2020/11/20	ND, RDL=0.010		mg/L	
7064859	EMT	RPD [OEA239-01]	Orthophosphate (P)	2020/11/20	NC		%	20
7064860	EMT	Matrix Spike [OEA239-01]	Nitrate + Nitrite (N)	2020/11/19		103	%	80 - 120
7064860	EMT	Spiked Blank	Nitrate + Nitrite (N)	2020/11/19		97	%	80 - 120
7064860	EMT	Method Blank	Nitrate + Nitrite (N)	2020/11/19	ND, RDL=0.050		mg/L	
7064860	EMT	RPD [OEA239-01]	Nitrate + Nitrite (N)	2020/11/19	NC		%	20
7064863	EMT	Matrix Spike [OEA239-01]	Nitrite (N)	2020/11/19		108	%	80 - 120
7064863	EMT	Spiked Blank	Nitrite (N)	2020/11/19		104	%	80 - 120
7064863	EMT	Method Blank	Nitrite (N)	2020/11/19	ND, RDL=0.010		mg/L	
7064863	EMT	RPD [OEA239-01]	Nitrite (N)	2020/11/19	NC		%	20
7064950	YLG	Matrix Spike	Total Organic Carbon (C)	2020/11/19		97	%	85 - 115
7064950	YLG	Spiked Blank	Total Organic Carbon (C)	2020/11/19		100	%	80 - 120
7064950	YLG	Method Blank	Total Organic Carbon (C)	2020/11/19	ND, RDL=0.50		mg/L	
7064950	YLG	RPD	Total Organic Carbon (C)	2020/11/19	4.6		%	15
7065083	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/11/20		100	%	80 - 120
7065083	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/11/19		106	%	80 - 120
7065083	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/11/19	ND, RDL=0.050		mg/L	
7065083	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/11/20	NC		%	20
7065085	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2020/11/20		100	%	80 - 120
7065085	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2020/11/20		100	%	80 - 120
7065085	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2020/11/20	ND, RDL=0.050		mg/L	
7065085	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2020/11/20	NC		%	20
7066866	SHW	Spiked Blank	Conductivity	2020/11/20		99	%	80 - 120
7066866	SHW	Method Blank	Conductivity	2020/11/20	ND, RDL=1.0		uS/cm	
7066866	SHW	RPD	Conductivity	2020/11/20	0.29		%	10
7066868	SHW	Spiked Blank	pH	2020/11/20		100	%	97 - 103
7066868	SHW	RPD	pH	2020/11/20	0.98		%	N/A
7066870	SHW	Matrix Spike	Dissolved Fluoride (F-)	2020/11/20		93	%	80 - 120
7066870	SHW	Spiked Blank	Dissolved Fluoride (F-)	2020/11/20		104	%	80 - 120
7066870	SHW	Method Blank	Dissolved Fluoride (F-)	2020/11/20	ND, RDL=0.10		mg/L	
7066870	SHW	RPD	Dissolved Fluoride (F-)	2020/11/20	0		%	20
7067029	YLG	Matrix Spike	Total Organic Carbon (C)	2020/11/20		94	%	85 - 115
7067029	YLG	Spiked Blank	Total Organic Carbon (C)	2020/11/20		102	%	80 - 120
7067029	YLG	Method Blank	Total Organic Carbon (C)	2020/11/20	ND, RDL=0.50		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7067029	YLG	RPD	Total Organic Carbon (C)	2020/11/20	0.91		%	15

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Elevated reporting limit due to turbidity.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

<Original signed by>

Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Your C.O.C. #: 819966-02-01, 819966-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/05/11
Report #: R6629001
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1C1120
Received: 2021/05/04, 10:22

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide (1)	12	N/A	2021/05/07	N/A	SM 23 4500-CO2 D
Alkalinity (1)	12	N/A	2021/05/10	ATL SOP 00013	EPA 310.2 R1974 m
Chloride (1)	12	N/A	2021/05/10	ATL SOP 00014	SM 23 4500-Cl- E m
Colour (1)	12	N/A	2021/05/10	ATL SOP 00020	SM 23 2120C m
Conductance - water (1)	12	N/A	2021/05/07	ATL SOP 00004	SM 23 2510B m
Fluoride (1)	12	N/A	2021/05/07	ATL SOP 00043	SM 23 4500-F- C m
Hardness (calculated as CaCO3) (1)	12	N/A	2021/05/10	ATL SOP 00048	Auto Calc
Mercury - Total (CVAA,LL) (1)	12	2021/05/06	2021/05/07	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Diss. MS (as rec'd) (1)	12	N/A	2021/05/07	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference) (1)	12	N/A	2021/05/11	N/A	Auto Calc.
Anion and Cation Sum (1)	12	N/A	2021/05/11	N/A	Auto Calc.
Nitrogen Ammonia - water (1)	12	N/A	2021/05/10	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite (1)	12	N/A	2021/05/10	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite (1)	12	N/A	2021/05/10	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N) (1)	12	N/A	2021/05/11	ATL SOP 00018	ASTM D3867-16
pH (1, 2)	12	N/A	2021/05/07	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho (1)	12	N/A	2021/05/10	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C) (1)	12	N/A	2021/05/11	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	12	N/A	2021/05/11	ATL SOP 00049	Auto Calc.
Reactive Silica (1)	12	N/A	2021/05/10	ATL SOP 00022	EPA 366.0 m
Sulphate (1)	12	N/A	2021/05/10	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc) (1)	12	N/A	2021/05/11	N/A	Auto Calc.
Organic carbon - Total (TOC) (1, 3)	12	N/A	2021/05/07	ATL SOP 00203	SM 23 5310B m
Turbidity (1)	12	N/A	2021/05/07	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement

Your C.O.C. #: 819966-02-01, 819966-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/05/11
Report #: R6629001
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1C1120
Received: 2021/05/04, 10:22

Uncertainty has not been accounted for when stating conformity to the referenced standard.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Bedford
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key <Original signed by>

Tyler Travers
Project Manager Assistant
11 May 2021 10:55:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Heather Macumber, Senior Project Manager
Email: Heather.MACUMBER@bureauveritas.com
Phone# (902)420-0203 Ext:226
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO079		PMO080			PMO080		
Sampling Date		2021/04/29		2021/04/29			2021/04/29		
COC Number		819966-01-01		819966-01-01			819966-01-01		
Sample #		M AQPOR		M+L SED			M+L SED		
	UNITS	M AQPOR	QC Batch	M+L SED	RDL	QC Batch	M+L SED Lab-Dup	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	0.980	7336939	0.970	N/A	7336939			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	47	7336935	46	1.0	7336935			
Calculated TDS	mg/L	49	7336943	49	1.0	7336943			
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7336935	ND	1.0	7336935			
Cation Sum	me/L	0.900	7336939	0.860	N/A	7336939			
Hardness (CaCO3)	mg/L	43	7336937	39	1.0	7336937			
Ion Balance (% Difference)	%	4.26	7336938	6.01	N/A	7336938			
Langelier Index (@ 20C)	N/A	-0.594	7336941	-0.467		7336941			
Langelier Index (@ 4C)	N/A	-0.846	7336942	-0.719		7336942			
Nitrate (N)	mg/L	ND	7336940	ND	0.050	7336940			
Saturation pH (@ 20C)	N/A	8.43	7336941	8.53		7336941			
Saturation pH (@ 4C)	N/A	8.68	7336942	8.78		7336942			
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	47	7340181	47	5.0	7340181			
Dissolved Chloride (Cl-)	mg/L	1.3	7340288	1.2	1.0	7340288			
Colour	TCU	ND	7340291	ND	5.0	7340291			
Nitrate + Nitrite (N)	mg/L	ND	7340297	ND	0.050	7340297			
Nitrite (N)	mg/L	ND	7340298	ND	0.010	7340298			
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7342635	ND	0.050	7342635			
Total Organic Carbon (C)	mg/L	ND (1)	7339789	ND (1)	5.0	7339789			
Orthophosphate (P)	mg/L	ND	7340296	ND	0.010	7340296			
pH	pH	7.83	7339264	8.06		7339264			
Reactive Silica (SiO2)	mg/L	1.5	7340290	2.1	0.50	7340290			
Dissolved Sulphate (SO4)	mg/L	ND	7340289	ND	2.0	7340289			
Turbidity	NTU	1.0	7339373	53	0.10	7339380	50	0.10	7339380
Conductivity	uS/cm	80	7339262	80	1.0	7339262			
Metals									
Dissolved Aluminum (Al)	ug/L	43	7339448	60	5.0	7339448			
Dissolved Antimony (Sb)	ug/L	ND	7339448	ND	1.0	7339448			
Dissolved Arsenic (As)	ug/L	ND	7339448	ND	1.0	7339448			
Dissolved Barium (Ba)	ug/L	1.8	7339448	1.8	1.0	7339448			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to turbidity.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO079		PMO080			PMO080		
Sampling Date		2021/04/29		2021/04/29			2021/04/29		
COC Number		819966-01-01		819966-01-01			819966-01-01		
Sample #		M AQPOR		M+L SED			M+L SED		
	UNITS	M AQPOR	QC Batch	M+L SED	RDL	QC Batch	M+L SED Lab-Dup	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	7339448	ND	1.0	7339448			
Dissolved Bismuth (Bi)	ug/L	ND	7339448	ND	2.0	7339448			
Dissolved Boron (B)	ug/L	ND	7339448	ND	50	7339448			
Dissolved Cadmium (Cd)	ug/L	ND	7339448	ND	0.010	7339448			
Dissolved Calcium (Ca)	ug/L	16000	7339448	13000	100	7339448			
Dissolved Chromium (Cr)	ug/L	ND	7339448	ND	1.0	7339448			
Dissolved Cobalt (Co)	ug/L	ND	7339448	ND	0.40	7339448			
Dissolved Copper (Cu)	ug/L	ND	7339448	0.68	0.50	7339448			
Dissolved Iron (Fe)	ug/L	ND	7339448	ND	50	7339448			
Dissolved Lead (Pb)	ug/L	ND	7339448	ND	0.50	7339448			
Dissolved Magnesium (Mg)	ug/L	750	7339448	1700	100	7339448			
Dissolved Manganese (Mn)	ug/L	51	7339448	40	2.0	7339448			
Dissolved Molybdenum (Mo)	ug/L	ND	7339448	ND	2.0	7339448			
Dissolved Nickel (Ni)	ug/L	ND	7339448	ND	2.0	7339448			
Dissolved Phosphorus (P)	ug/L	ND	7339448	ND	100	7339448			
Dissolved Potassium (K)	ug/L	420	7339448	1900	100	7339448			
Dissolved Selenium (Se)	ug/L	ND	7339448	ND	0.50	7339448			
Dissolved Silver (Ag)	ug/L	ND	7339448	ND	0.10	7339448			
Dissolved Sodium (Na)	ug/L	550	7339448	690	100	7339448			
Dissolved Strontium (Sr)	ug/L	38	7339448	64	2.0	7339448			
Dissolved Thallium (Tl)	ug/L	ND	7339448	ND	0.10	7339448			
Dissolved Tin (Sn)	ug/L	ND	7339448	ND	2.0	7339448			
Dissolved Titanium (Ti)	ug/L	ND	7339448	ND	2.0	7339448			
Dissolved Uranium (U)	ug/L	0.27	7339448	1.0	0.10	7339448			
Dissolved Vanadium (V)	ug/L	ND	7339448	ND	2.0	7339448			
Dissolved Zinc (Zn)	ug/L	ND	7339448	ND	5.0	7339448			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO081		PMO082		PMO083	PMO084		
Sampling Date		2021/04/29		2021/04/29		2021/04/29	2021/04/29		
COC Number		819966-01-01		819966-01-01		819966-01-01	819966-01-01		
Sample #		M+L MD		M QE-POR		M QZ-QE-POR-QTP-MIN	SZ+V QE-POR		
	UNITS	**M+L MD**	**RDL**	**M QE-POR**	**RDL**	**M QZ-QE-POR-QTP-MIN**	**SZ+V QE-POR**	**RDL**	**QC Batch**
Calculated Parameters									
Anion Sum	me/L	1.14	N/A	2.65	N/A	0.710	1.08	N/A	7336939
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	52	1.0	57	1.0	34	49	1.0	7336935
Calculated TDS	mg/L	57	1.0	160	1.0	36	54	1.0	7336943
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	ND	1.0	ND	ND	1.0	7336935
Cation Sum	me/L	1.02	N/A	2.42	N/A	0.650	0.930	N/A	7336939
Hardness (CaCO3)	mg/L	49	1.0	120	1.0	31	44	1.0	7336937
Ion Balance (% Difference)	%	5.56	N/A	4.54	N/A	4.41	7.46	N/A	7336938
Langelier Index (@ 20C)	N/A	-0.355		-0.0130		-0.944	-0.485		7336941
Langelier Index (@ 4C)	N/A	-0.607		-0.264		-1.20	-0.736		7336942
Nitrate (N)	mg/L	0.078	0.050	ND	0.050	ND	ND	0.050	7336940
Saturation pH (@ 20C)	N/A	8.34		7.96		8.70	8.41		7336941
Saturation pH (@ 4C)	N/A	8.59		8.21		8.95	8.66		7336942
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	52	5.0	57	5.0	34	49	5.0	7340181
Dissolved Chloride (Cl-)	mg/L	1.6	1.0	1.2	1.0	1.0	1.6	1.0	7340288
Colour	TCU	ND	5.0	ND	5.0	ND	ND	5.0	7340291
Nitrate + Nitrite (N)	mg/L	0.078	0.050	ND	0.050	ND	ND	0.050	7340297
Nitrite (N)	mg/L	ND	0.010	ND	0.010	ND	ND	0.010	7340298
Nitrogen (Ammonia Nitrogen)	mg/L	0.065	0.050	ND	0.050	ND	ND	0.050	7342635
Total Organic Carbon (C)	mg/L	0.66	0.50	ND (1)	5.0	1.2	ND	0.50	7339797
Orthophosphate (P)	mg/L	ND	0.010	ND	0.010	ND	ND	0.010	7340296
pH	pH	7.99		7.94		7.75	7.93		7339264
Reactive Silica (SiO2)	mg/L	1.0	0.50	2.8	0.50	1.1	1.7	0.50	7340290
Dissolved Sulphate (SO4)	mg/L	2.5	2.0	71	2.0	ND	2.4	2.0	7340289
Turbidity	NTU	5.1	0.10	2.3	0.10	3.0	12	0.10	7339373
Conductivity	uS/cm	94	1.0	230	1.0	59	86	1.0	7339262
Metals									
Dissolved Aluminum (Al)	ug/L	79	5.0	29	5.0	63	55	5.0	7339448
Dissolved Antimony (Sb)	ug/L	ND	1.0	ND	1.0	ND	ND	1.0	7339448
Dissolved Arsenic (As)	ug/L	ND	1.0	ND	1.0	ND	ND	1.0	7339448
Dissolved Barium (Ba)	ug/L	35	1.0	7.9	1.0	3.9	1.1	1.0	7339448

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to turbidity.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO081		PMO082		PMO083	PMO084		
Sampling Date		2021/04/29		2021/04/29		2021/04/29	2021/04/29		
COC Number		819966-01-01		819966-01-01		819966-01-01	819966-01-01		
Sample #		M+L MD		M QE-POR		M QZ-QE-POR-QTP-MIN	SZ+V QE-POR		
	UNITS	**M+L MD**	**RDL**	**M QE-POR**	**RDL**	**M QZ-QE-POR-QTP-MIN**	**SZ+V QE-POR**	**RDL**	**QC Batch**
Dissolved Beryllium (Be)	ug/L	ND	1.0	ND	1.0	ND	ND	1.0	7339448
Dissolved Bismuth (Bi)	ug/L	ND	2.0	ND	2.0	ND	ND	2.0	7339448
Dissolved Boron (B)	ug/L	ND	50	ND	50	ND	ND	50	7339448
Dissolved Cadmium (Cd)	ug/L	ND	0.010	ND	0.010	ND	ND	0.010	7339448
Dissolved Calcium (Ca)	ug/L	18000	100	45000	100	12000	16000	100	7339448
Dissolved Chromium (Cr)	ug/L	ND	1.0	ND	1.0	ND	ND	1.0	7339448
Dissolved Cobalt (Co)	ug/L	ND	0.40	ND	0.40	ND	ND	0.40	7339448
Dissolved Copper (Cu)	ug/L	0.73	0.50	ND	0.50	ND	0.57	0.50	7339448
Dissolved Iron (Fe)	ug/L	ND	50	ND	50	ND	ND	50	7339448
Dissolved Lead (Pb)	ug/L	ND	0.50	ND	0.50	ND	ND	0.50	7339448
Dissolved Magnesium (Mg)	ug/L	850	100	1200	100	400	940	100	7339448
Dissolved Manganese (Mn)	ug/L	57	2.0	29	2.0	51	22	2.0	7339448
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	ND	2.0	ND	ND	2.0	7339448
Dissolved Nickel (Ni)	ug/L	ND	2.0	ND	2.0	ND	ND	2.0	7339448
Dissolved Phosphorus (P)	ug/L	ND	100	ND	100	ND	ND	100	7339448
Dissolved Potassium (K)	ug/L	270	100	870	100	250	490	100	7339448
Dissolved Selenium (Se)	ug/L	ND	0.50	ND	0.50	ND	ND	0.50	7339448
Dissolved Silver (Ag)	ug/L	ND	0.10	ND	0.10	ND	ND	0.10	7339448
Dissolved Sodium (Na)	ug/L	740	100	800	100	570	760	100	7339448
Dissolved Strontium (Sr)	ug/L	51	2.0	120	2.0	23	21	2.0	7339448
Dissolved Thallium (Tl)	ug/L	ND	0.10	ND	0.10	ND	ND	0.10	7339448
Dissolved Tin (Sn)	ug/L	ND	2.0	ND	2.0	ND	ND	2.0	7339448
Dissolved Titanium (Ti)	ug/L	ND	2.0	ND	2.0	ND	ND	2.0	7339448
Dissolved Uranium (U)	ug/L	ND	0.10	0.39	0.10	0.11	0.30	0.10	7339448
Dissolved Vanadium (V)	ug/L	ND	2.0	ND	2.0	ND	ND	2.0	7339448
Dissolved Zinc (Zn)	ug/L	ND	5.0	ND	5.0	ND	ND	5.0	7339448

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO084			PMO085			PMO085		
Sampling Date		2021/04/29			2021/04/29			2021/04/29		
COC Number		819966-01-01			819966-01-01			819966-01-01		
Sample #		SZ+V QE-POR			L QZ-TQTP+QZ-QTP			L QZ-TQTP+QZ-QTP		
	UNITS	SZ+V QE-POR Lab-Dup	RDL	QC Batch	L QZ-TQTP+QZ-QTP	RDL	QC Batch	L QZ-TQTP+QZ-QTP Lab-Dup	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L				0.740	N/A	7336939			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				35	1.0	7336935			
Calculated TDS	mg/L				37	1.0	7336943			
Carb. Alkalinity (calc. as CaCO3)	mg/L				ND	1.0	7336935			
Cation Sum	me/L				0.680	N/A	7336939			
Hardness (CaCO3)	mg/L				33	1.0	7336937			
Ion Balance (% Difference)	%				4.23	N/A	7336938			
Langelier Index (@ 20C)	N/A				-0.882		7336941			
Langelier Index (@ 4C)	N/A				-1.13		7336942			
Nitrate (N)	mg/L				ND	0.050	7336940			
Saturation pH (@ 20C)	N/A				8.67		7336941			
Saturation pH (@ 4C)	N/A				8.92		7336942			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	48	5.0	7340181	36	5.0	7340181			
Dissolved Chloride (Cl-)	mg/L	1.5	1.0	7340288	1.1	1.0	7340288			
Colour	TCU	ND	5.0	7340291	ND	5.0	7340291			
Nitrate + Nitrite (N)	mg/L	ND	0.050	7340297	ND	0.050	7340297			
Nitrite (N)	mg/L	ND	0.010	7340298	ND	0.010	7340298			
Nitrogen (Ammonia Nitrogen)	mg/L				ND	0.050	7342635			
Total Organic Carbon (C)	mg/L				1.1	0.50	7339797	1.0	0.50	7339797
Orthophosphate (P)	mg/L	ND	0.010	7340296	ND	0.010	7340296			
pH	pH				7.79		7339264			
Reactive Silica (SiO2)	mg/L	1.7	0.50	7340290	1.2	0.50	7340290			
Dissolved Sulphate (SO4)	mg/L	2.4	2.0	7340289	ND	2.0	7340289			
Turbidity	NTU				2.0	0.10	7339373			
Conductivity	uS/cm				62	1.0	7339262			
Metals										
Dissolved Aluminum (Al)	ug/L				72	5.0	7339448			
Dissolved Antimony (Sb)	ug/L				ND	1.0	7339448			
Dissolved Arsenic (As)	ug/L				ND	1.0	7339448			
Dissolved Barium (Ba)	ug/L				4.0	1.0	7339448			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO084			PMO085			PMO085		
Sampling Date		2021/04/29			2021/04/29			2021/04/29		
COC Number		819966-01-01			819966-01-01			819966-01-01		
Sample #		SZ+V QE-POR			L QZ-TQTP+QZ-QTP			L QZ-TQTP+QZ-QTP		
	UNITS	SZ+V QE-POR Lab-Dup	RDL	QC Batch	L QZ-TQTP+QZ-QTP	RDL	QC Batch	L QZ-TQTP+QZ-QTP Lab-Dup	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L				ND	1.0	7339448			
Dissolved Bismuth (Bi)	ug/L				ND	2.0	7339448			
Dissolved Boron (B)	ug/L				ND	50	7339448			
Dissolved Cadmium (Cd)	ug/L				ND	0.010	7339448			
Dissolved Calcium (Ca)	ug/L				12000	100	7339448			
Dissolved Chromium (Cr)	ug/L				ND	1.0	7339448			
Dissolved Cobalt (Co)	ug/L				ND	0.40	7339448			
Dissolved Copper (Cu)	ug/L				0.61	0.50	7339448			
Dissolved Iron (Fe)	ug/L				ND	50	7339448			
Dissolved Lead (Pb)	ug/L				ND	0.50	7339448			
Dissolved Magnesium (Mg)	ug/L				660	100	7339448			
Dissolved Manganese (Mn)	ug/L				54	2.0	7339448			
Dissolved Molybdenum (Mo)	ug/L				ND	2.0	7339448			
Dissolved Nickel (Ni)	ug/L				ND	2.0	7339448			
Dissolved Phosphorus (P)	ug/L				ND	100	7339448			
Dissolved Potassium (K)	ug/L				420	100	7339448			
Dissolved Selenium (Se)	ug/L				ND	0.50	7339448			
Dissolved Silver (Ag)	ug/L				ND	0.10	7339448			
Dissolved Sodium (Na)	ug/L				570	100	7339448			
Dissolved Strontium (Sr)	ug/L				48	2.0	7339448			
Dissolved Thallium (Tl)	ug/L				ND	0.10	7339448			
Dissolved Tin (Sn)	ug/L				ND	2.0	7339448			
Dissolved Titanium (Ti)	ug/L				ND	2.0	7339448			
Dissolved Uranium (U)	ug/L				0.33	0.10	7339448			
Dissolved Vanadium (V)	ug/L				ND	2.0	7339448			
Dissolved Zinc (Zn)	ug/L				ND	5.0	7339448			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO086			PMO086			PMO087		
Sampling Date		2021/04/29			2021/04/29			2021/04/29		
COC Number		819966-01-01			819966-01-01			819966-01-01		
Sample #		L TRJ			L TRJ			V QE-POR-QTP		
	UNITS	L TRJ	RDL	QC Batch	L TRJ Lab-Dup	RDL	QC Batch	V QE-POR-QTP	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	0.950	N/A	7336939				0.730	N/A	7336939
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	45	1.0	7336935				35	1.0	7336935
Calculated TDS	mg/L	47	1.0	7336943				36	1.0	7336943
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7336935				ND	1.0	7336935
Cation Sum	me/L	0.840	N/A	7336939				0.660	N/A	7336939
Hardness (CaCO3)	mg/L	39	1.0	7336937				32	1.0	7336937
Ion Balance (% Difference)	%	6.15	N/A	7336938				5.04	N/A	7336938
Langelier Index (@ 20C)	N/A	-0.593		7336941				-0.967		7336941
Langelier Index (@ 4C)	N/A	-0.844		7336942				-1.22		7336942
Nitrate (N)	mg/L	ND	0.050	7336940				ND	0.050	7336940
Saturation pH (@ 20C)	N/A	8.50		7336941				8.68		7336941
Saturation pH (@ 4C)	N/A	8.75		7336942				8.93		7336942
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	45	5.0	7340352	44	5.0	7340352	35	5.0	7340181
Dissolved Chloride (Cl-)	mg/L	1.4	1.0	7342472	1.3	1.0	7342472	1.1	1.0	7340288
Colour	TCU	ND	5.0	7342475	ND	5.0	7342475	ND	5.0	7340291
Nitrate + Nitrite (N)	mg/L	ND	0.050	7342478	ND	0.050	7342478	ND	0.050	7340297
Nitrite (N)	mg/L	ND	0.010	7342479	ND	0.010	7342479	ND	0.010	7340298
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7342635				ND	0.050	7342635
Total Organic Carbon (C)	mg/L	ND (1)	5.0	7339789				ND (1)	5.0	7339789
Orthophosphate (P)	mg/L	ND	0.010	7342476	ND	0.010	7342476	0.051	0.010	7340296
pH	pH	7.91		7339264				7.71		7339264
Reactive Silica (SiO2)	mg/L	1.8	0.50	7342474	1.9	0.50	7342474	0.85	0.50	7340290
Dissolved Sulphate (SO4)	mg/L	ND	2.0	7342473	2.0	2.0	7342473	ND	2.0	7340289
Turbidity	NTU	1.6	0.10	7339373				3.5	0.10	7339373
Conductivity	uS/cm	76	1.0	7339262				61	1.0	7339262
Metals										
Dissolved Aluminum (Al)	ug/L	77	5.0	7339448	77	5.0	7339448	59	5.0	7339448
Dissolved Antimony (Sb)	ug/L	ND	1.0	7339448	ND	1.0	7339448	ND	1.0	7339448
Dissolved Arsenic (As)	ug/L	ND	1.0	7339448	ND	1.0	7339448	ND	1.0	7339448
Dissolved Barium (Ba)	ug/L	37	1.0	7339448	36	1.0	7339448	ND	1.0	7339448

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to turbidity.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO086			PMO086			PMO087		
Sampling Date		2021/04/29			2021/04/29			2021/04/29		
COC Number		819966-01-01			819966-01-01			819966-01-01		
Sample #		L TRJ			L TRJ			V QE-POR-QTP		
	UNITS	L TRJ	RDL	QC Batch	L TRJ Lab-Dup	RDL	QC Batch	V QE-POR-QTP	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	1.0	7339448	ND	1.0	7339448	ND	1.0	7339448
Dissolved Bismuth (Bi)	ug/L	ND	2.0	7339448	ND	2.0	7339448	ND	2.0	7339448
Dissolved Boron (B)	ug/L	ND	50	7339448	ND	50	7339448	ND	50	7339448
Dissolved Cadmium (Cd)	ug/L	ND	0.010	7339448	ND	0.010	7339448	ND	0.010	7339448
Dissolved Calcium (Ca)	ug/L	14000	100	7339448	14000	100	7339448	12000	100	7339448
Dissolved Chromium (Cr)	ug/L	ND	1.0	7339448	ND	1.0	7339448	ND	1.0	7339448
Dissolved Cobalt (Co)	ug/L	ND	0.40	7339448	ND	0.40	7339448	ND	0.40	7339448
Dissolved Copper (Cu)	ug/L	ND	0.50	7339448	ND	0.50	7339448	ND	0.50	7339448
Dissolved Iron (Fe)	ug/L	ND	50	7339448	ND	50	7339448	ND	50	7339448
Dissolved Lead (Pb)	ug/L	ND	0.50	7339448	ND	0.50	7339448	ND	0.50	7339448
Dissolved Magnesium (Mg)	ug/L	960	100	7339448	960	100	7339448	420	100	7339448
Dissolved Manganese (Mn)	ug/L	32	2.0	7339448	32	2.0	7339448	91	2.0	7339448
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	7339448	ND	2.0	7339448	ND	2.0	7339448
Dissolved Nickel (Ni)	ug/L	ND	2.0	7339448	ND	2.0	7339448	ND	2.0	7339448
Dissolved Phosphorus (P)	ug/L	ND	100	7339448	ND	100	7339448	ND	100	7339448
Dissolved Potassium (K)	ug/L	670	100	7339448	640	100	7339448	ND	100	7339448
Dissolved Selenium (Se)	ug/L	ND	0.50	7339448	ND	0.50	7339448	ND	0.50	7339448
Dissolved Silver (Ag)	ug/L	ND	0.10	7339448	ND	0.10	7339448	ND	0.10	7339448
Dissolved Sodium (Na)	ug/L	760	100	7339448	760	100	7339448	490	100	7339448
Dissolved Strontium (Sr)	ug/L	87	2.0	7339448	87	2.0	7339448	12	2.0	7339448
Dissolved Thallium (Tl)	ug/L	ND	0.10	7339448	ND	0.10	7339448	ND	0.10	7339448
Dissolved Tin (Sn)	ug/L	ND	2.0	7339448	ND	2.0	7339448	ND	2.0	7339448
Dissolved Titanium (Ti)	ug/L	ND	2.0	7339448	ND	2.0	7339448	ND	2.0	7339448
Dissolved Uranium (U)	ug/L	0.38	0.10	7339448	0.39	0.10	7339448	0.12	0.10	7339448
Dissolved Vanadium (V)	ug/L	ND	2.0	7339448	ND	2.0	7339448	ND	2.0	7339448
Dissolved Zinc (Zn)	ug/L	ND	5.0	7339448	ND	5.0	7339448	ND	5.0	7339448

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO088	PMO089			PMO090		
Sampling Date		2021/04/29	2021/04/29			2021/04/29		
COC Number		819966-01-01	819966-02-01			819966-02-01		
Sample #		MAR HL	LEP HL			FLBK		
	UNITS	Mar HL	Lep HL	RDL	QC Batch	FLBK	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	1.54	1.49	N/A	7336939	0.150	N/A	7336939
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	73	72	1.0	7336935	5.3	1.0	7336935
Calculated TDS	mg/L	79	75	1.0	7336943	6.0	1.0	7336943
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	ND	1.0	7336935	ND	1.0	7336935
Cation Sum	me/L	1.42	1.40	N/A	7336939	0.0800	N/A	7336939
Hardness (CaCO3)	mg/L	68	65	1.0	7336937	2.1	1.0	7336937
Ion Balance (% Difference)	%	4.05	3.11	N/A	7336938	30.4	N/A	7336938
Langelier Index (@ 20C)	N/A	-0.0530	-0.0630		7336941	-4.10		7336941
Langelier Index (@ 4C)	N/A	-0.304	-0.313		7336942	-4.35		7336942
Nitrate (N)	mg/L	ND	ND	0.050	7336940	ND	0.050	7336940
Saturation pH (@ 20C)	N/A	8.10	8.17		7336941	10.7		7336941
Saturation pH (@ 4C)	N/A	8.36	8.42		7336942	11.0		7336942
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	73	73	5.0	7340181	5.3	5.0	7340181
Dissolved Chloride (Cl-)	mg/L	ND	1.1	1.0	7340288	1.5	1.0	7340288
Colour	TCU	ND	ND	5.0	7340291	ND	5.0	7340291
Nitrate + Nitrite (N)	mg/L	ND	ND	0.050	7340297	ND	0.050	7340297
Nitrite (N)	mg/L	ND	ND	0.010	7340298	ND	0.010	7340298
Nitrogen (Ammonia Nitrogen)	mg/L	ND	ND	0.050	7342635	ND	0.050	7342635
Total Organic Carbon (C)	mg/L	ND (1)	ND (1)	5.0	7339789	1.3	0.50	7339797
Orthophosphate (P)	mg/L	ND	ND	0.010	7340296	ND	0.010	7340296
pH	pH	8.05	8.11		7339264	6.63		7339264
Reactive Silica (SiO2)	mg/L	3.7	3.4	0.50	7340290	ND	0.50	7340290
Dissolved Sulphate (SO4)	mg/L	3.6	ND	2.0	7340289	ND	2.0	7340289
Turbidity	NTU	7.8	22	0.10	7339375	1.4	0.10	7339375
Conductivity	uS/cm	130	120	1.0	7339262	9.8	1.0	7339262
Metals								
Dissolved Aluminum (Al)	ug/L	56	57	5.0	7339448	ND	5.0	7339448
Dissolved Antimony (Sb)	ug/L	ND	ND	1.0	7339448	ND	1.0	7339448
Dissolved Arsenic (As)	ug/L	ND	ND	1.0	7339448	ND	1.0	7339448
Dissolved Barium (Ba)	ug/L	14	6.2	1.0	7339448	ND	1.0	7339448

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to turbidity.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PMO088	PMO089			PMO090		
Sampling Date		2021/04/29	2021/04/29			2021/04/29		
COC Number		819966-01-01	819966-02-01			819966-02-01		
Sample #		MAR HL	LEP HL			FLBK		
	UNITS	Mar HL	Lep HL	RDL	QC Batch	FLBK	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	ND	1.0	7339448	ND	1.0	7339448
Dissolved Bismuth (Bi)	ug/L	ND	ND	2.0	7339448	ND	2.0	7339448
Dissolved Boron (B)	ug/L	ND	ND	50	7339448	ND	50	7339448
Dissolved Cadmium (Cd)	ug/L	ND	ND	0.010	7339448	0.010	0.010	7339448
Dissolved Calcium (Ca)	ug/L	23000	20000	100	7339448	630	100	7339448
Dissolved Chromium (Cr)	ug/L	ND	ND	1.0	7339448	ND	1.0	7339448
Dissolved Cobalt (Co)	ug/L	ND	ND	0.40	7339448	ND	0.40	7339448
Dissolved Copper (Cu)	ug/L	0.64	0.56	0.50	7339448	ND	0.50	7339448
Dissolved Iron (Fe)	ug/L	ND	ND	50	7339448	ND	50	7339448
Dissolved Lead (Pb)	ug/L	ND	ND	0.50	7339448	ND	0.50	7339448
Dissolved Magnesium (Mg)	ug/L	2400	3700	100	7339448	120	100	7339448
Dissolved Manganese (Mn)	ug/L	39	26	2.0	7339448	3.1	2.0	7339448
Dissolved Molybdenum (Mo)	ug/L	2.4	ND	2.0	7339448	ND	2.0	7339448
Dissolved Nickel (Ni)	ug/L	ND	ND	2.0	7339448	ND	2.0	7339448
Dissolved Phosphorus (P)	ug/L	ND	ND	100	7339448	ND	100	7339448
Dissolved Potassium (K)	ug/L	1000	1400	100	7339448	ND	100	7339448
Dissolved Selenium (Se)	ug/L	ND	ND	0.50	7339448	ND	0.50	7339448
Dissolved Silver (Ag)	ug/L	ND	ND	0.10	7339448	ND	0.10	7339448
Dissolved Sodium (Na)	ug/L	1000	1400	100	7339448	870	100	7339448
Dissolved Strontium (Sr)	ug/L	59	110	2.0	7339448	ND	2.0	7339448
Dissolved Thallium (Tl)	ug/L	ND	ND	0.10	7339448	ND	0.10	7339448
Dissolved Tin (Sn)	ug/L	ND	ND	2.0	7339448	ND	2.0	7339448
Dissolved Titanium (Ti)	ug/L	ND	ND	2.0	7339448	ND	2.0	7339448
Dissolved Uranium (U)	ug/L	0.26	1.8	0.10	7339448	ND	0.10	7339448
Dissolved Vanadium (V)	ug/L	ND	ND	2.0	7339448	ND	2.0	7339448
Dissolved Zinc (Zn)	ug/L	ND	ND	5.0	7339448	6.1	5.0	7339448

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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RESULTS OF ANALYSES OF WATER

BV Labs ID		PMO079	PMO080	PMO081	PMO082	PMO083		
Sampling Date		2021/04/29	2021/04/29	2021/04/29	2021/04/29	2021/04/29		
COC Number		819966-01-01	819966-01-01	819966-01-01	819966-01-01	819966-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Inorganics								
Dissolved Fluoride (F-)	mg/L	ND	ND	ND	ND	ND	0.10	7339266

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		PMO084	PMO085	PMO086	PMO087	PMO088	PMO089		
Sampling Date		2021/04/29	2021/04/29	2021/04/29	2021/04/29	2021/04/29	2021/04/29		
COC Number		819966-01-01	819966-01-01	819966-01-01	819966-01-01	819966-01-01	819966-02-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL	LEP HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**Lep HL**	**RDL**	**QC Batch**
Inorganics									
Dissolved Fluoride (F-)	mg/L	ND	ND	ND	ND	ND	ND	0.10	7339266

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		PMO090		
Sampling Date		2021/04/29		
COC Number		819966-02-01		
Sample #		FLBK		
	UNITS	**FLBK**	**RDL**	**QC Batch**
Inorganics				
Dissolved Fluoride (F-)	mg/L	ND	0.10	7339266

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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MERCURY BY COLD VAPOUR AA (WATER)

BV Labs ID		PMO079	PMO080	PMO081	PMO082	PMO083		
Sampling Date		2021/04/29	2021/04/29	2021/04/29	2021/04/29	2021/04/29		
COC Number		819966-01-01	819966-01-01	819966-01-01	819966-01-01	819966-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Metals								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.013	7337559

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		PMO084	PMO085	PMO086	PMO087	PMO088		
Sampling Date		2021/04/29	2021/04/29	2021/04/29	2021/04/29	2021/04/29		
COC Number		819966-01-01	819966-01-01	819966-01-01	819966-01-01	819966-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
Metals								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.013	7337559

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		PMO089	PMO090		
Sampling Date		2021/04/29	2021/04/29		
COC Number		819966-02-01	819966-02-01		
Sample #		LEP HL	FLBK		
	UNITS	**Lep HL**	**FLBK**	**RDL**	**QC Batch**
Metals					
Total Mercury (Hg)	ug/L	ND	ND	0.013	7337559

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.6°C

Sample PMO080 [M+L SED] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample PMO081 [M+L MD] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample PMO084 [SZ+V QE-POR] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample PMO086 [L TRJ] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample PMO087 [V QE-POR-QTP] : ortho-Phosphate > Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent. RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample PMO090 [FLBK] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7337559	NHU	Matrix Spike [PMO079-05]	Total Mercury (Hg)	2021/05/07		105	%	80 - 120
7337559	NHU	Spiked Blank	Total Mercury (Hg)	2021/05/07		103	%	80 - 120
7337559	NHU	Method Blank	Total Mercury (Hg)	2021/05/07	ND, RDL=0.013		ug/L	
7337559	NHU	RPD	Total Mercury (Hg)	2021/05/07	0		%	20
7339262	SHW	Spiked Blank	Conductivity	2021/05/07		99	%	80 - 120
7339262	SHW	Method Blank	Conductivity	2021/05/07	ND, RDL=1.0		uS/cm	
7339262	SHW	RPD	Conductivity	2021/05/07	0.97		%	10
7339264	SHW	Spiked Blank	pH	2021/05/07		100	%	97 - 103
7339264	SHW	RPD	pH	2021/05/07	3.4		%	N/A
7339266	SHW	Matrix Spike	Dissolved Fluoride (F-)	2021/05/07		90	%	80 - 120
7339266	SHW	Spiked Blank	Dissolved Fluoride (F-)	2021/05/07		104	%	80 - 120
7339266	SHW	Method Blank	Dissolved Fluoride (F-)	2021/05/07	ND, RDL=0.10		mg/L	
7339266	SHW	RPD	Dissolved Fluoride (F-)	2021/05/07	NC		%	20
7339373	SHW	QC Standard	Turbidity	2021/05/07		106	%	80 - 120
7339373	SHW	Spiked Blank	Turbidity	2021/05/07		104	%	80 - 120
7339373	SHW	Method Blank	Turbidity	2021/05/07	ND, RDL=0.10		NTU	
7339373	SHW	RPD	Turbidity	2021/05/07	5.0		%	20
7339375	SHW	QC Standard	Turbidity	2021/05/07		105	%	80 - 120
7339375	SHW	Spiked Blank	Turbidity	2021/05/07		103	%	80 - 120
7339375	SHW	Method Blank	Turbidity	2021/05/07	ND, RDL=0.10		NTU	
7339375	SHW	RPD	Turbidity	2021/05/07	7.4		%	20
7339380	SHW	QC Standard	Turbidity	2021/05/07		106	%	80 - 120
7339380	SHW	Spiked Blank	Turbidity	2021/05/07		105	%	80 - 120
7339380	SHW	Method Blank	Turbidity	2021/05/07	ND, RDL=0.10		NTU	
7339380	SHW	RPD [PMO080-01]	Turbidity	2021/05/07	6.4		%	20
7339448	BAN	Matrix Spike [PMO086-02]	Dissolved Aluminum (Al)	2021/05/07		99	%	80 - 120
			Dissolved Antimony (Sb)	2021/05/07		96	%	80 - 120
			Dissolved Arsenic (As)	2021/05/07		93	%	80 - 120
			Dissolved Barium (Ba)	2021/05/07		94	%	80 - 120
			Dissolved Beryllium (Be)	2021/05/07		100	%	80 - 120
			Dissolved Bismuth (Bi)	2021/05/07		94	%	80 - 120
			Dissolved Boron (B)	2021/05/07		107	%	80 - 120
			Dissolved Cadmium (Cd)	2021/05/07		93	%	80 - 120
			Dissolved Calcium (Ca)	2021/05/07		90	%	80 - 120
			Dissolved Chromium (Cr)	2021/05/07		92	%	80 - 120
			Dissolved Cobalt (Co)	2021/05/07		93	%	80 - 120
			Dissolved Copper (Cu)	2021/05/07		92	%	80 - 120
			Dissolved Iron (Fe)	2021/05/07		101	%	80 - 120
			Dissolved Lead (Pb)	2021/05/07		100	%	80 - 120
			Dissolved Magnesium (Mg)	2021/05/07		100	%	80 - 120
			Dissolved Manganese (Mn)	2021/05/07		95	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/05/07		98	%	80 - 120
			Dissolved Nickel (Ni)	2021/05/07		94	%	80 - 120
			Dissolved Phosphorus (P)	2021/05/07		100	%	80 - 120
			Dissolved Potassium (K)	2021/05/07		102	%	80 - 120
			Dissolved Selenium (Se)	2021/05/07		96	%	80 - 120
			Dissolved Silver (Ag)	2021/05/07		94	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Sodium (Na)	2021/05/07		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/05/07		91	%	80 - 120
			Dissolved Thallium (Tl)	2021/05/07		96	%	80 - 120
			Dissolved Tin (Sn)	2021/05/07		100	%	80 - 120
			Dissolved Titanium (Ti)	2021/05/07		96	%	80 - 120
			Dissolved Uranium (U)	2021/05/07		101	%	80 - 120
			Dissolved Vanadium (V)	2021/05/07		94	%	80 - 120
			Dissolved Zinc (Zn)	2021/05/07		95	%	80 - 120
7339448	BAN	Spiked Blank	Dissolved Aluminum (Al)	2021/05/07		97	%	80 - 120
			Dissolved Antimony (Sb)	2021/05/07		96	%	80 - 120
			Dissolved Arsenic (As)	2021/05/07		92	%	80 - 120
			Dissolved Barium (Ba)	2021/05/07		92	%	80 - 120
			Dissolved Beryllium (Be)	2021/05/07		100	%	80 - 120
			Dissolved Bismuth (Bi)	2021/05/07		95	%	80 - 120
			Dissolved Boron (B)	2021/05/07		108	%	80 - 120
			Dissolved Cadmium (Cd)	2021/05/07		92	%	80 - 120
			Dissolved Calcium (Ca)	2021/05/07		92	%	80 - 120
			Dissolved Chromium (Cr)	2021/05/07		92	%	80 - 120
			Dissolved Cobalt (Co)	2021/05/07		94	%	80 - 120
			Dissolved Copper (Cu)	2021/05/07		92	%	80 - 120
			Dissolved Iron (Fe)	2021/05/07		102	%	80 - 120
			Dissolved Lead (Pb)	2021/05/07		99	%	80 - 120
			Dissolved Magnesium (Mg)	2021/05/07		101	%	80 - 120
			Dissolved Manganese (Mn)	2021/05/07		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/05/07		97	%	80 - 120
			Dissolved Nickel (Ni)	2021/05/07		96	%	80 - 120
			Dissolved Phosphorus (P)	2021/05/07		99	%	80 - 120
			Dissolved Potassium (K)	2021/05/07		102	%	80 - 120
			Dissolved Selenium (Se)	2021/05/07		96	%	80 - 120
			Dissolved Silver (Ag)	2021/05/07		96	%	80 - 120
			Dissolved Sodium (Na)	2021/05/07		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/05/07		97	%	80 - 120
			Dissolved Thallium (Tl)	2021/05/07		96	%	80 - 120
			Dissolved Tin (Sn)	2021/05/07		98	%	80 - 120
			Dissolved Titanium (Ti)	2021/05/07		97	%	80 - 120
			Dissolved Uranium (U)	2021/05/07		101	%	80 - 120
			Dissolved Vanadium (V)	2021/05/07		95	%	80 - 120
			Dissolved Zinc (Zn)	2021/05/07		96	%	80 - 120
7339448	BAN	Method Blank	Dissolved Aluminum (Al)	2021/05/07	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2021/05/07	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2021/05/07	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2021/05/07	ND, RDL=1.0		ug/L	
			Dissolved Beryllium (Be)	2021/05/07	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2021/05/07	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2021/05/07	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2021/05/07	ND, RDL=0.010		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Calcium (Ca)	2021/05/07	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2021/05/07	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2021/05/07	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2021/05/07	ND, RDL=0.50		ug/L	
			Dissolved Iron (Fe)	2021/05/07	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2021/05/07	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2021/05/07	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2021/05/07	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2021/05/07	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2021/05/07	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2021/05/07	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2021/05/07	ND, RDL=100		ug/L	
			Dissolved Selenium (Se)	2021/05/07	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2021/05/07	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2021/05/07	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2021/05/07	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2021/05/07	ND, RDL=0.10		ug/L	
			Dissolved Tin (Sn)	2021/05/07	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2021/05/07	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2021/05/07	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2021/05/07	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2021/05/07	ND, RDL=5.0		ug/L	
7339448	BAN	RPD [PMO086-02]	Dissolved Aluminum (Al)	2021/05/07	0.35		%	20
			Dissolved Antimony (Sb)	2021/05/07	NC		%	20
			Dissolved Arsenic (As)	2021/05/07	NC		%	20
			Dissolved Barium (Ba)	2021/05/07	3.3		%	20
			Dissolved Beryllium (Be)	2021/05/07	NC		%	20
			Dissolved Bismuth (Bi)	2021/05/07	NC		%	20
			Dissolved Boron (B)	2021/05/07	NC		%	20
			Dissolved Cadmium (Cd)	2021/05/07	NC		%	20
			Dissolved Calcium (Ca)	2021/05/07	0.00074		%	20
			Dissolved Chromium (Cr)	2021/05/07	NC		%	20
			Dissolved Cobalt (Co)	2021/05/07	NC		%	20
			Dissolved Copper (Cu)	2021/05/07	NC		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Iron (Fe)	2021/05/07	NC		%	20
			Dissolved Lead (Pb)	2021/05/07	NC		%	20
			Dissolved Magnesium (Mg)	2021/05/07	0.18		%	20
			Dissolved Manganese (Mn)	2021/05/07	0.011		%	20
			Dissolved Molybdenum (Mo)	2021/05/07	NC		%	20
			Dissolved Nickel (Ni)	2021/05/07	NC		%	20
			Dissolved Phosphorus (P)	2021/05/07	NC		%	20
			Dissolved Potassium (K)	2021/05/07	3.4		%	20
			Dissolved Selenium (Se)	2021/05/07	NC		%	20
			Dissolved Silver (Ag)	2021/05/07	NC		%	20
			Dissolved Sodium (Na)	2021/05/07	0.12		%	20
			Dissolved Strontium (Sr)	2021/05/07	0.31		%	20
			Dissolved Thallium (Tl)	2021/05/07	NC		%	20
			Dissolved Tin (Sn)	2021/05/07	NC		%	20
			Dissolved Titanium (Ti)	2021/05/07	NC		%	20
			Dissolved Uranium (U)	2021/05/07	2.3		%	20
			Dissolved Vanadium (V)	2021/05/07	NC		%	20
			Dissolved Zinc (Zn)	2021/05/07	NC		%	20
7339789	YLG	Matrix Spike	Total Organic Carbon (C)	2021/05/07		101	%	85 - 115
7339789	YLG	Spiked Blank	Total Organic Carbon (C)	2021/05/07		100	%	80 - 120
7339789	YLG	Method Blank	Total Organic Carbon (C)	2021/05/07	ND, RDL=0.50		mg/L	
7339789	YLG	RPD	Total Organic Carbon (C)	2021/05/07	1.2		%	15
7339797	YLG	Matrix Spike [PMO085-04]	Total Organic Carbon (C)	2021/05/07		102	%	85 - 115
7339797	YLG	Spiked Blank	Total Organic Carbon (C)	2021/05/07		100	%	80 - 120
7339797	YLG	Method Blank	Total Organic Carbon (C)	2021/05/07	ND, RDL=0.50		mg/L	
7339797	YLG	RPD [PMO085-04]	Total Organic Carbon (C)	2021/05/07	6.9		%	15
7340181	EMT	Matrix Spike [PMO084-01]	Total Alkalinity (Total as CaCO3)	2021/05/10		NC	%	80 - 120
7340181	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/05/10		108	%	80 - 120
7340181	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/05/10	ND, RDL=5.0		mg/L	
7340181	EMT	RPD [PMO084-01]	Total Alkalinity (Total as CaCO3)	2021/05/10	2.0		%	20
7340288	EMT	Matrix Spike [PMO084-01]	Dissolved Chloride (Cl-)	2021/05/10		102	%	80 - 120
7340288	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/05/10		102	%	80 - 120
7340288	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/05/10	ND, RDL=1.0		mg/L	
7340288	EMT	RPD [PMO084-01]	Dissolved Chloride (Cl-)	2021/05/10	5.7		%	20
7340289	EMT	Matrix Spike [PMO084-01]	Dissolved Sulphate (SO4)	2021/05/10		107	%	80 - 120
7340289	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/05/10		109	%	80 - 120
7340289	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/05/10	ND, RDL=2.0		mg/L	
7340289	EMT	RPD [PMO084-01]	Dissolved Sulphate (SO4)	2021/05/10	1.3		%	20
7340290	EMT	Matrix Spike [PMO084-01]	Reactive Silica (SiO2)	2021/05/10		96	%	80 - 120
7340290	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/05/10		101	%	80 - 120
7340290	EMT	Method Blank	Reactive Silica (SiO2)	2021/05/10	ND, RDL=0.50		mg/L	
7340290	EMT	RPD [PMO084-01]	Reactive Silica (SiO2)	2021/05/10	0.17		%	20
7340291	EMT	Spiked Blank	Colour	2021/05/10		97	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7340291	EMT	Method Blank	Colour	2021/05/10	ND, RDL=5.0		TCU	
7340291	EMT	RPD [PMO084-01]	Colour	2021/05/10	NC		%	20
7340296	EMT	Matrix Spike [PMO084-01]	Orthophosphate (P)	2021/05/10		108	%	80 - 120
7340296	EMT	Spiked Blank	Orthophosphate (P)	2021/05/10		104	%	80 - 120
7340296	EMT	Method Blank	Orthophosphate (P)	2021/05/10	ND, RDL=0.010		mg/L	
7340296	EMT	RPD [PMO084-01]	Orthophosphate (P)	2021/05/10	NC		%	20
7340297	EMT	Matrix Spike [PMO084-01]	Nitrate + Nitrite (N)	2021/05/10		107	%	80 - 120
7340297	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/05/10		93	%	80 - 120
7340297	EMT	Method Blank	Nitrate + Nitrite (N)	2021/05/10	ND, RDL=0.050		mg/L	
7340297	EMT	RPD [PMO084-01]	Nitrate + Nitrite (N)	2021/05/10	NC		%	20
7340298	EMT	Matrix Spike [PMO084-01]	Nitrite (N)	2021/05/10		94	%	80 - 120
7340298	EMT	Spiked Blank	Nitrite (N)	2021/05/10		100	%	80 - 120
7340298	EMT	Method Blank	Nitrite (N)	2021/05/10	ND, RDL=0.010		mg/L	
7340298	EMT	RPD [PMO084-01]	Nitrite (N)	2021/05/10	NC		%	20
7340352	EMT	Matrix Spike [PMO086-01]	Total Alkalinity (Total as CaCO3)	2021/05/10		NC	%	80 - 120
7340352	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/05/10		105	%	80 - 120
7340352	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/05/10	ND, RDL=5.0		mg/L	
7340352	EMT	RPD [PMO086-01]	Total Alkalinity (Total as CaCO3)	2021/05/10	3.2		%	20
7342472	EMT	Matrix Spike [PMO086-01]	Dissolved Chloride (Cl-)	2021/05/10		94	%	80 - 120
7342472	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/05/10		101	%	80 - 120
7342472	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/05/10	ND, RDL=1.0		mg/L	
7342472	EMT	RPD [PMO086-01]	Dissolved Chloride (Cl-)	2021/05/10	6.8		%	20
7342473	EMT	Matrix Spike [PMO086-01]	Dissolved Sulphate (SO4)	2021/05/10		101	%	80 - 120
7342473	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/05/10		107	%	80 - 120
7342473	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/05/10	ND, RDL=2.0		mg/L	
7342473	EMT	RPD [PMO086-01]	Dissolved Sulphate (SO4)	2021/05/10	0.86		%	20
7342474	EMT	Matrix Spike [PMO086-01]	Reactive Silica (SiO2)	2021/05/10		89	%	80 - 120
7342474	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/05/10		102	%	80 - 120
7342474	EMT	Method Blank	Reactive Silica (SiO2)	2021/05/10	ND, RDL=0.50		mg/L	
7342474	EMT	RPD [PMO086-01]	Reactive Silica (SiO2)	2021/05/10	1.8		%	20
7342475	EMT	Spiked Blank	Colour	2021/05/10		102	%	80 - 120
7342475	EMT	Method Blank	Colour	2021/05/10	ND, RDL=5.0		TCU	
7342475	EMT	RPD [PMO086-01]	Colour	2021/05/10	NC		%	20
7342476	EMT	Matrix Spike [PMO086-01]	Orthophosphate (P)	2021/05/10		96	%	80 - 120
7342476	EMT	Spiked Blank	Orthophosphate (P)	2021/05/10		101	%	80 - 120
7342476	EMT	Method Blank	Orthophosphate (P)	2021/05/10	ND, RDL=0.010		mg/L	
7342476	EMT	RPD [PMO086-01]	Orthophosphate (P)	2021/05/10	NC		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7342478	EMT	Matrix Spike [PMO086-01]	Nitrate + Nitrite (N)	2021/05/10		89	%	80 - 120
7342478	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/05/10		95	%	80 - 120
7342478	EMT	Method Blank	Nitrate + Nitrite (N)	2021/05/10	ND, RDL=0.050		mg/L	
7342478	EMT	RPD [PMO086-01]	Nitrate + Nitrite (N)	2021/05/10	NC		%	20
7342479	EMT	Matrix Spike [PMO086-01]	Nitrite (N)	2021/05/10		88	%	80 - 120
7342479	EMT	Spiked Blank	Nitrite (N)	2021/05/10		100	%	80 - 120
7342479	EMT	Method Blank	Nitrite (N)	2021/05/10	ND, RDL=0.010		mg/L	
7342479	EMT	RPD [PMO086-01]	Nitrite (N)	2021/05/10	NC		%	20
7342635	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/05/10		102	%	80 - 120
7342635	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/05/10		99	%	80 - 120
7342635	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/05/10	ND, RDL=0.050		mg/L	
7342635	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2021/05/10	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

<Original signed by>

Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Your C.O.C. #: 819967-02-01, 819967-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/06/11
Report #: R6672021
Version: 1 - Partial

BV Labs - Partial/Rush Results

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C1F2167
Received: 2021/06/04, 11:04

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide (1)	11	N/A	2021/06/08	N/A	SM 23 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide (1)	1	N/A	2021/06/09	N/A	SM 23 4500-CO2 D
Alkalinity (1)	12	N/A	2021/06/09	ATL SOP 00013	EPA 310.2 R1974 m
Chloride (1)	12	N/A	2021/06/09	ATL SOP 00014	SM 23 4500-Cl- E m
Colour (1)	12	N/A	2021/06/09	ATL SOP 00020	SM 23 2120C m
Conductance - water (1)	11	N/A	2021/06/08	ATL SOP 00004	SM 23 2510B m
Conductance - water (1)	1	N/A	2021/06/09	ATL SOP 00004	SM 23 2510B m
Fluoride (1)	11	N/A	2021/06/08	ATL SOP 00043	SM 23 4500-F- C m
Fluoride (1)	1	N/A	2021/06/09	ATL SOP 00043	SM 23 4500-F- C m
Hardness (calculated as CaCO3) (1)	12	N/A	2021/06/11	ATL SOP 00048	Auto Calc
Metals Water Diss. MS (as rec'd) (1)	12	N/A	2021/06/11	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference) (1)	12	N/A	2021/06/11	N/A	Auto Calc.
Anion and Cation Sum (1)	12	N/A	2021/06/11	N/A	Auto Calc.
Nitrogen Ammonia - water (1)	12	N/A	2021/06/08	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite (1)	12	N/A	2021/06/09	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite (1)	12	N/A	2021/06/09	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N) (1)	12	N/A	2021/06/10	ATL SOP 00018	ASTM D3867-16
pH (1, 2)	11	N/A	2021/06/08	ATL SOP 00003	SM 23 4500-H+ B m
pH (1, 2)	1	N/A	2021/06/09	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho (1)	12	N/A	2021/06/09	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C) (1)	12	N/A	2021/06/11	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	12	N/A	2021/06/11	ATL SOP 00049	Auto Calc.
Reactive Silica (1)	12	N/A	2021/06/09	ATL SOP 00022	EPA 366.0 m
Sulphate (1)	12	N/A	2021/06/09	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc) (1)	12	N/A	2021/06/11	N/A	Auto Calc.
Organic carbon - Total (TOC) (1, 3)	5	N/A	2021/06/08	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (1, 3)	7	N/A	2021/06/09	ATL SOP 00203	SM 23 5310B m
Turbidity (1)	12	N/A	2021/06/08	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

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Your C.O.C. #: 819967-02-01, 819967-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/06/11
Report #: R6672021
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C1F2167
Received: 2021/06/04, 11:04

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Bedford
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key <Original signed by>
Tyler Travers
Project Manager Assistant
11 Jun 2021 16:16:39

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Melissa DiPinto, Project Manager
Email: Melissa.DIPINTO@bureauveritas.com
Phone# (902)420-0203 Ext:233
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C1F2167
Report Date: 2021/06/11

Marathon Gold

RESULTS OF ANALYSES OF WATER

BV Labs ID		PTB319			PTB320		PTB321		
Sampling Date		2021/06/01			2021/06/01		2021/06/01		
COC Number		819967-01-01			819967-01-01		819967-01-01		
Sample #		M AQPOR			M+L SED		M+L MD		
	UNITS	**M AQPOR**	**RDL**	**QC Batch**	**M+L SED**	**RDL**	**M+L MD**	**RDL**	**QC Batch**
Calculated Parameters									
Anion Sum	me/L	1.04	N/A	7389050	1.21	N/A	1.05	N/A	7389050
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	47	1.0	7389046	60	1.0	48	1.0	7389046
Calculated TDS	mg/L	53	1.0	7389055	62	1.0	54	1.0	7389055
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7389046	ND	1.0	ND	1.0	7389046
Cation Sum	me/L	0.920	N/A	7389050	1.18	N/A	1.00	N/A	7389050
Hardness (CaCO3)	mg/L	44	1.0	7389048	55	1.0	48	1.0	7389048
Ion Balance (% Difference)	%	6.12	N/A	7389049	1.26	N/A	2.44	N/A	7389049
Langelier Index (@ 20C)	N/A	-0.530		7389053	-0.166		-0.459		7389053
Langelier Index (@ 4C)	N/A	-0.781		7389054	-0.418		-0.711		7389054
Nitrate (N)	mg/L	ND	0.050	7389051	ND	0.050	ND	0.050	7389051
Saturation pH (@ 20C)	N/A	8.42		7389053	8.26		8.38		7389053
Saturation pH (@ 4C)	N/A	8.67		7389054	8.51		8.64		7389054
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	47	5.0	7394897	61	5.0	48	5.0	7394897
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7394915	ND	1.0	ND	1.0	7394915
Colour	TCU	ND	5.0	7394919	90	25	8.8	5.0	7394919
Dissolved Fluoride (F-)	mg/L	ND	0.10	7394551	ND	0.10	ND	0.10	7394551
Nitrate + Nitrite (N)	mg/L	ND	0.050	7394921	ND	0.050	ND	0.050	7394921
Nitrite (N)	mg/L	ND	0.010	7394924	ND	0.010	ND	0.010	7394924
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7394608	0.18	0.050	0.063	0.050	7394609
Total Organic Carbon (C)	mg/L	ND (1)	5.0	7394615	13	0.50	1.7	0.50	7397453
Orthophosphate (P)	mg/L	ND	0.010	7394920	0.015	0.010	ND	0.010	7394920
pH	pH	7.89		7394550	8.09		7.92		7394550
Reactive Silica (SiO2)	mg/L	1.7	0.50	7394918	2.5	0.50	1.2	0.50	7394918
Dissolved Sulphate (SO4)	mg/L	4.9	2.0	7394917	ND	2.0	4.2	2.0	7394917
Turbidity	NTU	8.1	0.10	7394813	96	0.10	5.7	0.10	7394813
Conductivity	uS/cm	90	1.0	7394548	120	1.0	98	1.0	7394548

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to turbidity.

BV Labs - Partial/Rush Results

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BV Labs Job #: C1F2167
Report Date: 2021/06/11

Marathon Gold

RESULTS OF ANALYSES OF WATER

BV Labs ID		PTB322			PTB323			PTB324		
Sampling Date		2021/06/01			2021/06/01			2021/06/01		
COC Number		819967-01-01			819967-01-01			819967-01-01		
Sample #		M QE-POR			M QZ-QE-POR-QTP-MIN			SZ+V QE-POR		
	UNITS	M QE-POR	RDL	QC Batch	M QZ-QE-POR-QTP-MIN	RDL	QC Batch	SZ+V QE-POR	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	3.06	N/A	7389050	0.860	N/A	7389050	1.08	N/A	7389050
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	64	1.0	7389046	40	1.0	7389046	43	1.0	7389046
Calculated TDS	mg/L	190	1.0	7389055	43	1.0	7389055	58	1.0	7389055
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7389046	ND	1.0	7389046	ND	1.0	7389046
Cation Sum	me/L	2.92	N/A	7389050	0.740	N/A	7389050	1.00	N/A	7389050
Hardness (CaCO3)	mg/L	140	1.0	7389048	35	1.0	7389048	48	1.0	7389048
Ion Balance (% Difference)	%	2.34	N/A	7389049	7.50	N/A	7389049	3.85	N/A	7389049
Langelier Index (@ 20C)	N/A	0.136		7389053	-0.751		7389053	-0.660		7389053
Langelier Index (@ 4C)	N/A	-0.114		7389054	-1.00		7389054	-0.912		7389054
Nitrate (N)	mg/L	ND	0.050	7389051	ND	0.050	7389051	ND	0.050	7389051
Saturation pH (@ 20C)	N/A	7.84		7389053	8.57		7389053	8.44		7389053
Saturation pH (@ 4C)	N/A	8.09		7389054	8.82		7389054	8.69		7389054
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	64	5.0	7394897	41	5.0	7394897	43	5.0	7394897
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7394915	ND	1.0	7394915	ND	1.0	7394915
Colour	TCU	ND	5.0	7394919	ND	5.0	7394919	ND	5.0	7394919
Dissolved Fluoride (F-)	mg/L	ND	0.10	7394551	ND	0.10	7394551	ND	0.10	7394551
Nitrate + Nitrite (N)	mg/L	ND	0.050	7394921	ND	0.050	7394921	ND	0.050	7394921
Nitrite (N)	mg/L	ND	0.010	7394924	ND	0.010	7394924	ND	0.010	7394924
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7394609	0.060	0.050	7394609	ND	0.050	7394609
Total Organic Carbon (C)	mg/L	ND (1)	5.0	7394615	1.2	0.50	7394615	ND (1)	5.0	7397453
Orthophosphate (P)	mg/L	ND	0.010	7394920	ND	0.010	7394920	ND	0.010	7394920
pH	pH	7.97		7394550	7.82		7394550	7.78		7394550
Reactive Silica (SiO2)	mg/L	3.5	0.50	7394918	1.5	0.50	7394918	2.1	0.50	7394918
Dissolved Sulphate (SO4)	mg/L	85	2.0	7394917	2.3	2.0	7394917	10	2.0	7394917
Turbidity	NTU	69	0.10	7394816	4.2	0.10	7394813	24	0.10	7394813
Conductivity	uS/cm	300	1.0	7394548	74	1.0	7394548	100	1.0	7394548

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to turbidity.

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BV Labs Job #: C1F2167
Report Date: 2021/06/11

Marathon Gold

RESULTS OF ANALYSES OF WATER

BV Labs ID		PTB325			PTB326			PTB327		
Sampling Date		2021/06/01			2021/06/01			2021/06/01		
COC Number		819967-01-01			819967-01-01			819967-01-01		
Sample #		L QZ-TQTP+QZ-QTP			L TRJ			V QE-POR-QTP		
	UNITS	L QZ-TQTP+QZ-QTP	RDL	QC Batch	L TRJ	RDL	QC Batch	V QE-POR-QTP	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	0.940	N/A	7389050	1.16	N/A	7389050	0.650	N/A	7389050
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	45	1.0	7389046	58	1.0	7389046	32	1.0	7389046
Calculated TDS	mg/L	48	1.0	7389055	59	1.0	7389055	33	1.0	7389055
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7389046	ND	1.0	7389046	ND	1.0	7389046
Cation Sum	me/L	0.860	N/A	7389050	1.08	N/A	7389050	0.640	N/A	7389050
Hardness (CaCO3)	mg/L	41	1.0	7389048	51	1.0	7389048	31	1.0	7389048
Ion Balance (% Difference)	%	4.44	N/A	7389049	3.57	N/A	7389049	0.780	N/A	7389049
Langelier Index (@ 20C)	N/A	-0.539		7389053	-0.317		7389053	-0.993		7389053
Langelier Index (@ 4C)	N/A	-0.791		7389054	-0.569		7389054	-1.25		7389054
Nitrate (N)	mg/L	ND	0.050	7389051	ND	0.050	7389051	ND	0.050	7389051
Saturation pH (@ 20C)	N/A	8.46		7389053	8.28		7389053	8.73		7389053
Saturation pH (@ 4C)	N/A	8.72		7389054	8.54		7389054	8.98		7389054
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	45	5.0	7394897	58	5.0	7394897	33	5.0	7394897
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7394915	ND	1.0	7394915	ND	1.0	7394915
Colour	TCU	19 (1)	5.0	7394919	ND	5.0	7394919	ND	5.0	7394919
Dissolved Fluoride (F-)	mg/L	ND	0.10	7394551	ND	0.10	7394551	ND	0.10	7394551
Nitrate + Nitrite (N)	mg/L	ND	0.050	7394921	ND	0.050	7394921	ND	0.050	7394921
Nitrite (N)	mg/L	ND	0.010	7394924	0.010	0.010	7394924	ND	0.010	7394924
Nitrogen (Ammonia Nitrogen)	mg/L	0.13	0.050	7394609	ND	0.050	7394609	ND	0.050	7394609
Total Organic Carbon (C)	mg/L	5.6	0.50	7394615	ND (2)	5.0	7397453	1.2	0.50	7397457
Orthophosphate (P)	mg/L	ND	0.010	7394920	ND	0.010	7394920	ND	0.010	7394920
pH	pH	7.93		7394550	7.97		7394550	7.73		7394550
Reactive Silica (SiO2)	mg/L	1.4	0.50	7394918	2.4	0.50	7394918	0.96	0.50	7394918
Dissolved Sulphate (SO4)	mg/L	2.0	2.0	7394917	ND	2.0	7394917	ND	2.0	7394917
Turbidity	NTU	49	0.10	7394813	120	1.0	7394813	4.5	0.10	7394816
Conductivity	uS/cm	86	1.0	7394548	110	1.0	7394548	66	1.0	7394548

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected
(1) Poor duplicate agreement due to sample inhomogeniety, results confirmed by repeat anaylsis.
(2) Elevated reporting limit due to turbidity.

BV Labs - Partial/Rush Results

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RESULTS OF ANALYSES OF WATER

BV Labs ID		PTB328		PTB329		PTB330		
Sampling Date		2021/06/01		2021/06/01		2021/06/01		
COC Number		819967-01-01		819967-02-01		819967-02-01		
Sample #		MAR HL		LEP HL		FLBK		
	UNITS	Mar HL	QC Batch	Lep HL	QC Batch	FLBK	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	1.42	7389050	1.64	7389050	0.200	N/A	7389050
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	65	7389046	78	7389046	10	1.0	7389046
Calculated TDS	mg/L	74	7389055	83	7389055	9.0	1.0	7389055
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7389046	ND	7389046	ND	1.0	7389046
Cation Sum	me/L	1.33	7389050	1.52	7389050	0.140	N/A	7389050
Hardness (CaCO3)	mg/L	63	7389048	72	7389048	5.9	1.0	7389048
Ion Balance (% Difference)	%	3.27	7389049	3.80	7389049	17.7	N/A	7389049
Langelier Index (@ 20C)	N/A	-0.156	7389053	0.00100	7389053	-3.08		7389053
Langelier Index (@ 4C)	N/A	-0.408	7389054	-0.250	7389054	-3.33		7389054
Nitrate (N)	mg/L	ND	7389051	ND	7389051	ND	0.050	7389051
Saturation pH (@ 20C)	N/A	8.16	7389053	8.08	7389053	9.88		7389053
Saturation pH (@ 4C)	N/A	8.41	7389054	8.33	7389054	10.1		7389054
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	66	7394897	79	7394897	10	5.0	7394897
Dissolved Chloride (Cl-)	mg/L	ND	7394915	ND	7394915	ND	1.0	7394915
Colour	TCU	ND	7394919	ND	7394919	8.8	5.0	7394919
Dissolved Fluoride (F-)	mg/L	ND	7394551	ND	7394551	ND	0.10	7397202
Nitrate + Nitrite (N)	mg/L	ND	7394921	ND	7394921	ND	0.050	7394921
Nitrite (N)	mg/L	ND	7394924	ND	7394924	ND	0.010	7394924
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7394609	ND	7394609	ND	0.050	7394609
Total Organic Carbon (C)	mg/L	ND	7397457	0.94	7394615	3.8	0.50	7397457
Orthophosphate (P)	mg/L	ND	7394920	ND	7394920	ND	0.010	7394920
pH	pH	8.00	7394550	8.08	7394550	6.80		7397201
Reactive Silica (SiO2)	mg/L	3.7	7394918	3.7	7394918	ND	0.50	7394918
Dissolved Sulphate (SO4)	mg/L	5.0	7394917	3.2	7394917	ND	2.0	7394917
Turbidity	NTU	12	7394816	12	7394816	8.8	0.10	7394816
Conductivity	uS/cm	130	7394548	150	7394548	16	1.0	7397200

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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ELEMENTS BY ICP/MS (WATER)

BV Labs ID		PTB319	PTB320	PTB321	PTB322	PTB323		
Sampling Date		2021/06/01	2021/06/01	2021/06/01	2021/06/01	2021/06/01		
COC Number		819967-01-01	819967-01-01	819967-01-01	819967-01-01	819967-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Metals								
Dissolved Aluminum (Al)	ug/L	61	66	81	51	85	5.0	7402456
Dissolved Antimony (Sb)	ug/L	ND	ND	ND	1.0	ND	1.0	7402456
Dissolved Arsenic (As)	ug/L	ND	ND	ND	ND	ND	1.0	7402456
Dissolved Barium (Ba)	ug/L	8.6	5.5	32	7.8	3.9	1.0	7402456
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	ND	1.0	7402456
Dissolved Bismuth (Bi)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Boron (B)	ug/L	ND	ND	ND	ND	ND	50	7402456
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	ND	0.010	7402456
Dissolved Calcium (Ca)	ug/L	17000	19000	18000	55000	13000	100	7402456
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	ND	1.0	7402456
Dissolved Cobalt (Co)	ug/L	ND	ND	ND	ND	ND	0.40	7402456
Dissolved Copper (Cu)	ug/L	0.72	0.69	ND	0.84	ND	0.50	7402456
Dissolved Iron (Fe)	ug/L	ND	ND	ND	ND	ND	50	7402456
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	ND	0.50	7402456
Dissolved Magnesium (Mg)	ug/L	620	1600	950	1400	380	100	7402456
Dissolved Manganese (Mn)	ug/L	58	17	49	30	58	2.0	7402456
Dissolved Molybdenum (Mo)	ug/L	ND	ND	ND	2.1	ND	2.0	7402456
Dissolved Nickel (Ni)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Phosphorus (P)	ug/L	ND	ND	ND	ND	ND	100	7402456
Dissolved Potassium (K)	ug/L	420	1300	270	1100	300	100	7402456
Dissolved Selenium (Se)	ug/L	ND	ND	ND	ND	ND	0.50	7402456
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	ND	0.10	7402456
Dissolved Sodium (Na)	ug/L	610	940	550	1000	670	100	7402456
Dissolved Strontium (Sr)	ug/L	32	67	47	150	24	2.0	7402456
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	ND	ND	0.10	7402456
Dissolved Tin (Sn)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Titanium (Ti)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Uranium (U)	ug/L	0.21	0.75	ND	0.48	ND	0.10	7402456
Dissolved Vanadium (V)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	ND	5.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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ELEMENTS BY ICP/MS (WATER)

BV Labs ID		PTB324	PTB325	PTB326	PTB327	PTB328		
Sampling Date		2021/06/01	2021/06/01	2021/06/01	2021/06/01	2021/06/01		
COC Number		819967-01-01	819967-01-01	819967-01-01	819967-01-01	819967-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
Metals								
Dissolved Aluminum (Al)	ug/L	86	93	110	56	74	5.0	7402456
Dissolved Antimony (Sb)	ug/L	ND	ND	ND	ND	ND	1.0	7402456
Dissolved Arsenic (As)	ug/L	ND	ND	ND	ND	ND	1.0	7402456
Dissolved Barium (Ba)	ug/L	1.4	3.0	61	ND	13	1.0	7402456
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	ND	1.0	7402456
Dissolved Bismuth (Bi)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Boron (B)	ug/L	ND	ND	ND	ND	ND	50	7402456
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	ND	0.010	7402456
Dissolved Calcium (Ca)	ug/L	17000	16000	19000	11000	23000	100	7402456
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	ND	1.0	7402456
Dissolved Cobalt (Co)	ug/L	ND	ND	ND	ND	ND	0.40	7402456
Dissolved Copper (Cu)	ug/L	0.75	ND	0.56	0.58	0.73	0.50	7402456
Dissolved Iron (Fe)	ug/L	ND	ND	ND	ND	ND	50	7402456
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	ND	0.50	7402456
Dissolved Magnesium (Mg)	ug/L	1200	530	1100	510	1600	100	7402456
Dissolved Manganese (Mn)	ug/L	28	30	46	85	35	2.0	7402456
Dissolved Molybdenum (Mo)	ug/L	ND	ND	ND	ND	3.1	2.0	7402456
Dissolved Nickel (Ni)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Phosphorus (P)	ug/L	ND	ND	ND	ND	ND	100	7402456
Dissolved Potassium (K)	ug/L	540	210	660	120	980	100	7402456
Dissolved Selenium (Se)	ug/L	ND	ND	ND	ND	ND	0.50	7402456
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	ND	0.10	7402456
Dissolved Sodium (Na)	ug/L	670	550	810	530	1100	100	7402456
Dissolved Strontium (Sr)	ug/L	20	42	110	10	52	2.0	7402456
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	ND	ND	0.10	7402456
Dissolved Tin (Sn)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Titanium (Ti)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Uranium (U)	ug/L	0.17	0.12	0.33	ND	0.42	0.10	7402456
Dissolved Vanadium (V)	ug/L	ND	ND	ND	ND	ND	2.0	7402456
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	ND	5.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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ELEMENTS BY ICP/MS (WATER)

BV Labs ID		PTB329	PTB330		
Sampling Date		2021/06/01	2021/06/01		
COC Number		819967-02-01	819967-02-01		
Sample #		LEP HL	FLBK		
	UNITS	Lep HL	FLBK	RDL	QC Batch
Metals					
Dissolved Aluminum (Al)	ug/L	79	9.5	5.0	7402456
Dissolved Antimony (Sb)	ug/L	ND	ND	1.0	7402456
Dissolved Arsenic (As)	ug/L	ND	ND	1.0	7402456
Dissolved Barium (Ba)	ug/L	6.5	ND	1.0	7402456
Dissolved Beryllium (Be)	ug/L	ND	ND	1.0	7402456
Dissolved Bismuth (Bi)	ug/L	ND	ND	2.0	7402456
Dissolved Boron (B)	ug/L	ND	ND	50	7402456
Dissolved Cadmium (Cd)	ug/L	ND	ND	0.010	7402456
Dissolved Calcium (Ca)	ug/L	23000	2400	100	7402456
Dissolved Chromium (Cr)	ug/L	ND	ND	1.0	7402456
Dissolved Cobalt (Co)	ug/L	ND	ND	0.40	7402456
Dissolved Copper (Cu)	ug/L	ND	1.1	0.50	7402456
Dissolved Iron (Fe)	ug/L	ND	ND	50	7402456
Dissolved Lead (Pb)	ug/L	ND	ND	0.50	7402456
Dissolved Magnesium (Mg)	ug/L	3500	ND	100	7402456
Dissolved Manganese (Mn)	ug/L	27	2.4	2.0	7402456
Dissolved Molybdenum (Mo)	ug/L	ND	ND	2.0	7402456
Dissolved Nickel (Ni)	ug/L	ND	ND	2.0	7402456
Dissolved Phosphorus (P)	ug/L	ND	ND	100	7402456
Dissolved Potassium (K)	ug/L	1300	ND	100	7402456
Dissolved Selenium (Se)	ug/L	ND	ND	0.50	7402456
Dissolved Silver (Ag)	ug/L	ND	ND	0.10	7402456
Dissolved Sodium (Na)	ug/L	1300	470	100	7402456
Dissolved Strontium (Sr)	ug/L	130	ND	2.0	7402456
Dissolved Thallium (Tl)	ug/L	ND	ND	0.10	7402456
Dissolved Tin (Sn)	ug/L	ND	ND	2.0	7402456
Dissolved Titanium (Ti)	ug/L	ND	ND	2.0	7402456
Dissolved Uranium (U)	ug/L	2.0	ND	0.10	7402456
Dissolved Vanadium (V)	ug/L	ND	ND	2.0	7402456
Dissolved Zinc (Zn)	ug/L	ND	5.9	5.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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GENERAL COMMENTS

Sample PTB319 [M AQPOR] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample PTB320 [M+L SED] : ortho-Phosphate > Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample PTB323 [M QZ-QE-POR-QTP-MIN] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample PTB326 [L TRJ] : NOX < NO2 : Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample PTB330 [FLBK] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7394548	SHW	Spiked Blank	Conductivity	2021/06/08		101	%	80 - 120
7394548	SHW	Method Blank	Conductivity	2021/06/08	ND, RDL=1.0		uS/cm	
7394548	SHW	RPD [PTB326-01]	Conductivity	2021/06/08	2.0		%	10
7394550	SHW	Spiked Blank	pH	2021/06/08		101	%	97 - 103
7394550	SHW	RPD [PTB326-01]	pH	2021/06/08	0.26		%	N/A
7394551	SHW	Matrix Spike	Dissolved Fluoride (F-)	2021/06/08		96	%	80 - 120
7394551	SHW	Spiked Blank	Dissolved Fluoride (F-)	2021/06/08		98	%	80 - 120
7394551	SHW	Method Blank	Dissolved Fluoride (F-)	2021/06/08	ND, RDL=0.10		mg/L	
7394551	SHW	RPD [PTB326-01]	Dissolved Fluoride (F-)	2021/06/08	NC		%	20
7394608	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/06/08		98	%	80 - 120
7394608	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/06/08		102	%	80 - 120
7394608	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/06/08	ND, RDL=0.050		mg/L	
7394608	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2021/06/08	NC		%	20
7394609	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/06/08		95	%	80 - 120
7394609	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/06/08		105	%	80 - 120
7394609	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/06/08	ND, RDL=0.050		mg/L	
7394609	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2021/06/08	6.8		%	20
7394615	YLG	Matrix Spike	Total Organic Carbon (C)	2021/06/08		97	%	85 - 115
7394615	YLG	Spiked Blank	Total Organic Carbon (C)	2021/06/08		99	%	80 - 120
7394615	YLG	Method Blank	Total Organic Carbon (C)	2021/06/08	ND, RDL=0.50		mg/L	
7394615	YLG	RPD	Total Organic Carbon (C)	2021/06/08	2.4		%	15
7394813	SHW	QC Standard	Turbidity	2021/06/08		105	%	80 - 120
7394813	SHW	Spiked Blank	Turbidity	2021/06/08		102	%	80 - 120
7394813	SHW	Method Blank	Turbidity	2021/06/08	ND, RDL=0.10		NTU	
7394813	SHW	RPD	Turbidity	2021/06/08	20		%	20
7394816	SHW	QC Standard	Turbidity	2021/06/08		104	%	80 - 120
7394816	SHW	Spiked Blank	Turbidity	2021/06/08		104	%	80 - 120
7394816	SHW	Method Blank	Turbidity	2021/06/08	ND, RDL=0.10		NTU	
7394816	SHW	RPD [PTB322-01]	Turbidity	2021/06/08	3.2		%	20
7394897	MCN	Matrix Spike [PTB325-01]	Total Alkalinity (Total as CaCO3)	2021/06/09		NC	%	80 - 120
7394897	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/06/09		106	%	80 - 120
7394897	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2021/06/09	ND, RDL=5.0		mg/L	
7394897	MCN	RPD [PTB325-01]	Total Alkalinity (Total as CaCO3)	2021/06/09	3.6		%	20
7394915	MCN	Matrix Spike [PTB325-01]	Dissolved Chloride (Cl-)	2021/06/09		97	%	80 - 120
7394915	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2021/06/09		97	%	80 - 120
7394915	MCN	Method Blank	Dissolved Chloride (Cl-)	2021/06/09	ND, RDL=1.0		mg/L	
7394915	MCN	RPD [PTB325-01]	Dissolved Chloride (Cl-)	2021/06/09	NC		%	20
7394917	MCN	Matrix Spike [PTB325-01]	Dissolved Sulphate (SO4)	2021/06/09		102	%	80 - 120
7394917	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2021/06/09		108	%	80 - 120
7394917	MCN	Method Blank	Dissolved Sulphate (SO4)	2021/06/09	ND, RDL=2.0		mg/L	
7394917	MCN	RPD [PTB325-01]	Dissolved Sulphate (SO4)	2021/06/09	1.7		%	20
7394918	MCN	Matrix Spike [PTB325-01]	Reactive Silica (SiO2)	2021/06/09		92	%	80 - 120
7394918	MCN	Spiked Blank	Reactive Silica (SiO2)	2021/06/09		96	%	80 - 120
7394918	MCN	Method Blank	Reactive Silica (SiO2)	2021/06/09	ND, RDL=0.50		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7394918	MCN	RPD [PTB325-01]	Reactive Silica (SiO2)	2021/06/09	7.2		%	20
7394919	MCN	Spiked Blank	Colour	2021/06/09		97	%	80 - 120
7394919	MCN	Method Blank	Colour	2021/06/09	ND, RDL=5.0		TCU	
7394919	MCN	RPD [PTB325-01]	Colour	2021/06/09	60 (1)		%	20
7394920	MCN	Matrix Spike [PTB325-01]	Orthophosphate (P)	2021/06/09		94	%	80 - 120
7394920	MCN	Spiked Blank	Orthophosphate (P)	2021/06/09		98	%	80 - 120
7394920	MCN	Method Blank	Orthophosphate (P)	2021/06/09	ND, RDL=0.010		mg/L	
7394920	MCN	RPD [PTB325-01]	Orthophosphate (P)	2021/06/09	4.9		%	20
7394921	MCN	Matrix Spike [PTB325-01]	Nitrate + Nitrite (N)	2021/06/09		94	%	80 - 120
7394921	MCN	Spiked Blank	Nitrate + Nitrite (N)	2021/06/09		92	%	80 - 120
7394921	MCN	Method Blank	Nitrate + Nitrite (N)	2021/06/09	ND, RDL=0.050		mg/L	
7394921	MCN	RPD [PTB325-01]	Nitrate + Nitrite (N)	2021/06/09	NC		%	20
7394924	MCN	Matrix Spike [PTB325-01]	Nitrite (N)	2021/06/09		99	%	80 - 120
7394924	MCN	Spiked Blank	Nitrite (N)	2021/06/09		102	%	80 - 120
7394924	MCN	Method Blank	Nitrite (N)	2021/06/09	ND, RDL=0.010		mg/L	
7394924	MCN	RPD [PTB325-01]	Nitrite (N)	2021/06/09	NC		%	20
7397200	SHW	Spiked Blank	Conductivity	2021/06/09		103	%	80 - 120
7397200	SHW	Method Blank	Conductivity	2021/06/09	ND, RDL=1.0		uS/cm	
7397200	SHW	RPD	Conductivity	2021/06/09	3.0		%	10
7397201	SHW	Spiked Blank	pH	2021/06/09		101	%	97 - 103
7397201	SHW	RPD	pH	2021/06/09	0.50		%	N/A
7397202	SHW	Matrix Spike	Dissolved Fluoride (F-)	2021/06/09		98	%	80 - 120
7397202	SHW	Spiked Blank	Dissolved Fluoride (F-)	2021/06/09		103	%	80 - 120
7397202	SHW	Method Blank	Dissolved Fluoride (F-)	2021/06/09	ND, RDL=0.10		mg/L	
7397202	SHW	RPD	Dissolved Fluoride (F-)	2021/06/09	NC		%	20
7397453	YLG	Matrix Spike	Total Organic Carbon (C)	2021/06/09		NC	%	85 - 115
7397453	YLG	Spiked Blank	Total Organic Carbon (C)	2021/06/09		101	%	80 - 120
7397453	YLG	Method Blank	Total Organic Carbon (C)	2021/06/09	ND, RDL=0.50		mg/L	
7397453	YLG	RPD	Total Organic Carbon (C)	2021/06/09	2.9		%	15
7397457	YLG	Matrix Spike	Total Organic Carbon (C)	2021/06/09		99	%	85 - 115
7397457	YLG	Spiked Blank	Total Organic Carbon (C)	2021/06/09		100	%	80 - 120
7397457	YLG	Method Blank	Total Organic Carbon (C)	2021/06/09	ND, RDL=0.50		mg/L	
7397457	YLG	RPD	Total Organic Carbon (C)	2021/06/09	NC		%	15
7402456	BAN	Matrix Spike	Dissolved Aluminum (Al)	2021/06/11		102	%	80 - 120
			Dissolved Antimony (Sb)	2021/06/11		107	%	80 - 120
			Dissolved Arsenic (As)	2021/06/11		96	%	80 - 120
			Dissolved Barium (Ba)	2021/06/11		97	%	80 - 120
			Dissolved Beryllium (Be)	2021/06/11		98	%	80 - 120
			Dissolved Bismuth (Bi)	2021/06/11		97	%	80 - 120
			Dissolved Boron (B)	2021/06/11		NC	%	80 - 120
			Dissolved Cadmium (Cd)	2021/06/11		97	%	80 - 120
			Dissolved Calcium (Ca)	2021/06/11		NC	%	80 - 120
			Dissolved Chromium (Cr)	2021/06/11		96	%	80 - 120
			Dissolved Cobalt (Co)	2021/06/11		94	%	80 - 120
			Dissolved Copper (Cu)	2021/06/11		95	%	80 - 120
			Dissolved Iron (Fe)	2021/06/11		99	%	80 - 120
			Dissolved Lead (Pb)	2021/06/11		99	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Magnesium (Mg)	2021/06/11		NC	%	80 - 120
			Dissolved Manganese (Mn)	2021/06/11		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/06/11		105	%	80 - 120
			Dissolved Nickel (Ni)	2021/06/11		94	%	80 - 120
			Dissolved Phosphorus (P)	2021/06/11		106	%	80 - 120
			Dissolved Potassium (K)	2021/06/11		100	%	80 - 120
			Dissolved Selenium (Se)	2021/06/11		98	%	80 - 120
			Dissolved Silver (Ag)	2021/06/11		93	%	80 - 120
			Dissolved Sodium (Na)	2021/06/11		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/06/11		98	%	80 - 120
			Dissolved Thallium (Tl)	2021/06/11		100	%	80 - 120
			Dissolved Tin (Sn)	2021/06/11		104	%	80 - 120
			Dissolved Titanium (Ti)	2021/06/11		101	%	80 - 120
			Dissolved Uranium (U)	2021/06/11		102	%	80 - 120
			Dissolved Vanadium (V)	2021/06/11		98	%	80 - 120
			Dissolved Zinc (Zn)	2021/06/11		97	%	80 - 120
7402456	BAN	Spiked Blank	Dissolved Aluminum (Al)	2021/06/11		102	%	80 - 120
			Dissolved Antimony (Sb)	2021/06/11		105	%	80 - 120
			Dissolved Arsenic (As)	2021/06/11		93	%	80 - 120
			Dissolved Barium (Ba)	2021/06/11		97	%	80 - 120
			Dissolved Beryllium (Be)	2021/06/11		98	%	80 - 120
			Dissolved Bismuth (Bi)	2021/06/11		98	%	80 - 120
			Dissolved Boron (B)	2021/06/11		100	%	80 - 120
			Dissolved Cadmium (Cd)	2021/06/11		97	%	80 - 120
			Dissolved Calcium (Ca)	2021/06/11		97	%	80 - 120
			Dissolved Chromium (Cr)	2021/06/11		94	%	80 - 120
			Dissolved Cobalt (Co)	2021/06/11		94	%	80 - 120
			Dissolved Copper (Cu)	2021/06/11		97	%	80 - 120
			Dissolved Iron (Fe)	2021/06/11		98	%	80 - 120
			Dissolved Lead (Pb)	2021/06/11		99	%	80 - 120
			Dissolved Magnesium (Mg)	2021/06/11		100	%	80 - 120
			Dissolved Manganese (Mn)	2021/06/11		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/06/11		100	%	80 - 120
			Dissolved Nickel (Ni)	2021/06/11		95	%	80 - 120
			Dissolved Phosphorus (P)	2021/06/11		105	%	80 - 120
			Dissolved Potassium (K)	2021/06/11		97	%	80 - 120
			Dissolved Selenium (Se)	2021/06/11		99	%	80 - 120
			Dissolved Silver (Ag)	2021/06/11		96	%	80 - 120
			Dissolved Sodium (Na)	2021/06/11		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/06/11		96	%	80 - 120
			Dissolved Thallium (Tl)	2021/06/11		100	%	80 - 120
			Dissolved Tin (Sn)	2021/06/11		100	%	80 - 120
			Dissolved Titanium (Ti)	2021/06/11		104	%	80 - 120
			Dissolved Uranium (U)	2021/06/11		100	%	80 - 120
			Dissolved Vanadium (V)	2021/06/11		97	%	80 - 120
			Dissolved Zinc (Zn)	2021/06/11		99	%	80 - 120
7402456	BAN	Method Blank	Dissolved Aluminum (Al)	2021/06/11	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2021/06/11	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2021/06/11	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2021/06/11	ND, RDL=1.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Beryllium (Be)	2021/06/11	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2021/06/11	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2021/06/11	ND, RDL=0.010		ug/L	
			Dissolved Calcium (Ca)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2021/06/11	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2021/06/11	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2021/06/11	ND, RDL=0.50		ug/L	
			Dissolved Iron (Fe)	2021/06/11	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2021/06/11	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Selenium (Se)	2021/06/11	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2021/06/11	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2021/06/11	ND, RDL=0.10		ug/L	
			Dissolved Tin (Sn)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2021/06/11	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2021/06/11	ND, RDL=5.0		ug/L	
7402456	BAN	RPD	Dissolved Aluminum (Al)	2021/06/11	NC		%	20
			Dissolved Antimony (Sb)	2021/06/11	NC		%	20
			Dissolved Arsenic (As)	2021/06/11	NC		%	20
			Dissolved Barium (Ba)	2021/06/11	0.73		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Beryllium (Be)	2021/06/11	NC		%	20
			Dissolved Bismuth (Bi)	2021/06/11	NC		%	20
			Dissolved Boron (B)	2021/06/11	1.6		%	20
			Dissolved Cadmium (Cd)	2021/06/11	NC		%	20
			Dissolved Calcium (Ca)	2021/06/11	0.90		%	20
			Dissolved Chromium (Cr)	2021/06/11	NC		%	20
			Dissolved Cobalt (Co)	2021/06/11	NC		%	20
			Dissolved Copper (Cu)	2021/06/11	2.1		%	20
			Dissolved Iron (Fe)	2021/06/11	NC		%	20
			Dissolved Lead (Pb)	2021/06/11	NC		%	20
			Dissolved Magnesium (Mg)	2021/06/11	0.78		%	20
			Dissolved Manganese (Mn)	2021/06/11	NC		%	20
			Dissolved Molybdenum (Mo)	2021/06/11	NC		%	20
			Dissolved Nickel (Ni)	2021/06/11	NC		%	20
			Dissolved Phosphorus (P)	2021/06/11	NC		%	20
			Dissolved Potassium (K)	2021/06/11	0.97		%	20
			Dissolved Selenium (Se)	2021/06/11	NC		%	20
			Dissolved Silver (Ag)	2021/06/11	NC		%	20
			Dissolved Sodium (Na)	2021/06/11	1.4		%	20
			Dissolved Strontium (Sr)	2021/06/11	3.1		%	20
			Dissolved Thallium (Tl)	2021/06/11	NC		%	20
			Dissolved Tin (Sn)	2021/06/11	NC		%	20
			Dissolved Titanium (Ti)	2021/06/11	NC		%	20
			Dissolved Uranium (U)	2021/06/11	2.0		%	20
			Dissolved Vanadium (V)	2021/06/11	NC		%	20
			Dissolved Zinc (Zn)	2021/06/11	7.6		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Poor duplicate agreement due to sample inhomogeniety, results confirmed by repeat anaylsis.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

<Original signed by>

Mike MacGillivray, Scientific Specialist (Inorganics)

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For Service Group specific validation please refer to the Validation Signature Page.

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Your C.O.C. #: 819967-02-01, 819967-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/06/15
Report #: R6676424
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1F2167
Received: 2021/06/04, 11:04

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide (1)	11	N/A	2021/06/08	N/A	SM 23 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide (1)	1	N/A	2021/06/09	N/A	SM 23 4500-CO2 D
Alkalinity (1)	12	N/A	2021/06/09	ATL SOP 00013	EPA 310.2 R1974 m
Chloride (1)	12	N/A	2021/06/09	ATL SOP 00014	SM 23 4500-Cl- E m
Colour (1)	12	N/A	2021/06/09	ATL SOP 00020	SM 23 2120C m
Conductance - water (1)	11	N/A	2021/06/08	ATL SOP 00004	SM 23 2510B m
Conductance - water (1)	1	N/A	2021/06/09	ATL SOP 00004	SM 23 2510B m
Fluoride (1)	11	N/A	2021/06/08	ATL SOP 00043	SM 23 4500-F- C m
Fluoride (1)	1	N/A	2021/06/09	ATL SOP 00043	SM 23 4500-F- C m
Hardness (calculated as CaCO3) (1)	12	N/A	2021/06/11	ATL SOP 00048	Auto Calc
Mercury (low level) (2)	12	2021/06/14	2021/06/14	CAM SOP-00453	EPA 7470 m
Metals Water Diss. MS (as rec'd) (1)	12	N/A	2021/06/11	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference) (1)	12	N/A	2021/06/11	N/A	Auto Calc.
Anion and Cation Sum (1)	12	N/A	2021/06/11	N/A	Auto Calc.
Nitrogen Ammonia - water (1)	12	N/A	2021/06/08	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite (1)	12	N/A	2021/06/09	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite (1)	12	N/A	2021/06/09	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N) (1)	12	N/A	2021/06/10	ATL SOP 00018	ASTM D3867-16
pH (1, 3)	11	N/A	2021/06/08	ATL SOP 00003	SM 23 4500-H+ B m
pH (1, 3)	1	N/A	2021/06/09	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho (1)	12	N/A	2021/06/09	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C) (1)	12	N/A	2021/06/11	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	12	N/A	2021/06/11	ATL SOP 00049	Auto Calc.
Reactive Silica (1)	12	N/A	2021/06/09	ATL SOP 00022	EPA 366.0 m
Sulphate (1)	12	N/A	2021/06/09	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc) (1)	12	N/A	2021/06/11	N/A	Auto Calc.
Organic carbon - Total (TOC) (1, 4)	5	N/A	2021/06/08	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (1, 4)	7	N/A	2021/06/09	ATL SOP 00203	SM 23 5310B m
Turbidity (1)	12	N/A	2021/06/08	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau

Your C.O.C. #: 819967-02-01, 819967-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/06/15
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CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1F2167
Received: 2021/06/04, 11:04

Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Bedford
(2) This test was performed by Bureau Veritas Mississauga
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key

<Original signed by>

Tyler Travers
Project Manager Assistant
15 Jun 2021 09:50:12

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Melissa DiPinto, Project Manager
Email: Melissa.DIPINTO@bureauveritas.com
Phone# (902)420-0203 Ext:233

==========

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB319			PTB320		PTB321		
Sampling Date		2021/06/01			2021/06/01		2021/06/01		
COC Number		819967-01-01			819967-01-01		819967-01-01		
Sample #		M AQPOR			M+L SED		M+L MD		
	UNITS	M AQPOR	RDL	QC Batch	M+L SED	RDL	M+L MD	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	1.04	N/A	7389050	1.21	N/A	1.05	N/A	7389050
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	47	1.0	7389046	60	1.0	48	1.0	7389046
Calculated TDS	mg/L	53	1.0	7389055	62	1.0	54	1.0	7389055
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7389046	ND	1.0	ND	1.0	7389046
Cation Sum	me/L	0.920	N/A	7389050	1.18	N/A	1.00	N/A	7389050
Hardness (CaCO3)	mg/L	44	1.0	7389048	55	1.0	48	1.0	7389048
Ion Balance (% Difference)	%	6.12	N/A	7389049	1.26	N/A	2.44	N/A	7389049
Langelier Index (@ 20C)	N/A	-0.530		7389053	-0.166		-0.459		7389053
Langelier Index (@ 4C)	N/A	-0.781		7389054	-0.418		-0.711		7389054
Nitrate (N)	mg/L	ND	0.050	7389051	ND	0.050	ND	0.050	7389051
Saturation pH (@ 20C)	N/A	8.42		7389053	8.26		8.38		7389053
Saturation pH (@ 4C)	N/A	8.67		7389054	8.51		8.64		7389054
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	47	5.0	7394897	61	5.0	48	5.0	7394897
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7394915	ND	1.0	ND	1.0	7394915
Colour	TCU	ND	5.0	7394919	90	25	8.8	5.0	7394919
Nitrate + Nitrite (N)	mg/L	ND	0.050	7394921	ND	0.050	ND	0.050	7394921
Nitrite (N)	mg/L	ND	0.010	7394924	ND	0.010	ND	0.010	7394924
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7394608	0.18	0.050	0.063	0.050	7394609
Total Organic Carbon (C)	mg/L	ND (1)	5.0	7394615	13	0.50	1.7	0.50	7397453
Orthophosphate (P)	mg/L	ND	0.010	7394920	0.015	0.010	ND	0.010	7394920
pH	pH	7.89		7394550	8.09		7.92		7394550
Reactive Silica (SiO2)	mg/L	1.7	0.50	7394918	2.5	0.50	1.2	0.50	7394918
Dissolved Sulphate (SO4)	mg/L	4.9	2.0	7394917	ND	2.0	4.2	2.0	7394917
Turbidity	NTU	8.1	0.10	7394813	96	0.10	5.7	0.10	7394813
Conductivity	uS/cm	90	1.0	7394548	120	1.0	98	1.0	7394548
Metals									
Dissolved Aluminum (Al)	ug/L	61	5.0	7402456	66	5.0	81	5.0	7402456
Dissolved Antimony (Sb)	ug/L	ND	1.0	7402456	ND	1.0	ND	1.0	7402456
Dissolved Arsenic (As)	ug/L	ND	1.0	7402456	ND	1.0	ND	1.0	7402456
Dissolved Barium (Ba)	ug/L	8.6	1.0	7402456	5.5	1.0	32	1.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to turbidity.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB319			PTB320		PTB321		
Sampling Date		2021/06/01			2021/06/01		2021/06/01		
COC Number		819967-01-01			819967-01-01		819967-01-01		
Sample #		M AQPOR			M+L SED		M+L MD		
	UNITS	M AQPOR	RDL	QC Batch	M+L SED	RDL	M+L MD	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	1.0	7402456	ND	1.0	ND	1.0	7402456
Dissolved Bismuth (Bi)	ug/L	ND	2.0	7402456	ND	2.0	ND	2.0	7402456
Dissolved Boron (B)	ug/L	ND	50	7402456	ND	50	ND	50	7402456
Dissolved Cadmium (Cd)	ug/L	ND	0.010	7402456	ND	0.010	ND	0.010	7402456
Dissolved Calcium (Ca)	ug/L	17000	100	7402456	19000	100	18000	100	7402456
Dissolved Chromium (Cr)	ug/L	ND	1.0	7402456	ND	1.0	ND	1.0	7402456
Dissolved Cobalt (Co)	ug/L	ND	0.40	7402456	ND	0.40	ND	0.40	7402456
Dissolved Copper (Cu)	ug/L	0.72	0.50	7402456	0.69	0.50	ND	0.50	7402456
Dissolved Iron (Fe)	ug/L	ND	50	7402456	ND	50	ND	50	7402456
Dissolved Lead (Pb)	ug/L	ND	0.50	7402456	ND	0.50	ND	0.50	7402456
Dissolved Magnesium (Mg)	ug/L	620	100	7402456	1600	100	950	100	7402456
Dissolved Manganese (Mn)	ug/L	58	2.0	7402456	17	2.0	49	2.0	7402456
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	7402456	ND	2.0	ND	2.0	7402456
Dissolved Nickel (Ni)	ug/L	ND	2.0	7402456	ND	2.0	ND	2.0	7402456
Dissolved Phosphorus (P)	ug/L	ND	100	7402456	ND	100	ND	100	7402456
Dissolved Potassium (K)	ug/L	420	100	7402456	1300	100	270	100	7402456
Dissolved Selenium (Se)	ug/L	ND	0.50	7402456	ND	0.50	ND	0.50	7402456
Dissolved Silver (Ag)	ug/L	ND	0.10	7402456	ND	0.10	ND	0.10	7402456
Dissolved Sodium (Na)	ug/L	610	100	7402456	940	100	550	100	7402456
Dissolved Strontium (Sr)	ug/L	32	2.0	7402456	67	2.0	47	2.0	7402456
Dissolved Thallium (Tl)	ug/L	ND	0.10	7402456	ND	0.10	ND	0.10	7402456
Dissolved Tin (Sn)	ug/L	ND	2.0	7402456	ND	2.0	ND	2.0	7402456
Dissolved Titanium (Ti)	ug/L	ND	2.0	7402456	ND	2.0	ND	2.0	7402456
Dissolved Uranium (U)	ug/L	0.21	0.10	7402456	0.75	0.10	ND	0.10	7402456
Dissolved Vanadium (V)	ug/L	ND	2.0	7402456	ND	2.0	ND	2.0	7402456
Dissolved Zinc (Zn)	ug/L	ND	5.0	7402456	ND	5.0	ND	5.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB322			PTB322			PTB323		
Sampling Date		2021/06/01			2021/06/01			2021/06/01		
COC Number		819967-01-01			819967-01-01			819967-01-01		
Sample #		M QE-POR			M QE-POR			M QZ-QE-POR-QTP-MIN		
	UNITS	M QE-POR	RDL	QC Batch	M QE-POR Lab-Dup	RDL	QC Batch	M QZ-QE-POR-QTP-MIN	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	3.06	N/A	7389050				0.860	N/A	7389050
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	64	1.0	7389046				40	1.0	7389046
Calculated TDS	mg/L	190	1.0	7389055				43	1.0	7389055
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7389046				ND	1.0	7389046
Cation Sum	me/L	2.92	N/A	7389050				0.740	N/A	7389050
Hardness (CaCO3)	mg/L	140	1.0	7389048				35	1.0	7389048
Ion Balance (% Difference)	%	2.34	N/A	7389049				7.50	N/A	7389049
Langelier Index (@ 20C)	N/A	0.136		7389053				-0.751		7389053
Langelier Index (@ 4C)	N/A	-0.114		7389054				-1.00		7389054
Nitrate (N)	mg/L	ND	0.050	7389051				ND	0.050	7389051
Saturation pH (@ 20C)	N/A	7.84		7389053				8.57		7389053
Saturation pH (@ 4C)	N/A	8.09		7389054				8.82		7389054
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	64	5.0	7394897				41	5.0	7394897
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7394915				ND	1.0	7394915
Colour	TCU	ND	5.0	7394919				ND	5.0	7394919
Nitrate + Nitrite (N)	mg/L	ND	0.050	7394921				ND	0.050	7394921
Nitrite (N)	mg/L	ND	0.010	7394924				ND	0.010	7394924
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7394609				0.060	0.050	7394609
Total Organic Carbon (C)	mg/L	ND (1)	5.0	7394615				1.2	0.50	7394615
Orthophosphate (P)	mg/L	ND	0.010	7394920				ND	0.010	7394920
pH	pH	7.97		7394550				7.82		7394550
Reactive Silica (SiO2)	mg/L	3.5	0.50	7394918				1.5	0.50	7394918
Dissolved Sulphate (SO4)	mg/L	85	2.0	7394917				2.3	2.0	7394917
Turbidity	NTU	69	0.10	7394816	66	0.10	7394816	4.2	0.10	7394813
Conductivity	uS/cm	300	1.0	7394548				74	1.0	7394548
Metals										
Dissolved Aluminum (Al)	ug/L	51	5.0	7402456				85	5.0	7402456
Dissolved Antimony (Sb)	ug/L	1.0	1.0	7402456				ND	1.0	7402456
Dissolved Arsenic (As)	ug/L	ND	1.0	7402456				ND	1.0	7402456
Dissolved Barium (Ba)	ug/L	7.8	1.0	7402456				3.9	1.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to turbidity.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB322			PTB322			PTB323		
Sampling Date		2021/06/01			2021/06/01			2021/06/01		
COC Number		819967-01-01			819967-01-01			819967-01-01		
Sample #		M QE-POR			M QE-POR			M QZ-QE-POR-QTP-MIN		
	UNITS	M QE-POR	RDL	QC Batch	M QE-POR Lab-Dup	RDL	QC Batch	M QZ-QE-POR-QTP-MIN	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	1.0	7402456				ND	1.0	7402456
Dissolved Bismuth (Bi)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Boron (B)	ug/L	ND	50	7402456				ND	50	7402456
Dissolved Cadmium (Cd)	ug/L	ND	0.010	7402456				ND	0.010	7402456
Dissolved Calcium (Ca)	ug/L	55000	100	7402456				13000	100	7402456
Dissolved Chromium (Cr)	ug/L	ND	1.0	7402456				ND	1.0	7402456
Dissolved Cobalt (Co)	ug/L	ND	0.40	7402456				ND	0.40	7402456
Dissolved Copper (Cu)	ug/L	0.84	0.50	7402456				ND	0.50	7402456
Dissolved Iron (Fe)	ug/L	ND	50	7402456				ND	50	7402456
Dissolved Lead (Pb)	ug/L	ND	0.50	7402456				ND	0.50	7402456
Dissolved Magnesium (Mg)	ug/L	1400	100	7402456				380	100	7402456
Dissolved Manganese (Mn)	ug/L	30	2.0	7402456				58	2.0	7402456
Dissolved Molybdenum (Mo)	ug/L	2.1	2.0	7402456				ND	2.0	7402456
Dissolved Nickel (Ni)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Phosphorus (P)	ug/L	ND	100	7402456				ND	100	7402456
Dissolved Potassium (K)	ug/L	1100	100	7402456				300	100	7402456
Dissolved Selenium (Se)	ug/L	ND	0.50	7402456				ND	0.50	7402456
Dissolved Silver (Ag)	ug/L	ND	0.10	7402456				ND	0.10	7402456
Dissolved Sodium (Na)	ug/L	1000	100	7402456				670	100	7402456
Dissolved Strontium (Sr)	ug/L	150	2.0	7402456				24	2.0	7402456
Dissolved Thallium (Tl)	ug/L	ND	0.10	7402456				ND	0.10	7402456
Dissolved Tin (Sn)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Titanium (Ti)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Uranium (U)	ug/L	0.48	0.10	7402456				ND	0.10	7402456
Dissolved Vanadium (V)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Zinc (Zn)	ug/L	ND	5.0	7402456				ND	5.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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BV Labs Job #: C1F2167
Report Date: 2021/06/15

Marathon Gold

AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB324			PTB325			PTB325		
Sampling Date		2021/06/01			2021/06/01			2021/06/01		
COC Number		819967-01-01			819967-01-01			819967-01-01		
Sample #		SZ+V QE-POR			L QZ-TQTP+QZ-QTP			L QZ-TQTP+QZ-QTP		
	UNITS	SZ+V QE-POR	RDL	QC Batch	L QZ-TQTP+QZ-QTP	RDL	QC Batch	L QZ-TQTP+QZ-QTP Lab-Dup	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	1.08	N/A	7389050	0.940	N/A	7389050			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	43	1.0	7389046	45	1.0	7389046			
Calculated TDS	mg/L	58	1.0	7389055	48	1.0	7389055			
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7389046	ND	1.0	7389046			
Cation Sum	me/L	1.00	N/A	7389050	0.860	N/A	7389050			
Hardness (CaCO3)	mg/L	48	1.0	7389048	41	1.0	7389048			
Ion Balance (% Difference)	%	3.85	N/A	7389049	4.44	N/A	7389049			
Langelier Index (@ 20C)	N/A	-0.660		7389053	-0.539		7389053			
Langelier Index (@ 4C)	N/A	-0.912		7389054	-0.791		7389054			
Nitrate (N)	mg/L	ND	0.050	7389051	ND	0.050	7389051			
Saturation pH (@ 20C)	N/A	8.44		7389053	8.46		7389053			
Saturation pH (@ 4C)	N/A	8.69		7389054	8.72		7389054			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	43	5.0	7394897	45	5.0	7394897	43	5.0	7394897
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7394915	ND	1.0	7394915	ND	1.0	7394915
Colour	TCU	ND	5.0	7394919	19 (1)	5.0	7394919	35 (1)	5.0	7394919
Nitrate + Nitrite (N)	mg/L	ND	0.050	7394921	ND	0.050	7394921	ND	0.050	7394921
Nitrite (N)	mg/L	ND	0.010	7394924	ND	0.010	7394924	ND	0.010	7394924
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7394609	0.13	0.050	7394609			
Total Organic Carbon (C)	mg/L	ND (2)	5.0	7397453	5.6	0.50	7394615			
Orthophosphate (P)	mg/L	ND	0.010	7394920	ND	0.010	7394920	0.011	0.010	7394920
pH	pH	7.78		7394550	7.93		7394550			
Reactive Silica (SiO2)	mg/L	2.1	0.50	7394918	1.4	0.50	7394918	1.5	0.50	7394918
Dissolved Sulphate (SO4)	mg/L	10	2.0	7394917	2.0	2.0	7394917	ND	2.0	7394917
Turbidity	NTU	24	0.10	7394813	49	0.10	7394813			
Conductivity	uS/cm	100	1.0	7394548	86	1.0	7394548			
Metals										
Dissolved Aluminum (Al)	ug/L	86	5.0	7402456	93	5.0	7402456			
Dissolved Antimony (Sb)	ug/L	ND	1.0	7402456	ND	1.0	7402456			
Dissolved Arsenic (As)	ug/L	ND	1.0	7402456	ND	1.0	7402456			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected
(1) Poor duplicate agreement due to sample inhomogeniety, results confirmed by repeat anaylsis.
(2) Elevated reporting limit due to turbidity.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB324			PTB325			PTB325		
Sampling Date		2021/06/01			2021/06/01			2021/06/01		
COC Number		819967-01-01			819967-01-01			819967-01-01		
Sample #		SZ+V QE-POR			L QZ-TQTP+QZ-QTP			L QZ-TQTP+QZ-QTP		
	UNITS	SZ+V QE-POR	RDL	QC Batch	L QZ-TQTP+QZ-QTP	RDL	QC Batch	L QZ-TQTP+QZ-QTP Lab-Dup	RDL	QC Batch
Dissolved Barium (Ba)	ug/L	1.4	1.0	7402456	3.0	1.0	7402456			
Dissolved Beryllium (Be)	ug/L	ND	1.0	7402456	ND	1.0	7402456			
Dissolved Bismuth (Bi)	ug/L	ND	2.0	7402456	ND	2.0	7402456			
Dissolved Boron (B)	ug/L	ND	50	7402456	ND	50	7402456			
Dissolved Cadmium (Cd)	ug/L	ND	0.010	7402456	ND	0.010	7402456			
Dissolved Calcium (Ca)	ug/L	17000	100	7402456	16000	100	7402456			
Dissolved Chromium (Cr)	ug/L	ND	1.0	7402456	ND	1.0	7402456			
Dissolved Cobalt (Co)	ug/L	ND	0.40	7402456	ND	0.40	7402456			
Dissolved Copper (Cu)	ug/L	0.75	0.50	7402456	ND	0.50	7402456			
Dissolved Iron (Fe)	ug/L	ND	50	7402456	ND	50	7402456			
Dissolved Lead (Pb)	ug/L	ND	0.50	7402456	ND	0.50	7402456			
Dissolved Magnesium (Mg)	ug/L	1200	100	7402456	530	100	7402456			
Dissolved Manganese (Mn)	ug/L	28	2.0	7402456	30	2.0	7402456			
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	7402456	ND	2.0	7402456			
Dissolved Nickel (Ni)	ug/L	ND	2.0	7402456	ND	2.0	7402456			
Dissolved Phosphorus (P)	ug/L	ND	100	7402456	ND	100	7402456			
Dissolved Potassium (K)	ug/L	540	100	7402456	210	100	7402456			
Dissolved Selenium (Se)	ug/L	ND	0.50	7402456	ND	0.50	7402456			
Dissolved Silver (Ag)	ug/L	ND	0.10	7402456	ND	0.10	7402456			
Dissolved Sodium (Na)	ug/L	670	100	7402456	550	100	7402456			
Dissolved Strontium (Sr)	ug/L	20	2.0	7402456	42	2.0	7402456			
Dissolved Thallium (Tl)	ug/L	ND	0.10	7402456	ND	0.10	7402456			
Dissolved Tin (Sn)	ug/L	ND	2.0	7402456	ND	2.0	7402456			
Dissolved Titanium (Ti)	ug/L	ND	2.0	7402456	ND	2.0	7402456			
Dissolved Uranium (U)	ug/L	0.17	0.10	7402456	0.12	0.10	7402456			
Dissolved Vanadium (V)	ug/L	ND	2.0	7402456	ND	2.0	7402456			
Dissolved Zinc (Zn)	ug/L	ND	5.0	7402456	ND	5.0	7402456			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB326			PTB326			PTB327		
Sampling Date		2021/06/01			2021/06/01			2021/06/01		
COC Number		819967-01-01			819967-01-01			819967-01-01		
Sample #		L TRJ			L TRJ			V QE-POR-QTP		
	UNITS	**L TRJ**	**RDL**	**QC Batch**	**L TRJ Lab-Dup**	**RDL**	**QC Batch**	**V QE-POR-QTP**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	1.16	N/A	7389050				0.650	N/A	7389050
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	58	1.0	7389046				32	1.0	7389046
Calculated TDS	mg/L	59	1.0	7389055				33	1.0	7389055
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7389046				ND	1.0	7389046
Cation Sum	me/L	1.08	N/A	7389050				0.640	N/A	7389050
Hardness (CaCO3)	mg/L	51	1.0	7389048				31	1.0	7389048
Ion Balance (% Difference)	%	3.57	N/A	7389049				0.780	N/A	7389049
Langelier Index (@ 20C)	N/A	-0.317		7389053				-0.993		7389053
Langelier Index (@ 4C)	N/A	-0.569		7389054				-1.25		7389054
Nitrate (N)	mg/L	ND	0.050	7389051				ND	0.050	7389051
Saturation pH (@ 20C)	N/A	8.28		7389053				8.73		7389053
Saturation pH (@ 4C)	N/A	8.54		7389054				8.98		7389054
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	58	5.0	7394897				33	5.0	7394897
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7394915				ND	1.0	7394915
Colour	TCU	ND	5.0	7394919				ND	5.0	7394919
Nitrate + Nitrite (N)	mg/L	ND	0.050	7394921				ND	0.050	7394921
Nitrite (N)	mg/L	0.010	0.010	7394924				ND	0.010	7394924
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7394609				ND	0.050	7394609
Total Organic Carbon (C)	mg/L	ND (1)	5.0	7397453				1.2	0.50	7397457
Orthophosphate (P)	mg/L	ND	0.010	7394920				ND	0.010	7394920
pH	pH	7.97		7394550	7.99		7394550	7.73		7394550
Reactive Silica (SiO2)	mg/L	2.4	0.50	7394918				0.96	0.50	7394918
Dissolved Sulphate (SO4)	mg/L	ND	2.0	7394917				ND	2.0	7394917
Turbidity	NTU	120	1.0	7394813				4.5	0.10	7394816
Conductivity	uS/cm	110	1.0	7394548	110	1.0	7394548	66	1.0	7394548
Metals										
Dissolved Aluminum (Al)	ug/L	110	5.0	7402456				56	5.0	7402456
Dissolved Antimony (Sb)	ug/L	ND	1.0	7402456				ND	1.0	7402456
Dissolved Arsenic (As)	ug/L	ND	1.0	7402456				ND	1.0	7402456
Dissolved Barium (Ba)	ug/L	61	1.0	7402456				ND	1.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to turbidity.

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB326			PTB326			PTB327		
Sampling Date		2021/06/01			2021/06/01			2021/06/01		
COC Number		819967-01-01			819967-01-01			819967-01-01		
Sample #		L TRJ			L TRJ			V QE-POR-QTP		
	UNITS	L TRJ	RDL	QC Batch	L TRJ Lab-Dup	RDL	QC Batch	V QE-POR-QTP	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	1.0	7402456				ND	1.0	7402456
Dissolved Bismuth (Bi)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Boron (B)	ug/L	ND	50	7402456				ND	50	7402456
Dissolved Cadmium (Cd)	ug/L	ND	0.010	7402456				ND	0.010	7402456
Dissolved Calcium (Ca)	ug/L	19000	100	7402456				11000	100	7402456
Dissolved Chromium (Cr)	ug/L	ND	1.0	7402456				ND	1.0	7402456
Dissolved Cobalt (Co)	ug/L	ND	0.40	7402456				ND	0.40	7402456
Dissolved Copper (Cu)	ug/L	0.56	0.50	7402456				0.58	0.50	7402456
Dissolved Iron (Fe)	ug/L	ND	50	7402456				ND	50	7402456
Dissolved Lead (Pb)	ug/L	ND	0.50	7402456				ND	0.50	7402456
Dissolved Magnesium (Mg)	ug/L	1100	100	7402456				510	100	7402456
Dissolved Manganese (Mn)	ug/L	46	2.0	7402456				85	2.0	7402456
Dissolved Molybdenum (Mo)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Nickel (Ni)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Phosphorus (P)	ug/L	ND	100	7402456				ND	100	7402456
Dissolved Potassium (K)	ug/L	660	100	7402456				120	100	7402456
Dissolved Selenium (Se)	ug/L	ND	0.50	7402456				ND	0.50	7402456
Dissolved Silver (Ag)	ug/L	ND	0.10	7402456				ND	0.10	7402456
Dissolved Sodium (Na)	ug/L	810	100	7402456				530	100	7402456
Dissolved Strontium (Sr)	ug/L	110	2.0	7402456				10	2.0	7402456
Dissolved Thallium (Tl)	ug/L	ND	0.10	7402456				ND	0.10	7402456
Dissolved Tin (Sn)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Titanium (Ti)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Uranium (U)	ug/L	0.33	0.10	7402456				ND	0.10	7402456
Dissolved Vanadium (V)	ug/L	ND	2.0	7402456				ND	2.0	7402456
Dissolved Zinc (Zn)	ug/L	ND	5.0	7402456				ND	5.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB328		PTB329		PTB330		
Sampling Date		2021/06/01		2021/06/01		2021/06/01		
COC Number		819967-01-01		819967-02-01		819967-02-01		
Sample #		MAR HL		LEP HL		FLBK		
	UNITS	Mar HL	QC Batch	Lep HL	QC Batch	FLBK	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	1.42	7389050	1.64	7389050	0.200	N/A	7389050
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	65	7389046	78	7389046	10	1.0	7389046
Calculated TDS	mg/L	74	7389055	83	7389055	9.0	1.0	7389055
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7389046	ND	7389046	ND	1.0	7389046
Cation Sum	me/L	1.33	7389050	1.52	7389050	0.140	N/A	7389050
Hardness (CaCO3)	mg/L	63	7389048	72	7389048	5.9	1.0	7389048
Ion Balance (% Difference)	%	3.27	7389049	3.80	7389049	17.7	N/A	7389049
Langelier Index (@ 20C)	N/A	-0.156	7389053	0.00100	7389053	-3.08		7389053
Langelier Index (@ 4C)	N/A	-0.408	7389054	-0.250	7389054	-3.33		7389054
Nitrate (N)	mg/L	ND	7389051	ND	7389051	ND	0.050	7389051
Saturation pH (@ 20C)	N/A	8.16	7389053	8.08	7389053	9.88		7389053
Saturation pH (@ 4C)	N/A	8.41	7389054	8.33	7389054	10.1		7389054
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	66	7394897	79	7394897	10	5.0	7394897
Dissolved Chloride (Cl-)	mg/L	ND	7394915	ND	7394915	ND	1.0	7394915
Colour	TCU	ND	7394919	ND	7394919	8.8	5.0	7394919
Nitrate + Nitrite (N)	mg/L	ND	7394921	ND	7394921	ND	0.050	7394921
Nitrite (N)	mg/L	ND	7394924	ND	7394924	ND	0.010	7394924
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7394609	ND	7394609	ND	0.050	7394609
Total Organic Carbon (C)	mg/L	ND	7397457	0.94	7394615	3.8	0.50	7397457
Orthophosphate (P)	mg/L	ND	7394920	ND	7394920	ND	0.010	7394920
pH	pH	8.00	7394550	8.08	7394550	6.80		7397201
Reactive Silica (SiO2)	mg/L	3.7	7394918	3.7	7394918	ND	0.50	7394918
Dissolved Sulphate (SO4)	mg/L	5.0	7394917	3.2	7394917	ND	2.0	7394917
Turbidity	NTU	12	7394816	12	7394816	8.8	0.10	7394816
Conductivity	uS/cm	130	7394548	150	7394548	16	1.0	7397200
Metals								
Dissolved Aluminum (Al)	ug/L	74	7402456	79	7402456	9.5	5.0	7402456
Dissolved Antimony (Sb)	ug/L	ND	7402456	ND	7402456	ND	1.0	7402456
Dissolved Arsenic (As)	ug/L	ND	7402456	ND	7402456	ND	1.0	7402456
Dissolved Barium (Ba)	ug/L	13	7402456	6.5	7402456	ND	1.0	7402456
Dissolved Beryllium (Be)	ug/L	ND	7402456	ND	7402456	ND	1.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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AT. RCAP-MS DISSOLVED (FIELDFILT) IN W

BV Labs ID		PTB328		PTB329		PTB330		
Sampling Date		2021/06/01		2021/06/01		2021/06/01		
COC Number		819967-01-01		819967-02-01		819967-02-01		
Sample #		MAR HL		LEP HL		FLBK		
	UNITS	Mar HL	QC Batch	Lep HL	QC Batch	FLBK	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	7402456	ND	7402456	ND	2.0	7402456
Dissolved Boron (B)	ug/L	ND	7402456	ND	7402456	ND	50	7402456
Dissolved Cadmium (Cd)	ug/L	ND	7402456	ND	7402456	ND	0.010	7402456
Dissolved Calcium (Ca)	ug/L	23000	7402456	23000	7402456	2400	100	7402456
Dissolved Chromium (Cr)	ug/L	ND	7402456	ND	7402456	ND	1.0	7402456
Dissolved Cobalt (Co)	ug/L	ND	7402456	ND	7402456	ND	0.40	7402456
Dissolved Copper (Cu)	ug/L	0.73	7402456	ND	7402456	1.1	0.50	7402456
Dissolved Iron (Fe)	ug/L	ND	7402456	ND	7402456	ND	50	7402456
Dissolved Lead (Pb)	ug/L	ND	7402456	ND	7402456	ND	0.50	7402456
Dissolved Magnesium (Mg)	ug/L	1600	7402456	3500	7402456	ND	100	7402456
Dissolved Manganese (Mn)	ug/L	35	7402456	27	7402456	2.4	2.0	7402456
Dissolved Molybdenum (Mo)	ug/L	3.1	7402456	ND	7402456	ND	2.0	7402456
Dissolved Nickel (Ni)	ug/L	ND	7402456	ND	7402456	ND	2.0	7402456
Dissolved Phosphorus (P)	ug/L	ND	7402456	ND	7402456	ND	100	7402456
Dissolved Potassium (K)	ug/L	980	7402456	1300	7402456	ND	100	7402456
Dissolved Selenium (Se)	ug/L	ND	7402456	ND	7402456	ND	0.50	7402456
Dissolved Silver (Ag)	ug/L	ND	7402456	ND	7402456	ND	0.10	7402456
Dissolved Sodium (Na)	ug/L	1100	7402456	1300	7402456	470	100	7402456
Dissolved Strontium (Sr)	ug/L	52	7402456	130	7402456	ND	2.0	7402456
Dissolved Thallium (Tl)	ug/L	ND	7402456	ND	7402456	ND	0.10	7402456
Dissolved Tin (Sn)	ug/L	ND	7402456	ND	7402456	ND	2.0	7402456
Dissolved Titanium (Ti)	ug/L	ND	7402456	ND	7402456	ND	2.0	7402456
Dissolved Uranium (U)	ug/L	0.42	7402456	2.0	7402456	ND	0.10	7402456
Dissolved Vanadium (V)	ug/L	ND	7402456	ND	7402456	ND	2.0	7402456
Dissolved Zinc (Zn)	ug/L	ND	7402456	ND	7402456	5.9	5.0	7402456

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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RESULTS OF ANALYSES OF WATER

BV Labs ID		PTB319	PTB320	PTB321	PTB322	PTB323		
Sampling Date		2021/06/01	2021/06/01	2021/06/01	2021/06/01	2021/06/01		
COC Number		819967-01-01	819967-01-01	819967-01-01	819967-01-01	819967-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Inorganics								
Dissolved Fluoride (F-)	mg/L	ND	ND	ND	ND	ND	0.10	7394551

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		PTB324	PTB325	PTB326	PTB326	PTB327	PTB328		
Sampling Date		2021/06/01	2021/06/01	2021/06/01	2021/06/01	2021/06/01	2021/06/01		
COC Number		819967-01-01	819967-01-01	819967-01-01	819967-01-01	819967-01-01	819967-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**L TRJ Lab-Dup**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
Inorganics									
Dissolved Fluoride (F-)	mg/L	ND	ND	ND	ND	ND	ND	0.10	7394551

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

BV Labs ID		PTB329		PTB330		
Sampling Date		2021/06/01		2021/06/01		
COC Number		819967-02-01		819967-02-01		
Sample #		LEP HL		FLBK		
	UNITS	**Lep HL**	**QC Batch**	**FLBK**	**RDL**	**QC Batch**
Inorganics						
Dissolved Fluoride (F-)	mg/L	ND	7394551	ND	0.10	7397202

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

BV Labs ID		PTB319	PTB320	PTB320	PTB321	PTB322		
Sampling Date		2021/06/01	2021/06/01	2021/06/01	2021/06/01	2021/06/01		
COC Number		819967-01-01	819967-01-01	819967-01-01	819967-01-01	819967-01-01		
Sample #		M AQPOR	M+L SED	M+L SED	M+L MD	M QE-POR		
	UNITS	**M AQPOR**	**M+L SED**	**M+L SED Lab-Dup**	**M+L MD**	**M QE-POR**	**RDL**	**QC Batch**
Metals								
Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.01	7406112

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

BV Labs ID		PTB323	PTB324	PTB325	PTB326	PTB327		
Sampling Date		2021/06/01	2021/06/01	2021/06/01	2021/06/01	2021/06/01		
COC Number		819967-01-01	819967-01-01	819967-01-01	819967-01-01	819967-01-01		
Sample #		M QZ-QE-POR-QTP-MIN	SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP		
	UNITS	**M QZ-QE-POR-QTP-MIN**	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**RDL**	**QC Batch**
Metals								
Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.01	7406112

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		PTB328	PTB329	PTB330		
Sampling Date		2021/06/01	2021/06/01	2021/06/01		
COC Number		819967-01-01	819967-02-01	819967-02-01		
Sample #		MAR HL	LEP HL	FLBK		
	UNITS	**Mar HL**	**Lep HL**	**FLBK**	**RDL**	**QC Batch**
Metals						
Mercury (Hg)	ug/L	ND	ND	ND	0.01	7406112

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	5.7°C

Sample PTB319 [M AQPOR] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample PTB320 [M+L SED] : ortho-Phosphate > Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample PTB323 [M QZ-QE-POR-QTP-MIN] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample PTB326 [L TRJ] : NOX < NO2 : Both values fall within the method uncertainty for duplicates and are likely equivalent.

Sample PTB330 [FLBK] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7394548	SHW	Spiked Blank	Conductivity	2021/06/08		101	%	80 - 120
7394548	SHW	Method Blank	Conductivity	2021/06/08	ND, RDL=1.0		uS/cm	
7394548	SHW	RPD [PTB326-01]	Conductivity	2021/06/08	2.0		%	10
7394550	SHW	Spiked Blank	pH	2021/06/08		101	%	97 - 103
7394550	SHW	RPD [PTB326-01]	pH	2021/06/08	0.26		%	N/A
7394551	SHW	Matrix Spike	Dissolved Fluoride (F-)	2021/06/08		96	%	80 - 120
7394551	SHW	Spiked Blank	Dissolved Fluoride (F-)	2021/06/08		98	%	80 - 120
7394551	SHW	Method Blank	Dissolved Fluoride (F-)	2021/06/08	ND, RDL=0.10		mg/L	
7394551	SHW	RPD [PTB326-01]	Dissolved Fluoride (F-)	2021/06/08	NC		%	20
7394608	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/06/08		98	%	80 - 120
7394608	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/06/08		102	%	80 - 120
7394608	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/06/08	ND, RDL=0.050		mg/L	
7394608	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2021/06/08	NC		%	20
7394609	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/06/08		95	%	80 - 120
7394609	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/06/08		105	%	80 - 120
7394609	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/06/08	ND, RDL=0.050		mg/L	
7394609	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2021/06/08	6.8		%	20
7394615	YLG	Matrix Spike	Total Organic Carbon (C)	2021/06/08		97	%	85 - 115
7394615	YLG	Spiked Blank	Total Organic Carbon (C)	2021/06/08		99	%	80 - 120
7394615	YLG	Method Blank	Total Organic Carbon (C)	2021/06/08	ND, RDL=0.50		mg/L	
7394615	YLG	RPD	Total Organic Carbon (C)	2021/06/08	2.4		%	15
7394813	SHW	QC Standard	Turbidity	2021/06/08		105	%	80 - 120
7394813	SHW	Spiked Blank	Turbidity	2021/06/08		102	%	80 - 120
7394813	SHW	Method Blank	Turbidity	2021/06/08	ND, RDL=0.10		NTU	
7394813	SHW	RPD	Turbidity	2021/06/08	20		%	20
7394816	SHW	QC Standard	Turbidity	2021/06/08		104	%	80 - 120
7394816	SHW	Spiked Blank	Turbidity	2021/06/08		104	%	80 - 120
7394816	SHW	Method Blank	Turbidity	2021/06/08	ND, RDL=0.10		NTU	
7394816	SHW	RPD [PTB322-01]	Turbidity	2021/06/08	3.2		%	20
7394897	MCN	Matrix Spike [PTB325-01]	Total Alkalinity (Total as CaCO3)	2021/06/09		NC	%	80 - 120
7394897	MCN	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/06/09		106	%	80 - 120
7394897	MCN	Method Blank	Total Alkalinity (Total as CaCO3)	2021/06/09	ND, RDL=5.0		mg/L	
7394897	MCN	RPD [PTB325-01]	Total Alkalinity (Total as CaCO3)	2021/06/09	3.6		%	20
7394915	MCN	Matrix Spike [PTB325-01]	Dissolved Chloride (Cl-)	2021/06/09		97	%	80 - 120
7394915	MCN	Spiked Blank	Dissolved Chloride (Cl-)	2021/06/09		97	%	80 - 120
7394915	MCN	Method Blank	Dissolved Chloride (Cl-)	2021/06/09	ND, RDL=1.0		mg/L	
7394915	MCN	RPD [PTB325-01]	Dissolved Chloride (Cl-)	2021/06/09	NC		%	20
7394917	MCN	Matrix Spike [PTB325-01]	Dissolved Sulphate (SO4)	2021/06/09		102	%	80 - 120
7394917	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2021/06/09		108	%	80 - 120
7394917	MCN	Method Blank	Dissolved Sulphate (SO4)	2021/06/09	ND, RDL=2.0		mg/L	
7394917	MCN	RPD [PTB325-01]	Dissolved Sulphate (SO4)	2021/06/09	1.7		%	20
7394918	MCN	Matrix Spike [PTB325-01]	Reactive Silica (SiO2)	2021/06/09		92	%	80 - 120
7394918	MCN	Spiked Blank	Reactive Silica (SiO2)	2021/06/09		96	%	80 - 120
7394918	MCN	Method Blank	Reactive Silica (SiO2)	2021/06/09	ND, RDL=0.50		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7394918	MCN	RPD [PTB325-01]	Reactive Silica (SiO2)	2021/06/09	7.2		%	20
7394919	MCN	Spiked Blank	Colour	2021/06/09		97	%	80 - 120
7394919	MCN	Method Blank	Colour	2021/06/09	ND, RDL=5.0		TCU	
7394919	MCN	RPD [PTB325-01]	Colour	2021/06/09	60 (1)		%	20
7394920	MCN	Matrix Spike [PTB325-01]	Orthophosphate (P)	2021/06/09		94	%	80 - 120
7394920	MCN	Spiked Blank	Orthophosphate (P)	2021/06/09		98	%	80 - 120
7394920	MCN	Method Blank	Orthophosphate (P)	2021/06/09	ND, RDL=0.010		mg/L	
7394920	MCN	RPD [PTB325-01]	Orthophosphate (P)	2021/06/09	4.9		%	20
7394921	MCN	Matrix Spike [PTB325-01]	Nitrate + Nitrite (N)	2021/06/09		94	%	80 - 120
7394921	MCN	Spiked Blank	Nitrate + Nitrite (N)	2021/06/09		92	%	80 - 120
7394921	MCN	Method Blank	Nitrate + Nitrite (N)	2021/06/09	ND, RDL=0.050		mg/L	
7394921	MCN	RPD [PTB325-01]	Nitrate + Nitrite (N)	2021/06/09	NC		%	20
7394924	MCN	Matrix Spike [PTB325-01]	Nitrite (N)	2021/06/09		99	%	80 - 120
7394924	MCN	Spiked Blank	Nitrite (N)	2021/06/09		102	%	80 - 120
7394924	MCN	Method Blank	Nitrite (N)	2021/06/09	ND, RDL=0.010		mg/L	
7394924	MCN	RPD [PTB325-01]	Nitrite (N)	2021/06/09	NC		%	20
7397200	SHW	Spiked Blank	Conductivity	2021/06/09		103	%	80 - 120
7397200	SHW	Method Blank	Conductivity	2021/06/09	ND, RDL=1.0		uS/cm	
7397200	SHW	RPD	Conductivity	2021/06/09	3.0		%	10
7397201	SHW	Spiked Blank	pH	2021/06/09		101	%	97 - 103
7397201	SHW	RPD	pH	2021/06/09	0.50		%	N/A
7397202	SHW	Matrix Spike	Dissolved Fluoride (F-)	2021/06/09		98	%	80 - 120
7397202	SHW	Spiked Blank	Dissolved Fluoride (F-)	2021/06/09		103	%	80 - 120
7397202	SHW	Method Blank	Dissolved Fluoride (F-)	2021/06/09	ND, RDL=0.10		mg/L	
7397202	SHW	RPD	Dissolved Fluoride (F-)	2021/06/09	NC		%	20
7397453	YLG	Matrix Spike	Total Organic Carbon (C)	2021/06/09		NC	%	85 - 115
7397453	YLG	Spiked Blank	Total Organic Carbon (C)	2021/06/09		101	%	80 - 120
7397453	YLG	Method Blank	Total Organic Carbon (C)	2021/06/09	ND, RDL=0.50		mg/L	
7397453	YLG	RPD	Total Organic Carbon (C)	2021/06/09	2.9		%	15
7397457	YLG	Matrix Spike	Total Organic Carbon (C)	2021/06/09		99	%	85 - 115
7397457	YLG	Spiked Blank	Total Organic Carbon (C)	2021/06/09		100	%	80 - 120
7397457	YLG	Method Blank	Total Organic Carbon (C)	2021/06/09	ND, RDL=0.50		mg/L	
7397457	YLG	RPD	Total Organic Carbon (C)	2021/06/09	NC		%	15
7402456	BAN	Matrix Spike	Dissolved Aluminum (Al)	2021/06/11		102	%	80 - 120
			Dissolved Antimony (Sb)	2021/06/11		107	%	80 - 120
			Dissolved Arsenic (As)	2021/06/11		96	%	80 - 120
			Dissolved Barium (Ba)	2021/06/11		97	%	80 - 120
			Dissolved Beryllium (Be)	2021/06/11		98	%	80 - 120
			Dissolved Bismuth (Bi)	2021/06/11		97	%	80 - 120
			Dissolved Boron (B)	2021/06/11		NC	%	80 - 120
			Dissolved Cadmium (Cd)	2021/06/11		97	%	80 - 120
			Dissolved Calcium (Ca)	2021/06/11		NC	%	80 - 120
			Dissolved Chromium (Cr)	2021/06/11		96	%	80 - 120
			Dissolved Cobalt (Co)	2021/06/11		94	%	80 - 120
			Dissolved Copper (Cu)	2021/06/11		95	%	80 - 120
			Dissolved Iron (Fe)	2021/06/11		99	%	80 - 120
			Dissolved Lead (Pb)	2021/06/11		99	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Magnesium (Mg)	2021/06/11		NC	%	80 - 120
			Dissolved Manganese (Mn)	2021/06/11		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/06/11		105	%	80 - 120
			Dissolved Nickel (Ni)	2021/06/11		94	%	80 - 120
			Dissolved Phosphorus (P)	2021/06/11		106	%	80 - 120
			Dissolved Potassium (K)	2021/06/11		100	%	80 - 120
			Dissolved Selenium (Se)	2021/06/11		98	%	80 - 120
			Dissolved Silver (Ag)	2021/06/11		93	%	80 - 120
			Dissolved Sodium (Na)	2021/06/11		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/06/11		98	%	80 - 120
			Dissolved Thallium (Tl)	2021/06/11		100	%	80 - 120
			Dissolved Tin (Sn)	2021/06/11		104	%	80 - 120
			Dissolved Titanium (Ti)	2021/06/11		101	%	80 - 120
			Dissolved Uranium (U)	2021/06/11		102	%	80 - 120
			Dissolved Vanadium (V)	2021/06/11		98	%	80 - 120
			Dissolved Zinc (Zn)	2021/06/11		97	%	80 - 120
7402456	BAN	Spiked Blank	Dissolved Aluminum (Al)	2021/06/11		102	%	80 - 120
			Dissolved Antimony (Sb)	2021/06/11		105	%	80 - 120
			Dissolved Arsenic (As)	2021/06/11		93	%	80 - 120
			Dissolved Barium (Ba)	2021/06/11		97	%	80 - 120
			Dissolved Beryllium (Be)	2021/06/11		98	%	80 - 120
			Dissolved Bismuth (Bi)	2021/06/11		98	%	80 - 120
			Dissolved Boron (B)	2021/06/11		100	%	80 - 120
			Dissolved Cadmium (Cd)	2021/06/11		97	%	80 - 120
			Dissolved Calcium (Ca)	2021/06/11		97	%	80 - 120
			Dissolved Chromium (Cr)	2021/06/11		94	%	80 - 120
			Dissolved Cobalt (Co)	2021/06/11		94	%	80 - 120
			Dissolved Copper (Cu)	2021/06/11		97	%	80 - 120
			Dissolved Iron (Fe)	2021/06/11		98	%	80 - 120
			Dissolved Lead (Pb)	2021/06/11		99	%	80 - 120
			Dissolved Magnesium (Mg)	2021/06/11		100	%	80 - 120
			Dissolved Manganese (Mn)	2021/06/11		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/06/11		100	%	80 - 120
			Dissolved Nickel (Ni)	2021/06/11		95	%	80 - 120
			Dissolved Phosphorus (P)	2021/06/11		105	%	80 - 120
			Dissolved Potassium (K)	2021/06/11		97	%	80 - 120
			Dissolved Selenium (Se)	2021/06/11		99	%	80 - 120
			Dissolved Silver (Ag)	2021/06/11		96	%	80 - 120
			Dissolved Sodium (Na)	2021/06/11		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/06/11		96	%	80 - 120
			Dissolved Thallium (Tl)	2021/06/11		100	%	80 - 120
			Dissolved Tin (Sn)	2021/06/11		100	%	80 - 120
			Dissolved Titanium (Ti)	2021/06/11		104	%	80 - 120
			Dissolved Uranium (U)	2021/06/11		100	%	80 - 120
			Dissolved Vanadium (V)	2021/06/11		97	%	80 - 120
			Dissolved Zinc (Zn)	2021/06/11		99	%	80 - 120
7402456	BAN	Method Blank	Dissolved Aluminum (Al)	2021/06/11	ND, RDL=5.0		ug/L	
			Dissolved Antimony (Sb)	2021/06/11	ND, RDL=1.0		ug/L	
			Dissolved Arsenic (As)	2021/06/11	ND, RDL=1.0		ug/L	
			Dissolved Barium (Ba)	2021/06/11	ND, RDL=1.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Beryllium (Be)	2021/06/11	ND, RDL=1.0		ug/L	
			Dissolved Bismuth (Bi)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Boron (B)	2021/06/11	ND, RDL=50		ug/L	
			Dissolved Cadmium (Cd)	2021/06/11	ND, RDL=0.010		ug/L	
			Dissolved Calcium (Ca)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Chromium (Cr)	2021/06/11	ND, RDL=1.0		ug/L	
			Dissolved Cobalt (Co)	2021/06/11	ND, RDL=0.40		ug/L	
			Dissolved Copper (Cu)	2021/06/11	ND, RDL=0.50		ug/L	
			Dissolved Iron (Fe)	2021/06/11	ND, RDL=50		ug/L	
			Dissolved Lead (Pb)	2021/06/11	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Manganese (Mn)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Nickel (Ni)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Selenium (Se)	2021/06/11	ND, RDL=0.50		ug/L	
			Dissolved Silver (Ag)	2021/06/11	ND, RDL=0.10		ug/L	
			Dissolved Sodium (Na)	2021/06/11	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Thallium (Tl)	2021/06/11	ND, RDL=0.10		ug/L	
			Dissolved Tin (Sn)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Titanium (Ti)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Uranium (U)	2021/06/11	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2021/06/11	ND, RDL=2.0		ug/L	
			Dissolved Zinc (Zn)	2021/06/11	ND, RDL=5.0		ug/L	
7402456	BAN	RPD	Dissolved Aluminum (Al)	2021/06/11	NC		%	20
			Dissolved Antimony (Sb)	2021/06/11	NC		%	20
			Dissolved Arsenic (As)	2021/06/11	NC		%	20
			Dissolved Barium (Ba)	2021/06/11	0.73		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Beryllium (Be)	2021/06/11	NC		%	20
			Dissolved Bismuth (Bi)	2021/06/11	NC		%	20
			Dissolved Boron (B)	2021/06/11	1.6		%	20
			Dissolved Cadmium (Cd)	2021/06/11	NC		%	20
			Dissolved Calcium (Ca)	2021/06/11	0.90		%	20
			Dissolved Chromium (Cr)	2021/06/11	NC		%	20
			Dissolved Cobalt (Co)	2021/06/11	NC		%	20
			Dissolved Copper (Cu)	2021/06/11	2.1		%	20
			Dissolved Iron (Fe)	2021/06/11	NC		%	20
			Dissolved Lead (Pb)	2021/06/11	NC		%	20
			Dissolved Magnesium (Mg)	2021/06/11	0.78		%	20
			Dissolved Manganese (Mn)	2021/06/11	NC		%	20
			Dissolved Molybdenum (Mo)	2021/06/11	NC		%	20
			Dissolved Nickel (Ni)	2021/06/11	NC		%	20
			Dissolved Phosphorus (P)	2021/06/11	NC		%	20
			Dissolved Potassium (K)	2021/06/11	0.97		%	20
			Dissolved Selenium (Se)	2021/06/11	NC		%	20
			Dissolved Silver (Ag)	2021/06/11	NC		%	20
			Dissolved Sodium (Na)	2021/06/11	1.4		%	20
			Dissolved Strontium (Sr)	2021/06/11	3.1		%	20
			Dissolved Thallium (Tl)	2021/06/11	NC		%	20
			Dissolved Tin (Sn)	2021/06/11	NC		%	20
			Dissolved Titanium (Ti)	2021/06/11	NC		%	20
			Dissolved Uranium (U)	2021/06/11	2.0		%	20
			Dissolved Vanadium (V)	2021/06/11	NC		%	20
			Dissolved Zinc (Zn)	2021/06/11	7.6		%	20
7406112	GR1	Matrix Spike [PTB320-05]	Mercury (Hg)	2021/06/14		93	%	75 - 125
7406112	GR1	Spiked Blank	Mercury (Hg)	2021/06/14		97	%	80 - 120
7406112	GR1	Method Blank	Mercury (Hg)	2021/06/14	ND, RDL=0.01		ug/L	
7406112	GR1	RPD [PTB320-05]	Mercury (Hg)	2021/06/14	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Poor duplicate agreement due to sample inhomogeniety, results confirmed by repeat anaylsis.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

<Original signed by>

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

<Original signed by>

Mike MacGillivray, Scientific Specialist (Inorganics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Your C.O.C. #: 834368-02-01, 834368-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/08/27
Report #: R6785149
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1L7012
Received: 2021/08/03, 09:45

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	1	N/A	2021/08/10	N/A	SM 23 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide	1	N/A	2021/08/12	N/A	SM 23 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide	11	N/A	2021/08/09	N/A	SM 23 4500-CO2 D
Alkalinity	12	N/A	2021/08/10	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity	1	N/A	2021/08/12	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	12	N/A	2021/08/10	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride	1	N/A	2021/08/12	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	11	N/A	2021/08/10	ATL SOP 00020	SM 23 2120C m
Colour	1	N/A	2021/08/16	ATL SOP 00020	SM 23 2120C m
Colour	1	N/A	2021/08/09	ATL SOP 00020	SM 23 2120C m
Conductance - water	1	N/A	2021/08/13	ATL SOP 00004	SM 23 2510B m
Conductance - water	12	N/A	2021/08/09	ATL SOP 00004	SM 23 2510B m
Ion Balance (% Difference)	1	N/A	2021/08/10	N/A	Auto Calc.
Ion Balance (% Difference)	10	N/A	2021/08/11	N/A	Auto Calc.
Ion Balance (% Difference)	1	N/A	2021/08/16	N/A	Auto Calc.
Anion and Cation Sum	12	N/A	2021/08/10	N/A	Auto Calc.
Anion and Cation Sum	1	N/A	2021/08/12	N/A	Auto Calc.
Fluoride - Low Level (1)	13	N/A	2021/08/06	BBY6SOP-00048	SM 23 4500-F C m
Hardness (calculated as CaCO3) (1)	13	N/A	2021/08/07	BBY WI-00033	Auto Calc
Mercury (Total) by CV (1)	13	2021/08/06	2021/08/06	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	13	N/A	2021/08/07	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved) (1)	7	N/A	2021/08/06	BBY7SOP-00002	EPA 6020B R2 m
Elements by ICPMS Low Level (dissolved) (1)	6	N/A	2021/08/07	BBY7SOP-00002	EPA 6020B R2 m
Nitrogen Ammonia - water	12	N/A	2021/08/10	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	1	N/A	2021/08/06	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	11	N/A	2021/08/10	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite	1	N/A	2021/08/16	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite	1	N/A	2021/08/09	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	1	N/A	2021/08/10	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrite	11	N/A	2021/08/11	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrite	1	N/A	2021/08/16	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	1	N/A	2021/08/10	ATL SOP 00018	ASTM D3867-16

Your C.O.C. #: 834368-02-01, 834368-01-01

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36 Birchview Dr
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CANADA A0L 1K0

Report Date: 2021/08/27
Report #: R6785149
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CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1L7012
Received: 2021/08/03, 09:45

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Nitrogen - Nitrate (as N)	11	N/A	2021/08/11	ATL SOP 00018	ASTM D3867-16
Nitrogen - Nitrate (as N)	1	N/A	2021/08/16	ATL SOP 00018	ASTM D3867-16
pH (2)	1	N/A	2021/08/13	ATL SOP 00003	SM 23 4500-H+ B m
pH (2)	12	N/A	2021/08/09	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	11	N/A	2021/08/10	ATL SOP 00021	SM 23 4500-P E m
Phosphorus - ortho	1	N/A	2021/08/16	ATL SOP 00021	SM 23 4500-P E m
Phosphorus - ortho	1	N/A	2021/08/09	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2021/08/10	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 20C)	11	N/A	2021/08/11	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 20C)	1	N/A	2021/08/16	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	1	N/A	2021/08/10	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	11	N/A	2021/08/11	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	1	N/A	2021/08/16	ATL SOP 00049	Auto Calc.
Reactive Silica	11	N/A	2021/08/10	ATL SOP 00022	EPA 366.0 m
Reactive Silica	1	N/A	2021/08/16	ATL SOP 00022	EPA 366.0 m
Reactive Silica	1	N/A	2021/08/09	ATL SOP 00022	EPA 366.0 m
Sulphate	12	N/A	2021/08/10	ATL SOP 00023	ASTM D516-16 m
Sulphate	1	N/A	2021/08/16	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	1	N/A	2021/08/10	N/A	Auto Calc.
Total Dissolved Solids (TDS calc)	11	N/A	2021/08/11	N/A	Auto Calc.
Total Dissolved Solids (TDS calc)	1	N/A	2021/08/16	N/A	Auto Calc.
Organic carbon - Total (TOC) (3)	1	N/A	2021/08/05	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (3)	8	N/A	2021/08/06	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (3)	4	N/A	2021/08/09	ATL SOP 00203	SM 23 5310B m
Turbidity	1	N/A	2021/08/13	ATL SOP 00011	EPA 180.1 R2 m
Turbidity	6	N/A	2021/08/05	ATL SOP 00011	EPA 180.1 R2 m
Turbidity	6	N/A	2021/08/06	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

Your C.O.C. #: 834368-02-01, 834368-01-01

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CANADA A0L 1K0

Report Date: 2021/08/27
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Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1L7012
Received: 2021/08/03, 09:45

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Burnaby via Bedford
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key <Original signed by>

Tyler Travers
Project Manager Assistant
Aug 2021 16:33:19

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Maryann Comeau, Customer Experience Supervisor/PM
Email: Maryann.COMEAU@bureauveritas.com
Phone# (902)420-0203 Ext:298

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR199		QGR200	QGR201			QGR202		
Sampling Date		2021/07/27		2021/07/27	2021/07/27			2021/07/27		
COC Number		834368-01-01		834368-01-01	834368-01-01			834368-01-01		
Sample #		M AQPOR		M+L SED	M+L MD			M QE-POR		
	UNITS	**M AQPOR**	**QC Batch**	**M+L SED**	**M+L MD**	**RDL**	**QC Batch**	**M QE-POR**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	1.16	7496851	1.15	0.990	N/A	7496851	3.98	N/A	7515157
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	47	7496847	57	44	1.0	7496847	53	1.0	7515155
Calculated TDS	mg/L	63	7496858	60	51	1.0	7496858	260	1.0	7515162
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7496847	ND	ND	1.0	7496847	ND	1.0	7515155
Cation Sum	me/L	1.10	7496851	1.09	0.930	N/A	7496851	4.10	N/A	7515157
Ion Balance (% Difference)	%	2.65	7496850	2.68	3.12	N/A	7496850	1.49	N/A	7515156
Langelier Index (@ 20C)	N/A	-0.682	7496856	-0.604	-0.821		7496856	0.0340		7515160
Langelier Index (@ 4C)	N/A	-0.934	7496857	-0.856	-1.07		7496857	-0.215		7515161
Nitrate (N)	mg/L	0.096	7496853	0.082	0.092	0.050	7496853	0.075	0.050	7515158
Saturation pH (@ 20C)	N/A	8.36	7496856	8.34	8.47		7496856	7.80		7515160
Saturation pH (@ 4C)	N/A	8.61	7496857	8.59	8.72		7496857	8.05		7515161
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	47	7508115	57	44	5.0	7508115	54	5.0	7513539
Dissolved Chloride (Cl-)	mg/L	ND	7508121	ND	ND	1.0	7508121	2.1	1.0	7513542
Colour	TCU	ND	7508128	ND	ND	5.0	7508128	ND	5.0	7521243
Nitrate + Nitrite (N)	mg/L	0.11	7508134	0.11	0.092	0.050	7508134	0.075	0.050	7521245
Nitrite (N)	mg/L	0.016	7508138	0.027	ND	0.010	7508138	ND	0.010	7521246
Nitrogen (Ammonia Nitrogen)	mg/L	0.098	7507883	0.33	0.11	0.050	7507883	ND	0.050	7507883
Total Organic Carbon (C)	mg/L	1.4	7504321	2.1	1.6	0.50	7504321	2.0	0.50	7504321
Orthophosphate (P)	mg/L	ND	7508132	ND	ND	0.010	7508132	0.034	0.010	7521244
pH	pH	7.68	7507847	7.74	7.65		7507847	7.84		7517714
Reactive Silica (SiO2)	mg/L	2.8	7508125	3.5	1.3	0.50	7508125	4.4	0.50	7521242
Dissolved Sulphate (SO4)	mg/L	9.7	7508122	ND	4.4	2.0	7508122	140	10	7517967
Turbidity	NTU	1.7	7504525	5.2	1.2	0.10	7501931	24	0.10	7517748
Conductivity	uS/cm	110	7507843	110	91	1.0	7507843	410	1.0	7517713
Metals										
Dissolved Aluminum (Al)	ug/L	71.5	7509054	95.9	106	0.50	7509054	64.6	0.50	7509054
Dissolved Antimony (Sb)	ug/L	0.390	7509054	0.675	0.302	0.020	7509054	1.37	0.020	7509054
Dissolved Arsenic (As)	ug/L	0.394	7509054	0.836	0.134	0.020	7509054	0.664	0.020	7509054
Dissolved Barium (Ba)	ug/L	2.46	7509054	2.29	34.2	0.020	7509054	14.7	0.020	7509054
Dissolved Beryllium (Be)	ug/L	ND	7509054	ND	ND	0.010	7509054	ND	0.010	7509054
Dissolved Bismuth (Bi)	ug/L	ND	7509054	ND	ND	0.0050	7509054	ND	0.0050	7509054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

Bureau Veritas Laboratories 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvlabs.com

ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR199		QGR200	QGR201			QGR202		
Sampling Date		2021/07/27		2021/07/27	2021/07/27			2021/07/27		
COC Number		834368-01-01		834368-01-01	834368-01-01			834368-01-01		
Sample #		M AQPOR		M+L SED	M+L MD			M QE-POR		
	UNITS	M AQPOR	QC Batch	M+L SED	M+L MD	RDL	QC Batch	M QE-POR	RDL	QC Batch
Dissolved Boron (B)	ug/L	ND	7509054	ND	ND	5.0	7509054	5.9	5.0	7509054
Dissolved Cadmium (Cd)	ug/L	ND	7509054	ND	ND	0.0050	7509054	ND	0.0050	7509054
Dissolved Chromium (Cr)	ug/L	ND	7509054	ND	ND	0.10	7509054	ND	0.10	7509054
Dissolved Cobalt (Co)	ug/L	0.0103	7509054	0.0107	0.0092	0.0050	7509054	0.0301	0.0050	7509054
Dissolved Copper (Cu)	ug/L	0.613	7509054	1.05	0.529	0.050	7509054	0.700	0.050	7509054
Dissolved Iron (Fe)	ug/L	1.0	7509054	ND	ND	1.0	7509054	ND	1.0	7509054
Dissolved Lead (Pb)	ug/L	ND	7509054	ND	0.0192	0.0050	7509054	ND	0.0050	7509054
Dissolved Lithium (Li)	ug/L	ND	7509054	ND	ND	0.50	7509054	ND	0.50	7509054
Dissolved Manganese (Mn)	ug/L	4.76	7509054	23.9	46.3	0.050	7509054	22.7	0.050	7509054
Dissolved Molybdenum (Mo)	ug/L	2.64	7509054	2.06	0.096	0.050	7509054	6.46	0.050	7509054
Dissolved Nickel (Ni)	ug/L	0.026	7509054	0.028	0.024	0.020	7509054	0.043	0.020	7509054
Dissolved Phosphorus (P)	ug/L	ND	7509054	ND	ND	2.0	7509054	ND	2.0	7509054
Dissolved Selenium (Se)	ug/L	0.077	7509054	0.058	0.057	0.040	7509054	0.081	0.040	7509054
Dissolved Silicon (Si)	ug/L	1250	7509054	1570	549	50	7509054	2130	50	7509054
Dissolved Silver (Ag)	ug/L	ND	7509054	ND	ND	0.0050	7509054	ND	0.0050	7509054
Dissolved Strontium (Sr)	ug/L	39.3	7509054	67.4	40.3	0.050	7509054	226	0.050	7509054
Dissolved Thallium (Tl)	ug/L	ND	7509054	ND	ND	0.0020	7509054	ND	0.0020	7509054
Dissolved Tin (Sn)	ug/L	ND	7509054	ND	ND	0.20	7509054	ND	0.20	7509054
Dissolved Titanium (Ti)	ug/L	ND	7509054	ND	ND	0.50	7509054	ND	0.50	7509054
Dissolved Uranium (U)	ug/L	0.321	7509054	1.43	0.111	0.0020	7509054	0.933	0.0020	7509054
Dissolved Vanadium (V)	ug/L	ND	7509054	1.05	ND	0.20	7509054	0.50	0.20	7509054
Dissolved Zinc (Zn)	ug/L	0.65	7509054	0.96	1.12	0.10	7509054	0.91	0.10	7509054
Dissolved Zirconium (Zr)	ug/L	ND	7509054	ND	ND	0.10	7509054	ND	0.10	7509054
Dissolved Calcium (Ca)	mg/L	19.3	7509053	16.6	15.5	0.050	7509053	75.2	0.050	7509053
Dissolved Magnesium (Mg)	mg/L	0.793	7509053	1.97	1.38	0.050	7509053	2.31	0.050	7509053
Dissolved Potassium (K)	mg/L	0.590	7509053	1.59	0.264	0.050	7509053	1.41	0.050	7509053
Dissolved Sodium (Na)	mg/L	1.22	7509053	0.840	0.554	0.050	7509053	2.77	0.050	7509053
Dissolved Sulphur (S)	mg/L	ND	7509053	ND	ND	3.0	7509053	52.1	3.0	7509053

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR203		QGR204			QGR204		
Sampling Date		2021/07/27		2021/07/27			2021/07/27		
COC Number		834368-01-01		834368-01-01			834368-01-01		
Sample #		M QZ-QE-POR-QTP-MIN		SZ+V QE-POR			SZ+V QE-POR		
	UNITS	**M QZ-QE-POR-QTP-MIN**	**QC Batch**	**SZ+V QE-POR**	**RDL**	**QC Batch**	**SZ+V QE-POR Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters									
Anion Sum	me/L	1.00	7496851	1.47	N/A	7496851			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	38	7496847	46	1.0	7496847			
Calculated TDS	mg/L	52	7496858	83	1.0	7496858			
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7496847	ND	1.0	7496847			
Cation Sum	me/L	0.840	7496851	1.36	N/A	7496851			
Ion Balance (% Difference)	%	8.70	7496850	3.89	N/A	7496850			
Langelier Index (@ 20C)	N/A	-0.912	7496856	-0.591		7496856			
Langelier Index (@ 4C)	N/A	-1.16	7496857	-0.842		7496857			
Nitrate (N)	mg/L	0.058	7496853	0.087	0.050	7496853			
Saturation pH (@ 20C)	N/A	8.55	7496856	8.32		7496856			
Saturation pH (@ 4C)	N/A	8.80	7496857	8.57		7496857			
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	39	7508115	46	5.0	7508115	47	5.0	7508115
Dissolved Chloride (Cl-)	mg/L	2.3	7508121	ND	1.0	7508121	ND	1.0	7508121
Colour	TCU	ND	7508128	ND	5.0	7508128	ND	5.0	7508128
Nitrate + Nitrite (N)	mg/L	0.058	7508134	0.11	0.050	7508134	0.11	0.050	7508134
Nitrite (N)	mg/L	ND	7508138	0.019	0.010	7508138	0.020	0.010	7508138
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7507883	0.053	0.050	7501782	ND	0.050	7501782
Total Organic Carbon (C)	mg/L	1.4	7504321	1.3	0.50	7504321			
Orthophosphate (P)	mg/L	ND	7508132	ND	0.010	7508132	ND	0.010	7508132
pH	pH	7.64	7507847	7.73		7507850	7.83		7507850
Reactive Silica (SiO2)	mg/L	2.2	7508125	2.7	0.50	7508125	2.7	0.50	7508125
Dissolved Sulphate (SO4)	mg/L	7.6	7508122	26	2.0	7508122	26	2.0	7508122
Turbidity	NTU	2.3	7501931	2.6	0.10	7501931			
Conductivity	uS/cm	88	7507843	140	1.0	7507848	140	1.0	7507848
Metals									
Dissolved Aluminum (Al)	ug/L	97.4	7509054	75.8	0.50	7509054			
Dissolved Antimony (Sb)	ug/L	0.432	7509054	0.674	0.020	7509054			
Dissolved Arsenic (As)	ug/L	0.347	7509054	0.406	0.020	7509054			
Dissolved Barium (Ba)	ug/L	4.50	7509054	1.67	0.020	7509054			
Dissolved Beryllium (Be)	ug/L	ND	7509054	ND	0.010	7509054			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR203		QGR204			QGR204		
Sampling Date		2021/07/27		2021/07/27			2021/07/27		
COC Number		834368-01-01		834368-01-01			834368-01-01		
Sample #		M QZ-QE-POR-QTP-MIN		SZ+V QE-POR			SZ+V QE-POR		
	UNITS	**M QZ-QE-POR-QTP-MIN**	**QC Batch**	**SZ+V QE-POR**	**RDL**	**QC Batch**	**SZ+V QE-POR Lab-Dup**	**RDL**	**QC Batch**
Dissolved Bismuth (Bi)	ug/L	ND	7509054	ND	0.0050	7509054			
Dissolved Boron (B)	ug/L	ND	7509054	ND	5.0	7509054			
Dissolved Cadmium (Cd)	ug/L	ND	7509054	ND	0.0050	7509054			
Dissolved Chromium (Cr)	ug/L	ND	7509054	ND	0.10	7509054			
Dissolved Cobalt (Co)	ug/L	0.0068	7509054	0.0122	0.0050	7509054			
Dissolved Copper (Cu)	ug/L	0.567	7509054	0.704	0.050	7509054			
Dissolved Iron (Fe)	ug/L	1.6	7509054	1.1	1.0	7509054			
Dissolved Lead (Pb)	ug/L	ND	7509054	ND	0.0050	7509054			
Dissolved Lithium (Li)	ug/L	ND	7509054	ND	0.50	7509054			
Dissolved Manganese (Mn)	ug/L	19.0	7509054	8.04	0.050	7509054			
Dissolved Molybdenum (Mo)	ug/L	0.144	7509054	3.12	0.050	7509054			
Dissolved Nickel (Ni)	ug/L	ND	7509054	0.023	0.020	7509054			
Dissolved Phosphorus (P)	ug/L	ND	7509054	ND	2.0	7509054			
Dissolved Selenium (Se)	ug/L	0.053	7509054	0.059	0.040	7509054			
Dissolved Silicon (Si)	ug/L	998	7509054	1200	50	7509054			
Dissolved Silver (Ag)	ug/L	ND	7509054	ND	0.0050	7509054			
Dissolved Strontium (Sr)	ug/L	27.5	7509054	26.5	0.050	7509054			
Dissolved Thallium (Tl)	ug/L	ND	7509054	ND	0.0020	7509054			
Dissolved Tin (Sn)	ug/L	ND	7509054	ND	0.20	7509054			
Dissolved Titanium (Ti)	ug/L	ND	7509054	ND	0.50	7509054			
Dissolved Uranium (U)	ug/L	0.171	7509054	0.278	0.0020	7509054			
Dissolved Vanadium (V)	ug/L	ND	7509054	ND	0.20	7509054			
Dissolved Zinc (Zn)	ug/L	0.69	7509054	0.82	0.10	7509054			
Dissolved Zirconium (Zr)	ug/L	ND	7509054	ND	0.10	7509054			
Dissolved Calcium (Ca)	mg/L	15.0	7509053	22.2	0.050	7509053			
Dissolved Magnesium (Mg)	mg/L	0.459	7509053	2.20	0.050	7509053			
Dissolved Potassium (K)	mg/L	0.372	7509053	0.710	0.050	7509053			
Dissolved Sodium (Na)	mg/L	0.884	7509053	1.26	0.050	7509053			
Dissolved Sulphur (S)	mg/L	ND	7509053	8.4	3.0	7509053			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR205			QGR205		
Sampling Date		2021/07/27			2021/07/27		
COC Number		834368-01-01			834368-01-01		
Sample #		L QZ-TQTP+QZ-QTP			L QZ-TQTP+QZ-QTP		
	UNITS	L QZ-TQTP+QZ-QTP	RDL	QC Batch	L QZ-TQTP+QZ-QTP Lab-Dup	RDL	QC Batch
Calculated Parameters							
Anion Sum	me/L	0.880	N/A	7496851			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	44	1.0	7496847			
Calculated TDS	mg/L	45	1.0	7496858			
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7496847			
Cation Sum	me/L	0.860	N/A	7496851			
Ion Balance (% Difference)	%	1.15	N/A	7496850			
Langelier Index (@ 20C)	N/A	-0.822		7496856			
Langelier Index (@ 4C)	N/A	-1.07		7496857			
Nitrate (N)	mg/L	0.072	0.050	7496853			
Saturation pH (@ 20C)	N/A	8.49		7496856			
Saturation pH (@ 4C)	N/A	8.74		7496857			
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	44	5.0	7508115			
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7508121			
Colour	TCU	ND	5.0	7508128			
Nitrate + Nitrite (N)	mg/L	0.088	0.050	7508134			
Nitrite (N)	mg/L	0.016	0.010	7508138			
Nitrogen (Ammonia Nitrogen)	mg/L	0.15	0.050	7507883			
Total Organic Carbon (C)	mg/L	1.9	0.50	7501568	1.9	0.50	7501568
Orthophosphate (P)	mg/L	ND	0.010	7508132			
pH	pH	7.66		7507847			
Reactive Silica (SiO2)	mg/L	1.6	0.50	7508125			
Dissolved Sulphate (SO4)	mg/L	ND	2.0	7508122			
Turbidity	NTU	0.95	0.10	7504525			
Conductivity	uS/cm	84	1.0	7507843			
Metals							
Dissolved Aluminum (Al)	ug/L	114	0.50	7509054			
Dissolved Antimony (Sb)	ug/L	0.346	0.020	7509054			
Dissolved Arsenic (As)	ug/L	0.317	0.020	7509054			
Dissolved Barium (Ba)	ug/L	3.44	0.020	7509054			
Dissolved Beryllium (Be)	ug/L	ND	0.010	7509054			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR205			QGR205		
Sampling Date		2021/07/27			2021/07/27		
COC Number		834368-01-01			834368-01-01		
Sample #		L QZ-TQTP+QZ-QTP			L QZ-TQTP+QZ-QTP		
	UNITS	L QZ-TQTP+QZ-QTP	RDL	QC Batch	L QZ-TQTP+QZ-QTP Lab-Dup	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	0.0050	7509054			
Dissolved Boron (B)	ug/L	ND	5.0	7509054			
Dissolved Cadmium (Cd)	ug/L	ND	0.0050	7509054			
Dissolved Chromium (Cr)	ug/L	ND	0.10	7509054			
Dissolved Cobalt (Co)	ug/L	0.0087	0.0050	7509054			
Dissolved Copper (Cu)	ug/L	1.05	0.050	7509054			
Dissolved Iron (Fe)	ug/L	ND	1.0	7509054			
Dissolved Lead (Pb)	ug/L	0.0053	0.0050	7509054			
Dissolved Lithium (Li)	ug/L	ND	0.50	7509054			
Dissolved Manganese (Mn)	ug/L	24.4	0.050	7509054			
Dissolved Molybdenum (Mo)	ug/L	ND	0.050	7509054			
Dissolved Nickel (Ni)	ug/L	0.028	0.020	7509054			
Dissolved Phosphorus (P)	ug/L	ND	2.0	7509054			
Dissolved Selenium (Se)	ug/L	0.048	0.040	7509054			
Dissolved Silicon (Si)	ug/L	733	50	7509054			
Dissolved Silver (Ag)	ug/L	ND	0.0050	7509054			
Dissolved Strontium (Sr)	ug/L	43.8	0.050	7509054			
Dissolved Thallium (Tl)	ug/L	ND	0.0020	7509054			
Dissolved Tin (Sn)	ug/L	ND	0.20	7509054			
Dissolved Titanium (Ti)	ug/L	ND	0.50	7509054			
Dissolved Uranium (U)	ug/L	0.206	0.0020	7509054			
Dissolved Vanadium (V)	ug/L	ND	0.20	7509054			
Dissolved Zinc (Zn)	ug/L	0.97	0.10	7509054			
Dissolved Zirconium (Zr)	ug/L	ND	0.10	7509054			
Dissolved Calcium (Ca)	mg/L	15.1	0.050	7509053			
Dissolved Magnesium (Mg)	mg/L	0.815	0.050	7509053			
Dissolved Potassium (K)	mg/L	0.334	0.050	7509053			
Dissolved Sodium (Na)	mg/L	0.575	0.050	7509053			
Dissolved Sulphur (S)	mg/L	ND	3.0	7509053			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR207			QGR208			QGR208		
Sampling Date		2021/07/27			2021/07/27			2021/07/27		
COC Number		834368-01-01			834368-01-01			834368-01-01		
Sample #		L TRJ			V QE-POR-QTP			V QE-POR-QTP		
	UNITS	L TRJ	RDL	QC Batch	V QE-POR-QTP	RDL	QC Batch	V QE-POR-QTP Lab-Dup	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	1.29	N/A	7496851	0.840	N/A	7496851			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	55	1.0	7496847	38	1.0	7496847			
Calculated TDS	mg/L	69	1.0	7496858	41	1.0	7496858			
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7496847	ND	1.0	7496847			
Cation Sum	me/L	1.23	N/A	7496851	0.690	N/A	7496851			
Ion Balance (% Difference)	%	2.38	N/A	7496850	9.80	N/A	7496850			
Langelier Index (@ 20C)	N/A	-0.573		7496856	-1.01		7496856			
Langelier Index (@ 4C)	N/A	-0.824		7496857	-1.27		7496857			
Nitrate (N)	mg/L	0.082	0.050	7496853	0.069	0.050	7496853			
Saturation pH (@ 20C)	N/A	8.29		7496856	8.66		7496856			
Saturation pH (@ 4C)	N/A	8.54		7496857	8.91		7496857			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	55	5.0	7508115	38	5.0	7505123	38	5.0	7505123
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7508121	ND	1.0	7505120	ND	1.0	7505120
Colour	TCU	ND	5.0	7508128	ND	5.0	7505152	ND	5.0	7505152
Nitrate + Nitrite (N)	mg/L	0.092	0.050	7508134	0.069	0.050	7505158	0.069	0.050	7505158
Nitrite (N)	mg/L	0.010	0.010	7508138	ND	0.010	7505160	0.011	0.010	7505160
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7507883	ND	0.050	7507883			
Total Organic Carbon (C)	mg/L	1.3	0.50	7504321	1.7	0.50	7504414			
Orthophosphate (P)	mg/L	ND	0.010	7508132	ND	0.010	7505156	ND	0.010	7505156
pH	pH	7.72		7507847	7.64		7507847			
Reactive Silica (SiO2)	mg/L	3.3	0.50	7508125	1.0	0.50	7505150	1.3	0.50	7505150
Dissolved Sulphate (SO4)	mg/L	8.3	2.0	7508122	3.2 (1)	2.5	7505144	5.9 (1)	2.5	7505144
Turbidity	NTU	2.1	0.10	7504525	1.5	0.10	7504525			
Conductivity	uS/cm	120	1.0	7507843	74	1.0	7507843			
Metals										
Dissolved Aluminum (Al)	ug/L	111	0.50	7509054	82.1	0.50	7509054			
Dissolved Antimony (Sb)	ug/L	0.719	0.020	7509054	0.424	0.020	7509054			
Dissolved Arsenic (As)	ug/L	0.555	0.020	7509054	0.291	0.020	7509054			
Dissolved Barium (Ba)	ug/L	77.9	0.020	7509054	0.712	0.020	7509054			
Dissolved Beryllium (Be)	ug/L	ND	0.010	7509054	ND	0.010	7509054			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected
(1) Elevated reporting limit due to method blank performance.

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR207			QGR208			QGR208		
Sampling Date		2021/07/27			2021/07/27			2021/07/27		
COC Number		834368-01-01			834368-01-01			834368-01-01		
Sample #		L TRJ			V QE-POR-QTP			V QE-POR-QTP		
	UNITS	L TRJ	RDL	QC Batch	V QE-POR-QTP	RDL	QC Batch	V QE-POR-QTP Lab-Dup	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	0.0050	7509054	ND	0.0050	7509054			
Dissolved Boron (B)	ug/L	ND	5.0	7509054	ND	5.0	7509054			
Dissolved Cadmium (Cd)	ug/L	ND	0.0050	7509054	ND	0.0050	7509054			
Dissolved Chromium (Cr)	ug/L	ND	0.10	7509054	ND	0.10	7509054			
Dissolved Cobalt (Co)	ug/L	0.0117	0.0050	7509054	0.0076	0.0050	7509054			
Dissolved Copper (Cu)	ug/L	0.922	0.050	7509054	1.13	0.050	7509054			
Dissolved Iron (Fe)	ug/L	ND	1.0	7509054	1.1	1.0	7509054			
Dissolved Lead (Pb)	ug/L	0.0051	0.0050	7509054	ND	0.0050	7509054			
Dissolved Lithium (Li)	ug/L	ND	0.50	7509054	ND	0.50	7509054			
Dissolved Manganese (Mn)	ug/L	37.5	0.050	7509054	33.5	0.050	7509054			
Dissolved Molybdenum (Mo)	ug/L	0.203	0.050	7509054	0.564	0.050	7509054			
Dissolved Nickel (Ni)	ug/L	0.038	0.020	7509054	0.040	0.020	7509054			
Dissolved Phosphorus (P)	ug/L	ND	2.0	7509054	ND	2.0	7509054			
Dissolved Selenium (Se)	ug/L	0.063	0.040	7509054	0.049	0.040	7509054			
Dissolved Silicon (Si)	ug/L	1540	50	7509054	598	50	7509054			
Dissolved Silver (Ag)	ug/L	ND	0.0050	7509054	ND	0.0050	7509054			
Dissolved Strontium (Sr)	ug/L	116	0.050	7509054	12.4	0.050	7509054			
Dissolved Thallium (Tl)	ug/L	ND	0.0020	7509054	ND	0.0020	7509054			
Dissolved Tin (Sn)	ug/L	ND	0.20	7509054	ND	0.20	7509054			
Dissolved Titanium (Ti)	ug/L	ND	0.50	7509054	ND	0.50	7509054			
Dissolved Uranium (U)	ug/L	0.552	0.0020	7509054	0.130	0.0020	7509054			
Dissolved Vanadium (V)	ug/L	ND	0.20	7509054	ND	0.20	7509054			
Dissolved Zinc (Zn)	ug/L	0.77	0.10	7509054	0.75	0.10	7509054			
Dissolved Zirconium (Zr)	ug/L	ND	0.10	7509054	ND	0.10	7509054			
Dissolved Calcium (Ca)	mg/L	19.6	0.050	7509053	11.6	0.050	7509053			
Dissolved Magnesium (Mg)	mg/L	1.99	0.050	7509053	0.998	0.050	7509053			
Dissolved Potassium (K)	mg/L	1.08	0.050	7509053	0.199	0.050	7509053			
Dissolved Sodium (Na)	mg/L	1.52	0.050	7509053	0.530	0.050	7509053			
Dissolved Sulphur (S)	mg/L	ND	3.0	7509053	ND	3.0	7509053			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR209		QGR210		QGR211		
Sampling Date		2021/07/27		2021/07/27		2021/07/27		
COC Number		834368-01-01		834368-02-01		834368-02-01		
Sample #		MAR HL		LEP HL		FLBK		
	UNITS	Mar HL	QC Batch	Lep HL	QC Batch	FLBK	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	1.53	7496851	1.46	7496851	0.00	N/A	7496851
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	56	7496847	63	7496847	ND	1.0	7496847
Calculated TDS	mg/L	87	7496858	78	7496858	ND	1.0	7496858
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7496847	ND	7496847	ND	1.0	7496847
Cation Sum	me/L	1.44	7496851	1.38	7496851	0.0100	N/A	7496851
Ion Balance (% Difference)	%	3.03	7496850	2.82	7496850	100	N/A	7496850
Langelier Index (@ 20C)	N/A	-0.469	7496856	-0.160	7496856	NC		7496856
Langelier Index (@ 4C)	N/A	-0.721	7496857	-0.411	7496857	NC		7496857
Nitrate (N)	mg/L	ND	7496853	ND	7496853	ND	0.050	7496853
Saturation pH (@ 20C)	N/A	8.21	7496856	8.22	7496856	NC		7496856
Saturation pH (@ 4C)	N/A	8.46	7496857	8.47	7496857	NC		7496857
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	56	7508115	64	7508115	ND	5.0	7508149
Dissolved Chloride (Cl-)	mg/L	ND	7508121	ND	7508121	ND	1.0	7508161
Colour	TCU	ND	7508128	ND	7508128	ND	5.0	7508177
Nitrate + Nitrite (N)	mg/L	0.054	7508134	ND	7508134	ND	0.050	7508184
Nitrite (N)	mg/L	0.011	7508138	ND	7508138	ND	0.010	7508186
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7507883	0.055	7507883	ND	0.050	7507883
Total Organic Carbon (C)	mg/L	0.80	7504321	1.2	7504414	2.0	0.50	7504414
Orthophosphate (P)	mg/L	ND	7508132	ND	7508132	0.011	0.010	7508179
pH	pH	7.74	7507847	8.06	7507850	5.99		7507850
Reactive Silica (SiO2)	mg/L	5.6	7508125	4.0	7508125	ND	0.50	7508171
Dissolved Sulphate (SO4)	mg/L	19	7508122	9.2	7508122	ND	2.0	7508169
Turbidity	NTU	1.5	7504526	8.1	7504525	0.58	0.10	7501931
Conductivity	uS/cm	150	7507843	130	7507848	2.9	1.0	7507848
Metals								
Dissolved Aluminum (Al)	ug/L	107	7509054	132	7509054	4.84	0.50	7509054
Dissolved Antimony (Sb)	ug/L	1.73	7509054	1.04	7509054	0.953	0.020	7509054
Dissolved Arsenic (As)	ug/L	1.21	7509054	0.469	7509054	0.079	0.020	7509054
Dissolved Barium (Ba)	ug/L	15.0	7509054	6.13	7509054	0.356	0.020	7509054
Dissolved Beryllium (Be)	ug/L	ND	7509054	ND	7509054	ND	0.010	7509054
Dissolved Bismuth (Bi)	ug/L	ND	7509054	ND	7509054	ND	0.0050	7509054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR209		QGR210		QGR211		
Sampling Date		2021/07/27		2021/07/27		2021/07/27		
COC Number		834368-01-01		834368-02-01		834368-02-01		
Sample #		MAR HL		LEP HL		FLBK		
	UNITS	Mar HL	QC Batch	Lep HL	QC Batch	FLBK	RDL	QC Batch
Dissolved Boron (B)	ug/L	9.3	7509054	10.0	7509054	ND	5.0	7509054
Dissolved Cadmium (Cd)	ug/L	ND	7509054	ND	7509054	ND	0.0050	7509054
Dissolved Chromium (Cr)	ug/L	ND	7509054	ND	7509054	ND	0.10	7509054
Dissolved Cobalt (Co)	ug/L	0.0062	7509054	0.0094	7509054	0.0667	0.0050	7509054
Dissolved Copper (Cu)	ug/L	0.393	7509054	0.318	7509054	0.119	0.050	7509054
Dissolved Iron (Fe)	ug/L	ND	7509054	ND	7509054	6.8	1.0	7509054
Dissolved Lead (Pb)	ug/L	0.0053	7509054	0.0062	7509054	0.0092	0.0050	7509054
Dissolved Lithium (Li)	ug/L	ND	7509054	ND	7509054	ND	0.50	7509054
Dissolved Manganese (Mn)	ug/L	20.6	7509054	21.9	7509054	10.0	0.050	7509054
Dissolved Molybdenum (Mo)	ug/L	7.25	7509054	0.450	7509054	ND	0.050	7509054
Dissolved Nickel (Ni)	ug/L	ND	7509054	ND	7509054	0.096	0.020	7509054
Dissolved Phosphorus (P)	ug/L	ND	7509054	ND	7509054	ND	2.0	7509054
Dissolved Selenium (Se)	ug/L	0.094	7509054	0.237	7509054	ND	0.040	7509054
Dissolved Silicon (Si)	ug/L	2650	7509054	1850	7509054	ND	50	7509054
Dissolved Silver (Ag)	ug/L	ND	7509054	ND	7509054	ND	0.0050	7509054
Dissolved Strontium (Sr)	ug/L	56.1	7509054	107	7509054	0.321	0.050	7509054
Dissolved Thallium (Tl)	ug/L	ND	7509054	ND	7509054	ND	0.0020	7509054
Dissolved Tin (Sn)	ug/L	ND	7509054	ND	7509054	ND	0.20	7509054
Dissolved Titanium (Ti)	ug/L	ND	7509054	ND	7509054	ND	0.50	7509054
Dissolved Uranium (U)	ug/L	1.39	7509054	2.42	7509054	ND	0.0020	7509054
Dissolved Vanadium (V)	ug/L	0.43	7509054	0.47	7509054	ND	0.20	7509054
Dissolved Zinc (Zn)	ug/L	1.35	7509054	0.80	7509054	3.93	0.10	7509054
Dissolved Zirconium (Zr)	ug/L	ND	7509054	ND	7509054	ND	0.10	7509054
Dissolved Calcium (Ca)	mg/L	24.0	7509053	20.6	7509053	0.128	0.050	7509053
Dissolved Magnesium (Mg)	mg/L	1.82	7509053	3.13	7509053	ND	0.050	7509053
Dissolved Potassium (K)	mg/L	0.976	7509053	1.08	7509053	0.059	0.050	7509053
Dissolved Sodium (Na)	mg/L	1.53	7509053	1.52	7509053	0.103	0.050	7509053
Dissolved Sulphur (S)	mg/L	6.5	7509053	ND	7509053	ND	3.0	7509053

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR211			QGR435		
Sampling Date		2021/07/27			2021/07/27		
COC Number		834368-02-01			834368-01-01		
Sample #		FLBK			TRIP BLANK		
	UNITS	FLBK Lab-Dup	RDL	QC Batch	TRIP BLANK	RDL	QC Batch
Calculated Parameters							
Anion Sum	me/L				0.00	N/A	7496851
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				ND	1.0	7496847
Calculated TDS	mg/L				ND	1.0	7496858
Carb. Alkalinity (calc. as CaCO3)	mg/L				ND	1.0	7496847
Cation Sum	me/L				0.00	N/A	7496851
Langelier Index (@ 20C)	N/A				NC		7496856
Langelier Index (@ 4C)	N/A				NC		7496857
Nitrate (N)	mg/L				ND	0.050	7496853
Saturation pH (@ 20C)	N/A				NC		7496856
Saturation pH (@ 4C)	N/A				NC		7496857
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	ND	5.0	7508149	ND	5.0	7508115
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7508161	ND	1.0	7508121
Colour	TCU	ND	5.0	7508177	ND	5.0	7508128
Nitrate + Nitrite (N)	mg/L	ND	0.050	7508184	ND	0.050	7508134
Nitrite (N)	mg/L	ND	0.010	7508186	ND	0.010	7508138
Nitrogen (Ammonia Nitrogen)	mg/L				ND	0.050	7507883
Total Organic Carbon (C)	mg/L				ND	0.50	7504414
Orthophosphate (P)	mg/L	ND	0.010	7508179	ND	0.010	7508132
pH	pH				5.84		7507850
Reactive Silica (SiO2)	mg/L	ND	0.50	7508171	ND	0.50	7508125
Dissolved Sulphate (SO4)	mg/L	ND	2.0	7508169	ND	2.0	7508122
Turbidity	NTU				0.27	0.10	7501937
Conductivity	uS/cm				1.0	1.0	7507848
Metals							
Dissolved Aluminum (Al)	ug/L				1.01	0.50	7509054
Dissolved Antimony (Sb)	ug/L				ND	0.020	7509054
Dissolved Arsenic (As)	ug/L				ND	0.020	7509054
Dissolved Barium (Ba)	ug/L				ND	0.020	7509054
Dissolved Beryllium (Be)	ug/L				ND	0.010	7509054
Dissolved Bismuth (Bi)	ug/L				ND	0.0050	7509054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QGR211			QGR435		
Sampling Date		2021/07/27			2021/07/27		
COC Number		834368-02-01			834368-01-01		
Sample #		FLBK			TRIP BLANK		
	UNITS	FLBK Lab-Dup	RDL	QC Batch	TRIP BLANK	RDL	QC Batch
Dissolved Boron (B)	ug/L				ND	5.0	7509054
Dissolved Cadmium (Cd)	ug/L				ND	0.0050	7509054
Dissolved Chromium (Cr)	ug/L				ND	0.10	7509054
Dissolved Cobalt (Co)	ug/L				ND	0.0050	7509054
Dissolved Copper (Cu)	ug/L				ND	0.050	7509054
Dissolved Iron (Fe)	ug/L				ND	1.0	7509054
Dissolved Lead (Pb)	ug/L				ND	0.0050	7509054
Dissolved Lithium (Li)	ug/L				ND	0.50	7509054
Dissolved Manganese (Mn)	ug/L				ND	0.050	7509054
Dissolved Molybdenum (Mo)	ug/L				ND	0.050	7509054
Dissolved Nickel (Ni)	ug/L				ND	0.020	7509054
Dissolved Phosphorus (P)	ug/L				ND	2.0	7509054
Dissolved Selenium (Se)	ug/L				ND	0.040	7509054
Dissolved Silicon (Si)	ug/L				ND	50	7509054
Dissolved Silver (Ag)	ug/L				ND	0.0050	7509054
Dissolved Strontium (Sr)	ug/L				ND	0.050	7509054
Dissolved Thallium (Tl)	ug/L				ND	0.0020	7509054
Dissolved Tin (Sn)	ug/L				ND	0.20	7509054
Dissolved Titanium (Ti)	ug/L				ND	0.50	7509054
Dissolved Uranium (U)	ug/L				ND	0.0020	7509054
Dissolved Vanadium (V)	ug/L				ND	0.20	7509054
Dissolved Zinc (Zn)	ug/L				0.79	0.10	7509054
Dissolved Zirconium (Zr)	ug/L				ND	0.10	7509054
Dissolved Calcium (Ca)	mg/L				ND	0.050	7509058
Dissolved Magnesium (Mg)	mg/L				ND	0.050	7509058
Dissolved Potassium (K)	mg/L				ND	0.050	7509058
Dissolved Sodium (Na)	mg/L				ND	0.050	7509058
Dissolved Sulphur (S)	mg/L				ND	3.0	7509058

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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RESULTS OF ANALYSES OF WATER

BV Labs ID		QGR199	QGR200	QGR201	QGR202	QGR203		
Sampling Date		2021/07/27	2021/07/27	2021/07/27	2021/07/27	2021/07/27		
COC Number		834368-01-01	834368-01-01	834368-01-01	834368-01-01	834368-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	51.3	49.5	44.4	197	39.4	0.50	7501213
ELEMENTS								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.0019	7509056
Inorganics								
Fluoride (F-)	mg/L	0.024	0.025	0.015	0.032	0.013	0.010	7509055

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		QGR204	QGR205	QGR207	QGR208	QGR209		
Sampling Date		2021/07/27	2021/07/27	2021/07/27	2021/07/27	2021/07/27		
COC Number		834368-01-01	834368-01-01	834368-01-01	834368-01-01	834368-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
Calculated Parameters								
Dissolved Hardness (CaCO3)	mg/L	64.4	41.0	57.1	33.1	67.5	0.50	7501213
ELEMENTS								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.0019	7509056
Inorganics								
Fluoride (F-)	mg/L	0.019	0.010	0.017	0.011	0.032	0.010	7509055

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		QGR210	QGR211		QGR435		
Sampling Date		2021/07/27	2021/07/27		2021/07/27		
COC Number		834368-02-01	834368-02-01		834368-01-01		
Sample #		LEP HL	FLBK		TRIP BLANK		
	UNITS	**Lep HL**	**FLBK**	**QC Batch**	**TRIP BLANK**	**RDL**	**QC Batch**
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	64.3	ND	7501213	ND	0.50	7509059
ELEMENTS							
Total Mercury (Hg)	ug/L	ND	ND	7509056	ND	0.0019	7509056
Inorganics							
Fluoride (F-)	mg/L	0.024	ND	7509055	ND	0.010	7509055

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.5°C

Sample QGR202 [M QE-POR] : ortho-Phosphate > Phosphorus: Re-analysis confirmed original results.

Sample QGR203 [M QZ-QE-POR-QTP-MIN] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QGR208 [V QE-POR-QTP] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QGR211 [FLBK] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L. ortho-Phosphate > Phosphorus: Both values fall within the method uncertainty for duplicates and are likely equivalent.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7501568	NGI	Matrix Spike [QGR205-04]	Total Organic Carbon (C)	2021/08/05		95	%	85 - 115
7501568	NGI	Spiked Blank	Total Organic Carbon (C)	2021/08/05		101	%	80 - 120
7501568	NGI	Method Blank	Total Organic Carbon (C)	2021/08/05	ND, RDL=0.50		mg/L	
7501568	NGI	RPD [QGR205-04]	Total Organic Carbon (C)	2021/08/05	1.3		%	15
7501782	EMT	Matrix Spike [QGR204-03]	Nitrogen (Ammonia Nitrogen)	2021/08/06		98	%	80 - 120
7501782	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/08/06		102	%	80 - 120
7501782	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/08/06	ND, RDL=0.050		mg/L	
7501782	EMT	RPD [QGR204-03]	Nitrogen (Ammonia Nitrogen)	2021/08/06	6.0		%	20
7501931	SHW	QC Standard	Turbidity	2021/08/05		106	%	80 - 120
7501931	SHW	Spiked Blank	Turbidity	2021/08/05		104	%	80 - 120
7501931	SHW	Method Blank	Turbidity	2021/08/05	ND, RDL=0.10		NTU	
7501931	SHW	RPD	Turbidity	2021/08/05	5.9		%	20
7501937	SHW	QC Standard	Turbidity	2021/08/05		102	%	80 - 120
7501937	SHW	Spiked Blank	Turbidity	2021/08/05		105	%	80 - 120
7501937	SHW	Method Blank	Turbidity	2021/08/05	ND, RDL=0.10		NTU	
7501937	SHW	RPD	Turbidity	2021/08/05	NC		%	20
7504321	NGI	Matrix Spike	Total Organic Carbon (C)	2021/08/06		94	%	85 - 115
7504321	NGI	Spiked Blank	Total Organic Carbon (C)	2021/08/06		99	%	80 - 120
7504321	NGI	Method Blank	Total Organic Carbon (C)	2021/08/06	ND, RDL=0.50		mg/L	
7504321	NGI	RPD	Total Organic Carbon (C)	2021/08/06	3.9		%	15
7504414	NGI	Matrix Spike	Total Organic Carbon (C)	2021/08/09		97	%	85 - 115
7504414	NGI	Spiked Blank	Total Organic Carbon (C)	2021/08/09		99	%	80 - 120
7504414	NGI	Method Blank	Total Organic Carbon (C)	2021/08/09	ND, RDL=0.50		mg/L	
7504414	NGI	RPD	Total Organic Carbon (C)	2021/08/09	4.1		%	15
7504525	SHW	QC Standard	Turbidity	2021/08/06		104	%	80 - 120
7504525	SHW	Spiked Blank	Turbidity	2021/08/06		105	%	80 - 120
7504525	SHW	Method Blank	Turbidity	2021/08/06	ND, RDL=0.10		NTU	
7504525	SHW	RPD	Turbidity	2021/08/06	5.9		%	20
7504526	SHW	QC Standard	Turbidity	2021/08/06		103	%	80 - 120
7504526	SHW	Spiked Blank	Turbidity	2021/08/06		104	%	80 - 120
7504526	SHW	Method Blank	Turbidity	2021/08/06	ND, RDL=0.10		NTU	
7504526	SHW	RPD	Turbidity	2021/08/06	0		%	20
7505120	EMT	Matrix Spike [QGR208-01]	Dissolved Chloride (Cl-)	2021/08/10		101	%	80 - 120
7505120	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/08/10		101	%	80 - 120
7505120	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/08/10	ND, RDL=1.0		mg/L	
7505120	EMT	RPD [QGR208-01]	Dissolved Chloride (Cl-)	2021/08/10	NC		%	20
7505123	EMT	Matrix Spike [QGR208-01]	Total Alkalinity (Total as CaCO3)	2021/08/10		96	%	80 - 120
7505123	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/08/10		104	%	80 - 120
7505123	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/08/10	ND, RDL=5.0		mg/L	
7505123	EMT	RPD [QGR208-01]	Total Alkalinity (Total as CaCO3)	2021/08/10	0.29		%	20
7505144	EMT	Matrix Spike [QGR208-01]	Dissolved Sulphate (SO4)	2021/08/10		104	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7505144	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/08/10		107	%	80 - 120
7505144	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/08/10	2.4, RDL=2.0		mg/L	
7505144	EMT	RPD [QGR208-01]	Dissolved Sulphate (SO4)	2021/08/10	NC (1)		%	20
7505150	EMT	Matrix Spike [QGR208-01]	Reactive Silica (SiO2)	2021/08/09		97	%	80 - 120
7505150	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/08/09		94	%	80 - 120
7505150	EMT	Method Blank	Reactive Silica (SiO2)	2021/08/09	ND, RDL=0.50		mg/L	
7505150	EMT	RPD [QGR208-01]	Reactive Silica (SiO2)	2021/08/09	NC		%	20
7505152	EMT	Spiked Blank	Colour	2021/08/09		106	%	80 - 120
7505152	EMT	Method Blank	Colour	2021/08/09	ND, RDL=5.0		TCU	
7505152	EMT	RPD [QGR208-01]	Colour	2021/08/09	NC		%	20
7505156	EMT	Matrix Spike [QGR208-01]	Orthophosphate (P)	2021/08/09		94	%	80 - 120
7505156	EMT	Spiked Blank	Orthophosphate (P)	2021/08/09		98	%	80 - 120
7505156	EMT	Method Blank	Orthophosphate (P)	2021/08/09	ND, RDL=0.010		mg/L	
7505156	EMT	RPD [QGR208-01]	Orthophosphate (P)	2021/08/09	NC		%	20
7505158	EMT	Matrix Spike [QGR208-01]	Nitrate + Nitrite (N)	2021/08/09		95	%	80 - 120
7505158	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/08/09		98	%	80 - 120
7505158	EMT	Method Blank	Nitrate + Nitrite (N)	2021/08/09	ND, RDL=0.050		mg/L	
7505158	EMT	RPD [QGR208-01]	Nitrate + Nitrite (N)	2021/08/09	0.43		%	20
7505160	EMT	Matrix Spike [QGR208-01]	Nitrite (N)	2021/08/10		93	%	80 - 120
7505160	EMT	Spiked Blank	Nitrite (N)	2021/08/10		96	%	80 - 120
7505160	EMT	Method Blank	Nitrite (N)	2021/08/10	ND, RDL=0.010		mg/L	
7505160	EMT	RPD [QGR208-01]	Nitrite (N)	2021/08/10	12		%	20
7507843	SHW	Spiked Blank	Conductivity	2021/08/09		101	%	80 - 120
7507843	SHW	Method Blank	Conductivity	2021/08/09	ND, RDL=1.0		uS/cm	
7507843	SHW	RPD	Conductivity	2021/08/09	0.50		%	10
7507847	SHW	Spiked Blank	pH	2021/08/09		100	%	97 - 103
7507847	SHW	RPD	pH	2021/08/09	1.5		%	N/A
7507848	SHW	Spiked Blank	Conductivity	2021/08/09		101	%	80 - 120
7507848	SHW	Method Blank	Conductivity	2021/08/09	1.1, RDL=1.0		uS/cm	
7507848	SHW	RPD [QGR204-01]	Conductivity	2021/08/09	0.14		%	10
7507850	SHW	Spiked Blank	pH	2021/08/09		100	%	97 - 103
7507850	SHW	RPD [QGR204-01]	pH	2021/08/09	1.3		%	N/A
7507883	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/08/10		97	%	80 - 120
7507883	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/08/09		103	%	80 - 120
7507883	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/08/09	ND, RDL=0.050		mg/L	
7507883	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2021/08/10	NC		%	20
7508115	EMT	Matrix Spike [QGR204-01]	Total Alkalinity (Total as CaCO3)	2021/08/10		NC	%	80 - 120
7508115	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/08/10		104	%	80 - 120
7508115	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/08/10	ND, RDL=5.0		mg/L	
7508115	EMT	RPD [QGR204-01]	Total Alkalinity (Total as CaCO3)	2021/08/10	1.6		%	20

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7508121	EMT	Matrix Spike [QGR204-01]	Dissolved Chloride (Cl-)	2021/08/10		96	%	80 - 120
7508121	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/08/10		99	%	80 - 120
7508121	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/08/10	ND, RDL=1.0		mg/L	
7508121	EMT	RPD [QGR204-01]	Dissolved Chloride (Cl-)	2021/08/10	NC		%	20
7508122	EMT	Matrix Spike [QGR204-01]	Dissolved Sulphate (SO4)	2021/08/10		98	%	80 - 120
7508122	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/08/10		100	%	80 - 120
7508122	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/08/10	ND, RDL=2.0		mg/L	
7508122	EMT	RPD [QGR204-01]	Dissolved Sulphate (SO4)	2021/08/10	0.84		%	20
7508125	EMT	Matrix Spike [QGR204-01]	Reactive Silica (SiO2)	2021/08/10		95	%	80 - 120
7508125	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/08/10		99	%	80 - 120
7508125	EMT	Method Blank	Reactive Silica (SiO2)	2021/08/10	ND, RDL=0.50		mg/L	
7508125	EMT	RPD [QGR204-01]	Reactive Silica (SiO2)	2021/08/10	1.5		%	20
7508128	EMT	Spiked Blank	Colour	2021/08/10		106	%	80 - 120
7508128	EMT	Method Blank	Colour	2021/08/10	ND, RDL=5.0		TCU	
7508128	EMT	RPD [QGR204-01]	Colour	2021/08/10	NC		%	20
7508132	EMT	Matrix Spike [QGR204-01]	Orthophosphate (P)	2021/08/10		89	%	80 - 120
7508132	EMT	Spiked Blank	Orthophosphate (P)	2021/08/10		100	%	80 - 120
7508132	EMT	Method Blank	Orthophosphate (P)	2021/08/10	ND, RDL=0.010		mg/L	
7508132	EMT	RPD [QGR204-01]	Orthophosphate (P)	2021/08/10	NC		%	20
7508134	EMT	Matrix Spike [QGR204-01]	Nitrate + Nitrite (N)	2021/08/10		88	%	80 - 120
7508134	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/08/10		90	%	80 - 120
7508134	EMT	Method Blank	Nitrate + Nitrite (N)	2021/08/10	ND, RDL=0.050		mg/L	
7508134	EMT	RPD [QGR204-01]	Nitrate + Nitrite (N)	2021/08/10	0.47		%	20
7508138	EMT	Matrix Spike [QGR204-01]	Nitrite (N)	2021/08/11		95	%	80 - 120
7508138	EMT	Spiked Blank	Nitrite (N)	2021/08/11		98	%	80 - 120
7508138	EMT	Method Blank	Nitrite (N)	2021/08/11	ND, RDL=0.010		mg/L	
7508138	EMT	RPD [QGR204-01]	Nitrite (N)	2021/08/11	4.2		%	20
7508149	EMT	Matrix Spike [QGR211-01]	Total Alkalinity (Total as CaCO3)	2021/08/10		87	%	80 - 120
7508149	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/08/10		107	%	80 - 120
7508149	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/08/10	ND, RDL=5.0		mg/L	
7508149	EMT	RPD [QGR211-01]	Total Alkalinity (Total as CaCO3)	2021/08/10	NC		%	20
7508161	EMT	Matrix Spike [QGR211-01]	Dissolved Chloride (Cl-)	2021/08/10		84	%	80 - 120
7508161	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/08/10		97	%	80 - 120
7508161	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/08/10	ND, RDL=1.0		mg/L	
7508161	EMT	RPD [QGR211-01]	Dissolved Chloride (Cl-)	2021/08/10	NC		%	20
7508169	EMT	Matrix Spike [QGR211-01]	Dissolved Sulphate (SO4)	2021/08/10		85	%	80 - 120
7508169	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/08/10		97	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7508169	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/08/10	ND, RDL=2.0		mg/L	
7508169	EMT	RPD [QGR211-01]	Dissolved Sulphate (SO4)	2021/08/10	NC		%	20
7508171	EMT	Matrix Spike [QGR211-01]	Reactive Silica (SiO2)	2021/08/10		72 (2)	%	80 - 120
7508171	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/08/10		94	%	80 - 120
7508171	EMT	Method Blank	Reactive Silica (SiO2)	2021/08/10	ND, RDL=0.50		mg/L	
7508171	EMT	RPD [QGR211-01]	Reactive Silica (SiO2)	2021/08/10	NC		%	20
7508177	EMT	Spiked Blank	Colour	2021/08/10		102	%	80 - 120
7508177	EMT	Method Blank	Colour	2021/08/10	ND, RDL=5.0		TCU	
7508177	EMT	RPD [QGR211-01]	Colour	2021/08/10	NC		%	20
7508179	EMT	Matrix Spike [QGR211-01]	Orthophosphate (P)	2021/08/10		81	%	80 - 120
7508179	EMT	Spiked Blank	Orthophosphate (P)	2021/08/10		99	%	80 - 120
7508179	EMT	Method Blank	Orthophosphate (P)	2021/08/10	ND, RDL=0.010		mg/L	
7508179	EMT	RPD [QGR211-01]	Orthophosphate (P)	2021/08/10	12		%	20
7508184	EMT	Matrix Spike [QGR211-01]	Nitrate + Nitrite (N)	2021/08/10		69 (2)	%	80 - 120
7508184	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/08/10		95	%	80 - 120
7508184	EMT	Method Blank	Nitrate + Nitrite (N)	2021/08/10	ND, RDL=0.050		mg/L	
7508184	EMT	RPD [QGR211-01]	Nitrate + Nitrite (N)	2021/08/10	NC		%	20
7508186	EMT	Matrix Spike [QGR211-01]	Nitrite (N)	2021/08/11		93	%	80 - 120
7508186	EMT	Spiked Blank	Nitrite (N)	2021/08/11		98	%	80 - 120
7508186	EMT	Method Blank	Nitrite (N)	2021/08/11	ND, RDL=0.010		mg/L	
7508186	EMT	RPD [QGR211-01]	Nitrite (N)	2021/08/11	NC		%	20
7509054	éCG	Matrix Spike	Dissolved Aluminum (Al)	2021/08/06		101	%	80 - 120
			Dissolved Antimony (Sb)	2021/08/06		NC	%	80 - 120
			Dissolved Arsenic (As)	2021/08/06		100	%	80 - 120
			Dissolved Barium (Ba)	2021/08/06		101	%	80 - 120
			Dissolved Beryllium (Be)	2021/08/06		101	%	80 - 120
			Dissolved Bismuth (Bi)	2021/08/06		98	%	80 - 120
			Dissolved Boron (B)	2021/08/06		105	%	80 - 120
			Dissolved Cadmium (Cd)	2021/08/06		100	%	80 - 120
			Dissolved Chromium (Cr)	2021/08/06		99	%	80 - 120
			Dissolved Cobalt (Co)	2021/08/06		95	%	80 - 120
			Dissolved Copper (Cu)	2021/08/06		95	%	80 - 120
			Dissolved Iron (Fe)	2021/08/06		104	%	80 - 120
			Dissolved Lead (Pb)	2021/08/06		100	%	80 - 120
			Dissolved Lithium (Li)	2021/08/06		96	%	80 - 120
			Dissolved Manganese (Mn)	2021/08/06		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/08/06		NC	%	80 - 120
			Dissolved Nickel (Ni)	2021/08/06		96	%	80 - 120
			Dissolved Phosphorus (P)	2021/08/06		103	%	80 - 120
			Dissolved Selenium (Se)	2021/08/06		99	%	80 - 120
			Dissolved Silicon (Si)	2021/08/06		113	%	80 - 120
			Dissolved Silver (Ag)	2021/08/06		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/08/06		NC	%	80 - 120
			Dissolved Thallium (Tl)	2021/08/06		99	%	80 - 120
			Dissolved Tin (Sn)	2021/08/06		100	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Titanium (Ti)	2021/08/06		102	%	80 - 120
			Dissolved Uranium (U)	2021/08/06		105	%	80 - 120
			Dissolved Vanadium (V)	2021/08/06		101	%	80 - 120
			Dissolved Zinc (Zn)	2021/08/06		97	%	80 - 120
			Dissolved Zirconium (Zr)	2021/08/06		101	%	80 - 120
7509054	éCG	Spiked Blank	Dissolved Aluminum (Al)	2021/08/06		104	%	80 - 120
			Dissolved Antimony (Sb)	2021/08/06		103	%	80 - 120
			Dissolved Arsenic (As)	2021/08/06		100	%	80 - 120
			Dissolved Barium (Ba)	2021/08/06		102	%	80 - 120
			Dissolved Beryllium (Be)	2021/08/06		101	%	80 - 120
			Dissolved Bismuth (Bi)	2021/08/06		99	%	80 - 120
			Dissolved Boron (B)	2021/08/06		103	%	80 - 120
			Dissolved Cadmium (Cd)	2021/08/06		101	%	80 - 120
			Dissolved Chromium (Cr)	2021/08/06		102	%	80 - 120
			Dissolved Cobalt (Co)	2021/08/06		99	%	80 - 120
			Dissolved Copper (Cu)	2021/08/06		99	%	80 - 120
			Dissolved Iron (Fe)	2021/08/06		101	%	80 - 120
			Dissolved Lead (Pb)	2021/08/06		101	%	80 - 120
			Dissolved Lithium (Li)	2021/08/06		98	%	80 - 120
			Dissolved Manganese (Mn)	2021/08/06		101	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/08/06		103	%	80 - 120
			Dissolved Nickel (Ni)	2021/08/06		101	%	80 - 120
			Dissolved Phosphorus (P)	2021/08/06		102	%	80 - 120
			Dissolved Selenium (Se)	2021/08/06		99	%	80 - 120
			Dissolved Silicon (Si)	2021/08/06		99	%	80 - 120
			Dissolved Silver (Ag)	2021/08/06		100	%	80 - 120
			Dissolved Strontium (Sr)	2021/08/06		102	%	80 - 120
			Dissolved Thallium (Tl)	2021/08/06		100	%	80 - 120
			Dissolved Tin (Sn)	2021/08/06		104	%	80 - 120
			Dissolved Titanium (Ti)	2021/08/06		106	%	80 - 120
			Dissolved Uranium (U)	2021/08/06		104	%	80 - 120
			Dissolved Vanadium (V)	2021/08/06		102	%	80 - 120
			Dissolved Zinc (Zn)	2021/08/06		101	%	80 - 120
			Dissolved Zirconium (Zr)	2021/08/06		102	%	80 - 120
7509054	éCG	Method Blank	Dissolved Aluminum (Al)	2021/08/06	ND, RDL=0.50		ug/L	
			Dissolved Antimony (Sb)	2021/08/06	ND, RDL=0.020		ug/L	
			Dissolved Arsenic (As)	2021/08/06	ND, RDL=0.020		ug/L	
			Dissolved Barium (Ba)	2021/08/06	ND, RDL=0.020		ug/L	
			Dissolved Beryllium (Be)	2021/08/06	ND, RDL=0.010		ug/L	
			Dissolved Bismuth (Bi)	2021/08/06	ND, RDL=0.0050		ug/L	
			Dissolved Boron (B)	2021/08/06	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2021/08/06	ND, RDL=0.0050		ug/L	
			Dissolved Chromium (Cr)	2021/08/06	ND, RDL=0.10		ug/L	
			Dissolved Cobalt (Co)	2021/08/06	ND, RDL=0.0050		ug/L	

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Copper (Cu)	2021/08/06	ND, RDL=0.050		ug/L	
			Dissolved Iron (Fe)	2021/08/06	ND, RDL=1.0		ug/L	
			Dissolved Lead (Pb)	2021/08/06	ND, RDL=0.0050		ug/L	
			Dissolved Lithium (Li)	2021/08/06	ND, RDL=0.50		ug/L	
			Dissolved Manganese (Mn)	2021/08/06	ND, RDL=0.050		ug/L	
			Dissolved Molybdenum (Mo)	2021/08/06	ND, RDL=0.050		ug/L	
			Dissolved Nickel (Ni)	2021/08/06	ND, RDL=0.020		ug/L	
			Dissolved Phosphorus (P)	2021/08/06	ND, RDL=2.0		ug/L	
			Dissolved Selenium (Se)	2021/08/06	ND, RDL=0.040		ug/L	
			Dissolved Silicon (Si)	2021/08/06	ND, RDL=50		ug/L	
			Dissolved Silver (Ag)	2021/08/06	ND, RDL=0.0050		ug/L	
			Dissolved Strontium (Sr)	2021/08/06	ND, RDL=0.050		ug/L	
			Dissolved Thallium (Tl)	2021/08/06	ND, RDL=0.0020		ug/L	
			Dissolved Tin (Sn)	2021/08/06	ND, RDL=0.20		ug/L	
			Dissolved Titanium (Ti)	2021/08/06	ND, RDL=0.50		ug/L	
			Dissolved Uranium (U)	2021/08/06	ND, RDL=0.0020		ug/L	
			Dissolved Vanadium (V)	2021/08/06	ND, RDL=0.20		ug/L	
			Dissolved Zinc (Zn)	2021/08/06	ND, RDL=0.10		ug/L	
			Dissolved Zirconium (Zr)	2021/08/06	ND, RDL=0.10		ug/L	
7509055	éCA	Matrix Spike	Fluoride (F-)	2021/08/06		108	%	80 - 120
7509055	éCA	Spiked Blank	Fluoride (F-)	2021/08/06		102	%	80 - 120
7509055	éCA	Method Blank	Fluoride (F-)	2021/08/06	ND, RDL=0.010		mg/L	
7509056	CJY	Matrix Spike [QGR200-06]	Total Mercury (Hg)	2021/08/06		84	%	80 - 120
7509056	CJY	Spiked Blank	Total Mercury (Hg)	2021/08/06		89	%	80 - 120
7509056	CJY	Method Blank	Total Mercury (Hg)	2021/08/06	ND, RDL=0.0019		ug/L	
7513539	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2021/08/12		NC	%	80 - 120
7513539	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/08/12		103	%	80 - 120
7513539	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/08/12	ND, RDL=5.0		mg/L	
7513539	EMT	RPD	Total Alkalinity (Total as CaCO3)	2021/08/12	0.080		%	20
7513542	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2021/08/12		96	%	80 - 120
7513542	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/08/12		97	%	80 - 120
7513542	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/08/12	ND, RDL=1.0		mg/L	

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7513542	EMT	RPD	Dissolved Chloride (Cl-)	2021/08/12	1.5		%	20
7517713	SHW	Spiked Blank	Conductivity	2021/08/13		102	%	80 - 120
7517713	SHW	Method Blank	Conductivity	2021/08/13	ND, RDL=1.0		uS/cm	
7517713	SHW	RPD	Conductivity	2021/08/13	0		%	10
7517714	SHW	Spiked Blank	pH	2021/08/13		100	%	97 - 103
7517714	SHW	RPD	pH	2021/08/13	0.32		%	N/A
7517748	SHW	QC Standard	Turbidity	2021/08/13		102	%	80 - 120
7517748	SHW	Spiked Blank	Turbidity	2021/08/13		104	%	80 - 120
7517748	SHW	Method Blank	Turbidity	2021/08/13	ND, RDL=0.10		NTU	
7517748	SHW	RPD	Turbidity	2021/08/13	3.5		%	20
7517967	MCN	Matrix Spike	Dissolved Sulphate (SO4)	2021/08/16		96	%	80 - 120
7517967	MCN	Spiked Blank	Dissolved Sulphate (SO4)	2021/08/16		99	%	80 - 120
7517967	MCN	Method Blank	Dissolved Sulphate (SO4)	2021/08/16	ND, RDL=2.0		mg/L	
7517967	MCN	RPD	Dissolved Sulphate (SO4)	2021/08/16	0.25		%	20
7521242	MCN	Matrix Spike	Reactive Silica (SiO2)	2021/08/16		81	%	80 - 120
7521242	MCN	Spiked Blank	Reactive Silica (SiO2)	2021/08/16		101	%	80 - 120
7521242	MCN	Method Blank	Reactive Silica (SiO2)	2021/08/16	ND, RDL=0.50		mg/L	
7521242	MCN	RPD	Reactive Silica (SiO2)	2021/08/16	1.7		%	20
7521243	MCN	Spiked Blank	Colour	2021/08/16		108	%	80 - 120
7521243	MCN	Method Blank	Colour	2021/08/16	ND, RDL=5.0		TCU	
7521243	MCN	RPD	Colour	2021/08/16	NC		%	20
7521244	MCN	Matrix Spike	Orthophosphate (P)	2021/08/16		95	%	80 - 120
7521244	MCN	Spiked Blank	Orthophosphate (P)	2021/08/16		97	%	80 - 120
7521244	MCN	Method Blank	Orthophosphate (P)	2021/08/16	ND, RDL=0.010		mg/L	
7521244	MCN	RPD	Orthophosphate (P)	2021/08/16	NC		%	20
7521245	MCN	Matrix Spike	Nitrate + Nitrite (N)	2021/08/16		96	%	80 - 120
7521245	MCN	Spiked Blank	Nitrate + Nitrite (N)	2021/08/16		95	%	80 - 120
7521245	MCN	Method Blank	Nitrate + Nitrite (N)	2021/08/16	ND, RDL=0.050		mg/L	
7521245	MCN	RPD	Nitrate + Nitrite (N)	2021/08/16	7.5		%	20
7521246	MCN	Matrix Spike	Nitrite (N)	2021/08/16		94	%	80 - 120
7521246	MCN	Spiked Blank	Nitrite (N)	2021/08/16		101	%	80 - 120
7521246	MCN	Method Blank	Nitrite (N)	2021/08/16	ND, RDL=0.010		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7521246	MCN	RPD	Nitrite (N)	2021/08/16	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Elevated reporting limit due to method blank performance.

(2) Poor spike recovery due to probable sample matrix interference.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

<Original signed by>

David Huang, BBY Scientific Specialist

<Original signed by>

Eric Dearman, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Your C.O.C. #: 834366-01-01, 834366-02-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/09/17
Report #: R6814789
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P8619
Received: 2021/09/07, 10:41

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	13	N/A	2021/09/14	N/A	SM 23 4500-CO2 D
Alkalinity	1	N/A	2021/09/14	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity	12	N/A	2021/09/15	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	1	N/A	2021/09/14	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride	12	N/A	2021/09/15	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	1	N/A	2021/09/14	ATL SOP 00020	SM 23 2120C m
Colour	12	N/A	2021/09/15	ATL SOP 00020	SM 23 2120C m
Conductance - water	13	N/A	2021/09/14	ATL SOP 00004	SM 23 2510B m
Ion Balance (% Difference)	12	N/A	2021/09/17	N/A	Auto Calc.
Anion and Cation Sum	13	N/A	2021/09/17	N/A	Auto Calc.
Fluoride - Low Level (1)	13	N/A	2021/09/14	BBY6SOP-00048	SM 23 4500-F C m
Hardness (calculated as CaCO3) (1)	13	N/A	2021/09/15	BBY WI-00033	Auto Calc
Mercury (Total) by CV (1)	13	2021/09/15	2021/09/15	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (1)	13	N/A	2021/09/15	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved) (1)	12	N/A	2021/09/15	BBY7SOP-00002	EPA 6020B R2 m
Elements by ICPMS Low Level (dissolved) (1)	1	N/A	2021/09/16	BBY7SOP-00002	EPA 6020B R2 m
Nitrogen Ammonia - water	1	N/A	2021/09/14	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water	12	N/A	2021/09/15	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	1	N/A	2021/09/14	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite	12	N/A	2021/09/15	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	1	N/A	2021/09/14	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrite	12	N/A	2021/09/15	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	1	N/A	2021/09/15	ATL SOP 00018	ASTM D3867-16
Nitrogen - Nitrate (as N)	12	N/A	2021/09/16	ATL SOP 00018	ASTM D3867-16
pH (2)	13	N/A	2021/09/14	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	1	N/A	2021/09/14	ATL SOP 00021	SM 23 4500-P E m
Phosphorus - ortho	12	N/A	2021/09/15	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	13	N/A	2021/09/17	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	13	N/A	2021/09/17	ATL SOP 00049	Auto Calc.
Reactive Silica	1	N/A	2021/09/14	ATL SOP 00022	EPA 366.0 m
Reactive Silica	12	N/A	2021/09/15	ATL SOP 00022	EPA 366.0 m
Sulphate	1	N/A	2021/09/14	ATL SOP 00023	ASTM D516-16 m

Your C.O.C. #: 834366-01-01, 834366-02-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/09/17
Report #: R6814789
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P8619
Received: 2021/09/07, 10:41

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sulphate	12	N/A	2021/09/15	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	13	N/A	2021/09/17	N/A	Auto Calc.
Organic carbon - Total (TOC) (3)	1	N/A	2021/09/15	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (3)	12	N/A	2021/09/16	ATL SOP 00203	SM 23 5310B m
Turbidity	13	N/A	2021/09/14	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Burnaby via Bedford
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Your C.O.C. #: 834366-01-01, 834366-02-01

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CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1P8619
Received: 2021/09/07, 10:41

Encryption Key <Original signed by>

Tyler Travers
Project Manager Assistant
17 Sep 2021 11:12:15

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Maryann Comeau, Customer Experience Supervisor/PM
Email: Maryann.COMEAU@bureauveritas.com
Phone# (902)420-0203 Ext:298

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH948			QPH948			QPH949		
Sampling Date		2021/09/02			2021/09/02			2021/09/02		
COC Number		834366-01-01			834366-01-01			834366-01-01		
Sample #		M AQPOR			M AQPOR			M+L SED		
	UNITS	**M AQPOR**	**RDL**	**QC Batch**	**M AQPOR Lab-Dup**	**RDL**	**QC Batch**	**M+L SED**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	0.820	N/A	7567846				1.23	N/A	7567846
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	29	1.0	7567839				57	1.0	7567839
Calculated TDS	mg/L	44	1.0	7567850				63	1.0	7567850
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7567839				ND	1.0	7567839
Cation Sum	me/L	0.710	N/A	7567846				1.07	N/A	7567846
Dissolved Hardness (CaCO3)	mg/L	33.7	0.50	7583037				48.5	0.50	7583037
Ion Balance (% Difference)	%	7.19	N/A	7567844				6.96	N/A	7567844
Langelier Index (@ 20C)	N/A	-1.21		7567847				-0.517		7567847
Langelier Index (@ 4C)	N/A	-1.46		7567848				-0.769		7567848
Nitrate (N)	mg/L	ND	0.050	7567564				ND	0.050	7573349
Saturation pH (@ 20C)	N/A	8.73		7567847				8.34		7567847
Saturation pH (@ 4C)	N/A	8.99		7567848				8.59		7567848
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	29	5.0	7573818				58	5.0	7575892
Dissolved Chloride (Cl-)	mg/L	1.3	1.0	7573825				1.1	1.0	7575900
Colour	TCU	ND	5.0	7573845				ND	5.0	7575903
Nitrate + Nitrite (N)	mg/L	ND	0.050	7573860				ND	0.050	7575908
Nitrite (N)	mg/L	0.012	0.010	7573861				ND	0.010	7575910
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7575446				ND	0.050	7578017
Total Organic Carbon (C)	mg/L	1.1	0.50	7578048				3.7	0.50	7578048
Orthophosphate (P)	mg/L	ND	0.010	7573847				ND	0.010	7575905
pH	pH	7.53		7575330	7.55		7575330	7.82		7575326
Reactive Silica (SiO2)	mg/L	1.9	0.50	7573838				3.3	0.50	7575902
Dissolved Sulphate (SO4)	mg/L	9.5	2.0	7573831				2.3	2.0	7575901
Turbidity	NTU	0.66	0.10	7575571				10	0.10	7575571
Conductivity	uS/cm	69	1.0	7575328	70	1.0	7575328	98	1.0	7575324
Metals										
Dissolved Aluminum (Al)	ug/L	60.2	0.50	7583039	59.7	0.50	7583039	104	0.50	7583039
Dissolved Antimony (Sb)	ug/L	0.264	0.020	7583039	0.263	0.020	7583039	0.607	0.020	7583039
Dissolved Arsenic (As)	ug/L	0.246	0.020	7583039	0.250	0.020	7583039	1.09	0.020	7583039
Dissolved Barium (Ba)	ug/L	1.46	0.020	7583039	1.50	0.020	7583039	1.95	0.020	7583039

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH948			QPH948			QPH949		
Sampling Date		2021/09/02			2021/09/02			2021/09/02		
COC Number		834366-01-01			834366-01-01			834366-01-01		
Sample #		M AQPOR			M AQPOR			M+L SED		
	UNITS	M AQPOR	RDL	QC Batch	M AQPOR Lab-Dup	RDL	QC Batch	M+L SED	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	0.010	7583039	ND	0.010	7583039	ND	0.010	7583039
Dissolved Bismuth (Bi)	ug/L	ND	0.0050	7583039	ND	0.0050	7583039	ND	0.0050	7583039
Dissolved Boron (B)	ug/L	ND	5.0	7583039	ND	5.0	7583039	ND	5.0	7583039
Dissolved Cadmium (Cd)	ug/L	ND	0.0050	7583039	ND	0.0050	7583039	ND	0.0050	7583039
Dissolved Chromium (Cr)	ug/L	ND	0.10	7583039	ND	0.10	7583039	ND	0.10	7583039
Dissolved Cobalt (Co)	ug/L	0.0065	0.0050	7583039	ND	0.0050	7583039	0.0112	0.0050	7583039
Dissolved Copper (Cu)	ug/L	0.259	0.050	7583039	0.262	0.050	7583039	1.07	0.050	7583039
Dissolved Iron (Fe)	ug/L	ND	1.0	7583039	ND	1.0	7583039	1.6	1.0	7583039
Dissolved Lead (Pb)	ug/L	ND	0.0050	7583039	ND	0.0050	7583039	0.0065	0.0050	7583039
Dissolved Lithium (Li)	ug/L	ND	0.50	7583039	ND	0.50	7583039	ND	0.50	7583039
Dissolved Manganese (Mn)	ug/L	1.83	0.050	7583039	1.83	0.050	7583039	7.34	0.050	7583039
Dissolved Molybdenum (Mo)	ug/L	0.343	0.050	7583039	0.321	0.050	7583039	0.276	0.050	7583039
Dissolved Nickel (Ni)	ug/L	ND	0.020	7583039	ND	0.020	7583039	0.077	0.020	7583039
Dissolved Phosphorus (P)	ug/L	ND	2.0	7583039	ND	2.0	7583039	ND	2.0	7583039
Dissolved Selenium (Se)	ug/L	ND	0.040	7583039	ND	0.040	7583039	0.053	0.040	7583039
Dissolved Silicon (Si)	ug/L	675	50	7583039	677	50	7583039	1610	50	7583039
Dissolved Silver (Ag)	ug/L	ND	0.0050	7583039	ND	0.0050	7583039	ND	0.0050	7583039
Dissolved Strontium (Sr)	ug/L	23.0	0.050	7583039	23.1	0.050	7583039	52.4	0.050	7583039
Dissolved Thallium (Tl)	ug/L	ND	0.0020	7583039	ND	0.0020	7583039	ND	0.0020	7583039
Dissolved Tin (Sn)	ug/L	ND	0.20	7583039	ND	0.20	7583039	ND	0.20	7583039
Dissolved Titanium (Ti)	ug/L	ND	0.50	7583039	ND	0.50	7583039	ND	0.50	7583039
Dissolved Uranium (U)	ug/L	0.173	0.0020	7583039	0.173	0.0020	7583039	1.32	0.0020	7583039
Dissolved Vanadium (V)	ug/L	ND	0.20	7583039	ND	0.20	7583039	0.99	0.20	7583039
Dissolved Zinc (Zn)	ug/L	0.94	0.10	7583039	0.92	0.10	7583039	1.51	0.10	7583039
Dissolved Zirconium (Zr)	ug/L	ND	0.10	7583039	ND	0.10	7583039	ND	0.10	7583039
Dissolved Calcium (Ca)	mg/L	12.7	0.050	7583038				16.7	0.050	7583038
Dissolved Magnesium (Mg)	mg/L	0.494	0.050	7583038				1.64	0.050	7583038
Dissolved Potassium (K)	mg/L	0.349	0.050	7583038				1.53	0.050	7583038
Dissolved Sodium (Na)	mg/L	0.552	0.050	7583038				1.35	0.050	7583038
Dissolved Sulphur (S)	mg/L	ND	3.0	7583038				ND	3.0	7583038

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH949			QPH950			QPH950		
Sampling Date		2021/09/02			2021/09/02			2021/09/02		
COC Number		834366-01-01			834366-01-01			834366-01-01		
Sample #		M+L SED			M+L MD			M+L MD		
	UNITS	M+L SED Lab-Dup	RDL	QC Batch	M+L MD	RDL	QC Batch	M+L MD Lab-Dup	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L				1.28	N/A	7567846			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				48	1.0	7567839			
Calculated TDS	mg/L				67	1.0	7567850			
Carb. Alkalinity (calc. as CaCO3)	mg/L				ND	1.0	7567839			
Cation Sum	me/L				1.14	N/A	7567846			
Dissolved Hardness (CaCO3)	mg/L				54.3	0.50	7583037			
Ion Balance (% Difference)	%				5.79	N/A	7567844			
Langelier Index (@ 20C)	N/A				-0.653		7567847			
Langelier Index (@ 4C)	N/A				-0.904		7567848			
Nitrate (N)	mg/L				0.054	0.050	7573350			
Saturation pH (@ 20C)	N/A				8.39		7567847			
Saturation pH (@ 4C)	N/A				8.64		7567848			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	58	5.0	7575892	49	5.0	7575863			
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7575900	1.2	1.0	7575872			
Colour	TCU	ND	5.0	7575903	ND	5.0	7575876			
Nitrate + Nitrite (N)	mg/L	ND	0.050	7575908	0.054	0.050	7575878			
Nitrite (N)	mg/L	0.011	0.010	7575910	ND	0.010	7575880			
Nitrogen (Ammonia Nitrogen)	mg/L				ND	0.050	7575462	ND	0.050	7575462
Total Organic Carbon (C)	mg/L				1.7	0.50	7578048			
Orthophosphate (P)	mg/L	ND	0.010	7575905	ND	0.010	7575877			
pH	pH				7.74		7575326			
Reactive Silica (SiO2)	mg/L	3.1	0.50	7575902	1.9	0.50	7575875			
Dissolved Sulphate (SO4)	mg/L	ND	2.0	7575901	13	2.0	7575874			
Turbidity	NTU				0.78	0.10	7575571			
Conductivity	uS/cm				110	1.0	7575324			
Metals										
Dissolved Aluminum (Al)	ug/L				101	0.50	7583039			
Dissolved Antimony (Sb)	ug/L				0.505	0.020	7583039			
Dissolved Arsenic (As)	ug/L				0.272	0.020	7583039			
Dissolved Barium (Ba)	ug/L				40.0	0.020	7583039			

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH949			QPH950			QPH950		
Sampling Date		2021/09/02			2021/09/02			2021/09/02		
COC Number		834366-01-01			834366-01-01			834366-01-01		
Sample #		M+L SED			M+L MD			M+L MD		
	UNITS	M+L SED Lab-Dup	RDL	QC Batch	M+L MD	RDL	QC Batch	M+L MD Lab-Dup	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L				ND	0.010	7583039			
Dissolved Bismuth (Bi)	ug/L				ND	0.0050	7583039			
Dissolved Boron (B)	ug/L				ND	5.0	7583039			
Dissolved Cadmium (Cd)	ug/L				0.0050	0.0050	7583039			
Dissolved Chromium (Cr)	ug/L				ND	0.10	7583039			
Dissolved Cobalt (Co)	ug/L				0.0124	0.0050	7583039			
Dissolved Copper (Cu)	ug/L				0.790	0.050	7583039			
Dissolved Iron (Fe)	ug/L				ND	1.0	7583039			
Dissolved Lead (Pb)	ug/L				ND	0.0050	7583039			
Dissolved Lithium (Li)	ug/L				ND	0.50	7583039			
Dissolved Manganese (Mn)	ug/L				40.5	0.050	7583039			
Dissolved Molybdenum (Mo)	ug/L				0.269	0.050	7583039			
Dissolved Nickel (Ni)	ug/L				0.048	0.020	7583039			
Dissolved Phosphorus (P)	ug/L				ND	2.0	7583039			
Dissolved Selenium (Se)	ug/L				0.060	0.040	7583039			
Dissolved Silicon (Si)	ug/L				738	50	7583039			
Dissolved Silver (Ag)	ug/L				ND	0.0050	7583039			
Dissolved Strontium (Sr)	ug/L				60.5	0.050	7583039			
Dissolved Thallium (Tl)	ug/L				0.0026	0.0020	7583039			
Dissolved Tin (Sn)	ug/L				ND	0.20	7583039			
Dissolved Titanium (Ti)	ug/L				ND	0.50	7583039			
Dissolved Uranium (U)	ug/L				0.209	0.0020	7583039			
Dissolved Vanadium (V)	ug/L				0.28	0.20	7583039			
Dissolved Zinc (Zn)	ug/L				1.03	0.10	7583039			
Dissolved Zirconium (Zr)	ug/L				ND	0.10	7583039			
Dissolved Calcium (Ca)	mg/L				17.7	0.050	7583038			
Dissolved Magnesium (Mg)	mg/L				2.46	0.050	7583038			
Dissolved Potassium (K)	mg/L				0.537	0.050	7583038			
Dissolved Sodium (Na)	mg/L				0.936	0.050	7583038			
Dissolved Sulphur (S)	mg/L				4.5	3.0	7583038			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH951	QPH952	QPH953		QPH954		
Sampling Date		2021/09/02	2021/09/02	2021/09/02		2021/09/02		
COC Number		834366-01-01	834366-01-01	834366-01-01		834366-01-01		
Sample #		M QE-POR	M QZ-QE-POR-QTP-MIN	SZ+V QE-POR		L QZ-TQTP+QZ-QTP		
	UNITS	M QE-POR	M QZ-QE-POR-QTP-MIN	SZ+V QE-POR	QC Batch	L QZ-TQTP+QZ-QTP	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	2.94	0.910	1.10	7567846	0.990	N/A	7567846
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	46	35	38	7567839	44	1.0	7567839
Calculated TDS	mg/L	190	49	59	7567850	51	1.0	7567850
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	ND	ND	7567839	ND	1.0	7567839
Cation Sum	me/L	2.82	0.810	1.00	7567846	0.900	N/A	7567846
Dissolved Hardness (CaCO3)	mg/L	136	38.7	47.5	7583037	42.5	0.50	7583037
Ion Balance (% Difference)	%	2.08	5.81	4.76	7567844	4.76	N/A	7567844
Langelier Index (@ 20C)	N/A	-0.313	-0.954	-0.873	7567847	-0.808		7567847
Langelier Index (@ 4C)	N/A	-0.563	-1.21	-1.13	7567848	-1.06		7567848
Nitrate (N)	mg/L	ND	ND	ND	7573350	ND	0.050	7573350
Saturation pH (@ 20C)	N/A	8.00	8.59	8.53	7567847	8.49		7567847
Saturation pH (@ 4C)	N/A	8.25	8.84	8.78	7567848	8.74		7567848
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	47	36	38	7575863	44	5.0	7575863
Dissolved Chloride (Cl-)	mg/L	ND	ND	ND	7575872	ND	1.0	7575872
Colour	TCU	ND	ND	ND	7575876	ND	5.0	7575876
Nitrate + Nitrite (N)	mg/L	ND	ND	ND	7575878	ND	0.050	7575878
Nitrite (N)	mg/L	ND	ND	ND	7575880	ND	0.010	7575880
Nitrogen (Ammonia Nitrogen)	mg/L	ND	ND	ND	7578017	ND	0.050	7578017
Total Organic Carbon (C)	mg/L	2.2	1.5	3.9	7578048	1.7	0.50	7578048
Orthophosphate (P)	mg/L	ND	ND	ND	7575877	ND	0.010	7575877
pH	pH	7.69	7.64	7.65	7575326	7.69		7575330
Reactive Silica (SiO2)	mg/L	4.3	2.4	0.50	7575875	1.9	0.50	7575875
Dissolved Sulphate (SO4)	mg/L	97	9.6	16	7575874	5.3	2.0	7575874
Turbidity	NTU	8.8	1.2	2.4	7575571	1.4	0.10	7575572
Conductivity	uS/cm	290	80	99	7575324	83	1.0	7575328
Metals								
Dissolved Aluminum (Al)	ug/L	77.9	98.1	100	7583039	104	0.50	7583039
Dissolved Antimony (Sb)	ug/L	1.11	0.425	0.552	7583039	0.507	0.020	7583039
Dissolved Arsenic (As)	ug/L	0.487	0.334	0.280	7583039	0.632	0.020	7583039
Dissolved Barium (Ba)	ug/L	10.5	4.12	1.14	7583039	3.31	0.020	7583039
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	7583039	ND	0.010	7583039

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH951	QPH952	QPH953		QPH954		
Sampling Date		2021/09/02	2021/09/02	2021/09/02		2021/09/02		
COC Number		834366-01-01	834366-01-01	834366-01-01		834366-01-01		
Sample #		M QE-POR	M QZ-QE-POR-QTP-MIN	SZ+V QE-POR		L QZ-TQTP+QZ-QTP		
	UNITS	M QE-POR	M QZ-QE-POR-QTP-MIN	SZ+V QE-POR	QC Batch	L QZ-TQTP+QZ-QTP	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	ND	ND	7583039	ND	0.0050	7583039
Dissolved Boron (B)	ug/L	ND	ND	ND	7583039	ND	5.0	7583039
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	7583039	ND	0.0050	7583039
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	7583039	ND	0.10	7583039
Dissolved Cobalt (Co)	ug/L	0.0207	0.0080	0.0089	7583039	0.0083	0.0050	7583039
Dissolved Copper (Cu)	ug/L	0.471	0.483	0.526	7583039	0.752	0.050	7583039
Dissolved Iron (Fe)	ug/L	ND	ND	1.1	7583039	1.1	1.0	7583039
Dissolved Lead (Pb)	ug/L	ND	ND	ND	7583039	0.0067	0.0050	7583039
Dissolved Lithium (Li)	ug/L	ND	ND	ND	7583039	ND	0.50	7583039
Dissolved Manganese (Mn)	ug/L	12.5	5.07	0.644	7583039	6.36	0.050	7583039
Dissolved Molybdenum (Mo)	ug/L	2.47	0.118	2.24	7583039	0.090	0.050	7583039
Dissolved Nickel (Ni)	ug/L	0.047	ND	0.029	7583039	0.020	0.020	7583039
Dissolved Phosphorus (P)	ug/L	ND	ND	ND	7583039	ND	2.0	7583039
Dissolved Selenium (Se)	ug/L	0.052	ND	ND	7583039	0.043	0.040	7583039
Dissolved Silicon (Si)	ug/L	2160	1050	125	7583039	876	50	7583039
Dissolved Silver (Ag)	ug/L	ND	ND	ND	7583039	ND	0.0050	7583039
Dissolved Strontium (Sr)	ug/L	140	23.7	17.7	7583039	46.1	0.050	7583039
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	7583039	ND	0.0020	7583039
Dissolved Tin (Sn)	ug/L	0.22	ND	ND	7583039	ND	0.20	7583039
Dissolved Titanium (Ti)	ug/L	ND	ND	ND	7583039	ND	0.50	7583039
Dissolved Uranium (U)	ug/L	0.552	0.158	0.204	7583039	0.245	0.0020	7583039
Dissolved Vanadium (V)	ug/L	0.58	ND	ND	7583039	ND	0.20	7583039
Dissolved Zinc (Zn)	ug/L	0.92	0.77	1.09	7583039	0.79	0.10	7583039
Dissolved Zirconium (Zr)	ug/L	ND	ND	ND	7583039	ND	0.10	7583039
Dissolved Calcium (Ca)	mg/L	51.8	14.8	16.2	7583038	15.0	0.050	7583038
Dissolved Magnesium (Mg)	mg/L	1.65	0.430	1.74	7583038	1.21	0.050	7583038
Dissolved Potassium (K)	mg/L	1.04	0.324	0.497	7583038	0.507	0.050	7583038
Dissolved Sodium (Na)	mg/L	1.62	0.610	0.833	7583038	0.831	0.050	7583038
Dissolved Sulphur (S)	mg/L	33.9	ND	5.6	7583038	ND	3.0	7583038

RDL = Reportable Detection Limit
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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH955			QPH955			QPH956		
Sampling Date		2021/09/02			2021/09/02			2021/09/02		
COC Number		834366-01-01			834366-01-01			834366-01-01		
Sample #		L TRJ			L TRJ			V QE-POR-QTP		
	UNITS	L TRJ	RDL	QC Batch	L TRJ Lab-Dup	RDL	QC Batch	V QE-POR-QTP	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	1.12	N/A	7567846				0.690	N/A	7567846
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	50	1.0	7567839				30	1.0	7567839
Calculated TDS	mg/L	58	1.0	7567850				35	1.0	7567850
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7567839				ND	1.0	7567839
Cation Sum	me/L	1.02	N/A	7567846				0.580	N/A	7567846
Dissolved Hardness (CaCO3)	mg/L	47.9	0.50	7583037				28.1	0.50	7583037
Ion Balance (% Difference)	%	4.67	N/A	7567844				8.66	N/A	7567844
Langelier Index (@ 20C)	N/A	-0.674		7567847				-1.25		7567847
Langelier Index (@ 4C)	N/A	-0.926		7567848				-1.50		7567848
Nitrate (N)	mg/L	ND	0.050	7573350				ND	0.050	7573350
Saturation pH (@ 20C)	N/A	8.40		7567847				8.83		7567847
Saturation pH (@ 4C)	N/A	8.65		7567848				9.08		7567848
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	51	5.0	7575978	53	5.0	7575978	30	5.0	7575863
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7575980	ND	1.0	7575980	ND	1.0	7575872
Colour	TCU	ND	5.0	7575984	ND	5.0	7575984	ND	5.0	7575876
Nitrate + Nitrite (N)	mg/L	ND	0.050	7575986				ND	0.050	7575878
Nitrite (N)	mg/L	ND	0.010	7575987	ND	0.010	7575987	ND	0.010	7575880
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7578017				ND	0.050	7578017
Total Organic Carbon (C)	mg/L	1.3	0.50	7578048				1.5	0.50	7575359
Orthophosphate (P)	mg/L	ND	0.010	7575985	ND	0.010	7575985	ND	0.010	7575877
pH	pH	7.73		7575330				7.57		7575330
Reactive Silica (SiO2)	mg/L	3.2	0.50	7575983	3.4	0.50	7575983	1.4	0.50	7575875
Dissolved Sulphate (SO4)	mg/L	5.0	2.0	7575982	4.8	2.0	7575982	3.8	2.0	7575874
Turbidity	NTU	1.0	0.10	7575572				0.64	0.10	7575572
Conductivity	uS/cm	94	1.0	7575328				57	1.0	7575328
Metals										
Dissolved Aluminum (Al)	ug/L	127	0.50	7583039				71.9	0.50	7583039
Dissolved Antimony (Sb)	ug/L	0.661	0.020	7583039				0.364	0.020	7583039
Dissolved Arsenic (As)	ug/L	0.397	0.020	7583039				0.323	0.020	7583039
Dissolved Barium (Ba)	ug/L	64.6	0.020	7583039				0.418	0.020	7583039

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH955			QPH955			QPH956		
Sampling Date		2021/09/02			2021/09/02			2021/09/02		
COC Number		834366-01-01			834366-01-01			834366-01-01		
Sample #		L TRJ			L TRJ			V QE-POR-QTP		
	UNITS	L TRJ	RDL	QC Batch	L TRJ Lab-Dup	RDL	QC Batch	V QE-POR-QTP	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L	ND	0.010	7583039				ND	0.010	7583039
Dissolved Bismuth (Bi)	ug/L	ND	0.0050	7583039				ND	0.0050	7583039
Dissolved Boron (B)	ug/L	ND	5.0	7583039				ND	5.0	7583039
Dissolved Cadmium (Cd)	ug/L	ND	0.0050	7583039				ND	0.0050	7583039
Dissolved Chromium (Cr)	ug/L	ND	0.10	7583039				ND	0.10	7583039
Dissolved Cobalt (Co)	ug/L	0.0147	0.0050	7583039				0.0101	0.0050	7583039
Dissolved Copper (Cu)	ug/L	0.737	0.050	7583039				1.33	0.050	7583039
Dissolved Iron (Fe)	ug/L	1.4	1.0	7583039				1.5	1.0	7583039
Dissolved Lead (Pb)	ug/L	0.0136	0.0050	7583039				ND	0.0050	7583039
Dissolved Lithium (Li)	ug/L	ND	0.50	7583039				ND	0.50	7583039
Dissolved Manganese (Mn)	ug/L	9.70	0.050	7583039				3.78	0.050	7583039
Dissolved Molybdenum (Mo)	ug/L	0.116	0.050	7583039				0.413	0.050	7583039
Dissolved Nickel (Ni)	ug/L	0.056	0.020	7583039				0.043	0.020	7583039
Dissolved Phosphorus (P)	ug/L	ND	2.0	7583039				ND	2.0	7583039
Dissolved Selenium (Se)	ug/L	ND	0.040	7583039				ND	0.040	7583039
Dissolved Silicon (Si)	ug/L	1580	50	7583039				527	50	7583039
Dissolved Silver (Ag)	ug/L	ND	0.0050	7583039				ND	0.0050	7583039
Dissolved Strontium (Sr)	ug/L	90.6	0.050	7583039				9.53	0.050	7583039
Dissolved Thallium (Tl)	ug/L	ND	0.0020	7583039				ND	0.0020	7583039
Dissolved Tin (Sn)	ug/L	ND	0.20	7583039				ND	0.20	7583039
Dissolved Titanium (Ti)	ug/L	ND	0.50	7583039				ND	0.50	7583039
Dissolved Uranium (U)	ug/L	0.463	0.0020	7583039				0.121	0.0020	7583039
Dissolved Vanadium (V)	ug/L	0.23	0.20	7583039				ND	0.20	7583039
Dissolved Zinc (Zn)	ug/L	1.44	0.10	7583039				1.08	0.10	7583039
Dissolved Zirconium (Zr)	ug/L	ND	0.10	7583039				ND	0.10	7583039
Dissolved Calcium (Ca)	mg/L	16.3	0.050	7583038				9.72	0.050	7583038
Dissolved Magnesium (Mg)	mg/L	1.76	0.050	7583038				0.928	0.050	7583038
Dissolved Potassium (K)	mg/L	0.889	0.050	7583038				0.169	0.050	7583038
Dissolved Sodium (Na)	mg/L	0.859	0.050	7583038				0.323	0.050	7583038
Dissolved Sulphur (S)	mg/L	ND	3.0	7583038				ND	3.0	7583038

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH956			QPH957		QPI040		
Sampling Date		2021/09/02			2021/09/02		2021/09/02		
COC Number		834366-01-01			834366-01-01		834366-02-01		
Sample #		V QE-POR-QTP			MAR HL		LEP HL		
	UNITS	V QE-POR-QTP Lab-Dup	RDL	QC Batch	Mar HL	QC Batch	Lep HL	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L				1.89	7567846	1.75	N/A	7567846
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				48	7567839	62	1.0	7567839
Calculated TDS	mg/L				120	7567850	98	1.0	7567850
Carb. Alkalinity (calc. as CaCO3)	mg/L				ND	7567839	ND	1.0	7567839
Cation Sum	me/L				1.85	7567846	1.63	N/A	7567846
Dissolved Hardness (CaCO3)	mg/L				84.9	7583037	72.4	0.50	7583037
Ion Balance (% Difference)	%				1.07	7567844	3.55	N/A	7567844
Langelier Index (@ 20C)	N/A				-0.524	7567847	-0.397		7567847
Langelier Index (@ 4C)	N/A				-0.775	7567848	-0.648		7567848
Nitrate (N)	mg/L				ND	7573350	ND	0.050	7573350
Saturation pH (@ 20C)	N/A				8.19	7567847	8.20		7567847
Saturation pH (@ 4C)	N/A				8.44	7567848	8.45		7567848
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L				48	7575863	62	5.0	7575863
Dissolved Chloride (Cl-)	mg/L				1.0	7575872	1.1	1.0	7575872
Colour	TCU				ND	7575876	ND	5.0	7575876
Nitrate + Nitrite (N)	mg/L				ND	7575878	ND	0.050	7575878
Nitrite (N)	mg/L				ND	7575880	ND	0.010	7575880
Nitrogen (Ammonia Nitrogen)	mg/L				ND	7578017	ND	0.050	7578017
Total Organic Carbon (C)	mg/L	1.5	0.50	7575359	2.1	7578048	1.5	0.50	7578040
Orthophosphate (P)	mg/L				ND	7575877	ND	0.010	7575877
pH	pH				7.67	7575330	7.81		7575330
Reactive Silica (SiO2)	mg/L				6.2	7575875	5.0	0.50	7575875
Dissolved Sulphate (SO4)	mg/L				43	7575874	23	2.0	7575874
Turbidity	NTU				1.9	7575572	0.89	0.10	7575572
Conductivity	uS/cm				180	7575328	160	1.0	7575328
Metals									
Dissolved Aluminum (Al)	ug/L				90.8	7583039	110	0.50	7583039
Dissolved Antimony (Sb)	ug/L				2.54	7583039	1.51	0.020	7583039
Dissolved Arsenic (As)	ug/L				1.55	7583039	0.876	0.020	7583039
Dissolved Barium (Ba)	ug/L				19.5	7583039	7.31	0.020	7583039

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPH956			QPH957		QPI040		
Sampling Date		2021/09/02			2021/09/02		2021/09/02		
COC Number		834366-01-01			834366-01-01		834366-02-01		
Sample #		V QE-POR-QTP			MAR HL		LEP HL		
	UNITS	V QE-POR-QTP Lab-Dup	RDL	QC Batch	Mar HL	QC Batch	Lep HL	RDL	QC Batch
Dissolved Beryllium (Be)	ug/L				ND	7583039	ND	0.010	7583039
Dissolved Bismuth (Bi)	ug/L				ND	7583039	ND	0.0050	7583039
Dissolved Boron (B)	ug/L				12.2	7583039	15.1	5.0	7583039
Dissolved Cadmium (Cd)	ug/L				ND	7583039	ND	0.0050	7583039
Dissolved Chromium (Cr)	ug/L				ND	7583039	ND	0.10	7583039
Dissolved Cobalt (Co)	ug/L				0.0110	7583039	0.0116	0.0050	7583039
Dissolved Copper (Cu)	ug/L				0.514	7583039	0.290	0.050	7583039
Dissolved Iron (Fe)	ug/L				ND	7583039	ND	1.0	7583039
Dissolved Lead (Pb)	ug/L				0.0115	7583039	0.0155	0.0050	7583039
Dissolved Lithium (Li)	ug/L				ND	7583039	ND	0.50	7583039
Dissolved Manganese (Mn)	ug/L				22.7	7583039	13.3	0.050	7583039
Dissolved Molybdenum (Mo)	ug/L				10.1	7583039	1.04	0.050	7583039
Dissolved Nickel (Ni)	ug/L				0.028	7583039	0.021	0.020	7583039
Dissolved Phosphorus (P)	ug/L				ND	7583039	ND	2.0	7583039
Dissolved Selenium (Se)	ug/L				0.132	7583039	0.360	0.040	7583039
Dissolved Silicon (Si)	ug/L				3350	7583039	2600	50	7583039
Dissolved Silver (Ag)	ug/L				ND	7583039	ND	0.0050	7583039
Dissolved Strontium (Sr)	ug/L				66.5	7583039	127	0.050	7583039
Dissolved Thallium (Tl)	ug/L				0.0021	7583039	ND	0.0020	7583039
Dissolved Tin (Sn)	ug/L				ND	7583039	ND	0.20	7583039
Dissolved Titanium (Ti)	ug/L				ND	7583039	ND	0.50	7583039
Dissolved Uranium (U)	ug/L				1.77	7583039	3.31	0.0020	7583039
Dissolved Vanadium (V)	ug/L				0.53	7583039	0.61	0.20	7583039
Dissolved Zinc (Zn)	ug/L				1.24	7583039	0.78	0.10	7583039
Dissolved Zirconium (Zr)	ug/L				ND	7583039	ND	0.10	7583039
Dissolved Calcium (Ca)	mg/L				30.1	7583038	22.2	0.050	7583038
Dissolved Magnesium (Mg)	mg/L				2.38	7583038	4.10	0.050	7583038
Dissolved Potassium (K)	mg/L				1.39	7583038	1.60	0.050	7583038
Dissolved Sodium (Na)	mg/L				2.61	7583038	3.28	0.050	7583038
Dissolved Sulphur (S)	mg/L				14.5	7583038	7.7	3.0	7583038

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPI041			QPI042			QPI042		
Sampling Date		2021/09/02			2021/09/02			2021/09/02		
COC Number		834366-02-01			834366-02-01			834366-02-01		
Sample #		FLBK			TRIP BLANK			TRIP BLANK		
	UNITS	**FLBK**	**RDL**	**QC Batch**	**TRIP BLANK**	**RDL**	**QC Batch**	**TRIP BLANK Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	0.110	N/A	7567846	0.00	N/A	7573066			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	5.3	1.0	7567839	ND	1.0	7573062			
Calculated TDS	mg/L	4.0	1.0	7567850	ND	1.0	7573071			
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7567839	ND	1.0	7573062			
Cation Sum	me/L	0.0300	N/A	7567846	0.00	N/A	7573066			
Dissolved Hardness (CaCO3)	mg/L	1.22	0.50	7583037	ND	0.50	7583037			
Ion Balance (% Difference)	%	57.1	N/A	7567844						
Langelier Index (@ 20C)	N/A	-4.36		7567847	NC		7573069			
Langelier Index (@ 4C)	N/A	-4.61		7567848	NC		7573070			
Nitrate (N)	mg/L	ND	0.050	7573350	ND	0.050	7573067			
Saturation pH (@ 20C)	N/A	10.9		7567847	NC		7573069			
Saturation pH (@ 4C)	N/A	11.1		7567848	NC		7573070			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	5.4	5.0	7575863	ND	5.0	7575918	ND	5.0	7575918
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7575872	ND	1.0	7575932	ND	1.0	7575932
Colour	TCU	ND	5.0	7575876	ND	5.0	7575961	ND	5.0	7575961
Nitrate + Nitrite (N)	mg/L	ND	0.050	7575878	ND	0.050	7575968	ND	0.050	7575968
Nitrite (N)	mg/L	ND	0.010	7575880	ND	0.010	7575975	ND	0.010	7575975
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7578017	0.053	0.050	7578017			
Total Organic Carbon (C)	mg/L	3.9	0.50	7578040	ND	0.50	7578040			
Orthophosphate (P)	mg/L	ND	0.010	7575877	ND	0.010	7575964	ND	0.010	7575964
pH	pH	6.53		7575330	6.33		7575330			
Reactive Silica (SiO2)	mg/L	0.50	0.50	7575875	ND	0.50	7575959	ND	0.50	7575959
Dissolved Sulphate (SO4)	mg/L	ND	2.0	7575874	ND	2.0	7575937	ND	2.0	7575937
Turbidity	NTU	2.0	0.10	7575572	0.22	0.10	7575576	0.19	0.10	7575576
Conductivity	uS/cm	3.6	1.0	7575328	ND	1.0	7575328			
Metals										
Dissolved Aluminum (Al)	ug/L				ND	0.50	7583039			
Dissolved Antimony (Sb)	ug/L				ND	0.020	7583039			
Dissolved Arsenic (As)	ug/L				ND	0.020	7583039			
Dissolved Barium (Ba)	ug/L				ND	0.020	7583039			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not detected

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QPI041			QPI042			QPI042		
Sampling Date		2021/09/02			2021/09/02			2021/09/02		
COC Number		834366-02-01			834366-02-01			834366-02-01		
Sample #		FLBK			TRIP BLANK			TRIP BLANK		
	UNITS	**FLBK**	**RDL**	**QC Batch**	**TRIP BLANK**	**RDL**	**QC Batch**	**TRIP BLANK Lab-Dup**	**RDL**	**QC Batch**
Dissolved Beryllium (Be)	ug/L				ND	0.010	7583039			
Dissolved Bismuth (Bi)	ug/L				ND	0.0050	7583039			
Dissolved Boron (B)	ug/L				ND	5.0	7583039			
Dissolved Cadmium (Cd)	ug/L				ND	0.0050	7583039			
Dissolved Chromium (Cr)	ug/L				ND	0.10	7583039			
Dissolved Cobalt (Co)	ug/L				ND	0.0050	7583039			
Dissolved Copper (Cu)	ug/L				ND	0.050	7583039			
Dissolved Iron (Fe)	ug/L				ND	1.0	7583039			
Dissolved Lead (Pb)	ug/L				ND	0.0050	7583039			
Dissolved Lithium (Li)	ug/L				ND	0.50	7583039			
Dissolved Manganese (Mn)	ug/L				ND	0.050	7583039			
Dissolved Molybdenum (Mo)	ug/L				ND	0.050	7583039			
Dissolved Nickel (Ni)	ug/L				ND	0.020	7583039			
Dissolved Phosphorus (P)	ug/L				ND	2.0	7583039			
Dissolved Selenium (Se)	ug/L				ND	0.040	7583039			
Dissolved Silicon (Si)	ug/L				ND	50	7583039			
Dissolved Silver (Ag)	ug/L				ND	0.0050	7583039			
Dissolved Strontium (Sr)	ug/L				ND	0.050	7583039			
Dissolved Thallium (Tl)	ug/L				ND	0.0020	7583039			
Dissolved Tin (Sn)	ug/L				ND	0.20	7583039			
Dissolved Titanium (Ti)	ug/L				ND	0.50	7583039			
Dissolved Uranium (U)	ug/L				ND	0.0020	7583039			
Dissolved Vanadium (V)	ug/L				ND	0.20	7583039			
Dissolved Zinc (Zn)	ug/L				0.28	0.10	7583039			
Dissolved Zirconium (Zr)	ug/L				ND	0.10	7583039			
Dissolved Calcium (Ca)	mg/L	0.431	0.050	7583038	ND	0.050	7583038			
Dissolved Magnesium (Mg)	mg/L	ND	0.050	7583038	ND	0.050	7583038			
Dissolved Potassium (K)	mg/L	0.050	0.050	7583038	ND	0.050	7583038			
Dissolved Sodium (Na)	mg/L	0.134	0.050	7583038	ND	0.050	7583038			
Dissolved Sulphur (S)	mg/L	ND	3.0	7583038	ND	3.0	7583038			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not detected

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RESULTS OF ANALYSES OF WATER

BV Labs ID		QPH948	QPH949	QPH950	QPH951	QPH952		
Sampling Date		2021/09/02	2021/09/02	2021/09/02	2021/09/02	2021/09/02		
COC Number		834366-01-01	834366-01-01	834366-01-01	834366-01-01	834366-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
ELEMENTS								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.0019	7583041
Inorganics								
Fluoride (F-)	mg/L	0.030	0.028	0.025	0.035	0.019	0.010	7583040

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

BV Labs ID		QPH953	QPH954	QPH955	QPH956	QPH957		
Sampling Date		2021/09/02	2021/09/02	2021/09/02	2021/09/02	2021/09/02		
COC Number		834366-01-01	834366-01-01	834366-01-01	834366-01-01	834366-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	V QE-POR-QTP	MAR HL		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**V QE-POR-QTP**	**Mar HL**	**RDL**	**QC Batch**
ELEMENTS								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.0019	7583041
Inorganics								
Fluoride (F-)	mg/L	0.020	0.017	0.018	0.016	0.055	0.010	7583040

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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RESULTS OF ANALYSES OF WATER

BV Labs ID		QPI040			QPI041			QPI042		
Sampling Date		2021/09/02			2021/09/02			2021/09/02		
COC Number		834366-02-01			834366-02-01			834366-02-01		
Sample #		LEP HL			FLBK			TRIP BLANK		
	UNITS	**Lep HL**	**RDL**	**QC Batch**	**FLBK**	**RDL**	**QC Batch**	**TRIP BLANK**	**RDL**	**QC Batch**
ELEMENTS										
Total Mercury (Hg)	ug/L	ND	0.0019	7583041	ND	0.0019	7583041	ND	0.0019	7583041
Inorganics										
Fluoride (F-)	mg/L	0.035	0.010	7583040	0.017	0.010	7583040	0.015	0.010	7583040
Metals										
Dissolved Aluminum (Al)	ug/L				6.47	0.50	7583042			
Dissolved Antimony (Sb)	ug/L				0.943	0.020	7583042			
Dissolved Arsenic (As)	ug/L				0.096	0.020	7583042			
Dissolved Barium (Ba)	ug/L				0.297	0.020	7583042			
Dissolved Beryllium (Be)	ug/L				ND	0.010	7583042			
Dissolved Bismuth (Bi)	ug/L				ND	0.0050	7583042			
Dissolved Boron (B)	ug/L				ND	5.0	7583042			
Dissolved Cadmium (Cd)	ug/L				ND	0.0050	7583042			
Dissolved Chromium (Cr)	ug/L				ND	0.10	7583042			
Dissolved Cobalt (Co)	ug/L				0.0346	0.0050	7583042			
Dissolved Copper (Cu)	ug/L				0.166	0.050	7583042			
Dissolved Iron (Fe)	ug/L				1.6	1.0	7583042			
Dissolved Lead (Pb)	ug/L				0.0099	0.0050	7583042			
Dissolved Lithium (Li)	ug/L				ND	0.50	7583042			
Dissolved Manganese (Mn)	ug/L				6.72	0.050	7583042			
Dissolved Molybdenum (Mo)	ug/L				ND	0.050	7583042			
Dissolved Nickel (Ni)	ug/L				0.061	0.020	7583042			
Dissolved Phosphorus (P)	ug/L				3.0	2.0	7583042			
Dissolved Selenium (Se)	ug/L				ND	0.040	7583042			
Dissolved Silicon (Si)	ug/L				ND	50	7583042			
Dissolved Silver (Ag)	ug/L				ND	0.0050	7583042			
Dissolved Strontium (Sr)	ug/L				0.473	0.050	7583042			
Dissolved Thallium (Tl)	ug/L				ND	0.0020	7583042			
Dissolved Tin (Sn)	ug/L				0.20	0.20	7583042			
Dissolved Titanium (Ti)	ug/L				ND	0.50	7583042			
Dissolved Uranium (U)	ug/L				ND	0.0020	7583042			
Dissolved Vanadium (V)	ug/L				ND	0.20	7583042			
Dissolved Zinc (Zn)	ug/L				4.01	0.10	7583042			
Dissolved Zirconium (Zr)	ug/L				ND	0.10	7583042			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not detected

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.6°C

Sample QPH948 [M AQPOR] : NOX < NO2 : Both values fall within the method uncertainty for duplicates and are likely equivalent. RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QPH949 [M+L SED] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QPH950 [M+L MD] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QPH952 [M QZ-QE-POR-QTP-MIN] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QPH956 [V QE-POR-QTP] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QPI041 [FLBK] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7573818	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2021/09/14		95	%	80 - 120
7573818	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/09/14		106	%	80 - 120
7573818	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/09/14	ND, RDL=5.0		mg/L	
7573818	EMT	RPD	Total Alkalinity (Total as CaCO3)	2021/09/14	4.5		%	20
7573825	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2021/09/14		NC	%	80 - 120
7573825	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/09/14		100	%	80 - 120
7573825	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/09/14	ND, RDL=1.0		mg/L	
7573825	EMT	RPD	Dissolved Chloride (Cl-)	2021/09/14	0.83		%	20
7573831	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2021/09/14		104	%	80 - 120
7573831	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/09/14		108	%	80 - 120
7573831	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/09/14	ND, RDL=2.0		mg/L	
7573831	EMT	RPD	Dissolved Sulphate (SO4)	2021/09/14	6.5		%	20
7573838	EMT	Matrix Spike	Reactive Silica (SiO2)	2021/09/14		93	%	80 - 120
7573838	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/09/14		94	%	80 - 120
7573838	EMT	Method Blank	Reactive Silica (SiO2)	2021/09/14	ND, RDL=0.50		mg/L	
7573838	EMT	RPD	Reactive Silica (SiO2)	2021/09/14	0.97		%	20
7573845	EMT	Spiked Blank	Colour	2021/09/14		104	%	80 - 120
7573845	EMT	Method Blank	Colour	2021/09/14	ND, RDL=5.0		TCU	
7573845	EMT	RPD	Colour	2021/09/14	NC		%	20
7573847	EMT	Matrix Spike	Orthophosphate (P)	2021/09/14		94	%	80 - 120
7573847	EMT	Spiked Blank	Orthophosphate (P)	2021/09/14		100	%	80 - 120
7573847	EMT	Method Blank	Orthophosphate (P)	2021/09/14	ND, RDL=0.010		mg/L	
7573847	EMT	RPD	Orthophosphate (P)	2021/09/14	5.6		%	20
7573860	EMT	Matrix Spike	Nitrate + Nitrite (N)	2021/09/14		77 (1)	%	80 - 120
7573860	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/09/14		81	%	80 - 120
7573860	EMT	Method Blank	Nitrate + Nitrite (N)	2021/09/14	ND, RDL=0.050		mg/L	
7573860	EMT	RPD	Nitrate + Nitrite (N)	2021/09/14	NC		%	20
7573861	EMT	Matrix Spike	Nitrite (N)	2021/09/14		100	%	80 - 120
7573861	EMT	Spiked Blank	Nitrite (N)	2021/09/14		101	%	80 - 120
7573861	EMT	Method Blank	Nitrite (N)	2021/09/14	ND, RDL=0.010		mg/L	
7573861	EMT	RPD	Nitrite (N)	2021/09/14	NC		%	20
7575324	SHW	Spiked Blank	Conductivity	2021/09/14		100	%	80 - 120
7575324	SHW	Method Blank	Conductivity	2021/09/14	ND, RDL=1.0		uS/cm	
7575324	SHW	RPD	Conductivity	2021/09/14	2.2		%	10
7575326	SHW	Spiked Blank	pH	2021/09/14		100	%	97 - 103
7575326	SHW	RPD	pH	2021/09/14	3.2		%	N/A
7575328	SHW	Spiked Blank	Conductivity	2021/09/14		99	%	80 - 120
7575328	SHW	Method Blank	Conductivity	2021/09/14	ND, RDL=1.0		uS/cm	
7575328	SHW	RPD [QPH948-01]	Conductivity	2021/09/14	0.41		%	10
7575330	SHW	Spiked Blank	pH	2021/09/14		100	%	97 - 103
7575330	SHW	RPD [QPH948-01]	pH	2021/09/14	0.32		%	N/A
7575359	NGI	Matrix Spike [QPH956-04]	Total Organic Carbon (C)	2021/09/15		103	%	85 - 115
7575359	NGI	Spiked Blank	Total Organic Carbon (C)	2021/09/15		104	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7575359	NGI	Method Blank	Total Organic Carbon (C)	2021/09/15	ND, RDL=0.50		mg/L	
7575359	NGI	RPD [QPH956-04]	Total Organic Carbon (C)	2021/09/15	1.6		%	15
7575446	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/09/15		103	%	80 - 120
7575446	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/09/14		105	%	80 - 120
7575446	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/09/14	ND, RDL=0.050		mg/L	
7575446	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2021/09/15	NC		%	20
7575462	EMT	Matrix Spike [QPH950-03]	Nitrogen (Ammonia Nitrogen)	2021/09/15		106	%	80 - 120
7575462	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/09/15		106	%	80 - 120
7575462	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/09/15	ND, RDL=0.050		mg/L	
7575462	EMT	RPD [QPH950-03]	Nitrogen (Ammonia Nitrogen)	2021/09/15	NC		%	20
7575571	SHW	QC Standard	Turbidity	2021/09/14		101	%	80 - 120
7575571	SHW	Spiked Blank	Turbidity	2021/09/14		100	%	80 - 120
7575571	SHW	Method Blank	Turbidity	2021/09/14	ND, RDL=0.10		NTU	
7575571	SHW	RPD	Turbidity	2021/09/14	NC		%	20
7575572	SHW	QC Standard	Turbidity	2021/09/14		101	%	80 - 120
7575572	SHW	Spiked Blank	Turbidity	2021/09/14		102	%	80 - 120
7575572	SHW	Method Blank	Turbidity	2021/09/14	ND, RDL=0.10		NTU	
7575572	SHW	RPD	Turbidity	2021/09/14	NC		%	20
7575576	SHW	QC Standard	Turbidity	2021/09/14		100	%	80 - 120
7575576	SHW	Spiked Blank	Turbidity	2021/09/14		100	%	80 - 120
7575576	SHW	Method Blank	Turbidity	2021/09/14	ND, RDL=0.10		NTU	
7575576	SHW	RPD [QPI042-01]	Turbidity	2021/09/14	15		%	20
7575863	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2021/09/15		90	%	80 - 120
7575863	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/09/15		107	%	80 - 120
7575863	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/09/15	ND, RDL=5.0		mg/L	
7575863	EMT	RPD	Total Alkalinity (Total as CaCO3)	2021/09/15	12		%	20
7575872	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2021/09/15		97	%	80 - 120
7575872	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/09/15		99	%	80 - 120
7575872	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/09/15	ND, RDL=1.0		mg/L	
7575872	EMT	RPD	Dissolved Chloride (Cl-)	2021/09/15	2.0		%	20
7575874	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2021/09/15		98	%	80 - 120
7575874	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/09/15		101	%	80 - 120
7575874	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/09/15	ND, RDL=2.0		mg/L	
7575874	EMT	RPD	Dissolved Sulphate (SO4)	2021/09/15	5.3		%	20
7575875	EMT	Matrix Spike	Reactive Silica (SiO2)	2021/09/15		NC	%	80 - 120
7575875	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/09/15		92	%	80 - 120
7575875	EMT	Method Blank	Reactive Silica (SiO2)	2021/09/15	ND, RDL=0.50		mg/L	
7575875	EMT	RPD	Reactive Silica (SiO2)	2021/09/15	1.2		%	20
7575876	EMT	Spiked Blank	Colour	2021/09/15		103	%	80 - 120
7575876	EMT	Method Blank	Colour	2021/09/15	ND, RDL=5.0		TCU	
7575876	EMT	RPD	Colour	2021/09/15	1.3		%	20
7575877	EMT	Matrix Spike	Orthophosphate (P)	2021/09/15		89	%	80 - 120
7575877	EMT	Spiked Blank	Orthophosphate (P)	2021/09/15		98	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7575877	EMT	Method Blank	Orthophosphate (P)	2021/09/15	ND, RDL=0.010		mg/L	
7575877	EMT	RPD	Orthophosphate (P)	2021/09/15	NC		%	20
7575878	EMT	Matrix Spike	Nitrate + Nitrite (N)	2021/09/15		85	%	80 - 120
7575878	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/09/15		93	%	80 - 120
7575878	EMT	Method Blank	Nitrate + Nitrite (N)	2021/09/15	ND, RDL=0.050		mg/L	
7575878	EMT	RPD	Nitrate + Nitrite (N)	2021/09/15	NC		%	20
7575880	EMT	Matrix Spike	Nitrite (N)	2021/09/15		94	%	80 - 120
7575880	EMT	Spiked Blank	Nitrite (N)	2021/09/15		103	%	80 - 120
7575880	EMT	Method Blank	Nitrite (N)	2021/09/15	ND, RDL=0.010		mg/L	
7575880	EMT	RPD	Nitrite (N)	2021/09/15	NC		%	20
7575892	EMT	Matrix Spike [QPH949-01]	Total Alkalinity (Total as CaCO3)	2021/09/15		NC	%	80 - 120
7575892	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/09/15		104	%	80 - 120
7575892	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/09/15	ND, RDL=5.0		mg/L	
7575892	EMT	RPD [QPH949-01]	Total Alkalinity (Total as CaCO3)	2021/09/15	0.074		%	20
7575900	EMT	Matrix Spike [QPH949-01]	Dissolved Chloride (Cl-)	2021/09/15		97	%	80 - 120
7575900	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/09/15		98	%	80 - 120
7575900	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/09/15	ND, RDL=1.0		mg/L	
7575900	EMT	RPD [QPH949-01]	Dissolved Chloride (Cl-)	2021/09/15	5.7		%	20
7575901	EMT	Matrix Spike [QPH949-01]	Dissolved Sulphate (SO4)	2021/09/15		97	%	80 - 120
7575901	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/09/15		99	%	80 - 120
7575901	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/09/15	ND, RDL=2.0		mg/L	
7575901	EMT	RPD [QPH949-01]	Dissolved Sulphate (SO4)	2021/09/15	12		%	20
7575902	EMT	Matrix Spike [QPH949-01]	Reactive Silica (SiO2)	2021/09/15		79 (1)	%	80 - 120
7575902	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/09/15		93	%	80 - 120
7575902	EMT	Method Blank	Reactive Silica (SiO2)	2021/09/15	ND, RDL=0.50		mg/L	
7575902	EMT	RPD [QPH949-01]	Reactive Silica (SiO2)	2021/09/15	5.3		%	20
7575903	EMT	Spiked Blank	Colour	2021/09/15		103	%	80 - 120
7575903	EMT	Method Blank	Colour	2021/09/15	ND, RDL=5.0		TCU	
7575903	EMT	RPD [QPH949-01]	Colour	2021/09/15	NC		%	20
7575905	EMT	Matrix Spike [QPH949-01]	Orthophosphate (P)	2021/09/15		96	%	80 - 120
7575905	EMT	Spiked Blank	Orthophosphate (P)	2021/09/15		102	%	80 - 120
7575905	EMT	Method Blank	Orthophosphate (P)	2021/09/15	ND, RDL=0.010		mg/L	
7575905	EMT	RPD [QPH949-01]	Orthophosphate (P)	2021/09/15	NC		%	20
7575908	EMT	Matrix Spike [QPH949-01]	Nitrate + Nitrite (N)	2021/09/15		91	%	80 - 120
7575908	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/09/15		95	%	80 - 120
7575908	EMT	Method Blank	Nitrate + Nitrite (N)	2021/09/15	ND, RDL=0.050		mg/L	
7575908	EMT	RPD [QPH949-01]	Nitrate + Nitrite (N)	2021/09/15	NC		%	20
7575910	EMT	Matrix Spike [QPH949-01]	Nitrite (N)	2021/09/15		97	%	80 - 120
7575910	EMT	Spiked Blank	Nitrite (N)	2021/09/15		105	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7575910	EMT	Method Blank	Nitrite (N)	2021/09/15	ND, RDL=0.010		mg/L	
7575910	EMT	RPD [QPH949-01]	Nitrite (N)	2021/09/15	6.1		%	20
7575918	EMT	Matrix Spike [QPI042-01]	Total Alkalinity (Total as CaCO3)	2021/09/15		99	%	80 - 120
7575918	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/09/15		104	%	80 - 120
7575918	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/09/15	ND, RDL=5.0		mg/L	
7575918	EMT	RPD [QPI042-01]	Total Alkalinity (Total as CaCO3)	2021/09/15	NC		%	20
7575932	EMT	Matrix Spike [QPI042-01]	Dissolved Chloride (Cl-)	2021/09/15		97	%	80 - 120
7575932	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/09/15		97	%	80 - 120
7575932	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/09/15	ND, RDL=1.0		mg/L	
7575932	EMT	RPD [QPI042-01]	Dissolved Chloride (Cl-)	2021/09/15	NC		%	20
7575937	EMT	Matrix Spike [QPI042-01]	Dissolved Sulphate (SO4)	2021/09/15		98	%	80 - 120
7575937	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/09/15		100	%	80 - 120
7575937	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/09/15	ND, RDL=2.0		mg/L	
7575937	EMT	RPD [QPI042-01]	Dissolved Sulphate (SO4)	2021/09/15	NC		%	20
7575959	EMT	Matrix Spike [QPI042-01]	Reactive Silica (SiO2)	2021/09/15		84	%	80 - 120
7575959	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/09/15		90	%	80 - 120
7575959	EMT	Method Blank	Reactive Silica (SiO2)	2021/09/15	ND, RDL=0.50		mg/L	
7575959	EMT	RPD [QPI042-01]	Reactive Silica (SiO2)	2021/09/15	NC		%	20
7575961	EMT	Spiked Blank	Colour	2021/09/15		101	%	80 - 120
7575961	EMT	Method Blank	Colour	2021/09/15	ND, RDL=5.0		TCU	
7575961	EMT	RPD [QPI042-01]	Colour	2021/09/15	NC		%	20
7575964	EMT	Matrix Spike [QPI042-01]	Orthophosphate (P)	2021/09/15		88	%	80 - 120
7575964	EMT	Spiked Blank	Orthophosphate (P)	2021/09/15		103	%	80 - 120
7575964	EMT	Method Blank	Orthophosphate (P)	2021/09/15	ND, RDL=0.010		mg/L	
7575964	EMT	RPD [QPI042-01]	Orthophosphate (P)	2021/09/15	NC		%	20
7575968	EMT	Matrix Spike [QPI042-01]	Nitrate + Nitrite (N)	2021/09/15		79 (1)	%	80 - 120
7575968	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/09/15		87	%	80 - 120
7575968	EMT	Method Blank	Nitrate + Nitrite (N)	2021/09/15	ND, RDL=0.050		mg/L	
7575968	EMT	RPD [QPI042-01]	Nitrate + Nitrite (N)	2021/09/15	NC		%	20
7575975	EMT	Matrix Spike [QPI042-01]	Nitrite (N)	2021/09/15		92	%	80 - 120
7575975	EMT	Spiked Blank	Nitrite (N)	2021/09/15		106	%	80 - 120
7575975	EMT	Method Blank	Nitrite (N)	2021/09/15	ND, RDL=0.010		mg/L	
7575975	EMT	RPD [QPI042-01]	Nitrite (N)	2021/09/15	NC		%	20
7575978	EMT	Matrix Spike [QPH955-01]	Total Alkalinity (Total as CaCO3)	2021/09/15		NC	%	80 - 120
7575978	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/09/15		100	%	80 - 120
7575978	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/09/15	ND, RDL=5.0		mg/L	
7575978	EMT	RPD [QPH955-01]	Total Alkalinity (Total as CaCO3)	2021/09/15	4.1		%	20
7575980	EMT	Matrix Spike [QPH955-01]	Dissolved Chloride (Cl-)	2021/09/15		91	%	80 - 120
7575980	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/09/15		98	%	80 - 120
7575980	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/09/15	ND, RDL=1.0		mg/L	
7575980	EMT	RPD [QPH955-01]	Dissolved Chloride (Cl-)	2021/09/15	NC		%	20
7575982	EMT	Matrix Spike [QPH955-01]	Dissolved Sulphate (SO4)	2021/09/15		97	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7575982	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/09/15		100	%	80 - 120
7575982	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/09/15	ND, RDL=2.0		mg/L	
7575982	EMT	RPD [QPH955-01]	Dissolved Sulphate (SO4)	2021/09/15	3.4		%	20
7575983	EMT	Matrix Spike [QPH955-01]	Reactive Silica (SiO2)	2021/09/15		74 (1)	%	80 - 120
7575983	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/09/15		87	%	80 - 120
7575983	EMT	Method Blank	Reactive Silica (SiO2)	2021/09/15	ND, RDL=0.50		mg/L	
7575983	EMT	RPD [QPH955-01]	Reactive Silica (SiO2)	2021/09/15	6.7		%	20
7575984	EMT	Spiked Blank	Colour	2021/09/15		103	%	80 - 120
7575984	EMT	Method Blank	Colour	2021/09/15	ND, RDL=5.0		TCU	
7575984	EMT	RPD [QPH955-01]	Colour	2021/09/15	NC		%	20
7575985	EMT	Matrix Spike [QPH955-01]	Orthophosphate (P)	2021/09/15		98	%	80 - 120
7575985	EMT	Spiked Blank	Orthophosphate (P)	2021/09/15		102	%	80 - 120
7575985	EMT	Method Blank	Orthophosphate (P)	2021/09/15	ND, RDL=0.010		mg/L	
7575985	EMT	RPD [QPH955-01]	Orthophosphate (P)	2021/09/15	NC		%	20
7575986	EMT	Matrix Spike [QPH955-01]	Nitrate + Nitrite (N)	2021/09/15		94	%	80 - 120
7575986	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/09/15		85	%	80 - 120
7575986	EMT	Method Blank	Nitrate + Nitrite (N)	2021/09/15	ND, RDL=0.050		mg/L	
7575986	EMT	RPD	Nitrate + Nitrite (N)	2021/09/15	NC		%	20
7575987	EMT	Matrix Spike [QPH955-01]	Nitrite (N)	2021/09/15		92	%	80 - 120
7575987	EMT	Spiked Blank	Nitrite (N)	2021/09/15		100	%	80 - 120
7575987	EMT	Method Blank	Nitrite (N)	2021/09/15	ND, RDL=0.010		mg/L	
7575987	EMT	RPD [QPH955-01]	Nitrite (N)	2021/09/15	NC		%	20
7578017	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/09/15		103	%	80 - 120
7578017	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/09/15		105	%	80 - 120
7578017	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/09/15	ND, RDL=0.050		mg/L	
7578017	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2021/09/15	NC		%	20
7578040	NGI	Matrix Spike	Total Organic Carbon (C)	2021/09/16		100	%	85 - 115
7578040	NGI	Spiked Blank	Total Organic Carbon (C)	2021/09/16		104	%	80 - 120
7578040	NGI	Method Blank	Total Organic Carbon (C)	2021/09/16	ND, RDL=0.50		mg/L	
7578040	NGI	RPD	Total Organic Carbon (C)	2021/09/16	1.2		%	15
7578048	NGI	Matrix Spike	Total Organic Carbon (C)	2021/09/16		104	%	85 - 115
7578048	NGI	Spiked Blank	Total Organic Carbon (C)	2021/09/16		104	%	80 - 120
7578048	NGI	Method Blank	Total Organic Carbon (C)	2021/09/16	ND, RDL=0.50		mg/L	
7578048	NGI	RPD	Total Organic Carbon (C)	2021/09/16	0.21		%	15
7583039	éCG	Matrix Spike [QPH948-02]	Dissolved Aluminum (Al)	2021/09/15		99	%	80 - 120
			Dissolved Antimony (Sb)	2021/09/15		100	%	80 - 120
			Dissolved Arsenic (As)	2021/09/15		99	%	80 - 120
			Dissolved Barium (Ba)	2021/09/15		98	%	80 - 120
			Dissolved Beryllium (Be)	2021/09/15		101	%	80 - 120
			Dissolved Bismuth (Bi)	2021/09/15		96	%	80 - 120
			Dissolved Boron (B)	2021/09/15		104	%	80 - 120
			Dissolved Cadmium (Cd)	2021/09/15		100	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Chromium (Cr)	2021/09/15		96	%	80 - 120
			Dissolved Cobalt (Co)	2021/09/15		100	%	80 - 120
			Dissolved Copper (Cu)	2021/09/15		94	%	80 - 120
			Dissolved Iron (Fe)	2021/09/15		103	%	80 - 120
			Dissolved Lead (Pb)	2021/09/15		97	%	80 - 120
			Dissolved Lithium (Li)	2021/09/15		103	%	80 - 120
			Dissolved Manganese (Mn)	2021/09/15		95	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/09/15		101	%	80 - 120
			Dissolved Nickel (Ni)	2021/09/15		97	%	80 - 120
			Dissolved Phosphorus (P)	2021/09/15		104	%	80 - 120
			Dissolved Selenium (Se)	2021/09/15		97	%	80 - 120
			Dissolved Silicon (Si)	2021/09/15		105	%	80 - 120
			Dissolved Silver (Ag)	2021/09/15		97	%	80 - 120
			Dissolved Strontium (Sr)	2021/09/15		105	%	80 - 120
			Dissolved Thallium (Tl)	2021/09/15		97	%	80 - 120
			Dissolved Tin (Sn)	2021/09/15		99	%	80 - 120
			Dissolved Titanium (Ti)	2021/09/15		101	%	80 - 120
			Dissolved Uranium (U)	2021/09/15		100	%	80 - 120
			Dissolved Vanadium (V)	2021/09/15		98	%	80 - 120
			Dissolved Zinc (Zn)	2021/09/15		100	%	80 - 120
			Dissolved Zirconium (Zr)	2021/09/15		102	%	80 - 120
7583039	éCG	Spiked Blank	Dissolved Aluminum (Al)	2021/09/15		102	%	80 - 120
			Dissolved Antimony (Sb)	2021/09/15		103	%	80 - 120
			Dissolved Arsenic (As)	2021/09/15		101	%	80 - 120
			Dissolved Barium (Ba)	2021/09/15		100	%	80 - 120
			Dissolved Beryllium (Be)	2021/09/15		104	%	80 - 120
			Dissolved Bismuth (Bi)	2021/09/15		95	%	80 - 120
			Dissolved Boron (B)	2021/09/15		101	%	80 - 120
			Dissolved Cadmium (Cd)	2021/09/15		102	%	80 - 120
			Dissolved Chromium (Cr)	2021/09/15		98	%	80 - 120
			Dissolved Cobalt (Co)	2021/09/15		102	%	80 - 120
			Dissolved Copper (Cu)	2021/09/15		96	%	80 - 120
			Dissolved Iron (Fe)	2021/09/15		104	%	80 - 120
			Dissolved Lead (Pb)	2021/09/15		96	%	80 - 120
			Dissolved Lithium (Li)	2021/09/15		108	%	80 - 120
			Dissolved Manganese (Mn)	2021/09/15		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/09/15		100	%	80 - 120
			Dissolved Nickel (Ni)	2021/09/15		100	%	80 - 120
			Dissolved Phosphorus (P)	2021/09/15		107	%	80 - 120
			Dissolved Selenium (Se)	2021/09/15		99	%	80 - 120
			Dissolved Silicon (Si)	2021/09/15		108	%	80 - 120
			Dissolved Silver (Ag)	2021/09/15		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/09/15		97	%	80 - 120
			Dissolved Thallium (Tl)	2021/09/15		94	%	80 - 120
			Dissolved Tin (Sn)	2021/09/15		101	%	80 - 120
			Dissolved Titanium (Ti)	2021/09/15		103	%	80 - 120
			Dissolved Uranium (U)	2021/09/15		98	%	80 - 120
			Dissolved Vanadium (V)	2021/09/15		99	%	80 - 120
			Dissolved Zinc (Zn)	2021/09/15		106	%	80 - 120
			Dissolved Zirconium (Zr)	2021/09/15		101	%	80 - 120
7583039	éCG	Method Blank	Dissolved Aluminum (Al)	2021/09/15	ND, RDL=0.50		ug/L	
			Dissolved Antimony (Sb)	2021/09/15	ND, RDL=0.020		ug/L	

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Arsenic (As)	2021/09/15	ND, RDL=0.020		ug/L	
			Dissolved Barium (Ba)	2021/09/15	ND, RDL=0.020		ug/L	
			Dissolved Beryllium (Be)	2021/09/15	ND, RDL=0.010		ug/L	
			Dissolved Bismuth (Bi)	2021/09/15	ND, RDL=0.0050		ug/L	
			Dissolved Boron (B)	2021/09/15	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2021/09/15	ND, RDL=0.0050		ug/L	
			Dissolved Chromium (Cr)	2021/09/15	ND, RDL=0.10		ug/L	
			Dissolved Cobalt (Co)	2021/09/15	ND, RDL=0.0050		ug/L	
			Dissolved Copper (Cu)	2021/09/15	ND, RDL=0.050		ug/L	
			Dissolved Iron (Fe)	2021/09/15	ND, RDL=1.0		ug/L	
			Dissolved Lead (Pb)	2021/09/15	ND, RDL=0.0050		ug/L	
			Dissolved Lithium (Li)	2021/09/15	ND, RDL=0.50		ug/L	
			Dissolved Manganese (Mn)	2021/09/15	ND, RDL=0.050		ug/L	
			Dissolved Molybdenum (Mo)	2021/09/15	ND, RDL=0.050		ug/L	
			Dissolved Nickel (Ni)	2021/09/15	ND, RDL=0.020		ug/L	
			Dissolved Phosphorus (P)	2021/09/15	ND, RDL=2.0		ug/L	
			Dissolved Selenium (Se)	2021/09/15	ND, RDL=0.040		ug/L	
			Dissolved Silicon (Si)	2021/09/15	ND, RDL=50		ug/L	
			Dissolved Silver (Ag)	2021/09/15	ND, RDL=0.0050		ug/L	
			Dissolved Strontium (Sr)	2021/09/15	ND, RDL=0.050		ug/L	
			Dissolved Thallium (Tl)	2021/09/15	ND, RDL=0.0020		ug/L	
			Dissolved Tin (Sn)	2021/09/15	ND, RDL=0.20		ug/L	
			Dissolved Titanium (Ti)	2021/09/15	ND, RDL=0.50		ug/L	
			Dissolved Uranium (U)	2021/09/15	ND, RDL=0.0020		ug/L	
			Dissolved Vanadium (V)	2021/09/15	ND, RDL=0.20		ug/L	
			Dissolved Zinc (Zn)	2021/09/15	ND, RDL=0.10		ug/L	
			Dissolved Zirconium (Zr)	2021/09/15	ND, RDL=0.10		ug/L	
7583039	éCG	RPD [QPH948-02]	Dissolved Aluminum (Al)	2021/09/15	0.69		%	20
			Dissolved Antimony (Sb)	2021/09/15	0.61		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Arsenic (As)	2021/09/15	1.7		%	20
			Dissolved Barium (Ba)	2021/09/15	2.2		%	20
			Dissolved Beryllium (Be)	2021/09/15	NC		%	20
			Dissolved Bismuth (Bi)	2021/09/15	NC		%	20
			Dissolved Boron (B)	2021/09/15	NC		%	20
			Dissolved Cadmium (Cd)	2021/09/15	NC		%	20
			Dissolved Chromium (Cr)	2021/09/15	NC		%	20
			Dissolved Cobalt (Co)	2021/09/15	NC		%	20
			Dissolved Copper (Cu)	2021/09/15	1.3		%	20
			Dissolved Iron (Fe)	2021/09/15	NC		%	20
			Dissolved Lead (Pb)	2021/09/15	NC		%	20
			Dissolved Lithium (Li)	2021/09/15	NC		%	20
			Dissolved Manganese (Mn)	2021/09/15	0.021		%	20
			Dissolved Molybdenum (Mo)	2021/09/15	6.7		%	20
			Dissolved Nickel (Ni)	2021/09/15	NC		%	20
			Dissolved Phosphorus (P)	2021/09/15	NC		%	20
			Dissolved Selenium (Se)	2021/09/15	NC		%	20
			Dissolved Silicon (Si)	2021/09/15	0.32		%	20
			Dissolved Silver (Ag)	2021/09/15	NC		%	20
			Dissolved Strontium (Sr)	2021/09/15	0.46		%	20
			Dissolved Thallium (Tl)	2021/09/15	NC		%	20
			Dissolved Tin (Sn)	2021/09/15	NC		%	20
			Dissolved Titanium (Ti)	2021/09/15	NC		%	20
			Dissolved Uranium (U)	2021/09/15	0.13		%	20
			Dissolved Vanadium (V)	2021/09/15	NC		%	20
			Dissolved Zinc (Zn)	2021/09/15	1.6		%	20
			Dissolved Zirconium (Zr)	2021/09/15	NC		%	20
7583040	MO5	Matrix Spike	Fluoride (F-)	2021/09/14		96	%	80 - 120
7583040	MO5	Spiked Blank	Fluoride (F-)	2021/09/14		104	%	80 - 120
7583040	MO5	Method Blank	Fluoride (F-)	2021/09/14	0.012, RDL=0.010		mg/L	
7583041	CJY	Matrix Spike	Total Mercury (Hg)	2021/09/15		85	%	80 - 120
7583041	CJY	Spiked Blank	Total Mercury (Hg)	2021/09/15		94	%	80 - 120
7583041	CJY	Method Blank	Total Mercury (Hg)	2021/09/15	ND, RDL=0.0019		ug/L	
7583042	éCG	Spiked Blank	Dissolved Aluminum (Al)	2021/09/16		100	%	80 - 120
			Dissolved Antimony (Sb)	2021/09/16		102	%	80 - 120
			Dissolved Arsenic (As)	2021/09/16		101	%	80 - 120
			Dissolved Barium (Ba)	2021/09/16		98	%	80 - 120
			Dissolved Beryllium (Be)	2021/09/16		101	%	80 - 120
			Dissolved Bismuth (Bi)	2021/09/16		95	%	80 - 120
			Dissolved Boron (B)	2021/09/16		104	%	80 - 120
			Dissolved Cadmium (Cd)	2021/09/16		101	%	80 - 120
			Dissolved Chromium (Cr)	2021/09/16		99	%	80 - 120
			Dissolved Cobalt (Co)	2021/09/16		102	%	80 - 120
			Dissolved Copper (Cu)	2021/09/16		97	%	80 - 120
			Dissolved Iron (Fe)	2021/09/16		100	%	80 - 120
			Dissolved Lead (Pb)	2021/09/16		100	%	80 - 120
			Dissolved Lithium (Li)	2021/09/16		96	%	80 - 120
			Dissolved Manganese (Mn)	2021/09/16		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/09/16		104	%	80 - 120
			Dissolved Nickel (Ni)	2021/09/16		100	%	80 - 120
			Dissolved Phosphorus (P)	2021/09/16		104	%	80 - 120
			Dissolved Selenium (Se)	2021/09/16		105	%	80 - 120
			Dissolved Silicon (Si)	2021/09/16		107	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Silver (Ag)	2021/09/16		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/09/16		96	%	80 - 120
			Dissolved Thallium (Tl)	2021/09/16		95	%	80 - 120
			Dissolved Tin (Sn)	2021/09/16		102	%	80 - 120
			Dissolved Titanium (Ti)	2021/09/16		103	%	80 - 120
			Dissolved Uranium (U)	2021/09/16		100	%	80 - 120
			Dissolved Vanadium (V)	2021/09/16		99	%	80 - 120
			Dissolved Zinc (Zn)	2021/09/16		105	%	80 - 120
			Dissolved Zirconium (Zr)	2021/09/16		101	%	80 - 120
7583042	éCG	Method Blank	Dissolved Aluminum (Al)	2021/09/16	ND, RDL=0.50		ug/L	
			Dissolved Antimony (Sb)	2021/09/16	ND, RDL=0.020		ug/L	
			Dissolved Arsenic (As)	2021/09/16	ND, RDL=0.020		ug/L	
			Dissolved Barium (Ba)	2021/09/16	ND, RDL=0.020		ug/L	
			Dissolved Beryllium (Be)	2021/09/16	ND, RDL=0.010		ug/L	
			Dissolved Bismuth (Bi)	2021/09/16	ND, RDL=0.0050		ug/L	
			Dissolved Boron (B)	2021/09/16	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2021/09/16	ND, RDL=0.0050		ug/L	
			Dissolved Chromium (Cr)	2021/09/16	ND, RDL=0.10		ug/L	
			Dissolved Cobalt (Co)	2021/09/16	ND, RDL=0.0050		ug/L	
			Dissolved Copper (Cu)	2021/09/16	ND, RDL=0.050		ug/L	
			Dissolved Iron (Fe)	2021/09/16	ND, RDL=1.0		ug/L	
			Dissolved Lead (Pb)	2021/09/16	ND, RDL=0.0050		ug/L	
			Dissolved Lithium (Li)	2021/09/16	ND, RDL=0.50		ug/L	
			Dissolved Manganese (Mn)	2021/09/16	ND, RDL=0.050		ug/L	
			Dissolved Molybdenum (Mo)	2021/09/16	ND, RDL=0.050		ug/L	
			Dissolved Nickel (Ni)	2021/09/16	ND, RDL=0.020		ug/L	
			Dissolved Phosphorus (P)	2021/09/16	ND, RDL=2.0		ug/L	
			Dissolved Selenium (Se)	2021/09/16	ND, RDL=0.040		ug/L	
			Dissolved Silicon (Si)	2021/09/16	ND, RDL=50		ug/L	
			Dissolved Silver (Ag)	2021/09/16	ND, RDL=0.0050		ug/L	
			Dissolved Strontium (Sr)	2021/09/16	ND, RDL=0.050		ug/L	
			Dissolved Thallium (Tl)	2021/09/16	ND, RDL=0.0020		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Tin (Sn)	2021/09/16	ND, RDL=0.20		ug/L	
			Dissolved Titanium (Ti)	2021/09/16	ND, RDL=0.50		ug/L	
			Dissolved Uranium (U)	2021/09/16	0.0032, RDL=0.0020 (2)		ug/L	
			Dissolved Vanadium (V)	2021/09/16	ND, RDL=0.20		ug/L	
			Dissolved Zinc (Zn)	2021/09/16	ND, RDL=0.10		ug/L	
			Dissolved Zirconium (Zr)	2021/09/16	ND, RDL=0.10		ug/L	

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Poor spike recovery due to probable sample matrix interference.

(2) Method blank exceeds acceptance limits for U- 2X RDL acceptable for low level metals determination.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

<Original signed by>

Colleen Acker, B.Sc, Scientific Service Specialist

<Original signed by>

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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Your C.O.C. #: 834359-02-01, 834359-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/09/28
Report #: R6830525
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1Q8807
Received: 2021/09/13, 11:08

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	12	N/A	2021/09/21	N/A	SM 23 4500-CO2 D
Alkalinity	12	N/A	2021/09/21	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	12	N/A	2021/09/21	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	12	N/A	2021/09/21	ATL SOP 00020	SM 23 2120C m
Conductance - water	12	N/A	2021/09/20	ATL SOP 00004	SM 23 2510B m
Ion Balance (% Difference)	12	N/A	2021/09/27	N/A	Auto Calc.
Anion and Cation Sum	12	N/A	2021/09/27	N/A	Auto Calc.
Fluoride - Low Level (1)	12	N/A	2021/09/22	AB SOP-00005	SM 23 4500-F C m
Hardness (calculated as CaCO3) (2)	9	N/A	2021/09/23	BBY WI-00033	Auto Calc
Hardness (calculated as CaCO3) (2)	3	N/A	2021/09/24	BBY WI-00033	Auto Calc
Mercury (Total) by CV (2)	12	2021/09/22	2021/09/22	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (2)	9	N/A	2021/09/23	BBY WI-00033	Auto Calc
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (2)	3	N/A	2021/09/24	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved) (2)	9	N/A	2021/09/23	BBY7SOP-00002	EPA 6020B R2 m
Elements by ICPMS Low Level (dissolved) (2)	3	N/A	2021/09/24	BBY7SOP-00002	EPA 6020B R2 m
Nitrogen Ammonia - water	12	N/A	2021/09/21	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	12	N/A	2021/09/21	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	11	N/A	2021/09/21	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrite	1	N/A	2021/09/27	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	12	N/A	2021/09/22	ATL SOP 00018	ASTM D3867-16
pH (3)	12	N/A	2021/09/20	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	12	N/A	2021/09/21	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	12	N/A	2021/09/27	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	12	N/A	2021/09/27	ATL SOP 00049	Auto Calc.
Reactive Silica	12	N/A	2021/09/21	ATL SOP 00022	EPA 366.0 m
Sulphate	12	N/A	2021/09/21	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	12	N/A	2021/09/27	N/A	Auto Calc.
Organic carbon - Total (TOC) (4)	12	N/A	2021/09/23	ATL SOP 00203	SM 23 5310B m
Turbidity	5	N/A	2021/09/20	ATL SOP 00011	EPA 180.1 R2 m
Turbidity	7	N/A	2021/09/21	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

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Your C.O.C. #: 834359-02-01, 834359-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
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CANADA A0L 1K0

Report Date: 2021/09/28
Report #: R6830525
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1Q8807
Received: 2021/09/13, 11:08

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary., 4000-19th Street North-East , Calgary, AB, T2E 6P8
(2) This test was performed by Bureau Veritas Burnaby, 4606 Canada Way , Burnaby, BC, V5G 1K5
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key <Original signed by>

Tyler Travers
Project Manager Assistant
28 Sep 2021 11:09:35

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Maryann Comeau, Customer Experience Supervisor/PM
Email: Maryann.COMEAU@bureauveritas.com
Phone# (902)420-0203 Ext:298

==========

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QRK319	QRK320		QRK321		QRK322		
Sampling Date		2021/09/08	2021/09/08		2021/09/08		2021/09/08		
COC Number		834359-01-01	834359-01-01		834359-01-01		834359-01-01		
Sample #		M AQPOR	M+L SED		M+L MD		M QE-POR		
	UNITS	M AQPOR	M+L SED	QC Batch	M+L MD	QC Batch	M QE-POR	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	1.00	1.11	7583664	1.08	7583664	2.78	N/A	7583664
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	39	51	7583660	47	7583660	54	1.0	7583660
Calculated TDS	mg/L	55	56	7583673	56	7583673	170	1.0	7583673
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	ND	7583660	ND	7583660	ND	1.0	7583660
Cation Sum	me/L	0.920	0.910	7583664	1.00	7583664	2.67	N/A	7583664
Dissolved Hardness (CaCO3)	mg/L	43.7	41.6	7596218	48.3	7596218	129	0.50	7596218
Ion Balance (% Difference)	%	4.17	9.90	7583662	3.85	7583662	2.02	N/A	7583662
Langelier Index (@ 20C)	N/A	-0.647	-0.468	7583670	-0.503	7583670	-0.00300		7583670
Langelier Index (@ 4C)	N/A	-0.898	-0.720	7583671	-0.755	7583671	-0.253		7583671
Nitrate (N)	mg/L	0.066	0.068	7584585	ND	7584585	0.068	0.050	7584585
Saturation pH (@ 20C)	N/A	8.51	8.47	7583670	8.44	7583670	7.95		7583670
Saturation pH (@ 4C)	N/A	8.76	8.72	7583671	8.69	7583671	8.20		7583671
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	39	52	7588071	47	7589503	55	5.0	7588117
Dissolved Chloride (Cl-)	mg/L	ND	ND	7588086	ND	7589505	ND	1.0	7589434
Colour	TCU	ND	ND	7588093	ND	7589509	ND	5.0	7589437
Nitrate + Nitrite (N)	mg/L	0.066	0.086	7588095	0.060	7589511	0.081	0.050	7589439
Nitrite (N)	mg/L	ND	0.018	7588096	0.011	7602079	0.013	0.010	7589440
Nitrogen (Ammonia Nitrogen)	mg/L	0.051	ND	7589555	ND	7589555	ND	0.050	7589555
Total Organic Carbon (C)	mg/L	0.79	1.5	7592414	0.87	7592414	0.73	0.50	7592414
Orthophosphate (P)	mg/L	ND	ND	7588094	ND	7589510	ND	0.010	7589438
pH	pH	7.86	8.00	7587924	7.93	7587924	7.95		7587924
Reactive Silica (SiO2)	mg/L	2.3	3.3	7588092	1.6	7589508	4.5	0.50	7589436
Dissolved Sulphate (SO4)	mg/L	10	3.3	7588088	6.6	7589507	81	2.0	7589435
Turbidity	NTU	4.9	27	7587213	1.6	7589970	5.7	0.10	7589970
Conductivity	uS/cm	94	91	7587921	97	7587921	280	1.0	7587921
Metals									
Dissolved Aluminum (Al)	ug/L	71.7	76.6	7599481	88.5	7599481	74.7	0.50	7599481
Dissolved Antimony (Sb)	ug/L	0.233	0.423	7599481	0.360	7599481	0.897	0.020	7599481
Dissolved Arsenic (As)	ug/L	0.311	0.795	7599481	0.180	7599481	0.627	0.020	7599481
Dissolved Barium (Ba)	ug/L	1.85	1.79	7599481	36.2	7599481	9.91	0.020	7599481
Dissolved Beryllium (Be)	ug/L	ND	ND	7599481	ND	7599481	ND	0.010	7599481
Dissolved Bismuth (Bi)	ug/L	ND	ND	7599481	ND	7599481	ND	0.0050	7599481
Dissolved Boron (B)	ug/L	ND	ND	7599481	ND	7599481	ND	5.0	7599481

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QRK319	QRK320		QRK321		QRK322		
Sampling Date		2021/09/08	2021/09/08		2021/09/08		2021/09/08		
COC Number		834359-01-01	834359-01-01		834359-01-01		834359-01-01		
Sample #		M AQPOR	M+L SED		M+L MD		M QE-POR		
	UNITS	M AQPOR	M+L SED	QC Batch	M+L MD	QC Batch	M QE-POR	RDL	QC Batch
Dissolved Cadmium (Cd)	ug/L	ND	ND	7599481	ND	7599481	ND	0.0050	7599481
Dissolved Chromium (Cr)	ug/L	ND	ND	7599481	ND	7599481	ND	0.10	7599481
Dissolved Cobalt (Co)	ug/L	0.0100	0.0133	7599481	0.0127	7599481	0.0260	0.0050	7599481
Dissolved Copper (Cu)	ug/L	0.433	0.958	7599481	0.568	7599481	0.486	0.050	7599481
Dissolved Iron (Fe)	ug/L	1.4	1.6	7599481	ND	7599481	ND	1.0	7599481
Dissolved Lead (Pb)	ug/L	ND	ND	7599481	ND	7599481	ND	0.0050	7599481
Dissolved Lithium (Li)	ug/L	ND	ND	7599481	ND	7599481	ND	0.50	7599481
Dissolved Manganese (Mn)	ug/L	1.85	27.0	7599481	32.5	7599481	18.5	0.050	7599481
Dissolved Molybdenum (Mo)	ug/L	0.510	0.181	7599481	0.136	7599481	3.97	0.050	7599481
Dissolved Nickel (Ni)	ug/L	0.041	0.048	7599481	0.040	7599481	0.095	0.020	7599481
Dissolved Phosphorus (P)	ug/L	ND	ND	7599481	ND	7599481	ND	2.0	7599481
Dissolved Selenium (Se)	ug/L	0.046	0.045	7599481	0.053	7599481	0.065	0.040	7599481
Dissolved Silicon (Si)	ug/L	992	1530	7599481	667	7599481	2400	50	7599481
Dissolved Silver (Ag)	ug/L	ND	ND	7599481	ND	7599481	ND	0.0050	7599481
Dissolved Strontium (Sr)	ug/L	30.0	54.0	7599481	47.8	7599481	134	0.050	7599481
Dissolved Thallium (Tl)	ug/L	ND	ND	7599481	ND	7599481	ND	0.0020	7599481
Dissolved Tin (Sn)	ug/L	ND	ND	7599481	ND	7599481	ND	0.20	7599481
Dissolved Titanium (Ti)	ug/L	ND	ND	7599481	ND	7599481	ND	0.50	7599481
Dissolved Uranium (U)	ug/L	0.236	1.23	7599481	0.126	7599481	0.566	0.0020	7599481
Dissolved Vanadium (V)	ug/L	ND	0.89	7599481	0.24	7599481	0.55	0.20	7599481
Dissolved Zinc (Zn)	ug/L	1.57	1.22	7599481	2.47	7599481	2.24	0.10	7599481
Dissolved Zirconium (Zr)	ug/L	ND	ND	7599481	ND	7599481	ND	0.10	7599481
Dissolved Calcium (Ca)	mg/L	16.4	13.6	7599480	16.1	7599480	48.5	0.050	7599480
Dissolved Magnesium (Mg)	mg/L	0.652	1.88	7599480	1.97	7599480	1.78	0.050	7599480
Dissolved Potassium (K)	mg/L	0.437	1.41	7599480	0.388	7599480	1.00	0.050	7599480
Dissolved Sodium (Na)	mg/L	0.800	0.875	7599480	0.594	7599480	1.66	0.050	7599480
Dissolved Sulphur (S)	mg/L	3.1	ND	7599480	ND	7599480	26.4	3.0	7599480

RDL = Reportable Detection Limit
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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QRK323	QRK324		QRK325		
Sampling Date		2021/09/08	2021/09/08		2021/09/08		
COC Number		834359-01-01	834359-01-01		834359-01-01		
Sample #		M QZ-QE-POR-QTP-MIN	SZ+V QE-POR		L QZ-TQTP+QZ-QTP		
	UNITS	**M QZ-QE-POR-QTP-MIN**	**SZ+V QE-POR**	**QC Batch**	**L QZ-TQTP+QZ-QTP**	**RDL**	**QC Batch**
Calculated Parameters							
Anion Sum	me/L	0.810	1.18	7583664	0.770	N/A	7583664
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	33	45	7583660	35	1.0	7583660
Calculated TDS	mg/L	43	63	7583673	39	1.0	7583673
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	ND	7583660	ND	1.0	7583660
Cation Sum	me/L	0.720	1.08	7583664	0.650	N/A	7583664
Dissolved Hardness (CaCO3)	mg/L	34.6	51.1	7596218	31.4	0.50	7596218
Ion Balance (% Difference)	%	5.88	4.42	7583662	8.45	N/A	7583662
Langelier Index (@ 20C)	N/A	-0.889	-0.496	7583670	-0.915		7583670
Langelier Index (@ 4C)	N/A	-1.14	-0.747	7583671	-1.17		7583671
Nitrate (N)	mg/L	ND	ND	7584585	0.050	0.050	7584585
Saturation pH (@ 20C)	N/A	8.66	8.43	7583670	8.72		7583670
Saturation pH (@ 4C)	N/A	8.91	8.68	7583671	8.97		7583671
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	33	46	7588071	35	5.0	7588071
Dissolved Chloride (Cl-)	mg/L	ND	ND	7588086	ND	1.0	7588086
Colour	TCU	ND	ND	7588093	ND	5.0	7588093
Nitrate + Nitrite (N)	mg/L	0.050	ND	7588095	0.050	0.050	7588095
Nitrite (N)	mg/L	0.055	ND	7588096	ND	0.010	7588096
Nitrogen (Ammonia Nitrogen)	mg/L	ND	ND	7589555	0.060	0.050	7589555
Total Organic Carbon (C)	mg/L	0.69	0.79	7595201	0.68	0.50	7595201
Orthophosphate (P)	mg/L	ND	ND	7588094	ND	0.010	7588094
pH	pH	7.77	7.93	7587924	7.80		7587924
Reactive Silica (SiO2)	mg/L	1.8	2.4	7588092	1.6	0.50	7588092
Dissolved Sulphate (SO4)	mg/L	6.9	13	7588088	3.4	2.0	7588088
Turbidity	NTU	12	3.1	7587213	0.37	0.10	7589974
Conductivity	uS/cm	73	110	7587921	65	1.0	7587921
Metals							
Dissolved Aluminum (Al)	ug/L	92.8	124	7599481	101	0.50	7599481
Dissolved Antimony (Sb)	ug/L	0.207	0.378	7599481	0.294	0.020	7599481
Dissolved Arsenic (As)	ug/L	0.221	0.397	7599481	0.257	0.020	7599481
Dissolved Barium (Ba)	ug/L	3.43	0.921	7599481	2.53	0.020	7599481
Dissolved Beryllium (Be)	ug/L	ND	ND	7599481	ND	0.010	7599481
Dissolved Bismuth (Bi)	ug/L	ND	ND	7599481	ND	0.0050	7599481
Dissolved Boron (B)	ug/L	ND	ND	7599481	ND	5.0	7599481

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N/A = Not Applicable
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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QRK323	QRK324		QRK325		
Sampling Date		2021/09/08	2021/09/08		2021/09/08		
COC Number		834359-01-01	834359-01-01		834359-01-01		
Sample #		M QZ-QE-POR-QTP-MIN	SZ+V QE-POR		L QZ-TQTP+QZ-QTP		
	UNITS	M QZ-QE-POR-QTP-MIN	SZ+V QE-POR	QC Batch	L QZ-TQTP+QZ-QTP	RDL	QC Batch
Dissolved Cadmium (Cd)	ug/L	ND	ND	7599481	ND	0.0050	7599481
Dissolved Chromium (Cr)	ug/L	ND	ND	7599481	ND	0.10	7599481
Dissolved Cobalt (Co)	ug/L	0.0102	0.0131	7599481	0.0101	0.0050	7599481
Dissolved Copper (Cu)	ug/L	0.466	0.674	7599481	0.591	0.050	7599481
Dissolved Iron (Fe)	ug/L	ND	2.3	7599481	1.3	1.0	7599481
Dissolved Lead (Pb)	ug/L	ND	ND	7599481	0.0053	0.0050	7599481
Dissolved Lithium (Li)	ug/L	ND	ND	7599481	ND	0.50	7599481
Dissolved Manganese (Mn)	ug/L	12.1	4.31	7599481	14.3	0.050	7599481
Dissolved Molybdenum (Mo)	ug/L	0.084	1.84	7599481	ND	0.050	7599481
Dissolved Nickel (Ni)	ug/L	0.032	0.036	7599481	0.057	0.020	7599481
Dissolved Phosphorus (P)	ug/L	ND	ND	7599481	ND	2.0	7599481
Dissolved Selenium (Se)	ug/L	ND	ND	7599481	ND	0.040	7599481
Dissolved Silicon (Si)	ug/L	744	1130	7599481	653	50	7599481
Dissolved Silver (Ag)	ug/L	ND	ND	7599481	ND	0.0050	7599481
Dissolved Strontium (Sr)	ug/L	19.3	17.5	7599481	36.6	0.050	7599481
Dissolved Thallium (Tl)	ug/L	ND	ND	7599481	ND	0.0020	7599481
Dissolved Tin (Sn)	ug/L	ND	ND	7599481	ND	0.20	7599481
Dissolved Titanium (Ti)	ug/L	ND	ND	7599481	ND	0.50	7599481
Dissolved Uranium (U)	ug/L	0.124	0.223	7599481	0.200	0.0020	7599481
Dissolved Vanadium (V)	ug/L	ND	ND	7599481	ND	0.20	7599481
Dissolved Zinc (Zn)	ug/L	1.10	1.06	7599481	1.44	0.10	7599481
Dissolved Zirconium (Zr)	ug/L	ND	ND	7599481	ND	0.10	7599481
Dissolved Calcium (Ca)	mg/L	13.3	17.2	7599480	11.0	0.050	7599480
Dissolved Magnesium (Mg)	mg/L	0.356	1.98	7599480	0.953	0.050	7599480
Dissolved Potassium (K)	mg/L	0.259	0.561	7599480	0.277	0.050	7599480
Dissolved Sodium (Na)	mg/L	0.468	0.932	7599480	0.354	0.050	7599480
Dissolved Sulphur (S)	mg/L	ND	4.2	7599480	ND	3.0	7599480

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QRK326		QRK327		QRK328		
Sampling Date		2021/09/08		2021/09/08		2021/09/08		
COC Number		834359-01-01		834359-01-01		834359-01-01		
Sample #		L TRJ		V QE-POR-QTP		MAR HL		
	UNITS	**L TRJ**	**QC Batch**	**V QE-POR-QTP**	**QC Batch**	**Mar HL**	**RDL**	**QC Batch**
Calculated Parameters								
Anion Sum	me/L	0.960	7583664	0.610	7583664	1.48	N/A	7583664
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	43	7583660	28	7583660	48	1.0	7583660
Calculated TDS	mg/L	50	7583673	30	7583673	84	1.0	7583673
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7583660	ND	7583660	ND	1.0	7583660
Cation Sum	me/L	0.850	7583664	0.520	7583664	1.32	N/A	7583664
Dissolved Hardness (CaCO3)	mg/L	40.2	7596218	25.1	7596218	61.0	0.50	7596218
Ion Balance (% Difference)	%	6.08	7583662	7.96	7583662	5.71	N/A	7583662
Langelier Index (@ 20C)	N/A	-0.706	7583670	-1.25	7583670	-0.456		7583670
Langelier Index (@ 4C)	N/A	-0.958	7583671	-1.50	7583671	-0.707		7583671
Nitrate (N)	mg/L	0.10	7584585	ND	7584585	0.052	0.050	7584585
Saturation pH (@ 20C)	N/A	8.54	7583670	8.89	7583670	8.32		7583670
Saturation pH (@ 4C)	N/A	8.80	7583671	9.14	7583671	8.57		7583671
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	44	7588071	28	7588071	48	5.0	7588071
Dissolved Chloride (Cl-)	mg/L	ND	7588086	ND	7588086	1.0	1.0	7588086
Colour	TCU	ND	7588093	ND	7588093	ND	5.0	7588093
Nitrate + Nitrite (N)	mg/L	0.10	7588095	0.059	7588095	0.052	0.050	7588095
Nitrite (N)	mg/L	ND	7588096	0.020	7588096	ND	0.010	7588096
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7589564	ND	7589564	ND	0.050	7589564
Total Organic Carbon (C)	mg/L	0.83	7595201	0.94	7592414	0.93	0.50	7592414
Orthophosphate (P)	mg/L	ND	7588094	ND	7588094	ND	0.010	7588094
pH	pH	7.84	7587924	7.64	7587924	7.87		7587924
Reactive Silica (SiO2)	mg/L	2.9	7588092	1.0	7588092	5.0	0.50	7588092
Dissolved Sulphate (SO4)	mg/L	3.8	7588088	2.4	7588088	23	2.0	7588088
Turbidity	NTU	2.5	7589974	0.44	7589974	2.7	0.10	7587213
Conductivity	uS/cm	85	7587921	51	7587921	140	1.0	7587921
Metals								
Dissolved Aluminum (Al)	ug/L	147	7599481	59.4	7599481	129	0.50	7599478
Dissolved Antimony (Sb)	ug/L	0.328	7599481	0.184	7599481	1.20	0.020	7599478
Dissolved Arsenic (As)	ug/L	0.374	7599481	0.144	7599481	1.61	0.020	7599478
Dissolved Barium (Ba)	ug/L	51.9	7599481	0.376	7599481	12.7	0.020	7599478
Dissolved Beryllium (Be)	ug/L	ND	7599481	ND	7599481	ND	0.010	7599478
Dissolved Bismuth (Bi)	ug/L	ND	7599481	ND	7599481	ND	0.0050	7599478
Dissolved Boron (B)	ug/L	ND	7599481	ND	7599481	7.9	5.0	7599478

RDL = Reportable Detection Limit
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N/A = Not Applicable
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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QRK326		QRK327		QRK328		
Sampling Date		2021/09/08		2021/09/08		2021/09/08		
COC Number		834359-01-01		834359-01-01		834359-01-01		
Sample #		L TRJ		V QE-POR-QTP		MAR HL		
	UNITS	**L TRJ**	**QC Batch**	**V QE-POR-QTP**	**QC Batch**	**Mar HL**	**RDL**	**QC Batch**
Dissolved Cadmium (Cd)	ug/L	ND	7599481	ND	7599481	0.0073	0.0050	7599478
Dissolved Chromium (Cr)	ug/L	ND	7599481	ND	7599481	ND	0.10	7599478
Dissolved Cobalt (Co)	ug/L	0.0121	7599481	0.0119	7599481	0.0151	0.0050	7599478
Dissolved Copper (Cu)	ug/L	0.804	7599481	0.940	7599481	0.526	0.050	7599478
Dissolved Iron (Fe)	ug/L	1.7	7599481	1.6	7599481	1.6	1.0	7599478
Dissolved Lead (Pb)	ug/L	0.0074	7599481	0.0085	7599481	0.0129	0.0050	7599478
Dissolved Lithium (Li)	ug/L	ND	7599481	ND	7599481	ND	0.50	7599478
Dissolved Manganese (Mn)	ug/L	18.6	7599481	14.5	7599481	27.1	0.050	7599478
Dissolved Molybdenum (Mo)	ug/L	0.091	7599481	0.146	7599481	5.85	0.050	7599478
Dissolved Nickel (Ni)	ug/L	0.072	7599481	0.050	7599481	0.077	0.020	7599478
Dissolved Phosphorus (P)	ug/L	ND	7599481	ND	7599481	ND	2.0	7599478
Dissolved Selenium (Se)	ug/L	ND	7599481	ND	7599481	0.083	0.040	7599478
Dissolved Silicon (Si)	ug/L	1420	7599481	357	7599481	2430	50	7599478
Dissolved Silver (Ag)	ug/L	ND	7599481	ND	7599481	ND	0.0050	7599478
Dissolved Strontium (Sr)	ug/L	68.2	7599481	8.03	7599481	45.1	0.050	7599478
Dissolved Thallium (Tl)	ug/L	ND	7599481	ND	7599481	ND	0.0020	7599478
Dissolved Tin (Sn)	ug/L	ND	7599481	ND	7599481	ND	0.20	7599478
Dissolved Titanium (Ti)	ug/L	ND	7599481	ND	7599481	ND	0.50	7599478
Dissolved Uranium (U)	ug/L	0.391	7599481	0.0915	7599481	1.13	0.0020	7599478
Dissolved Vanadium (V)	ug/L	0.26	7599481	ND	7599481	0.48	0.20	7599478
Dissolved Zinc (Zn)	ug/L	0.92	7599481	1.24	7599481	1.55	0.10	7599478
Dissolved Zirconium (Zr)	ug/L	ND	7599481	ND	7599481	ND	0.10	7599478
Dissolved Calcium (Ca)	mg/L	13.5	7599480	8.98	7599480	21.5	0.050	7599480
Dissolved Magnesium (Mg)	mg/L	1.59	7599480	0.656	7599480	1.80	0.050	7599480
Dissolved Potassium (K)	mg/L	0.650	7599480	0.139	7599480	0.946	0.050	7599480
Dissolved Sodium (Na)	mg/L	0.724	7599480	0.266	7599480	1.71	0.050	7599480
Dissolved Sulphur (S)	mg/L	ND	7599480	ND	7599480	7.7	3.0	7599480

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QRK329		QRK330		
Sampling Date		2021/09/08		2021/09/08		
COC Number		834359-02-01		834359-02-01		
Sample #		LEP HL		FLBK		
	UNITS	Lep HL	QC Batch	FLBK	RDL	QC Batch
Calculated Parameters						
Anion Sum	me/L	1.76	7584672	0.170	N/A	7584672
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	67	7584669	5.0	1.0	7584669
Calculated TDS	mg/L	97	7584695	7.0	1.0	7584695
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7584669	ND	1.0	7584669
Cation Sum	me/L	1.62	7584672	0.0200	N/A	7584672
Dissolved Hardness (CaCO3)	mg/L	72.8	7596218	ND	0.50	7596218
Ion Balance (% Difference)	%	4.14	7584670	79.0	N/A	7584670
Langelier Index (@ 20C)	N/A	-0.116	7584692	-5.31		7584692
Langelier Index (@ 4C)	N/A	-0.367	7584694	-5.57		7584694
Nitrate (N)	mg/L	ND	7584585	ND	0.050	7584585
Saturation pH (@ 20C)	N/A	8.17	7584692	11.4		7584692
Saturation pH (@ 4C)	N/A	8.42	7584694	11.7		7584694
Inorganics						
Total Alkalinity (Total as CaCO3)	mg/L	67	7588117	5.0	5.0	7589503
Dissolved Chloride (Cl-)	mg/L	1.1	7589434	ND	1.0	7589505
Colour	TCU	ND	7589437	ND	5.0	7589509
Nitrate + Nitrite (N)	mg/L	0.058	7589439	ND	0.050	7589511
Nitrite (N)	mg/L	0.011	7589440	ND	0.010	7589512
Nitrogen (Ammonia Nitrogen)	mg/L	0.054	7589564	ND	0.050	7589564
Total Organic Carbon (C)	mg/L	1.2	7592414	1.2	0.50	7592414
Orthophosphate (P)	mg/L	ND	7589438	ND	0.010	7589510
pH	pH	8.05	7587924	6.10		7587924
Reactive Silica (SiO2)	mg/L	6.1	7589436	ND	0.50	7589508
Dissolved Sulphate (SO4)	mg/L	18	7589435	3.2	2.0	7589507
Turbidity	NTU	7.4	7589974	1.8	0.10	7589974
Conductivity	uS/cm	160	7587921	2.6	1.0	7587921
Metals						
Dissolved Aluminum (Al)	ug/L	105	7599478	6.66	0.50	7599478
Dissolved Antimony (Sb)	ug/L	1.12	7599478	0.418	0.020	7599478
Dissolved Arsenic (As)	ug/L	0.739	7599478	0.051	0.020	7599478
Dissolved Barium (Ba)	ug/L	7.03	7599478	0.234	0.020	7599478
Dissolved Beryllium (Be)	ug/L	ND	7599478	ND	0.010	7599478
Dissolved Bismuth (Bi)	ug/L	ND	7599478	ND	0.0050	7599478

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N/A = Not Applicable
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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

BV Labs ID		QRK329		QRK330		
Sampling Date		2021/09/08		2021/09/08		
COC Number		834359-02-01		834359-02-01		
Sample #		LEP HL		FLBK		
	UNITS	Lep HL	QC Batch	FLBK	RDL	QC Batch
Dissolved Boron (B)	ug/L	12.0	7599478	ND	5.0	7599478
Dissolved Cadmium (Cd)	ug/L	ND	7599478	0.0056	0.0050	7599478
Dissolved Chromium (Cr)	ug/L	0.10	7599478	ND	0.10	7599478
Dissolved Cobalt (Co)	ug/L	0.0168	7599478	0.0481	0.0050	7599478
Dissolved Copper (Cu)	ug/L	0.443	7599478	0.257	0.050	7599478
Dissolved Iron (Fe)	ug/L	1.4	7599478	4.4	1.0	7599478
Dissolved Lead (Pb)	ug/L	0.0276	7599478	0.0282	0.0050	7599478
Dissolved Lithium (Li)	ug/L	ND	7599478	ND	0.50	7599478
Dissolved Manganese (Mn)	ug/L	24.7	7599478	4.57	0.050	7599478
Dissolved Molybdenum (Mo)	ug/L	0.598	7599478	ND	0.050	7599478
Dissolved Nickel (Ni)	ug/L	0.057	7599478	0.055	0.020	7599478
Dissolved Phosphorus (P)	ug/L	ND	7599478	3.3	2.0	7599478
Dissolved Selenium (Se)	ug/L	0.285	7599478	ND	0.040	7599478
Dissolved Silicon (Si)	ug/L	2710	7599478	ND	50	7599478
Dissolved Silver (Ag)	ug/L	ND	7599478	ND	0.0050	7599478
Dissolved Strontium (Sr)	ug/L	125	7599478	0.315	0.050	7599478
Dissolved Thallium (Tl)	ug/L	ND	7599478	ND	0.0020	7599478
Dissolved Tin (Sn)	ug/L	ND	7599478	ND	0.20	7599478
Dissolved Titanium (Ti)	ug/L	ND	7599478	ND	0.50	7599478
Dissolved Uranium (U)	ug/L	2.92	7599478	0.0046	0.0020	7599478
Dissolved Vanadium (V)	ug/L	0.62	7599478	ND	0.20	7599478
Dissolved Zinc (Zn)	ug/L	1.20	7599478	3.56	0.10	7599478
Dissolved Zirconium (Zr)	ug/L	ND	7599478	ND	0.10	7599478
Dissolved Calcium (Ca)	mg/L	22.4	7599480	0.141	0.050	7599480
Dissolved Magnesium (Mg)	mg/L	4.10	7599480	ND	0.050	7599480
Dissolved Potassium (K)	mg/L	1.51	7599480	0.066	0.050	7599480
Dissolved Sodium (Na)	mg/L	2.85	7599480	0.145	0.050	7599480
Dissolved Sulphur (S)	mg/L	5.7	7599480	ND	3.0	7599480

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RESULTS OF ANALYSES OF WATER

BV Labs ID		QRK319	QRK320	QRK321	QRK322	QRK323		
Sampling Date		2021/09/08	2021/09/08	2021/09/08	2021/09/08	2021/09/08		
COC Number		834359-01-01	834359-01-01	834359-01-01	834359-01-01	834359-01-01		
Sample #		M AQPOR	M+L SED	M+L MD	M QE-POR	M QZ-QE-POR-QTP-MIN		
	UNITS	**M AQPOR**	**M+L SED**	**M+L MD**	**M QE-POR**	**M QZ-QE-POR-QTP-MIN**	**RDL**	**QC Batch**
ELEMENTS								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.0019	7599482
Inorganics								
Fluoride (F-)	mg/L	0.011	0.020	0.011	0.027	ND	0.010	7600310

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

BV Labs ID		QRK324	QRK325	QRK326			QRK326		
Sampling Date		2021/09/08	2021/09/08	2021/09/08			2021/09/08		
COC Number		834359-01-01	834359-01-01	834359-01-01			834359-01-01		
Sample #		SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ			L TRJ		
	UNITS	**SZ+V QE-POR**	**L QZ-TQTP+QZ-QTP**	**L TRJ**	**RDL**	**QC Batch**	**L TRJ Lab-Dup**	**RDL**	**QC Batch**
ELEMENTS									
Total Mercury (Hg)	ug/L	ND	ND	ND	0.0019	7599482			
Inorganics									
Fluoride (F-)	mg/L	0.011	ND	ND	0.010	7600310	ND	0.010	7600310

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

BV Labs ID		QRK327	QRK328	QRK329	QRK330		
Sampling Date		2021/09/08	2021/09/08	2021/09/08	2021/09/08		
COC Number		834359-01-01	834359-01-01	834359-02-01	834359-02-01		
Sample #		V QE-POR-QTP	MAR HL	LEP HL	FLBK		
	UNITS	**V QE-POR-QTP**	**Mar HL**	**Lep HL**	**FLBK**	**RDL**	**QC Batch**
ELEMENTS							
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	0.0019	7599482
Inorganics							
Fluoride (F-)	mg/L	ND	0.028	0.025	ND	0.010	7600310

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.5°C

Sample QRK320 [M+L SED] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QRK323 [M QZ-QE-POR-QTP-MIN] : NOX < NO2 : Both values fall within the method uncertainty for duplicates and are likely equivalent. RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QRK325 [L QZ-TQTP+QZ-QTP] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QRK326 [L TRJ] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QRK327 [V QE-POR-QTP] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QRK328 [Mar HL] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample QRK330 [FLBK] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7587213	SHW	QC Standard	Turbidity	2021/09/20		104	%	80 - 120
7587213	SHW	Spiked Blank	Turbidity	2021/09/20		105	%	80 - 120
7587213	SHW	Method Blank	Turbidity	2021/09/20	ND, RDL=0.10		NTU	
7587213	SHW	RPD	Turbidity	2021/09/20	NC		%	20
7587921	SHW	Spiked Blank	Conductivity	2021/09/20		100	%	80 - 120
7587921	SHW	Method Blank	Conductivity	2021/09/20	ND, RDL=1.0		uS/cm	
7587921	SHW	RPD	Conductivity	2021/09/20	0.45		%	10
7587924	SHW	Spiked Blank	pH	2021/09/20		100	%	97 - 103
7587924	SHW	RPD	pH	2021/09/20	0.78		%	N/A
7588071	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2021/09/21		NC	%	80 - 120
7588071	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/09/22		104	%	80 - 120
7588071	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/09/21	ND, RDL=5.0		mg/L	
7588071	EMT	RPD	Total Alkalinity (Total as CaCO3)	2021/09/21	1.9		%	20
7588086	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2021/09/21		NC	%	80 - 120
7588086	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/09/21		100	%	80 - 120
7588086	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/09/21	ND, RDL=1.0		mg/L	
7588086	EMT	RPD	Dissolved Chloride (Cl-)	2021/09/21	0.45		%	20
7588088	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2021/09/21		NC	%	80 - 120
7588088	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/09/21		102	%	80 - 120
7588088	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/09/21	ND, RDL=2.0		mg/L	
7588088	EMT	RPD	Dissolved Sulphate (SO4)	2021/09/21	1.3		%	20
7588092	EMT	Matrix Spike	Reactive Silica (SiO2)	2021/09/21		NC	%	80 - 120
7588092	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/09/21		95	%	80 - 120
7588092	EMT	Method Blank	Reactive Silica (SiO2)	2021/09/21	ND, RDL=0.50		mg/L	
7588092	EMT	RPD	Reactive Silica (SiO2)	2021/09/21	1.3		%	20
7588093	EMT	Spiked Blank	Colour	2021/09/21		109	%	80 - 120
7588093	EMT	Method Blank	Colour	2021/09/21	ND, RDL=5.0		TCU	
7588093	EMT	RPD	Colour	2021/09/21	16		%	20
7588094	EMT	Matrix Spike	Orthophosphate (P)	2021/09/21		94	%	80 - 120
7588094	EMT	Spiked Blank	Orthophosphate (P)	2021/09/21		92	%	80 - 120
7588094	EMT	Method Blank	Orthophosphate (P)	2021/09/21	ND, RDL=0.010		mg/L	
7588094	EMT	RPD	Orthophosphate (P)	2021/09/21	NC		%	20
7588095	EMT	Matrix Spike	Nitrate + Nitrite (N)	2021/09/21		89	%	80 - 120
7588095	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/09/21		87	%	80 - 120
7588095	EMT	Method Blank	Nitrate + Nitrite (N)	2021/09/21	ND, RDL=0.050		mg/L	
7588095	EMT	RPD	Nitrate + Nitrite (N)	2021/09/21	1.7		%	20
7588096	EMT	Matrix Spike	Nitrite (N)	2021/09/21		102	%	80 - 120
7588096	EMT	Spiked Blank	Nitrite (N)	2021/09/21		104	%	80 - 120
7588096	EMT	Method Blank	Nitrite (N)	2021/09/21	ND, RDL=0.010		mg/L	
7588096	EMT	RPD	Nitrite (N)	2021/09/21	NC		%	20
7588117	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2021/09/21		NC	%	80 - 120
7588117	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/09/21		108	%	80 - 120
7588117	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/09/21	ND, RDL=5.0		mg/L	
7588117	EMT	RPD	Total Alkalinity (Total as CaCO3)	2021/09/21	4.2		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7589434	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2021/09/21		98	%	80 - 120
7589434	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/09/21		99	%	80 - 120
7589434	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/09/21	ND, RDL=1.0		mg/L	
7589434	EMT	RPD	Dissolved Chloride (Cl-)	2021/09/21	3.0		%	20
7589435	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2021/09/21		94	%	80 - 120
7589435	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/09/21		101	%	80 - 120
7589435	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/09/21	ND, RDL=2.0		mg/L	
7589435	EMT	RPD	Dissolved Sulphate (SO4)	2021/09/21	NC		%	20
7589436	EMT	Matrix Spike	Reactive Silica (SiO2)	2021/09/21		NC	%	80 - 120
7589436	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/09/21		94	%	80 - 120
7589436	EMT	Method Blank	Reactive Silica (SiO2)	2021/09/21	ND, RDL=0.50		mg/L	
7589436	EMT	RPD	Reactive Silica (SiO2)	2021/09/21	0.11		%	20
7589437	EMT	Spiked Blank	Colour	2021/09/21		102	%	80 - 120
7589437	EMT	Method Blank	Colour	2021/09/21	ND, RDL=5.0		TCU	
7589437	EMT	RPD	Colour	2021/09/21	NC		%	20
7589438	EMT	Matrix Spike	Orthophosphate (P)	2021/09/21		94	%	80 - 120
7589438	EMT	Spiked Blank	Orthophosphate (P)	2021/09/21		99	%	80 - 120
7589438	EMT	Method Blank	Orthophosphate (P)	2021/09/21	ND, RDL=0.010		mg/L	
7589438	EMT	RPD	Orthophosphate (P)	2021/09/21	NC		%	20
7589439	EMT	Matrix Spike	Nitrate + Nitrite (N)	2021/09/21		96	%	80 - 120
7589439	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/09/21		102	%	80 - 120
7589439	EMT	Method Blank	Nitrate + Nitrite (N)	2021/09/21	ND, RDL=0.050		mg/L	
7589439	EMT	RPD	Nitrate + Nitrite (N)	2021/09/21	0.20		%	20
7589440	EMT	Matrix Spike	Nitrite (N)	2021/09/21		101	%	80 - 120
7589440	EMT	Spiked Blank	Nitrite (N)	2021/09/21		103	%	80 - 120
7589440	EMT	Method Blank	Nitrite (N)	2021/09/21	ND, RDL=0.010		mg/L	
7589440	EMT	RPD	Nitrite (N)	2021/09/21	NC		%	20
7589503	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2021/09/21		NC	%	80 - 120
7589503	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/09/21		107	%	80 - 120
7589503	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/09/21	ND, RDL=5.0		mg/L	
7589503	EMT	RPD	Total Alkalinity (Total as CaCO3)	2021/09/21	1.2		%	20
7589505	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2021/09/21		93	%	80 - 120
7589505	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/09/21		100	%	80 - 120
7589505	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/09/21	ND, RDL=1.0		mg/L	
7589505	EMT	RPD	Dissolved Chloride (Cl-)	2021/09/21	6.7		%	20
7589507	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2021/09/21		96	%	80 - 120
7589507	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/09/21		104	%	80 - 120
7589507	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/09/21	ND, RDL=2.0		mg/L	
7589507	EMT	RPD	Dissolved Sulphate (SO4)	2021/09/21	3.3		%	20
7589508	EMT	Matrix Spike	Reactive Silica (SiO2)	2021/09/21		81	%	80 - 120
7589508	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/09/21		97	%	80 - 120
7589508	EMT	Method Blank	Reactive Silica (SiO2)	2021/09/21	ND, RDL=0.50		mg/L	
7589508	EMT	RPD	Reactive Silica (SiO2)	2021/09/21	0.96		%	20
7589509	EMT	Spiked Blank	Colour	2021/09/21		100	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7589509	EMT	Method Blank	Colour	2021/09/21	ND, RDL=5.0		TCU	
7589509	EMT	RPD	Colour	2021/09/21	7.1		%	20
7589510	EMT	Matrix Spike	Orthophosphate (P)	2021/09/21		88	%	80 - 120
7589510	EMT	Spiked Blank	Orthophosphate (P)	2021/09/21		100	%	80 - 120
7589510	EMT	Method Blank	Orthophosphate (P)	2021/09/21	ND, RDL=0.010		mg/L	
7589510	EMT	RPD	Orthophosphate (P)	2021/09/21	NC		%	20
7589511	EMT	Matrix Spike	Nitrate + Nitrite (N)	2021/09/21		85	%	80 - 120
7589511	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/09/21		88	%	80 - 120
7589511	EMT	Method Blank	Nitrate + Nitrite (N)	2021/09/21	ND, RDL=0.050		mg/L	
7589511	EMT	RPD	Nitrate + Nitrite (N)	2021/09/21	17		%	20
7589512	EMT	Matrix Spike	Nitrite (N)	2021/09/21		84	%	80 - 120
7589512	EMT	Spiked Blank	Nitrite (N)	2021/09/21		105	%	80 - 120
7589512	EMT	Method Blank	Nitrite (N)	2021/09/21	ND, RDL=0.010		mg/L	
7589512	EMT	RPD	Nitrite (N)	2021/09/21	NC		%	20
7589555	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/09/21		90	%	80 - 120
7589555	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/09/21		99	%	80 - 120
7589555	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/09/21	ND, RDL=0.050		mg/L	
7589555	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2021/09/21	NC		%	20
7589564	EMT	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/09/21		97	%	80 - 120
7589564	EMT	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/09/21		101	%	80 - 120
7589564	EMT	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/09/21	ND, RDL=0.050		mg/L	
7589564	EMT	RPD	Nitrogen (Ammonia Nitrogen)	2021/09/21	NC		%	20
7589970	SHW	QC Standard	Turbidity	2021/09/21		102	%	80 - 120
7589970	SHW	Spiked Blank	Turbidity	2021/09/21		104	%	80 - 120
7589970	SHW	Method Blank	Turbidity	2021/09/21	ND, RDL=0.10		NTU	
7589970	SHW	RPD	Turbidity	2021/09/21	NC		%	20
7589974	SHW	QC Standard	Turbidity	2021/09/21		101	%	80 - 120
7589974	SHW	Spiked Blank	Turbidity	2021/09/21		104	%	80 - 120
7589974	SHW	Method Blank	Turbidity	2021/09/21	ND, RDL=0.10		NTU	
7589974	SHW	RPD	Turbidity	2021/09/21	11		%	20
7592414	NGI	Matrix Spike	Total Organic Carbon (C)	2021/09/23		99	%	85 - 115
7592414	NGI	Spiked Blank	Total Organic Carbon (C)	2021/09/23		96	%	80 - 120
7592414	NGI	Method Blank	Total Organic Carbon (C)	2021/09/23	ND, RDL=0.50		mg/L	
7592414	NGI	RPD	Total Organic Carbon (C)	2021/09/23	0.52		%	15
7595201	NGI	Matrix Spike	Total Organic Carbon (C)	2021/09/23		98	%	85 - 115
7595201	NGI	Spiked Blank	Total Organic Carbon (C)	2021/09/23		96	%	80 - 120
7595201	NGI	Method Blank	Total Organic Carbon (C)	2021/09/23	ND, RDL=0.50		mg/L	
7595201	NGI	RPD	Total Organic Carbon (C)	2021/09/23	0.41		%	15
7599478	éCG	Matrix Spike	Dissolved Aluminum (Al)	2021/09/24		NC	%	80 - 120
			Dissolved Aluminum (Al)	2021/09/24		NC	%	80 - 120
			Dissolved Antimony (Sb)	2021/09/24		96	%	80 - 120
			Dissolved Antimony (Sb)	2021/09/24		96	%	80 - 120
			Dissolved Arsenic (As)	2021/09/24		95	%	80 - 120
			Dissolved Arsenic (As)	2021/09/24		95	%	80 - 120
			Dissolved Barium (Ba)	2021/09/24		91	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Barium (Ba)	2021/09/24		91	%	80 - 120
			Dissolved Beryllium (Be)	2021/09/24		89	%	80 - 120
			Dissolved Beryllium (Be)	2021/09/24		89	%	80 - 120
			Dissolved Bismuth (Bi)	2021/09/24		94	%	80 - 120
			Dissolved Bismuth (Bi)	2021/09/24		94	%	80 - 120
			Dissolved Boron (B)	2021/09/24		95	%	80 - 120
			Dissolved Boron (B)	2021/09/24		95	%	80 - 120
			Dissolved Cadmium (Cd)	2021/09/24		94	%	80 - 120
			Dissolved Cadmium (Cd)	2021/09/24		94	%	80 - 120
			Dissolved Chromium (Cr)	2021/09/24		92	%	80 - 120
			Dissolved Chromium (Cr)	2021/09/24		92	%	80 - 120
			Dissolved Cobalt (Co)	2021/09/24		NC	%	80 - 120
			Dissolved Cobalt (Co)	2021/09/24		NC	%	80 - 120
			Dissolved Copper (Cu)	2021/09/24		NC	%	80 - 120
			Dissolved Copper (Cu)	2021/09/24		NC	%	80 - 120
			Dissolved Iron (Fe)	2021/09/24		NC	%	80 - 120
			Dissolved Iron (Fe)	2021/09/24		NC	%	80 - 120
			Dissolved Lead (Pb)	2021/09/24		98	%	80 - 120
			Dissolved Lead (Pb)	2021/09/24		98	%	80 - 120
			Dissolved Lithium (Li)	2021/09/24		87	%	80 - 120
			Dissolved Lithium (Li)	2021/09/24		87	%	80 - 120
			Dissolved Manganese (Mn)	2021/09/24		NC	%	80 - 120
			Dissolved Manganese (Mn)	2021/09/24		NC	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/09/24		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/09/24		99	%	80 - 120
			Dissolved Nickel (Ni)	2021/09/24		NC	%	80 - 120
			Dissolved Nickel (Ni)	2021/09/24		NC	%	80 - 120
			Dissolved Phosphorus (P)	2021/09/24		98	%	80 - 120
			Dissolved Phosphorus (P)	2021/09/24		98	%	80 - 120
			Dissolved Selenium (Se)	2021/09/24		95	%	80 - 120
			Dissolved Selenium (Se)	2021/09/24		95	%	80 - 120
			Dissolved Silicon (Si)	2021/09/24		NC	%	80 - 120
			Dissolved Silicon (Si)	2021/09/24		NC	%	80 - 120
			Dissolved Silver (Ag)	2021/09/24		91	%	80 - 120
			Dissolved Silver (Ag)	2021/09/24		91	%	80 - 120
			Dissolved Strontium (Sr)	2021/09/24		NC	%	80 - 120
			Dissolved Strontium (Sr)	2021/09/24		NC	%	80 - 120
			Dissolved Thallium (Tl)	2021/09/24		97	%	80 - 120
			Dissolved Thallium (Tl)	2021/09/24		97	%	80 - 120
			Dissolved Tin (Sn)	2021/09/24		93	%	80 - 120
			Dissolved Tin (Sn)	2021/09/24		93	%	80 - 120
			Dissolved Titanium (Ti)	2021/09/24		99	%	80 - 120
			Dissolved Titanium (Ti)	2021/09/24		99	%	80 - 120
			Dissolved Uranium (U)	2021/09/24		104	%	80 - 120
			Dissolved Uranium (U)	2021/09/24		104	%	80 - 120
			Dissolved Vanadium (V)	2021/09/24		96	%	80 - 120
			Dissolved Vanadium (V)	2021/09/24		96	%	80 - 120
			Dissolved Zinc (Zn)	2021/09/24		NC	%	80 - 120
			Dissolved Zinc (Zn)	2021/09/24		NC	%	80 - 120
			Dissolved Zirconium (Zr)	2021/09/24		99	%	80 - 120
			Dissolved Zirconium (Zr)	2021/09/24		99	%	80 - 120
7599478	éCG	Spiked Blank	Dissolved Aluminum (Al)	2021/09/24		102	%	80 - 120
			Dissolved Aluminum (Al)	2021/09/24		102	%	80 - 120
			Dissolved Antimony (Sb)	2021/09/24		100	%	80 - 120
			Dissolved Antimony (Sb)	2021/09/24		100	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Arsenic (As)	2021/09/24		100	%	80 - 120
			Dissolved Arsenic (As)	2021/09/24		100	%	80 - 120
			Dissolved Barium (Ba)	2021/09/24		100	%	80 - 120
			Dissolved Barium (Ba)	2021/09/24		100	%	80 - 120
			Dissolved Beryllium (Be)	2021/09/24		99	%	80 - 120
			Dissolved Beryllium (Be)	2021/09/24		99	%	80 - 120
			Dissolved Bismuth (Bi)	2021/09/24		100	%	80 - 120
			Dissolved Bismuth (Bi)	2021/09/24		100	%	80 - 120
			Dissolved Boron (B)	2021/09/24		104	%	80 - 120
			Dissolved Boron (B)	2021/09/24		104	%	80 - 120
			Dissolved Cadmium (Cd)	2021/09/24		101	%	80 - 120
			Dissolved Cadmium (Cd)	2021/09/24		101	%	80 - 120
			Dissolved Chromium (Cr)	2021/09/24		99	%	80 - 120
			Dissolved Chromium (Cr)	2021/09/24		99	%	80 - 120
			Dissolved Cobalt (Co)	2021/09/24		98	%	80 - 120
			Dissolved Cobalt (Co)	2021/09/24		98	%	80 - 120
			Dissolved Copper (Cu)	2021/09/24		99	%	80 - 120
			Dissolved Copper (Cu)	2021/09/24		99	%	80 - 120
			Dissolved Iron (Fe)	2021/09/24		104	%	80 - 120
			Dissolved Iron (Fe)	2021/09/24		104	%	80 - 120
			Dissolved Lead (Pb)	2021/09/24		103	%	80 - 120
			Dissolved Lead (Pb)	2021/09/24		103	%	80 - 120
			Dissolved Lithium (Li)	2021/09/24		95	%	80 - 120
			Dissolved Lithium (Li)	2021/09/24		95	%	80 - 120
			Dissolved Manganese (Mn)	2021/09/24		100	%	80 - 120
			Dissolved Manganese (Mn)	2021/09/24		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/09/24		103	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/09/24		103	%	80 - 120
			Dissolved Nickel (Ni)	2021/09/24		101	%	80 - 120
			Dissolved Nickel (Ni)	2021/09/24		101	%	80 - 120
			Dissolved Phosphorus (P)	2021/09/24		103	%	80 - 120
			Dissolved Phosphorus (P)	2021/09/24		103	%	80 - 120
			Dissolved Selenium (Se)	2021/09/24		99	%	80 - 120
			Dissolved Selenium (Se)	2021/09/24		99	%	80 - 120
			Dissolved Silicon (Si)	2021/09/24		112	%	80 - 120
			Dissolved Silicon (Si)	2021/09/24		112	%	80 - 120
			Dissolved Silver (Ag)	2021/09/24		98	%	80 - 120
			Dissolved Silver (Ag)	2021/09/24		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/09/24		96	%	80 - 120
			Dissolved Strontium (Sr)	2021/09/24		96	%	80 - 120
			Dissolved Thallium (Tl)	2021/09/24		99	%	80 - 120
			Dissolved Thallium (Tl)	2021/09/24		99	%	80 - 120
			Dissolved Tin (Sn)	2021/09/24		102	%	80 - 120
			Dissolved Tin (Sn)	2021/09/24		102	%	80 - 120
			Dissolved Titanium (Ti)	2021/09/24		104	%	80 - 120
			Dissolved Titanium (Ti)	2021/09/24		104	%	80 - 120
			Dissolved Uranium (U)	2021/09/24		106	%	80 - 120
			Dissolved Uranium (U)	2021/09/24		106	%	80 - 120
			Dissolved Vanadium (V)	2021/09/24		101	%	80 - 120
			Dissolved Vanadium (V)	2021/09/24		101	%	80 - 120
			Dissolved Zinc (Zn)	2021/09/24		103	%	80 - 120
			Dissolved Zinc (Zn)	2021/09/24		103	%	80 - 120
			Dissolved Zirconium (Zr)	2021/09/24		100	%	80 - 120
			Dissolved Zirconium (Zr)	2021/09/24		100	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7599478	éCG	Method Blank	Dissolved Aluminum (Al)	2021/09/24	ND, RDL=0.50		ug/L	
			Dissolved Aluminum (Al)	2021/09/24	ND, RDL=0.50		ug/L	
			Dissolved Antimony (Sb)	2021/09/24	ND, RDL=0.020		ug/L	
			Dissolved Antimony (Sb)	2021/09/24	ND, RDL=0.020		ug/L	
			Dissolved Arsenic (As)	2021/09/24	ND, RDL=0.020		ug/L	
			Dissolved Arsenic (As)	2021/09/24	ND, RDL=0.020		ug/L	
			Dissolved Barium (Ba)	2021/09/24	ND, RDL=0.020		ug/L	
			Dissolved Barium (Ba)	2021/09/24	ND, RDL=0.020		ug/L	
			Dissolved Beryllium (Be)	2021/09/24	ND, RDL=0.010		ug/L	
			Dissolved Beryllium (Be)	2021/09/24	ND, RDL=0.010		ug/L	
			Dissolved Bismuth (Bi)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Bismuth (Bi)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Boron (B)	2021/09/24	ND, RDL=10		ug/L	
			Dissolved Boron (B)	2021/09/24	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Cadmium (Cd)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Chromium (Cr)	2021/09/24	ND, RDL=0.10		ug/L	
			Dissolved Chromium (Cr)	2021/09/24	ND, RDL=0.10		ug/L	
			Dissolved Cobalt (Co)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Cobalt (Co)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Copper (Cu)	2021/09/24	ND, RDL=0.050		ug/L	
			Dissolved Copper (Cu)	2021/09/24	ND, RDL=0.050		ug/L	
			Dissolved Iron (Fe)	2021/09/24	ND, RDL=1.0		ug/L	
			Dissolved Iron (Fe)	2021/09/24	ND, RDL=1.0		ug/L	
			Dissolved Lead (Pb)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Lead (Pb)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Lithium (Li)	2021/09/24	ND, RDL=0.50		ug/L	
			Dissolved Lithium (Li)	2021/09/24	ND, RDL=0.50		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Manganese (Mn)	2021/09/24	ND, RDL=0.050		ug/L	
			Dissolved Manganese (Mn)	2021/09/24	ND, RDL=0.050		ug/L	
			Dissolved Molybdenum (Mo)	2021/09/24	ND, RDL=0.050		ug/L	
			Dissolved Molybdenum (Mo)	2021/09/24	ND, RDL=0.050		ug/L	
			Dissolved Nickel (Ni)	2021/09/24	ND, RDL=0.020		ug/L	
			Dissolved Nickel (Ni)	2021/09/24	ND, RDL=0.020		ug/L	
			Dissolved Phosphorus (P)	2021/09/24	ND, RDL=2.0		ug/L	
			Dissolved Phosphorus (P)	2021/09/24	ND, RDL=2.0		ug/L	
			Dissolved Selenium (Se)	2021/09/24	ND, RDL=0.040		ug/L	
			Dissolved Selenium (Se)	2021/09/24	ND, RDL=0.040		ug/L	
			Dissolved Silicon (Si)	2021/09/24	ND, RDL=50		ug/L	
			Dissolved Silicon (Si)	2021/09/24	ND, RDL=50		ug/L	
			Dissolved Silver (Ag)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Silver (Ag)	2021/09/24	ND, RDL=0.0050		ug/L	
			Dissolved Strontium (Sr)	2021/09/24	ND, RDL=0.050		ug/L	
			Dissolved Strontium (Sr)	2021/09/24	ND, RDL=0.050		ug/L	
			Dissolved Thallium (Tl)	2021/09/24	ND, RDL=0.0020		ug/L	
			Dissolved Thallium (Tl)	2021/09/24	ND, RDL=0.0020		ug/L	
			Dissolved Tin (Sn)	2021/09/24	ND, RDL=0.20		ug/L	
			Dissolved Tin (Sn)	2021/09/24	ND, RDL=0.20		ug/L	
			Dissolved Titanium (Ti)	2021/09/24	ND, RDL=0.50		ug/L	
			Dissolved Titanium (Ti)	2021/09/24	ND, RDL=0.50		ug/L	
			Dissolved Uranium (U)	2021/09/24	ND, RDL=0.0020		ug/L	
			Dissolved Uranium (U)	2021/09/24	ND, RDL=0.0020		ug/L	
			Dissolved Vanadium (V)	2021/09/24	ND, RDL=0.20		ug/L	
			Dissolved Vanadium (V)	2021/09/24	ND, RDL=0.20		ug/L	
			Dissolved Zinc (Zn)	2021/09/24	ND, RDL=0.10		ug/L	
			Dissolved Zinc (Zn)	2021/09/24	ND, RDL=0.10		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Zirconium (Zr)	2021/09/24	ND, RDL=0.10		ug/L	
			Dissolved Zirconium (Zr)	2021/09/24	ND, RDL=0.10		ug/L	
7599481	éCG	Matrix Spike	Dissolved Aluminum (Al)	2021/09/23		94	%	80 - 120
			Dissolved Antimony (Sb)	2021/09/23		96	%	80 - 120
			Dissolved Arsenic (As)	2021/09/23		96	%	80 - 120
			Dissolved Barium (Ba)	2021/09/23		95	%	80 - 120
			Dissolved Beryllium (Be)	2021/09/23		96	%	80 - 120
			Dissolved Bismuth (Bi)	2021/09/23		95	%	80 - 120
			Dissolved Boron (B)	2021/09/23		101	%	80 - 120
			Dissolved Cadmium (Cd)	2021/09/23		96	%	80 - 120
			Dissolved Chromium (Cr)	2021/09/23		91	%	80 - 120
			Dissolved Cobalt (Co)	2021/09/23		90	%	80 - 120
			Dissolved Copper (Cu)	2021/09/23		NC	%	80 - 120
			Dissolved Iron (Fe)	2021/09/23		98	%	80 - 120
			Dissolved Lead (Pb)	2021/09/23		95	%	80 - 120
			Dissolved Lithium (Li)	2021/09/23		95	%	80 - 120
			Dissolved Manganese (Mn)	2021/09/23		92	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/09/23		98	%	80 - 120
			Dissolved Nickel (Ni)	2021/09/23		92	%	80 - 120
			Dissolved Phosphorus (P)	2021/09/23		95	%	80 - 120
			Dissolved Selenium (Se)	2021/09/23		94	%	80 - 120
			Dissolved Silicon (Si)	2021/09/23		97	%	80 - 120
			Dissolved Silver (Ag)	2021/09/23		93	%	80 - 120
			Dissolved Strontium (Sr)	2021/09/23		93	%	80 - 120
			Dissolved Thallium (Tl)	2021/09/23		95	%	80 - 120
			Dissolved Tin (Sn)	2021/09/23		94	%	80 - 120
			Dissolved Titanium (Ti)	2021/09/23		98	%	80 - 120
			Dissolved Uranium (U)	2021/09/23		99	%	80 - 120
			Dissolved Vanadium (V)	2021/09/23		93	%	80 - 120
			Dissolved Zinc (Zn)	2021/09/23		96	%	80 - 120
			Dissolved Zirconium (Zr)	2021/09/23		96	%	80 - 120
7599481	éCG	Spiked Blank	Dissolved Aluminum (Al)	2021/09/23		101	%	80 - 120
			Dissolved Antimony (Sb)	2021/09/23		102	%	80 - 120
			Dissolved Arsenic (As)	2021/09/23		101	%	80 - 120
			Dissolved Barium (Ba)	2021/09/23		102	%	80 - 120
			Dissolved Beryllium (Be)	2021/09/23		104	%	80 - 120
			Dissolved Bismuth (Bi)	2021/09/23		100	%	80 - 120
			Dissolved Boron (B)	2021/09/23		108	%	80 - 120
			Dissolved Cadmium (Cd)	2021/09/23		102	%	80 - 120
			Dissolved Chromium (Cr)	2021/09/23		97	%	80 - 120
			Dissolved Cobalt (Co)	2021/09/23		97	%	80 - 120
			Dissolved Copper (Cu)	2021/09/23		94	%	80 - 120
			Dissolved Iron (Fe)	2021/09/23		106	%	80 - 120
			Dissolved Lead (Pb)	2021/09/23		103	%	80 - 120
			Dissolved Lithium (Li)	2021/09/23		101	%	80 - 120
			Dissolved Manganese (Mn)	2021/09/23		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/09/23		103	%	80 - 120
			Dissolved Nickel (Ni)	2021/09/23		99	%	80 - 120
			Dissolved Phosphorus (P)	2021/09/23		101	%	80 - 120
			Dissolved Selenium (Se)	2021/09/23		102	%	80 - 120
			Dissolved Silicon (Si)	2021/09/23		111	%	80 - 120
			Dissolved Silver (Ag)	2021/09/23		99	%	80 - 120
			Dissolved Strontium (Sr)	2021/09/23		98	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Thallium (Tl)	2021/09/23		101	%	80 - 120
			Dissolved Tin (Sn)	2021/09/23		102	%	80 - 120
			Dissolved Titanium (Ti)	2021/09/23		103	%	80 - 120
			Dissolved Uranium (U)	2021/09/23		104	%	80 - 120
			Dissolved Vanadium (V)	2021/09/23		99	%	80 - 120
			Dissolved Zinc (Zn)	2021/09/23		103	%	80 - 120
			Dissolved Zirconium (Zr)	2021/09/23		103	%	80 - 120
7599481	éCG	Method Blank	Dissolved Aluminum (Al)	2021/09/23	ND, RDL=0.50		ug/L	
			Dissolved Antimony (Sb)	2021/09/23	ND, RDL=0.020		ug/L	
			Dissolved Arsenic (As)	2021/09/23	ND, RDL=0.020		ug/L	
			Dissolved Barium (Ba)	2021/09/23	ND, RDL=0.020		ug/L	
			Dissolved Beryllium (Be)	2021/09/23	ND, RDL=0.010		ug/L	
			Dissolved Bismuth (Bi)	2021/09/23	ND, RDL=0.0050		ug/L	
			Dissolved Boron (B)	2021/09/23	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2021/09/23	ND, RDL=0.0050		ug/L	
			Dissolved Chromium (Cr)	2021/09/23	ND, RDL=0.10		ug/L	
			Dissolved Cobalt (Co)	2021/09/23	ND, RDL=0.0050		ug/L	
			Dissolved Copper (Cu)	2021/09/23	ND, RDL=0.050		ug/L	
			Dissolved Iron (Fe)	2021/09/23	ND, RDL=1.0		ug/L	
			Dissolved Lead (Pb)	2021/09/23	ND, RDL=0.0050		ug/L	
			Dissolved Lithium (Li)	2021/09/23	ND, RDL=0.50		ug/L	
			Dissolved Manganese (Mn)	2021/09/23	ND, RDL=0.050		ug/L	
			Dissolved Molybdenum (Mo)	2021/09/23	ND, RDL=0.050		ug/L	
			Dissolved Nickel (Ni)	2021/09/23	ND, RDL=0.020		ug/L	
			Dissolved Phosphorus (P)	2021/09/23	ND, RDL=2.0		ug/L	
			Dissolved Selenium (Se)	2021/09/23	ND, RDL=0.040		ug/L	
			Dissolved Silicon (Si)	2021/09/23	ND, RDL=50		ug/L	
			Dissolved Silver (Ag)	2021/09/23	ND, RDL=0.0050		ug/L	
			Dissolved Strontium (Sr)	2021/09/23	ND, RDL=0.050		ug/L	
			Dissolved Thallium (Tl)	2021/09/23	ND, RDL=0.0020		ug/L	
			Dissolved Tin (Sn)	2021/09/23	ND, RDL=0.20		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Titanium (Ti)	2021/09/23	ND, RDL=0.50		ug/L	
			Dissolved Uranium (U)	2021/09/23	ND, RDL=0.0020		ug/L	
			Dissolved Vanadium (V)	2021/09/23	ND, RDL=0.20		ug/L	
			Dissolved Zinc (Zn)	2021/09/23	ND, RDL=0.10		ug/L	
			Dissolved Zirconium (Zr)	2021/09/23	ND, RDL=0.10		ug/L	
7599482	CJY	Matrix Spike [QRK320-06]	Total Mercury (Hg)	2021/09/22		81	%	80 - 120
7599482	CJY	Spiked Blank	Total Mercury (Hg)	2021/09/22		85	%	80 - 120
7599482	CJY	Method Blank	Total Mercury (Hg)	2021/09/22	ND, RDL=0.0019		ug/L	
7600310	IK0	Matrix Spike [QRK326-05]	Fluoride (F-)	2021/09/22		90	%	80 - 120
7600310	IK0	Spiked Blank	Fluoride (F-)	2021/09/22		88	%	80 - 120
7600310	IK0	Method Blank	Fluoride (F-)	2021/09/22	ND, RDL=0.010		mg/L	
7600310	IK0	RPD [QRK326-05]	Fluoride (F-)	2021/09/22	NC		%	20
7602079	MCN	Matrix Spike	Nitrite (N)	2021/09/27		97	%	80 - 120
7602079	MCN	Spiked Blank	Nitrite (N)	2021/09/27		93	%	80 - 120
7602079	MCN	Method Blank	Nitrite (N)	2021/09/27	ND, RDL=0.010		mg/L	
7602079	MCN	RPD	Nitrite (N)	2021/09/27	NC		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

<Original signed by>

David Huang, BBY Scientific Specialist

<Original signed by>

Mike MacGillivray, Scientific Specialist (Inorganics)

<Original signed by>

Sze Yeung Fock, B.Sc., Scientific Specialist

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Your C.O.C. #: C847623-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/11/09
Report #: R6893143
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C1V5900
Received: 2021/10/28, 10:13

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Fluoride - Low Level (1)	12	N/A	2021/11/03	AB SOP-00005	SM 23 4500-F C m
Hardness (calculated as CaCO3) (2)	12	N/A	2021/11/04	BBY WI-00033	Auto Calc
Mercury (Total) by CV (2)	12	2021/11/04	2021/11/04	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (2)	12	N/A	2021/11/04	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved) (2)	12	N/A	2021/11/04	BBY7SOP-00002	EPA 6020B R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary., 4000-19th Street North-East , Calgary, AB, T2E 6P8
(2) This test was performed by Bureau Veritas Burnaby, 4606 Canada Way , Burnaby, BC, V5G 1K5

Your C.O.C. #: C847623-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/11/09
Report #: R6893143
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BV LABS JOB #: C1V5900
Received: 2021/10/28, 10:13

Encryption Key <Original signed by>

Tyler Travers
Project Manager Assistant
09 Nov 2021 09:50:29

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Atena Georgescu, Project Manager II
Email: Atena.Georgescu@bureauveritas.com
Phone# (902)420-0203 Ext:239

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		RBN534	RBN584	RBN585	RBN586		
Sampling Date		2021/10/25	2021/10/25	2021/10/25	2021/10/25		
COC Number		C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01		
	UNITS	M AQPOR	M+L SED	M+L MD	M QE+POR	RDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	49.1	54.9	57.3	143	0.50	7688092
ELEMENTS							
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	0.0019	7688091
Inorganics							
Fluoride (F-)	mg/L	ND	ND	ND	0.015	0.010	7682280
Metals							
Dissolved Aluminum (Al)	ug/L	37.3	41.1	45.2	37.6	0.50	7688094
Dissolved Antimony (Sb)	ug/L	0.160	0.314	0.342	0.859	0.020	7688094
Dissolved Arsenic (As)	ug/L	0.234	0.500	0.155	0.475	0.020	7688094
Dissolved Barium (Ba)	ug/L	1.71	2.08	46.4	9.78	0.020	7688094
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	0.010	7688094
Dissolved Bismuth (Bi)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Boron (B)	ug/L	ND	ND	ND	ND	5.0	7688094
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	0.12	0.10	7688094
Dissolved Cobalt (Co)	ug/L	0.0075	0.0126	0.0103	0.0234	0.0050	7688094
Dissolved Copper (Cu)	ug/L	0.266	0.612	0.513	0.368	0.050	7688094
Dissolved Iron (Fe)	ug/L	ND	ND	ND	ND	1.0	7688094
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Lithium (Li)	ug/L	ND	ND	ND	ND	0.50	7688094
Dissolved Manganese (Mn)	ug/L	0.673	17.9	35.9	10.2	0.050	7688094
Dissolved Molybdenum (Mo)	ug/L	0.349	0.116	0.097	3.15	0.050	7688094
Dissolved Nickel (Ni)	ug/L	0.040	0.024	0.030	0.057	0.020	7688094
Dissolved Phosphorus (P)	ug/L	3.9	3.9	4.2	4.8	2.0	7688094
Dissolved Selenium (Se)	ug/L	ND	0.043	0.046	0.050	0.040	7688094
Dissolved Silicon (Si)	ug/L	904	1540	713	2350	50	7688094
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Strontium (Sr)	ug/L	31.8	69.3	58.8	143	0.050	7688094
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	ND	0.0020	7688094
Dissolved Tin (Sn)	ug/L	ND	ND	ND	ND	0.20	7688094
Dissolved Titanium (Ti)	ug/L	0.86	0.63	ND	0.70	0.50	7688094
Dissolved Uranium (U)	ug/L	0.217	1.11	0.121	0.590	0.0020	7688094
Dissolved Vanadium (V)	ug/L	0.62	0.91	0.48	0.91	0.20	7688094
Dissolved Zinc (Zn)	ug/L	0.88	0.68	0.46	0.67	0.10	7688094
Dissolved Zirconium (Zr)	ug/L	ND	ND	ND	ND	0.10	7688094
Dissolved Calcium (Ca)	mg/L	18.5	18.0	19.1	54.1	0.050	7688093

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		RBN534	RBN584	RBN585	RBN586		
Sampling Date		2021/10/25	2021/10/25	2021/10/25	2021/10/25		
COC Number		C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01		
	UNITS	M AQPOR	M+L SED	M+L MD	M QE+POR	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	0.667	2.43	2.32	1.89	0.050	7688093
Dissolved Potassium (K)	mg/L	0.398	1.27	0.353	0.819	0.050	7688093
Dissolved Sodium (Na)	mg/L	0.489	0.564	0.468	1.06	0.050	7688093
Dissolved Sulphur (S)	mg/L	ND	ND	ND	27.6	3.0	7688093

RDL = Reportable Detection Limit
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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		RBN592	RBN595	RBN596	RBN603		
Sampling Date		2021/10/25	2021/10/25	2021/10/25	2021/10/25		
COC Number		C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01		
	UNITS	M QZ-QE-POR-QTP-MIN	SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	RDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	38.2	52.0	40.6	49.0	0.50	7688095
ELEMENTS							
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	0.0019	7688091
Inorganics							
Fluoride (F-)	mg/L	ND	ND	ND	ND	0.010	7682280
Metals							
Dissolved Aluminum (Al)	ug/L	54.4	65.6	49.3	71.6	0.50	7688094
Dissolved Antimony (Sb)	ug/L	0.167	0.291	0.243	0.294	0.020	7688094
Dissolved Arsenic (As)	ug/L	0.158	0.293	0.204	0.214	0.020	7688094
Dissolved Barium (Ba)	ug/L	2.84	0.766	2.43	66.3	0.020	7688094
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	0.010	7688094
Dissolved Bismuth (Bi)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Boron (B)	ug/L	ND	ND	ND	ND	5.0	7688094
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	0.10	7688094
Dissolved Cobalt (Co)	ug/L	0.0087	0.0096	0.0076	0.0118	0.0050	7688094
Dissolved Copper (Cu)	ug/L	0.257	0.468	0.415	0.490	0.050	7688094
Dissolved Iron (Fe)	ug/L	ND	ND	ND	1.0	1.0	7688094
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Lithium (Li)	ug/L	ND	ND	ND	ND	0.50	7688094
Dissolved Manganese (Mn)	ug/L	4.16	0.821	3.22	10.8	0.050	7688094
Dissolved Molybdenum (Mo)	ug/L	0.067	0.996	ND	ND	0.050	7688094
Dissolved Nickel (Ni)	ug/L	0.033	0.027	0.029	0.048	0.020	7688094
Dissolved Phosphorus (P)	ug/L	4.8	4.3	4.3	3.8	2.0	7688094
Dissolved Selenium (Se)	ug/L	ND	ND	ND	ND	0.040	7688094
Dissolved Silicon (Si)	ug/L	617	1040	662	1280	50	7688094
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Strontium (Sr)	ug/L	20.4	17.4	45.6	80.6	0.050	7688094
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	ND	0.0020	7688094
Dissolved Tin (Sn)	ug/L	ND	ND	ND	ND	0.20	7688094
Dissolved Titanium (Ti)	ug/L	0.68	0.74	0.82	ND	0.50	7688094
Dissolved Uranium (U)	ug/L	0.0967	0.182	0.166	0.308	0.0020	7688094
Dissolved Vanadium (V)	ug/L	0.48	0.46	0.42	0.42	0.20	7688094
Dissolved Zinc (Zn)	ug/L	0.77	0.72	0.36	1.06	0.10	7688094
Dissolved Zirconium (Zr)	ug/L	ND	ND	ND	ND	0.10	7688094
Dissolved Calcium (Ca)	mg/L	14.7	17.8	14.5	16.8	0.050	7688093

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		RBN592	RBN595	RBN596	RBN603		
Sampling Date		2021/10/25	2021/10/25	2021/10/25	2021/10/25		
COC Number		C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01		
	UNITS	M QZ-QE-POR-QTP-MIN	SZ+V QE-POR	L QZ-TQTP+QZ-QTP	L TRJ	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	0.364	1.84	1.09	1.73	0.050	7688093
Dissolved Potassium (K)	mg/L	0.232	0.453	0.239	0.559	0.050	7688093
Dissolved Sodium (Na)	mg/L	0.315	0.559	0.312	0.508	0.050	7688093
Dissolved Sulphur (S)	mg/L	ND	ND	ND	ND	3.0	7688093

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		RBN604	RBN605	RBN606	RBN607		
Sampling Date		2021/10/25	2021/10/25	2021/10/25	2021/10/25		
COC Number		C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01		
	UNITS	V QE-POR-QTP	MAR HL	LEP HL	FLBK	RDL	QC Batch
Calculated Parameters							
Dissolved Hardness (CaCO3)	mg/L	29.2	74.4	81.2	4.16	0.50	7688095
ELEMENTS							
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	0.0019	7688091
Inorganics							
Fluoride (F-)	mg/L	ND	0.014	0.013	ND	0.010	7682280
Metals							
Dissolved Aluminum (Al)	ug/L	32.9	52.4	59.1	6.01	0.50	7688094
Dissolved Antimony (Sb)	ug/L	0.167	1.32	1.06	0.705	0.020	7688094
Dissolved Arsenic (As)	ug/L	0.133	0.950	0.466	0.092	0.020	7688094
Dissolved Barium (Ba)	ug/L	1.23	13.7	6.84	0.131	0.020	7688094
Dissolved Beryllium (Be)	ug/L	ND	ND	ND	ND	0.010	7688094
Dissolved Bismuth (Bi)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Boron (B)	ug/L	ND	ND	6.3	ND	5.0	7688094
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	0.10	7688094
Dissolved Cobalt (Co)	ug/L	ND	0.0153	0.0185	0.0263	0.0050	7688094
Dissolved Copper (Cu)	ug/L	0.748	0.325	0.261	0.187	0.050	7688094
Dissolved Iron (Fe)	ug/L	ND	ND	ND	ND	1.0	7688094
Dissolved Lead (Pb)	ug/L	ND	ND	0.0072	0.0124	0.0050	7688094
Dissolved Lithium (Li)	ug/L	ND	ND	ND	ND	0.50	7688094
Dissolved Manganese (Mn)	ug/L	3.29	35.1	26.5	2.69	0.050	7688094
Dissolved Molybdenum (Mo)	ug/L	0.160	3.86	0.310	ND	0.050	7688094
Dissolved Nickel (Ni)	ug/L	0.041	0.045	0.040	ND	0.020	7688094
Dissolved Phosphorus (P)	ug/L	4.6	3.3	3.4	4.1	2.0	7688094
Dissolved Selenium (Se)	ug/L	ND	0.060	0.160	ND	0.040	7688094
Dissolved Silicon (Si)	ug/L	376	2330	2640	ND	50	7688094
Dissolved Silver (Ag)	ug/L	ND	ND	ND	ND	0.0050	7688094
Dissolved Strontium (Sr)	ug/L	9.22	54.5	135	1.12	0.050	7688094
Dissolved Thallium (Tl)	ug/L	ND	ND	ND	ND	0.0020	7688094
Dissolved Tin (Sn)	ug/L	ND	ND	ND	ND	0.20	7688094
Dissolved Titanium (Ti)	ug/L	0.79	ND	ND	0.72	0.50	7688094
Dissolved Uranium (U)	ug/L	0.0786	1.07	2.68	0.0039	0.0020	7688094
Dissolved Vanadium (V)	ug/L	0.44	0.57	0.79	0.47	0.20	7688094
Dissolved Zinc (Zn)	ug/L	0.44	1.83	0.93	1.62	0.10	7688094
Dissolved Zirconium (Zr)	ug/L	ND	ND	ND	ND	0.10	7688094
Dissolved Calcium (Ca)	mg/L	10.5	26.8	25.1	1.67	0.050	7688093

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		RBN604	RBN605	RBN606	RBN607		
Sampling Date		2021/10/25	2021/10/25	2021/10/25	2021/10/25		
COC Number		C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01		
	UNITS	V QE-POR-QTP	MAR HL	LEP HL	FLBK	RDL	QC Batch
Dissolved Magnesium (Mg)	mg/L	0.734	1.79	4.49	ND	0.050	7688093
Dissolved Potassium (K)	mg/L	0.117	0.733	1.27	0.067	0.050	7688093
Dissolved Sodium (Na)	mg/L	0.230	1.14	1.76	0.137	0.050	7688093
Dissolved Sulphur (S)	mg/L	ND	6.2	3.4	ND	3.0	7688093

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.3°C
Package 2	0.3°C
Package 3	1.0°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7682280	IK0	Matrix Spike	Fluoride (F-)	2021/11/03		113	%	80 - 120
7682280	IK0	Spiked Blank	Fluoride (F-)	2021/11/03		102	%	80 - 120
7682280	IK0	Method Blank	Fluoride (F-)	2021/11/03	ND, RDL=0.010		mg/L	
7688091	CJY	Matrix Spike [RBN584-05]	Total Mercury (Hg)	2021/11/04		80	%	80 - 120
7688091	CJY	Spiked Blank	Total Mercury (Hg)	2021/11/04		107	%	80 - 120
7688091	CJY	Method Blank	Total Mercury (Hg)	2021/11/04	ND, RDL=0.0019		ug/L	
7688091	CJY	RPD [RBN534-05]	Total Mercury (Hg)	2021/11/04	NC		%	20
7688094	éCG	Matrix Spike	Dissolved Aluminum (Al)	2021/11/04		97	%	80 - 120
			Dissolved Antimony (Sb)	2021/11/04		98	%	80 - 120
			Dissolved Arsenic (As)	2021/11/04		98	%	80 - 120
			Dissolved Barium (Ba)	2021/11/04		97	%	80 - 120
			Dissolved Beryllium (Be)	2021/11/04		95	%	80 - 120
			Dissolved Bismuth (Bi)	2021/11/04		96	%	80 - 120
			Dissolved Boron (B)	2021/11/04		96	%	80 - 120
			Dissolved Cadmium (Cd)	2021/11/04		97	%	80 - 120
			Dissolved Chromium (Cr)	2021/11/04		97	%	80 - 120
			Dissolved Cobalt (Co)	2021/11/04		93	%	80 - 120
			Dissolved Copper (Cu)	2021/11/04		93	%	80 - 120
			Dissolved Iron (Fe)	2021/11/04		100	%	80 - 120
			Dissolved Lead (Pb)	2021/11/04		97	%	80 - 120
			Dissolved Lithium (Li)	2021/11/04		90	%	80 - 120
			Dissolved Manganese (Mn)	2021/11/04		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/11/04		101	%	80 - 120
			Dissolved Nickel (Ni)	2021/11/04		96	%	80 - 120
			Dissolved Phosphorus (P)	2021/11/04		99	%	80 - 120
			Dissolved Selenium (Se)	2021/11/04		97	%	80 - 120
			Dissolved Silicon (Si)	2021/11/04		106	%	80 - 120
			Dissolved Silver (Ag)	2021/11/04		98	%	80 - 120
			Dissolved Strontium (Sr)	2021/11/04		NC	%	80 - 120
			Dissolved Thallium (Tl)	2021/11/04		99	%	80 - 120
			Dissolved Tin (Sn)	2021/11/04		100	%	80 - 120
			Dissolved Titanium (Ti)	2021/11/04		102	%	80 - 120
			Dissolved Uranium (U)	2021/11/04		111	%	80 - 120
			Dissolved Vanadium (V)	2021/11/04		99	%	80 - 120
			Dissolved Zinc (Zn)	2021/11/04		95	%	80 - 120
			Dissolved Zirconium (Zr)	2021/11/04		103	%	80 - 120
7688094	éCG	Spiked Blank	Dissolved Aluminum (Al)	2021/11/04		100	%	80 - 120
			Dissolved Antimony (Sb)	2021/11/04		98	%	80 - 120
			Dissolved Arsenic (As)	2021/11/04		99	%	80 - 120
			Dissolved Barium (Ba)	2021/11/04		97	%	80 - 120
			Dissolved Beryllium (Be)	2021/11/04		97	%	80 - 120
			Dissolved Bismuth (Bi)	2021/11/04		99	%	80 - 120
			Dissolved Boron (B)	2021/11/04		96	%	80 - 120
			Dissolved Cadmium (Cd)	2021/11/04		100	%	80 - 120
			Dissolved Chromium (Cr)	2021/11/04		96	%	80 - 120
			Dissolved Cobalt (Co)	2021/11/04		95	%	80 - 120
			Dissolved Copper (Cu)	2021/11/04		96	%	80 - 120
			Dissolved Iron (Fe)	2021/11/04		102	%	80 - 120
			Dissolved Lead (Pb)	2021/11/04		101	%	80 - 120
			Dissolved Lithium (Li)	2021/11/04		94	%	80 - 120
			Dissolved Manganese (Mn)	2021/11/04		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/11/04		102	%	80 - 120
			Dissolved Nickel (Ni)	2021/11/04		99	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Phosphorus (P)	2021/11/04		101	%	80 - 120
			Dissolved Selenium (Se)	2021/11/04		99	%	80 - 120
			Dissolved Silicon (Si)	2021/11/04		109	%	80 - 120
			Dissolved Silver (Ag)	2021/11/04		97	%	80 - 120
			Dissolved Strontium (Sr)	2021/11/04		100	%	80 - 120
			Dissolved Thallium (Tl)	2021/11/04		99	%	80 - 120
			Dissolved Tin (Sn)	2021/11/04		100	%	80 - 120
			Dissolved Titanium (Ti)	2021/11/04		102	%	80 - 120
			Dissolved Uranium (U)	2021/11/04		112	%	80 - 120
			Dissolved Vanadium (V)	2021/11/04		99	%	80 - 120
			Dissolved Zinc (Zn)	2021/11/04		104	%	80 - 120
			Dissolved Zirconium (Zr)	2021/11/04		101	%	80 - 120
7688094	éCG	Method Blank	Dissolved Aluminum (Al)	2021/11/04	ND, RDL=0.50		ug/L	
			Dissolved Antimony (Sb)	2021/11/04	ND, RDL=0.020		ug/L	
			Dissolved Arsenic (As)	2021/11/04	ND, RDL=0.020		ug/L	
			Dissolved Barium (Ba)	2021/11/04	ND, RDL=0.020		ug/L	
			Dissolved Beryllium (Be)	2021/11/04	ND, RDL=0.010		ug/L	
			Dissolved Bismuth (Bi)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Boron (B)	2021/11/04	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Chromium (Cr)	2021/11/04	ND, RDL=0.10		ug/L	
			Dissolved Cobalt (Co)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Copper (Cu)	2021/11/04	ND, RDL=0.050		ug/L	
			Dissolved Iron (Fe)	2021/11/04	ND, RDL=1.0		ug/L	
			Dissolved Lead (Pb)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Lithium (Li)	2021/11/04	ND, RDL=0.50		ug/L	
			Dissolved Manganese (Mn)	2021/11/04	ND, RDL=0.050		ug/L	
			Dissolved Molybdenum (Mo)	2021/11/04	ND, RDL=0.050		ug/L	
			Dissolved Nickel (Ni)	2021/11/04	ND, RDL=0.020		ug/L	
			Dissolved Phosphorus (P)	2021/11/04	ND, RDL=2.0		ug/L	
			Dissolved Selenium (Se)	2021/11/04	ND, RDL=0.040		ug/L	
			Dissolved Silicon (Si)	2021/11/04	ND, RDL=50		ug/L	
			Dissolved Silver (Ag)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Strontium (Sr)	2021/11/04	ND, RDL=0.050		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Thallium (Tl)	2021/11/04	ND, RDL=0.0020		ug/L	
			Dissolved Tin (Sn)	2021/11/04	ND, RDL=0.20		ug/L	
			Dissolved Titanium (Ti)	2021/11/04	ND, RDL=0.50		ug/L	
			Dissolved Uranium (U)	2021/11/04	ND, RDL=0.0020		ug/L	
			Dissolved Vanadium (V)	2021/11/04	ND, RDL=0.20		ug/L	
			Dissolved Zinc (Zn)	2021/11/04	ND, RDL=0.10		ug/L	
			Dissolved Zirconium (Zr)	2021/11/04	ND, RDL=0.10		ug/L	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

<Original signed by>

David Huang, BBY Scientific Specialist

<Original signed by>

Sze Yeung Fock, B.Sc., Scientific Specialist

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Your C.O.C. #: C847623-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/11/10
Report #: R6895227
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1V5900
Received: 2021/10/28, 10:13

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Carbonate, Bicarbonate and Hydroxide	12	N/A	2021/11/03	N/A	SM 23 4500-CO2 D
Alkalinity	5	N/A	2021/11/04	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity	2	N/A	2021/11/05	ATL SOP 00013	EPA 310.2 R1974 m
Alkalinity	5	N/A	2021/11/09	ATL SOP 00013	EPA 310.2 R1974 m
Chloride	7	N/A	2021/11/05	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride	5	N/A	2021/11/09	ATL SOP 00014	SM 23 4500-Cl- E m
Colour	7	N/A	2021/11/05	ATL SOP 00020	SM 23 2120C m
Colour	5	N/A	2021/11/09	ATL SOP 00020	SM 23 2120C m
Conductance - water	12	N/A	2021/11/03	ATL SOP 00004	SM 23 2510B m
Ion Balance (% Difference)	12	N/A	2021/11/10	N/A	Auto Calc.
Anion and Cation Sum	7	N/A	2021/11/10	N/A	Auto Calc.
Anion and Cation Sum	5	N/A	2021/11/09	N/A	Auto Calc.
Fluoride - Low Level (1)	12	N/A	2021/11/03	AB SOP-00005	SM 23 4500-F C m
Hardness (calculated as CaCO3) (2)	12	N/A	2021/11/04	BBY WI-00033	Auto Calc
Mercury (Total) by CV (2)	12	2021/11/04	2021/11/04	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.) (2)	12	N/A	2021/11/04	BBY WI-00033	Auto Calc
Elements by ICPMS Low Level (dissolved) (2)	12	N/A	2021/11/04	BBY7SOP-00002	EPA 6020B R2 m
Nitrogen Ammonia - water	12	N/A	2021/11/03	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite	7	N/A	2021/11/04	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrate + Nitrite	5	N/A	2021/11/09	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite	7	N/A	2021/11/05	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrite	5	N/A	2021/11/09	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N)	5	N/A	2021/11/10	ATL SOP 00018	ASTM D3867-16
Nitrogen - Nitrate (as N)	7	N/A	2021/11/05	ATL SOP 00018	ASTM D3867-16
pH (3)	12	N/A	2021/11/03	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho	7	N/A	2021/11/04	ATL SOP 00021	SM 23 4500-P E m
Phosphorus - ortho	5	N/A	2021/11/09	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	12	N/A	2021/11/10	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C)	12	N/A	2021/11/10	ATL SOP 00049	Auto Calc.
Reactive Silica	7	N/A	2021/11/05	ATL SOP 00022	EPA 366.0 m
Reactive Silica	5	N/A	2021/11/09	ATL SOP 00022	EPA 366.0 m
Sulphate	7	N/A	2021/11/04	ATL SOP 00023	ASTM D516-16 m

Your C.O.C. #: C847623-01-01

Attention: James Powel

Marathon Gold
36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/11/10
Report #: R6895227
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1V5900
Received: 2021/10/28, 10:13

Sample Matrix: Water
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Sulphate	5	N/A	2021/11/09	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc)	12	N/A	2021/11/10	N/A	Auto Calc.
Organic carbon - Total (TOC) (4)	12	N/A	2021/11/03	ATL SOP 00203	SM 23 5310B m
Turbidity	12	N/A	2021/11/03	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Calgary., 4000-19th Street North-East , Calgary, AB, T2E 6P8
(2) This test was performed by Bureau Veritas Burnaby, 4606 Canada Way , Burnaby, BC, V5G 1K5
(3) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(4) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Your C.O.C. #: C847623-01-01

Attention: James Powel

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36 Birchview Dr
Pasadena, NL
CANADA A0L 1K0

Report Date: 2021/11/10
Report #: R6895227
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1V5900
Received: 2021/10/28, 10:13

Encryption Key

<Original signed by>

Tyler Travers
Project Manager Assistant
10 Nov 2021 15:27:43

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Atena Georgescu, Project Manager II
Email: Atena.Georgescu@bureauveritas.com
Phone# (902)420-0203 Ext:239

==========

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN534	RBN584		RBN585		RBN586		
Sampling Date		2021/10/25	2021/10/25		2021/10/25		2021/10/25		
COC Number		C847623-01-01	C847623-01-01		C847623-01-01		C847623-01-01		
	UNITS	M AQPOR	M+L SED	QC Batch	M+L MD	QC Batch	M QE+POR	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	1.12	1.26	7668366	1.31	7668366	3.17	N/A	7668366
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	48	63	7668361	60	7668361	67	1.0	7668361
Calculated TDS	mg/L	59	63	7668374	65	7668374	190	1.0	7668374
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	ND	7668361	ND	7668361	ND	1.0	7668361
Cation Sum	me/L	1.01	1.15	7668366	1.17	7668366	2.92	N/A	7668366
Dissolved Hardness (CaCO3)	mg/L	49.1	54.9	7688092	57.3	7688092	143	0.50	7688092
Ion Balance (% Difference)	%	5.16	4.56	7668364	5.65	7668364	4.11	N/A	7668364
Langelier Index (@ 20C)	N/A	-0.575	-0.384	7668370	-0.586	7668370	0.0530		7668370
Langelier Index (@ 4C)	N/A	-0.827	-0.636	7668372	-0.838	7668372	-0.197		7668372
Nitrate (N)	mg/L	ND	ND	7668367	0.072	7668367	ND	0.050	7668367
Saturation pH (@ 20C)	N/A	8.37	8.27	7668370	8.26	7668370	7.83		7668370
Saturation pH (@ 4C)	N/A	8.62	8.52	7668372	8.51	7668372	8.08		7668372
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	48	63	7679991	60	7679991	67	5.0	7679991
Dissolved Chloride (Cl-)	mg/L	ND	ND	7679995	ND	7679995	ND	1.0	7679995
Colour	TCU	ND	ND	7679999	ND	7679999	ND	5.0	7679999
Nitrate + Nitrite (N)	mg/L	ND	ND	7680003	0.072	7680003	ND	0.050	7680003
Nitrite (N)	mg/L	ND	ND	7680004	ND	7680004	ND	0.010	7680004
Nitrogen (Ammonia Nitrogen)	mg/L	ND	ND	7676996	ND	7676996	ND	0.050	7676996
Total Organic Carbon (C)	mg/L	ND	0.62	7676982	0.56	7676982	ND	0.50	7676982
Orthophosphate (P)	mg/L	ND	ND	7680002	ND	7680002	ND	0.010	7680002
pH	pH	7.79	7.88	7676927	7.68	7676951	7.88		7676927
Reactive Silica (SiO2)	mg/L	1.8	3.0	7679998	1.3	7679998	4.5	0.50	7679998
Dissolved Sulphate (SO4)	mg/L	7.9	ND	7679996	4.8	7679996	88	2.0	7679996
Turbidity	NTU	0.49	2.2	7677011	0.14	7677011	4.5	0.10	7677011
Conductivity	uS/cm	100	110	7676926	120	7676947	310	1.0	7676926
Metals									
Dissolved Aluminum (Al)	ug/L	37.3	41.1	7688094	45.2	7688094	37.6	0.50	7688094
Dissolved Antimony (Sb)	ug/L	0.160	0.314	7688094	0.342	7688094	0.859	0.020	7688094
Dissolved Arsenic (As)	ug/L	0.234	0.500	7688094	0.155	7688094	0.475	0.020	7688094
Dissolved Barium (Ba)	ug/L	1.71	2.08	7688094	46.4	7688094	9.78	0.020	7688094
Dissolved Beryllium (Be)	ug/L	ND	ND	7688094	ND	7688094	ND	0.010	7688094
Dissolved Bismuth (Bi)	ug/L	ND	ND	7688094	ND	7688094	ND	0.0050	7688094

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN534	RBN584		RBN585		RBN586		
Sampling Date		2021/10/25	2021/10/25		2021/10/25		2021/10/25		
COC Number		C847623-01-01	C847623-01-01		C847623-01-01		C847623-01-01		
	UNITS	M AQPOR	M+L SED	QC Batch	M+L MD	QC Batch	M QE+POR	RDL	QC Batch
Dissolved Boron (B)	ug/L	ND	ND	7688094	ND	7688094	ND	5.0	7688094
Dissolved Cadmium (Cd)	ug/L	ND	ND	7688094	ND	7688094	ND	0.0050	7688094
Dissolved Chromium (Cr)	ug/L	ND	ND	7688094	ND	7688094	0.12	0.10	7688094
Dissolved Cobalt (Co)	ug/L	0.0075	0.0126	7688094	0.0103	7688094	0.0234	0.0050	7688094
Dissolved Copper (Cu)	ug/L	0.266	0.612	7688094	0.513	7688094	0.368	0.050	7688094
Dissolved Iron (Fe)	ug/L	ND	ND	7688094	ND	7688094	ND	1.0	7688094
Dissolved Lead (Pb)	ug/L	ND	ND	7688094	ND	7688094	ND	0.0050	7688094
Dissolved Lithium (Li)	ug/L	ND	ND	7688094	ND	7688094	ND	0.50	7688094
Dissolved Manganese (Mn)	ug/L	0.673	17.9	7688094	35.9	7688094	10.2	0.050	7688094
Dissolved Molybdenum (Mo)	ug/L	0.349	0.116	7688094	0.097	7688094	3.15	0.050	7688094
Dissolved Nickel (Ni)	ug/L	0.040	0.024	7688094	0.030	7688094	0.057	0.020	7688094
Dissolved Phosphorus (P)	ug/L	3.9	3.9	7688094	4.2	7688094	4.8	2.0	7688094
Dissolved Selenium (Se)	ug/L	ND	0.043	7688094	0.046	7688094	0.050	0.040	7688094
Dissolved Silicon (Si)	ug/L	904	1540	7688094	713	7688094	2350	50	7688094
Dissolved Silver (Ag)	ug/L	ND	ND	7688094	ND	7688094	ND	0.0050	7688094
Dissolved Strontium (Sr)	ug/L	31.8	69.3	7688094	58.8	7688094	143	0.050	7688094
Dissolved Thallium (Tl)	ug/L	ND	ND	7688094	ND	7688094	ND	0.0020	7688094
Dissolved Tin (Sn)	ug/L	ND	ND	7688094	ND	7688094	ND	0.20	7688094
Dissolved Titanium (Ti)	ug/L	0.86	0.63	7688094	ND	7688094	0.70	0.50	7688094
Dissolved Uranium (U)	ug/L	0.217	1.11	7688094	0.121	7688094	0.590	0.0020	7688094
Dissolved Vanadium (V)	ug/L	0.62	0.91	7688094	0.48	7688094	0.91	0.20	7688094
Dissolved Zinc (Zn)	ug/L	0.88	0.68	7688094	0.46	7688094	0.67	0.10	7688094
Dissolved Zirconium (Zr)	ug/L	ND	ND	7688094	ND	7688094	ND	0.10	7688094
Dissolved Calcium (Ca)	mg/L	18.5	18.0	7688093	19.1	7688093	54.1	0.050	7688093
Dissolved Magnesium (Mg)	mg/L	0.667	2.43	7688093	2.32	7688093	1.89	0.050	7688093
Dissolved Potassium (K)	mg/L	0.398	1.27	7688093	0.353	7688093	0.819	0.050	7688093
Dissolved Sodium (Na)	mg/L	0.489	0.564	7688093	0.468	7688093	1.06	0.050	7688093
Dissolved Sulphur (S)	mg/L	ND	ND	7688093	ND	7688093	27.6	3.0	7688093

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN592		RBN595	RBN596		
Sampling Date		2021/10/25		2021/10/25	2021/10/25		
COC Number		C847623-01-01		C847623-01-01	C847623-01-01		
	UNITS	M QZ-QE-POR-QTP-MIN	QC Batch	SZ+V QE-POR	L QZ-TQTP+QZ-QTP	RDL	QC Batch
Calculated Parameters							
Anion Sum	me/L	0.850	7668366	1.16	0.840	N/A	7668366
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	38	7668361	50	42	1.0	7668361
Calculated TDS	mg/L	44	7668374	60	43	1.0	7668374
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	7668361	ND	ND	1.0	7668361
Cation Sum	me/L	0.780	7668366	1.07	0.830	N/A	7668366
Dissolved Hardness (CaCO3)	mg/L	38.2	7688095	52.0	40.6	0.50	7688095
Ion Balance (% Difference)	%	4.29	7668364	4.04	0.600	N/A	7668364
Langelier Index (@ 20C)	N/A	-0.981	7668370	-0.555	-0.800		7668370
Langelier Index (@ 4C)	N/A	-1.23	7668372	-0.806	-1.05		7668372
Nitrate (N)	mg/L	0.087	7668367	0.065	0.065	0.050	7668367
Saturation pH (@ 20C)	N/A	8.56	7668370	8.37	8.52		7668370
Saturation pH (@ 4C)	N/A	8.81	7668372	8.62	8.78		7668372
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	38	7679991	51	42	5.0	7679991
Dissolved Chloride (Cl-)	mg/L	ND	7679995	ND	ND	1.0	7679995
Colour	TCU	ND	7679999	ND	ND	5.0	7679999
Nitrate + Nitrite (N)	mg/L	0.087	7680003	0.065	0.065	0.050	7680003
Nitrite (N)	mg/L	ND	7680004	ND	ND	0.010	7680004
Nitrogen (Ammonia Nitrogen)	mg/L	ND	7676996	ND	ND	0.050	7676996
Total Organic Carbon (C)	mg/L	ND	7676982	ND	0.51	0.50	7676982
Orthophosphate (P)	mg/L	ND	7680002	ND	ND	0.010	7680002
pH	pH	7.58	7676951	7.81	7.72		7676927
Reactive Silica (SiO2)	mg/L	1.2	7679998	1.6	1.2	0.50	7679998
Dissolved Sulphate (SO4)	mg/L	4.1	7679996	7.1	ND	2.0	7679996
Turbidity	NTU	1.1	7677011	0.97	0.44	0.10	7677011
Conductivity	uS/cm	77	7676947	110	81	1.0	7676926
Metals							
Dissolved Aluminum (Al)	ug/L	54.4	7688094	65.6	49.3	0.50	7688094
Dissolved Antimony (Sb)	ug/L	0.167	7688094	0.291	0.243	0.020	7688094
Dissolved Arsenic (As)	ug/L	0.158	7688094	0.293	0.204	0.020	7688094
Dissolved Barium (Ba)	ug/L	2.84	7688094	0.766	2.43	0.020	7688094
Dissolved Beryllium (Be)	ug/L	ND	7688094	ND	ND	0.010	7688094
Dissolved Bismuth (Bi)	ug/L	ND	7688094	ND	ND	0.0050	7688094

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN592		RBN595	RBN596		
Sampling Date		2021/10/25		2021/10/25	2021/10/25		
COC Number		C847623-01-01		C847623-01-01	C847623-01-01		
	UNITS	M QZ-QE-POR-QTP-MIN	QC Batch	SZ+V QE-POR	L QZ-TQTP+QZ-QTP	RDL	QC Batch
Dissolved Boron (B)	ug/L	ND	7688094	ND	ND	5.0	7688094
Dissolved Cadmium (Cd)	ug/L	ND	7688094	ND	ND	0.0050	7688094
Dissolved Chromium (Cr)	ug/L	ND	7688094	ND	ND	0.10	7688094
Dissolved Cobalt (Co)	ug/L	0.0087	7688094	0.0096	0.0076	0.0050	7688094
Dissolved Copper (Cu)	ug/L	0.257	7688094	0.468	0.415	0.050	7688094
Dissolved Iron (Fe)	ug/L	ND	7688094	ND	ND	1.0	7688094
Dissolved Lead (Pb)	ug/L	ND	7688094	ND	ND	0.0050	7688094
Dissolved Lithium (Li)	ug/L	ND	7688094	ND	ND	0.50	7688094
Dissolved Manganese (Mn)	ug/L	4.16	7688094	0.821	3.22	0.050	7688094
Dissolved Molybdenum (Mo)	ug/L	0.067	7688094	0.996	ND	0.050	7688094
Dissolved Nickel (Ni)	ug/L	0.033	7688094	0.027	0.029	0.020	7688094
Dissolved Phosphorus (P)	ug/L	4.8	7688094	4.3	4.3	2.0	7688094
Dissolved Selenium (Se)	ug/L	ND	7688094	ND	ND	0.040	7688094
Dissolved Silicon (Si)	ug/L	617	7688094	1040	662	50	7688094
Dissolved Silver (Ag)	ug/L	ND	7688094	ND	ND	0.0050	7688094
Dissolved Strontium (Sr)	ug/L	20.4	7688094	17.4	45.6	0.050	7688094
Dissolved Thallium (Tl)	ug/L	ND	7688094	ND	ND	0.0020	7688094
Dissolved Tin (Sn)	ug/L	ND	7688094	ND	ND	0.20	7688094
Dissolved Titanium (Ti)	ug/L	0.68	7688094	0.74	0.82	0.50	7688094
Dissolved Uranium (U)	ug/L	0.0967	7688094	0.182	0.166	0.0020	7688094
Dissolved Vanadium (V)	ug/L	0.48	7688094	0.46	0.42	0.20	7688094
Dissolved Zinc (Zn)	ug/L	0.77	7688094	0.72	0.36	0.10	7688094
Dissolved Zirconium (Zr)	ug/L	ND	7688094	ND	ND	0.10	7688094
Dissolved Calcium (Ca)	mg/L	14.7	7688093	17.8	14.5	0.050	7688093
Dissolved Magnesium (Mg)	mg/L	0.364	7688093	1.84	1.09	0.050	7688093
Dissolved Potassium (K)	mg/L	0.232	7688093	0.453	0.239	0.050	7688093
Dissolved Sodium (Na)	mg/L	0.315	7688093	0.559	0.312	0.050	7688093
Dissolved Sulphur (S)	mg/L	ND	7688093	ND	ND	3.0	7688093

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN603	RBN604			RBN604		
Sampling Date		2021/10/25	2021/10/25			2021/10/25		
COC Number		C847623-01-01	C847623-01-01			C847623-01-01		
	UNITS	L TRJ	V QE-POR-QTP	RDL	QC Batch	V QE-POR-QTP Lab-Dup	RDL	QC Batch
Calculated Parameters								
Anion Sum	me/L	1.21	0.820	N/A	7668366			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	58	37	1.0	7668361			
Calculated TDS	mg/L	59	37	1.0	7668374			
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	ND	1.0	7668361			
Cation Sum	me/L	1.02	0.600	N/A	7668366			
Dissolved Hardness (CaCO3)	mg/L	49.0	29.2	0.50	7688095			
Ion Balance (% Difference)	%	8.52	15.5	N/A	7668364			
Langelier Index (@ 20C)	N/A	-0.579	-1.17		7668370			
Langelier Index (@ 4C)	N/A	-0.831	-1.43		7668372			
Nitrate (N)	mg/L	0.063	0.061	0.050	7668367			
Saturation pH (@ 20C)	N/A	8.32	8.71		7668370			
Saturation pH (@ 4C)	N/A	8.58	8.97		7668372			
Inorganics								
Total Alkalinity (Total as CaCO3)	mg/L	59	37	5.0	7686477	36	5.0	7686477
Dissolved Chloride (Cl-)	mg/L	1.1	1.0	1.0	7686478	ND	1.0	7686478
Colour	TCU	ND	ND	5.0	7686481	ND	5.0	7686481
Nitrate + Nitrite (N)	mg/L	0.063	0.061	0.050	7686483	0.077	0.050	7686483
Nitrite (N)	mg/L	ND	ND	0.010	7686484	ND	0.010	7686484
Nitrogen (Ammonia Nitrogen)	mg/L	ND	ND	0.050	7676996			
Total Organic Carbon (C)	mg/L	ND	0.65	0.50	7676982			
Orthophosphate (P)	mg/L	ND	ND	0.010	7686482	ND	0.010	7686482
pH	pH	7.75	7.54		7676951			
Reactive Silica (SiO2)	mg/L	2.3	ND	0.50	7686480	ND	0.50	7686480
Dissolved Sulphate (SO4)	mg/L	ND	2.6	2.0	7686479	2.5	2.0	7686479
Turbidity	NTU	0.67	0.94	0.10	7677011			
Conductivity	uS/cm	100	61	1.0	7676947			
Metals								
Dissolved Aluminum (Al)	ug/L	71.6	32.9	0.50	7688094			
Dissolved Antimony (Sb)	ug/L	0.294	0.167	0.020	7688094			
Dissolved Arsenic (As)	ug/L	0.214	0.133	0.020	7688094			
Dissolved Barium (Ba)	ug/L	66.3	1.23	0.020	7688094			
Dissolved Beryllium (Be)	ug/L	ND	ND	0.010	7688094			

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN603	RBN604			RBN604		
Sampling Date		2021/10/25	2021/10/25			2021/10/25		
COC Number		C847623-01-01	C847623-01-01			C847623-01-01		
	UNITS	L TRJ	V QE-POR-QTP	RDL	QC Batch	V QE-POR-QTP Lab-Dup	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	ND	0.0050	7688094			
Dissolved Boron (B)	ug/L	ND	ND	5.0	7688094			
Dissolved Cadmium (Cd)	ug/L	ND	ND	0.0050	7688094			
Dissolved Chromium (Cr)	ug/L	ND	ND	0.10	7688094			
Dissolved Cobalt (Co)	ug/L	0.0118	ND	0.0050	7688094			
Dissolved Copper (Cu)	ug/L	0.490	0.748	0.050	7688094			
Dissolved Iron (Fe)	ug/L	1.0	ND	1.0	7688094			
Dissolved Lead (Pb)	ug/L	ND	ND	0.0050	7688094			
Dissolved Lithium (Li)	ug/L	ND	ND	0.50	7688094			
Dissolved Manganese (Mn)	ug/L	10.8	3.29	0.050	7688094			
Dissolved Molybdenum (Mo)	ug/L	ND	0.160	0.050	7688094			
Dissolved Nickel (Ni)	ug/L	0.048	0.041	0.020	7688094			
Dissolved Phosphorus (P)	ug/L	3.8	4.6	2.0	7688094			
Dissolved Selenium (Se)	ug/L	ND	ND	0.040	7688094			
Dissolved Silicon (Si)	ug/L	1280	376	50	7688094			
Dissolved Silver (Ag)	ug/L	ND	ND	0.0050	7688094			
Dissolved Strontium (Sr)	ug/L	80.6	9.22	0.050	7688094			
Dissolved Thallium (Tl)	ug/L	ND	ND	0.0020	7688094			
Dissolved Tin (Sn)	ug/L	ND	ND	0.20	7688094			
Dissolved Titanium (Ti)	ug/L	ND	0.79	0.50	7688094			
Dissolved Uranium (U)	ug/L	0.308	0.0786	0.0020	7688094			
Dissolved Vanadium (V)	ug/L	0.42	0.44	0.20	7688094			
Dissolved Zinc (Zn)	ug/L	1.06	0.44	0.10	7688094			
Dissolved Zirconium (Zr)	ug/L	ND	ND	0.10	7688094			
Dissolved Calcium (Ca)	mg/L	16.8	10.5	0.050	7688093			
Dissolved Magnesium (Mg)	mg/L	1.73	0.734	0.050	7688093			
Dissolved Potassium (K)	mg/L	0.559	0.117	0.050	7688093			
Dissolved Sodium (Na)	mg/L	0.508	0.230	0.050	7688093			
Dissolved Sulphur (S)	mg/L	ND	ND	3.0	7688093			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN605			RBN605			RBN606		
Sampling Date		2021/10/25			2021/10/25			2021/10/25		
COC Number		C847623-01-01			C847623-01-01			C847623-01-01		
	UNITS	MAR HL	RDL	QC Batch	MAR HL Lab-Dup	RDL	QC Batch	LEP HL	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	2.00	N/A	7668366				2.14	N/A	7668366
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	76	1.0	7668361				93	1.0	7668361
Calculated TDS	mg/L	100	1.0	7668374				110	1.0	7668374
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	7668361				ND	1.0	7668361
Cation Sum	me/L	1.55	N/A	7668366				1.73	N/A	7668366
Dissolved Hardness (CaCO3)	mg/L	74.4	0.50	7688095				81.2	0.50	7688095
Ion Balance (% Difference)	%	12.7	N/A	7668364				10.6	N/A	7668364
Langelier Index (@ 20C)	N/A	-0.169		7668370				-0.221		7668370
Langelier Index (@ 4C)	N/A	-0.420		7668372				-0.472		7668372
Nitrate (N)	mg/L	ND	0.050	7668367				0.098	0.050	7668367
Saturation pH (@ 20C)	N/A	8.04		7668370				7.98		7668370
Saturation pH (@ 4C)	N/A	8.29		7668372				8.23		7668372
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	76	5.0	7686487	74	5.0	7686487	93	5.0	7686499
Dissolved Chloride (Cl-)	mg/L	1.2	1.0	7686490	ND	1.0	7686490	1.1	1.0	7686522
Colour	TCU	ND	5.0	7686495	ND	5.0	7686495	ND	5.0	7686525
Nitrate + Nitrite (N)	mg/L	0.064	0.050	7686497	0.068	0.050	7686497	0.098	0.050	7686528
Nitrite (N)	mg/L	0.018	0.010	7686498	ND	0.010	7686498	ND	0.010	7686531
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	7676996				ND	0.050	7676996
Total Organic Carbon (C)	mg/L	ND	0.50	7676982	ND	0.50	7676982	ND	0.50	7676982
Orthophosphate (P)	mg/L	ND	0.010	7686496	ND	0.010	7686496	ND	0.010	7686527
pH	pH	7.87		7676927				7.76		7676957
Reactive Silica (SiO2)	mg/L	4.8	0.50	7686493	4.7	0.50	7686493	5.1	0.50	7686524
Dissolved Sulphate (SO4)	mg/L	21	2.0	7686491	21	2.0	7686491	11	2.0	7686523
Turbidity	NTU	0.86	0.10	7677011				0.79	0.10	7677011
Conductivity	uS/cm	160	1.0	7676926				170	1.0	7676953
Metals										
Dissolved Aluminum (Al)	ug/L	52.4	0.50	7688094				59.1	0.50	7688094
Dissolved Antimony (Sb)	ug/L	1.32	0.020	7688094				1.06	0.020	7688094
Dissolved Arsenic (As)	ug/L	0.950	0.020	7688094				0.466	0.020	7688094
Dissolved Barium (Ba)	ug/L	13.7	0.020	7688094				6.84	0.020	7688094
Dissolved Beryllium (Be)	ug/L	ND	0.010	7688094				ND	0.010	7688094

RDL = Reportable Detection Limit
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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN605			RBN605			RBN606		
Sampling Date		2021/10/25			2021/10/25			2021/10/25		
COC Number		C847623-01-01			C847623-01-01			C847623-01-01		
	UNITS	MAR HL	RDL	QC Batch	MAR HL Lab-Dup	RDL	QC Batch	LEP HL	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L	ND	0.0050	7688094				ND	0.0050	7688094
Dissolved Boron (B)	ug/L	ND	5.0	7688094				6.3	5.0	7688094
Dissolved Cadmium (Cd)	ug/L	ND	0.0050	7688094				ND	0.0050	7688094
Dissolved Chromium (Cr)	ug/L	ND	0.10	7688094				ND	0.10	7688094
Dissolved Cobalt (Co)	ug/L	0.0153	0.0050	7688094				0.0185	0.0050	7688094
Dissolved Copper (Cu)	ug/L	0.325	0.050	7688094				0.261	0.050	7688094
Dissolved Iron (Fe)	ug/L	ND	1.0	7688094				ND	1.0	7688094
Dissolved Lead (Pb)	ug/L	ND	0.0050	7688094				0.0072	0.0050	7688094
Dissolved Lithium (Li)	ug/L	ND	0.50	7688094				ND	0.50	7688094
Dissolved Manganese (Mn)	ug/L	35.1	0.050	7688094				26.5	0.050	7688094
Dissolved Molybdenum (Mo)	ug/L	3.86	0.050	7688094				0.310	0.050	7688094
Dissolved Nickel (Ni)	ug/L	0.045	0.020	7688094				0.040	0.020	7688094
Dissolved Phosphorus (P)	ug/L	3.3	2.0	7688094				3.4	2.0	7688094
Dissolved Selenium (Se)	ug/L	0.060	0.040	7688094				0.160	0.040	7688094
Dissolved Silicon (Si)	ug/L	2330	50	7688094				2640	50	7688094
Dissolved Silver (Ag)	ug/L	ND	0.0050	7688094				ND	0.0050	7688094
Dissolved Strontium (Sr)	ug/L	54.5	0.050	7688094				135	0.050	7688094
Dissolved Thallium (Tl)	ug/L	ND	0.0020	7688094				ND	0.0020	7688094
Dissolved Tin (Sn)	ug/L	ND	0.20	7688094				ND	0.20	7688094
Dissolved Titanium (Ti)	ug/L	ND	0.50	7688094				ND	0.50	7688094
Dissolved Uranium (U)	ug/L	1.07	0.0020	7688094				2.68	0.0020	7688094
Dissolved Vanadium (V)	ug/L	0.57	0.20	7688094				0.79	0.20	7688094
Dissolved Zinc (Zn)	ug/L	1.83	0.10	7688094				0.93	0.10	7688094
Dissolved Zirconium (Zr)	ug/L	ND	0.10	7688094				ND	0.10	7688094
Dissolved Calcium (Ca)	mg/L	26.8	0.050	7688093				25.1	0.050	7688093
Dissolved Magnesium (Mg)	mg/L	1.79	0.050	7688093				4.49	0.050	7688093
Dissolved Potassium (K)	mg/L	0.733	0.050	7688093				1.27	0.050	7688093
Dissolved Sodium (Na)	mg/L	1.14	0.050	7688093				1.76	0.050	7688093
Dissolved Sulphur (S)	mg/L	6.2	3.0	7688093				3.4	3.0	7688093

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN606			RBN607			RBN607		
Sampling Date		2021/10/25			2021/10/25			2021/10/25		
COC Number		C847623-01-01			C847623-01-01			C847623-01-01		
	UNITS	LEP HL Lab-Dup	RDL	QC Batch	FLBK	RDL	QC Batch	FLBK Lab-Dup	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L				0.110	N/A	7668366			
Bicarb. Alkalinity (calc. as CaCO3)	mg/L				5.2	1.0	7668361			
Calculated TDS	mg/L				5.0	1.0	7668374			
Carb. Alkalinity (calc. as CaCO3)	mg/L				ND	1.0	7668361			
Cation Sum	me/L				0.0900	N/A	7668366			
Dissolved Hardness (CaCO3)	mg/L				4.16	0.50	7688095			
Ion Balance (% Difference)	%				10.0	N/A	7668364			
Langelier Index (@ 20C)	N/A				-3.96		7668370			
Langelier Index (@ 4C)	N/A				-4.22		7668372			
Nitrate (N)	mg/L				0.071	0.050	7668367			
Saturation pH (@ 20C)	N/A				10.3		7668370			
Saturation pH (@ 4C)	N/A				10.6		7668372			
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	88	5.0	7686499	5.2	5.0	7686477			
Dissolved Chloride (Cl-)	mg/L	ND	1.0	7686522	ND	1.0	7686478			
Colour	TCU	ND	5.0	7686525	ND	5.0	7686481			
Nitrate + Nitrite (N)	mg/L	0.082	0.050	7686528	0.071	0.050	7686483			
Nitrite (N)	mg/L	ND	0.010	7686531	ND	0.010	7686484			
Nitrogen (Ammonia Nitrogen)	mg/L				ND	0.050	7676996			
Total Organic Carbon (C)	mg/L				0.85	0.50	7676982			
Orthophosphate (P)	mg/L	ND	0.010	7686527	ND	0.010	7686482			
pH	pH	7.79		7676957	6.35		7676951			
Reactive Silica (SiO2)	mg/L	4.9	0.50	7686524	ND	0.50	7686480			
Dissolved Sulphate (SO4)	mg/L	11	2.0	7686523	ND	2.0	7686479			
Turbidity	NTU				1.1	0.10	7677011	1.0	0.10	7677011
Conductivity	uS/cm	170	1.0	7676953	3.3	1.0	7676947			
Metals										
Dissolved Aluminum (Al)	ug/L				6.01	0.50	7688094			
Dissolved Antimony (Sb)	ug/L				0.705	0.020	7688094			
Dissolved Arsenic (As)	ug/L				0.092	0.020	7688094			
Dissolved Barium (Ba)	ug/L				0.131	0.020	7688094			
Dissolved Beryllium (Be)	ug/L				ND	0.010	7688094			

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Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ATL RCAPMS DISSOLVED LOW LEVEL BC (WATER)

Bureau Veritas ID		RBN606			RBN607			RBN607		
Sampling Date		2021/10/25			2021/10/25			2021/10/25		
COC Number		C847623-01-01			C847623-01-01			C847623-01-01		
	UNITS	LEP HL Lab-Dup	RDL	QC Batch	FLBK	RDL	QC Batch	FLBK Lab-Dup	RDL	QC Batch
Dissolved Bismuth (Bi)	ug/L				ND	0.0050	7688094			
Dissolved Boron (B)	ug/L				ND	5.0	7688094			
Dissolved Cadmium (Cd)	ug/L				ND	0.0050	7688094			
Dissolved Chromium (Cr)	ug/L				ND	0.10	7688094			
Dissolved Cobalt (Co)	ug/L				0.0263	0.0050	7688094			
Dissolved Copper (Cu)	ug/L				0.187	0.050	7688094			
Dissolved Iron (Fe)	ug/L				ND	1.0	7688094			
Dissolved Lead (Pb)	ug/L				0.0124	0.0050	7688094			
Dissolved Lithium (Li)	ug/L				ND	0.50	7688094			
Dissolved Manganese (Mn)	ug/L				2.69	0.050	7688094			
Dissolved Molybdenum (Mo)	ug/L				ND	0.050	7688094			
Dissolved Nickel (Ni)	ug/L				ND	0.020	7688094			
Dissolved Phosphorus (P)	ug/L				4.1	2.0	7688094			
Dissolved Selenium (Se)	ug/L				ND	0.040	7688094			
Dissolved Silicon (Si)	ug/L				ND	50	7688094			
Dissolved Silver (Ag)	ug/L				ND	0.0050	7688094			
Dissolved Strontium (Sr)	ug/L				1.12	0.050	7688094			
Dissolved Thallium (Tl)	ug/L				ND	0.0020	7688094			
Dissolved Tin (Sn)	ug/L				ND	0.20	7688094			
Dissolved Titanium (Ti)	ug/L				0.72	0.50	7688094			
Dissolved Uranium (U)	ug/L				0.0039	0.0020	7688094			
Dissolved Vanadium (V)	ug/L				0.47	0.20	7688094			
Dissolved Zinc (Zn)	ug/L				1.62	0.10	7688094			
Dissolved Zirconium (Zr)	ug/L				ND	0.10	7688094			
Dissolved Calcium (Ca)	mg/L				1.67	0.050	7688093			
Dissolved Magnesium (Mg)	mg/L				ND	0.050	7688093			
Dissolved Potassium (K)	mg/L				0.067	0.050	7688093			
Dissolved Sodium (Na)	mg/L				0.137	0.050	7688093			
Dissolved Sulphur (S)	mg/L				ND	3.0	7688093			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
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ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		RBN534			RBN534			RBN584		
Sampling Date		2021/10/25			2021/10/25			2021/10/25		
COC Number		C847623-01-01			C847623-01-01			C847623-01-01		
	UNITS	M AQPOR	RDL	QC Batch	M AQPOR Lab-Dup	RDL	QC Batch	M+L SED	RDL	QC Batch
ELEMENTS										
Total Mercury (Hg)	ug/L	ND	0.0019	7688091	ND	0.0019	7688091	ND	0.0019	7688091
Inorganics										
Fluoride (F-)	mg/L	ND	0.010	7682280				ND	0.010	7682280

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		RBN585	RBN586	RBN592	RBN595	RBN596		
Sampling Date		2021/10/25	2021/10/25	2021/10/25	2021/10/25	2021/10/25		
COC Number		C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01		
	UNITS	M+L MD	M QE+POR	M QZ-QE-POR-QTP-MIN	SZ+V QE-POR	L QZ-TQTP+QZ-QTP	RDL	QC Batch
ELEMENTS								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.0019	7688091
Inorganics								
Fluoride (F-)	mg/L	ND	0.015	ND	ND	ND	0.010	7682280

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		RBN603	RBN604	RBN605	RBN606	RBN607		
Sampling Date		2021/10/25	2021/10/25	2021/10/25	2021/10/25	2021/10/25		
COC Number		C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01	C847623-01-01		
	UNITS	L TRJ	V QE-POR-QTP	MAR HL	LEP HL	FLBK	RDL	QC Batch
ELEMENTS								
Total Mercury (Hg)	ug/L	ND	ND	ND	ND	ND	0.0019	7688091
Inorganics								
Fluoride (F-)	mg/L	ND	ND	0.014	0.013	ND	0.010	7682280

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.3°C
Package 2	0.3°C
Package 3	1.0°C

Sample RBN534 [M AQPOR] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample RBN585 [M+L MD] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample RBN603 [L TRJ] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Sample RBN604 [V QE-POR-QTP] : RCAp Ion Balance acceptable. Low ionic strength sample.

Sample RBN605 [MAR HL] : Poor RCAp Ion Balance due to sample matrix.

Sample RBN606 [LEP HL] : Poor RCAp Ion Balance due to sample matrix.

Sample RBN607 [FLBK] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7676926	SHW	Spiked Blank	Conductivity	2021/11/03		100	%	80 - 120
7676926	SHW	Method Blank	Conductivity	2021/11/03	1.1, RDL=1.0		uS/cm	
7676926	SHW	RPD	Conductivity	2021/11/03	0.93		%	10
7676927	SHW	Spiked Blank	pH	2021/11/03		100	%	97 - 103
7676927	SHW	RPD	pH	2021/11/03	0.42		%	N/A
7676947	SHW	Spiked Blank	Conductivity	2021/11/03		101	%	80 - 120
7676947	SHW	Method Blank	Conductivity	2021/11/03	1.0, RDL=1.0		uS/cm	
7676947	SHW	RPD	Conductivity	2021/11/03	0.72		%	10
7676951	SHW	Spiked Blank	pH	2021/11/03		100	%	97 - 103
7676951	SHW	RPD	pH	2021/11/03	0.16		%	N/A
7676953	SHW	Spiked Blank	Conductivity	2021/11/03		100	%	80 - 120
7676953	SHW	Method Blank	Conductivity	2021/11/03	1.1, RDL=1.0		uS/cm	
7676953	SHW	RPD [RBN606-01]	Conductivity	2021/11/03	0.48		%	10
7676957	SHW	Spiked Blank	pH	2021/11/03		100	%	97 - 103
7676957	SHW	RPD [RBN606-01]	pH	2021/11/03	0.46		%	N/A
7676982	NGI	Matrix Spike [RBN605-04]	Total Organic Carbon (C)	2021/11/03		90	%	85 - 115
7676982	NGI	Spiked Blank	Total Organic Carbon (C)	2021/11/03		96	%	80 - 120
7676982	NGI	Method Blank	Total Organic Carbon (C)	2021/11/03	ND, RDL=0.50		mg/L	
7676982	NGI	RPD [RBN605-04]	Total Organic Carbon (C)	2021/11/03	NC		%	15
7676996	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2021/11/03		98	%	80 - 120
7676996	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2021/11/03		103	%	80 - 120
7676996	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2021/11/03	ND, RDL=0.050		mg/L	
7676996	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2021/11/03	2.3		%	20
7677011	SHW	QC Standard	Turbidity	2021/11/03		104	%	80 - 120
7677011	SHW	Spiked Blank	Turbidity	2021/11/03		102	%	80 - 120
7677011	SHW	Method Blank	Turbidity	2021/11/03	ND, RDL=0.10		NTU	
7677011	SHW	RPD [RBN607-01]	Turbidity	2021/11/03	6.5		%	20
7679991	EMT	Matrix Spike	Total Alkalinity (Total as CaCO3)	2021/11/04		95	%	80 - 120
7679991	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/11/04		103	%	80 - 120
7679991	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/11/04	ND, RDL=5.0		mg/L	
7679991	EMT	RPD	Total Alkalinity (Total as CaCO3)	2021/11/04	NC		%	20
7679995	EMT	Matrix Spike	Dissolved Chloride (Cl-)	2021/11/05		94	%	80 - 120
7679995	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/11/05		95	%	80 - 120
7679995	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/11/05	ND, RDL=1.0		mg/L	
7679995	EMT	RPD	Dissolved Chloride (Cl-)	2021/11/05	0.57		%	20
7679996	EMT	Matrix Spike	Dissolved Sulphate (SO4)	2021/11/04		114	%	80 - 120
7679996	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/11/04		94	%	80 - 120
7679996	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/11/04	ND, RDL=2.0		mg/L	
7679996	EMT	RPD	Dissolved Sulphate (SO4)	2021/11/04	NC		%	20
7679998	EMT	Matrix Spike	Reactive Silica (SiO2)	2021/11/05		88	%	80 - 120
7679998	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/11/05		91	%	80 - 120
7679998	EMT	Method Blank	Reactive Silica (SiO2)	2021/11/05	ND, RDL=0.50		mg/L	
7679998	EMT	RPD	Reactive Silica (SiO2)	2021/11/05	0.061		%	20
7679999	EMT	Spiked Blank	Colour	2021/11/05		104	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7679999	EMT	Method Blank	Colour	2021/11/05	ND, RDL=5.0		TCU	
7679999	EMT	RPD	Colour	2021/11/05	0.58		%	20
7680002	EMT	Matrix Spike	Orthophosphate (P)	2021/11/04		92	%	80 - 120
7680002	EMT	Spiked Blank	Orthophosphate (P)	2021/11/04		90	%	80 - 120
7680002	EMT	Method Blank	Orthophosphate (P)	2021/11/04	ND, RDL=0.010		mg/L	
7680002	EMT	RPD	Orthophosphate (P)	2021/11/04	NC		%	20
7680003	EMT	Matrix Spike	Nitrate + Nitrite (N)	2021/11/04		88	%	80 - 120
7680003	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/11/04		91	%	80 - 120
7680003	EMT	Method Blank	Nitrate + Nitrite (N)	2021/11/04	ND, RDL=0.050		mg/L	
7680003	EMT	RPD	Nitrate + Nitrite (N)	2021/11/04	NC		%	20
7680004	EMT	Matrix Spike	Nitrite (N)	2021/11/05		83	%	80 - 120
7680004	EMT	Spiked Blank	Nitrite (N)	2021/11/05		94	%	80 - 120
7680004	EMT	Method Blank	Nitrite (N)	2021/11/05	ND, RDL=0.010		mg/L	
7680004	EMT	RPD	Nitrite (N)	2021/11/05	NC		%	20
7682280	IK0	Matrix Spike	Fluoride (F-)	2021/11/03		113	%	80 - 120
7682280	IK0	Spiked Blank	Fluoride (F-)	2021/11/03		102	%	80 - 120
7682280	IK0	Method Blank	Fluoride (F-)	2021/11/03	ND, RDL=0.010		mg/L	
7686477	EMT	Matrix Spike [RBN604-01]	Total Alkalinity (Total as CaCO3)	2021/11/09		103	%	80 - 120
7686477	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/11/09		112	%	80 - 120
7686477	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/11/09	ND, RDL=5.0		mg/L	
7686477	EMT	RPD [RBN604-01]	Total Alkalinity (Total as CaCO3)	2021/11/09	0.83		%	20
7686478	EMT	Matrix Spike [RBN604-01]	Dissolved Chloride (Cl-)	2021/11/09		96	%	80 - 120
7686478	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/11/09		98	%	80 - 120
7686478	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/11/09	ND, RDL=1.0		mg/L	
7686478	EMT	RPD [RBN604-01]	Dissolved Chloride (Cl-)	2021/11/09	0.59		%	20
7686479	EMT	Matrix Spike [RBN604-01]	Dissolved Sulphate (SO4)	2021/11/09		98	%	80 - 120
7686479	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/11/09		101	%	80 - 120
7686479	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/11/09	ND, RDL=2.0		mg/L	
7686479	EMT	RPD [RBN604-01]	Dissolved Sulphate (SO4)	2021/11/09	1.6		%	20
7686480	EMT	Matrix Spike [RBN604-01]	Reactive Silica (SiO2)	2021/11/09		96	%	80 - 120
7686480	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/11/09		96	%	80 - 120
7686480	EMT	Method Blank	Reactive Silica (SiO2)	2021/11/09	ND, RDL=0.50		mg/L	
7686480	EMT	RPD [RBN604-01]	Reactive Silica (SiO2)	2021/11/09	NC		%	20
7686481	EMT	Spiked Blank	Colour	2021/11/09		95	%	80 - 120
7686481	EMT	Method Blank	Colour	2021/11/09	ND, RDL=5.0		TCU	
7686481	EMT	RPD [RBN604-01]	Colour	2021/11/09	NC		%	20
7686482	EMT	Matrix Spike [RBN604-01]	Orthophosphate (P)	2021/11/09		100	%	80 - 120
7686482	EMT	Spiked Blank	Orthophosphate (P)	2021/11/09		106	%	80 - 120
7686482	EMT	Method Blank	Orthophosphate (P)	2021/11/09	ND, RDL=0.010		mg/L	
7686482	EMT	RPD [RBN604-01]	Orthophosphate (P)	2021/11/09	NC		%	20
7686483	EMT	Matrix Spike [RBN604-01]	Nitrate + Nitrite (N)	2021/11/09		97	%	80 - 120
7686483	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/11/09		102	%	80 - 120
7686483	EMT	Method Blank	Nitrate + Nitrite (N)	2021/11/09	ND, RDL=0.050		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7686483	EMT	RPD [RBN604-01]	Nitrate + Nitrite (N)	2021/11/09	NC		%	20
7686484	EMT	Matrix Spike [RBN604-01]	Nitrite (N)	2021/11/09		101	%	80 - 120
7686484	EMT	Spiked Blank	Nitrite (N)	2021/11/09		104	%	80 - 120
7686484	EMT	Method Blank	Nitrite (N)	2021/11/09	ND, RDL=0.010		mg/L	
7686484	EMT	RPD [RBN604-01]	Nitrite (N)	2021/11/09	NC		%	20
7686487	EMT	Matrix Spike [RBN605-01]	Total Alkalinity (Total as CaCO3)	2021/11/09		NC	%	80 - 120
7686487	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/11/09		114	%	80 - 120
7686487	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/11/09	ND, RDL=5.0		mg/L	
7686487	EMT	RPD [RBN605-01]	Total Alkalinity (Total as CaCO3)	2021/11/09	3.1		%	20
7686490	EMT	Matrix Spike [RBN605-01]	Dissolved Chloride (Cl-)	2021/11/09		96	%	80 - 120
7686490	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/11/09		97	%	80 - 120
7686490	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/11/10	ND, RDL=1.0		mg/L	
7686490	EMT	RPD [RBN605-01]	Dissolved Chloride (Cl-)	2021/11/09	16		%	20
7686491	EMT	Matrix Spike [RBN605-01]	Dissolved Sulphate (SO4)	2021/11/09		101	%	80 - 120
7686491	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/11/09		101	%	80 - 120
7686491	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/11/10	ND, RDL=2.0		mg/L	
7686491	EMT	RPD [RBN605-01]	Dissolved Sulphate (SO4)	2021/11/09	0.91		%	20
7686493	EMT	Matrix Spike [RBN605-01]	Reactive Silica (SiO2)	2021/11/09		91	%	80 - 120
7686493	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/11/09		96	%	80 - 120
7686493	EMT	Method Blank	Reactive Silica (SiO2)	2021/11/09	ND, RDL=0.50		mg/L	
7686493	EMT	RPD [RBN605-01]	Reactive Silica (SiO2)	2021/11/09	1.8		%	20
7686495	EMT	Spiked Blank	Colour	2021/11/09		94	%	80 - 120
7686495	EMT	Method Blank	Colour	2021/11/09	ND, RDL=5.0		TCU	
7686495	EMT	RPD [RBN605-01]	Colour	2021/11/09	NC		%	20
7686496	EMT	Matrix Spike [RBN605-01]	Orthophosphate (P)	2021/11/09		101	%	80 - 120
7686496	EMT	Spiked Blank	Orthophosphate (P)	2021/11/09		105	%	80 - 120
7686496	EMT	Method Blank	Orthophosphate (P)	2021/11/09	ND, RDL=0.010		mg/L	
7686496	EMT	RPD [RBN605-01]	Orthophosphate (P)	2021/11/09	NC		%	20
7686497	EMT	Matrix Spike [RBN605-01]	Nitrate + Nitrite (N)	2021/11/09		94	%	80 - 120
7686497	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/11/09		99	%	80 - 120
7686497	EMT	Method Blank	Nitrate + Nitrite (N)	2021/11/09	ND, RDL=0.050		mg/L	
7686497	EMT	RPD [RBN605-01]	Nitrate + Nitrite (N)	2021/11/09	7.1		%	20
7686498	EMT	Matrix Spike [RBN605-01]	Nitrite (N)	2021/11/09		94	%	80 - 120
7686498	EMT	Spiked Blank	Nitrite (N)	2021/11/09		107	%	80 - 120
7686498	EMT	Method Blank	Nitrite (N)	2021/11/09	ND, RDL=0.010		mg/L	
7686498	EMT	RPD [RBN605-01]	Nitrite (N)	2021/11/09	NC		%	20
7686499	EMT	Matrix Spike [RBN606-01]	Total Alkalinity (Total as CaCO3)	2021/11/09		NC	%	80 - 120
7686499	EMT	Spiked Blank	Total Alkalinity (Total as CaCO3)	2021/11/09		110	%	80 - 120
7686499	EMT	Method Blank	Total Alkalinity (Total as CaCO3)	2021/11/09	ND, RDL=5.0		mg/L	
7686499	EMT	RPD [RBN606-01]	Total Alkalinity (Total as CaCO3)	2021/11/09	5.4		%	20
7686522	EMT	Matrix Spike [RBN606-01]	Dissolved Chloride (Cl-)	2021/11/09		95	%	80 - 120
7686522	EMT	Spiked Blank	Dissolved Chloride (Cl-)	2021/11/09		97	%	80 - 120
7686522	EMT	Method Blank	Dissolved Chloride (Cl-)	2021/11/09	ND, RDL=1.0		mg/L	
7686522	EMT	RPD [RBN606-01]	Dissolved Chloride (Cl-)	2021/11/09	13		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
7686523	EMT	Matrix Spike [RBN606-01]	Dissolved Sulphate (SO4)	2021/11/09		100	%	80 - 120
7686523	EMT	Spiked Blank	Dissolved Sulphate (SO4)	2021/11/09		102	%	80 - 120
7686523	EMT	Method Blank	Dissolved Sulphate (SO4)	2021/11/09	ND, RDL=2.0		mg/L	
7686523	EMT	RPD [RBN606-01]	Dissolved Sulphate (SO4)	2021/11/09	1.9		%	20
7686524	EMT	Matrix Spike [RBN606-01]	Reactive Silica (SiO2)	2021/11/09		91	%	80 - 120
7686524	EMT	Spiked Blank	Reactive Silica (SiO2)	2021/11/09		97	%	80 - 120
7686524	EMT	Method Blank	Reactive Silica (SiO2)	2021/11/09	ND, RDL=0.50		mg/L	
7686524	EMT	RPD [RBN606-01]	Reactive Silica (SiO2)	2021/11/09	3.8		%	20
7686525	EMT	Spiked Blank	Colour	2021/11/09		102	%	80 - 120
7686525	EMT	Method Blank	Colour	2021/11/09	ND, RDL=5.0		TCU	
7686525	EMT	RPD [RBN606-01]	Colour	2021/11/09	NC		%	20
7686527	EMT	Matrix Spike [RBN606-01]	Orthophosphate (P)	2021/11/09		99	%	80 - 120
7686527	EMT	Spiked Blank	Orthophosphate (P)	2021/11/09		106	%	80 - 120
7686527	EMT	Method Blank	Orthophosphate (P)	2021/11/09	ND, RDL=0.010		mg/L	
7686527	EMT	RPD [RBN606-01]	Orthophosphate (P)	2021/11/09	NC		%	20
7686528	EMT	Matrix Spike [RBN606-01]	Nitrate + Nitrite (N)	2021/11/09		95	%	80 - 120
7686528	EMT	Spiked Blank	Nitrate + Nitrite (N)	2021/11/09		103	%	80 - 120
7686528	EMT	Method Blank	Nitrate + Nitrite (N)	2021/11/09	ND, RDL=0.050		mg/L	
7686528	EMT	RPD [RBN606-01]	Nitrate + Nitrite (N)	2021/11/09	18		%	20
7686531	EMT	Matrix Spike [RBN606-01]	Nitrite (N)	2021/11/09		100	%	80 - 120
7686531	EMT	Spiked Blank	Nitrite (N)	2021/11/09		103	%	80 - 120
7686531	EMT	Method Blank	Nitrite (N)	2021/11/09	ND, RDL=0.010		mg/L	
7686531	EMT	RPD [RBN606-01]	Nitrite (N)	2021/11/09	NC		%	20
7688091	CJY	Matrix Spike [RBN584-05]	Total Mercury (Hg)	2021/11/04		80	%	80 - 120
7688091	CJY	Spiked Blank	Total Mercury (Hg)	2021/11/04		107	%	80 - 120
7688091	CJY	Method Blank	Total Mercury (Hg)	2021/11/04	ND, RDL=0.0019		ug/L	
7688091	CJY	RPD [RBN534-05]	Total Mercury (Hg)	2021/11/04	NC		%	20
7688094	éCG	Matrix Spike	Dissolved Aluminum (Al)	2021/11/04		97	%	80 - 120
			Dissolved Antimony (Sb)	2021/11/04		98	%	80 - 120
			Dissolved Arsenic (As)	2021/11/04		98	%	80 - 120
			Dissolved Barium (Ba)	2021/11/04		97	%	80 - 120
			Dissolved Beryllium (Be)	2021/11/04		95	%	80 - 120
			Dissolved Bismuth (Bi)	2021/11/04		96	%	80 - 120
			Dissolved Boron (B)	2021/11/04		96	%	80 - 120
			Dissolved Cadmium (Cd)	2021/11/04		97	%	80 - 120
			Dissolved Chromium (Cr)	2021/11/04		97	%	80 - 120
			Dissolved Cobalt (Co)	2021/11/04		93	%	80 - 120
			Dissolved Copper (Cu)	2021/11/04		93	%	80 - 120
			Dissolved Iron (Fe)	2021/11/04		100	%	80 - 120
			Dissolved Lead (Pb)	2021/11/04		97	%	80 - 120
			Dissolved Lithium (Li)	2021/11/04		90	%	80 - 120
			Dissolved Manganese (Mn)	2021/11/04		96	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/11/04		101	%	80 - 120
			Dissolved Nickel (Ni)	2021/11/04		96	%	80 - 120
			Dissolved Phosphorus (P)	2021/11/04		99	%	80 - 120
			Dissolved Selenium (Se)	2021/11/04		97	%	80 - 120
			Dissolved Silicon (Si)	2021/11/04		106	%	80 - 120
			Dissolved Silver (Ag)	2021/11/04		98	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Strontium (Sr)	2021/11/04		NC	%	80 - 120
			Dissolved Thallium (Tl)	2021/11/04		99	%	80 - 120
			Dissolved Tin (Sn)	2021/11/04		100	%	80 - 120
			Dissolved Titanium (Ti)	2021/11/04		102	%	80 - 120
			Dissolved Uranium (U)	2021/11/04		111	%	80 - 120
			Dissolved Vanadium (V)	2021/11/04		99	%	80 - 120
			Dissolved Zinc (Zn)	2021/11/04		95	%	80 - 120
			Dissolved Zirconium (Zr)	2021/11/04		103	%	80 - 120
7688094	éCG	Spiked Blank	Dissolved Aluminum (Al)	2021/11/04		100	%	80 - 120
			Dissolved Antimony (Sb)	2021/11/04		98	%	80 - 120
			Dissolved Arsenic (As)	2021/11/04		99	%	80 - 120
			Dissolved Barium (Ba)	2021/11/04		97	%	80 - 120
			Dissolved Beryllium (Be)	2021/11/04		97	%	80 - 120
			Dissolved Bismuth (Bi)	2021/11/04		99	%	80 - 120
			Dissolved Boron (B)	2021/11/04		96	%	80 - 120
			Dissolved Cadmium (Cd)	2021/11/04		100	%	80 - 120
			Dissolved Chromium (Cr)	2021/11/04		96	%	80 - 120
			Dissolved Cobalt (Co)	2021/11/04		95	%	80 - 120
			Dissolved Copper (Cu)	2021/11/04		96	%	80 - 120
			Dissolved Iron (Fe)	2021/11/04		102	%	80 - 120
			Dissolved Lead (Pb)	2021/11/04		101	%	80 - 120
			Dissolved Lithium (Li)	2021/11/04		94	%	80 - 120
			Dissolved Manganese (Mn)	2021/11/04		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2021/11/04		102	%	80 - 120
			Dissolved Nickel (Ni)	2021/11/04		99	%	80 - 120
			Dissolved Phosphorus (P)	2021/11/04		101	%	80 - 120
			Dissolved Selenium (Se)	2021/11/04		99	%	80 - 120
			Dissolved Silicon (Si)	2021/11/04		109	%	80 - 120
			Dissolved Silver (Ag)	2021/11/04		97	%	80 - 120
			Dissolved Strontium (Sr)	2021/11/04		100	%	80 - 120
			Dissolved Thallium (Tl)	2021/11/04		99	%	80 - 120
			Dissolved Tin (Sn)	2021/11/04		100	%	80 - 120
			Dissolved Titanium (Ti)	2021/11/04		102	%	80 - 120
			Dissolved Uranium (U)	2021/11/04		112	%	80 - 120
			Dissolved Vanadium (V)	2021/11/04		99	%	80 - 120
			Dissolved Zinc (Zn)	2021/11/04		104	%	80 - 120
			Dissolved Zirconium (Zr)	2021/11/04		101	%	80 - 120
7688094	éCG	Method Blank	Dissolved Aluminum (Al)	2021/11/04	ND, RDL=0.50		ug/L	
			Dissolved Antimony (Sb)	2021/11/04	ND, RDL=0.020		ug/L	
			Dissolved Arsenic (As)	2021/11/04	ND, RDL=0.020		ug/L	
			Dissolved Barium (Ba)	2021/11/04	ND, RDL=0.020		ug/L	
			Dissolved Beryllium (Be)	2021/11/04	ND, RDL=0.010		ug/L	
			Dissolved Bismuth (Bi)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Boron (B)	2021/11/04	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Chromium (Cr)	2021/11/04	ND, RDL=0.10		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Cobalt (Co)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Copper (Cu)	2021/11/04	ND, RDL=0.050		ug/L	
			Dissolved Iron (Fe)	2021/11/04	ND, RDL=1.0		ug/L	
			Dissolved Lead (Pb)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Lithium (Li)	2021/11/04	ND, RDL=0.50		ug/L	
			Dissolved Manganese (Mn)	2021/11/04	ND, RDL=0.050		ug/L	
			Dissolved Molybdenum (Mo)	2021/11/04	ND, RDL=0.050		ug/L	
			Dissolved Nickel (Ni)	2021/11/04	ND, RDL=0.020		ug/L	
			Dissolved Phosphorus (P)	2021/11/04	ND, RDL=2.0		ug/L	
			Dissolved Selenium (Se)	2021/11/04	ND, RDL=0.040		ug/L	
			Dissolved Silicon (Si)	2021/11/04	ND, RDL=50		ug/L	
			Dissolved Silver (Ag)	2021/11/04	ND, RDL=0.0050		ug/L	
			Dissolved Strontium (Sr)	2021/11/04	ND, RDL=0.050		ug/L	
			Dissolved Thallium (Tl)	2021/11/04	ND, RDL=0.0020		ug/L	
			Dissolved Tin (Sn)	2021/11/04	ND, RDL=0.20		ug/L	
			Dissolved Titanium (Ti)	2021/11/04	ND, RDL=0.50		ug/L	
			Dissolved Uranium (U)	2021/11/04	ND, RDL=0.0020		ug/L	
			Dissolved Vanadium (V)	2021/11/04	ND, RDL=0.20		ug/L	
			Dissolved Zinc (Zn)	2021/11/04	ND, RDL=0.10		ug/L	
			Dissolved Zirconium (Zr)	2021/11/04	ND, RDL=0.10		ug/L	

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

<Original signed by>

David Huang, BBY Scientific Specialist

<Original signed by>

Mike MacGillivray, Scientific Specialist (Inorganics)

<Original signed by>

Sze Yeung Fock, B.Sc., Scientific Specialist

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BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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APPENDIX B.3

Lab Kinetic Tests

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	3	4	5	6	7	8	9
Date			Effective	12-Aug-20	19-Aug-20	26-Aug-20	02-Sep-20	09-Sep-20	16-Sep-20	23-Sep-20	30-Sep-20	07-Oct-20	14-Oct-20
LIMS			01-Jun-2021	10105-AUG20	10144-AUG20	10222-AUG20	10007-SEP20	10091-SEP20	10154-SEP20	10232-SEP20	10315-SEP20	10021-OCT20	10132-OCT20
Hum Cell Leachate Vo	mL	-	-	975	969	818	984	995	1018	1007	476	512	550
pH	no unit	6.0-9.5	-	**5.49**	**4.64**	**5.30**	**5.96**	**4.95**	**5.86**	**5.11**	**4.77**	**5.19**	**5.36**
Acidity	mg/L as $CaCO_3$	-	-	7	10	7	3	4	2	4	5	5	4
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	5	22	20	26	26	24	27	43	46	42
SO_4	mg/L	-	-	1.6	6.7	6.9	10	9.6	9.2	9.3	24	20	15
F	mg/L	0.12	-	< 0.06	< 0.06	< 0.06	---	< 0.06	---	---	---	< 0.06	---
NH_3+NH_4	as N mg/L			<0.1	<0.1	<0.1	---	<0.1	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	0.000	0.000	0.000	---	0.000	---	---	---	---	---
Hg	mg/L	0.000026	-	< 0.00001	< 0.00001	0.00001	---	< 0.00001	---	---	---	< 0.00001	---
Ag	mg/L	0.00025	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---
Al	mg/L	0.005@pH<6.5	-	**0.007**	**0.039**	**0.006**	---	**0.022**	---	---	---	**0.058**	---
As	mg/L	0.005	0.10	< 0.0002	0.0002	< 0.0002	---	< 0.0002	---	---	---	< 0.0002	---
Ba	mg/L	-	-	0.00018	0.00021	0.00028	---	0.00056	---	---	---	0.00115	---
Be	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	< 0.000007	---	---	---	0.000019	---
B	mg/L	1.5	-	0.004	< 0.002	0.004	---	0.002	---	---	---	0.004	---
Bi	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	0.000020	---	---	---	< 0.000007	---
Ca	mg/L	-	-	0.20	0.80	1.45	---	2.41	---	---	---	4.60	---
Cd	mg/L	0.00009	-	0.000009	0.000007	0.000025	---	0.000055	---	---	---	**0.000203**	---
Co	mg/L	-	-	0.000038	0.000123	0.000306	---	0.000653	---	---	---	0.00177	---
Cr	mg/L	-	-	0.00014	< 0.00008	< 0.00008	---	< 0.00008	---	---	---	< 0.00008	---
Cu	mg/L	0.002	0.10	0.0003	0.0006	0.0004	---	0.0013	---	---	---	**0.0059**	---
Fe	mg/L	0.3	-	0.008	0.010	0.017	---	0.033	---	---	---	0.106	---
K	mg/L	-	-	0.056	0.082	0.077	---	0.083	---	---	---	0.138	---
Li	mg/L	-	-	0.0001	< 0.0001	0.0001	---	0.0001	---	---	---	0.0002	---
Mg	mg/L	-	-	0.027	0.093	0.174	---	0.274	---	---	---	0.457	---
Mn	mg/L	-	-	0.00421	0.0167	0.0345	---	0.0581	---	---	---	0.117	---
Mo	mg/L	0.073	-	0.00017	0.00020	0.00009	---	0.00005	---	---	---	0.00013	---
Na	mg/L	-	-	0.85	1.34	1.46	---	1.13	---	---	---	1.28	---
Ni	mg/L	0.03	0.25	0.0002	0.0003	0.0005	---	0.0008	---	---	---	0.0017	---
P	mg/L	-	-	< 0.003	< 0.003	< 0.003	---	< 0.003	---	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	0.00001	< 0.00001	0.00003	---	0.00004	---	---	---	0.00003	---
Sb	mg/L	-	-	< 0.0009	< 0.0009	< 0.0009	---	< 0.0009	---	---	---	< 0.0009	---
Se	mg/L	0.001	-	< 0.00004	< 0.00004	0.00005	---	0.00004	---	---	---	0.00007	---
Si	mg/L	-	-	0.35	1.44	1.92	---	2.48	---	---	---	2.07	---
Sn	mg/L	-	-	0.00014	0.00013	0.00016	---	0.00014	---	---	---	0.00009	---
Sr	mg/L	-	-	0.00159	0.00135	0.00142	---	0.00298	---	---	---	0.00547	---
Th	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	---	< 0.0001	---	---	---	< 0.0001	---
Ti	mg/L	-	-	0.00009	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	0.00006	---
Tl	mg/L	0.0008	-	< 0.000005	< 0.000005	< 0.000005	---	< 0.000005	---	---	---	< 0.000005	---
U	mg/L	0.015	-	0.000002	0.000006	0.000022	---	0.000007	---	---	---	0.000040	---
V	mg/L	-	-	0.00006	0.00003	< 0.00001	---	< 0.00001	---	---	---	< 0.00001	---
W	mg/L	-	-	0.00003	0.00007	0.00003	---	< 0.00002	---	---	---	0.00004	---
Y	mg/L	-	-	0.000017	0.000006	0.000014	---	0.000047	---	---	---	0.000500	---
Zn	mg/L	0.007	0.40	0.005	**0.012**	**0.013**	---	**0.016**	---	---	---	**0.049**	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	10	11	12	13	14	15	16	17	18	19
Date			Effective	21-Oct-20	28-Oct-20	04-Nov-20	11-Nov-20	18-Nov-20	25-Nov-20	02-Dec-20	09-Dec-20	16-Dec-20	23-Dec-20
LIMS			01-Jun-2021	10196-OCT20	10254-OCT20	10019-NOV20	10077-NOV20	10124-NOV20	10162-NOV20	10018-DEC20	10070-DEC20	10162-DEC20	10185-DEC20
Hum Cell Leachate Vol	mL	-	-	471	386	490	498	422	386	465	511	510	512
pH	no unit	6.0-9.5	-	**4.73**	**5.00**	**4.96**	**4.82**	**5.28**	**4.75**	**5.22**	**4.73**	**4.73**	**4.64**
Acidity	mg/L as $CaCO_3$	-	-	6	6	5	5	6	8	6	6	5	6
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	53	60	35	33	39	53	34	37	37	40
SO_4	mg/L	-	-	19	21	12	9.7	13	16	10	11	11	12
F	mg/L	0.12	-	---	---	< 0.06	---	---	---	< 0.06	---	---	---
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	---	---	< 0.00001	---	---	---	< 0.00001	---	---	---
Ag	mg/L	0.00025	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---
Al	mg/L	0.005@pH<6.5	-	---	---	**0.064**	---	---	---	**0.059**	---	---	---
As	mg/L	0.005	0.10	---	---	0.0004	---	---	---	< 0.0002	---	---	---
Ba	mg/L	-	-	---	---	0.00122	---	---	---	0.00166	---	---	---
Be	mg/L	-	-	---	---	0.000027	---	---	---	0.000029	---	---	---
B	mg/L	1.5	-	---	---	0.003	---	---	---	0.002	---	---	---
Bi	mg/L	-	-	---	---	< 0.000007	---	---	---	< 0.000007	---	---	---
Ca	mg/L	-	-	---	---	3.06	---	---	---	2.99	---	---	---
Cd	mg/L	0.00009	-	---	---	**0.000180**	---	---	---	**0.000143**	---	---	---
Co	mg/L	-	-	---	---	0.00168	---	---	---	0.00172	---	---	---
Cr	mg/L	-	-	---	---	< 0.00008	---	---	---	< 0.00008	---	---	---
Cu	mg/L	0.002	0.10	---	---	**0.0094**	---	---	---	**0.0095**	---	---	---
Fe	mg/L	0.3	-	---	---	0.118	---	---	---	0.110	---	---	---
K	mg/L	-	-	---	---	0.139	---	---	---	0.143	---	---	---
Li	mg/L	-	-	---	---	< 0.0001	---	---	---	0.0002	---	---	---
Mg	mg/L	-	-	---	---	0.324	---	---	---	0.311	---	---	---
Mn	mg/L	-	-	---	---	0.0833	---	---	---	0.0775	---	---	---
Mo	mg/L	0.073	-	---	---	0.00069	---	---	---	< 0.00004	---	---	---
Na	mg/L	-	-	---	---	0.84	---	---	---	0.75	---	---	---
Ni	mg/L	0.03	0.25	---	---	0.0013	---	---	---	0.0011	---	---	---
P	mg/L	-	-	---	---	< 0.003	---	---	---	< 0.003	---	---	---
Pb	mg/L	0.001	0.08	---	---	0.00011	---	---	---	< 0.00001	---	---	---
Sb	mg/L	-	-	---	---	< 0.0009	---	---	---	< 0.0009	---	---	---
Se	mg/L	0.001	-	---	---	0.00010	---	---	---	0.00008	---	---	---
Si	mg/L	-	-	---	---	2.54	---	---	---	1.09	---	---	---
Sn	mg/L	-	-	---	---	0.00007	---	---	---	< 0.00006	---	---	---
Sr	mg/L	-	-	---	---	0.00492	---	---	---	0.00557	---	---	---
Th	mg/L	-	-	---	---	< 0.0001	---	---	---	< 0.0001	---	---	---
Ti	mg/L	-	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---
Tl	mg/L	0.0008	-	---	---	< 0.000005	---	---	---	< 0.000005	---	---	---
U	mg/L	0.015	-	---	---	0.000069	---	---	---	0.000023	---	---	---
V	mg/L	-	-	---	---	0.00003	---	---	---	< 0.00001	---	---	---
W	mg/L	-	-	---	---	0.00012	---	---	---	< 0.00002	---	---	---
Y	mg/L	-	-	---	---	0.000537	---	---	---	0.000158	---	---	---
Zn	mg/L	0.007	0.40	---	---	**0.048**	---	---	---	**0.044**	---	---	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	20	21	22	23	24	25	26	27	28	29	30
Date			Effective	30-Dec-20	06-Jan-21	13-Jan-21	20-Jan-21	27-Jan-21	03-Feb-21	10-Feb-21	17-Feb-21	24-Feb-21	03-Mar-21	10-Mar-21
LIMS			01-Jun-2021	10240-DEC20	10025-JAN21	10066-JAN21	10142-JAN21	10207-JAN21	10018-FEB21	10044-FEB21	10166-FEB21	10262-FEB21	10020-MAR21	10120-MAR21
Hum Cell Leachate Vol	mL	-	-	517	498	515	472	507	513	502	502	490	519	535
pH	no unit	6.0-9.5	-	**4.51**	**4.56**	**4.67**	**4.58**	**4.55**	**4.82**	**4.59**	**4.74**	**4.55**	**4.77**	**4.42**
Acidity	mg/L as $CaCO_3$	-	-	7	7	6	5	8	5	6	6	7	7	9
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	47	44	43	36	44	38	41	38	41	41	49
SO_4	mg/L	-	-	12	12	13	13	13	11	12	13	12	12	12
F	mg/L	0.12	-	< 0.06	---	---	---	< 0.06	---	---	---	< 0.06	---	---
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001	---	---
Ag	mg/L	0.00025	-	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005	---	---
Al	mg/L	0.005@pH<6.5	-	**0.132**	---	---	---	**0.251**	---	---	---	**0.298**	---	---
As	mg/L	0.005	0.10	< 0.0002	---	---	---	< 0.0002	---	---	---	< 0.0002	---	---
Ba	mg/L	-	-	0.00222	---	---	---	0.00301	---	---	---	0.00302	---	---
Be	mg/L	-	-	0.000055	---	---	---	0.000081	---	---	---	0.000084	---	---
B	mg/L	1.5	-	0.003	---	---	---	0.005	---	---	---	< 0.002	---	---
Bi	mg/L	-	-	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.000007	---	---
Ca	mg/L	-	-	2.93	---	---	---	3.34	---	---	---	3.01	---	---
Cd	mg/L	0.00009	-	**0.000242**	---	---	---	**0.000407**	---	---	---	**0.000433**	---	---
Co	mg/L	-	-	0.00203	---	---	---	0.00235	---	---	---	0.00205	---	---
Cr	mg/L	-	-	< 0.00008	---	---	---	< 0.00008	---	---	---	0.00032	---	---
Cu	mg/L	0.002	0.10	**0.0253**	---	---	---	**0.0500**	---	---	---	**0.0655**	---	---
Fe	mg/L	0.3	-	0.295	---	---	---	**0.431**	---	---	---	**0.437**	---	---
K	mg/L	-	-	0.158	---	---	---	0.145	---	---	---	0.182	---	---
Li	mg/L	-	-	0.0002	---	---	---	0.0003	---	---	---	0.0003	---	---
Mg	mg/L	-	-	0.308	---	---	---	0.270	---	---	---	0.209	---	---
Mn	mg/L	-	-	0.0880	---	---	---	0.0965	---	---	---	0.0875	---	---
Mo	mg/L	0.073	-	0.00028	---	---	---	0.00016	---	---	---	0.00601	---	---
Na	mg/L	-	-	0.64	---	---	---	0.65	---	---	---	0.83	---	---
Ni	mg/L	0.03	0.25	0.0010	---	---	---	0.0011	---	---	---	0.0007	---	---
P	mg/L	-	-	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003	---	---
Pb	mg/L	0.001	0.08	0.00013	---	---	---	0.00050	---	---	---	0.00040	---	---
Sb	mg/L	-	-	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009	---	---
Se	mg/L	0.001	-	0.00009	---	---	---	0.00017	---	---	---	0.00016	---	---
Si	mg/L	-	-	4.66	---	---	---	5.06	---	---	---	4.12	---	---
Sn	mg/L	-	-	< 0.00006	---	---	---	0.00007	---	---	---	< 0.00006	---	---
Sr	mg/L	-	-	0.00718	---	---	---	0.00704	---	---	---	0.00917	---	---
Th	mg/L	-	-	< 0.0001	---	---	---	< 0.0001	---	---	---	< 0.0001	---	---
Ti	mg/L	-	-	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005	---	---
Tl	mg/L	0.0008	-	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005	---	---
U	mg/L	0.015	-	0.000130	---	---	---	0.000150	---	---	---	0.000169	---	---
V	mg/L	-	-	< 0.00001	---	---	---	< 0.00001	---	---	---	0.00010	---	---
W	mg/L	-	-	< 0.00002	---	---	---	0.00002	---	---	---	< 0.00002	---	---
Y	mg/L	-	-	0.00122	---	---	---	0.00238	---	---	---	0.00288	---	---
Zn	mg/L	0.007	0.40	**0.055**	---	---	---	**0.079**	---	---	---	**0.082**	---	---

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	31	32	33	34	35	36	37	38	39	40
Date			Effective	17-Mar-21	24-Mar-21	31-Mar-21	07-Apr-21	14-Apr-21	21-Apr-21	28-Apr-21	05-May-21	12-May-21	19-May-21
LIMS			01-Jun-2021	10150-MAR21	10256-MAR21	10314-MAR21	10031-APR21	10114-APR21	10171-APR21	10199-APR21	10023-MAY21	10057-MAY21	10155-MAY21
Hum Cell Leachate Vo	mL	-	-	533	512	488	534	520	504	499	538	509	526
pH	no unit	6.0-9.5	-	**4.68**	**4.60**	**4.58**	**4.48**	**4.52**	**4.56**	**4.64**	**4.35**	**4.51**	**4.53**
Acidity	mg/L as $CaCO_3$	-	-	8	9	7	6	9	8	7	8	8	7
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	37	40	42	42	39	36	35	38	40	40
SO_4	mg/L	-	-	11	12	12	11	11	11	14	14	17	13
F	mg/L	0.12	-	---	< 0.06	---	---	---	< 0.06	---	---	---	< 0.06
NH_3+NH_4	as N mg/L			---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---
Hg	mg/L	0.000026	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	0.00001
Ag	mg/L	0.00025	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Al	mg/L	0.005@pH<6.5	-	---	**0.431**	---	---	---	**0.370**	---	---	---	**0.393**
As	mg/L	0.005	0.10	---	< 0.0002	---	---	---	0.0002	---	---	---	< 0.0002
Ba	mg/L	-	-	---	0.0041	---	---	---	0.00329	---	---	---	0.00325
Be	mg/L	-	-	---	0.00011	---	---	---	0.000076	---	---	---	0.000078
B	mg/L	1.5	-	---	0.003	---	---	---	< 0.002	---	---	---	< 0.002
Bi	mg/L	-	-	---	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.00001
Ca	mg/L	-	-	---	3.33	---	---	---	2.45	---	---	---	2.00
Cd	mg/L	0.00009	-	---	**0.00060**	---	---	---	**0.000434**	---	---	---	**0.00037**
Co	mg/L	-	-	---	0.0023	---	---	---	0.001809	---	---	---	0.00171
Cr	mg/L	-	-	---	< 0.00008	---	---	---	< 0.00008	---	---	---	< 0.00008
Cu	mg/L	0.002	0.10	---	**0.101**	---	---	---	**0.0930**	---	---	---	**0.102**
Fe	mg/L	0.3	-	---	**0.554**	---	---	---	**0.427**	---	---	---	**0.351**
K	mg/L	-	-	---	0.129	---	---	---	0.131	---	---	---	0.083
Li	mg/L	-	-	---	0.0003	---	---	---	0.0005	---	---	---	0.0002
Mg	mg/L	-	-	---	0.222	---	---	---	0.146	---	---	---	0.123
Mn	mg/L	-	-	---	0.0979	---	---	---	0.0694	---	---	---	0.0626
Mo	mg/L	0.073	-	---	< 0.00004	---	---	---	< 0.00004	---	---	---	0.00013
Na	mg/L	-	-	---	0.59	---	---	---	0.75	---	---	---	0.34
Ni	mg/L	0.03	0.25	---	0.0009	---	---	---	0.0010	---	---	---	0.0004
P	mg/L	-	-	---	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003
Pb	mg/L	0.001	0.08	---	0.00058	---	---	---	0.00045	---	---	---	0.00054
Sb	mg/L	-	-	---	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009
Se	mg/L	0.001	-	---	0.00013	---	---	---	0.00008	---	---	---	0.00011
Si	mg/L	-	-	---	5.97	---	---	---	4.40	---	---	---	3.64
Sn	mg/L	-	-	---	0.00007	---	---	---	< 0.00006	---	---	---	< 0.00006
Sr	mg/L	-	-	---	0.0070	---	---	---	0.00561	---	---	---	0.00454
Th	mg/L	-	-	---	< 0.0001	---	---	---	< 0.0001	---	---	---	< 0.0001
Ti	mg/L	-	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Tl	mg/L	0.0008	-	---	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005
U	mg/L	0.015	-	---	0.00023	---	---	---	0.000162	---	---	---	0.000166
V	mg/L	-	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001
W	mg/L	-	-	---	< 0.00002	---	---	---	0.00002	---	---	---	< 0.00002
Y	mg/L	-	-	---	0.0041	---	---	---	0.00342	---	---	---	0.00373
Zn	mg/L	0.007	0.40	---	**0.096**	---	---	---	**0.066**	---	---	---	**0.061**

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	41
Date			Effective	26-May-21
LIMS			01-Jun-2021	10230-MAY21
Hum Cell Leachate Vo	mL	-	-	501
pH	no unit	6.0-9.5	-	**4.58**
Acidity	mg/L as $CaCO_3$	-	-	10
Alkalinity	mg/L as $CaCO_3$	-	-	< 2
Conductivity	µS/cm	-	-	38
SO_4	mg/L	-	-	15
F	mg/L	0.12	-	---
NH_3+NH_4	as N mg/L			---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---
Hg	mg/L	0.000026	-	---
Ag	mg/L	0.00025	-	---
Al	mg/L	0.005@pH<6.5	-	---
As	mg/L	0.005	0.10	---
Ba	mg/L	-	-	---
Be	mg/L	-	-	---
B	mg/L	1.5	-	---
Bi	mg/L	-	-	---
Ca	mg/L	-	-	---
Cd	mg/L	0.00009	-	---
Co	mg/L	-	-	---
Cr	mg/L	-	-	---
Cu	mg/L	0.002	0.10	---
Fe	mg/L	0.3	-	---
K	mg/L	-	-	---
Li	mg/L	-	-	---
Mg	mg/L	-	-	---
Mn	mg/L	-	-	---
Mo	mg/L	0.073	-	---
Na	mg/L	-	-	---
Ni	mg/L	0.03	0.25	---
P	mg/L	-	-	---
Pb	mg/L	0.001	0.08	---
Sb	mg/L	-	-	---
Se	mg/L	0.001	-	---
Si	mg/L	-	-	---
Sn	mg/L	-	-	---
Sr	mg/L	-	-	---
Th	mg/L	-	-	---
Ti	mg/L	-	-	---
Tl	mg/L	0.0008	-	---
U	mg/L	0.015	-	---
V	mg/L	-	-	---
W	mg/L	-	-	---
Y	mg/L	-	-	---
Zn	mg/L	0.007	0.40	---

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Summary of ABA Test Data

Parameter	Units	Ref No.: 10139-JUL20
Sulphur (S)	%	0.536
Sulphide (S^{-})	%	0.50
NP	t $CaCO_3$/1000 t	4.5
CO_3 NP	t $CaCO_3$/1000 t	1.5

Leachate Parameters Measured | ***Acid Generation*** [1] | ***Acid Neutralization*** [1]

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
0	975	5.49	7	<2	5	1.6	1.6	1.6	0.01	0.01	1.63	0.04	0.11
1	969	4.64	10	<2	22	6.7	6.5	8.1	0.04	0.05	6.76	0.19	0.56
2	818	5.30	7	<2	20	6.9	5.6	13.7	0.04	0.09	5.88	0.32	0.95
3	984	5.96	3	<2	26	10	9.8	23.5	0.07	0.16	10.25	0.54	1.63
4	995	4.95	4	<2	26	9.6	9.6	33.1	0.06	0.22	9.95	0.77	2.30
5	1018	5.86	2	<2	24	9.2	9.4	42.5	0.06	0.28	9.76	0.98	2.95
6	1007	5.11	4	<2	27	9.3	9.4	51.8	0.06	0.35	9.76	1.20	3.60
7	476	4.77	5	<2	43	24	11.4	63.2	0.08	0.42	11.90	1.46	4.39
8	512	5.19	5	<2	46	20	10.2	73.5	0.07	0.49	10.67	1.70	5.10
9	550	5.36	4	<2	42	15	8.3	81.7	0.06	0.54	8.59	1.89	5.68
10	471	4.73	6	<2	53	19	8.9	90.7	0.06	0.60	9.32	2.10	6.30
11	386	5.00	6	<2	60	21	8.1	98.8	0.05	0.66	8.44	2.29	6.86
12	490	4.96	5	<2	35	12	5.9	104.7	0.04	0.70	6.13	2.42	7.27
13	498	4.82	5	<2	33	9.7	4.8	109.5	0.03	0.73	5.03	2.53	7.60
14	422	5.28	6	<2	39	13	5.5	115.0	0.04	0.77	5.71	2.66	7.99
15	386	4.75	8	<2	53	16	6.2	121.2	0.04	0.81	6.43	2.80	8.41
16	465	5.22	6	<2	34	10	4.7	125.8	0.03	0.84	4.84	2.91	8.74
17	511	4.73	6	<2	37	11	5.6	131.4	0.04	0.88	5.86	3.04	9.13
18	510	4.73	5	<2	37	11	5.6	137.0	0.04	0.91	5.84	3.17	9.52
19	512	4.64	6	<2	40	12	6.1	143.2	0.04	0.95	6.40	3.31	9.94
20	517	4.51	7	<2	47	12	6.2	149.4	0.04	1.00	6.46	3.46	10.37

** Initial Week 0 leachate may included soluble sulphate, and may not indicate oxidation of sulphide in the sample material has occurred.*

[1] *Calculated values*

Summary - Weeks 0 to 20

Maximum Value	5.96	10	2	60	24	11.4	-	0.08	-	11.90	-	-
Minimum Value	4.51	2	<2	5	1.6	1.6	-	0.01	-	1.63	-	-
Average Value	4.92	6	2	36	12	7.1	-	0.05	-	7.41	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Changes to Head Sample after 20 Weeks [1]

Parameter	Units	Ref No.: 10139-JUL20
Sulphide ($S^{=}$) Remaining	%	0.50
NP Remaining	t $CaCO_3$/1000 t	4.3
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.3

Leachate Parameters Measured | ***Acid Generation*** [1] | ***Acid Neutralization*** [1]

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
21	498	4.56	7	<2	44	12	6.0	155.4	0.04	1.04	6.23	3.60	10.79
22	515	4.67	6	<2	43	13	6.7	162.1	0.04	1.08	6.97	3.75	11.25
23	472	4.58	5	<2	36	13	6.1	168.2	0.04	1.12	6.39	3.89	11.68
24	507	4.55	8	<2	44	13	6.6	174.8	0.04	1.17	6.87	4.05	12.14
25	513	4.82	5	<2	38	11	5.6	180.4	0.04	1.20	5.88	4.18	12.53
26	502	4.59	6	<2	41	12	6.0	186.5	0.04	1.24	6.28	4.32	12.95
27	502	4.74	6	<2	38	13	6.5	193.0	0.04	1.29	6.80	4.47	13.40
28	490	4.55	7	<2	41	12	5.9	198.9	0.04	1.33	6.13	4.60	13.81
29	519	4.77	7	<2	41	12	6.2	205.1	0.04	1.37	6.49	4.75	14.24
30	535	4.42	9	<2	49	12	6.4	211.5	0.04	1.41	6.69	4.90	14.69
31	533	4.68	8	<2	37	11	5.9	217.4	0.04	1.45	6.11	5.03	15.10
32	512	4.60	9	<2	40	12	6.1	223.5	0.04	1.49	6.40	5.17	15.52
33	488	4.58	7	<2	42	12	5.9	229.4	0.04	1.53	6.10	5.31	15.93
34	534	4.48	6	<2	42	11	5.9	235.2	0.04	1.57	6.12	5.45	16.34
35	520	4.52	9	<2	39	11	5.7	241.0	0.04	1.61	5.96	5.58	16.73
36	504	4.56	8	<2	36	11	5.5	246.5	0.04	1.64	5.78	5.71	17.12
37	499	4.64	7	<2	35	14	7.0	253.5	0.05	1.69	7.28	5.87	17.60
38	538	4.35	8	<2	38	14	7.5	261.0	0.05	1.74	7.85	6.04	18.13
39	509	4.51	8	<2	40	17	8.7	269.7	0.06	1.80	9.01	6.24	18.73
40	526	4.53	7	<2	40	13	6.8	276.5	0.05	1.84	7.12	6.40	19.20

[1] *Calculated values*

Summary - Weeks 0 to 40

Maximum Value	5.96	10	2	60	24	11.4	-	0.06	-	12	-	-
Minimum Value	4.35	2	<2	5	1.6	1.6	-	0.01	-	1.6	-	-
Average Value	4.71	6	2	38	12	6.7	-	0.04	-	7.03	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
M-LGO CNP DPL	1000

Changes to Head Sample after 40 Weeks [1]

Parameter	Units	Ref No.: 10139-JUL20
Sulphide ($S^{=}$) Remaining	%	0.49
NP Remaining	t $CaCO_3$/1000 t	4.2
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.2

Leachate Parameters Measured

Weekly Leach	Volume Collected	pH	Acidity	Alkalinity	Conductivity	SO_4
No.	mL	units	$CaCO_3$ eq. mg/L	$CaCO_3$ eq. mg/L	µS/cm	mg/L
41	501	4.58	10	<2	38	15

Acid Generation [1]

SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^{=}$ Depletion	Cumulative $S^{=}$ Depletion
g/t/wk	g/t	%	%
7.5	284.0	0.05	1.89

Acid Neutralization [1]

NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
$CaCO_3$, g/t/wk	%	%
7.83	6.57	19.72

[1] *Calculated values*

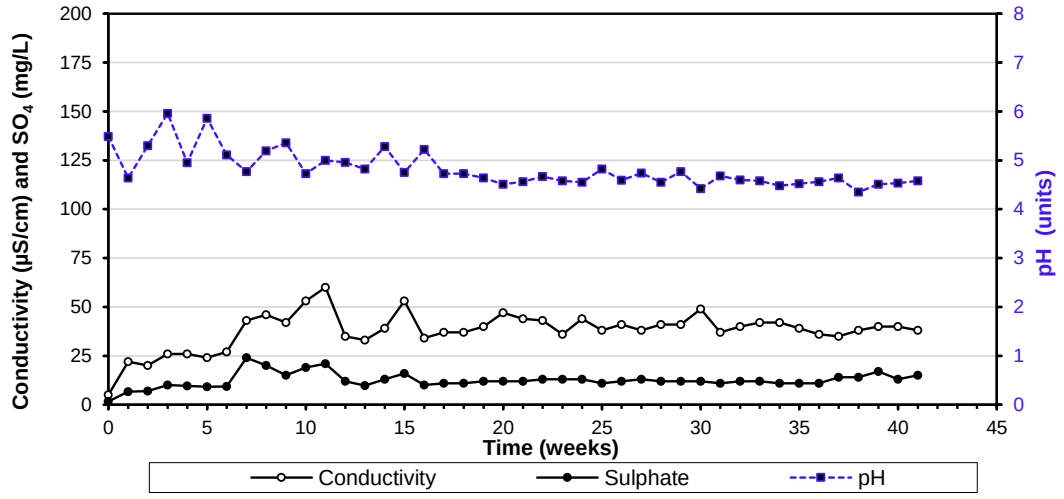
Summary - Weeks 0 to 60

Maximum Value	5.96	10	2	60	24	11.4	-	0.06	-	11.90	-	-
Minimum Value	4.35	2	<2	5	1.6	1.6	-	0.01	-	1.63	-	-
Average Value	4.57	6	2	38	12	6.8	-	0.05	-	7.04	-	-

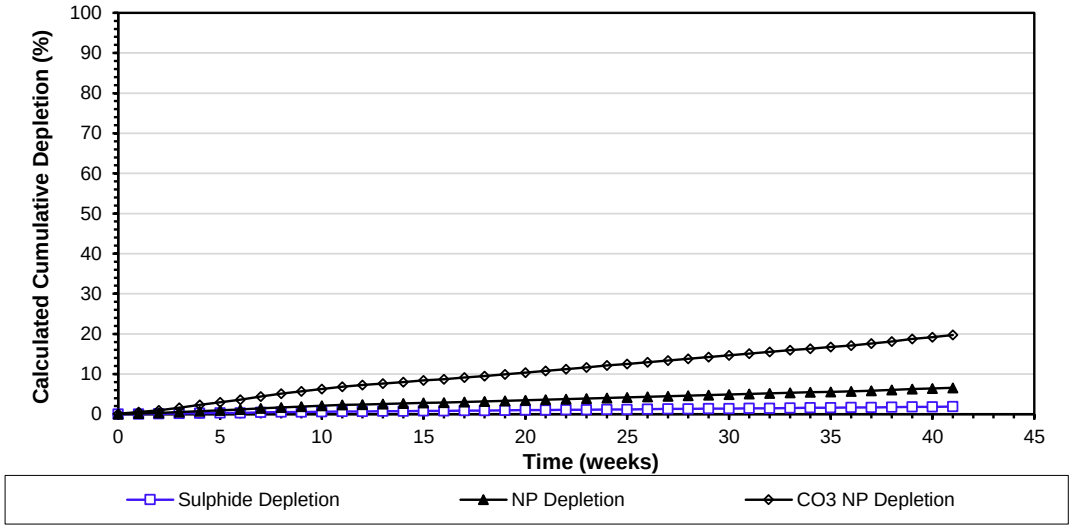
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Conductivity, Sulphate, and pH in Weekly Humidity Cell Leachate - M-LGO CNP DPL



Cumulative Sulphide and NP Depletion M-LGO CNP DPL

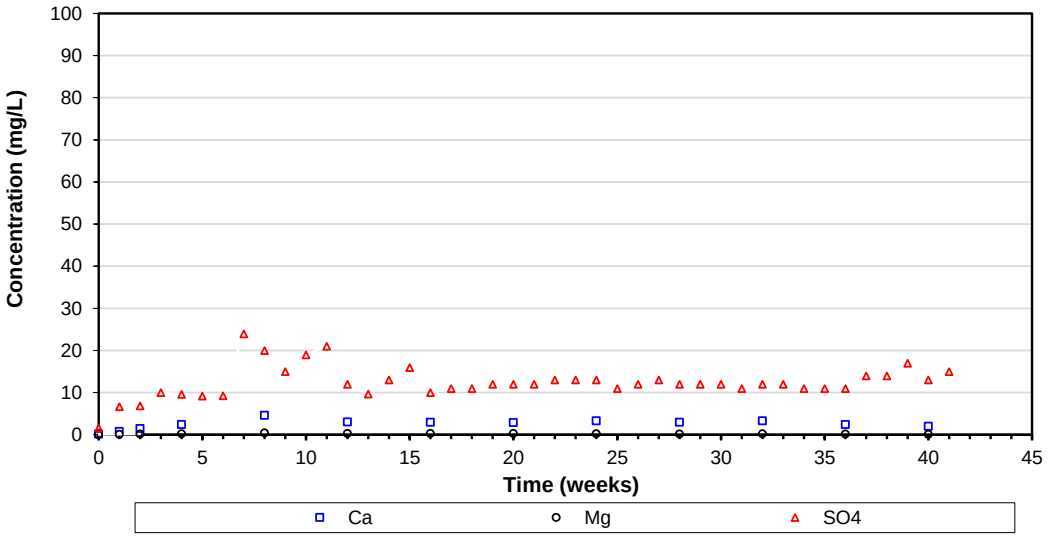


Note: NP depletion calculated based on sulphate assay.

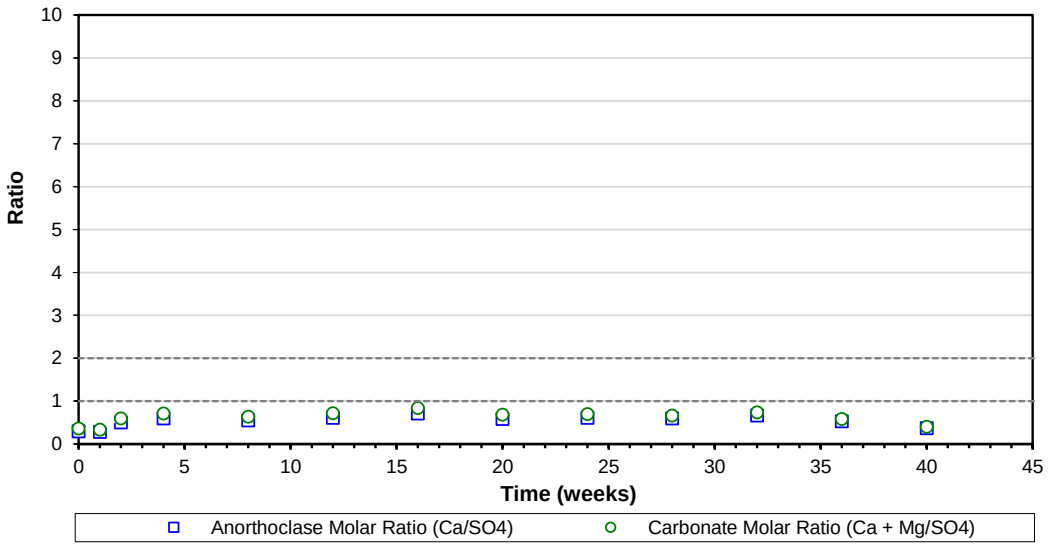
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL



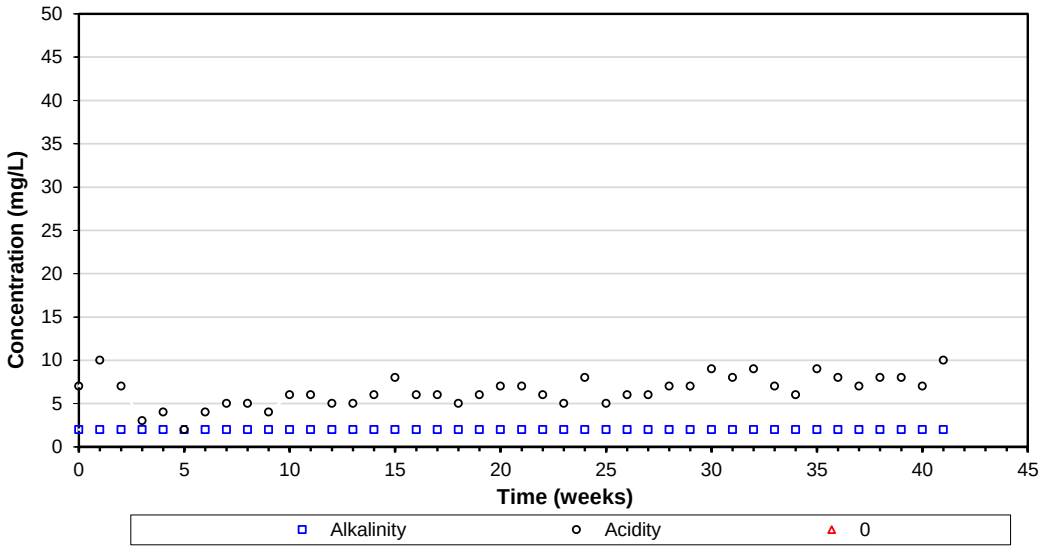
Carbonate (Ca + Mg/SO 4) and Anorthoclase (Ca/SO 4) Molar Ratios M-LGO CNP DPL



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

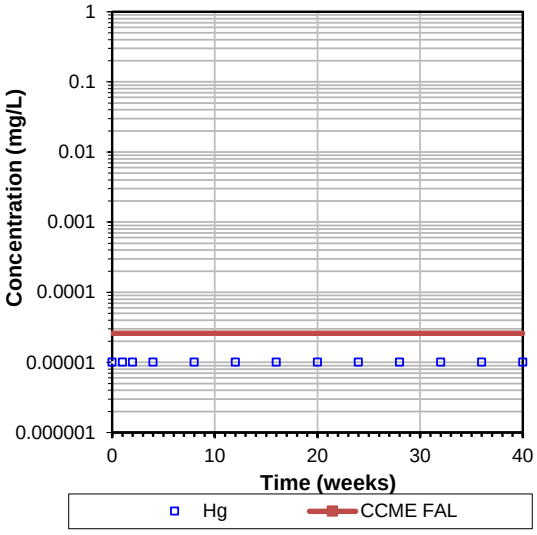
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

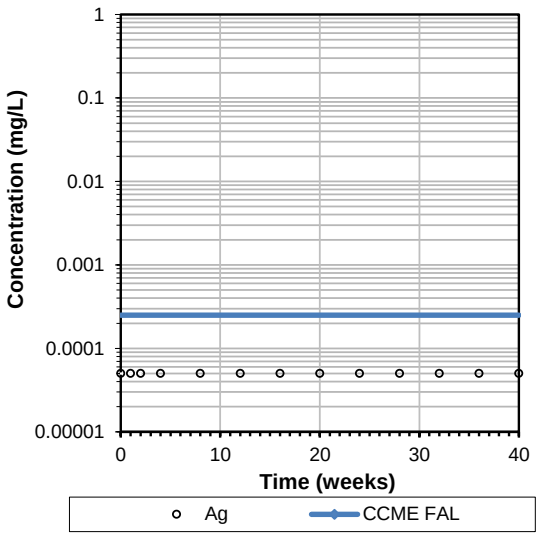


TEST REPORT

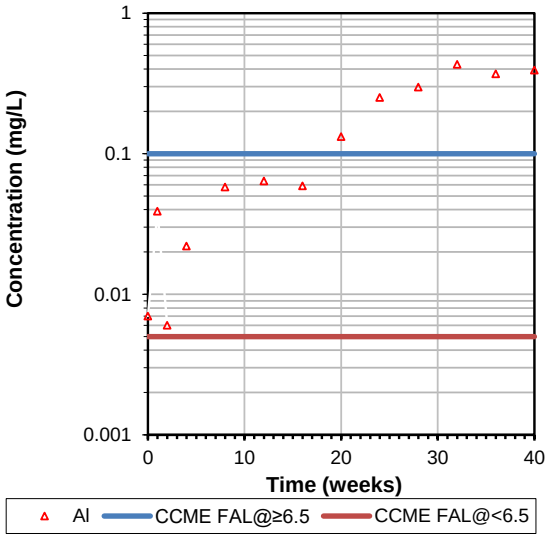
Humidity Cell Test (ASTM D 5744-96)

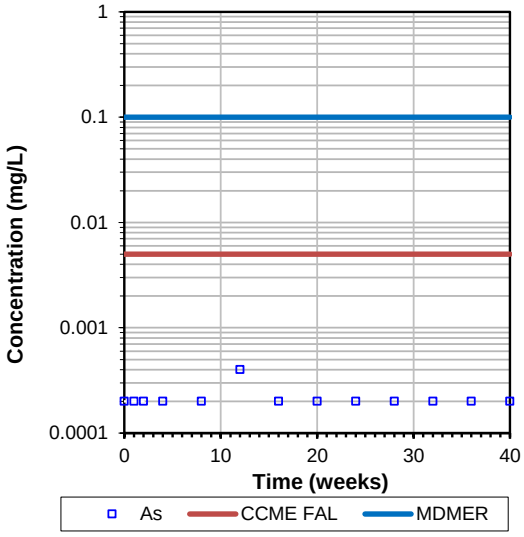
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

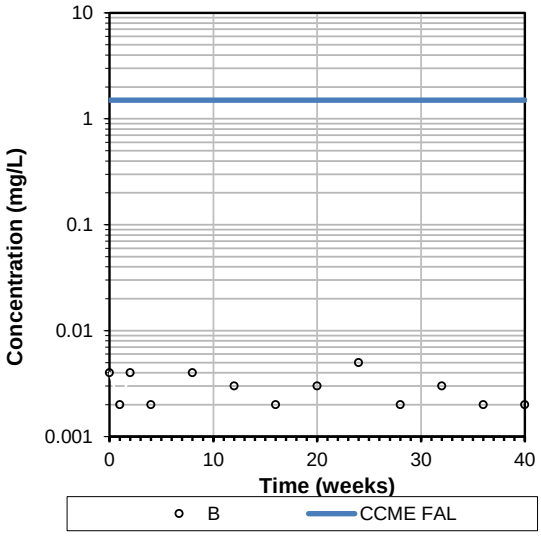


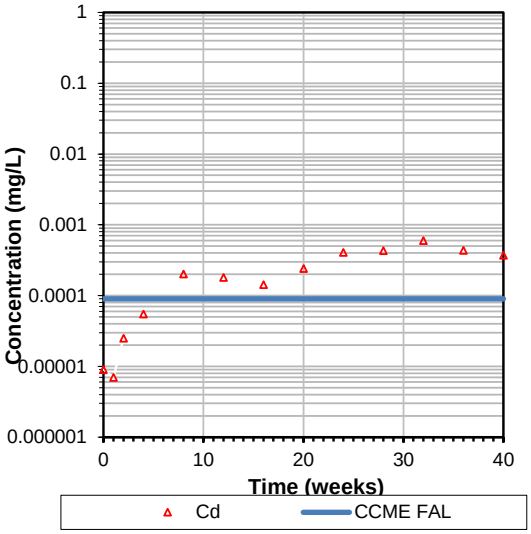


TEST REPORT

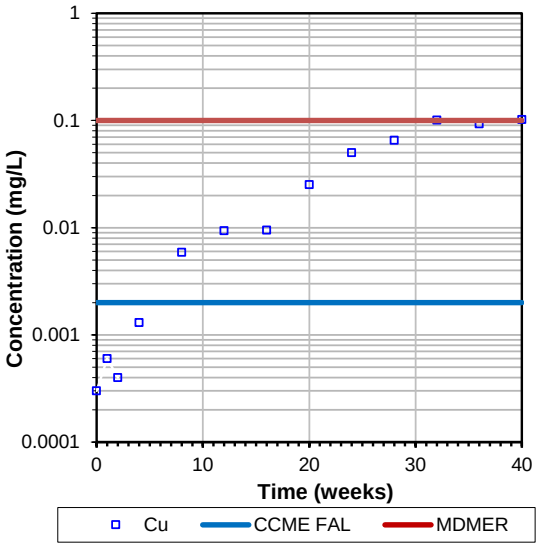
Humidity Cell Test (ASTM D 5744-96)

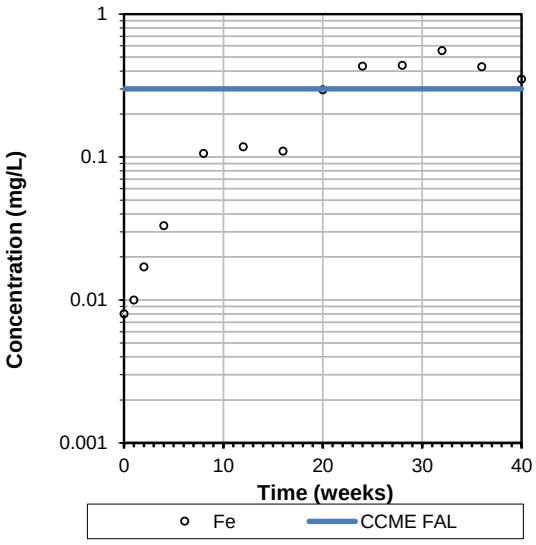
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

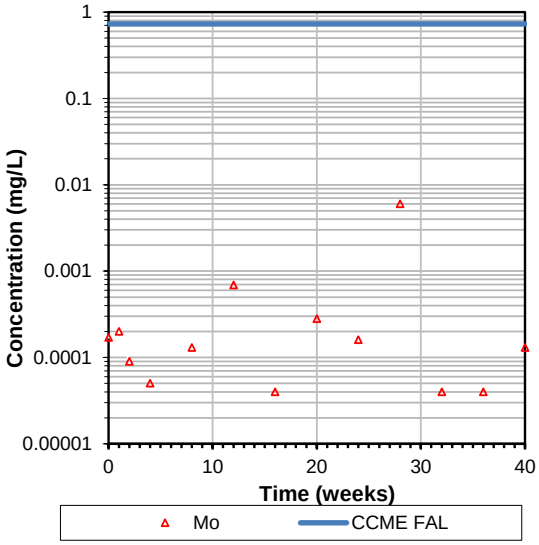


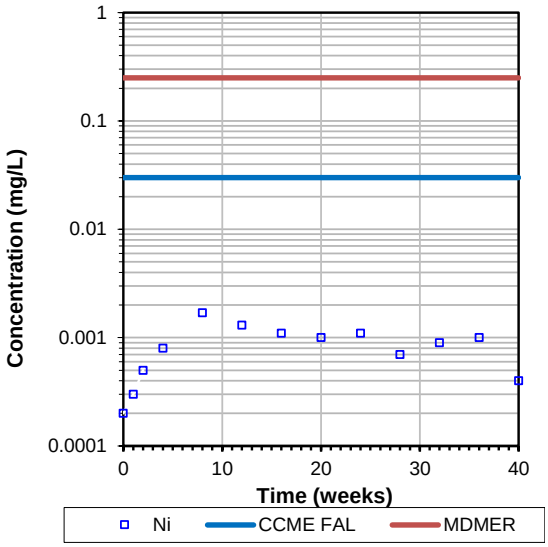


TEST REPORT

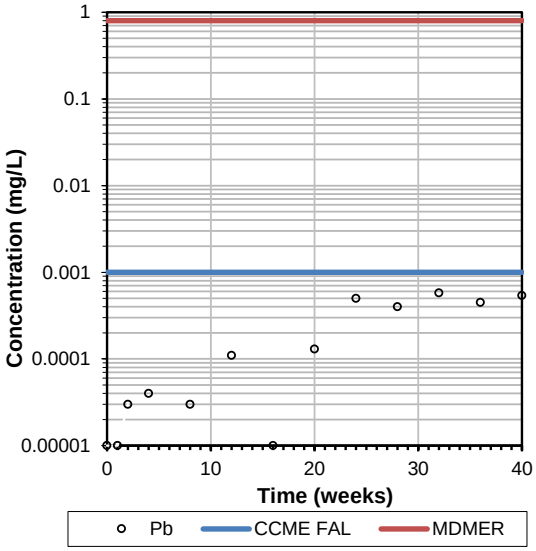
Humidity Cell Test (ASTM D 5744-96)

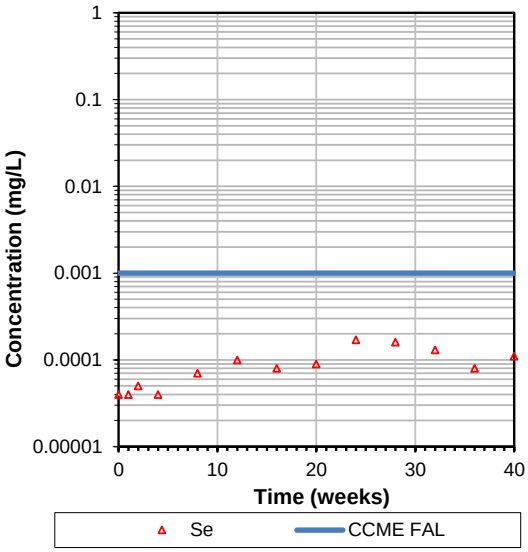
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

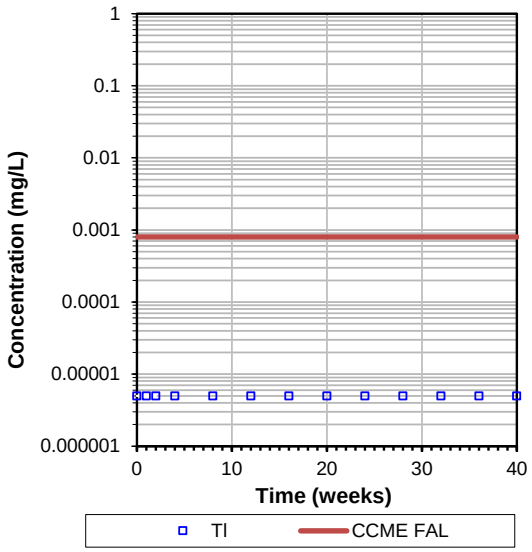


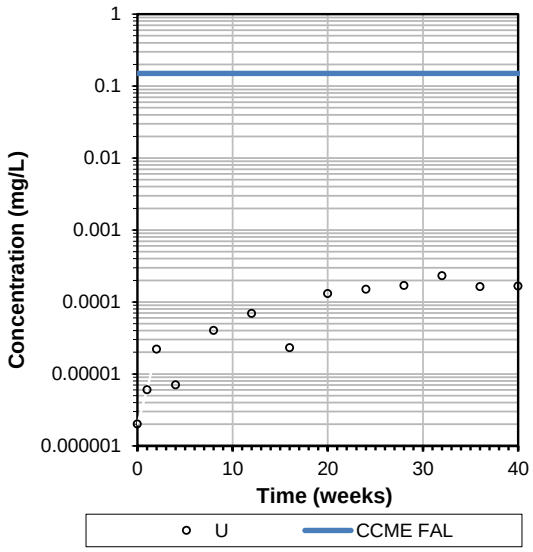


TEST REPORT

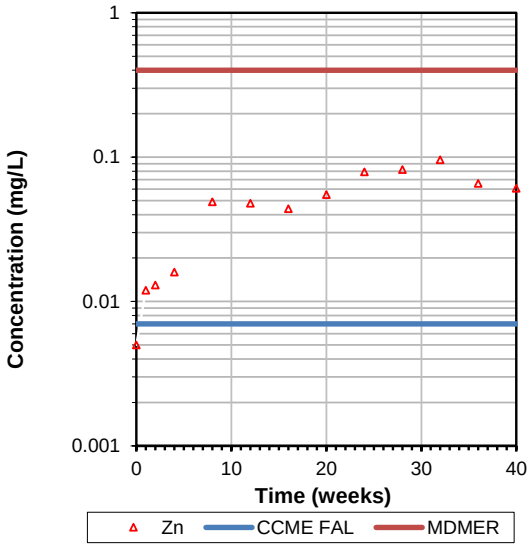
Humidity Cell Test (ASTM D 5744-96)

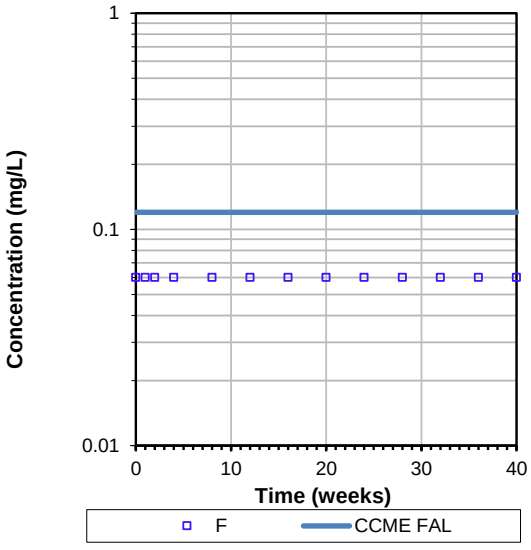
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	3	4	5	6	7	8	9	10
Date			Effective	12-Aug-20	19-Aug-20	26-Aug-20	02-Sep-20	09-Sep-20	16-Sep-20	23-Sep-20	30-Sep-20	07-Oct-20	14-Oct-20	21-Oct-20
LIMS			01-Jun-2021	10106-AUG20	10145-AUG20	10223-AUG20	10008-SEP20	10092-SEP20	10154-SEP20	10233-SEP20	10315-SEP20	10022-OCT20	10133-OCT20	10197-OCT20
Hum Cell Leachate Vol	mL	-	-	568	846	859	813	890	899	831	486	394	502	319
pH	no unit	6.0-9.5	-	**5.73**	**5.96**	**5.42**	**5.66**	**5.52**	**5.45**	**5.18**	**4.98**	**4.84**	**4.41**	**4.36**
Acidity	mg/L as $CaCO_3$	-	-	15	9	6	3	3	4	4	14	15	18	8
Alkalinity	mg/L as $CaCO_3$	-	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	110	32	42	54	54	71	85	66	68	177	61
SO_4	mg/L	-	-	33	10	15	24	21	28	48	31	28	74	19
F	mg/L	0.12	-	< 0.06	< 0.06	< 0.06	---	< 0.06	---	---	---	< 0.06	---	---
NH_3+NH_4	as N mg/L	-	-	0.1	<0.1	<0.1	---	<0.1	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	0.000	0.000	0.000	---	0.000	---	---	---	---	---	---
CN_T	mg/L	-	0.50	0.004	0.002	0.002	---	< 0.002	---	---	---	< 0.002	---	---
CN_{WAD}	mg/L	0.005 as CNF	-	0.003	0.002	0.002	---	< 0.002	---	---	---	< 0.002	---	---
Hg	mg/L	0.000026	-	< 0.00001	< 0.00001	0.00001	---	< 0.00001	---	---	---	< 0.00001	---	---
Ag	mg/L	0.00025	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---	---
Al	mg/L	0.005@pH<6.5	-	0.001	0.016	0.002	---	0.006	---	---	---	**0.077**	---	---
As	mg/L	0.005	0.10	< 0.0002	< 0.0002	< 0.0002	---	< 0.0002	---	---	---	0.0002	---	---
Ba	mg/L	-	-	0.00100	0.00074	0.00031	---	0.00140	---	---	---	0.00470	---	---
Be	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	---	< 0.000007	---	---	---	0.000034	---	---
B	mg/L	1.5	-	0.011	0.010	0.004	---	0.009	---	---	---	0.007	---	---
Bi	mg/L	-	-	< 0.000007	< 0.000007	0.000024	---	< 0.000007	---	---	---	< 0.000007	---	---
Ca	mg/L	-	-	10.1	3.03	4.18	---	6.32	---	---	---	6.74	---	---
Cd	mg/L	0.00009	-	0.000043	0.000004	0.000026	---	0.000050	---	---	---	**0.000283**	---	---
Co	mg/L	-	-	0.00113	0.000272	0.000743	---	0.00218	---	---	---	0.00648	---	---
Cr	mg/L	-	-	< 0.00008	< 0.00008	< 0.00008	---	< 0.00008	---	---	---	< 0.00008	---	---
Cu	mg/L	0.002	0.10	**0.0024**	0.0003	0.0009	---	**0.0028**	---	---	---	**0.0388**	---	---
Fe	mg/L	0.3	-	< 0.007	< 0.007	0.011	---	0.007	---	---	---	0.147	---	---
K	mg/L	-	-	0.322	0.335	0.052	---	0.088	---	---	---	0.081	---	---
Li	mg/L	-	-	0.0009	0.0011	0.0003	---	0.0004	---	---	---	0.0007	---	---
Mg	mg/L	-	-	3.76	0.926	1.24	---	1.52	---	---	---	1.33	---	---
Mn	mg/L	-	-	0.227	0.0657	0.117	---	0.159	---	---	---	0.198	---	---
Mo	mg/L	0.073	-	< 0.00004	0.00091	< 0.00004	---	0.00011	---	---	---	< 0.00004	---	---
Na	mg/L	-	-	2.61	2.98	0.52	---	0.51	---	---	---	0.48	---	---
Ni	mg/L	0.03	0.25	0.0021	0.0005	0.0013	---	0.0037	---	---	---	0.0133	---	---
P	mg/L	-	-	0.019	< 0.003	< 0.003	---	< 0.003	---	---	---	< 0.003	---	---
Pb	mg/L	0.001	0.08	0.00008	< 0.00001	< 0.00001	---	0.00003	---	---	---	0.00027	---	---
Sb	mg/L	-	-	0.0009	< 0.0009	< 0.0009	---	< 0.0009	---	---	---	< 0.0009	---	---
Se	mg/L	0.001	-	0.00034	0.00007	0.00009	---	0.00008	---	---	---	0.00009	---	---
Si	mg/L	-	-	0.89	0.33	0.40	---	0.57	---	---	---	0.88	---	---
Sn	mg/L	-	-	0.00034	0.00006	0.00024	---	< 0.00006	---	---	---	0.00006	---	---
Sr	mg/L	-	-	0.00887	0.0330	0.00312	---	0.00636	---	---	---	0.0126	---	---
Th	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	---	< 0.0001	---	---	---	< 0.0001	---	---
Ti	mg/L	-	-	< 0.00005	< 0.00005	< 0.00005	---	< 0.00005	---	---	---	< 0.00005	---	---
Tl	mg/L	0.0008	-	< 0.000005	< 0.000005	< 0.000005	---	< 0.000005	---	---	---	< 0.000005	---	---
U	mg/L	0.015	-	< 0.000002	0.000004	< 0.000002	---	< 0.000002	---	---	---	0.000034	---	---
V	mg/L	-	-	< 0.00001	0.00002	< 0.00001	---	< 0.00001	---	---	---	< 0.00001	---	---
W	mg/L	-	-	0.00005	0.00009	< 0.00002	---	< 0.00002	---	---	---	0.00025	---	---
Y	mg/L	-	-	0.000016	< 0.000002	0.000006	---	0.000066	---	---	---	0.000901	---	---
Zn	mg/L	0.007	0.40	**0.016**	0.003	0.008	---	**0.019**	---	---	---	**0.064**	---	---

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	11	12	13	14	15	16	17	18	19	20	21
Date			Effective	28-Oct-20	04-Nov-20	11-Nov-20	18-Nov-20	25-Nov-20	02-Dec-20	09-Dec-20	16-Dec-20	23-Dec-20	30-Dec-20	06-Jan-21
LIMS			01-Jun-2021	10255-OCT20	10020-NOV20	10078-NOV20	10125-NOV20	10163-NOV20	10019-DEC20	10071-DEC20	10163-DEC20	10186-DEC20	10241-DEC20	10026-JAN21
Hum Cell Leachate Vol	mL	-	-	673	755	420	304	308	298	289	353	282	250	304
pH	no unit	6.0-9.5	-	**4.28**	**4.02**	**3.70**	**3.76**	**3.21**	**3.02**	**2.98**	**2.84**	**2.73**	**2.70**	**2.75**
Acidity	mg/L as $CaCO_3$	-	-	14	49	101	112	174	198	373	454	547	585	556
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	243	336	561	498	602	691	970	1160	1400	1460	1380
SO_4	mg/L	-	-	100	130	240	180	220	290	420	470	630	650	560
F	mg/L	0.12	-	---	**0.29**	---	---	---	**0.21**	---	---	---	**0.16**	---
NH_3+NH_4	as N mg/L	-	-	---	---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---	---
CN_T	mg/L	-	0.50	---	< 0.002	---	---	---	< 0.002	---	---	---	< 0.002	---
CN_{WAD}	mg/L	0.005 as CNF	-	---	< 0.002	---	---	---	< 0.002	---	---	---	0.002	---
Hg	mg/L	0.000026	-	---	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001	---
Ag	mg/L	0.00025	-	---	< 0.00005	---	---	---	< 0.00005	---	---	---	0.00005	---
Al	mg/L	0.005@pH<6.5	-	---	**4.50**	---	---	---	**27.8**	---	---	---	**51.8**	---
As	mg/L	0.005	0.10	---	0.0038	---	---	---	0.0043	---	---	---	0.0046	---
Ba	mg/L	-	-	---	0.0338	---	---	---	0.0637	---	---	---	0.0555	---
Be	mg/L	-	-	---	0.000852	---	---	---	0.00236	---	---	---	0.00233	---
B	mg/L	1.5	-	---	0.004	---	---	---	0.004	---	---	---	0.007	---
Bi	mg/L	-	-	---	< 0.000007	---	---	---	< 0.000007	---	---	---	0.000080	---
Ca	mg/L	-	-	---	14.4	---	---	---	11.1	---	---	---	5.10	---
Cd	mg/L	0.00009	-	---	**0.00454**	---	---	---	**0.00459**	---	---	---	**0.00530**	---
Co	mg/L	-	-	---	0.0851	---	---	---	0.0567	---	---	---	0.0901	---
Cr	mg/L	-	-	---	0.00073	---	---	---	0.0276	---	---	---	0.166	---
Cu	mg/L	0.002	0.10	---	**0.688**	---	---	---	**1.67**	---	---	---	**1.20**	---
Fe	mg/L	0.3	-	---	**3.06**	---	---	---	**13.9**	---	---	---	**69.3**	---
K	mg/L	-	-	---	0.612	---	---	---	0.853	---	---	---	0.830	---
Li	mg/L	-	-	---	0.0072	---	---	---	0.0083	---	---	---	0.0295	---
Mg	mg/L	-	-	---	13.6	---	---	---	4.36	---	---	---	10.1	---
Mn	mg/L	-	-	---	1.83	---	---	---	0.506	---	---	---	0.727	---
Mo	mg/L	0.073	-	---	0.00024	---	---	---	0.00022	---	---	---	0.00031	---
Na	mg/L	-	-	---	4.79	---	---	---	3.75	---	---	---	4.71	---
Ni	mg/L	0.03	0.25	---	**0.187**	---	---	---	**0.0906**	---	---	---	**0.0997**	---
P	mg/L	-	-	---	< 0.003	---	---	---	< 0.003	---	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	---	**0.00138**	---	---	---	**0.0134**	---	---	---	**0.0580**	---
Sb	mg/L	-	-	---	< 0.0009	---	---	---	< 0.0009	---	---	---	0.0011	---
Se	mg/L	0.001	-	---	0.00093	---	---	---	**0.00105**	---	---	---	0.00085	---
Si	mg/L	-	-	---	3.84	---	---	---	15.4	---	---	---	18.5	---
Sn	mg/L	-	-	---	0.00007	---	---	---	0.00016	---	---	---	0.00041	---
Sr	mg/L	-	-	---	0.0501	---	---	---	0.0378	---	---	---	0.0266	---
Th	mg/L	-	-	---	< 0.0001	---	---	---	0.0028	---	---	---	0.0108	---
Ti	mg/L	-	-	---	0.00008	---	---	---	< 0.00005	---	---	---	0.00014	---
Tl	mg/L	0.0008	-	---	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005	---
U	mg/L	0.015	-	---	0.00105	---	---	---	0.00328	---	---	---	0.00420	---
V	mg/L	-	-	---	0.00002	---	---	---	< 0.00001	---	---	---	0.00025	---
W	mg/L	-	-	---	0.00054	---	---	---	0.00006	---	---	---	0.00055	---
Y	mg/L	-	-	---	0.0365	---	---	---	0.105	---	---	---	0.0851	---
Zn	mg/L	0.007	0.40	---	**0.793**	---	---	---	**0.603**	---	---	---	**0.606**	---

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	22	23	24	25	26	27	28	29	30	31	32
Date			Effective	13-Jan-21	20-Jan-21	27-Jan-21	03-Feb-21	10-Feb-21	17-Feb-21	24-Feb-21	03-Mar-21	10-Mar-21	17-Mar-21	24-Mar-21
LIMS			01-Jun-2021	10067-JAN21	10143-JAN21	10208-JAN21	10019-FEB21	10045-FEB21	10167-FEB21	10263-FEB21	10021-MAR21	10121-MAR21	10151-MAR21	10257-MAR21
Hum Cell Leachate Vol	mL	-	-	307	398	372	302	386	269	319	347	313	418	345
pH	no unit	6.0-9.5	-	**2.71**	**2.74**	**2.77**	**2.69**	**2.75**	**2.74**	**2.68**	**2.77**	**2.81**	**2.80**	**2.82**
Acidity	mg/L as $CaCO_3$	-	-	589	492	450	468	430	512	448	424	423	339	334
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	1510	1330	1320	1400	1270	1390	1370	1260	1290	1110	1080
SO_4	mg/L	-	-	660	520	500	540	490	560	530	470	460	360	410
F	mg/L	0.12	-	---	---	< 0.06	---	---	---	< 0.06	---	---	---	**0.29**
NH_3+NH_4	as N mg/L	-	-	---	---	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---	---	---
CN_T	mg/L	-	0.50	---	---	< 0.002	---	---	---	< 0.002	---	---	---	< 0.002
CN_{WAD}	mg/L	0.005 as CNF	-	---	---	< 0.002	---	---	---	< 0.002	---	---	---	< 0.002
Hg	mg/L	0.000026	-	---	---	< 0.00001	---	---	---	< 0.00001	---	---	---	< 0.00001
Ag	mg/L	0.00025	-	---	---	< 0.00005	---	---	---	< 0.00005	---	---	---	< 0.00005
Al	mg/L	0.005@pH<6.5	-	---	---	**37.6**	---	---	---	**40.8**	---	---	---	**31.3**
As	mg/L	0.005	0.10	---	---	0.0026	---	---	---	0.0019	---	---	---	0.0010
Ba	mg/L	-	-	---	---	0.0398	---	---	---	0.0305	---	---	---	0.0310
Be	mg/L	-	-	---	---	0.00117	---	---	---	0.00146	---	---	---	0.0012
B	mg/L	1.5	-	---	---	0.003	---	---	---	0.003	---	---	---	0.004
Bi	mg/L	-	-	---	---	< 0.000007	---	---	---	< 0.000007	---	---	---	< 0.000007
Ca	mg/L	-	-	---	---	4.60	---	---	---	5.79	---	---	---	7.24
Cd	mg/L	0.00009	-	---	---	**0.00399**	---	---	---	**0.00369**	---	---	---	**0.0024**
Co	mg/L	-	-	---	---	0.0616	---	---	---	0.0679	---	---	---	0.0514
Cr	mg/L	-	-	---	---	0.110	---	---	---	0.133	---	---	---	0.0821
Cu	mg/L	0.002	0.10	---	---	**0.558**	---	---	---	**0.461**	---	---	---	**0.311**
Fe	mg/L	0.3	-	---	---	**59.7**	---	---	---	**68.8**	---	---	---	**55.2**
K	mg/L	-	-	---	---	0.544	---	---	---	0.490	---	---	---	0.419
Li	mg/L	-	-	---	---	0.0126	---	---	---	0.0152	---	---	---	0.0132
Mg	mg/L	-	-	---	---	6.89	---	---	---	9.42	---	---	---	7.59
Mn	mg/L	-	-	---	---	0.543	---	---	---	0.648	---	---	---	0.472
Mo	mg/L	0.073	-	---	---	0.00012	---	---	---	0.00673	---	---	---	0.00006
Na	mg/L	-	-	---	---	3.11	---	---	---	3.86	---	---	---	3.54
Ni	mg/L	0.03	0.25	---	---	**0.0639**	---	---	---	**0.0716**	---	---	---	**0.0516**
P	mg/L	-	-	---	---	< 0.003	---	---	---	0.003	---	---	---	< 0.003
Pb	mg/L	0.001	0.08	---	---	**0.0574**	---	---	---	**0.0662**	---	---	---	**0.0599**
Sb	mg/L	-	-	---	---	< 0.0009	---	---	---	< 0.0009	---	---	---	< 0.0009
Se	mg/L	0.001	-	---	---	0.00059	---	---	---	0.00048	---	---	---	0.00041
Si	mg/L	-	-	---	---	32.5	---	---	---	26.5	---	---	---	35.4
Sn	mg/L	-	-	---	---	0.00026	---	---	---	0.00021	---	---	---	0.00036
Sr	mg/L	-	-	---	---	0.0184	---	---	---	0.0217	---	---	---	0.0188
Th	mg/L	-	-	---	---	0.0111	---	---	---	0.0151	---	---	---	0.0055
Ti	mg/L	-	-	---	---	0.00020	---	---	---	0.00020	---	---	---	0.00022
Tl	mg/L	0.0008	-	---	---	< 0.000005	---	---	---	< 0.000005	---	---	---	< 0.000005
U	mg/L	0.015	-	---	---	0.00191	---	---	---	0.00223	---	---	---	0.0015
V	mg/L	-	-	---	---	0.00029	---	---	---	0.00047	---	---	---	0.00023
W	mg/L	-	-	---	---	0.00005	---	---	---	0.00002	---	---	---	0.00002
Y	mg/L	-	-	---	---	0.0389	---	---	---	0.0400	---	---	---	0.0321
Zn	mg/L	0.007	0.40	---	---	**0.332**	---	---	---	**0.283**	---	---	---	**0.174**

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	33	34	35	36	37	38	39	40	41
Date			Effective	31-Mar-21	07-Apr-21	14-Apr-21	21-Apr-21	28-Apr-21	05-May-21	12-May-21	19-May-21	26-May-21
LIMS			01-Jun-2021	10315-MAR21	10032-APR21	10115-APR21	10172-APR21	10200-APR21	10024-MAY21	10058-MAY21	10151-MAY21	10231-MAY21
Hum Cell Leachate Vol	mL	-	-	409	409	427	404	399	398	412	453	468
pH	no unit	6.0-9.5	-	**2.79**	**2.87**	**2.89**	**2.92**	**2.90**	**2.88**	**2.93**	**2.94**	**2.98**
Acidity	mg/L as $CaCO_3$	-	-	339	326	275	251	249	239	251	209	196
Alkalinity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Conductivity	µS/cm	-	-	1160	1030	978	916	919	916	884	832	772
SO_4	mg/L	-	-	390	360	290	290	290	280	400	240	220
F	mg/L	0.12	-	---	---	---	**0.35**	---	---	---	**0.37**	---
NH_3+NH_4	as N mg/L	-	-	---	---	---	---	---	---	---	---	---
Un-Ionized NH_3	as N mg/L	0.020	0.50	---	---	---	---	---	---	---	---	---
CN_T	mg/L	-	0.50	---	---	---	< 0.002	---	---	---	< 0.002	---
CN_{WAD}	mg/L	0.005 as CNF	-	---	---	---	< 0.002	---	---	---	< 0.002	---
Hg	mg/L	0.000026	-	---	---	---	< 0.00001	---	---	---	0.00001	---
Ag	mg/L	0.00025	-	---	---	---	< 0.00005	---	---	---	< 0.00005	---
Al	mg/L	0.005@pH<6.5	-	---	---	---	**22.9**	---	---	---	**16.0**	---
As	mg/L	0.005	0.10	---	---	---	0.0007	---	---	---	0.0005	---
Ba	mg/L	-	-	---	---	---	0.0217	---	---	---	0.0230	---
Be	mg/L	-	-	---	---	---	0.000711	---	---	---	0.00065	---
B	mg/L	1.5	-	---	---	---	< 0.002	---	---	---	< 0.002	---
Bi	mg/L	-	-	---	---	---	0.000007	---	---	---	< 0.00001	---
Ca	mg/L	-	-	---	---	---	6.72	---	---	---	5.73	---
Cd	mg/L	0.00009	-	---	---	---	**0.00128**	---	---	---	**0.000964**	---
Co	mg/L	-	-	---	---	---	0.0356	---	---	---	0.0276	---
Cr	mg/L	-	-	---	---	---	0.0471	---	---	---	0.0299	---
Cu	mg/L	0.002	0.10	---	---	---	**0.193**	---	---	---	**0.138**	---
Fe	mg/L	0.3	-	---	---	---	**35.3**	---	---	---	**22.9**	---
K	mg/L	-	-	---	---	---	0.326	---	---	---	0.209	---
Li	mg/L	-	-	---	---	---	0.0085	---	---	---	0.0075	---
Mg	mg/L	-	-	---	---	---	6.02	---	---	---	4.31	---
Mn	mg/L	-	-	---	---	---	0.317	---	---	---	0.238	---
Mo	mg/L	0.073	-	---	---	---	0.00004	---	---	---	0.00005	---
Na	mg/L	-	-	---	---	---	3.18	---	---	---	2.37	---
Ni	mg/L	0.03	0.25	---	---	---	**0.0350**	---	---	---	0.0263	---
P	mg/L	-	-	---	---	---	0.012	---	---	---	< 0.003	---
Pb	mg/L	0.001	0.08	---	---	---	**0.0344**	---	---	---	**0.0345**	---
Sb	mg/L	-	-	---	---	---	< 0.0009	---	---	---	< 0.0009	---
Se	mg/L	0.001	-	---	---	---	0.00028	---	---	---	0.00025	---
Si	mg/L	-	-	---	---	---	24.8	---	---	---	23.8	---
Sn	mg/L	-	-	---	---	---	0.00014	---	---	---	0.00015	---
Sr	mg/L	-	-	---	---	---	0.0154	---	---	---	0.0131	---
Th	mg/L	-	-	---	---	---	0.0025	---	---	---	0.0015	---
Ti	mg/L	-	-	---	---	---	0.00013	---	---	---	0.00014	---
Tl	mg/L	0.0008	-	---	---	---	< 0.000005	---	---	---	< 0.000005	---
U	mg/L	0.015	-	---	---	---	0.00121	---	---	---	0.000585	---
V	mg/L	-	-	---	---	---	0.00012	---	---	---	0.00007	---
W	mg/L	-	-	---	---	---	< 0.00002	---	---	---	< 0.00002	---
Y	mg/L	-	-	---	---	---	0.0225	---	---	---	0.0202	---
Zn	mg/L	0.007	0.40	---	---	---	**0.098**	---	---	---	**0.075**	---

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Summary of ABA Test Data

Parameter	Units	Ref No.: 10141-JUL20
Sulphur (S)	%	0.408
Sulphide (S^-)	%	0.42
NP	t $CaCO_3$/1000 t	3.5
CO_3 NP	t $CaCO_3$/1000 t	3.3

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
0	568	5.73	15	2	110	33
1	846	5.96	9	<2	32	10
2	859	5.42	6	<2	42	15
3	813	5.66	3	<2	54	24
4	890	5.52	3	<2	54	21
5	899	5.45	4	<2	71	28
6	831	5.18	4	<2	85	48
7	486	4.98	14	<2	66	31
8	394	4.84	15	<2	68	28
9	502	4.41	18	<2	177	74
10	319	4.36	8	<2	61	19
11	673	4.28	14	<2	243	100
12	755	4.02	49	<2	336	130
13	420	3.70	101	<2	561	240
14	304	3.76	112	<2	498	180
15	308	3.21	174	<2	602	220
16	298	3.02	198	<2	691	290
17	289	2.98	373	<2	970	420
18	353	2.84	454	<2	1160	470
19	282	2.73	547	<2	1400	630
20	250	2.70	585	<2	1460	650

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^=$ Depletion %	Cumulative $S^=$ Depletion %
18.7	18.7	0.15	0.15
8.5	27.2	0.07	0.22
12.9	40.1	0.10	0.32
19.5	59.6	0.15	0.47
18.7	78.3	0.15	0.62
25.2	103.5	0.20	0.82
39.9	143.4	0.32	1.14
15.1	158.4	0.12	1.26
11.0	169.4	0.09	1.34
37.1	206.6	0.29	1.64
6.1	212.7	0.05	1.69
67.3	280.0	0.53	2.22
98.2	378.1	0.78	3.00
100.8	478.9	0.80	3.80
54.7	533.6	0.43	4.24
67.8	601.4	0.54	4.77
86.4	687.8	0.69	5.46
121.4	809.2	0.96	6.42
165.9	975.1	1.32	7.74
177.7	1152.8	1.41	9.15
162.5	1315.3	1.29	10.44

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
19.53	0.56	0.59
8.81	0.81	0.86
13.42	1.19	1.27
20.33	1.77	1.88
19.47	2.33	2.47
26.22	3.08	3.27
41.55	4.27	4.52
15.69	4.71	5.00
11.49	5.04	5.35
38.70	6.15	6.52
6.31	6.33	6.71
70.10	8.33	8.84
102.24	11.25	11.94
105.00	14.25	15.12
57.00	15.88	16.84
70.58	17.90	18.98
90.02	20.47	21.71
126.44	24.08	25.54
172.82	29.02	30.78
185.06	34.31	36.39
169.27	39.14	41.52

** Initial Week 0 leachate may included soluble sulphate, and may not indicate oxidation of sulphide in the sample material has occurred.*

[1] *Calculated values*

Summary - Weeks 0 to 20

	pH	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^=$ Depletion %	Cumulative $S^=$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
Maximum Value	5.96	585	2	1460	650	177.7	-	1.41	-	185.06	-	-
Minimum Value	2.70	3	<2	32	10	6.1	-	0.05	-	6.31	-	-
Average Value	3.39	129	2	416	174	62.6	-	0.50	-	65.24	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Changes to Head Sample after 20 Weeks [1]

Parameter	Units	Ref No.: 10141-JUL20
Sulphide ($S^{=}$) Remaining	%	0.38
NP Remaining	t $CaCO_3$/1000 t	2.1
CO_3 NP Remaining	t $CaCO_3$/1000 t	1.9

Leachate Parameters Measured | ***Acid Generation*** [1] | ***Acid Neutralization*** [1]

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
21	304	2.75	556	<2	1380	560	170.2	1485.5	1.35	11.79	177.33	44.21	46.89
22	307	2.71	589	<2	1510	660	202.6	1688.1	1.61	13.40	211.06	50.24	53.29
23	398	2.74	492	<2	1330	520	207.0	1895.1	1.64	15.04	215.58	56.40	59.82
24	372	2.77	450	<2	1320	500	186.0	2081.1	1.48	16.52	193.75	61.94	65.69
25	302	2.69	468	<2	1400	540	163.1	2244.2	1.29	17.81	169.88	66.79	70.84
26	386	2.75	430	<2	1270	490	189.1	2433.3	1.50	19.31	197.02	72.42	76.81
27	269	2.74	512	<2	1390	560	150.6	2583.9	1.20	20.51	156.92	76.90	81.56
28	319	2.68	448	<2	1370	530	169.1	2753.0	1.34	21.85	176.11	81.93	86.90
29	347	2.77	424	<2	1260	470	163.1	2916.1	1.29	23.14	169.89	86.79	92.05
30	313	2.81	423	<2	1290	460	144.0	3060.1	1.14	24.29	149.98	91.07	96.59
31	418	2.80	339	<2	1110	360	150.5	3210.6	1.19	25.48	156.75	95.55	101.34
32	345	2.82	334	<2	1080	410	141.5	3352.0	1.12	26.60	147.34	99.76	105.81
33	409	2.79	339	<2	1160	390	159.5	3511.5	1.27	27.87	166.16	104.51	110.84
34	409	2.87	326	<2	1030	360	147.2	3658.8	1.17	29.04	153.38	108.89	115.49
35	427	2.89	275	<2	978	290	123.8	3782.6	0.98	30.02	128.99	112.58	119.40
36	404	2.92	251	<2	916	290	117.2	3899.7	0.93	30.95	122.04	116.06	123.10
37	399	2.90	249	<2	919	290	115.7	4015.5	0.92	31.87	120.53	119.51	126.75
38	398	2.88	239	<2	916	280	111.4	4126.9	0.88	32.75	116.08	122.82	130.27
39	412	2.93	251	<2	884	400	164.8	4291.7	1.31	34.06	171.67	127.73	135.47
40	453	2.94	209	<2	832	240	108.7	4400.4	0.86	34.92	113.25	130.96	138.90

[1] *Calculated values*

Summary - Weeks 0 to 40

Maximum Value	5.96	589	2	1510	660	207.0	-	1.64	-	216	-	-
Minimum Value	2.68	3	<2	32	10	6.1	-	0.05	-	6.3	-	-
Average Value	3.01	251	2	783	299	107.3	-	0.85	-	111.80	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
CND 1 Residue CNP DPL	1000

Changes to Head Sample after 40 Weeks [1]

Parameter	Units	Ref No.: 10141-JUL20
Sulphide ($S^{=}$) Remaining	%	0.27
NP Remaining	t $CaCO_3$/1000 t	-1.1
CO_3 NP Remaining	t $CaCO_3$/1000 t	-1.3

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
41	468	2.98	196	<2	772	220

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %
103.0	4503.4	0.82	35.74

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
107.25	134.03	142.15

[1] *Calculated values*

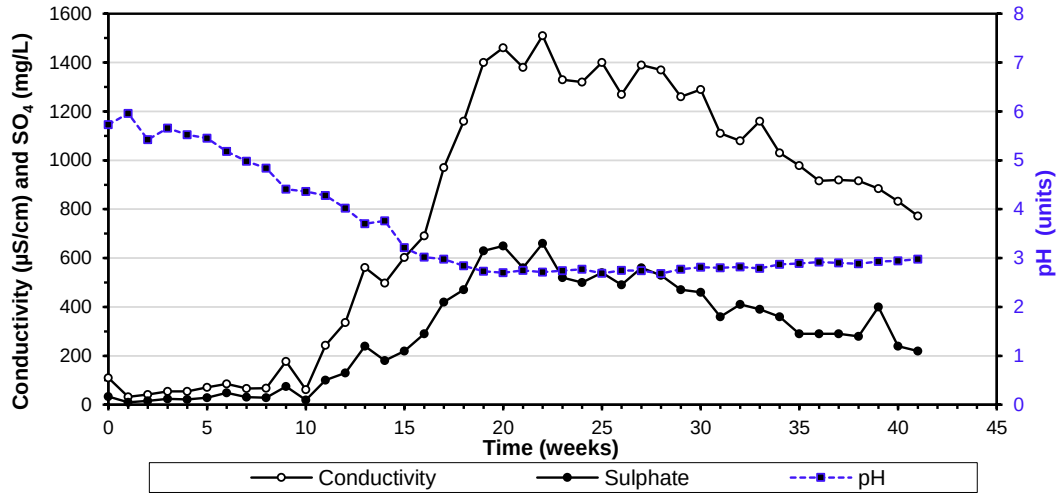
Summary - Weeks 0 to 60

Maximum Value	5.96	589	2	1510	660	207.0	-	1.64	-	215.58	-	-
Minimum Value	2.68	3	<2	32	10	6.1	-	0.05	-	6.31	-	-
Average Value	2.80	250	2	782	297	107.2	-	0.85	-	111.69	-	-

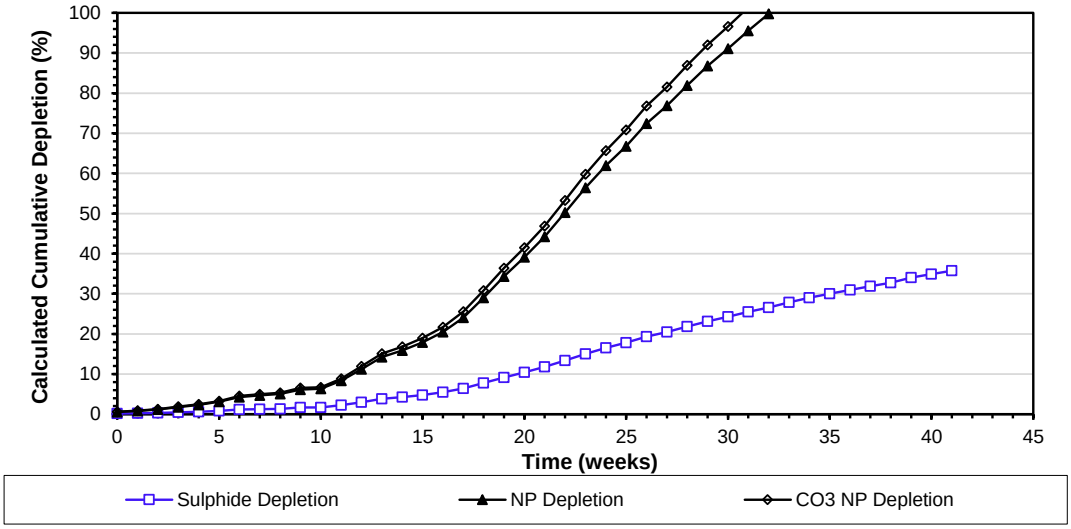
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Conductivity, Sulphate, and pH in Weekly Humidity Cell Leachate - CND 1 Residue CNP DPL



Cumulative Sulphide and NP Depletion CND 1 Residue CNP DPL

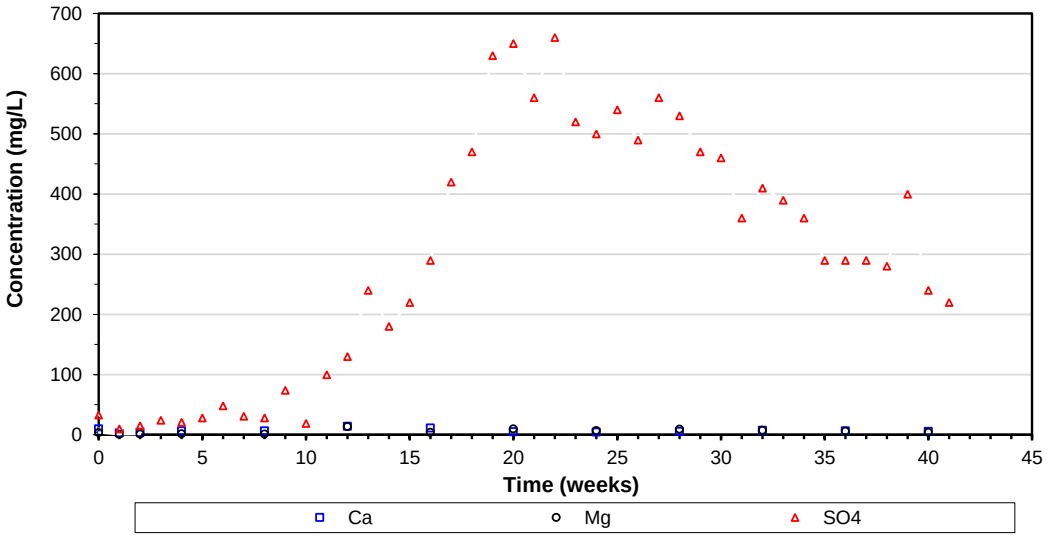


Note: NP depletion calculated based on sulphate assay.

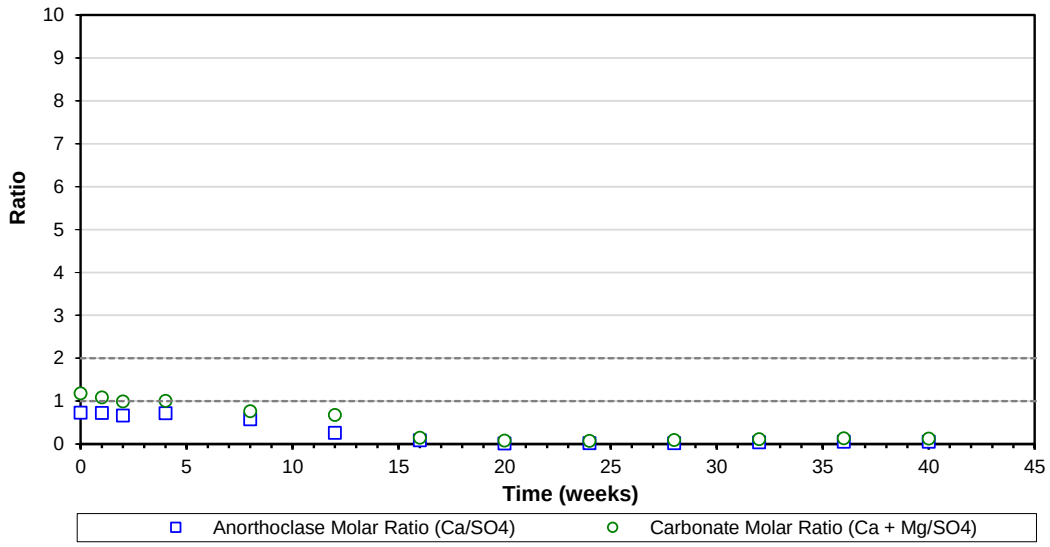
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL



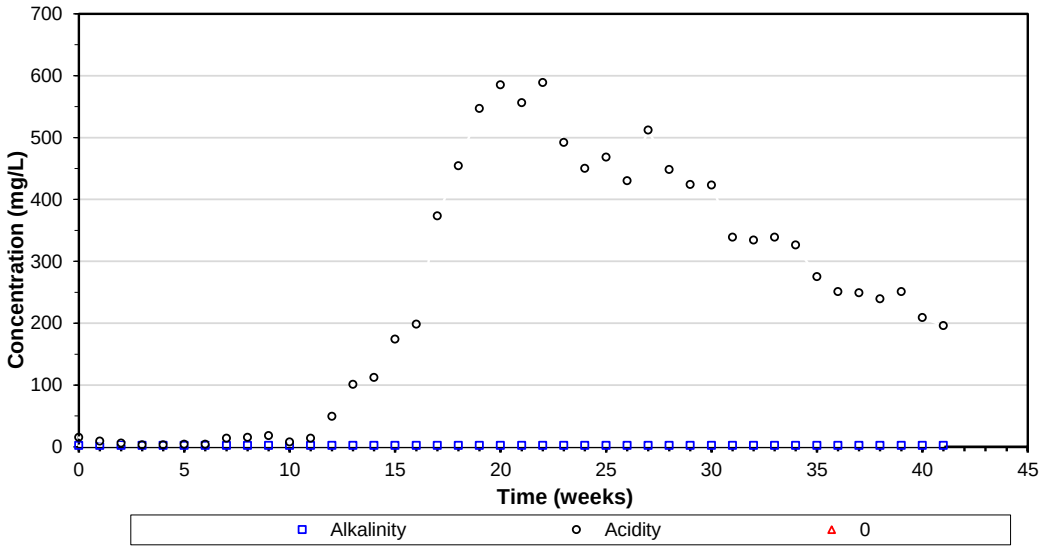
Carbonate (Ca + Mg/SO$_4$) and Anorthoclase (Ca/SO$_4$) Molar Ratios CND 1 Residue CNP DPL



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

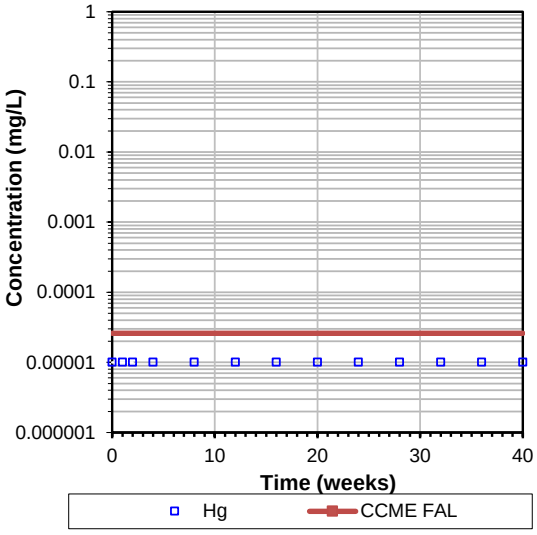
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

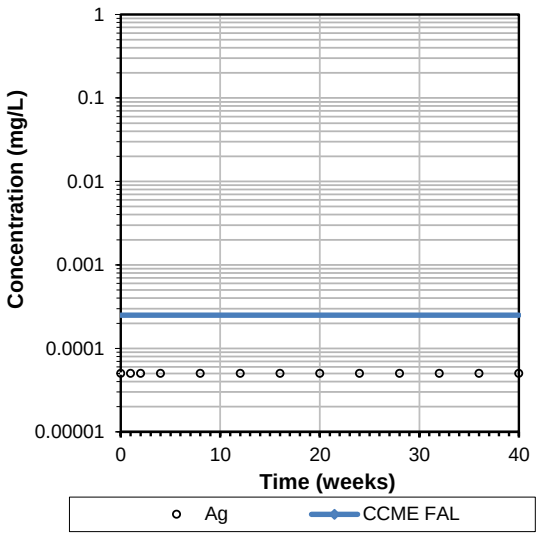


TEST REPORT

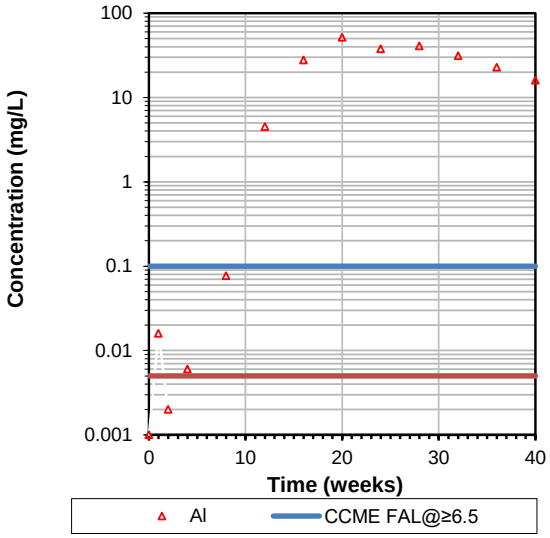
Humidity Cell Test (ASTM D 5744-96)

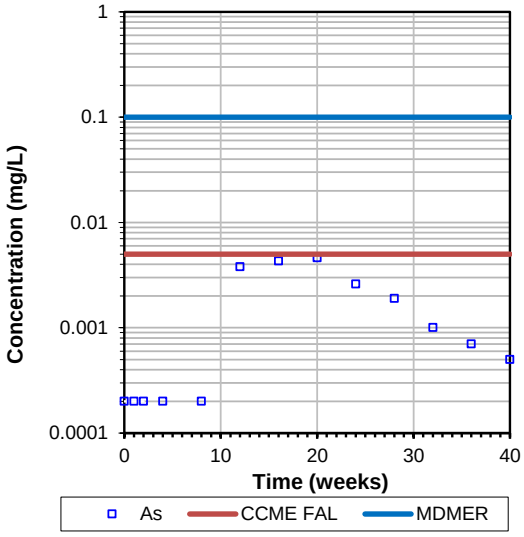
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

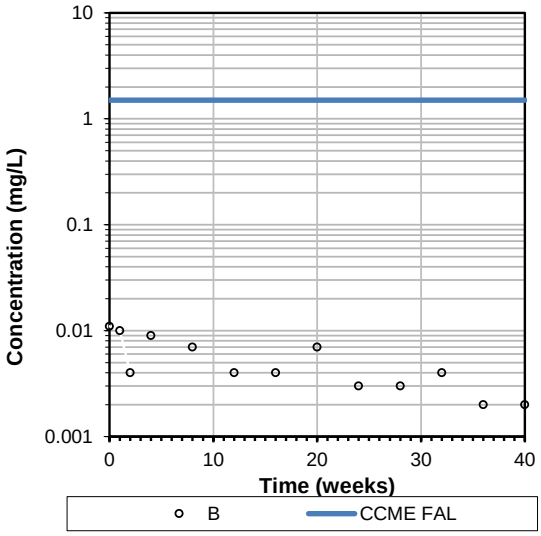


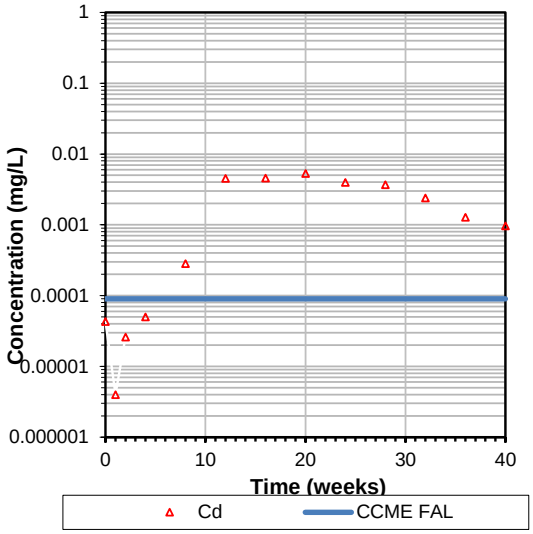


TEST REPORT

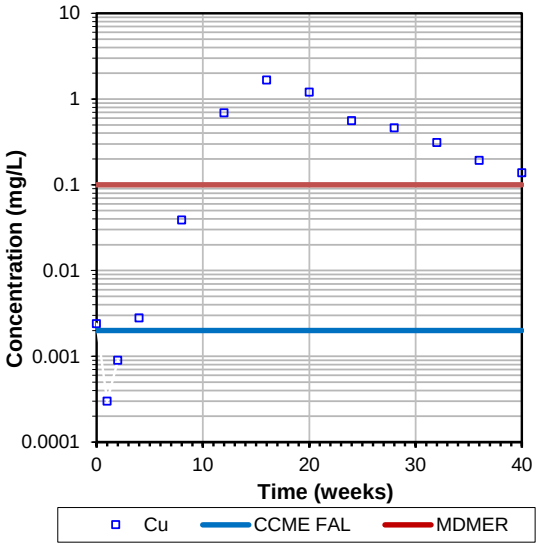
Humidity Cell Test (ASTM D 5744-96)

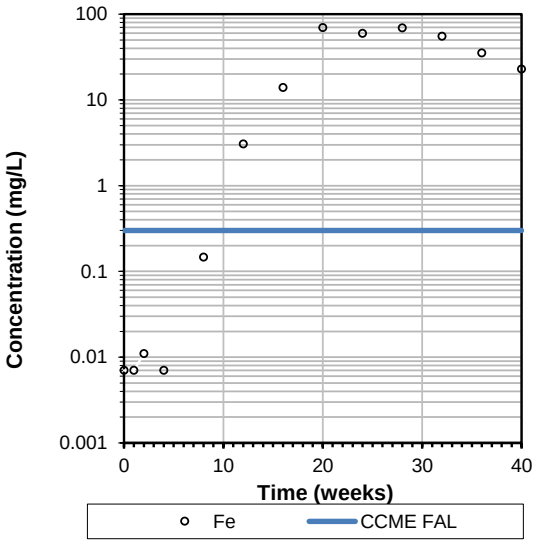
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

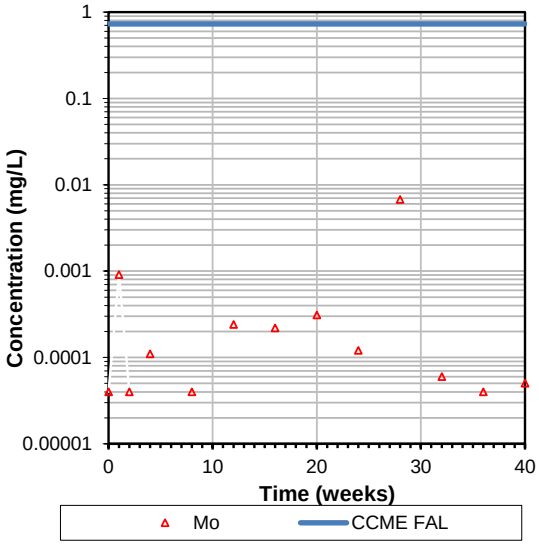


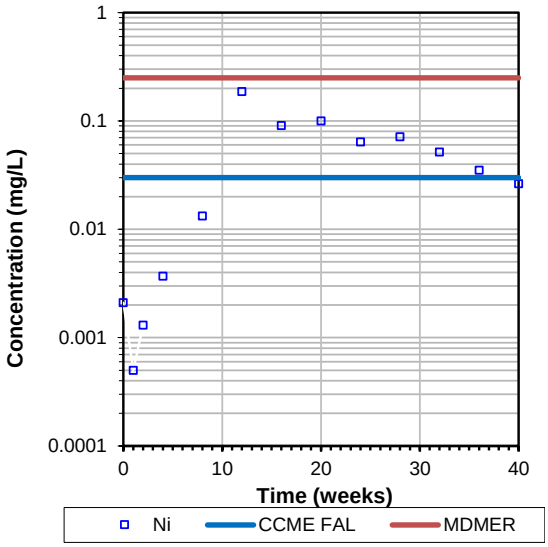


TEST REPORT

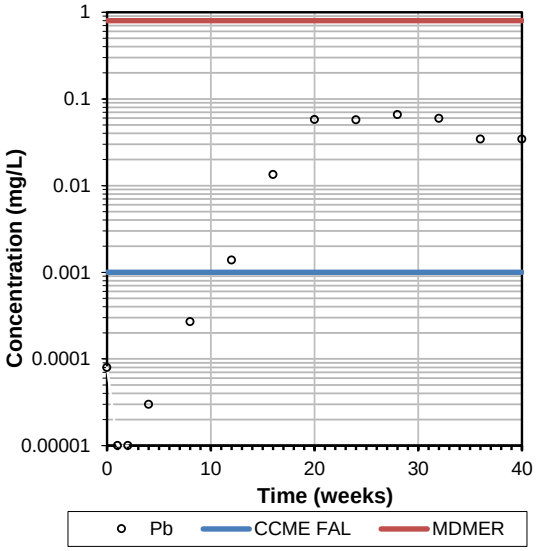
Humidity Cell Test (ASTM D 5744-96)

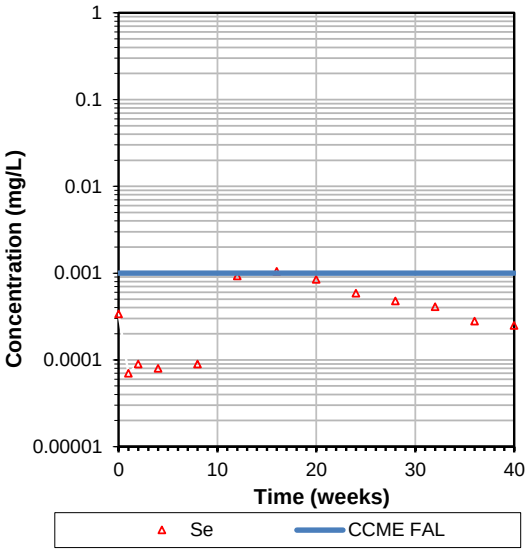
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

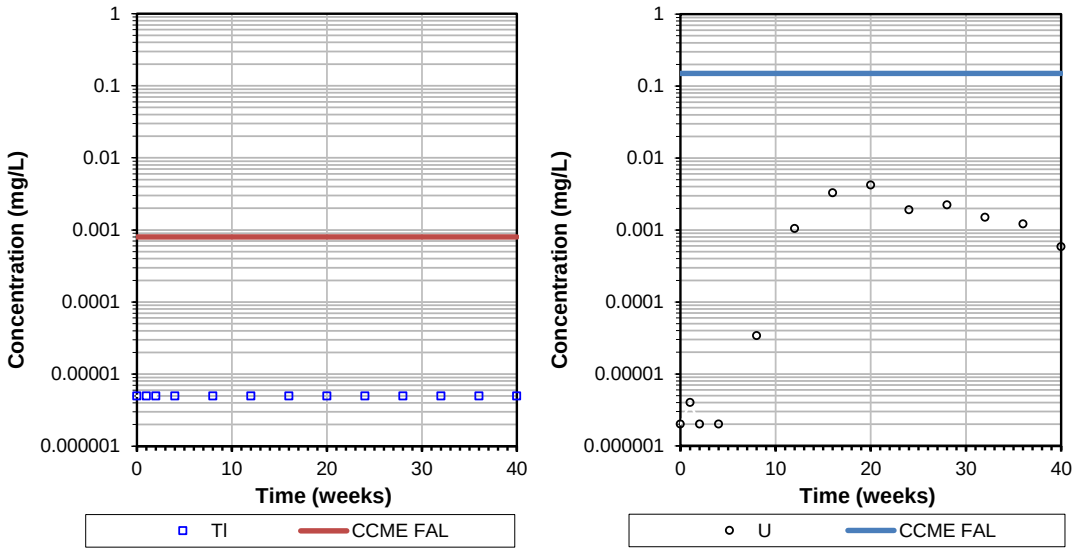




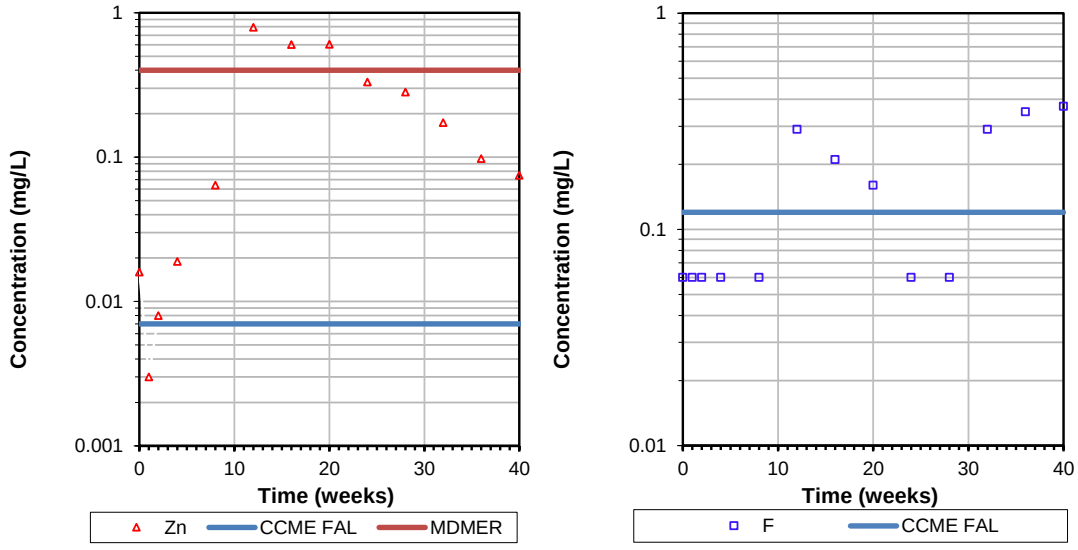
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL



Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL



Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	3	4	5	6	7	8	9
Date			Effective	12-Jan-21	19-Jan-21	26-Jan-21	02-Feb-21	09-Feb-21	16-Feb-21	23-Feb-21	02-Mar-21	09-Mar-21	16-Mar-21
LIMS			01-Jun-2021	10061-JAN21	10137-JAN21	10202-JAN21	10013-FEB21	10037-FEB21	10159-FEB21	10256-FEB21	10013-MAR21	10113-MAR21	10142-MAR21
Hum Cell Leachate Vo	mL	-	-	650	732	899	911	663	914	811	782	829	815
pH	no unit	6.0-9.5	-	7.84	7.74	7.91	8.02	8.22	8.12	8.18	8.13	8.14	8.24
Acidity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity	mg/L as $CaCO_3$	-	-	53	29	57	39	36	47	43	44	44	48
Conductivity	µS/cm	-	-	2950	820	496	144	118	124	114	115	116	111
SO_4	mg/L	-	-	1500	380	180	28	18	17	15	16	13	11
F	mg/L	0.12	-	**0.12**	< 0.06	0.07	--	< 0.06	--	--	--	< 0.06	--
NH_3+NH_4	as N mg/L			38.4	2.2	0.6	--	0.1	--	--	--	<0.1	--
Un-Ionized NH_3	as N mg/L	0.020	0.50	**1.02**	**0.05**	**0.02**	--	0.01	--	--	--	0.01	--
Hg	mg/L	0.000026	-	< 0.00001	0.00003	**0.00033**	--	**0.00013**	--	--	--	< 0.00001	--
Ag	mg/L	0.00025	-	< 0.00005	0.00020	**0.00060**	--	**0.00041**	--	--	--	< 0.00005	--
Al	mg/L	0.1@pH>6.5	-	0.055	0.063	**0.125**	--	**0.178**	--	--	--	**0.272**	--
As	mg/L	0.005	0.10	0.0030	0.0017	0.0026	--	0.0023	--	--	--	0.0028	--
Ba	mg/L	-	-	0.0278	0.0167	0.0128	--	0.00306	--	--	--	0.00248	--
Be	mg/L	-	-	< 0.000007	< 0.000007	< 0.000007	--	< 0.000007	--	--	--	< 0.000007	--
B	mg/L	1.5	-	0.037	0.016	0.012	--	0.009	--	--	--	0.011	--
Bi	mg/L	-	-	< 0.000007	< 0.000007	0.000023	--	0.000013	--	--	--	< 0.000007	--
Ca	mg/L	-	-	478	161	81.4	--	16.0	--	--	--	14.4	--
Cd	mg/L	0.00009	-	0.000024	0.000008	< 0.000003	--	0.000004	--	--	--	0.000004	--
Co	mg/L	-	-	0.00275	0.000421	0.000215	--	0.000094	--	--	--	0.000119	--
Cr	mg/L	-	-	0.00024	0.00012	< 0.00008	--	< 0.00008	--	--	--	0.00014	--
Cu	mg/L	0.002	0.10	**0.0106**	**0.0027**	**0.0022**	--	**0.0029**	--	--	--	0.0008	--
Fe	mg/L	0.3	-	0.015	< 0.007	< 0.007	--	0.024	--	--	--	0.010	--
K	mg/L	-	-	6.67	1.07	0.566	--	0.173	--	--	--	0.198	--
Li	mg/L	-	-	0.0010	0.0005	0.0005	--	0.0002	--	--	--	0.0002	--
Mg	mg/L	-	-	7.06	5.02	5.71	--	3.00	--	--	--	3.44	--
Mn	mg/L	-	-	0.117	0.0730	0.0587	--	0.0235	--	--	--	0.0169	--
Mo	mg/L	0.073	-	0.0116	0.00219	0.00154	--	0.00248	--	--	--	0.00080	--
Na	mg/L	-	-	273	27.2	10.1	--	2.05	--	--	--	1.42	--
Ni	mg/L	0.03	0.25	0.0014	0.0007	0.0003	--	0.0001	--	--	--	< 0.0001	--
P	mg/L	-	-	< 0.003	< 0.003	< 0.003	--	< 0.003	--	--	--	< 0.003	--
Pb	mg/L	0.001	0.08	0.00006	0.00001	0.00002	--	0.00008	--	--	--	0.00002	--
Sb	mg/L	-	-	0.0106	0.0055	0.0059	--	0.0030	--	--	--	0.0021	--
Se	mg/L	0.001	-	0.00053	0.00020	0.00036	--	0.00026	--	--	--	0.00008	--
Si	mg/L	-	-	3.97	2.02	2.72	--	1.98	--	--	--	2.34	--
Sn	mg/L	-	-	0.00039	0.00024	0.00010	--	0.00012	--	--	--	0.00008	--
Sr	mg/L	-	-	1.32	0.412	0.216	--	0.0474	--	--	--	0.0416	--
Th	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	--	0.0003	--	--	--	< 0.0001	--
Ti	mg/L	-	-	< 0.00005	< 0.00005	< 0.00005	--	0.00011	--	--	--	< 0.00005	--
Tl	mg/L	0.0008	-	0.000043	< 0.000005	< 0.000005	--	< 0.000005	--	--	--	< 0.000005	--
U	mg/L	0.015	-	0.00236	0.000520	0.000251	--	0.000216	--	--	--	0.000070	--
V	mg/L	-	-	0.00053	0.00032	0.00063	--	0.00053	--	--	--	0.00091	--
W	mg/L	-	-	0.00155	0.00061	0.00069	--	0.00083	--	--	--	0.00132	--
Y	mg/L	-	-	0.000010	0.000008	0.000003	--	0.000014	--	--	--	< 0.00002	--
Zn	mg/L	0.007	0.40	**0.007**	0.003	< 0.002	--	< 0.002	--	--	--	< 0.002	--

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	10	11	12	13	14	15	16	17	18	19
Date			Effective	23-Mar-21	30-Mar-21	06-Apr-21	13-Apr-21	20-Apr-21	27-Apr-21	04-May-21	11-May-21	18-May-21	25-May-21
LIMS			01-Jun-2021	10246-MAR21	10301-MAR21	10021-APR21	10102-APR21	10160-APR21	10188-APR21	10012-MAY21	10045-MAY21	10138-MAY21	10217-MAY21
Hum Cell Leachate Vo	mL	-	-	833	698	807	933	797	846	929	841	831	840
pH	no unit	6.0-9.5	-	7.96	8.30	8.12	8.15	8.10	8.12	8.27	8.01	8.05	7.99
Acidity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity	mg/L as $CaCO_3$	-	-	46	49	45	47	43	47	48	43	44	48
Conductivity	µS/cm	-	-	110	102	102	96	99	97	96	90	91	89
SO_4	mg/L	-	-	9.6	8.6	7.0	5.1	5.6	5.0	3.6	3.8	3.5	3.0
F	mg/L	0.12	-	--	--	< 0.06	--	--	--	< 0.06	--	--	--
NH_3+NH_4	as N mg/L			--	--	<0.1	--	--	--	<0.1	--	--	--
Un-Ionized NH_3	as N mg/L	0.020	0.50	--	--	0.005	--	--	--	0.007	--	--	--
Hg	mg/L	0.000026	-	--	--	< 0.00001	--	--	--	0.00001	--	--	--
Ag	mg/L	0.00025	-	--	--	< 0.00005	--	--	--	< 0.00005	--	--	--
Al	mg/L	0.1@pH>6.5	-	--	--	**0.358**	--	--	--	**0.344**	--	--	--
As	mg/L	0.005	0.10	--	--	0.0029	--	--	--	0.0031	--	--	--
Ba	mg/L	-	-	--	--	0.0033	--	--	--	0.00214	--	--	--
Be	mg/L	-	-	--	--	< 0.000007	--	--	--	< 0.000007	--	--	--
B	mg/L	1.5	-	--	--	0.004	--	--	--	0.003	--	--	--
Bi	mg/L	-	-	--	--	< 0.000007	--	--	--	< 0.00001	--	--	--
Ca	mg/L	-	-	--	--	14.8	--	--	--	13.8	--	--	--
Cd	mg/L	0.00009	-	--	--	0.000005	--	--	--	< 0.000003	--	--	--
Co	mg/L	-	-	--	--	0.000073	--	--	--	0.000044	--	--	--
Cr	mg/L	-	-	--	--	< 0.00008	--	--	--	< 0.00008	--	--	--
Cu	mg/L	0.002	0.10	--	--	0.0016	--	--	--	0.0004	--	--	--
Fe	mg/L	0.3	-	--	--	0.01	--	--	--	< 0.007	--	--	--
K	mg/L	-	-	--	--	0.177	--	--	--	0.158	--	--	--
Li	mg/L	-	-	--	--	0.0002	--	--	--	0.0002	--	--	--
Mg	mg/L	-	-	--	--	3.48	--	--	--	3.02	--	--	--
Mn	mg/L	-	-	--	--	0.017	--	--	--	0.0145	--	--	--
Mo	mg/L	0.073	-	--	--	0.00048	--	--	--	0.00029	--	--	--
Na	mg/L	-	-	--	--	1.08	--	--	--	0.84	--	--	--
Ni	mg/L	0.03	0.25	--	--	0.0001	--	--	--	< 0.0001	--	--	--
P	mg/L	-	-	--	--	0.003	--	--	--	< 0.003	--	--	--
Pb	mg/L	0.001	0.08	--	--	0.00003	--	--	--	< 0.00009	--	--	--
Sb	mg/L	-	-	--	--	0.0019	--	--	--	0.0012	--	--	--
Se	mg/L	0.001	-	--	--	0.00008	--	--	--	0.00005	--	--	--
Si	mg/L	-	-	--	--	2.54	--	--	--	2.21	--	--	--
Sn	mg/L	-	-	--	--	< 0.00006	--	--	--	< 0.00006	--	--	--
Sr	mg/L	-	-	--	--	0.0439	--	--	--	0.0381	--	--	--
Th	mg/L	-	-	--	--	< 0.0001	--	--	--	< 0.0001	--	--	--
Ti	mg/L	-	-	--	--	< 0.00005	--	--	--	< 0.00005	--	--	--
Tl	mg/L	0.0008	-	--	--	< 0.000005	--	--	--	< 0.000005	--	--	--
U	mg/L	0.015	-	--	--	0.000068	--	--	--	0.000069	--	--	--
V	mg/L	-	-	--	--	0.00092	--	--	--	0.00099	--	--	--
W	mg/L	-	-	--	--	0.00069	--	--	--	0.00053	--	--	--
Y	mg/L	-	-	--	--	< 0.00002	--	--	--	< 0.00002	--	--	--
Zn	mg/L	0.007	0.40	--	--	< 0.002	--	--	--	< 0.002	--	--	--

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	20	21	22	23	24	25	26	27	28	29	30
Date			Effective	01-Jun-21	08-Jun-21	15-Jun-21	22-Jun-21	29-Jun-21	06-Jul-21	13-Jul-21	20-Jul-21	27-Jul-21	03-Aug-21	10-Aug-21
LIMS			01-Jun-2021	10012-JUN21	10046-JUN21	10142-JUN21	10203-JUN21	10237-JUN21	10008-JUL21	10048-JUL21	10147-JUL21	10203-JUL21	10007-AUG21	10045-AGU21
Hum Cell Leachate Vol	mL	-	-	870	920	878	886	845	874	878	847	872	802	867
pH	no unit	6.0-9.5	-	8.07	8.14	8.21	8.09	8.16	8.20	8.16	8.07	8.05	7.84	8.20
Acidity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity	mg/L as $CaCO_3$	-	-	43	48	43	45	48	52	45	44	46	40	45
Conductivity	µS/cm	-	-	93	90	85	87	92	93	84	85	88	75	87
SO_4	mg/L	-	-	2.8	2.7	2.4	2.1	2.2	2.2	2.1	2.1	2.1	1.8	3.3
F	mg/L	0.12	-	< 0.06	--	--	--	< 0.06	--	--	--	--	--	< 0.06
NH_3+NH_4	as N mg/L			<0.1	--	--	--	0.1	--	--	--	--	--	<0.1
Un-Ionized NH_3	as N mg/L	0.020	0.50	0.004	--	--	--	0.005	--	--	--	--	--	0.006
Hg	mg/L	0.000026	-	< 0.00001	--	--	--	< 0.00001	--	--	--	--	--	0.00002
Ag	mg/L	0.00025	-	< 0.00005	--	--	--	< 0.00005	--	--	--	--	--	< 0.00005
Al	mg/L	0.1@pH>6.5	-	**0.316**	--	--	--	**0.274**	--	--	--	--	--	**0.299**
As	mg/L	0.005	0.10	0.0026	--	--	--	0.0024	--	--	--	--	--	0.0024
Ba	mg/L	-	-	0.00231	--	--	--	0.00241	--	--	--	--	--	0.00229
Be	mg/L	-	-	< 0.000007	--	--	--	< 0.000007	--	--	--	--	--	< 0.000007
B	mg/L	1.5	-	0.002	--	--	--	< 0.002	--	--	--	--	--	0.003
Bi	mg/L	-	-	< 0.00001	--	--	--	< 0.00001	--	--	--	--	--	< 0.00001
Ca	mg/L	-	-	13.9	--	--	--	13.6	--	--	--	--	--	14.2
Cd	mg/L	0.00009	-	< 0.000003	--	--	--	< 0.000003	--	--	--	--	--	< 0.000003
Co	mg/L	-	-	0.000029	--	--	--	0.000023	--	--	--	--	--	0.000025
Cr	mg/L	-	-	< 0.00008	--	--	--	< 0.00008	--	--	--	--	--	0.00008
Cu	mg/L	0.002	0.10	0.0003	--	--	--	0.0004	--	--	--	--	--	0.0004
Fe	mg/L	0.3	-	< 0.007	--	--	--	< 0.007	--	--	--	--	--	0.008
K	mg/L	-	-	0.142	--	--	--	0.105	--	--	--	--	--	0.137
Li	mg/L	-	-	0.0001	--	--	--	0.0002	--	--	--	--	--	0.0019
Mg	mg/L	-	-	2.78	--	--	--	2.14	--	--	--	--	--	2.28
Mn	mg/L	-	-	0.01761	--	--	--	0.0187	--	--	--	--	--	0.0206
Mo	mg/L	0.073	-	0.00038	--	--	--	0.00023	--	--	--	--	--	0.00029
Na	mg/L	-	-	0.61	--	--	--	0.54	--	--	--	--	--	0.60
Ni	mg/L	0.03	0.25	< 0.0001	--	--	--	< 0.0001	--	--	--	--	--	< 0.0001
P	mg/L	-	-	< 0.003	--	--	--	< 0.003	--	--	--	--	--	< 0.003
Pb	mg/L	0.001	0.08	< 0.00009	--	--	--	< 0.00009	--	--	--	--	--	< 0.00009
Sb	mg/L	-	-	0.0011	--	--	--	0.0011	--	--	--	--	--	< 0.0009
Se	mg/L	0.001	-	< 0.00004	--	--	--	< 0.00004	--	--	--	--	--	< 0.00004
Si	mg/L	-	-	2.18	--	--	--	1.71	--	--	--	--	--	2.50
Sn	mg/L	-	-	< 0.00006	--	--	--	< 0.00006	--	--	--	--	--	< 0.00006
Sr	mg/L	-	-	0.03914	--	--	--	0.0408	--	--	--	--	--	0.0348
Th	mg/L	-	-	< 0.0001	--	--	--	< 0.0001	--	--	--	--	--	< 0.0001
Ti	mg/L	-	-	< 0.00005	--	--	--	< 0.00005	--	--	--	--	--	< 0.00005
Tl	mg/L	0.0008	-	< 0.000005	--	--	--	< 0.000005	--	--	--	--	--	< 0.000005
U	mg/L	0.015	-	0.000057	--	--	--	0.000064	--	--	--	--	--	0.000047
V	mg/L	-	-	0.00070	--	--	--	0.00063	--	--	--	--	--	0.00060
W	mg/L	-	-	0.00050	--	--	--	0.00037	--	--	--	--	--	0.00036
Y	mg/L	-	-	< 0.00002	--	--	--	< 0.00002	--	--	--	--	--	< 0.00002
Zn	mg/L	0.007	0.40	< 0.002	--	--	--	< 0.002	--	--	--	--	--	< 0.002

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Analysis of Weekly Humidity Cell Leachate

Parameter	Units	CCME FAL	MDMER	31	32	33	34	35	36	37	38	39	40
Date			Effective	17-Aug-21	24-Aug-21	31-Aug-21	07-Sep-21	14-Sep-21	21-Sep-21	28-Sep-21	05-Oct-21	12-Oct-21	19-Oct-21
LIMS			01-Jun-2021	10081-AGU21	10211-AGU21	10280-AUG21	10018-SEP21	10058-SEP21	10108-SEP21	10174-SEP21	10005-OCT21	10038-OCT21	10069-OCT21
Hum Cell Leachate Vo	mL	-	-	866	888	811	898	953	895	860	861	888	820
pH	no unit	6.0-9.5	-	7.74	8.16	8.00	8.13	8.06	8.21	8.08	8.23	7.82	8.07
Acidity	mg/L as $CaCO_3$	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity	mg/L as $CaCO_3$	-	-	44	46	43	48	48	47	42	43	52	44
Conductivity	µS/cm	-	-	87	84	83	88	93	85	90	82	83	80
SO_4	mg/L	-	-	2.0	8.0	2.0	1.5	1.5	1.5	1.7	1.8	1.8	1.8
F	mg/L	0.12	-	--	< 0.06	--	--	--	< 0.06	--	--	--	< 0.06
NH_3+NH_4	as N mg/L			--	<0.1	--	--	--	<0.1	--	--	--	<0.1
Un-Ionized NH_3	as N mg/L	0.020	0.50	--	0.005	--	--	--	0.006	--	--	--	0.004
Hg	mg/L	0.000026	-	--	0.00001	--	--	--	< 0.00001	--	--	--	< 0.00001
Ag	mg/L	0.00025	-	--	< 0.00005	--	--	--	< 0.00005	--	--	--	0.00006
Al	mg/L	0.1@pH>6.5	-	--	**0.305**	--	--	--	**0.313**	--	--	--	**0.325**
As	mg/L	0.005	0.10	--	0.0021	--	--	--	0.0016	--	--	--	0.0025
Ba	mg/L	-	-	--	0.00217	--	--	--	0.00215	--	--	--	0.00193
Be	mg/L	-	-	--	< 0.000007	--	--	--	< 0.000007	--	--	--	< 0.000007
B	mg/L	1.5	-	--	0.003	--	--	--	0.031	--	--	--	0.065
Bi	mg/L	-	-	--	< 0.00001	--	--	--	< 0.00001	--	--	--	< 0.00001
Ca	mg/L	-	-	--	13.3	--	--	--	13.8	--	--	--	14.1
Cd	mg/L	0.00009	-	--	< 0.000003	--	--	--	< 0.000003	--	--	--	0.000029
Co	mg/L	-	-	--	0.000055	--	--	--	0.000029	--	--	--	0.000043
Cr	mg/L	-	-	--	0.00009	--	--	--	< 0.00008	--	--	--	0.00012
Cu	mg/L	0.002	0.10	--	0.0003	--	--	--	0.0003	--	--	--	0.0006
Fe	mg/L	0.3	-	--	< 0.007	--	--	--	< 0.007	--	--	--	0.010
K	mg/L	-	-	--	0.126	--	--	--	0.106	--	--	--	0.187
Li	mg/L	-	-	--	0.0001	--	--	--	0.0001	--	--	--	0.0014
Mg	mg/L	-	-	--	2.22	--	--	--	2.10	--	--	--	2.05
Mn	mg/L	-	-	--	0.0212	--	--	--	0.0228	--	--	--	0.0246
Mo	mg/L	0.073	-	--	0.00041	--	--	--	0.00042	--	--	--	0.00027
Na	mg/L	-	-	--	0.54	--	--	--	0.49	--	--	--	1.30
Ni	mg/L	0.03	0.25	--	< 0.0001	--	--	--	< 0.0001	--	--	--	< 0.0001
P	mg/L	-	-	--	< 0.003	--	--	--	< 0.003	--	--	--	0.006
Pb	mg/L	0.001	0.08	--	< 0.00009	--	--	--	< 0.00009	--	--	--	0.00054
Sb	mg/L	-	-	--	< 0.0009	--	--	--	< 0.0009	--	--	--	< 0.0009
Se	mg/L	0.001	-	--	0.00005	--	--	--	< 0.00004	--	--	--	0.00005
Si	mg/L	-	-	--	1.99	--	--	--	1.68	--	--	--	2.19
Sn	mg/L	-	-	--	< 0.00006	--	--	--	0.00041	--	--	--	< 0.00006
Sr	mg/L	-	-	--	0.0349	--	--	--	0.0341	--	--	--	0.0358
Th	mg/L	-	-	--	< 0.0001	--	--	--	< 0.0001	--	--	--	< 0.0001
Ti	mg/L	-	-	--	0.00011	--	--	--	0.00006	--	--	--	< 0.00005
Tl	mg/L	0.0008	-	--	< 0.000005	--	--	--	< 0.000005	--	--	--	< 0.000005
U	mg/L	0.015	-	--	0.000059	--	--	--	0.000049	--	--	--	0.000046
V	mg/L	-	-	--	0.00057	--	--	--	0.00044	--	--	--	0.00049
W	mg/L	-	-	--	0.00048	--	--	--	0.00031	--	--	--	0.00037
Y	mg/L	-	-	--	< 0.00002	--	--	--	< 0.00002	--	--	--	< 0.00002
Zn	mg/L	0.007	0.40	--	< 0.002	--	--	--	< 0.002	--	--	--	< 0.002

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Summary of ABA Test Data **Averages**

Parameter	Units	Ref No.: 14221-JAN21
Sulphur (S)	%	0.396
Sulphide (S^-)	%	0.27
NP	t $CaCO_3$/1000 t	37.5
CO_3 NP	t $CaCO_3$/1000 t	44.7

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
0	650	7.84	<2	53	2950	1500
1	732	7.74	<2	29	820	380
2	899	7.91	<2	57	496	180
3	911	8.02	<2	39	144	28
4	663	8.22	<2	36	118	18
5	914	8.12	<2	47	124	17
6	811	8.18	<2	43	114	15
7	782	8.13	<2	44	115	16
8	829	8.14	<2	44	116	13
9	815	8.24	<2	48	111	11
10	833	7.96	<2	46	110	9.6
11	698	8.30	<2	49	102	8.6
12	807	8.12	<2	45	102	7.0
13	933	8.15	<2	47	96	5.1
14	797	8.10	<2	43	99	5.6
15	846	8.12	<2	47	97	5.0
16	929	8.27	<2	48	96	3.6
17	841	8.01	<2	43	90	3.8
18	831	8.05	<2	44	91	3.5
19	840	7.99	<2	48	89	3.0
20	870	8.07	<2	43	93	2.8

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^=$ Depletion %	Cumulative $S^=$ Depletion %
975.0	975.0	12.04	12.04
278.2	1253.2	3.43	15.47
161.8	1415.0	2.00	17.47
25.5	1440.5	0.31	17.78
11.9	1452.4	0.15	17.93
15.5	1468.0	0.19	18.12
12.2	1480.1	0.15	18.27
12.5	1492.6	0.15	18.43
10.8	1503.4	0.13	18.56
9.0	1512.4	0.11	18.67
8.0	1520.4	0.10	18.77
6.0	1526.4	0.07	18.84
5.6	1532.0	0.07	18.91
4.8	1536.8	0.06	18.97
4.5	1541.2	0.06	19.03
4.2	1545.5	0.05	19.08
3.3	1548.8	0.04	19.12
3.2	1552.0	0.04	19.16
2.9	1554.9	0.04	19.20
2.5	1557.4	0.03	19.23
2.4	1559.9	0.03	19.26

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
1015.63	2.71	2.27
289.75	3.48	2.92
168.56	3.93	3.30
26.57	4.00	3.36
12.43	4.03	3.38
16.19	4.08	3.42
12.67	4.11	3.45
13.03	4.15	3.48
11.23	4.18	3.50
9.34	4.20	3.52
8.33	4.22	3.54
6.25	4.24	3.56
5.88	4.26	3.57
4.96	4.27	3.58
4.65	4.28	3.59
4.41	4.29	3.60
3.48	4.30	3.61
3.33	4.31	3.62
3.03	4.32	3.62
2.63	4.33	3.63
2.54	4.33	3.64

** Initial Week 0 leachate may included soluble sulphate, and may not indicate oxidation of sulphide in the sample material has occurred.*

[1] *Calculated values*

Summary - Weeks 0 to 20

Maximum Value	8.30	2	57	2950	1500	975.0	-	12.04	-	1015.63	-	-
Minimum Value	7.74	<2	29	89	2.8	2.4	-	0.03	-	2.54	-	-
Average Value	8.06	2	45	294	106	74.3	-	0.92	-	77.38	-	-

TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Test Specimen

Sample	Weight (g)
BL639-83D Detox Tls	1000

Changes to Head Sample after 20 Weeks [1]

Parameter	Units	Ref No.: 14221-JAN21
Sulphide ($S^{=}$) Remaining	%	0.22
NP Remaining	t $CaCO_3$/1000 t	35.9
CO_3 NP Remaining	t $CaCO_3$/1000 t	43.1

Leachate Parameters Measured

Weekly Leach No.	Volume Collected mL	pH units	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L
21	920	8.14	<2	48	90	2.7
22	878	8.21	<2	43	85	2.4
23	886	8.09	<2	45	87	2.1
24	845	8.16	<2	48	92	2.2
25	874	8.20	<2	52	93	2.2
26	878	8.16	<2	45	84	2.1
27	847	8.07	<2	44	85	2.1
28	872	8.05	<2	46	88	2.1
29	802	7.84	<2	40	75	1.8
30	867	8.20	<2	45	87	3.3
31	866	7.74	<2	44	87	2.0
32	888	8.16	<2	46	84	8.0
33	811	8.00	<2	43	83	2.0
34	898	8.13	<2	48	88	1.5
35	953	8.06	<2	48	93	1.5
36	895	8.21	<2	47	85	1.5
37	860	8.08	<2	42	90	1.7
38	861	8.23	<2	43	82	1.8
39	888	7.82	<2	52	83	1.8
40	820	8.07	<2	44	80	1.8

Acid Generation [1]

SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %
2.5	1562.4	0.03	19.29
2.1	1564.5	0.03	19.31
1.9	1566.3	0.02	19.34
1.9	1568.2	0.02	19.36
1.9	1570.1	0.02	19.38
1.8	1572.0	0.02	19.41
1.8	1573.7	0.02	19.43
1.8	1575.6	0.02	19.45
1.4	1577.0	0.02	19.47
2.9	1579.9	0.04	19.50
1.7	1581.6	0.02	19.53
7.1	1588.7	0.09	19.61
1.6	1590.3	0.02	19.63
1.3	1591.7	0.02	19.65
1.4	1593.1	0.02	19.67
1.3	1594.5	0.02	19.68
1.5	1595.9	0.02	19.70
1.5	1597.5	0.02	19.72
1.6	1599.1	0.02	19.74
1.5	1600.5	0.02	19.76

Acid Neutralization [1]

NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
2.59	4.34	3.64
2.20	4.35	3.65
1.94	4.35	3.65
1.94	4.36	3.65
2.00	4.36	3.66
1.92	4.37	3.66
1.85	4.37	3.67
1.91	4.38	3.67
1.50	4.38	3.67
2.98	4.39	3.68
1.80	4.39	3.69
7.40	4.41	3.70
1.69	4.42	3.71
1.40	4.42	3.71
1.49	4.43	3.71
1.40	4.43	3.72
1.52	4.43	3.72
1.61	4.44	3.72
1.67	4.44	3.73
1.54	4.45	3.73

[1] *Calculated values*

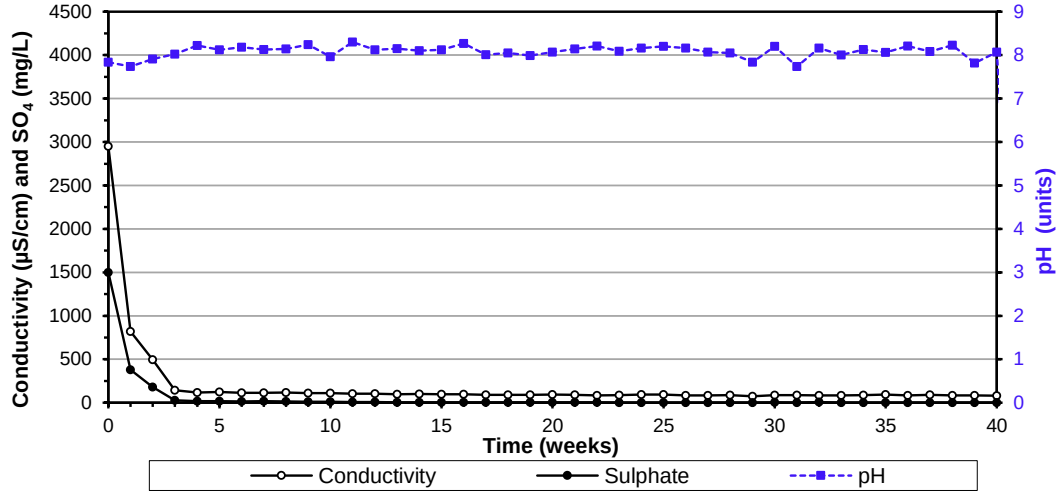
Summary - Weeks 0 to 40

	pH	Acidity $CaCO_3$ eq. mg/L	Alkalinity $CaCO_3$ eq. mg/L	Conductivity µS/cm	SO_4 mg/L	SO_4 Production Rate g/t/wk	Cumulative SO_4 Production g/t	Weekly $S^{=}$ Depletion %	Cumulative $S^{=}$ Depletion %	NP Consumption $CaCO_3$, g/t/wk	Cumulative NP Depletion %	Cumulative CO_3 NP Depletion %
Maximum Value	8.30	2	57	2950	1500	975.0	-	0.09	-	1016	-	-
Minimum Value	7.74	<2	29	75	1.5	1.3	-	0.02	-	1.4	-	-
Average Value	8.06	2	45	193	55.7	39.0	-	0.48	-	40.66	-	-

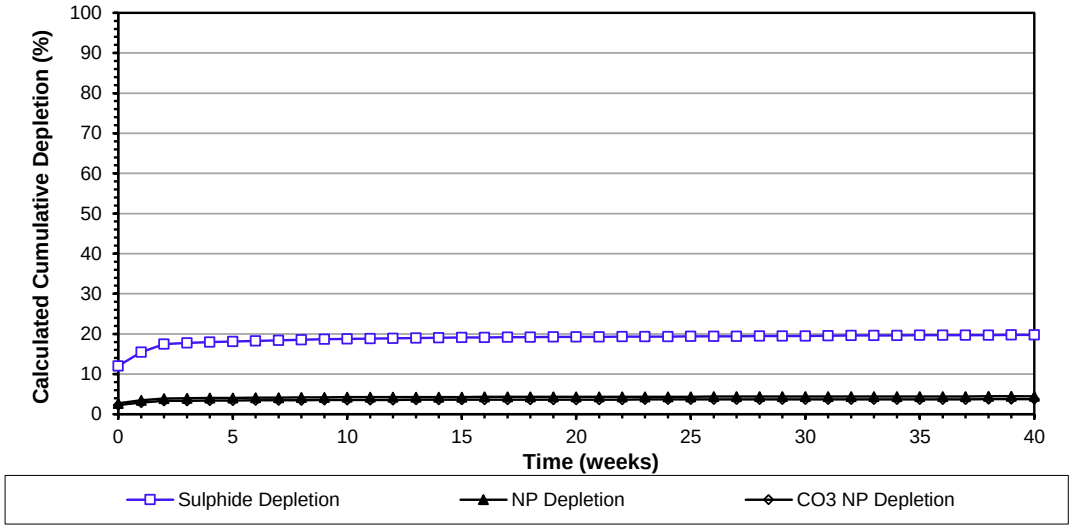
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Conductivity, Sulphate, and pH in Weekly Humidity Cell Leachate - BL639-83D Detox Tls



Cumulative Sulphide and NP Depletion BL639-83D Detox Tls

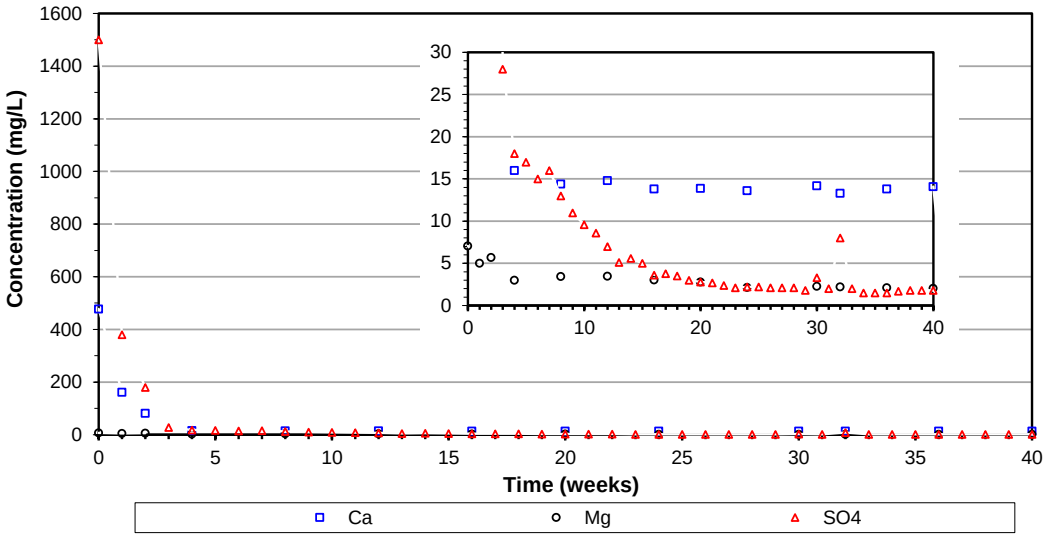


Note: NP depletion calculated based on sulphate assay.

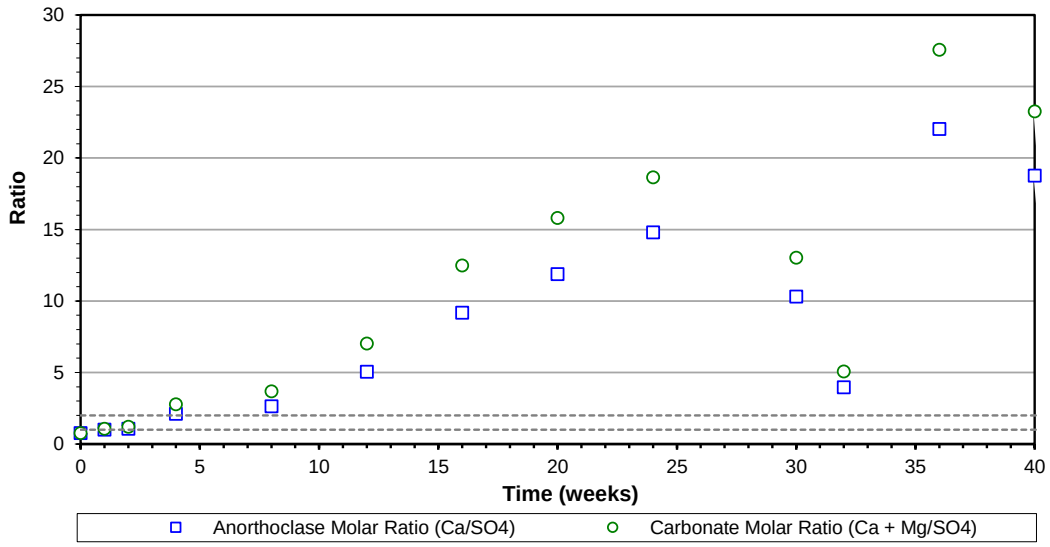
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls



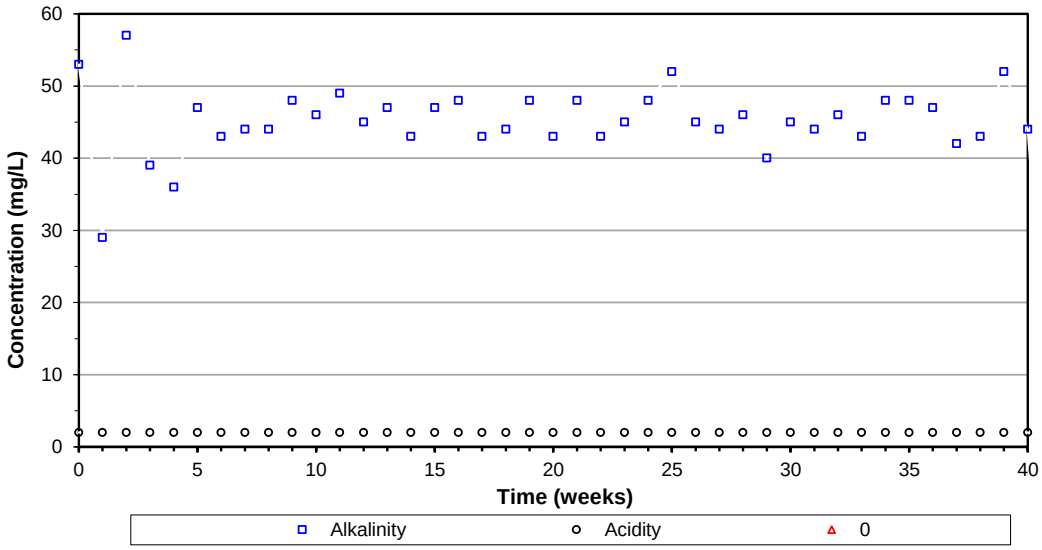
Carbonate (Ca + Mg/SO 4) and Anorthoclase (Ca/SO 4) Molar Ratios BL639-83D Detox Tls



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

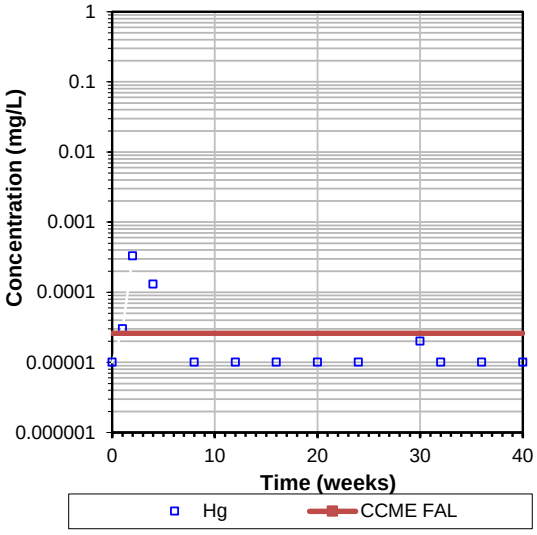
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls

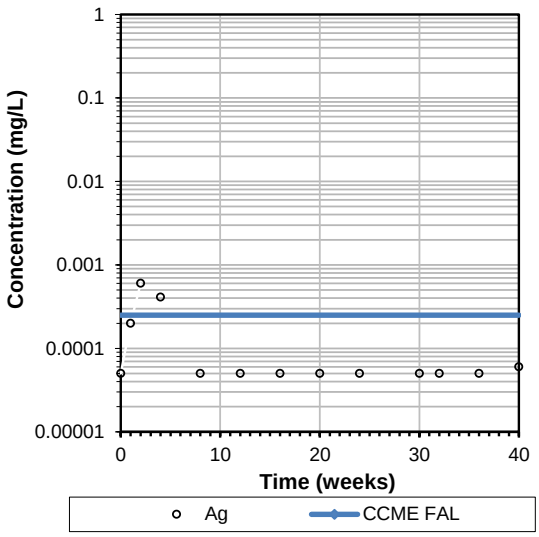


TEST REPORT

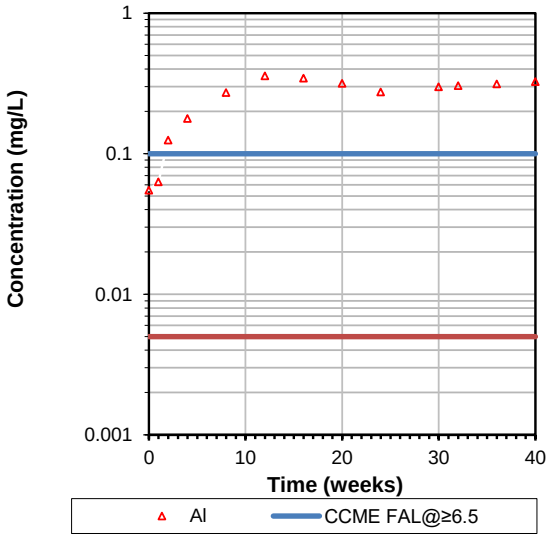
Humidity Cell Test (ASTM D 5744-96)

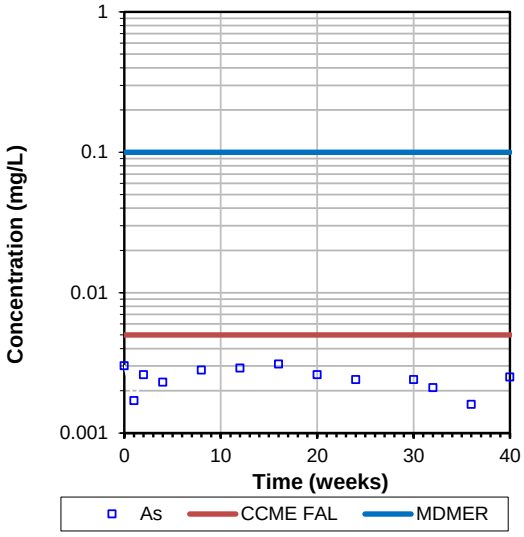
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls

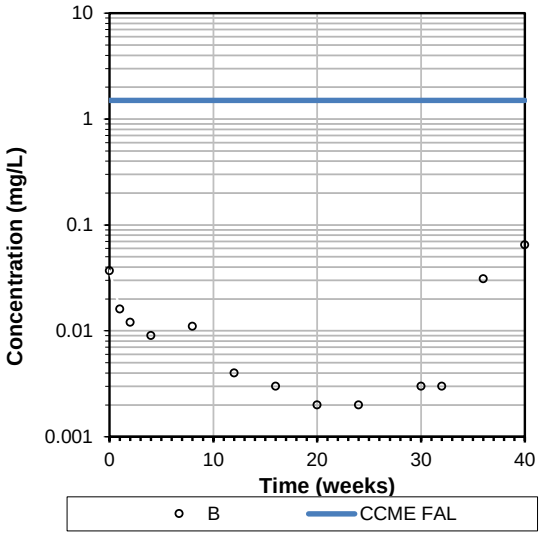


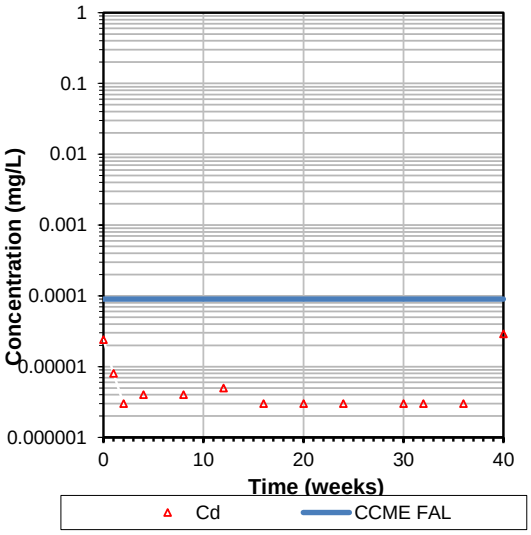


TEST REPORT

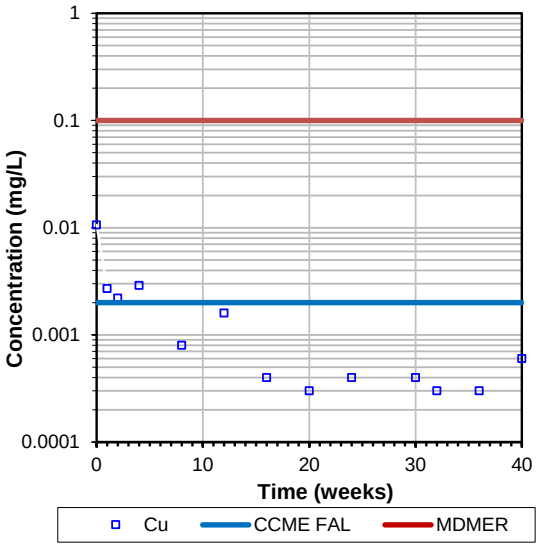
Humidity Cell Test (ASTM D 5744-96)

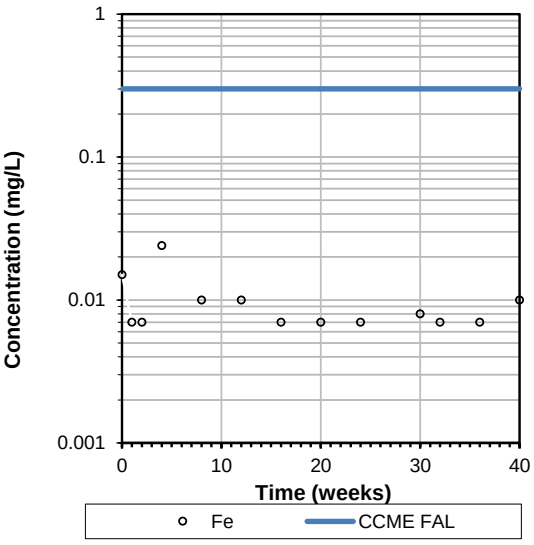
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls

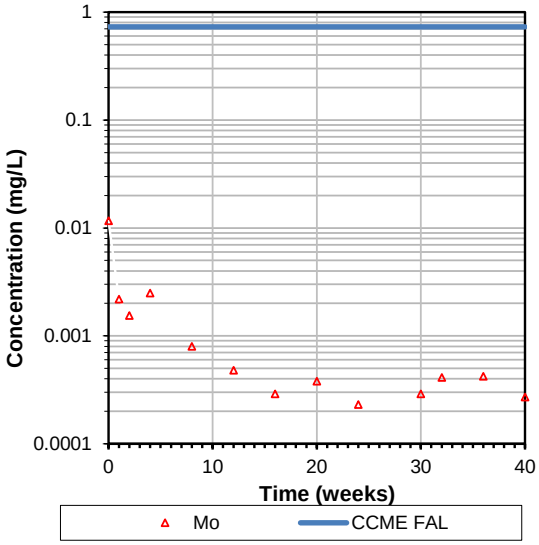


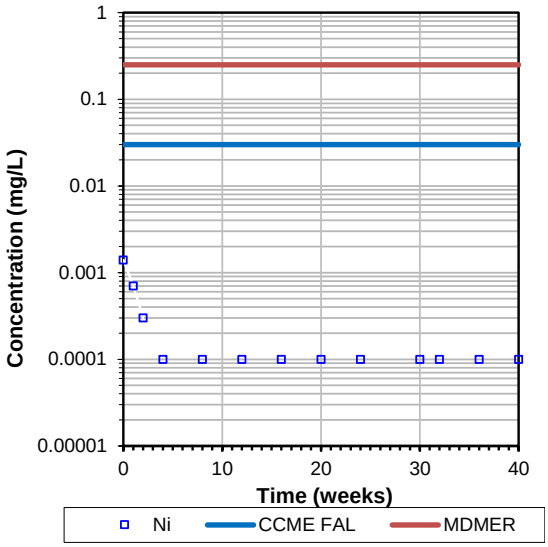


TEST REPORT

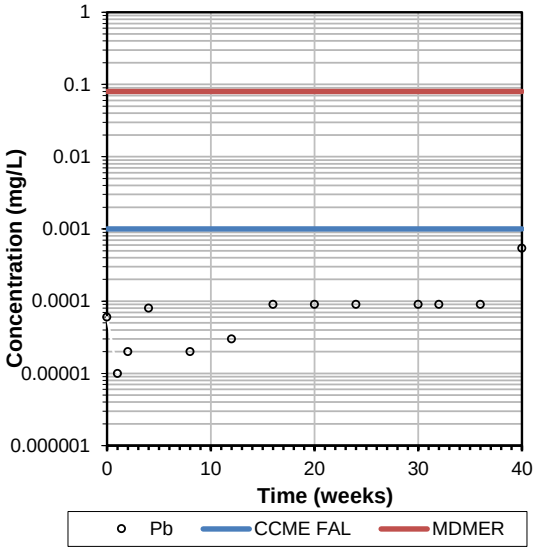
Humidity Cell Test (ASTM D 5744-96)

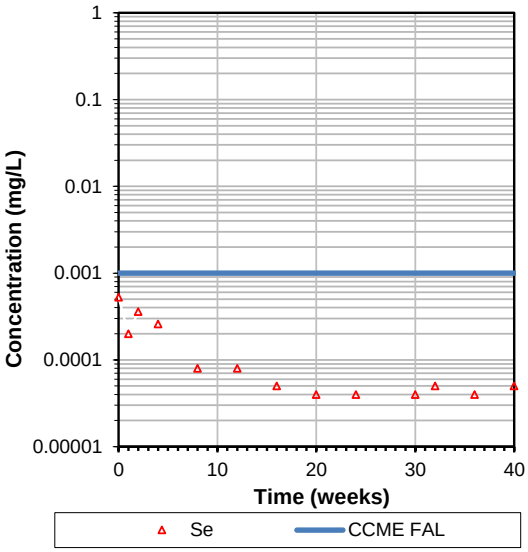
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls

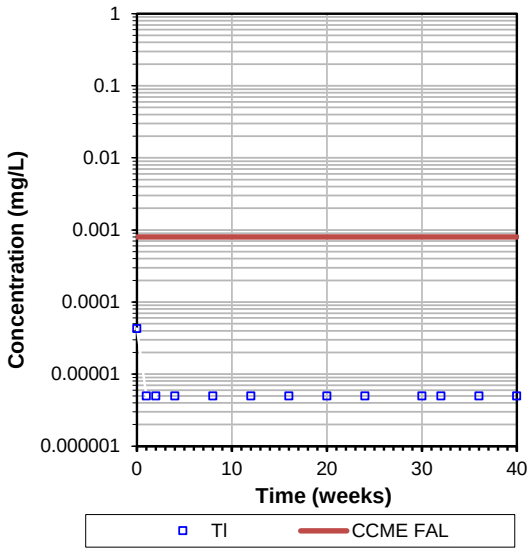


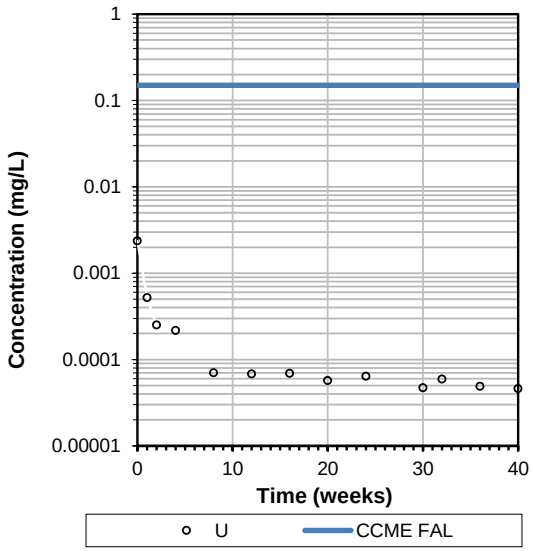


TEST REPORT

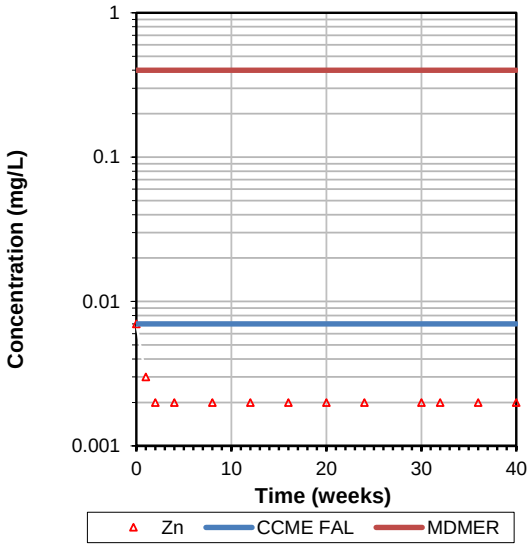
Humidity Cell Test (ASTM D 5744-96)

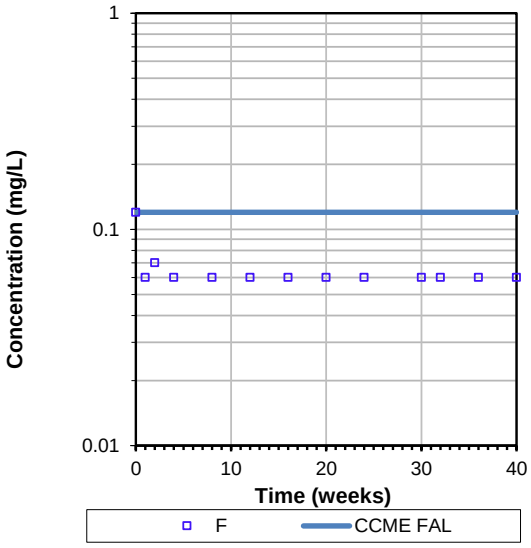
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





TEST REPORT
Sub-Aqueous Column

Sample Properties

BL639-83D Detox Tls (Column 1)	2000	g
Process Water Cover	3170	mL
Initital Height of Tailings in Column	17.5	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	4	6	8
Date			Effective	19-Jan-21	26-Jan-21	02-Feb-21	16-Feb-21	02-Mar-21	16-Mar-21
LIMS			01-Jun-2021	14364-JAN21	14499-JAN21	14069-FEB21	14457-FEB21	n/a	14311-MAR21
Volume Collected	mL	-	-	450	450	450	450	450	460
Temp Upon Receipt	°C	-	-	16.0	19.0	19.0	18.0	-	17.0
pH	no unit	6.0-9.5	-	8.10	8.12	8.11	7.96	-	8.08
Alkalinity	mg/L as $CaCO_3$	-	-	151	169	163	165	-	168
Conductivity	µS/cm	-	-	7340	6810	7410	7420	-	6700
Redox Potential	mV	-	-	226	186	206	167	-	209
TDS	mg/L	-	-	6040	6240	6130	6200	-	5700
F	mg/L	0.12	-	0.11	0.11	0.11	0.09	-	0.06
NO_2	as N mg/L	0.06	-	**1.51**	**1.55**	**1.69**	**1.69**	-	**1.85**
NO_3	as N mg/L	13	-	< 0.6	< 0.6	< 0.6	< 0.6	-	< 0.6
NO_2+NO_3	as N mg/L	-	-	1.51	1.55	1.69	1.69	-	1.85
Cl	mg/L	120	-	13	14	13	15	-	12
SO_4	mg/L	-	-	4000	3600	3700	3800	-	3700
$CN_{(T)}$	mg/L	-	0.50	0.10	0.07	0.06	0.09	-	0.11
CN_{WAD}	mg/L	0.005 as CNF	-	**0.024**	**0.021**	**0.020**	**0.057**	-	**0.093**
CNS	mg/L	-	-	5.2	5.5	5.3	5.1	-	5.6
CNO	mg/L	-	-	690	540	560	390	-	300
NH_3+NH_4	as N mg/L	-	-	14.7	39.1	43.8	66.2	-	73.9
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	**0.70**	**1.94**	**2.13**	**2.31**	-	**3.36**
S_2O_3	as S_2O_3 mg/L	-	-	< 2	< 2	< 2	< 2	-	< 2
Hg	mg/L	0.000026	-	**0.00002**	**0.00013**	0.00001	**0.00004**	-	**0.00022**
Ag	mg/L	0.00025	-	< 0.0005	0.00019	0.00008	**0.00034**	-	**0.00033**
Al	mg/L	0.1@pH>6.5	-	0.04	0.029	0.025	0.026	-	0.020
As	mg/L	0.005	0.10	**0.016**	0.0043	0.0042	0.0039	-	0.0038
B	mg/L	1.5	-	0.14	0.101	0.099	0.101	-	0.098
Ba	mg/L	-	-	0.0343	0.0210	0.0204	0.0178	-	0.0176
Be	mg/L	-	-	< 0.00007	< 0.000007	< 0.000007	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	< 0.00007	0.000011	0.000008	< 0.000007	-	< 0.000007
Ca	mg/L	-	-	491	511	506	424	-	421
Cd	mg/L	0.00009	-	0.00006	0.000085	0.000052	0.000047	-	0.000037
Co	mg/L	-	-	0.0190	0.0183	0.01740	0.0171	-	0.0163
Cr	mg/L	-	-	< 0.0008	0.00075	0.00088	0.00035	-	0.00023
Cu	mg/L	0.002	0.10	**0.109**	**0.0974**	**0.0919**	**0.155**	-	**0.268**
Fe	mg/L	0.3	-	0.09	0.036	0.025	0.028	-	0.017
K	mg/L	-	-	18.6	21.0	18.2	18.8	-	17.6
Li	mg/L	-	-	0.006	0.0031	0.0029	0.0034	-	0.0025
Mg	mg/L	-	-	18.3	19.3	18.7	19.1	-	19.2
Mn	mg/L	-	-	0.283	0.225	0.190	0.133	-	0.111
Mo	mg/L	0.073	-	0.0563	0.0612	0.0539	0.0549	-	0.0584
Na	mg/L	-	-	1340	1430	1310	1290	-	1390
Ni	mg/L	0.03	0.25	0.006	0.0073	0.0055	0.0049	-	0.0031
P	mg/L	-	-	< 0.03	0.014	0.017	0.008	-	< 0.003
Pb	mg/L	0.001	0.08	0.0006	0.00003	0.00003	< 0.00001	-	0.00004
S	mg/L	-	-	1310	1310	1320	1240	-	1300
Sb	mg/L	-	-	0.037	0.0319	0.0351	0.0335	-	0.0287
Se	mg/L	0.001	-	**0.0021**	**0.00123**	**0.00152**	**0.00304**	-	**0.0013**
Si	mg/L	-	-	3.8	4.56	4.53	4.19	-	4.29
Sn	mg/L	-	-	0.0012	0.00086	0.00088	0.00092	-	0.00093
Sr	mg/L	-	-	2.94	2.96	3.15	2.75	-	2.69
Th	mg/L	-	-	< 0.001	0.0002	< 0.0001	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	0.00089	0.00020	0.00023	0.00015	-	0.00015
Tl	mg/L	0.0008	-	0.00031	0.000239	0.000126	0.00012	-	0.00011
U	mg/L	0.015	-	0.00584	0.00577	0.00545	0.00488	-	0.00620
V	mg/L	-	-	< 0.0001	0.00059	0.00052	0.00052	-	0.00047
W	mg/L	-	-	0.0087	0.00528	0.00577	0.00503	-	0.0056
Y	mg/L	-	-	0.00004	0.000010	0.000013	< 0.00002	-	< 0.00002
Zn	mg/L	0.007	0.40	**0.03**	**0.047**	0.004	0.003	-	0.003

Parameters outside the CCME/MDMER guidelines are indicated in bold type.
Column top-ups with Li spiked DI water (5 mg/L) starting upon completion of the Week 8 sampling event

TEST REPORT

Sub-Aqueous Column

Sample Properties

BL639-83D Detox Tls (Column 1)	2000	g
Process Water Cover	3170	mL
Initital Height of Tailings in Column	17.5	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	10	12	14	16	18	20
Date			Effective	30-Mar-21	13-Apr-21	27-Apr-21	11-May-21	25-May-21	08-Jun-21
LIMS			01-Jun-2021	n/a	14352-APR21	n/a	14154-MAY21	n/a	14170-JUN21
Volume Collected	mL	-	-	460	450	450	480	500	500
Temp Upon Receipt	°C	-	-	-	18.0	-	18.0	-	18.0
pH	no unit	6.0-9.5	-	-	8.11	-	8.14	-	8.16
Alkalinity	mg/L as $CaCO_3$	-	-	-	160	-	124	-	124
Conductivity	µS/cm	-	-	-	5960	-	3620	-	2160
Redox Potential	mV	-	-	-	194	-	180	-	168
TDS	mg/L	-	-	-	5180	-	2630	-	1320
F	mg/L	0.12	-	-	< 0.06	-	0.06	-	< 0.06
NO_2	as N mg/L	0.06	-	-	**1.88**	-	**1.59**	-	**0.92**
NO_3	as N mg/L	13	-	-	3.67	-	8.06	-	11.2
NO_2+NO_3	as N mg/L	-	-	-	5.55	-	9.65	-	12.1
Cl	mg/L	120	-	-	12	-	5.6	-	2.9
SO_4	mg/L	-	-	-	3200	-	1700	-	830
$CN_{(T)}$	mg/L	-	0.50	-	0.14	-	0.13	-	0.10
CN_{WAD}	mg/L	0.005 as CNF	-	-	**0.134**	-	**0.109**	-	**0.073**
CNS	mg/L	-	-	-	< 2	-	2.4	-	< 2
CNO	mg/L	-	-	-	160	-	36	-	7.4
NH_3+NH_4	as N mg/L	-	-	-	73.9	-	45.5	-	30.6
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**3.59**	-	**2.36**	-	**1.66**
S_2O_3	as S_2O_3 mg/L	-	-	-	< 1	-	< 20	-	< 2
Hg	mg/L	0.000026	-	-	**0.00024**	-	**0.00023**	-	**0.00014**
Ag	mg/L	0.00025	-	-	< 0.0005	-	0.00015	-	**0.00033**
Al	mg/L	0.1@pH>6.5	-	-	0.02	-	0.029	-	0.046
As	mg/L	0.005	0.10	-	0.004	-	0.0045	-	**0.0053**
B	mg/L	1.5	-	-	0.11	-	0.063	-	0.044
Ba	mg/L	-	-	-	0.0179	-	0.0197	-	0.0177
Be	mg/L	-	-	-	< 0.00007	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	< 0.00007	-	0.00001	-	< 0.00001
Ca	mg/L	-	-	-	393	-	167	-	53.0
Cd	mg/L	0.00009	-	-	0.00005	-	0.000027	-	0.000009
Co	mg/L	-	-	-	0.0116	-	0.00750	-	0.00428
Cr	mg/L	-	-	-	< 0.0008	-	< 0.00008	-	0.00009
Cu	mg/L	0.002	0.10	-	**0.414**	-	**0.292**	-	**0.190**
Fe	mg/L	0.3	-	-	< 0.07	-	0.009	-	0.011
K	mg/L	-	-	-	14.8	-	9.48	-	5.82
Li	mg/L	-	-	-	0.565	-	2.30	-	3.00
Mg	mg/L	-	-	-	16.8	-	14.6	-	11.4
Mn	mg/L	-	-	-	0.0945	-	0.0402	-	0.0186
Mo	mg/L	0.073	-	-	0.0430	-	0.0275	-	0.0153
Na	mg/L	-	-	-	1050	-	589	-	346
Ni	mg/L	0.03	0.25	-	0.002	-	0.0008	-	0.0003
P	mg/L	-	-	-	< 0.03	-	0.016	-	0.006
Pb	mg/L	0.001	0.08	-	0.0002	-	< 0.00009	-	< 0.00009
S	mg/L	-	-	-	1190	-	675	-	285
Sb	mg/L	-	-	-	0.026	-	0.0228	-	0.0167
Se	mg/L	0.001	-	-	**0.0011**	-	0.00062	-	0.00055
Si	mg/L	-	-	-	5.3	-	4.91	-	4.63
Sn	mg/L	-	-	-	0.0008	-	0.00050	-	0.00043
Sr	mg/L	-	-	-	2.07	-	1.11	-	0.565
Th	mg/L	-	-	-	< 0.001	-	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	-	< 0.0005	-	< 0.00005	-	0.00009
Tl	mg/L	0.0008	-	-	0.00007	-	0.000061	-	0.000031
U	mg/L	0.015	-	-	0.00460	-	0.000718	-	0.000117
V	mg/L	-	-	-	0.0003	-	0.00051	-	0.00066
W	mg/L	-	-	-	0.0045	-	0.00574	-	0.00564
Y	mg/L	-	-	-	< 0.0002	-	< 0.00002	-	< 0.00002
Zn	mg/L	0.007	0.40	-	< 0.02	-	0.005	-	0.003

Parameters outside the CCME/MDMER guidelines are indicated in bold type.
Column top-ups with Li spiked DI water (5 mg/L) starting upon completion of the Week 8 sampling event

Note: Raised DL's (10x) due to samlpe matrix

TEST REPORT

Sub-Aqueous Column

Sample Properties

BL639-83D Detox Tls (Column 1)	2000	g
Process Water Cover	3170	mL
Initital Height of Tailings in Column	17.5	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	22	24	26	28	30	32
Date			Effective	22-Jun-21	06-Jul-21	20-Jul-21	03-Aug-21	17-Aug-21	29-Aug-21
LIMS			01-Jun-2021	n/a	14041-JUL21	n/a	14007-AUG21	n/a	14530-AUG21
Volume Collected	mL	-	-	500	500	450	450	450	410
Temp Upon Receipt	°C	-	-	-	20.0	-	14.0	-	15.0
pH	no unit	6.0-9.5	-	-	8.26	-	8.18	-	8.09
Alkalinity	mg/L as $CaCO_3$	-	-	-	112	-	109	-	82
Conductivity	µS/cm	-	-	-	1340	-	1110	-	307
Redox Potential	mV	-	-	-	148	-	276	-	194
TDS	mg/L	-	-	-	826	-	600	-	174
F	mg/L	0.12	-	-	< 0.06	-	< 0.06	-	< 0.06
NO_2	as N mg/L	0.06	-	-	**0.64**	-	0.06	-	**0.48**
NO_3	as N mg/L	13	-	-	**12.9**	-	1.24	-	**13.8**
NO_2+NO_3	as N mg/L	-	-	-	13.6	-	1.30	-	14.3
Cl	mg/L	120	-	-	3.0	-	< 2	-	< 2
SO_4	mg/L	-	-	-	490	-	330	-	16
$CN_{(T)}$	mg/L	-	0.50	-	0.10	-	0.10	-	0.02
CN_{WAD}	mg/L	0.005 as CNF	-	-	**0.091**	-	**0.084**	-	**0.020**
CNS	mg/L	-	-	-	1.1	-	< 2	-	< 2
CNO	mg/L	-	-	-	2.0	-	< 1	-	< 1
NH_3+NH_4	as N mg/L	-	-	-	19.6	-	15.6	-	4.6
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**1.32**	-	**0.88**	-	**0.21**
S_2O_3	as S_2O_3 mg/L	-	-	-	< 2	-	< 2	-	1.8
Hg	mg/L	0.000026	-	-	*** 0.00034**	-	**0.00012**	-	**0.00066**
Ag	mg/L	0.00025	-	-	**0.00175**	-	**0.00083**	-	**0.00106**
Al	mg/L	0.1@pH>6.5	-	-	0.043	-	0.045	-	0.071
As	mg/L	0.005	0.10	-	**0.0053**	-	0.0046	-	0.0045
B	mg/L	1.5	-	-	0.032	-	0.027	-	0.020
Ba	mg/L	-	-	-	0.0149	-	0.0150	-	0.00630
Be	mg/L	-	-	-	< 0.000007	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	< 0.00001	-	0.00001	-	< 0.00001
Ca	mg/L	-	-	-	35.7	-	33.5	-	16.4
Cd	mg/L	0.00009	-	-	0.000012	-	0.000003	-	< 0.000003
Co	mg/L	-	-	-	0.00242	-	0.00159	-	0.000114
Cr	mg/L	-	-	-	0.00101	-	0.00014	-	< 0.00008
Cu	mg/L	0.002	0.10	-	**0.144**	-	**0.125**	-	**0.0604**
Fe	mg/L	0.3	-	-	0.016	-	< 0.007	-	** < 0.007
K	mg/L	-	-	-	4.68	-	2.50	-	0.570
Li	mg/L	-	-	-	3.96	-	3.57	-	2.77
Mg	mg/L	-	-	-	9.90	-	10.2	-	4.44
Mn	mg/L	-	-	-	0.0164	-	0.0166	-	0.0112
Mo	mg/L	0.073	-	-	0.00891	-	0.00634	-	0.00059
Na	mg/L	-	-	-	187	-	148	-	16.6
Ni	mg/L	0.03	0.25	-	0.0012	-	0.0025	-	0.0003
P	mg/L	-	-	-	< 0.003	-	0.004	-	< 0.003
Pb	mg/L	0.001	0.08	-	< 0.00009	-	< 0.00009	-	0.00011
S	mg/L	-	-	-	147	-	120	-	5
Sb	mg/L	-	-	-	0.0114	-	0.0089	-	0.0043
Se	mg/L	0.001	-	-	0.00033	-	0.00025	-	0.00008
Si	mg/L	-	-	-	3.68	-	3.88	-	3.46
Sn	mg/L	-	-	-	0.00016	-	0.00013	-	0.00007
Sr	mg/L	-	-	-	0.348	-	0.311	-	0.118
Th	mg/L	-	-	-	< 0.0001	-	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	-	0.00006	-	0.00007	-	0.00005
Tl	mg/L	0.0008	-	-	0.000018	-	0.000019	-	0.000006
U	mg/L	0.015	-	-	0.000058	-	0.000050	-	< 0.000002
V	mg/L	-	-	-	0.00063	-	0.00058	-	0.00069
W	mg/L	-	-	-	0.00469	-	0.00424	-	0.00268
Y	mg/L	-	-	-	< 0.00002	-	< 0.00002	-	< 0.00002
Zn	mg/L	0.007	0.40	-	**0.013**	-	0.004	-	**0.009**

Parameters outside the CCME/MDMER guidelines are indicated in bold type.
Column top-ups with Li spiked DI water (5 mg/L) starting upon completion of the Week 8 sampling event

*Reassay LIMS 15135-AUG21

**Reassay LIMS 14202-SEP21

TEST REPORT
Sub-Aqueous Column

Sample Properties

BL639-83D Detox Tls (Column 1)	2000	g
Process Water Cover	3170	mL
Initital Height of Tailings in Column	17.5	cm

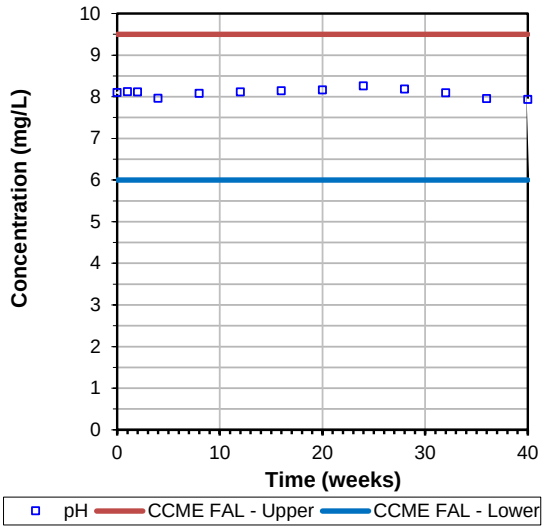
Analysis of Column Leachate

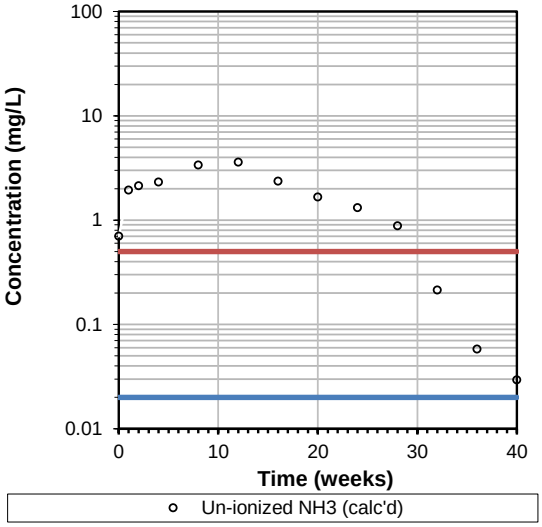
Parameter	Units	CCME FAL	MDMER	34	36	38	40
Date			Effective	13-Sep-21	28-Sep-21	12-Oct-21	26-Oct-21
LIMS			01-Jun-2021	n/a	14624-SEP21	n/a	14459-OCT21
Volume Collected	mL	-	-	450	450	450	475
Temp Upon Receipt	°C	-	-	-	21.0	-	21.0
pH	no unit	6.0-9.5	-	-	7.95	-	7.93
Alkalinity	mg/L as $CaCO_3$	-	-	-	72	-	76
Conductivity	µS/cm	-	-	-	280	-	283
Redox Potential	mV	-	-	-	323	-	263
TDS	mg/L	-	-	-	163	-	171
F	mg/L	0.12	-	-	**0.20**	-	< 0.06
NO_2	as N mg/L	0.06	-	-	**0.45**	-	**0.42**
NO_3	as N mg/L	13	-	-	**14.3**	-	**13.9**
NO_2+NO_3	as N mg/L	-	-	-	14.7	-	14.3
Cl	mg/L	120	-	-	< 0.2	-	< 2
SO_4	mg/L	-	-	-	12	-	12
$CN_{(T)}$	mg/L	-	0.50	-	< 0.01	-	< 0.01
CN_{WAD}	mg/L	0.005 as CNF	-	-	0.004	-	< 0.004
CNS	mg/L	-	-	-	< 2	-	< 2
CNO	mg/L	-	-	-	< 1	-	< 1
NH_3+NH_4	as N mg/L	-	-	-	1.7	-	0.9
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**0.06**	-	**0.03**
S_2O_3	as S_2O_3 mg/L	-	-	-	2.2	-	2.6
Hg	mg/L	0.000026	-	-	**0.00044**	-	**0.00016**
Ag	mg/L	0.00025	-	-	**0.00126**	-	**0.00108**
Al	mg/L	0.1@pH>6.5	-	-	0.054	-	0.053
As	mg/L	0.005	0.10	-	0.0043	-	0.0042
B	mg/L	1.5	-	-	0.010	-	0.006
Ba	mg/L	-	-	-	0.00676	-	0.00692
Be	mg/L	-	-	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	< 0.00001	-	< 0.00001
Ca	mg/L	-	-	-	23.2	-	26.7
Cd	mg/L	0.00009	-	-	< 0.000003	-	0.000004
Co	mg/L	-	-	-	0.000081	-	0.000056
Cr	mg/L	-	-	-	< 0.00008	-	< 0.00008
Cu	mg/L	0.002	0.10	-	**0.0179**	-	**0.0083**
Fe	mg/L	0.3	-	-	< 0.007	-	< 0.007
K	mg/L	-	-	-	0.326	-	0.258
Li	mg/L	-	-	-	3.47	-	4.02
Mg	mg/L	-	-	-	6.44	-	7.24
Mn	mg/L	-	-	-	0.0154	-	0.0173
Mo	mg/L	0.073	-	-	0.00065	-	0.00049
Na	mg/L	-	-	-	6.15	-	4.51
Ni	mg/L	0.03	0.25	-	< 0.0001	-	0.0002
P	mg/L	-	-	-	< 0.003	-	< 0.003
Pb	mg/L	0.001	0.08	-	< 0.00009	-	< 0.00009
S	mg/L	-	-	-	5	-	6
Sb	mg/L	-	-	-	0.0041	-	0.0039
Se	mg/L	0.001	-	-	0.00008	-	0.00010
Si	mg/L	-	-	-	4.27	-	4.80
Sn	mg/L	-	-	-	0.00023	-	< 0.00006
Sr	mg/L	-	-	-	0.145	-	0.134
Th	mg/L	-	-	-	0.0008	-	< 0.0001
Ti	mg/L	-	-	-	0.00012	-	0.00012
Tl	mg/L	0.0008	-	-	0.000006	-	< 0.000005
U	mg/L	0.015	-	-	0.000024	-	0.000029
V	mg/L	-	-	-	0.00071	-	0.00074
W	mg/L	-	-	-	0.00375	-	0.00243
Y	mg/L	-	-	-	< 0.00002	-	< 0.00002
Zn	mg/L	0.007	0.40	-	0.004	-	**0.007**

Parameters outside the CCME/MDMER guidelines are indicated in bold type.
Column top-ups with Li spiked DI water (5 mg/L) starting upon completion of the Week 8 sampling event

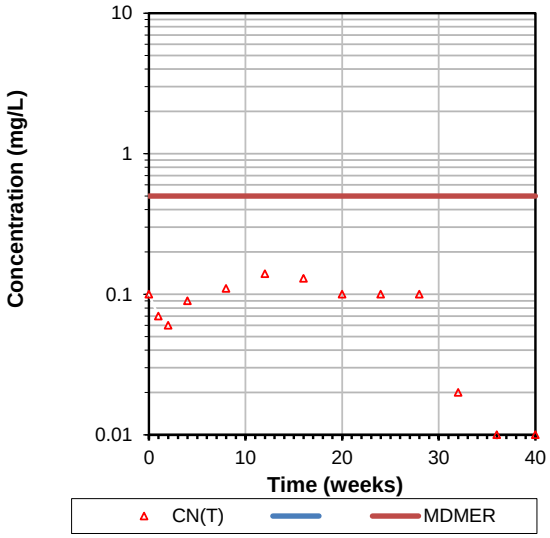
TEST REPORT
Sub-Aqueous Column

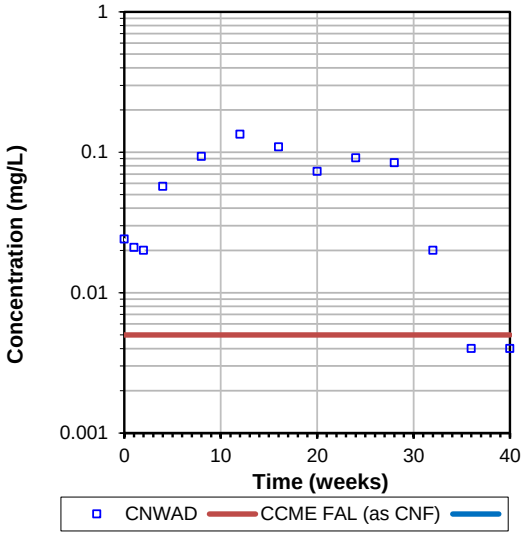
Selected Parameters - BL639-83D Detox Tls (Column 1)





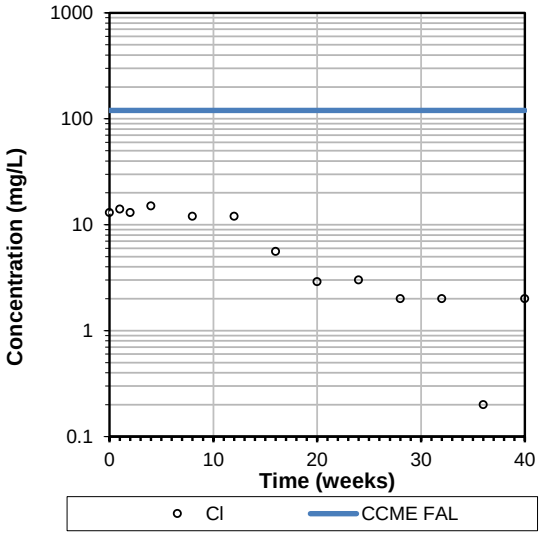
Selected Parameters - BL639-83D Detox Tls (Column 1)

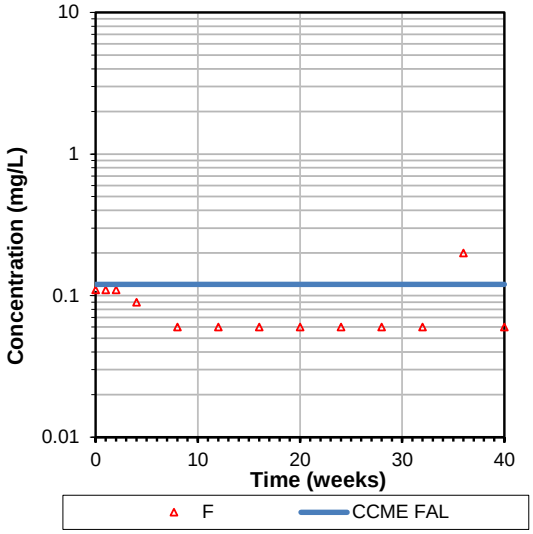




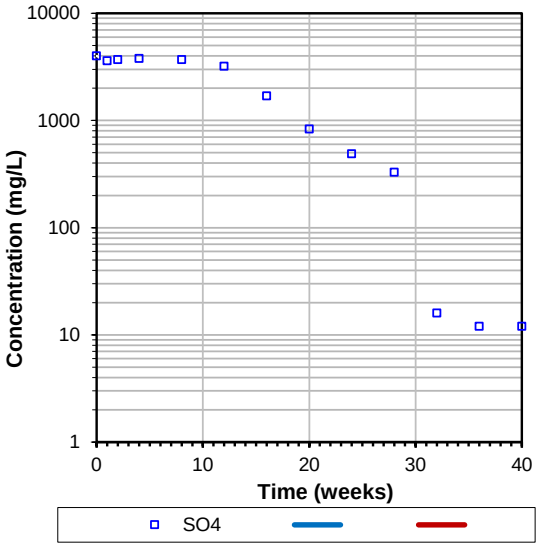
TEST REPORT
Sub-Aqueous Column

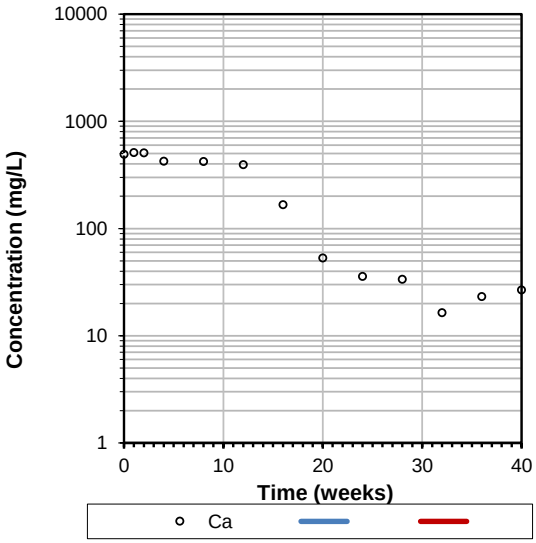
Selected Parameters - BL639-83D Detox Tls (Column 1)





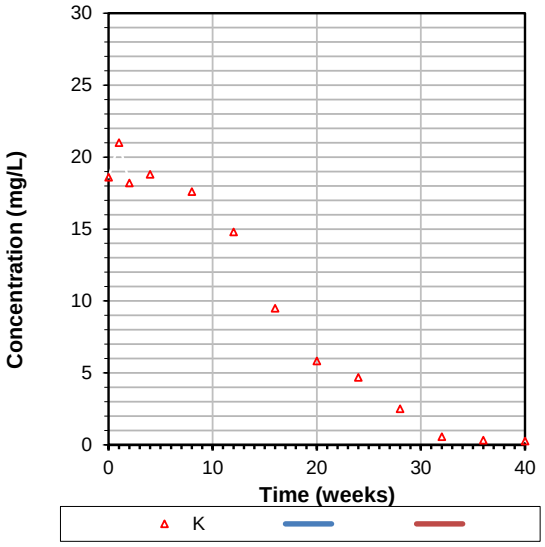
Selected Parameters - BL639-83D Detox Tls (Column 1)

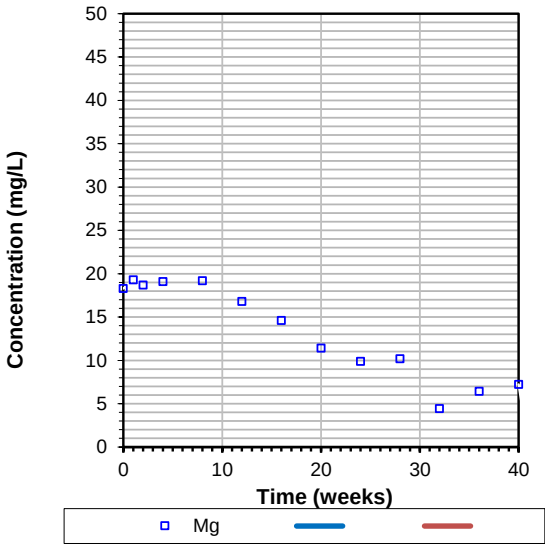




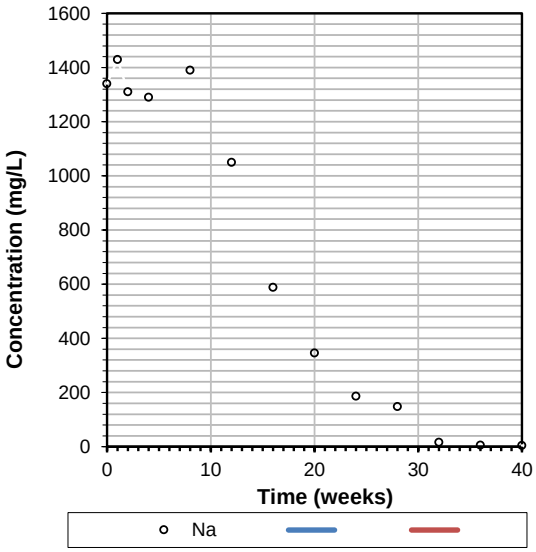
TEST REPORT
Sub-Aqueous Column

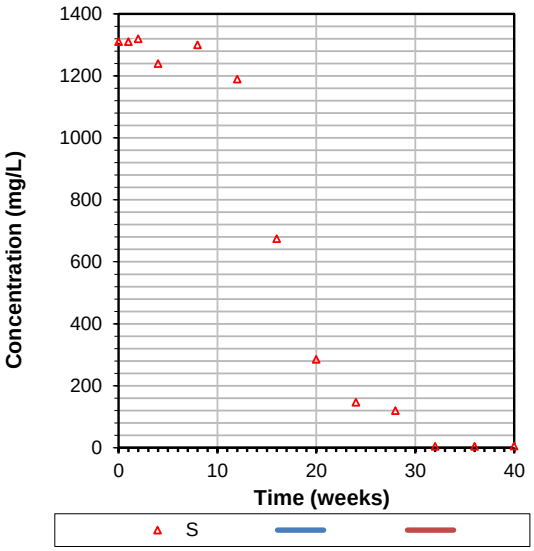
Selected Parameters - BL639-83D Detox Tls (Column 1)





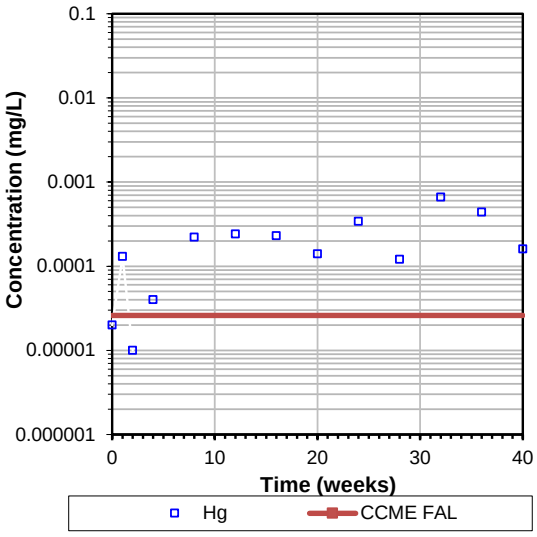
Selected Parameters - BL639-83D Detox Tls (Column 1)

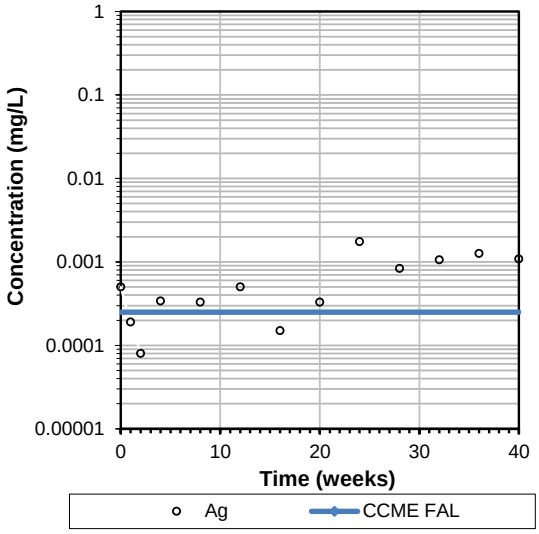




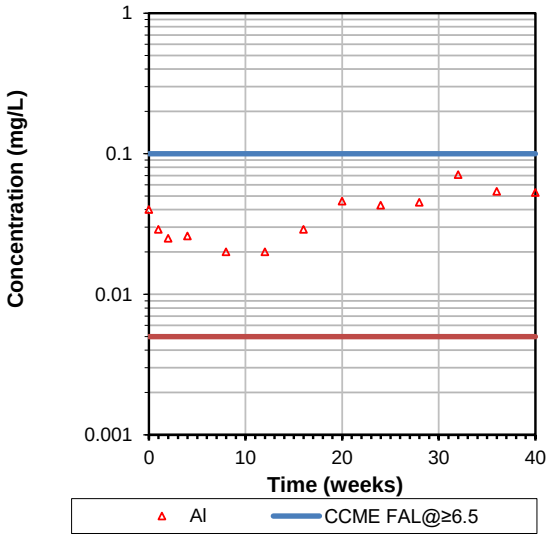
TEST REPORT
Sub-Aqueous Column

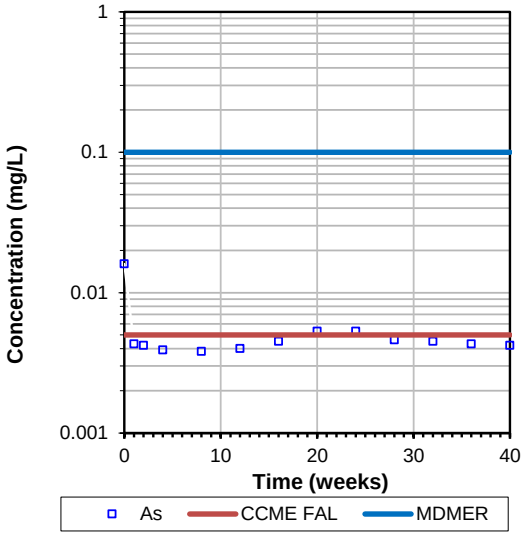
Selected Parameters - BL639-83D Detox Tls (Column 1)





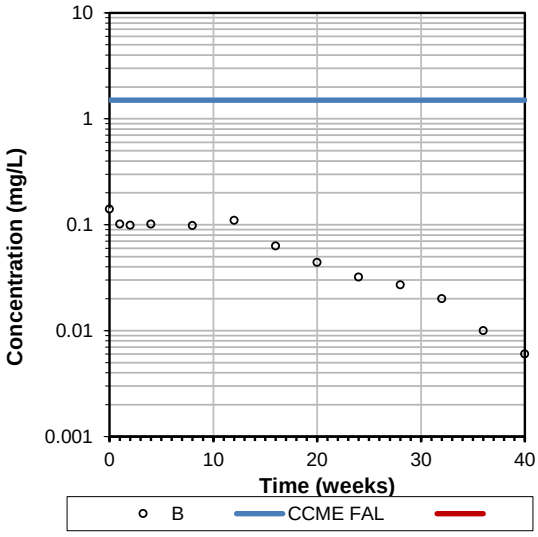
Selected Parameters - BL639-83D Detox Tls (Column 1)

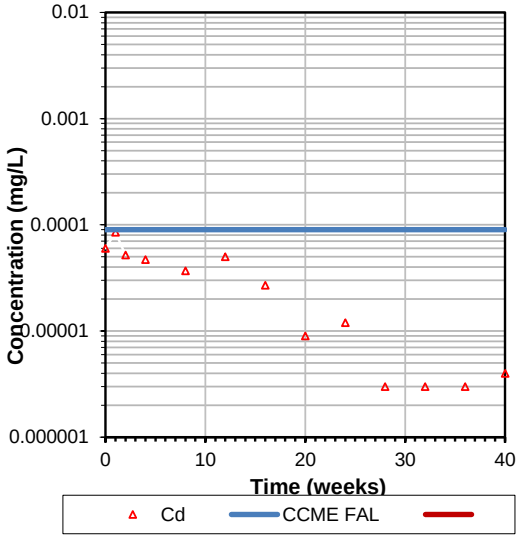




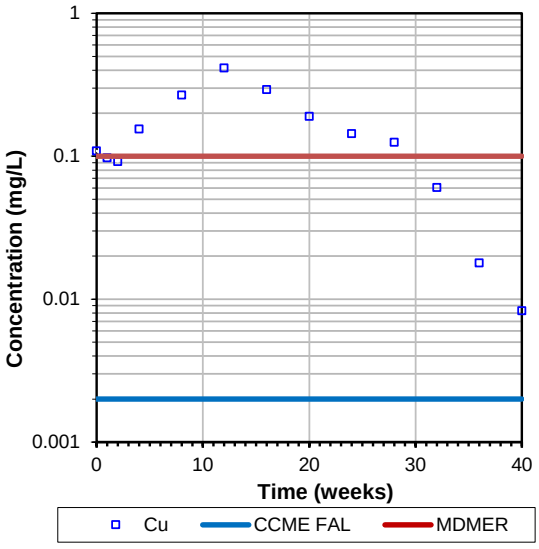
TEST REPORT
Sub-Aqueous Column

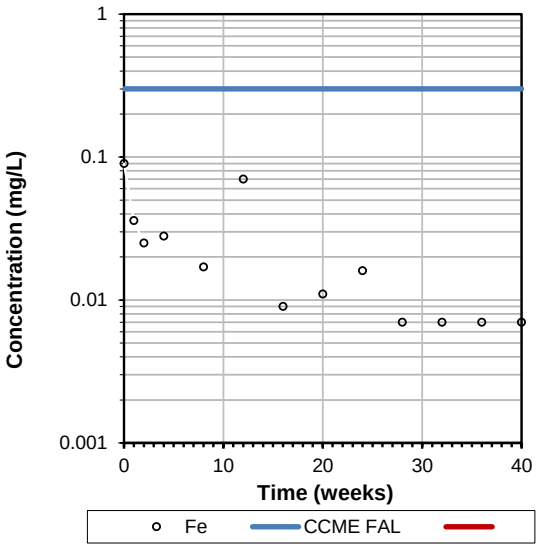
Selected Parameters - BL639-83D Detox Tls (Column 1)





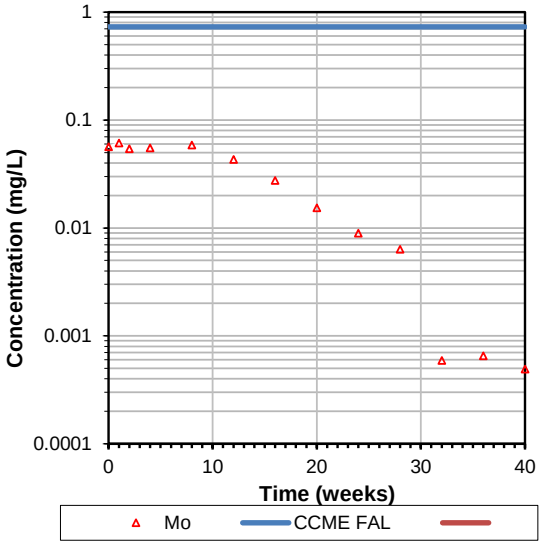
Selected Parameters - BL639-83D Detox Tls (Column 1)

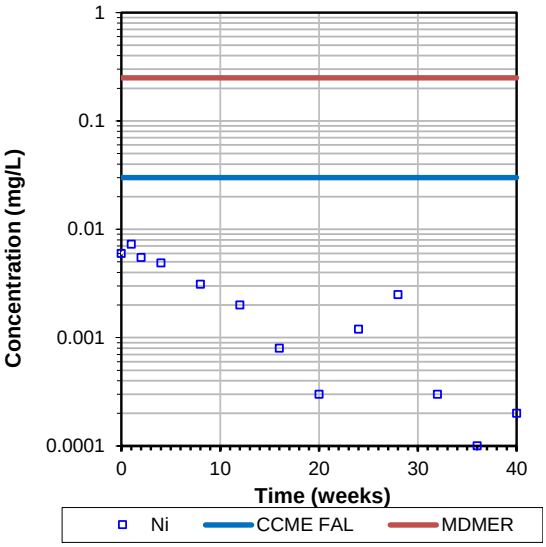




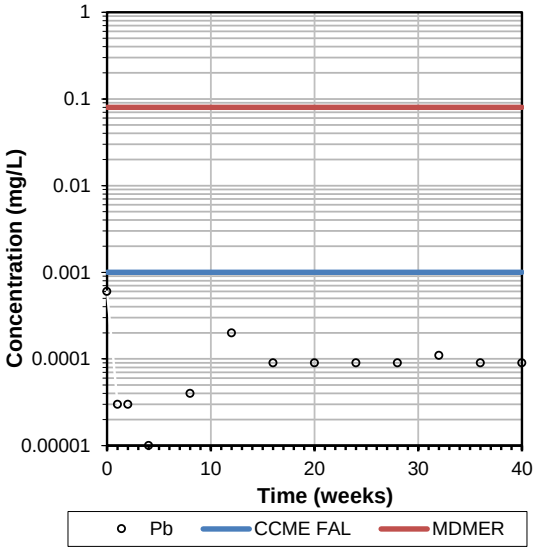
TEST REPORT
Sub-Aqueous Column

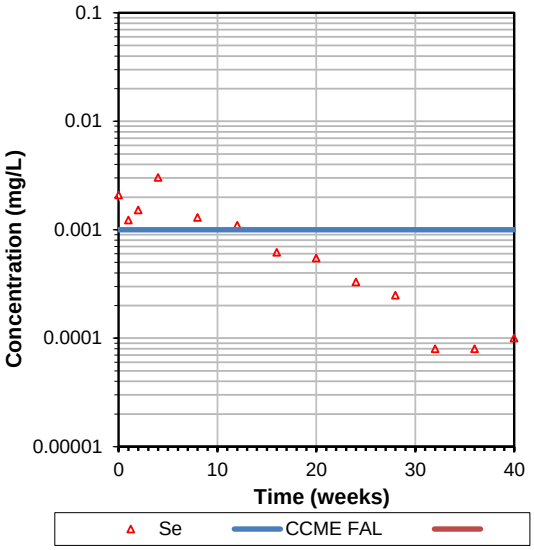
Selected Parameters - BL639-83D Detox Tls (Column 1)





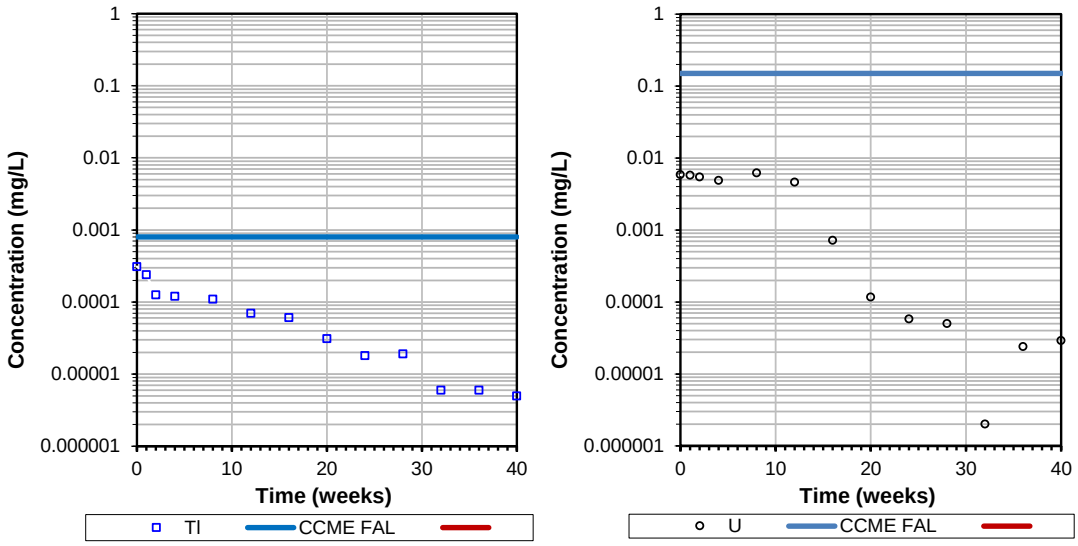
Selected Parameters - BL639-83D Detox Tls (Column 1)



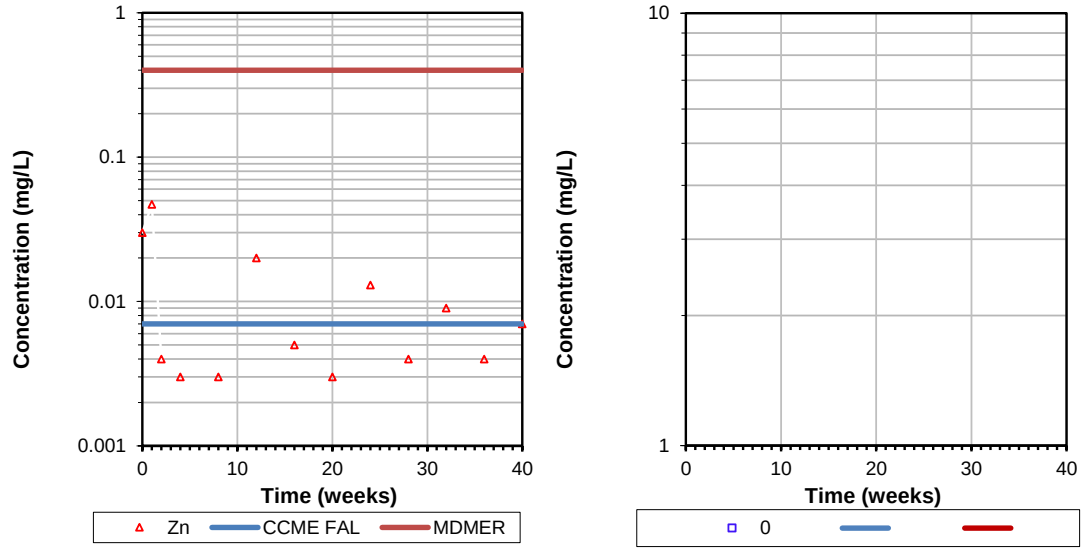


TEST REPORT
Sub-Aqueous Column

Selected Parameters - BL639-83D Detox Tls (Column 1)



Selected Parameters - BL639-83D Detox Tls (Column 1)



TEST REPORT
Sub-Aqueous Column

Sample Properties

19-TP-7 BS1+2 (Column 2)	900	g
Process Water Cover	n/a	mL
Initital Height of Tailings in Column	n/a	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	0	1	2	4	6	8
Date			Effective	20-Jan-21	27-Jan-21	03-Feb-21	17-Feb-21	03-Mar-21	17-Mar-21
LIMS			01-Jun-2021	14439-JAN2:	14506-JAN21	14084-FEB11	14474-FEB11	n/a	14328-MAR21
Volume Collected	mL	-	-	400	400	400	400	400	400
Temp Upon Receipt	°C	-	-	16.0	18.0	20.0	15.5	-	18.0
pH	no unit	6.0-9.5	-	7.48	7.96	8.15	8.18	-	8.17
Alkalinity	mg/L as $CaCO_3$	-	-	182	362	420	421	-	376
Conductivity	µS/cm	-	-	6010	6860	7100	7200	-	6650
Redox Potential	mV	-	-	174	188	169	184	-	187
TDS	mg/L	-	-	5630	6000	5960	5920	-	5880
F	mg/L	0.12	-	0.08	**0.15**	**0.23**	**0.20**	-	**0.45**
NO_2	as N mg/L	0.06	-	**1.48**	**1.51**	**1.55**	**1.72**	-	**1.86**
NO_3	as N mg/L	13	-	1.57	0.80	< 0.6	< 0.6	-	< 0.6
NO_2+NO_3	as N mg/L	-	-	3.05	2.31	1.55	1.72	-	1.86
Cl	mg/L	120	-	18	29	12	14	-	12
SO_4	mg/L	-	-	3300	3700	3500	3600	-	3700
$CN_{(T)}$	mg/L	-	0.50	0.06	0.05	0.07	0.06	-	0.05
CN_{WAD}	mg/L	0.005 as CNF	-	**0.026**	**0.016**	**0.015**	**0.015**	-	**0.026**
CNS	mg/L	-	-	4.4	4.6	< 2	5.1	-	5.3
CNO	mg/L	-	-	400	200	170	83	-	64
NH_3+NH_4	as N mg/L	-	-	6.7	23.4	35.4	65.4	-	118
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	**0.08**	**0.82**	**1.88**	**3.70**	-	**6.53**
S_2O_3	as S_2O_3 mg/L	-	-	< 2	< 2	< 2	< 2	-	< 2
Hg	mg/L	0.000026	-	**0.00012**	**0.00065**	0.00002	**0.00003**	-	0.00001
Ag	mg/L	0.00025	-	< 0.0005	**0.00105**	< 0.00005	< 0.00005	-	0.00012
Al	mg/L	0.1@pH>6.5	-	0.02	0.003	0.006	0.027	-	0.004
As	mg/L	0.005	0.10	**0.009**	**0.0061**	**0.0061**	**0.0064**	-	**0.0073**
B	mg/L	1.5	-	0.03	0.033	0.031	0.036	-	0.045
Ba	mg/L	-	-	0.0974	0.0360	0.0472	0.045	-	0.0359
Be	mg/L	-	-	< 0.00007	< 0.000007	< 0.000007	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	0.00035	0.000020	0.000015	0.00001	-	0.000008
Ca	mg/L	-	-	538	500	472	411	-	319
Cd	mg/L	0.00009	-	**0.00738**	**0.000104**	**0.000370**	**0.00046**	-	**0.00018**
Co	mg/L	-	-	0.0459	0.0234	0.0209	0.0177	-	0.0167
Cr	mg/L	-	-	< 0.0008	0.00127	0.00127	0.00100	-	0.00056
Cu	mg/L	0.002	0.10	**0.119**	**0.0294**	**0.0235**	**0.0204**	-	**0.0173**
Fe	mg/L	0.3	-	< 0.07	0.027	0.027	0.067	-	0.019
K	mg/L	-	-	6.81	27.7	7.38	10.9	-	14.4
Li	mg/L	-	-	0.010	0.0042	0.0026	0.0016	-	0.0015
Mg	mg/L	-	-	45.4	35.1	23.1	16.0	-	9.45
Mn	mg/L	-	-	4.10	1.32	1.07	0.751	-	0.262
Mo	mg/L	0.073	-	0.00416	0.00515	0.00551	0.00640	-	0.0340
Na	mg/L	-	-	1010	1290	1300	1230	-	1430
Ni	mg/L	0.03	0.25	**0.044**	0.0148	0.0065	0.0035	-	0.0014
P	mg/L	-	-	0.07	0.011	0.028	0.030	-	0.032
Pb	mg/L	0.001	0.08	< 0.00001	< 0.00001	0.00002	0.00004	-	0.00004
S	mg/L	-	-	1040	1250	1270	1140	-	1320
Sb	mg/L	-	-	< 0.009	0.0010	0.0024	< 0.0009	-	0.0016
Se	mg/L	0.001	-	**0.0025**	**0.00223**	**0.00234**	**0.0026**	-	**0.0020**
Si	mg/L	-	-	5.7	6.23	4.94	4.52	-	2.50
Sn	mg/L	-	-	< 0.0006	0.00043	0.00056	0.00076	-	0.0021
Sr	mg/L	-	-	1.63	1.34	1.59	1.51	-	1.49
Th	mg/L	-	-	< 0.001	0.0007	0.0001	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	0.0011	0.00013	0.00020	0.00110	-	0.00006
Tl	mg/L	0.0008	-	< 0.00005	< 0.000005	< 0.000005	0.000007	-	0.000018
U	mg/L	0.015	-	0.00127	0.00922	**0.0229**	**0.0334**	-	**0.0332**
V	mg/L	-	-	0.0003	0.00040	0.00033	0.00044	-	0.00030
W	mg/L	-	-	< 0.0002	0.00019	0.00019	0.00017	-	0.00027
Y	mg/L	-	-	0.00241	0.000013	0.000105	0.0004	-	0.00018
Zn	mg/L	0.007	0.40	**0.11**	< 0.002	< 0.002	0.003	-	0.003

Parameters outside the CCME/MDMER guidelines are indicated in bold type.

TEST REPORT
Sub-Aqueous Column

Sample Properties

19-TP-7 BS1+2 (Column 2)	900	g
Process Water Cover	n/a	mL
Initital Height of Tailings in Column	n/a	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	10	12	14	16	18	20
Date			Effective	31-Mar-21	14-Apr-21	28-Apr-21	12-May-21	26-May-21	09-Jun-21
LIMS			01-Jun-2021	n/a	14365-APR21	n/a	14167-MAY21	n/a	14174-JUN21
Volume Collected	mL	-	-	400	400	400	400	420	410
Temp Upon Receipt	°C	-	-	-	18.0	-	18.0	-	18.0
pH	no unit	6.0-9.5	-	-	8.18	-	8.25	-	8.28
Alkalinity	mg/L as $CaCO_3$	-	-	-	282	-	212	-	170
Conductivity	µS/cm	-	-	-	6500	-	4160	-	2430
Redox Potential	mV	-	-	-	184	-	187	-	186
TDS	mg/L	-	-	-	5140	-	2680	-	1580
F	mg/L	0.12	-	-	**0.67**	-	**0.83**	-	**0.98**
NO_2	as N mg/L	0.06	-	-	**1.82**	-	**1.78**	-	**1.04**
NO_3	as N mg/L	13	-	-	1.83	-	6.80	-	10.5
NO_2+NO_3	as N mg/L	-	-	-	3.65	-	8.58	-	11.6
Cl	mg/L	120	-	-	13	-	7.7	-	4.0
SO_4	mg/L	-	-	-	3300	-	1900	-	930
$CN_{(T)}$	mg/L	-	0.50	-	0.04	-	0.03	-	0.03
CN_{WAD}	mg/L	0.005 as CNF	-	-	**0.015**	-	**0.007**	-	**0.005**
CNS	mg/L	-	-	-	< 2	-	2.7	-	< 2
CNO	mg/L	-	-	-	12	-	1.2	-	< 1
NH_3+NH_4	as N mg/L	-	-	-	124	-	82.9	-	50.1
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**7.01**	-	**5.45**	-	**3.52**
S_2O_3	as S_2O_3 mg/L	-	-	-	< 1	-	< 20	-	< 2
Hg	mg/L	0.000026	-	-	0.00002	-	0.00001	-	< 0.00001
Ag	mg/L	0.00025	-	-	< 0.0005	-	0.00010	-	< 0.00005
Al	mg/L	0.1@pH>6.5	-	-	< 0.01	-	0.007	-	0.012
As	mg/L	0.005	0.10	-	**0.0076**	-	**0.0090**	-	**0.0095**
B	mg/L	1.5	-	-	0.08	-	0.076	-	0.069
Ba	mg/L	-	-	-	0.0277	-	0.0262	-	0.0254
Be	mg/L	-	-	-	< 0.00007	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	< 0.00007	-	< 0.00001	-	< 0.00001
Ca	mg/L	-	-	-	251	-	163	-	59.9
Cd	mg/L	0.00009	-	-	0.00003	-	0.000071	-	0.00005
Co	mg/L	-	-	-	0.0124	-	0.00863	-	0.00488
Cr	mg/L	-	-	-	< 0.0008	-	0.00037	-	0.00035
Cu	mg/L	0.002	0.10	-	**0.0114**	-	**0.0099**	-	**0.0083**
Fe	mg/L	0.3	-	-	< 0.07	-	0.011	-	0.016
K	mg/L	-	-	-	14.6	-	11.9	-	7.39
Li	mg/L	-	-	-	0.0025	-	0.0387	-	0.659
Mg	mg/L	-	-	-	7.26	-	3.81	-	1.49
Mn	mg/L	-	-	-	0.151	-	0.0802	-	0.0291
Mo	mg/L	0.073	-	-	0.0563	-	0.0632	-	0.0492
Na	mg/L	-	-	-	1130	-	678	-	397
Ni	mg/L	0.03	0.25	-	< 0.001	-	0.0006	-	0.0005
P	mg/L	-	-	-	0.04	-	0.045	-	0.038
Pb	mg/L	0.001	0.08	-	0.0002	-	< 0.00009	-	0.00012
S	mg/L	-	-	-	1180	-	774	-	327
Sb	mg/L	-	-	-	< 0.009	-	0.0017	-	0.0019
Se	mg/L	0.001	-	-	**0.0015**	-	**0.00115**	-	0.00084
Si	mg/L	-	-	-	2.8	-	2.35	-	2.44
Sn	mg/L	-	-	-	0.0051	-	0.0083	-	0.00896
Sr	mg/L	-	-	-	1.31	-	0.884	-	0.359
Th	mg/L	-	-	-	< 0.001	-	< 0.0001	-	< 0.0001
Ti	mg/L	-	-	-	< 0.0005	-	0.00012	-	0.00011
Tl	mg/L	0.0008	-	-	< 0.00005	-	0.000013	-	0.000007
U	mg/L	0.015	-	-	**0.0191**	-	0.00990	-	0.00416
V	mg/L	-	-	-	0.0003	-	0.00037	-	0.00038
W	mg/L	-	-	-	0.0003	-	0.00057	-	0.00046
Y	mg/L	-	-	-	< 0.0002	-	0.00006	-	0.00004
Zn	mg/L	0.007	0.40	-	< 0.02	-	< 0.002	-	0.002

Parameters outside the CCME/MDMER guidelines are indicated in bold type.

Note: Raised DL's (10x) due to samlpe matrix

TEST REPORT
Sub-Aqueous Column

Sample Properties

19-TP-7 BS1+2 (Column 2)	900	g
Process Water Cover	n/a	mL
Initital Height of Tailings in Column	n/a	cm

Analysis of Column Leachate

Parameter	Units	CCME FAL	MDMER	22	24	26	28	30	32
Date			Effective	23-Jun-21	07-Jul-21	21-Jul-21	04-Aug-21	18-Aug-21	30-Aug-21
LIMS			01-Jun-2021	n/a	14067-JUL21	n/a	14008-AUG21	n/a	l4530-AUG2:
Volume Collected	mL	-	-	400	400	400	450	425	400
Temp Upon Receipt	°C	-	-	-	18.0	-	21.0	-	15.0
pH	no unit	6.0-9.5	-	-	8.21	-	8.19	-	8.27
Alkalinity	mg/L as $CaCO_3$	-	-	-	147	-	124	-	109
Conductivity	µS/cm	-	-	-	1590	-	1190	-	475
Redox Potential	mV	-	-	-	184	-	155	-	255
TDS	mg/L	-	-	-	926	-	611	-	263
F	mg/L	0.12	-	-	**0.90**	-	**0.69**	-	**0.39**
NO_2	as N mg/L	0.06	-	-	**0.66**	-	0.04	-	**0.39**
NO_3	as N mg/L	13	-	-	12.5	-	1.26	-	**14.2**
NO_2+NO_3	as N mg/L	-	-	-	13.2	-	1.30	-	14.6
Cl	mg/L	120	-	-	2.0	-	< 2	-	< 2
SO_4	mg/L	-	-	-	530	-	350	-	61
$CN_{(T)}$	mg/L	-	0.50	-	0.02	-	0.01	-	0.01
CN_{WAD}	mg/L	0.005 as CNF	-	-	< 0.004	-	0.004	-	<0.004
CNS	mg/L	-	-	-	< 2	-	< 2	-	< 2
CNO	mg/L	-	-	-	< 1	-	< 1	-	< 1
NH_3+NH_4	as N mg/L	-	-	-	35.9	-	25.3	-	10.0
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**2.17**	-	**1.46**	-	**0.69**
S_2O_3	as S_2O_3 mg/L	-	-	-	< 2	-	< 2	-	< 1
Hg	mg/L	0.000026	-	-	* 0.00001	-	< 0.00001	-	** < 0.00001
Ag	mg/L	0.00025	-	-	< 0.00005	-	0.00006	-	**0.00059**
Al	mg/L	0.1@pH>6.5	-	-	0.009	-	0.010	-	0.054
As	mg/L	0.005	0.10	-	**0.0099**	-	**0.0098**	-	**0.0075**
B	mg/L	1.5	-	-	0.060	-	0.052	-	0.021
Ba	mg/L	-	-	-	0.0183	-	0.0121	-	0.00665
Be	mg/L	-	-	-	< 0.000007	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	0.00006	-	0.00004	-	0.00003
Ca	mg/L	-	-	-	27.1	-	22.2	-	15.6
Cd	mg/L	0.00009	-	-	0.000025	-	0.000011	-	0.000006
Co	mg/L	-	-	-	0.00290	-	0.00173	-	0.000210
Cr	mg/L	-	-	-	0.00033	-	0.00021	-	0.00016
Cu	mg/L	0.002	0.10	-	**0.0058**	-	**0.0051**	-	**** 0.0029**
Fe	mg/L	0.3	-	-	0.013	-	0.008	-	< 0.007
K	mg/L	-	-	-	4.79	-	3.52	-	1.17
Li	mg/L	-	-	-	1.51	-	2.24	-	3.11
Mg	mg/L	-	-	-	0.705	-	0.683	-	3.00
Mn	mg/L	-	-	-	0.0136	-	0.0125	-	0.00990
Mo	mg/L	0.073	-	-	0.0389	-	0.0241	-	0.00571
Na	mg/L	-	-	-	236	-	172	-	37.6
Ni	mg/L	0.03	0.25	-	0.0002	-	0.0030	-	0.0026
P	mg/L	-	-	-	0.026	-	0.035	-	< 0.003
Pb	mg/L	0.001	0.08	-	0.00066	-	< 0.00009	-	< 0.00009
S	mg/L	-	-	-	163	-	117	-	12
Sb	mg/L	-	-	-	0.0024	-	0.0023	-	0.0042
Se	mg/L	0.001	-	-	0.00055	-	0.00041	-	0.00018
Si	mg/L	-	-	-	1.82	-	1.77	-	3.64
Sn	mg/L	-	-	-	0.00748	-	0.00670	-	0.00146
Sr	mg/L	-	-	-	0.173	-	0.137	-	0.108
Th	mg/L	-	-	-	0.0004	-	< 0.0001	-	0.0001
Ti	mg/L	-	-	-	0.00010	-	0.00010	-	< 0.00005
Tl	mg/L	0.0008	-	-	0.000010	-	< 0.000005	-	0.000007
U	mg/L	0.015	-	-	0.00219	-	0.00145	-	0.000372
V	mg/L	-	-	-	0.00042	-	0.00036	-	0.00060
W	mg/L	-	-	-	0.00036	-	0.00036	-	0.00189
Y	mg/L	-	-	-	0.00003	-	0.00003	-	< 0.00002
Zn	mg/L	0.007	0.40	-	**0.007**	-	**0.047**	-	**0.017**

Parameters outside the CCME/MDMER guidelines are indicated in bold type. *Reassay LIMS 15136-AUG21 **Reassay LIMS 14202-SEP21

TEST REPORT
Sub-Aqueous Column

Sample Properties

19-TP-7 BS1+2 (Column 2)	900	g
Process Water Cover	n/a	mL
Initital Height of Tailings in Column	n/a	cm

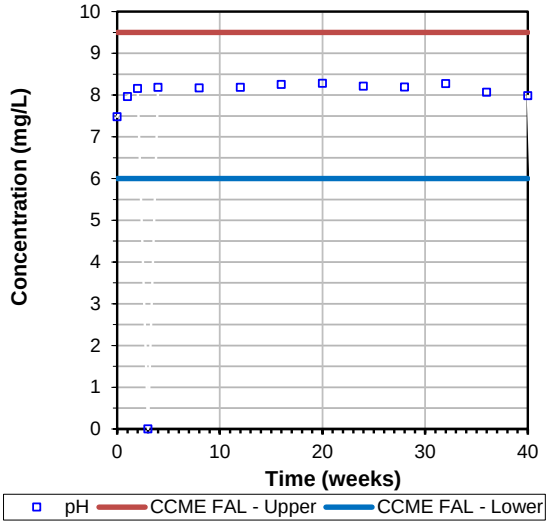
Analysis of Column Leachate

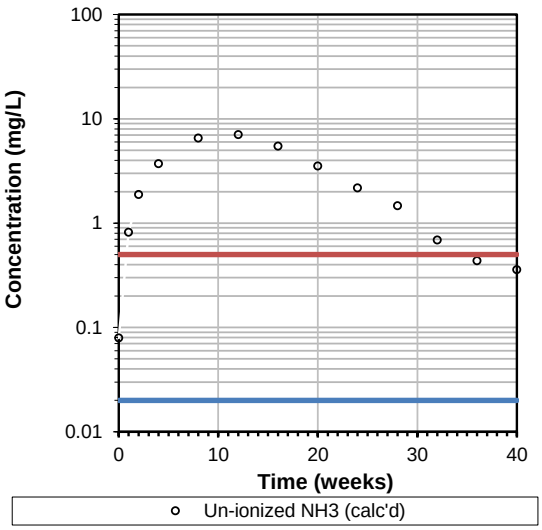
Parameter	Units	CCME FAL	MDMER	34	36	38	40
Date			Effective	14-Sep-21	29-Sep-21	13-Oct-21	27-Oct-21
LIMS			01-Jun-2021	n/a	14633-SEP21	n/a	14497-OCT21
Volume Collected	mL	-	-	400	400	400	400
Temp Upon Receipt	°C	-	-	-	18.0	-	21.0
pH	no unit	6.0-9.5	-	-	8.06	-	7.98
Alkalinity	mg/L as $CaCO_3$	-	-	-	82	-	80
Conductivity	µS/cm	-	-	-	319	-	310
Redox Potential	mV	-	-	-	204	-	151
TDS	mg/L	-	-	-	146	-	160
F	mg/L	0.12	-	-	**0.35**	-	**0.33**
NO_2	as N mg/L	0.06	-	-	**0.25**	-	< 0.3
NO_3	as N mg/L	13	-	-	**14.0**	-	**14.0**
NO_2+NO_3	as N mg/L	-	-	-	14.3	-	14.0
Cl	mg/L	120	-	-	< 2	-	< 2
SO_4	mg/L	-	-	-	18	-	17
$CN_{(T)}$	mg/L	-	0.50	-	0.01	-	< 0.01
CN_{WAD}	mg/L	0.005 as CNF	-	-	<0.004	-	< 0.004
CNS	mg/L	-	-	-	< 2	-	< 2
CNO	mg/L	-	-	-	< 1	-	< 1
NH_3+NH_4	as N mg/L	-	-	-	10.0	-	9.8
Un-ionized NH_3 (calc'd)	as N mg/L	0.020	0.50	-	**0.43**	-	**0.36**
S_2O_3	as S_2O_3 mg/L	-	-	-	< 0.2	-	< 0.2
Hg	mg/L	0.000026	-	-	< 0.00001	-	< 0.00001
Ag	mg/L	0.00025	-	-	< 0.00005	-	< 0.00005
Al	mg/L	0.1@pH>6.5	-	-	0.027	-	0.010
As	mg/L	0.005	0.10	-	**0.0083**	-	**0.0059**
B	mg/L	1.5	-	-	0.028	-	0.022
Ba	mg/L	-	-	-	0.00442	-	0.00581
Be	mg/L	-	-	-	< 0.000007	-	< 0.000007
Bi	mg/L	-	-	-	< 0.00001	-	< 0.00001
Ca	mg/L	-	-	-	12.5	-	19.2
Cd	mg/L	0.00009	-	-	0.000014	-	0.000035
Co	mg/L	-	-	-	0.000138	-	0.000128
Cr	mg/L	-	-	-	0.00015	-	< 0.00008
Cu	mg/L	0.002	0.10	-	**0.0023**	-	0.0018
Fe	mg/L	0.3	-	-	0.033	-	< 0.007
K	mg/L	-	-	-	1.71	-	1.94
Li	mg/L	-	-	-	3.08	-	3.79
Mg	mg/L	-	-	-	0.865	-	1.37
Mn	mg/L	-	-	-	0.00935	-	0.0118
Mo	mg/L	0.073	-	-	0.0102	-	0.00715
Na	mg/L	-	-	-	25.1	-	11.8
Ni	mg/L	0.03	0.25	-	0.0002	-	0.0002
P	mg/L	-	-	-	0.021	-	0.017
Pb	mg/L	0.001	0.08	-	< 0.00009	-	< 0.00009
S	mg/L	-	-	-	6	-	7
Sb	mg/L	-	-	-	0.0024	-	0.0022
Se	mg/L	0.001	-	-	0.00018	-	0.00011
Si	mg/L	-	-	-	2.03	-	2.30
Sn	mg/L	-	-	-	0.00311	-	0.00277
Sr	mg/L	-	-	-	0.0748	-	0.103
Th	mg/L	-	-	-	0.0003	-	< 0.0001
Ti	mg/L	-	-	-	0.00057	-	0.00022
Tl	mg/L	0.0008	-	-	< 0.000005	-	< 0.000005
U	mg/L	0.015	-	-	0.000492	-	0.000394
V	mg/L	-	-	-	0.00043	-	0.00039
W	mg/L	-	-	-	0.00044	-	0.00018
Y	mg/L	-	-	-	0.00003	-	0.00002
Zn	mg/L	0.007	0.40	-	**0.010**	-	**0.021**

Parameters outside the CCME/MDMER guidelines are indicated in bold type.

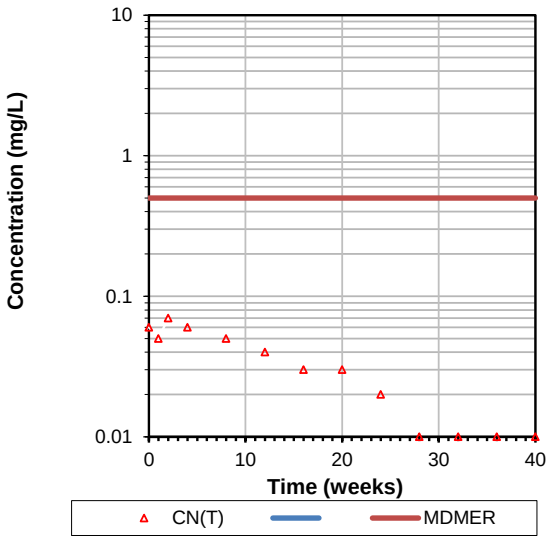
TEST REPORT
Sub-Aqueous Column

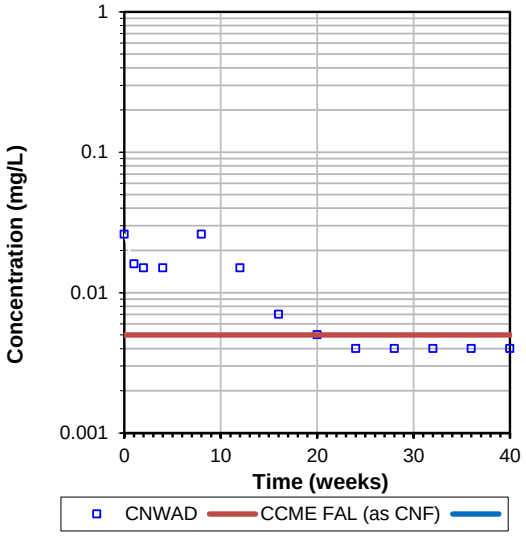
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





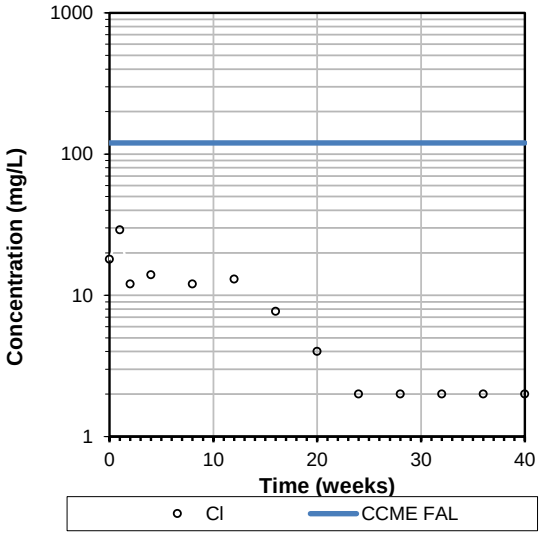
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

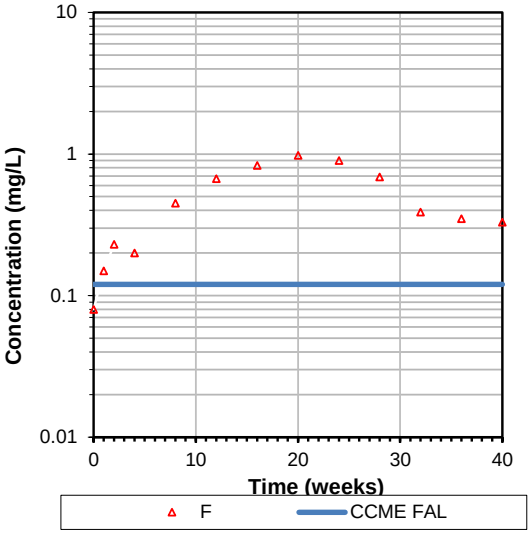




TEST REPORT
Sub-Aqueous Column

Selected Parameters - 19-TP-7 BS1+2 (Column 2)





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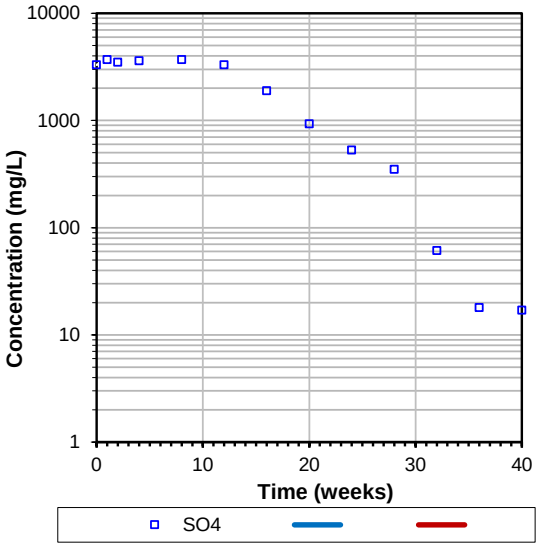
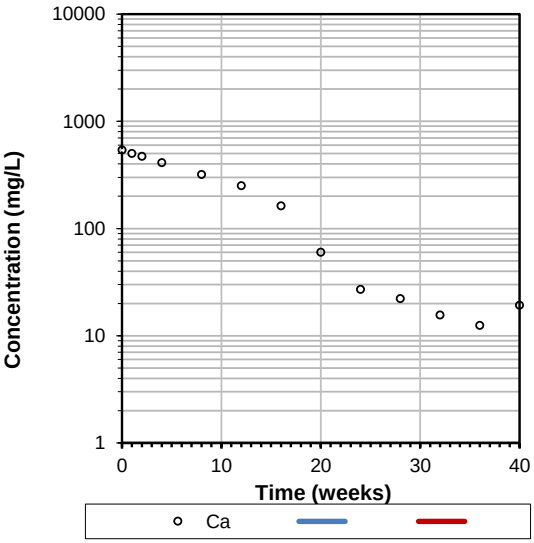
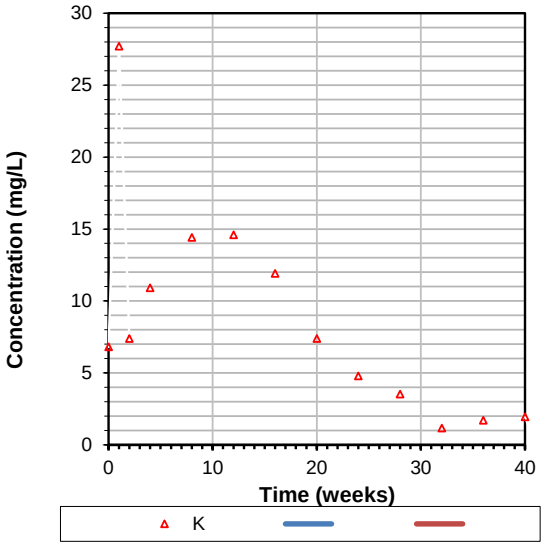
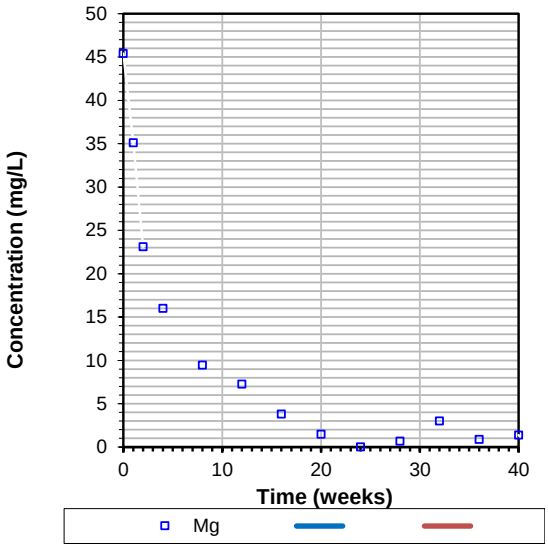




TEST REPORT
Sub-Aqueous Column

Selected Parameters - 19-TP-7 BS1+2 (Column 2)





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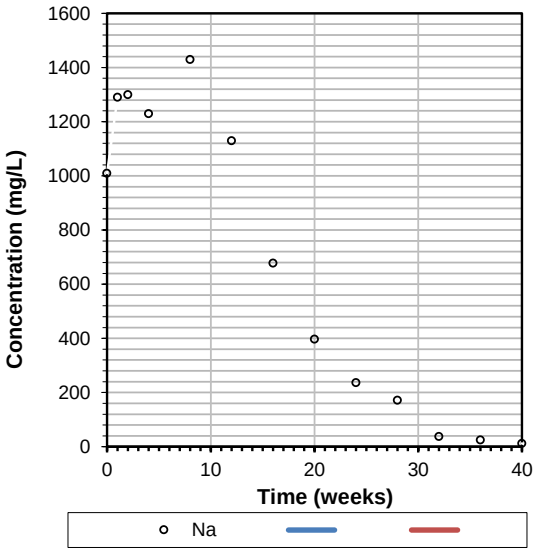
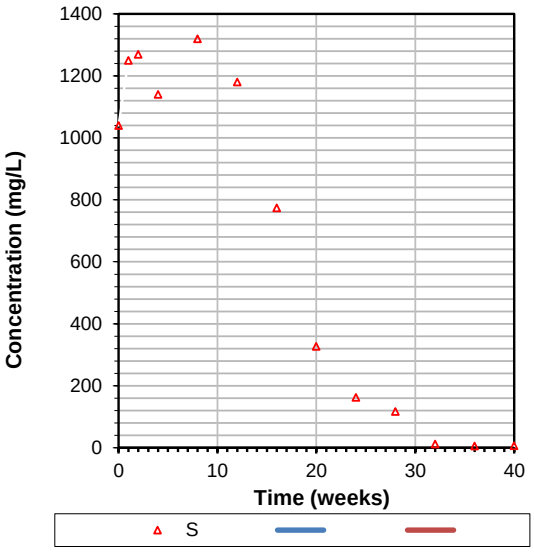
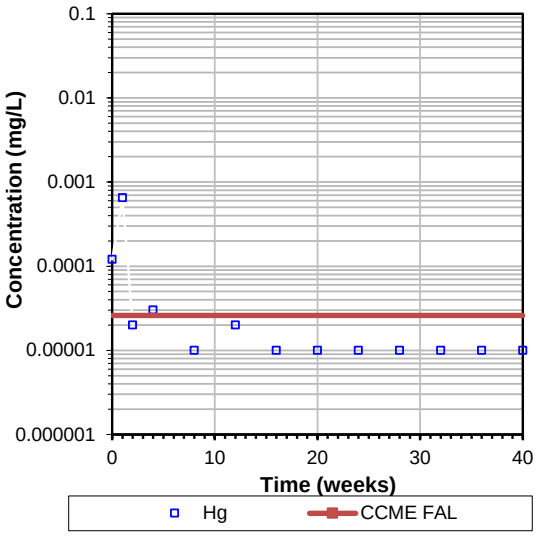
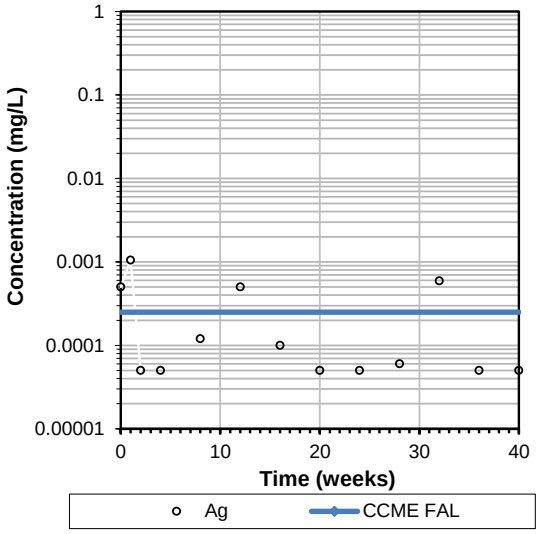




TEST REPORT
Sub-Aqueous Column

Selected Parameters - 19-TP-7 BS1+2 (Column 2)





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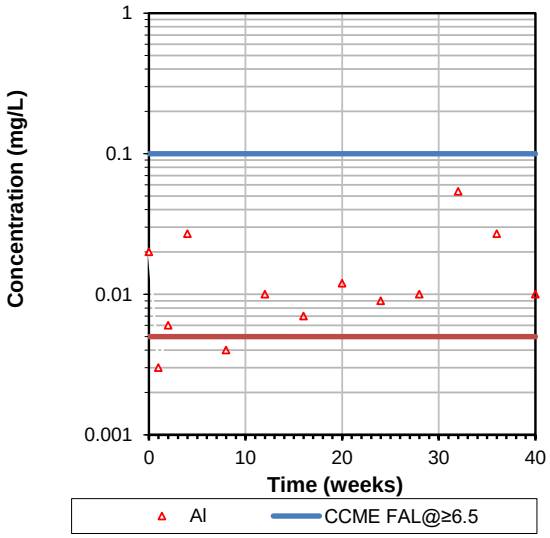
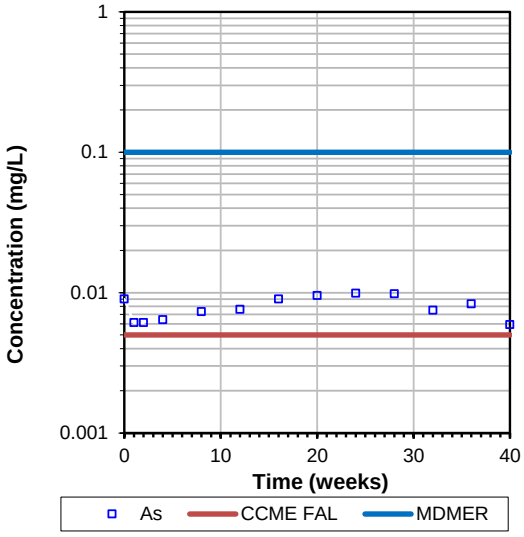
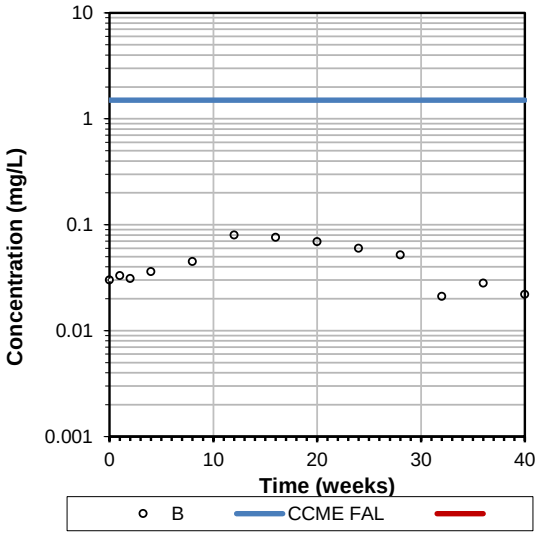
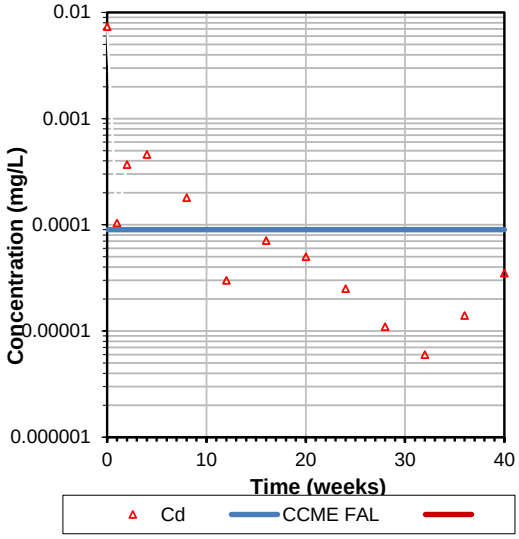




TEST REPORT
Sub-Aqueous Column

Selected Parameters - 19-TP-7 BS1+2 (Column 2)





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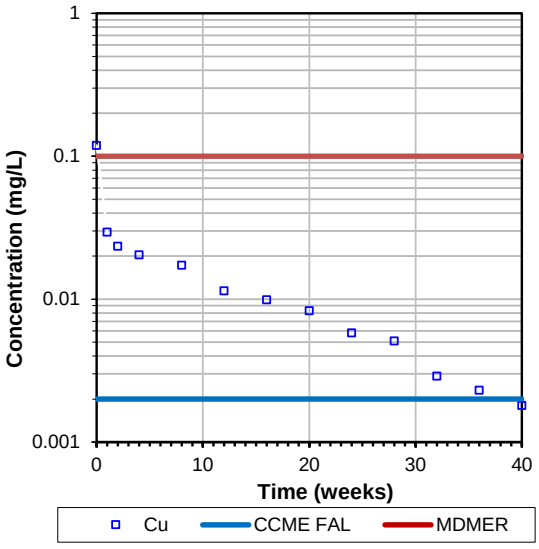
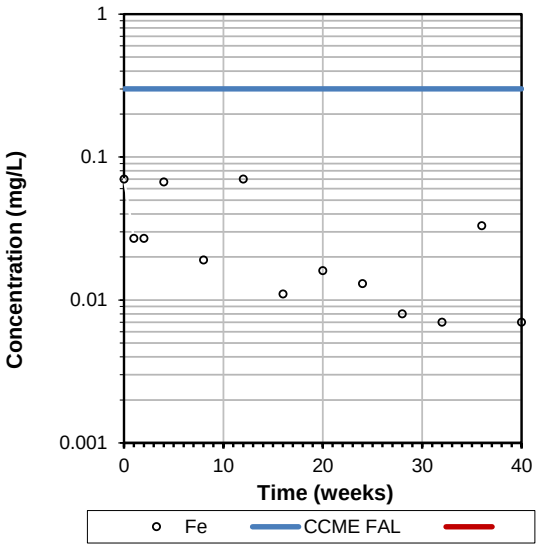
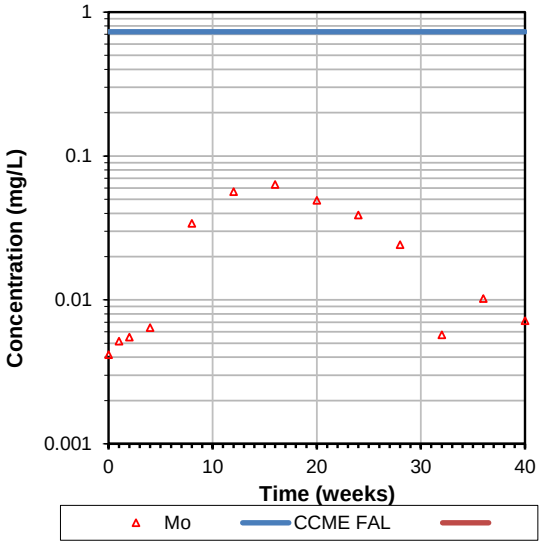
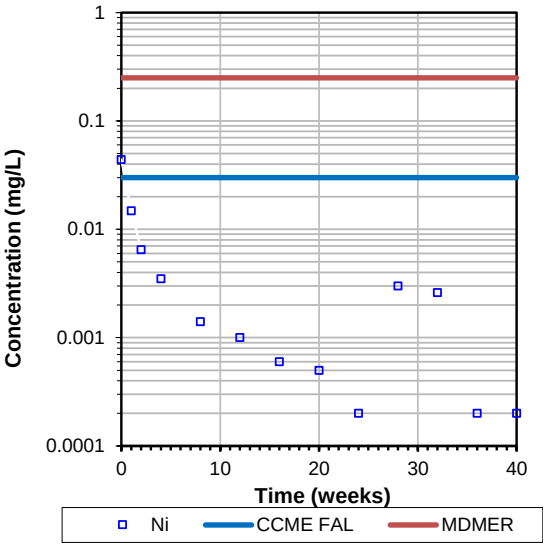




TEST REPORT
Sub-Aqueous Column

Selected Parameters - 19-TP-7 BS1+2 (Column 2)





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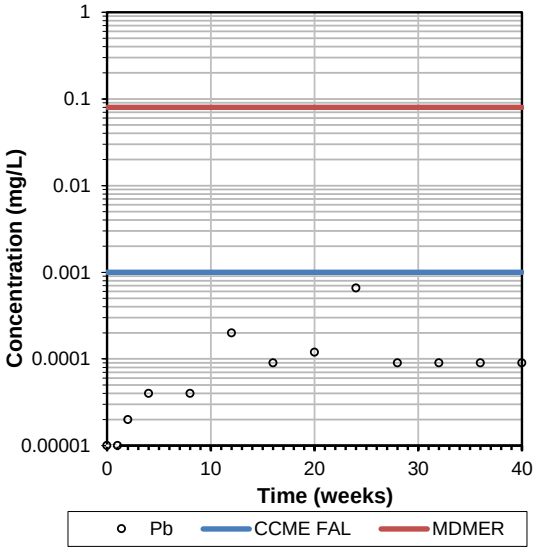
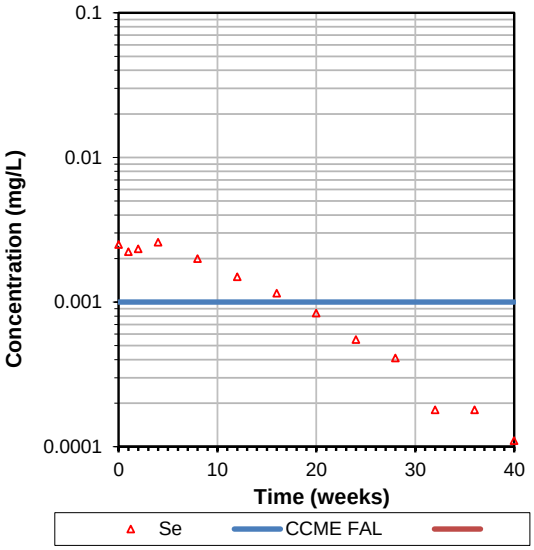
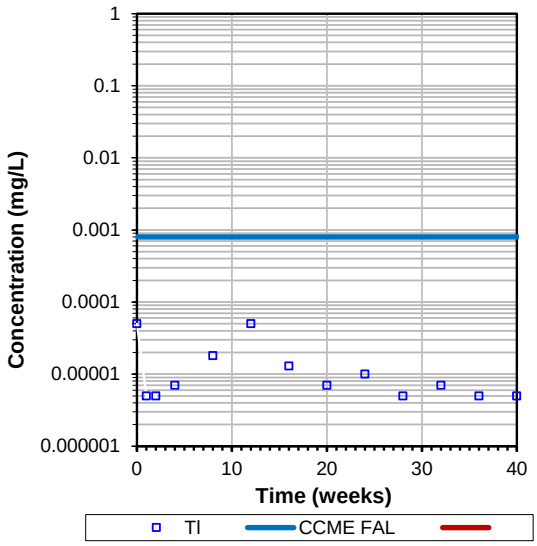
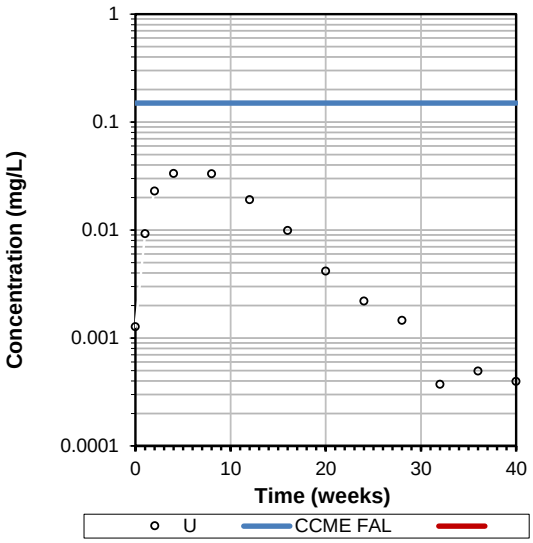




TEST REPORT
Sub-Aqueous Column

Selected Parameters - 19-TP-7 BS1+2 (Column 2)





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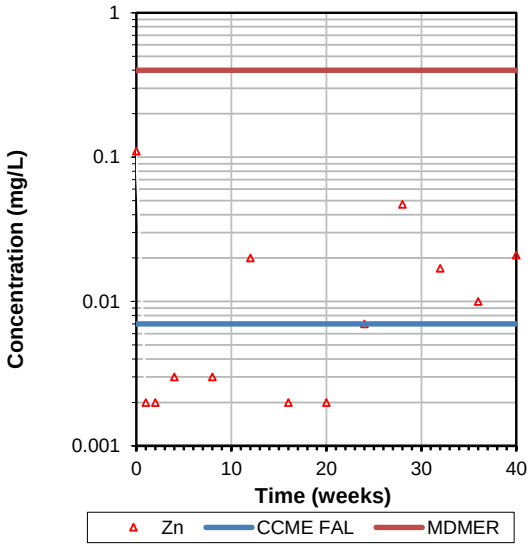

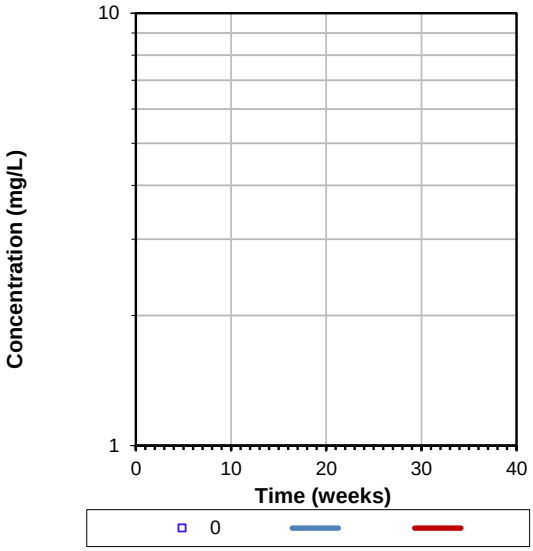

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SGS Lakefield Environmental Met
Attn : Barb Bowman

ABA - Modified Sobek

Project : CA20M-00000-110-16863-02

03-September-2020

Date Rec. : 16 July 2020
LR Report: **CA10139-JUL20**
Reference: 16863-02-23

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: QC - Blank	6: QC - STD % Recovery	7: QC - DUP % RPD	8: QC - Spike Rep	9: M-LGO CNP DPL
Sample Date & Time									N/A
Paste pH [no unit]	13-Aug-20	07:12	14-Aug-20	10:23					9.33
Fizz Rate [no unit]	12-Aug-20	08:46	14-Aug-20	10:23					1
Sample weight [g]	12-Aug-20	08:46	14-Aug-20	10:23					2.01
HCl_add [mL]	13-Aug-20	06:53	14-Aug-20	10:23					20.00
HCl [Normality]	12-Aug-20	08:46	14-Aug-20	10:23					0.10
NaOH [Normality]	12-Aug-20	08:46	14-Aug-20	10:23					0.10
Vol NaOH to pH=8.3 [mL]	13-Aug-20	08:46	14-Aug-20	10:23					18.21
Final pH [no unit]	13-Aug-20	08:46	14-Aug-20	10:23					1.20
NP [t CaCO3/1000 t]	13-Aug-20	08:46	14-Aug-20	10:23					4.5
AP [t CaCO3/1000 t]	14-Aug-20	10:23	14-Aug-20	10:23					15.6
Net NP [t CaCO3/1000 t]	14-Aug-20	10:23	14-Aug-20	10:23					-11.12
NP/AP [ratio]	14-Aug-20	10:24	14-Aug-20	10:24					0.29
S [%]	13-Aug-20	10:53	13-Aug-20	11:38	< 0.005	100%	7%		0.536
Acid Leachable SO4-S [%]	13-Aug-20	11:38	13-Aug-20	11:38					< 0.04
Sulphide [%]	13-Aug-20	11:06	13-Aug-20	11:38	< 0.04	100%	11%		0.50

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ABA - Modified Sobek

Project : CA20M-00000-110-16863-02

LR Report : **CA10139-JUL20**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: QC - Blank	6: QC - STD % Recovery	7: QC - DUP % RPD	8: QC - Spike Rep	9: M-LGO CNP DPL
C [%]	13-Aug-20	10:53	17-Aug-20	12:12	< 0.005	94%	2%		0.131
CO3 [%]	17-Aug-20	09:41	17-Aug-20	12:12	< 0.025	100%	0%		0.090
TIC [%]	17-Aug-20	09:41	02-Sep-20	16:27					< 0.025
	---	---	---	---	---	---	---	---	1

*NP (Neutralization Potential)
 = 50 x (N of HCL x Total HCL added - N NaOH x NaOH added)

                        Weight of Sample

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.02 will be calculated using a 0.02 value.

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Project : CA20M-00000-110-16863-02

03-September-2020

Date Rec. : 16 July 2020
LR Report: **CA10141-JUL20**
Reference: 16863-02-22

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: QC - Blank	6: QC - STD % Recovery	7: QC - DUP % RPD	8: QC - Spike Rep	9: CND 1 Residue CNP DPL
Sample Date & Time									N/A
Paste pH [no unit]	13-Aug-20	07:12	14-Aug-20	10:24					8.69
Fizz Rate [no unit]	12-Aug-20	08:46	14-Aug-20	10:24					1
Sample weight [g]	12-Aug-20	08:46	14-Aug-20	10:24					2.02
HCl_add [mL]	13-Aug-20	06:53	14-Aug-20	10:24					20.00
HCl [Normality]	12-Aug-20	08:46	14-Aug-20	10:24					0.10
NaOH [Normality]	12-Aug-20	08:46	14-Aug-20	10:24					0.10
Vol NaOH to pH=8.3 [mL]	13-Aug-20	08:46	14-Aug-20	10:24					18.59
Final pH [no unit]	13-Aug-20	08:46	14-Aug-20	10:24					1.16
NP [t CaCO3/1000 t]	13-Aug-20	08:46	14-Aug-20	10:24					3.5
AP [t CaCO3/1000 t]	14-Aug-20	10:24	14-Aug-20	10:24					13.1
Net NP [t CaCO3/1000 t]	14-Aug-20	10:24	14-Aug-20	10:24					-9.62
NP/AP [ratio]	14-Aug-20	10:24	14-Aug-20	10:24					0.27
S [%]	13-Aug-20	10:53	13-Aug-20	11:38	< 0.005	100%	7%		0.408
Acid Leachable SO4-S [%]	13-Aug-20	11:38	13-Aug-20	11:38					< 0.04
Sulphide [%]	13-Aug-20	11:06	13-Aug-20	11:38	< 0.04	100%	11%		0.42

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Project : CA20M-00000-110-16863-02

LR Report : **CA10141-JUL20**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: QC - Blank	6: QC - STD % Recovery	7: QC - DUP % RPD	8: QC - Spike Rep	9: CND 1 Residue CNP DPL
C [%]	13-Aug-20	10:53	17-Aug-20	12:13	< 0.005	94%	2%		0.040
CO3 [%]	17-Aug-20	09:41	17-Aug-20	12:13	< 0.025	100%	0%		0.200
TIC [%]	02-Sep-20	16:27	02-Sep-20	16:27					0.040

*NP (Neutralization Potential)

$$= \frac{50 \times (N \text{ of HCL} \times \text{Total HCL added} - N \text{ NaOH} \times \text{NaOH added})}{\text{Weight of Sample}}$$

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.02 will be calculated using a 0.02 value.

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SGS Lakefield Environmental Met
Attn : Barb Bowman

NP Depletion Prior to Humidity Cell Set-Up

Project : CA20M-00000-110-16863-02

07-August-2020

Date Rec. : 02 June 2020
LR Report: **CA14673-JUN20**
Reference: 16863-02-21

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: QC - Blank	6: QC - STD % Recovery	7: QC - DUP % RPD	9: M-LGO Comp	10: CND 1 Residue
Sample Date & Time								N/A	N/A
TIC [%]	14-Jul-20	13:20	14-Jul-20	13:24	< 0.025	94%	3%	0.515	0.318
TIC [%]	16-Jul-20	14:12	16-Jul-20	15:10	< 0.025	88%	17%	0.052	< 0.025
TIC [%]	21-Jul-20	16:10	21-Jul-20	17:14	< 0.025	92%	5%	0.029	---
TIC [%]	24-Jul-20	14:54	24-Jul-20	15:21	< 0.005	0.923	0.064	0.040	---
TIC [%]	29-Jul-20	15:16	29-Jul-20	16:15	< 0.025	NV	NV	0.027	---
TIC [%]	30-Jul-20	10:26	30-Jul-20	11:16	< 0.025	94%	1%	0.036	---
TIC [%]	31-Jul-20	13:34	31-Jul-20	13:39	< 0.025	90%	6%	< 0.025	---

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APPENDIX C

Summary Tables Showing ARD/ML Reclassification Based on Static Tests (ABA and SFE)

Table C.1 ARD Classification of Materials/Lithologies Tested before and after the EIS Submission

Marathon Deposit												
Criteria		Classification	Conglomerate		Gabbro		Low-Grade Ore		High-Grade Ore		Overburden	
Parameter			n	%	n	%	n	%	n	%	n	%
Tests presented in the EIS												
All			9	100	4	100	8	100	9	100	14	100
NPR	>1 <2	uncertain	0	0	0	0	2	25	1	11	0	0
NPR	<1	PAG	0	0	1	25	2	25	5	56	0	0
NPR	<2	PAG+uncertain	0	0	1	25	4	50	6	67	0	0
All up to date tests												
All			89	100	35	100	80	100	96	100	30	100
NPR	>1 <2	uncertain	0	0	0	0	27	34	33	34	2	7
NPR	<1	PAG	0	0	1	3	24	30	44	46	2	7
NPR	<2	PAG+uncertain	0	0	1	3	51	64	77	80	4	13
Note: n - number of samples tested												

Table C.2 ARD Classification of Materials/Lithologies Tested before and after the EIS Submission

Leprechaun Deposit												
Criteria		Classification	Sediments		Veins in mafic dykes (QZ-MQTP)		Low-Grade Ore		High-Grade Ore		Overburden	
Parameter			n	%	n	%	n	%	n	%	n	%
Tests presented in the EIS												
All			17	100	3	100	10	100	8	100	6	100
NPR	>1 <2	uncertain	0	0	0	0	0	0	0	0	0	0
NPR	<1	PAG	0	0	0	0	1	10	1	13	0	0
NPR	<2	PAG+uncertain	0	0	0	0	1	10	1	13	0	0
All up to date tests												
All			76	100	4	100	28	100	41	100	9	100
NPR	>1 <2	uncertain	0	0	0	0	0	0	1	0	1	22
NPR	<1	PAG	0	0	0	0	1	4	1	2	1	0
NPR	<2	PAG+uncertain	0	0	0	0	1	4	2	5	2	11
Note: n - number of samples tested												

Table C.3 Metal leaching Classification of Materials/Lithologies Tested before and after the EIS Submission

Marathon Deposit												
Parameter	**Units**	**Criteria**	**Conglomerate**		**Gabbro**		**Low-Grade Ore**		**High-Grade Ore**		**Overburden**	
CWQG Criteria			**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Tests presented in the EIS												
All			3	100	2	100	3	100	2	100	14	100
Final pH	pH unit	<6.5	0	0	0	0	0	0	0	0	0	0
Final pH	pH unit	>9	0	0	0	0	0	0	1	50	0	0
Al	mg/L	>0.1	3	100	2	100	3	100	1	50	6	43
As	mg/L	>0.005	0	0	0	0	0	0	0	0	6	43
Cd*	mg/L	>0.00004	0	0	0	0	0	0	0	0	3	21
Cr	mg/L	>0.0089	0	0	0	0	0	0	0	0	0	0
Cu*	mg/L	>0.002	0	0	0	0	0	0	0	0	5	36
Fe	mg/L	>0.3	0	0	0	0	0	0	0	0	5	36
Mn*	mg/L	>0.19	0	0	0	0	0	0	0	0	2	14
Mo	mg/L	>0.073	0	0	0	0	0	0	0	0	0	0
Pb*	mg/L	>0.001	0	0	0	0	0	0	0	0	1	7
Se	mg/L	>0.001	0	0	0	0	0	0	0	0	3	21
Zn*	mg/L	>0.0017	0	0	0	0	0	0	0	0	4	29
All up to date tests												
All			74	100	33	100	49	100	48	100	30	100
Final pH	pH unit	<6.5	0	0	2	6	0	0	0	0	4	13
Final pH	pH unit	>9	4	5	2	6	1	2	1	2	0	0
Al	mg/L	>0.1	74	100	33	100	49	100	47	98	17	57
As	mg/L	>0.005	10	14	0	0	0	0	1	2	15	50
Cd*	mg/L	>0.00004	0	0	0	0	1	2	0	0	8	27
Cr	mg/L	>0.0089	0	0	0	0	0	0	0	0	0	0
Cu*	mg/L	>0.002	3	4	0	0	3	6	1	2	11	37
Fe	mg/L	>0.3	0	0	0	0	0	0	0	0	11	37
Mn*	mg/L	>0.19	0	0	0	0	0	0	0	0	5	17
Mo	mg/L	>0.073	0	0	0	0	0	0	0	0	1	3
Pb*	mg/L	>0.001	0	0	0	0	1	2	1	2	2	7
Se	mg/L	>0.001	0	0	1	3	0	0	0	0	9	30
Zn*	mg/L	>0.0017	0	0	0	0	1	2	2	4	15	50

Note:
n - number of samples tested; only parameters with exceedances are shown.

Table C.4 Metal Leaching Classification of Materials/Lithologies Tested before and after the EIS Submission

Leprechaun Deposit												
Parameter	**Units**	**Criteria**	**Sediments**		**Veins in mafic dykes (QZ-MQTP)**		**Low-Grade Ore**		**High-Grade Ore**		**Overburden**	
CWQG Criteria			**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Tests presented in the EIS												
All			8	100	3	100	5	100	3	100	5	100
Final pH	pH unit	<6.5	0	0	0	0	0	0	0	0	5	100
Final pH	pH unit	>9	0	0	0	0	0	0	0	0	0	0
Al	mg/L	>0.1	8	100	3	100	3	60	3	100	3	60
As	mg/L	>0.005	0	0	0	0	0	0	0	0	0	0
Cu*	mg/L	>0.002	0	0	0	0	2	40	0	0	0	0
Fe	mg/L	>0.3	0	0	0	0	0	0	0	0	1	20
Hg	mg/L	>0.000026	0	0	0	0	0	0	0	0	0	0
Mn*	mg/L	>0.19	1	13	0	0	0	0	0	0	0	0
Pb*	mg/L	>0.001	0	0	0	0	0	0	0	0	1	20
Zn*	mg/L	>0.0017	0	0	0	0	0	0	0	0	3	60
All up to date tests												
All			67	100	4	100	21	100	12	100	8	100
Final pH	pH unit	<6.5	0	0	0	0	0	0	0	0	6	75
Final pH	pH unit	>9	0	0	0	0	0	0	0	0	0	0
Al	mg/L	>0.1	67	100	4	100	19	90	12	100	5	63
As	mg/L	>0.005	32	48	0	0	0	0	0	0	0	0
Cu*	mg/L	>0.002	25	37	0	0	8	38	1	8	2	25
Fe	mg/L	>0.3	0	0	0	0	8	38	0	0	3	38
Hg	mg/L	>0.000026	0	0	0	0	0	0	1	8	0	0
Mn*	mg/L	>0.19	1	1	0	0	0	0	0	0	0	0
Pb*	mg/L	>0.001	0	0	0	0	0	0	0	0	1	13
Zn*	mg/L	>0.0017	3	4	0	0	0	0	0	0	4	50

Note:
n - number of samples tested; only parameters with exceedances are shown.