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

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October 18, 2021

Table of Contents

RESPONSE TO IR(2)-18 1

RESPONSE TO IR(2)-19 5

RESPONSE TO IR(2)-21 8

RESPONSE TO IR(2)-23 16

RESPONSE TO IR(2)-26 20

RESPONSE TO IR(2)-41 21

List of Appendices

Appendix IR(2)-18.A Updated Cross-Sections
Appendix IR(2)-19.A ARD/ML Management Approach
Appendix IR(2)-41.A Dissolved Loading
Appendix IR(2)-41.B Suspended Loading

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.

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.

IR 2 Reference#:	IR(2)-19
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

IR 2 Reference#:	IR(2)-19
	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

IR 2 Reference#:	IR(2)-21
	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.

IR 2 Reference#:	IR(2)-21
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

IR 2 Reference#:	IR(2)-21
	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

IR 2 Reference#:	**IR(2)-21**
	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

RESPONSE TO IR(2)-41

IR 2 Reference#:	**IR(2)-41**
IR 1 Reference #:	IR-41
EIS Reference:	Chapter 4: Assessment of Effects to Surface Water Appendix 7C – Assimilative Capacity Assessment Report
Context and Rationale:	The EIS guidelines require a sediment quality analysis for key sites likely to receive mine effluents. Sediment quality is an important aspect of a healthy ecosystem especially in supporting fish health in the receiving environment. The proponent has conducted baseline sediment studies but has not modelled or predicted impacts to sediments nor is any monitoring program planned to evaluate sediment quality. While water quality modelling and monitoring programs give good information related to the health of the aquatic environment, continuous loadings of elevated contaminants of potential concern may be deposited to sediments over time which may then act as an ongoing source of contamination in the benthic environment which can affect fish health. Contaminants of potential concern in sediments in streams and rivers can be remobilized over time or during high flow events to create risks to downstream aquatic receptors.
Information Request:	Provide the time series plots of Al, As, AG, Cd, Cr, Cu, Fe, Mn, Hg, Se, U, Zn, NO2, Cyanide, UN-NH3, SO4, F in sediments of Victoria Lake Reservoir, Valentine Lake and Victoria River throughout the project life cycle (construction, operation, closure and post-closure) to characterize the build-up of metal overtime in sediment. The plots must show monthly loading during operations and decommissioning. Update the effects assessment on fish and fish habitat accordingly.
Response:	Sediment assessment methodology including background sediment concentrations, sediment load predictions from ***modelling*** contacted and non-contacted areas, and load predictions from sedimentations ponds was presented in the original response to IR-41 (provided in response to Federal Information Requirements issued on February 10, 2021). Please note however that the time series parameters concentration plots/tables meant to be appended to the original response to IR-41 were inadvertently omitted. In addition to presenting the time-series plots and tables that were intended to be included with the original response, the following response also summarizes the extensive modeling of geochemistry, water quality and sediment deposition in the receiving environment undertaken in support of the EIS and in responding to the original IR. Baseline sediment quality is presented in Table IR-41.4 (provided in response to Federal Information Requirements issued on February 10,

IR 2 Reference#:	IR(2)-41
	202). The monthly time series plots for parameters of potential concern (POPC) (i.e., Al, As, Cd, Cu, Fe, Pb, Mn and Zn) for operation and post closure conditions are presented in Appendix IR(2)-41.A and IR(2)-41.B, with results in tabular format of suspended metal loading presented in Tables IR(2)-41.1 to IR(2)-41.16 below. No baseline sediment quality data are available to complete the loading assessment for Ag, Hg, NO_2, Cyanide, UN-NH_3, SO_4 and F. As presented in the original response to IR-41, assessment of operation and closure phases demonstrated similar sediment geochemistry and removal rates in Project sedimentation ponds and thus the operation phase is used to present sediment predictions for both operation and closure. Final Discharge Points (FDPs) MA-FDP-01/02 represent sediments discharging to Valentine Lake, MA-FDP-03/04 represent sediments discharging to the Victoria River and LP-FDP-01/02/03/05 represent sediments discharging to Victoria Lake Reservoir. The distance from the FDP to the ultimate receiver is different in each case, however, for the purposes of this assessment, and as presented in the original response to IR-41, a worst-case scenario has been assumed in which 100% of the sediment load at the FDP is transported to and settles out in the ultimate receiving water mixing zone. During operation and closure, discharge from the sedimentation ponds will comply with the *Metal and Diamond Mining Effluent Regulations* (MDMER) limits. For modeling purposes, outflow from the sedimentation ponds during operation and closure were assumed at MDMER or at 95th percentile of modeling prediction where no MDMER limit exists. Therefore, sediment transport and sediment loading predictions during mine operation and closure in the model are the same. After mine rehabilitation is complete and the mine moves to a recognized closed mine (RCM) status post-closure, the thresholds for discharge are understood to be those of baseline or Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (CWQG-FAL). The following assumptions were used to generate the monthly time series: • Effluent concentrations of POPC for operation conditions were assumed at MDMER or at 95th percentile of modeling prediction where no MDMER limit exists. • Effluent concentrations of POPC for post-closure conditions were assumed at CCME CWQG-FAL or baseline, whichever has a larger value. • Monthly average flows for operation and post-closure were generated using the GoldSim water balance and water quality model.

IR 2 Reference#:	IR(2)-41
	• Loading of suspended POPC was calculated from disturbed and non-disturbed areas separately, then combined. Total suspended solids (TSS) removal in the ponds was modelled at 80%, which aligns with pond design performance criteria. • Monthly TSS concentrations were distributed proportionally to average monthly flows. It was observed that loading of dissolved forms of metals (Appendix IR(2)-41.A) reduces substantially from operation to post-closure. For metals with relatively high baseline concentration, such as aluminum, iron and manganese, the loading reduction from operation to closure ranges from 50-80%. Metals with very low baseline concentrations (arsenic, copper, lead and zinc) have reduction of dissolved forms in a range of 80-95%. The highest dissolved loading was observed at MA-FDP- 3/4 as it has the largest total catchment area (7.1 km^2) and largest disturbed area (1.55 km^2). The lowest dissolved loading was observed at LP-FDP-04 due to its small watershed size, as its total area is 0.54 km^2 and disturbed area is 0.1 km^2. Loading of monthly suspended forms is presented in Appendix IR(2)-41.B. It was observed that most of the suspended loading originates from background conditions (i.e., undisturbed areas). Reduction of loading from operation to closure is on average about 5 to 10%. Loading of suspended metals during operation is not significant due to passive treatment (i.e., TSS sedimentation in sedimentation ponds, perimeter ditches) and relatively small Project footprint relative to non-disturbed areas. As with the dissolved forms, the highest suspended loading was observed at MA-FDP-3/4 due to its largest total catchment area, and the lowest suspended loading was observed at LP-FDP-04 due to its small watershed size. Most of the suspended and dissolved loading occurs in April when monthly average flows are the highest. Lowest dissolved and suspended load is observed in June and July. Based on predictions of ultimate combined sediment quality presented in the original response to IR-41 and additional information provided above, the following observations are made: • Sediment chemistry for ***baseline*** conditions exceeds Canadian Sediment Quality Guideline (CSQG) Interim Sediment Quality Guidelines (ISQG) for arsenic, cadmium and zinc, and Canadian Environmental Quality Guidelines (CEQG) Probable Effects Limit (PEL) for arsenic.

IR 2 Reference#:	**IR(2)-41**
	• No CEQG-ISQG and CEQG-PEL exceedances are predicted in sediments from contact areas discharging from Project sedimentation ponds. • Average sediment deposition depth in the mixing zone of ultimate receivers for all FDPs is less than 0.1 mm per year, which is comparable to natural (background) deposition rates for receivers with similar hydraulics (Chien and Wan 2014). It is anticipated that sediment quality may change due to Project discharges; however, that sediment quality in these discharges will not increase above ISQG or PEL and will not diminish baseline sediment quality. Sediment deposition, even when estimated for the worst-case scenario, will not adversely affect sediment accretion depth in the ultimate receiver mixing zones. As such, no adverse sediment deposition effects are predicted for benthos, fish or fish habitat. Sediment quality is predicted to remain the same as for baseline conditions for all parameters. Therefore, the Project is not predicted to have an adverse effect on fish, fish habitat or benthic habitat as a result of changes in sediment quality or quantity. References: Chien N and Wan Zha. 2014. Mechanics of Sediment transport. ASCE Press.
Appendix:	Appendix IR(2)-41.A and Appendix IR(2)-41.B

Table IR(2)-41.1 Operation – Lead Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	0.092	0.132	0.149	0.360	0.091	0.050	0.039	0.086	0.107	0.109	0.145	0.119
MA-FDP-02	0.010	0.013	0.014	0.033	0.013	0.010	0.010	0.015	0.017	0.015	0.018	0.013
MA-FDP-03/04	0.298	0.378	0.392	0.768	0.354	0.320	0.321	0.393	0.404	0.369	0.419	0.348
LP-FDP-01	0.027	0.039	0.045	0.108	0.029	0.018	0.017	0.028	0.032	0.031	0.041	0.035
LP-FDP-02	0.040	0.055	0.060	0.143	0.049	0.037	0.034	0.055	0.061	0.056	0.068	0.052
LP-FDP-03C	0.380	0.521	0.574	1.270	0.428	0.333	0.322	0.449	0.483	0.456	0.560	0.470
LP-FDP-04	0.051	0.069	0.075	0.183	0.051	0.027	0.018	0.049	0.065	0.067	0.086	0.066

Table IR(2)-41.2 Post Closure – Lead Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	0.088	0.127	0.143	0.346	0.088	0.048	0.038	0.082	0.103	0.104	0.140	0.115
MA-FDP-02	0.010	0.013	0.014	0.032	0.013	0.010	0.009	0.015	0.016	0.015	0.017	0.012
MA-FDP-03/04	0.297	0.377	0.392	0.768	0.353	0.320	0.321	0.392	0.404	0.368	0.419	0.348
LP-FDP-01	0.025	0.037	0.043	0.103	0.027	0.017	0.016	0.027	0.030	0.030	0.039	0.033
LP-FDP-02	0.035	0.048	0.052	0.124	0.042	0.032	0.030	0.047	0.052	0.049	0.059	0.045
LP-FDP-03C	0.304	0.422	0.467	1.048	0.341	0.259	0.250	0.355	0.385	0.365	0.453	0.380
LP-FDP-04	0.048	0.065	0.071	0.172	0.048	0.025	0.017	0.046	0.061	0.063	0.081	0.062

Table IR(2)-41.3 Operation – Zinc Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	1.77	2.56	2.88	6.96	1.77	0.97	0.76	1.66	2.06	2.10	2.81	2.31
MA-FDP-02	0.20	0.26	0.27	0.66	0.25	0.20	0.19	0.30	0.33	0.30	0.35	0.25
MA-FDP-03/04	7.10	9.01	9.36	18.34	8.44	7.64	7.66	9.37	9.65	8.80	10.00	8.30
LP-FDP-01	0.19	0.29	0.33	0.79	0.21	0.13	0.12	0.20	0.23	0.23	0.30	0.25
LP-FDP-02	0.16	0.22	0.24	0.58	0.20	0.15	0.14	0.22	0.25	0.23	0.28	0.21
LP-FDP-03C	1.73	2.37	2.62	5.79	1.95	1.51	1.47	2.04	2.20	2.08	2.55	2.14
LP-FDP-04	0.42	0.57	0.62	1.50	0.42	0.22	0.15	0.40	0.53	0.55	0.71	0.54

Table IR(2)-41.4 Post Closure – Zinc Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	1.75	2.53	2.84	6.88	1.75	0.96	0.75	1.64	2.04	2.08	2.77	2.28
MA-FDP-02	0.19	0.26	0.27	0.65	0.25	0.20	0.19	0.29	0.32	0.29	0.34	0.25
MA-FDP-03/04	7.10	9.01	9.36	18.34	8.44	7.64	7.66	9.37	9.64	8.80	10.00	8.30
LP-FDP-01	0.19	0.28	0.32	0.77	0.20	0.13	0.12	0.20	0.22	0.22	0.29	0.25
LP-FDP-02	0.14	0.20	0.21	0.51	0.17	0.13	0.12	0.20	0.22	0.20	0.24	0.18
LP-FDP-03C	1.42	1.96	2.18	4.90	1.59	1.20	1.15	1.65	1.79	1.70	2.11	1.77
LP-FDP-04	0.41	0.55	0.60	1.46	0.41	0.21	0.14	0.39	0.52	0.53	0.69	0.53

Table IR(2)-41.5 Operation – Manganese Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	38.16	55.19	61.99	149.92	38.08	20.91	16.27	35.73	44.47	45.27	60.48	49.67
MA-FDP-02	4.29	5.67	5.97	14.31	5.52	4.43	4.14	6.50	7.10	6.42	7.52	5.46
MA-FDP-03/04	154.71	196.31	203.88	399.47	183.87	166.44	166.77	204.10	210.09	191.68	217.74	180.82
LP-FDP-01	7.40	10.89	12.53	29.98	7.97	5.08	4.75	7.80	8.80	8.69	11.48	9.65
LP-FDP-02	3.00	4.11	4.45	10.67	3.65	2.74	2.57	4.09	4.51	4.19	5.08	3.85
LP-FDP-03C	34.35	48.09	53.88	122.86	38.31	28.21	26.89	39.54	43.19	41.17	51.73	43.32
LP-FDP-04	17.20	23.32	25.26	61.46	17.15	8.94	6.09	16.56	21.81	22.42	29.00	22.14

Table IR(2)-41.6 Post Closure – Manganese Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	37.52	54.26	60.95	147.39	37.44	20.56	16.00	35.13	43.72	44.51	59.46	48.84
MA-FDP-02	4.19	5.54	5.83	13.98	5.39	4.32	4.05	6.35	6.93	6.27	7.35	5.34
MA-FDP-03/04	154.67	196.26	203.82	399.36	183.81	166.39	166.72	204.04	210.03	191.62	217.68	180.77
LP-FDP-01	7.33	10.78	12.41	29.69	7.89	5.03	4.71	7.73	8.72	8.61	11.37	9.56
LP-FDP-02	2.71	3.71	4.02	9.64	3.30	2.48	2.32	3.69	4.08	3.79	4.59	3.48
LP-FDP-03C	30.11	42.51	47.92	110.61	33.40	24.02	22.73	34.26	37.67	36.06	45.71	38.25
LP-FDP-04	17.04	23.10	25.03	60.90	16.99	8.86	6.03	16.41	21.61	22.22	28.74	21.94

Table IR(2)-41.7 Operation – Iron Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	388.6	562.0	631.2	1,526.5	387.7	212.9	165.7	363.8	452.8	461.0	615.9	505.8
MA-FDP-02	52.1	69.0	72.6	174.1	67.1	53.8	50.4	79.1	86.3	78.0	91.5	66.4
MA-FDP-03/04	1,061.2	1,346.5	1,398.4	2,740.0	1,261.2	1,141.6	1,143.9	1,400.0	1,441.0	1,314.7	1,493.5	1,240.2
LP-FDP-01	44.0	64.7	74.4	178.1	47.3	30.2	28.2	46.4	52.3	51.6	68.2	57.3
LP-FDP-02	21.7	29.6	32.2	77.0	26.4	19.8	18.5	29.5	32.6	30.3	36.7	27.8
LP-FDP-03C	254.3	351.4	390.0	872.4	285.7	217.8	209.7	297.7	322.0	305.1	378.1	317.1
LP-FDP-04	100.7	136.6	148.0	360.0	100.4	52.4	35.6	97.0	127.7	131.3	169.9	129.7

Table IR(2)-41.8 Post Closure – Iron Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	368.8	533.3	599.0	1,448.7	367.9	202.0	157.3	345.3	429.7	437.5	584.5	480.0
MA-FDP-02	48.9	64.7	68.1	163.3	62.9	50.5	47.3	74.2	80.9	73.2	85.8	62.3
MA-FDP-03/04	1,059.7	1,344.7	1,396.5	2,736.3	1,259.4	1,140.0	1,142.3	1,398.0	1,439.1	1,312.9	1,491.4	1,238.5
LP-FDP-01	43.4	63.8	73.5	175.8	46.7	29.8	27.9	45.8	51.6	51.0	67.3	56.6
LP-FDP-02	19.4	26.5	28.7	68.8	23.6	17.7	16.6	26.4	29.1	27.0	32.8	24.8
LP-FDP-03C	215.9	301.4	336.9	765.3	241.1	178.9	170.8	249.3	271.8	258.7	324.1	271.5
LP-FDP-04	99.5	134.9	146.1	355.6	99.2	51.7	35.2	95.8	126.2	129.7	167.8	128.1

Table IR(2)-41.9 Operation – Copper Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	0.39	0.56	0.63	1.52	0.39	0.21	0.17	0.36	0.45	0.46	0.61	0.50
MA-FDP-02	0.04	0.06	0.06	0.15	0.06	0.04	0.04	0.07	0.07	0.07	0.08	0.06
MA-FDP-03/04	0.97	1.24	1.28	2.51	1.16	1.05	1.05	1.28	1.32	1.21	1.37	1.14
LP-FDP-01	0.04	0.06	0.07	0.17	0.05	0.03	0.03	0.04	0.05	0.05	0.07	0.06
LP-FDP-02	0.04	0.05	0.06	0.13	0.05	0.03	0.03	0.05	0.06	0.05	0.06	0.05
LP-FDP-03C	0.40	0.55	0.61	1.33	0.46	0.36	0.35	0.48	0.51	0.48	0.59	0.50
LP-FDP-04	0.09	0.12	0.13	0.33	0.09	0.05	0.03	0.09	0.12	0.12	0.15	0.12

Table IR(2)-41.10 Post Closure – Copper Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	0.35	0.51	0.57	1.39	0.35	0.19	0.15	0.33	0.41	0.42	0.56	0.46
MA-FDP-02	0.04	0.05	0.06	0.14	0.05	0.04	0.04	0.06	0.07	0.06	0.07	0.05
MA-FDP-03/04	0.97	1.23	1.28	2.51	1.16	1.05	1.05	1.28	1.32	1.21	1.37	1.14
LP-FDP-01	0.04	0.06	0.07	0.17	0.04	0.03	0.03	0.04	0.05	0.05	0.06	0.05
LP-FDP-02	0.03	0.04	0.05	0.12	0.04	0.03	0.03	0.04	0.05	0.05	0.06	0.04
LP-FDP-03C	0.33	0.45	0.50	1.12	0.37	0.28	0.27	0.38	0.41	0.39	0.49	0.41
LP-FDP-04	0.09	0.12	0.13	0.32	0.09	0.05	0.03	0.09	0.11	0.12	0.15	0.11

Table IR(2)-41.11 Operation – Cadmium Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	0.0107	0.0155	0.0174	0.0422	0.0107	0.0059	0.0046	0.0101	0.0125	0.0127	0.0170	0.0140
MA-FDP-02	0.0011	0.0014	0.0015	0.0036	0.0014	0.0011	0.0010	0.0016	0.0018	0.0016	0.0019	0.0014
MA-FDP-03/04	0.0625	0.0793	0.0824	0.1614	0.0743	0.0672	0.0674	0.0825	0.0849	0.0774	0.0880	0.0731
LP-FDP-01	0.0008	0.0012	0.0014	0.0034	0.0009	0.0006	0.0005	0.0009	0.0010	0.0010	0.0013	0.0011
LP-FDP-02	0.0003	0.0004	0.0004	0.0010	0.0003	0.0002	0.0002	0.0004	0.0004	0.0004	0.0005	0.0003
LP-FDP-03C	0.0034	0.0048	0.0054	0.0122	0.0038	0.0028	0.0027	0.0039	0.0043	0.0041	0.0051	0.0043
LP-FDP-04	0.0020	0.0027	0.0029	0.0070	0.0020	0.0010	0.0007	0.0019	0.0025	0.0026	0.0033	0.0025

Table IR(2)-41.12 Post Closure – Cadmium Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	0.0106	0.0153	0.0172	0.0415	0.0105	0.0058	0.0045	0.0099	0.0123	0.0125	0.0167	0.0137
MA-FDP-02	0.0011	0.0014	0.0015	0.0036	0.0014	0.0011	0.0010	0.0016	0.0018	0.0016	0.0019	0.0014
MA-FDP-03/04	0.0625	0.0793	0.0824	0.1614	0.0743	0.0672	0.0674	0.0825	0.0849	0.0774	0.0880	0.0730
LP-FDP-01	0.0008	0.0012	0.0014	0.0034	0.0009	0.0006	0.0005	0.0009	0.0010	0.0010	0.0013	0.0011
LP-FDP-02	0.0002	0.0003	0.0004	0.0009	0.0003	0.0002	0.0002	0.0003	0.0004	0.0003	0.0004	0.0003
LP-FDP-03C	0.0030	0.0043	0.0048	0.0112	0.0034	0.0024	0.0023	0.0034	0.0038	0.0036	0.0046	0.0039
LP-FDP-04	0.0020	0.0027	0.0029	0.0070	0.0020	0.0010	0.0007	0.0019	0.0025	0.0026	0.0033	0.0025

Table IR(2)-41.13 Operation – Arsenic Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	1.485	2.148	2.413	5.834	1.482	0.814	0.633	1.391	1.731	1.762	2.354	1.933
MA-FDP-02	0.153	0.203	0.214	0.512	0.197	0.158	0.148	0.233	0.254	0.230	0.269	0.195
MA-FDP-03/04	4.999	6.343	6.588	12.908	5.941	5.378	5.388	6.595	6.788	6.193	7.035	5.843
LP-FDP-01	0.126	0.186	0.213	0.511	0.136	0.087	0.081	0.133	0.150	0.148	0.196	0.164
LP-FDP-02	0.025	0.035	0.038	0.090	0.031	0.023	0.022	0.035	0.038	0.036	0.043	0.033
LP-FDP-03C	0.353	0.504	0.575	1.353	0.388	0.267	0.250	0.393	0.438	0.422	0.543	0.453
LP-FDP-04	0.303	0.410	0.445	1.082	0.302	0.157	0.107	0.291	0.384	0.395	0.510	0.390

Table IR(2)-41.14 Post Closure – Arsenic Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	1.484	2.146	2.410	5.828	1.480	0.813	0.633	1.389	1.729	1.760	2.352	1.931
MA-FDP-02	0.153	0.203	0.213	0.512	0.197	0.158	0.148	0.232	0.254	0.229	0.269	0.195
MA-FDP-03/04	4.999	6.343	6.587	12.907	5.941	5.378	5.388	6.595	6.788	6.193	7.035	5.842
LP-FDP-01	0.126	0.185	0.213	0.510	0.135	0.086	0.081	0.133	0.150	0.148	0.195	0.164
LP-FDP-02	0.024	0.033	0.036	0.087	0.030	0.022	0.021	0.033	0.037	0.034	0.041	0.031
LP-FDP-03C	0.336	0.482	0.552	1.305	0.368	0.251	0.233	0.372	0.416	0.401	0.519	0.434
LP-FDP-04	0.302	0.409	0.444	1.079	0.301	0.157	0.107	0.291	0.383	0.394	0.509	0.389

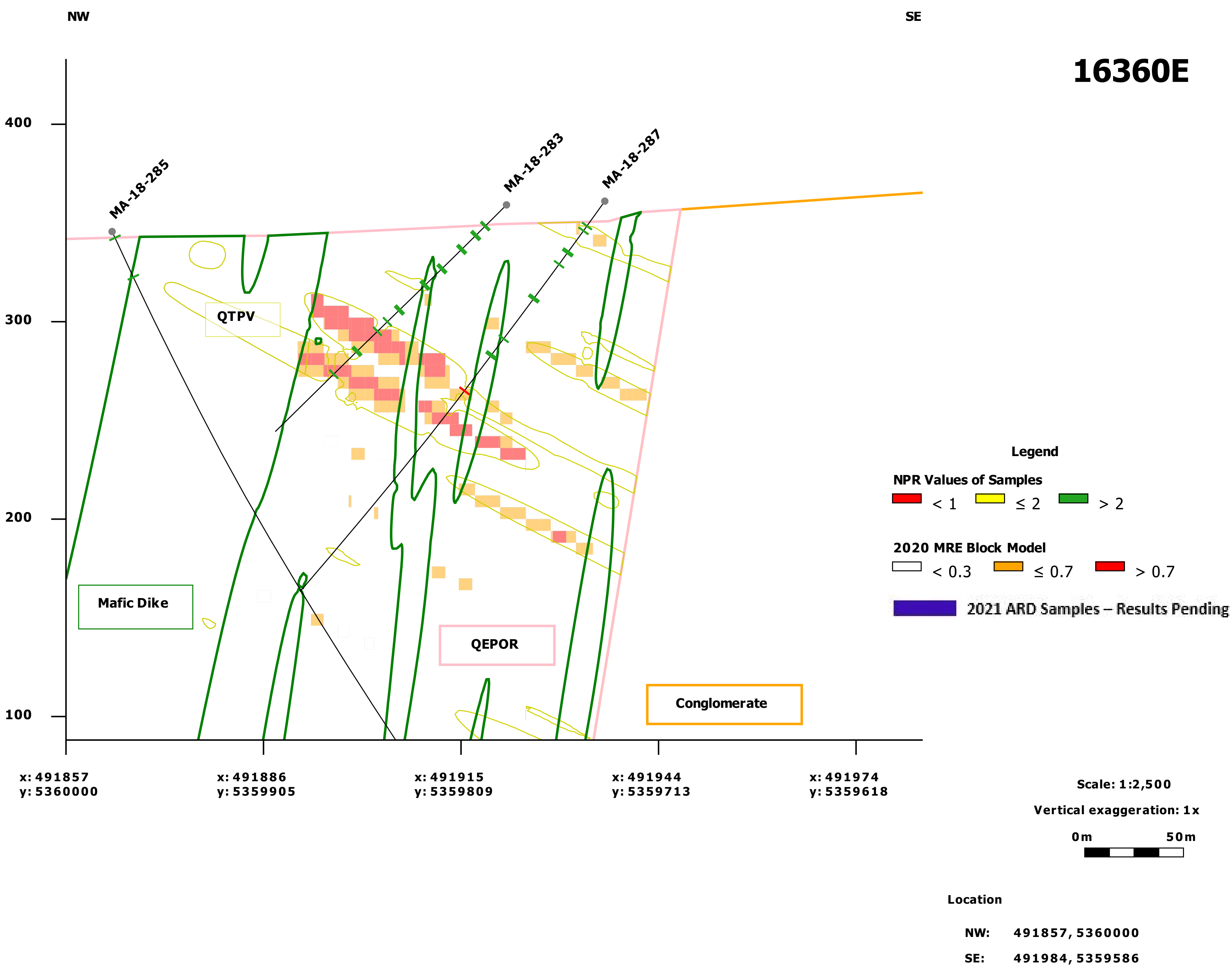
Table IR(2)-41.15 Operation – Aluminum Load Total FDP, g/day

Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	227	328	368	890	226	124	97	212	264	269	359	295
MA-FDP-02	28	36	38	92	35	28	27	42	46	41	48	35
MA-FDP-03/04	758	961	998	1,956	900	815	817	999	1,029	939	1,066	885
LP-FDP-01	30	44	51	122	33	21	19	32	36	36	47	39
LP-FDP-02	27	37	40	97	33	25	23	37	41	38	46	35
LP-FDP-03C	276	380	420	932	311	239	231	325	350	331	408	342
LP-FDP-04	65	88	95	231	65	34	23	62	82	84	109	83

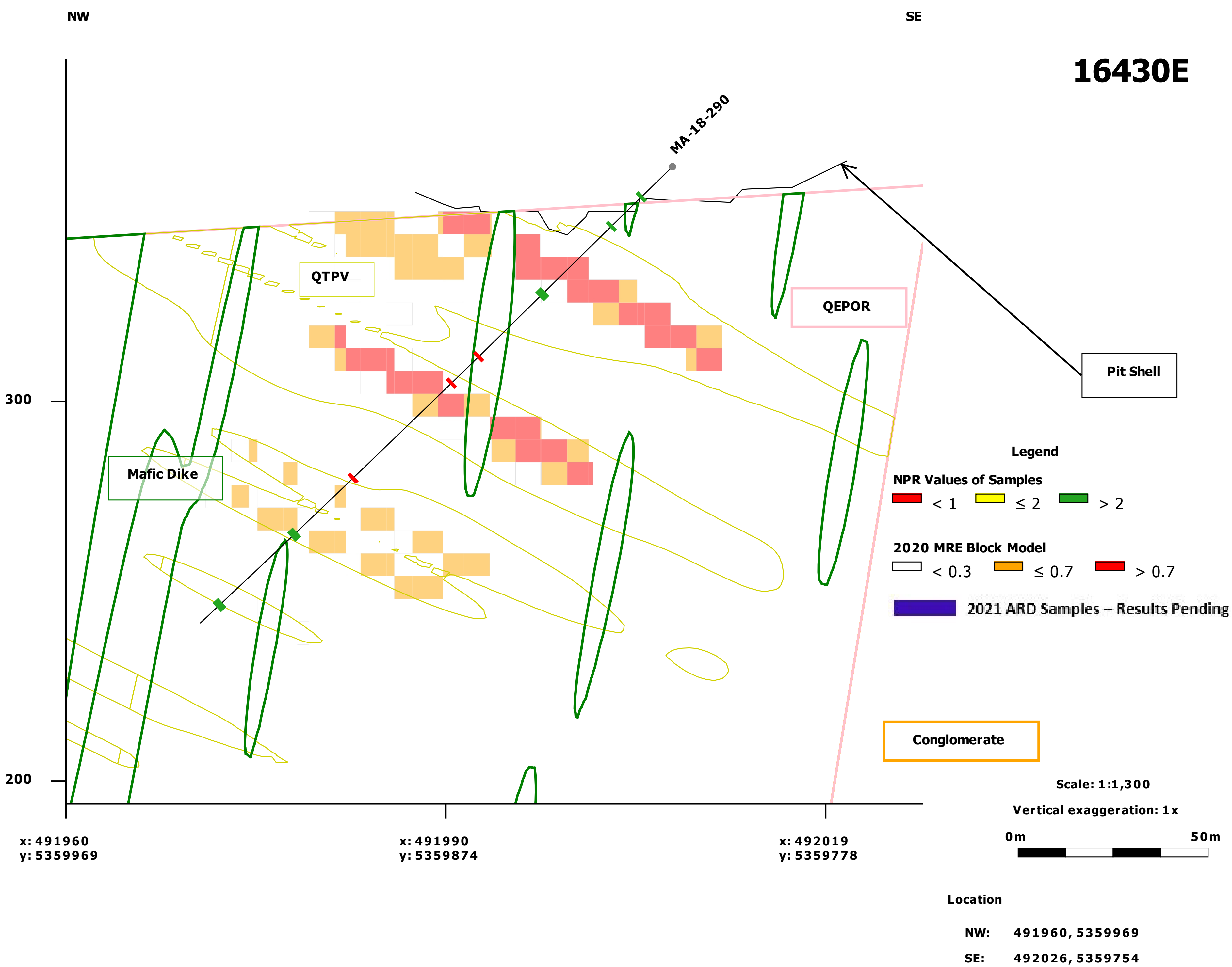
Table IR(2)-41.16 Post Closure – Aluminum Load Total FDP, g/day

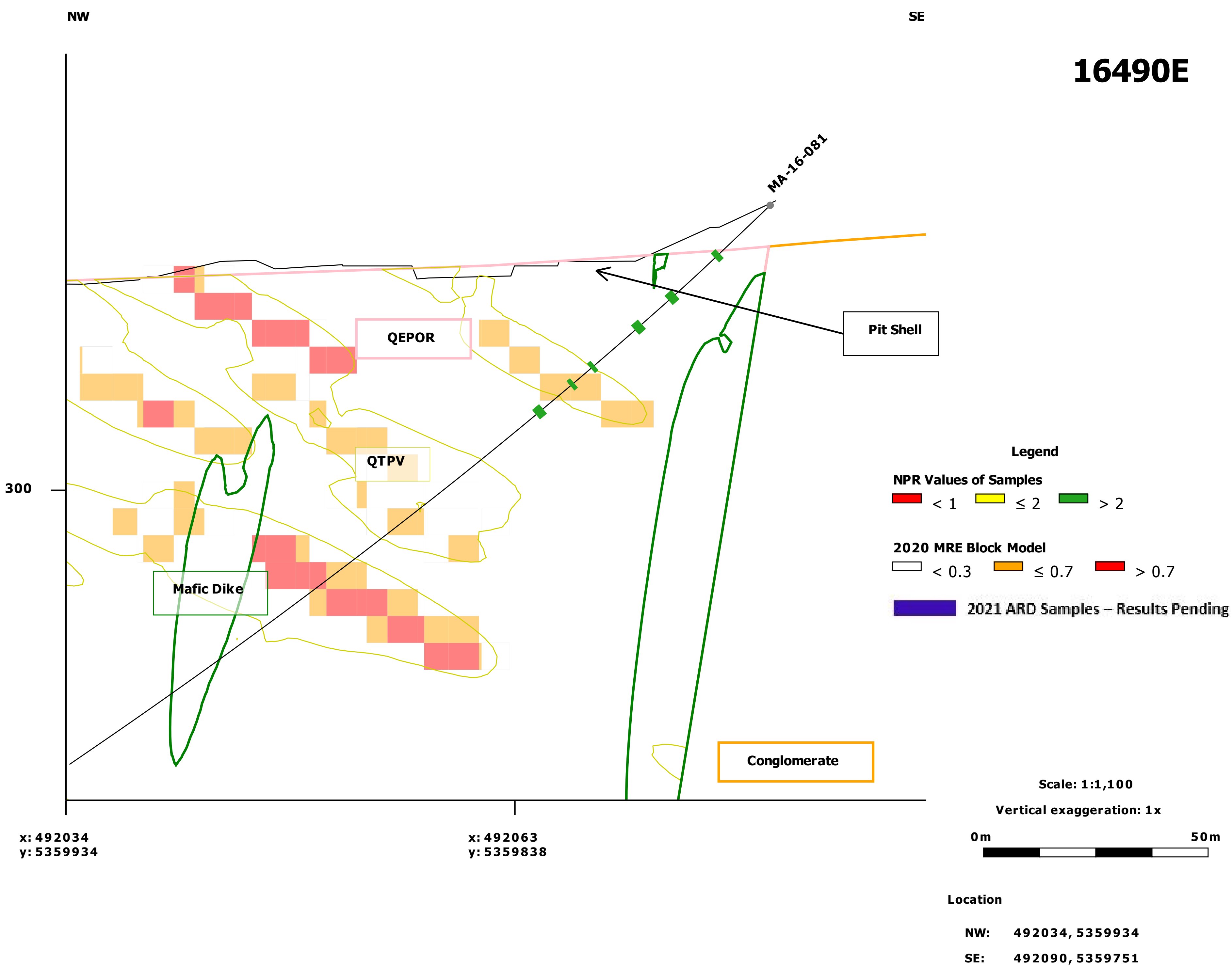
Final Discharge Point	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MA-FDP-01A/B	217	313	352	852	216	119	92	203	253	257	344	282
MA-FDP-02	26	35	37	88	34	27	25	40	43	39	46	33
MA-FDP-03/04	757	961	998	1,955	900	814	816	999	1,028	938	1,065	885
LP-FDP-01	29	43	50	119	32	20	19	31	35	35	46	38
LP-FDP-02	24	32	35	84	29	22	20	32	36	33	40	30
LP-FDP-03C	226	314	350	788	253	190	183	263	285	271	338	283
LP-FDP-04	63	85	92	225	63	33	22	61	80	82	106	81

APPENDIX IR(2)-18.A UPDATED CROSS-SECTIONS

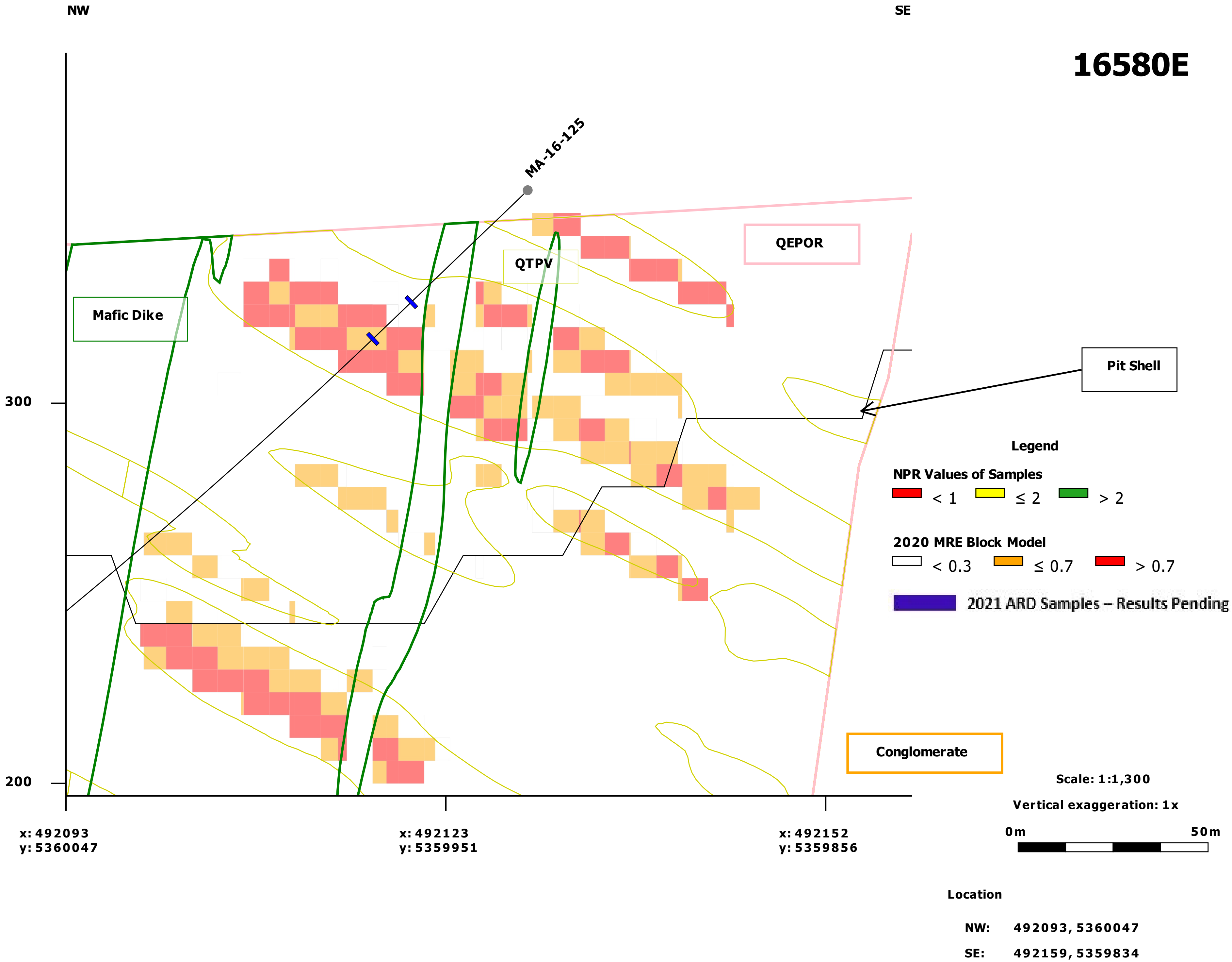


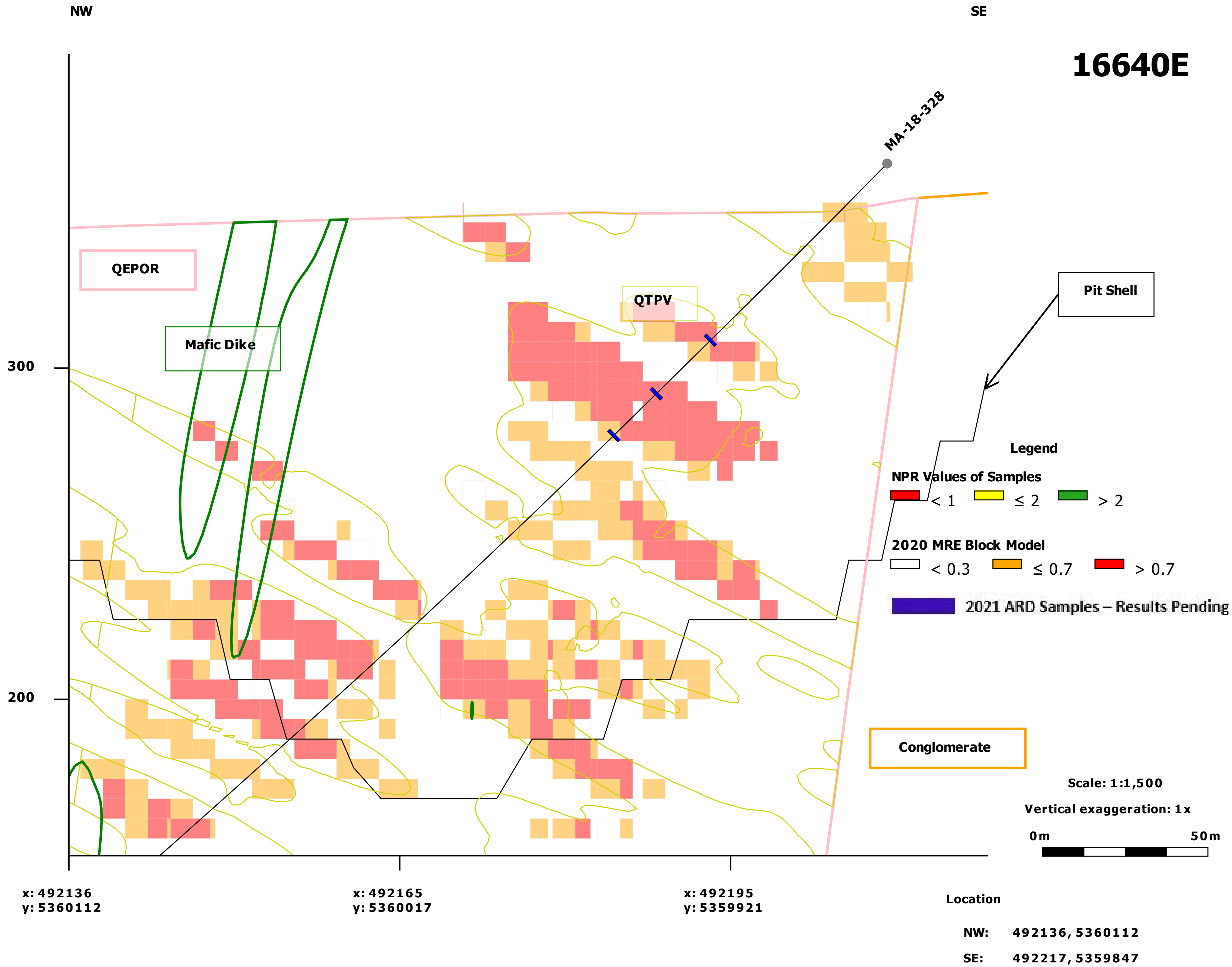
NW
SE
16360E
400
300
200
100
MA-18-285
MA-18-283
MA-18-287
QTPV
Mafic Dike
QEPOR
Conglomerate
x: 491857
y: 5360000
x: 491886
y: 5359905
x: 491915
y: 5359809
x: 491944
y: 5359713
x: 491974
y: 5359618
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results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


NW
SE
16430E
MA-18-290
QTPV
QEPOR
Pit Shell
300
200
Mafic Dike
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: 1:1,300
Vertical exaggeration: 1x
0m
50m
x: 491960
y: 5359969
x: 491990
y: 5359874
x: 492019
y: 5359778
Location
NW: 491960, 5359969
SE: 492026, 5359754

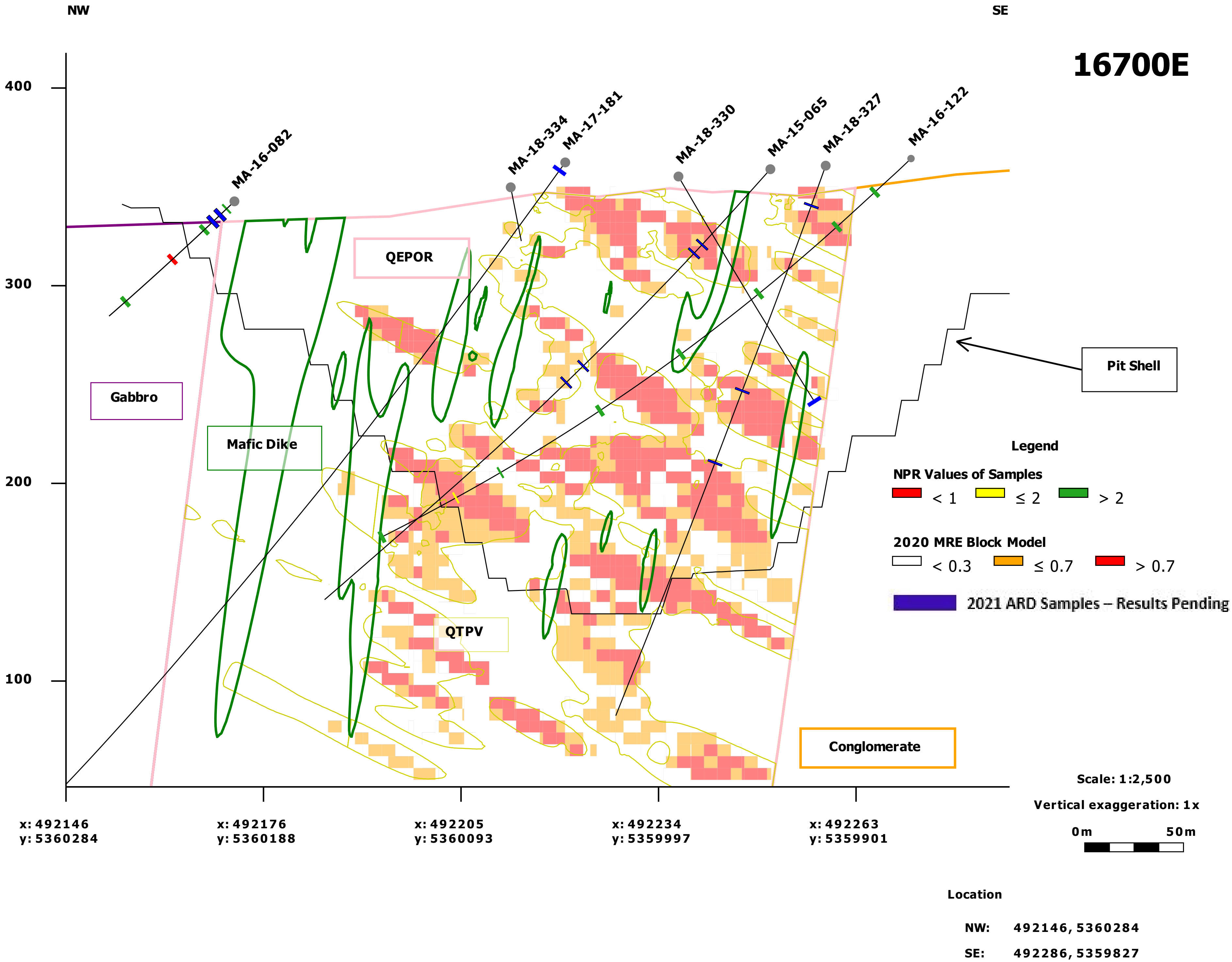


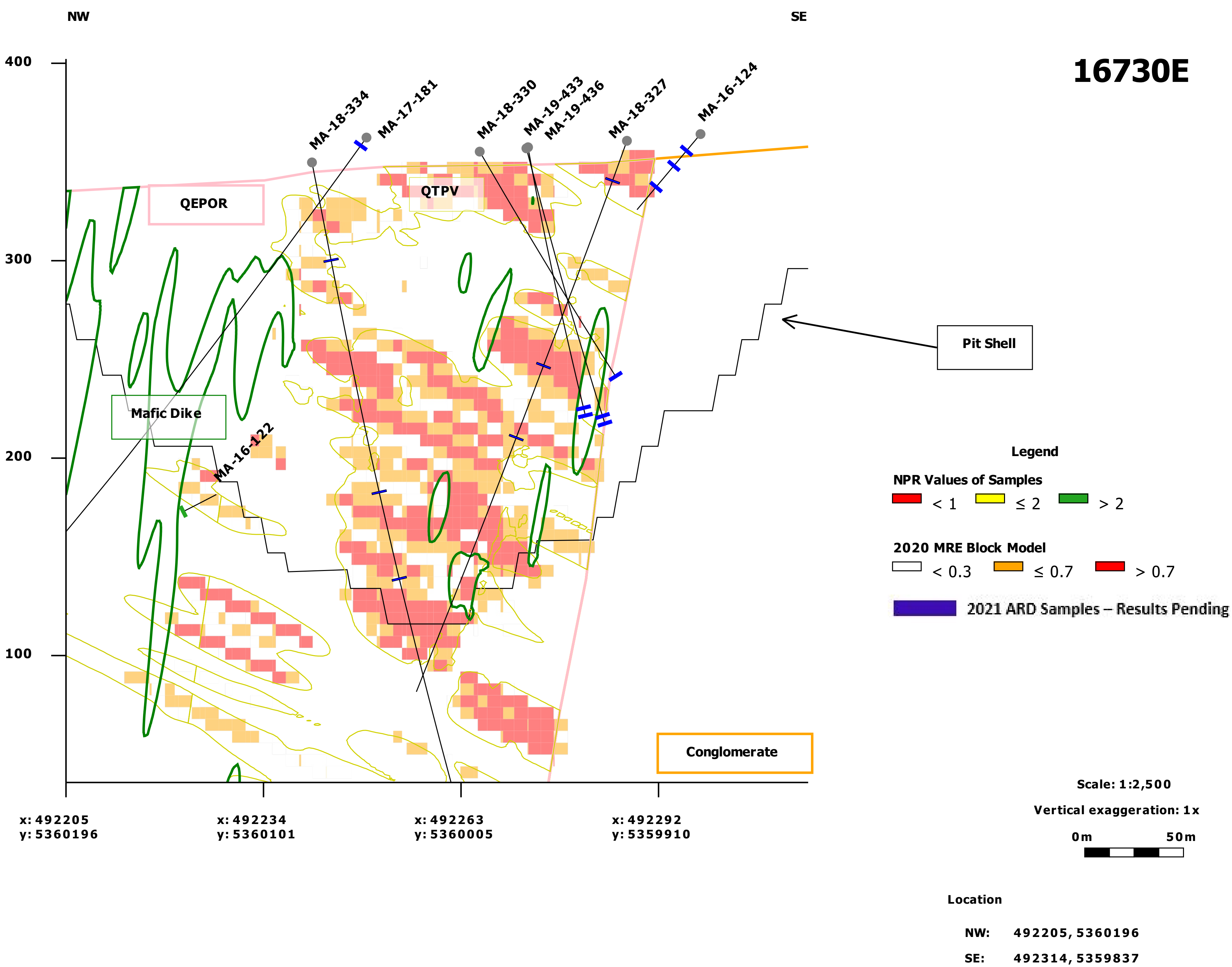
NW
SE
16490E
MA-16-081
Pit Shell
QEPOR
QTPV
Mafic Dike
Conglomerate
300
x: 492034
y: 5359934
x: 492063
y: 5359838
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:1,100
Vertical exaggeration: 1x
0m
50m
Location
NW: 492034, 5359934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


NW
SE
16580E
MA-16-125
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: 1:1,300
Vertical exaggeration: 1x
0m
50m
x: 492093
y: 5360047
x: 492123
y: 5359951
x: 492152
y: 5359856
Location
NW: 492093, 5360047
SE: 492159, 5359834

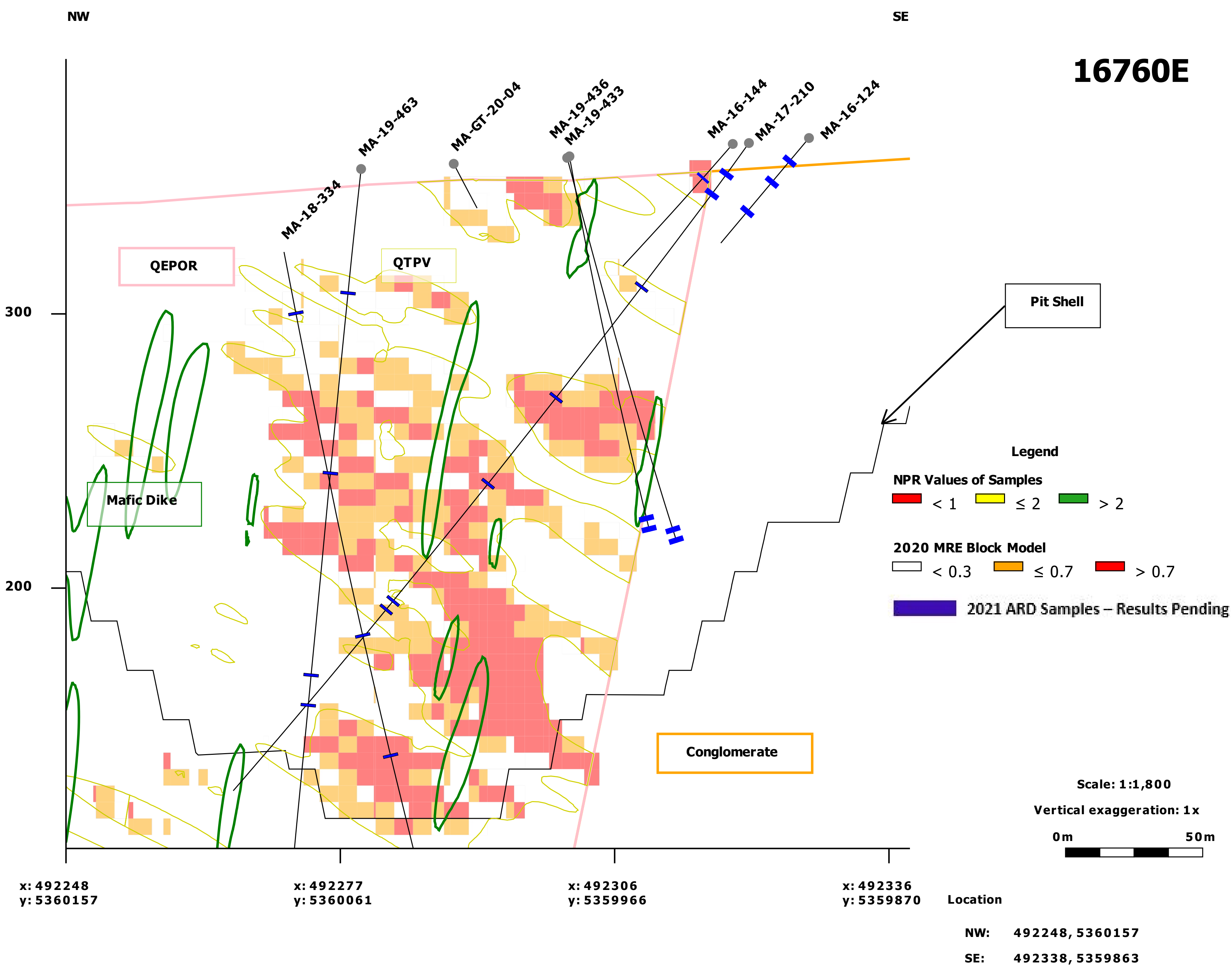


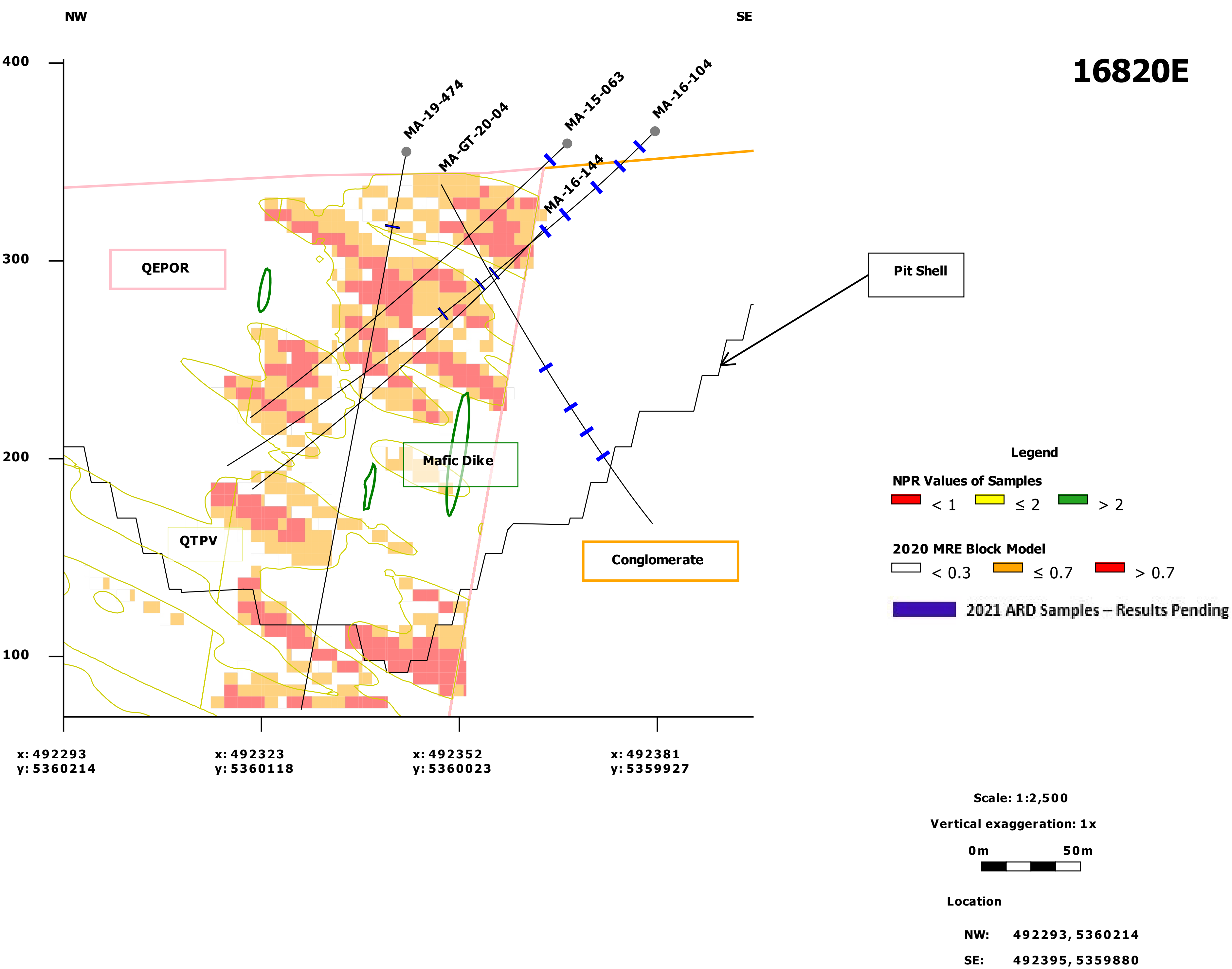
NW
SE
16640E
MA-18-328
QEPOR
Mafic Dike
QTPV
Pit Shell
300
200
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Conglomerate
Scale: 1:1,500
Vertical exaggeration: 1x
0m
50m
x: 492136
y: 5360112
x: 492165
y: 5360017
x: 492195
y: 5359921
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
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: 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
NW: 492146, 5360284
SE: 492286, 5359827

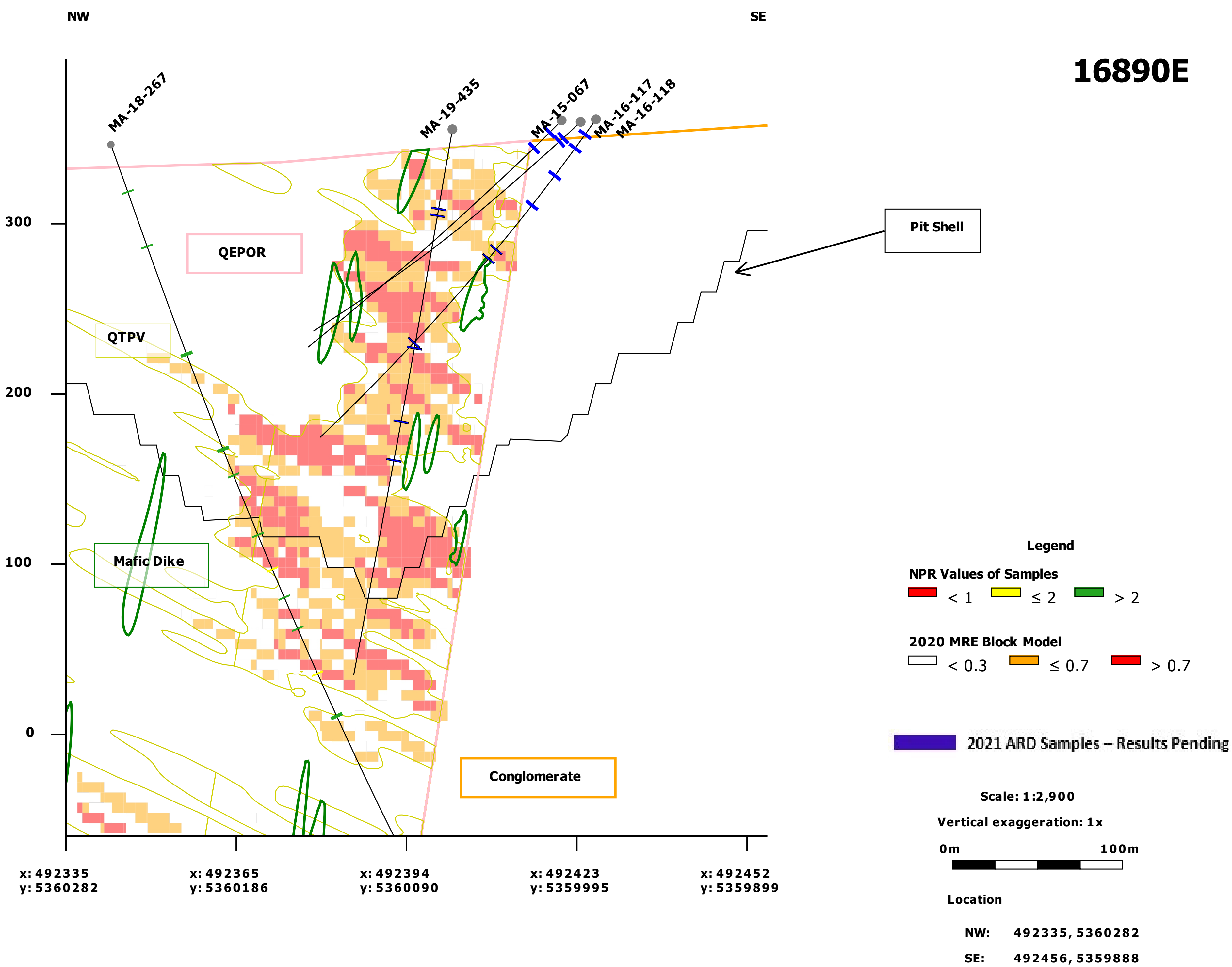


NW
SE
16730E
400
300
200
100
MA-18-334
MA-17-181
MA-18-330
MA-19-433
MA-19-436
MA-18-327
MA-16-124
MA-16-122
QEPOR
QTPV
Mafic Dike
Pit Shell
Conglomerate
x: 492205
y: 5360196
x: 492234
y: 5360101
x: 492263
y: 5360005
x: 492292
y: 5359910
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
NW: 492205, 5360196
SE: 492314, 5359837

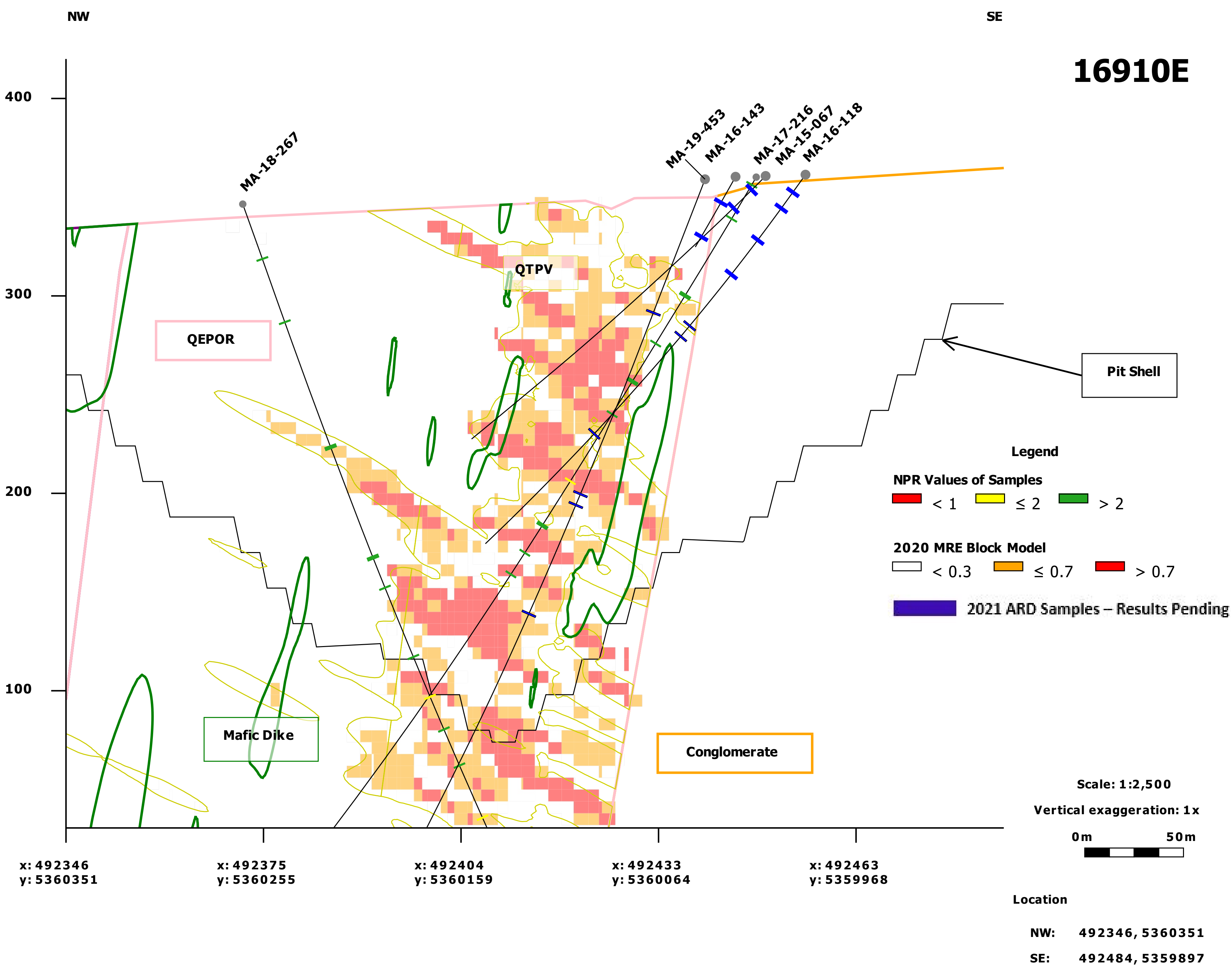

NW
SE
16760E
MA-18-334
MA-19-463
MA-GT-20-04
MA-19-436
MA-19-433
MA-16-144
MA-17-210
MA-16-124
QEPOR
QTPV
Pit Shell
300
200
Mafic Dike
Conglomerate
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:1,800
Vertical exaggeration: 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



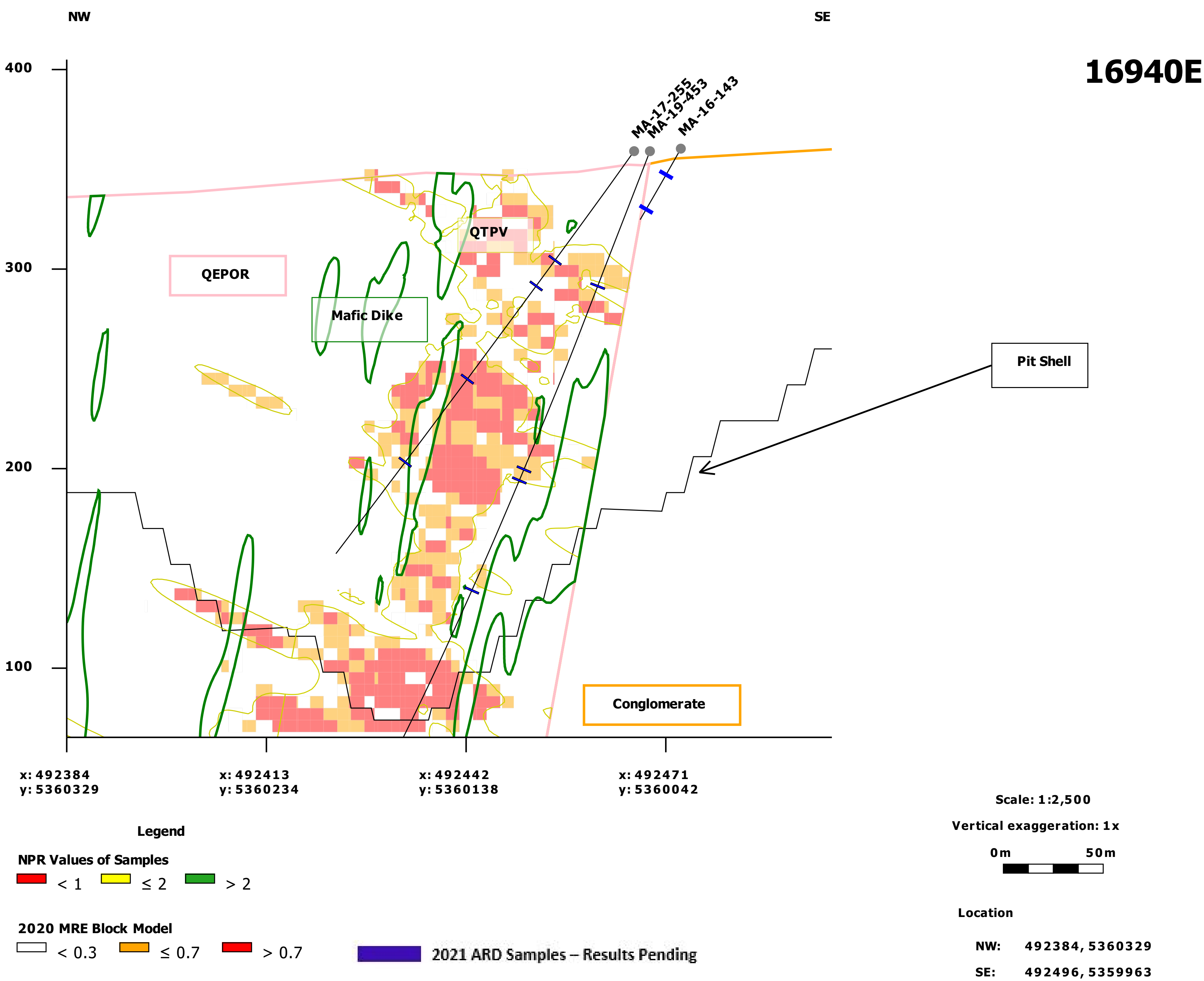
NW
SE
16820E
400
300
200
100
MA-19-474
MA-GT-20-04
MA-15-063
MA-16-104
MA-16-144
QEPOR
Pit Shell
Mafic Dike
QTPV
Conglomerate
x: 492293
y: 5360214
x: 492323
y: 5360118
x: 492352
y: 5360023
x: 492381
y: 5359927
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
NW: 492293, 5360214
SE: 492395, 5359880

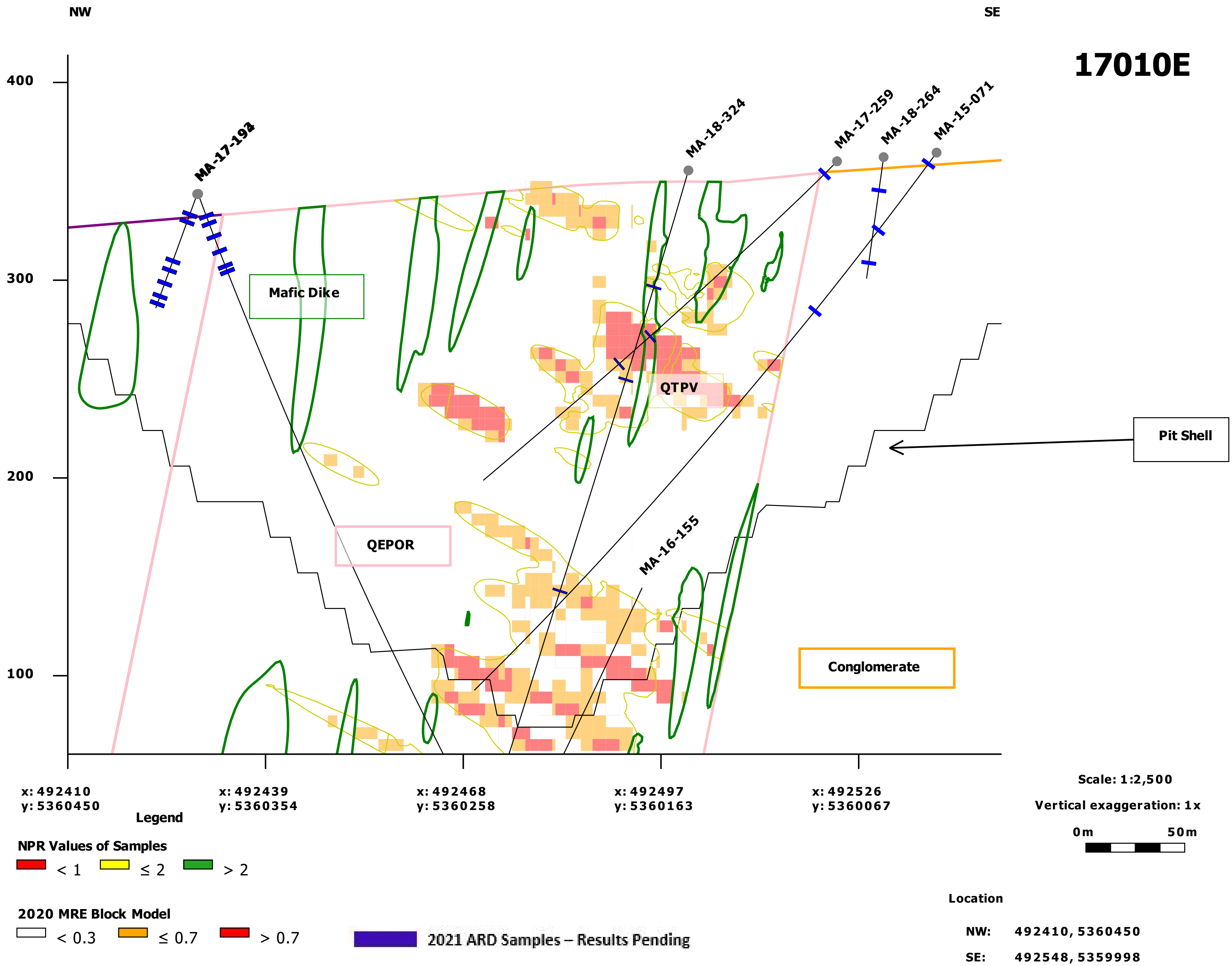


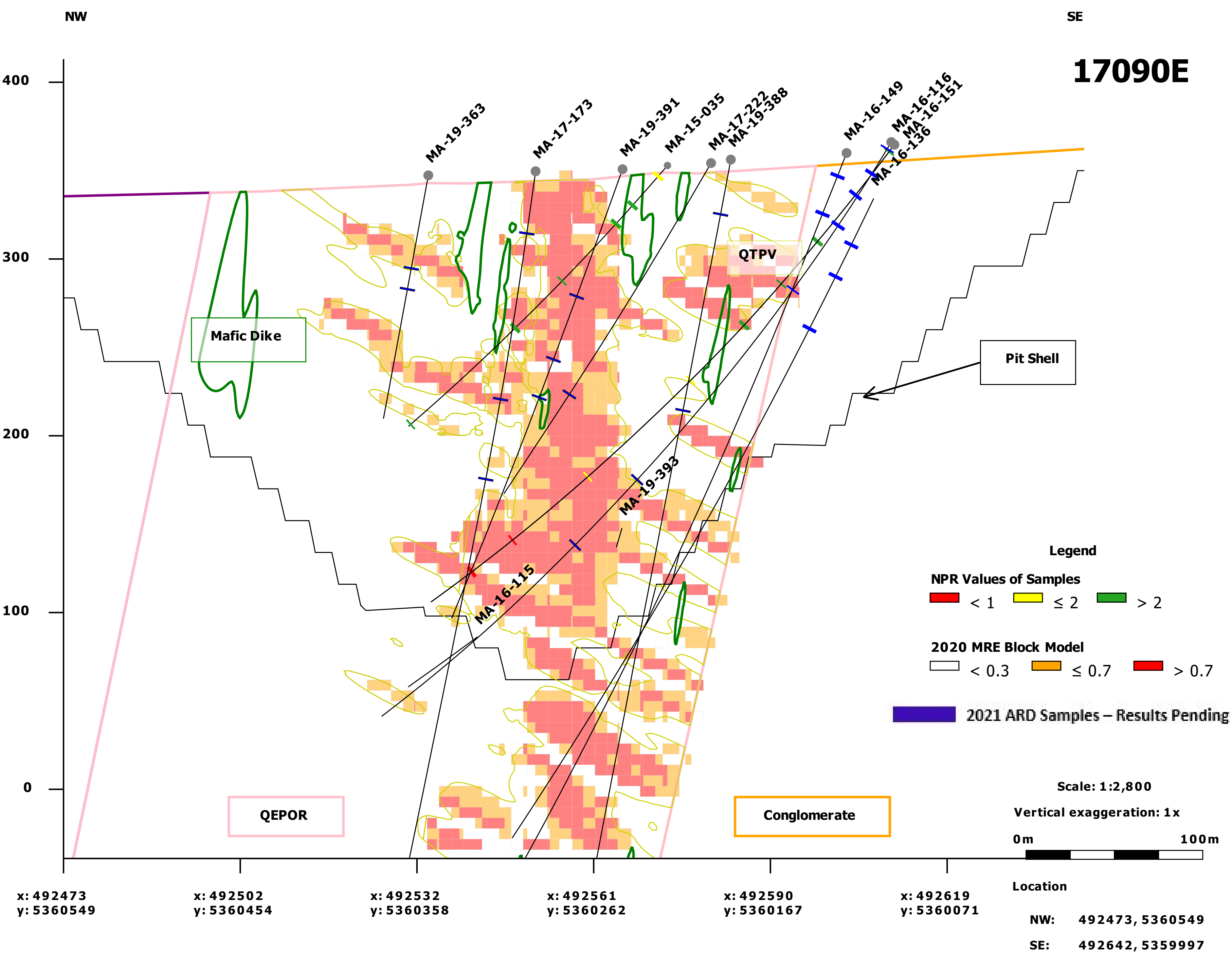
16890E
NW
SE
MA-18-267
MA-19-435
MA-15-067
MA-16-117
MA-16-118
QEPOR
QTPV
Mafic Dike
Conglomerate
Pit Shell
300
200
100
0
x: 492335
y: 5360282
x: 492365
y: 5360186
x: 492394
y: 5360090
x: 492423
y: 5359995
x: 492452
y: 5359899
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,900
Vertical exaggeration: 1x
0m
100m
Location
NW: 492335, 5360282
SE: 492456, 5359888

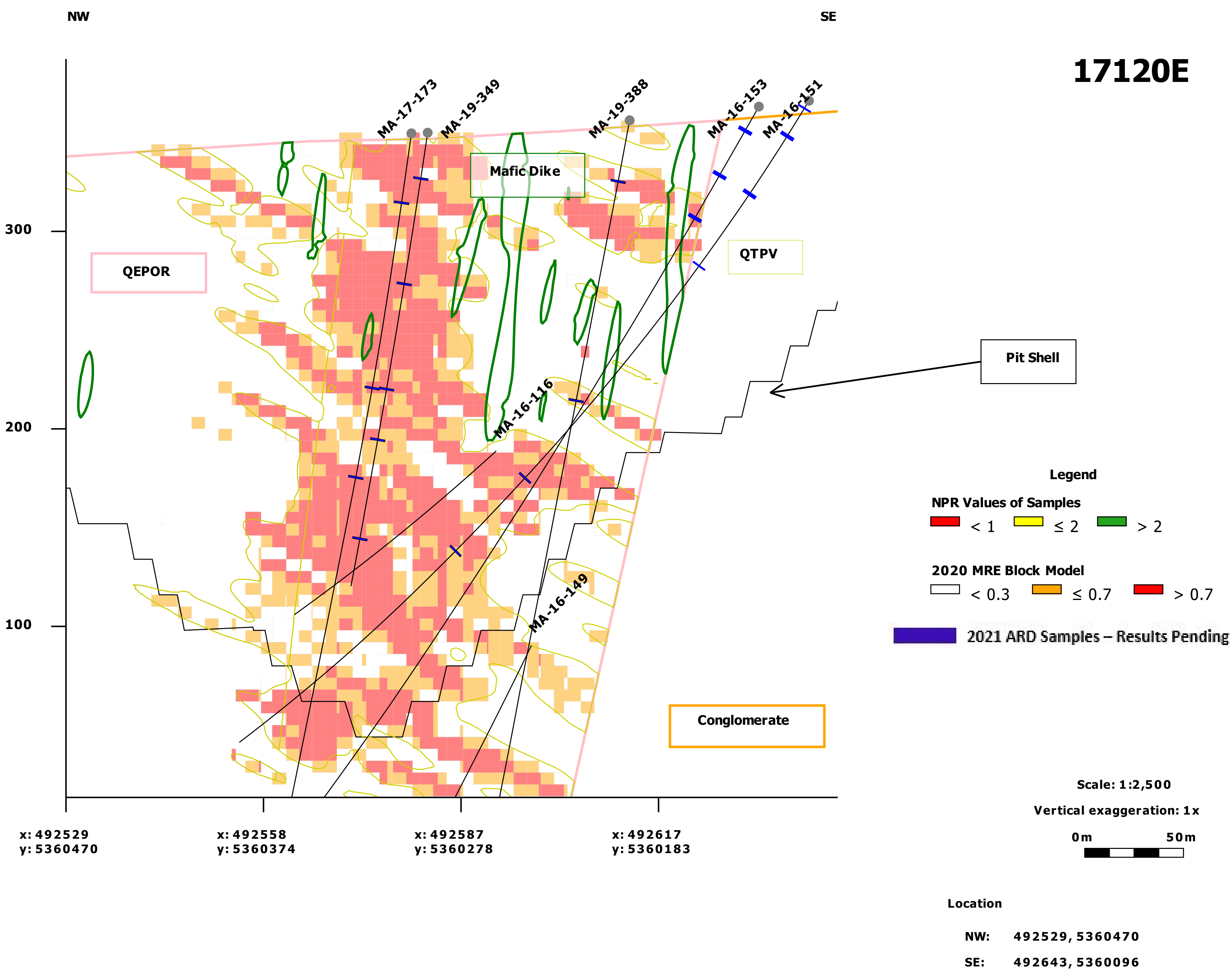


NW
SE
16910E
400
300
200
100
MA-18-267
MA-19-453
MA-16-143
MA-17-216
MA-15-067
MA-16-118
QTPV
QEPOR
Pit Shell
Mafic Dike
Conglomerate
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
x: 492346
y: 5360351
x: 492375
y: 5360255
x: 492404
y: 5360159
x: 492433
y: 5360064
x: 492463
y: 5359968
Location
NW: 492346, 5360351
SE: 492484, 5359897

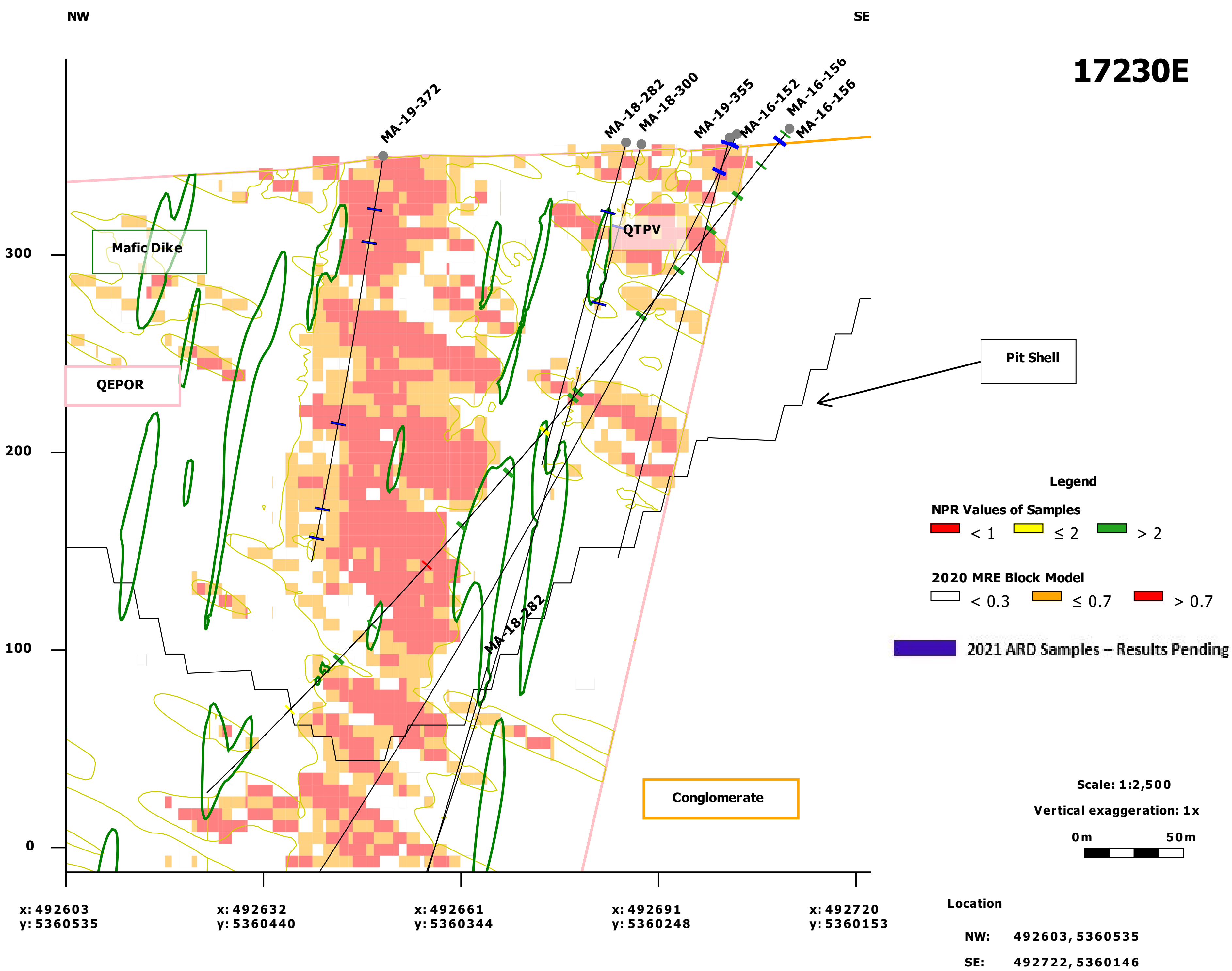

NW
SE
16940E
400
300
200
100
MA-17-255
MA-19-453
MA-16-143
QTPV
QEPOR
Mafic Dike
Pit Shell
Conglomerate
x: 492384
y: 5360329
x: 492413
y: 5360234
x: 492442
y: 5360138
x: 492471
y: 5360042
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
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
Pit Shell
Conglomerate
x: 492410
y: 5360450
x: 492439
y: 5360354
x: 492468
y: 5360258
x: 492497
y: 5360163
x: 492526
y: 5360067
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Location
NW: 492410, 5360450
SE: 492548, 5359998

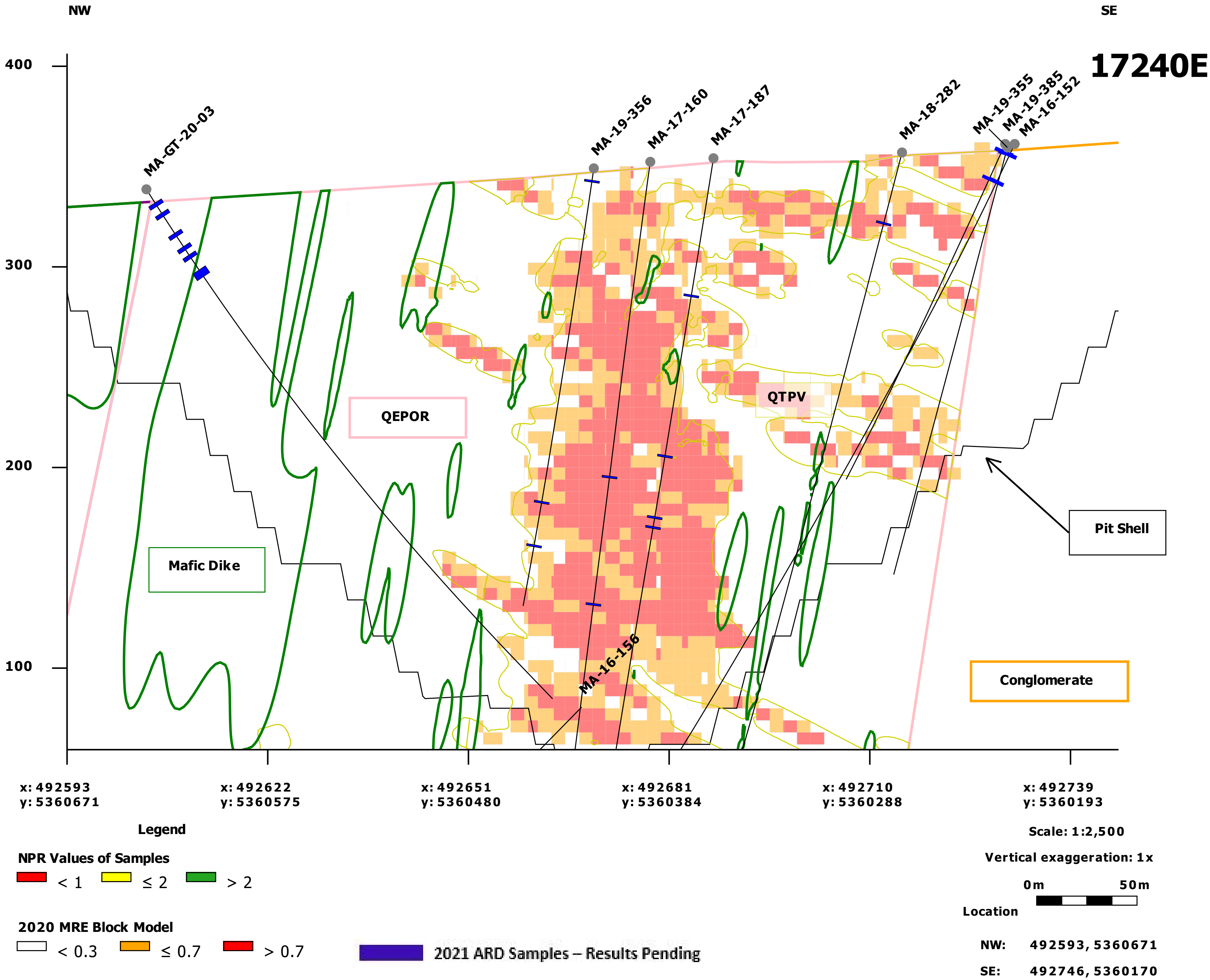

NW
SE
17090E
400
300
200
100
0
MA-19-363
MA-17-173
MA-19-391
MA-15-035
MA-17-222
MA-19-388
MA-16-149
MA-16-116
MA-16-151
MA-16-136
MA-19-393
MA-16-115
QTPV
Mafic Dike
Pit Shell
QEPOR
Conglomerate
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,800
Vertical exaggeration: 1x
0m
100m
x: 492473
y: 5360549
x: 492502
y: 5360454
x: 492532
y: 5360358
x: 492561
y: 5360262
x: 492590
y: 5360167
x: 492619
y: 5360071
Location
NW: 492473, 5360549
SE: 492642, 5359997



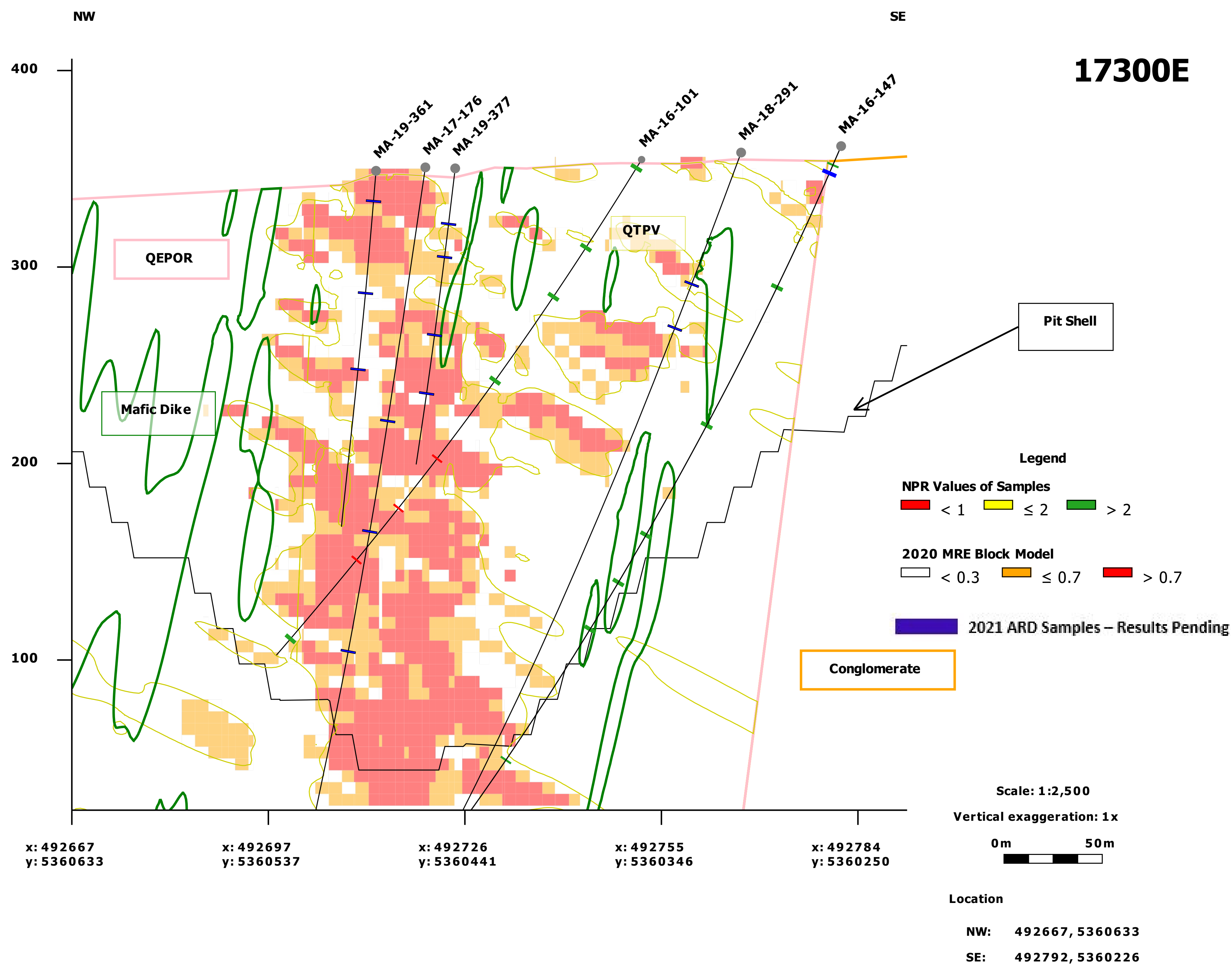
17120E
NW
SE
MA-17-173
MA-19-349
MA-19-388
MA-16-153
MA-16-151
MA-16-116
MA-16-149
Mafic Dike
QEPOR
QTPV
Pit Shell
Conglomerate
300
200
100
x: 492529
y: 5360470
x: 492558
y: 5360374
x: 492587
y: 5360278
x: 492617
y: 5360183
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
NW: 492529, 5360470
SE: 492643, 5360096



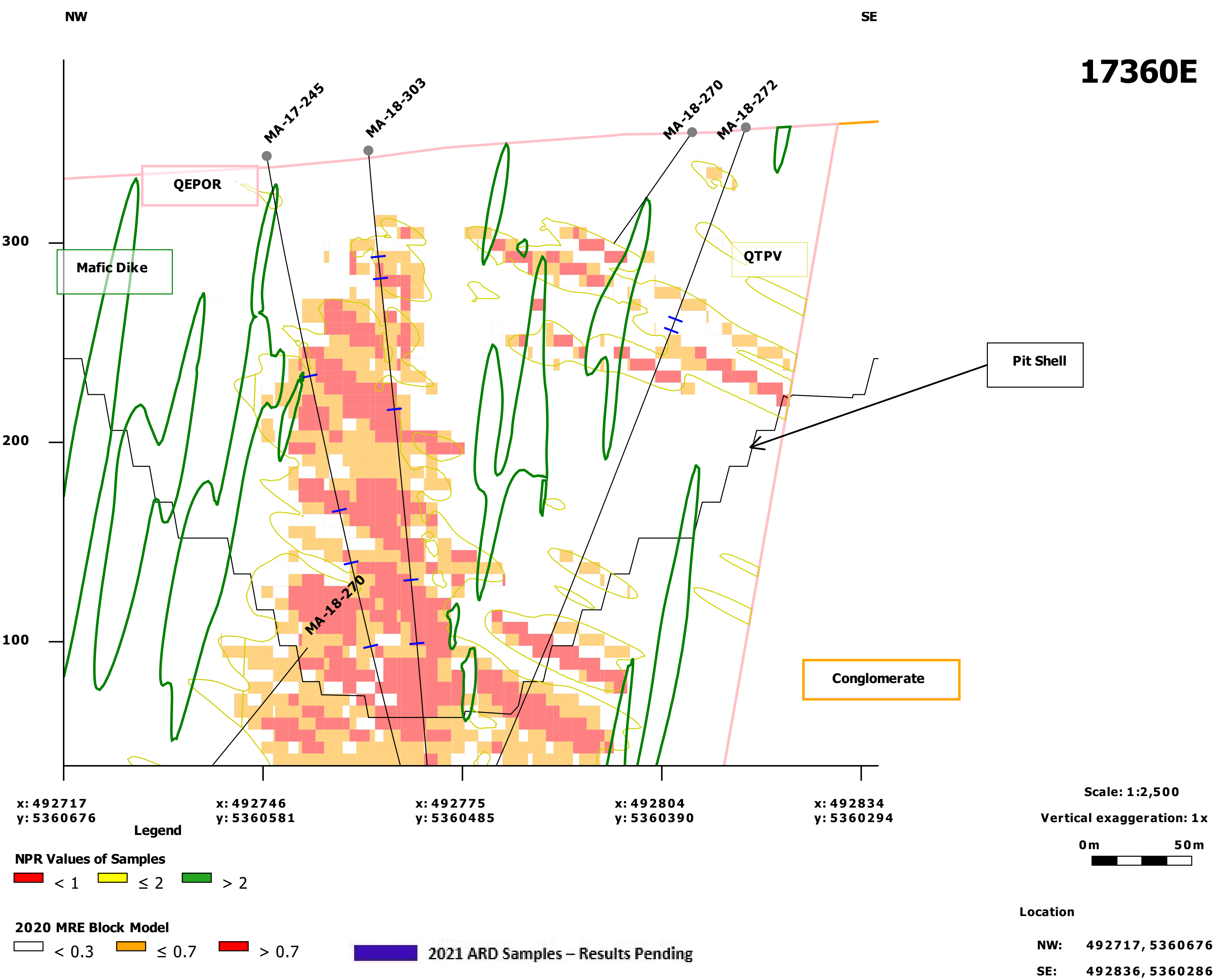
NW
SE
17230E
MA-19-372
MA-18-282
MA-18-300
MA-19-355
MA-16-152
MA-16-156
MA-16-156
Mafic Dike
QTPV
QEPOR
Pit Shell
MA-18-282
Conglomerate
300
200
100
0
x: 492603
y: 5360535
x: 492632
y: 5360440
x: 492661
y: 5360344
x: 492691
y: 5360248
x: 492720
y: 5360153
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 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: 492603, 5360535
SE: 492722, 5360146

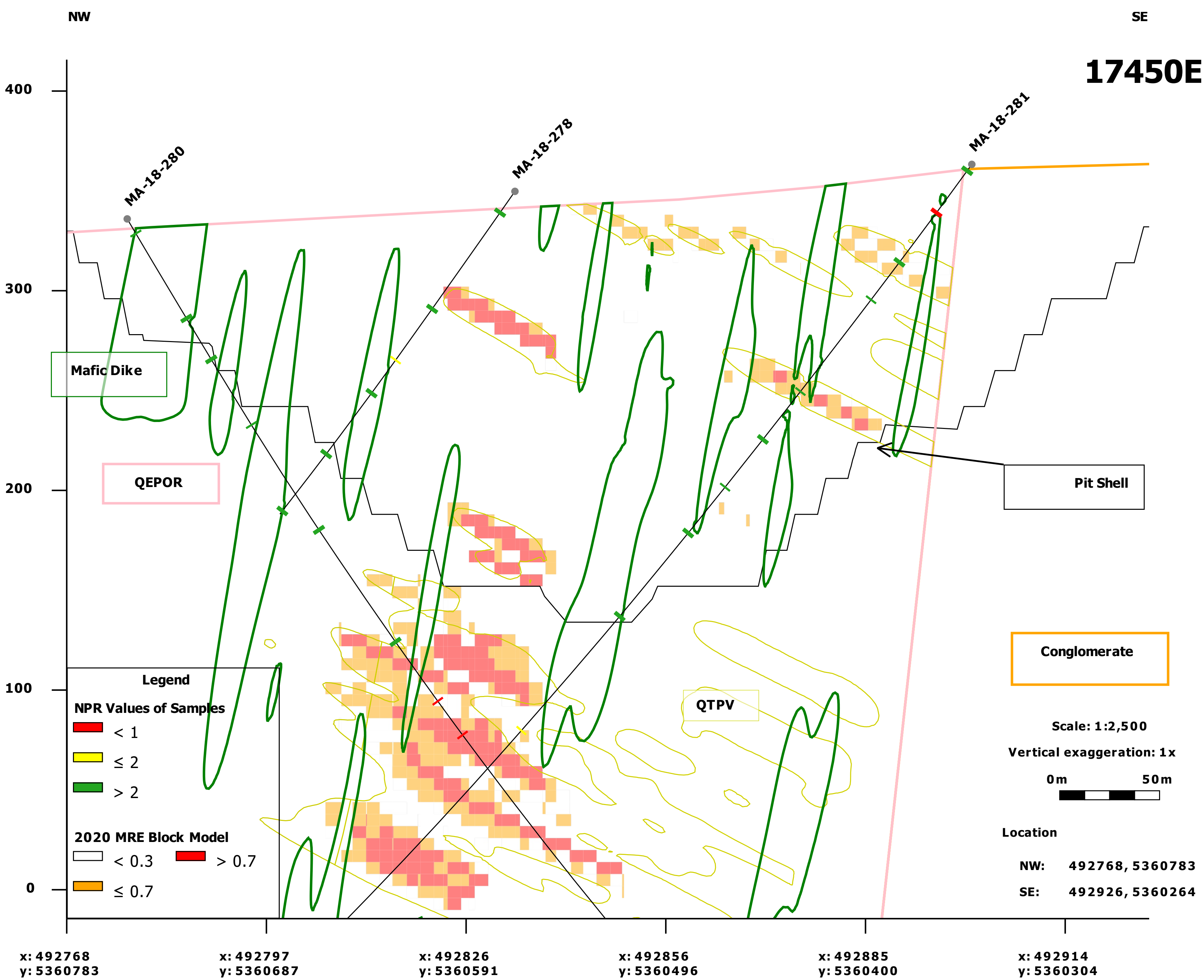


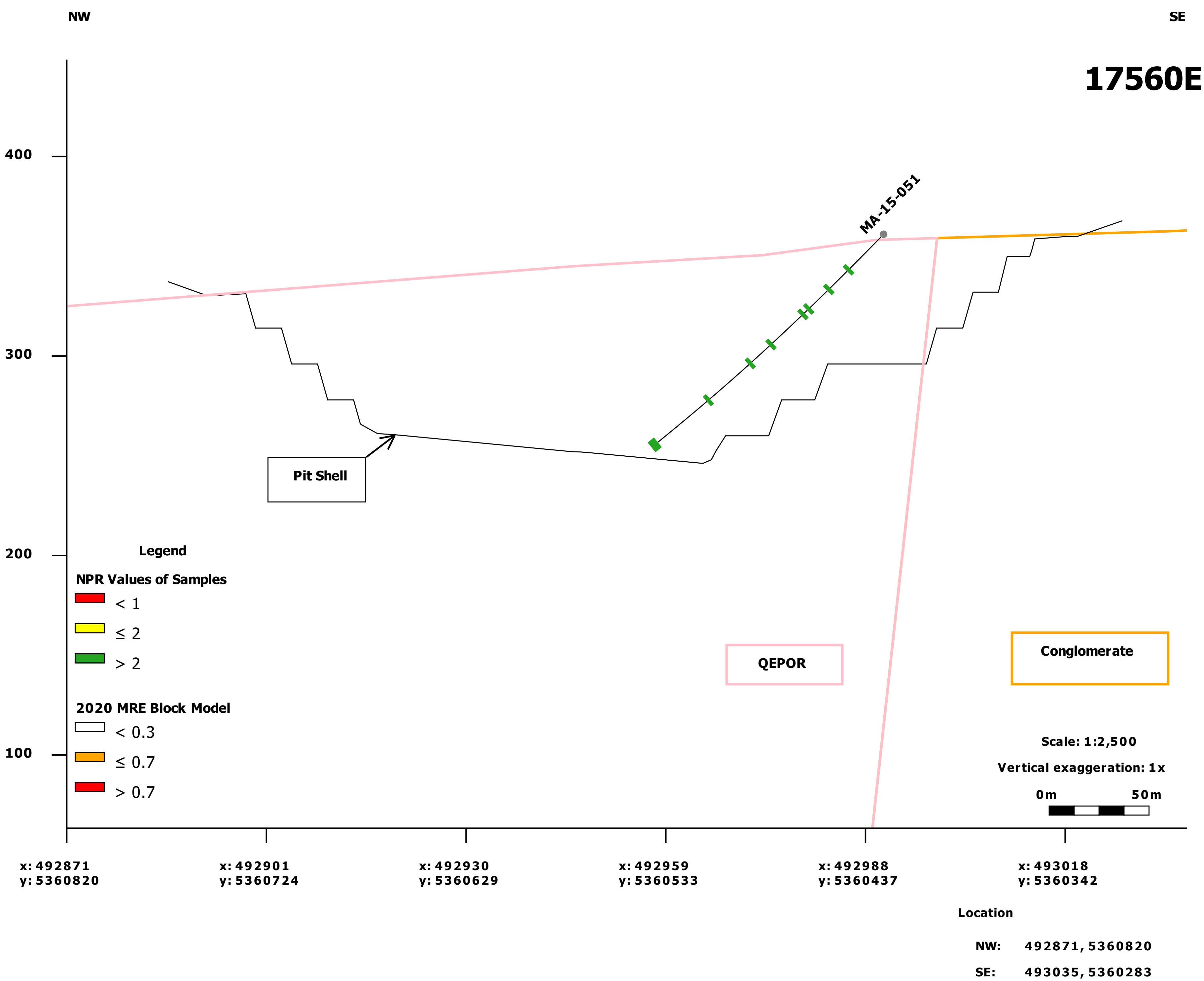
NW
SE
17240E
400
300
200
100
MA-GT-20-03
MA-19-356
MA-17-160
MA-17-187
MA-18-282
MA-19-355
MA-19-385
MA-16-152
MA-16-156
QEPOR
QTPV
Mafic Dike
Pit Shell
Conglomerate
x: 492593
y: 5360671
x: 492622
y: 5360575
x: 492651
y: 5360480
x: 492681
y: 5360384
x: 492710
y: 5360288
x: 492739
y: 5360193
Legend
NPR 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: 492593, 5360671
SE: 492746, 5360170



NW
SE
17300E
400
300
200
100
MA-19-361
MA-17-176
MA-19-377
MA-16-101
MA-18-291
MA-16-147
QEPOR
QTPV
Mafic Dike
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: 492667
y: 5360633
x: 492697
y: 5360537
x: 492726
y: 5360441
x: 492755
y: 5360346
x: 492784
y: 5360250
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Location
NW: 492667, 5360633
SE: 492792, 5360226


NW
SE
17360E
MA-17-245
MA-18-303
MA-18-270
MA-18-272
QEPOR
Mafic Dike
QTPV
Pit Shell
Conglomerate
MA-18-270
300
200
100
x: 492717
y: 5360676
x: 492746
y: 5360581
x: 492775
y: 5360485
x: 492804
y: 5360390
x: 492834
y: 5360294
Scale: 1:2,500
Vertical exaggeration: 1x
0m
50m
Legend
NPR Values of Samples
< 1
≤ 2
> 2
2020 MRE Block Model
< 0.3
≤ 0.7
> 0.7
2021 ARD Samples – Results Pending
Location
NW: 492717, 5360676
SE: 492836, 5360286


NW
SE
17450E
MA-18-280
MA-18-278
MA-18-281
400
300
200
100
0
Mafic Dike
QEPOR
Pit Shell
QTPV
Conglomerate
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
NW: 492768, 5360783
SE: 492926, 5360264
x: 492768
y: 5360783
x: 492797
y: 5360687
x: 492826
y: 5360591
x: 492856
y: 5360496
x: 492885
y: 5360400
x: 492914
y: 5360304


NW
SE
17560E
400
300
200
100
MA-15-051
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 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**	---	---	---

Marathon Gold
Valentine Lake Project
SGS Reference No.: 16863-02

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							***Acid Generation***[1]				***Acid Neutralization***[1]		
Weekly Leach	**Volume Collected**	**pH**	**Acidity**	**Alkalinity**	**Conductivity**	**SO_4**	**SO_4 Production Rate**	**Cumulative SO_4 Production**	**Weekly $S^=$ Depletion**	**Cumulative $S^=$ Depletion**	**NP Consumption**	**Cumulative NP Depletion**	**Cumulative CO_3 NP Depletion**
No.	mL	units	$CaCO_3$ eq. mg/L	$CaCO_3$ eq. mg/L	µS/cm	mg/L	g/t/wk	g/t	%	%	$CaCO_3$, g/t/wk	%	%
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

	pH	Acidity	Alkalinity	Conductivity	SO_4	SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^=$ Depletion	Cumulative $S^=$ Depletion	NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
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

	pH	Acidity	Alkalinity	Conductivity	SO_4	SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^=$ Depletion	Cumulative $S^=$ Depletion	NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
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							*Acid Generation* [1]				*Acid Neutralization* [1]		
Weekly Leach	**Volume Collected**	**pH**	**Acidity**	**Alkalinity**	**Conductivity**	**SO_4**	**SO_4 Production Rate**	**Cumulative SO_4 Production**	**Weekly $S^=$ Depletion**	**Cumulative $S^=$ Depletion**	**NP Consumption**	**Cumulative NP Depletion**	**Cumulative CO_3 NP Depletion**
No.	mL	units	$CaCO_3$ eq. mg/L	$CaCO_3$ eq. mg/L	µS/cm	mg/L	g/t/wk	g/t	%	%	$CaCO_3$, g/t/wk	%	%
41	501	4.58	10	<2	38	15	7.5	284.0	0.05	1.89	7.83	6.57	19.72

[1] *Calculated values*

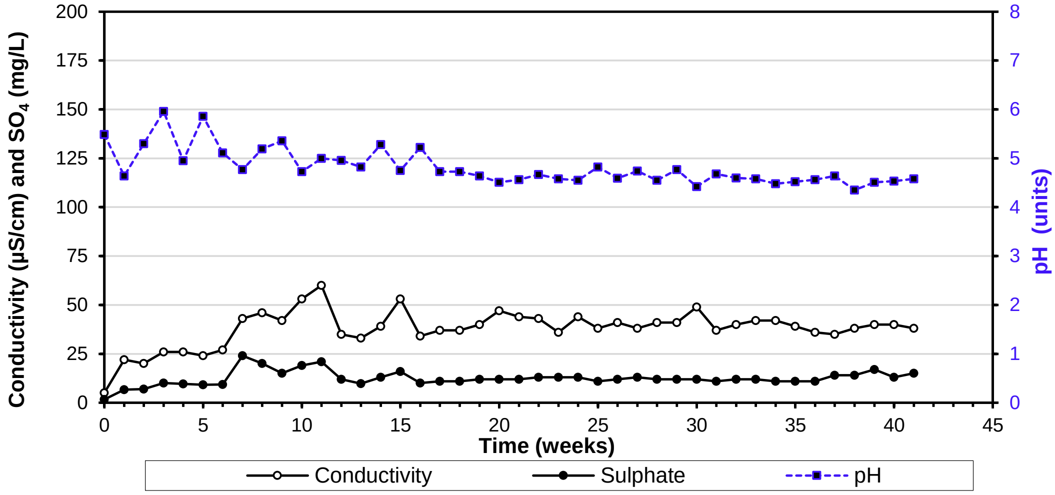
Summary - Weeks 0 to 60

	pH	Acidity	Alkalinity	Conductivity	SO_4	SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^=$ Depletion	Cumulative $S^=$ Depletion	NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
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	-	-

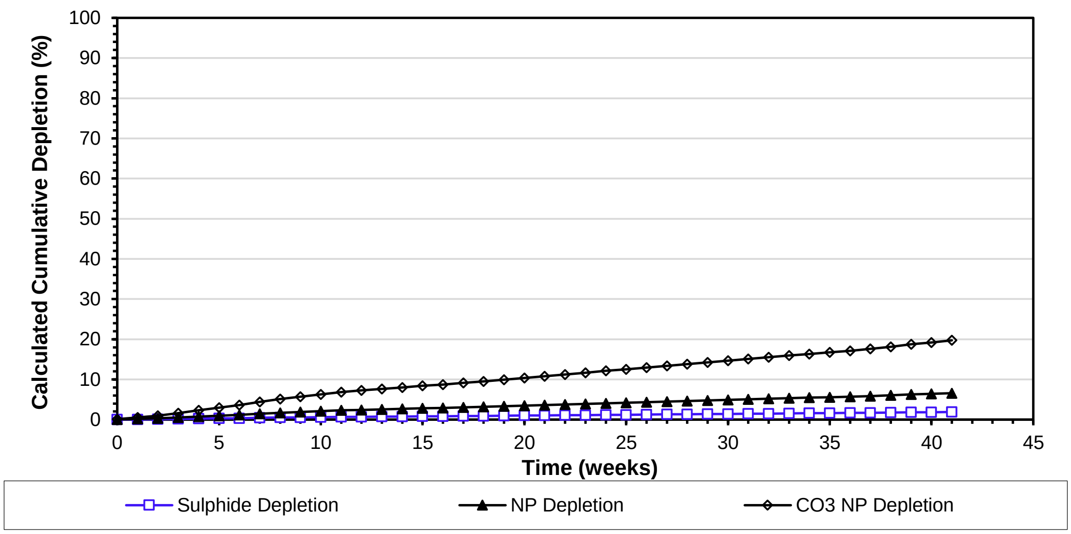
TEST REPORT

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

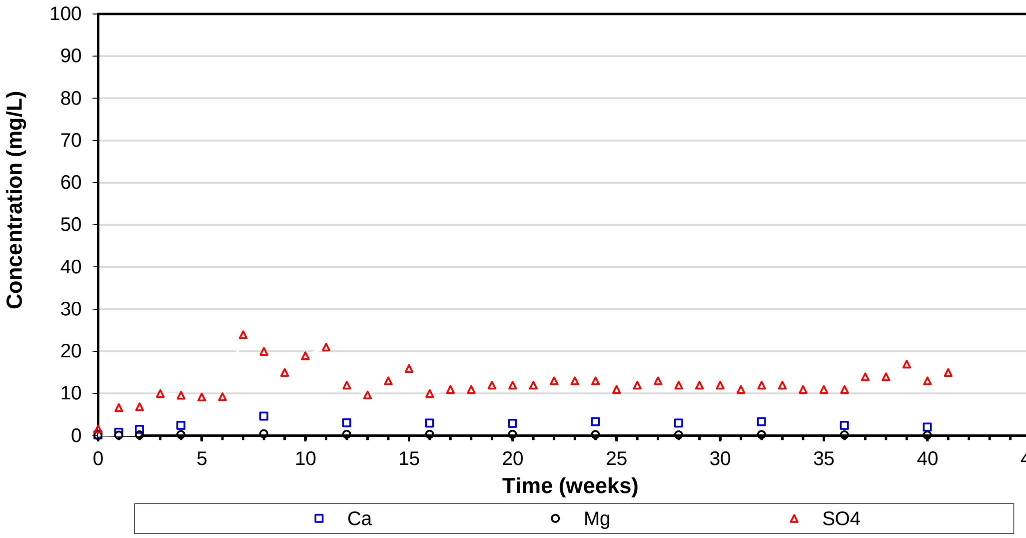


Note: NP depletion calculated based on sulphate assay.

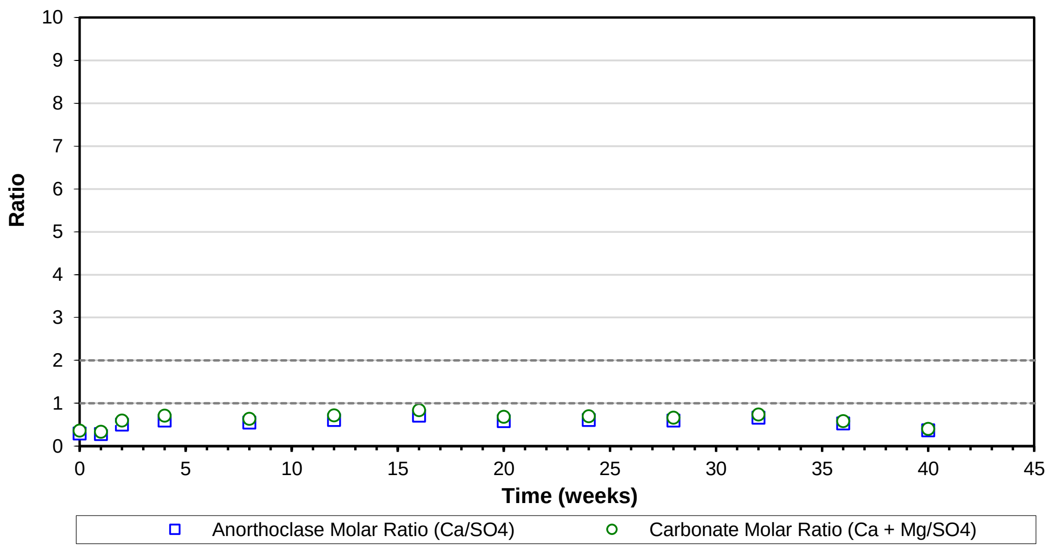
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

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



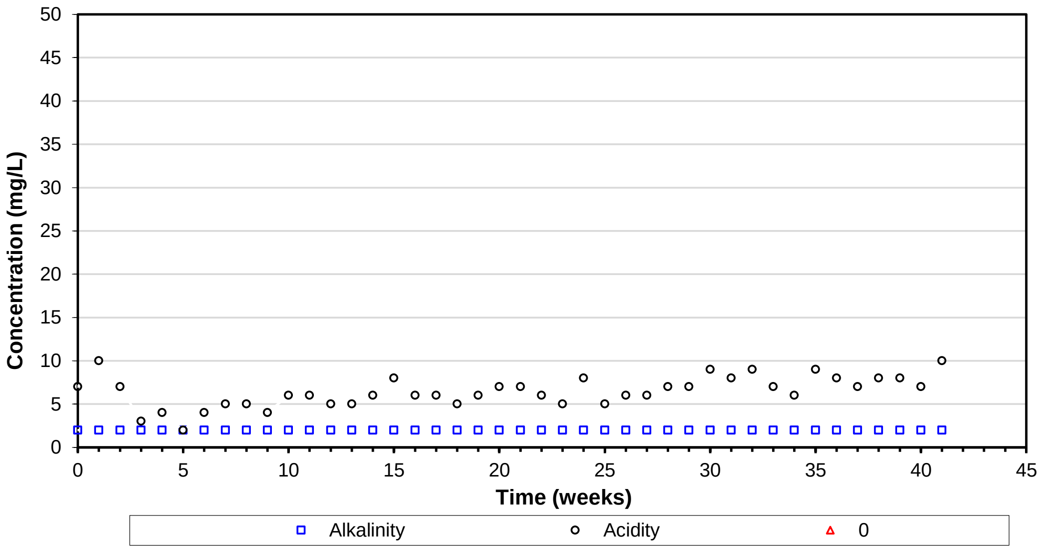
Carbonate (Ca + Mg/SO $_4$) and Anorthoclase (Ca/SO $_4$) Molar Ratios M-LGO CNP DPL



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

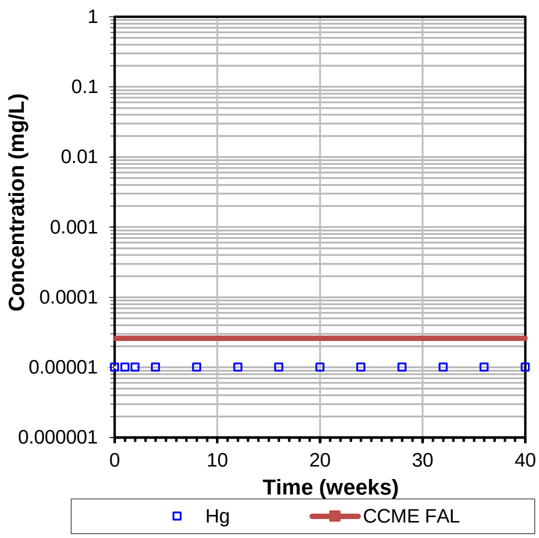
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL

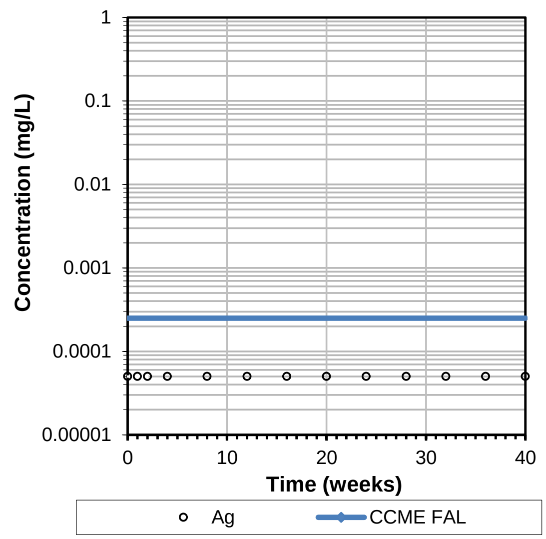


TEST REPORT

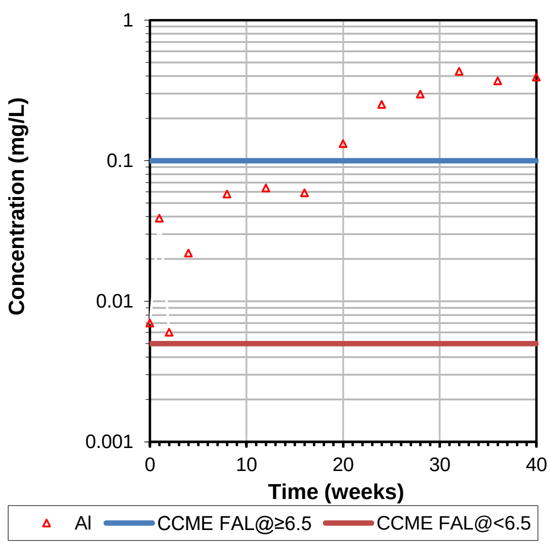
Humidity Cell Test (ASTM D 5744-96)

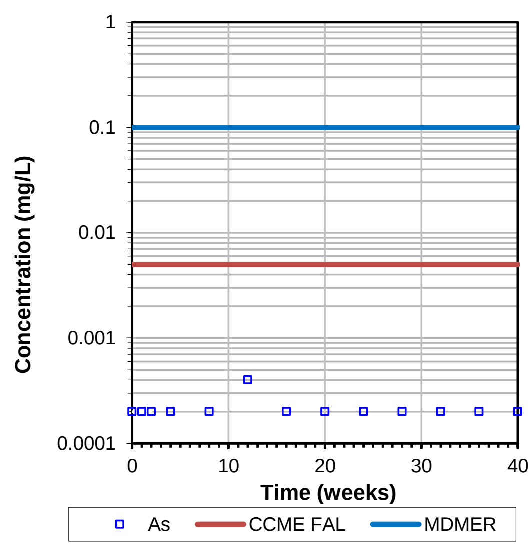
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





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

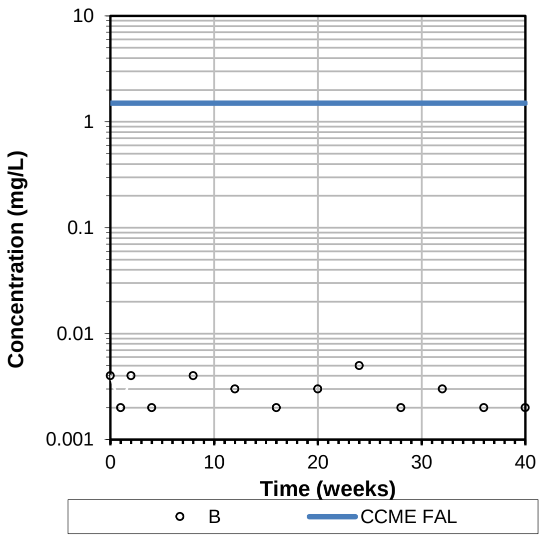


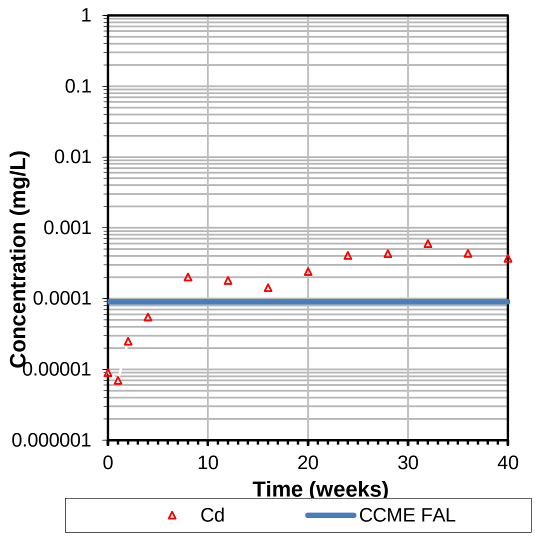


TEST REPORT

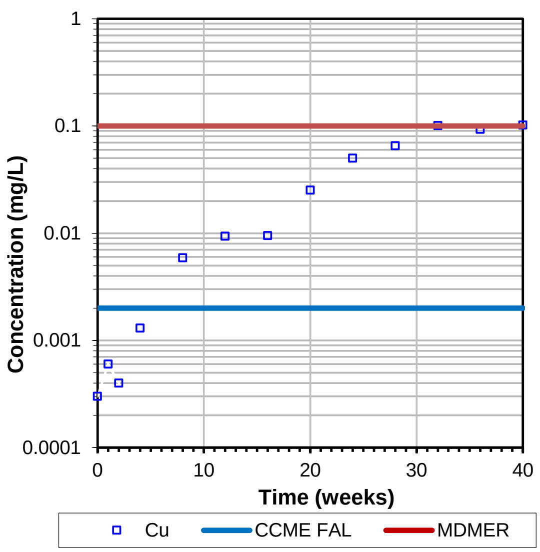
Humidity Cell Test (ASTM D 5744-96)

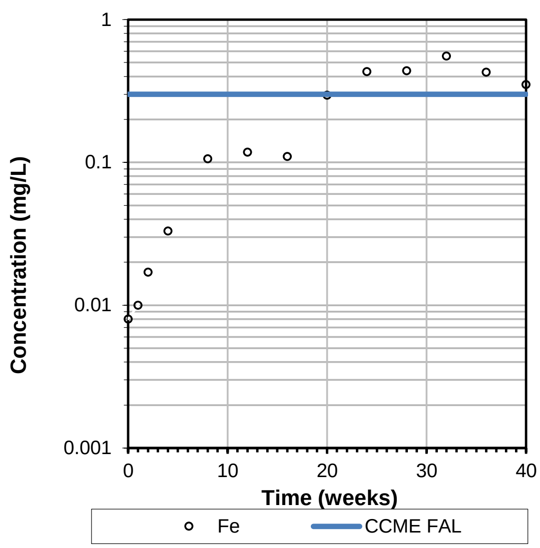
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





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

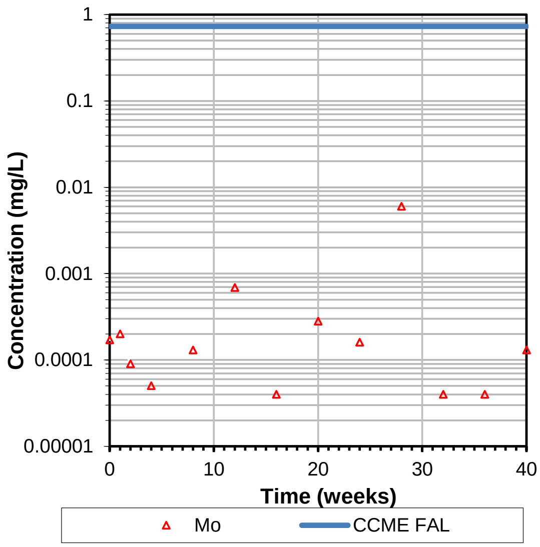


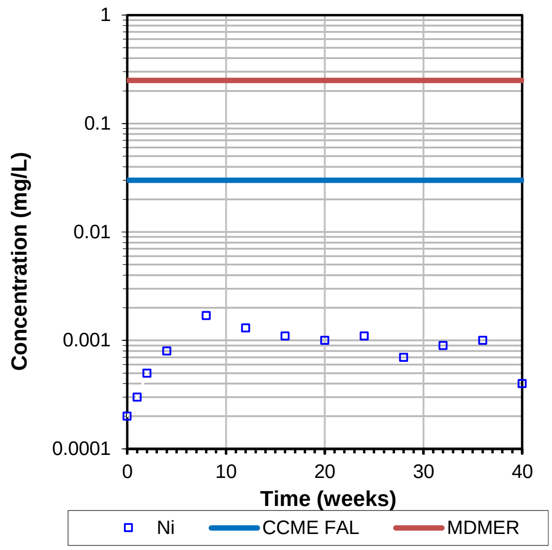


TEST REPORT

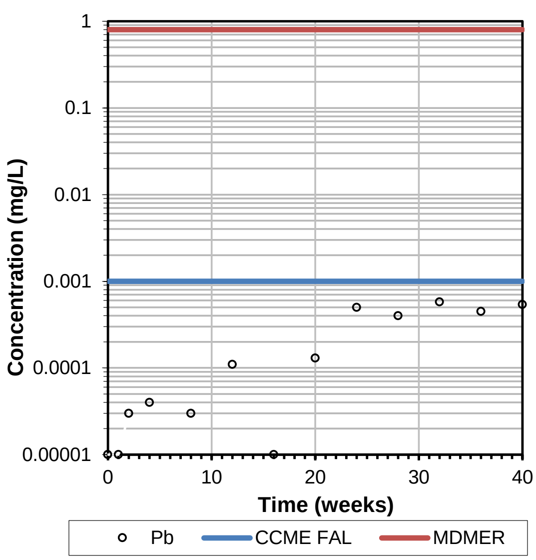
Humidity Cell Test (ASTM D 5744-96)

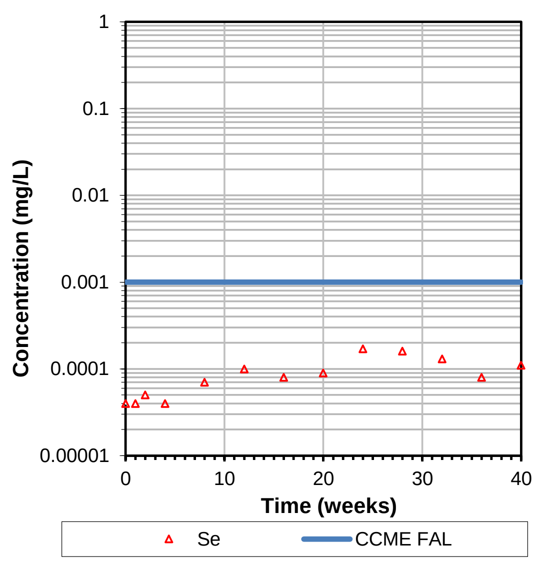
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





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

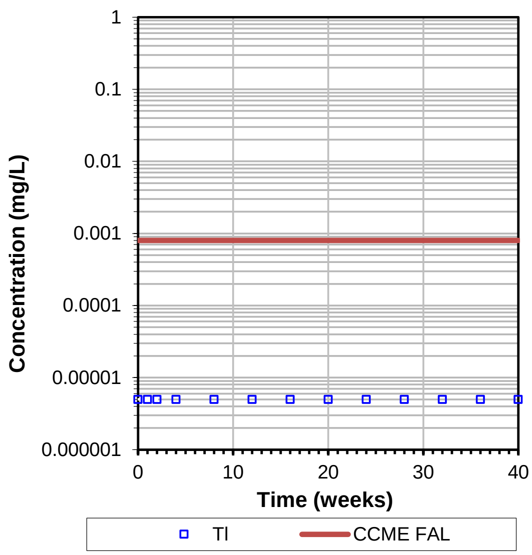


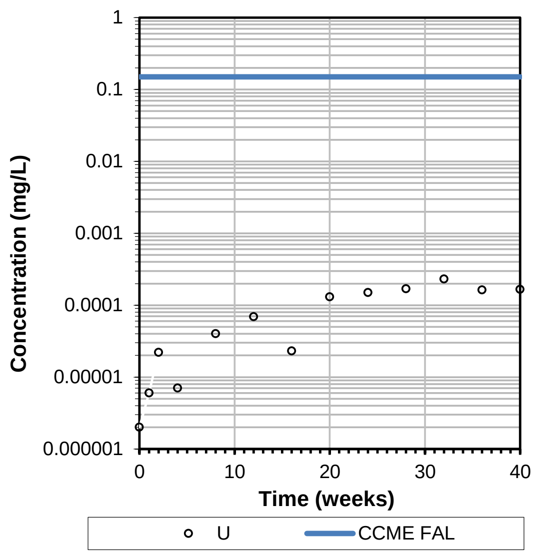


TEST REPORT

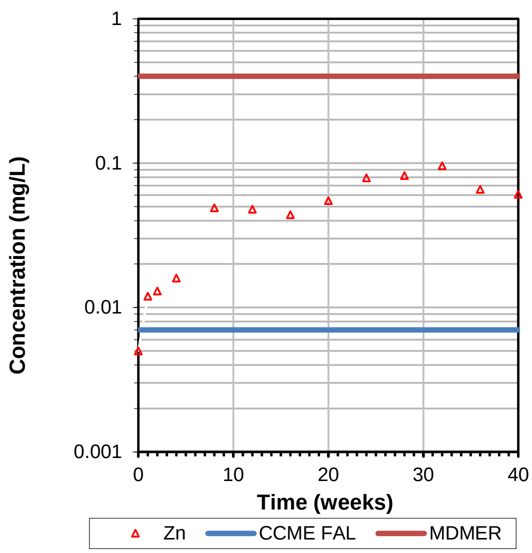
Humidity Cell Test (ASTM D 5744-96)

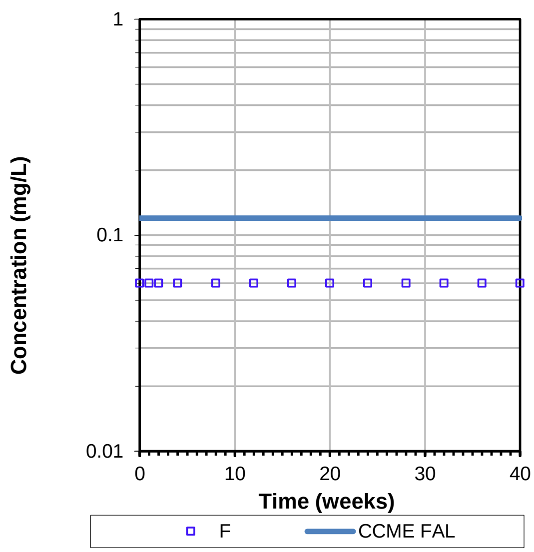
Selected Parameters in Weekly Humidity Cell Leachate M-LGO CNP DPL





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							*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	568	5.73	15	2	110	33	18.7	18.7	0.15	0.15	19.53	0.56	0.59
1	846	5.96	9	<2	32	10	8.5	27.2	0.07	0.22	8.81	0.81	0.86
2	859	5.42	6	<2	42	15	12.9	40.1	0.10	0.32	13.42	1.19	1.27
3	813	5.66	3	<2	54	24	19.5	59.6	0.15	0.47	20.33	1.77	1.88
4	890	5.52	3	<2	54	21	18.7	78.3	0.15	0.62	19.47	2.33	2.47
5	899	5.45	4	<2	71	28	25.2	103.5	0.20	0.82	26.22	3.08	3.27
6	831	5.18	4	<2	85	48	39.9	143.4	0.32	1.14	41.55	4.27	4.52
7	486	4.98	14	<2	66	31	15.1	158.4	0.12	1.26	15.69	4.71	5.00
8	394	4.84	15	<2	68	28	11.0	169.4	0.09	1.34	11.49	5.04	5.35
9	502	4.41	18	<2	177	74	37.1	206.6	0.29	1.64	38.70	6.15	6.52
10	319	4.36	8	<2	61	19	6.1	212.7	0.05	1.69	6.31	6.33	6.71
11	673	4.28	14	<2	243	100	67.3	280.0	0.53	2.22	70.10	8.33	8.84
12	755	4.02	49	<2	336	130	98.2	378.1	0.78	3.00	102.24	11.25	11.94
13	420	3.70	101	<2	561	240	100.8	478.9	0.80	3.80	105.00	14.25	15.12
14	304	3.76	112	<2	498	180	54.7	533.6	0.43	4.24	57.00	15.88	16.84
15	308	3.21	174	<2	602	220	67.8	601.4	0.54	4.77	70.58	17.90	18.98
16	298	3.02	198	<2	691	290	86.4	687.8	0.69	5.46	90.02	20.47	21.71
17	289	2.98	373	<2	970	420	121.4	809.2	0.96	6.42	126.44	24.08	25.54
18	353	2.84	454	<2	1160	470	165.9	975.1	1.32	7.74	172.82	29.02	30.78
19	282	2.73	547	<2	1400	630	177.7	1152.8	1.41	9.15	185.06	34.31	36.39
20	250	2.70	585	<2	1460	650	162.5	1315.3	1.29	10.44	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	Alkalinity	Conductivity	SO_4	SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^{=}$ Depletion	Cumulative $S^{=}$ Depletion	NP Consumption	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

	pH	Acidity	Alkalinity	Conductivity	SO_4	SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^=$ Depletion	Cumulative $S^=$ Depletion	NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
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							Acid Generation [1]				Acid Neutralization [1]		
Weekly Leach	Volume Collected	pH	Acidity	Alkalinity	Conductivity	SO_4	SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^{=}$ Depletion	Cumulative $S^{=}$ Depletion	NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
No.	mL	units	$CaCO_3$ eq. mg/L	$CaCO_3$ eq. mg/L	µS/cm	mg/L	g/t/wk	g/t	%	%	$CaCO_3$, g/t/wk	%	%
41	468	2.98	196	<2	772	220	103.0	4503.4	0.82	35.74	107.25	134.03	142.15

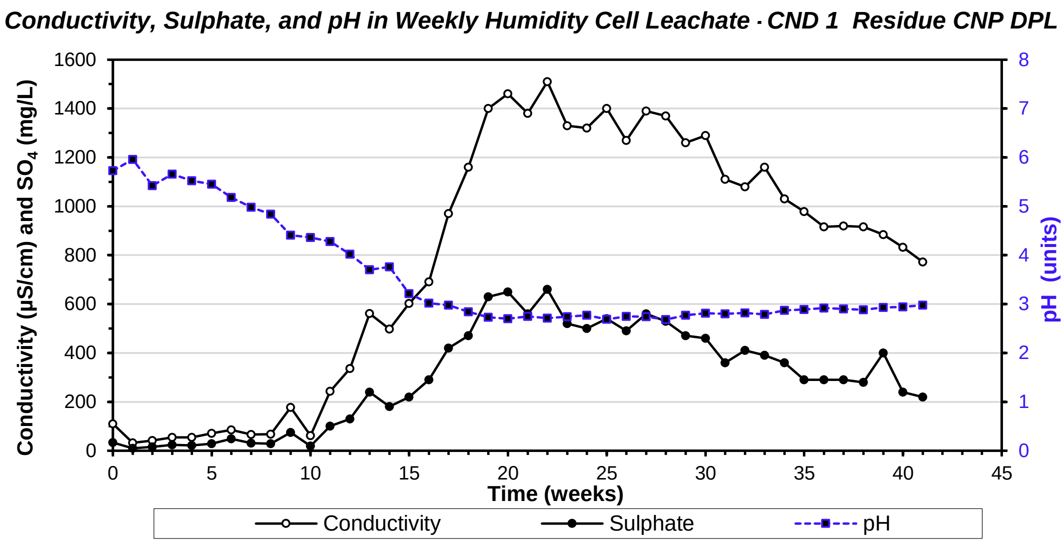
[1] *Calculated values*

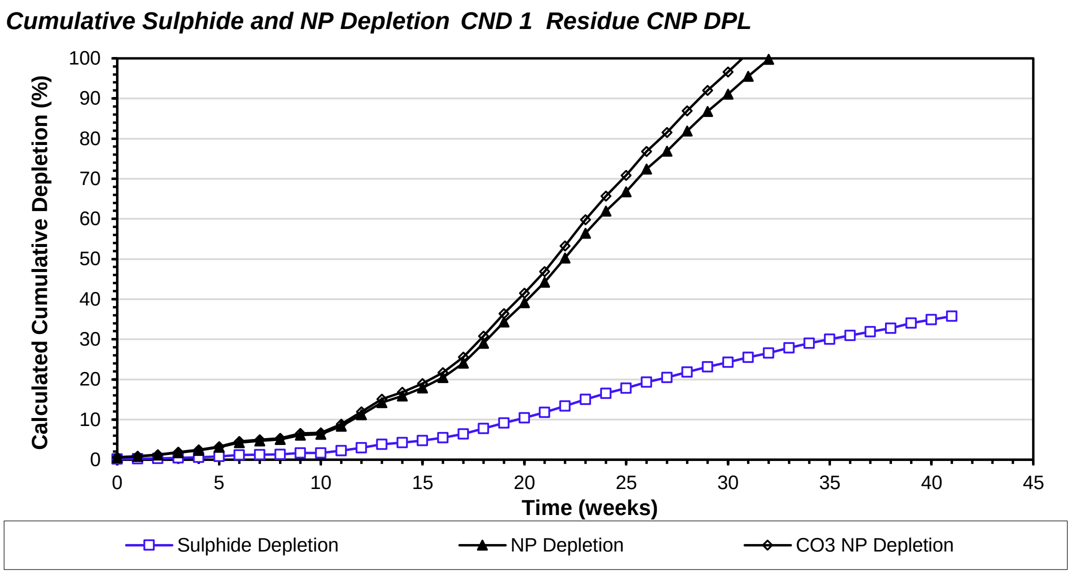
Summary - Weeks 0 to 60

	pH	Acidity	Alkalinity	Conductivity	SO_4	SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^{=}$ Depletion	Cumulative $S^{=}$ Depletion	NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
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)



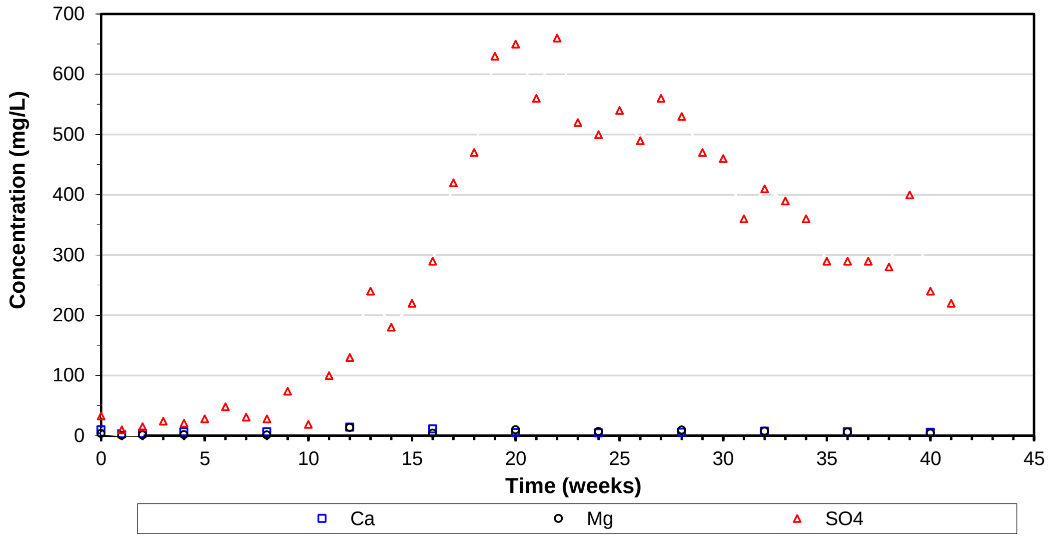


Note: NP depletion calculated based on sulphate assay.

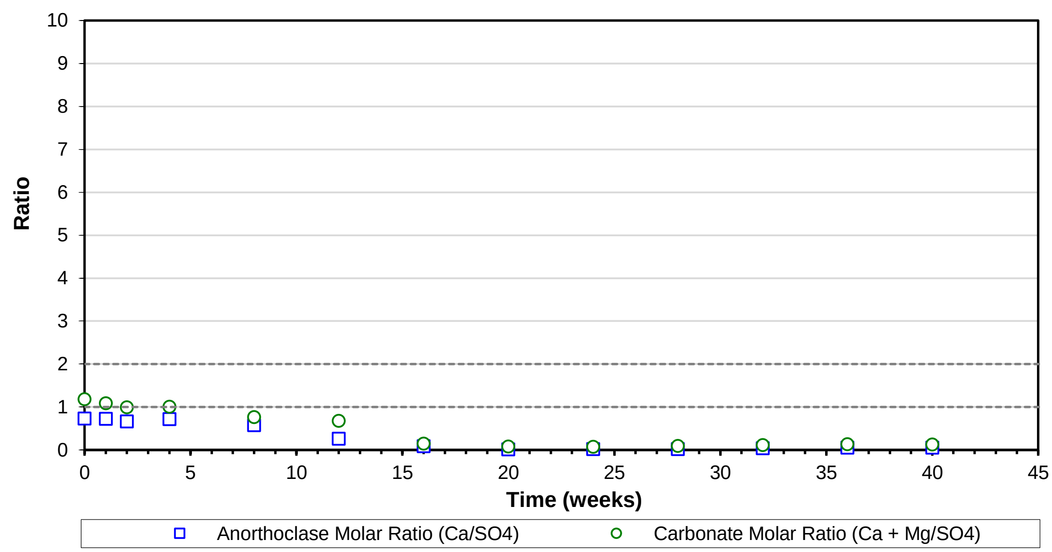
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

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



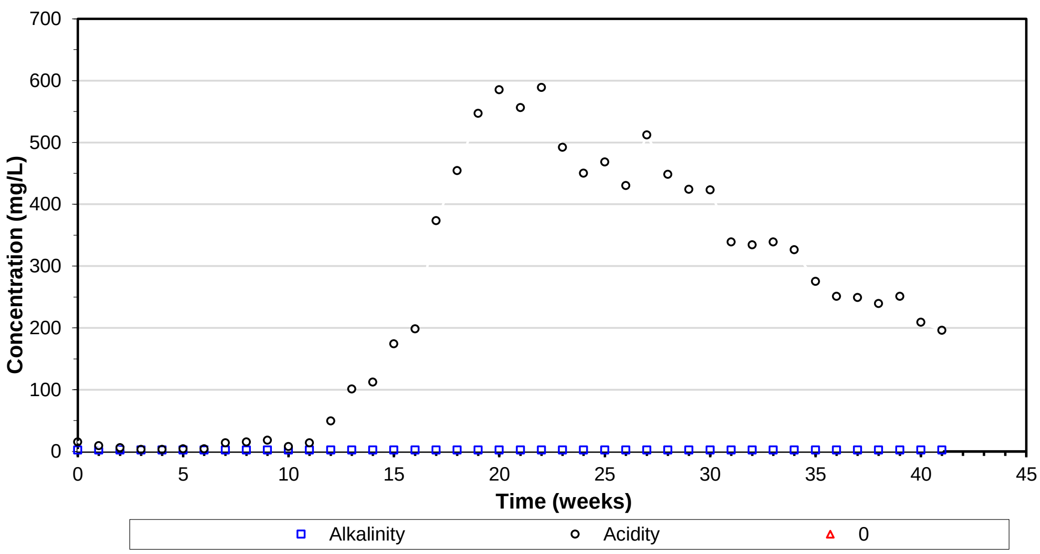
Carbonate (Ca + Mg/SO$_4$) and Anorthoclase (Ca/SO$_4$) Molar Ratio: CND 1 Residue CNP DPL



TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

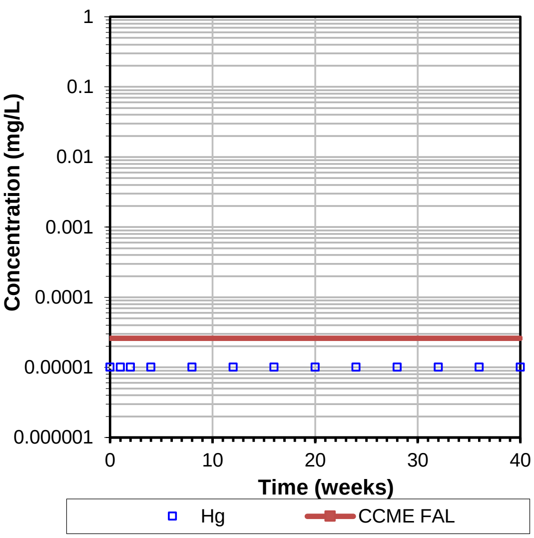
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL

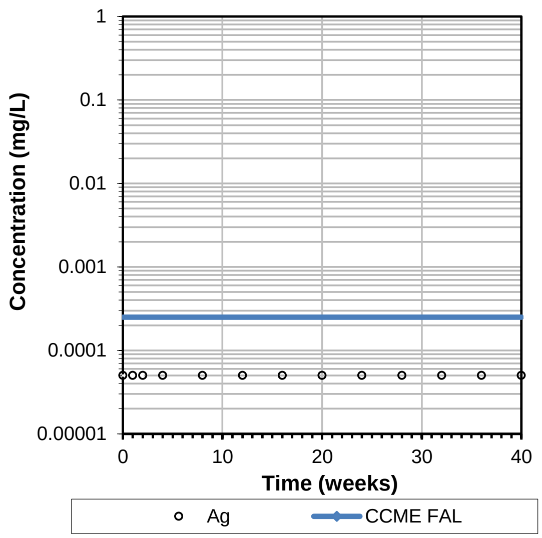


TEST REPORT

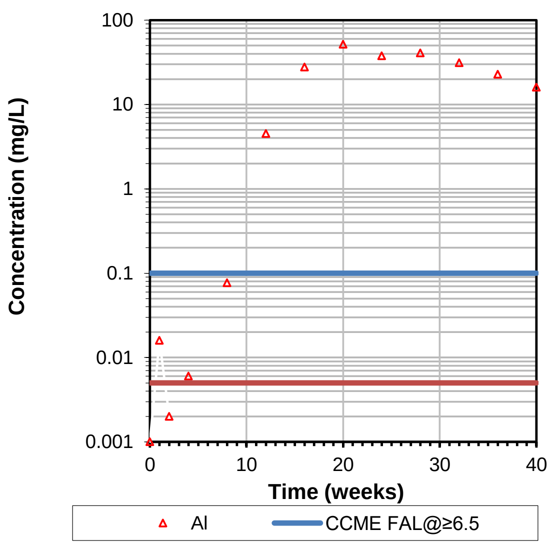
Humidity Cell Test (ASTM D 5744-96)

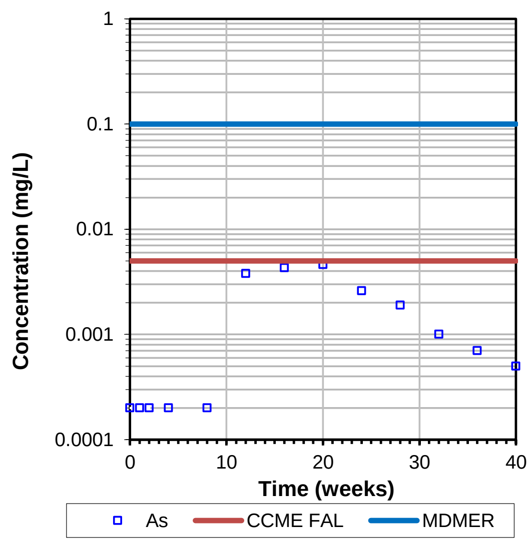
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





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

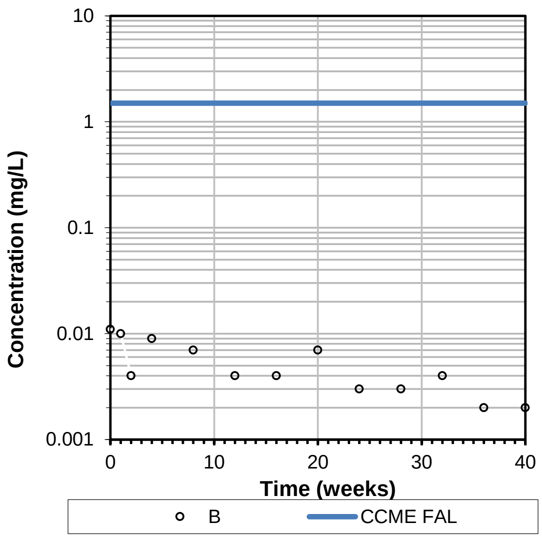


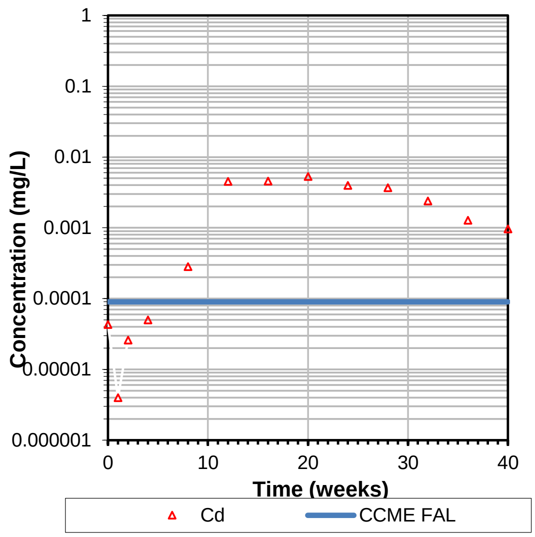


TEST REPORT

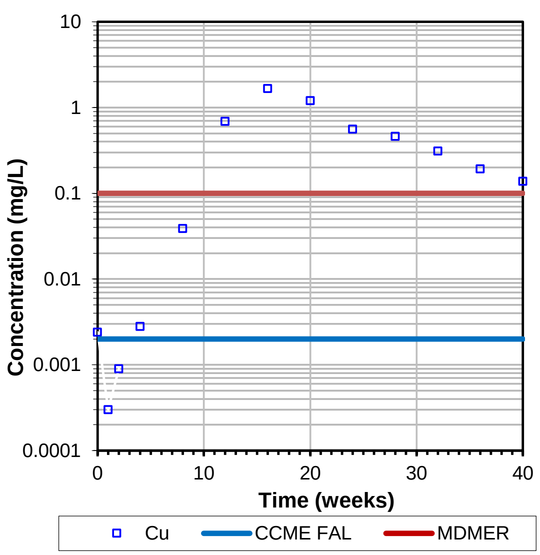
Humidity Cell Test (ASTM D 5744-96)

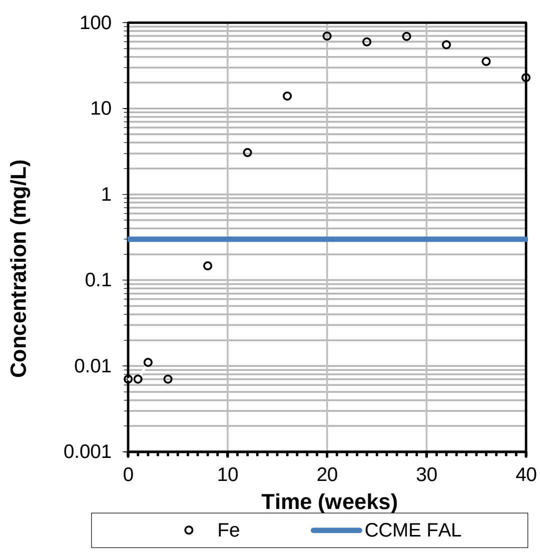
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





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

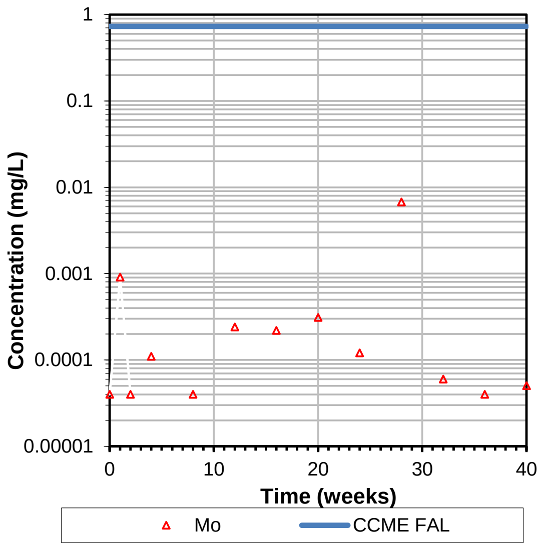


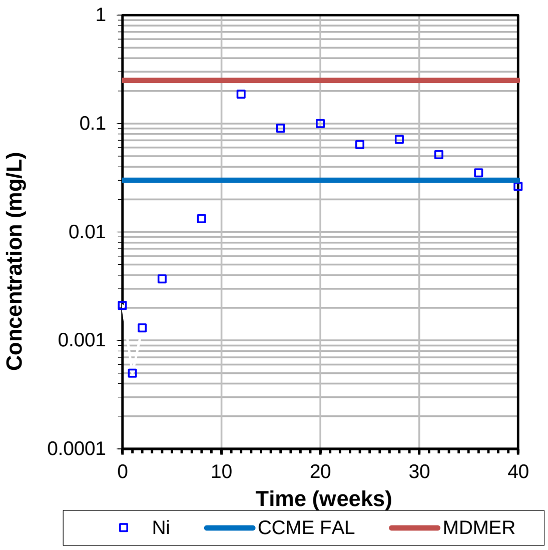


TEST REPORT

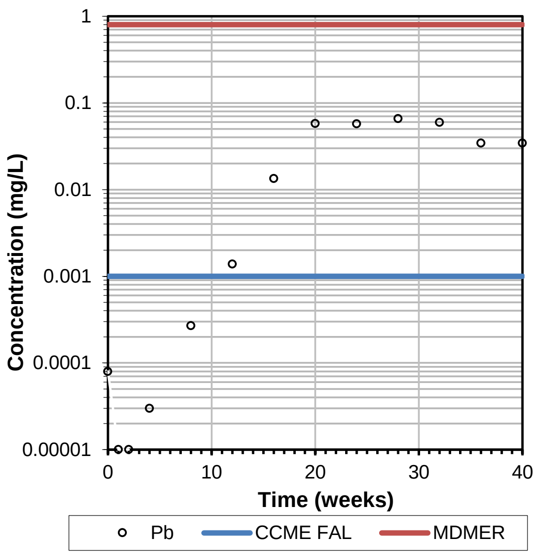
Humidity Cell Test (ASTM D 5744-96)

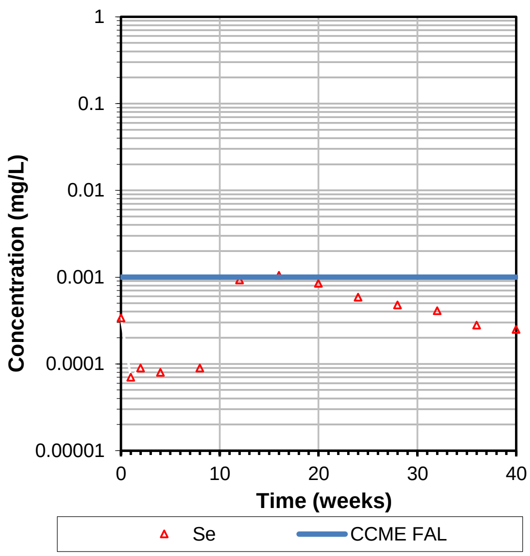
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





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

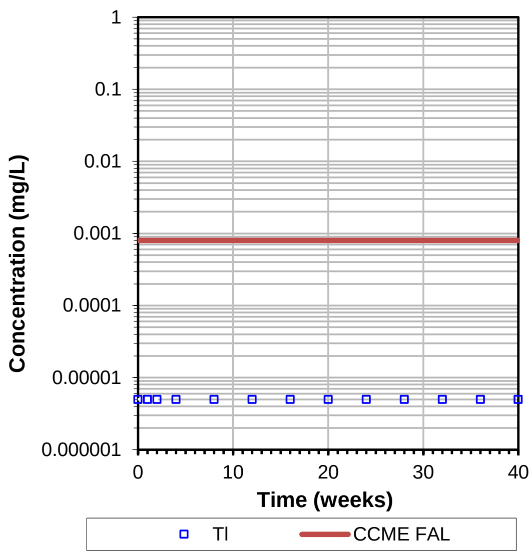


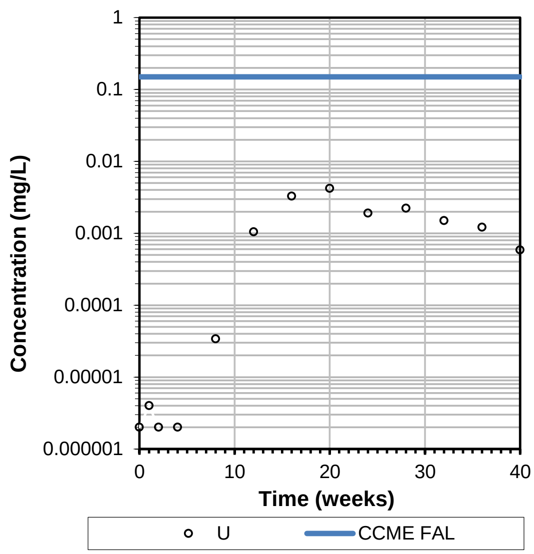


TEST REPORT

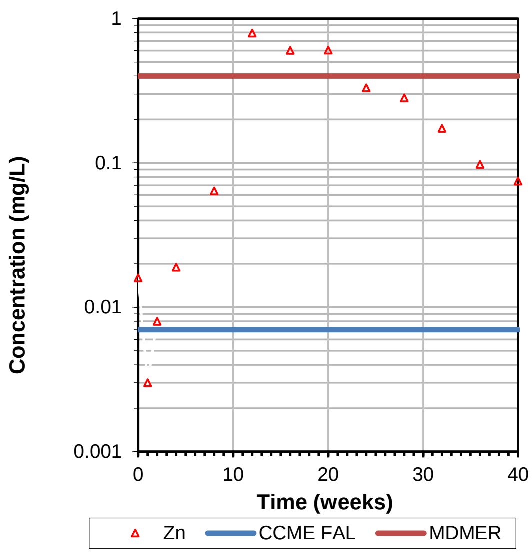
Humidity Cell Test (ASTM D 5744-96)

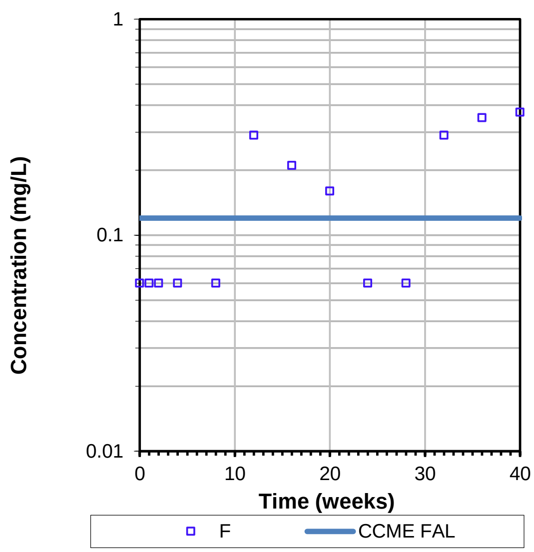
Selected Parameters in Weekly Humidity Cell Leachate CND 1 Residue CNP DPL





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 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	--	--	--

Marathon Gold
Valentine Lake Project
SGS Reference No.: 16863-02

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 Vo	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 Vo	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

	pH	Acidity	Alkalinity	Conductivity	SO_4	SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^{=}$ Depletion	Cumulative $S^{=}$ Depletion	NP Consumption	Cumulative NP Depletion	Cumulative CO_3 NP Depletion
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							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	920	8.14	<2	48	90	2.7	2.5	1562.4	0.03	19.29	2.59	4.34	3.64
22	878	8.21	<2	43	85	2.4	2.1	1564.5	0.03	19.31	2.20	4.35	3.65
23	886	8.09	<2	45	87	2.1	1.9	1566.3	0.02	19.34	1.94	4.35	3.65
24	845	8.16	<2	48	92	2.2	1.9	1568.2	0.02	19.36	1.94	4.36	3.65
25	874	8.20	<2	52	93	2.2	1.9	1570.1	0.02	19.38	2.00	4.36	3.66
26	878	8.16	<2	45	84	2.1	1.8	1572.0	0.02	19.41	1.92	4.37	3.66
27	847	8.07	<2	44	85	2.1	1.8	1573.7	0.02	19.43	1.85	4.37	3.67
28	872	8.05	<2	46	88	2.1	1.8	1575.6	0.02	19.45	1.91	4.38	3.67
29	802	7.84	<2	40	75	1.8	1.4	1577.0	0.02	19.47	1.50	4.38	3.67
30	867	8.20	<2	45	87	3.3	2.9	1579.9	0.04	19.50	2.98	4.39	3.68
31	866	7.74	<2	44	87	2.0	1.7	1581.6	0.02	19.53	1.80	4.39	3.69
32	888	8.16	<2	46	84	8.0	7.1	1588.7	0.09	19.61	7.40	4.41	3.70
33	811	8.00	<2	43	83	2.0	1.6	1590.3	0.02	19.63	1.69	4.42	3.71
34	898	8.13	<2	48	88	1.5	1.3	1591.7	0.02	19.65	1.40	4.42	3.71
35	953	8.06	<2	48	93	1.5	1.4	1593.1	0.02	19.67	1.49	4.43	3.71
36	895	8.21	<2	47	85	1.5	1.3	1594.5	0.02	19.68	1.40	4.43	3.72
37	860	8.08	<2	42	90	1.7	1.5	1595.9	0.02	19.70	1.52	4.43	3.72

[1] *Calculated values*

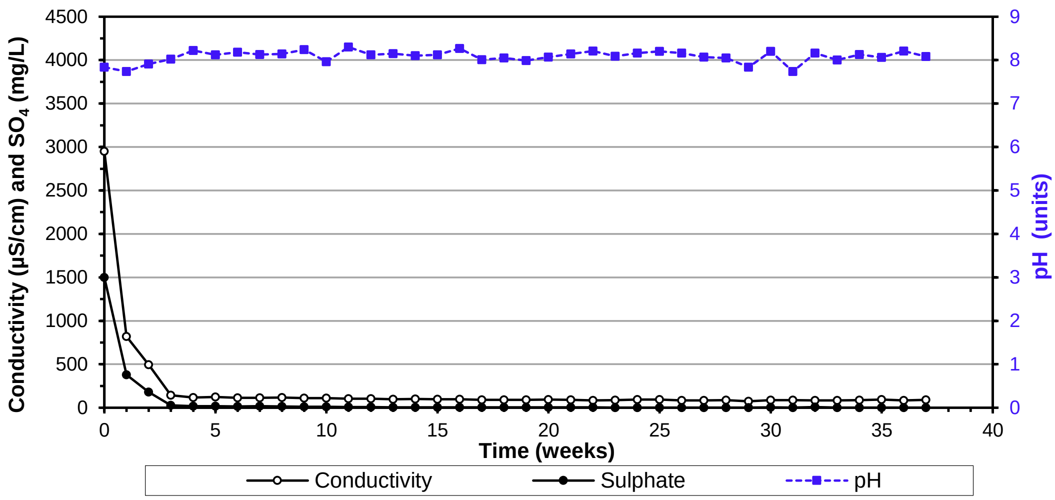
Summary - Weeks 0 to 40

	pH	Acidity	Alkalinity	Conductivity	SO_4	SO_4 Production Rate	Cumulative SO_4 Production	Weekly $S^=$ Depletion	Cumulative $S^=$ Depletion	NP Consumption	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	201	59.9	42.0	-	0.52	-	43.75	-	-

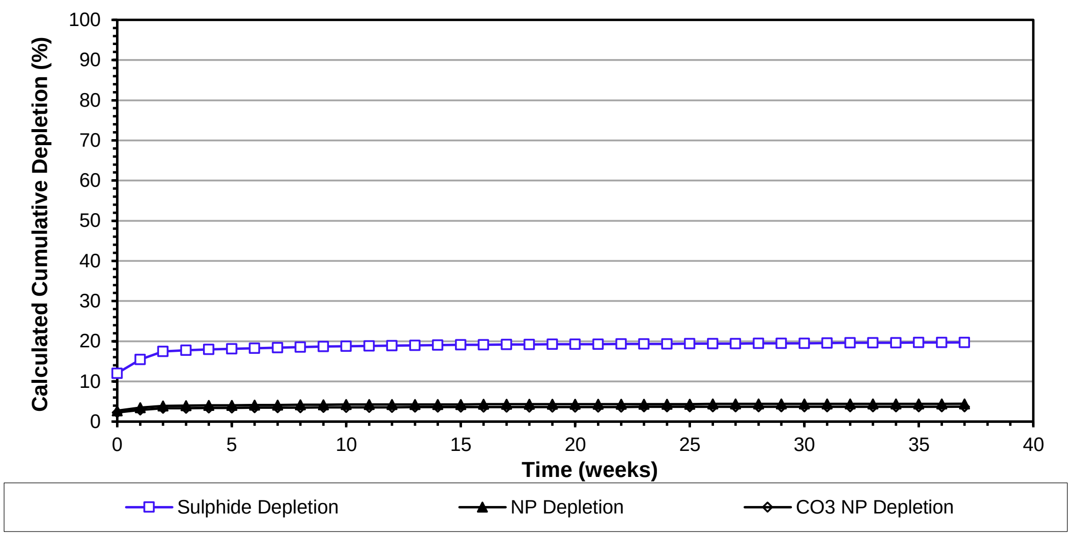
TEST REPORT

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

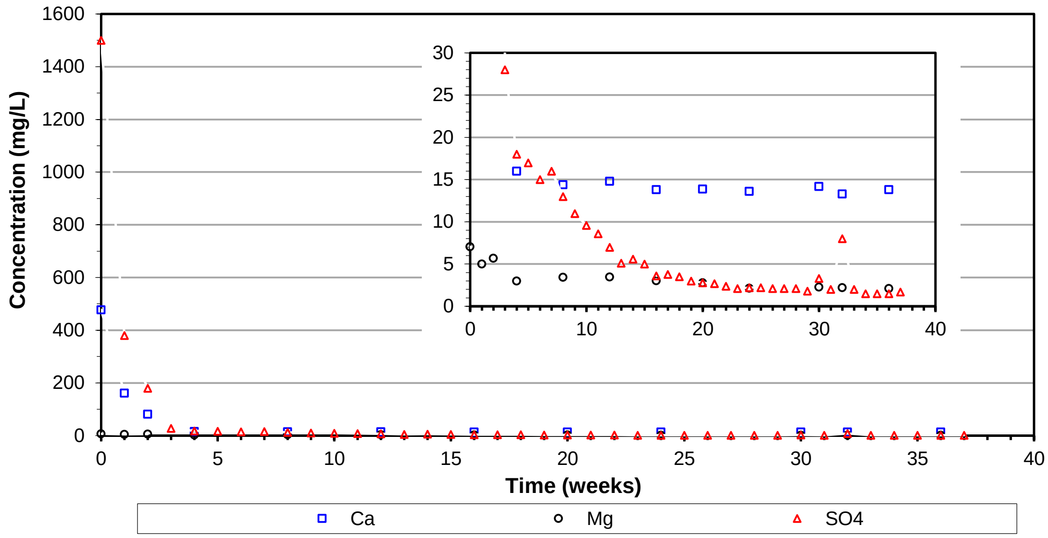


Note: NP depletion calculated based on sulphate assay.

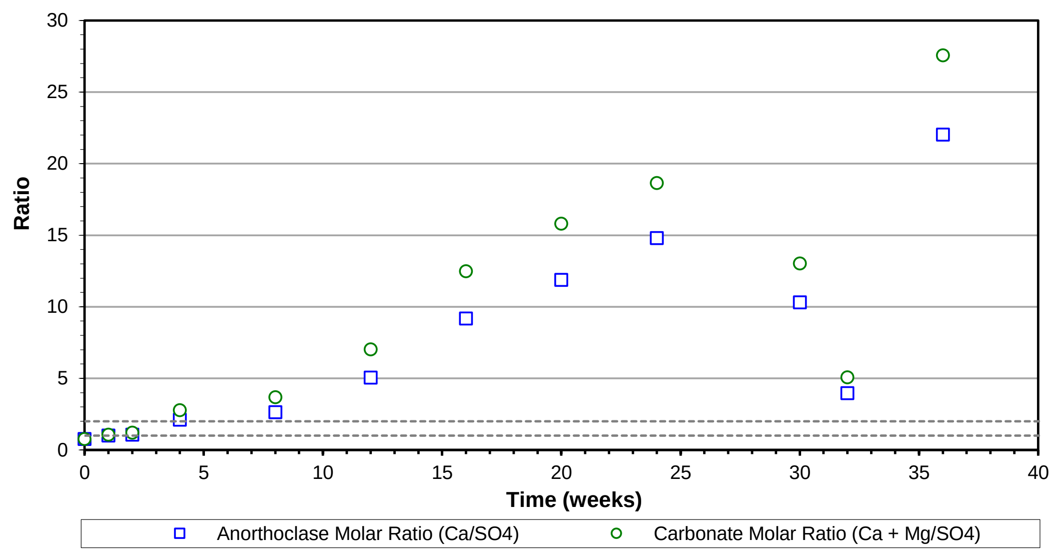
TEST REPORT

Humidity Cell Test (ASTM D 5744-96)

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

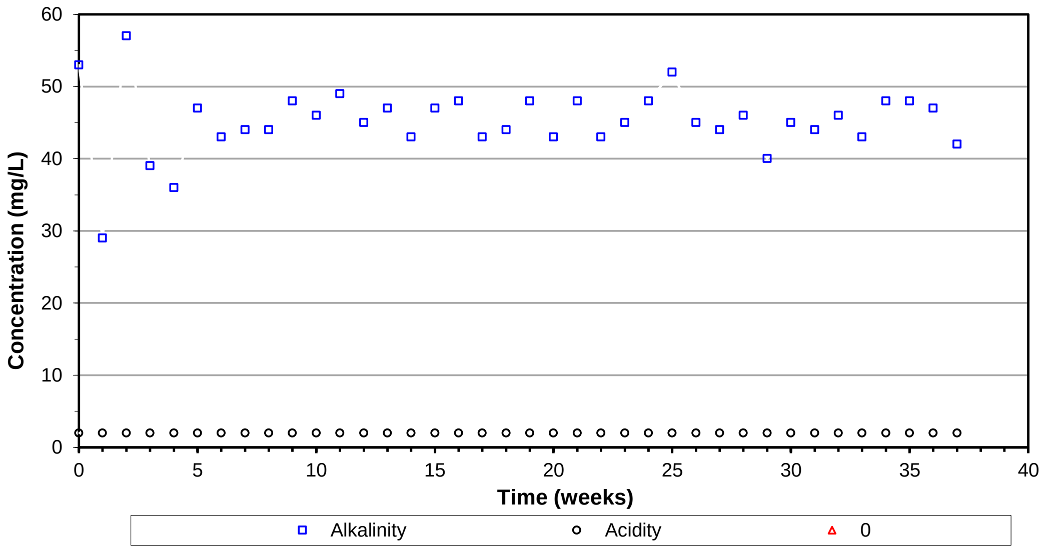


Carbonate (Ca + Mg/SO₄) and Anorthoclase (Ca/SO₄) Molar Ratios BL639-83D Detox Tls



TEST REPORT
Humidity Cell Test (ASTM D 5744-96)

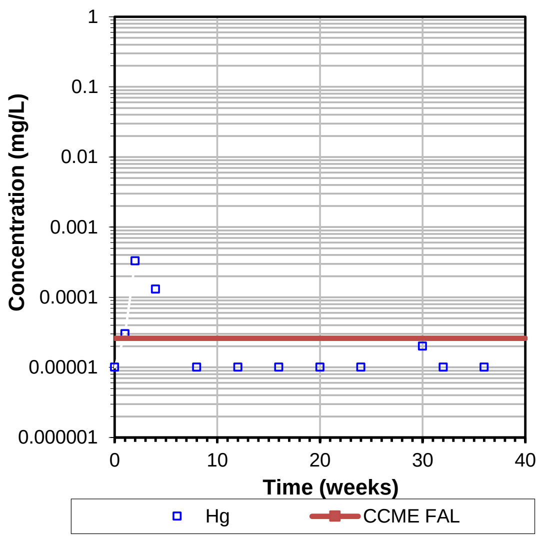
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls

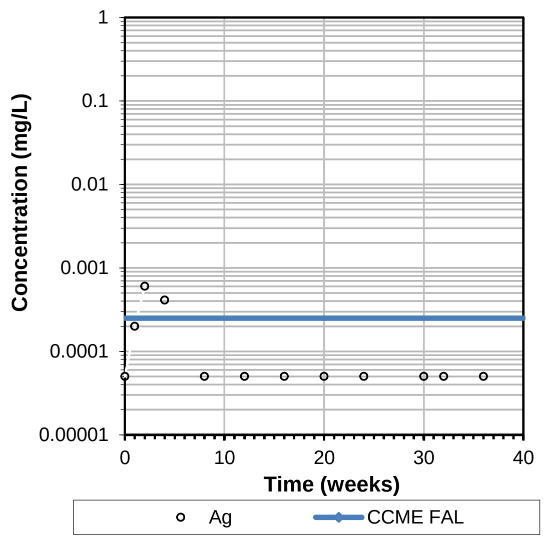


TEST REPORT

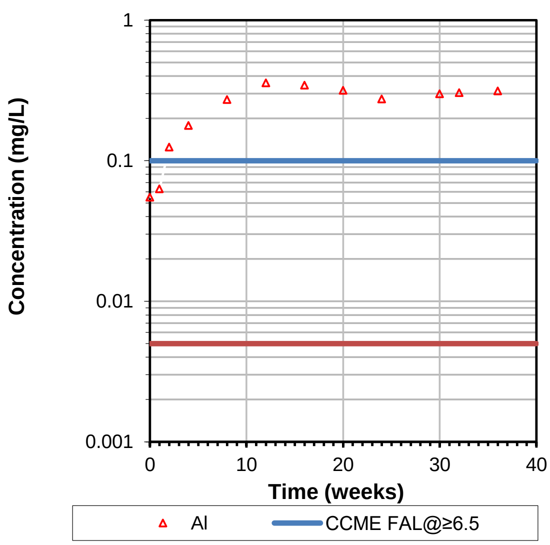
Humidity Cell Test (ASTM D 5744-96)

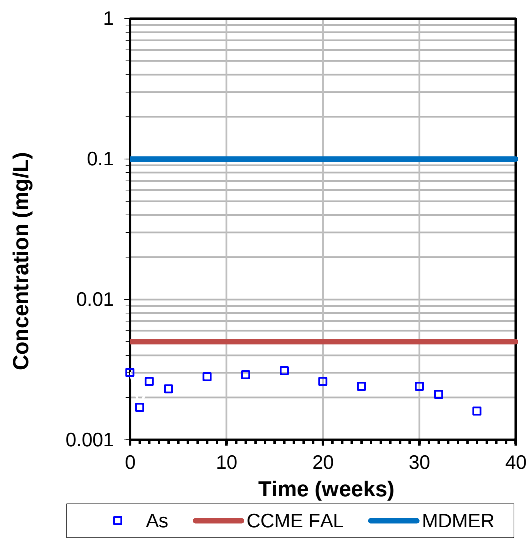
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





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

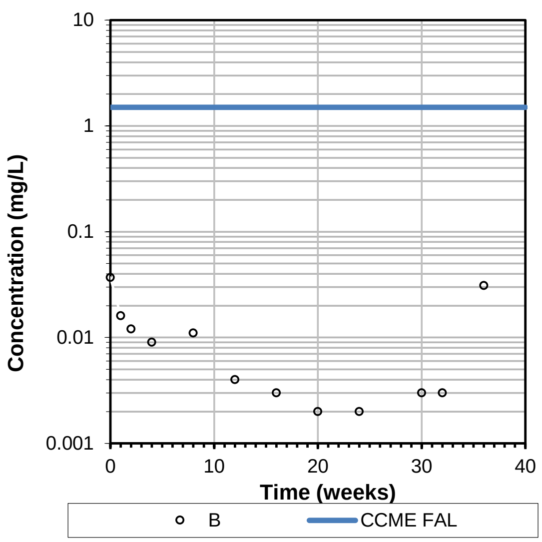


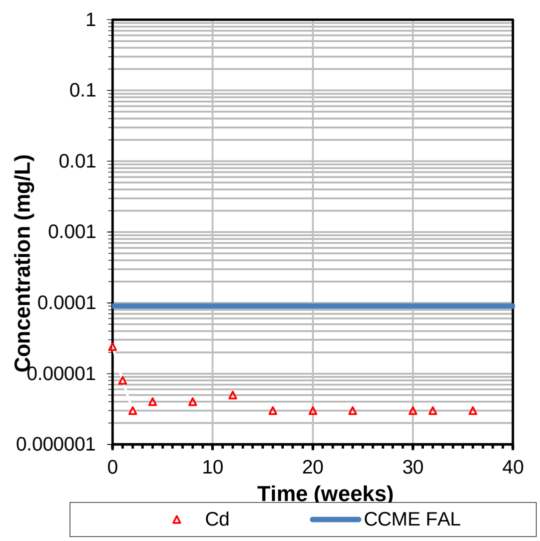


TEST REPORT

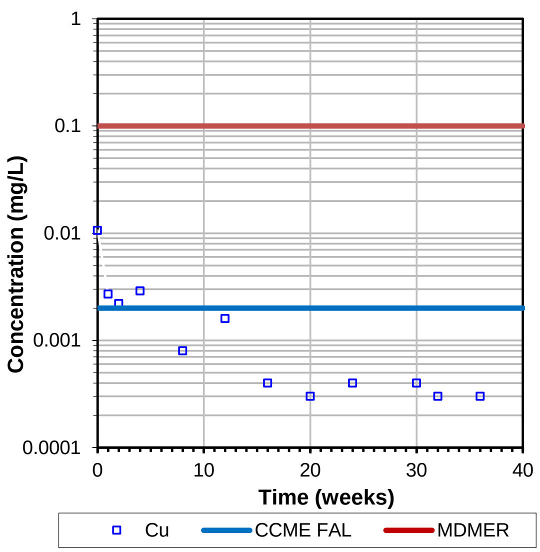
Humidity Cell Test (ASTM D 5744-96)

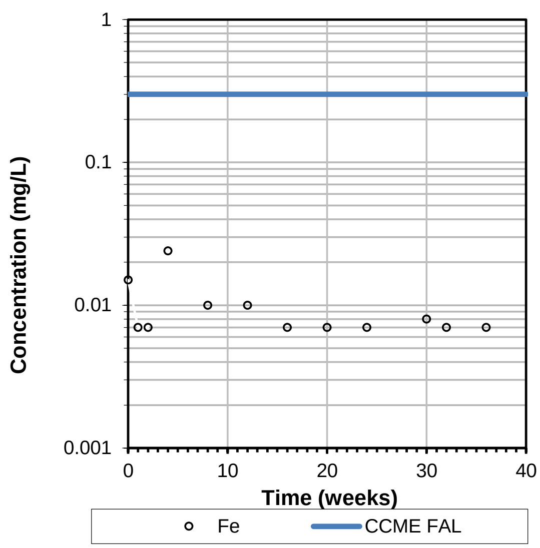
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





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

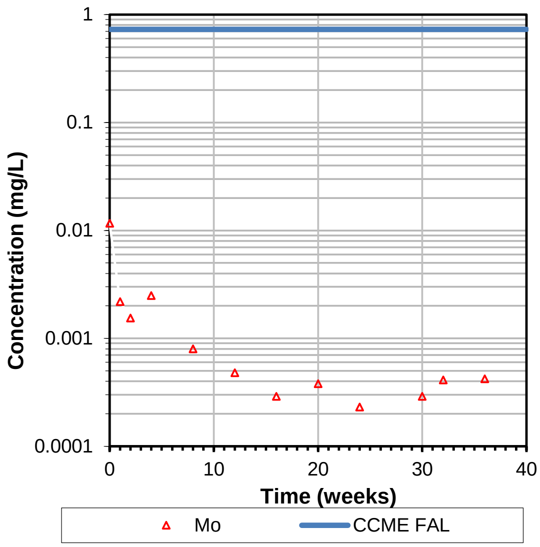


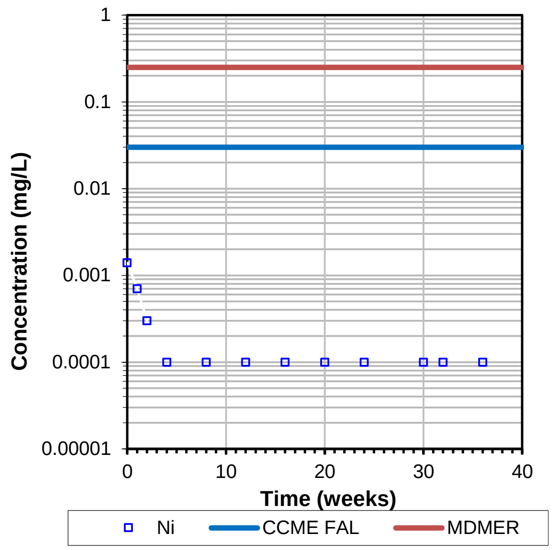


TEST REPORT

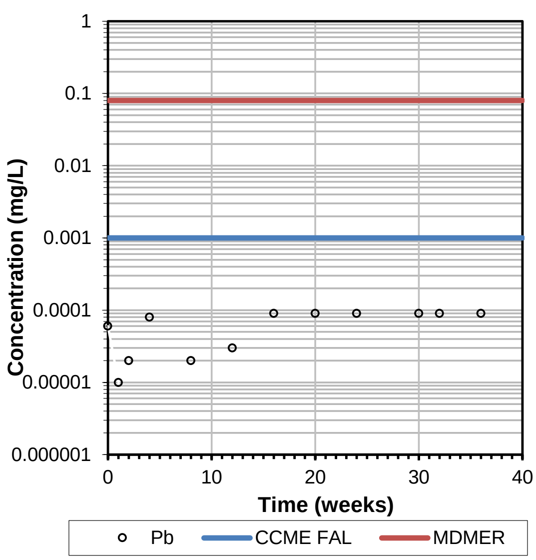
Humidity Cell Test (ASTM D 5744-96)

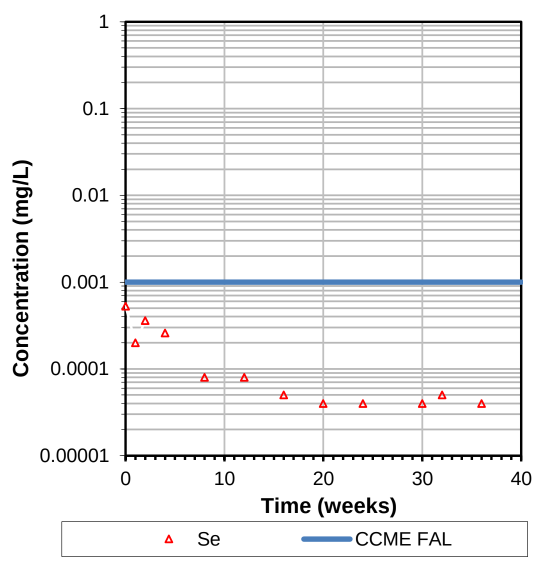
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





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

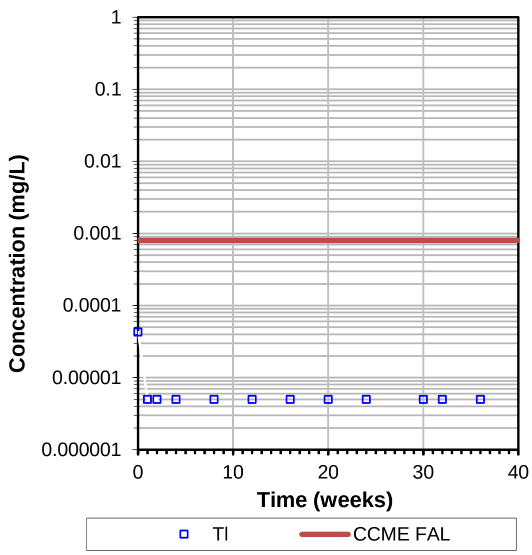


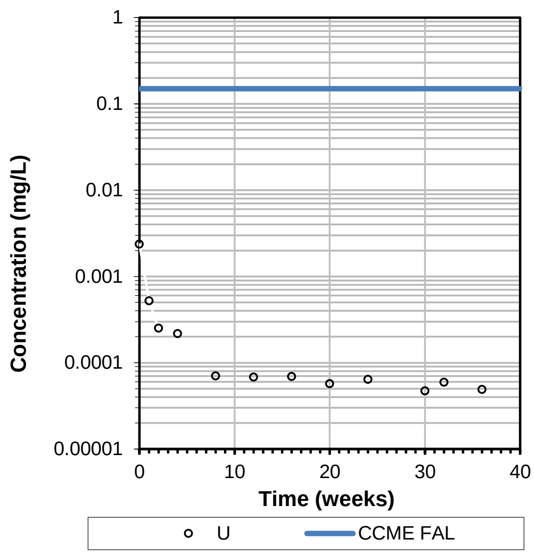


TEST REPORT

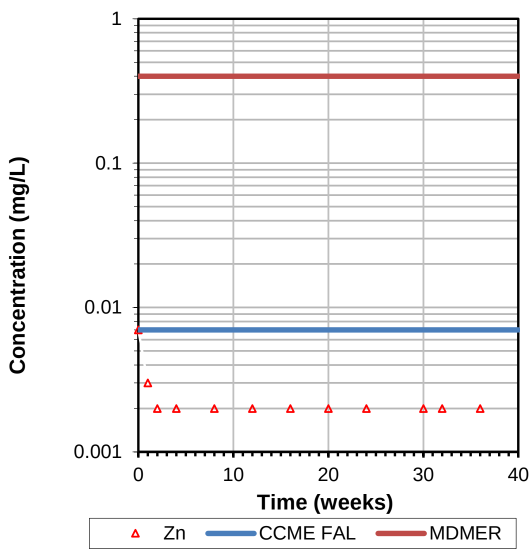
Humidity Cell Test (ASTM D 5744-96)

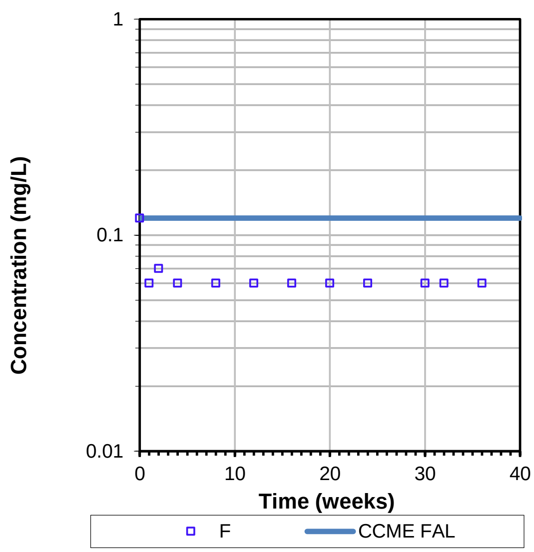
Selected Parameters in Weekly Humidity Cell Leachate BL639-83D Detox Tls





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

Marathon Gold
Valentine Lake Project
SGS Reference No.: 16863-02

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**

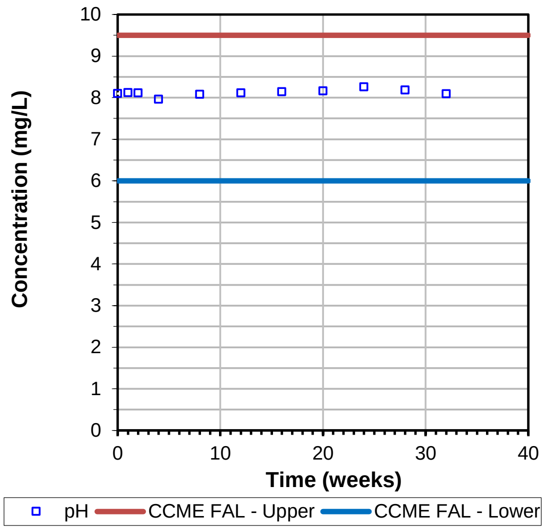
Parameters outside the CCME/MDMER guidelines are indicated in bold type.
Column top-ups with Li spiked DI water (5 mg/L) starting upon completion of the Week 8 sampling event

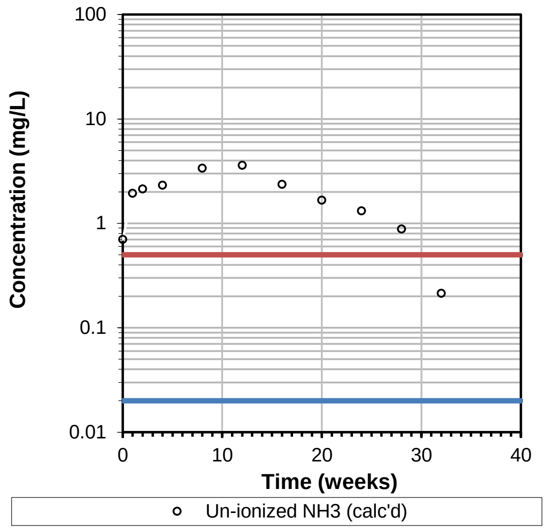
*Reassay LIMS 15135-AUG21

TEST REPORT

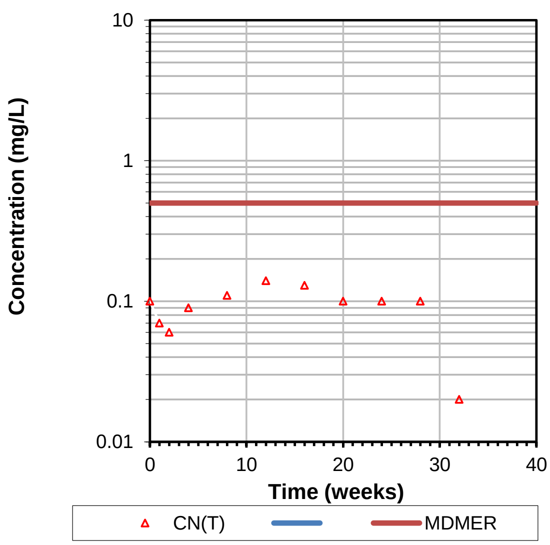
Sub-Aqueous Column

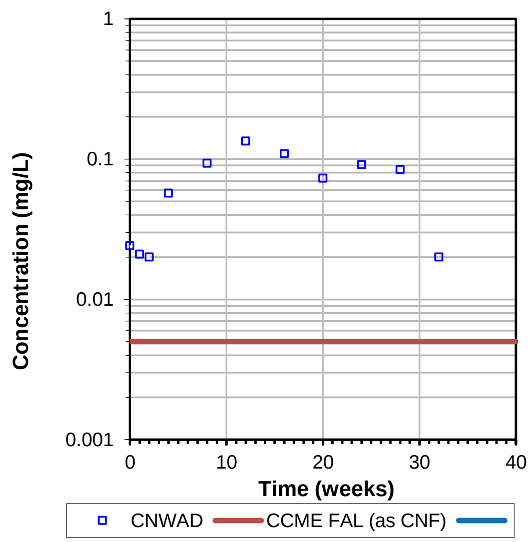
Selected Parameters - BL639-83D Detox Tls (Column 1)





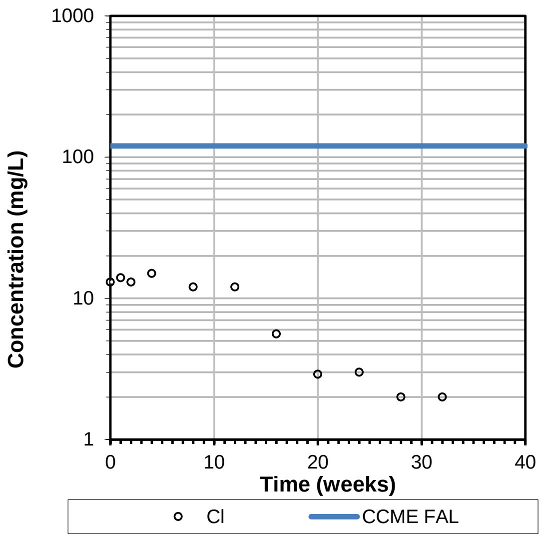
Selected Parameters - BL639-83D Detox Tls (Column 1)

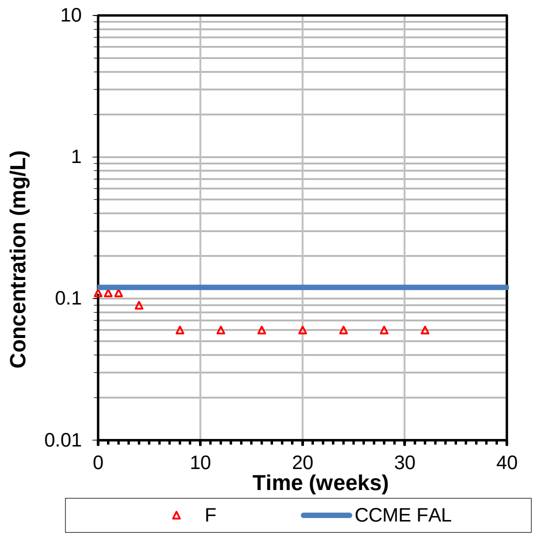




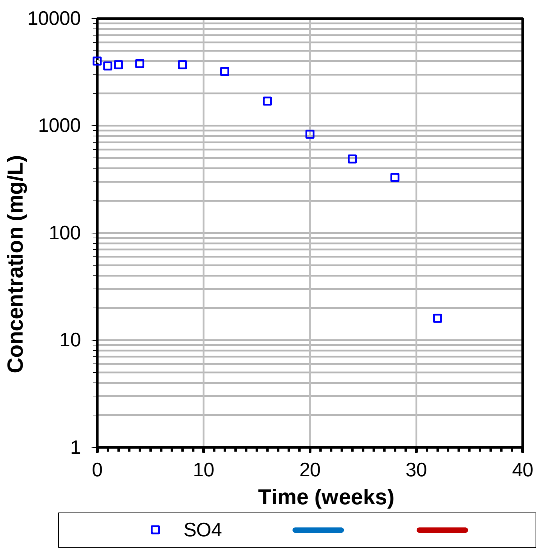
TEST REPORT
Sub-Aqueous Column

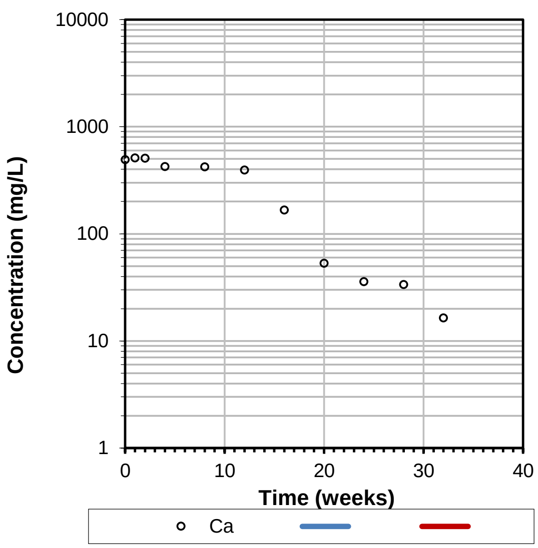
Selected Parameters - BL639-83D Detox Tls (Column 1)





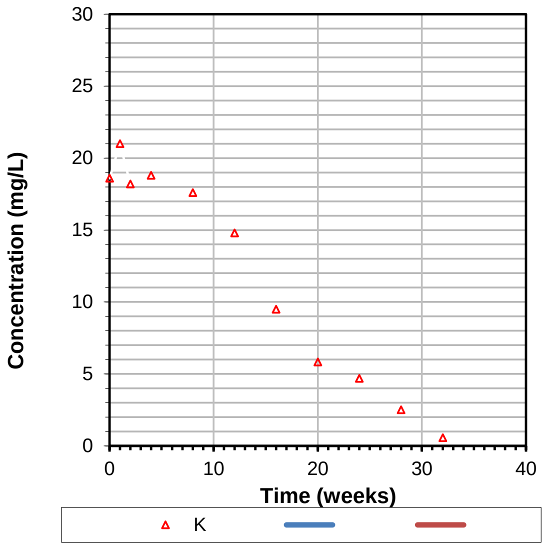
Selected Parameters - BL639-83D Detox Tls (Column 1)

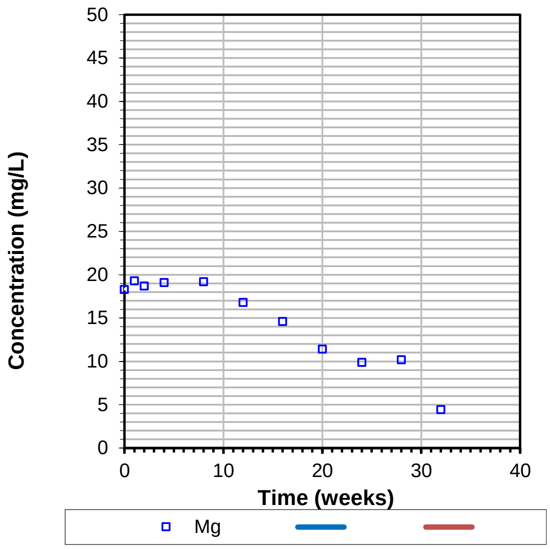




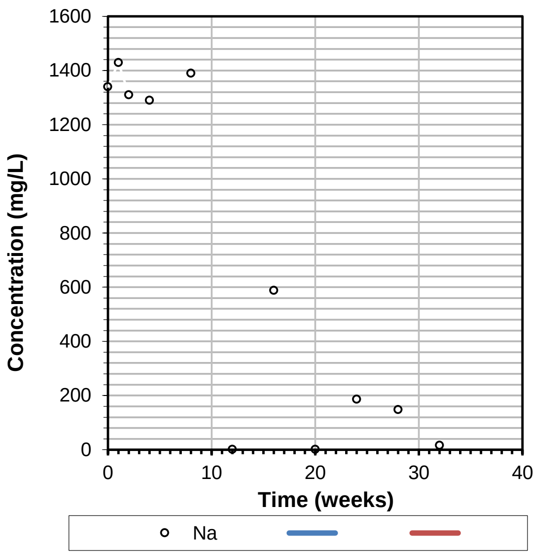
TEST REPORT
Sub-Aqueous Column

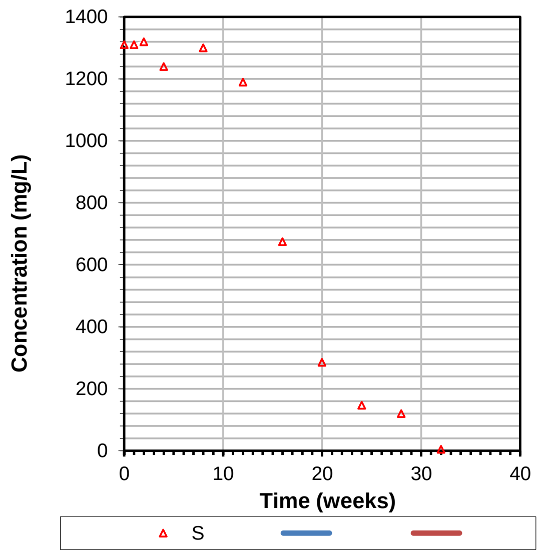
Selected Parameters - BL639-83D Detox Tls (Column 1)





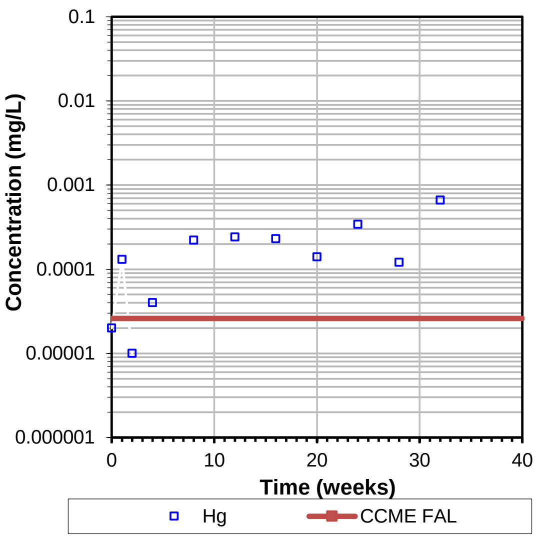
Selected Parameters - BL639-83D Detox Tls (Column 1)

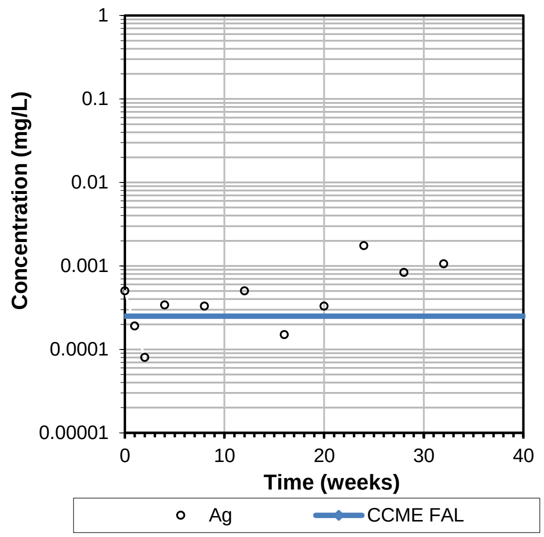




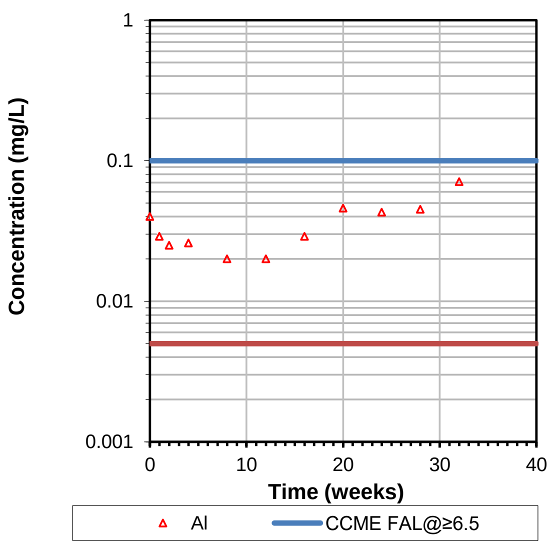
TEST REPORT
Sub-Aqueous Column

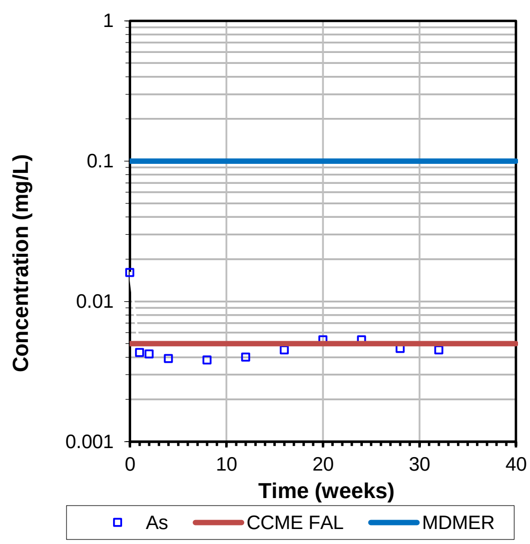
Selected Parameters - BL639-83D Detox Tls (Column 1)





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

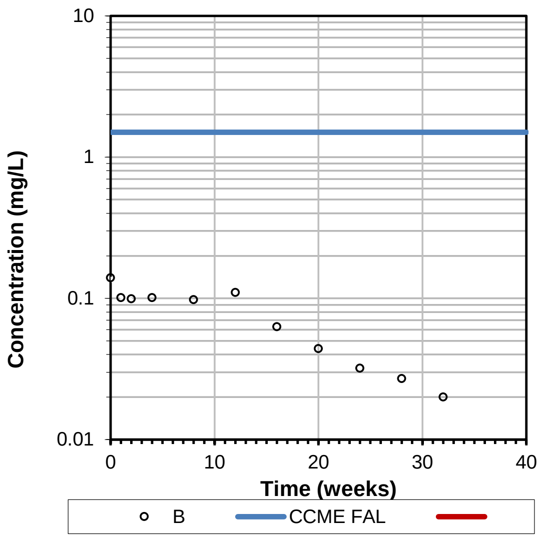


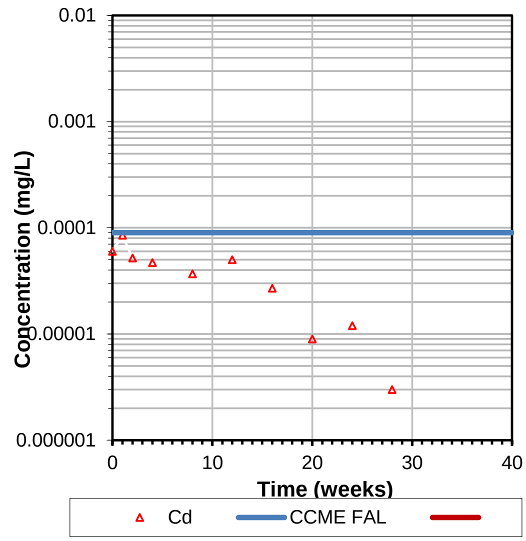


TEST REPORT

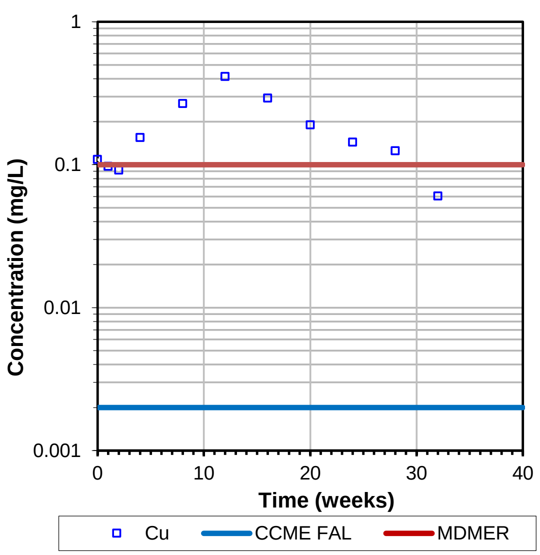
Sub-Aqueous Column

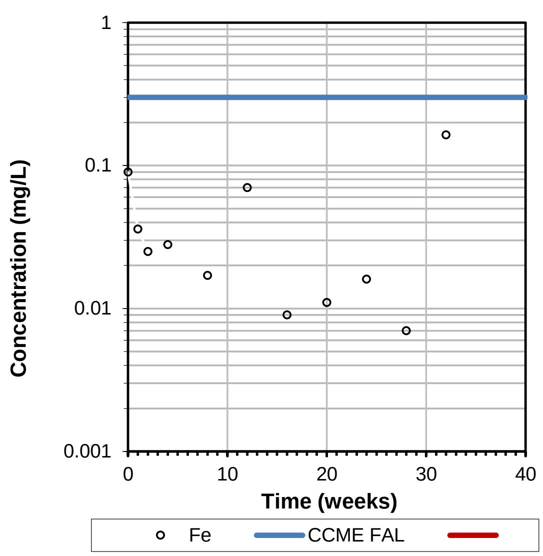
Selected Parameters - BL639-83D Detox Tls (Column 1)





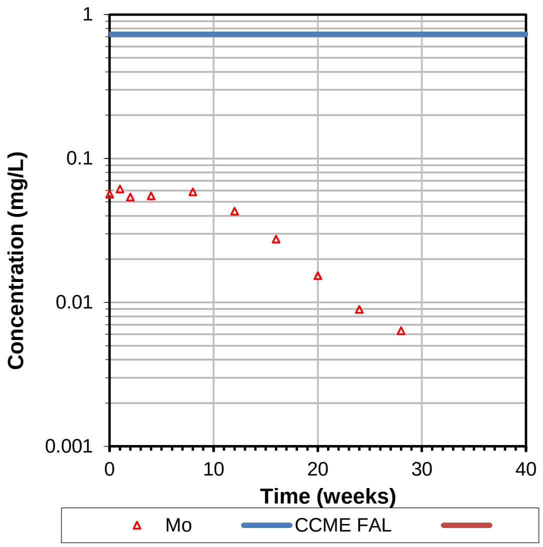
Selected Parameters - BL639-83D Detox Tls (Column 1)

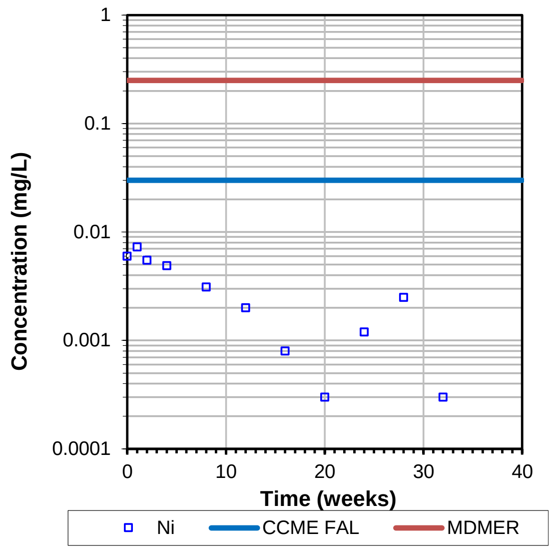




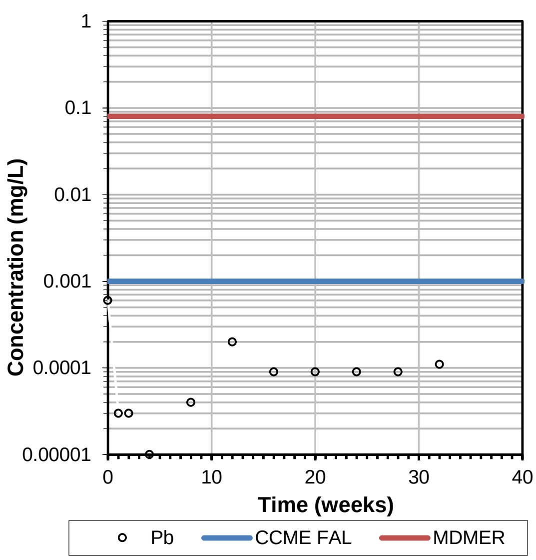
TEST REPORT
Sub-Aqueous Column

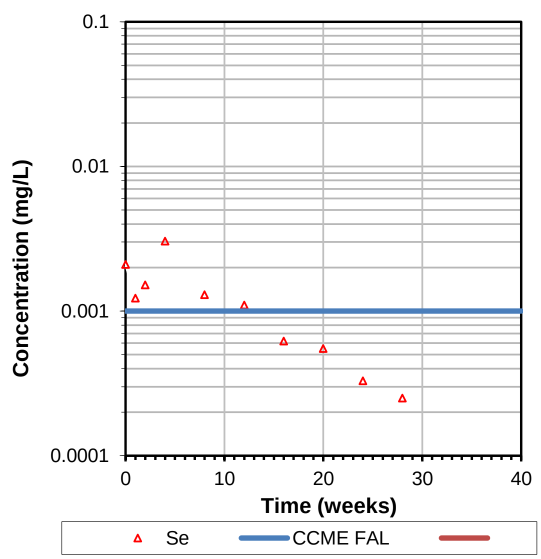
Selected Parameters - BL639-83D Detox Tls (Column 1)





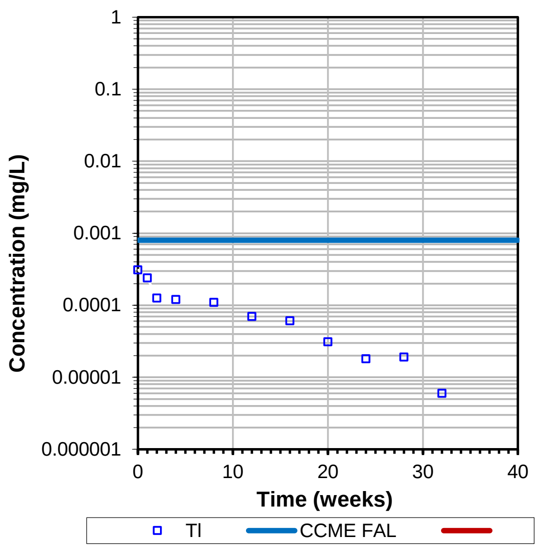
Selected Parameters - BL639-83D Detox Tls (Column 1)

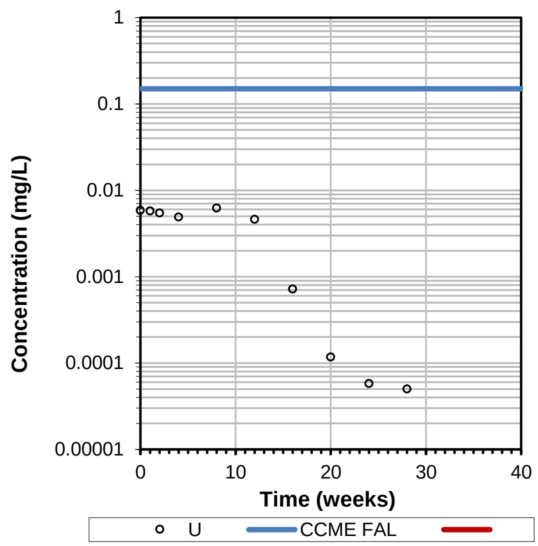




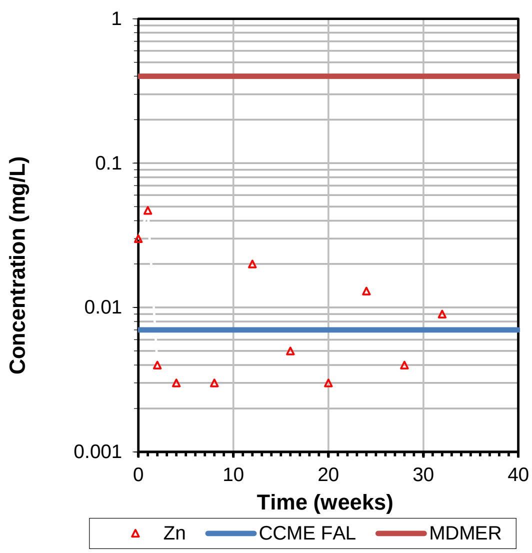
TEST REPORT
Sub-Aqueous Column

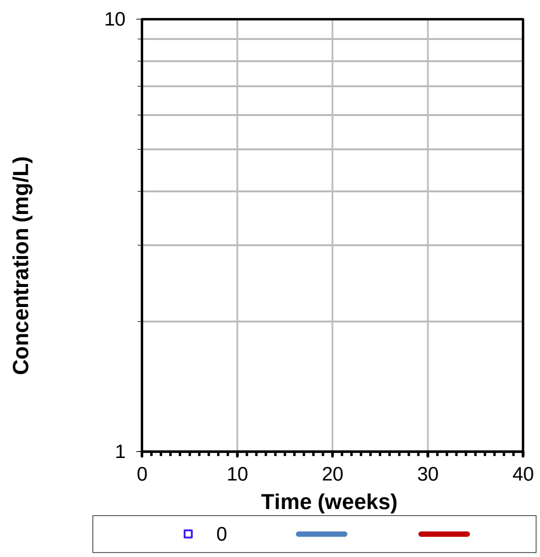
Selected Parameters - BL639-83D Detox Tls (Column 1)





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	-	-	< 0.000007	< 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.

Marathon Gold
Valentine Lake Project
SGS Reference No.: 16863-02

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	14530-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**

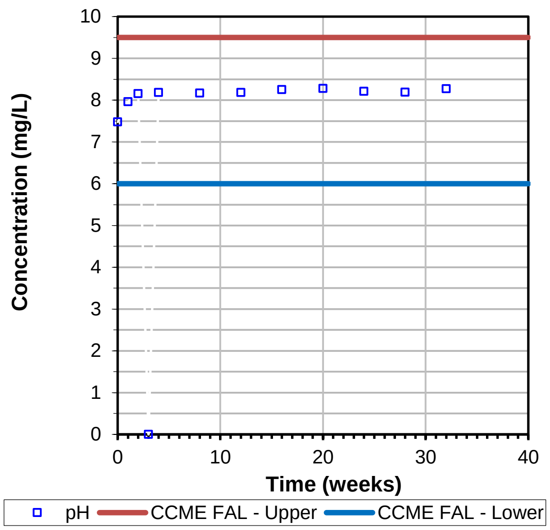
Parameters outside the CCME/MDMER guidelines are indicated in bold type.

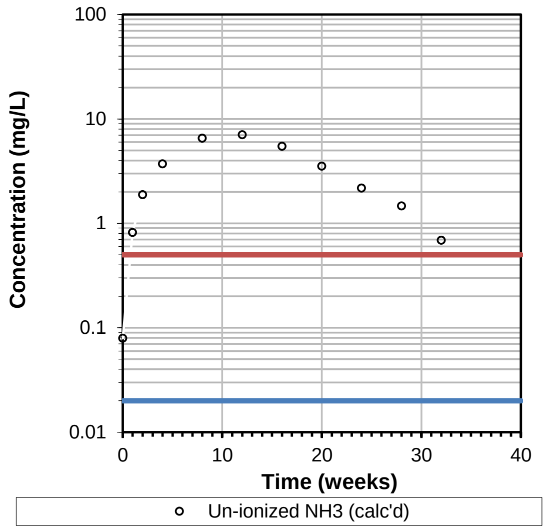
*Reassay LIMS 15136-AUG21

TEST REPORT

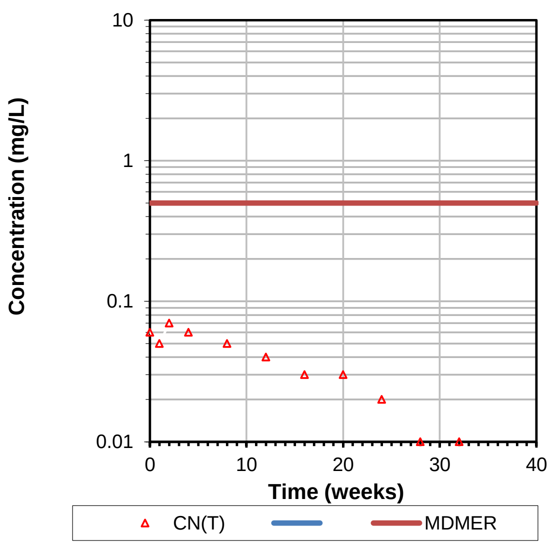
Sub-Aqueous Column

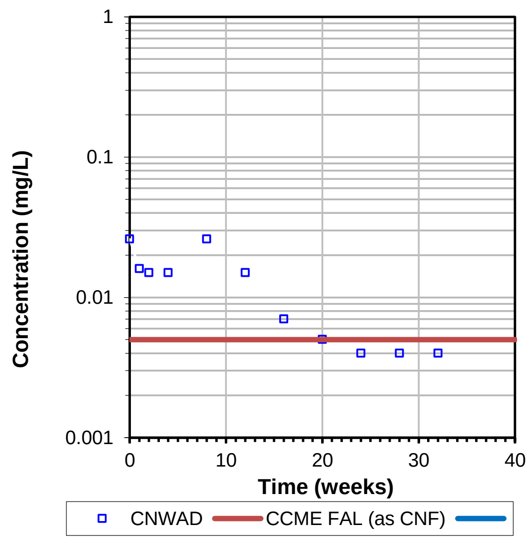
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





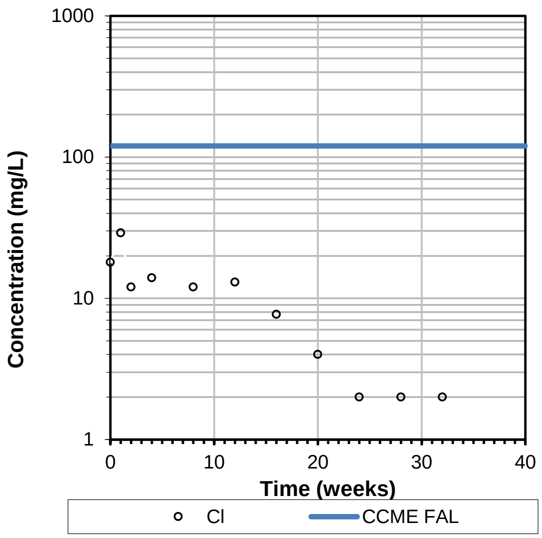
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

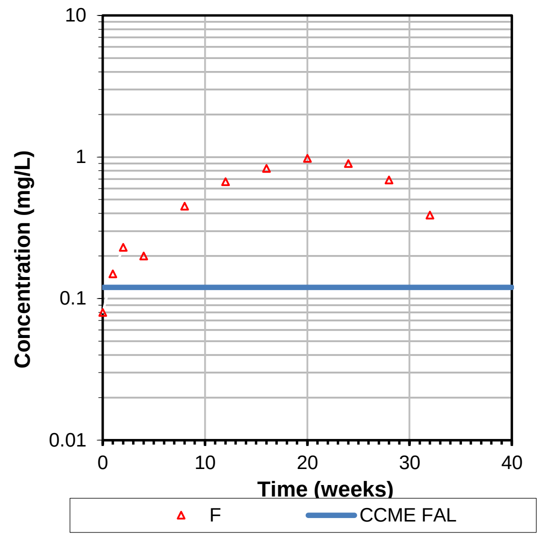




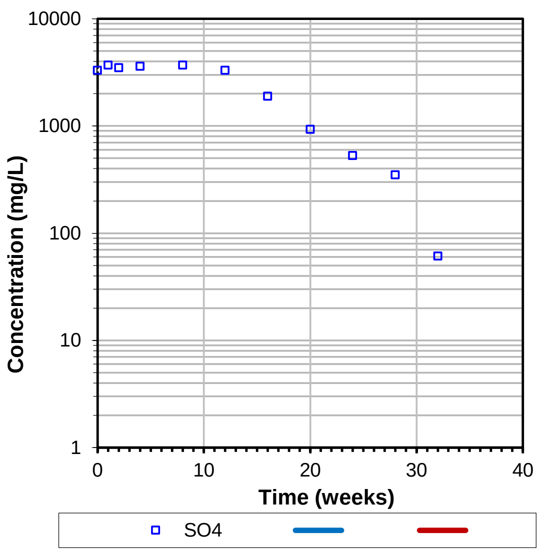
TEST REPORT
Sub-Aqueous Column

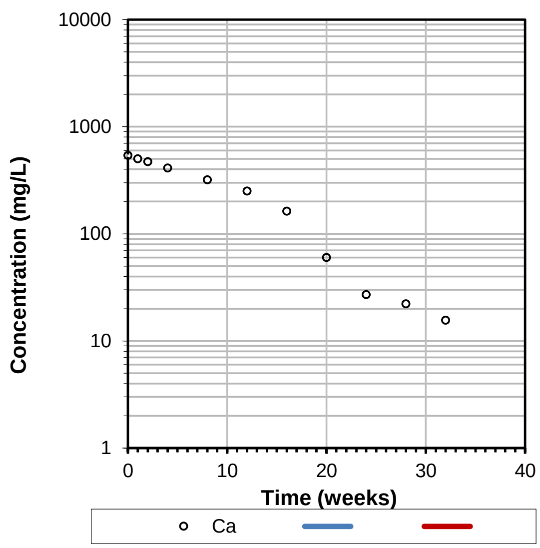
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





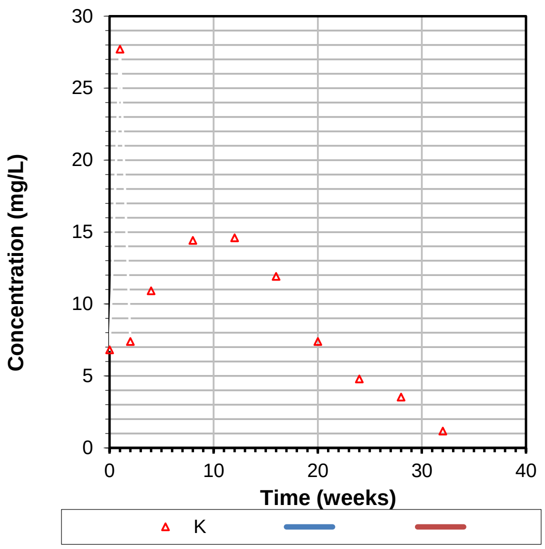
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

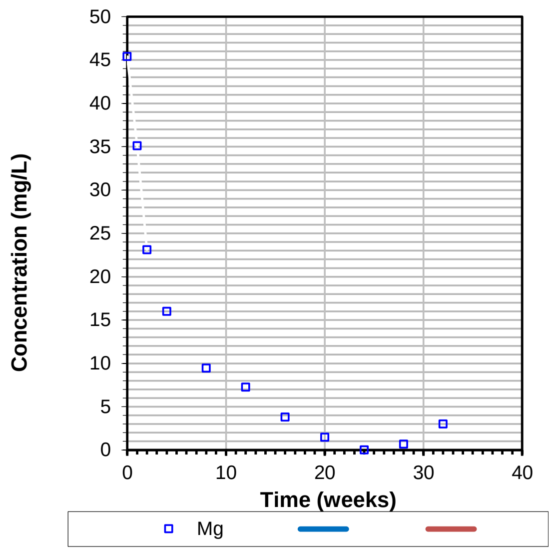




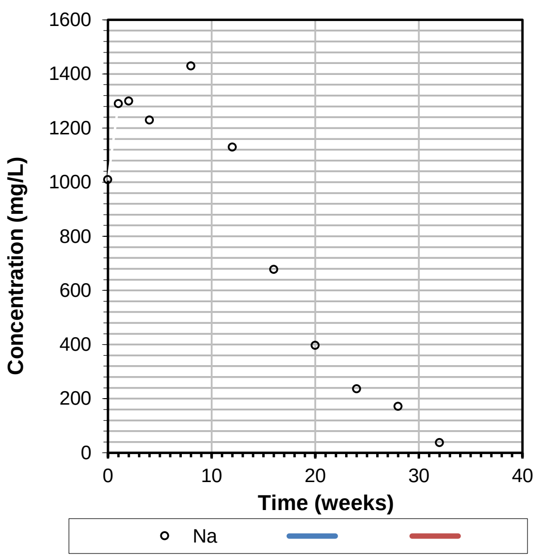
TEST REPORT
Sub-Aqueous Column

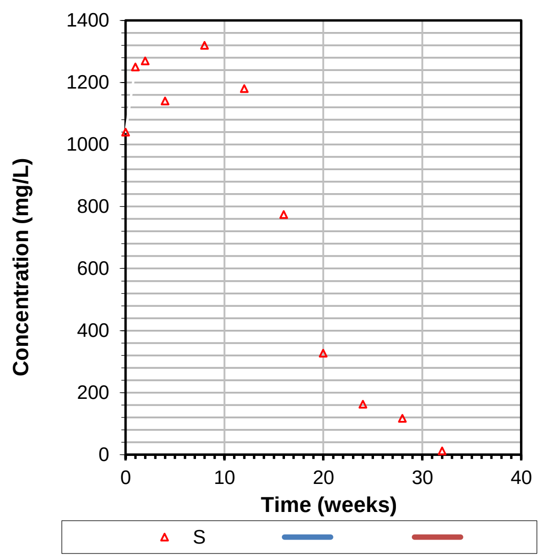
Selected Parameters - 19-TP-7 BS1+2 (Column 2)





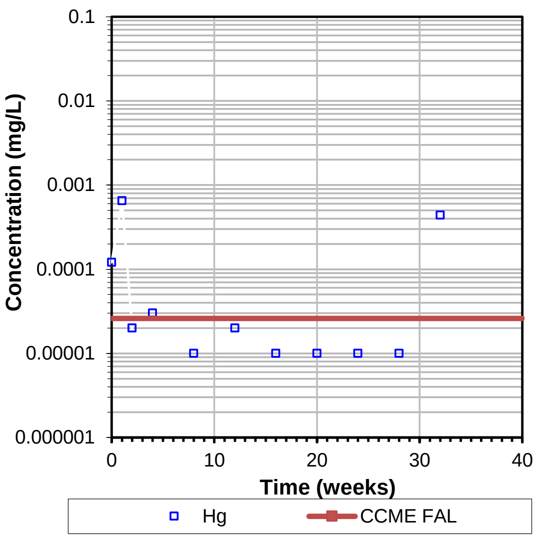
Selected Parameters - 19-TP-7 BS1+2 (Column 2)

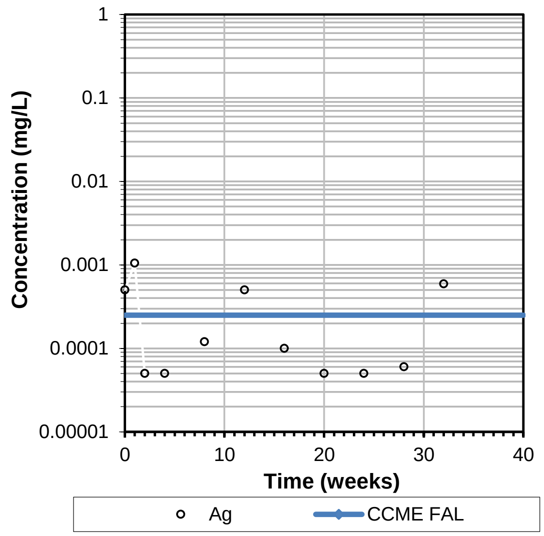




TEST REPORT
Sub-Aqueous Column

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





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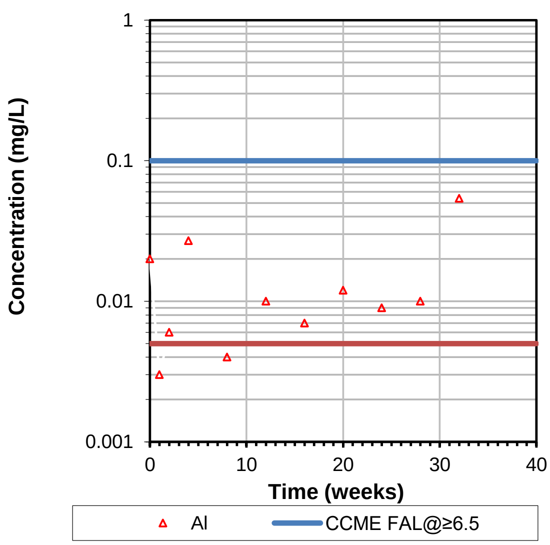
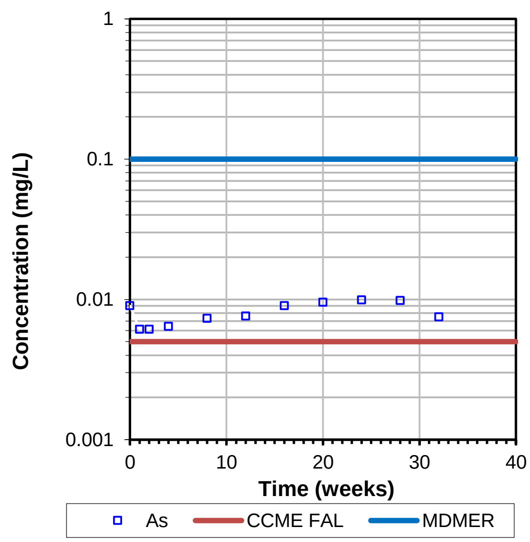
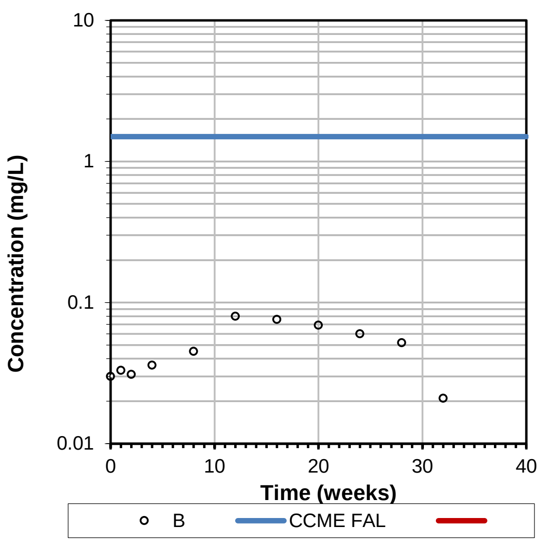
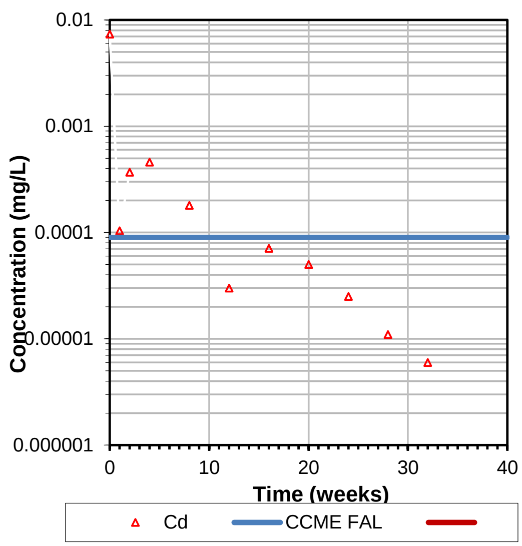




TEST REPORT
Sub-Aqueous Column

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





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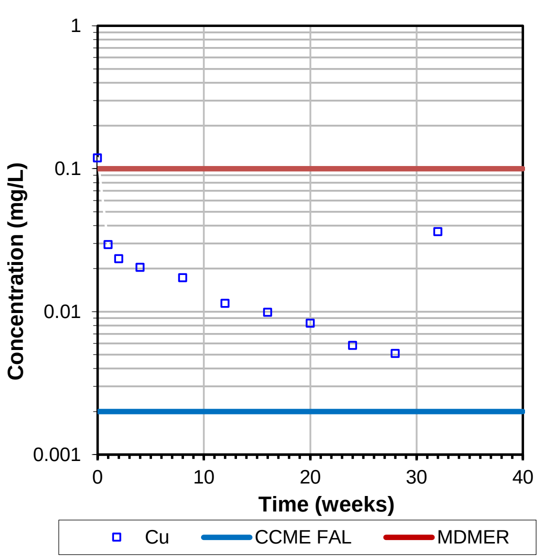
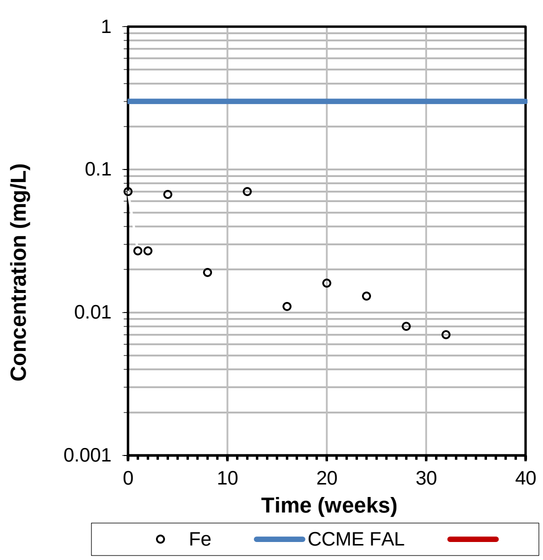
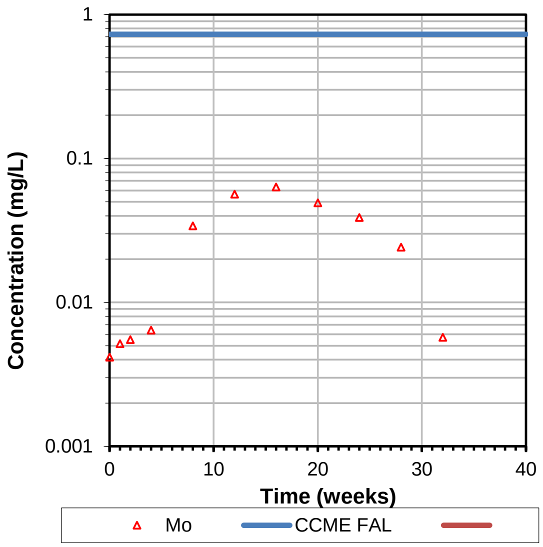
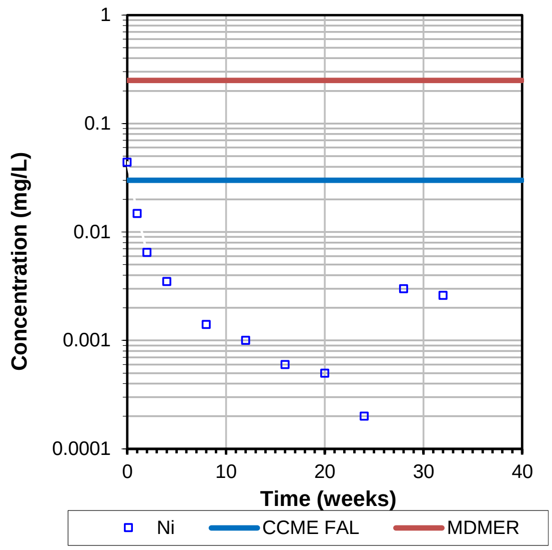




TEST REPORT
Sub-Aqueous Column

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





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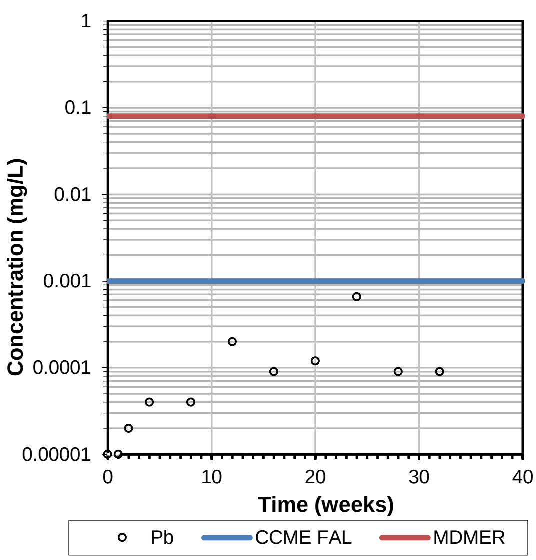
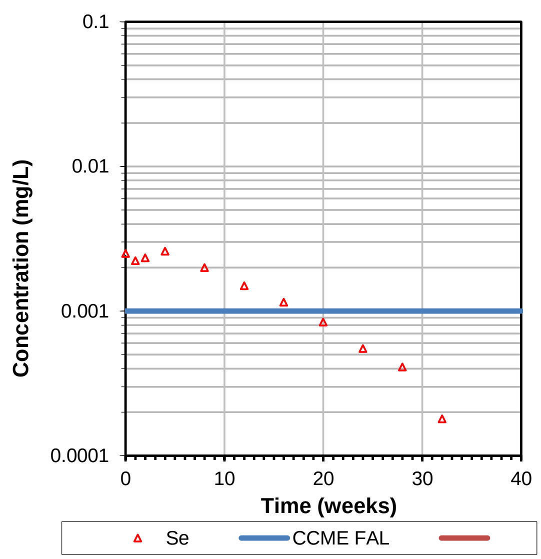
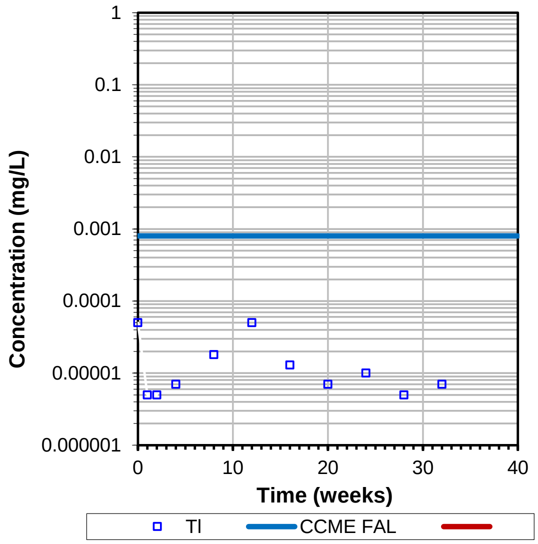
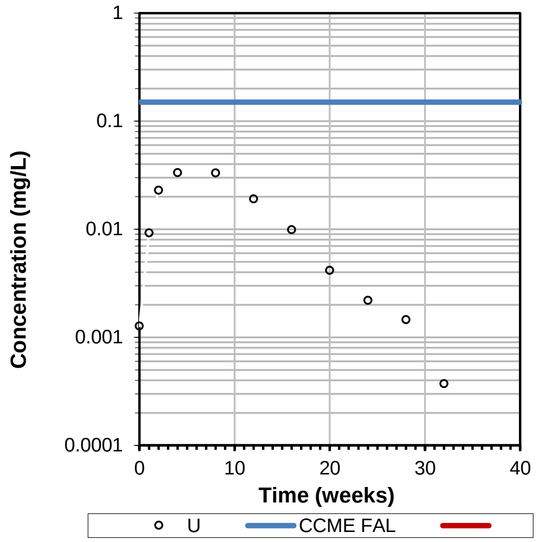




TEST REPORT
Sub-Aqueous Column

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





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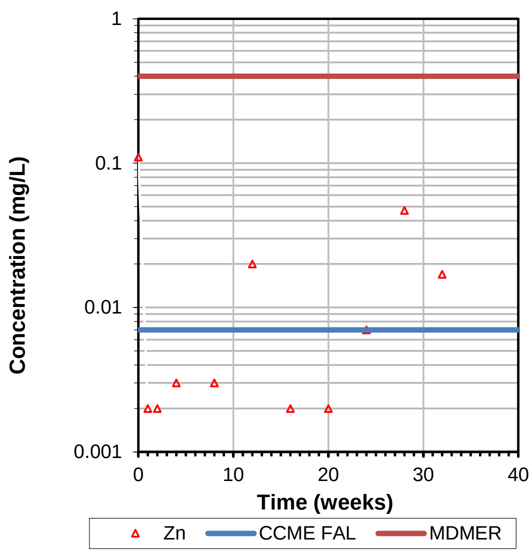

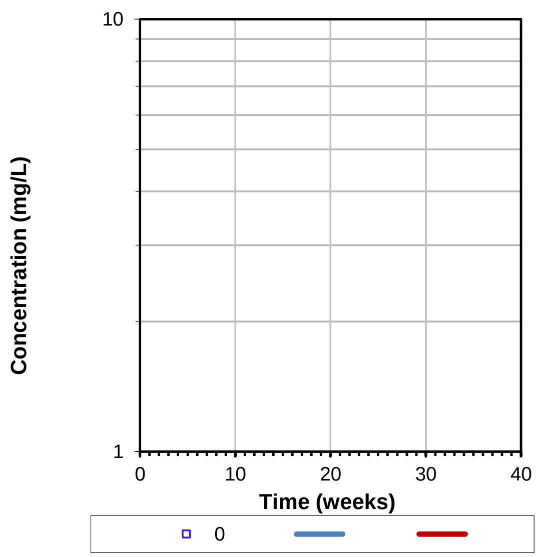

ATTACHMENT 3

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
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

OnLine LIMS

0002632445

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

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.
```

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OnLine LIMS

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08-September-2021

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Phone: 709-730-5046
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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 [µg/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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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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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

Catharine Arnold

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08-September-2021

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

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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
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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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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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

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0002632457

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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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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

Catharine Arnold

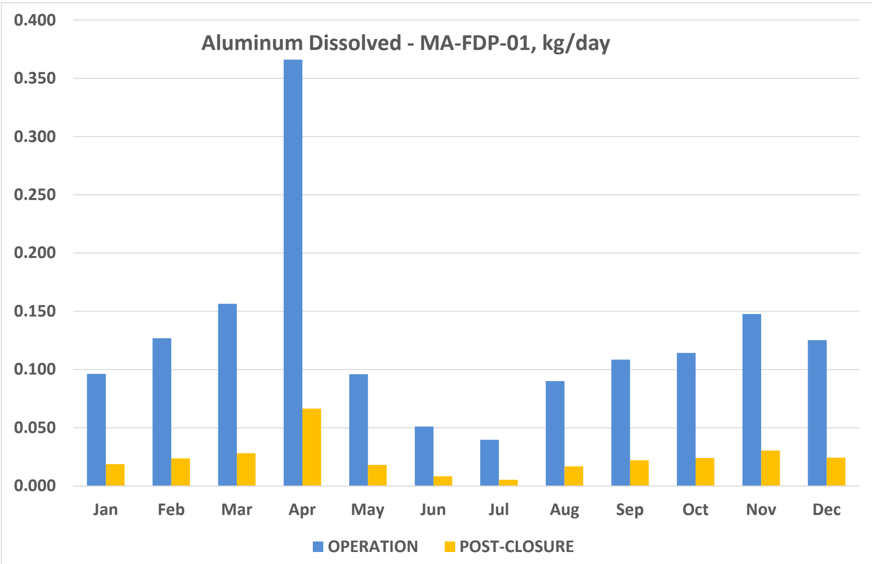
CHARTERED CATHARINE ARNOLD CHEMIST — ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO

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

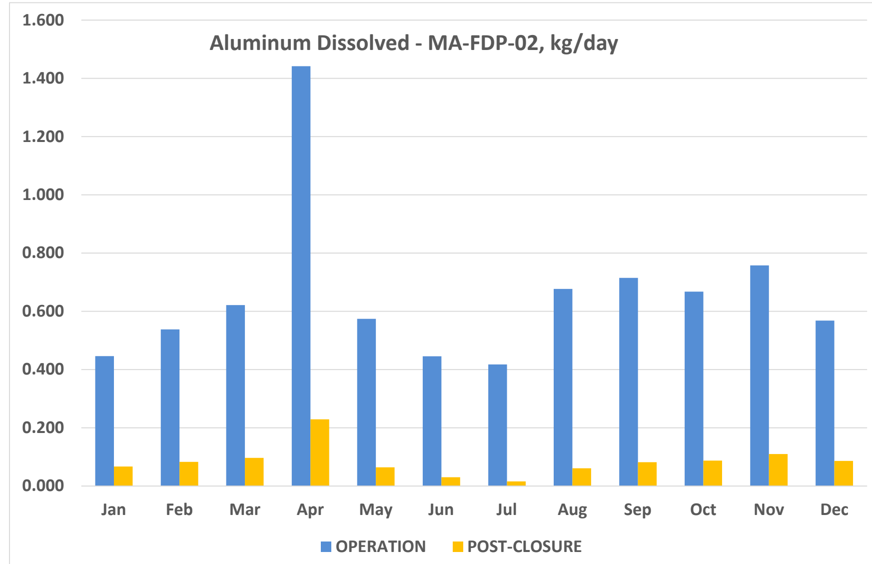
OnLine LIMS

0002632457

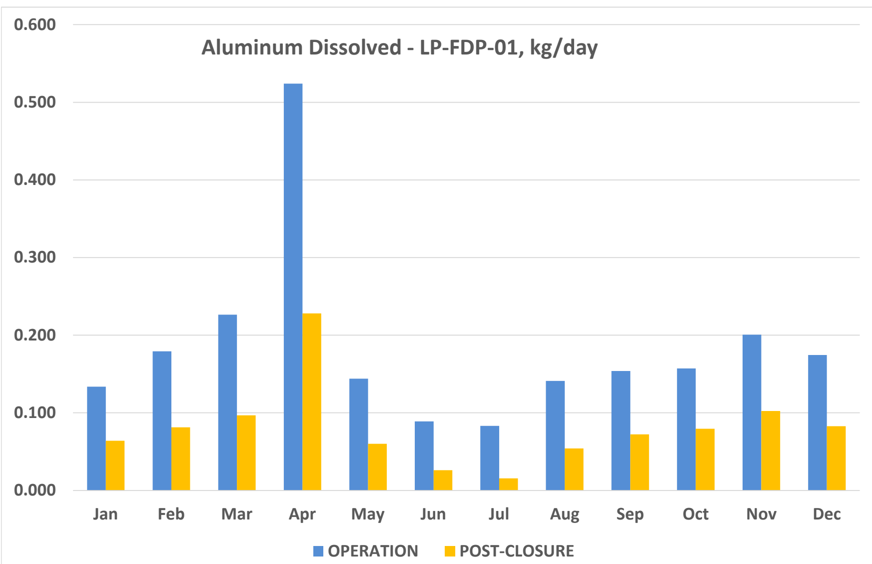
APPENDIX IR(2)-41.A DISSOLVED LOADING



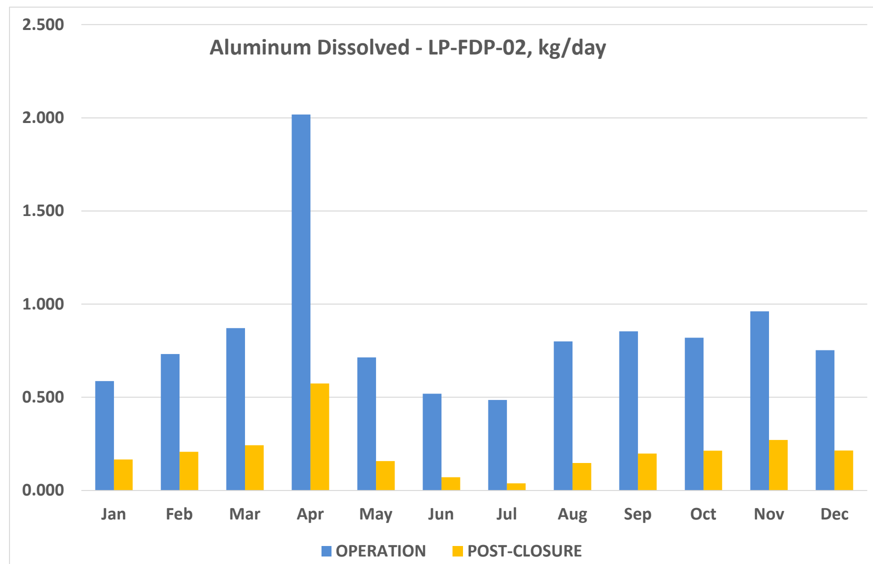
Aluminum Dissolved - MA-FDP-01, kg/day
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE



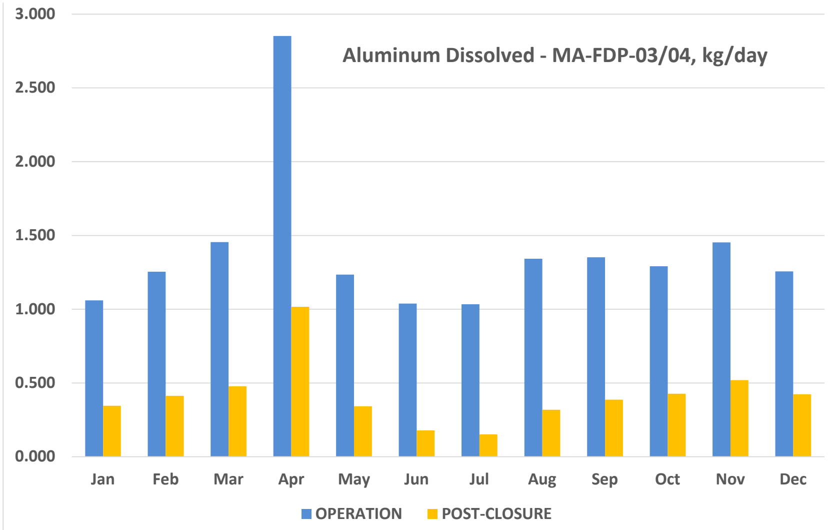
Aluminum Dissolved - MA-FDP-02, kg/day
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE

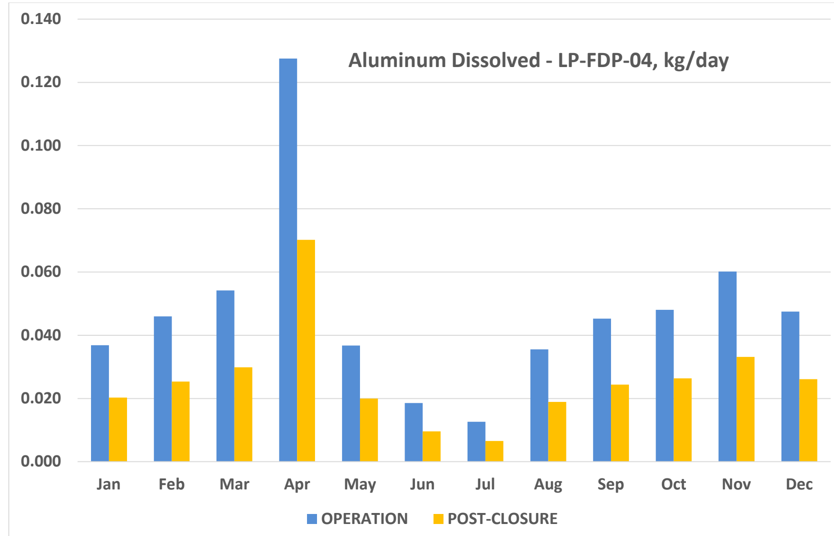


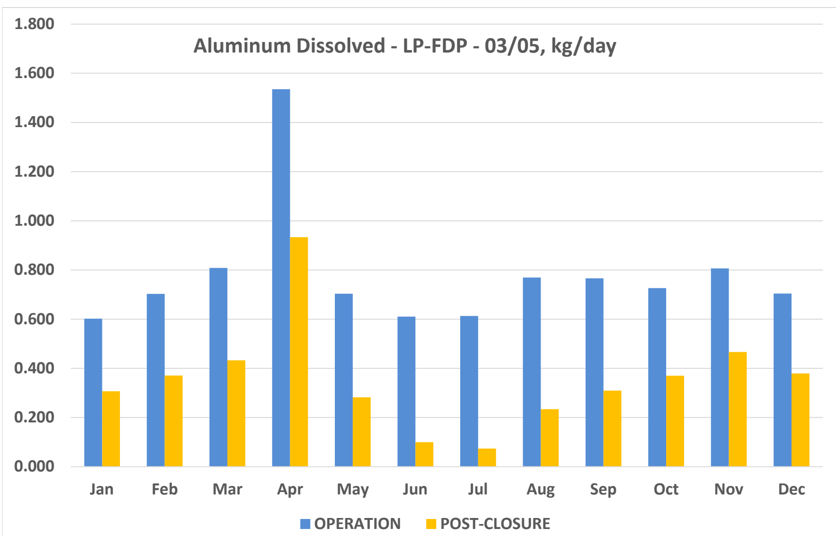
Aluminum Dissolved - LP-FDP-01, kg/day
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE

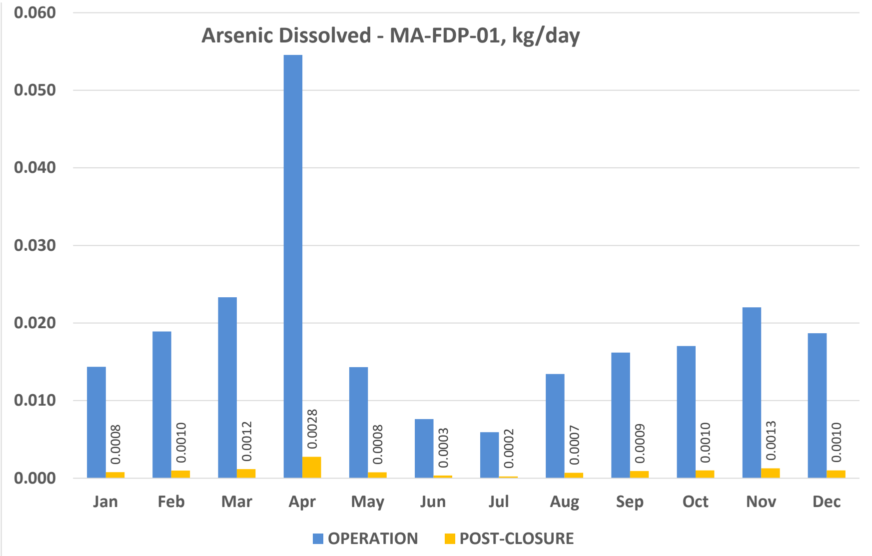


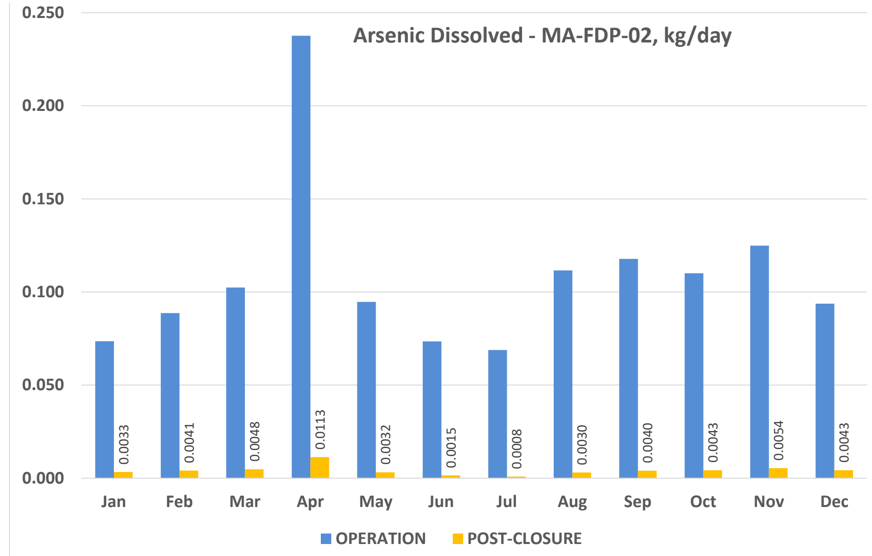
Aluminum Dissolved - LP-FDP-02, kg/day
2.500
2.000
1.500
1.000
0.500
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE

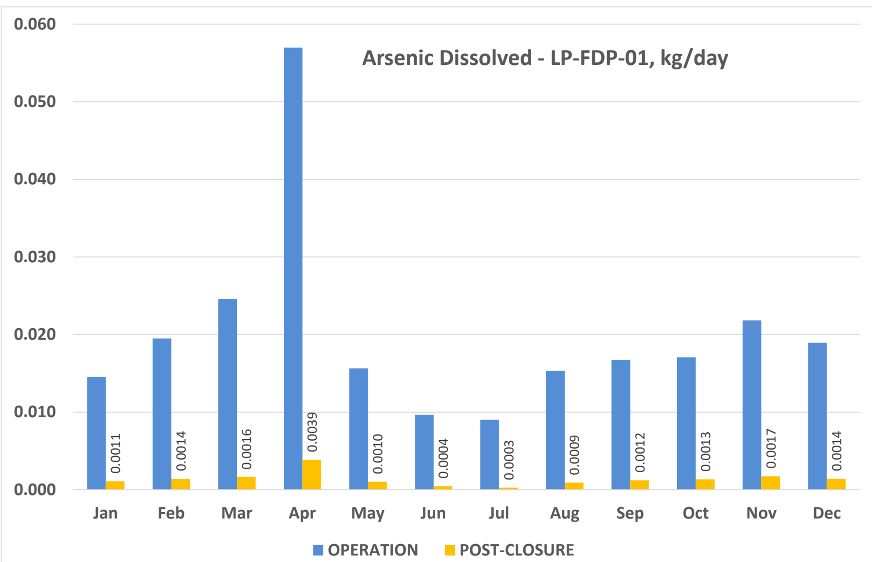

Aluminum Dissolved - MA-FDP-03/04, kg/day
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

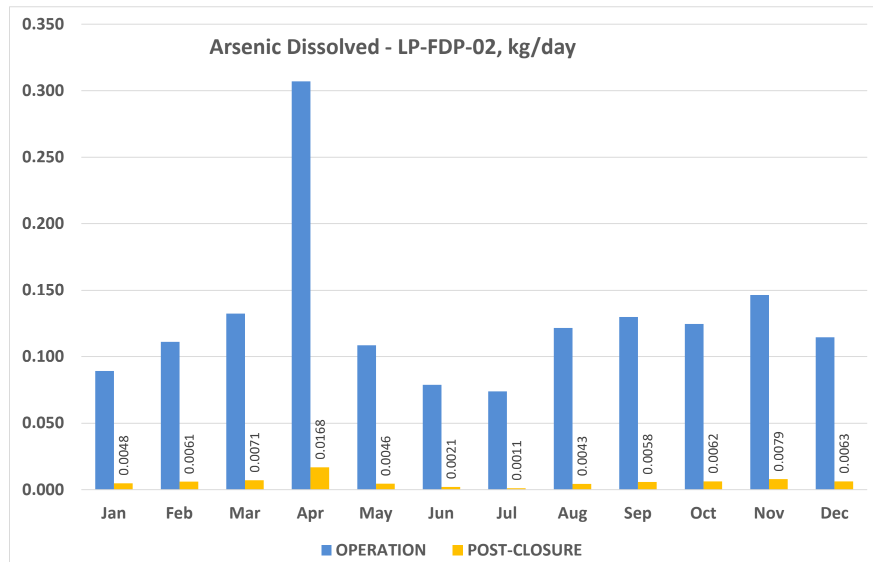

Aluminum Dissolved - LP-FDP-04, kg/day
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

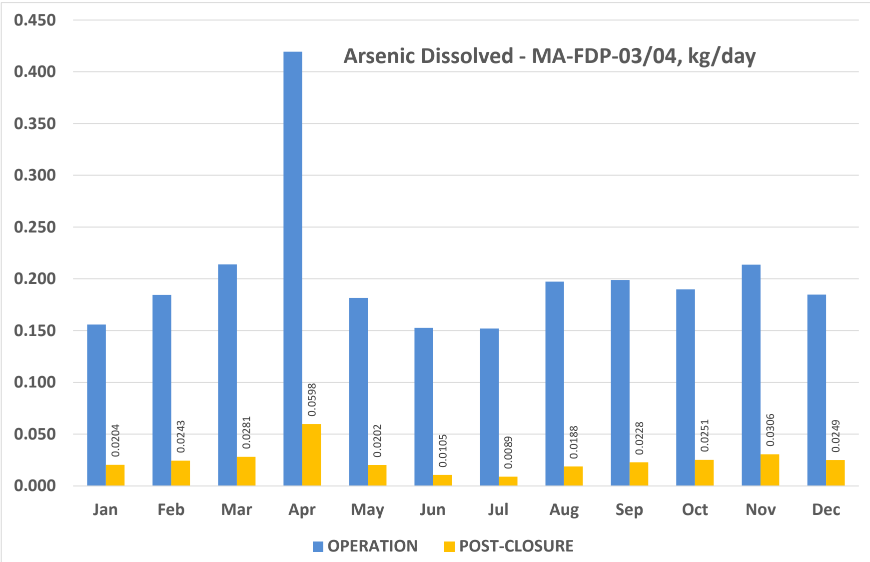

Aluminum Dissolved - LP-FDP - 03/05, kg/day
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Arsenic Dissolved - MA-FDP-01, kg/day
0.060
0.050
0.040
0.030
0.020
0.010
0.000
0.0008
0.0010
0.0012
0.0028
0.0008
0.0003
0.0002
0.0007
0.0009
0.0010
0.0013
0.0010
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Arsenic Dissolved - MA-FDP-02, kg/day
0.250
0.200
0.150
0.100
0.050
0.000
0.0033
0.0041
0.0048
0.0113
0.0032
0.0015
0.0008
0.0030
0.0040
0.0043
0.0054
0.0043
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Arsenic Dissolved - LP-FDP-01, kg/day
0.060
0.050
0.040
0.030
0.020
0.010
0.000
0.0011
0.0014
0.0016
0.0039
0.0010
0.0004
0.0003
0.0009
0.0012
0.0013
0.0017
0.0014
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Arsenic Dissolved - LP-FDP-02, kg/day
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0.0048
0.0061
0.0071
0.0168
0.0046
0.0021
0.0011
0.0043
0.0058
0.0062
0.0079
0.0063
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Arsenic Dissolved - MA-FDP-03/04, kg/day
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0.0204
0.0243
0.0281
0.0598
0.0202
0.0105
0.0089
0.0188
0.0228
0.0251
0.0306
0.0249
Jan
Feb
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May
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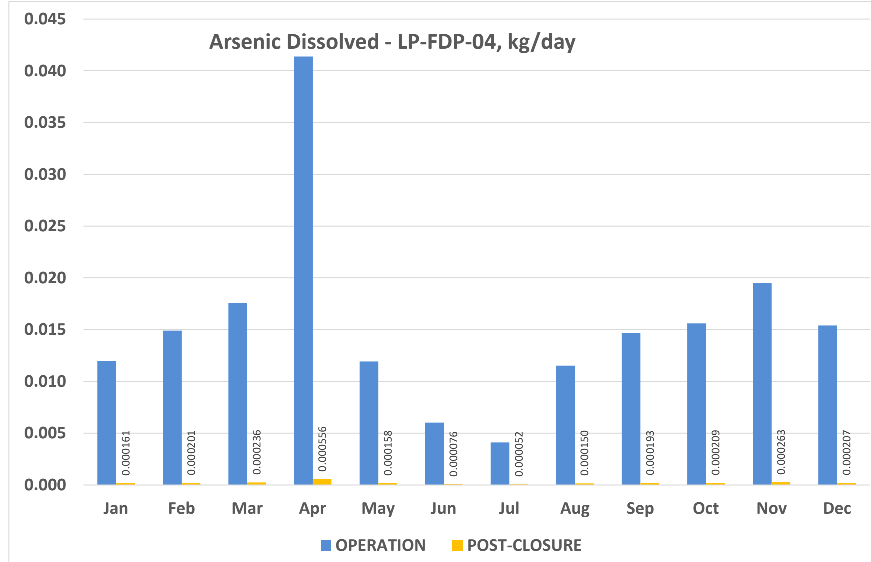
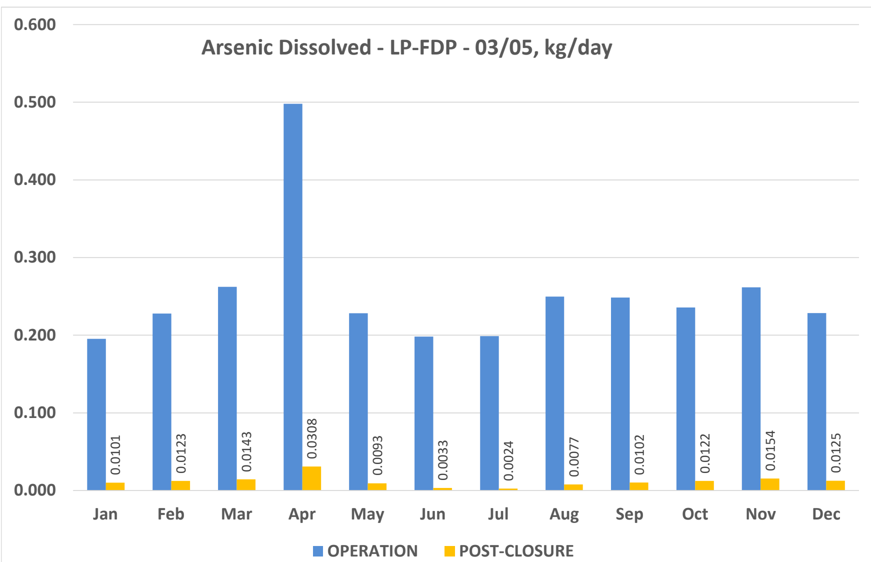
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Arsenic Dissolved - LP-FDP-04, kg/day
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.000161
0.000201
0.000236
0.000556
0.000158
0.000076
0.000052
0.000150
0.000193
0.000209
0.000263
0.000207
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Arsenic Dissolved - LP-FDP - 03/05, kg/day
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0.0101
0.0123
0.0143
0.0308
0.0093
0.0033
0.0024
0.0077
0.0102
0.0122
0.0154
0.0125
Jan
Feb
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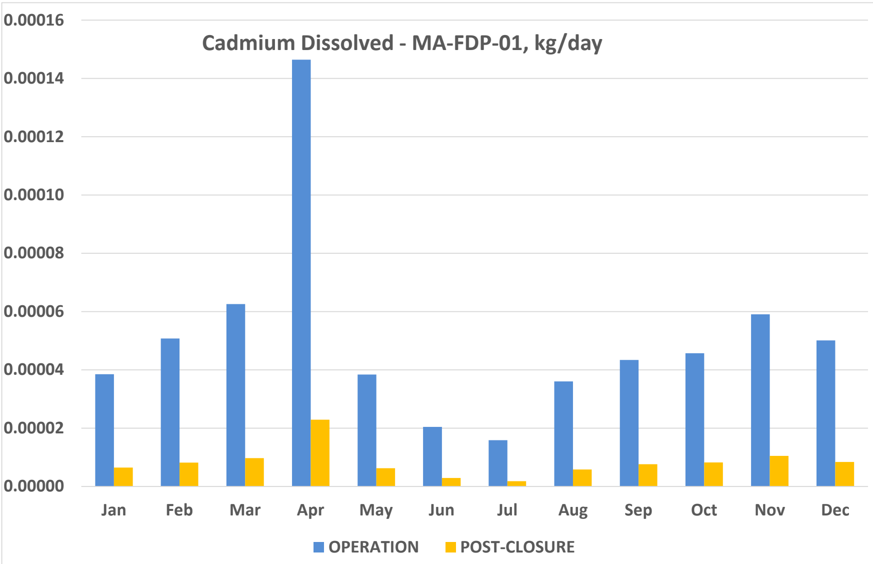
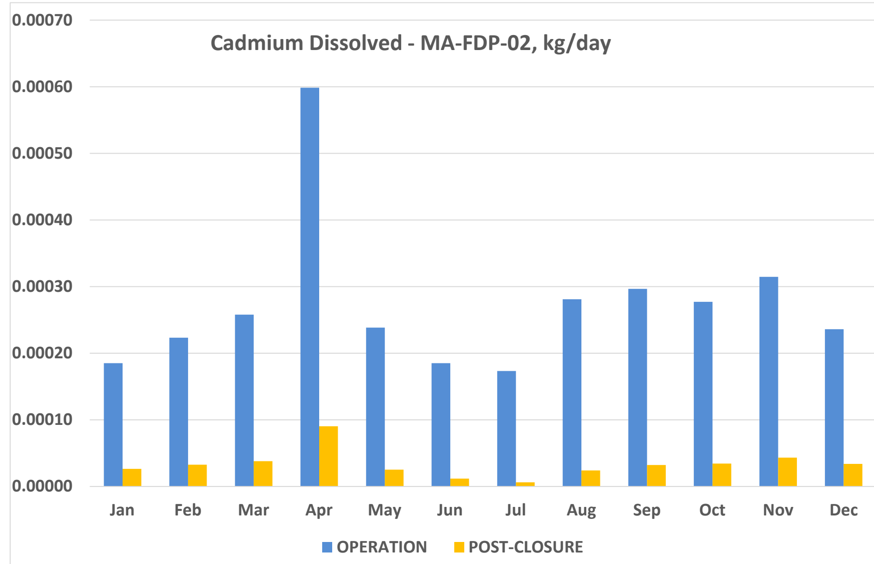
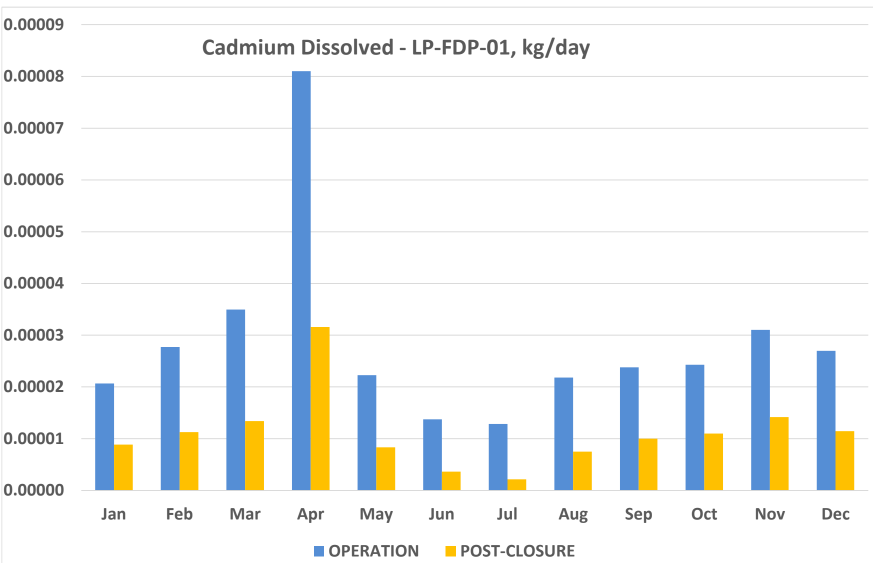
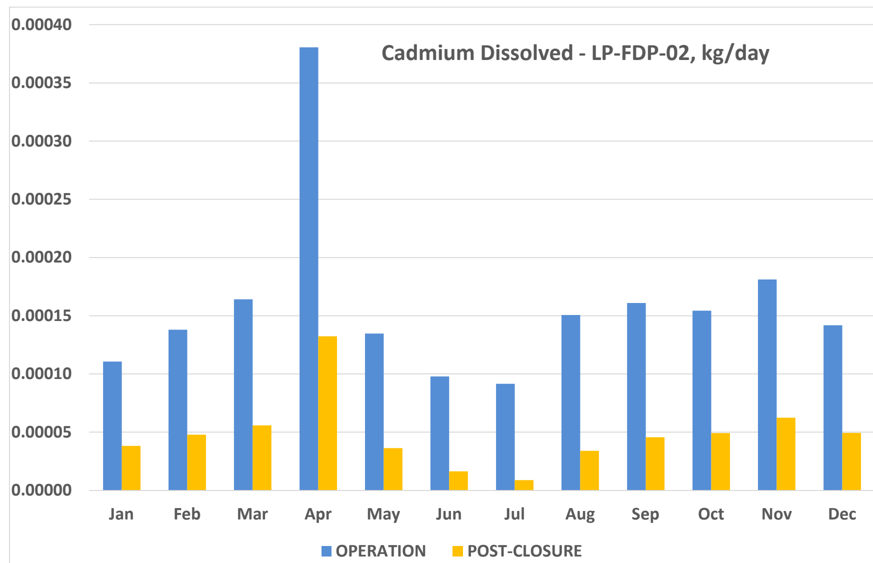
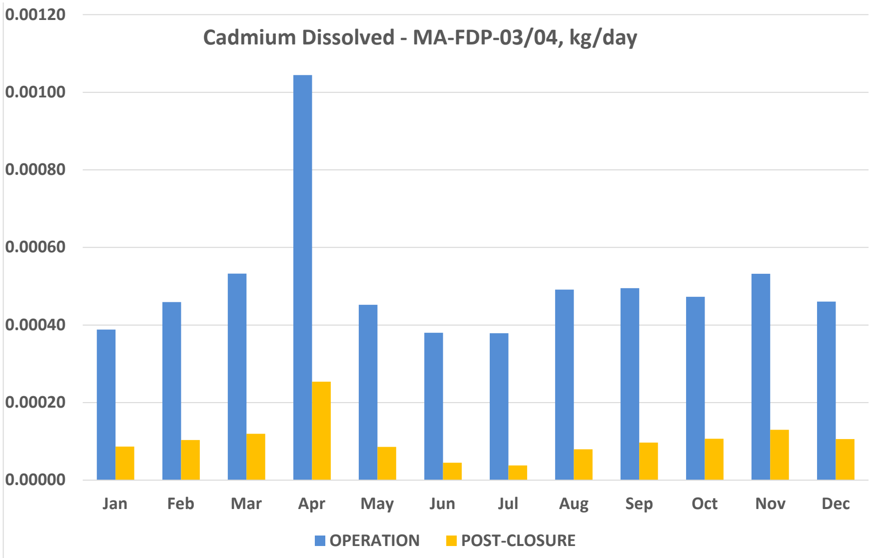
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

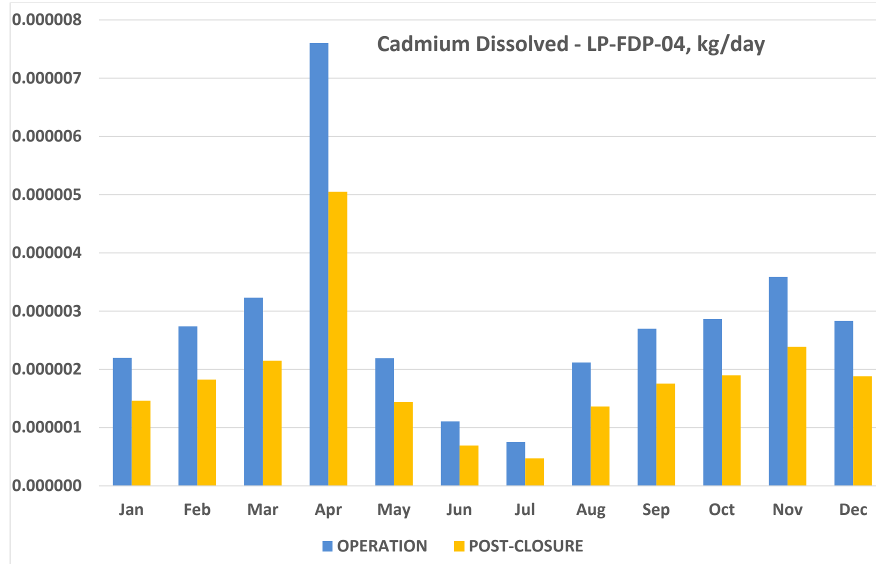

Cadmium Dissolved - MA-FDP-01, kg/day
0.00016
0.00014
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

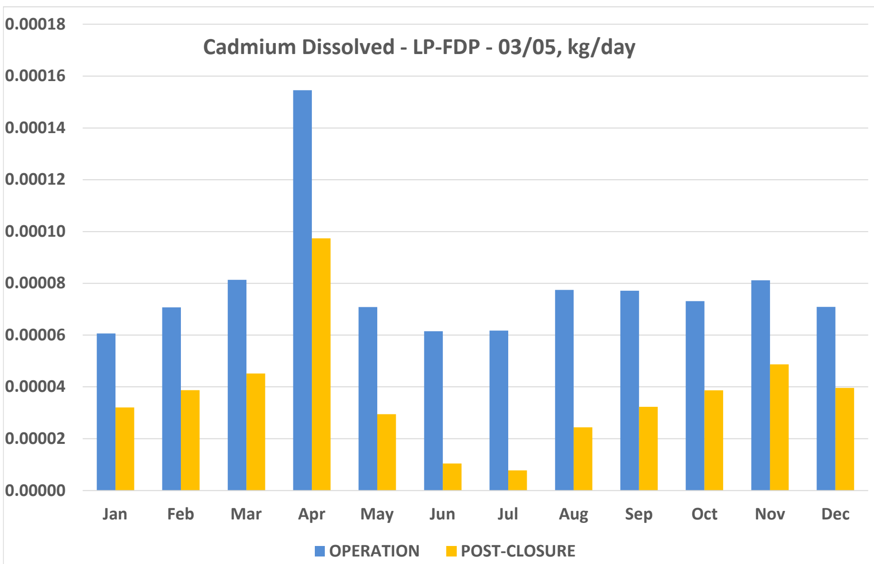

Cadmium Dissolved - MA-FDP-02, kg/day
0.00070
0.00060
0.00050
0.00040
0.00030
0.00020
0.00010
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

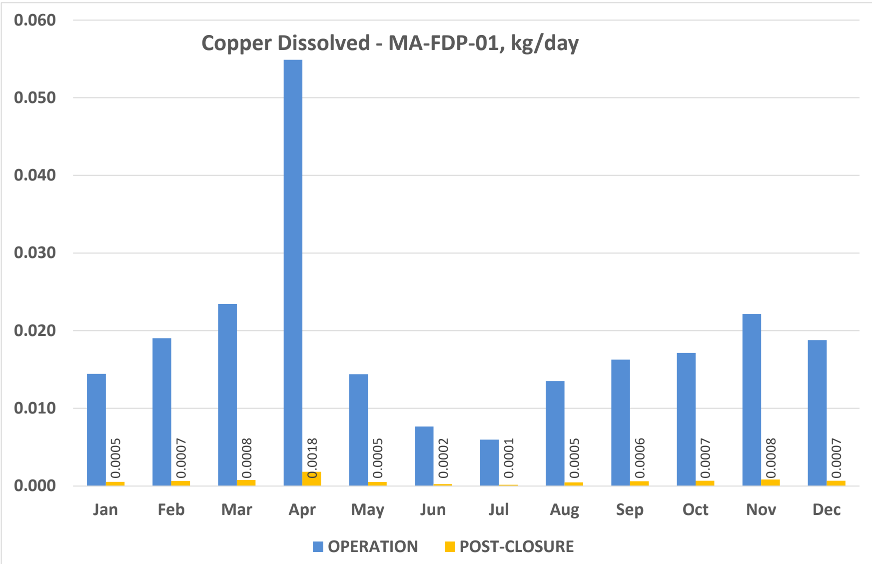

Cadmium Dissolved - LP-FDP-01, kg/day
0.00009
0.00008
0.00007
0.00006
0.00005
0.00004
0.00003
0.00002
0.00001
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Cadmium Dissolved - LP-FDP-02, kg/day
0.00040
0.00035
0.00030
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Cadmium Dissolved - MA-FDP-03/04, kg/day
0.00120
0.00100
0.00080
0.00060
0.00040
0.00020
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Cadmium Dissolved - LP-FDP-04, kg/day
0.000008
0.000007
0.000006
0.000005
0.000004
0.000003
0.000002
0.000001
0.000000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Cadmium Dissolved - LP-FDP - 03/05, kg/day
0.00018
0.00016
0.00014
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Copper Dissolved - MA-FDP-01, kg/day
0.060
0.050
0.040
0.030
0.020
0.010
0.000
0.0005
0.0007
0.0008
0.0018
0.0005
0.0002
0.0001
0.0005
0.0006
0.0007
0.0008
0.0007
Jan
Feb
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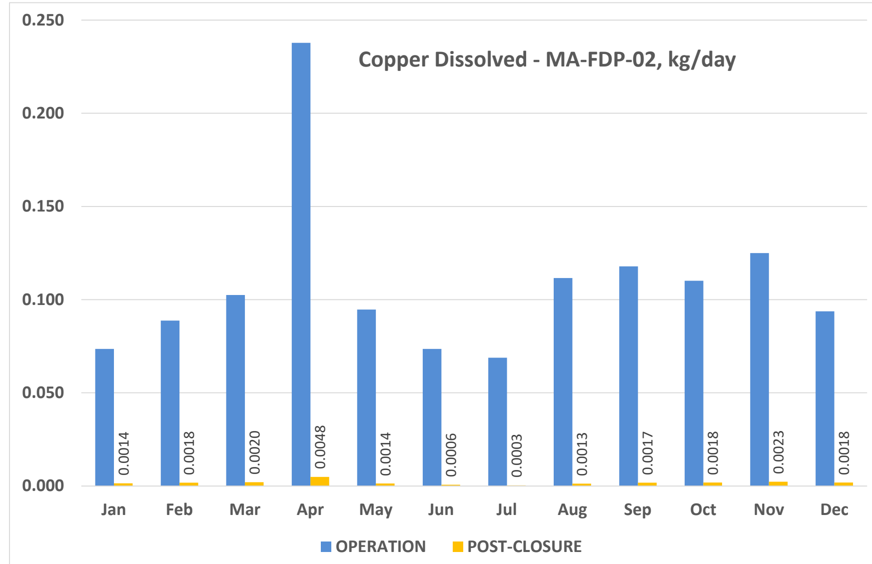
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Copper Dissolved - MA-FDP-02, kg/day
0.250
0.200
0.150
0.100
0.050
0.000
0.0014
0.0018
0.0020
0.0048
0.0014
0.0006
0.0003
0.0013
0.0017
0.0018
0.0023
0.0018
Jan
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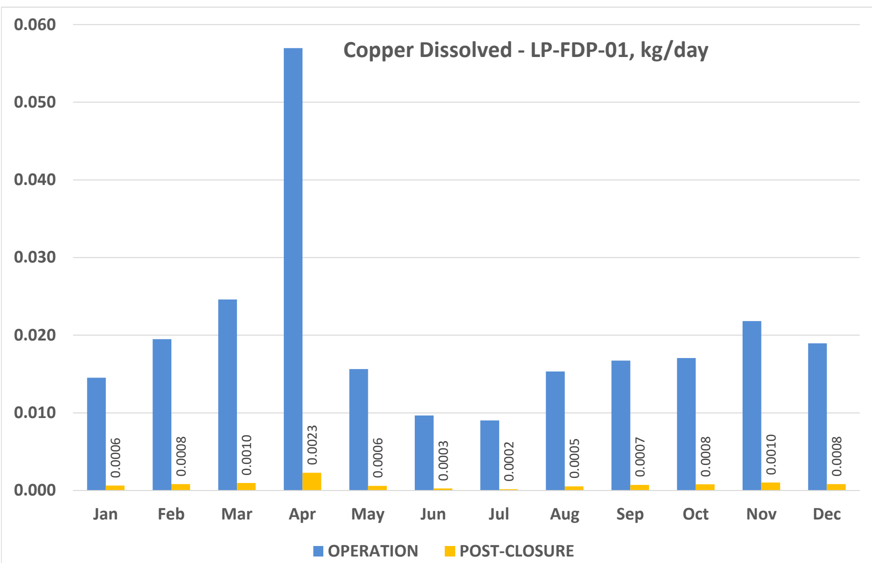
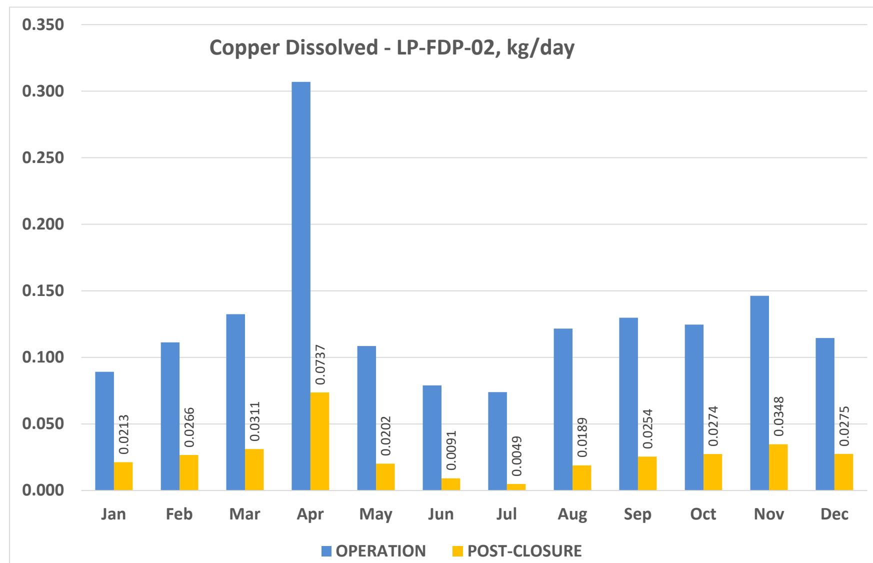
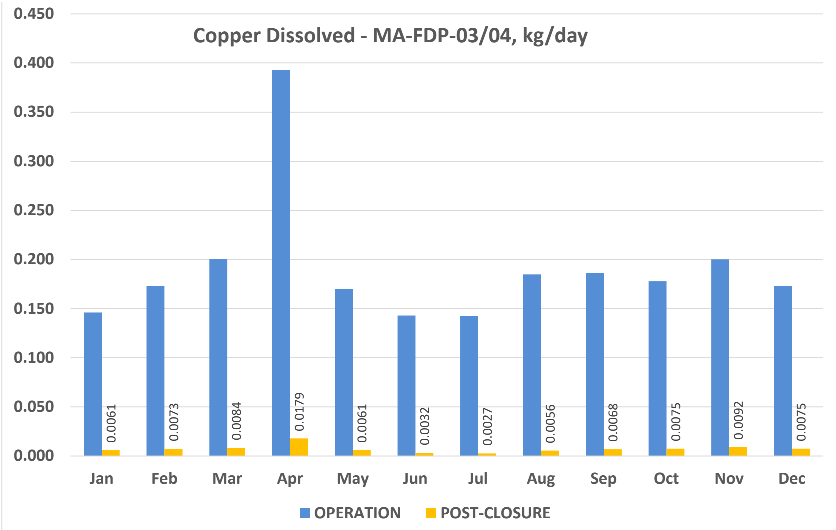
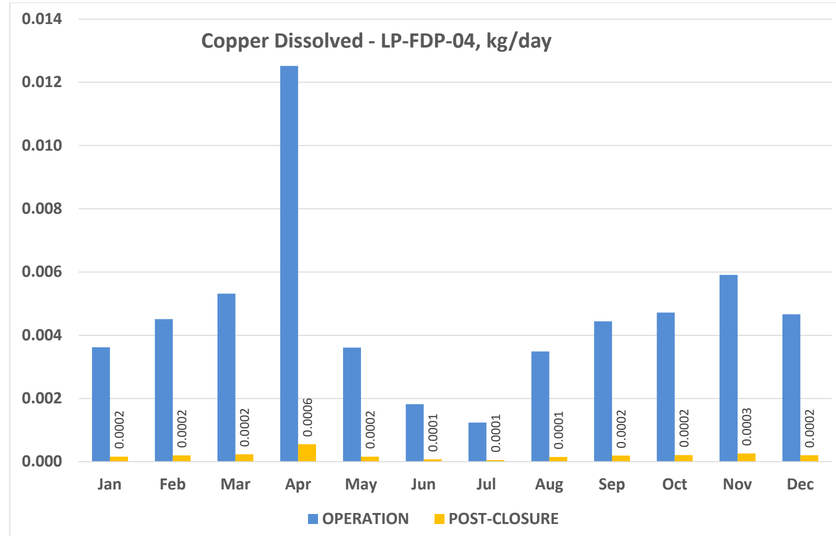
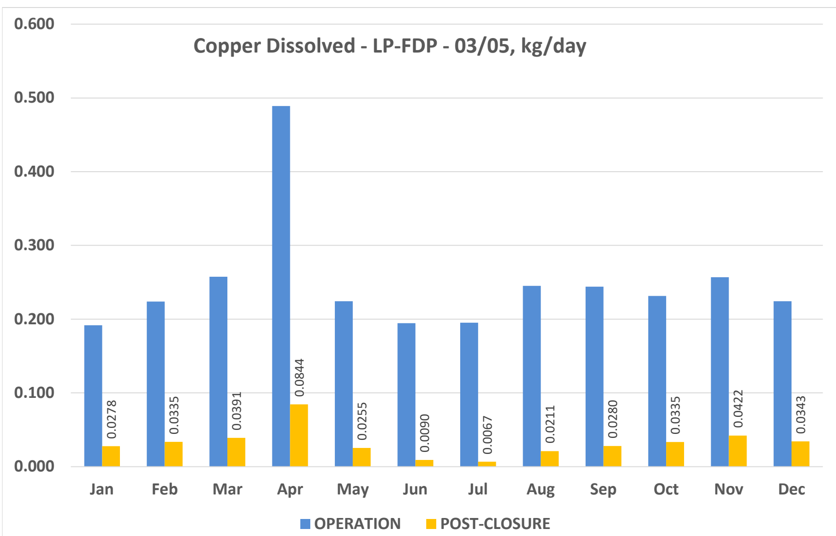
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

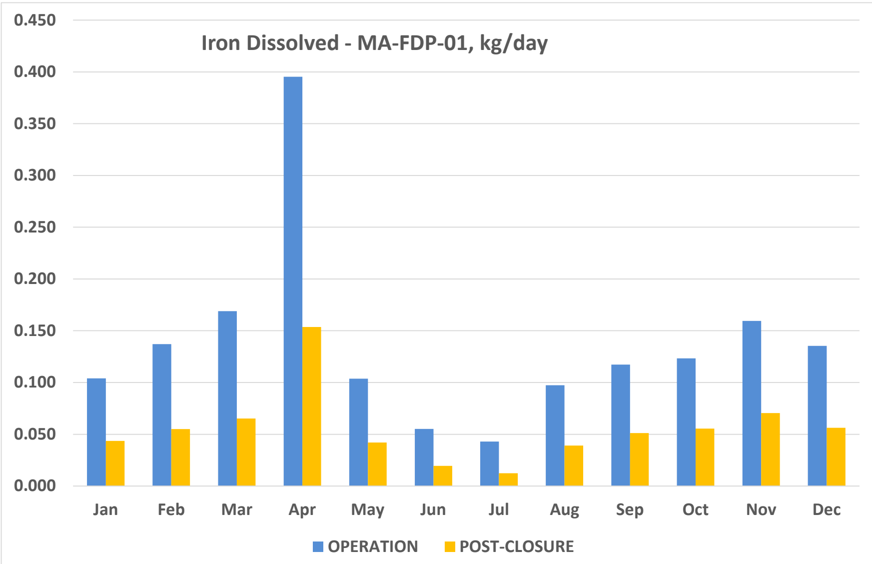

Copper Dissolved - LP-FDP-01, kg/day
0.060
0.050
0.040
0.030
0.020
0.010
0.000
0.0006
0.0008
0.0010
0.0023
0.0006
0.0003
0.0002
0.0005
0.0007
0.0008
0.0010
0.0008
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

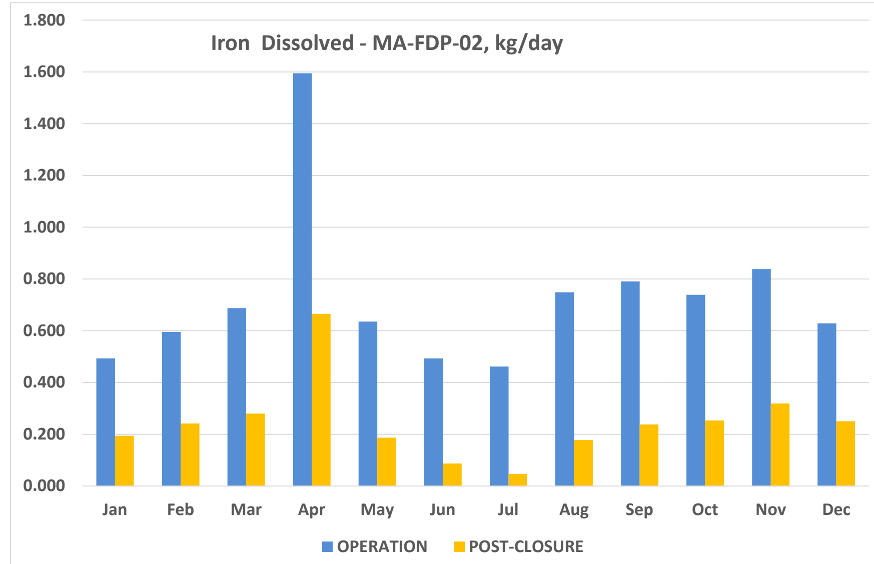

Copper Dissolved - LP-FDP-02, kg/day
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0.0213
0.0266
0.0311
0.0737
0.0202
0.0091
0.0049
0.0189
0.0254
0.0274
0.0348
0.0275
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

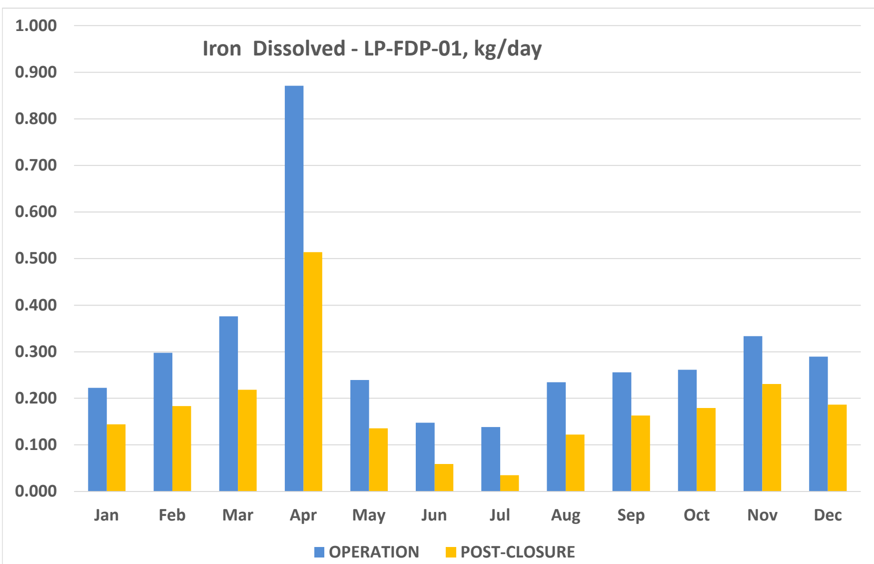

Copper Dissolved - MA-FDP-03/04, kg/day
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0.0061
0.0073
0.0084
0.0179
0.0061
0.0032
0.0027
0.0056
0.0068
0.0075
0.0092
0.0075
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

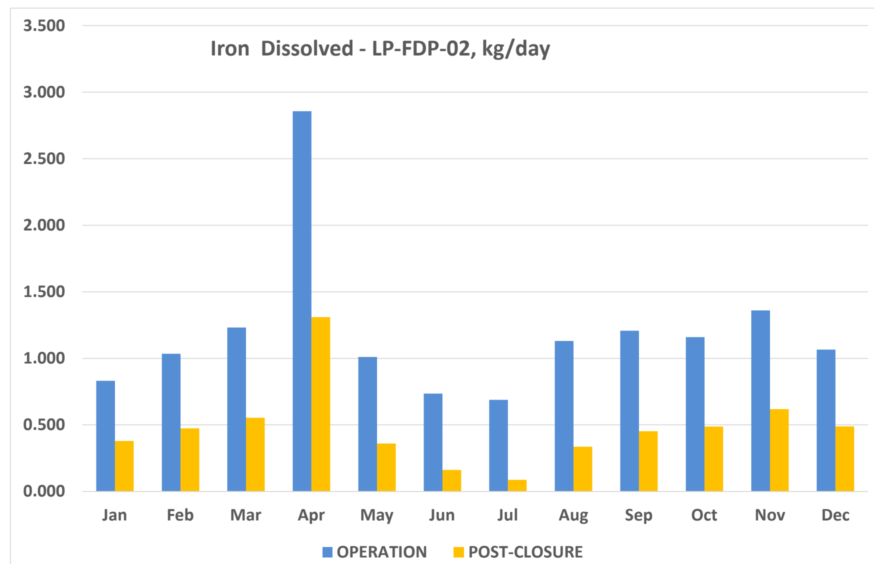

Copper Dissolved - LP-FDP-04, kg/day
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0.0002
0.0002
0.0002
0.0006
0.0002
0.0001
0.0001
0.0001
0.0002
0.0002
0.0003
0.0002
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

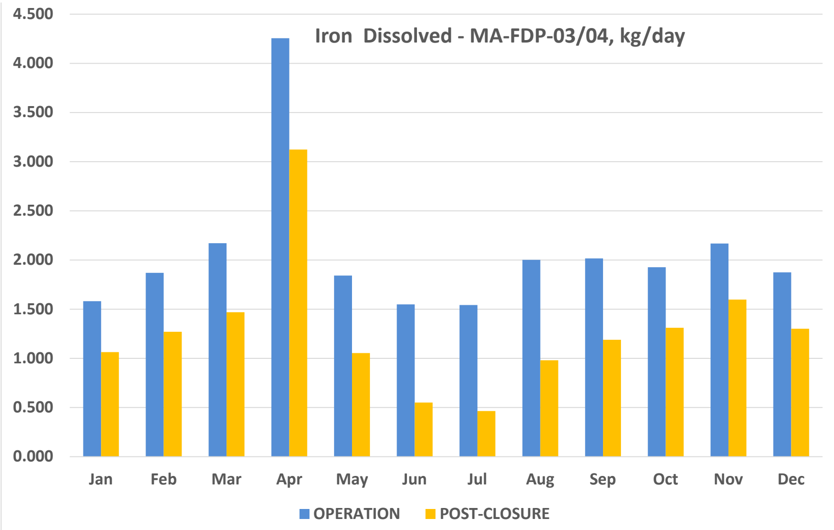

Copper Dissolved - LP-FDP - 03/05, kg/day
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0.0278
0.0335
0.0391
0.0844
0.0255
0.0090
0.0067
0.0211
0.0280
0.0335
0.0422
0.0343
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Iron Dissolved - MA-FDP-01, kg/day
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Iron Dissolved - MA-FDP-02, kg/day
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Iron Dissolved - LP-FDP-01, kg/day
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Iron Dissolved - LP-FDP-02, kg/day
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Iron Dissolved - MA-FDP-03/04, kg/day
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Jan
Feb
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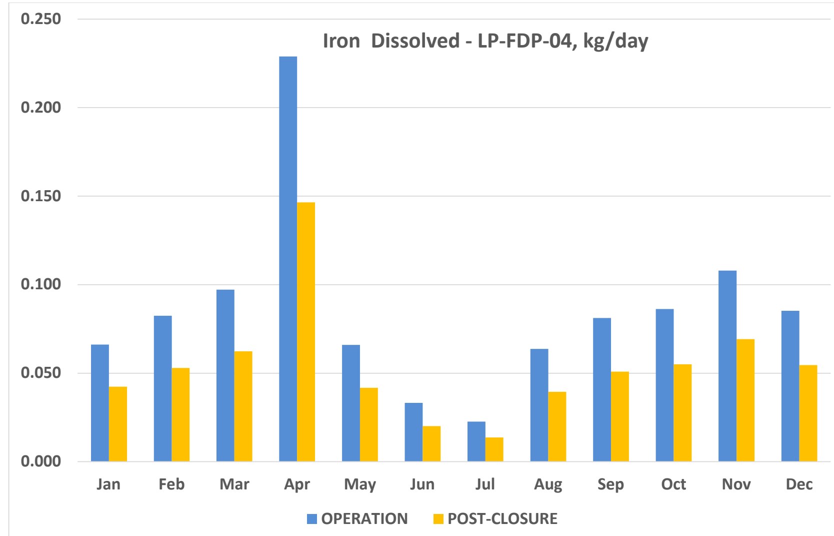
Dec
OPERATION
POST-CLOSURE


Iron Dissolved - LP-FDP-04, kg/day
0.250
0.200
0.150
0.100
0.050
0.000
Jan
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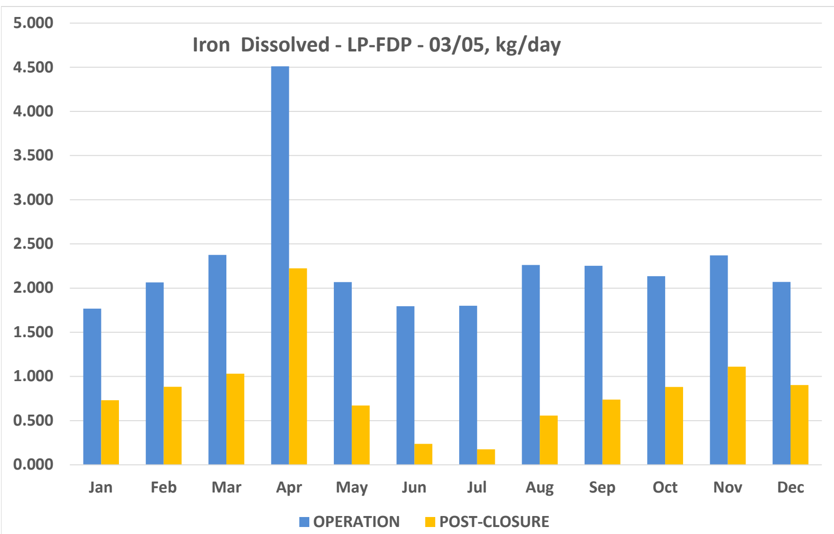
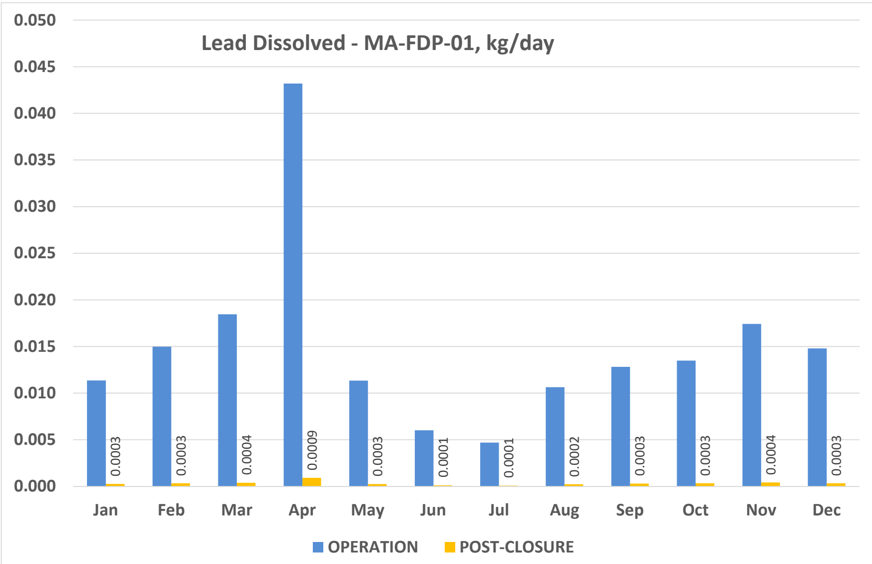
Dec
OPERATION
POST-CLOSURE


Iron Dissolved - LP-FDP - 03/05, kg/day
5.000
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Lead Dissolved - MA-FDP-01, kg/day
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0003
0.0003
0.0004
0.0009
0.0003
0.0001
0.0001
0.0002
0.0003
0.0003
0.0004
0.0003
Jan
Feb
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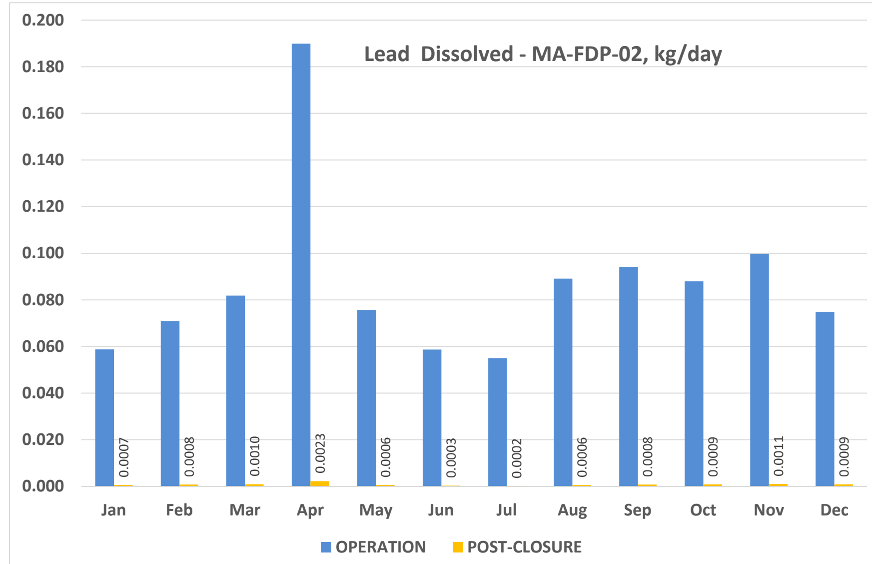
Dec
OPERATION
POST-CLOSURE


Lead Dissolved - MA-FDP-02, kg/day
0.200
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
0.0007
0.0008
0.0010
0.0023
0.0006
0.0003
0.0002
0.0006
0.0008
0.0009
0.0011
0.0009
Jan
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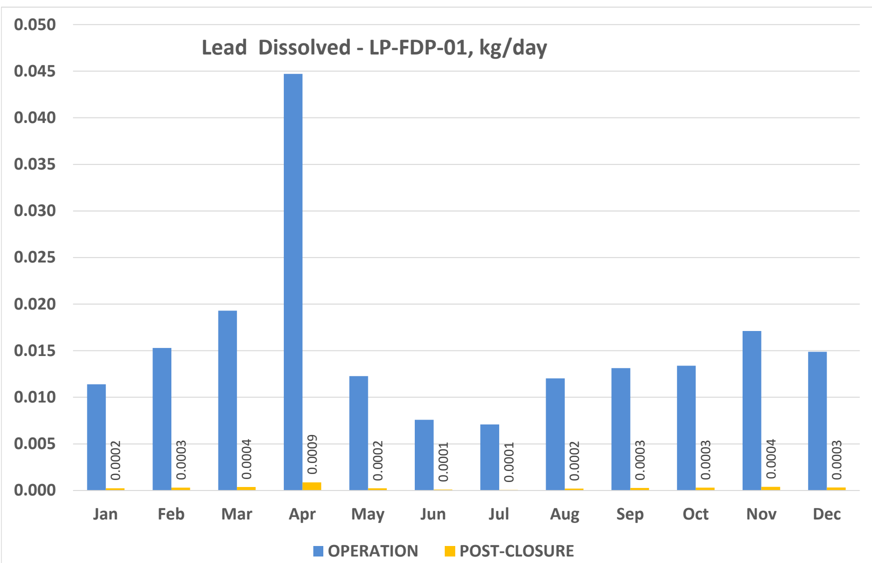
Dec
OPERATION
POST-CLOSURE


Lead Dissolved - LP-FDP-01, kg/day
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
0.0002
0.0003
0.0004
0.0009
0.0002
0.0001
0.0001
0.0002
0.0003
0.0003
0.0004
0.0003
Jan
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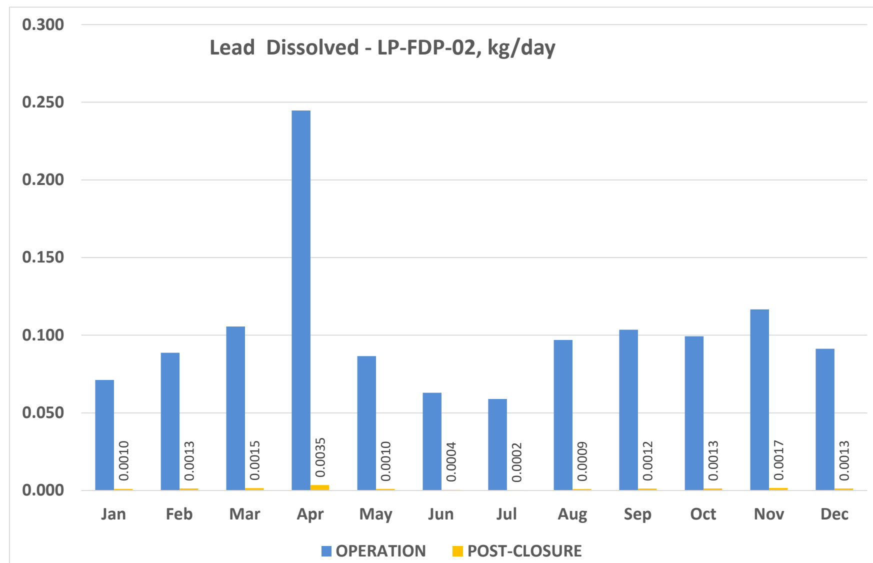
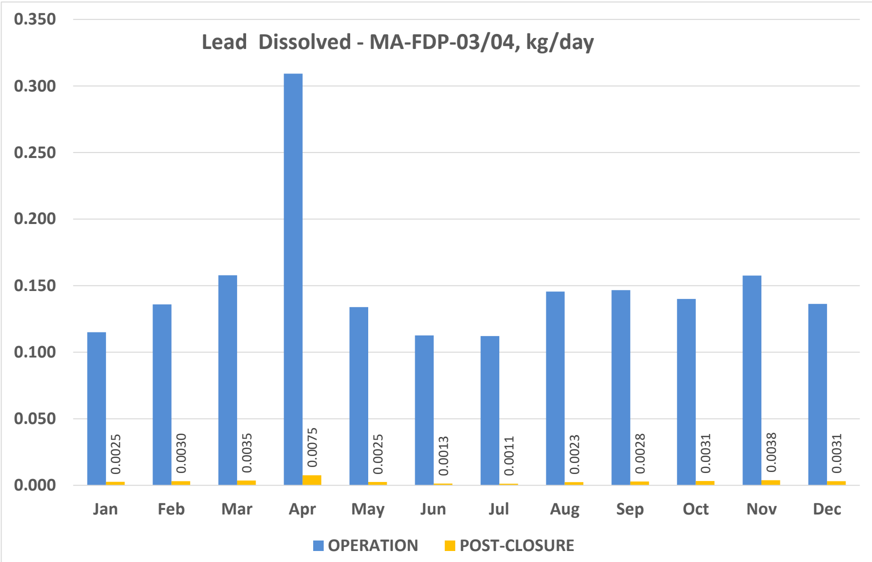
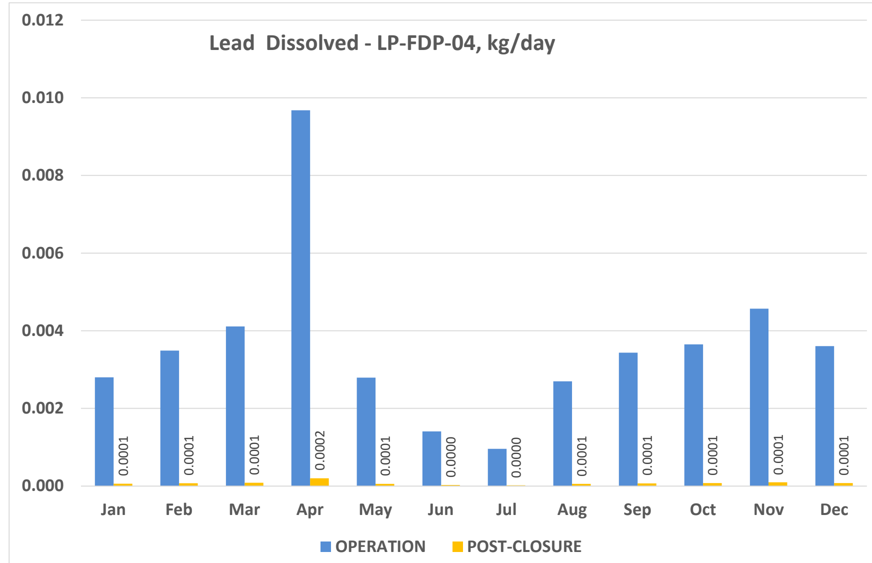
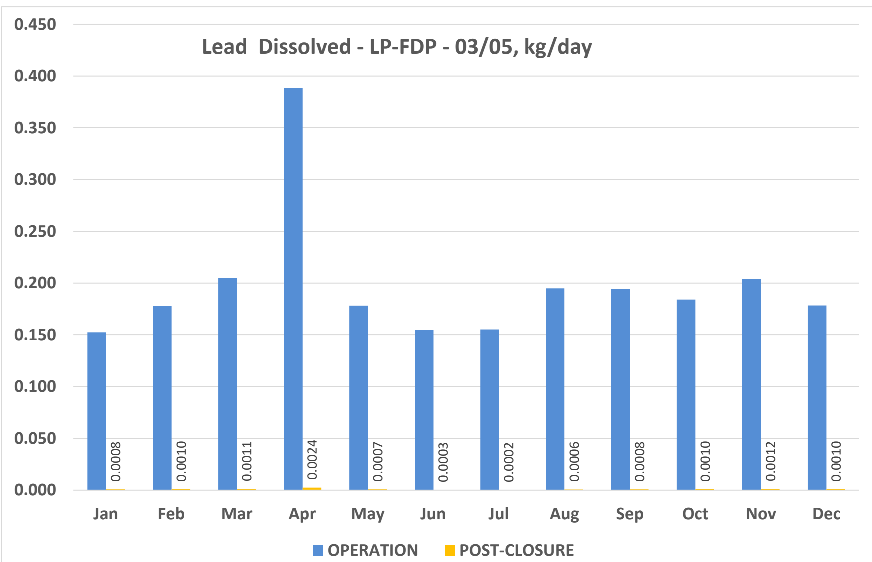
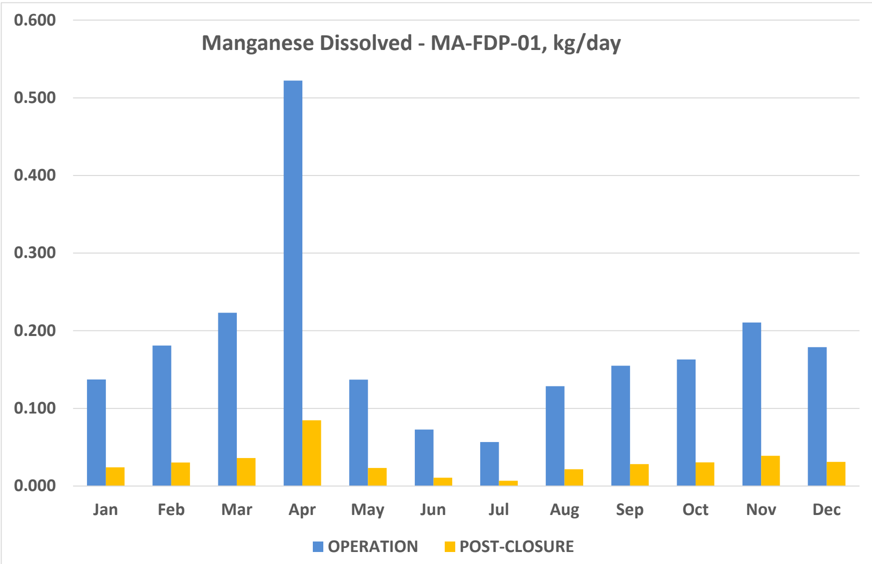
Nov
Dec
OPERATION
POST-CLOSURE

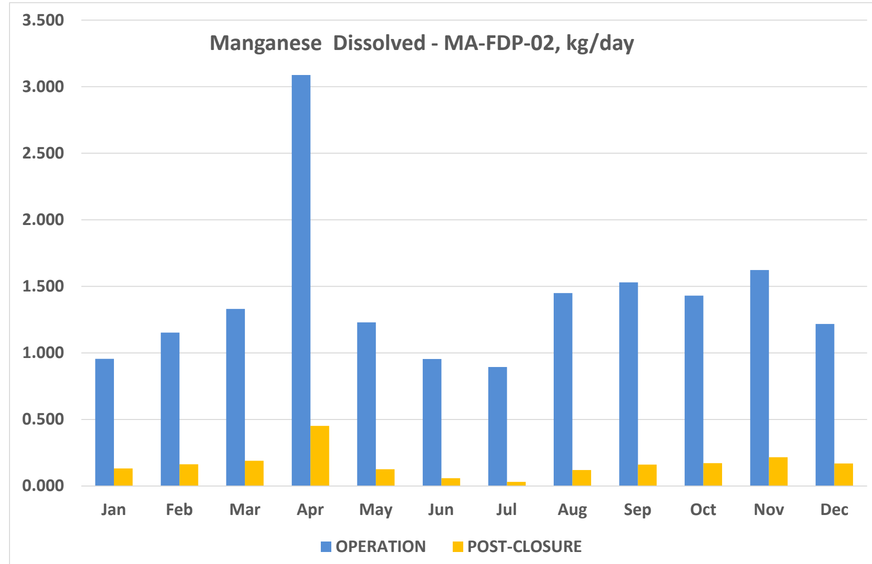

Lead Dissolved - LP-FDP-02, kg/day
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0.0010
0.0013
0.0015
0.0035
0.0010
0.0004
0.0002
0.0009
0.0012
0.0013
0.0017
0.0013
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

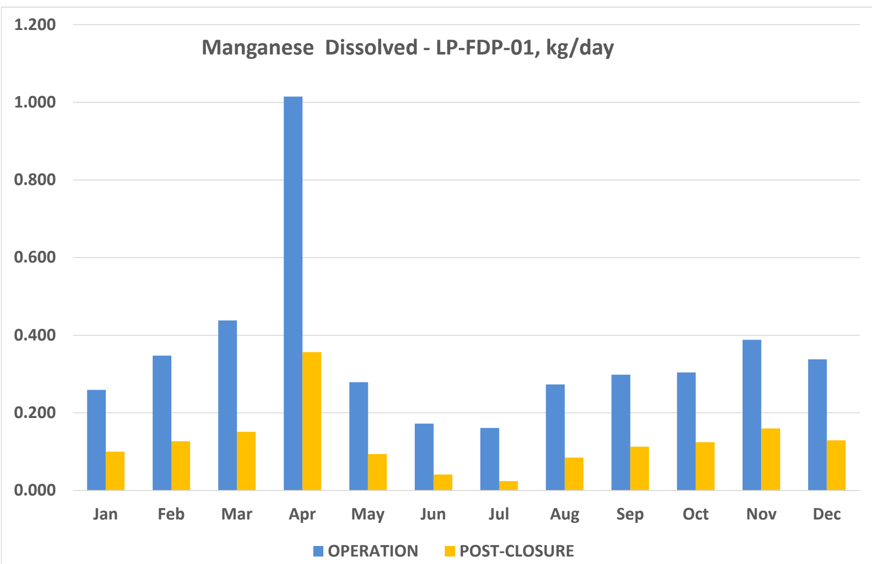

Lead Dissolved - MA-FDP-03/04, kg/day
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0.0025
0.0030
0.0035
0.0075
0.0025
0.0013
0.0011
0.0023
0.0028
0.0031
0.0038
0.0031
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

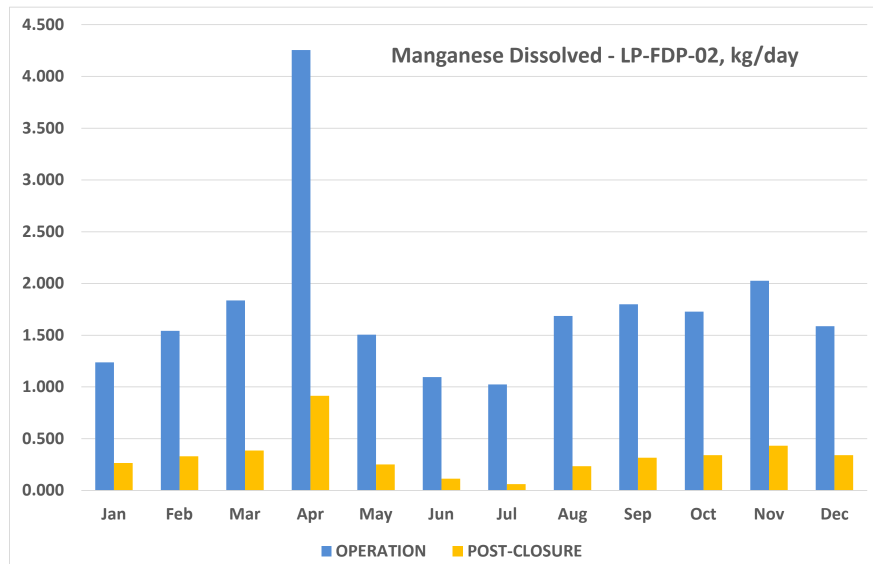

Lead Dissolved - LP-FDP-04, kg/day
0.012
0.010
0.008
0.006
0.004
0.002
0.000
0.0001
0.0001
0.0001
0.0002
0.0001
0.0000
0.0000
0.0001
0.0001
0.0001
0.0001
0.0001
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

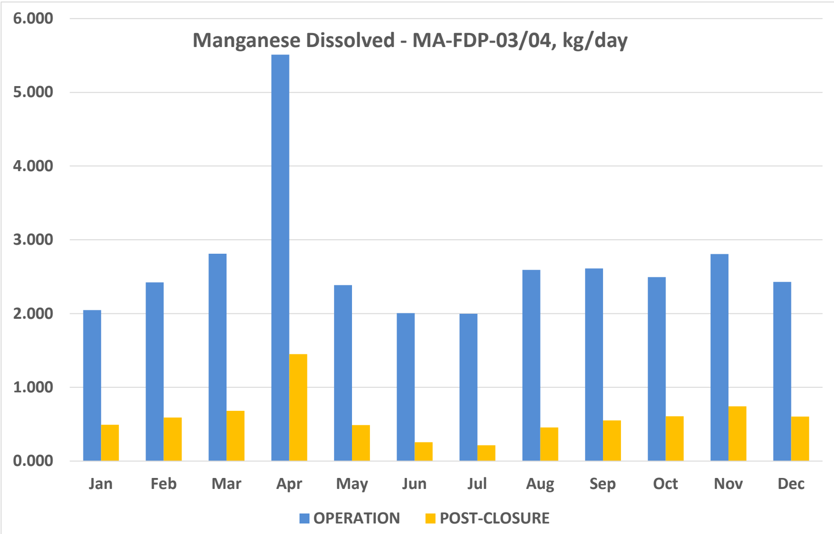

Lead Dissolved - LP-FDP - 03/05, kg/day
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0.0008
0.0010
0.0011
0.0024
0.0007
0.0003
0.0002
0.0006
0.0008
0.0010
0.0012
0.0010
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

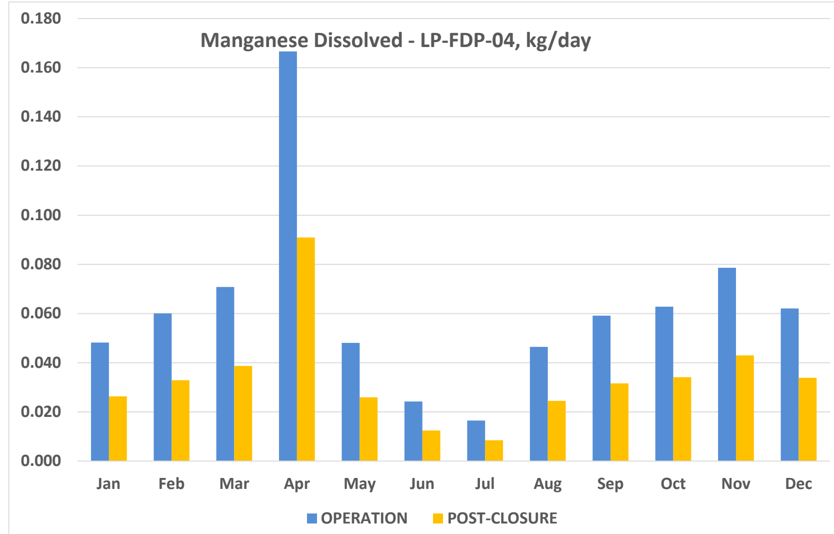

Manganese Dissolved - MA-FDP-01, kg/day
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

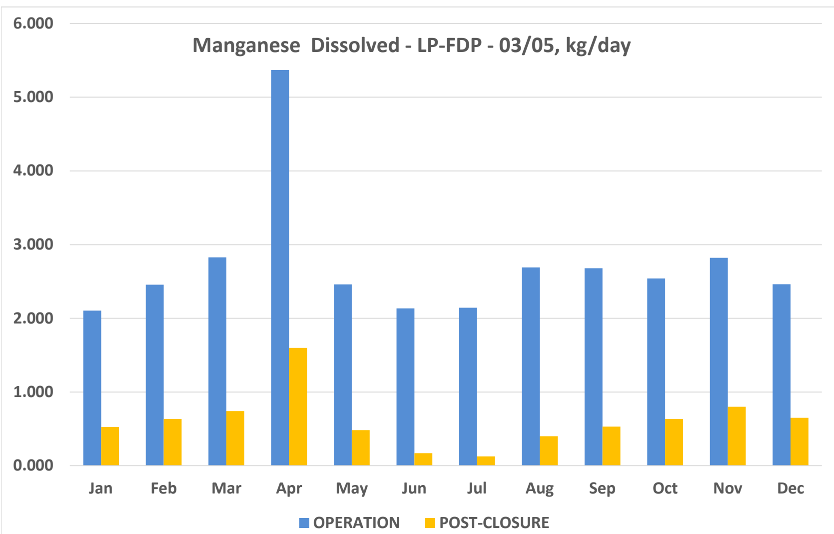

Manganese Dissolved - MA-FDP-02, kg/day
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

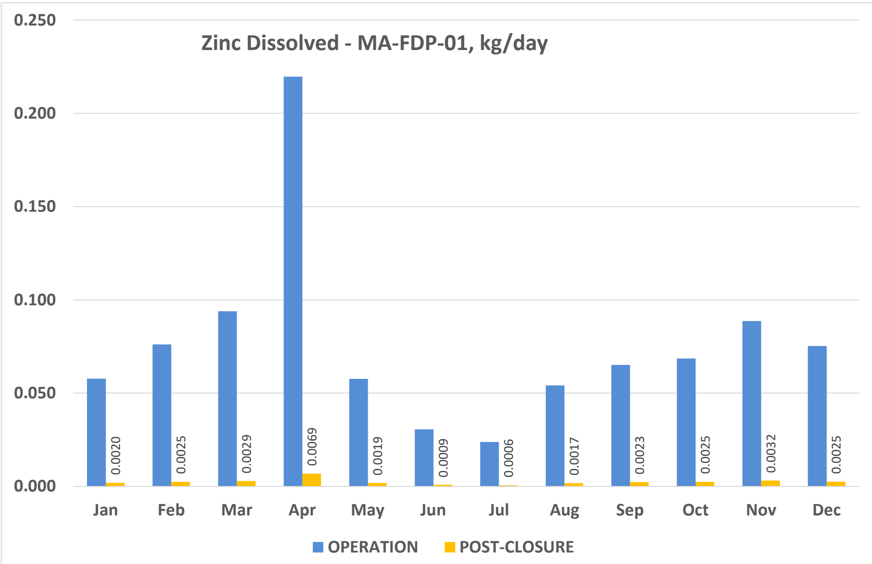

Manganese Dissolved - LP-FDP-01, kg/day
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

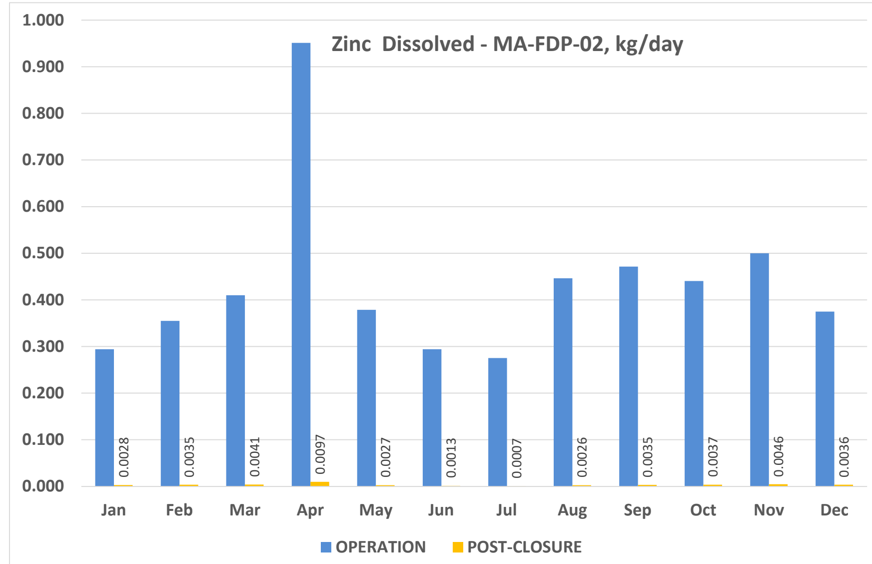

Manganese Dissolved - LP-FDP-02, kg/day
4.500
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

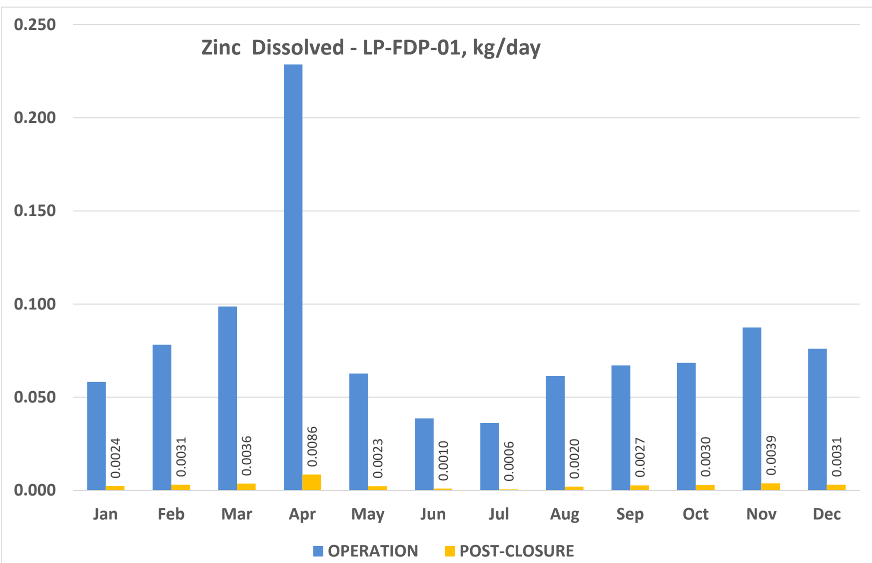

Manganese Dissolved - MA-FDP-03/04, kg/day
6.000
5.000
4.000
3.000
2.000
1.000
0.000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

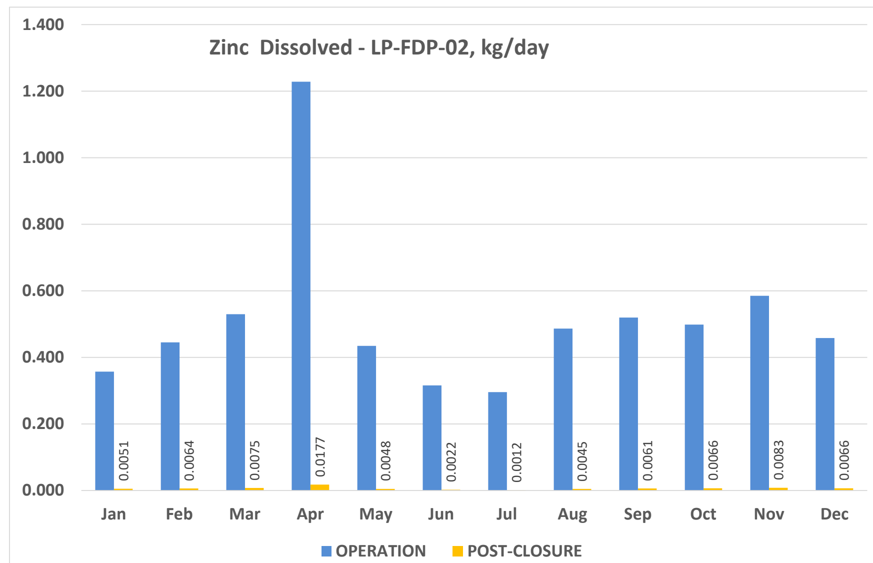

Manganese Dissolved - LP-FDP-04, kg/day
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

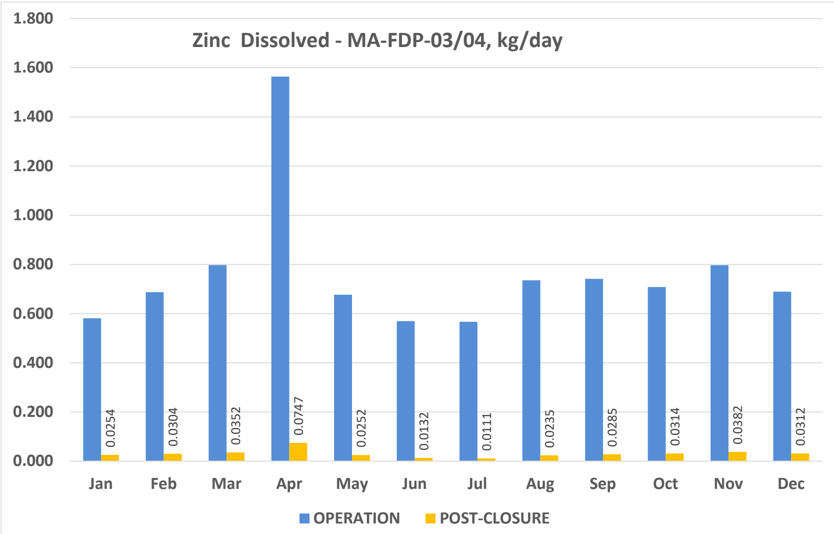

Manganese Dissolved - LP-FDP - 03/05, kg/day
6.000
5.000
4.000
3.000
2.000
1.000
0.000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

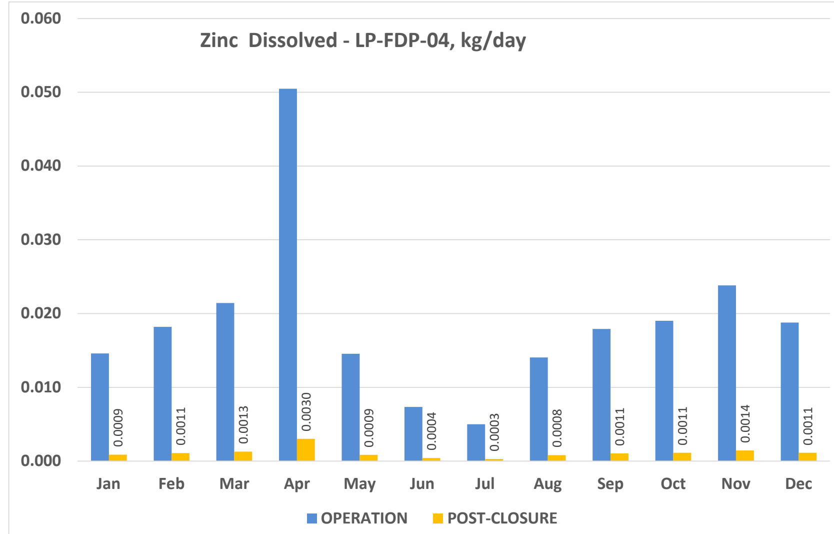

Zinc Dissolved - MA-FDP-01, kg/day
0.250
0.200
0.150
0.100
0.050
0.000
0.0020
0.0025
0.0029
0.0069
0.0019
0.0009
0.0006
0.0017
0.0023
0.0025
0.0032
0.0025
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

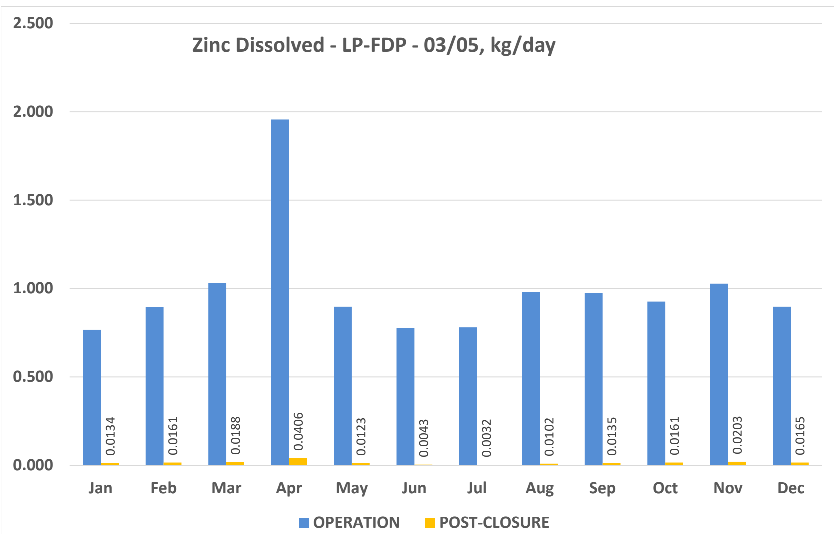

Zinc Dissolved - MA-FDP-02, kg/day
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0.0028
0.0035
0.0041
0.0097
0.0027
0.0013
0.0007
0.0026
0.0035
0.0037
0.0046
0.0036
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Zinc Dissolved - LP-FDP-01, kg/day
0.250
0.200
0.150
0.100
0.050
0.000
0.0024
0.0031
0.0036
0.0086
0.0023
0.0010
0.0006
0.0020
0.0027
0.0030
0.0039
0.0031
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

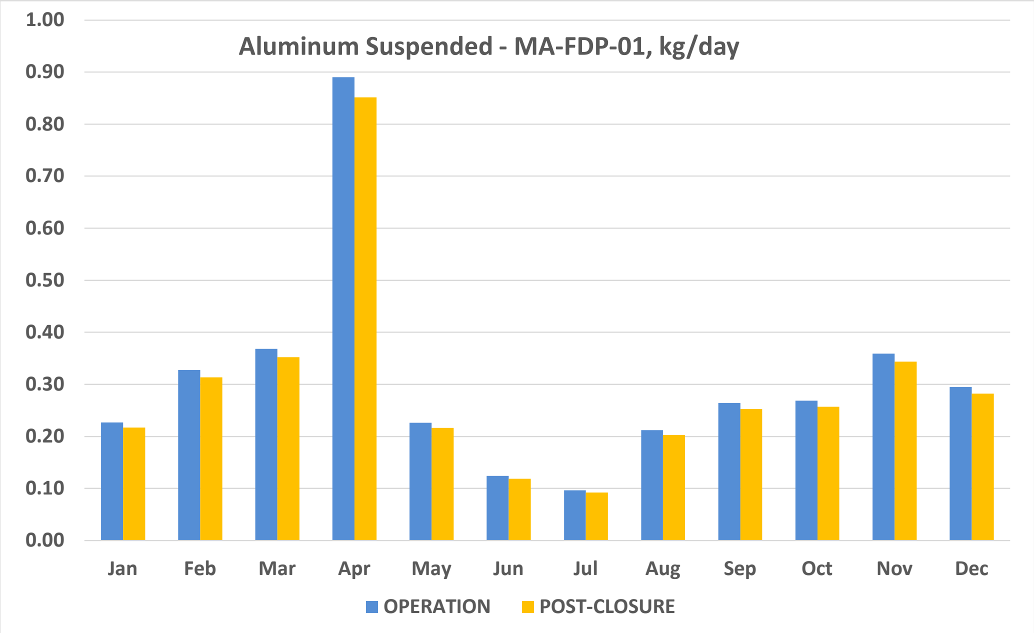

Zinc Dissolved - LP-FDP-02, kg/day
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0.0051
0.0064
0.0075
0.0177
0.0048
0.0022
0.0012
0.0045
0.0061
0.0066
0.0083
0.0066
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

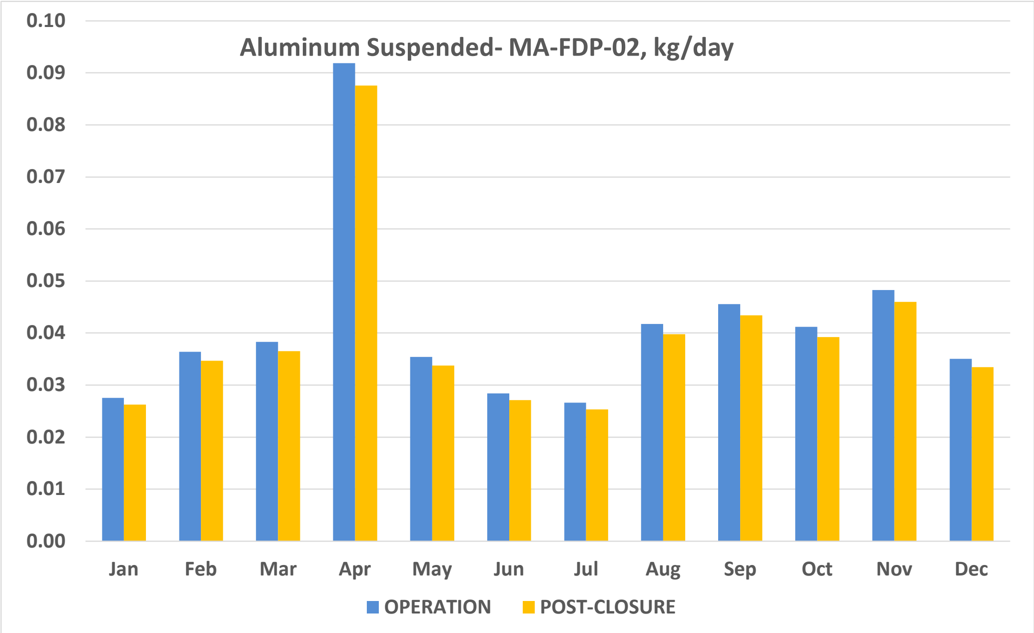

Zinc Dissolved - MA-FDP-03/04, kg/day
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0.0254
0.0304
0.0352
0.0747
0.0252
0.0132
0.0111
0.0235
0.0285
0.0314
0.0382
0.0312
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

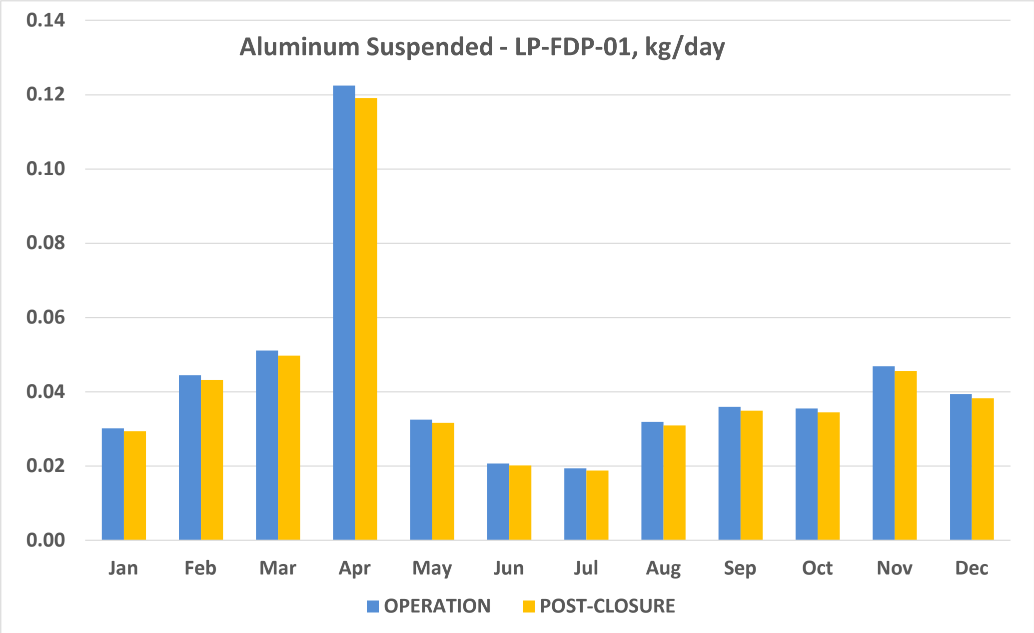

Zinc Dissolved - LP-FDP-04, kg/day
0.060
0.050
0.040
0.030
0.020
0.010
0.000
0.0009
0.0011
0.0013
0.0030
0.0009
0.0004
0.0003
0.0008
0.0011
0.0011
0.0014
0.0011
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

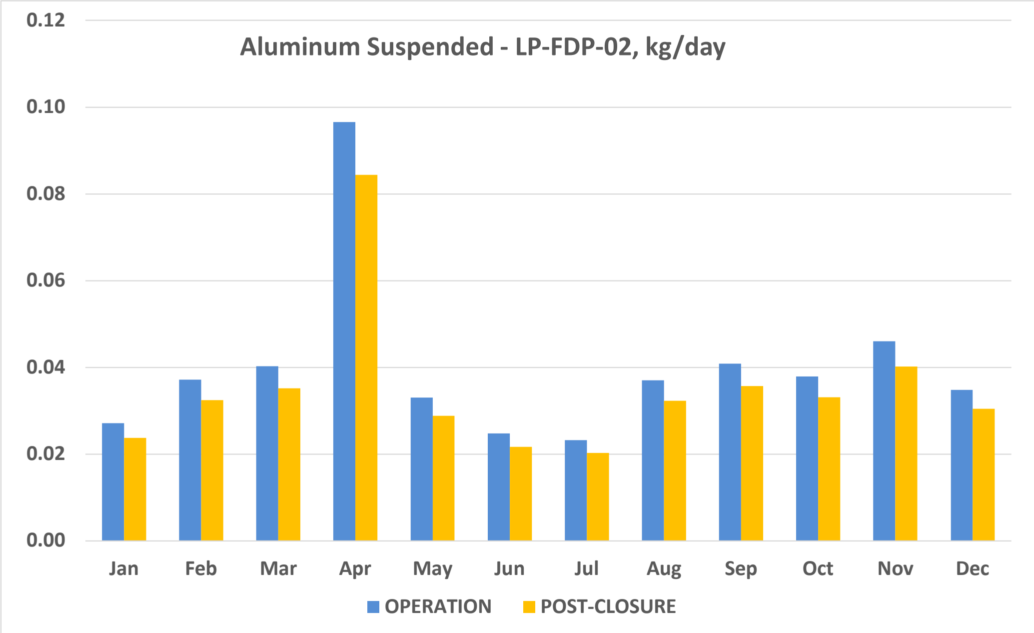

Zinc Dissolved - LP-FDP - 03/05, kg/day
2.500
2.000
1.500
1.000
0.500
0.000
0.0134
0.0161
0.0188
0.0406
0.0123
0.0043
0.0032
0.0102
0.0135
0.0161
0.0203
0.0165
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

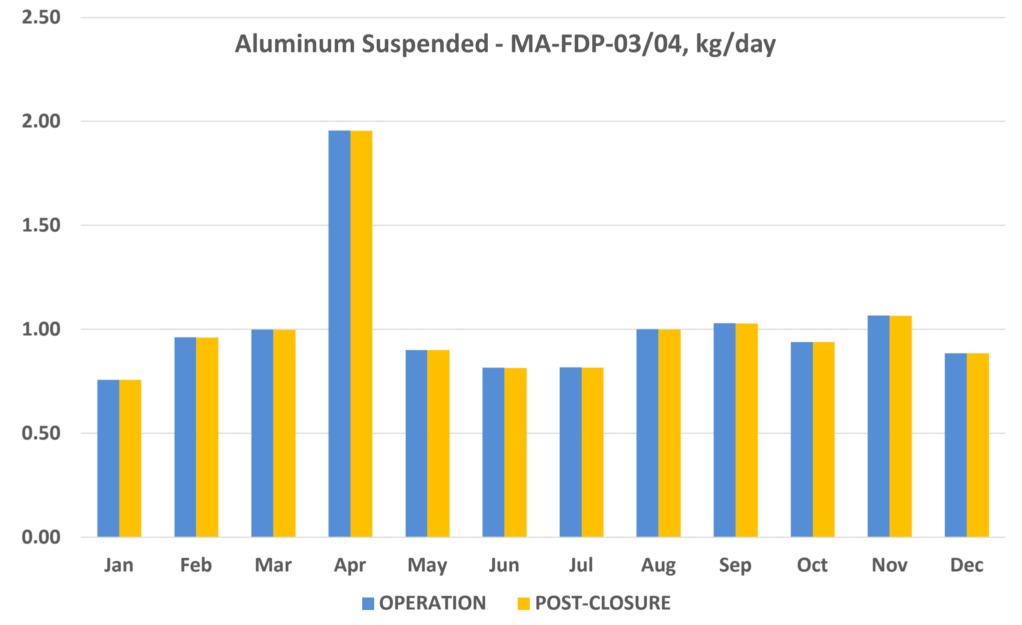
APPENDIX IR(2)-41.B SUSPENDED LOADING

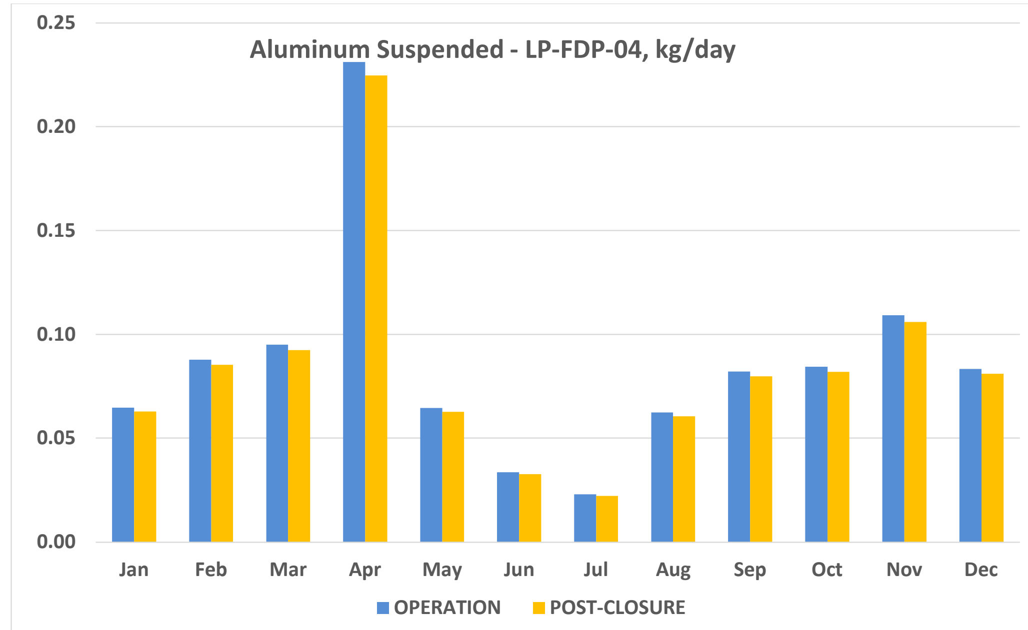

Aluminum Suspended - MA-FDP-01, kg/day
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

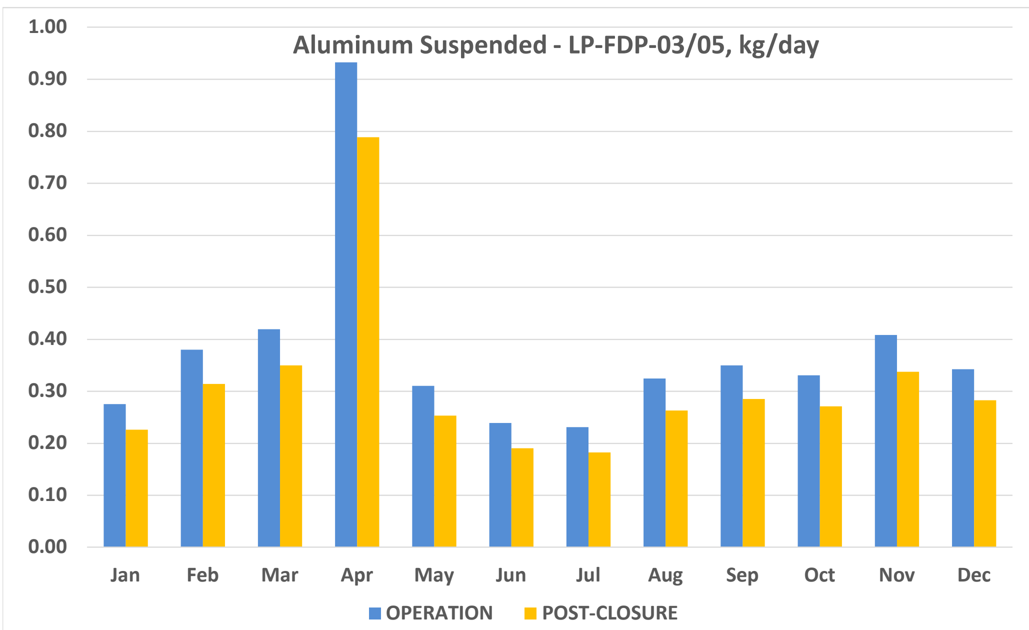

Aluminum Suspended- MA-FDP-02, kg/day
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

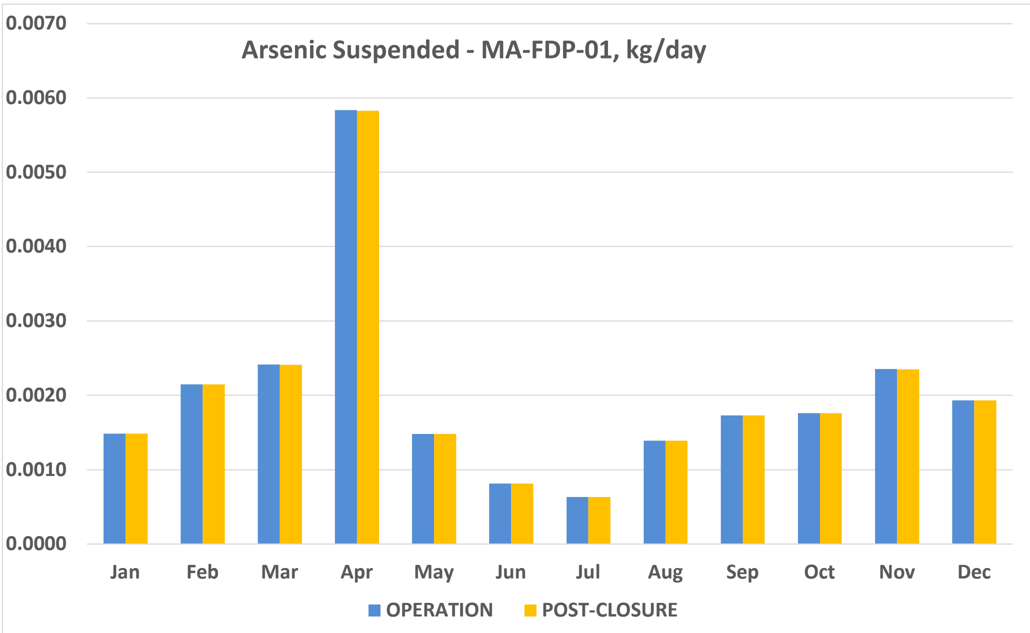

Aluminum Suspended - LP-FDP-01, kg/day
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

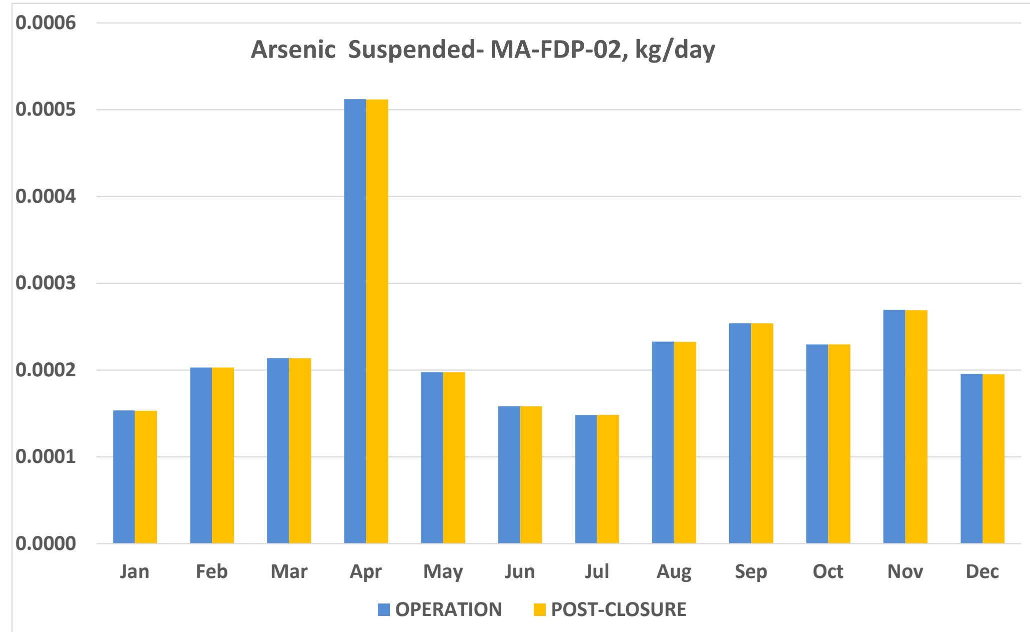

Aluminum Suspended - LP-FDP-02, kg/day
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

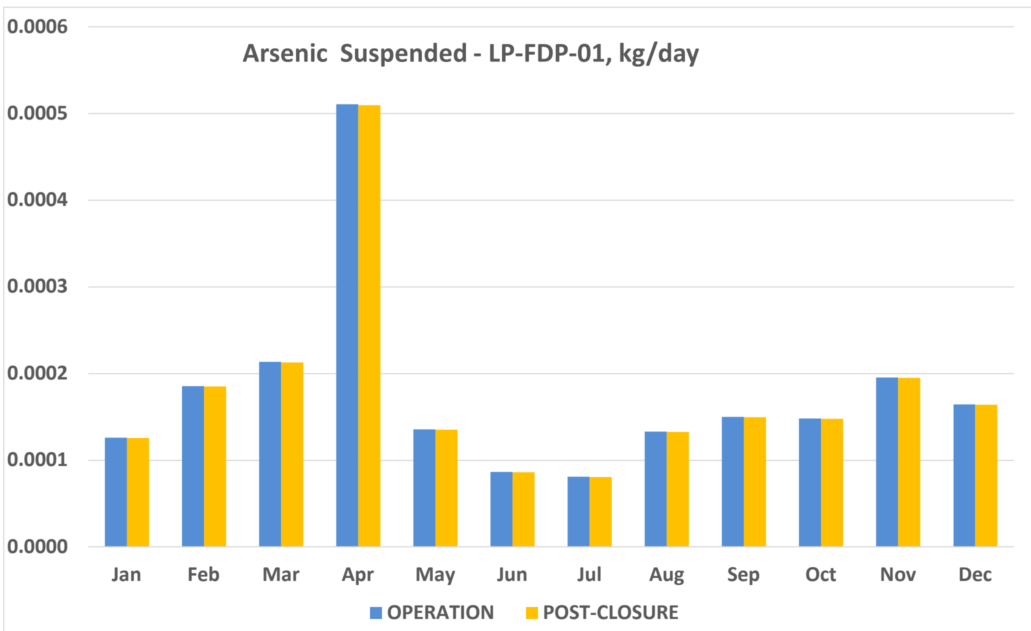

Aluminum Suspended - MA-FDP-03/04, kg/day
2.50
2.00
1.50
1.00
0.50
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

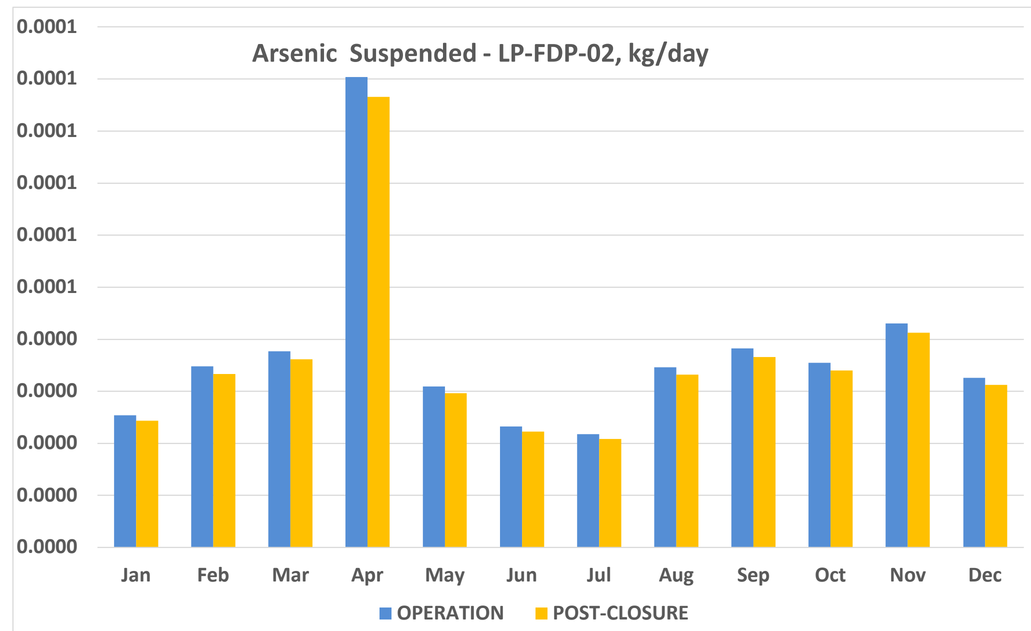

Aluminum Suspended - LP-FDP-04, kg/day
0.25
0.20
0.15
0.10
0.05
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

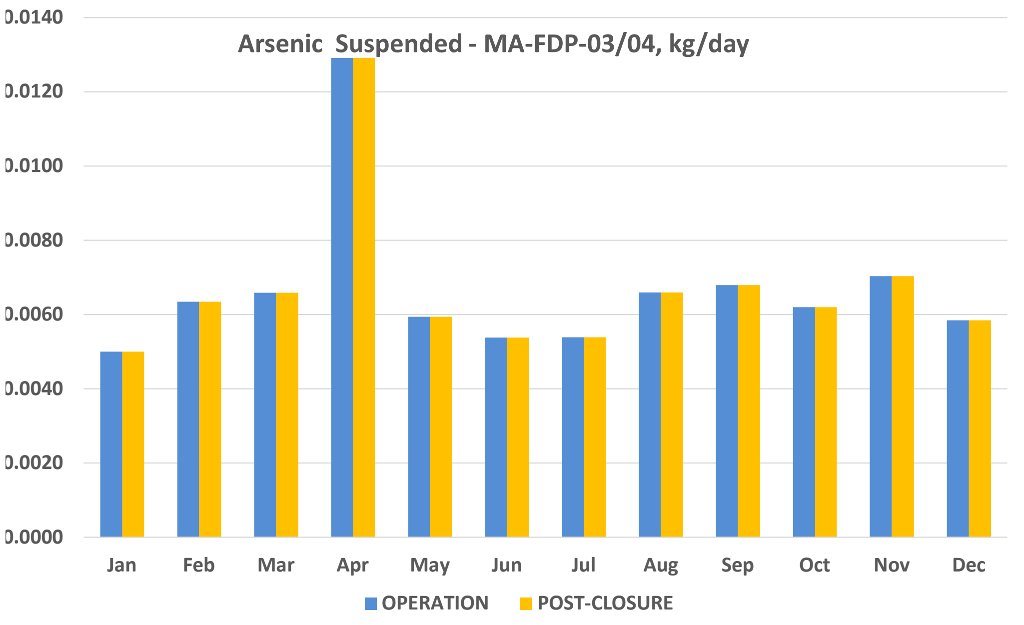

Aluminum Suspended - LP-FDP-03/05, kg/day
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE

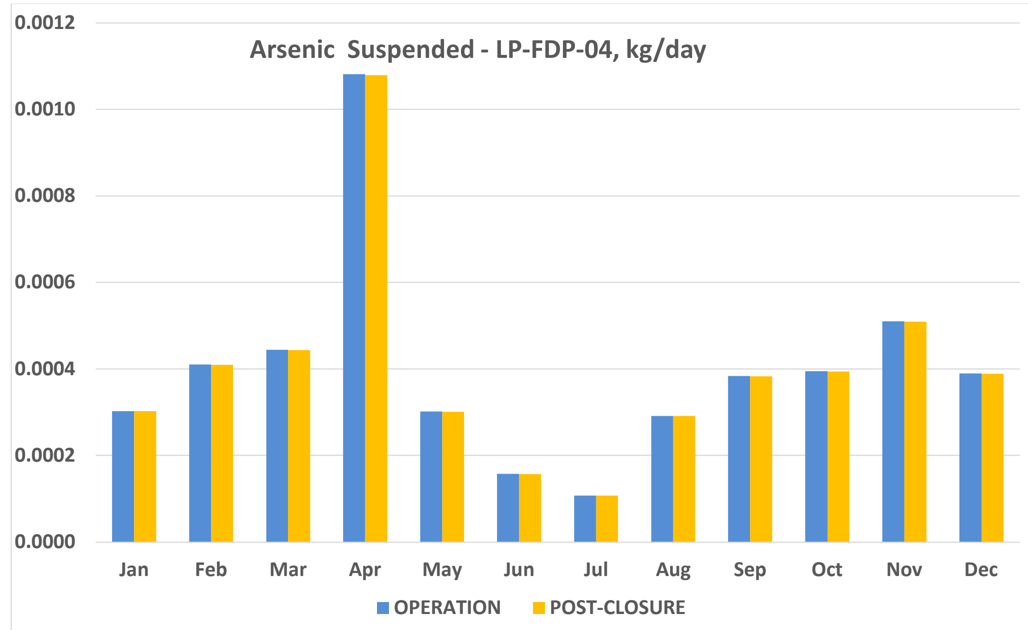

Arsenic Suspended - MA-FDP-01, kg/day
0.0070
0.0060
0.0050
0.0040
0.0030
0.0020
0.0010
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

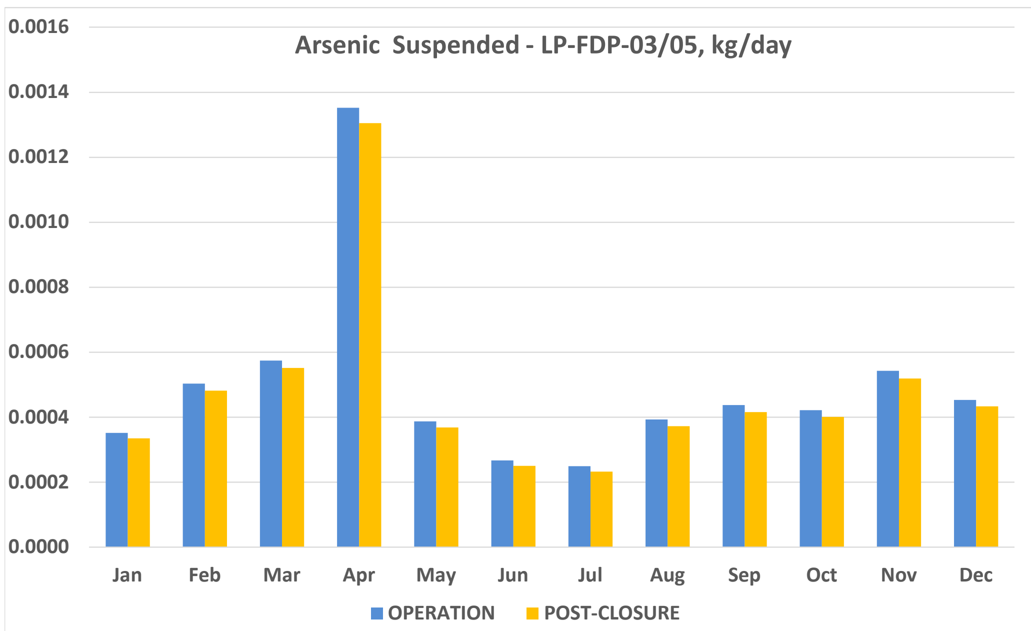

Arsenic Suspended- MA-FDP-02, kg/day
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

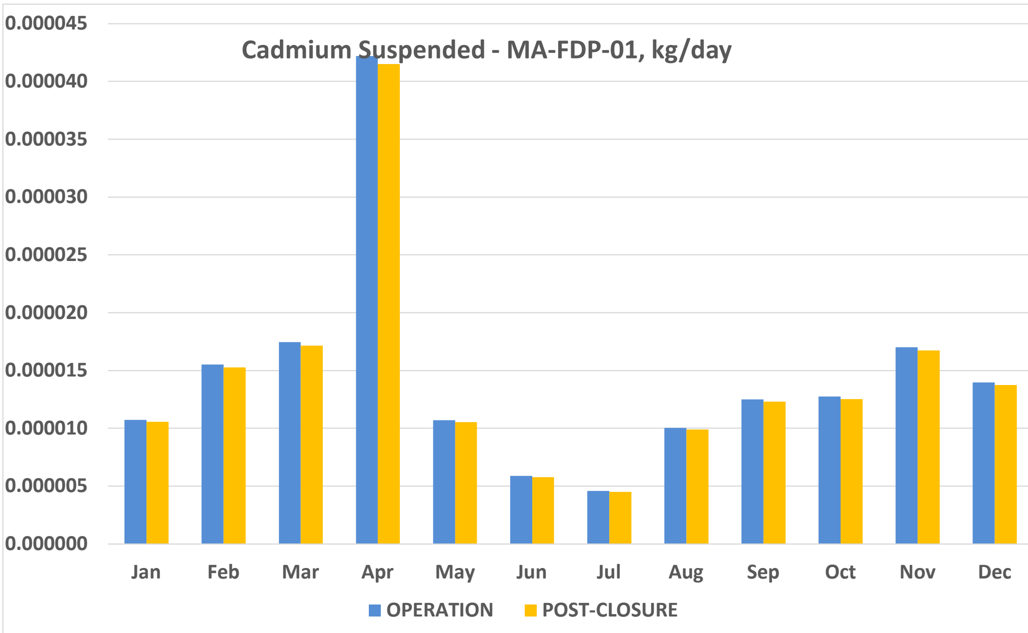

Arsenic Suspended - LP-FDP-01, kg/day
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

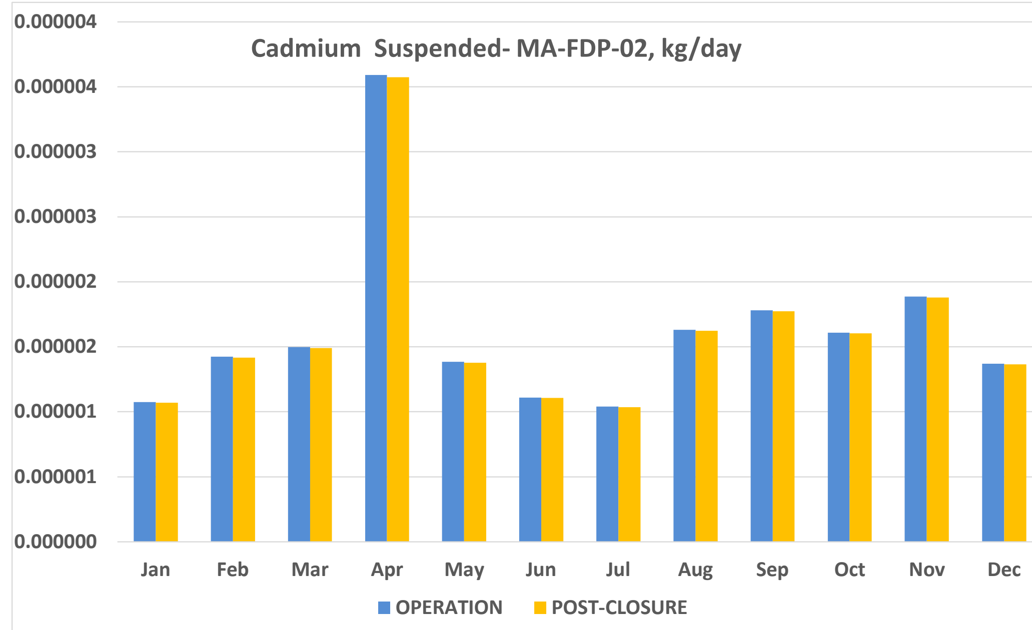

Arsenic Suspended - LP-FDP-02, kg/day
0.0001
0.0001
0.0001
0.0001
0.0001
0.0001
0.0000
0.0000
0.0000
0.0000
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

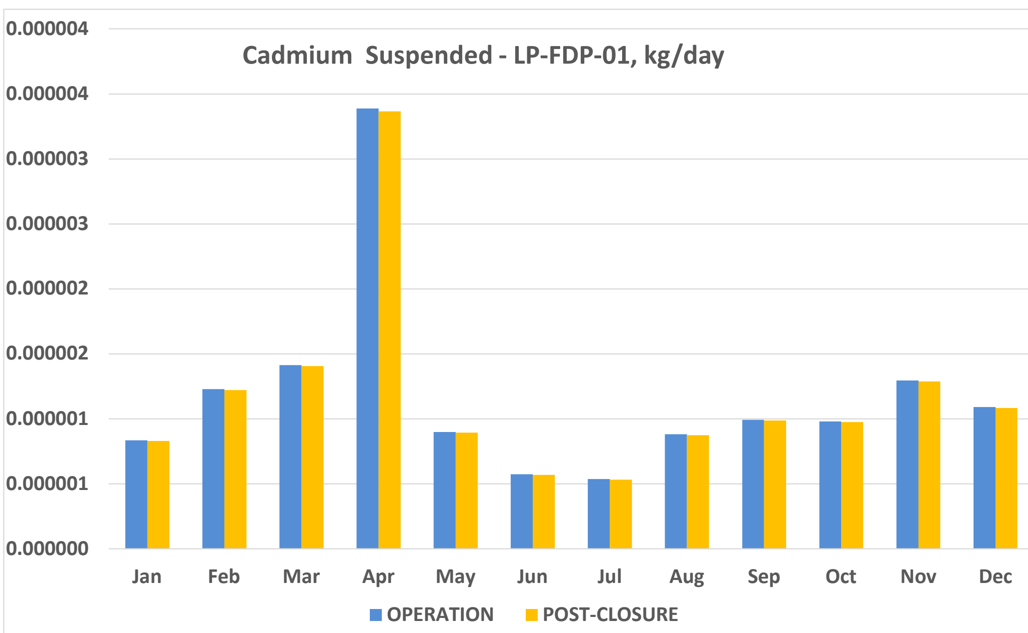

Arsenic Suspended - MA-FDP-03/04, kg/day
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE

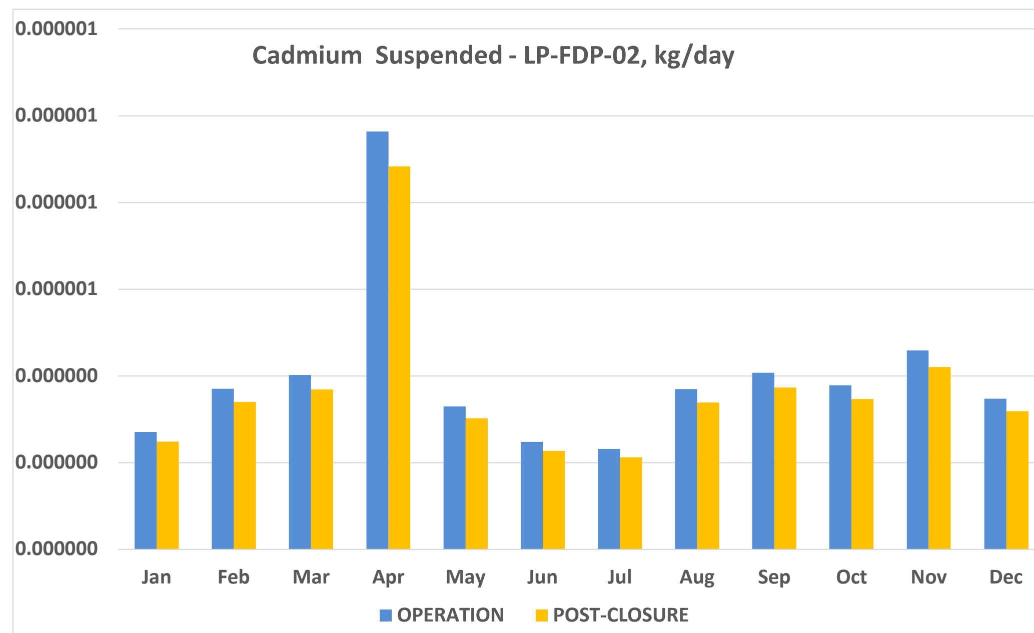

Arsenic Suspended - LP-FDP-04, kg/day
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE

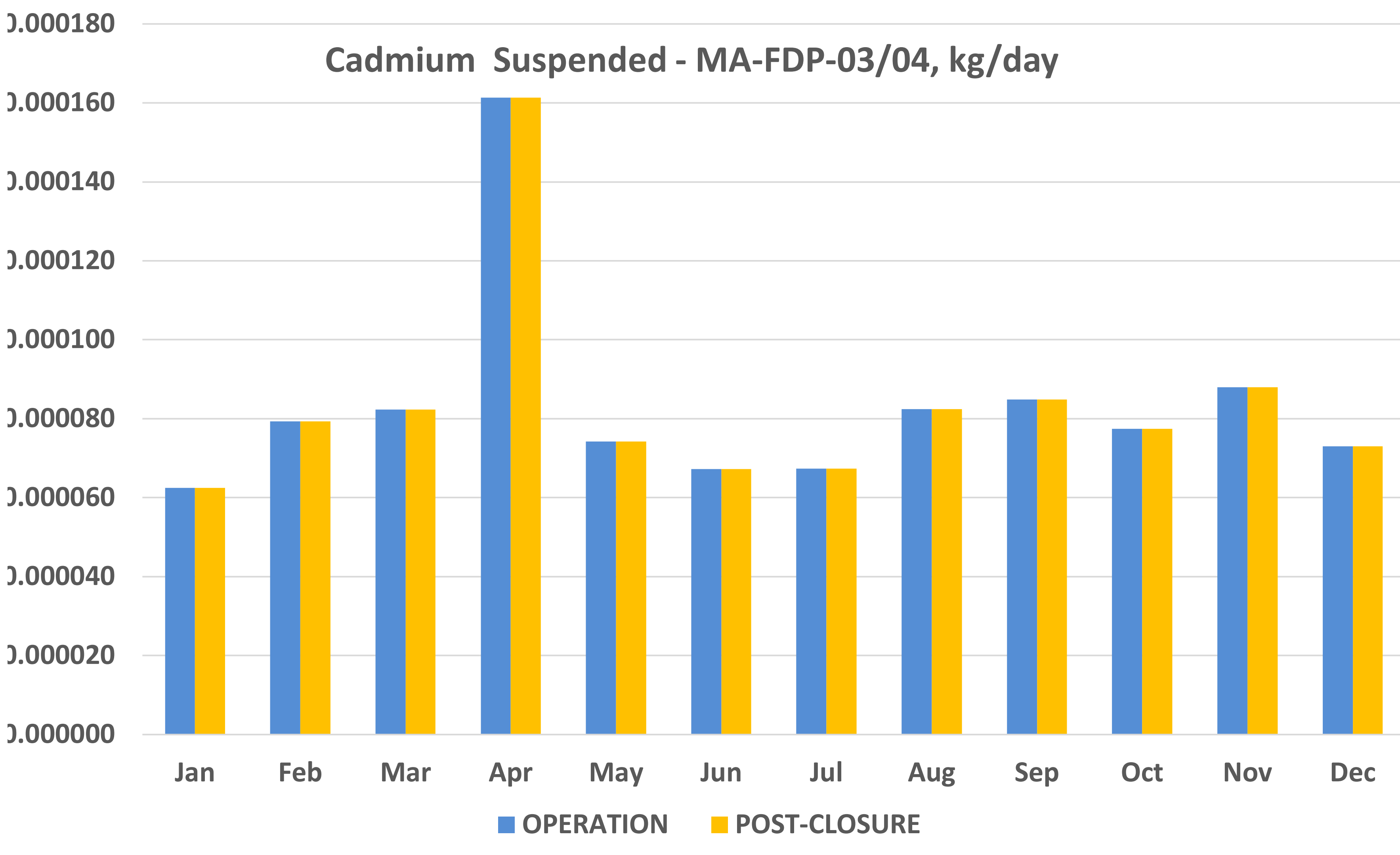

Arsenic Suspended - LP-FDP-03/05, kg/day
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE

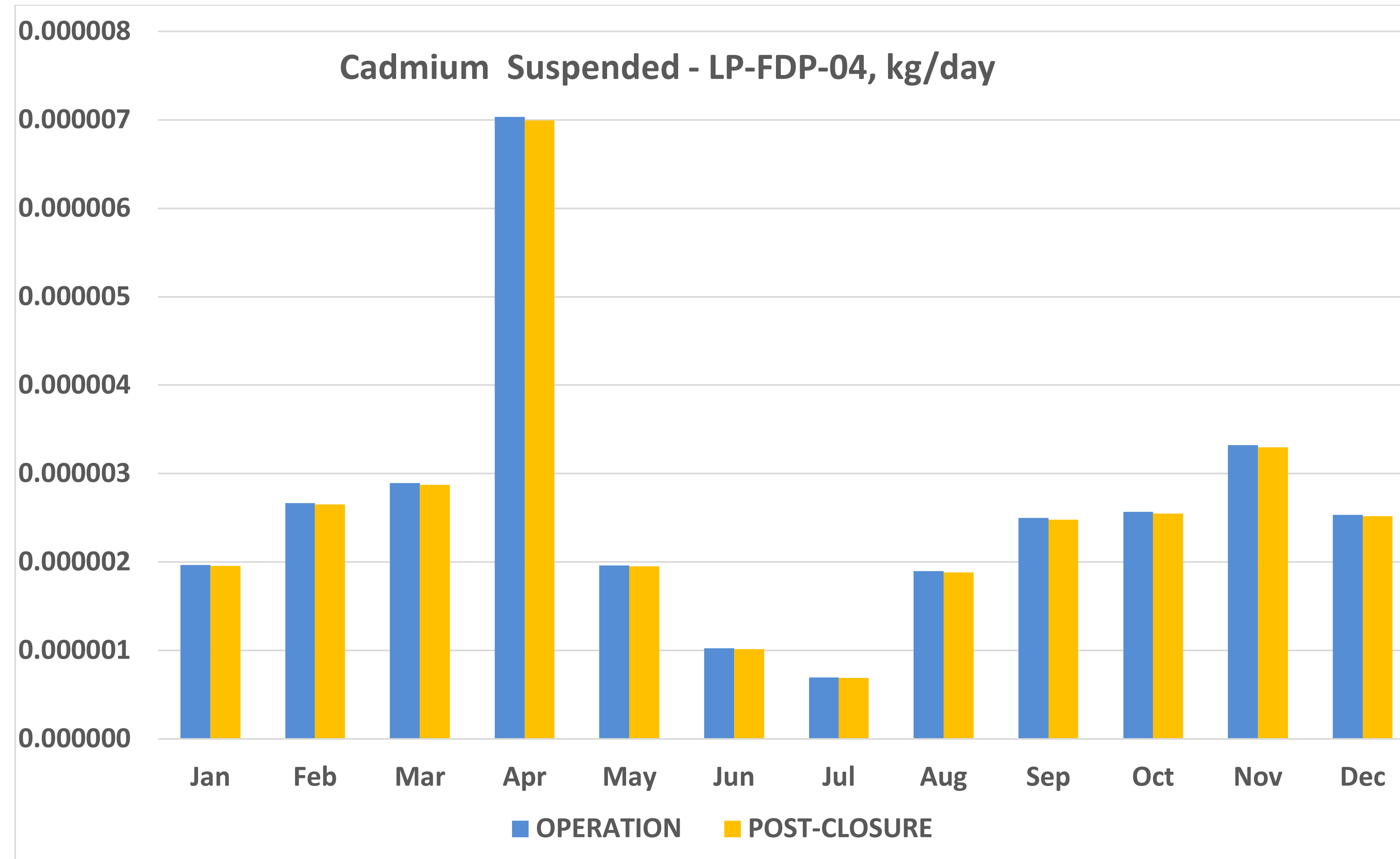

Cadmium Suspended - MA-FDP-01, kg/day
0.000045
0.000040
0.000035
0.000030
0.000025
0.000020
0.000015
0.000010
0.000005
0.000000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

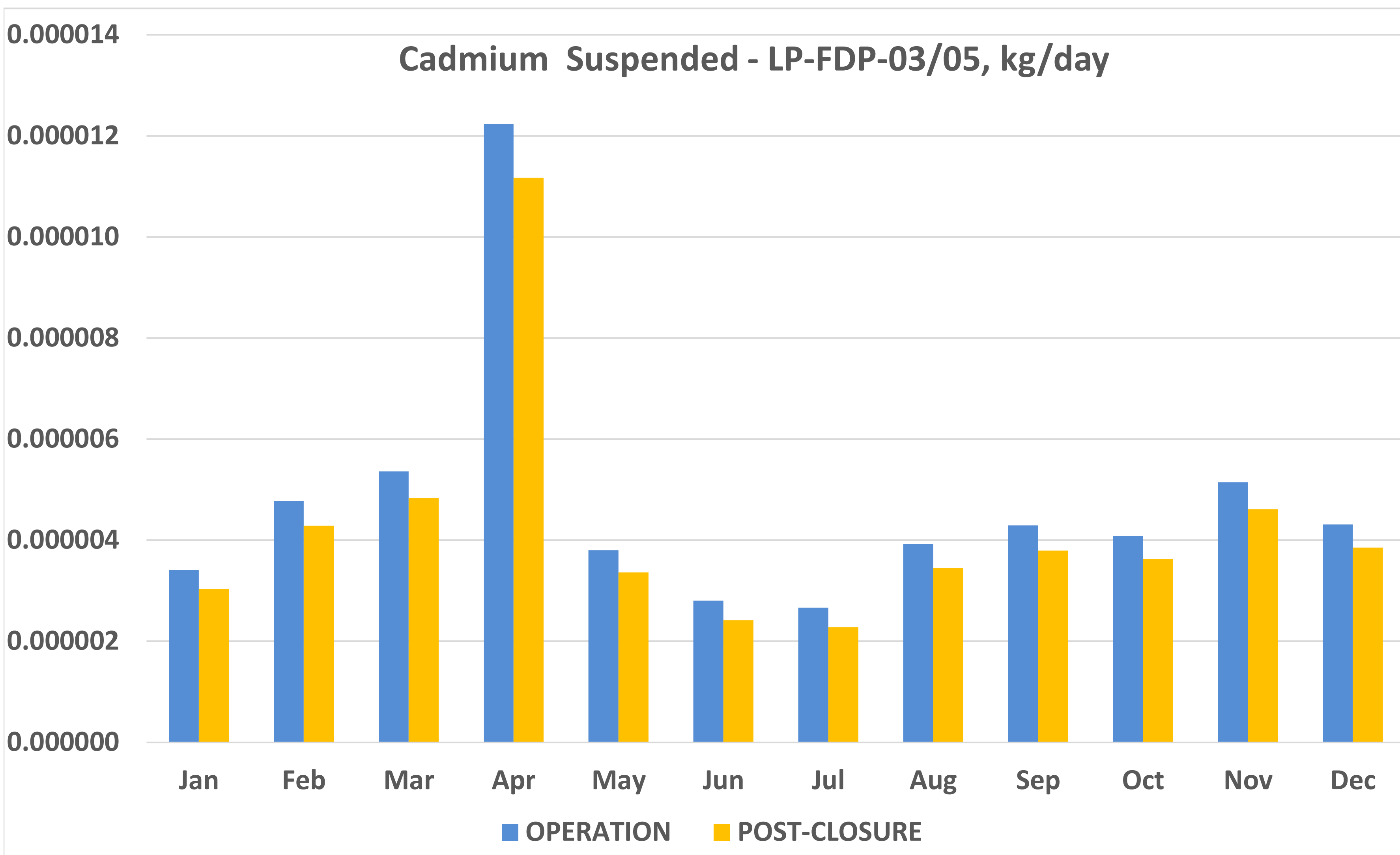

Cadmium Suspended- MA-FDP-02, kg/day
0.000004
0.000004
0.000003
0.000003
0.000002
0.000002
0.000001
0.000001
0.000000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

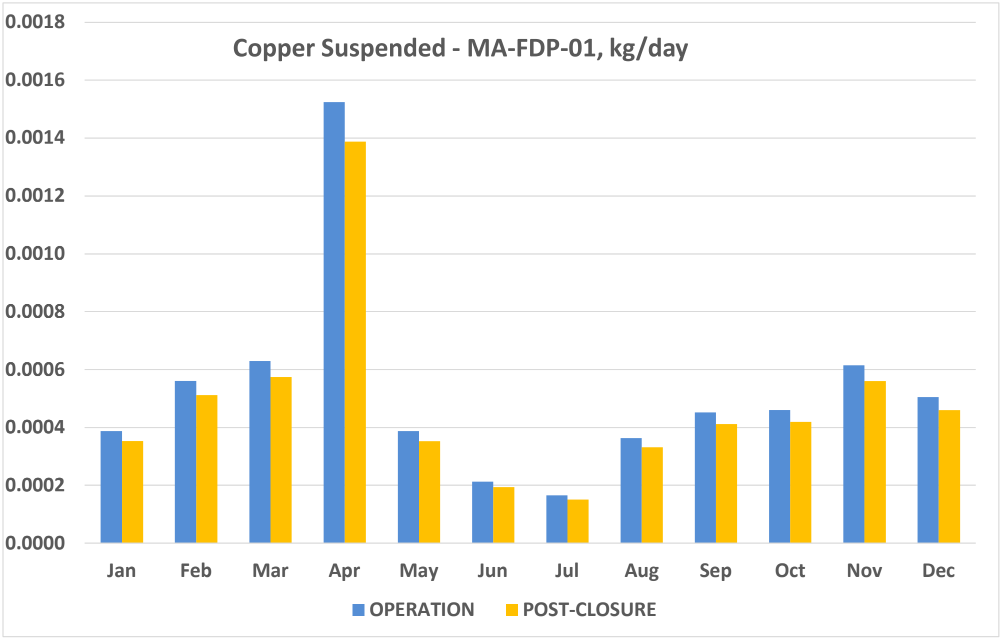

Cadmium Suspended - LP-FDP-01, kg/day
0.000004
0.000004
0.000003
0.000003
0.000002
0.000002
0.000001
0.000001
0.000000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

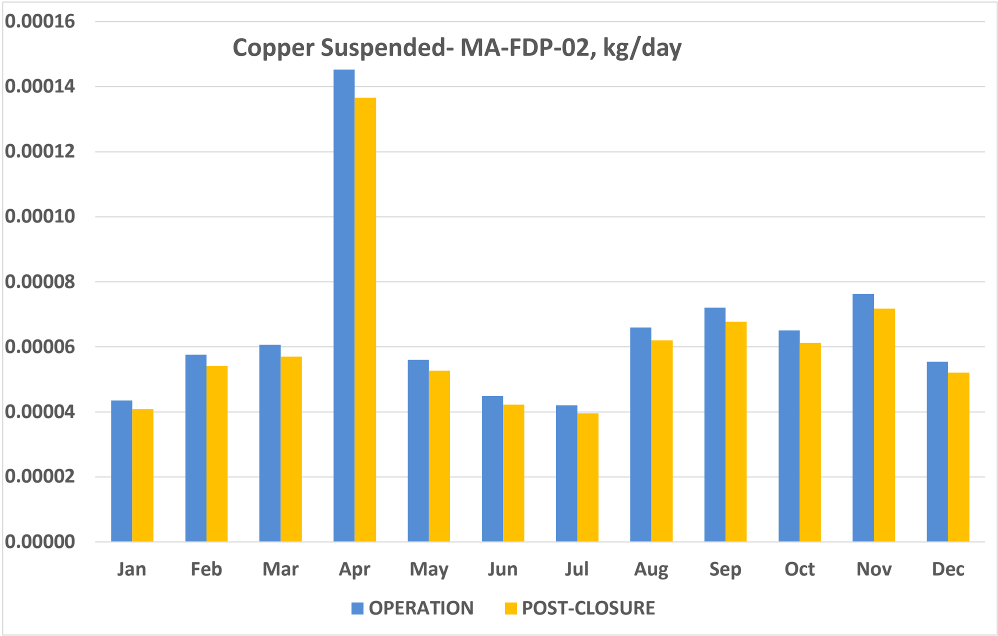

Cadmium Suspended - LP-FDP-02, kg/day
0.000001
0.000001
0.000001
0.000001
0.000000
0.000000
0.000000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

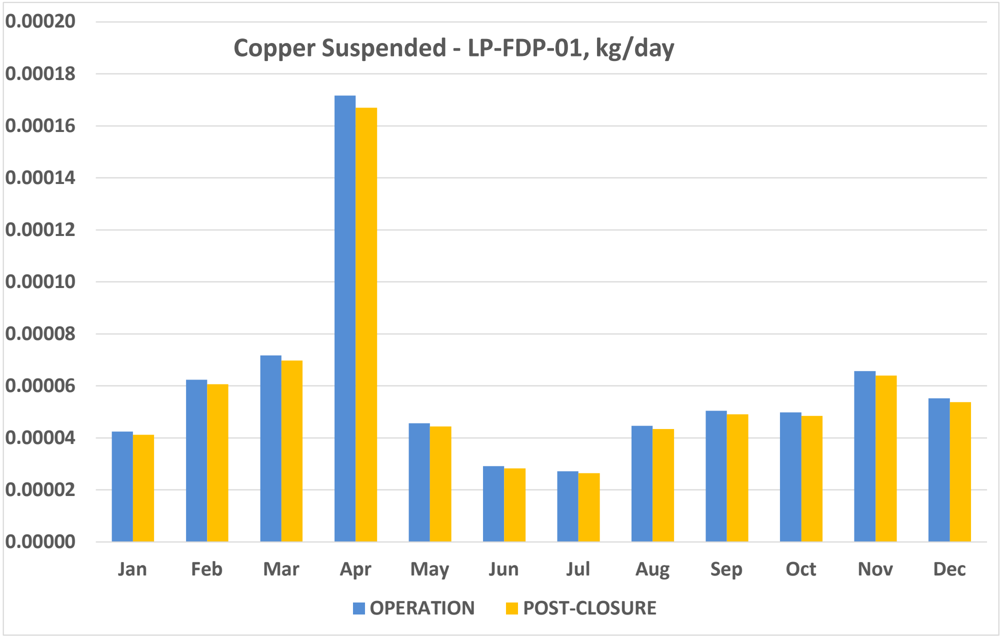

Cadmium Suspended - MA-FDP-03/04, kg/day
0.000180
0.000160
0.000140
0.000120
0.000100
0.000080
0.000060
0.000040
0.000020
0.000000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

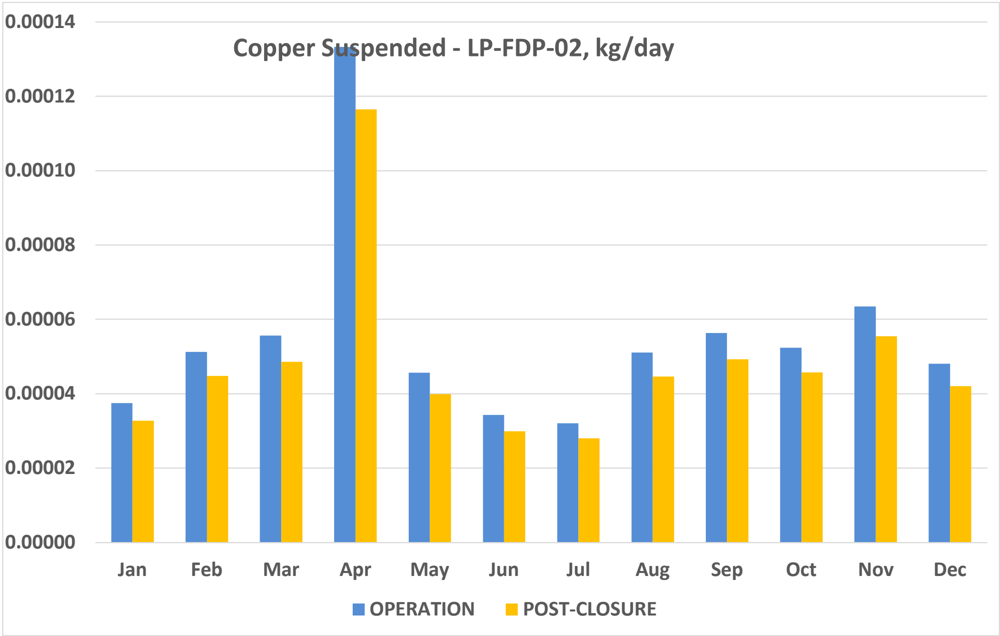

Cadmium Suspended - LP-FDP-04, kg/day
0.000008
0.000007
0.000006
0.000005
0.000004
0.000003
0.000002
0.000001
0.000000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

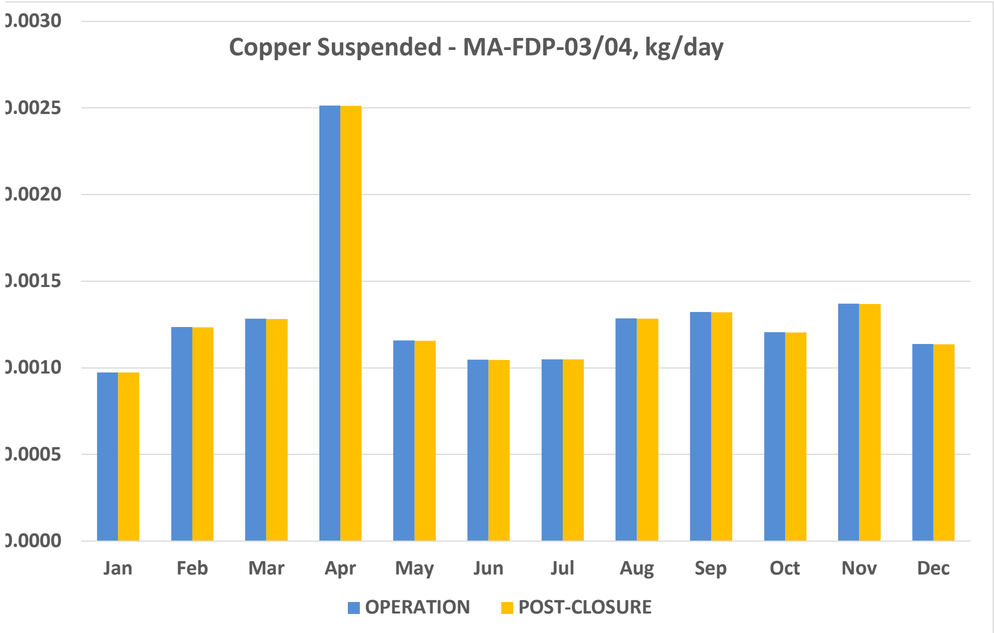

Cadmium Suspended - LP-FDP-03/05, kg/day
0.000014
0.000012
0.000010
0.000008
0.000006
0.000004
0.000002
0.000000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Copper Suspended - MA-FDP-01, kg/day
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE

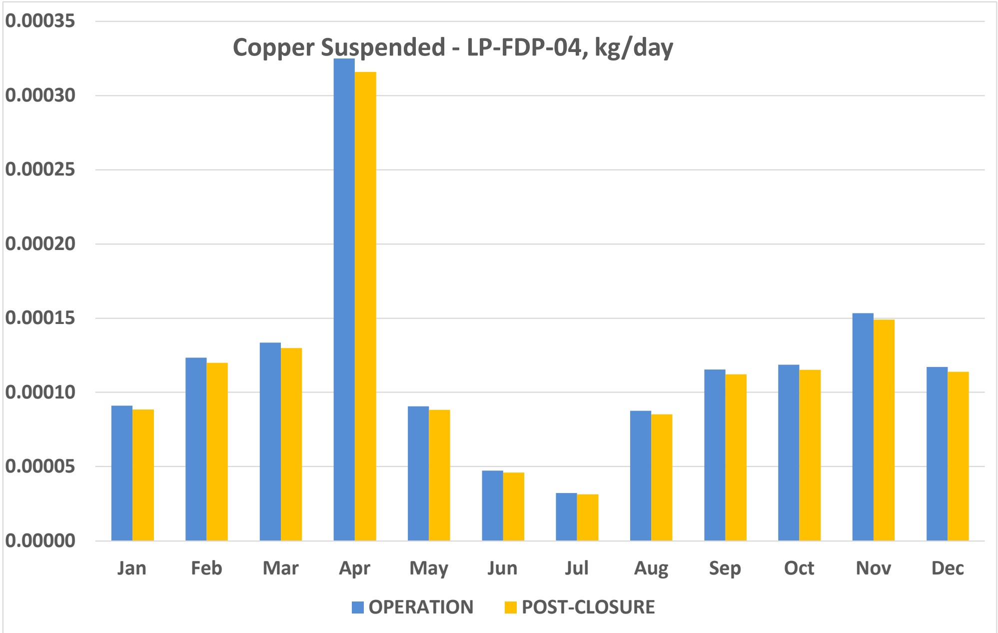

Copper Suspended- MA-FDP-02, kg/day
0.00016
0.00014
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE


Copper Suspended - LP-FDP-01, kg/day
0.00020
0.00018
0.00016
0.00014
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE

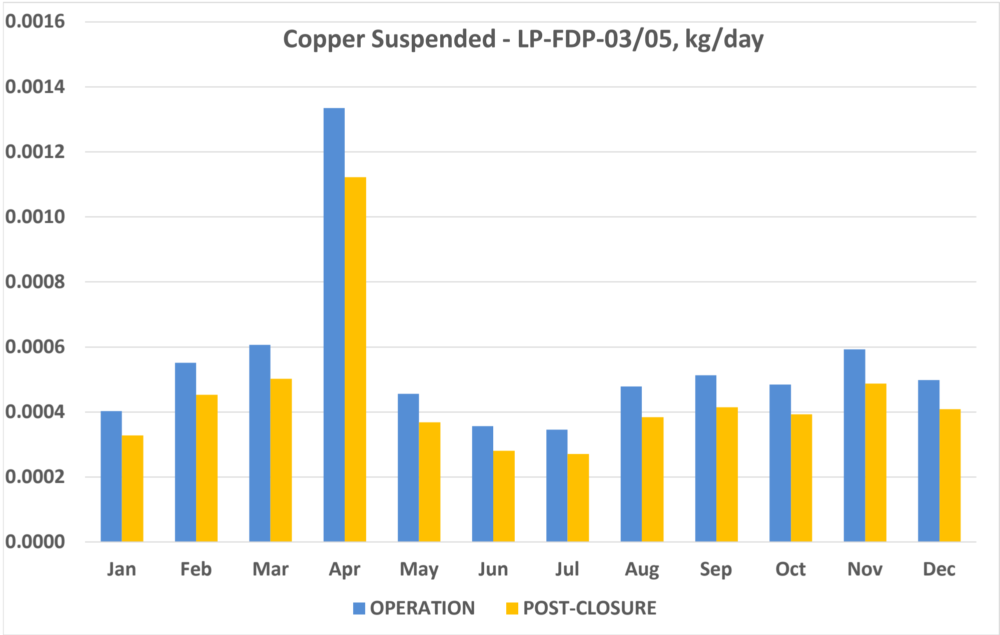

Copper Suspended - LP-FDP-02, kg/day
0.00014
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE



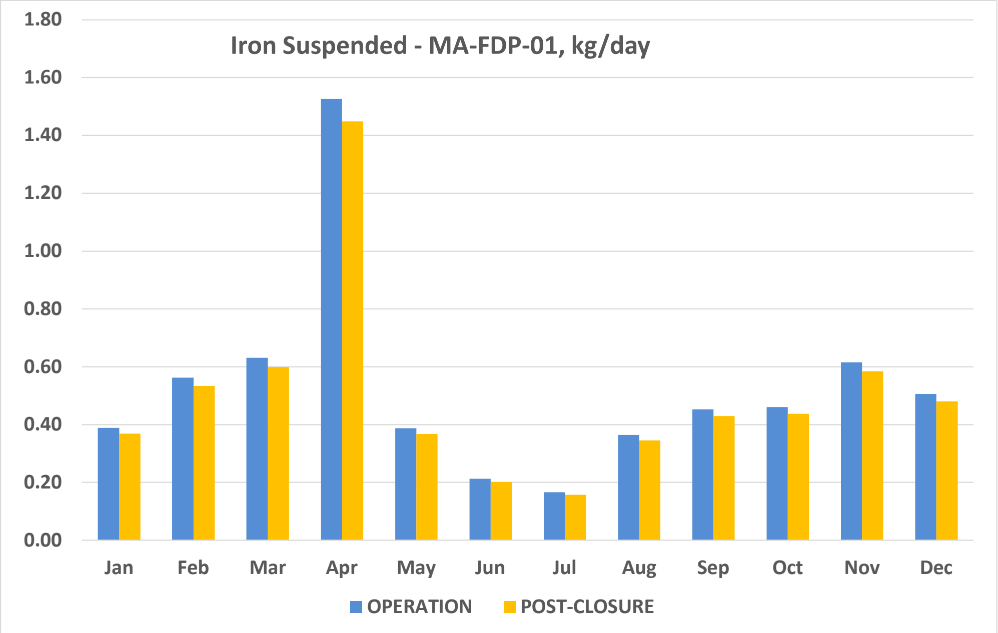
Copper Suspended - MA-FDP-03/04, kg/day
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

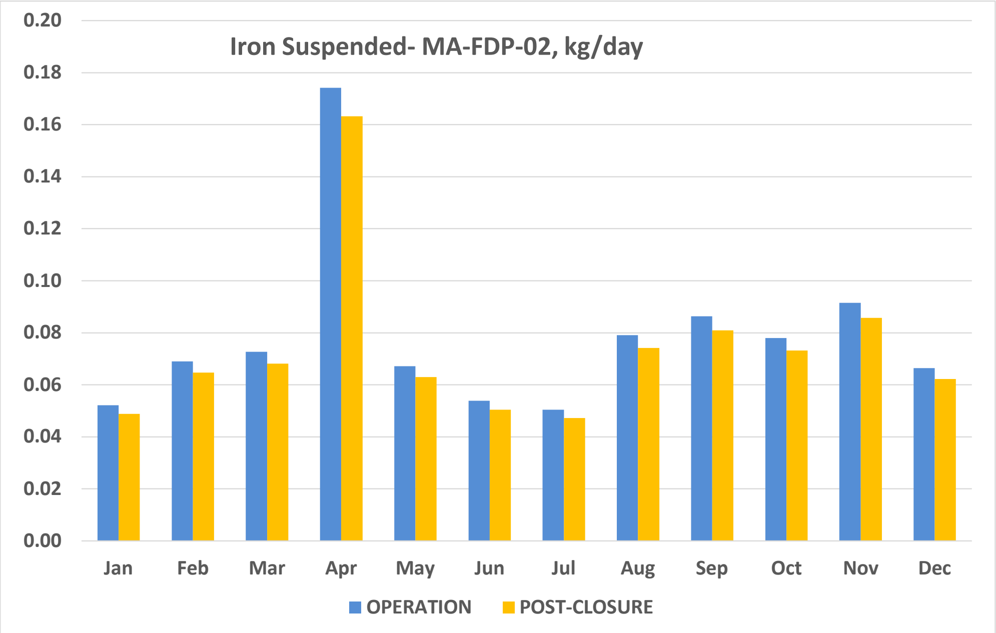


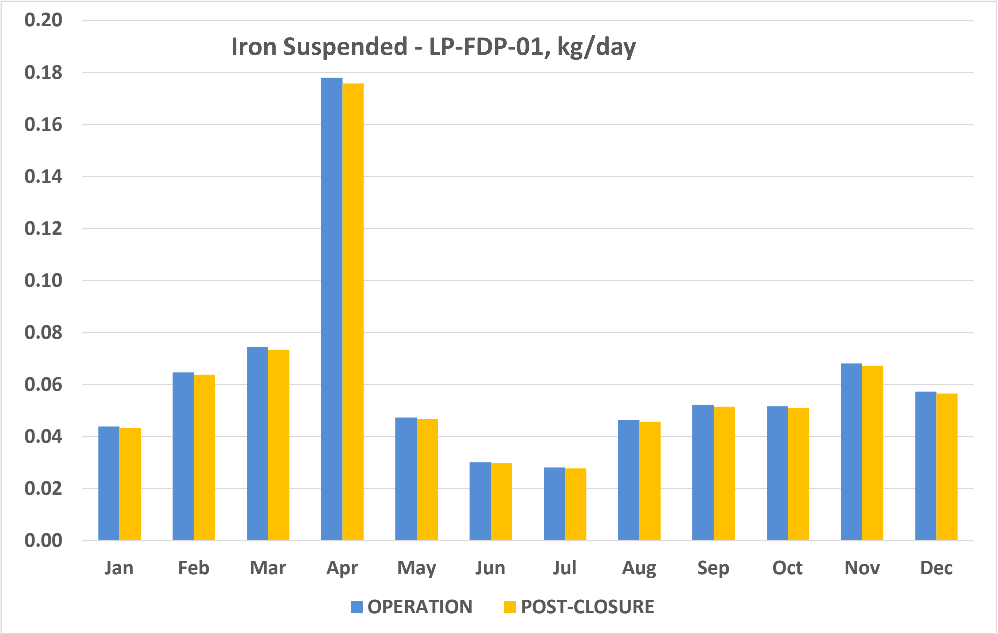
Copper Suspended - LP-FDP-04, kg/day
0.00035
0.00030
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE

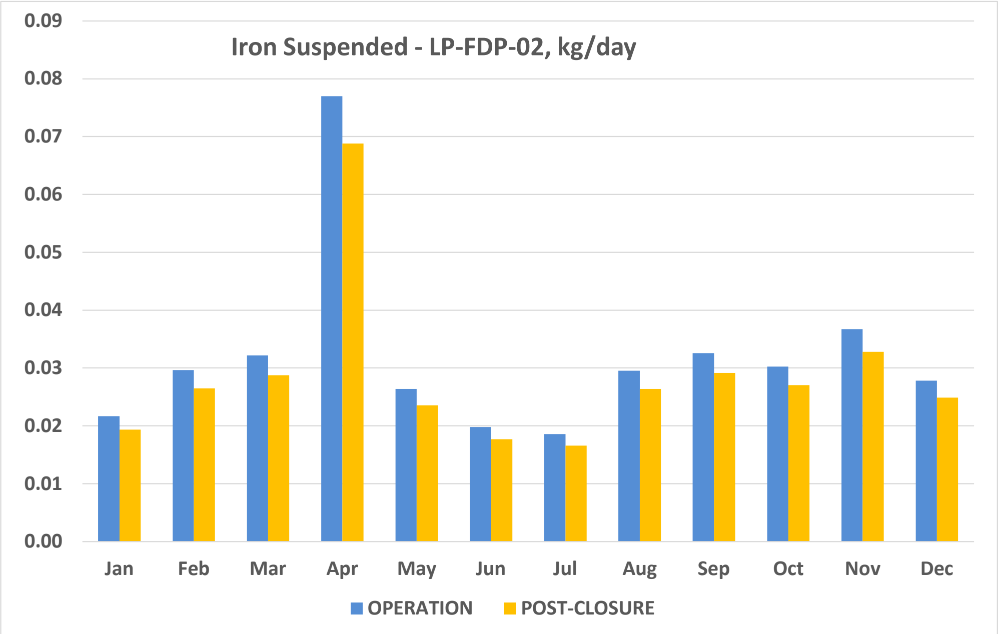


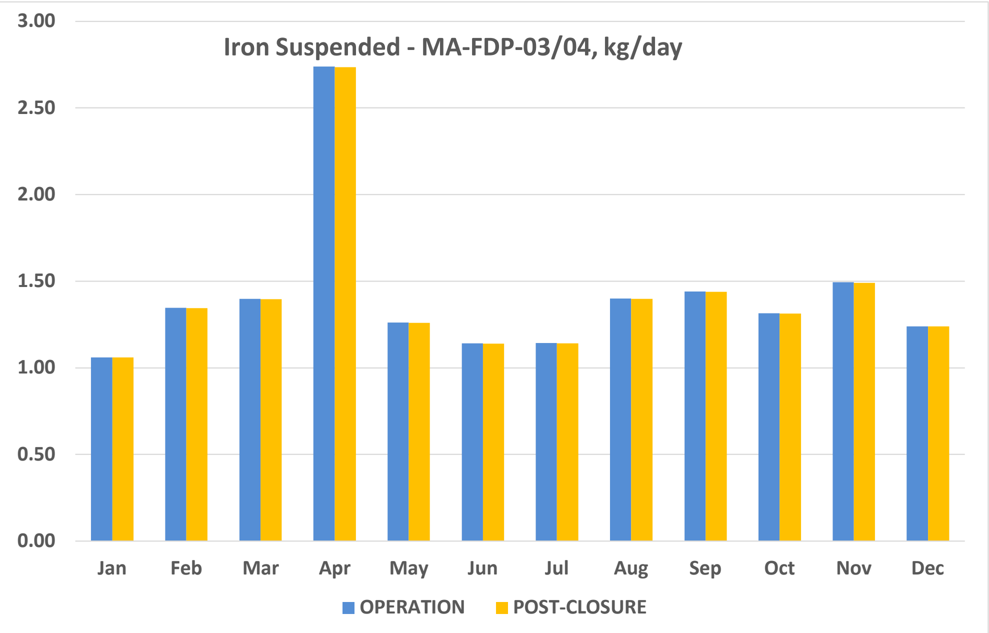
Copper Suspended - LP-FDP-03/05, kg/day
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Iron Suspended - MA-FDP-01, kg/day
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE


Iron Suspended- MA-FDP-02, kg/day
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE


Iron Suspended - LP-FDP-01, kg/day
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE


Iron Suspended - LP-FDP-02, kg/day
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE


Iron Suspended - MA-FDP-03/04, kg/day
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Jan
Feb
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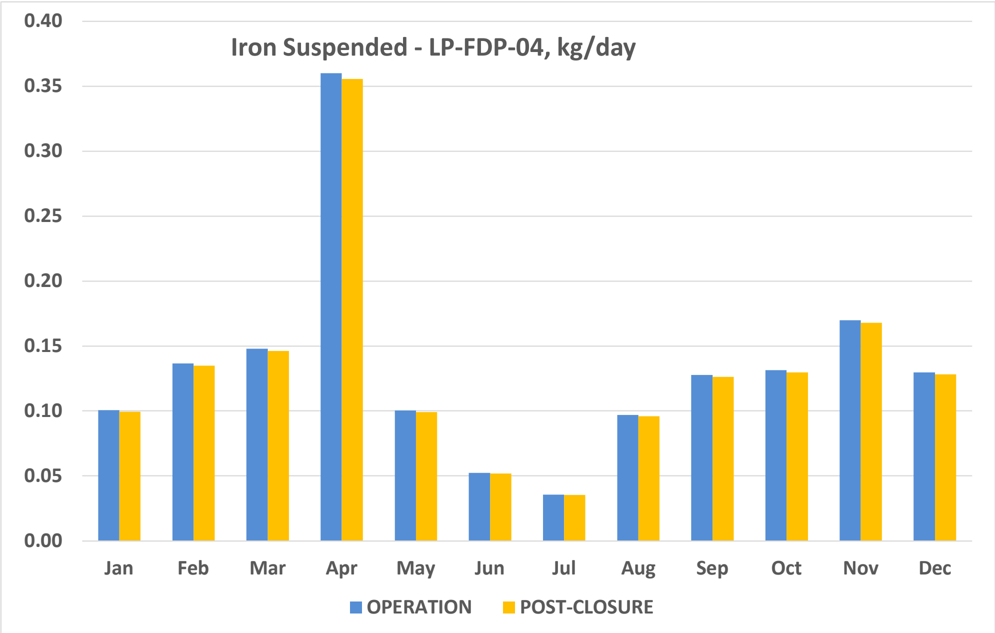
Dec
OPERATION
POST-CLOSURE


Iron Suspended - LP-FDP-04, kg/day
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Jan
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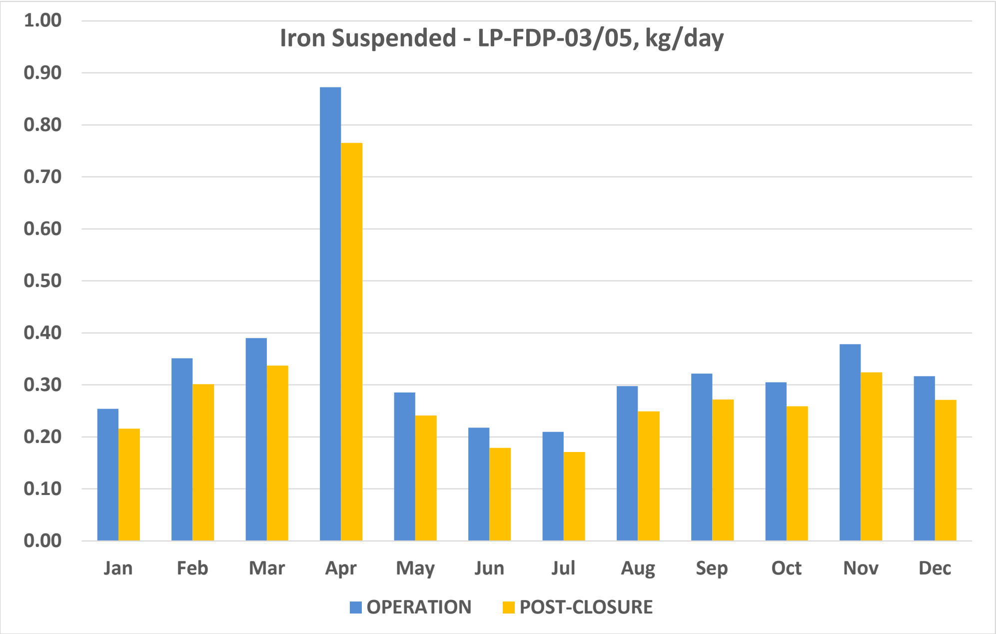
Nov
Dec
OPERATION
POST-CLOSURE


Iron Suspended - LP-FDP-03/05, kg/day
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Jan
Feb
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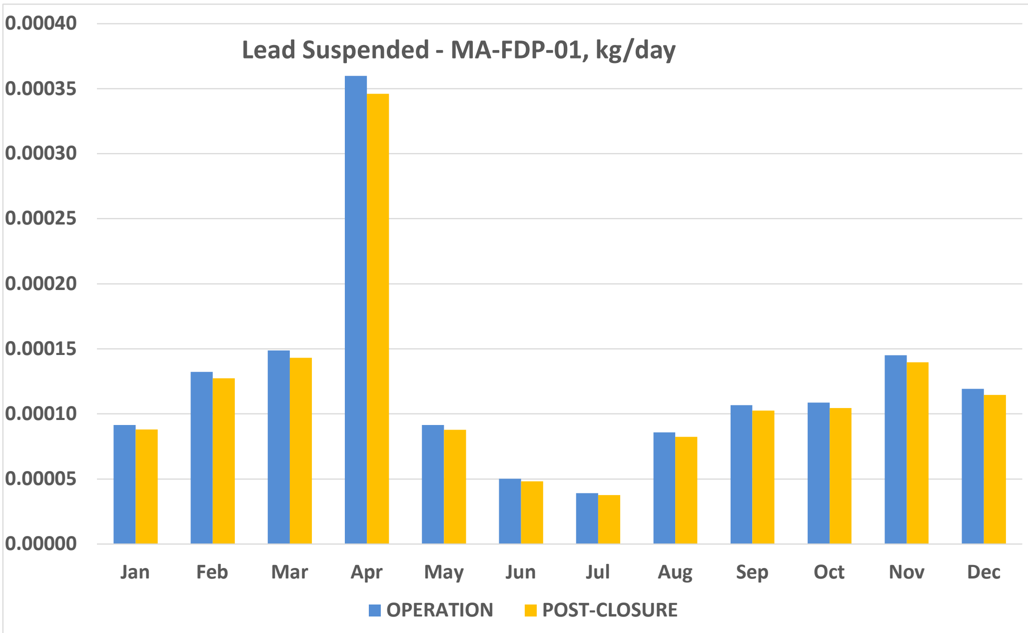
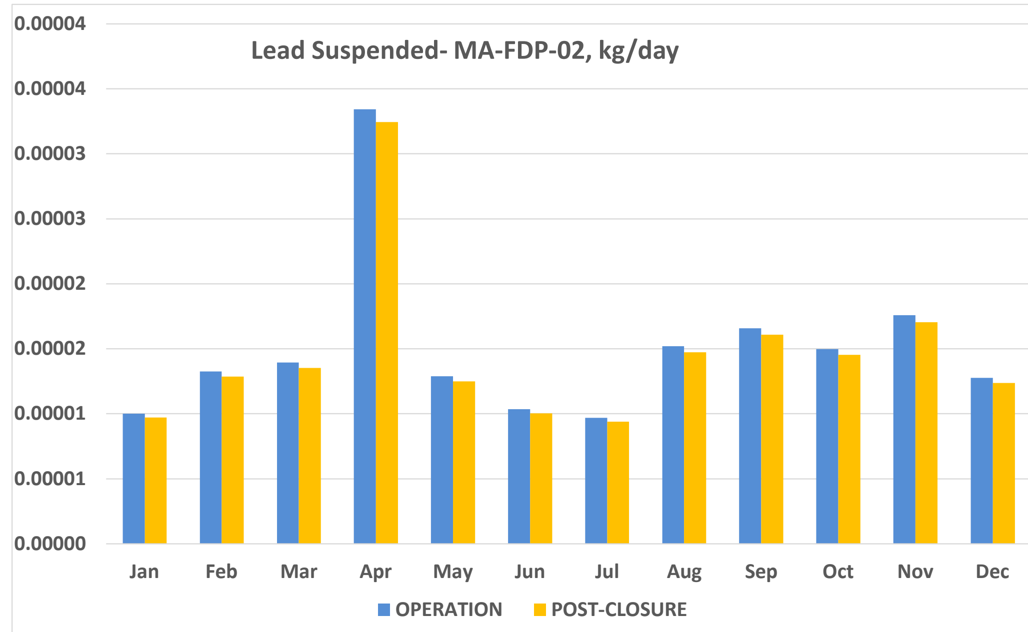
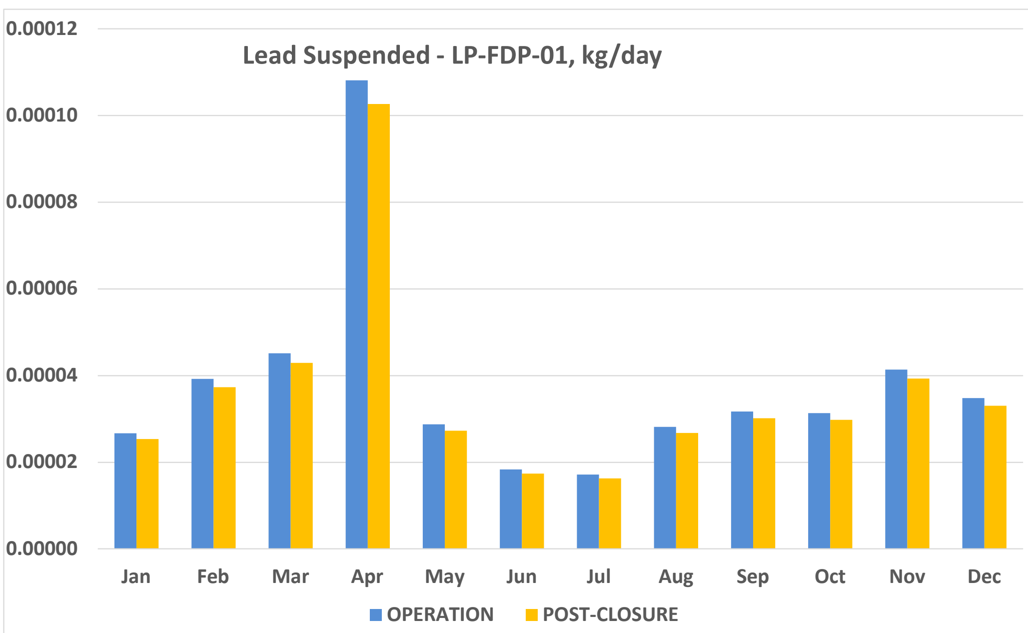
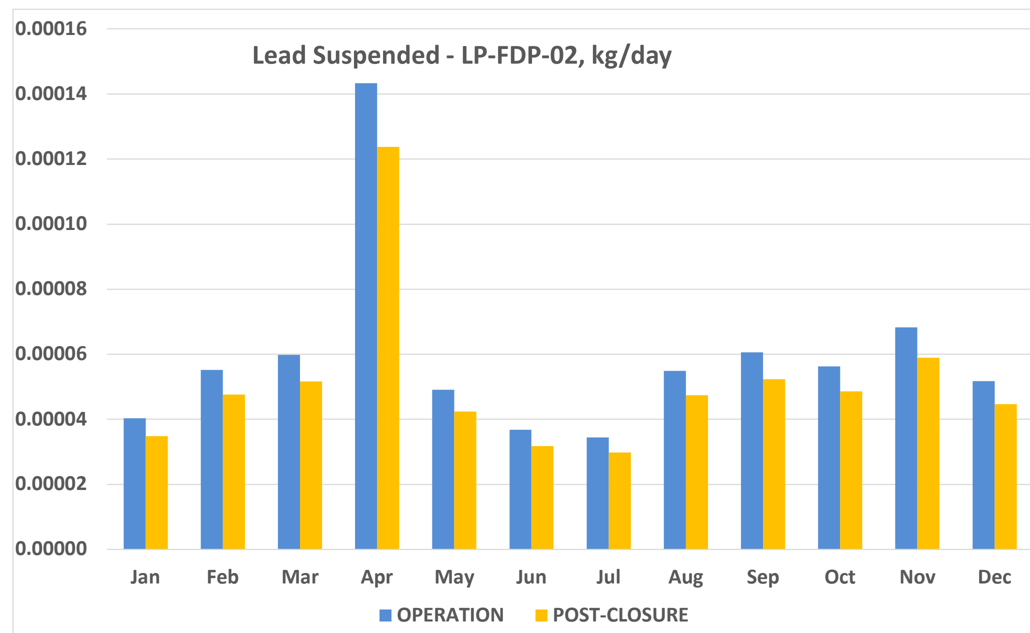
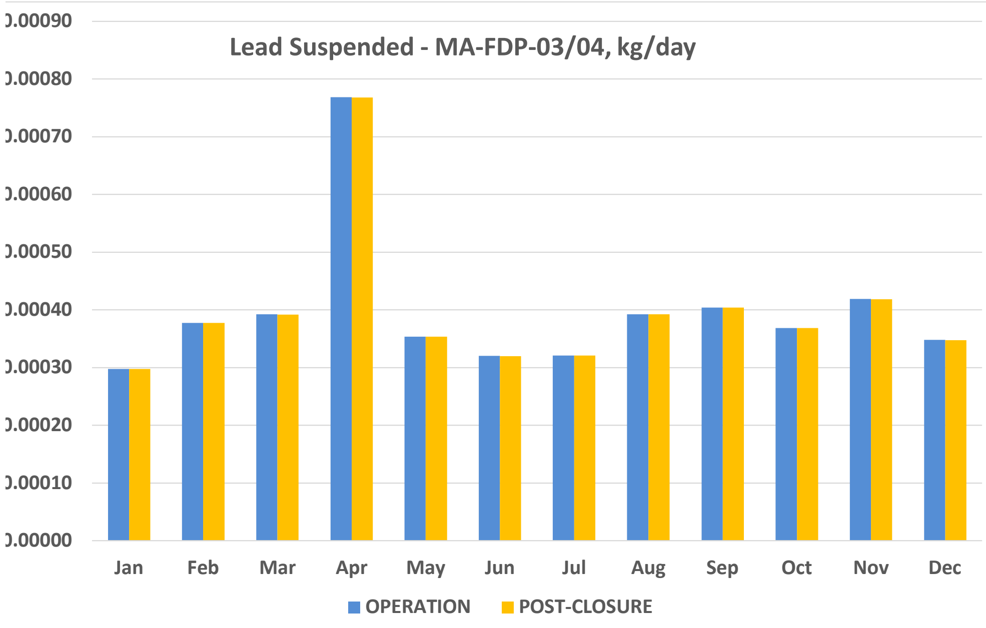
Dec
OPERATION
POST-CLOSURE


Lead Suspended - MA-FDP-01, kg/day
0.00040
0.00035
0.00030
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Lead Suspended- MA-FDP-02, kg/day
0.00004
0.00004
0.00003
0.00003
0.00002
0.00002
0.00001
0.00001
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Lead Suspended - LP-FDP-01, kg/day
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Lead Suspended - LP-FDP-02, kg/day
0.00016
0.00014
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION
POST-CLOSURE


Lead Suspended - MA-FDP-03/04, kg/day
0.00090
0.00080
0.00070
0.00060
0.00050
0.00040
0.00030
0.00020
0.00010
0.00000
Jan
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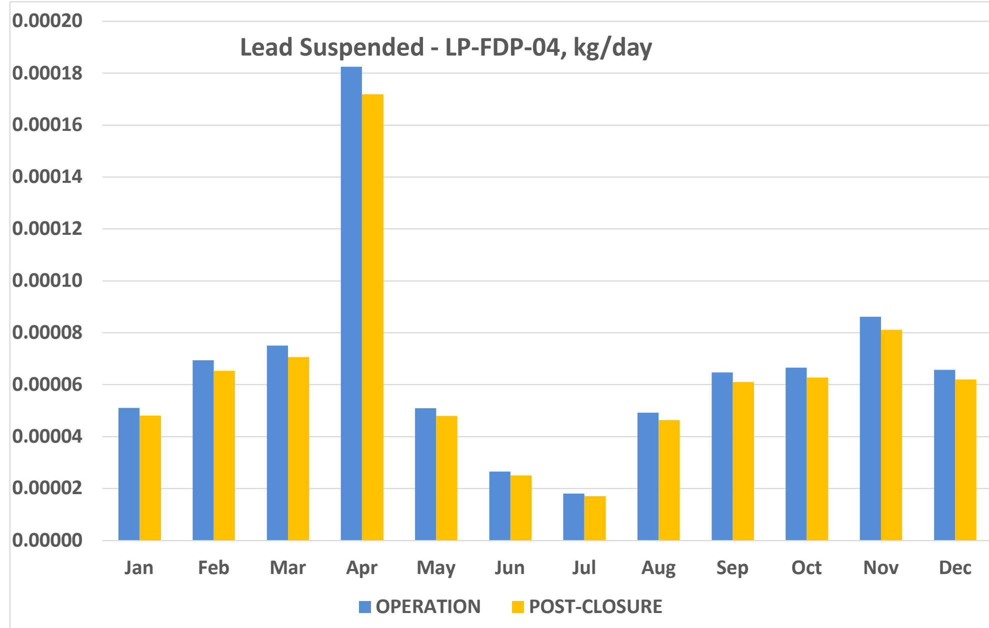
Nov
Dec
OPERATION
POST-CLOSURE


Lead Suspended - LP-FDP-04, kg/day
0.00020
0.00018
0.00016
0.00014
0.00012
0.00010
0.00008
0.00006
0.00004
0.00002
0.00000
Jan
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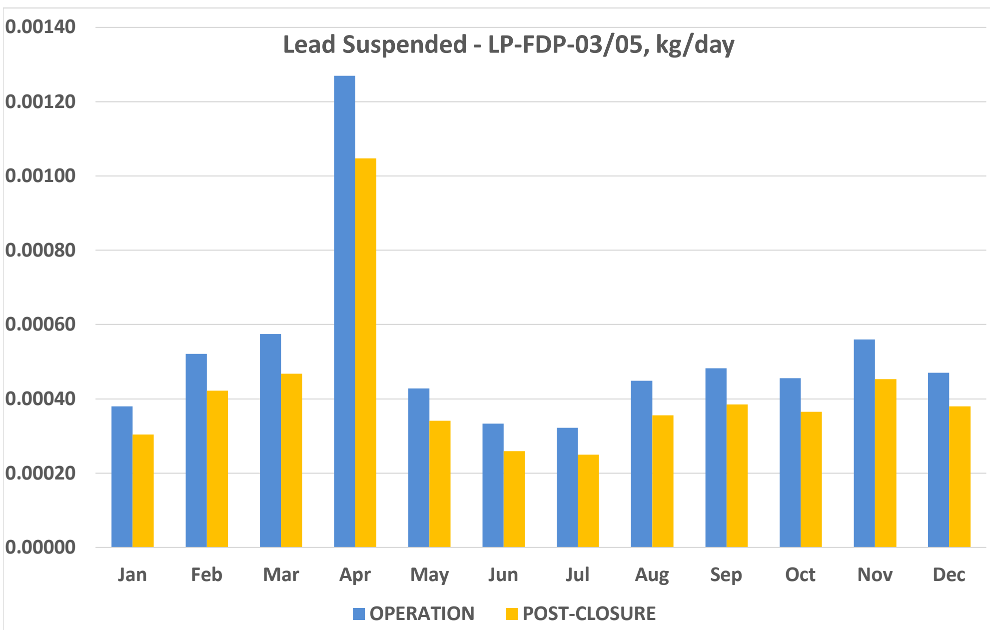
Nov
Dec
OPERATION
POST-CLOSURE


Lead Suspended - LP-FDP-03/05, kg/day
0.00140
0.00120
0.00100
0.00080
0.00060
0.00040
0.00020
0.00000
Jan
Feb
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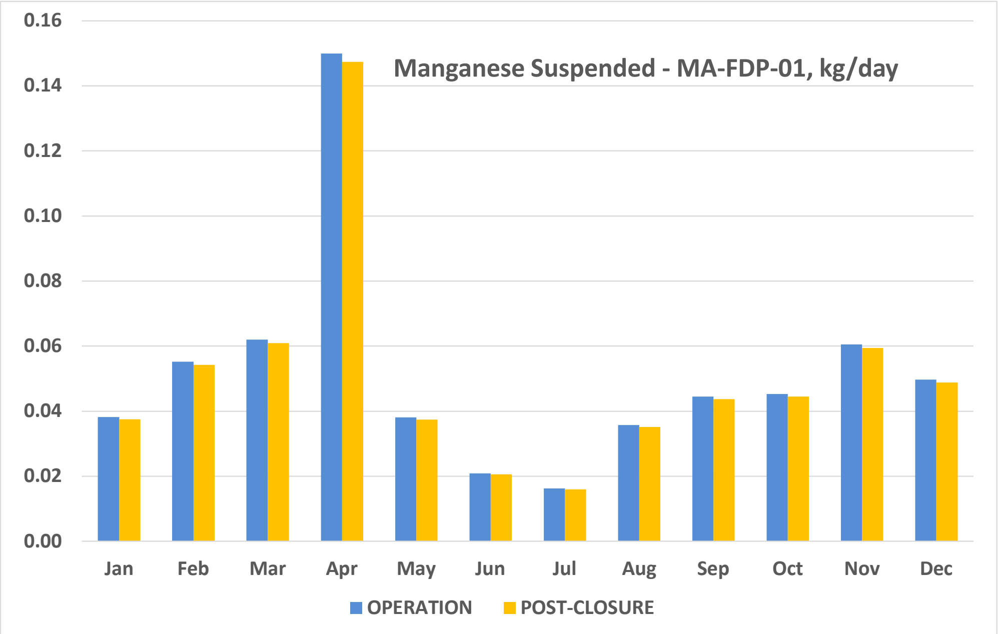
Nov
Dec
OPERATION
POST-CLOSURE


Manganese Suspended - MA-FDP-01, kg/day
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Jan
Feb
Mar
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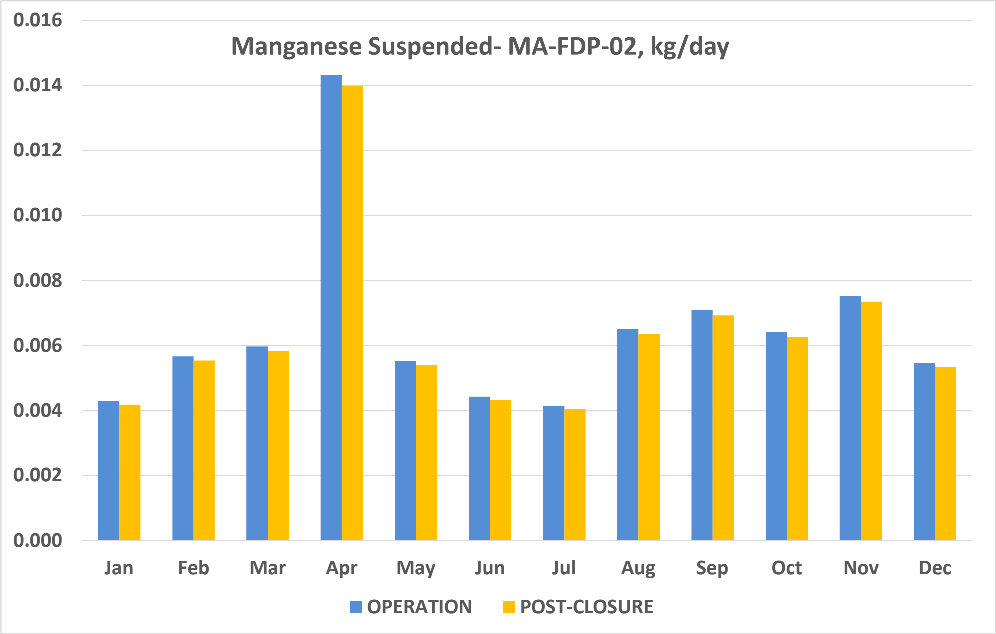
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Manganese Suspended- MA-FDP-02, kg/day
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Jan
Feb
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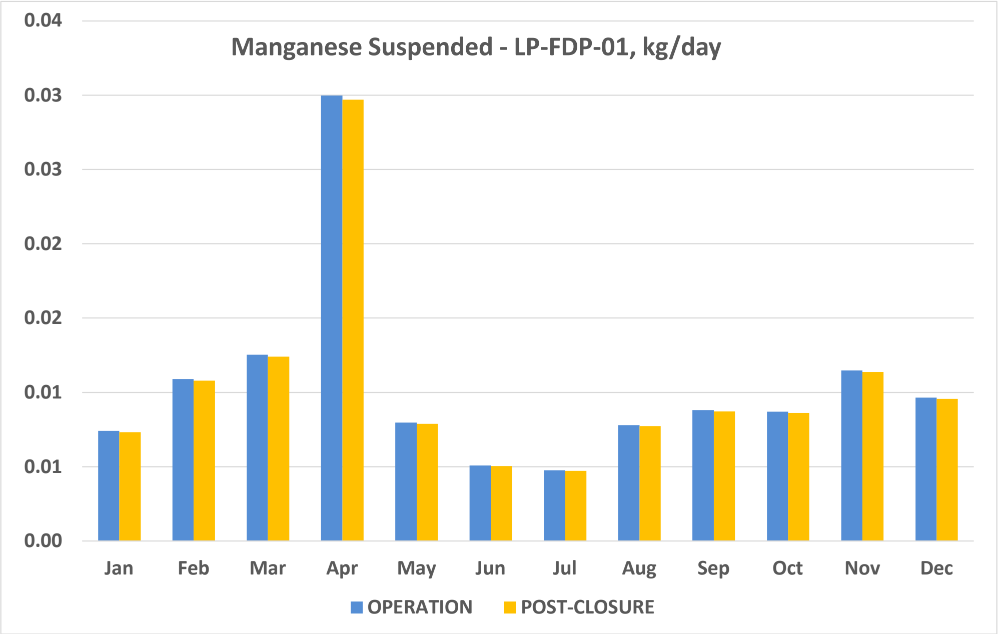
OPERATION
POST-CLOSURE


Manganese Suspended - LP-FDP-01, kg/day
0.04
0.03
0.03
0.02
0.02
0.01
0.01
0.00
Jan
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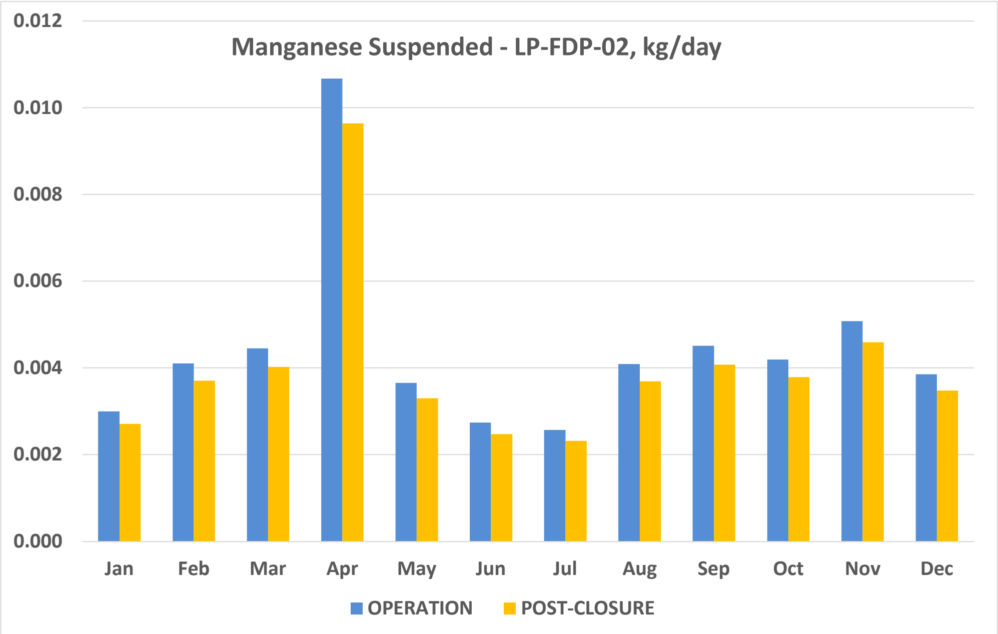
Dec
OPERATION
POST-CLOSURE


Manganese Suspended - LP-FDP-02, kg/day
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Jan
Feb
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Apr
May
Jun
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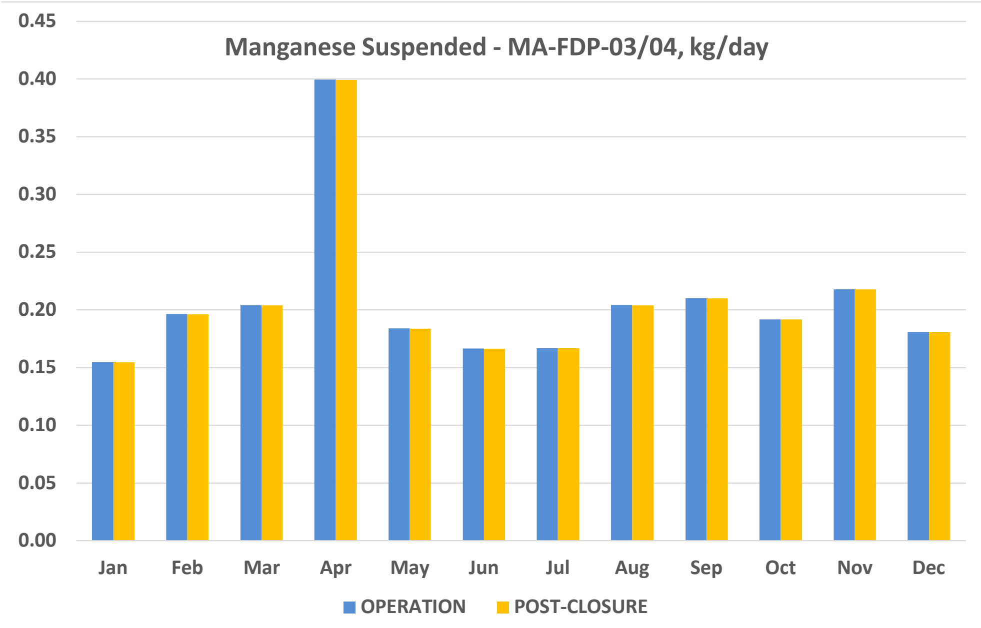
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Manganese Suspended - MA-FDP-03/04, kg/day
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Jan
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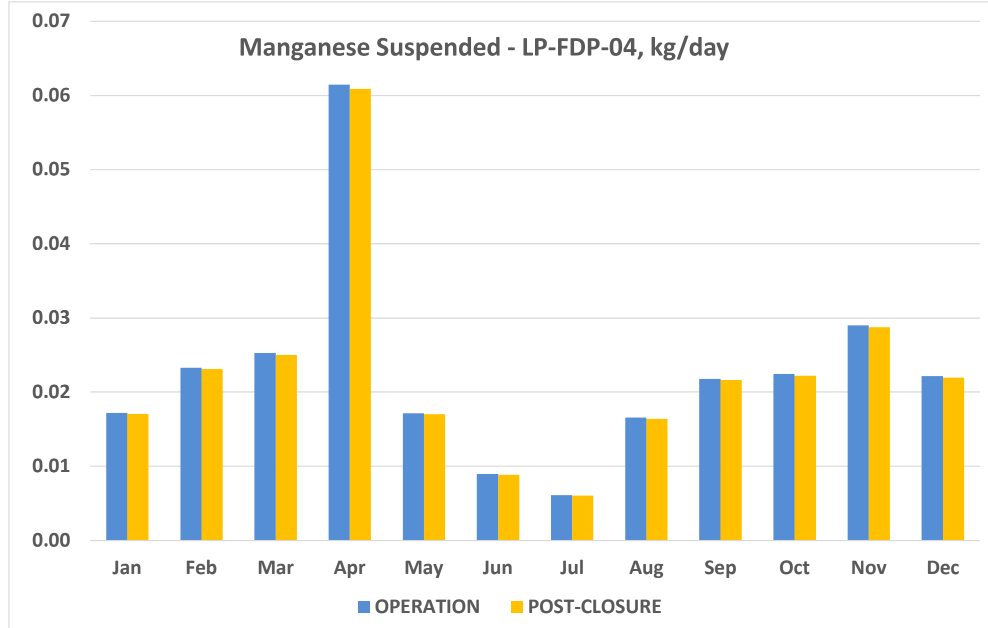
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE


Manganese Suspended - LP-FDP-04, kg/day
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Jan
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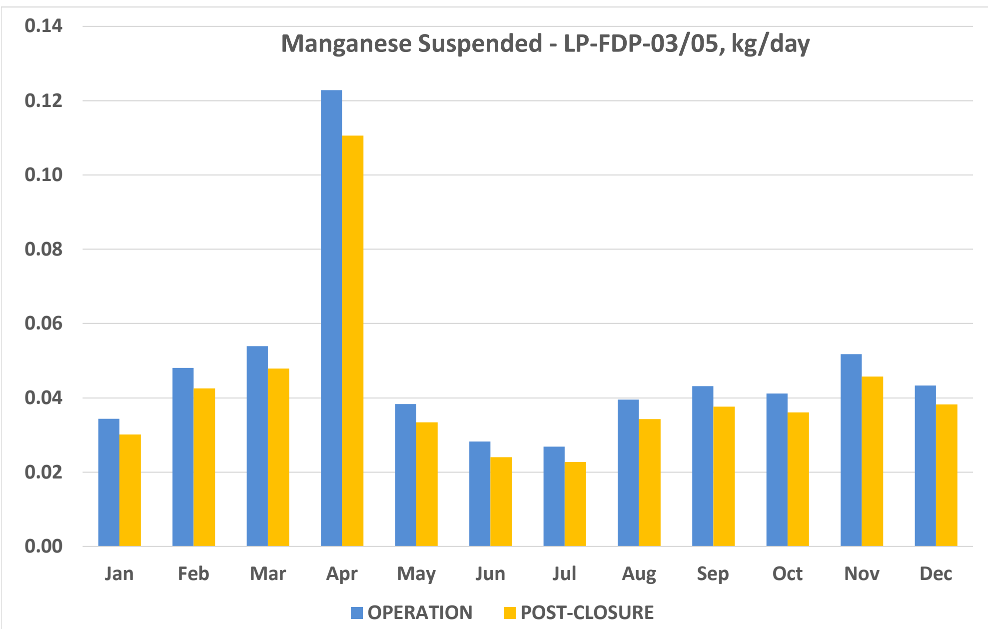
Nov
Dec
OPERATION
POST-CLOSURE


Manganese Suspended - LP-FDP-03/05, kg/day
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Jan
Feb
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Sep
Oct
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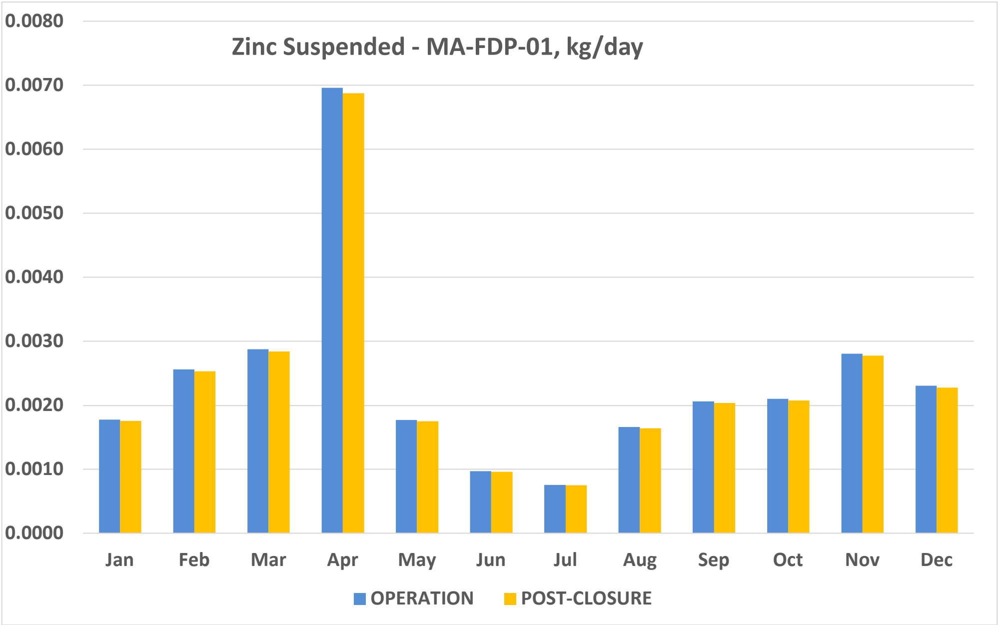
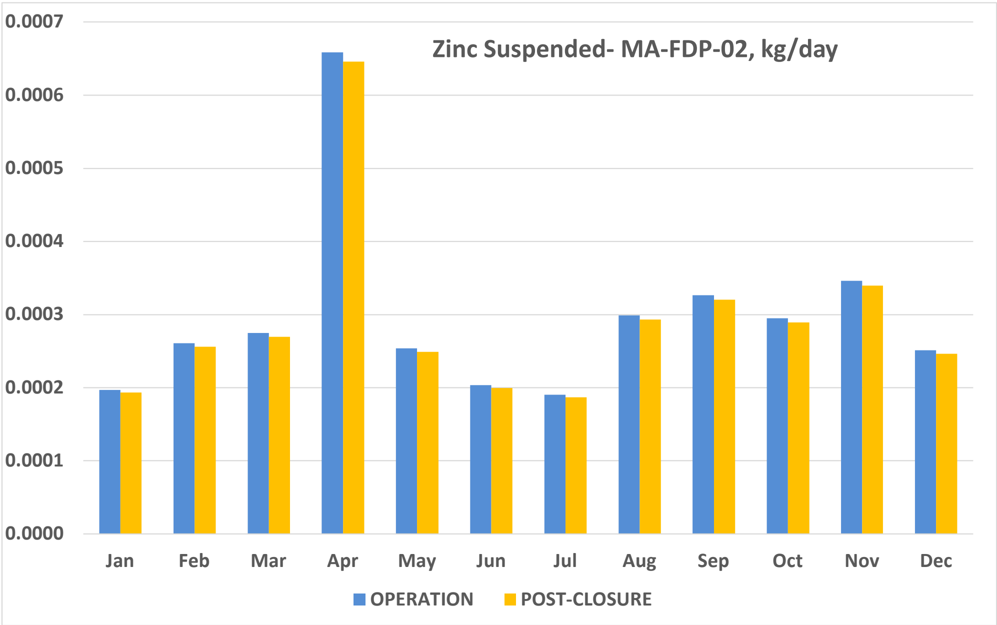
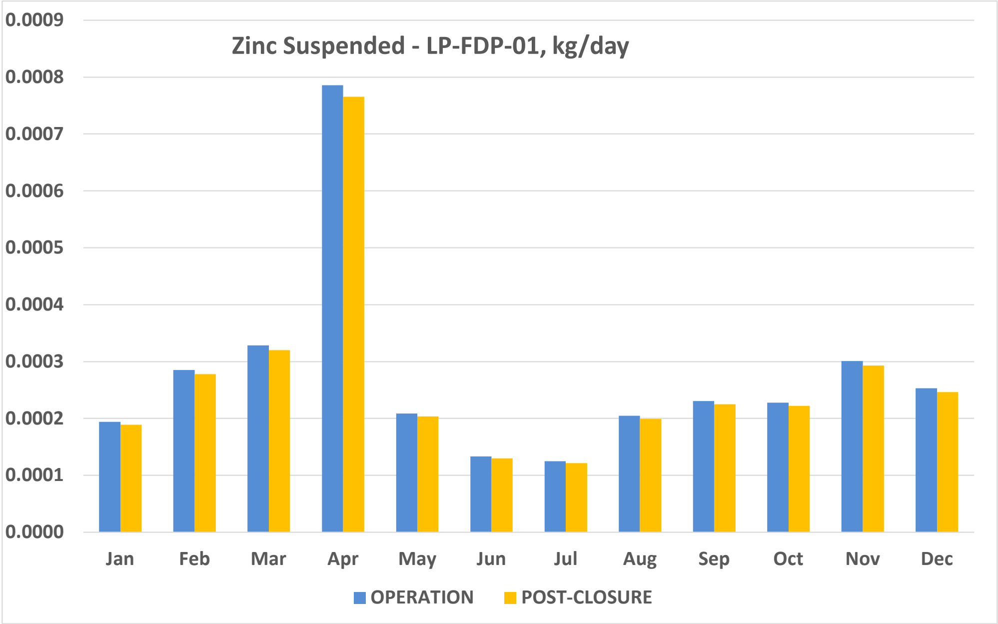
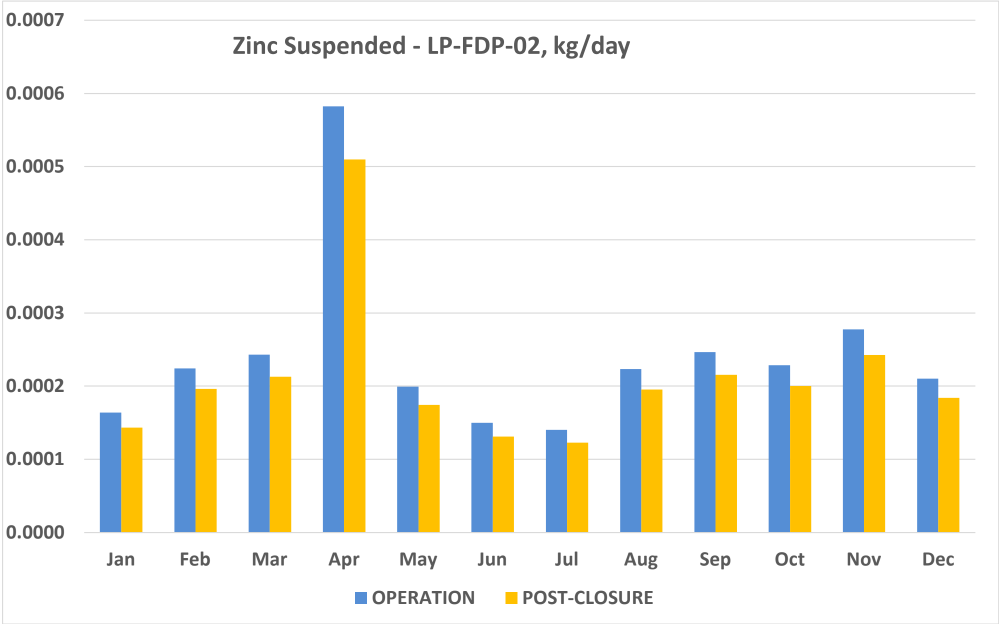
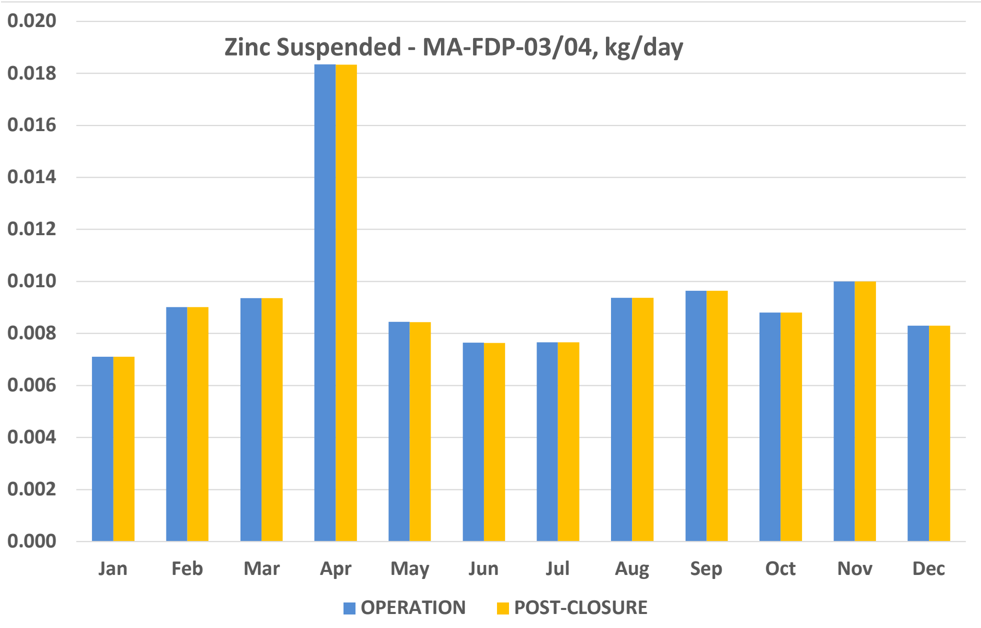
Dec
OPERATION
POST-CLOSURE


Zinc Suspended - MA-FDP-01, kg/day
0.0080
0.0070
0.0060
0.0050
0.0040
0.0030
0.0020
0.0010
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE


Zinc Suspended- MA-FDP-02, kg/day
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE


Zinc Suspended - LP-FDP-01, kg/day
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE


Zinc Suspended - LP-FDP-02, kg/day
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
OPERATION POST-CLOSURE



Zinc Suspended - MA-FDP-03/04, kg/day
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Jan
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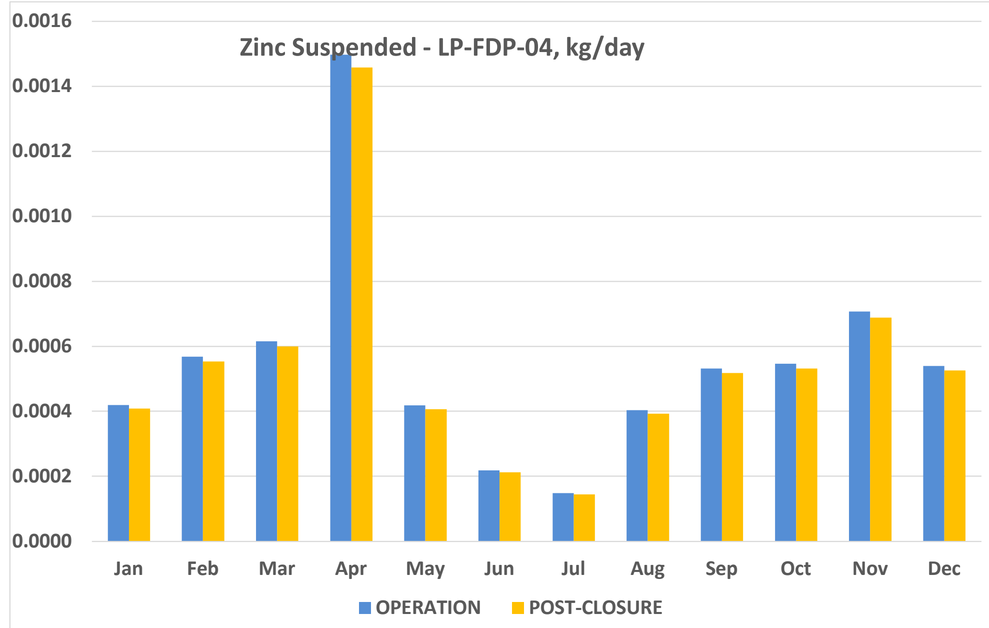
Oct
Nov
Dec
OPERATION
POST-CLOSURE



Zinc Suspended - LP-FDP-04, kg/day
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
Jan
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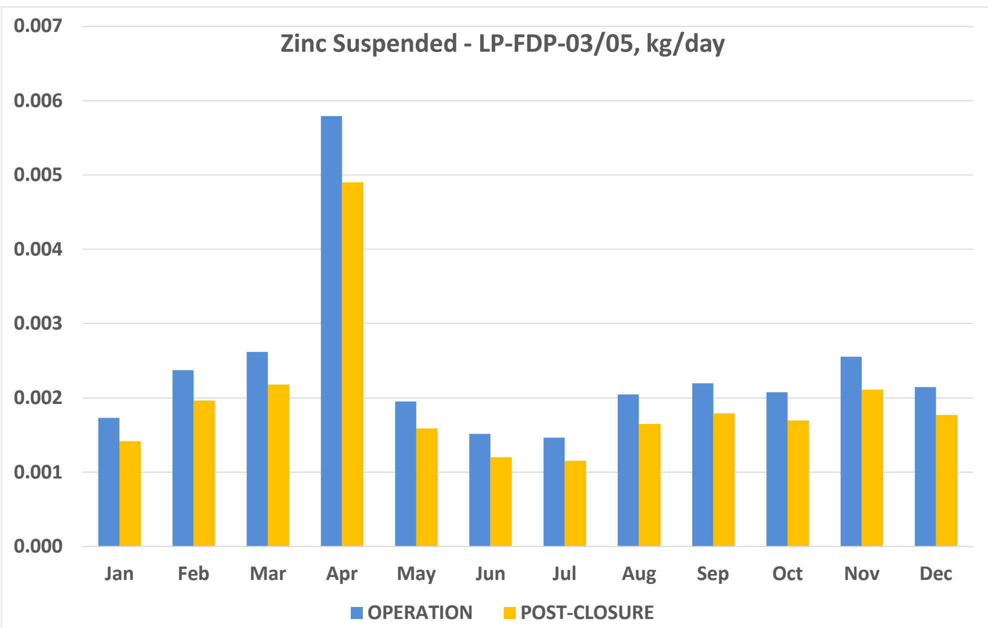
Dec
OPERATION
POST-CLOSURE



Zinc Suspended - LP-FDP-03/05, kg/day
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
OPERATION
POST-CLOSURE