

Appendix E Wildlife-Water Monitoring and Management Plan

E.1 Background

Mining operations produce waste that can contain substances that may be harmful to wildlife. Open water features located at mining facilities (specifically tailings management facilities [TMF]) have been associated with migratory bird use and mortality (Timoney and Ronconi 2010; St. Clair 2014). In Canada, many occurrences of bird mortality associated with TMFs have resulted from the oilsands and much of the research around wildlife risks and deterrents is based on oilsands tailings (Boag and Lewin 1980; St. Clair 2014). However, different types of mining result in different TMFs with different water quality characteristics and associated resulting risks to wildlife.

Gold mines have been associated with migratory bird mortalities as a result of cyanide use (Henny et al. 1994; Northern Territory of Australia 1998). The International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide In the Production of Gold (Cyanide Code) indicates that cyanide levels of less than 50 mg/L WAD are appropriate for wildlife protection (ICMI 2007).

A mitigation measure, monitoring plan, triggers, and corrective actions have been identified to protect wildlife (specifically waterfowl and large mammals) that have the potential to come in contact with the TMF and water management collection ponds at the Hardrock Mine.

E.2 Mitigation

During all phases of the Project:

- To reduce use of the ponds by waterfowl for foraging or breeding, no vegetation will be planted on the embankments of the TMF or the water management collection ponds. Vegetation that naturally regenerates around seepage and water collection ponds and the TMF will be removed as required.

E.3 Monitoring

The monitoring program will include vegetation growth, wildlife use and water quality monitoring of open water project areas as follows:

- Once per month during the growing season (May to September) the perimeter embankments of the TMF and the collection ponds will be visually inspected for evidence of revegetation.
- Water quality in the TMF and the collection ponds will be monitored as part of internal operations.
- During operation of the mine, open water areas associated with the Project such as the TMF and the collection (i.e., Ponds T2, T3, D2, D1, M1, B1, B2, A2, A1, C1) will be monitored for use by

wildlife, with an emphasis on waterfowl and large mammals such as moose. From the start of filling of the pit lake until the end of decommissioning the pit lake will also be monitored for use by wildlife in accordance with the methods outlined below:

- The survey of the TMF and each operational collection pond will be completed from a single survey station at each feature. The survey stations will be selected based on accessibility, safety, repeatability, and a suitable field of view of the pond surface. Extra survey stations will be added if additional vantage points are required to obtain full visibility of the features.
- Twice a week, starting at spring break-up and continuing until the start of freeze up (approximately April to October), environment staff will survey the TMF pond and operational collection ponds. The surveyor will use binoculars and/or a spotting scope as required. If waterfowl are present, the surveyor will document their species, age class, behaviour (e.g., resting, feeding, flying over), abundance, and specific location (to be marked on a large-scale site map). Observations of flyovers (i.e., any birds flying directly over the water feature, but not landing) will also be recorded. Species, number and flight height and direction of flyovers will be documented.
- Observations of other wildlife, including evidence of their presence (e.g., tracks, scat) will also be recorded. In addition, as described above, project personnel and contractors will be instructed to report sightings of wildlife near or within the TMF boundaries and other project water areas directly to the Environmental Superintendent, by radio or in person. These sightings will be recorded in the wildlife observation log maintained by GGM.
- Any occurrences of wildlife mortality observed in the TMF or operational collection ponds will be recorded (species, number of individuals, location)
- During each survey, surveyors will also record any visual evidence indicating abnormal water conditions (e.g. odour, cloudiness, oil sheen)

The monitoring program will be reassessed annually considering water quality monitoring data and wildlife use survey results. For example, monitoring may be discontinued at open water areas that have no recorded use by waterfowl or mammals after the first year of monitoring, if water quality data indicate little to no risk of exposure to wildlife, or the monitoring period may be adjusted to reflect periods of use.

E.4 Thresholds and Corrective Actions

Measures to deter wildlife from the TMF or other open water areas will be directed by the Environment Superintendent as needed. Wildlife use data from the TMF and collection ponds will be reviewed to identify the need for such measures and water quality monitoring data will be used to further assess risk to wildlife and inform the need for corrective actions. Specific corrective actions will need to be determined based on the results of wildlife use data (species, numbers, behaviour, and season/time of day of use).

Corrective actions will be implemented:

- If revegetation is observed along the perimeter embankments of the TMF or the collection ponds
- If the water quality monitoring results indicate cyanide levels that exceed 40 mg/L WAD (i.e. prior to the 50 mg/L WAD Cyanide Code threshold)
- If wildlife use monitoring records the following:
 - Consistent observations of waterfowl use over a one-month period
 - A mortality of waterfowl or large mammals (e.g., bear, moose) in or adjacent to the open water areas associated with the Project (e.g., TMF or the collection ponds)
 - More than one incidence of a large mammal (e.g., moose, bear) entering the TMF per year

The Environmental Superintendent, in consultation with relevant regulatory agencies and possibly a qualified biologist, will direct corrective actions to deter/exclude wildlife based on the wildlife use data.

Corrective actions may include:

- Prevention of continued vegetation growth will be controlled using manual methods (e.g., pulling, cutting, tarping)
- Use of automated auditory deterrents (e.g., air horns, propane bangers) at certain times of the year (e.g., spring) and for certain durations (e.g., one month), based on observations at the TMF
- Installation of site-specific visual deterrents (e.g., posts with predator decoys, reflectors strung along or over sections of the TMF)
- Strategic placement of fences or barriers along sections of the TMF

Upon implementation of a corrective action, continued monitoring will assess the action's effectiveness. If the corrective action is determined to be ineffective (i.e., number of individuals observed does not decrease after implementation) the deterrents will be re-evaluated and changed, as appropriate.

E.5 Reporting and Notifications

Any abnormal water conditions or incidences of wildlife mortality will be reported as soon as possible to the Environmental Superintendent for follow up actions.

Identification of a mortality event (i.e., mortality of multiple individuals of a species, attributable to the Project) will be reported within 2 business days to CEA Agency and MNRF. Mortality of a SAR will also be reported within 2 business days to MECP.

Wildlife use of the TMF and operational collection ponds as well as the effectiveness of mitigation measures and corrective actions (i.e., vegetation control on embankments, use of wildlife deterrents) will be included in the annual Biodiversity Assessment Report for each year of mine operation. The results of the wildlife-water monitoring program will be reviewed annually by the Environmental Superintendent, qualified professionals, relevant agencies and Indigenous communities and used to revise the monitoring and corrective action plan, as required.

E.6 References

- Boag, A, D & Lewin, V. (1980). Effectiveness of Three Waterfowl Deterrents on Natural and Polluted Ponds. *The Journal of Wildlife Management*. 44. 145. 10.2307/3808360.
- C. C. St. Clair (2014) Final Report on the Research on Avian Protection Project. Prepared for Alberta Justice, Edmonton, Canada.
- Henny, Charles & J. Hallock, Robert & F. Hill, Elwood. (1994). Cyanide and migratory birds at gold mines in Nevada, USA. *Ecotoxicology* (London, England). 3. 45-58. 10.1007/BF00121387.
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