

**Mount Nansen Care and Maintenance Project  
Project Proposal**

**Appendix 7D  
Terrestrial Effects Monitoring Program**

**January, 2018**

**Government of Yukon  
Energy, Mines and Resources  
Assessment and Abandoned Mines**

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# 1 Introduction

This Terrestrial Effects Monitoring Plan (TEMP) has been prepared for the Mount Nansen Care and Maintenance Project (MNCMP; the Project) for implementation at the Mount Nansen Site (the Site). The purpose of the TEMP is to describe the specific metrics to be monitored over the five-year life of the project and, where relevant, to describe thresholds that may trigger follow up activities. The metrics covered by this TEMP include monitoring on-site metals concentrations in and on vegetation, principally located around the Tailings Storage Facility (TSF), and logging specific wildlife species observations or wildlife incidents. These metrics are discussed further in the sections below.

## 2 Monitoring On-Site Metals Depositions

### 2.1 Background

Studies of metals concentrations in soil and plant tissue have indicated that some metals concentrations (e.g., iron, aluminum, arsenic, cadmium) on Site are elevated above background concentrations near existing infrastructure (Appendix 6F, Terrestrial Existing Environment). The source of the metals is likely linked to historic mining activity, although there is evidence that the background concentrations of some metals recorded at certain control sites are comparable to the Site concentrations (e.g., iron and aluminum). The TSF is considered to be the main source of fugitive dust during the life of the Project that could potentially contribute to increasing metals concentrations both in and on vegetation at the Site. Those increasing metals concentrations could potentially lead to sub-lethal or lethal effects on wildlife (e.g., foraging small mammals and birds) and be transferred up to higher trophic levels.

### 2.2 Metal Deposition Monitoring Through Moss Bag Sampling

Moss bags will be deployed around the Site for the purpose of monitoring the deposition rate of metals over the short-term (fugitive dust is captured by the moss and can be quantified). The reason that moss bags were chosen for the study is that they are widely used for deposition studies and are a relatively inexpensive method for collecting deposited particulates for laboratory analysis. They also can provide results for a discrete period of time and so would indicate metals concentrations that are deposited on Site for any given period (e.g., April to July).

The moss bag metals studies will be designed by a qualified person who will use previous vegetation metals studies from the Site as a guide along with other information (e.g., related scientific literature, predominant wind direction on Site).

Once the metals in the moss bags are analyzed, one criterion will be applied that may trigger the implementation of a mitigation measure. The criterion is:

**The laboratory analytical results indicate that the same metal in at least 10% of deployed moss bags (excluding controls) exceeds the rodent maximum tolerable limit (MTL; NRC 2005) concentration.**

The maximum tolerable limit (MTL) guideline concentrations set by the National Research Council (2005) have been used before at the Site during previous studies of metal concentrations in plant tissue. The guidelines provide MTL concentrations for metals in feed for a number of animals including rodents. These guideline concentrations can be directly compared to the results obtained from the moss bag study.

The 10% exceedance rate for the same metal was considered a conservative rate while accepting outlying results. For example, if 40 moss bags were deployed and the results from three bags (7.5%) indicated an exceedance of the arsenic MTL concentration for rodents, then follow up activity would not be required. However, if the same study indicates that four of the moss bags exceeded the arsenic MTL concentration for rodents then follow up activity would be required.

## **2.3 Follow-Up Activities if Moss Bag Study Criterion is Achieved**

If the criterion provided above is achieved, an additional project mitigation will be required to help control fugitive dust. In this case, tackifiers will be applied to the surface area of all tailings within the TSF at the first opportunity, but not later than the end of June in the year following the study year. The goal of applying tackifiers would be to reduce the occurrence of fugitive dust that is resulting in the metals deposition. The precise nature of tackifiers can vary but they are typically applied as a spray from a holding truck using a spray canon, and the tackifier binds surface fines. The specific tackifier to be used will be determined once its use is required but readily available tackifier products typically include guar gum or a pine rosin emulsion.

## **2.4 Moss Bag Study Schedule**

The Moss bags will be deployed in years one to five of the Project between spring and early summer. The actual deployment period will be determined by the study designer. The results of the annual moss bag study not only help with decision making about mitigation measures but also provide monitoring data that can be compared year on year for the duration of the project. If tackifiers are applied to the tailings, the data will help establish if their application has achieved the desired effect (i.e., reduce metals deposition on vegetation).

# **3 Wildlife Monitoring**

A wildlife observation log will be kept at the Site for the duration of the Project. The purpose of the log is to record occurrences of specified wildlife. The log will be reviewed monthly to determine if the number of observed species is increasing or decreasing and if any follow-up activities are required (e.g., bear deterrents or additional road signage). It is not necessary to record all wildlife species observed on Site and therefore the log can be limited to all medium-sized or large wildlife (e.g., Porcupine, Red Fox, Moose, Woodland Caribou, Grizzly Bear). A separate form related to all incidents of nuisance wildlife or hazardous wildlife can also be completed, when relevant (e.g., rodent infestation in the bunkhouse, human attacked by a gull by the garbage storage containers, vehicular collision with a Coyote). Examples of a Wildlife Observation Log and a Nuisance/Hazardous Wildlife Form are attached. Log and form entries should be completed within 24 hours of the observation or incident occurring.

## References

Minto Explorations Limited. 2014. Minto Mine 2014 Wildlife Protection Plan

National Research Council (NRC). 2005. Mineral Tolerance of Animals: 2nd Revised Edition. Committee on Minerals and Toxic Substances in Diets and Water for Animals, Board on Agriculture and Natural Resources, Division on Earth and Life Studies, National Academy of Sciences. pp. 510.

**MNCMP: Nuisance and/or Hazardous Wildlife Incident Form (example)**

Date of Observation/Incident: \_\_\_\_\_ Time of observation/incident (24hr): \_\_\_\_\_

Reported By (full name): \_\_\_\_\_

Species (please circle):

Grizzly Bear    Black Bear    Moose    Wolf    Wolverine    Other (specify): \_\_\_\_\_

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Number of wildlife individuals: \_\_\_\_\_

Location of wildlife/incident: \_\_\_\_\_

Description of wildlife:

Size: \_\_\_\_\_ Colour: \_\_\_\_\_ Sex (circle one):    M    F    Unknown

Photos of wildlife/incident taken (please circle)?    YES    NO    If yes, photo #s: \_\_\_\_\_

Distinctive markings on wildlife (please give as much information as possible, especially for bears):

\_\_\_\_\_  
\_\_\_\_\_

Describe the animal behaviour/incident (e.g., feeding, agitated / infestation, attack, vehicle collision):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Describe any actions taken in response to the observation/incident (e.g., shouting, sounding horn, non-lethal trap):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature of reporter: \_\_\_\_\_ Date this form was completed: \_\_\_\_\_

**Please Submit this completed form to Safety Department and to AAM, Government of Yukon**

**Completed forms to be filed in Nuisance/Hazardous Wildlife Reporting Binder on site**

