APPENDIX D

MINTO MINE CLOSURE ADAPTIVE MANAGEMENT PLAN

MINTO PHASE IV RECLAMATION AND CLOSURE

PRELIMINARY ADAPTIVE MANAGEMENT PLAN

Version 1.0

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Prepared for:

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ACCESS CONSULTING GROUP SIGNATURES

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1 INTRODUCTION

Minto Explorations Ltd. (Minto), a wholly owned subsidiary of Capstone Mining Corp. (Capstone), owns and operates the Minto copper mine. The Minto mine site is located within Selkirk First Nation (SFN) Category-A Settlement Land (Parcel R-6A), and is approximately 240 km northwest of Whitehorse, Yukon. The Minto mine commenced commercial operations in October 2007.

An AMP is an iterative process. This implies that an AMP is never complete in nature, but in a continuous state of refinement in response to feedback from monitoring, analysis of data and changing conditions. The ideas presented within this document build on information gathered through the operations and environmental monitoring at Minto. Phase IV is part of a sequence of stages in the evolution of the life cycle of the Minto mine site. Until final closure, the project is anticipated to continue to evolve and change. For example, as Phase IV proceeds into the reclamation and closure process, mining and development of Phase V/VI may be commencing. The various components and activities related to the phases do not occur in isolation, and plans such as this AMP must be dynamic in order to effectively deal with change. As a result, any future developments that occur at the Minto mine site will necessitate updates to the AMP. Thus the AMP is considered a “living document”. Subsequent iterations of the closure AMP will take these changes into account.

Anticipated events, response planning, and results are normally contained within site management plans. AMPs are typically designed to guide responses to unforeseen or contingency events. This AMP is designed to guide responses to unanticipated results and also provide a framework to guide responses to potential but low probability events where uncertainty exists.

Since it is difficult to predict the specific environmental condition that may arise which requires a response from management, the AMP does not necessarily provide specific detailed descriptions of responses to a situation. The AMP provides a range of possible responses to use as a guide to respond to specific environmental conditions encountered. Management should use the information provided in the AMP to identify and undertake the appropriate response.

1.1 ADAPTIVE MANAGEMENT PLAN BACKGROUND AND VERSION HISTORY

A number of iterations and versions of operational adaptive management plans have been utilized by the Minto project. A new water management plan (WMP) was created as part of WUL QZ96-006 Amendment #7 with a focus on the protection of the receiving environment. An adaptive monitoring and management plan (AMMP) was established as a starting point from which Minto intended to improve its understanding and management of water at the Minto mine site. The WMP was developed based on predicted water quality and quantities at the Minto site. The AMMP was established to measure water quality and quantities and to test the assumptions that underlie the WMP. The WMP and supporting documents represented a significant effort to better understand and predict the scale and frequency of events as well as their expected impact on the operations at the Minto mine site. These efforts to increase the comprehension of the water quality and quantities at the Minto mine site included:

- monitor the environment
- detect changing conditions by evaluating monitoring
- appropriate reactions and responses

The AMMP also provided a framework for re-evaluating key elements of the WMP in a systematic and adaptive way. This adaptive approach continues to evaluate and adjust activities in the WMP including:

- when monitoring frequency will increase
- where monitoring will take place
- when the mine will discharge water downstream
- when the mine will stop discharging downstream

The AMMP included processes for changing the WMP in a systematic and adaptive way. It also included a reporting schedule as well as mechanisms for incorporating stakeholder inputs to ensure the principles on which the WMP was approved are being applied.

The AMMP was used as a starting source for the establishment of his AMP (Phase IV Preliminary AMP). Details in this document (specific triggers, thresholds and responses)_are still being developed through the 'living document process" in ongoing discussions with Selkirk First Nations (SFN). This Phase IV AMP has beendrafted in conjunction with the updated Phase IV RCP – however, the Minto mine site is currently actively developing the Phase V/VI mine plan and developing the updated mine closure configurations. There are no plans to end the mining operations in the configuration presented in the Phase IV RCP; however, this AMP provides direction regarding how the Phase IV AMP would be implemented in the unlikely event that the Minto Mine was to close prior initiation of the Phase V/VI closure configuration.

1.2 CLOSURE AND RECLAMATION ADAPTIVE MANAGEMENT PLAN (AMP)

1.2.1 AMP Objectives

This adaptive management plan (AMP) aims to identify areas of uncertainty within the Phase IV RCP and its predictive elements. This AMP, or subsequent iterations, will develop monitoring commitments, thresholds, triggers, and responses to underperforming elements or emerging risks within the Phase IV reclamation and closure process.

The primary objective of this AMP is to protect the quality of off-site water by isolating and controlling the on-site water, if necessary. The AMP also focuses on internal component within the disturbed mining footprint in order to ensure that the entire site is maintained in a state that is consistent with land use objectives and SFN expectations. Active water treatment is held as a contingency measure within the Phase IV AMP.

Within this Phase IV AMP, active water treatment is to be considered the ultimate fail safe in the event that mine discharge water quality is unable to meet the specified closure standards in the near term, following closure. If the mine was to closure at the end of Phase IV – the existing treatment plant would remain online, treating as necessary. Studies are currently underway looking at passive treatment technologies, and would be advanced to the point of "proof of concept" well within the first three years of necessitated active water treatment.

1.2.2 AMP Approach

The approach presented in this AMP follows the Environmental Code of Practice for Metal Mines, Environment Canada, Section 4.1.17 on Adaptive Management:

"Mine owners/operators should use adaptive management methods to revise and refine the environmental management strategy. Adaptive management should consider a wide range of factors, including:

- the results of environmental audits or other evaluation activities;
- the results of environmental monitoring;
- the results of monitoring of the performance or condition of environmental infrastructure, such as containment structures, water management systems or treatment facilities;
- technological developments; and
- changing environmental conditions."

1.2.3 AMP Components

The following AMP components have been identified through various processes including the water licencing amendment process, consultation with SFN and their agents, site operations including monitoring/ management, and input from Access Consulting Group (Access) as well as other consultants. The activities associated with the mining life cycle of Phase IV may contribute to future environmental conditions (particularly water quality) that may require the implementation of an adaptive management plan for:

- Surface water quality
- Groundwater quality
- Pit lake water quality
- Waste rock and tailings cover performance
- Water collection and conveyance structures
- Administrative failures
- General reclamation measures

1.2.4 AMP Specific Triggers and Thresholds

Specific AMP triggers and thresholds for most of the major components remain to be developed and are not yet presented in this AMP. For example, Section 2 describing AMP responses to changes in surface water quality, refers generically to "exceedances of corresponding AMP thresholds." Development of these thresholds is still subject to ongoing discussions with regulators and key stakeholders including SFN.

In concept, it is Minto's position that these thresholds and triggers will be selected in order to maintain suitable and protective water quality to protect environmental values at and surrounding the project site during operations and post-closure. Conceptually, Minto believes that "suitable water quality" metrics and corresponding AMP triggers and thresholds will be selected based on closure configuration and primary closure mitigation and designed to ensure that any water leaving the mine site is protective of the aquatic environment – the most sensitive receiver – such that the water chemistry of the discharge water is always below the "no effects level" for protection of sensitive aquatic habit. Further to this point:

- The "no effects" concentration of the various constituents of concern (i.e., Cu, Cd, Se..,) have been calculated using an environmental effects assessment.
- Minto, in consultation with SFN, recognizes that it is desirable to maintain the concentration of constituents of concern as low as practicable. To that end, Minto will propose a series of environmental triggers, well below the calculated no effects level that would initiate a progressive series of steps to both investigate potential reasons for the observed changes to metal concentrations in the water and, if warranted, implement plans to mitigate against undesirable changes to discharge water quality.
- The primary point of compliance for mine water discharge is proposed to be W3
- Several additional internal monitoring points (i.e., W15, W37…) will also be tracked and compared against discharge water quality standards. Trends and instantaneous water quality will be monitored to determine if additional investigation and/or mitigation is warranted to address changes to water make-up.

1.2.5 AMP Monitoring

The keystone environmental component for the Minto mine site is the water quality within Minto Creek, which flows into the Yukon River.

To evaluate Minto Creek water quality, routine water quality monitoring at key locations within the physical footprint of the Minto mine site and at the lowest point of control (monitoring station W3) will be the primary monitoring method used to identify the need for adaptive management. The locations of the various AMP monitoring stations are shown in Figure 2-1.

Drainage from the Southwest Waste Dump is to be collected in a pond and to be monitored by station W15 (monitoring stations are shown in Figure 2-1) and routed to the Main Pit prior to discharge. Monitoring results obtained from W15 will indicate the performance of the closure system components upgradient of this location including waste rock cover systems, and water diversion and conveyance systems.

The final point of control for drainage from the Minto mine site will occur at W3 on Minto Creek, which is at the base of the disturbed footprint. Monitoring results from W3 will indicate the water quality inputs from the whole mine site into Minto Creek. A contingency collection system will allow for the capture and return of water to the active water treatment plant (WTP), if necessary. Monitoring results obtained from W3 will indicate the performance of all closure mitigation system components upgradient of this collection point, and for the whole mine site that sits with the Minto Creek drainage basin.

Monitoring and the interpretation of monitoring results will serve as key indicators of the effectiveness of the onsite natural and constructed systems. Specific triggers and thresholds will be developed and refined through interpretation of monitoring results, site specific closure system trials, and in response to changing environmental conditions.

Trends and instantaneous water quality will be monitored to determine if additional investigation and/or mitigation is warranted to address changes to water make-up.

A summary of the four key surface water quality monitoring stations are listed from distal to proximal to the mine site and are described in Table 1-1:

Table 1-1: Summary of the five key surface water quality monitoring stations for Minto mine site listed from distal to proximal

Water Quality Monitoring Station	Description
W2	Monitoring point in lower Minto Creek prior to confluence with Yukon River,.
W3	Located at the toe of the WSP dam, currently the main discharge compliance point in the current water licence. Receives all surface drainage from the upgradient mine site.
W37	Located at the collection pond at the toe of the dry stack tailings storage facility (DSTSF) and the mill valley fill extension (MVFE) prior to discharge to Minto Creek.
W35	Top of the South Diversion Ditch, prior to flow into Area 2 Pit.
W15	Located at the outlet of the contingency collection pond below the bioreactor and wetland systems which treats drainage from the Southwest Dump.

Specific indicators and thresholds at these key monitoring locations will be used as the primary triggers for adaptive management. Once this AMP water quality trigger has occurred an investigative adaptive management response will be used to determine the cause of the water quality trigger, and develop the appropriate response(s).

Example 1:

A specific threshold for a key indicator (total copper) is exceeded at monitoring station W15. Contingency collection and pumping of this water to the active WTP is conducted in the short term prior to release, and an investigation to determine the root cause of the trigger is conducted. This investigation determines that a major failure in the upper diversion structures on the Southwest dump has resulted in excessive run-on of upgradient water into and through the southwest dump.

For the example above, the routine water quality monitoring results at W3 and W15 were the primary monitoring methods used to identify the need for adaptive management. Other routine and periodic monitoring for specific components may initiate an AMP trigger, even though the water quality at stations W3 or W15 may be below threshold levels.

Increasing trends in constituents of concern at this location would also trigger a re-evaluation of the potential role of passive and semi-passive treatment technologies to supplement the existing closure measures.

Example 2:

An annual geotechnical inspection revealed erosion and significant cracks forming in the cover of the DSTSF. This triggered the adaptive management plan for cover system failures and a response is initiated. The cover system is repaired, and increased monitoring and result evaluations are conducted for stations W37 and W3.

1.2.6 AMP Elements

Each of the AMP components within this document are described according to the elements listed below. A common element approach was taken for each component. This was done to create consistency across, and within, all of the AMP components. The common elements and resulting processes are summarized below and illustrated in Figure 1-1

1. Component description and possible environmental consequences (resulting in)
    a. Possible environmental impacts (resulting in)
        i. Narrative triggers and specific thresholds
2. Narrative triggers (resulting in)
    a. Specific Indicators
3. Monitoring requirements (resulting in)
    a. Monitoring frequency and scheduling of specific indicators
4. Evaluation of monitoring (resulting in)
    a. Examination if thresholds have been crossed
5. Specific indicators (resulting in)
    a. Environmental parameters to be monitored and assessed
6. Specific thresholds (resulting in)
    a. Conditions defined for specific indicator(s) – There may be a series of staged thresholds
    b. Management action plan activated

7. Response approaches (resulting in)

    a. Implementation of response plan(s) for any thresholds that have been crossed

1.2.7 General Approach to AMP Responses

The following general steps may be taken if any AMP trigger(s) have been exceeded:

- Internal notification to management, followed by notification to SFN and the Water Inspector that a trigger has been exceeded (within a timely period)
- Investigation of the root cause of the exceedance
- If a root cause of the exceedance can be readily identified and remedied, the remedy will be implemented in a timely manner, and the water inspector will be notified of the remedy and the implementation in a timely manner according to permit requirements
- If a root cause cannot be readily identified, a study plan will be outlined and communicated to involve qualified professionals to assist in the identification of the root cause(s)
- An action plan will be devised for the mediation of the problem
- Increased monitoring / sampling frequencies to monitor the situation and see if prescribed mitigation is appropriate and effective
- Inspect and monitor any modification to infrastructure

1.2.8 Annual Review and Annual Reporting

An annual review of the AMP will be performed and any necessary amendments or updates to the AMP elements will be conducted. The annual review will include a review of the relevant monitored data and AMP elements.

Updates, amendments, thresholds crossed, and trigger activated will be provided to the appropriate governmental (including SFN) organizations as required and will be part of the annual report.

1.3 RECLAMATION RESEARCH INTO PASSIVE TREATMENT (CONTINGENCY AMP ELEMENTS)

Research is ongoing into a variety of passive and semi-passive treatment technologies that could potentially be incorporated into closure planning at the Minto Site to provide supplementary treatment of mining impacted waters. A detailed screening process and literature review identified three primary candidate passive/semi-passive treatment technologies that warranted further consideration for possible incorporation into closure planning at Minto. The short-listed technologies include: constructed wetland treatment systems (CWTS), bioreactors and batch treatment of open-pit water.

Minto is committed to continuing to evaluate and develop all three of these technologies to the "proof of concept" level such that these technologies could, if necessary, be rapidly deployed and efficiently incorporated as long-term, post closure supplementary treatment of mining impacted waters. The research is designed to have the each of these technologies developed to an advanced stage (ready for full scale implementation) within the next three to five years (or within three years of the commencement of final closure).

It is currently anticipated that the existing proposed source control measures (covers and water diversions) will be sufficient to ensure that discharge water quality will be protective of the most sensitive aquatic receivers and well below (to be determined) final discharge water quality standards. The passive/semi-passive treatment technologies being evaluated as part of the ongoing reclamation research would only be implemented in the event that water quality is significantly worse than predicted and the "base case" mitigation measure prove to be inadequate.

Brief summaries of the passive treatment technologies being evaluated in connection with the Reclamation Research Plan are presented below.

1.3.1 Constructed Wetland Treatment Systems

Constructed wetlands are considered to be one of the most established passive treatment methods for remediating mine-impacted water and have been used by the mining industry since the mid-1980s. There have been many wetland systems that have had long-term success but there have also been failures among improperly designed systems. Many of the systems that failed or were not effective at remediating the contaminants of concern were either improperly sized or designed, all of which can be corrected through a systematically designed piloting program (INAP 2010). A research program is currently underway to evaluate

Proposed as contingency load reduction measures, CWTSs have good potential for success at the Minto site, should additional load reduction beyond the proposed source control measures be required. The ability to achieve water quality targets by any type of technology is reliant upon accurate knowledge of input parameters and clearly defined objectives. Many of these have been assessed for the Minto site, and a research program has been designed to obtain additional necessary information for the successful development and implementation of the CWTS. This preliminary site data will then be applied to pilot-scale CWTS on site and in testing in Contango Strategies Ltd.'s (CSL's) year-round greenhouse in order to develop the design basis for the eventual demonstration and full-scale CWTS on site.

Areas that have been identified as potential locations for construction of passive treatment wetlands on the Minto Site include the:

- W15 Area – Upgradient of the runoff collection sump at the toe of the Southwest Dump; and
- W37 Area – vicinity of the existing Water Storage Pond and Dam location, below the toe of the MVFE.

More information on CTWS research program and how they could be implemented at these candidate locations is presented in the Phase IV RCP - Section 4.5.4.2.

1.3.2 Bioreactors

Bioreactors are proposed as the complimentary contingency passive treatment technology to CTWSs for Minto closure. In the broadest sense, a bioreactor can be defined as permeable treatment zone that uses biochemical processes. Biological reactors use the degradation of organic materials for the purposes of treatment and often involve installation of the treatment materials into lined trenches or pond systems.

These systems have been used in mining applications to treat groundwater discharges from underground workings and also for shallow groundwater systems. Treatment media for biological reactors in the documented studies are often derived from local municipal and industrial waste sources; however, it would be necessary to determine whether these sources exist in the local area or can be sourced and transported to site in a cost effective manner. Wood chips or peat are local products that could be utilized. These systems could also be operated in a semi-passive mode where an alcohol tank can be set up to drip into the influent end of the biological reactor, and only require infrequent refilling.

A primary challenge with the design of bioreactors (and PRB systems), which can lead to poor performance, is the inadequate characterization of the in situ flow conditions within the permeable reactive media which results in the bioreactor failing to achieve suitable hydraulic performance and residence time. The nature of potential failures includes improper sizing of the reactor for the flow conditions at the site, and problems with the substrate composition. Examples of flow-related failures are cases where the range flow is too great, causing—at certain times of the year—situations where not all of the flow can be routed through the bioreactor (because of physical limitations of the media), or where the concentration of seepage varies through the year, and the mass loading exceeds the potential mass removal. Examples of these substrate-related failures includes insufficient inclusion of porous media (typically gravel), layered substrates where one layer becomes a flow barrier, and changes in hydraulic properties of organic substrates as they degrade. Other design considerations that affect the potential for bioreactors to work are the physical configuration of the reactor, with some configurations more susceptible to dead zones where substrate is partially or entirely unused for treatment because flow does not pass through these zones.

To avoid these potential pitfalls, the scope of work for evaluating the potential application of bioreactor technology at the Minto Site has been divided into several stages—beginning with detailed characterization of the seepage inputs and foundation conditions in the areas where bioreactors are being considered and advancing to laboratory characterization and bench scale testing of substrate mixtures before ultimately advancing to field scale pilot trials.

More details of the ongoing evaluation of bioreactor technologies and application at the Minto Site is presented in the Phase IV RCP – in Section 4.5.4.3.

1.3.3 Batch Treatment of Open Pits

Investigations are currently underway to evaluate the feasibility and effectiveness of batch treating pit-lake water by adding additional carbon sources (e.g., sugars and alcohols) to create reducing conditions that would facilitate the precipitation of metals as sulphides. In 2012, four limnocorrals were placed into the Main Pit, filled with pit water, and amended with reagents to encourage microbial reductive treatment of selenium, copper, and nitrate. The treatment method for the removal of these constituents is biochemical reduction, where nitrate is reduced to nitrogen (gas), selenium (as selenite/selenite) is reduced to elemental selenium (solid precipitate). In the higher doses of organic carbon sources, sulphate reduction is also expected; in this case, some metals such as copper may be removed as sulphide precipitates. This limnocorral study is part of an ongoing program to evaluate the feasibility of passive treatment at the Minto Mine site, and the results of this study will be used to design possible larger scale trials in the lake and/or will inform other potential passive treatment studies, including constructed wetlands and bioreactors, at the site.

Initial limnocoral tests have provided promising results for sequestering metals. More details of the ongoing pit-lake treatment evaluation are presented in the Phase IV RCP - Section 4.5.4.1.

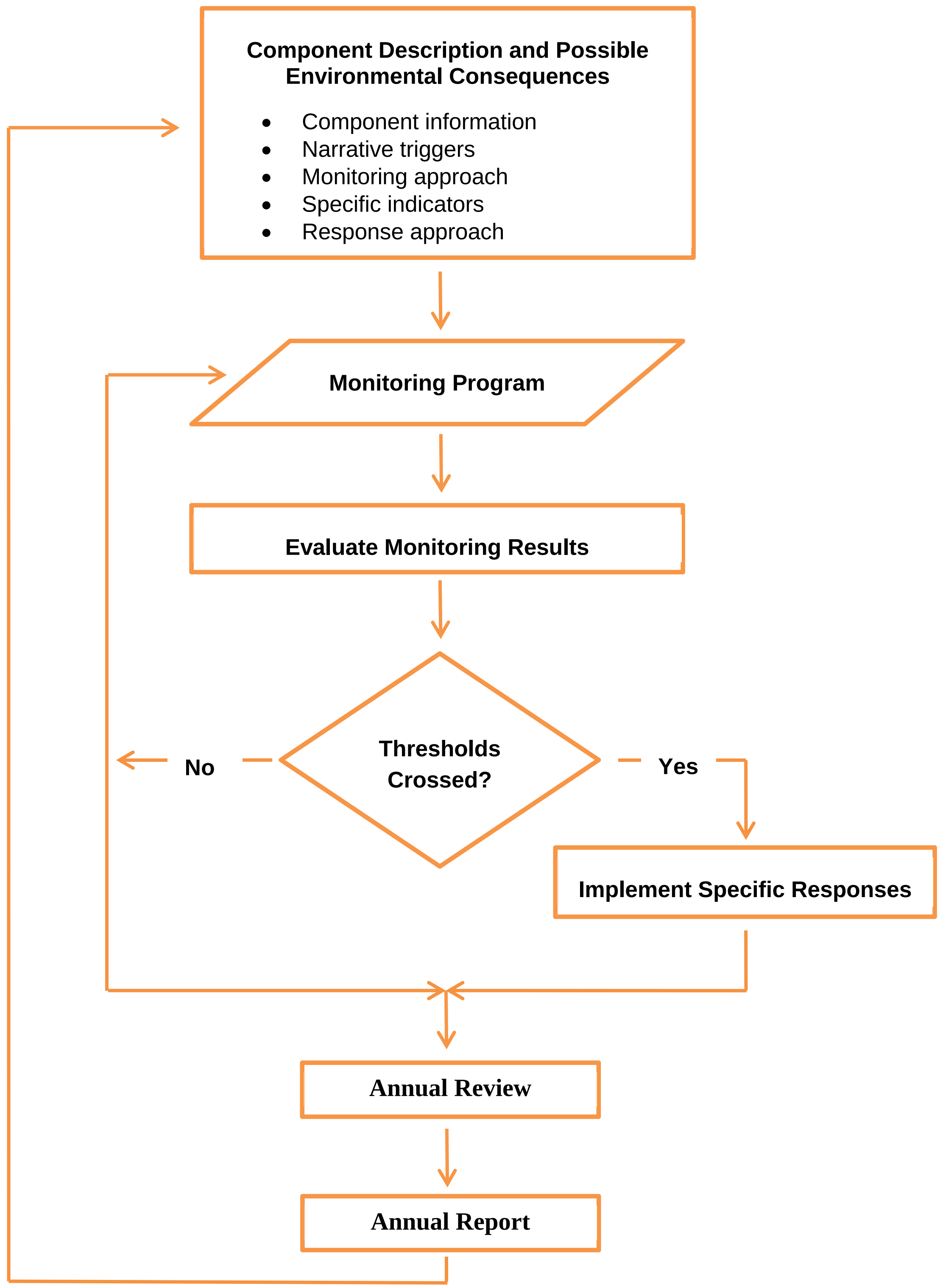


Figure 1-1: Sequential components of the AMP (Adapted from AECOM, 2010)

2 AMP COMPONENT – SURFACE WATER

2.1 SURFACE WATER – DESCRIPTIONS

Station W3 (Figure 2-1) is to be considered the main control point on Minto Creek. It is also the last surface monitoring point on the mine site property and is considered a discharge compliance point under the current water licence.

Additional key surface water monitoring locations upgradient of W3 and within the mine footprint are located at W37, W35, and W15 (Figure 2-1). It is anticipated that all mine site surface drainage will flow through at least one of the monitoring stations mentioned above, with all surface water reporting through monitoring station W3.

It is recognized that the W2 (Table 1-1) monitoring point is well beyond the final mine water discharge point controlled by Minto, and is subject to a broad range of influences from tributaries and catchment areas that are beyond Minto's control; however, Minto is committed to monitoring the water quality at W2 and working collaboratively with SFN to develop a series of progressive triggers by which Minto would respond proactively to unanticipated changes.

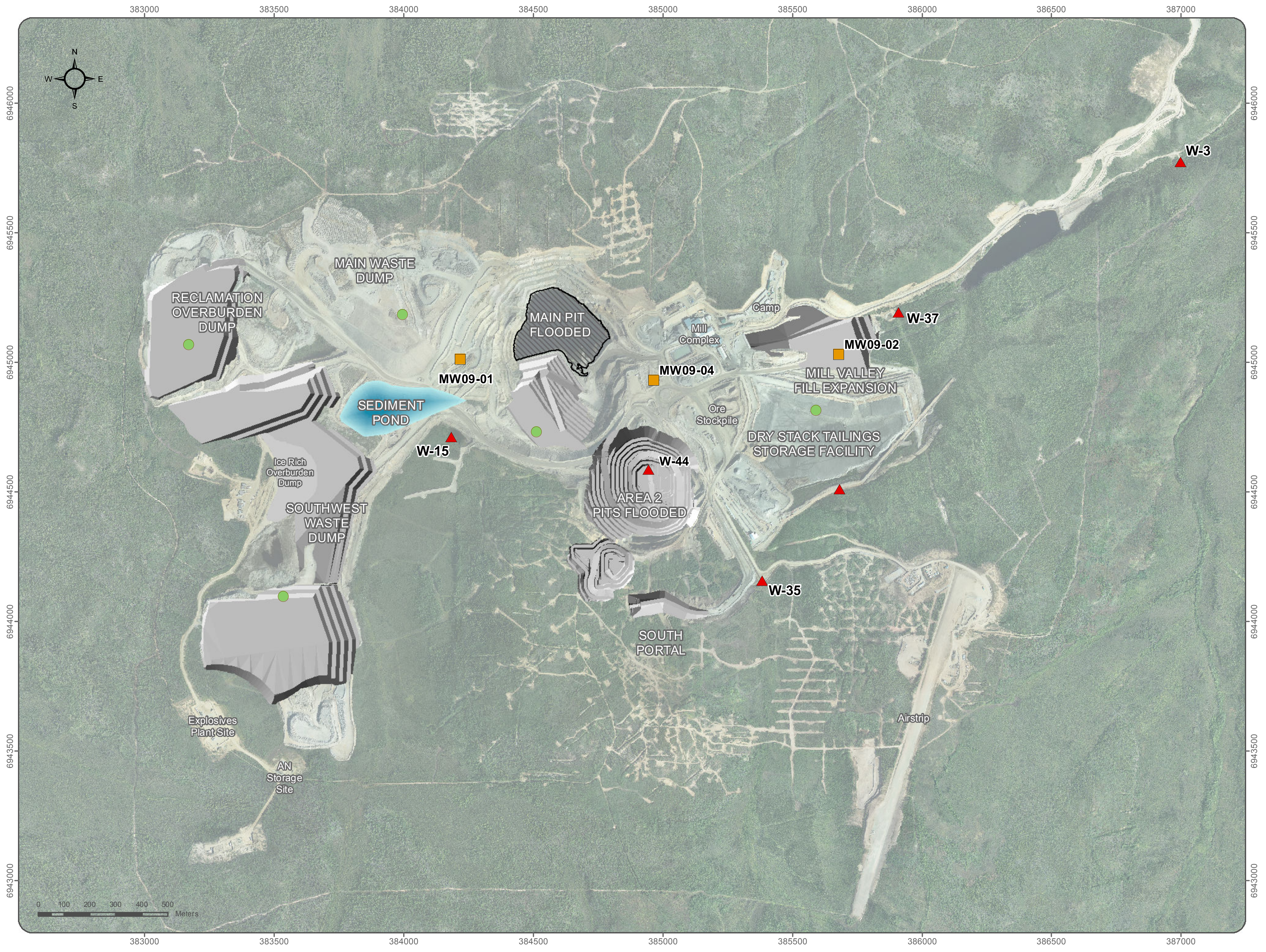
Capstone MINTO MINE

MINTO MINE PHASE IV

ADAPTIVE MANAGEMENT PLAN

FIGURE 2-1

CONCEPTUAL CLOSURE AMP MONITORING



Ground Water Monitoring

Pysical and Geotech Monitoring

Surface Water Quality Monitoring

ACCESS

Aerial imagery obtained from Challenger Geomatics.
Imagery acquired August 14 th 2012.
Site contours derived from 2012 aerial imagery obtained from Challenger Geomatics.

Datum: NAD 83 Projection: UTM Zone 8N

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2.2 SURFACE WATER – NARRATIVE TRIGGERS

Surface water quality specific indicators exceed their corresponding AMP thresholds.

2.3 SURFACE WATER – MONITORING REQUIREMENTS

Routine surface water monitoring is to take place at stations W3, W37, W35, and W15 for the full suite of recommended parameters. The regular monitoring schedule, and list of parameters may vary over time as the mine site advances through the closure and reclamation process towards steady state.

Minto is committed to monitoring the water quality at W2 and working collaboratively with SFN to develop a series of progressive triggers by which Minto would respond proactively to unanticipated changes.

2.4 SURFACE WATER – EVALUATION OF MONITORING

Regularly scheduled reviews and interpretations (tied to the monitoring frequencies) of surface water monitoring results are needed in order to determine if the specific thresholds or triggers within the AMP have been exceeded.

The surface water quality results are to be circulated to the appropriate internal and/or external personnel for evaluation and comparison to specific indicators and thresholds.

2.5 SURFACE WATER – SPECIFIC INDICATORS

Specific indicators of water quality will most likely include total metal concentrations. Currently, constituents of potential concern (COPCs) for the site include total Cu, Cd and Se. Other non-metal parameters for water quality may be included as specific indicators, for example total suspended solids (TSS).

The number of surface water parameters, or the parameter's specific thresholds, may change over time as the mine site advances through the closure and reclamation process towards steady state (Table 1-1).

2.6 SURFACE WATER – SPECIFIC THRESHOLDS

To be determined, pending interpretations and results from monitoring and modeling work. The specific thresholds need to consider the following:

- Water Use License (WUL) effluent compliance limits – (currently being redeveloped)
- Metal Mining Effluent Regulations (MMER) effluent limits are applicable for 3 years after written notice has been submitted to Environment Canada that the mine site will be closed.
- Performance evaluation of cover systems and semi-passive treatment systems
- Predictive work which includes interpretations and results from monitoring and modeling work

2.7 SURFACE WATER – RESPONSE APPROACHES

A response is initiated once the AMP is triggered by a threshold exceedance and may consist of:

- Internal notification to management, followed by notification to SFN and the Water Inspector that a trigger has been exceeded within a timely period
- Investigation of the root cause of the exceedance
- Check mitigation systems for integrity (i.e., covers, treatment systems, conveyance structures)
- If a root cause of the exceedance can be readily identified and remedied, the remedy will be implemented in a timely manner, and the water inspector notified of the remedy implementation in a timely manner according to permit requirements
- If a root cause cannot be readily identified, a study plan will be outlined and communicated to involve qualified professionals to assist in the identification of the root cause
- Prepare action plan for the mediation of the problem
- Sample monitoring locations, with a systematic approach from the furthest known contaminated downstream point moving upstream and review results
- Increase monitoring frequencies and locations. For example, set up monitoring stations before and after bioreactors to isolate issues if it has been traced to the bioreactor area
- Isolate location of elevated values
- Increase monitoring / sampling frequencies to monitor status and see if mediation is appropriate and effective
- Inspect and monitor any modification to infrastructure
- Initiate active treatment if determined an appropriate response

Example:

> Total copper concentrations exceeding threshold levels were reported in 2 consecutive sampling events at station W3 (Figure 2-1).

Example Response:

- Minto staff, SFN, and Water resources notified that a trigger has been exceeded within a timely period
- Samples taken at monitoring stations W37, W35, and at W15. Results indicate elevated or increasing copper concentrations occur at station W15, but not at station W35

- Investigate potential root cause of observed changes to water chemistry including the performance of the cover system, water diversions and water conveyance.
- Address any observed deficiencies and increase sampling locations and frequencies around the deficient infrastructure to evaluate the impact of the system upgrades/repairs
- Evaluate potential benefits of incorporating passive and/or semi-passive treatment technologies to treat mining impacted water in this location
- Increase monitoring frequency at W3 and at W15 for the near term until steady state and / or expected performance returns
- Active treatment (contingency) initiated / increased if determined an appropriate response

3 AMP COMPONENT – GROUNDWATER

3.1 GROUNDWATER – DESCRIPTIONS

The groundwater conditions at the Minto mine site are monitored according to the Groundwater Monitoring Plan. Groundwater monitoring is conducted through routine sampling of groundwater wells and / or piezometers at key locations around the site. This work has shown that the groundwater is controlled topographically, and is assumed to report to surface before monitoring station W3. The groundwater may be influenced by the construction, operation, and infrastructure located on site. These infrastructures include, but are not limited to: the underground workings, waste rock, tailings, pits, as well as their interactions with the natural systems.

3.2 GROUNDWATER – NARRATIVE TRIGGERS

Groundwater quality parameters exceed their corresponding AMP thresholds.

3.3 GROUNDWATER – MONITORING REQUIREMENTS

Monitoring locations to be picked, and may include: groundwater wells, underground workings, pits, etc. which are located down gradient of significant infrastructure on site and to follow the groundwater monitoring plan.

3.4 GROUNDWATER – EVALUATION OF MONITORING

Regularly scheduled reviews and interpretations (tied to the monitoring frequencies) of groundwater monitoring results are needed in order to determine if the specific thresholds or triggers within the AMP have been exceeded.

The groundwater quality results are to be circulated to the appropriate internal and / or external personnel.

3.5 GROUNDWATER – SPECIFIC INDICATORS

Specific indicators of water quality will mostly likely include dissolved metal concentrations. Currently, constituents of potential concern (COPCs) for the site include Cu, Cd and Se.

The number of groundwater parameters, or the parameter's specific thresholds, may change over time as the mine site advances through the closure and reclamation process towards steady state.

3.6 GROUNDWATER – SPECIFIC THRESHOLDS

To be determined, pending interpretations and results from monitoring and modeling work.

3.7 GROUNDWATER – RESPONSE APPROACHES

- Internal notification to management, followed by notification to SFN and the Water Inspector that a trigger has been exceeded within a timely period
- Investigation of the root cause of the exceedance
- Check upgradient mitigation systems which could influence groundwater for integrity (i.e., covers, treatment systems and water conveyance structures)
- If a root cause of the exceedance can be readily identified and remedied, the remedy will be implemented in a timely manner, and the water inspector notified of the remedy implementation in a timely manner according to permit requirements
- If a root cause cannot be readily identified, a study plan will be outlined and communicated to involve qualified professionals to assist in the identification of the root cause
- Prepare action plan for the mediation of the problem
- Sample monitoring locations, with a systematic approach and review results, from the furthest known contaminated down gradient point moving up gradient
- Isolate location of elevated values
- Increase monitoring / sampling frequencies and locations to monitor status and see if mitigation is appropriate and effective
- Inspect and monitor any modification to infrastructure
- Evaluate the potential benefits of incorporation passive/semi-passive treatment technologies (i.e., permeable reactive barriers (PRBs)) to treat contaminant plumes where conditions allow
- Initiate seepage interception and pump-back to active treatment if determined an appropriate response

4 AMP COMPONENT – PIT LAKE WATER QUALITY

4.1 PIT LAKE WATER QUALITY – DESCRIPTIONS

This AMP section will focus on the following water quality variables for the Main and Area 2 Pit Lakes:

- Open pits slope stability and extent of fracturing
- Flooding events and the effects on Pit Lake water quality, and the water and materials within the open pits
- Source(s) and quality of surface and groundwater entering and leaving the Pit Lakes

4.2 PIT LAKE WATER QUALITY – NARRATIVE TRIGGERS

Within this AMP, pit lake water quality refers to the discharge water conditions from the Area 1 and Area 2 Pit Lakes, which are both anticipated to be 'flow through' pit lakes. This means that they have engineered channels carrying collected site runoff entering and exiting the pit.. . Example possible failures related to the pit lakes include:

A. Water quality flow through the open pits does not perform as expected

B. Source terms are underestimated, resulting in higher than expected loading from the Pit Lakes and unacceptable water quality results downstream

C. Pit wall failure results in a displacement wave, of water released from either Pit Lake causing damage to downstream facilities and / or the mobilization of tailings

4.3 PIT LAKE WATER QUALITY – MONITORING REQUIREMENTS

Specific indicators will be established from the surface water quality results Pit Lakes as well as from the monitoring stations results from W15, W37, W35, W2 and W15.

4.4 PIT LAKE WATER QUALITY – EVALUATION OF MONITORING

A performance evaluation is to be conducted on the Pit Lakes water quality. Periodical inspections, maintenance, sampling, and geotechnical monitoring are also to be performed.

The performance evaluation will consist of (in part):

- The surface water quality results and monitoring stations W3, W37, W35, W2 and W15
- Periodical physical inspections and maintenance

4.5 PIT LAKE WATER QUALITY – SPECIFIC INDICATORS

Specific indicators of water quality will most likely include total metal concentrations. Currently, constituents of potential concern (COPCs) for the site include total Cu, Cd and Se. Other non-metal parameters for water quality may be included as specific indicators, for example total suspended solids (TSS).

The number of surface water parameters, or the parameter's specific thresholds, may change over time as the mine site advances through the closure and reclamation process towards steady state (Table 1-1).

Specific indicators will be established from the surface water quality parameters at monitoring stations W15, W37, W35, W2 and W15.

4.6 PIT LAKE WATER QUALITY – SPECIFIC THRESHOLDS

Specific thresholds will be related to, or triggered by, unacceptable water quality measurements at key downstream monitoring stations.

4.7 PIT LAKE WATER QUALITY – RESPONSE APPROACHES

- The basic assumption for this subsection is that the Pit Lakes water quality will contain a moderate initial contamination level, particularly during active flooding. Adaptive management maybe required if water quality conditions are elevated or show increasing trends above this base assumption.

- Lake water quality conditions are not as expected. In response, an adaptive management approach is initiated to address these issues.

- downstream channels and facilities will be designed and constructed for peak flow conditions. This approach will help to decrease the possible impact of storm events.. A general adaptive management response is described in Section 1.2.6.

5 AMP COMPONENT – WASTE ROCK AND TAILINGS COVER PERFORMANCE

5.1 WASTE ROCK AND TAILINGS COVER PERFORMANCE – DESCRIPTIONS

The main waste rock dumps and tailings facilities that will exist at the end of Phase V/VI and will be covered include the following (Figure 2-1):

- Main waste dump (MWD)
- Southwest waste dump (SWD)
- South wall buttress (SWB) in the Main Pit
- Area 118 Pit
- Mill valley fill extension (MVFE), which stabilizes the toe of the dry stack tailings facility (DSTSF)
- DSTSF
- Ore stockpile pads and mill area

As described in the Phase IV RCP, all waste rock dumps will be covered with an isolating soil cover constructed from available overburden materials at site. These will then be revegetated. These cover are designed to limit exposure of the waste materials to the atmosphere and vegetation, and provide a modest reduction in infiltration of precipitation.

Potential failure modes of the cover systems were considered in the preliminary FMEA and the failure of these systems may affect the quality and / or quantity of drainage from waste rock dumps and tailings areas.

5.2 WASTE ROCK AND TAILINGS COVER PERFORMANCE – NARRATIVE TRIGGERS

Example narrative triggers based on identified potential failure mechanisms include:

- Waste rock and tailing pile and covers do not produce expected infiltration reduction which leads to an increase in metal loading and results in unacceptable downstream water quality effects.
- Erosion issues lead to increased infiltration rates and unacceptable downstream water quality effects.

5.3 WASTE ROCK AND TAILINGS COVER PERFORMANCE – MONITORING REQUIREMENTS

A performance evaluation is to be conducted on the effectiveness of the covers and waste rock storage areas. Periodic inspections and maintenance, sampling, and geotechnical monitoring are also to be performed on the waste rock storage facilities and for the tailings covers. Conceptual monitoring stations are shown on Figure 2-1.

The performance evaluation will consist of (in part):

- The surface water quality results from the waste rock dumps and the covered DSTSF
- The surface water quality results from monitoring stations W3, W37, W35, and W15
- Periodic physical inspection and maintenance

It should be noted that the risks are different for DSTSF than for other facilities on site. The DSTSF has the potential for migrating, slumping or erosion which still needs to be considered in the design, maintenance costing, etc. stages of closure and reclamation.

5.4 WASTE ROCK AND TAILINGS COVER PERFORMANCE – EVALUATION OF MONITORING

Periodic evaluations and inspections to determine:

- Geotechnical integrity and stability
- Downgradient surface and groundwater monitoring
- cover effectiveness related to vegetative success and erosion control

5.5 WASTE ROCK AND TAILINGS COVER PERFORMANCE – SPECIFIC INDICATORS

- Cover integrity and geotechnical stability, including erosion/slumping evidence
- Infiltration rates
- Surface and groundwater results
- Vegetation success

5.6 WASTE ROCK AND TAILINGS COVER PERFORMANCE – SPECIFIC THRESHOLDS

Specific thresholds will be related to, or triggered by, unacceptable water quality measurements at key downstream monitoring stations as well as the following:

- Failure to meet expected performance
- Partial or complete cover failure

5.7 WASTE ROCK AND TAILINGS COVER PERFORMANCE – RESPONSE APPROACHES

Appropriate corrective actions should take place if the waste rock and tailings cover performance fails to meet expectations. Repairs should be performed on the cover where applicable. Increased monitoring and the evaluation of the monitored results should be conducted as part of a response plan.

A general adaptive management response is described in Section 1.2.6.

6 AMP COMPONENT – WATER COLLECTION AND CONVEYANCE STRUCTURES

6.1 WATER COLLECTION AND CONVEYANCE STRUCTURES – DESCRIPTIONS

The major water diversion and conveyance structures for Phase IV closure and reclamation are shown on Figure 2-1. Detailed descriptions of these structures are provided in thePhase IV RCP. PRCP.

The water collection and conveyance structures consist of the infrastructures that assist in drainage from waste rock and tailings piles and include pipes, ditches, armored channels, bypasses, etc.

Conveyance and collection structures are also used to convey drainage from the major waste infrastructure to treatment systems prior to release.

6.2 WATER COLLECTIONS AND CONVEYANCE STRUCTURES – NARRATIVE TRIGGERS

- Undiverted runoff upstream of waste management facilities leads to run-on water, increased infiltration, and ongoing maintenance costs
- Failure of upstream diversions and/or waste management facilities leads to excessive infiltration into upgradient base of dump, resulting in increased flows and/or metal loads and unacceptable water quality conditions downstream.

6.3 WATER COLLECTIONS AND CONVEYANCE STRUCTURES – MONITORING REQUIREMENTS

In addition to water quality monitoring, other monitoring of the water diversion and conveyance structures will consist of periodic physical and/or geotechnical inspections.

Closure monitoring of the physical stability of the water diversion and conveyance structures is discussed in the Phase IV RCP.

6.4 WATER COLLECTIONS AND CONVEYANCE STRUCTURES – EVALUATION OF MONITORING

- Periodic inspections and maintenance to determine condition of infrastructure
- Water quality monitoring and results evaluation from key downstream locations

6.5 WATER COLLECTIONS AND CONVEYANCE STRUCTURES – SPECIFIC INDICATORS

Water quality and quantity at downgradient monitoring locations

Physical inspections and maintenance to be performed on infrastructure for example: pipes, channels, erosion and stability, etc.

6.6 WATER COLLECTIONS AND CONVEYANCE STRUCTURES – SPECIFIC THRESHOLDS

- Exceedance of acceptable water quality thresholds (refer to Section 2.6)
- Physical condition of infrastructure is deteriorating and requires repair

6.7 WATER COLLECTIONS AND CONVEYANCE STRUCTURES – RESPONSE APPROACHES

Appropriate corrective actions should take place if the water collection and conveyance structures performance fails to meet expectations. Repairs should be performed on the collection and conveyance structures where applicable. Increased monitoring and the evaluation of the monitored results should be conducted as part of a response plan.

A general adaptive management response is described in Section 1.2.6.

7 AMP COMPONENT – ADMINISTRATIVE FAILURES

An “administrative failure” is defined broadly as a failure by Minto or their agents to comply with obligations under environmental acts, conditions of licences, permits, or commitments.

An administrative failure could be the result of a number of factors including, but not limited to: incompetence, lack of due diligence, fraud or deliberate error in the reporting of environmental program evaluations, site abandonment or bankruptcy. As such, possible modes of administrative failures are discussed in this section, and possible adaptive management responses are presented.

7.1 ADMINISTRATIVE FAILURES – DESCRIPTIONS

Administrative failure could occur at a number of levels within the organization including, but not limited to: the site monitoring and field staff, management, and consultants. Administrative failure is seen to be limited to be directly a result of action or lack of action which results in a failure to comply with obligations. An administrative failure could be the result of a deliberate or unintentional action or inaction.

7.2 ADMINISTRATIVE FAILURES – NARRATIVE TRIGGERS

In general, an administrative failure is considered to be a failure to maintain the site requirements and obligations as they have committed to, or agreed upon. Minto, their agents, or other agencies in charge of administering the project fail to competently manage the closure and reclamation process and fulfill their obligations as described under environmental acts, licences and permits, and agreements.

7.3 ADMINISTRATIVE FAILURES – MONITORING REQUIREMENTS

Minto is primarily responsible for the monitoring for administrative failures. Other parties including regulators, first nations, and other groups or individuals may also monitor administrative performance. Specific monitoring consists of:

1. ensuring compliance with, and proper reporting of environmental monitoring requirements under licences and permits, as well as this AMP.

2. ensuring compliance with relevant Canadian or Yukon legislation and licences. Regulatory bodies in charge of enforcing legislation and licences are also responsible to monitor compliance by Minto through regular review of environmental programming results and potentially through independent audit.

3. ensuring compliance with agreements between SFN and any other interest group. SFN and other partners in these agreements also have a responsibility to monitor the performance of the project to ensure compliance.

7.4 ADMINISTRATIVE FAILURES – EVALUATION OF MONITORING

As discussed in Section 9.3, Minto holds the primary responsibility for monitoring and evaluation of the performance of its project under relevant legislation and regulatory and licence requirements and obligations. These types of evaluations are expected to occur routinely as part of reporting requirements for site licences. These regular reports provide an opportunity for Minto to recognize if any administrative failures may be occurring, and take corrective action.

7.5 ADMINISTRATIVE FAILURES – SPECIFIC INDICATORS

Specific indicators of administrative failure will be the lack of compliance with federal and territorial legislation, and the permits, licences, plans and obligations under said legislation which governs site activity. In addition, discrepancies with any agreements with First Nations or other interest groups may also be specific indicators of administrative failure. Specific indicators may be contained in the following specific legislation, regulations, permits, licences and other agreements, which are listed below by category.

1. Federal Legislation, including the following but not limited to:
    - Environmental Violations Administrative Monetary Penalties Act, (2009) and regulations
    - Canadian Environmental Protection Act, *(1999)* and regulations
    - Canadian Environmental Assessment Act, (2012*)* and regulations
    - Fisheries Act (1985) and regulations (especially Metal Mining Effluent Regulations)
    - International River Improvements Act (1985) and regulations
    - Migratory Birds Convention Act (1994)
    - Species at Risk Act (2002)
    - Navigable Waters Protection Act and Regulations
2. Yukon Legislation, including the following but not limited to:
    - The Yukon Quartz Mining Act (2003) and Quartz Mining Land Use regulations
    - Territorial Lands (Yukon) Act (2003)
    - Yukon Waters Act (2003) and regulations
    - Yukon Environmental and Socio-economic Assessment Act (2003) and regulations
    - Yukon Environment Act (2003) and regulations

3. Licences and Permits and all plans and requirements under those licences and permits held by Minto including but not limited to:

    - Quartz mining licence QML-0001
    - Type A water licence QZ96-006

Any other agreements which may exist between Minto and any other interest group, such as SFN and the Selkirk First Nation Cooperation Agreement, may contain specific triggers and thresholds which indicate administrative failure of the project. A failure to meet the obligations under the agreement could also be viewed as a specific trigger.

7.6 ADMINISTRATIVE FAILURES – SPECIFIC THRESHOLDS

Specific thresholds are linked with specific triggers discussed in Section 9.5. A specific threshold for adaptive management is considered to be a failure to comply with obligations.

7.7 ADMINISTRATIVE FAILURES – RESPONSE APPROACHES

As discussed in Section 9.3, Minto bears the primary responsibility for monitoring, identifying and addressing administrative failures, should they occur. However, an administrative failure, by definition, involves failure as the direct result of some action or inaction, of Minto or one of its agents. Thus, responses could vary depending on the level on which the administrative failure has occurred (see Figure 9-1).

Administrative failures are primarily envisioned as initiating at the bottom of the responsibility chain at the level of site operators or contractors. Minto management should have the opportunity to identify administrative failure during regular review of environmental monitoring and performance data and results. If a failure is identified, corrective action could be undertaken. Should no corrective action be undertaken at any given level, the responsibility to bring the project back into compliance and fulfillment of its obligations would belong to the next level above in the hierarchy in Figure 9-1.

As can be seen in Figure 9-1, severe administrative failures (e.g. bankruptcy, site abandonment) could result in Minto no longer being the responsible party for the site. Should such an unlikely event occur, responsibility for the site would revert to the bond holder (i.e. YG EMR). Should the bond holder fail to administrate the site effectively or posted bond be insufficient to administer the site effectively, responsibility for the site could fall to public trust.

Legal action against the responsible parties by regulators or other groups is another avenue by which severe administrative failures (for example, deliberate contravention of Canadian or Yukon law) could result in civil or criminal charges or other penalties. This constitutes a possible response in the case of an extreme administrative failure.

If Minto is still the responsible party for site administration, the same general approach to AMP responses as presented in Section 1.2.6 will be followed for administrative failures.

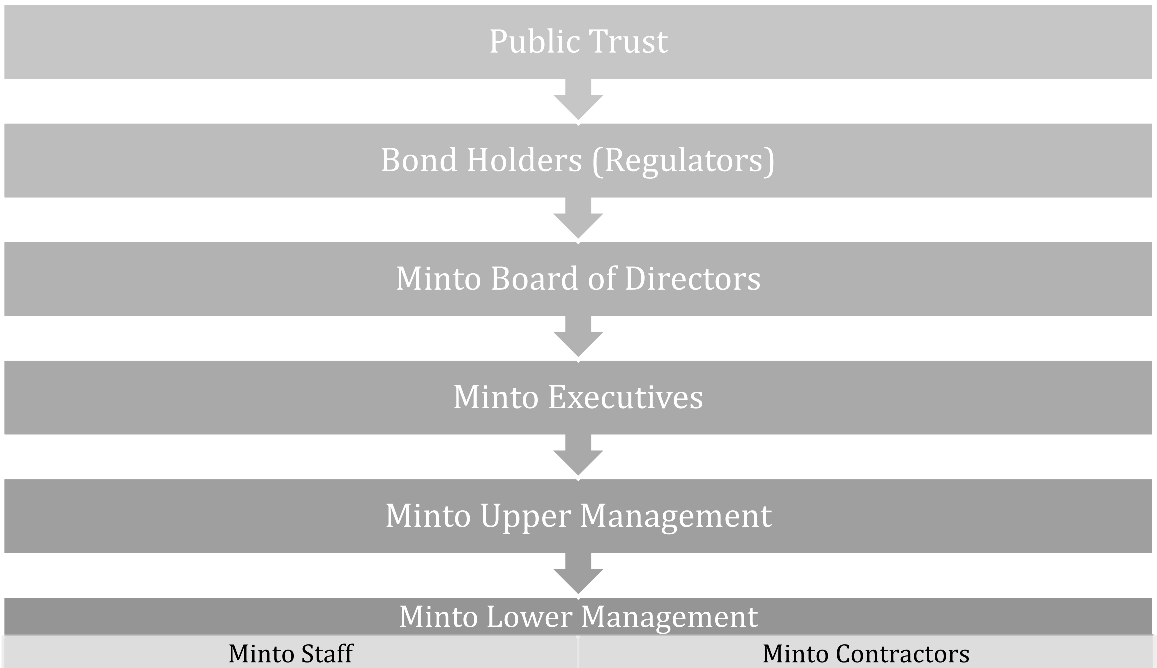

Figure 7-1: Responsibility hierarchy for the Minto closure process

8 MAJOR CONTINGENCY AMP ELEMENTS

8.1 AMP COMPONENT – BIOREACTOR TREATMENT SYSTEMS

8.1.1 Bioreactor Treatment System – Descriptions

Bioreactors are currently being evaluated in the context of potential incorporation at key locations on the Minto mine site (Figure 2-1), where the potential for contaminant loading may occur at closure. Bioreactors are not proposed as part of the base case closure measures for the Minto Site; however, studies are currently underway to advance conceptual bioreactor designs for the Minto site to the "proof of concept" level such that they could be efficiently incorporated into the closure plan in the event that observed post-closure water quality is significantly worse than predicted and bioreactors are deemed to be an appropriate mitigation. Bioreactors could potentially be installed along the SWD and at the toe of the DSTSF. The bioreactor system is considered to be semi-passive and would require periodic maintenance.

As the water quality within the SWD and DSTSF is still evolving it is suggested that the area should be monitored, and the results evaluated to determine the potential benefits of incorporating bioreactors as part of the long-term water treatment solution.

A description of the proposed bioreactor conceptual systems is found in the PRCP within Section 4.2.2.3. The following section has prepared to address a hypothetical scenario in which bioreactors are incorporated into future water treatment at Minto.

8.1.2 Bioreactor Treatment System – Narrative Triggers

Bioreactors don't perform as designed, for example they become: overwhelmed, freeze, discharge unacceptable water quality, etc.

8.1.3 Bioreactor Treatment System – Monitoring Requirements

The bioreactors are part of the semi-passive water quality treatment train systems on site, which also include the anaerobic and aerobic wetlands. The primary monitoring and key performance indicators for these semi-passive water quality treatment systems will consist of the monitoring (and evaluation of monitored results) at key locations up and down stream of each treatment train. Intermediate monitoring locations within the bioreactors themselves may be used during the construction and set up phase as well as during maintenance or monitoring of the systems.

- Monitoring station W15 will serve as the key monitoring location below the SWD
- Monitoring station W37 will serve as the key monitoring station below the second treatment system which is located below the DSTSF and MVFE

If an AMP trigger is exceeded at a downstream monitoring location, additional detailed upstream monitoring within the passive treatment train would be conducted in order to help determine the root cause of the exceedance. For example, monitoring could take place at the input points, intermediate monitoring points, and discharge points for each bioreactor, and / or above and below each of the wetland systems.

8.1.4 Bioreactor Treatment System – Evaluation of Monitoring

A performance evaluation is to be conducted on the effectiveness of the bioreactors. Periodic inspections and maintenance are to be performed on the bioreactors.

The performance evaluation will consist of (in part):

- The surface water quality results from stations W3, W37, W35, and W15
- Periodic physical inspection and maintenance

8.1.5 Bioreactor Treatment System – Specific Indicators

Specific indicators will be established from the surface water quality parameters at monitoring stations W15, W37, W35, and W15.

Additional specific indicators directly related to the condition and performance of the bioreactors to be developed if required.

8.1.6 Bioreactor Treatment System – Specific Thresholds

Specific thresholds will be related to, or triggered by, unacceptable water quality measurements at key downstream monitoring stations.

8.1.7 Bioreactor Treatment System – Response Approaches

Specific bioreactor response approaches are to be developed by someone within the bioreactor field, and / or develop over time as this AMP evolves.

A general adaptive management response is described in Section 1.2.6.

8.2 AMP COMPONENT – WETLANDS

8.2.1 Wetlands – Descriptions

Wetlands, specifically Constructed Wetland Treatment Systems (CWTS) are currently being evaluated in the context of potential incorporation at key locations on the Minto mine site (Figure 2-1). CWTS are not proposed as part of the base case closure measures for the Minto Site; however, studies are currently underway to advance conceptual (and small scale field trial) CWTS designs to the "proof of concept" level such that CWTS could be efficiently incorporated into closure planning in the event that observed post-closure water quality is significantly worse than predicted and CWTS is deemed to be an appropriate mitigation. These locations include to the east of the Southwest Dump (after the bioreactors), within the main pit, and before the water storage pond (WSP dam). The wetlands are considered to be a passive to semi-passive treatment system, and as a result would require periodical maintenance and service.

High flow events may lead to blowouts within the wetland, causing damage and maintenance requirements. It is assumed that during high flows events the wetlands are designed to allow for a discharge bypass.

A description of wetlands and their processes can be found within the PRCP. The following section has prepared to address a hypothetical scenario in which bioreactors are incorporated into future water treatment at Minto.

8.2.2 Wetlands – Narrative Triggers

Wetlands don't perform as designed, for example they become: overwhelmed, freeze, resulting in unacceptable water quality conditions downstream, etc.

8.2.3 Wetlands – Monitoring Requirements

The wetlands are part of the passive water quality treatment train systems, which included the bioreactors, and both the anaerobic and aerobic wetlands. The primary monitoring and key performance indicator of the passive water quality treatment systems will be the routine monitoring at key locations directly below each treatment train. Station W15 will serve as the key monitoring location below the SWD, and station W37 will serve as the key monitoring station below the second treatment system below the DSTSF and MVFE (Figure 2-1).

If an AMP trigger is exceeded at a key downstream monitoring location, additional upstream monitoring will be conducted above and below the passive treatment train components to help determine the root cause and/or source of the exceedance. Intermediate monitoring may occur within the wetlands if monitoring station(s) have been established there. For example, sampling could be conducted at the input points, intermediate monitoring point(s), and discharge points for each bioreactor and/or above and below each of the wetland systems.

It is assumed that during peak flow or flooding events that the wetlands will not treat the surface water. During these periods or events, a discharge bypass will convey water away from the wetland in an effort to preserve them. An understanding of this assumption and its implications are needed during freshets, flooding events, and also during peak flow events as the wetlands are neither designed nor capable of treating these peak flows conditions. Downstream water quality measurements will be evaluated at monitoring stations, for example station W3, and these results will be used to determine if any AMP thresholds have been exceeded and if adaptive management is required.

8.2.4 Wetlands – Evaluation of Monitoring

A performance evaluation is to be conducted on the effectiveness of the anaerobic and aerobic wetlands. Periodical inspections and maintenance are also to be performed on the wetlands.

The performance evaluation will consist of (in part):

- The surface water quality results from stations W3, W37, W35, and W15
- Periodic physical inspection and maintenance

8.2.5 Wetlands – Specific Indicators

Specific indicators will be established from the surface water quality parameters at monitoring stations W15, W37, W35, and W15.

Additional specific indicators directly related to the condition and performance of the wetlands to be developed if required.

8.2.6 Wetlands – Specific Thresholds

Specific thresholds will be related to, or triggered by, unacceptable water quality measurements at key downstream monitoring stations.

8.2.7 Wetlands – Response Approaches

Specific wetland response approaches are to be developed by Contango Strategies Ltd., and / or develop over time as this AMP evolves.

A general adaptive management response is described in Section 1.2.6.

9 AMP COMPONENT – GENERAL RECLAMATION MEASURES

Section 6.13 of the previous Decommissioning and Reclamation Plan (Revision 3.2) included discussion and commitments towards developing and refining AMP measures around issues relating to general reclamation. Specifically, two issues are discussed including:

- **Reclamation Cover Material** – uncertainty around whether the quantity of reclamation cover material (overburden or other materials) will be adequate for closure and reclamation requirements.
- **Contaminated Soil** – the permitted Land Treatment Facility (LTF) removes hydrocarbon contamination but residual metal contamination in soil may result in its designation as special waste.

AMP protocols for these issues are presented in Section 11.1 and Section 11.2, respectively.

9.1 RECLAMATION COVER MATERIAL – DESCRIPTIONS

A significant volume of reclamation cover material will be required for development of cover systems (see Section 7). Overburden stockpiles are created during pre-development and stripping. The major overburden stockpile at the site is the Reclamation Overburden Dump (see Figure 2-1). Overburden will also be used for progressive reclamation and bulk-disposed in waste dumps with waste rock.

The final design of these covers are not complete and may depend on the results of cover trials and other design and performance testing, but may vary in thickness (and thus required volume) depending on the desired performance specifications.

9.1.1 Reclamation Cover Material – Narrative Triggers

Insufficient quantities of cover material are available to construct closure cover systems or other planned uses for overburden.

9.1.2 Reclamation Cover Material – Monitoring Requirements

Evaluation and accounting of available and anticipated reclamation overburden volumes, and reconciling this against anticipated reclamation cover material requirements will occur regularly during the operations and closure periods.

9.1.3 Reclamation Cover Material – Evaluation of Monitoring

Calculations of available reclamation overburden volumes will be conducted using standard industry practices and will be performed by qualified persons. This volume will be compared with the predicted volumes required for closure and reclamation uses, as indicated by the most current version of the RCP. Factors such as compaction and placed density will be taken into account to ensure accurate accounting. The reclamation research programs will provide insight into:

- The quality and quantity of growth medium required to achieve the objectives of the revegetation/reclamation plan
- The thickness and material properties required to achieve cover performance objectives (e.g. organic content, nutrient composition).

9.1.4 Reclamation Cover Material – Specific Indicators

- Available quantity and quality of overburden material
- Predicted requirements for reclamation cover material and or other material

9.1.5 Reclamation Cover Material – Specific Thresholds

- If at any time in the closure process the overburden requirements exceed the stockpiled inventory by more than 100,000 cubic metres, this will be considered as a specific threshold for adaptive management
- If available overburden is determined to be of insufficient quality in order to achieve objectives of revegetation/reclamation planning or cover performance objectives

9.1.6 Reclamation Cover Material – Response Approaches

1. Internal notification to management, followed by notification to SFN and the closure liability holder that a trigger has been exceeded within a timely period
2. Company will add the cost of mining overburden to the closure liability estimate.
3. Identify a source of overburden or suitable cover material for reclamation use.

9.2 CONTAMINATED SOILS – DESCRIPTIONS

The LTF is permitted for the treatment of soils and allows for the removal of hydrocarbon contamination. This process does not alter the concentrations of metal present in the soil. Given the present condition and the confirmed geochemical signature of area surficial soils, it is likely that some of the materials treated will have metal contamination that would designate it as special waste.

9.2.1 Contaminated Soils – Narrative Triggers

Contaminated soils treated in the LTF require additional remediation or adaptive management

9.2.2 Contaminated Soils – Monitoring Requirements

After the hydrocarbon remediation is complete in the LTF, a complete suite of testing to ensure that LTF soil is compliant with relevant standards with respect to both hydrocarbon content, and metals, will be undertaken. This testing will be undertaken using appropriate methods and sufficient sample numbers that ensure that results are representative of the treated LTF soil.

Preliminary testing of materials in the LTF has indicated that this material may contain levels of metals that could result in its designation as special waste and/or require other special handling.

9.2.3 Contaminated Soils – Evaluation of Monitoring

The results of testing of the LTF soils will be compared with relevant standards to determine what handling and/or disposal methods are most appropriate. Relevant standards for this comparison and reference may include:

- Yukon Contaminated Sites Regulation (CSR) Soil Standards
- Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines

9.2.4 Contaminated Soils – Specific Indicators

Parameters listed in soil guidelines and standards listed in Section 11.2.3 are considered to contain the specific indicators to determine appropriate disposal methods for LTF soil.

9.2.5 Contaminated Soils – Specific Thresholds

Specific thresholds are the levels specified in the guidelines and standards listed in Section 11.2.3. Exceedance of the thresholds and guidelines could result in designation of the material as special waste, which may require special handling and disposal.

9.2.6 Contaminated Soils – Response Approaches

1. Should testing of LTF soil indicate that soil exceeds specific thresholds, internal notification to management, followed by notification to SFN and the closure liability holder that a trigger has been exceeded within a timely period.
2. This material, once successfully treated for hydrocarbons, could be placed in one of the waste storage areas (tailings, waste rock or IROD storage areas) and reclaimed in keeping with the implemented measures at that location.

3. Adaptive management and monitoring for mitigation success (i.e. cover systems and geotechnical integrity, downgradient water quality) for this material would be implemented as per these components of the AMP

10 REFERENCES

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