

Anvil Range Mine Complex Closure Planning Project Management

Submitted by the
Type II Mines Project Office

as a companion document to

*Anvil Range Mining Corporation (Interim Receivership)
2004-2008 Water Licence Renewal
Environmental Assessment Report*

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1. PURPOSE

This document outlines the project management structure for closure planning for the Anvil Range Mining Complex. It is designed to accompany the Environmental Assessment Report (“EAR”) submitted by the Interim Receiver of Anvil Range Mining Corporation (“Anvil Range”)¹ for the renewal of the water licences for the Anvil Range Property, which expire on December 31 2003.

This document outlines:

- the Federal and Yukon government’s commitment to closure planning for and remediation of this the Anvil Range site;
- the need for updating of previous closure planning exercises;
- current closure planning information gaps; and
- the current management approach for closure planning.

2. WATER LICENCE RENEWAL PROCESS

Background

In January 2003, at a Technical Advisory Committee (“TAC”) meeting held by the Interim Receiver, in Whitehorse, it was announced, on behalf of DIAND and the Government of Yukon, that the two governments recognized that the Faro mine was not going to reopen and that closure planning would become the responsibility of a joint government project team.

As such, the project submitted by the Interim Receiver to the DIAND Environment Directorate, to initiate the CEAA review for the renewal of the water licence for the Anvil Range property, was scoped to care and maintenance activities for protection of the property and the environment. This revised scope was described in the Guidelines for the EAR written by the DIAND Environment Directorate, in consultation with the Responsible Authorities, the RERC, First Nations, stakeholders and the public, and provided to the Interim Receiver March 10, 2003. The Interim Receiver submitted its’ EAR to the Yukon Government, Executive Council Office² on April 29, 2003.

The Guidelines stated:

“The scope of the project for this assessment includes the physical works and undertakings in relation to the care and maintenance and related activities of the Anvil Range Mining Complex during the period of the proposed 5 year water licence. This must include the principal undertaking and any accessory activities or physical works that are directly linked to, or interconnected with, the principal project. In this case, the physical work is the actual mine site and the principal undertaking in relation to that physical work is the care and maintenance, new activities/undertakings, adaptive management program, ongoing studies and other accessory activities.”

¹ Deloitte and Touche Inc were appointed Interim Receiver of Anvil Range pursuant to an order of the Ontario Court (General Division), now the Superior Court of Justice, on April 21, 1998.

² The responsibility for the completion of the environmental assessment screening was transferred to the Yukon Government, Executive Council Office, Environmental Assessment Unit on April 1, 2003.

The project scope did not make reference to closure planning and was not discussed by the Interim Receiver in the EAR. This is consistent with the announcement made in January 2003, which indicated that development of the Final Closure and Reclamation Plan (FCRP) for the Anvil Range mine site would be the ultimate responsibility of a joint government project team.

3. CLOSURE PLANNING

3.1 NEED FOR CLOSURE PLANNING

Advances in knowledge and experience in mine reclamation technology, the complex nature of the environmental issues at the Anvil Range site, identified information gaps and the current wide range of closure options and costs that have been proposed for this site argues for a review and re-evaluation of previous abandonment options.

The linkages among many site components and associated closure alternatives highlight the difficulties that would be encountered if major closure measures on selected parts of the site were implemented in the absence of an overall plan. That consideration was behind earlier requirements for a fully integrated, comprehensive plan, and is imperative in planning for a new Final Comprehensive Reclamation Plan.

Licence requirements around closure and abandonment have been integrated in successive amendments to Anvil Range's current licences and, as a result, are of a piecemeal nature. There have been four closure plan documents³ for the Faro site, none of which have undergone regulatory review and approval; nor have they undergone an environmental assessment. However they do contain valuable characterization information upon which closure planning can build.

Initial closure plans for the Vangorda and Grum sites were provided in the 1989 Initial Environmental Evaluation and Water Licence Application documents and underwent an environmental assessment screening at that time.

These previous abandonment options need to be reassessed in an integrated fashion to ensure that 1) they are internally consistent; 2) environmental protection is maximized by including the most recent technological advances in the closure options and 3) they are cost-effective.

³ The closure planning documents for the Faro site include:

- Faro Mine Tailings Abandonment Plan, prepared by Klohn Leonoff Consulting Engineers, 1981;
- Abandonment Submission: Summary report, prepared by Curragh Resources, 1988;
- Down Valley Tailings Abandonment Plan, prepared by SRK for Curragh Resources, 1991; and
- Integrated Comprehensive Abandonment Plan, prepared by Robertson Geoconsultants Inc., 1996, for Anvil Range.

3.1.1 SCIENTIFIC AND TECHNOLOGICAL ADVANCES

Since the 1996 ICAP was prepared, industry has gained significant experience in implementation and monitoring of mine site closure measures. Examples of some of the key developments include:

- An assessment of the feasibility of tailings relocation (and reprocessing) completed shortly after the 1996 ICAP. Experience elsewhere has shown the importance of considering the water treatment costs associated with any relocation or disturbance of tailings materials.
- The performance of soil covers has been an active field of research and rigorous assessments are now available for a number of sites (e.g. Equity Silver in British Columbia, Cluff Lake in Saskatchewan).
- The performance of sulphide cells has been assessed at other properties, and serious concerns have been noted. (e.g. Samatosum in British Columbia, Mt. Muro in Australia)
- Passive water treatment measures have been shown to be effective for treating low zinc levels in pit lakes (e.g. Island Copper in British Columbia)
- Backfilling of waste rock to pits has been shown to be cost competitive with long-term treatment at other sites, and preferable because it avoids the creation of a contaminated pit lake (e.g. Ronnenburg in Germany, Flambeau in Wisconsin).

These experiences allow a better assessment of the effectiveness of several alternatives contained in the 1996 ICAP. Furthermore, there have been several additional studies and monitoring programs at the Anvil Range sites that provide additional insight. Examples include:

- Site monitoring and seep survey data now provide a much better basis for understanding the site's waste dump water quality. Experience from other sites has led to improved understanding of how such data can be used to predict future trends.
- A detailed investigation of the groundwater regime in the Rose Creek tailings basin was completed in 2002.

3.1.2. INFORMATION GAPS FOR FINAL CLOSURE PLANNING

The significant gaps in the 1996 ICAP, which must be addressed prior to implementation of closure measures include, but are not necessarily limited to:

- Whether all of the waste dumps will eventually generate acid drainage. A particular concern is the effectiveness of the sulphide cells in isolating acid-generating waste rock;
- Insufficient knowledge of dump drainage paths and water balances;
- Evaluation of alternative tailings closure measures for the Rose Creek tailings aquifer;
- Geotechnical investigations for site selection, design and construction of facilities such as the Faro water treatment plant, the Plug Dam, spillways or re-routing of the major creek diversions;
- Detailed engineering for construction of physical facilities;
- The level of success that can be achieved by implementing some of the proposed closure measures (e.g. to control metal loading for flows into the Faro or Vangorda pits);
- Costing based on more detailed engineering, the availability of actual field data, and data on actual costs for implementing similar measures at other sites.

Specific information gaps in the 1996 ICAP are presented in Tables 3.1 to 3.3 with respect to water flow, water chemistry, and geotechnical/engineering issues.

Table 3.1 - Knowledge Gaps with Respect to Hydrology and Hydrogeology

Topic	Description of Knowledge Gap
Water balance	<ul style="list-style-type: none"> • Including surface and groundwater for final design of the water treatment facilities (plant, ponds, water collection systems). For example, at Faro, it is unclear where the water infiltrating into the dumps eventually discharges. It is not evident from seep surveys and monitoring at the toe. Possibly it reports to shallow or deep groundwater systems. Water is being retained physically or chemically within the dump and may, in the longer term, be released and require treatment.
Groundwater	<ul style="list-style-type: none"> • Flowpaths downstream of the dumps at Faro and Vangorda, in the Rose Creek tailings area are unknown.
Seepage	<ul style="list-style-type: none"> • Water balance and mass balance (in seepage) for Main Pit and Zone II pit to assess storage capacity and seepage potential. • Seepage from Grum pit.
Diversions	<ul style="list-style-type: none"> • Geotechnical stability and hydrologic capacities for existing and proposed Faro, Vangorda and Rose Creek Diversions.

Table 3.2 - Knowledge Gaps with Respect to Water Chemistry

Topic	Description of Knowledge Gap
Waste Dump Drainage	<ul style="list-style-type: none"> • Predictions were made in the 1996 ICAP of “worst case” drainage chemistry from waste dumps. However, the remaining questions are “how soon?” and “how much?”. • What would be the load to a treatment facility for long-term collection and treatment of Grum waste rock dump drainage, should it occur?
Tailings	<ul style="list-style-type: none"> • Specific requirements for water management and water treatment if relocation of the tailings occurred.
Pit Water	<ul style="list-style-type: none"> • Length of time required to achieve acceptable discharge water quality in both the flooded tailings and in the open pits. • Available measures to achieve dischargeable water quality in

Topic	Description of Knowledge Gap
	<p>the open pits or to allow some version of the flow through option at both Faro and Vangorda.</p> <ul style="list-style-type: none"> • Water treatment options and requirements if waste rock and/or tailings were moved to the pits.

Table 3.3 - Knowledge Gaps with Respect to Engineering and Geotechnical Issues

Topic	Description of Knowledge Gap
Field Conditions	<ul style="list-style-type: none"> • Investigation of foundation conditions for treatment plant and contaminated water storage reservoir. • Location for a spillway in bedrock for the Intermediate Dam. • Field conditions for routing of Faro Creek diversion around west side of pit.
Stability	<ul style="list-style-type: none"> • Stability (under dynamic loading) of Intermediate Dam for all options, including the proposed toe buttress. • Stability of north pit wall as the pit floods, and requirements to route Faro Creek Diversion and/or inflow away from north wall failure zone.
Design and Materials	<ul style="list-style-type: none"> • Foundation conditions and construction material (and source) for the Plug Dam and spillway for Faro Main Pit. • Cover design and borrow sources.
Engineering	<ul style="list-style-type: none"> • Detailed engineering for construction of treatment facilities, re-routing of diversions, stabilization of the Intermediate Dam and construction of the Faro Plug Dam and spillway.
Tailings Relocation	<ul style="list-style-type: none"> • Methods of moving and treating the tailings.

These knowledge gaps will need to be addressed prior to the completion of a closure plan.

3.2. CLOSURE PLANNING MANAGEMENT

DIAND and the Yukon Government have agreed to take a co-operative approach to the environmental management of Type II mine sites listed in the Devolution Transfer Agreement (DTA), that are under government care. This includes activities undertaken for interim care and maintenance through to the closure and final reclamation of these sites. A joint Steering Committee has been established to provide senior level leadership and direction to a project management team with respect to the Type II sites.

3.2.1. ROLE OF GOVERNMENT

In January 2003 DIAND and the Government of Yukon acknowledged that the Anvil Range mine was not going to reopen and stated publicly that closure planning would be the responsibility of the two governments. The Type II Mines Project Office, established by DIAND and the Yukon Government, will be responsible for overseeing mine remediation planning at the Anvil Range site and ensuring intergovernmental coordination and involvement, including First Nations involvement. These responsibilities include:

- Reclamation planning including development of abandonment options;
- Development of the Faro Final Closure and Reclamation plan;
- Preparation of the environmental assessment report for review under YEAA or YESAA;
- Ensuring all regulatory authorizations are in place;
- Remediation of the site; and
- Follow-up monitoring.

An important component of these responsibilities will be communication and consultation throughout the process with affected communities, interested parties and groups. The Type II Mines Project Office⁴ recognizes the need to maximize continuity, momentum and stability for closure planning at this property during a period of transition. The Project Office will utilize previous planning efforts to the extent possible in the development of the FCRP.

3.2.2. ROLE OF FIRST NATIONS

Four First Nations are specifically identified, under Chapter 6 of the DTA, as “Affected First Nations” with respect to final abandonment of the Anvil Range Mine Complex. First Nations’ involvement will be integrated into the closure planning process, to ensure that the obligations set forth in Chapter 6 of the DTA are met. Invitations have been sent out to the four First Nations to meet to discuss key considerations regarding planning for closure and abandonment of this site and First Nation participation. The specifics of the involvement of First Nations will be determined through these discussions.

3.2.3. LINKAGE TO INTERIM RECEIVER

The Interim Receiver has overseen the management of the Anvil Range property under the terms of the existing water licences since its appointment in 1998. There are outstanding legal issues to be resolved with regards to the property and its administration, which the Interim Receiver must address. The Interim Receiver will continue to have the responsibility for environmental care and maintenance operations at the site, until these issues are addressed and the interim receivership is wound up. Additional activities planned by the Interim Receiver for the next licence period include the continued collection and provision of data regarding on-going site characterization work.

3.3 INITIAL CLOSURE PLANNING

The complex nature of the environmental issues at the site and the current wide range of closure costs, estimated at between \$175 and \$350 million, requires that a rational, step-by-step closure planning process be followed.

⁴ The contacts for the Type II Mines Project office are listed in Appendix B.

3.3.1. STUDIES REQUIRED TO FILL KNOWLEDGE GAPS

In the May 2002 Project Description, the Interim Receiver outlined proposed studies designed to fill several knowledge gaps. These are described in Appendix A. The rationale and appropriateness for these studies will be reviewed by the Project Team, along with those gaps identified in Tables 3.1, 3.2 and 3.3. The 2002 studies completed by the Interim Receiver will also be reviewed. Based on overall closure objectives, studies will be integrated into a comprehensive program to carry out in the 2004 to 2008 water licence period. No closure objectives have been pre-empted nor will the identified studies constrain future decisions.

3.3.2. FINAL CLOSURE AND RECLAMATION PLAN PREPARATION

The studies listed in Appendix A and/or others identified by the Project Team will be used in preparing a FCRP. The selection of closure alternatives will be conducted within the project management and consultation structure described in Section 3.2. The comprehensive closure plan will address all of the facilities at the site.

3.3.3. REGULATORY APPROVAL PROCESS

The submission of the FCRP document will trigger a YESAA assessment. An EAR, or its equivalent under YESAA, will be prepared, to evaluate the environmental impacts of the FCRP and it will be reviewed under YESAA.

A water licence application will be submitted and a water license obtained prior to implementation of closure measures.

3.3.4. PROJECT SCHEDULE

The Project Team is working towards the timelines recommended for inclusion within the Receiver's current water licence application. To provide for sufficient time for this task, studies and closure planning activities have been designed to take place as expediently as possible while providing sufficient information to assess a range of closure alternatives.

4. LINKAGE TO WATER LICENCE RENEWAL

Through the authority granted by its Interim Receivership Order, the Interim Receiver will, in mid-May 2003, submit an application to the Yukon Water Board for the renewal of the water licences. This will describe and justify proposed changes to the water licence relating to care and maintenance. A request will be made to group the closure clauses within the licence and hold them in abeyance until the submission of the FCRP.

Anvil Range (as represented by the Interim Receiver), will be legally bound by the terms of the new licence until its' affairs are wound up. The closure plan will be developed by the Type II Mines Project Office and submitted to the Yukon Water Board for review and approval. Canada and the Yukon Government have accepted the responsibility of ensuring that closure planning is done and closure of the site is completed.

5. CONCLUSION

The information provided in this document provides an outline of the process to be followed for integrated and updated closure planning at the Anvil Range property. It also describes the current management approach for closure planning during the next licence term and potential closure studies and timelines that the Project Team will address.

APPENDIX A: IDENTIFICATION OF KNOWLEDGE GAPS RELATED TO CLOSURE PLANNING – BY THE INTERIM RECEIVER

The information provided in the Integrated Comprehensive Abandonment Plans (ICAP) as part of the previous water licence obligations by Curragh Resources and Anvil Range Mining identified a number of areas in which additional research and/or data collection was needed. Subsequent work by the Interim Receiver added knowledge of abandonment methods but pointed out further gaps in the knowledge required for acceptable final abandonment planning.

The currently identified knowledge gaps are:

1. Faro Mine Site

1.1 Rock Dump and Open Pit Geochemical Characterization

- Waste Rock Dump Water Balance Studies:
 - Snow survey data to support improved estimates of the rate at which water infiltrates the dumps.
 - Drill hole programs to assess any effects of frozen zone conditions on rates of water seepage from the dumps.
 - Revision of 1996 ICAP water balance calculations based on results of snow surveys and drill hole programs.

- Predictions of seepage contaminant concentrations from Faro waste rock dumps and Faro open pit lake.

1.2 Closure Alternative Studies

- Conceptual design and cost estimates for Faro waste rock dump decommissioning:
 - Surface regrading
 - Cover types and performance
 - Relocation options

- Faro Creek Diversion Options:
 - Upgrades to the current system
 - Re-alignment to the N.E. of the current location
 - Allowing flow-through the existing open pit
 - Re-alignment through a back-filled pit
 - Flow through constructed channel or tunnel in the pit area.

- Faro Water Collection and Treatment System Options
 - Pumping versus gravity feed to treatment plant(s)

- Treatment plant location
- Feed(s) to treatment plant
- Volumes requiring treatment

2. Rose Creek Valley

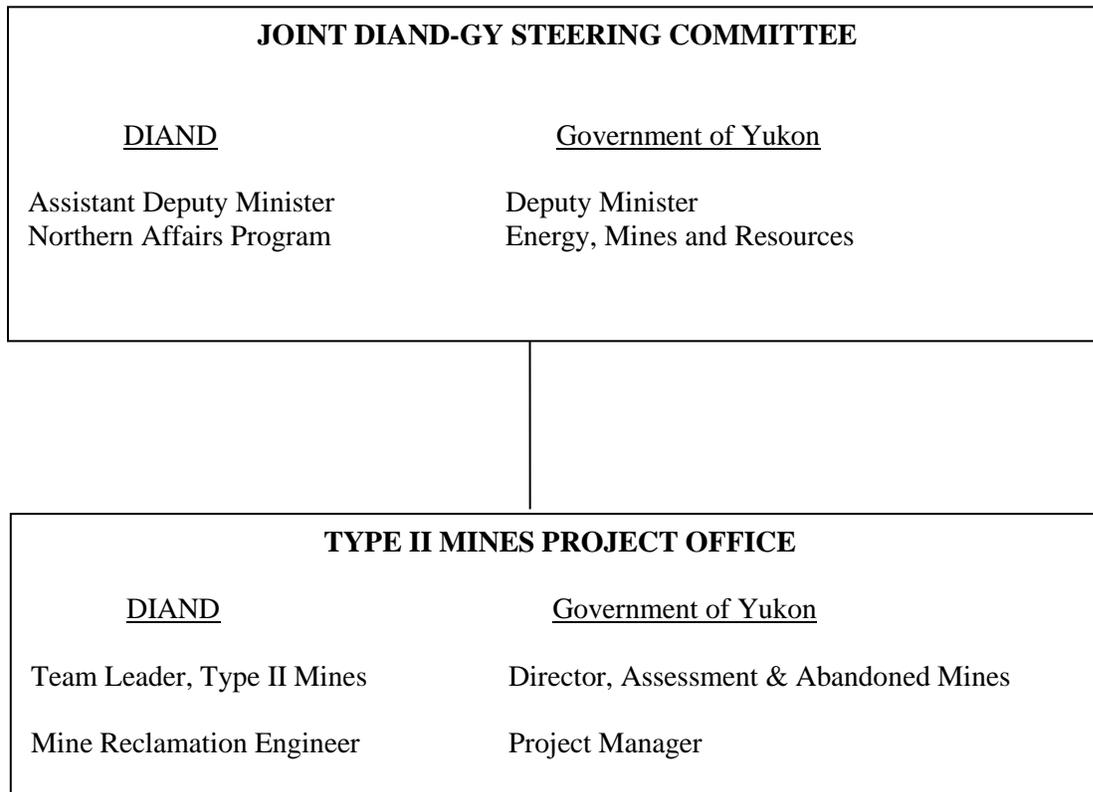
- Site Characterization
 - Hydrogeology of the tailings
 - Geochemistry of the tailings
- Decommissioning Options
 - Performance of wet covers
 - Performance of dry covers
 - Relocation to the Faro Open Pit
 - Characterization of the Rose Creek Valley aquifer
 - Risk-based engineering criteria
 - Long-term water treatment requirements
- Tailings Cover Test Cell Program

3. Vangorda Plateau Site

- Temperature and gas exchange study of Vangorda and Grum waste dumps Revised water balance studies based on information obtained from snow survey program and acid rock drainage geotechnical testing
- Water infiltration rates in frozen zones to determine seepage rates from dumps
- Closure Alternatives
 - Regrading dump surfaces
 - Cover types and performance
 - Relocation options for Vangorda and Grum sulphide waste rock
 - Critical analysis of 1994 waste rock cover trials
- Vangorda Creek Diversion Options
 - Upgrades to current system.
 - Redirection of flow to Shrimp Creek
 - Routing water through the current open pit
 - Routing flow through a back-filled pit
 - Routing flow through a tunnel in pit area
 - Via aqueduct or flume over causeway in partially-filled pit

APPENDIX B: PROJECT MANAGEMENT

Joint Government Management Structure:



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