Martin Haefele

From: Lorraine Seale [sealel@inac-ainc.gc.ca]
Sent: May 18, 2005 4:14 PM
To: david@canadianzinc.com; Lorraine Seale
Cc: alan@canadianzinc.com; Martin Haefele
Subject: Re: Prairie Creek EA for Phase 3 Drilling

Follow Up Flag: Follow up
Flag Status: Red

Hello David,

Two of the key references we had in mind are:

Technical Guidelines: Guidelines and Conditions for Mine Site Reclamation and Closure for New Mines -Technical Issues. DRAFT. Date Issued: March 23, 2005. Yukon Energy, Mines, and Resources.
available at: http://www.emr.gov.yk.ca/mining/info/mine_reclamation_policy.htm

Health, Safety and Reclamation Code for Mines in British Columbia. Ministry of Energy and Mines Updated to 2003. available at
http://www.em.gov.bc.ca/mining/mineper/mineereg1.htm

Since Canadian Zinc has already committed to using the PDAC Environmental Excellence in Exploration materials, I am not providing any references from that source.

I am copying this email to Martin Haefele at the Review Board for the public registry since our comment was directed at Canadian Zinc and the Board.

Regards,

Lorraine Seale

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>>> <david@canadianzinc.com> 05/06/05 12:56 pm >>>
Lorraine,

I refer to the DIAND letter dated April 12, 2005. On page 2, you offered to provide references on road construction and reclamation in mountainous areas in BC and the Yukon. Please provide these, and any document download links if you have them.

Thanks.

Dave Harpley
Environmental Coordinator

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Technical Guidelines

Guidelines and Conditions For Mine Site Reclamation and Closure for New Mines - Technical Issues

Date issued:

Table of Contents

Appendices

1 Purpose of the Guidelines

1.1 Objective

1.1.1 These guidelines are intended to ensure the protection of the environment and the goals of sustainability relating to mine closures in Yukon.

1.1.2 These guidelines are intended to provide direction to proponents and regulators on matters that should be considered in planning mine closure, including closure plans (Appendix A) and reports (Appendix B). They are not intended to provide detailed instruction on how to develop a rehabilitation plan.

1.2 Not a substitute for legislation

1.2.1 These guidelines are not a substitute for Quartz Mining Act, the Waters Act and other applicable legislation (Appendix C) and have no legislative sanction. Their purpose is to emphasize the main requirements of the Act and define the expectations of the Yukon Government for the development of mine closure plans.

1.3 Global Objectives

1.3.1 Mining is inherently a temporary use of the land. In order to meet sustainability objectives the land must be returned to an acceptable state of productivity after the mining cycle is completed.

1.3.2 The protection of the health and safety of public and area fauna by the elimination of unacceptable hazards.

1.3.3 Reclaiming for productive future use the areas where infrastructures (e.g., buildings, chemical and fuel storage, roads, sediment ponds, solution treatment facilities, tailings facilities, waste rock storage areas, heap leach pads) are located.

1.3.4 Prevent significant exposure to or release of substances that could damage the receiving environment.

1.3.5 Minimize liability and environmental risk.

1.3.6 In the long-term, minimize or eliminate the need for maintenance and monitoring.

1.3.7 Minimize the footprint of minesite development.

2 Terrain Hazards

2.1 Objective

2.1.1 The protection of the public health and safety through measures to prevent or otherwise protect from terrain hazards such as excavations and surface openings.

2.2 General Standards

2.1.2 Access to areas of unsafe drop-offs are blocked and as required, posted appropriately.

2.1.3 Internal and external waste rock storage are re-contoured to a stable configuration and left in a condition conducive to successful revegetation.

3 Erosion Control

3.1 Objective

3.1.1 Prevent erosion that significantly impacts drainage quality or impedes regeneration of reclaimed site.

3.2 General Standards

3.2.1 Slopes are stabilized by contouring and leveling to provide land forms which conform to the surrounding terrain and provide suitable seedbeds

3.2.2 Lack of erosion features on re-sloped surfaces such as gullies and rills

3.2.3 Diversion ditches are constructed to guide drainage away from remaining workings, where necessary

3.2.4 Vegetative mat is sufficient to control erosion

3.2.5 Adequate growth media (fines) is present to sustain re-vegetation

3.2.6 Appropriate pit ponds and decants are in place

4 Re-vegetation

4.1 Objective

4.1.1 To restore wildlife habitat through the reestablishment of a vegetation mat (food source, cover, hide etc,) and self sustaining native vegetation.

4.2 General Standards

4.2.1 Vegetation is self sustaining and comprises native seed mixes

4.2.2 The vegetative cover is capable of self-regeneration without continued dependence on fertilizer or re-seeding.

4.2.3 The establishment of a vegetative cover with sufficient density and species diversity to stabilize the surface against the effects of long term erosion

4.2.4 The successive vegetation must be similar to naturally occurring habitats in the surrounding area

4.2.5 Plant material does not show environmentally significant uptake of metals

4.2.6 Vegetation is self sustaining 3 to 5 years after the last application of re-seeding, maintenance or fertilization

5 Watercourses

5.1 Objective

5.1.1 Restore watercourses to required standards.

5.2 General Standards

5.2.1 Restore watercourses to meet the approved closure plan

6 Contaminated Soils

6.1 Objective

6.1.1 Prevent significant release of substances that could damage the receiving environment.

6.2 General Standards

6.2.1 Any contaminated land outside of the boundaries of a designated or properly managed contaminated area must be rehabilitated. Contaminated soil must be removed from the said land for placement into a designated site, or otherwise ensure that the contaminated soil will not, in perpetuity, cause harm to public health or the environment

7 Roads & Trails

7.1 Objective

7.1.1 Decommissioning of access corridors when they are no longer required

7.2 General Standards

7.2.1 Removal of bridges, culverts & pipes. Streambeds re-established with appropriate stabilization of banks.

7.2.2 Stabilization of banks, road fills and cuts

7.2.3 Installation of diversion berms on steep slopes

7.2.4 Reclamation of the surface and seeding

7.2.5 Ensure road cuts are stable and access is restricted where there is a safety hazard or where access could impact fish or wildlife population

7.2.6 Access to be restricted with appropriate signage for areas posing a safety risk

8 Infrastructure

8.1 Objective

8.1.1 Removal or stabilization of any structures remaining after closure to ensure physical stability and no threat to public health and safety.

8.1.2 Re-establishment of vegetation mat over the disturbed areas of the minesite.

8.1.3 Removal of all hazardous material

8.2 General Standards

8.2.1 All buildings and structures are to be dismantled and removed from the site to an extent that is consistent with the approved final closure plan.

8.2.2 Waste from dismantling and demolition is to be removed from the site and reused or stored in an authorized landfill.

8.2.3 Sites of all buildings and structures shall be reclaimed so as to blend in with surrounding topography

8.2.4 All buried support infrastructures (tanks, pipes, underground services, etc.) will be removed or decommissioned in a safe, acceptable manner. All buried infrastructure remaining will be identified on site closure maps.

8.2.5 All non- hazardous waste materials may be disposed of in an approved non-hazardous materials landfill.

8.2.6 In all areas where ore, concentrate, wastes, fuel, and chemicals were stored or handled at the site, the soil will be tested for contaminants, and if contamination is found, it shall be removed or treated based on an approved management plan

8.2.7 All machinery, equipment, and storage tanks will be cleaned and removed from the site or disposed of on site in an approved manner.

8.2.8 All power transmission lines, pipelines, railways, and airstrips shall be dismantled and removed from the site to an extent that is consistent with the approved future use of the land.

8.2.9 After being emptied, decommissioned septic tanks will be either removed or completely filled with gravel, sand, earth or inert material

8.2.10 All concrete structures, foundations and slabs shall be removed or covered with overburden and re-vegetated.

8.2.11 Contaminated soils remediation will conform to the Yukon Contaminated Sites Regulations and all other applicable requirements.

8.2.12 All explosives shall be removed from the site or be properly disposed of.

8.2.13 No hazardous materials shall remain on site unless they are contained in an approved hazardous materials site and consistent with the final closure plan

8.2.14 Reclamation plans shall consider the health and safety of the public as well as persons involved in undertaking the work

8.2.15 All waste storage sites shall be closed and rehabilitated

9 Rock Dumps

9.1 Objective

9.1.1 Reclaimed rock dumps are to be physically and chemically stable in the long term

9.2 General Standards

9.2.1 Major dumps shall be operated and monitored in accordance with the Interim Guidelines of the B.C. Waste Rock Pile Research Committee

9.2.2 Dumps shall be monitored for physical stability during all phases of closure until the site is closed out

9.2.3 Dumps shall be reclaimed to ensure long-term stability and erosion control

9.2.4 Major dumps are to be re-contoured to be consistent with the approved final land use

9.2.5 Follow design requirements for the dumps and conduct the work in accordance with the Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia

9.2.6 For water quality, meet minimum standard included in the Metal Mine Effluent Regulations at last points of control.

10 Heap Leach Pads

10.1 Objective

10.1.1 Prevent significant impacts to downstream terrestrial and aquatic resources

10.1.2 Minimize liability and environmental risk both during operation and after mine closure

10.2 General Standards

10.2.1 Design to standards laid out in Canadian Dam Safety Guidelines (1999)

10.2.2 For water quality, meet minimum standards included in the Metal Mine Effluent Regulations at last points of control

10.2.3 Follow design requirements and conduct the work outlined in the Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia

10.2.4 When necessary, develop plans for impact prevention (mitigation[1]), operational material characterization, material handling, waste disposal, site reclamation, water management, monitoring and maintenance.

10.3 Liner Design

10.3.1 Requires a Liner System (including materials; conceptual construction methods and conditions; operation and maintenance procedures) achieving a permeability at least equivalent to a synthetic liner over a 12" soil liner with permeability of 10^{-6} cm/sec

10.3.2 Including a Leak Detection and Recovery System with contingency plans

11 Underground Openings

11.1 Objective

11.1.1 Prevent long-term inadvertent access to underground mine openings to the surface

11.2 General Standards

11.2.1 When a mine is left unattended for any length of time, the owner shall take all practicable measures to prevent inadvertent access to all mine openings

11.2.2 At final closure, all surface openings to underground workings must be blocked utilizing a suitable method as designed by a qualified professional engineer. This includes capping with an appropriate reinforced concrete structure or filling with material so that the backfilled opening is stable in the long-term.

11.2.3 The plan for closing openings shall be designed so as to make it as practicable as possible for future access to the mine workings, should the mine be considered for possible mine re-commissioning, at some future date.

11.2.4 Drainage of any mine water through a long-term drain shall be included where there is a possibility for mine water pressures to build to dangerous levels

11.2.5 The closed openings shall be monitored for physical stability during all phases of closure until the site is closed out

12 Stability of Underground Workings

12.1 Objective

12.1.1 Prevent the development of hazardous conditions due to subsidence of surface materials into underground workings and to restore the site to an approved final closure plan.

12.2 General Standards

12.2.1 The owner shall provide details of any underground working that come to within 25 meters of the surface

12.2.2 All surface and subsurface mine workings shall be assessed by a qualified professional engineer to determine their stability. Any surface areas disturbed or likely to be disturbed by such workings in the long-term shall be stabilized. The study shall include an assessment of risk and consequence of crown pillar failure and be submitted for regulatory review and approval.

12.2.3 The areas shall be monitored for physical stability during all phases of closure until the site is closed out

13 Acid Mine Drainage Concerns

13.1 Objective

13.1.1 Prevent significant impacts to downstream terrestrial and aquatic resources

13.2 General Standards

13.2.1 For water quality, meet minimum standard included in the Metal Mine Effluent Regulations at last points of control

13.2.2 Long term active effluent treatment is not considered acceptable rehabilitation

13.2.3 Follow design requirements and conduct the work outlined in the Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia

14 Tailings Impoundment

14.1 Objective

14.1.1 All tailings impoundments and associated components are to reclaimed to a condition that ensure physical and chemical stability for the long term

14.2 General Standards

14.2.1 All impoundment structures shall be certified by a qualified professional engineer with respect to their long-term stability so as to ensure meeting the approved final land use

14.2.2 The procedures and requirements set out in the Canadian Dam Association's (CDA) Canadian Dam Safety Guidelines shall be utilized in the decommissioning and maintenance of tailings dams and containment structures

14.2.3 Exposed slopes of all major impoundments are to be stable in the long term based on criteria provided in the above guidelines

14.2.4 All spillways and other water control structures required for the long term shall be designed by a qualified professional engineer in accordance with the above guidelines and installed before closure of the tailings facility

14.2.5 All final effluents are to meet water quality criteria stipulated in the federal Metal Mine Effluent Regulations at last points of control

14.2.6 Long-term active effluent treatment does not constitute an acceptable closure plan for a tailings facility. Measures that allow for more rapid cessation of active treatment are encouraged

14.2.7 The closed tailings facility will comply with approved design requirements

14.2.8 All work shall be undertaken accordance with the Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia

14.2.9 Tailings impoundments and their related components shall be inspected, monitored and maintained to ensure long-term physical and chemical stability

15 Water Control Structures

15.1 Objective

15.1.1 Stable in long term

15.2 General Standards

15.2.1 Minimal maintenance requirements

15.2.2 Meet Canadian Dam Safety Guidelines

15.2.3 For water quality, meet minimum standard included in the Metal Mine Effluent Regulations at last points of control

16 Risk Assessment Methodology

16.1 Objective

16.1.1 Utilize a common framework to assess risk associated with closure planning and security calculations

16.2 General Standards

16.2.1 **Risk Assessment: Failure Modes and Effects Criticality Analysis (FMECA)**
This form of analysis will be used to determine the level of risk associated with each of the primary elements of the closure plan. If the level of risk is unacceptable, then further mitigations will be included in the plans until an acceptable level of risk is achieved. FMECA is recognized as an effective and credible process base on the use of current scientific and engineering knowledge (see Appendix D)

15.2.2 The costs associated with each element of the plan and its associated mitigations can then be calculated using standard third party rates. The sum of these costs will be the outstanding liability for closure security.

17 Post Closure Monitoring

17.1 Objective

17.1.1 Ensure effectiveness of the reclamation and closure plan through monitoring during all phases of closure until the site is closed out.

17.2 General Standards

17.2.1 Restore to approved performance standards

17.2.2 Inspect and monitor for compliance with reclamation requirements.

16.2.3 Implement adaptive management plans to ensure reclamation objectives.

Appendix A

Contents of Closure Plan

A closure plan must include the following:

a) the name and address of the proponent or operator of the project;
b) the name of the project;
c) the legal description of the project site;
d) the name, address and telephone number of any person authorized to act on behalf of the proponent or operator in respect of the plan;
e) the surface rights, mineral rights held by the proponent or operator in respect of the project site;
f) the previous use of the project site;
g) a description of any previous disturbance or other activity that has, or could have, resulted in contamination of the project site or land adjoining the site;
h) current conditions and activities on the site and security measures employed;
i) a plan showing the location and use of equipment, machinery, buildings and other structures on the project site or in the area in which the site is located;
j) a plan of the project site or the area in which the site is located, drawn to scale and showing the boundaries of the proponent's surface rights and the areas within those boundaries that will or could be subject to disturbance, alteration or contamination as a result of the project;
k) mining and milling processes to be employed in the operation of the project and the planned production levels expressed in tonnes per day;
l) the expected life of the project expressed in months or years;
m) the nature, location and expected size of areas for the storage of tailings, including associated structures and treatment systems;
n) dams and other drainage control structures and details of watercourses;
o) crown pillars and mine openings to the surface;
p) an assessment of the effect of all mine openings on the stability of the surface areas above and adjacent to areas of mining activity to determine whether the surface areas are likely to be disturbed;
q) a description and schedule of any development work that could cause disturbances or hazards at the project site or land adjoining the site;
r) the nature and location of systems for the treatment, management or disposal of waste and for storage of petroleum products, chemicals, hazardous substances and toxic substances;
s) expected conditions of and uses for the project site following permanent closure of the project and rehabilitation of the site;
t) the stages by which the project will be temporarily or permanently closed and a schedule of the practices and procedures by which progressive rehabilitation of the

project site will be carried out during the life of the project and at each stage of closure;

u) the monitoring to be carried out at the project site during the life of the project and at each stage of closure;

v) the procedures to be used to evaluate and verify compliance with the plan during the life of the project and at each stage of closure;

w) the information required under the Financial Assurance Guidelines.

Appendix B

Annual Report

An annual report must include the following:

x) the name, address and telephone number of the proponent or operator and the senior project manager;
y) the name of the project;
z) the nature and extent of the rehabilitation carried out on the project site in the 12 months ending on the anniversary date of the commencement or recommencement of the project, and to be carried out in the 12 months following the anniversary date;
aa) an evaluation of whether or not the approved closure plan is adequate to properly rehabilitate the site
bb) when the report indicates that the closure plan is not adequate to properly rehabilitate the project site,
   a) the operator or proponent may submit a revised plan; or
   b) a revised plan may be requested by Yukon Government

Appendix C

List of Relevant Legislation

Appendix D

Risk Assessment

Appendix E

Glossary

Contents
Other Links

This Handbook will assist persons who wish to explore for minerals and coal in British Columbia to understand the process whereby exploration activities are permitted and regulated. Mineral and coal deposits are widely distributed throughout the jurisdiction, and their discovery, development and production result in significant benefits to regional and provincial economies. Consequently, exploration and mine development is encouraged in all areas of the province where mineral and coal tenure can be acquired.

Mineral and coal exploration activities are regulated under the Mineral Exploration (MX) Code which has replaced Part 11 of the Health, Safety and Reclamation Code (the Code) under the Mines Act.

The purpose of the MX Code is to

(1) Establish province-wide standards for mineral and coal exploration and development activities.

(2) Administer and manage exploration and development activities to ensure maximum extraction with a minimum of environmental disturbance, taking into account sound engineering practice and prevailing economic conditions.

The Handbook contains:

- Mineral Exploration Code;
- Guide to the standards for mineral and coal exploration activities;
- Notice of Work and Reclamation (Mines Act Permit application form);
- Notice of Work and Reclamation guide;
- Exploration Activities and Reclamation Permit,
- Annual Notice of Completion of Work

The MX Code does not apply, nor is an Exploration Activities and Reclamation Permit required, for exploration work that is excluded under the definition of exploration activities in Part 11 of the Code. Work that is excluded from the definition is generally that which does not involve mechanical disturbance of the surface and includes:

- prospecting using hand-held tools;
- geological and geochemical surveying;
- airborne geophysical surveying;
- ground geophysical surveying without the use of exposed, energized electrodes;
- hand trenching without the use of explosives;

- establishment of grid lines that do not require the felling of trees unless permitted under the definition.

Exploration activities that do require permitting and to which the MX Code applies are:

- drilling, trenching and excavating using machinery;
- blasting;
- disturbance of the ground by mechanical means;
- construction, modification, deactivation and reclamation of an exploration access;
- induced polarization surveys using exposed electrodes; and
- site reclamation.

Exploration and mining activities related to placer mining are administered under other areas of the Mines Act and the Code.

Rights to mineral and coal resources in the province are initially obtained from the Crown pursuant to tenure legislation. The following is a brief description of the regulatory and administrative connection between the Mineral Tenure Act, the Coal Act and the Mines Act.

Tenure acquisition

Tenure to mineral and coal resources may presently be acquired on approximately 80% of British Columbia's land area. The remaining lands are in parks, lands where sub-surface rights are reserved to the Crown and lands which are excluded by provisions of the tenure statutes. Title for exploration and development purposes is available from the Crown through the locating and recording of mineral claims in accordance with the Mineral Tenure Act and Regulations, and through application for coal licenses under the Coal Act. Title may also be acquired from recorded holders of tenures. The person acquiring title becomes the recorded holder of that particular mineral or coal tenure.

Tenure maintenance

Having acquired title to mineral or coal rights, the recorded holder of a claim or license may exercise statutory rights to use, enter and occupy the surface of the respective tenure for exploration and development purposes. In conjunction with these rights is an obligation to maintain title. Coal licences are maintained by payment of an annual rental, while mineral claims are maintained by undertaking exploration and development of a value sufficient to satisfy the requirements of the tenure statutes, and by recording the value of work performed with the Crown. (The document "Guide to the Evaluation of Physical Work for Assessment Purposes" which is available from the Mineral Titles Branch, Energy and Minerals Division details the evaluation of activities for title maintenance purposes).

Notice of Work and Reclamation

The application for an Exploration Activities and Reclamation Permit is called the Notice of Work and Reclamation (Notice). A person wishing to undertake exploration describes the location, nature, extent and duration of proposed exploration activities in a Notice, and submits it to the appropriate regional office of the Mines Branch, Energy and Minerals Division. The Notice may then be referred for review and comment.

Exploration Activities and Reclamation Permit

An Exploration Activities and Reclamation Permit is issued pursuant to Section 10 of the Mines Act. A Permit authorizes those exploration activities, including reclamation of disturbed areas, which are detailed in the Notice, and may contain terms and conditions which address issues and concerns raised during the review and referral of the Notice. Standard conditions require that approved exploration activities be carried out in accordance with the Mines Act, the Code and with any term or condition of the Permit.

Last Updated October 20, 2003