

Wolverine Project

**DECOMMISSIONING, CLOSURE AND
RECLAMATION PLAN FOR FINAL CLOSURE**

ADVANCED EXPLORATION PHASE

Quartz Mining Land Use LQ00140: CONDITION 103

Type B Water Licence Approval QZ01-051: CONDITION 58

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Table of Contents

1	Introduction.....	1
2	Final Closure Plan Objectives.....	2
3	Decommissioning, Closure and Reclamation Phase Activities	3
3.1	Personnel Requirements.....	3
3.2	Activities and Timelines	3
3.3	Water Management and Treatment.....	5
3.4	Mine Openings.....	5
3.5	Borrow Areas.....	5
3.6	Portal Area	6
3.7	Equipment.....	7
3.8	Industrial Reagents and Hazardous Products.....	7
3.9	Miscellaneous Materials in Laydown Areas.....	8
3.10	Waste Rock Pad	8
3.11	Exploration Camp Site.....	9
3.12	Airstrip	10
3.13	Roads.....	10
3.14	Site Remediation.....	10
4	Site Reclamation.....	10
5	Decommissioning and Reclamation Cost Estimates	11
6	Post Closure Monitoring and Maintenance Programs.....	16

List of Tables

Table 3-1. Site Decommissioning, Closure and Reclamation Work Force Requirements	3
Table 3-2. Activities Associated with the Decommissioning and Post Closure Phases	4
Table 3-3. Wolverine Project – Custom Seed Mixture	6
Table 4-1. Summary of Disturbed Areas and Reclamation Activities.....	11
Table 5-1. Estimated Cost to Execute Decommissioning, Closure and Reclamation Plans.....	14
Table 5-2. Estimated Unit Costs for Equipment and Personnel	15

List of Appendices

Appendix A Figures

Figure 3-1	Status of Portal at the End of Test Mining
Figure 3-2	Tire and Rock Composite Barrier for Portal 1345
Figure 3-3	Original Contours in the Phase I and Phase II Waste Rock Storage Area
Figure 3-4	Closure Contours for Phase I Waste Rock Area

Appendix B Decommissioning, Reclamation and Post-Closure Costs

Abbreviations

ARD	Acid Rock Drainage
HDPE	High Density Polyethylene
ML	Metal Leaching

1 Introduction

This Decommissioning, Closure and Reclamation Plan for final closure (Final Closure Plan) has been prepared to meet the requirements under the Quartz Mining Land Use Approval LQ00140 - Condition 103 and Type “B” Water Licence Approval QZ01-051 – Condition 58. The licenses were issued to Yukon Zinc Corporation for the Wolverine Advanced Exploration Project. The Wolverine project area is located 280 km east-northeast of Whitehorse, 170 km northwest of Watson Lake and 140 km east-southeast of Ross River in southeastern Yukon Territory. The site is in the Campbell Range on the northeast side of the Pelly Mountains. Elevations on the property range between 1200 and 1300 m above sea level (a.s.l). Coordinates for the area are latitude 61°25’ N, longitude 130°07’ W on NTS map sheet 105G, Finlayson Lake.

This plan describes activities related to decommissioning, closure and reclamation for the Advanced Exploration Phase. The proposed activities will commence with a decision that does not advance the exploration project to production, and following a period of temporary closure. A seasonal temporary closure plan for the 2005-6 winter period (from December 1, 2005 to March 15, 2006) was submitted to the Yukon Government on November 17, 2005. In conjunction with this Final Closure Plan, a Temporary Closure Plan has been submitted that covers any period of site inactivity up to a 5 year long duration.

The plan is limited in scope to the underground mine (portal and workings), portal area (including sumps, buildings, equipment and fuel tank), explosive magazines, waste rock pad, roads and exploration trails, airstrip and camp area. In addition, this plan addresses waste and water management issues related to the Advanced Exploration Phase. As the only surface opening (1345 Portal) is located above the pre-mining groundwater table, water is not expected to build up in the mine and discharge out of the mine through the portal. Therefore, at closure water treatment is only proposed at the waste rock pad sump during the decommissioning and closure period.

Activities pertaining to final closure of this project include:

- Removal of site buildings and facilities
- Closure of the mine portal and underground workings
- Stabilization and revegetation of the general site areas
- Restoration of exploration trails and access roads
- Removal of site runoff water diversions and re-establishing pre-development flow paths
- Relocation of a portion of waste rock and all of the ore from the waste rock pad to the underground workings
- Decommissioning of the waste rock pad to mitigate the potential for metal leaching/ acid rock drainage

- Post closure maintenance and monitoring programs for a three-year period.

The planned decommissioning, closure and reclamation activities will be undertaken to ensure that high environmental standards are achieved, while respecting all legal requirements and public interests. A principal approach followed in the development of this plan was to incorporate measures that will result in eventual passive closure.

2 Final Closure Plan Objectives

The underground test mining activities were completed on November 10, 2005 and the temporary (seasonal) site closure plan was implemented accordingly. In recognition of the fact that test mining is a temporary land use, this Final Closure Plan has been developed to meet the following objectives:

- protecting public health and safety;
- implementing environmental protection measures that prevent short and long term adverse environmental impacts;
- monitoring performance of completed reclamation activities to ensure attainment of performance objectives, with additional monitoring and maintenance as required.

The determination of closure activities and mitigation measures consisted of an assessment of the critical components that could potentially place the public or the environment at risk. Site specific monitoring and contingency plans will continue to be developed as necessary. Where possible, performance based criteria will be integrated into the monitoring programs.

A mechanism will be established to ensure that communication between government agencies, communities of interest and YZC is clear and consistent, and all closure objectives are met.

It is important to note that the length of the closure period will depend upon whether decommissioning, closure and reclamation objectives are met. Once decommissioning, closure and reclamation activities meet the respective objectives, the site will be declared as permanently closed. It is also important to note that it is unlikely that all areas will be reclaimed as the area is in a region of known metal resources. As such, this plan has been prepared with the intent of providing cost estimates for those entities that will be decommissioned and those that are unlikely to be decommissioned (such as the airstrip). The sections below document the requirements for the decommissioning and closure for all entities, and cost estimates have been separated into those activities that are deemed to be likely and unlikely.

3 Decommissioning, Closure and Reclamation Phase Activities

Decommissioning and final closure activities will commence following the cessation of the five year temporary closure period. The closure phase is anticipated to range from one to three years, but is ultimately dependent on achieving site-specific performance criteria designed to allow for eventual passive closure.

3.1 Personnel Requirements

A number of personnel will be required onsite to implement the various decommissioning, closure and reclamation activities. The majority of these activities will need to be undertaken on a seasonal basis (May–October) and directed by the onsite manager.

The work force requirements for the decommissioning and post closure phases are provided in Table 3-1.

Table 3-1. Site Decommissioning, Closure and Reclamation Work Force Requirements

Personnel	Decommissioning Period: Year 1	Post Closure Period: Years 2 to 4
Site Manager	1	-
Environmental Monitor	1	1
Equipment Operators	3	1
Tradesman	2	-
General Labourers	3	2
Camp Support Staff	2	-
Total	12	4

3.2 Activities and Timelines

The activities outlined below summarize the physical and biological requirements of the site including the decommissioning of infrastructure and the reclamation of surface disturbances. All decommissioning, closure and reclamation activities will be properly supervised and documented to ensure that all works are completed according to design plans and as per industry practice. Table 3-2 provides a list of planned activities that will be required during the one-year decommissioning period and the three-year-post closure phase.

The following infrastructure and equipment will remain operational onsite to support the post closure phase:

- Onsite roads to the camp;

- Light duty vehicle(s) and ATV;
- Water treatment infrastructure (pumps, pipelines, reagent storage);
- Power generating facility with adequate capacity to power pumping systems and camp as required, and
- Small maintenance workshop; and
- Communication system

Table 3-2. Activities Associated with the Decommissioning and Post Closure Phases

Component	Decommissioning Activities: 2006 (Year I)	Post Closure Activities: 2007-2009 (Years 2 to 4)
Test Mine Workings	Relocate 2430 m ³ (ore) and 4773 m ³ (waste) from the waste rock pad; Seal the portal and allow test mine to flood	Assess the performance of the closure measure. Test mine will continue to flood
Exploration Trails and Onsite Roads (~9.12 ha)	Reclaim exploration trails and access roads no longer in use	Performance monitoring of reclaimed areas
Portal Area (~1.6 ha)	Remove office and maintenance facility; decommission dirty and clean water sumps; dispose of sump sediments; backfill the sumps; remove materials from the lower storage pad; conduct remediation programs where necessary; reclaim disturbed areas	Performance monitoring of reclaimed areas
Waste Rock Pad (~0.67 ha)	Relocate 100% of the ore and 30% of waste rock to the underground, place cover over the pad, install drainage systems, install passive systems to treat water from the sump if above the discharge criteria	Perform monitoring of reclamation measures; monitoring waste rock pad sump water quality as required
Camp (~2.7 ha)	In use; downsize; conduct remediation program as required; reclaim unused disturbed areas	Remove structures and reclaim areas not required to support ongoing activities
Airstrip (~2.7 ha)	Airstrip will not be decommissioned at this stage	Airstrip will be deactivated or decommissioned once not needed
Power Generation – Camp and Portal Areas	Assess future power requirements and downsize the power requirements as required and leave adequate capacity for the operation of the camp, and water and fire suppression purposes	Remove remaining gensets once all activities are complete
Overall Environmental Site Assessment	Prior to undertaking closure activities, as part of a comprehensive environmental site assessment, areas of suspected oil, chemical, or other contaminant spills will be tested to confirm locations and quantities requiring clean-up; undertake remediation of identified areas as required; land farm contaminated soils	Undertake remediation of identified areas as required; Performance monitoring of remediated areas.

3.3 Water Management and Treatment

In the event that the mine requires to be drained at the time of closure to allow the placement of waste rock and ore, the mine water will be treated to meet discharge standards. Yukon Zinc Corporation is currently working on the treatment process to remove the contaminants of concern, as outlined in the previously submitted report entitled Water Management and Treatment Plan (YZC, November 17, 2005). The treatment system will be operational in the spring of 2006, when the site reopens as per the Temporary Closure Plan.

Monthly monitoring of the Surveillance Network Monitoring Stations will continue during the decommissioning phase, and if deemed necessary, during the post closure phase.

3.4 Mine Openings

The 1345 Portal will be sealed off by a barrier, constructed of tires and coarse riprap to prevent access by the public and wildlife. It is proposed to construct the barriers of used heavy machinery tires, a technique used in Alberta and British Columbia. The tires would be compressed by an excavator equipped with a thumb attachment and wedged into the opening. If size 15.5R25 Radial Tires (Overall Diameter and Width are 1278 mm and 396 mm respectively) are used, approximately 36 tires will be needed. Figure 3-2 illustrates the barrier proposed.

This type of portal barrier has several advantages:

- in the absence of sunlight, the rubber will take a long time to degrade
- the compression of the tires ensures the tires are locked tight against the rock wall of the portal. If over time these rock wall surfaces loosen, the tires will have some expansion to maintain the tight fit
- the configuration of tires (placed on edge) has enough gaps to ensure that it is permeable to water without permitting access by people or animals

A cap of coarse waste rock (300 mm – 400 mm) will be placed over the tires to control degradation of the tires by sunlight and to provide a permeable barrier. It is necessary to note that the portal is located above the pre-mining groundwater table and as such, water pressure will not build up in the mine and result in a potential safety hazard with this type of barrier.

The cap of waste rock over the portal will be contoured to restore the natural slope of the surrounding terrain.

3.5 Borrow Areas

The borrow areas that were used to generate material for the construction of site components such as the temporary waste rock pad cover material will re-vegetated using the seed mixtures detailed in Table 3-3.

Table 3-3. Wolverine Project – Custom Seed Mixture

Use	Species	Common Name	% in Mixture	Rate of Application	Cost/kg
Roadside:	Agropyron violaceum	Violet wheat grass	33.30	30kg/ha	\$25.50
	Agoropyron pauciflorum	Slender wheat gras	33.30		
	Agrostis scabra	Tickle Grass	3.30		
	Festuca ovina	Sheep Fescue	30.00		
Slope:	Agropyron violaceum	Violet wheat grass	37.50	40kg/ha	\$29.50
	Agoropyron pauciflorum	Slender wheat grass	37.50		
	Agrostis scabra	Tickle Grass	2.50		
	Deschampsia caespitosa	Tufted Hair Grass	2.50		
	Festuca ovina	Sheep Fescue	20.00		
Cost per Hectare		Roadside	\$ 765.00	Slopes	\$ 1,180.00

3.6 Portal Area

As shown on Figure 3.2, the portal area has the following components:

- Maintenance shop and offices;
- Power generation;
- Lower laydown area;
- Dirty, clean and treatment sumps;
- Diesel fuel tank

Additional supporting infrastructure located to the southwest of the portal includes the waste rock pad and the explosive magazines.

Closure related activities for infrastructure within these areas include removal of buildings, relocation of ore and waste rock from the waste rock pad to underground, installation of engineered cover over the waste rock pad, decommissioning and removal of gensets, site stabilization, and restoration of disturbed lands. At closure, these areas will be re-contoured to ensure adequate drainage and prevent pooling of water. A landfill will be required during the site-decommissioning phase for the disposal of non-hazardous debris from the industrial area. The landfill will be eventually decommissioned in an environmentally sound manner.

Power Generation Infrastructure

During the decommissioning phase, power requirements will be reduced and only those generators required for ongoing activities will remain operational to support the decommissioning activities. The excess gensets will be deactivated and removed from the site. Power distribution lines no longer in use will be salvaged or buried on site.

At the end of the post closure phase when power is no longer required, the remaining gensets will be removed from the site, and the distribution lines will be re-spooled for salvage or buried on site if in poor condition.

Explosives and Magazines

Unused explosives and detonation devices will be checked for condition and either returned to the supplier for credit, shipped to another third party user, or destroyed through appropriate procedures. In all cases the explosives will be handled, transported and disposed of in compliance with the Explosive Act. The explosives magazines will be returned to the supplier or to a third party.

Fuel Storage Tanks

Diesel fuel will be required until all decommissioning activities cease. All tanks will be emptied of their contents in accordance with the Yukon Environment Act. The tanks will either sold or destroyed and buried on site.

Water Supply Systems

The water supply systems will be decommissioned once the maintenance shop and other auxiliary facilities are no longer required.

Portal Sumps

Dirty and clean sumps will be decommissioned and their contents – mainly sediments will be emptied and disposed of underground. It is estimated that sumps will have a combined sediment volume of 120 m³. The enviro liners will be removed and kept for emergency application during the post closure phase. Once it has been established that the liners would no longer be needed, the liners will be buried on site. The sumps will then be backfilled with 800 m³ of till (Note that the sumps have an estimated combined volume of 800 m³) and reclaimed using the Wolverine custom seed mixture.

3.7 Equipment

The majority of the mobile equipment and fixed equipment belongs to the contractor and the contractor will have demobilized the equipment during the temporary closure phase as per the contractual agreement between YZC and the contractor.

All fixed equipment (owned by YZC) with marketable value will be removed from the site and sold. Materials without any marketable value, which are non hazardous, such as piping, wood, and concrete, etc., will be left in place. Electric installation cables will be left in place unless it is determined that they contain hazardous materials. Equipment that cannot be sold will be disposed of in a proper manner.

3.8 Industrial Reagents and Hazardous Products

Apart from hydrocarbon and shotcrete products, there are limited types of chemicals on site. Any remaining materials will be removed from the site and returned to the original supplier for credit and reuse, or sold to a third party user subject to the appropriate regulatory requirements. Unused specialized products such as water treatment chemicals (flocculants and coagulants) will be disposed of through a licensed waste disposal firm. It is anticipated that such material will be

small in volume at the time of closure. In addition, due to the limited number of products used on site, disposal of any hazardous materials will not be an arduous task at closure.

3.9 Miscellaneous Materials in Laydown Areas

Salvageable material will be sold and removed from the site if feasible. Material that has no scrap value will be disposed of on site. Prior to disposal of the material on site, all of the materials will be examined to ensure that all hazardous materials have been removed and disposed of in an approved manner. Any scrap wood will be stockpiled and burned. A burning license will be obtained from the YTG. All the laydown areas will then be prepared and covered with a vegetated cover.

3.10 Waste Rock Pad

The waste rock pad is located to the southeast of the test mine portal at approximately 6810200N and 440650E as shown in Figure 3-3. The site preparation during construction included removal of trees and shrubs, grading, placement of imported engineered soil and compaction. The compacted till-like foundation layer was further augmented by a 30 mil Enviro Liner to prevent the infiltration of water into the foundation subsoil. Two layers of geotextile (above and below the Enviro Liner) add additional lines of protection. A collection sump located at the southern end of the pad collects drainage from the pad (Photo 3-1). The sump is sized to contain a volume of 216 m³.



Photo 3-1. Lined Phase I Waste Rock Storage Area (looking west)

The volume of waste rock on the pad is 15,500 m³, 4,773 m³ of which will be relocated and deposited underground. The remaining volume of 10,727 m³ will be left on the waste rock pad. The waste rock has potential to generate acid and mitigative measures are required to minimize environmental impacts.

Reclamation of the waste rock pad will include installation of a soil cover and frost protection layer, followed by re-vegetation. Berms and/or lined runoff channels will be constructed to minimize infiltration and erosion. To minimize the generation of future acid rock drainage, the soil cover has to be a low infiltration and low oxygen diffusion cover.

Prior to the placement of the capping material, the waste rock (WR) pad would be re-shaped to a dome shape to a final grade of 3H:1V on the side slopes (Figure 3-4). The WR would be compacted with heavy equipment and the surface would be smoothed by a bulldozer to facilitate shedding of surface water. The contours in Figure 3-4 represent the final anticipated contours. The footprint of that WR pad is approximately 3,200 m². The sloped areas will be approximately 50 m x 60 m on the south facing slope and a combined total of 165 m x 20 m on the west, north and east facing slopes.

To minimize surface runoff onto the pad the footprint of the Enviro Liner will be reduced in size in areas where the Enviro Liner extends far beyond (>2 m) the final contoured edge of the WR. A reduction in size of the Enviro Liner could be achieved by cutting the protruding liner and re-anchoring it closer to the final contoured edge of the WR or by cutting the liner and folding it over the contoured WR prior to placement of the capping material. The WR pad would then be capped with a low permeability and low oxygen diffusion cover system consisting of a 1 m thick compacted clay layer covered with a frost protection layer (~ 2 m of till), and topsoil (0.15-0.3 m) and a vegetation layer.

Test pitting revealed that suitable clay material for this cover is available in the immediate vicinity of the WR pad (e.g. test pit hole TP05-012; YZC and Klohn Crippen, 2005). Compaction should achieve at least 90% of maximum Modified Proctor density. The clay should be compacted at the optimum to 2% wet of optimum water content for compaction. To protect the clay layer from freeze-thaw effects (e.g. development of vertical shrinkage cracks), a frost protection layer would be required. It is anticipated that the frost protection layer would have to be 2 m thick. It could consist of the locally abundant till material. Finally, the stockpiled topsoil and organic material would be spread over the capped pad. The surface of the organic material would then be seeded with a site appropriate seed mix to re-establish a vegetation cover.

All surface water draining towards and from the WR pad engineered cover system would be collected in perimeter ditches (Figure 3-4). The perimeter ditches would discharge by gravity into the existing natural drainage just east of the WR pad. A culvert beneath the road just south of the WR pad would be needed to convey surface water collected from the WR pad into the natural drainage. The total length of the perimeter ditches would be approximately 250 m.

The reclamation plan also includes the installation of a number of passive sediment retention systems such as hay bales or activated carbon to ensure there are no sediment or metal releases to the local streams. A water management plan will be implemented to ensure the success of the passive system. The management plan will include inspections of the waste rock pad and its appurtenances during scheduled site inspections for three years after decommissioning and reclamation.

3.11 Exploration Camp Site

The exploration camp consists of sleeping quarters, offices, kitchen and mess hall, shop, core storage facilities, tool shed, camp fuel cache, incinerators, generators, helipad, dry, outhouses and

recreation center. The overall footprint of the camp area is 2.7 ha, however, once all the infrastructure and buildings are removed, the actual disturbed area is 1.6 ha. All buildings are made out of wood with no foundations.

The camp facilities will be downsized and the structures that will not be required will be demolished progressively. Areas will be re-vegetated with the Wolverine custom seed mixture. Any scrap wood will be stockpiled and burned on site. A burning permit will be obtained from the YTG.

Power supply systems will be kept until they are no longer required and at the end of the post closure phase, they will be decommissioned and removed.

The landfill will be required during the site-decommissioning phase for the disposal of non-hazardous debris from the camp area. The landfill will be eventually decommissioned in an environmentally sound manner.

3.12 Airstrip

The airstrip has an overall area of 2.70 ha and the footprint drains to Go Creek. Decommissioning will consist of removing drainage ditches, ripping the surface and seeding.

3.13 Roads

Once frequency of access around the site areas is reduced to a point where vehicle access is no longer required, the roads will be decommissioned. This will consist of removing culverts and replacing them with cross-ditches or swales, ripping the road surface and re-vegetating with the Wolverine custom seed mixture. Access will remain for ATVs or similar transport for monitoring and inspections and with minimal effort vehicle access could be re-established.

3.14 Site Remediation

During decommissioning and the early post closure periods, site assessments will be undertaken to determine if there are any contaminated areas. In the event the assessment finds some contaminated soils, the material will be isolated and remediated. All fuel storage areas and refueling stations will be assessed for soil contamination. The contaminated soils will be removed from the area and disposed of in the land farm near the airstrip. The selected disposal method will be in accordance with the Yukon Environment Act and Special Waste Regulation.

4 Site Reclamation

The primary objectives of land reclamation and re-vegetation for the Advanced Exploration at the Wolverine property will be to provide short and long-term erosion control and to ensure that end land use is compatible with surrounding lands to leave the area as a self-supporting ecosystem. The overall goal is to prepare the site so that the vegetation returns to a state as near as possible to that in existence prior to mining activities. The Wolverine custom seed mixture given in Table 3-3 will be used for the reclamation of disturbed lands.

A summary of projected spatial disturbances for the project is provided in Table 4-1. The total disturbed footprint is estimated to be 19 ha.

The re-vegetated areas will be subject to periodic inspections that will include the monitoring of the metal uptake in vegetation, the inspection of native plant colonization, and the evaluation of plant growth.

Success of the re-vegetation program will be determined by measuring a number of aspects including growth, survival, density and diversity of perennial species. Monitoring locations will include randomly located plots within areas representative of the reclaimed lands.

Once all reclamation program objectives have been met and external reviews are complete, YZC will submit an application for a Certificate of Closure.

Table 4-1. Summary of Disturbed Areas and Reclamation Activities

Component	Estimated Area (ha)
Slopes around the Portal area	0.2
Land Treatment Farm	0.5
Borrow areas – Current areas and areas that will be created during the closure and post closure phases	1.5
Roads	9.12
Camp	2.7
Portal area	1.6
Portal Sumps(Combined Area)	0.05
Waste Rock Pad Area (Cover on Waste Pad area = 0.32 ha, remaining area = 0.35 ha)	0.67
Airstrip	2.7
Total Disturbed Area	19.02

5 Decommissioning and Reclamation Cost Estimates

Financial security may be required to ensure that the cost of reclamation and closure is covered. The cost summaries provided below include costs associated with project shutdown, the decommissioning of facilities and support infrastructure, reclamation activities, and compliance and reclamation monitoring. The estimated costs are based on the following assumptions, rationale and information:

- Equipment demobilization costs at the end of the advanced exploration program will be borne by the contractor in a previous temporary closure phase and therefore, no cost estimates have been assigned.
- Decommissioning and post closure phases are assumed to be phased out within a four year period.

- Based on a hydrological assessment completed by Gartner Lee Ltd., the 1345 Portal is deemed to be above the pre-mining groundwater table elevation. As a result groundwater is not expected to discharge to surface from the portal when the mine floods. Therefore, there are no plans to deal with potential mine water issues.
- On the basis of the hydrological assessment completed by Gartner Lee, the portal is not anticipated to discharge water and therefore, there will be no need to keep a water treatment plant and hence there are no contingency fund allocated for such purpose.
- ARD and metal leaching control methods for the waste rock pad will function as per design intent beyond a four year period (the post closure phase) without requiring any perpetual maintenance.
- The passive water treatment systems for the waste rock pad sump water will perform as designed and will produce effluent quality that meets the required criteria, therefore no funds have been allocated beyond the post closure phase.
- Approximately 120 m³ of sediment from the portal sumps will be disposed of in the underground workings.
- Approximately 7203 m³ of material (2430 m³ of ore and 4773 m³ waste rock) will be disposed of in the underground workings.
- Based on hydrological investigations undertaken for the Environmental Assessment (EA) report, the flooded underground workings may carry contaminants to surface waters (Wolverine Creek). A monitoring program has been incorporated to assess impacts and the existing Surveillance Network Monitoring will be monitored to determine potential impacts.
- Type B Water License water quality standards will be used to assess impacts during the decommissioning and post closure phases.
- Non-acid generating fill, clay and till material will be available within the project area for the decommissioning and closure activities.
- Equipment mobilization and demobilization costs were not included in the closure cost analysis.
- Reclamation costs are based on the cost of having the work completed by a third party contractor.
- The custom seed mixes and application rates supplied for roadside and slopes were used to estimate seeding costs.

The estimated costs to implement the detailed decommissioning, closure and reclamation plans described above are presented in Table 5-1. Tables 5-2 provide the unit costs associated with decommissioning and reclamation activities. Based on the plans presented above, the total cost to restore the site to a productive state is estimated to be approximately \$666,966.00. This value assumes that the exploration camp, roads and airstrip remain operational for regional exploration

programs, and are not decommissioned. All costs are reported in 2005 \$CDN. Detailed cost estimates are given in Appendix B.

There are a number of opportunities to reduce closure costs and may include but are not limited to the following:

- YZC will exercise its best effort to develop borrow areas near the point of use (waste rock pad area, exploration camp and the portal area) to reduce haulage costs;
- YZC will engage multi-skilled personnel to minimize the number of people required for closure. This will in turn reduce camp costs and other overhead costs;
- YZC will optimise the construction schedule to efficiently implement the decommissioning, reclamation and closure plan;
- YZC may investigate the potential for shortening the decommissioning and reclamation program to reduce labour costs and camp costs;
- Equipment used for Advanced Exploration Phase will be used to close the site in order to eliminate mobilization and demobilization costs.

Table 5-1. Estimated Cost to Execute Decommissioning, Closure and Reclamation Plans

Item No.	Work Item Description	Likely to be Decommissioned	Cost
1	MINE		
1.1.4	1345 Portal	Yes	\$54,460
2	WASTE ROCK PAD		
2.1	Waste Rock and Ore Relocation	Yes	\$72,510
3	WASTE ROCK PAD		
3.1	Waste Rock Pad - Clay and Till Cover	Yes	\$114,080
4	PORTAL AREA	Yes	\$43,135
4.1	Maintenance Shop and Offices		\$14,410
4.2	Power Supply Systems		\$5,100
4.3	Water Supply		\$2,225
4.4	Sump Backfilling		\$6,400
4.5	Explosive Magazine		\$5,000
4.6	Industrial Wastes		\$5,000
4.7	Land Treatment Farm		\$5,000
5	EXPLORATION CAMP		
5.1	Buildings	No	\$28,590
6	LAND RECLAMATION AND REVEGETATION		\$80,868
6.1	Roads and Trails		
6.1.1	Exploration Trails and Access Roads	No	\$26,345
6.1.2	Airstrip	No	\$7,963
6.1.3	Portal Area	Yes	\$24,583
6.1.4	Exploration Camp	No	\$6,280
6.1.5	Waste Rock Pad	Yes	\$15,543
6.1.6	Magazine Area	Yes	\$156
7	SITE MANAGEMENT		\$342,500
7.1	Decommissioning Phase - Administration		
7.1.1	Administration		\$168,500
7.1.2	Environmental Assessment		\$16,000
7.1.3	Environmental Supervision		\$27,000
7.1.4	Compliance Monitoring		\$5,000
7.2	Post Closure		
7.2.1	Environmental Supervision		\$81,000
7.2.2	Post Closure Monitoring		\$30,000
7.2.3	Post Closure Maintenance		\$15,000
	TOTAL COSTS OF ALL DECOMMISSIONING AND CLOSURE ACTIVITIES		\$736,143
	LESS COST OF ITEMS NOT LIKELY TO BE DECOMMISSIONED		-\$69,177
	ESTIMATED COST OF FINAL CLOSURE		\$666,966

Tables 5-2 and 5-3 present unit costs that were used to derive the costs for various project components. The costs have been developed using unit rates for Yukon Territory and northern

British Columbia construction projects and assumes that all work will be conducted by a third party contractor. Therefore, they include charges for overheads and profit.

Table 5-2. Estimated Unit Costs for Equipment and Personnel

Equipment	All found Rates/hr	Rate/month
D8 dozer	\$150	
Haul truck D250E	\$65	
36" walk behind roller – for Waste Rock Pad Compaction	\$40	
Cat 235 excavator	\$186	
Cat 950 loader	\$75	
Light-duty vehicles		\$2,000
Personnel		
Labourer	\$40	
Tradesman	\$55	
Site supervisor	\$80	
Design engineer	\$115	
Project manager		\$8,800
Camp labourer		\$3,000
Site caretaker		\$5,500
Environmental monitor		\$4,500

Table 5-3. Estimated Unit Costs for Materials and Activities

Other Materials		
Wolverine Seed Mixture – Roadside and Flats	\$756 /ha	\$25.50/kg @ 30 kg/ha
Wolverine Seed Mixture - Slopes	\$1180 /ha	\$29.50/kg @ 40 kg/ha
Seed/Fertilizer Application	\$1,325	per ha
Erosion barrier	\$1,500	per linear km
Contractor Unit Rates and Camp Costs		
Excavation of Soil	\$5	per m ³
Haul and place soil cover (Till 2m thick, and Clay 1 m thick) = 3200 m ³ x 3m = 9600 m ³	\$8	per m ³
Haul and soil cushion layer for WRP (0.3 m thick on top of the waste rock footprint) – 960 m ³	\$8	per m ³
Camp Costs	\$100	per day per person
Supply and Place Rip Rap	\$20	per m ³
Recontouring	\$3,000	per ha
Ripping using a Dozer	\$720	Per ha
Backfilling of Dirty and Clean Sumps (800 m ³) – Haul and Placed	\$8	per m ³
Haul sump sediments to the underground workings (120 m ³)	\$4	per m ³
Procurement of recycled tires for Portal (36 tires) – mainly for transportation costs	\$300	Per tire

6 Post Closure Monitoring and Maintenance Programs

The site manager will oversee all decommissioning programs (Year 1) as per the closure plan. The site will also have an environmental monitor who will be responsible for all construction activities and environmental control programs during the post closure phase (Years 1-4).

Monitoring will include assessment of water quality, site re-vegetation, and physical stability. This is will be undertaken during the first three years following site reclamation.

An annual inspection of the site will be undertaken to evaluate revegetation success and identify any areas of concern.

Post closure water quality monitoring will be undertaken at water sampling station W-9, W12, W16 and at the Waste Rock Pad sump. The waste rock pad sump water quality must meet the levels as required under Conditions 40 and 41 of the Type B Water Licence QZ01-051. The samples will be taken on a quarterly or monthly basis during the months of May to October.

Annual inspections will be undertaken to identify areas where remedial work will be required. No further inspections and maintenance are planned beyond the post closure phase or beyond 3 years following the completion of the reclamation work. The plan assumes the access corridors, the waste rock pad, airstrip, the portal area and the camp would not require further reclamation work and therefore, there will be no long term liability associated with them.

REFERENCES

Quartz Mining Land Use Approval LQ0040

Type B Water License Approval QZ01-051.

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Yukon Zinc Corporation, 2005. Temporary Closure Plan, November 17, 2005

Yukon Zinc Corporation, 2005. Water Management and Treatment Plan, November 17, 2005

Yukon Zinc Corporation, 2005. Environmental Assessment Report for Wolverine Project.

Yukon Zinc Corporation and Klohn Crippen Consultants Ltd. 2005: Wolverine Project – Temporary Waste Rock and Ore Storage Facility Report, Advanced Exploration Phase, Dated June 09, 2005.

Yukon Statutes of 2003: Chapter 14 – Quartz Mining Act. Whitehorse, Yukon, Canada. 2003.

Yukon Statutes of 2003: Chapter 2 – Environment Act. Whitehorse, Yukon, Canada. 2003

Appendix A:

Figures

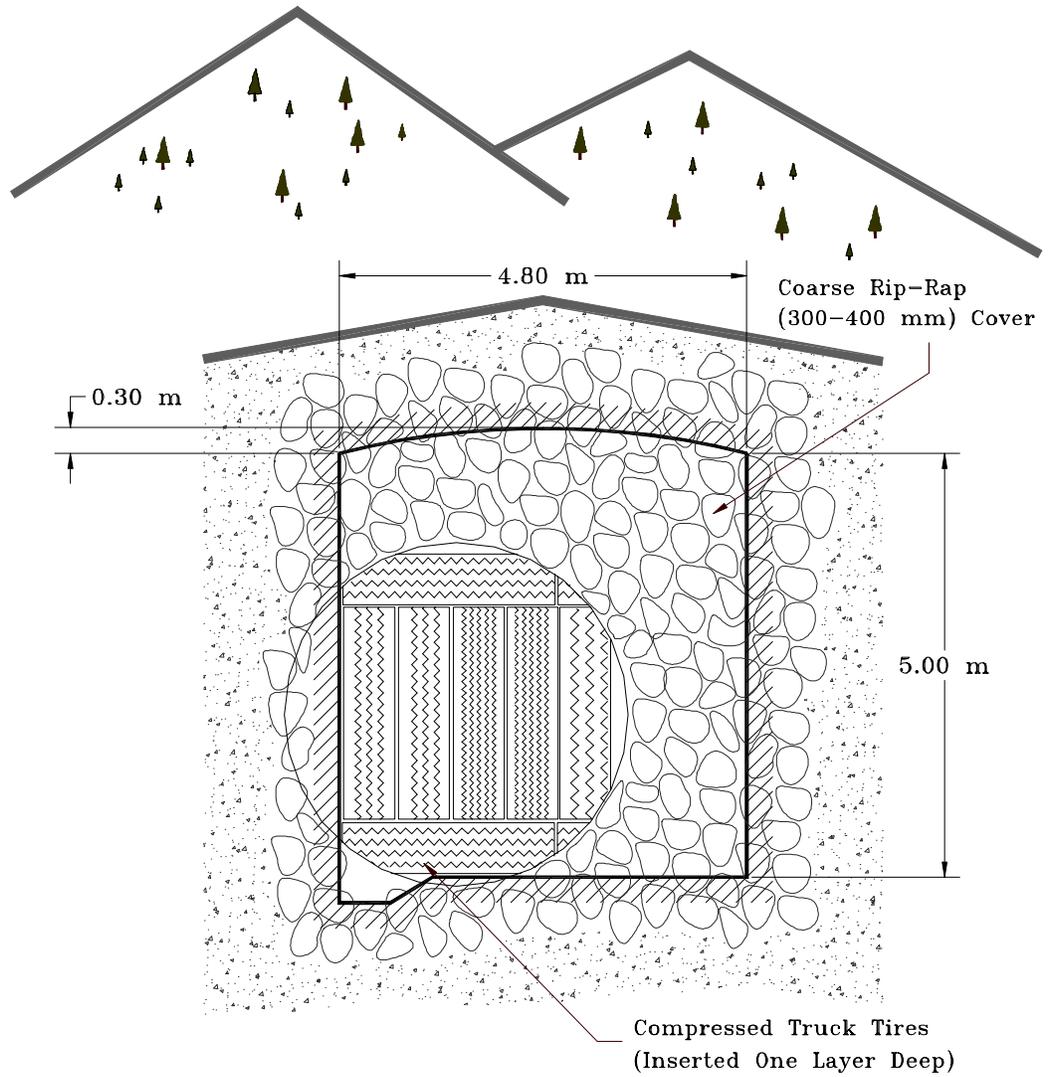


Figure 3-1. Tire and Rock Composite Barrier for Portal 1345

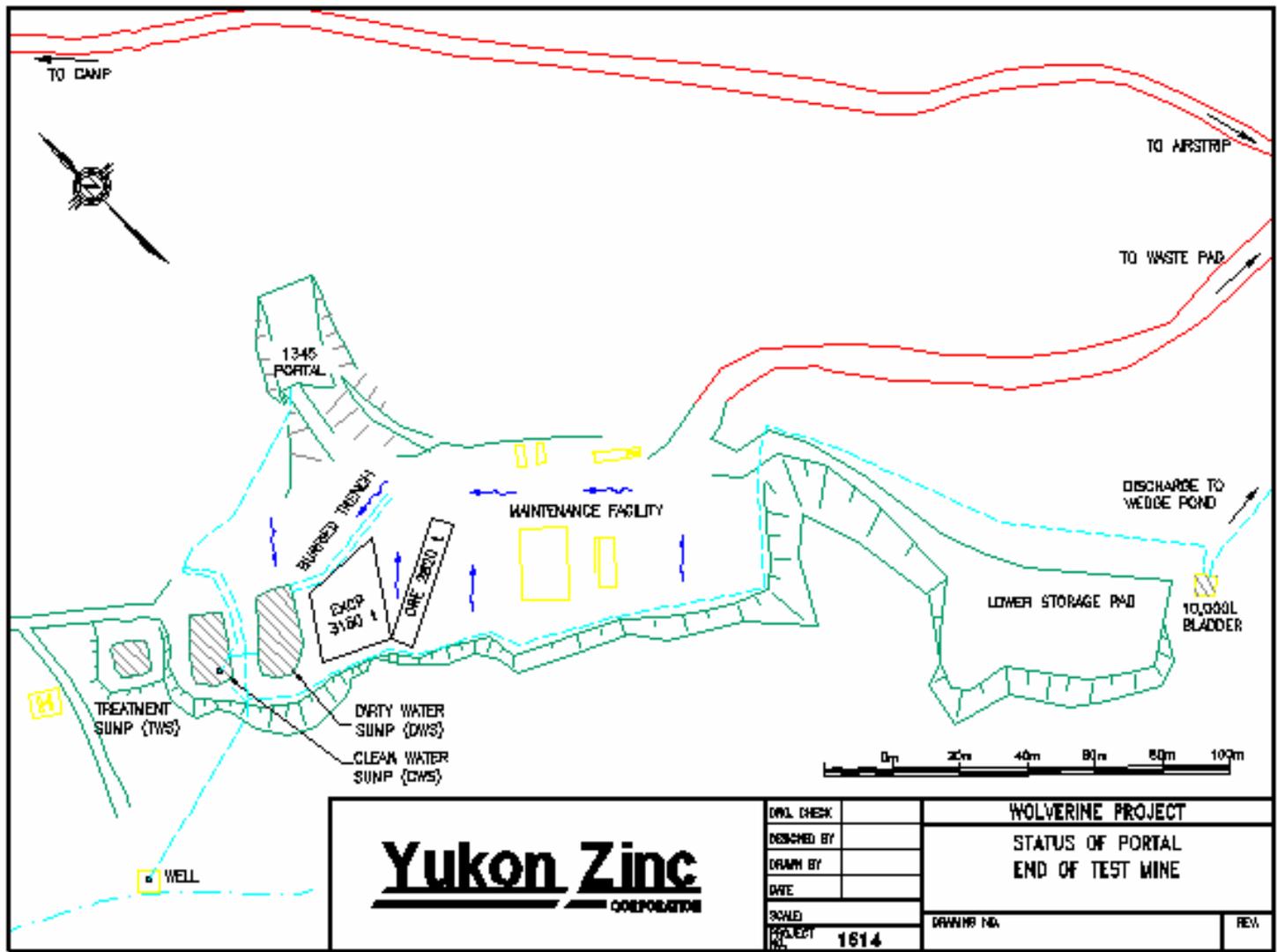


Figure 3-2. Status of Portal at End of Test Mine (November 2005)

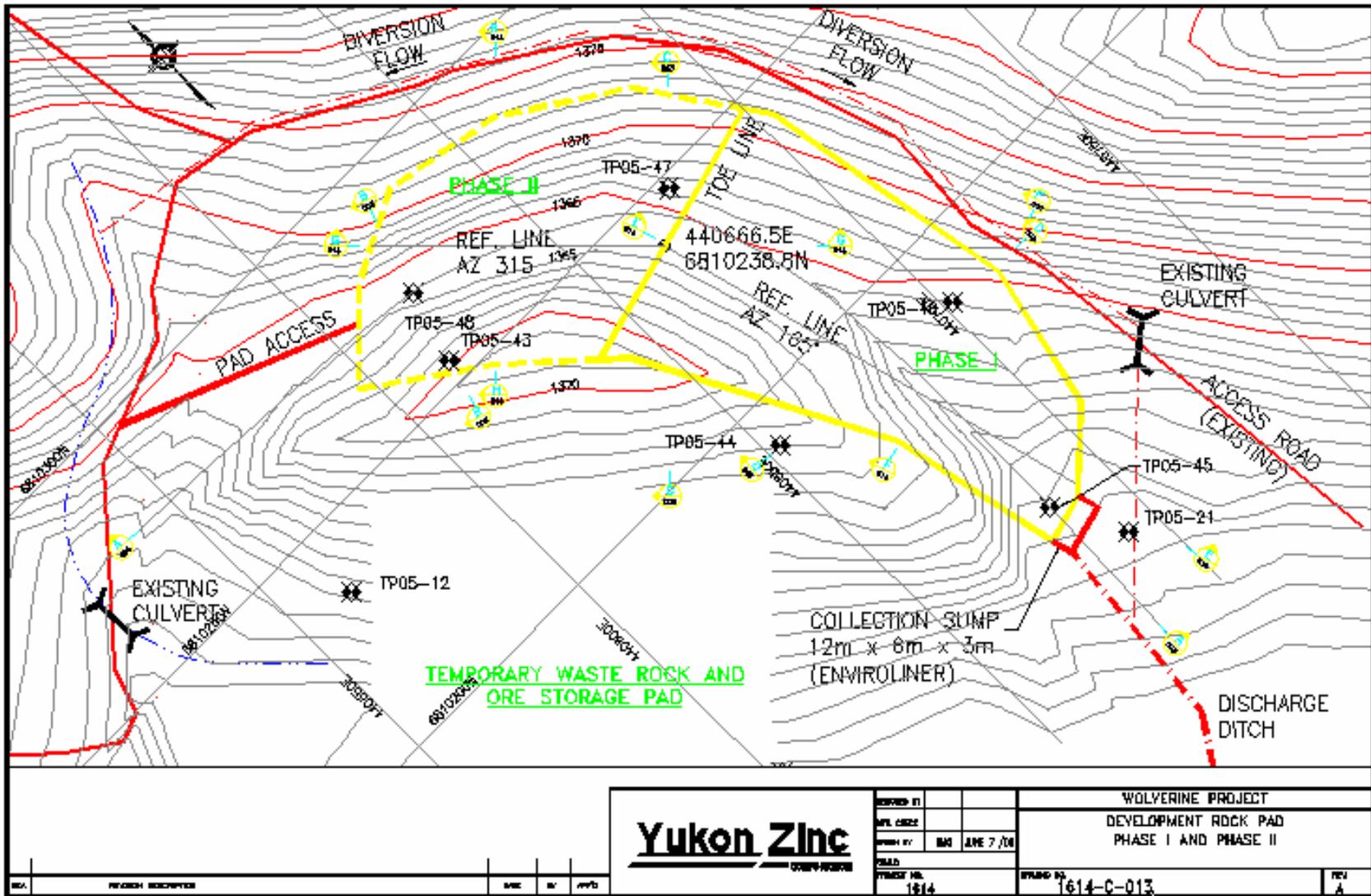


Figure 3-3. Original Contours in the Phase I and Phase II Waste Rock Storage Area

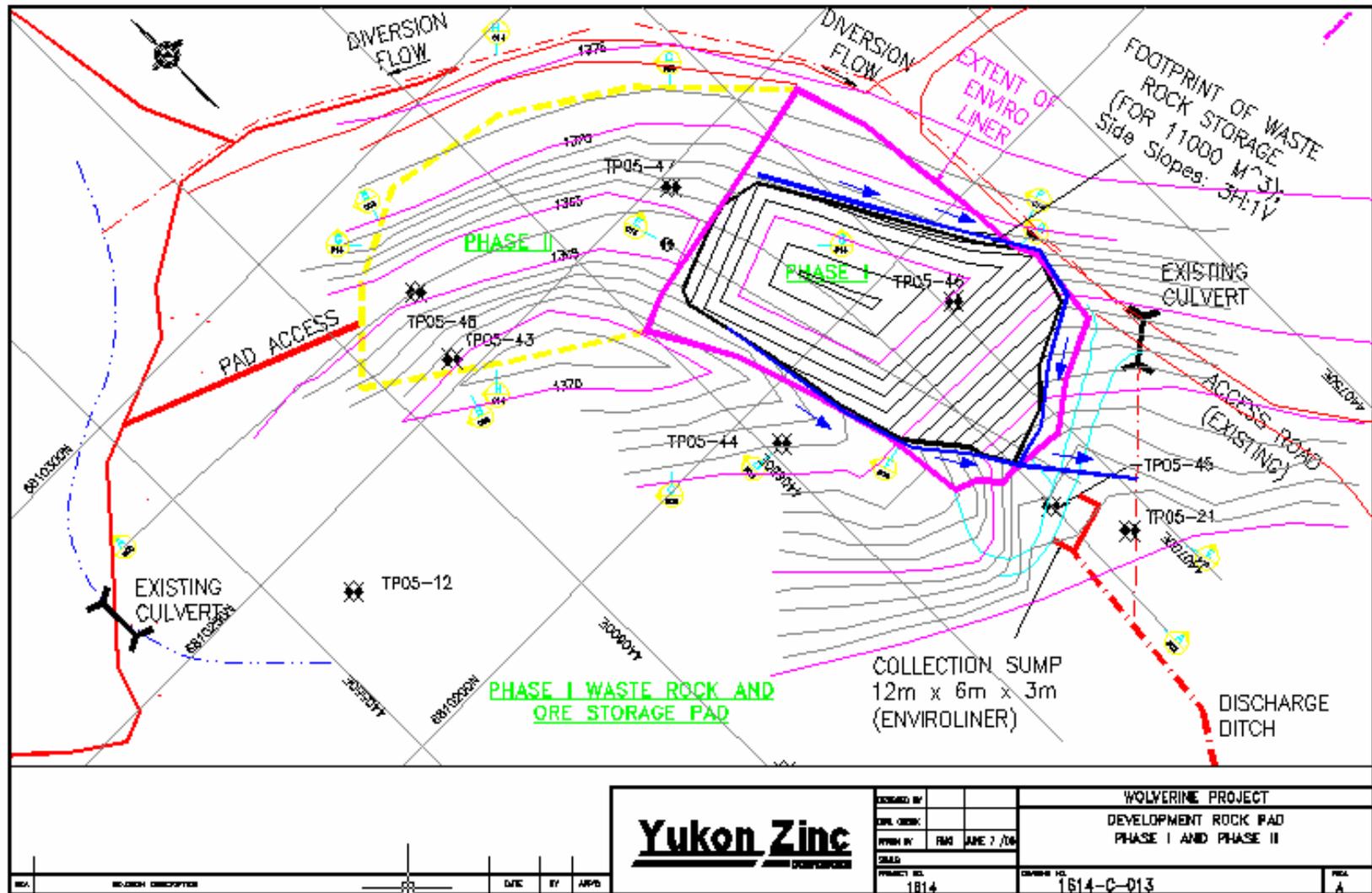


Figure 3-4. Closure Contours for Phase I Waste Rock Area in 'No-Go' Scenario

Appendix B:

Decommissioning, Reclamation, and Post-Closure Costs

Table B- 1. MINE CAMP DECOMMISSIONING COSTS

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost
1	Mine Workings					
1.1	Surface Openings					
	Sub-Total					
1.1.4	1345 Portal					
	Tire Purchase and Shipping			36	\$300	\$10,800
	<i>Plug portal with tires</i>	Cat 235 Hoe	hrs	30	\$186	\$5,580
	<i>Supply and place waste rock cap over tires</i>	Cat 235 Hoe	hrs	20	\$186	\$3,720
		Cat 250E	hrs	40	\$65	\$2,600
		Truck				
	<i>Supply broken rock at base of plug and discharge channel riprap</i>	Cat 235 Hoe	hrs	20	\$186	\$3,720
		Cat 250E	hrs	40	\$65	\$2,600
		Truck				
	<i>Construct rock drain at base of plug</i>	Cat 235 Hoe	hrs	10	\$186	\$1,860
	<i>Supply fill to seal discharge channel</i>	Cat 235 Hoe	hrs	10	\$186	\$1,860
		Cat 250E	hrs	20	\$65	\$1,300
		Truck				
	<i>Construct lined open channel for discharge from portal</i>	Cat 235 Hoe	hrs	20	\$186	\$3,720
		Compactor	hrs	10	\$40	\$400
	<i>Misc. Supplies & Shipping & Mob. & Demob</i>	Misc.				\$4,500
	<i>Labour to assist with placing tires & cap</i>	Labourer	hrs	80	\$40	\$3,200
	<i>Design of rock drain and channel (Engineering)</i>	Engineering	hrs	40	\$115	\$4,600
	<i>Supervision to design & install tires and cap</i>	Supervision	hrs	50	\$80	\$4,000
	Sub-Total					\$54,460
Estimated Costs in Reclaiming Mine Workings						\$54,460

Table B- 2. WASTE ROCK, ORE AND SEDIMENT RELOCATION COSTS TO UNDERGROUND WORKINGS

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost
2	Waste Rock Pad					
2.1	Waste Rock and Ore Relocation					
	Sub-Total					
2.1.1	Waste Rock Haul and Placement - Underground	Truck and Excavator	m ³	4773	\$10	\$47,730
2.1.2	Ore <i>Haul and Placement - Underground</i>	Truck and Excavator	m ³	2430	\$10	\$24,300
2.1.3	Sediment from Sumps <i>Haul and Placement - Underground</i>	Truck and Excavator	m ³	120	\$4	\$480
	Sub-Total					\$72,510
Total Estimated Costs in Relocating Waste Rock and Ore to Underground Workings						\$72,510

Table B- 3. WASTE ROCK PAD ARD CONTROL

Item No.	Work Item Description	Units	Quantity	Unit Cost	Cost
3	Waste Rock Pad Cover				
3.1	Waste Rock Pad - Clay and Till Cover				
	Site Preparation - Waste Rock Pad Footprint Compaction	hrs	40	\$ 40	\$1,600
	Clay Layer (1 m over 3200 m ²)	m ³	3200	\$ 8	\$25,600
	Frost Protection Layer (2 m over 3200 m ²)	m ³	6400	\$ 8	\$51,200
	Vegetative Cover -0.30 m for 3200 m ² of cover footprint = 960 m ³	m ³	960	\$ 8	\$7,680
	Construction of Diversion Ditches (Perimeter Ditches) - 250 m	m	250	\$ 100	\$25,000
	Perimeter Ditch Discharge Line - 50 m long into Go Creek	m	50	\$ 60	\$3,000
	Sub-Total				\$114,080

Table B- 4. PORTAL AREA DECOMMISSIONING COSTS

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost
4	PORTAL AREA					\$43,135
4.1	Maintenance Shop and Offices					
	<i>Remove salvageable equipment</i>	General Labour	hrs	40	\$40	\$1,600
		Trades Labour	hrs	20	\$55	\$1,100
	<i>Dismantle Building - Manpower</i>	General Labour	hrs	40	\$40	\$1,600
	<i>Dismantle Building - Manpower</i>	Trades Labour	hrs	20	\$55	\$1,100
	<i>Dismantle Building - Equipment</i>	Cat 235	hrs	10	\$186	\$1,860
	<i>Reslope, contour & bury</i>	Cat D8	hrs	10	\$150	\$1,500
	<i>Misc. Supplies & Tools</i>	Misc.	l.s.			\$5,000
	<i>Scrap haul to closure dump</i>	Truck D250E	hrs	10	\$65	\$650
	Sub-Total					\$14,410
4.2	Power Supply Systems					
	<i>Remove salvageable equipment</i>	General Labour	hrs	32	\$40	\$1,280
		Trades Labour	hrs	24	\$55	\$1,320
	<i>Salvage and remove power distribution systems</i>		l.s.			\$1,500
	<i>Misc. Supplies & Tools</i>	Misc.	l.s.			\$1,000
	Sub-Total					\$5,100
4.3	Water Supply					
	<i>Remove salvageable equipment - pipeline/pumps</i>	General Labour	hrs	10	\$40	\$400
		Trades Labour	hrs	5	\$55	\$275
	<i>Remove pipeline, Reslope, contour & bury</i>	Truck D250E	hrs	10	\$65	\$650
		Cat 235	hrs	0	\$186	\$0
		General Labour	hrs	10	\$40	\$400
	<i>Misc. Supplies & Tools</i>	Misc.	l.s.			\$500
	Sub-Total					\$2,225
4.4	Portal Sump Backfilling					
	<i>Backfill Sumps with NAG Material</i>	Truck and Loader		800	\$8	\$6,400
	Sub-Total					\$6,400

4.5	Explosive Magazine <i>remove from site</i>	Misc.	I.s.			\$5,000
	Sub-Total					\$5,000
4.6	Industrial Wastes <i>remove from site to Licensed Disposal Sites</i>	Misc.	I.s.			\$5,000
	Sub-Total					\$5,000
4.7	Land Treatment Farm <i>Treat contaminated soils</i>	Misc.	I.s.			\$5,000
	Sub-Total					\$5,000

I.s. = lump sum

Table B- 5. EXPLORATION CAMP DECOMMISSIONING COSTS

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost
5	Exploration Camp					
5.1	Buildings					
	Sub-Total					
	<i>Demolish 22 Sleeping Cabins</i>	Cat 235 Hoe	hrs	44	\$186	\$8,184
	<i>Demolish 3 Offices</i>	Cat 235 Hoe	hrs	6	\$186	\$1,116
	<i>Demolish Rec Hall</i>	Cat 235 Hoe	hrs	6	\$186	\$1,116
	<i>Demolish Dry</i>	Cat 235 Hoe	hrs	6	\$186	\$1,116
	<i>Demolish Workshop</i>	Cat 235 Hoe	hrs	3	\$186	\$558
	<i>Miscellaneous Bldgs</i>	Cat 235 Hoe	hrs	10	\$186	\$1,860
	<i>Load - Haul - Dump to Landfill</i>	Cat 235 Hoe	hrs	40	\$186	\$7,440
		Cat 250E Truck	hrs	40	\$65	\$2,600
	<i>General Labour</i>	Labour	hrs	115	\$40	\$4,600
	Sub-Total					\$28,590
Total Estimated Costs to Decommission the Exploration Camp						\$28,590

Table B- 6. LAND RECLAMATION AND REVEGETATION COSTS

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Cost	Cost
6	Land Reclamation and Revegetation					
6.1	Roads and Trails					
6.1.1	Exploration Trails and Access Roads					
	<i>Ripping of the roads to loosen the soil base</i>	Unit Cost Basis	per ha	9.12	\$ 720	\$6,566
	<i>revegetate - Seed</i>	Unit Cost Basis	per ha	9.12	\$ 756	\$6,895
	<i>revegetate - Fertilizer</i>	Unit Cost Basis	per ha	9.12	\$ 1,325	\$12,084
	<i>Application Labour</i>	General Labour	hrs	20	\$ 40	\$800
	<i>Note: Width = 10 metres</i>					
	Sub Total					\$26,345
6.1.2	Airstrip					
	<i>Ripping of the airstrip to loosen the soil base</i>	Unit Costs Basis	per ha	2.7	\$ 720	\$1,944
	<i>Revegetate with Wolverine Custom Seed Mixture</i>	Unit Costs Basis	per ha	2.7	\$ 756	\$2,041
	<i>revegetate - fertilize</i>	Unit Costs Basis	per ha	2.7	\$ 1,325	\$3,578
	<i>application labour</i>	Unit Costs Basis	hrs	10	\$ 40	\$400
	Sub Total					\$7,963
6.1.3	Portal Area					
	<i>Ripping with a dozer</i>	Unit cost Basis	per ha	1.6	\$ 720	\$1,152
	<i>Apply 0.3 m of Growth Media (till) for 16000 m²</i>	Unit cost Basis	m ³	480	\$ 4	\$19,200
	<i>revegetate - seed</i>	Unit CostBasis	per ha	1.6	\$ 756	\$1,210
	<i>revegetate - fertilizer</i>	Unit CostBasis	per ha	1.6	\$ 1,325	\$2,120
	<i>application cost(Labour)</i>	Unit cost Basis	hrs	10	\$ 40	\$400
	<i>Slope Side of the Portal Area (Seeding, Fertilizer)</i>	Unit cost Basis	per ha	0.2	\$ 2,505	\$501
	<i>(Seeding, Fertilizer)</i>					
	Sub Total					\$24,583

6.1. 4	Exploration Camp					
	<i>Ripping - Half the area (Estimated)</i>	Unit Cost Basis	per ha	1.4	\$ 756	\$1,058
	<i>revegetate - seed</i>	Unit cost Basis	per ha	2.7	\$ 756	\$2,041
	<i>revegetate - fertilizer (Half the Area)</i>	Unit Cost Basis	per ha	1.4	\$ 1,325	\$1,855
	<i>application cost</i>	Unit cost Basis	ha	1	\$ 1,325	\$1,325
	Sub Total					\$6,280
6.1. 5	Waste Rock Pad					
	<i>revegetate - seed</i>	Unit cost Basis	per ha	6.7	\$ 756	\$5,065
	<i>revegetate - fertilizer</i>	Unit Cost Basis	per ha	6.7	\$ 1,325	\$8,878
	<i>application cost (Labour)</i>	Unit cost Basis	hrs	40	\$ 40	\$1,600
	Sub Total					\$15,543
6.1. 6	Magazine Area					
	<i>revegetate - seed</i>	Unit Cost Basis	per ha	0.1	\$ 756	\$76
	<i>application cost</i>	Unit Cost Basis	hrs	2	\$ 40	\$80
	Sub Total					\$156
Estimated Cost in Land Reclamation						\$80,868

Table B- 7. DECOMMISSIONING AND POST CLOSURE PHASES: SITE MANAGEMENT COSTS

Item No.	Work Item Description		Equipment / Labour	Units	Quantity	Unit Cost	Cost	
7	Decommissioning and Post Closure Phases: Site Management							
7.1	Decommissioning Phase - Administration)							
7.1.1	Administration							
	<i>Pre closure planning and Org project manager</i>		Management	Monthly	1	\$ 8,800	\$8,800	
	<i>camp cost (Effective Presence = 3 Months)</i>		Management	Monthly	2	\$ 8,800	\$17,600	
	<i>General Labour (Camp)</i>		labour	Pers Days	1157	\$ 100	\$115,700	
	<i>vehicles for security and manager</i>		Labour	Monthly	6	\$ 3,000	\$18,000	
	<i>miscellaneous office/supply costs</i>		light truck	Monthly	6	\$ 1,000	\$6,000	
			miscellaneous	Monthly	6	\$ 400	\$2,400	
			Sub Total					\$168,500
7.1.2	Environmental Assessment							
	<i>pre closure site environmental assessment</i>		contract	I.s.			\$8,000	
	<i>post closure environmental clean-up confirmation assessment</i>		contract	I.s.			\$8,000	
			Sub Total					\$16,000
7.1.3	Environmental Supervision							
	<i>Environmental Monitor</i>		Management	monthly	6	\$ 4,500	\$27,000	
			Sub Total					\$27,000

7.1.4	Compliance Monitoring and Reporting <i>Water Quality Monitoring during closure implementation analytical</i>	Misc.	per year	1	\$ 5,000	\$5,000
	Sub Total					\$5,000
7.2	Post Closure					
7.2.1	Environmental Supervision <i>Environmental Monitor</i>	<i>Management</i>	<i>monthly</i>	18	\$ 4,500	\$81,000
	Sub Total					\$81,000
7.2.2	Post Closure Monitoring <i>WQ monitoring Post Closure Implementation(PCI)- Analytical and collection (3 Years)</i>	Miscellaneous	per year	3	\$ 10,000	\$30,000
	Sub Total					\$30,000
7.2.3	Post Closure Maintenance <i>Miscellaneous Maintenance work to the site after 3 Years</i>	Miscellaneous	per year	3	\$ 5,000	\$15,000
	Sub Total					\$15,000
Estimated Cost for Post Closure						\$342,500

I.s. = lump sum