



WOLVERINE PROJECT

MINE DEVELOPMENT AND OPERATION PLAN

VERSION 2010-02

QML-0006

Prepared for:

Yukon Government

Department of Energy, Mines and Resources

Prepared by:

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1 Introduction

This Mine Development and Operation Plan (Plan) has been prepared to satisfy requirements in the *Quartz Mining License QML-0006* (QML), specifically, section 13.1. This Plan supersedes Mine Development and Operation Plan V2006-01 submitted to Yukon Energy, Mines and Resources (EMR) in April 2006. This Plan also replaces Section 3.5 of General Site Plan V2008-04, which briefly summarized the pre-production mine development.

This Plan describes infrastructure and processes, and associated support services, for mining activities Yukon Zinc Corporation's Wolverine Project. Table 1-1 summarizes the QML documentation requirements for the Plan, and the corresponding report sections where the information is provided herein.

Table 1-1: QML Information Requirements and Corresponding Report Sections

QML Section	Requirement	Report Section(s) Where Addressed
13.1 a)	A geotechnical assessment of the Wolverine deposit associated with the mine.	3
13.1 b)	Proposed ground support methods and monitoring instrumentation.	5
13.1 c)	Description of mining methods and equipment to be used in the Undertaking, including a map showing all structures, works and installations associated with the mining.	4
13.1 d)	A summary of ore reserves, including grades and dilution and recovery factors.	2.1
13.1 e)	Materials for use in mine backfill and methods of placement.	4.2.3, 4.3.3
13.1 f)	Mine services, such as power, communications, compressed air, and dewatering.	6
13.1 g)	A description of waste and ore handling, including details of all quality assurance or quality control protocols to be used by the Licensee during the construction of any waste rock dumps, ore stockpiles, or other structures, works or installations associated with the Undertaking.	6.5, 6.6
13.1 h)	A description and analysis of the results of a foundation investigation program and geotechnical analysis carried out by the Licensee for structures, works or installations associated with the Undertaking.	6.7
13.1 i)	A description of the layout, configuration and staging of the use of any proposed waste rock dump and ore stockpiles, including any design elements associated with the collection, treatment and monitoring of run-off from the waste rock dump and ore stockpiles.	6.5
13.1 j)	A description of how the ore stockpiles, waste rock and tailings will be handled given that they are potentially acid generating and mitigation designed to prevent ARD/ML from any of these sources.	6.5, 6.6
13.1 k)	A description of the proposed construction methods for any proposed waste rock dump or ore stockpiles, including lift heights, set backs and slopes, and a	6.5

QML Section	Requirement	Report Section(s) Where Addressed
	stability analysis of the design of the waste rock dump and ore stockpiles.	
13.1 l)	A strategy and implementation protocol for any required dewatering of the mine.	6.4
13.1 m)	The procedures for implementing source controls by shotcreting and backfilling underground workings to minimize the risk of oxidation of sulphide minerals.	4.2.3, 4.3.3
13.1 n)	A safety plan that identifies emergency egress routes during the life of the mine, refuge station locations, emergency ventilation systems, and standard emergency procedures, including ground failure and equipment fire emergency response measures.	7

Information contained herein is derived from or supported by the following reports prepared for Yukon Zinc Corporation:

1. AMC Mining Consultants Ltd. (2010). *YZC Wolverine Project mining methodology*.
2. EBA Engineering Consultants Ltd. (2008). *Geotechnical Assessment – Industrial Area Wolverine Lake Mine Site, Wolverine Lake, YT*.
3. Gartner Lee. (2006). *Mine Area Hydrogeological Characterization Programme – Wolverine Advanced Exploration Project*.
4. Pearson, C. & Giroux, G. (2006). *Wolverine Mineral property resource estimation independent technical report*.
5. Rockland (2006). *Geomechanical mine design assessment of the Wolverine deposit*.
6. Smyth, W.V. (2008). *Yukon Zinc Corporation Wolverine Project mine ventilation study*.
7. Snowden. (2007). *Mining portion of underground feasibility study*.
8. Wardrop. (2007). *Independent technical report on the Wolverine project – Finlayson District, Yukon*.

Additional references are contained in Section 9.

2 Wolverine Deposit

Yukon Zinc's Wolverine Project is a massive sulphide, zinc-silver-copper-lead-gold deposit located in the Yukon Finlayson District. The deposit is a weakly undulating tabular body striking northwest and dipping shallowly to the northeast. The deposit contains two stratiform sulphide lenses, the Lynx and Wolverine zones, each ranging from ~0.5m to 30m in true thickness. The two lenses are separated by a deformed zone, called the Saddle Zone, with dominantly replacement and stringer sulphide mineralization, as shown in Figure 2-1. Jambor (1996) noted that the bulk of the mineralization at Wolverine occurs as massive sulphide lenses composed of the sulphide minerals such as pyrite and sphalerite with lesser amounts of pyrrhotite, chalcopyrite, galena, tetrahedrite-tennantite and arsenopyrite. Other sulphide minerals identified through petrographic analysis include marcasite, native gold, and native silver. There are also lead sulfosalt zones that occur locally and contain minerals such as meneghinite ($\text{Pb}_{13}\text{CuSb}_7\text{S}_{13}$), bournonite (PbCuSbS_3), boulangerite ($\text{Pb}_5\text{Sb}_4\text{S}_{11}$) and miargyrite ($\text{Ag}_2\text{SSb}_2\text{S}_3$). Gangue minerals within the massive sulphide mineralization consist of quartz, calcite, dolomite-ankerite, and muscovite. These

gangue minerals typically comprise less than 5% of the mineralized zones and occur as very fine grains or irregular blebs interstitial to sulphides (Jambor, 1996; Bradshaw, 2003).

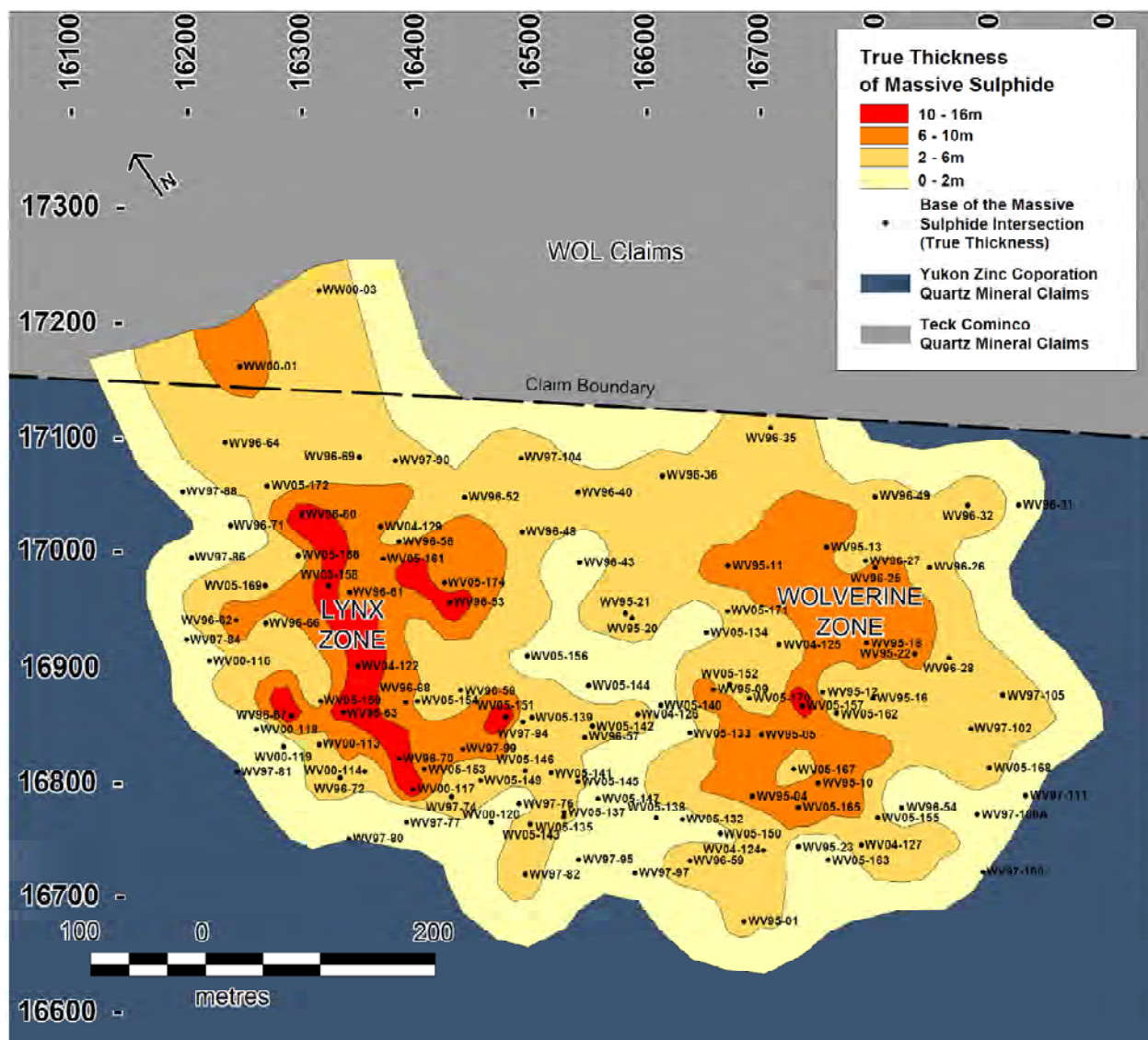


Figure 2-1: Contoured true thickness of composite massive sulphide mineralization

For the Wolverine and Lynx zones, the zinc, silver and copper contours in plan view are shown in Figures 2-2, 2-3 and 2-4, respectively, along with the current mine development. The graduated colour scale in these figures represents contour thickness with blue and red indicating the lowest and highest thicknesses, respectively.

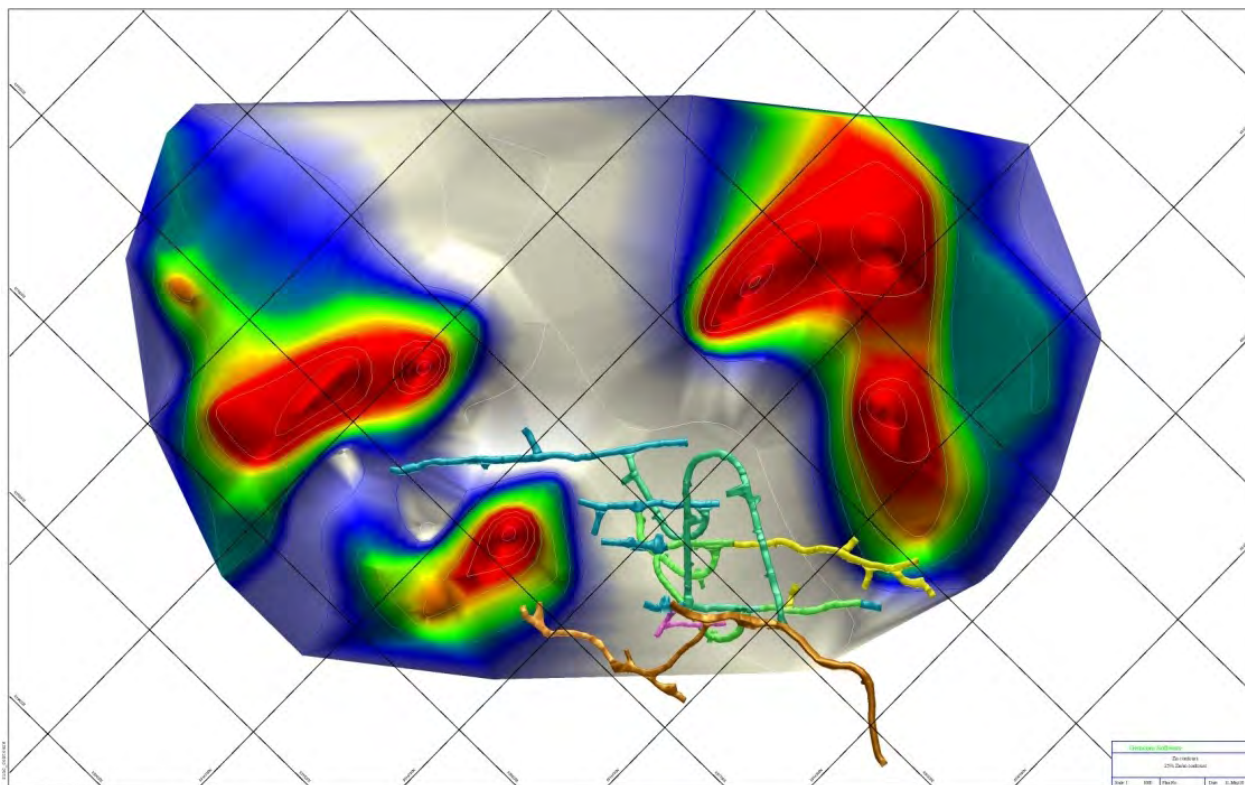


Figure 2-2: Wolverine Mine Zinc Contour Thickness (25% Zn/m)

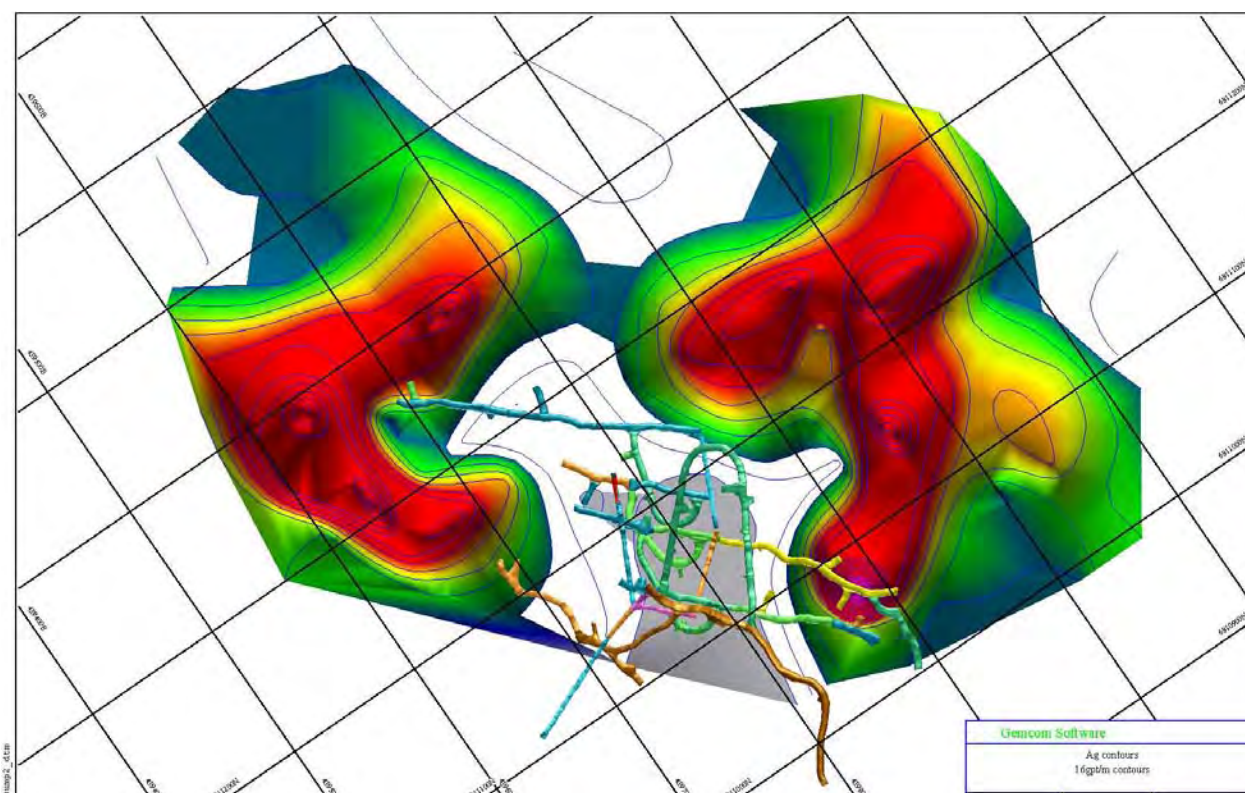


Figure 2-3: Wolverine Mine Silver Contour Thickness (16 gpt/m)

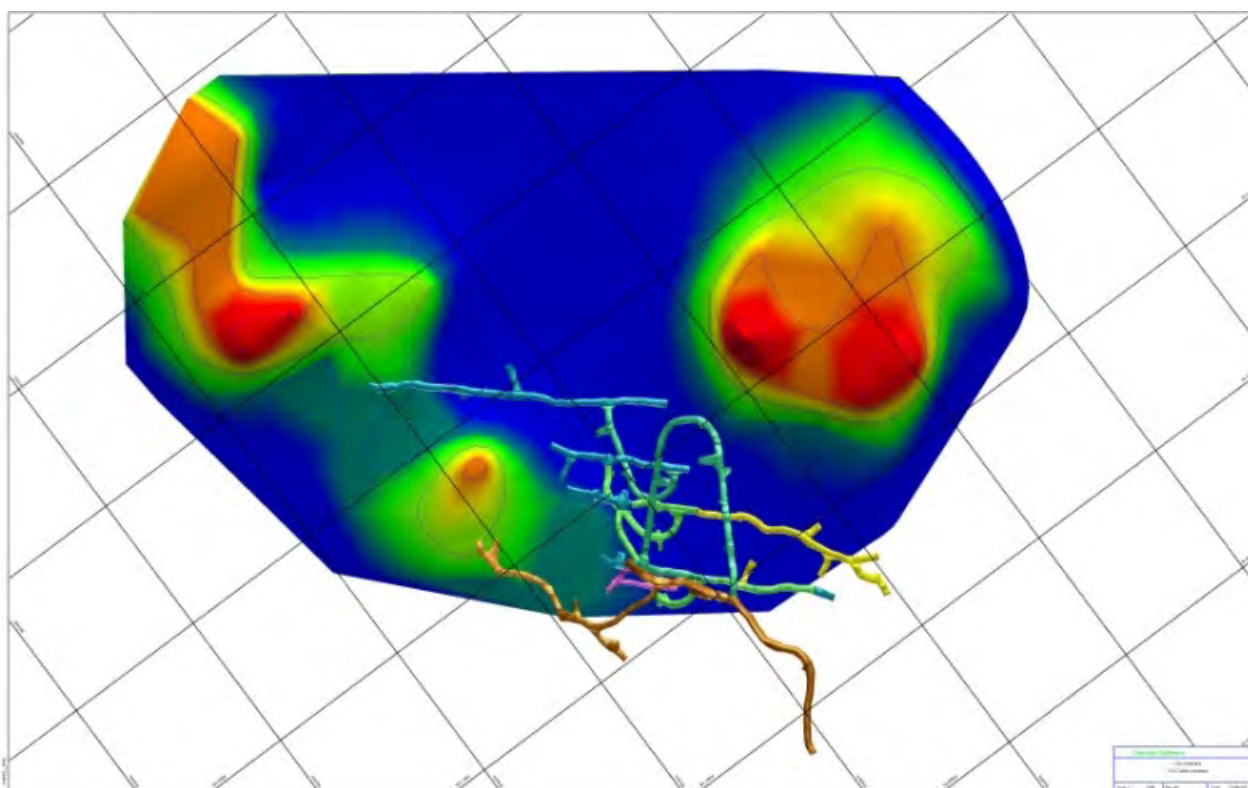


Figure 2-4: Wolverine Mine Copper Contour (5% Cu/m)

Immediately above the massive sulphide, the hanging wall (HW) zone is several meters of graphitic to carbonaceous, massive to well-bedded to laminated argillite in both the Wolverine and Lynx orebodies. The next two significant marker horizons in the HW zone are the calcitepyrite exhalites (EXCP) and the magnetite exhalites (EXMT), which are separated by tens of meters of interbedded argillite and siliceous sandstone. The immediate footwall (FW) is generally rhyolitic rock type which is intensely altered with chlorite and/or sericite. The typical rock types of the ore, HW and FW zones are presented in Table 2-1.

Table 2-1: Summary of Rock Types

Location	Description	Typical Rock Type
Immediate Hanging Wall	Interbedded carbonaceous to siliceous argillite and rhyolite	Argillite (ARMS), Carbonaceous Argillite (ARCB), Carbonaceous Argillite with Rhyolite Lapilli (ARRT), Graphite Argillite (ARGR), Siliceous Argillite (ARSI)
Ore zone	Massive to semi-massive sulphide	Massive sulphide (SSMS), Pyrite-rich massive sulphite (PYMS) and Sphalerite-rich massive sulphide (SPMS)
Immediate Foot Wall	Rhyolite tuff and argillite, chloritic and sericitic alteration strongly foliated	Chlorite Rhyolite Tuff (RHCT), Sericitic Lapilli Tuff (RHSR), Chloritic Lapilli Tuff (RHCL)

2.1 Ore Reserves

The amount of diluted ore milled over the life of mine is provided in the material balance in Figure 2-5. Based on the milling rate of 1700 t/d, the current reserve will sustain an approximate nine year mine life.

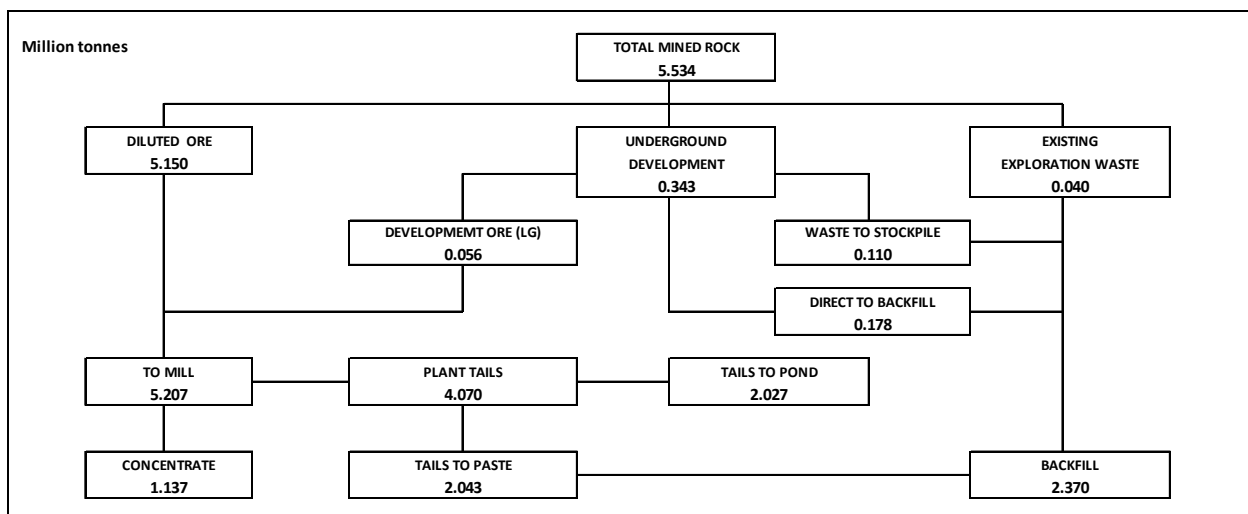


Figure 2-5: Life of mine material balance

The estimated ore reserves for the Wolverine Project are provided in Table 2-2. Dilution and recovery factors were estimated for the various mining thicknesses based on the average orebody dip of 34°. It was assumed that the footwall drift will follow the ore footwall as a marker, keeping the ore/waste contact at a distance of 1 m from the back (3 m of waste beneath 1 m of ore on a 4 m wall, matching the cutoff criteria proportions). Similarly, the ore will be mined to the hangingwall until 1 m of ore is left in the face. For the narrowest ore, a shanty-back drift is assumed. A recovery of 95% was selected for the narrowest ore, which is a judgment factor that considers the narrow width of the stope and the overlapping mining shapes from the shanty-back profiles.

Table 2-2: Ore Reserves Estimate

Classification	Metric Tonnes	Au g/t	Ag g/t	Cu %	Pb %	Zn %
Measured	4.14 M	1.83	374	1.83	1.7	12.9
Indicated	1.64 M	1.57	368	1.57	1.6	11.8
Unclassified	.46 M	1.203	313	0.95	1.81	11.88
Total	6.24 M					

Where mining will occur above other mined and filled voids, a 0.1 m layer of broken ore is assumed lost within fill. Paste backfill dilution from over-mucking was also assumed (an average of 0.05 m from exposed backfill walls and 0.15 m from backfill floors).

All waste dilution was added at a grade of 0.2% Zn, 0.048 % Cu, 0.03 % Pb, 7.67 g/t Ag and 0.052 g/t Au, with the background grade derived from the resource estimate. Backfill dilution was added without grade.

The tonnage and grades as a monthly average predicted in the first 25 months of mining are provided in Figure 2-6.

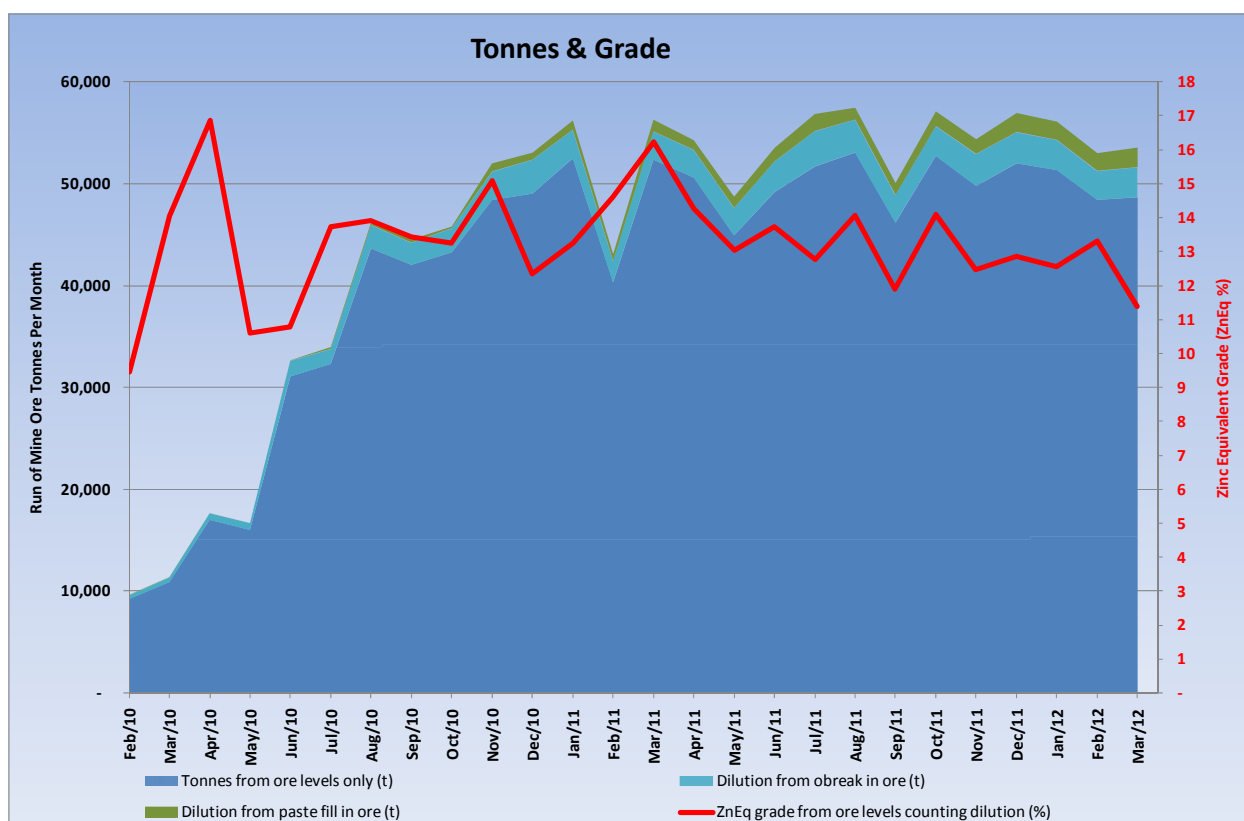


Figure 2-6: Average Monthly Mining production tonnage and grades – Feb 2010 to Mar 2012

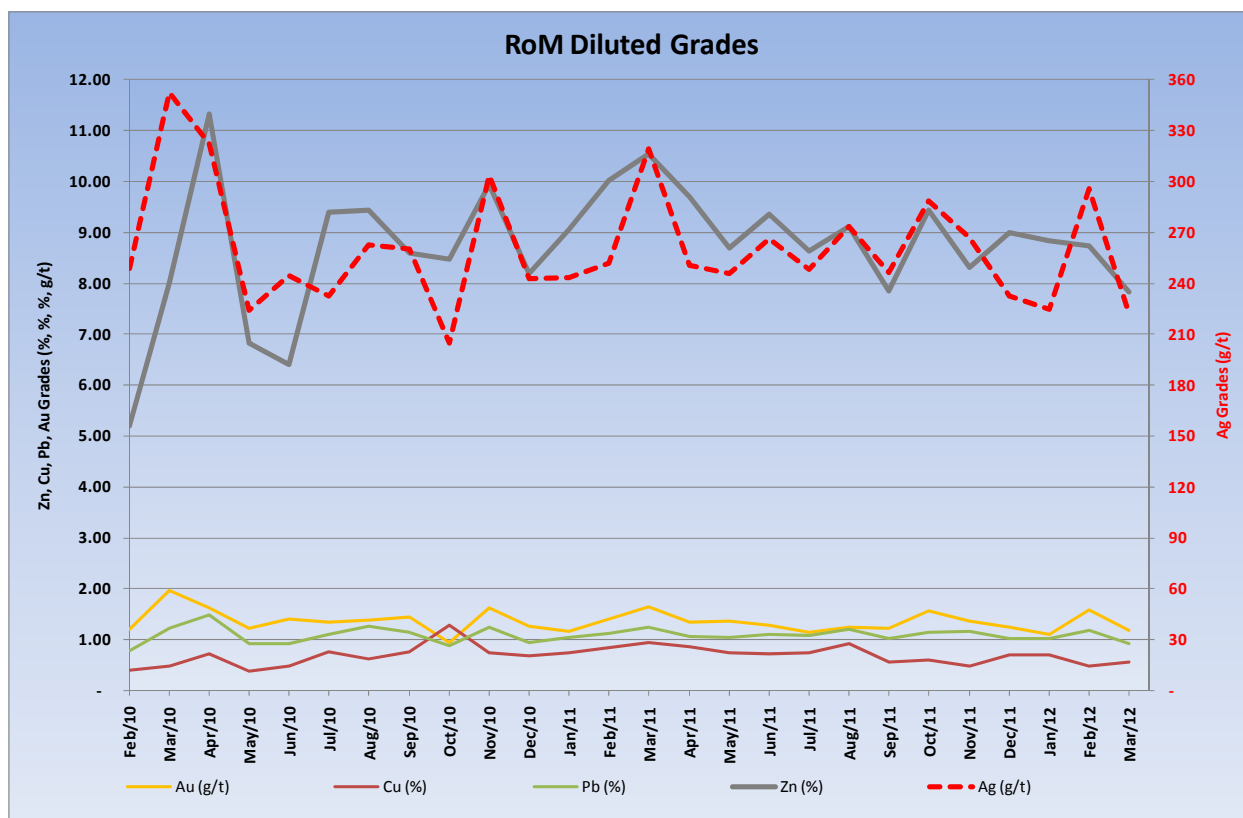
At a milling rate of 1700 t/d, copper, lead and zinc concentrates will be produced at a rate of 2.6, 2.0 and 12.3 t/hr (solids), respectively. At the average mill feed grades of 0.91% Cu, 1.26% Pb, 9.66% Zn, 1.36 g/t Au and 282 g/t Ag, the daily production (in tonnes) for the three concentrates and the concentrate grades (as percent) and metal recoveries (as percent) are as provided in Table 2-3. As summarized in Table 2-3 and Table 2-4, gold and silver are contained within the three concentrates and will be separated during the smelting process off site. Run of mine (ROM) diluted grades as a monthly average for the first 25 months of mining are provided in Figure 2-7. For more details on concentrate production, see *Wolverine Project Mill Operating Plan V2010-02*.

Table 2-3: Daily Concentrate Grades and Metal Recoveries

Daily Production		Concentrate Grades					Metal Recoveries, %				
<i>Products</i>	<i>tonnes</i>	<i>Cu %</i>	<i>Pb %</i>	<i>Zn %</i>	<i>Au (g/t)</i>	<i>Ag (g/t)</i>	<i>Cu</i>	<i>Pb</i>	<i>Zn</i>	<i>Au</i>	<i>Ag</i>
<i>Cu Concentrates</i>	58.2	21.25	2.25	3.74	11.3	4409.4	79.9	8.0	1.2	33.4	60.0
<i>Pb Concentrates</i>	46.4	1.97	21.25	12.41	13.5	1625.4	4.3	46.0	2.4	23.2	12.9
<i>Zn Concentrates</i>	270.8	0.36	0.98	54.21	0.7	151.2	6.7	17.2	89.4	10.9	10.2

Table 2-4: Daily Concentrate Production Rates

Metal	Daily Production	Metal	Daily Production	Metal	Daily Production
Cu Concentrate	58.2 tonnes	Pb Concentrate	46.4 tonnes	Zn Concentrate	270.8 tonnes
Cu Metal	27,250.3 lbs	Pb Metal	21,722.6 lbs	Zn Metal	323,666.5 lbs
Au in Cu Con.	24.8 oz	Au in Pb Con.	17.2 oz	Au in Zn Con.	8.1 oz
Ag in Cu Con.	9,253.3 oz	Ag in Pb Con.	1,981.0 oz	Ag in Zn Con.	1,574.3 oz

**Figure 2-7: Run of Mine dilute average monthly production grades – Feb 2010 to Mar 2012**

3 Geotechnical Assessment

A geotechnical assessment to analyze the collected geotechnical data, assess stope and pillar sizes and recommend ground support systems was conducted in 2006. The subsequent report summarized the results of several previously conducted geotechnical investigations and the geomechanical mine design guidelines for stope excavations and mine development headings. In addition to geotechnical drill holes, an underground test mining program was conducted in 2005 to provide further information on various geological aspects.

3.1 Rock Mass Quality

Rock mass rating (RMR), as described by Bieniawski (1976, 1989), and rock tunnelling index (Q), of Barton et al. (1974) were used to classify the Wolverine deposit. The Unconfined Compressive Strength (UCS) of rock was also used to apply the rock mass classification systems, and drill hole cores (labelled “WV 05-XXX” in Table 3-1) and core logs were also examined.

Point load strength tests (to provide UCS) were carried out on the core samples of several exploration drill holes, and a summary of the results for the HW, ore and FW zones is presented in Table 3-1. The resulting point load strength index ($Is_{(50)}$) was then used to classify the rock point load strength, grade and term (as defined by the International Society of Rock Mechanics (Brown, 1981)), as summarized in Table 3-2.

With the exception of QCVN (Quartz Carbonate Vein), the point load strength index ranged from 1.43 to 2.06MPa and 1.33 to 1.45MPa for the immediate HW and FW, respectively. When the UCS falls below 25MPa ($Is_{(50)} < 1\text{MPa}$), the point load test results are not accurate. Using the results of point load index strength tests and drill hole logs, the representative ranges of UCS for the HW and FW zones are classified as “extremely weak to medium strong” and “weak to medium strong”, respectively (Table 3-2). The ore zone rock types, with average point load strength values ranging from 3.43 to 4.86MPa, are rated as “strong to very strong”. Therefore, according to the point load strength tests, examination of drill hole cores and review of core logs, the ore zone is more competent than the immediate HW and FW zones.

Table 3-1: Summary of the Point Load Strength Test Results for HW, Ore and FW Zones

Location	Rock	Drill Hole	Number of Tests	$Is_{(50)}$ Mean Value (MPa)
Above HW	EXCP	WV 05-175, WV 05-186, WV 05-187, WV 05-178	55	3.25
	EXSP	WV 05-176, WV 05-177, WV 05-178,	60	2.2
HW	RHFS	WV 05-178	9	3.93
	RHMS	WV 05-175, WV 05-178	27	2.83
	ARSI	WV 05-177, WV 05-178, WV 05-180, WV 05-188	59	1.69
Immediate HW	ARMS	WV 05-174, WV 05-175, WV 05-177, WV 05-180	65	1.8
	ARCB	WV 05-174	6	1.43
	ARCL	WV 05-176	13	2.06

Location	Rock	Drill Hole	Number of Tests	Is ₍₅₀₎ Mean Value (MPa)
Ore	PYMS	WV 05-177	19	3.43
	PMMS	WV 05-176	10	5.62
	PMSM	WV 05-176	6	4.2
	SSMS	WV 05-174, WV 05-175, WV 05-176, WV 05-177, WV 05-180	160	4.86
	CPMS	WV 05-176	8	4.66
Immediate FW	RHCL	WV 05-186	8	1.33
	RHCT	WV 05-176	19	1.45
	QCVN	WV 05-174, WV 05-175, WV 05-176, WV 05-177, WV 05-180, WV 05-186, WV 05-187	41	3.14
ARCB = carbonaceous argillite		EXSP = silica-pyrite exhalite	RHCT = chloritic rhyolite tuff	
ARCL = chlorite altered argillite		PMMS = massive sulphide (polymetallic)	RHFS = aphanitic rhyolite	
ARMS = argillite		PMSM = semi-massive sulphides (polymetallic)	RHMS = massive rhyolite	
ARSI = siliceous argillite		PYMS = massive sulphide (pyrite-rich)	SSMS = massive sulphides	
CPMS = massive sulphide (chalcopyrite -rich)		QCVN = quartz-carbonate vein		
EXCP = calcitepyrite exhalites		RHCL = chloritic lapilli tuff		

Table 3-2: Range of Point Load Strength Index, Grade and Term for HW, Ore and FW Zones

Location	Rock Type	Is ₍₅₀₎ Mean Value (MPa)	Grade	Term
Above HW	EXCP, EXSP	2.2 - 3.25	R4	Strong
HW	RHFS, RHMS, ARSI	1.69 - 3.93	R3-R4	Medium strong - strong
Immediate HW	ARMS, ARCB, ARCL	1.43 - 2.06	R3	Medium strong
Ore zone	SSMS, PYMS, PMMS, PMSM, CPMS	3.43 - 5.62	R4 - R5	Strong-very strong
Immediate FW	RHCL, RHCT,	1.33 - 1.45	R3	Medium strong
	QCVN	3.14	R4	Strong

Note: For rock type label descriptions, refer to Table 3-1.

In order to characterize and compare the rock mass quality across the Wolverine deposit, each orebody was divided into the upper, center and lower zones. The rock mass quality ratings highlight the distinct separation between ore and immediate HW/FW rock zones (Table 3-3). The ore rock quality can be described as “good to extremely good”. With the exception of the “extremely poor” HW rock quality in the center zone of the Wolverine orebody, the rock mass quality in the immediate HW and FW is rated as “very poor to poor”. In the upper zones, the Saddle HW is poorer than Wolverine and Lynx; however, it has a higher rock mass quality for the FW zone. In the center zones, the Saddle HW has a higher rock mass quality than Lynx and Wolverine. In lower zones, Lynx and Wolverine have similar HW and FW zones. A comparison of the ore rock mass quality indicates that Lynx has a higher rating than Saddle and Wolverine orebodies for all zones.

This geotechnical information was utilized in the design of the mine and mine operations (see Section 4).

Table 3-3: Summary of Typical Rock Mass Quality for the Wolverine Deposit

Orebody	Zone	HW/Ore/FW	Q (Rock mass quality)	Description
Lynx	Upper	HW	1.3	Poor
		Ore	120	Extremely good
		FW	0.6	Very poor
	Center	HW	0.8	Very poor
		Ore	135	Extremely good
		FW	0.7	Very poor
	Lower	HW	2.3	Poor
		Ore	168	Extremely good
		FW	2.5	Poor
Saddle	Upper	HW	0.4	Very poor
		Ore	64	Very good
		FW	1.6	Poor
	Center	HW	1.3	Poor
		Ore	75	Very good
		FW	2.6	Poor
Wolverine	Upper	HW	1.1	Poor
		Ore	22	Good
		FW	0.5	Very Poor
	Center	HW	0.03	Extremely poor
		Ore	75	Very good
		FW	1	Poor
	Lower	HW	1.4	Poor
		Ore	90	Very good
		FW	2	Poor

4 Mining Design and Methods

The components of the Wolverine Mine, including stoping blocks, drift and fill horizons and paste backfill are summarized below. This section also details mine design, development and production in drift and fill horizons, and ventilation.

4.1 Mine Design

Governing assumptions and design requirements in the design of the Wolverine Mine were:

- Positioning the drifts relative to the ore body geometry for optimum ore recovery and minimum dilution.
- Minimizing the amount of ground opened up in the development phase.
- Anticipation of greater stability and therefore better ground conditions in the ore rock relative to the wall rocks.

- In general, minimizing any penetration of the HW by:
 - Minimizing any strike drive intersection with the HW; and
 - In wider areas, driving to the HW at an orientation that will minimize any ground control issues should the HW be penetrated.
- Minimizing open span areas where additional support would be required through optimizing the interaction of drive and fill activities.
- Slashing of ore from walls on retreat in areas where the vein width allows for mining at greater than a single drift width but less than that for two drifts.

A schematic of the mine design for the first 25 months of mining is provided in Figure 4-1. As shown, a central spiral decline intersects the Saddle Zone and provides access to the Wolverine and Lynx Zones. When the final design for the successive years of mining is complete, it will be submitted as an addendum to or in a revision of this Plan.

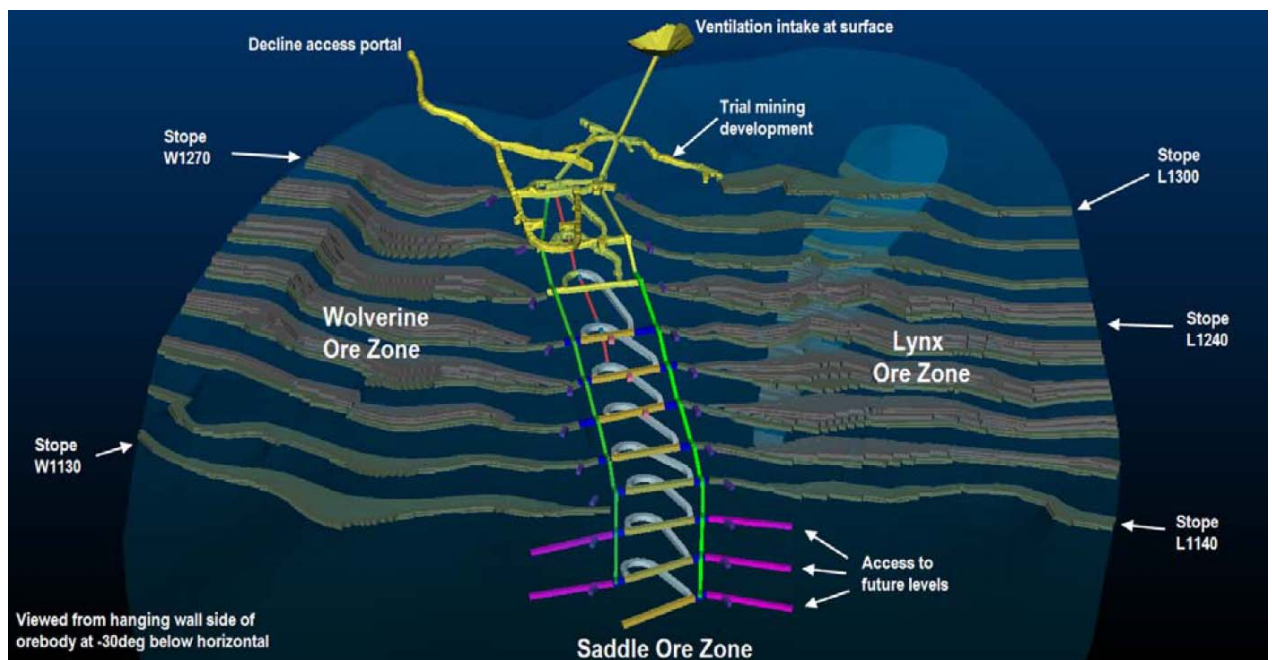


Figure 4-1: Mine Design Schematic for the first 25 months of mining

The mining method at the Wolverine Project is drift and fill (DAF). This has been dictated by the:

- geometry of the deposit;
- anticipated poor ground conditions in the immediate HW and FW; and
- desire to achieve an optimum level of selectivity in the mining process.

Drift and fill allows a high proportion of the deposit to be extracted, as no permanent pillars are required and the selective nature of the method will allow mining in areas where the ore grade mineralization is thin. Additionally, the poor rock conditions of the immediate hangingwall will be managed appropriately by utilizing small excavations and quick stope cycle times.

Mining will begin in the upper portions of the orebody, to minimize the time and costs required to develop sufficient stopes for full scale production. Mining within any stope begins at the bottom of a stope, with a 4m lift being mined. Each stope will be comprised of five lifts, over a vertical extent of 20m. Paste backfill with loose waste from the development program will be used to fill the mined

voids. When one lift is mined and filled, the next will be mined at an elevation 4 m higher, using the backfill of the previous lift as the new floor of the stope. Mining will proceed in this fashion in the up-dip direction until the 20m stope block is completely mined out and filled. Because overall mining of the orebody has started at the top, the 5th and final lift in any stope will occur below the first lift of the stope above, exposing the backfill.

In all stopes, a footwall drift will be excavated ahead of stope mining. This drift will be excavated at a moderate size and will follow the footwall contact of the orebody, keeping the back of the drift in ore as much as possible. Behind the advancing face, a portable diamond drill will be utilized to drill horizontal test-holes towards the hangingwall of the ore so that the horizontal width of the orebody can be determined accurately. More test-holing will be required on the first lift of a stope. As each lift is mined and mapped, more information is known and fewer test-holes will be required.

In very difficult back conditions, underhand drift and fill mining is an alternative methodology that may be used. With this method, the stope is progressed downward rather than upward, with every cut requiring fill of sufficient quality and strength to provide stable back conditions for the next cut, which will be mined immediately underneath. Underhand DAF will only be used on the top cut of each five-cut stope series.

The mine access and surface ventilation raises have shotcreted surfaces to enhance structural stability and minimize wall oxidation. Monitoring with respect to water quality in the underground workings and effectiveness of oxidation prevention measures are detailed in the *Wolverine Project Monitoring and Surveillance Plan V2010-02*.

The details of the methodology outlined above are provided in the sections below.

4.2 Design Parameters

The key mine design parameters for the Wolverine Project are provided in Table 4-1. These parameters apply to the full scale mining; pre-production mining (e.g., mining prior to mill operation) will run at approximately 80% capacity of the full scale parameters.

Table 4-1: Mine Design Parameters

Mine Design and Production Parameters	
Methodology	Overhand Drift & Fill
Equipment	Jumbo, scoop, bolter
Stope height	20 m
Cuts per stope	5
Ore drifts	4.25 m W x 4.25 m H
Density Ore in-situ (average)	3.5 t/m ³
Density Waste in-situ	2.8 t/m ³
Density Paste placed	2.1 t/m ³
Nominal advance/round	3.0 m
Est. max. ore drift advance - primary	100 m/month
Est. max. ore drift advance - secondary	80 m/month
Est. max. ore drift advance - tertiary	60 m/month
Est. max. slash advance	130 m/month
Est. max. advance each Jumbo crew	160 m/month
Nominal production rate	1700 t/d

Mine Design and Production Parameters	
Number of jumbos required	6
Fill type - sill cuts	High-strength paste
Fill type - cuts 2 to 5	Rock fill and paste
Est. max. paste fill placement	690 m ³ /d
Est. max. rock fill placement	670 m ³ /d
Est. time - finish drift to start slash	2 days
Est. time - fill prep and build fence	2 days
Est. time - fill cure	5 days
Est. time – build paste fill wall	2 days

Figure 4-2 illustrates the ramp-up in mining that will occur in 2010 to achieve full production by March 2011. Drift development productivity increases as the number of jumbo drill rigs working in multiple stope levels increases.

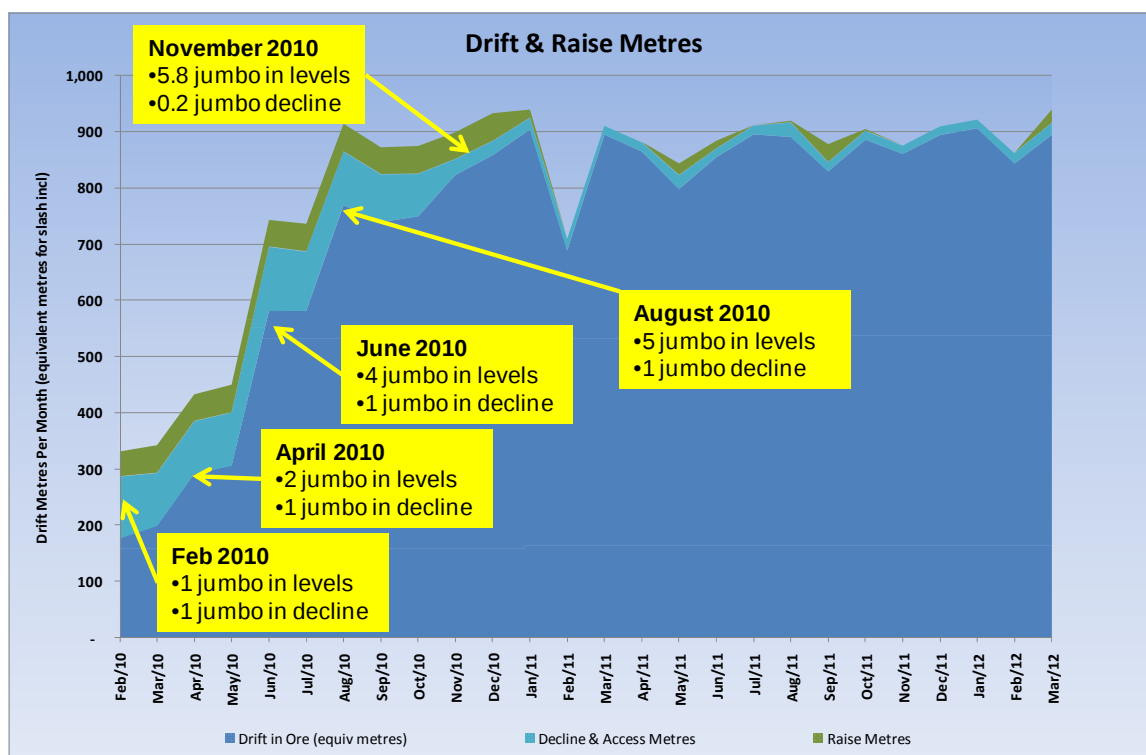


Figure 4-2: Proposed Drift and Raise Development – February 2010 to March 2012

4.2.1 Stopping Blocks

Each 20 m high stopping block will be mined in a series of five 4 m high cuts or slices, as illustrated in Figure 4-3. Multiple stopping blocks allows for many areas to be mined concurrently, thereby increasing production.

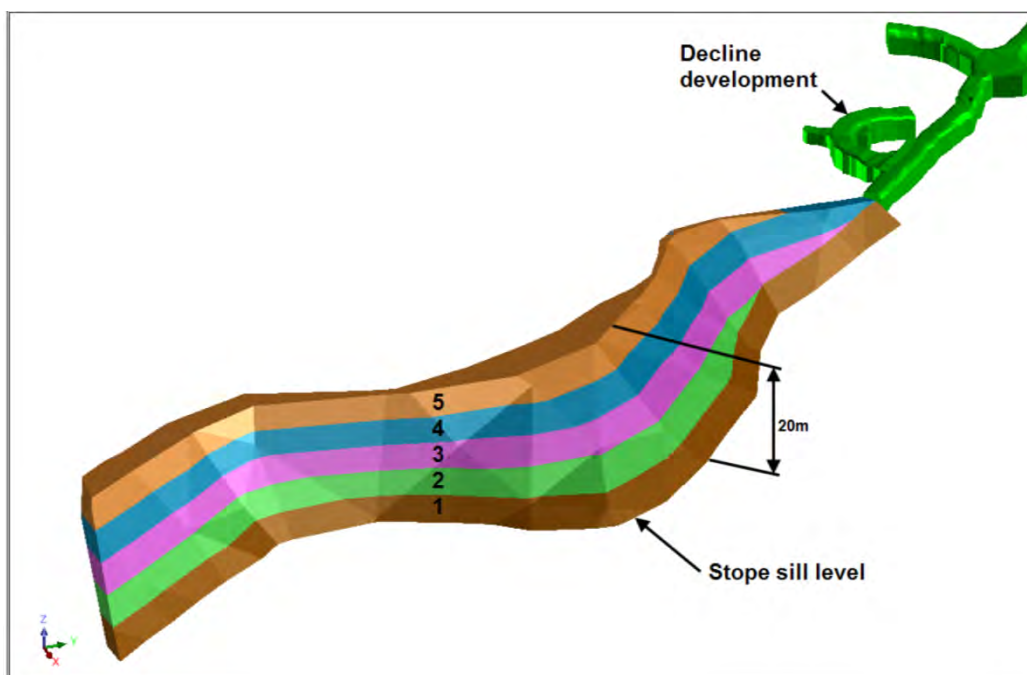


Figure 4-3: Drift and Fill Slope Schematic

4.2.2 Drift and Fill Horizon

Drift and fill (DAF) horizons are accessed via ramps grading $\pm 15\%$ from the central decline. Ore development drives are planned at 4.25m x 4.25m nominal dimensions. Each horizon will be mined to the dip at a gradient of 1:100 along the horizon axis so that any ground or mine water can be managed at the face. Sumps are not planned within the DAF levels. The down grade of each horizon will also facilitate tight filling against the back of the excavation.

Each horizon will be developed to the furthest extent of the economic mineralization via a single drive, thus minimizing the amount of ground opened up in the development phase. The initial drive will generally be located as close as is practicable to the FW; it is anticipated that the FW rocks will be more competent than those in the HW. In the production phase, after the initial drive is filled, adjacent parallel drives may be mined, or short-drives to the HW may be excavated as overall mining retreats towards the access.

Seven different types of excavations in ore are anticipated in the mining schedule:

1. **Ore Footwall Drift:** The initial development drift that follows the FW contact.
2. **Primary Drift:** A drift excavated in ore alongside which additional drifts are to be excavated; this drift will have both side walls in rock.
3. **Secondary Drift:** A drift excavated alongside a filled drift. This drift will have one side wall as rock and one as paste fill.
4. **Tertiary Drift:** A drift excavated between two filled excavations. Both sidewalls will be paste fill.
5. **Slash Wall Full Height:** Slashing of the wall to the height of that wall. The nominal design depth excavation for this slashing is 1.7m.
6. **Slash Wall Toe:** Slashing the bottom half of a drift wall (design height 2m from floor). The nominal design depth of this excavation is 1.7m.

7. **Slash Wall Shoulder:** Slashing to the top half of a drift wall (design height 2m from back). The nominal design depth of this excavation is 1.7m.

Figure 4-4 is a representative plan view schematic of part of a DAF horizon illustrating the relative positioning of the types of excavation described above.

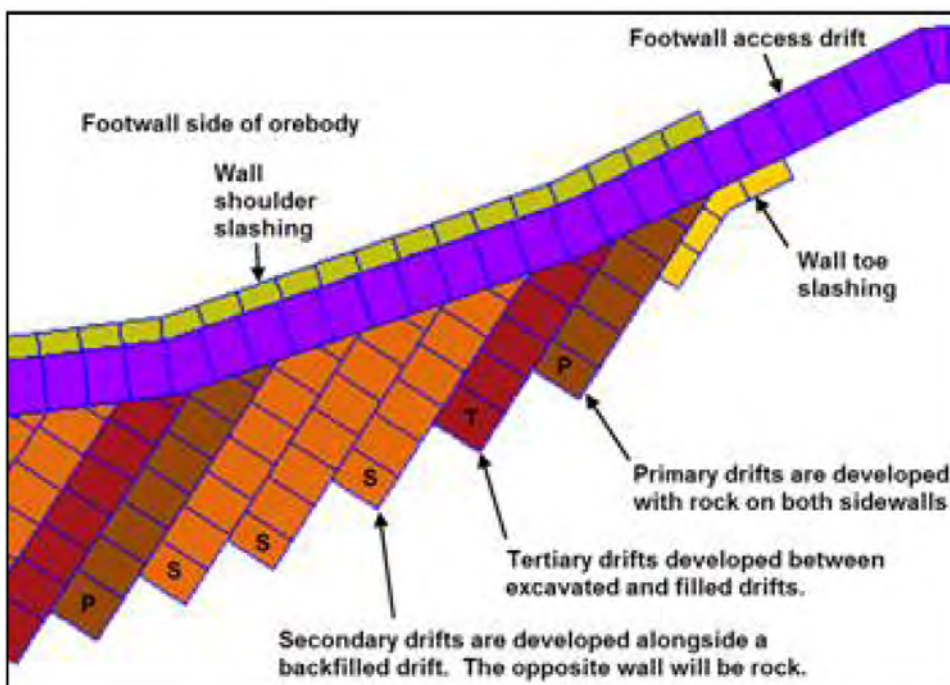


Figure 4-4: Drift and Fill Horizon Segment - Plan View

Figure 4-5 is a representative cross-section illustrating primary (footwall) and secondary drifts and wall shoulder and wall toe slashing.

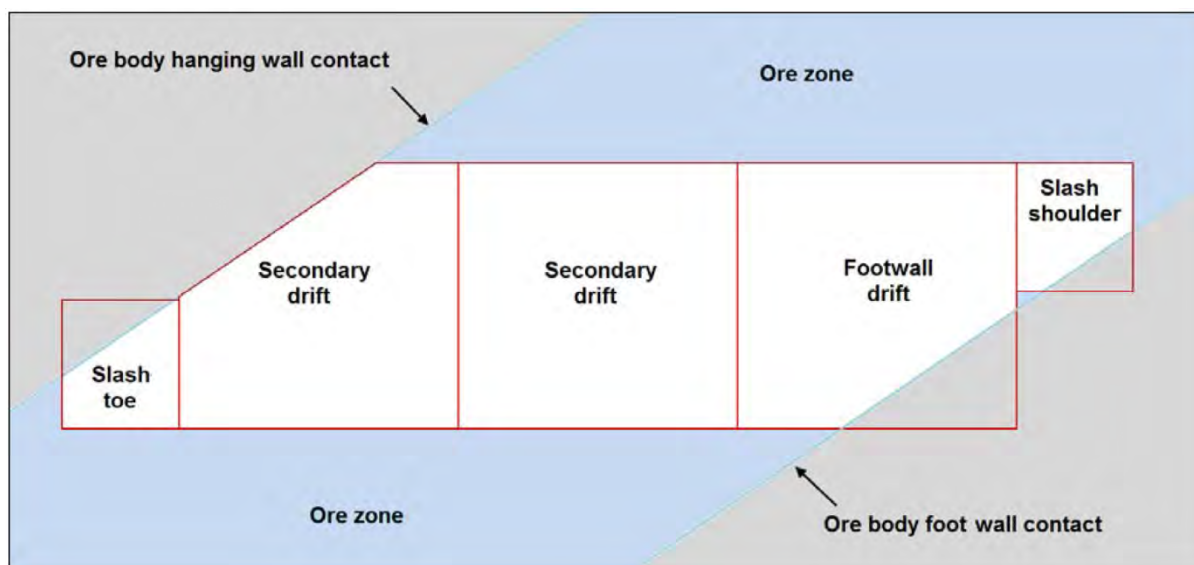


Figure 4-5: Drift and Fill Horizon Segment - Section View

4.2.3 Paste Backfill

Paste backfill will be generated from mill tailings in the processing plant and delivered to individual stopes via a fill pipe distribution system. For more information on the production of paste backfill, see *Wolverine Project Mill Operating Plan V2010-02*. Each stope sill level will be filled with good quality, high strength paste to provide a stable back for subsequent mining underneath. On all DAF levels other than the sill (bottom) level of a stope, waste rock backfill will be placed into the development excavation prior to paste backfill. The local paste/rock fill profile considers any future adjacent development so as to maximize rock fill placement while providing appropriate fill against which future development can be done (see Figure 4-6). Fill walls (fences) will be constructed to an appropriately engineered design.

The rock fill profile in a drift is determined by the position of that drift relative to the position of drifts yet to be excavated. Section 4.3.3 shows specific examples of fill profiles in adjacent drifts.

Before commencing mining adjacent to any filled drift, paste must first cure for an adequate period of time to achieve appropriate paste strength. The estimated curing period is five days. Monitoring of paste cure throughout the cycle will be necessary to confirm performance predictions.

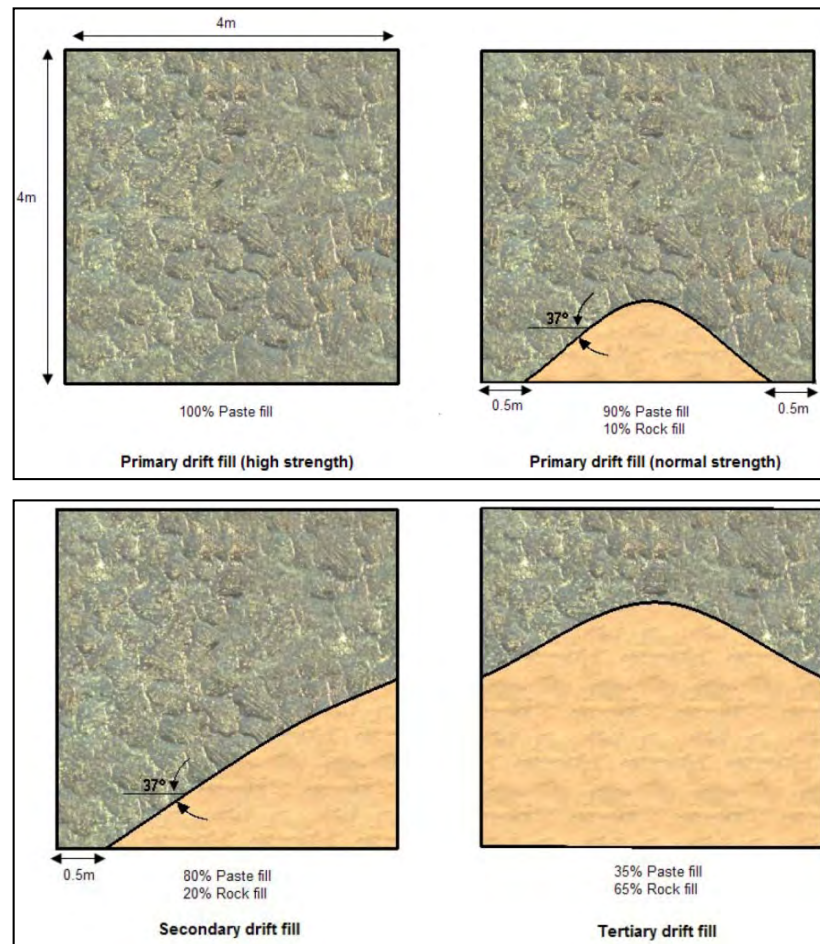


Figure 4-6: Typical Rock Fill Profiles

4.3 Development and Production Operations

The sections below describe development of and production from a drift and fill level, and paste backfill procedures.

4.3.1 Development of a Drift and Fill Level

At each DAF horizon, decline development intersects lower grade mineralization in the Saddle Zone between the Wolverine and Lynx zones (see Figure 4-1 above and Figure 4-7 below). Figure 4-7 illustrates the decline intersecting a narrow area of mineralization in the Saddle zone. Access to allow stope development is achieved by drifting to the Wolverine and Lynx zones via ramps grading $\pm 15\%$.

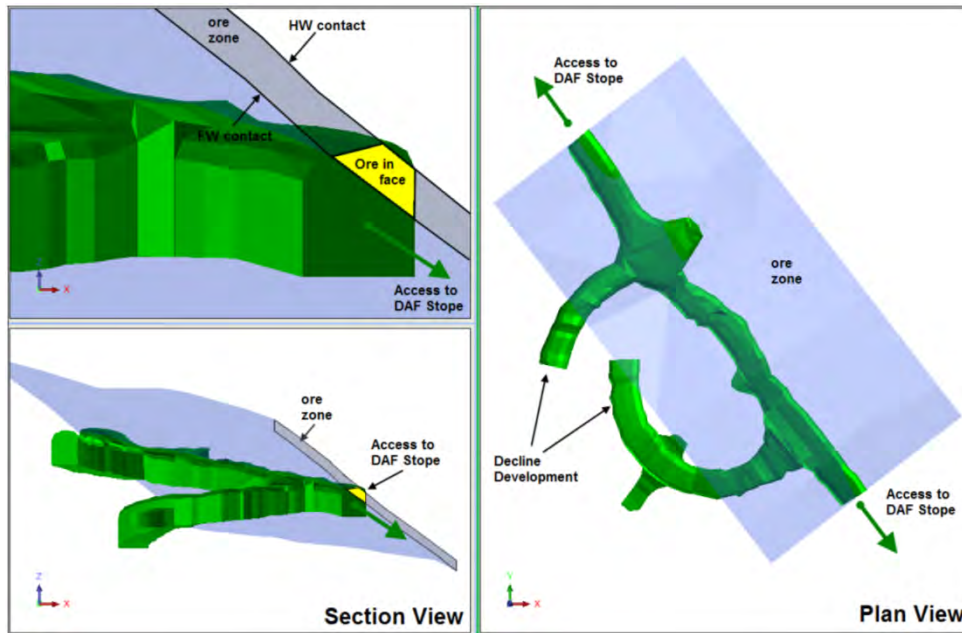


Figure 4-7: Stope Access from Decline

Initial development in the ore zone advances parallel to and offset from the FW of the ore body (i.e., the footwall “drive”). The varying dip and thickness of the orebody will influence the 'ideal' positioning of the development. The more precisely the locations of the HW and FW contacts are known along the DAF horizon, the better the positioning of the FW drive. The optimum development location provides for:

- The back being in ore to minimize ground support (maximizing safety) and maximize efficiency;
- Minimal dilution from waste material; and
- Optimum slashing in the shoulder on retreat relative to the dip of the orebody and the jumbo drilling capability. A practicable depth of slash of the order of 1.7 m has been assumed at a development width of 4 m.

The objective for the FW drive is to mine to the economic extent of the ore body as quickly as possible while maintaining the optimum characteristics described above. The round to round orientation of the drive will be determined after considering the current location of ore in the face and the anticipated ore geometry immediately beyond the face and through to the projected end of the drive. If the position of the ore in the face is actually 'lost' due to contact deviation, it may

be necessary to drill to relocate the mineralization. Similarly, if the ore widens such that the HW contact is lost, then definition drilling via a small mobile drill to relocate the contact may be necessary.

4.3.2 Production from a Drift and Fill Level

Knowledge and understanding of the ore body geometry, grade distribution, and ground conditions will be gained via direct observation and definition drilling during the FW drive excavation. This will be used to plan for the layout of production mining on retreat and for the positioning of remuck bays. Ore horizontal width and grade will influence the production DAF layout with respect to parallel drifting along strike, multiple drifting across the strike, and wall slashing. For the envisaged length of the DAF operations in each direction, up to three remuck areas have been assumed to facilitate re-handling of ore and waste fill material. Ground conditions will play a major role in determining any change from the nominal drift span of 4m in further headings, the support to be installed, and the round length and advance rate to be anticipated.

Once the FW drift has extended to the limit of economic production, it is projected that final geological interpretation of the excavation will require two days before the drift is released for production. Initial retreat mining is expected to include slashing from a drift wall shoulder and or drift wall toe. In some cases toe slashing will increase to a full wall slash as ore width increases.

Figure 4-8 is a plan view representation of a full DAF horizon mining sequence. Mining activities are numbered sequentially, starting with the FW Development as No.1. Also shown as No. 1 are three drives from the FW drift towards the HW in the wider, central area. Wall shoulder slashing on the FW side (No.2) and then filling would precede secondary parallel drifting and HW toe slashing (Nos. 3 and 4, respectively). Numbers 5 through 12 illustrate further secondary and tertiary drifting, each drift being filled before the one alongside it can be mined.

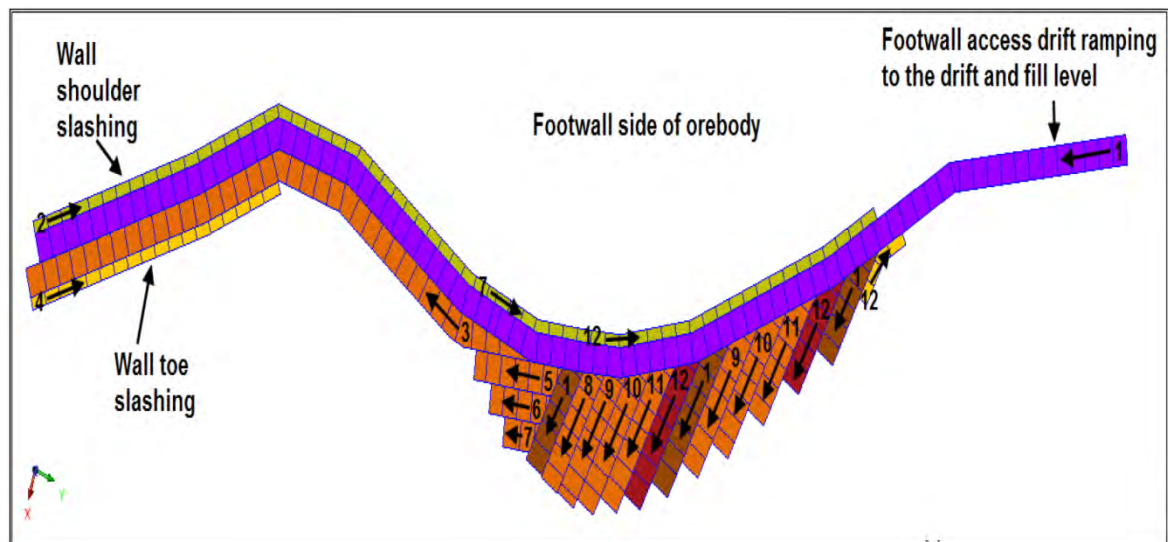


Figure 4-8: Drift and Fill Horizon Mining Sequence – Plan View

4.3.3 Backfill Procedures

Production in drift and fill mining is very much contingent on the capability of the backfill system. Paste backfilling of mined areas will occur throughout the life of the operation, using cemented tailings as the dominant backfill material with lesser quantities of mined waste rock.

Efficient fill preparation and fence construction, consistent fill quality, a responsive and reliable delivery system (including that for rock fill), and rigorous planning and scheduling are all critical items. Particularly important is the ability to place fill as tight to the back as possible in order to minimize back spans. Equally important is having adequate curing time, while continuing to have available the scheduled number of production faces.

The strength of the paste fill mat (e.g., the filled floor of the underlying cut) located at each sill level will be sufficient to provide a secure back for the underlying 5th cut to be mined up against, as well as support the overlying combination of paste and paste/rockfill filled drifts.

Depending on results of modelling and strength requirements, additional structural elements might be proposed to be incorporated into the sill design, such as laying of weld-mesh or chain-link screen on the sill floor and erecting plates and bolts at the sill elevation, prior to pour, to act as pre-support of the 5th cut back as the sill is exposed.

Figure 4-9 is a schematic showing three drifts mined in parallel, each using both paste and rock for fill. Drift 1 is developed first, with rock fill being placed in the drift against the wall that will not be excavated. The rock/fill profile in Drift 2 is the same as Drift 1, with a view to Drift 3 being excavated alongside. Drift 3 is the final drift with no requirement to maintain a paste wall. The maximum amount of rock fill is deposited into this drift prior to paste filling.

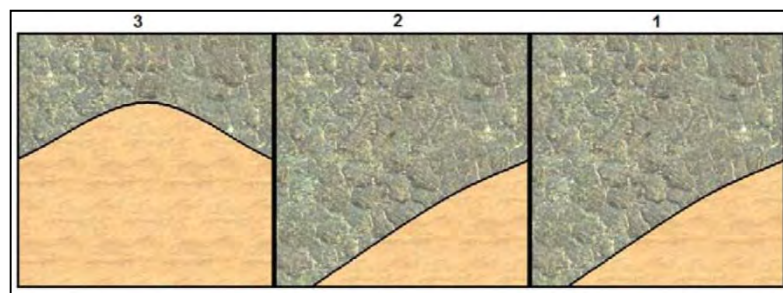


Figure 4-9: Parallel Drifting along Strike

Another DAF development layout is drifting in multiple locations across the strike of the ore body (see Figure 4-10 and reference the drifting to the HW shown in Figure 4-8). In the development layout shown in Figure 4-10, the primary drifts (labelled 1) are excavated during or immediately after the level FW development. Secondary and tertiary drifting (2's and 3's) occurs after respective filling and curing of 1's and 2's as per the fill profiles shown.



Figure 4-10: Multiple Drifting along Strike

Paste fill (high strength and normal strength) and waste rock placement underground for the first 25 months of mining are shown in Figure 4-11, as is the paste fill capacity of the underground mining infrastructure.

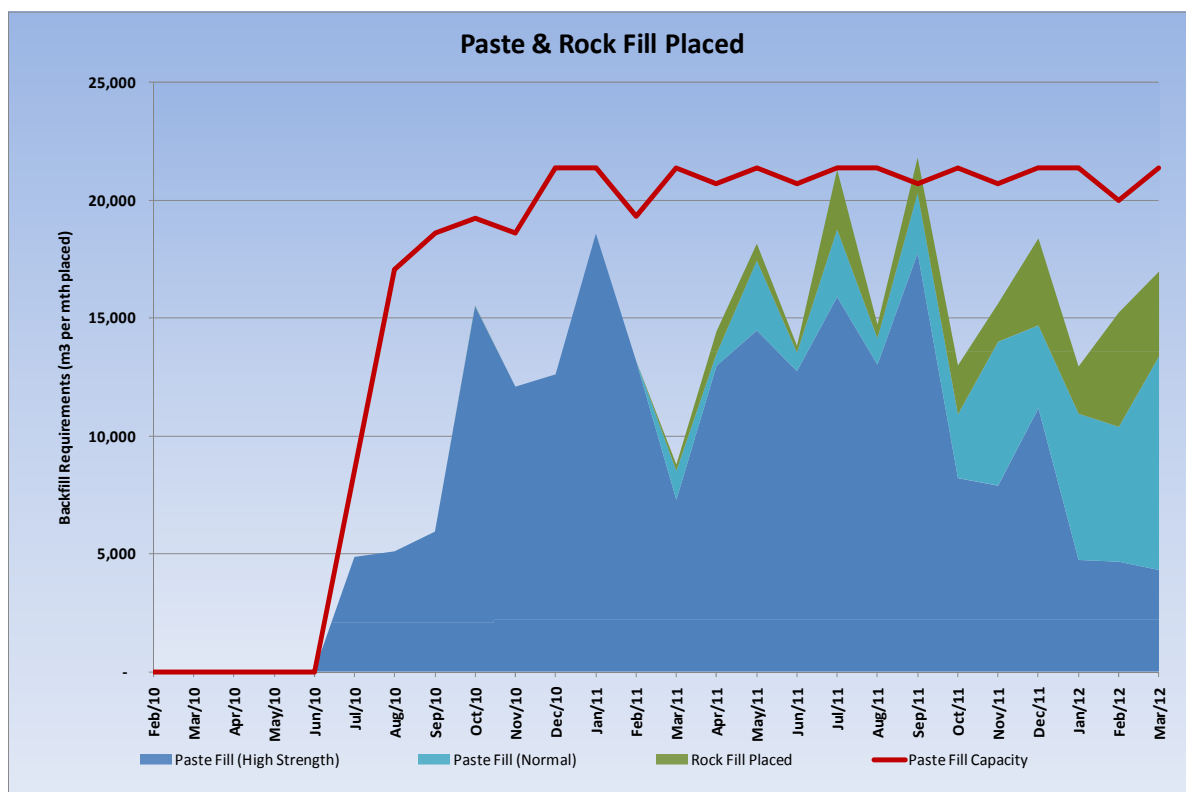


Figure 4-11: Paste and Rock Fill Placement – February 2010 – March 2012

4.4 Ventilation

The primary airflow requirement for any mine is based primarily on the mobile diesel equipment usage, permitted diesel engine airflows, effectiveness of the ventilation concept defined and other allowances. The Wolverine Mine ventilation system is a push system in which the mine is under positive pressure relative to atmosphere. The mine is pressurized with a single primary intake fan located at a surface portal (Picture 4-1), feeding two fresh air intake raises located in the footwall of the ramp. This main fan (diameter 2.35 m) is a heavy duty axial Alphair model 9250 powered by an 800 HP motor, 1200 RPM to start the fan on cold start up and able to provide 151 m³/s of heated air (320,000 cfm). Fresh air for each active work face is pulled from the appropriate intake raise and blown to the work face with the secondary fan/ducting system.

The secondary fan, located in an airtight bulkhead that separates the fresh air raise from the ramp, conveys air to the working face utilizing flexible, or bag, ducting. The main ramp serves as the collection and transport airway for all airflows from the active work faces. The air flows up the ramp and discharges to surface through the existing portal culvert. Airflow velocities in the ramp are kept below 6 m/s to minimize stripping of fines from the haulage trucks and generation of air-borne dust that would contaminate the working environment in the lower portions of the ramp.



Picture 4-1: Surface Infrastructure – Mine Vent Air Raise (May, 2010)

Intake air is heated, as required, by direct-fired propane heaters located on the intake side of the primary intake fan (located within the fan house, the brown building in Picture 4-1). The primary intake airflow volume is dictated by the cumulative volume of air pulled from the intake raises by the secondary fans. The Wolverine Mine ventilation ramp is a 4.5 m x 4.8 m ramp with an ancillary return air raise on the upper levels to reduce air velocity, as shown in Figure 4-12.

A centrally located monitoring and control system for the primary intake fan and secondary fans will be installed at the intercepts of the fresh air raises and main ramps as mining progresses (Figure 4-12). The system will control all fans through on/off control and individual fan motor frequency control.

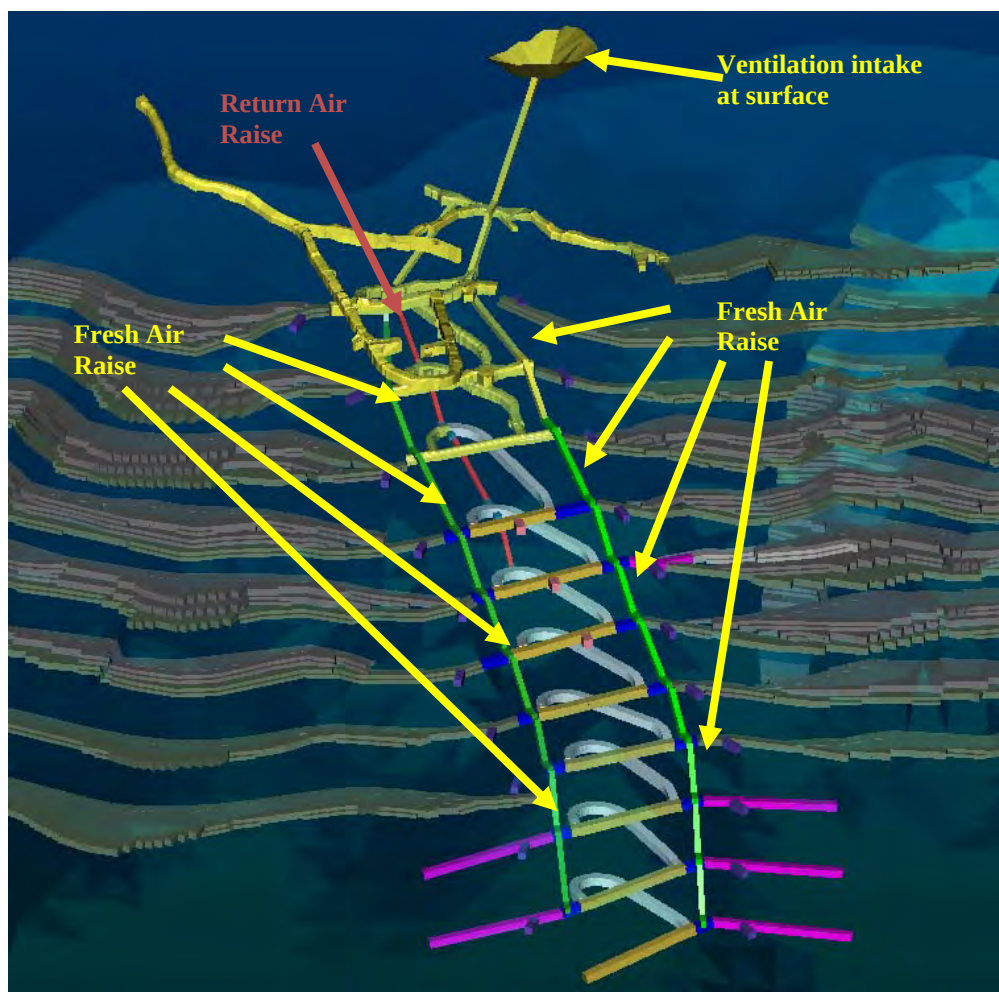


Figure 4-12: Mine Ventilation System Design

5 Ground Support Methods and Monitoring Instrumentation

The ground support methods and instrumentation systems described in this section are currently under review by a geotechnical engineer and Yukon Zinc will update this Plan, if necessary, once complete.

Empirical methods are widely used for the specification of rock support systems in mining projects. The empirical methods can be divided into two major categories:

- Rules of Thumb
- Rock Mass Classification System

Rules of thumb were developed based upon various past project experiences gained in the construction of tunnels, caverns and mine openings. The support specifications based on rock mass classification systems distinguish between different rock masses and specify the rock support system accordingly. It has been proven that the rock mass classification system, in conjunction with monitoring and sound engineering judgement, provides an excellent guideline for the design of ground support systems.

The formation of stress arches above underground excavations occurs in most mines. The formation of the arches is the result of the stress redistribution in the rock as the opening is formed. The rock in the arch is subjected to compressive stresses. The location of the stable arch beyond the excavation is dependent upon the rock mass properties and excavation span. In order to maintain the natural arch, the de-stressed rock between the excavation boundary and natural arch boundary must be stabilized. This can be achieved by reinforcing the rock by bolts that anchor above the stressed arch boundary.

For any support system specification; three major design parameters should be considered:

- bolt capacity;
- bolt length; and,
- bolt spacing.

Bolt specifications take into account the dimension of the de-stressed zone above the excavation. Normally, the length of the bolt ranges from one third to one half of the span of the excavation.

Ground support guidelines for the Wolverine Project (by Rockland, 2006) were based upon rock mass classifications, experience gained during the 2005 test mining program, and on the geotechnical analysis presented above. Rockland recommended that rock bolts and shotcrete be the major forms of ground support, and these ground support methods, and associated monitoring instrumentation are summarized below.

5.1 Ground Support Methods

The development of the 2005 test mine allowed for installation of various methods of ground support to determine the best methods for underground mine development. Support methods included:

- Steel arch, split set, timber & shotcrete;
- Resin rebar, mesh;
- Timber, split set, mesh, shotcrete;
- Resin rebar, split set, mesh, shotcrete; and
- Resin rebar, split set, mesh.

The main support elements recommended for the back were resin rebar and split set in conjunction with mesh and occasional fibre reinforced shotcrete (FRS). In 2005 a steel arch and timber support system was used at the portal and a location in argillite. In very poor to poor rock quality (such as in ARMS), resin rebar did not provide sufficient anchorage; split set and mesh with occasional application of FRS was successful. In the poor to fair ground rock quality (as in EXCP or SSMS), resin rebar with mesh was implemented. The main type of ground support on the walls is split set.

Tables 5-1 and 5-2 present the support guidelines based upon the geomechanical zones (rock types) for the back and walls, respectively. Based on experience gained during the decline excavation in the "very poor to poor" ground condition, it is preferable to support the back immediately after a blast. The application of a thin layer of FRS to the rock surfaces also improves stability.

It is also essential that patterns are regularly examined to meet the most critical conditions expected. This rule can be relaxed somewhat for temporary openings that will be open for less than 6 months. Bolt spacing should be uniform to preserve the interlocking nature of the rock in the back. This is particularly important where the rock quality deteriorates. Where adverse ground conditions are encountered during development, additional support will be installed. Major intersections require additional support as specified above. Based on experience gained during the test mining program at Wolverine, the length of bolt equivalent to the one half of excavation span is recommended. In order for bolts to act together rather than individually, they must be located proximal to each other. For 1.8m and 2.4m (6' and 8') long bolts, this distance should not be greater than 1.5m (5') otherwise spacing is insufficient for bolt interaction. Again, based on experience gained during the test mining program, a minimum spacing of 1.2m by 1.2m (Table 5-1) for the back and 1.5m by 1.5m (Table 5-2) for the walls were selected for Wolverine.

As described in Section 3.1 above, Barton (1974) has developed a relationship between rock mass quality, opening size and support requirements. A summary graph proposed by Grimstad et al (1993), was employed to estimate the ground support requirements for the Wolverine project.

The suggested ground support recommendations are applicable where the Q values are consistently equal or greater than specified values. It should be noted that the excavation support ratio (ESR) is related to the use for which the excavation is intended, and the extent to which some degree of instability is acceptable. The span calculated and ground support recommended by this method does not apply to multiple opening situations. This is primarily due to the effect of stress redistribution. Barton's method is not sensitive to such changing conditions and therefore only provides guidance for initial conditions prior to full production mining.

According to the proposed mining method at the Wolverine Project (see Section 4), the permanent mine development headings will be 4.5 m wide. As per by Grimstad et al (1993), a drift with Span/ESR ratio of 2.5 and rock mass quality (Q) value of 0.4-2.3 requires ground support consisting of fibre reinforced shotcrete (FRS) or mesh reinforced shotcrete and bolts. In poorer ground conditions, where Q values drop below 1.0 (Table 3-3), FRS and bolts are required. The shotcrete thickness should be 50mm (2") in the back. In better ground quality ($Q > 1$), pattern bolting is expected to be sufficient. In the ore zone, where Q values range from 22 to 168 (Table 3-3), and using the Span/ESR ratio of 2.5, application of pattern bolting will be sufficient.

Table 5-1: General Guidelines on Support Type and Density for the Back

Geomechanics zone/Rock Type	Function	Opening	Operating Life	Span m (ft)	Support Type*	Bolt Length m (ft)	Spacing** m (ft)	Shotcrete*** mm (in)	Comments
Argillite or similar rock type	Access	Decline	Long	5 (16')	Split set + mesh + some resin rebar	2.4 (8')	1.2 by 1.2 (4' by 4')	50 (2")	Also requires timber support, steel set arches 5m (16') span and straps for occasional use
	Intersection	Decline intersection	Long	>5 (16')	Split set + mesh + some resin rebar	2.4 to 4.5 (8' to 15')	1.5 by 1.5 (5' by 5') to 1.8 by 1.8 (6' by 6')	50 (2")	Use of final support depends on geometry of intersection
EXCP or similar rock type		Decline	Long	5 (16')	Resin rebar + Mesh + some split set	2.4 (8')	1.2 by 1.2 (4' by 4')		
Ore	Stope	Herringbone Primary	Short	4 (13')	Resin rebar + Mesh + some split set	1.8 to 2.4 (6' and 8')	1.2 by 1.2 (4' by 4')		Close spacing because men constantly working under exposed back
		Herringbone Secondary	Short	4 (13')	Resin rebar + Mesh + some split set	1.8 to 2.4 (6' and 8')	1.2 by 1.2 (4' by 4')		Close spacing because men constantly working under exposed back

*Split set is SS33; Resin rebar is #7; Mesh is #8 gauge

**Spacing values quoted represent minimum. Conditions will occur where specific block of ground support density require additional support, resulting in higher densities.

***Shotcrete is fibre reinforced shotcrete

Table 5-2: General Guidelines on Support Type and Density for the Walls

Geomechanics zone/Rock Type	Function	Opening	Operating Life	Span m (ft)	Support Type*	Bolt Length m (ft)	Spacing** m (ft)	Shotcrete*** mm (in)
Argillite or similar rock type	Access	Decline	Long	5 (16')	Split set + mesh	2.4 (8')	1.5 by 1.5 (5' by 5')	25 (1")
	Intersection	Decline intersection	Long	>5 (16')	Split set + mesh	2.4 (8')	1.5 by 1.5 (5' by 5')	25 (1")
EXCP or similar rock type		Decline	Long	5 (16')	Split set + mesh	2.4 (8')	1.8 by 1.8 (6' by 6')	
Ore	Stope	Herringbone Primary	Short	4 (13')	Split set + mesh	1.8 to 2.4 (6' and 8')	1.8 by 1.8 (6' by 6')	
		Herringbone Secondary	Short	4 (13')	Split set + mesh	1.8 to 2.4 (6' and 8')	1.8 by 1.8 (6' by 6')	

*Split set is SS33; Mesh is #8 gauge

**Spacing values quoted represent minimum. Conditions will occur where specific block of ground support density require additional support, resulting in higher densities.

***Shotcrete is the fibre reinforced shotcrete

5.2 Instrumentation and Monitoring

The main goals of the instrumentation and monitoring program are to verify adequacy or stability of the panel/pillar design (see Section 4) and ensure the adequacy of the recommended ground support methods. The instrumentation and monitoring results will be compared with empirical and/or numerical model predicted displacement and stresses. The calibrated model will be used to optimize the mine layouts and the design of similar geomechanical domains at the mine.

The following instrumentation and monitoring programs are in place at the Wolverine Mine, and are described below:

- Visual observation and monitoring;
- Extensometers;
- Pull testing;
- Tilt meters in the steel sets and bull horns.

5.2.1 Visual observation and monitoring

Visual observation is often the best and most comprehensive monitor of changes in ground conditions in a mine. The key to establishing a good system is the reliable recording of the observations made. A binder is kept in the mining office with daily inspection sheets filed chronologically. The engineers, supervisors, and surveyors document for specific locations any visual observations through logs and photographs. Items recorded may include loading of rockbolts plates, loading or bagging of mesh, fresh loose on the ground, groundwater inflows, or the formation of cracks in the ground or in the shotcrete.

5.2.2 Extensometer

An extensometer is an instrument used to accurately measure changes in distance between two points. Extensometers were installed in 2008 at the locations shown in Figure 5-1. Measurements are taken twice daily by the instrument, and the instruments are downloaded monthly by the operators. Comparisons are made to previous measurements in order to identify changes.

5.2.3 Pull Testing

A pull test is a method commonly used to determine the effectiveness of ground support element. Bolts are tested regularly after installation by applying a load to the collar and increasing it until the bolt slips or the desired load has been applied. One percent of the installed bolts will be pull tested to ensure quality control.

5.2.4 Tilt Meters

Tilt meters are attached to the portal area steel sets at the location shown in Figure 5-1, there are three tilt meters per steel set (SS) location, and one tilt meter per bull horn (BH) location shown in Figure 5-1. Tilt meters monitor any rotational movement of the steel sets and measurements are recorded twice daily. Results from these instruments are downloaded monthly.

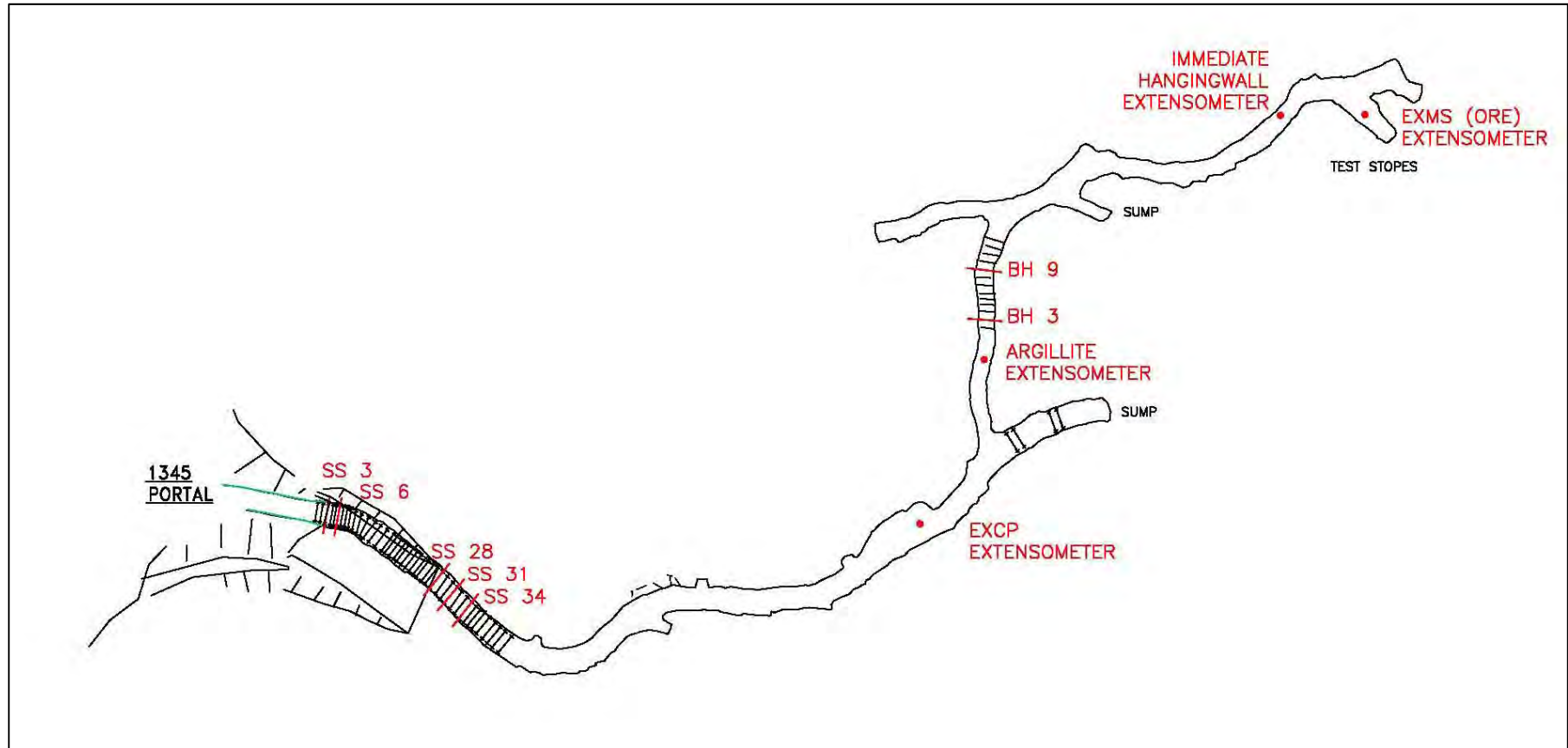


Figure 5-1: Instrumentation and Monitoring Locations

6 Associated Mine Services and Infrastructure

Infrastructure associated with the Wolverine Mine are detailed in the *Wolverine Project General Site Plan V2008-04* and the *Wolverine Project Mill Operating Plan V2010-02*. Major infrastructure is shown on Figure 6-1, and includes:

- Tailings impoundment;
- Access road and mine site roads;
- Airstrip;
- Landfill and waste storage area;
- Waste rock and ore storage pad;
- Camp and administration buildings;
- Assay lab;
- Fuel storage and generator system;
- Industrial complex, including crusher, milling and concentrate load-out buildings; and
- Surface water storage and treatment infrastructure.

Infrastructure directly associated with the mine includes:

- Heater building (with associated propane storage);
- Explosive magazines;
- Compressed air;
- Power supply;
- Communications; and
- Dewatering system.

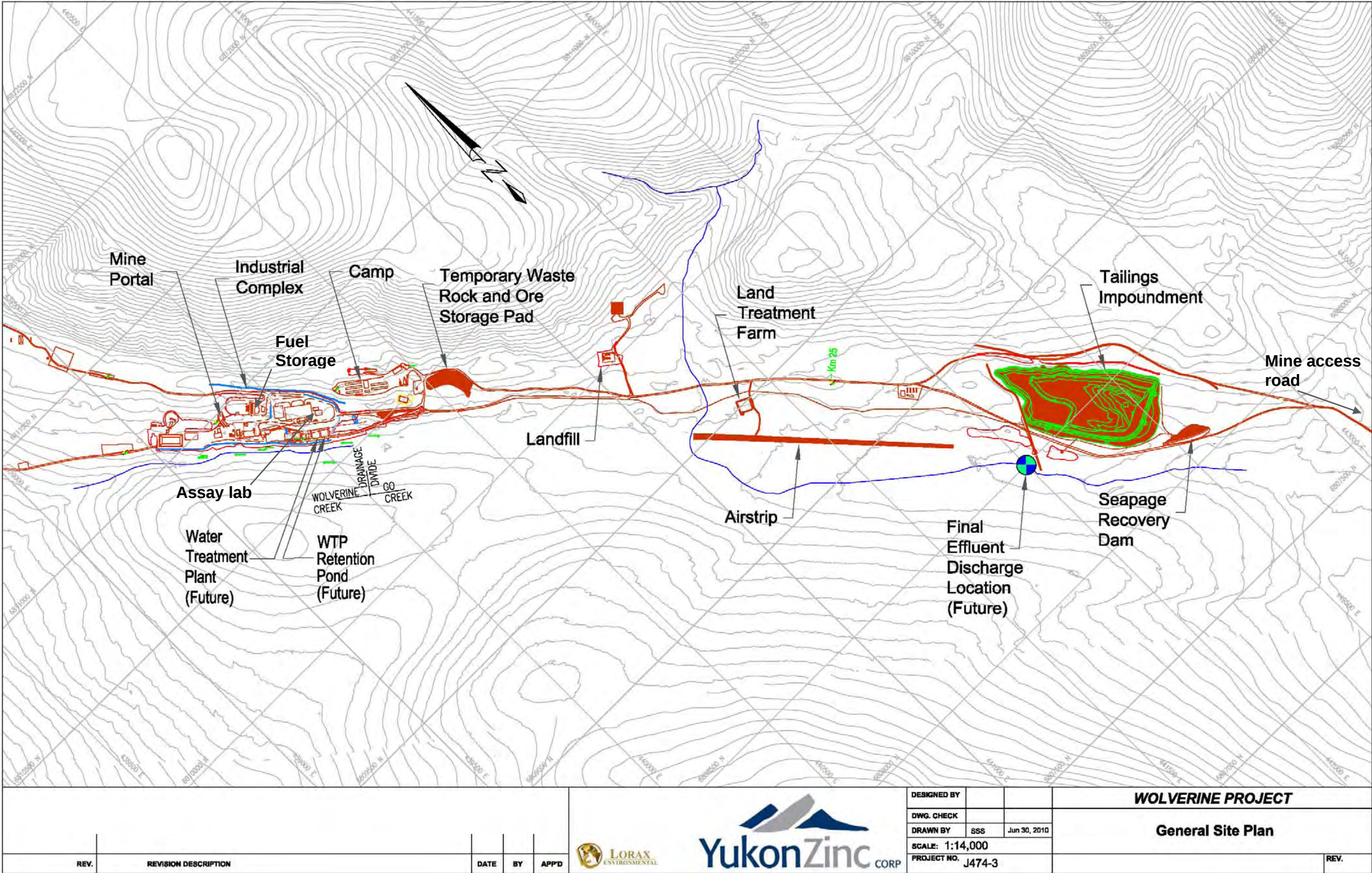


Figure 6-1: Site Location General Arrangement

6.1 Power

Power is supplied from a stand-alone diesel power plant that will be upgraded to handle 2MW of connected load to feed the underground mine until such time as the main power plant is commissioned and operable to handle the underground load. The plant will consist of 5 x 500kW 600 volt containerized and synchronized generators with up to 4 generators running at any given time with one generator on standby. Power will be fed to two 1500 KVA 600V/4160V step-up transformers with each transformer capable of feeding two independent 4160V lines underground.

Power is fed to the underground mine via 5 KVA shielded armour cables. Two step-down transformers are located at 1280 Level and 1225 elevation on off the main ramp.

6.2 Communications

Communications in the mine include a radio system that utilizes a standard leaky feeder antenna, and a hard line pager phone backup system.

6.3 Compressed Air

The need for compressed air will be minimal because the majority of the mining equipment is electric or diesel powered. The small amount of air that will be required for hand tools and small face pumps will be supplied from the processing plant via a 6" air line to the portal.

6.4 Dewatering

Water from the underground is pumped to the tailings facility for subsequent re-use in the mill or used in paste backfill operations.

The current underground dewatering system is based on several small dewatering sumps supplied with submersible electric pumps in a cascade arrangement. The main dewatering 4" diameter hard line is installed in the main access ramp and connected to each sump located along the walls of the decline. The ground water collected in the bottom of the ramp and in the stope accesses is pumped to the closest sump in the ramp. The current lowest 1243 level sump contains a 30 HP pump that discharges water from the main ramp heading and the 1220 stope access (SA) to the 1274 level sump. The 1274 level sump with a 13HP pump collects water from the 1250 SA and discharges it to the 1294 level sump, which is a double sump allowing for staged settling. A 58 HP pump pumps settled water from the cleaner side of the 1294 double sump into sump # 1 in the 1300 level, and this water is pumped to the surface into sump #3. From surface Sump #3, a 13 HP pump pumps water to the tailings pond and a 13 HP pump pumps service water back to underground.

Water from the active headings is pumped in the ramp sumps either by air pumps or small 13 HP submersible pumps. One of such pump arrangement is located on 1220 SA level.

Future dewatering operations will include a mono pumping system and skid tank. CAC Industries is currently assessing designs for alternative underground locations.

6.5 Waste Rock and Ore Storage

Temporary storage was required for the ore and waste produced during the test mining program and pre-production development program, and will be required for mined rock prior to milling. Mining

methods are designed to minimize the amount of waste rock produced during the mining operation; however, some waste rock will be produced, and will require surface storage prior to development underground progressing to the point where waste can be backfilled in the mined stopes. Temporary ore storage is also required on surface in the initial production phase to ensure a steady feed to ore processing facilities.

The main locations of ore and waste rock storage at the Wolverine Project are at the temporary waste rock and ore storage facility, located east of the camp (Figure 6-1), the dynamic operating stockpile, located at the west side of the crusher building, and the temporary dynamic ore stockpile at the west end of the industrial complex area.

The temporary waste rock and ore storage facility was constructed in 2005 and extended in fall 2007 to accommodate test mine and pre-production development rock generated in 2005 and 2009 – mid 2010, respectively (Picture 6-1). The pad was lined with an HDPE liner and clay prior to the deposition of ore and waste. The ore and some waste material contained on the pad will be used to commission the mill during start-up in summer 2010, and the remaining waste material will be transported underground and used as fill in the first two years of operations.

Water collected within the storage pad drains towards a sump at the south end. Water is pumped from this sump as required and trucked to the tailings facility. Clean runoff emanating from the hillside up slope of the storage pad is directed via ditches around the pad to minimize contamination.



Picture 6-1: Temporary Waste Rock and Ore Storage Facility (April 24, 2010)

The dynamic operating stockpile is a lined area used to temporarily store the ore as it is brought up from the underground mine preceding throughput through the crusher. This area will be used for life of mine. The temporary dynamic stockpile located at the west end of the industrial complex was developed during the pre-production phase to meet minimum design through-put in the mill for the early production phase. Runoff from the dynamic stockpiles, and from the entire industrial complex, is via collection ditches 2, 3 and 4. These lined ditches ultimately discharge into the settling pond no.

2 located east of the crusher building. Diversion ditch 1 diverts clean surface runoff upslope of the industrial complex into the headwaters of Wolverine Creek.

The surface stockpile size and mine and mill production over the first 25 months of mining is provided in Figure 6-2.

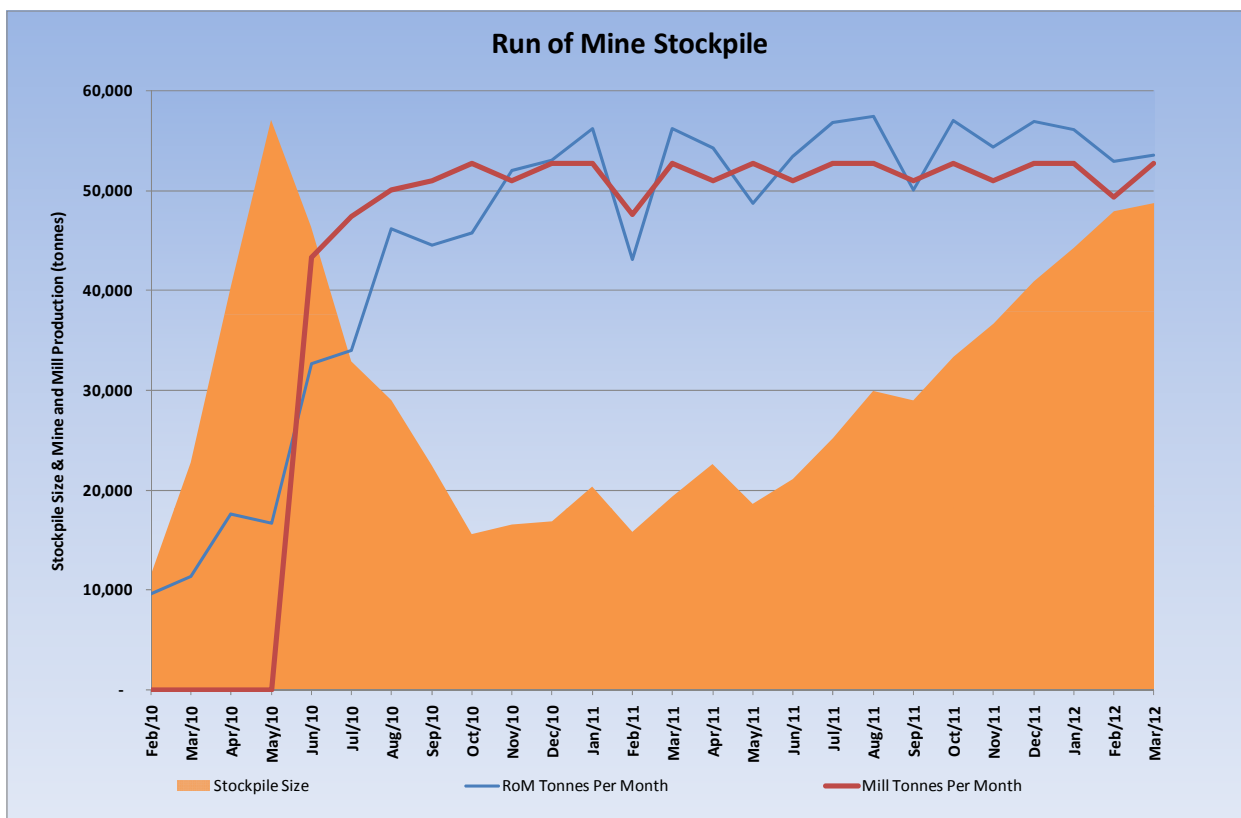


Figure 6-2: Run of Mine Dynamic Stockpile Size and Mine and Mill Production

Over the life of the mine the dynamic operating stockpile will continue to function; however, the temporary waste rock and ore storage facility, and temporary dynamic stockpile will no longer be required once waste material is required underground for fill in the stopes (see Section 4.3.3 for the use of waste rock as backfill).

Descriptions of the construction activities of the temporary waste rock and ore storage facility, including quality assurance/quality control packages can be found in the *Temporary Waste Rock and Ore Storage Facility As-Constructed Report and Drawings* (November 17, 2005) and the *Temporary Waste Rock and Ore Storage Facility As-Constructed Report and Drawings Advanced Exploration Phase* (December 14, 2007) for Phase I and Phase II construction of the facility, respectively. A description of the construction activities for the dynamic operating stockpile will be included in the *Industrial Complex As-Constructed Report*, due to EMR 60 days following the completion of construction.

6.6 Tailings Storage Facility

The milling process produces tailings that will either be utilized in the underground mine as paste backfill, or deposited in the tailings facility. The tailings have high sulphide content and have the

potential to become acid generating if allowed to oxidize. Therefore, tailings will be stored in a saturated containment system (tailings facility) located east of the airstrip (Figure 6-1). The design of the tailings facility was based on field and laboratory investigations of the foundation conditions at the facility location, and considerations of geochemical characteristics of the tailings and supernatant water. The results of the foundation investigation and subsequent design of the tailings storage facility are provided in the *Tailings and Infrastructure Design and Construction Plan V2009-02* (Klohn Crippen Berger, 2009). The design incorporated the availability of local dam borrow materials, storage capacity requirements, site water balance, dam failure consequence rating, and earthquake and flood potential. Further as-constructed details of the starter dam and supporting infrastructure are available in the *Wolverine Project Tailings Storage Facility 2009 Civil Works Construction Summary Report* (Klohn Crippen Berger, 2010).

The tailings facility includes an L-shaped dam, a tailings pond, a seepage collection dam and pond, two upland diversion ditches, and a spillway (Figure 6-3). The impoundment covers an area approximately 600 m long and 300 m wide. The dam is currently 19.5 m high and will be raised to 23.5 m after Year 2 of mining operations. The tailings dam is a compacted homogeneous earthfill dam with an impervious 40 mil LLDPE geosynthetic liner. The liner covers the base of the tailings impoundment and the upstream face of the dam up to the crest.

The impoundment is designed to safely route the 1:10,000 year return period flood through a spillway located in the west flank of the dam. The tailings facility will also store the 1:200 year return-period flood event, without the release of water. The design earthquake is a 1:10,000 return period, with a peak ground acceleration of 0.22 g. The minimum geotechnical factors of safety during operations are 1.5 for static stability and 1.1 for pseudo-static stability. The negligibly low seepage rate provides a safety margin against the potential for long-term degradation of portions of the liner. A seepage collection pond constructed downstream of the main dam allows for the return of potentially contaminated seepage water.

The catchment area for the tailings facility is reduced with the construction of diversion ditches A and B, which are shown in Figure 6-3. The ditches consist of open channel excavations with corrugated steel pipe culverts in areas where the gradients are steeper than 2%. The ditch side slopes are typically 2H:1V. Ditch A intercepts runoff from the catchment northwest of the tailings impoundment and conveys the runoff to Go Creek. Ditch B intercepts runoff directly uphill (northeast) of the tailings basin and directs the flow, via a culvert, to Go Creek downstream of the seepage collection pond. Both ditches discharge first to a stilling basin to reduce discharge velocity into the creek.

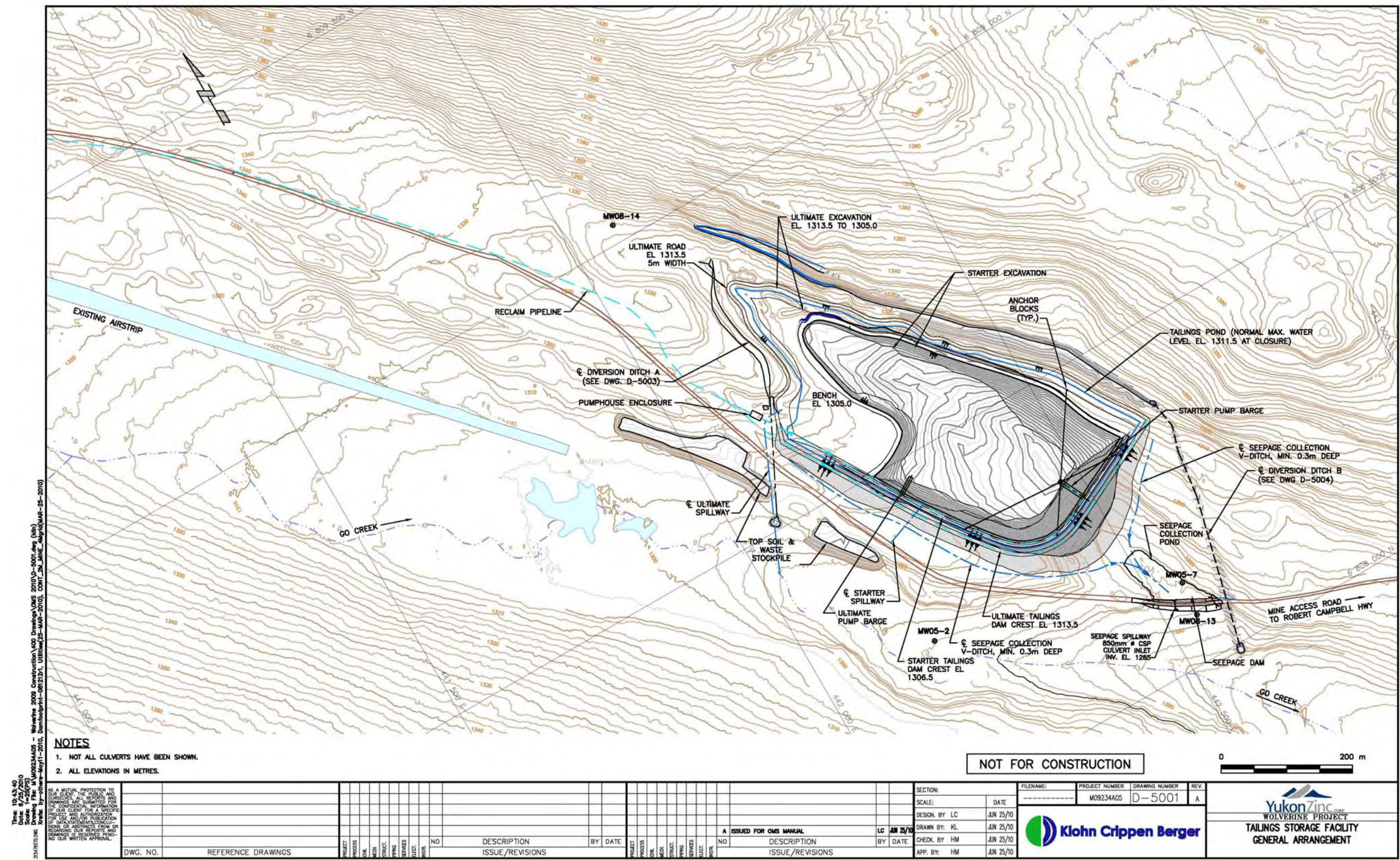


Figure 6-3: Tailings Storage Facility – General Arrangement

6.7 Industrial Complex

The *Wolverine Project Mill Operating Plan V2010-02* details infrastructure contained at the industrial complex, including major ore processing equipment design and installation details. Information not contained in that plan is outlined below with regards to geotechnical investigation of the installations associated with the Wolverine Mine.

A preliminary geotechnical investigation of the industrial complex area was undertaken by Klohn Crippen Berger (Klohn) on June 15, 2005. Nineteen test pits were dug at locations outlined in Figure 6-4. A subsequent geotechnical investigation was conducted by EBA Engineering Consultants Ltd. (EBA) in 2007 and 2008, which included further test pits and boreholes to confirm findings of the earlier investigations, and to test at sites of new/re-located infrastructure. Eleven test pits were dug and eight bore holes were drilled in the 2007 and 2008 investigations.

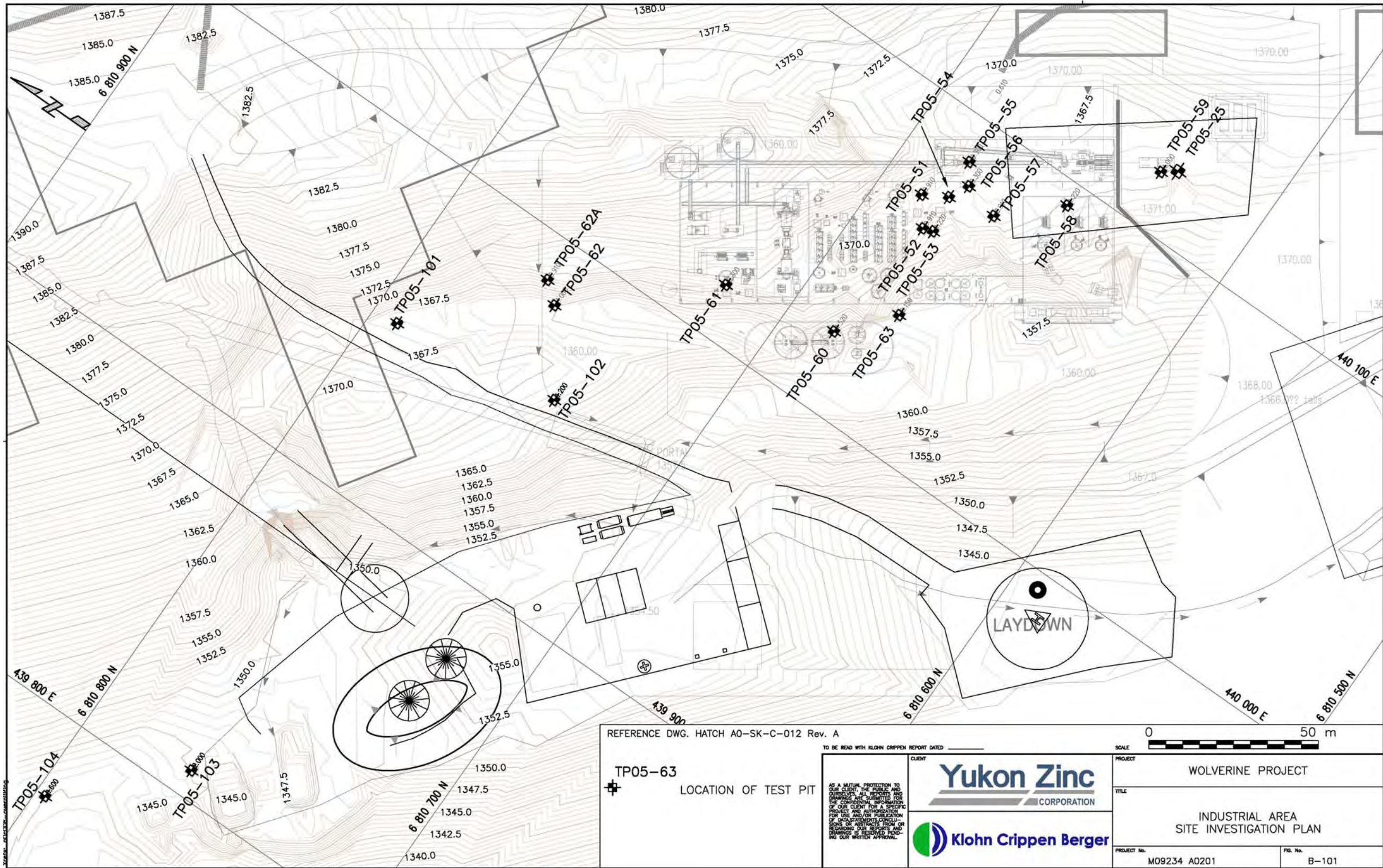


Figure 6-4: 2005 Geotechnical Assessment Test Pit Locations



7 Safety Plan

The underground mine Emergency Procedure Documents provided in Appendix A include details on emergency procedures and emergency response measures. Current emergency egress routes, refuge station locations, and emergency ventilation systems are shown on Figure 7-1. The Emergency Procedure Documents will be updated as necessary to reflect changes in the underground development, as well any management additions/changes.

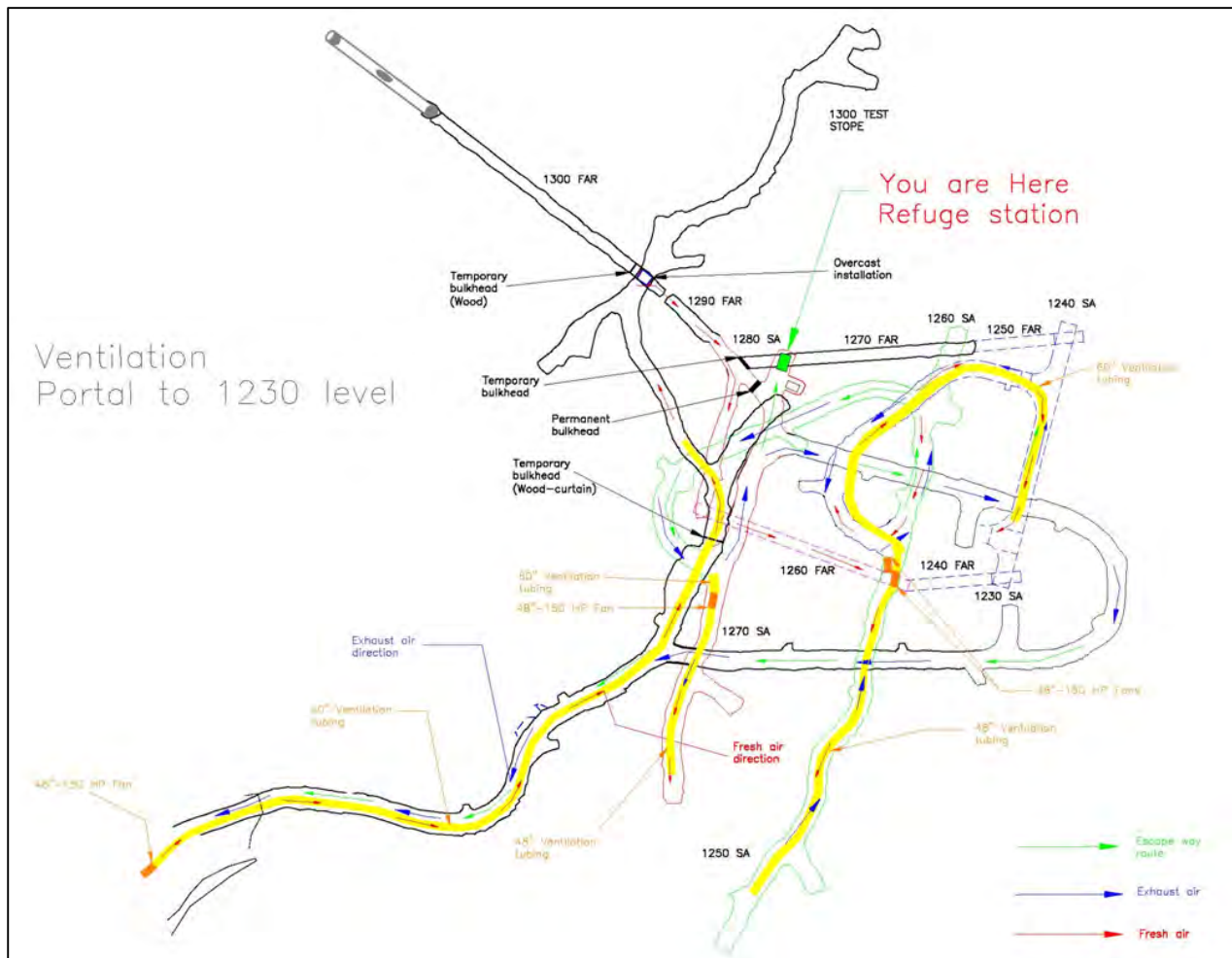
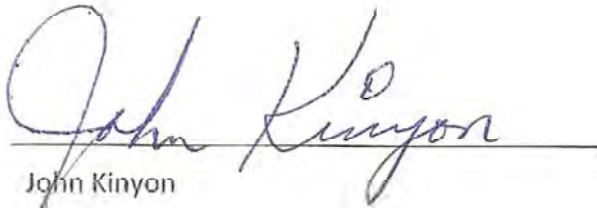


Figure 7-1: Current Egress and Ventilation Routes – Wolverine Mine

8 Summary

This Mine Operating Plan incorporates the requirements outlined in QML-0006 Section 13.1. It will be updated as necessary to reflect current mine development plans and operating conditions.



John Kinyon

Mine General Manager

YUKON ZINC CORPORATION



Raymond Mah, P.Eng.

Chief Operating Officer

YUKON ZINC CORPORATION

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Appendix A: Emergency Procedure Documents



WOLVERINE PROJECT

LOCATION: WOLVERINE LAKE, KM 190 ROBERT CAMPBELL
HIGHWAY, YT, CANADA

EMERGENCY RESPONSE PLAN

UNDERGROUND

V2010-01

June 29, 2010

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1 General Directive

When an emergency situation has been communicated, all personnel should return to their office or post EXCEPT THOSE DESIGNATED AS PART OF THE "EMERGENCY CONTROL GROUP". They must report to the "Emergency Control Officer" as soon as possible. (EMERGENCY CONTROL OFFICE / MAIN CONFERENCE ROOM)

2 Summary of Primary Responsibilities

1. The General Mine Manager is responsible for having the required number of men and supervisors trained in mine rescue and, in the case of an emergency will assemble the Emergency Control Group for the direction of rescue and recovery operations.
2. Primary and secondary members of the emergency control group must know their duty card responsibilities in advance of an emergency and must participate in annual mock mine emergencies.
3. All potential duty card designates are required to be knowledgeable with this policy and the ECP in its entirety.
4. The Emergency Control Group will consist of the General Manager, Mine Manager, Safety Superintendent, Engineers and other members designated to duty cards while on site.
5. Emergency Control Center will be located in the Conference Room.
6. In the absence of the General Manager a designated Senior Person will be in charge of the mine during an emergency and will assume the duties of the Incident Controller.
7. The control group will assemble for all serious and potentially serious incidents that would require its support and organization of response.
8. Mine rescue and medics will report to their stations and will prepare for the emergency response under the direction of the Emergency Response Coordinator.
9. Responses requiring the assembly of the emergency control group will require immediate shut down of outside communication lines. Only communication systems required for the emergency control group will be active.
10. The incident commander will appoint himself or another person to relay required communications of the incident on and or off site. There will be only one spokes person for the emergency control group and emergency response teams.

3 Emergency Telephone Contacts

Wolverine Project Emergency Telephone Contacts		
Wolverine Mine Site:		
		(604) 638-0921
Mine General Manager	John Kinyon	(604) 638-0911
		(778) 233-7381 - cell
Mine Manager	Audie MacDonnell	(604) 638-0921 ext.5067
		(778) 846-8660 - cell
Mine Safety Superintendent	John Arnold	(604) 638-0921 ext. 5032
		(778) 228-8832- cell
Yukon Zinc First Aid Room	Medics	(604) 638-0921 ext. 5044
Mining office at Portal	Procon Superintendent	(604) 678-5900
Procon Safety office	Procon Safety	(604) 678-5902
Environmental Department	Environment	(604) 638-0921 ext. 5043/22
Yukon Zinc Corporate Office:		
		(604) 682-5474
Chief Operating Officer	Ray Mah	(604) 682-5474 Ext. 311
		(604) 790-4462 - cell
VP Environment and Community Affairs	Pamela O'Hara	(604) 682-5474 Ext. 246
		(604) 644-7655 - cell
Environmental Health and Safety Coordinator	Melissa Kirby	(604) 682-5474 Ext. 250
		(604) 375-6477 - cell
First Nation Contacts:		
Yukon Zinc Aboriginal Liaison Officer	Nora Ladue	(867) 969-2026
Development Corporation	John Etzel	(867) 969-2832
Liard First Nation	Jimmy Wolfetail	(867) 536-2912
Yukon Government Contacts:		
YWCB	Ossie Venasse	(867) 667-3777
24-hour Yukon Spill Line		(867) 667-7244
Client Services and Inspections		(867) 456-3882
Watson Lake District Conservation Officer		(867) 536-7363
Whitehorse District Conservation Officer		(867) 667-5221
Environmental Inspections Branch		(867) 667-3436
Mine Rescue Station	24 Hr emergency reporting	(867) 667-5450
Federal Government Contacts:		
Department of Fisheries and Oceans		(867) 393-6722
Environment Canada (Whitehorse)		(867) 667-3400
Transport Canada (CANUTEC 24Hr Service)		(613) 996-6666
Regional Emergency Numbers:		
Watson Lake Hospital	Ambulance & medical advice	(867) 536-4444
Whitehorse Hospital	Aircraft & medical advice	(867) 393-8700
Watson Lake Health Unit		(867) 536-7834
Watson Lake Ambulance		(867) 536-4444
Watson Lake Police		(867) 536-5555
Whitehorse Police		(867) 667-5555
Watson Lake Fire Department		(867) 536-2222
Whitehorse Fire Department		(867) 668-8699/668-2462
Ministry of Forests	Forest Fire Reporting	1 (800) 663-5555

4 Underground Injury Emergencies

ONCE AN INJURED PERSON HAS BEEN DISCOVERED

1. Ensure the area is safe and then administer first aid. If unsafe to approach and the person is not able to move out on their own do not put yourself at risk. Call for supervision utilizing the leaky feeder radio or nearest Femco phone.
2. Supervision must contact paramedics and relay the following information:
 - a. Location of injury site.
 - b. Number of injured workers.
 - c. Cause of injury, if known.
 - d. Additional help required from mine rescue.
3. The emergency response coordinator will be notified to organize support for the paramedics.
4. **The incident control center will be notified and manned as required under the direction of the incident commander.**
5. **The incident scene must be made safe before paramedics approach the patient.** This may require mine rescue team members to extract the injured or additional mine support. **The incident scene will be under the control of the emergency response coordinator and or mine rescue captain.**
6. Paramedics will make their way to the portal by ambulance and will be transported down to the incident scene by mine supervision or someone designated by mine supervision. Mine rescue and other emergency members will also be required to be escorted to the scene.
7. Underground personnel must ensure that:
 - a. Emergency medical supplies are delivered to the injury site from the nearest refuge station and the underground jeep/ambulance is equipped to transport the patient(s) to surface.
 - b. Adequate personnel are available for services and transport of injured worker(s)
 - c. Equipment has cleared the ramp and shut down until further notice.
8. The incident control group will ensure that all support and requests from the incident scene are conducted and that a trained class 4 ambulance driver is sent to the portal for transport.
9. **The paramedics are in charge of injury care and transport.**

Refer to Transportation and Med-Evac Guidelines.

5 Underground Fire Procedure

IF YOU SMELL SMOKE OR EXPERIENCE ANY OTHER SIGN OF FIRE

1. **Immediately put on your Self-rescuer and retreat to an area of safety.** (i.e. Outside the mine, nearest Refuge Station, or a work heading).
2. **If in a Refuge Station**, raise the Fire Alarm as quickly as possible via the Leaky Feeder System or Femco phone. Give all pertinent information and request initiation of the Stench Warning System.
3. **If you travel out of the Mine**, report the circumstances as quickly as possible to Supervision/Management and request initiation of the Stench Warning System.
4. **If you retreat to a workplace:**
 - o Turn off the fan if possible, if not, take the vent tube apart as close to the fan as possible or tie the vent tube off.
 - o Try to leave some kind of sign that the heading is occupied (paint on the wall, a slicker jacket hung on a scaling bar etc.).
 - o Retreat as far back in the heading as possible and turn on a compressed air header.

***STAY IN PLACE UNTIL RESCUED**

5. If possible, extinguish small fires using a portable fire extinguisher.
6. Use only dry chemical extinguishers on electrical and oil fires.
7. **DO NOT** use water on electrical fires.
8. If a fire occurs on LHD equipment, try to move the machine off any main ramp (if possible) and **shut the engine down immediately.**
9. The **Master Switch must be shut off**, and if the fire cannot be managed with a portable fire extinguisher then the fire suppression system must be activated.
10. If the fire suppression system has to be activated and the fire is not being managed by either method then it has to be treated as a serious threat to life and the Stench Warning System must be activated.

DO NOT HESITATE TO HAVE THE STENCH WARNING SYSTEM ACTIVATED. PUT ON YOUR SELF-RESCUER IMMEDIATELY AND PROCEED TO THE NEAREST COMMUNICATION SYSTEM. When leaving the area of the fire, **DO NOT** expose yourself to smoke, and travel up-wind. Using the Leaky Feeder Radio or Femco phone **call for the Stench Gas Warning System to be activated without delay.**

11. Provide all pertinent information:
 - a. What is burning.
 - b. Is fire out of control.
 - c. Location of fire and direction of smoke.
 - d. Your planned route of travel.
12. **PUT YOUR SELF RESCUER BACK ON** and proceed immediately to an area of safety:
 - e. Outside the Mine
 - f. Nearest Refuge Station

- g. Retreat into Workplace
- 13. If you're intended route of travel shows signs of **SMOKE** or your self-rescuer is getting **HOT** retreat to the nearest workplace. Once there:
 - h. Turn off the Ventilation Fan, if the switch can be reached.
 - i. Separate the Vent Tube from the Fan, if the switch cannot be reached.
 - j. Tie the Vent Tube closed.
 - k. Retreat as far back into the workplace as possible.
 - l. Blow compressed air against the face.
 - m. Remain in the workplace until rescued.

6 Stench Gas Release

STENCH GAS MAY BE INITIATED BY ANYONE AWARE OF AN EMERGENCY. *IF THE EMERGENCY IS AN U/G FIRE, (THAT CANNOT BE IMMEDIATELY EXTINGUISHED), OR OTHER LIFE THREATENING SITUATION REQUIRING EVACUATION TO REFUGE STATIONS THE STENCH WARNING SYSTEM IS REQUIRED TO BE ACTIVATED WITHOUT HESITATION. IF THERE IS NO IMMEDIATE ACTUATOR AVAILABLE THEN A COMMUNICATION LINK MUST BE ESTABLISHED IN ORDER TO RELEASE THE STENCH WARNING.

COMMUNICATION TO RELEASE STENCH GAS:

1. Immediately communicate by utilizing the 'Leaky Feeder Radio System'.
2. If a "Leaky Feeder Radio" is not available immediately utilize the nearest Femco telephone.
3. Upon receiving an answer, state the nature and location of the emergency, request the stench warning system to be activated and immediately retreat to the closest Refuge Station.
4. If not already in a refuge station ensure to state your intended route of travel.
5. DO NOT by-pass a Refuge Station, even if the atmosphere appears to be clear of smoke.
6. Stand-by in the Refuge Station to receive and/or impart additional information.
7. Receivers of information are required to notify Supervision and Safety Department as soon as practically possible.

UPON RECEPTION OF COMMUNICATION TO RELEASE STENCH WARNING:

1. Immediately acknowledge receipt of message and activate Stench Warning System. Inform sender of message that the Stench Warning System has been activated and is operational.
2. Inform Supervision/Management that the Stench Warning System has been activated and post guards at the portal entrances.

STENCH GAS SYSTEM ACTUATOR LOCATIONS:

- Compressed air line beside Procon Shop.
- Ventilation system in front of portal.

IF YOU SMELL STENCH GAS UNDERGROUND:

STOP WORK IMMEDIATELY AND PUT ON YOUR SELF RESCUER.

1. Ensure that all diesel equipment is properly parked and shut down immediately. Proceed on foot. Leave the ramp clear to maintain a travel way for rescue teams. Immediately proceed to the nearest **REFUGE STATION or OUT of the MINE**, if possible.
2. In determining the escape route to be used, consider:
 - Your location.
 - The presence and/or location of smoke.
 - The direction of ventilation flow.
 - The most direct route.
 - Proceed immediately; informing others you meet of the emergency.
4. **DO NOT PARK VEHICLES IN THE MAIN RAMPS:** Park Vehicles in the next available X-Cut.
5. **DO NOT USE THE COMMUNICATIONS SYSTEMS** except to:
 - Advise of your location (if you are not in a Refuge Station).
 - Report locations of fire conditions and/or injured persons.
 - Other emergency information.
 - To relay information as instructed.
6. **DO NOT ATTEMPT TO TRAVEL THROUGH THICK SMOKE.**
If upon exiting your work place and encountering thick smoke in the Ramp:
 - Immediately retreat to your work heading or one closest to your location.
 - Ensure that work-heading vent fan is turned off.
 - If the fan switch cannot be reached, tie off the vent tube or separate tube from the fan.
 - Try to leave some sign (paint on the wall or slicker jacket on a scaling bar etc.) that would indicate to a Rescue Team that the heading is occupied.
 - Move to the furthest point in the workplace from the fan.
 - Turn on a compressed air line and direct the air-flow toward the face.
 - **Stay in place even if the compressed air goes off.**

Note:

A large green garbage bag carried in your gear bag (permanently) will provide you with a small, readymade tent, which can be placed over your head with compressed air blowing gently inside. A piece of Vent Tube or any enclosure could also be used.

7. STAY IN PLACE UNTIL RESCUED

- Remain in your place of refuge until rescued or are instructed otherwise by a Mine Rescue Team, Emergency Control Center or Shift Boss.

8. IF YOU TRAVEL OUT OF THE MINE

- Upon reaching surface, be sure to Tag Out and do not leave the Shift Boss Office area until you have been accounted for and receive further instructions.
- Stand-by to assist, if called upon.

7 Refuge Station Procedure

IN THE EVENT OF A FIRE OR OTHER EMERGENCY:

1. An experienced worker should list the names of those present.
2. A Mine Rescue trained worker is best suited for this assignment, as they will know the expected progression of the Emergency Contingency Plan in regard to rescue.
3. Use the phone **only to test if it is in working order: DO NOT** try to contact the surface or the Control Center.
4. **Keep the Phone Lines Clear otherwise the Control Center cannot reach the Refuge Stations in order to ascertain the names of those present.**
5. If the Refuge Station phone does not work and a Leaky Feeder Radio is unavailable, post the names of the occupants on the outside of the door, prior to sealing the door.
6. The Control Center will contact each Refuge Station on a regular basis.
7. Mine Rescue Personnel should identify themselves so this information can be relayed to the Emergency Control Center.
8. Prior to sealing the entry door gather up all smoking and open flame materials and deposit them outside the door.

FIRE CLAY STORED USE IN THE REFUGE STATIONS:

1. Ready the fire clay provided to seal cracks and openings in and around the door.
2. Use the fire clay to seal the water drain holes and any other openings in the entry wall.
3. Ensure that the Refuge Station vent fan and valve on the vent pipe are turned off.
4. Open the compressed air line to create a positive pressure inside the Refuge Station.
5. Observe the water level in the plastic tube [water gauge] located on the inside of the entry wall: The water level should recede from a marked line on the tube. This indicates a positive pressure within the Refuge Station.
6. While the compressed air is blowing, self-rescuers should continue to be worn until the stench gas has dissipated.
7. Sit down and remain calm, knowing that help is on the way.
8. Conserve and ration food and water.
9. Water is available from the Emergency Cache Box. Use it sparingly.
10. In the event of a power failure the Emergency Lights will come on and work for up to two hours.
11. When the Emergency Lights go out turn on only one cap lamp at a time and repeat as necessary.
12. A Portable toilet is available for use within the Refuge Station.
13. **DO NOT SMOKE** in the Refuge Station during an emergency.
14. When additional workers require entry into the Refuge Station after sealing the doors, immediately reseal the door with additional putty. The Putty will remain pliable for a considerable length of time after application.
15. Do not leave the Refuge Station for any reason unless contacted by the Mine Rescue Team from outside the Refuge Station Door.

IF THE COMPRESSED AIR GOES OFF:

1. First Aid trained workers must be on the look-out for signs of oxygen deficiency in all occupants.
2. Turn off all electrical appliances.
3. Be prepared to activate the bank of Oxygen Bottles and carbon dioxide scrubbers as per the posted procedure.
4. Check gas monitor often to ensure adequate supply of oxygen and carbon dioxide levels.

RESERVE OXYGEN BOTTLES:

Oxygen bottles are not to be used for Refuge Station pressurization purposes.

Oxygen bottles are to replenish oxygen used by occupants in natural breathing.

- Oxygen bottles must only be used in the event of a compressed air shutdown.
- The oxygen bottles are to be used immediately upon the first sign of oxygen deficiency in any occupant of the Refuge Station.
- If the compressed air shuts down, immediately RECHECK the door seals and add putty clay if necessary.

Prior to Operating the Oxygen Bottles:

1. Ensure that ALL power sources have been turned off.
2. Ensure that ALL smoking materials are bagged and stored outside the Refuge Station.
3. Inspect for and remove ALL personal equipment that may cause a spark. Store these items outside the Refuge Station or in the emergency cache container.
4. Regulate Oxygen – **follow the instructions on the sign at the Oxygen Bottle Bank and maintain levels utilizing the refuge station gas monitor for reference.**

8 Emergency Response Team Duties

ERT MEMBERS UNDERGROUND AT THE TIME OF EMERGENCY

1. All Emergency Response Team Members underground at the time of a communicated emergency or upon smelling the stench gas should, if possible, proceed directly to the nearest Refuge Station.
2. Upon arrival at the Refuge Station take charge, utilizing the Emergency Contingency Plan.
3. When Emergency Control Center contacts the Refuge Station ensure to inform them of your presence and that of all other ERT members.

ERT MEMBERS ON SURFACE / RESIDENCE AT THE TIME OF EMERGENCY

1. ERT Members on surface and/or in the residence will be summoned to assist in the Emergency Procedure.
2. Under the direction of the emergency response coordinator and the team captain, members will assemble equipment, test the self contained breathing apparatus if required and stand-by for instructions.
3. Upon arrival, additional trained emergency response team members will act as stand-by and members at rest.

4. Briefing and debriefing of emergency response team captains will be conducted by the emergency response coordinator and or the incident commander.
5. Mine rescue station technicians will be responsible to ensure that the self contained breathing apparatus are serviced in preparation for the back-up teams.

PARAMEDIC AND INDUSTRIAL FIRST AID ATTENDANTS DUTIES

1. Upon Notification of an Emergency Situation immediately proceed to the First Aid Station.
2. Prepare First Aid facility for possible casualties.
3. Prepare to attend casualty at site location: Surface or Underground.
4. Assign an ambulance driver (Class 4 required).
5. Standby for briefing by the emergency response coordinator.
6. The incident scene will be overseen by the emergency response coordinator and mine rescue captain as per mine rescue protocols and duty card system.
7. Paramedics are in charge of treatment and transportation of patients as per transportation and med-evac guidelines procedure.



WOLVERINE PROJECT

STANDARD OPERATING PROCEDURES

TRANSPORTATION

AND

MED-EVAC GUIDELINES

V2010-05

June 25, 2010

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1 General

This document was prepared to inform and guide all parties involved in the process of the rapid decision making required when you have to evacuate personnel with life threatening injury or serious illness from the work location to the appropriate hospital either by ground or Air Ambulance.

2 Scope

This procedure covers all ground transport or Med Evac cases from the Wolverine Project to the appropriate hospital but not limited to:

- The requirement for urgent medical care beyond the YZ medical facility
- The requirement for further investigation to determine a diagnosis

The authority to ground transport or Med Evac an individual from the Wolverine Project lies on the Health Care Provider (HCP) in liaison with the Health and Safety Superintendent, Medical Director for YZ and/or ER Physician from either the Watson Lake Hospital or Whitehorse General Hospital.

3 Ground Transportation/Med Evac Classification

3.1 Immediate (Air Ambulance or Helicopter)

A medical case that requires immediate evacuation, which includes life threatening illnesses or injuries that require transport to an advanced care facility for treatment.

- myocardial infarction
- multi system trauma
- fracture with loss of distal pulses and no change with traction
- GCS less than 12
- Signs of decompensating shock
- Penetrating eye injuries
- Airway obstruction
- Chest trauma
- 2nd/3rd degree burns to $\geq 5\%$ body surface area
- Moderate to severe hypothermia
- Head injury with decreased LOC
- Seizures lasting more than 15mins in length
- Cyanide poisoning

3.2 Urgent (ground transportation)

A medical case or injury that requires evaluation within 24 hours of onset. These cases require advance medical care but are not life threatening.

- questionable fractures
- infections that need IV antibiotics
- Dental emergencies

3.3 Non urgent (ground transportation)

- Routine cases that require examination by a Physician to manage the patient's medical condition.
- uncontrolled diabetes
- hypertension
- uncontrolled seizures
- prescription refills (pt forgot his regular prescribed meds/possible refill over phone)

4 Procedure

In the event that any personnel that is injured or seriously ill, and the condition is beyond the medical care of the Wolverine Project HCP, that HCP will contact the Medical Director and/or ER Physician and also the H&S Superintendent to notify them of the situation.

The HCP should have the following information ready for the Medical Director and/or ER Physician:

1. Age
2. Gender
3. Nature of injury/illness, time frame of when happened.
4. Clinical examination including all V/S, and medical procedures preformed and meds given
5. Provisional diagnosis

In consultation with Medical Director and/or ER Physician determine the need for ground transportation or air transportation. If you are transporting by air call **Whitehorse EMS Communications 1-867-667-3333 1st then Yukon Air Ambulance 24/7 telephone line, at 1-867-456-8401/8400**, and arrange for dispatch of Med Evac team to site. If you are having problems getting through call Whitehorse Emergency dept and they can assist.

If transport is by Yukon Air Ambulance:

1. Ascertain the arrival grounding time (end of Civil Twilight) Yukon Air Ambulance will not be able to land if after sunset or be able to take off without airstrip lighting.
2. Add ½ - 1hr if the weather is poor and decide if the flight can be accomplished in the daylight.
3. If the decision has been made that the Med Evac can proceed, continue with call to Yukon Air Ambulance.
4. Give all pertinent details including Latitude and Longitude for the Km 26 Airstrip:

KM 26 AIRSTRIP Latitude: N61 24 43.94 Longitude: W130 05 48.57

5. Give all pertinent patient details as stated under procedures.
6. Follow all directions from Air Ambulance if possible.
7. Find out ETA
8. Ensure you have right equipment and manpower to transport patient to airstrip.
9. Management will make any NOK calls to family as required.

If transport is by Helicopter to Watson Lake:

We will not transport to Whitehorse via helicopter, all patients transported by helicopter will be sent to Watson Lake for stabilization and then flown to Whitehorse based on ER physician decision at Hospital. In conjunction with Health & Safety Superintendent and/or Mine Manager and the decision has been made to transport to Watson Lake by Helicopter. Trans North Helicopters based in Watson Lake or Ross River.

Trans North Helicopters direct daytime 1-867-536-2100/after hours 24/7 1-867-668-2177 (leave message call back will be within 15mins)

1. Ascertain the arrival grounding time (end of Civil Twilight).
2. Add ½ - 1hr if the weather is poor and decide if the flight can be accomplished in the daylight.
3. Give all pertinent details including Latitude and Longitude for the Km 26 Airstrip.
4. When you call inform them how many patients and attendants will be on board. So they can dispatch the proper helicopter, flight routing for fuel if required.
5. The helicopter based at Watson Lake is a Bell 206B Jetranger (average block speed 100mph).
6. The Jetranger will accommodate a stretcher patient plus one medical attendant ONLY.
7. Unless extremely serious only one attendant should be transported with the patient unless multiple patients.
8. Find out ETA
9. Ensure you have right equipment and manpower to transport patient to airstrip.
10. Contact Watson Lake Hospital giving all pertinent patient details as stated under procedures.

If transport is by ground to Watson Lake:

Watson Lake has PCP/EMR only Ambulance, if ground transport is the choice transportation will be directly to hospital. Watson Lake EMS has only one unit on duty and we do not want to remove the Emergency care from the town, as with the higher level of care at Yukon Zinc we would not be able to hand over patient care.

1. Ensure proper equipment accompanies the patient.
2. Ensure Ambulance is fueled.
3. Responding crew must be prepared for the possibility of spending the night away from camp.
4. Ensure adequate clothing, credit card/money is available to crew.
5. Ensure basic survival kit goes with team (flashlight, food, water, SAT phone, etc)
6. Ensure all proper phone numbers are with crew in case one must contact hospital if patient status deteriorates.

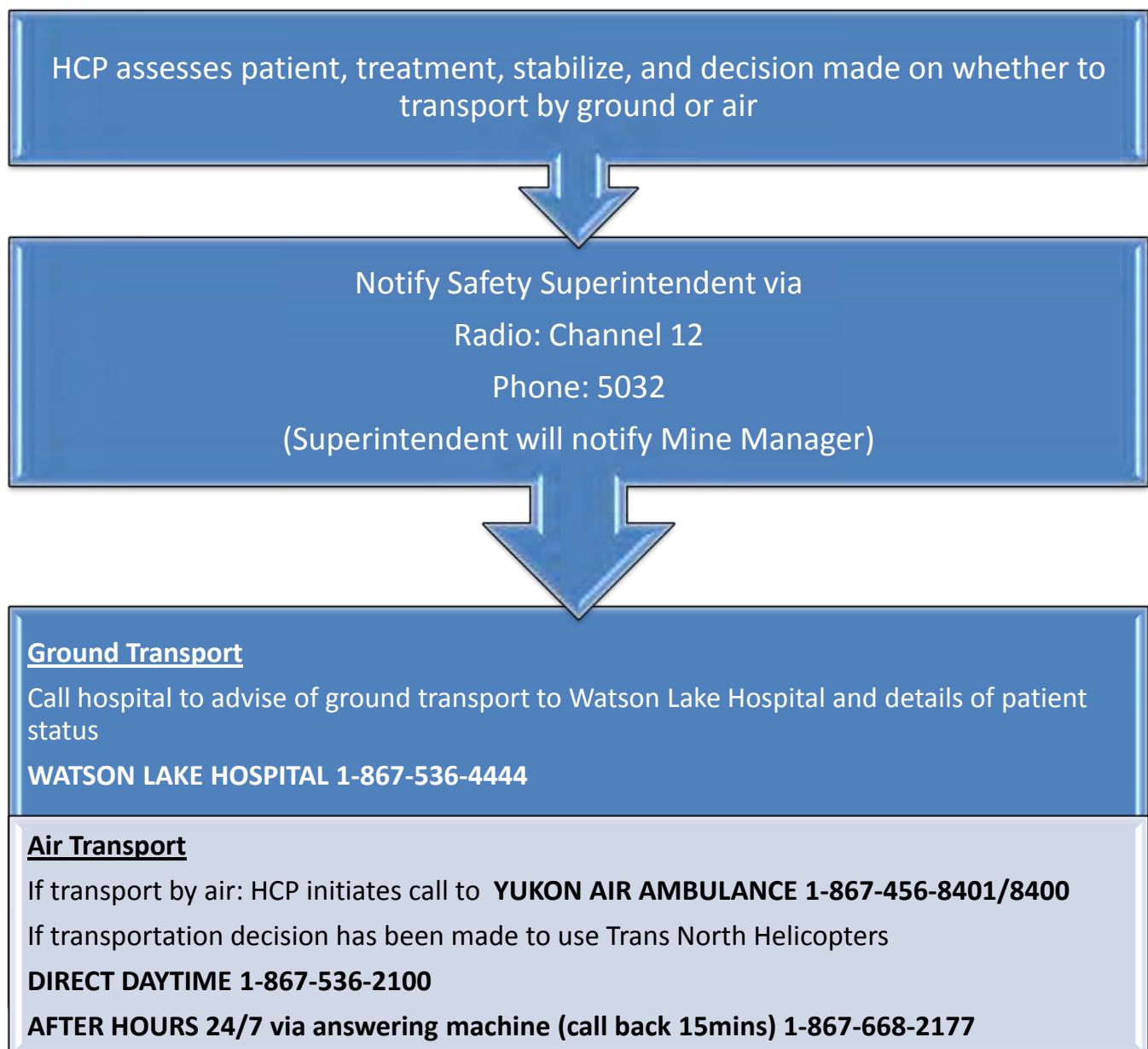
Driving directions from Wolverine Mine site to Watson Lake Hospital (1-867-536-4444):

26km from camp to Robert Campbell Highway (gravel road), turn R onto Hwy #4, we are located approx 200km North East of Watson Lake when you arrive in town turn Left on Ravenhill Dr, the hospital is located at the corner of Ravenhill Dr. and 9th St. N.

Travel time approximately 3 hours, weather dependant

***Even though Ross River is closer to our Mine Site, Watson Lake is the best choice for patient care and any required Air Ambulance flights to Whitehorse.

5 Ground Transport Med Evac Flow Chart



6 Death in the field

Even if CPR has been initiated, patients may be pronounced dead in the field in the following circumstances:

1. Injuries incompatible with life
 - Decapitation
 - Decomposition
 - Incineration
 - Rigor mortis
 - Post mortem lividity
 - Severe crush injuries
2. If the performance of CPR places the rescuer at personal risk of any type
3. Victims of blunt or penetrating trauma who have no vital signs on arrival of the HCP on site and patient displays no papillary reflexes or who are in asystole
4. Any traumatic cardiopulmonary arrest patient with a transport time to a health facility of greater than 20 min from the time of arrest is identified.
5. Cardiac arrest patients who have had no resuscitation efforts for at least 20mins prior to medical arrival on scene and who are in asystole.
6. Cardiac arrest patients who have failed to respond to BLS resuscitation efforts for a period of 30mins or full ALS resuscitation efforts for a period of 30mins who are now in asystole or PEA.
7. Drowning victims who are known to have been submerged longer than 60mins.
8. Hypothermia victims whose chest is frozen and non compliant.
9. The rescuers are exhausted and cannot continue or procedures cause significant delay in evacuation of the patient with a core temp of less than 30°C.

Note:

When a decision is made to pronounce death in the field the Medical Director or ER Physician should be consulted on the circumstances and the decision.

Resuscitation efforts should not be withheld in trauma victims in cardiopulmonary arrest where the mechanism of injury does not correlate with clinical condition thus suggesting a possible non-traumatic cause of the arrest. These patients should have standard resuscitation initiated.

If there is any doubt as to whether CPR should be started, the HCP should provide CPR (and ALS interventions, if available) until a physician can be contacted for further orders.

In the event that the HCP has been called to the scene of a fatality, the provider will have the primary responsibility of pronouncing an individual deceased based on criteria stated above.

For patients pronounced dead at the scene with or without attempted resuscitation and to assist the police and coroner in their duties the HCP duties are as follows:

1. Do not disturb the scene (cover body to protect scene/ to maintain pt dignity)
2. Call local police

- Watson Lake RCMP 1-867-536-5555/Whitehorse RCMP 1-867-667-5557
 - Find out ETA of police to site and inform appropriate management on scene
 - Coroner will be contacted by RCMP
3. Have all paperwork relevant to the incident ready for the police/Coroner and assist them while on scene.
 4. After the incident a debriefing should be held for all involved.

7 Quick Phone Numbers

Yukon Air Ambulance	1-867-456-8401/8400
Trans North Helicopters	direct 1-867-536-2100 24/7 answering service – 1-867-668-2177 (call back will be within 15 min)
Watson Lake Hospital	1-867-536-4444
Whitehorse General Hospital	1-867-393-8700 (switchboard will patch you through to ER)
Watson Lake RCMP	1-867-536-5555
Whitehorse RCMP	1-867-667-5557
Yukon Zinc Medical Director - Dr. Said Secerbegovic	Clinic # 1-867-536-2565 ext 0 for reception Home # (YUKON) 1-867-536-4655 Home # (MB) 1-204-452-5211 Cell # (MB) 1-204-509-5211
Emergency # (rings to Dr's house - this # will ONLY be used by Medical personnel)	1-867-536-2225



WOLVERINE PROJECT

EMERGENCY DUTY CARDS

V2010-01

June 29, 2010

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Appendix 9:	Underground Duty Card 9 – Emergency Response Coordinator

1 Introduction

1.1 Purpose

The aim of this document is to provide those involved in responding to emergencies with detailed information about the particular tasks that they are required to undertake.

These “Underground Mining Emergency Duty Cards” indicate the systematic actions that should be followed in case of an underground emergency. Although they are intended as a detailed guide, there may be additional tasks and/or a different sequence required depending on the particular emergency incident that has occurred.

1.2 Scope

This document, the Wolverine Mine Underground Mining Emergency Duty Cards forms part of the documentation of the Wolverine Mine Emergency and Disaster Management System.

1.3 Audience

This information is important to the safety of everyone associated with the Wolverine Mine and is to be used by all personnel who may be required to undertake duties in an emergency. This information must be communicated to personnel through formal training so the various requirements are understood and acknowledged.

1.4 Implementation

1.4.1 Responsibilities - Training Required

The Wolverine Mine Emergency Duty Cards have been developed for the Team members who undertake the following roles during an underground mining emergency:

Incident Control Team (control and coordination)

- Incident Controller
- Access Control Officer
- Communications Officer
- Emergency Plans Officer
- Resources Officer
- Surface Muster Point Warden
- Ventilation Officer
- Fan/Ventilation Monitor

Emergency Response Team (incident response)

- Emergency Response Coordinator
- Mine Rescue Teams

1.4.2 Awareness Requirement

Each **Department Manager** is responsible for the effectiveness of emergency management within his or her area of responsibility. This includes implementing the requirements of Yukon Zinc's Mine Emergency and Disaster Management Standard and ensuring understanding of essential aspects of these Duty Cards.

The **Site or Contractor Underground Superintendent** and **Underground Shift Supervisors** are responsible for ensuring that local area emergency and evacuation procedures are communicated to team members regularly and that regular drills are conducted. This includes providing personnel for training in their roles under the Duty Card system.

The **General Manager, Underground Manager or Acting Mine Manager** is likely to act as the **Incident Controller** (leader of the area or **Site Incident Control Team**) should a local emergency occur. This person will be required to use the Emergency Duty Card system to help manage the emergency.

The **Health and Safety Superintendent** is responsible for maintaining and up-dating the Wolverine Mine Emergency Duty Cards. This includes training site personnel in the use of the Duty Card system. Team members assigned particular roles or tasks under the Emergency Management System (e.g. via Duty Cards) are responsible for carrying out those roles or tasks to the best of their ability.

2 Details

2.1 Duty card system

The Duty Card system is designed to provide team members in emergencies with a set of instructions to assist in the effective management of the incident.

The Duty Cards themselves will be placed at the control room in a filing box along with ventilations prints, phone and radio base station.

Where required, the Duty Cards will also have attached forms or checklists that assist in the required duties and documentation. There is also room to record important information on the Duty Card itself. This acts as a record of what has been done in real-time. Any additional steps or information should be recorded on the blank sheets attached at the rear of the Duty Card.

Note that these duty cards are intended as a detailed guide. There may be additional tasks and/or a different sequence required depending on the particular emergency incident that has occurred.

A list of the Underground Emergency Duty Cards is contained in Table 1.

The Duty Cards themselves are contained in the attached Appendices.

Table 1. “List of Underground Emergency Duty Cards”

Duty Card	Title	Reports To	Based at	Comments
1	Incident Controller	VP or General Manager	Incident Control Center	Controls and directs overall Emergency Response (ER) effort; liaises with Disaster Management Team Leader (if initiated).
2	Access Control Officer	Incident Controller	Incident Site Access Control Points	Secures and controls access to incident area; records all movements using Access Control Log; directs personnel leaving mine to Surface Muster Point.
3	Communications Officer	Incident Controller	Incident Control Centre	Manages and controls all communications; maintains Communications Log; records all decisions and actions taken by Incident Controller.
4	Emergency Plan Officer	Incident Controller	Nearby to Incident Control Centre	Provides and up-dates level and decline plans showing all services, isolation points, accesses, etc to Incident Controller.
5	Resources Officer	Incident Controller	Nearby to Incident Control Centre	Supervises and controls effort to maintain equipment and services; arranges and coordinates additional resources (materials, manpower, specialist services etc), transport, supplies etc; may source internal and/or external resources.
6	Surface Muster Point Warden	Incident Controller	Tag Board and Surface Muster Point	Monitors and documents personnel returning from underground; records names and status of personnel who return to Surface Muster Point on Muster Point Log.
7	Ventilation Officer	Incident Controller	Nearby to Incident Control Centre	Provides advice on ventilation aspects ex. likely impacts, repairs needed, fan or regulator settings etc; monitors ventilation system; reviews ventilation plans.
8	Fan/Ventilation Monitor	Ventilation Officer	Surface Ventilation Observation Points	Observes status of exhausts/surface fans and provides reports to Ventilation Officer; records observations using Ventilation Observation form.
9	Emergency Response Coordinator	Incident Controller	Incident Control Centre or with teams and in direct contact by radio with Incident Control Center.	Will usually be the H&S Superintendent or Coordinator; controls and directs Mine Rescue Team and backup support teams; acts as Deputy to Incident Controller.

3 Related Documents

Details of the structure of the various teams (i.e. Incident Control, Emergency Response and Disaster Management) will be developed in the Wolverine Mine Emergency and Disaster Management Standard.

4 Appendices

The following Underground Emergency Duty Cards are contained in the following Appendices:

Appendix 1 – Duty Card 1 Incident Controller

Appendix 2 – Duty Card 2 Access Control Officer

Appendix 3 – Duty Card 3 Communications Officer

Appendix 4 – Duty Card 4 Emergency Plans Officer

Appendix 5 – Duty Card 5 Resources Officer

Appendix 6 – Duty Card 6 Surface Muster Point Warden

Appendix 7 – Duty Card 7 Ventilation Officer

Appendix 8 – Duty Card 8 Fan/Ventilation Monitor

Appendix 9 – Duty Card 9 Emergency Response Coordinator

Appendix 1: Underground Duty Card 1 - Incident Controller

Name: _____ Date: _____ Time: _____

In The Event Of an Emergency:

The designated person on duty, the alternate or the most senior person present is to take charge and act as **Incident Controller**. The **Incident Controller** will organize and plan the emergency response with the support of the other members of the **Control Group**. In the case of a prolonged response or where outside resources are required, the **Incident Controller** will initiate the **Disaster Management Team** for additional support.

Complete the information on the line above, and then follow the instructions below:

Note that a list of The Underground Duty Cards, which includes a summary of all Duty Cards, is attached at the front of this Emergency Box. Follow the instructions below. Any additional instructions or occurrences should also be recorded on the blank sheet provided at the end of this section.

No.	Task Description	Date and Time	Comments
01	Put on the Incident Controller's Vest. Remove both the Emergency Contact Listing and Area Emergency Plan contained in the Emergency Box. You may need it for future reference. Duty Card #1		
02	Muster Control Group Radio contact and or camp manager to locate members in their bunk house rooms. Including note recorder (Administration person)		
03	Appoint Access Control Officer to operate Duty Card #2		Name:
04	Appoint Communications Officer to operate Duty Card Number 3 . Incident Controller to act as Communications Officer until assistance arrives.		Name:
05	Confirm evacuation status with Access Control Officer. Has stench been injected (If required?)		

No.	Task Description	Date and Time	Comments
	Activate Evacuation Procedures (If Required?). Ask person(s) who have been instructed to activate alarm(s) to confirm that alarm has been initiated and time.		
06	Confirm Communications Officer has contacted persons as required on Duty Card Number 3 .		
07	Appoint Emergency Plans Officer to operate Duty Card Number 4 .		Name:
08	Appoint Resources Officer to operate Duty Card Number 5. Record his or her contact number, if required.		Name: Number:
09	Appoint Surface Muster Point Warden to operate Duty Card Number 6. Record his or her contact number, if required.		Name: Number:
10	Appoint Ventilation Officer to operate Duty Card Number 7 .		Name: Number:
11	If the incident is a major underground emergency involving fire, explosion etc, appoint a Fan/Ventilation Monitor to operate Duty Card Number 8. This person reports directly to the Ventilation Officer.		Name:
12	Brief Emergency Response Coordinator Duty Card 9 . This position will be pre assigned at all times and position will prepare ERT teams and operate both in and out of the control center as required.		Name:
13	Contact <i>Surface Muster Point Warden</i> and		

No.	Task Description	Date and Time	Comments
	confirm/update personnel accounting and list of eyewitnesses.		
14	Have the <i>Surface Muster Point Warden</i> send any eyewitnesses to the Control Centre for eyewitness debriefing.		
15	Contact individuals in refuge stations for eyewitness debriefing.		
16	In cooperation with the control group. Identify known effects, likely effects and likely causes of the incident. Develop a plan following mine rescue protocols.		
17	Along with ERC facilitate briefing Mine Rescue Team and Team Captain of situation and proposed incident Response Plan.		
18	Ensure Duty Card is completed, signed and returned to <i>Communications Officer</i> (including any completed logs etc)		
19	Facilitate De-briefing session.		

Record any additional tasks on the following page(s):

No.	Additional Task Description	Date and Time	Comments
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[illegible]

* Use extra sheets, if required

Attached:

Duty Card List/Summary (Table 1 from Underground Emergency Duty Cards)

Please ensure Duty Card is completed and signed-off before handing to Communications Officer (include any additional pages, completed checklists/logs etc)

Signed: _____ **Date:** _____

Appendix 2: Underground Duty Card 2- Access Control Officer

Name: _____ Date: _____ Time: _____

In The Event Of an Emergency:

The **Incident Controller** will usually appoint the **Access Control Officer**.

If you are instructed to operate this Card, complete the information on the line above, follow the instructions below. Any additional instructions or occurrences should also be recorded on the blank sheet provided at the end of this section.

No.	Task Description	Date/Time	Comments
01	Put on the Access Control Officer vest and receive details of the incident.		
02	Obtain contact details of Incident Controller and Incident Control Centre. Get a handheld radio. Record the contact details.		Contact Details: Control Centre Radio Channel: Control Centre Phone:
03	If a surface emergency post guards as required by the control center. Proceed to stench injection site if required to do so. Report status of stench system to Incident Controller. Give any other pertinent details. Set off stench gas system if instructed.		
04	Proceed to underground portal area. Establish access control to underground Access Control points must be established in a safe location (e.g. if an explosion likely, at least 500 m away from any mine opening).		Your designated Access Control Point Location:

No.	Task Description	Date/Time	Comments
05	Record the names/times of all incoming and outgoing personnel and equipment using the <i>Access Control Log</i> (attached) Ensure that no personnel are permitted access to the incident site unless authorised by the <i>Incident Controller</i> .		
06	Direct all underground personnel leaving the mine to the Surface Muster Point.		
07	Provide situation up-dates to <i>Incident Controller</i> regarding status of incident site security or other relevant information.		
08	Once situation under control and given “All Clear” by <i>Incident Controller</i> , stand-down and return to Surface Muster Point. Note that some Access Control Points may remain active after “All Clear” given to maintain security of affected area(s).		
09	Ensure Duty Card is completed, signed and returned to <i>Communications Officer</i> (including any completed logs etc).		
10	Attend De-briefing session.		

Record any additional tasks in the following spaces:

No.	Task Description	Date/Time	Comments
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[illegible]

* Use extra sheets, if required

Attached:

Access Control Log Duty

Please ensure Duty Card is completed and signed-off before handing to Communications Officer (include any additional pages, completed checklists/logs etc)

Signed:

Date: _____

Appendix 3: Underground Duty Card 3 - Communications Officer

Name: _____ Date: _____ Time: _____

In The Event Of an Emergency:

The **Incident Controller** will appoint the Communications Officer. The **Communications Officer** will set up communications in the control room, execute required communications and log all incoming and outgoing communications. Liaise with **Incident Controller** to determine any additional assistance that can be provided (as well as recording communications etc). Record and pass-on any messages to **Incident Controller**. Keep the **Incident Controller** up to date on the status of all communications systems.

Once established, the **Communications Officer** should remain in the Incident Control Centre with the **Incident Controller**. Only give incident information out as directed by the **Incident Controller**.

If you are instructed to operate this Card, complete the information on the line above and follow the instructions below. Any additional instructions or occurrences should also be recorded on the blank sheet provided at the end of this section.

No.	Task Description	Date/Time	Comments
01	Put on the Communications Officer vest contained in the Emergency Box.		
02	Take emergency phones and plug into wall in Control Centre. Test each phone to ensure operation. Get two portable radios and one charger and set up with phones. Test both radios and put one radio on charge. Man radio base station		
03	Source appropriate equipment for use by the Incident Control Team and task to the Resources Officer.		
04	Determine which personnel are available on site to assist with the emergency (i.e. personnel who could act as Incident Control Team members).		

No.	Task Description	Date/Time	Comments
05	Obtain copies of the Communications Log attached to this Duty Card and record details of any communications to or from the Incident Control Centre.		
06	Call all personnel on the Emergency Call List. Record any calls made on the Communications Log. Ensure the contact number for the Incident Control Centre is provided and release information only as instructed by the Incident Controller.		
07	If surface emergency contact resources as requested by the control center. If an evacuation of the mine has been initiated, contact all Refuge Stations and ask for and record on the Evacuation Log the names of all personnel in the refuge station. Ask who is in charge. If there is no one in charge, then appoint someone. Ask about the condition of personnel in the Refuge Station and record. Ask what conditions personnel in the refuge station observed and record . Ask if anyone in the refuge station is an eyewitness to the incident and record name(s). Tell the Person In Charge that you will phone back: immediately if there is an eyewitness or in 5 minutes if some personnel are still unaccounted for. Report this information to the <i>Incident Controller</i>. Stress the importance of remaining in the refuge station at all costs, even if contact is lost. Give them as much information as is necessary to reassure them.		Refuge Stn: Person In Charge: Refuge Stn: Person In Charge: Refuge Stn: Person In Charge:
08	Contact <i>Surface Muster Point Warden</i> and		

No.	Task Description	Date/Time	Comments
	get a list of persons accounted and unaccounted for. Record this on the Evacuation Log. Report this info to the <i>Incident Controller</i> .		
09	Liaise with the Incident Controller to arrange for Statements to be taken from all witnesses/relevant personnel.		
10	Record details of all situation reports made to <i>Incident Controller</i> .		
11	Once <i>Incident Controller</i> declares Stand Down , communicate this to all personnel.		
12	Arrange for the de-briefing sessions and take minutes, including recording all personnel who attended.		
13	Once All Clear is given, ensure Duty Card is completed, signed (including any completed logs etc).		
14	Attend de-briefing session.		
15	Collect and sign all completed Duty Cards.		

Record any additional tasks in the following spaces:

No.	Task Description	Date/Time	Comments
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No.	Task Description	Date/Time	Comments

* Use extra sheets, if required

Attached:

Communications Log

Evacuation Log

Please ensure Duty Card is completed and signed-off before handing to Communications Officer (include any additional pages, completed checklists/logs etc)

Signed:

Date: _____

Appendix 4: Underground Duty Card 4 - Emergency Plan Officer

Name: _____ Date: _____ Time: _____

In The Event Of an Emergency:

The ***Incident Controller*** will usually appoint the Emergency Plans Officer. The Emergency Plans Officer will obtain the required plans/drawings/maps etc. and provide them to *Incident Controller*. Where possible, ensure you obtain the latest versions of plans/drawings/maps etc. Ensure all plans/drawings/maps etc are clearly labelled and have appropriate scale coordinates etc.

If you are instructed to operate this Card, complete the information on the line above, and then follow the instructions below. Any additional instructions or occurrences should also be recorded on the blank sheet provided at the end of this section.

No.	Task Description	Date/Time	Comments
01	Put on the Emergency Plans Officer vest contained in the Emergency Box.		
02	Obtain details from the Incident Controller regarding the type and extent of the emergency (i.e. location, type of incident) surface and or underground		
03	Retrieve set of Emergency Response drawings.		
04	Determine with the <i>Incident Controller</i> other information that may be required. Source and gather this information. The Emergency Plan Information Check-list (attached) may be used as a guide.		
05	Be prepared to supply copies of relevant plans to the <i>Emergency Response Coordinator</i> , if requested.		
06	Arrange for survey team to be available to provide updates on plans/layouts.		

No.	Task Description	Date/Time	Comments
07	Provide any advice or assistance to <i>Incident Controller</i> , as requested.		
08	Once All Clear is given, ensure Duty Card is completed, signed and returned to Communications Officer (including any completed logs etc).		
09	Attend De-Briefing Session.		

Record any additional tasks in the following spaces:

[illegible]

* Use extra sheets, if required

Attached:

Emergency Plan Information Check-list

Please ensure Duty Card is completed and signed-off before handing to Communications Officer (include any additional pages, completed checklists/logs etc)

Signed: _____ **Date:** _____

Appendix 5: Underground Duty Card 5 – Resources Officer

Name: _____ Date: _____ Time: _____

In The Event Of an Emergency:

The ***Incident Controller*** will usually appoint the Resources Officer. The Resources Officer will be responsible for organizing, managing and sourcing various resources for the incident response. If the required equipment is not available on site, the Incident controller can contact off site assistance to source or transport resources.

If you are instructed to operate this Card, complete the information on the line above, and then follow the instructions below. Any additional instructions or occurrences should also be recorded on the blank sheet provided at the end of this section.

No.	Task Description	Date/Time	Comments
01	Put on the “Resources Officer” vest contained in the Emergency Box.		
02	Obtain details from the <i>Incident Controller</i> regarding the type and extent of the emergency (i.e. location, type of incident, impact on mine services, infrastructure etc).		
03	Organize Surface and Underground Vehicles and be prepared to issue them for use as required by the Incident Controller. Transportation of ERT.		
04	Organise handheld radios and chargers and be prepared to issue them for use as required by the <i>Incident Controller</i> .		
05	Determine with <i>Incident Controller</i> and <i>Emergency Response Coordinator</i> what additional equipment, services and transport is required.		
06	Assemble individuals not assigned to other duties and keep them as resources for transport, deliveries etc. Add to this group as required and as people become		

No.	Task Description	Date/Time	Comments
	available. If additional personnel are required, notify the <i>Incident Controller</i> .		
07	Contact the <i>Surface Muster Point Warden</i> to determine any special needs for personnel returning from incident scene (e.g. meals, drinks, clothes, blankets, counselling services etc). Arrange transport for Mine Rescue Team members and eyewitnesses as required.		
08	Arrange for food/ beverages etc from the camp(s) for the Incident Control and Emergency Response Team members.		
09	If required, appoint a competent person (e.g. Maintenance Supervisor) to coordinate maintenance activities.		Person Appointed:
10	Arrange with maintenance crews to lock and tag out all switches or isolators etc as required by the Incident Controller and Emergency Response Coordinator.		
11	Establish reserved areas for loading and unloading facilities. If required, appoint a competent person to supervise the unloading or loading operations.		Loading/ unloading areas are:
12	If required, designate appropriate personnel to assist with controlling external equipment/materials/personnel when arriving on site. Appoint a competent person to supervise the unloading or loading operations; meet any external response teams, etc.		
13	Update the <i>Incident Controller</i> on status of additional resources and transport (e.g. ETAs, what resources are being provided)		
14	If likely to be a "Prolonged Event", arrange for relief personnel and crews,		

No.	Task Description	Date/Time	Comments
	where required. To be done in consultation with the <i>Incident Control Group</i> .		
15	Once “All Clear” given, ensure Duty Card is completed, signed and returned to Communications Officer (including any completed logs etc).		
16	Attend De-briefing session.		

Record any additional tasks in the following spaces:

No.	Task Description	Date/Time	Comments
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* Use extra sheets, if required

Please ensure Duty Card is completed and signed-off before handing to Communications Officer (include any additional pages, completed checklists/logs etc)

Signed: _____ **Date:** _____

Appendix 6: Underground Duty Card 6 – Surface Muster Point Warden

Name: _____ Date: _____ Time: _____

In The Event Of an Emergency:

The ***Incident Controller*** will usually appoint the Surface Muster Point Warden. The Surface Muster Point Warden will proceed to the tag board and account for all personnel in the work area. This is a critical function in the process of developing an appropriate response to the incident. In an underground emergency this job would be conducted by underground supervision or shift boss. If surface camp area could be administration or catering supervisor

If you are instructed to operate this Card, complete the information on the line above, and then follow the instructions below. Any additional instructions or occurrences should also be recorded on the blank sheet provided at the end of this section.

No.	Task Description	Date/Time	Comments
01	Obtain the “Surface Muster Point warden” vest from the Emergency Box and put it on.		
02	Obtain details from the <i>Incident Controller</i> regarding the type and extent of the emergency or give details (i.e. location, type of incident).		
03	Verify contact details to maintain communications with the Incident Controller. Obtain a hand held radio.		<i>Incident Controller:</i> Phone No: Radio Channel:
04	Proceed to the surface muster or tag board related to the emergency. Contact the <i>Resources Officer</i> for transportation.		Location of Surface Muster Point:

No.	Task Description	Date/Time	Comments
05	Once personnel begin to arrive at the Surface Muster Point, record their names, arrival times and condition on the <i>Evacuation Log</i> . Refer active Mine Rescue personnel to the <i>Emergency Response Coordinator</i> . Notify all personnel that no one is to leave the Surface Muster Point until instructed.		
06	Seek help for individuals requiring First Aid or Medical Attention.		
07	Refer any eyewitnesses to the Control Centre in person or by phone. Transport arrangements can be made through <i>Resources Officer</i> .		
08	Provide any relevant information concerning the incident obtained from people returning from underground or the incident scene to the <i>Incident Controller</i> .		
09	Contact the <i>Incident Controller</i> when all personnel have tagged out and are accounted for.		
10	Once situation is under control and given "All Clear" by <i>Incident Controller</i> , complete and sign Duty Card and returned it to the Communications Officer.		
11	Attend De-briefing session.		

Record any additional tasks in the following spaces:

No.	Task Description	Date/Time	Comments
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[illegible]

* Use extra sheets, if required

Attached:

Evacuation Log

Please ensure Duty Card is completed and signed-off before handing to Communications Officer (include any additional pages, completed checklists/logs etc)

Signed: _____ **Date:** _____

Appendix 7: Underground Duty Card 7 – Ventilation Officer

Name: _____ Date: _____ Time: _____

In The Event Of an Emergency:

The ***Incident Controller*** will usually appoint the Ventilation Officer.

If you are instructed to operate this Card, complete the information on the line above and follow the instructions below. Any additional instructions or occurrences should also be recorded on the blank sheet provided at the end of this section.

No.	Task Description	Date/Time	Comments
01	Obtain the “Ventilation Officer” vest from the Emergency Box and put it on.		
02	Obtain details from the <i>Incident Controller</i> regarding the nature and extent of the emergency (i.e. location, type of incident).		
03	Obtain a set of up-to-date Ventilation Plans (showing current ventilation flows, natural ventilation, location of ventilation controls, fans, stopping’s, regulators, vent doors etc).		
04	Obtain all relevant information or observations regarding ventilation from appropriate personnel (e.g. personnel returning from underground, FAB Officers, Fan/Ventilation Monitor etc) This may include status of fans, presence of smoke/noxious fumes/toxic gases, natural ventilation (wind strength and direction) etc.		
05	Participate in solutions or potential impacts on the emergency response plans involving ventilation.		
06	Record reports from the <i>Fan/Ventilation Monitor(s)</i> (if being available) regarding the status of fans, smoke, observations		

No.	Task Description	Date/Time	Comments
	etc.		
07	Report to the <i>Incident Controller</i> any changes to the ventilation system or circuit. Be aware of changes that may affect diffusion of noxious gases, impacts on FAB's, access control points, evacuation muster points, etc.		
08	Determine how to safely change, alter or repair the ventilation system.		
09	Provide specific instructions to the <i>Incident Controller</i> and <i>Emergency Response Coordinator</i> regarding actions to be taken to change or repair the ventilation circuit or controls and the results of those changes on the entire ventilation stream.		
10	Plot the location of Fresh Air Bases (FABs) on the Ventilation Plan.		
11	Once the "All Clear" is given, ensure the Duty Card is completed, signed and returned to Communications Officer (including any completed logs etc).		
12	Attend De-briefing session.		

Record any additional tasks in the following spaces:

No.	Task Description	Date/Time	Comments
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[illegible]

* Use extra sheets, if required

Please ensure Duty Card is completed and signed-off before handing to Communications Officer (include any additional pages, completed checklists/logs etc)

Signed: _____ **Date:** _____

Appendix 8: Underground Duty Card 8 – Fan/Ventilation Monitor

Name: _____ Date: _____ Time: _____

In The Event Of an Emergency:

The ***Incident Controller*** will usually appoint the Fan/Ventilation Monitor.

If you are instructed to operate this Card, complete the information on the line above and follow the instructions below. Any additional instructions or occurrences should also be recorded on the blank sheet provided at the end of this section.

No.	Task Description	Date/Time	Comments
01	Obtain a “Fan/Ventilation Monitor” vest from the Emergency Box and put it on.		
02	Contact the <i>Ventilation Officer</i> to determine the information that is requires and your designated monitoring point(s). E.g., Presence of smoke, airflow direction and strength, status of fans, colour of smoke, time of changes, etc. (*Do not expose yourself to exhaust air from the mine). Wear SCBA if required but do not enter the mine. The <i>Ventilation Officer</i> is the person who you will be reporting your observations to.		
03	Request a vehicle and radio from the Resources Officer and go to your designated observation points.		Your designated observation points:
04	Record all observations on the <i>Ventilation Observation</i> form (attached).		
05	Report initial observations to the <i>Ventilation Officer</i> . Report any changes to the <i>Ventilation Officer</i> without delay.		

No.	Task Description	Date/Time	Comments
06	Once situation under control and given "All Clear" by Incident Controller, complete and sign Duty Card and returned it to the Communications Officer. (including any completed logs etc)		

Record any additional tasks in the following spaces:

No.	Task Description	Date/Time	Comments
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* Use extra sheets, if required

Attached:

Ventilation Observation Form

Please ensure Duty Card is completed and signed-off before handing to Communications Officer (include any additional pages, completed checklists/logs etc)

Signed: _____ **Date:** _____

Appendix 9: Underground Duty Card 9 – Emergency Response Coordinator

Name: _____ Date: _____ Time: _____

In The Event Of an Emergency:

The **Emergency Response Coordinator** will usually be the Safety Superintendent or alternate Safety Coordinator. This position requires intimate knowledge of Mine Rescue operations and procedures and of the Wolverine Mine Rescue infrastructure and equipment.

The **Emergency Response Coordinator** once notified of the emergency will prepare Mine Rescue Team members as required.

Emergency Response Coordinator will then make his way to the control center or be in direct communications with the Incident Controller in responding to the emergency. It is the responsibility of the **Emergency Response Coordinator** to provide assistance in identifying or recommending sources of additional assistance that may be beneficial to the response effort. In a prolonged response the **Emergency Response Coordinator** will be responsible for generating a rotation roster for all available Mine Rescue Teams as well as ensuring equipment is properly resupplied and maintained. Where Mine Rescue teams from other mines are required the Emergency Response Coordinator will be the primary liaison with the visiting coordinator(s).

If you are instructed to operate this Card, complete the information on the line above and follow the steps below. Any additional steps should also be recorded.

No.	Task Description	Date/Time	Comments
01	Obtain the “Emergency Response Coordinator” vest from the Emergency Box and put it on.		
02	Obtain latest details from the <i>Incident Controller</i> regarding the nature and extent of the emergency (i.e. what has happened, type of incident etc)		
03	Confirm with <i>Incident Controller</i> whether or not mine/area evacuation has been initiated.		
04	Confirm called out Mine Rescue Team members are reporting to the Mine Rescue station.		

No.	Task Description	Date/Time	Comments
05	Appoint a <u>Mine Rescue Team Captain</u> , for the primary and backup teams if not already done.		Team #1 Captain: Team #2 Captain:
06	Assign members to primary and backup teams.		
07	Obtain from <i>Incident Controller</i> a list of the names of the Incident Control Team members who have been activated to respond to the emergency and record.		Incident Controller: Access Control Officer: Communications Officer: Ventilation Officer: Emergency Plan Officer: Fan Ventilation Officer: Resources Officer: Surface Muster Point Warden:
08	Identify and record contact details for the Incident Control Centre.		Phone #: Radio Channel (s):
09	Assist <i>Incident Controller</i> in developing a team exploration Plan. Assist <i>Incident Controller</i> in developing a response/solution Plan. The type of response will depend on the nature of the incident. This should include consideration of any external assistance that may be required. Review emergency pre-plans if available as a guide. Where possible, document and record key aspects of your Response Plan.		
10	Check with the <i>Resources Officer</i>		

No.	Task Description	Date/Time	Comments
	regarding the availability of suitable transport for the Mine Rescue Team (if required).		
11	Confirm status of Primary Mine Rescue Team (1 st team) and ETA. Check that Mine Rescue Team Members have been notified and informed of ERT Muster Point at the mine.		Team Captain #1
12	Record the names of all Mine Rescue Team members attending.		
13	Check with the <i>Emergency Plans Officer</i> that appropriate plans are available for the Mine Rescue Team.		
14	Support Incident Controller in briefing Mine Rescue Team and Team Captain of situation and proposed incident Response Plan.		
15	Confirm status and ETA of backup team (2 nd team).		Team Captain #2
16	Confirm status of standby team (3 rd team) and appoint team Captain.		Team Captain #3
17	Verify that Mine Rescue Team members are wearing the proper personal protective equipment before entering incident area(s).		
18	Dispatch primary team.		
19	Develop a Mine Rescue Team rotation roster for prolonged response.		
20	Ensure the Emergency Plans Officer records locations of FABs on Emergency Plans.		
21	Provide regular situation reports to the <i>Incident Controller</i> .		
22	Once situation under control and given "All Clear" by Incident Controller,		

23 Attend De-briefing session.

No.	Task Description	Date/Time	Comments
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Please ensure Duty Card is completed and signed-off before handing to Communications Officer (include any additional pages, completed checklists/logs etc)

June 25, 2010
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