Preliminary Economic Assessment

White Pine North Project
Michigan, USA

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IMPORTANT NOTE

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Preliminary Economic Assessment – White Pine North Project

Final Version

Michigan, USA

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1 SUMMARY

1.1 Introduction

G Mining Services Inc. ("GMS") was retained by White Pine Copper LLC. ("WPC") or the ("Company") to produce a Preliminary Economic Assessment (the "PEA" or "Study") for the White Pine North Project located in the western Upper Peninsula of Michigan, USA, and to prepare a technical report ("the Report") in accordance with the Canadian National Instrument 43-101 ("NI 43-101") Standards of Disclosure for Mineral Projects to support the results of the PEA and the Mineral Resource Estimate ("MRE"); as disclosed in Highland Copper press release entitled "Highland Copper announces positive PEA results and mineral resource estimate for the White Pine North Copper Project in Michigan" dated June 12, 2023.

1.2 Property Description and Ownership

The White Pine North Project is located in the historical copper range district of the Upper Peninsula of Michigan, approximately 7.5 kilometres ("km") south of Lake Superior in Ontonagon County. The Project covers approximately 4,500 hectares ("ha") (11,000 acres) of surface rights and approximately 11,990 ha (29,615 acres) of mineral rights.

In April 2015, White Pine Copper LLC. a wholly owned subsidiary of Highland at the time entered into an agreement with Great Lake Resources, LLC to lease certain mineral rights covering an area of approximately 1,816 acres within the White Pine North Project area. The mineral lease is for 20 years, with an option for an additional five (5) years.

In July 2021, White Pine Copper LLC. ("WPC"), a wholly owned subsidiary of Highland at the time, successfully completed the acquisition of the rights, title and interest of Copper Range Company ("CRC"), a subsidiary of First Quantum Minerals Ltd., in the White Pine Project.

In July 2023, Highland Copper and Kinterra Copper USA LLC ("Kinterra") signed a joint venture agreement in which Kinterra holds a 66% stake in the White Pine North project. Additionally, the joint venture has agreed to spend a further $30 million to advance the project through permitting, infill drilling and feasibility study.

1.3 Accessibility, Climate, Local Resources, Infrastructure and Physiography

The area is accessible via Michigan State Highway 64, which runs north-south 0.5 km west of the Project footprint. The Project is close to several communities, including White Pine, Ontonagon, Bergland, Wakefield and Ironwood.

The unincorporated town site of White Pine lies immediately across M-64, 0.6 km to the southwest of the mine site and had a population of 339 persons in the 2020 census. The town was built during the construction of the present White Pine Mine in 1952 to service employees of the mine.

The Michigan Upper Peninsula has well developed infrastructure, with paved road, optic fibre, natural gas, power grid and rail assets. The Project area is accessible by a Canadian National ("CN") rail spur, now owned by Watco, which leads to the Morengo junction in Ashland County, Wisconsin. The other nearest rail spur is in Ontonagon County, owned by Escanaba and Lake Superior Railroad, which leads southwest to Escanaba and connects to the CN rail grid. Both rail spurs would need to be refurbished if to be used commercially by a new mining operation.

CRC decided to sell all existing facilities upon closure in 1995 and several parties bought various buildings and parcels of land of what was called "White Pine Industrial Park". The processing plant and smelter were dismantled, but the power plant, refinery and other buildings kept and sold. Some of these buildings could be repurposed and used for a new mining operation.

The water intake is located off the mouth of the Big Iron River in Silver City, and it was constructed by mining a tunnel under Lake Superior. The tunnel is 110 feet ("ft") below the pump house and 80 ft below the crib, 2,600 ft from pump house to crib. The current water withdrawal limit, based on pumping capacity, is 26 million gallons per day.

1.4 History

The discovery by CRC in the 1930s that lower grade zones of chalcocite mineralization extended over a very large area, coupled with increasingly sophisticated metallurgical techniques for treating fine-grained sulfide mineralization, led to development of the White Pine Mine and subsequent discovery of the Copperwood deposit farther west.

Construction began in March 1952 of the White Pine Mine and on March 31, 1953, the first ore was hauled to surface via the portal. The mill was completed in 1954 and the first pour of copper in the smelter was on

January 13, 1955. Inmet Mining Corporation (formerly "Metall") announced in July 1995 that CRC would suspend all conventional mining and milling operations at the White Pine Mine on September 30th, 1995.

1.5 Geological Setting

The White Pine copper deposit is located in the Western Upper Peninsula of Michigan (USA) on the south side of Lake Superior. The copper mineralization in the area of the former White Pine Mine occurs in the bottom 6 m (20 ft) of the Nonesuch Formation at the contact with the Copper Harbor Conglomerate. The shale and siltstone in the lower part of the Nonesuch Formation are divided into two (2) mineralized shale units, the lower "Parting Shale" and the upper "Upper Shale". The mineralized units are laterally persistent over tens of kilometres. The Parting Shale has an average thickness of 2.2 m for the entire of the deposit, and the Upper shale has a thickness of around 3.0 m.

1.6 Mineralization

Copper mineralization at the White Pine deposit occurs in two (2) modes: as very fine-grained sulfide (chalcocite) and as native copper. Sulfide mineralization is estimated to account for 85-90% of the copper in the deposit, but both modes of copper are intimately associated throughout the deposit. Sulphides occur as fine-grained lamellae in laminites and partings in interbedded sandstone and shale, very-fine grained disseminations and discrete clots in siltstone, and in veinlets and veins. Native copper mineralization occurs as sheet copper and mineralized sandstone. Sheet copper forms along thrust surfaces and are bedding parallel as well as cross-cutting stratigraphy.

1.7 Deposit Types

The mineralization of the White Pine North Project is classified as a reduced facies stratiform sediment-hosted copper deposit and is often compared to the Kuperschiefer-type in Germany and Poland.

1.8 Exploration

All exploration works completed on the White Pine North Project prior to 2014 were performed by the previous owner, CRC, who is now a wholly owned subsidiary of First Quantum Minerals Ltd. White Pine Copper explored the property and conducted diamond drilling between 2014 and 2015 to complete an MRE, and additional metallurgical and geotechnical test work was also undertaken.

1.9 Drilling

Before the White Pine Mine was closed in 1997, all drilling activities undertaken on the property were performed by previous owners. In 1907, Calumet and Hecla Mining Co. began an extensive drilling program that discovered locally high grades of native copper. CRC conducted a continuous drilling program at the White Pine Mine from 1929 until the early 1970s. There was a hiatus in drilling until the commencement of a drilling program in 1994 – 1995. The 1994 – 1995 drilling program was conducted to provide a historical estimate supporting a feasibility study to build a new smelter at the White Pine Mine. Limited data are available from historical drilling, which totals 248,070 m.

WPC carried out two (2) phases of drilling at the White Pine North Project in 2014 and 2015, with the aim of completing a current resource estimate for the Project as well as obtaining information for mine planning purposes. Drilling conducted by WPC in 2014 and 2015 totals 30,481 m.

In Winter 2022 - 2023, WPC completed an infill drilling program with the main purpose of converting mineral resources from Inferred to Indicated. A total of three (3) holes and 2,714 m were drilled; these holes are not included in this current MRE.

1.10 Data Verification

WPC provided GMS data files for the White Pine North Project, in date of March 2015 and September 2022 (bulk density only). The drilling database was reviewed, and only minor errors were detected and corrected. A compilation of bulk density measurements was provided in September 2022 and incorporated into the model at that time.

Site visit was conducted by Mr. Réjean Sirois, P.Eng., and Mr. Christian Beaulieu, consultants for GMS, to validate drill logs, assay certificates, sample intervals, downhole survey information and field checks to validate drill collars. No major discrepancies were found, and it is GMS' opinion that the drill hole database is acceptable for use in calculating Mineral Resources.

1.11 Mineral Processing and Metallurgical Testing

The mineral processing is based on historical data of the Copper Rand Company which operated a process plant from 1953 through 1995 and has produced over 2 Mt of copper.

The flowsheet consists of a standard grinding circuit with SAG and Ball Mill in closed circuit with cyclones. The cyclone overflow feeds the primary flotation cells following by a desliming cyclone and secondary flotations cells. The concentrate from the primary and secondary flotation cells will be sent to a regrind mill in close circuit with cyclone targeting a grind of 20 microns. The regrind cyclone overflow feeds two (2) stages of concentrate cleaning cells before thickening, filtration concentrate and tailings disposal.

The key process design criteria are summarized in Table 1.1.

Table 1.1: Key Process Design Criteria

Parameter	Units	Value
Plant Throughput	tpd	15,000
Head Grade - LoM	% Cu	1.03
Head Grade – Silver (Ag)	g/t	10
Plant Availability	%	92
SMC Impact Breakage Index	Axb	33.6
Bond Ball Mill Work Index	kWh/t	14.4
Grind Size (P_{80})	µm	105
Regrind Mill Product Size (P_{80})	µm	20
Copper Grade	% Cu	30.5
Copper Recovery	%	88

1.12 Mineral Resources Estimate

GMS has prepared a Mineral Resource Estimate ("MRE") for the White Pine North Project based on data generated up to March 2015. The main objective of this assessment was to produce a Mineral Resource for the White Pine North sector. The MRE was prepared by Mr. Réjean Sirois, P.Eng., and Mr. Christian Beaulieu, P.Geo., both consultant for GMS and independent "Qualified Persons" ("QP") as defined in the NI 43-101 and has an effective date of June 12, 2023.

The 3D geological modelling performed for the resource estimate was produced by GMS based on the drill hole database and historical information pertaining to the three (3) mineralized columns (the Parting Shale ("PS"), Upper Shale ("US") and Full Column ("FC"). A minimum true thickness of 2 m ("PS" and "US") or 3 m ("FC") was applied during modelling of these columns.

One composite was generated per drill hole, per column of varying thickness. Statistics were calculated on the resulting copper and silver grade, and it was judged unnecessary at this stage to apply capping values as no major outliers were observed.

A homogeneous 2.74 g/cm^3 density value was used for all rock types in the block model, based on a per bed sequence statistics.

Grade variography was generated in preparation for the estimation of copper grades using the Ordinary Kriging ("OK") interpolation method. The variography was undertaken on the composites for each of the three (3) columns (PS, FC and US). No variography was undertaken on silver composites.

Two (2) interpolation techniques were selected for the White Pine North Project MRE. The OK method was used for copper grade interpolation and the Inverse Distance Squared ("ID^2") for silver grades. A percentage-style block model was created using the wireframes of the mineralized columns and was used during grade interpolation. A three-pass estimation strategy was adopted, using progressively larger search ellipses and relaxed estimation parameters for later passes.

The block model was validated visually on a global and local scale, and statistical checks were made between the block model grades and composite grades (swath plots, descriptive statistics). The block model was found to be a good representation of the composites.

Blocks were classified in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") guidelines for Mineral Resources and Reserves. Classification was primarily based on estimation pass, with a manual coding step to ensure a coherent classification. No measured was declared at White Pine North due to the lack of QAQC and supporting information from the historical data. The deposit comprises of Indicated and Inferred Mineral Resources.

A 300 m buffer zone (or boundary pillar) was applied around existing workings and excluded from the Mineral Resource. Only blocks within mineral leases where WPC has a greater than or equal to 25% ownership were classified as Mineral Resources.

The cut-off for the declaration of the Mineral Resource is 0.9% Cu, and was calculated using a copper price of USD 4.00/lb., and a silver price of USD 25/oz. A metallurgical recovery of 88% for copper and 73.4% for silver was assumed, with a payable rate of 96.5% for copper and 90% for silver. A flat NSR royalty rate of $0.10/lb. Cu payable was applied, which incorporates three (3) royalties on the Project (Osisko Silver Royalties, Osisko Copper Royalties and Longyear Royalty). No mining dilution or loss was applied during the calculation in the cut-off grade.

Table 1.2 reports Mineral Resources for the White Pine North deposit. All parameters used in the calculations are also presented in the table's notes.

Table 1.2: Mineral Resource for the Parting Shale Column – White Pine North Deposit 0.9% Cu Cut-off Grade – June 12, 2023

Resource Category	Tonnage (Mt)	Copper Grade (%)	Silver Grade (g/t)	Copper Contained (M lbs)	Silver Contained (M oz)
Indicated	150.7	1.05	13.5	3.497	65.5
Inferred	96.4	1.03	9.0	2.183	27.8

Notes on Mineral Resources:

1. *Mineral Resources are reported using a copper price of USD 4.00/lb and a silver price of USD 25/oz.*
2. *A payable rate of 96.5% for copper and 90% for silver was assumed.*
3. *Metallurgical recoveries of 88% for copper and 73.4% for silver were assumed.*
4. *A cut-off grade of 0.90% copper was used, based on an underground "room and pillar" mining scenario.*
5. *Mineral Resources are reported within the most probable extraction scenario of Full Column or Parting Shale based on mine engineering.*
6. *Operating costs are based on a processing plant located at the White Pine site.*
7. *A flat NSR royalty rate of $0.10/lb Cu payable was applied, which incorporates three royalties on the project (Osisko Silver Royalties, Osisko Copper Royalties and Longyear Royalty).*
8. *Minimum mining thicknesses of 2 m and 3 m were applied to the Parting Shale and the Full Column respectively.*
9. *No mining dilution and mining loss were considered for the Mineral Resources.*
10. *Mineralized rock bulk densities are assumed at 2.74 g/cc.*
11. *Classification of Mineral Resources conforms to CIM definitions.*
12. *The qualified persons for the estimate are Mr. Réjean Sirois, P.Eng., consultant for GMS and Mr. Christian Beaulieu, P.Geo., consultant for GMS. The estimate has an effective date of June 12, 2023.*
13. *Mineral Resources that are not mineral reserves do not have demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.*
14. *Parting Shale: interval defined from the base of the Lower Transition unit to the top of the Tiger unit.*
15. *Full Column: interval defined from the base of the Lower Transition unit to the top of the Thinly unit.*
16. *The quantity and grade of reported Inferred Resources in this estimation are uncertain in nature and there has been insufficient exploration to define these Inferred Resources as Indicated or Measured Mineral Resources.*

1.13 Mineral Reserves Estimate

Given that this report is a PEA, there is no Mineral Reserve Estimate for the White Pine North Project.

1.14 Mining

1.14.1 Mining Method

The proposed mining method for the White Pine North Project is a mix of continuous mining and conventional jumbo driven room-and-pillar mining. The mineralized zone is relatively sub-horizontal and thin, having mineralized zone thicknesses from 2 m up to 7.7 m. The method consists of the extraction of a series of entries and crosscuts in the mineralized zone leaving pillars in place to support the back. The entries, crosscuts and pillars are sized using a geotechnical analysis of the rock, and experience from the old White Pine mine with similar ground conditions.

1.14.2 Mine Access

The mine is divided in three sectors: the Eastern, Center and Western parts. The mine will be accessed via a new covered box-cut to establish a portal at the mine entrance from the surface, located at the western side of the deposit. The pre-production period requires 18,193 m of development to establish the main entry panel requiring four (4) to six (6) drifts according to the ventilation requirements. All drifts are set at a width of 6.1 m, and their height varies from a minimum of 3.5 m to a maximum of 6.1 m.

1.14.3 Rock Mechanics and Geotechnical Design Criteria

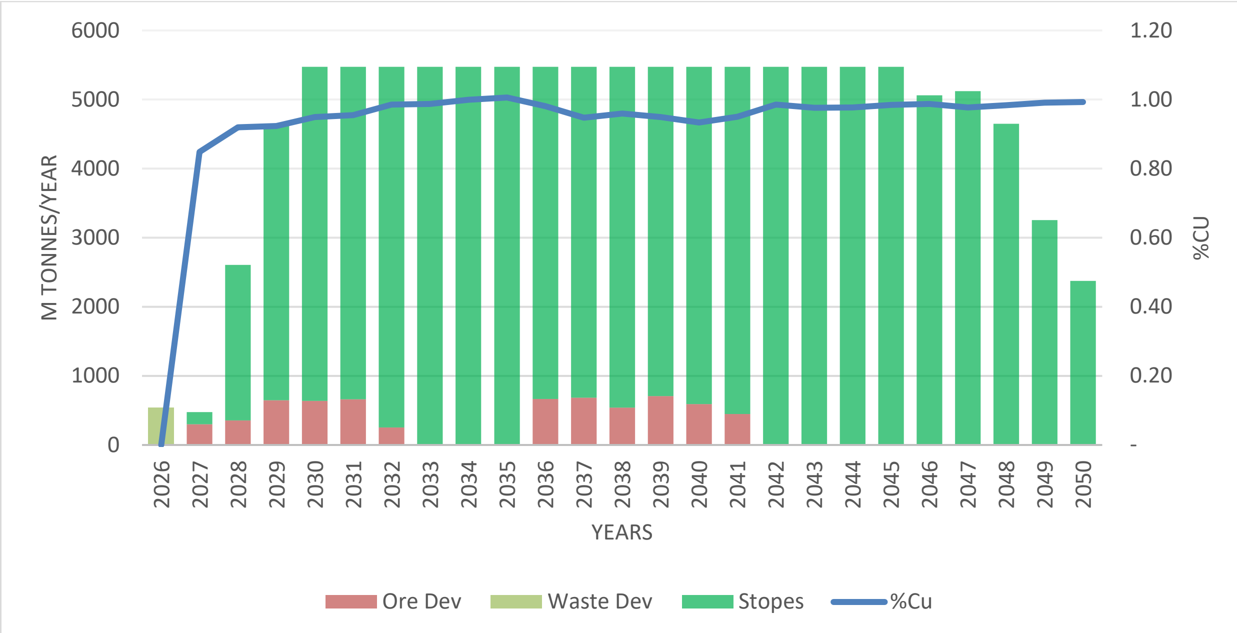
The old White Pine Mine was in operation from 1955 to 1995 as a room and pillar operation. Conditions in the mine were reported as variable, depending on the proximity to major structures and the syncline axis. For the most part, back conditions were observed to be good where the back was formed in the sandstone formation. The ground support planned consists of a 1.8 m rebar bolts on a 1.2 m x 1.2 m pattern.

A 300 m pillar has been left between the White Pine North Project and the former White Pine Mine. This pillar dimensioning will require further investigation and sizing.

1.14.4 Mine Design and Production Schedule

The production schedule is based on mining a fixed target of 5.475 M/y. To achieve this annual production, up to 21 production panels must be in production simultaneously. The number of required panels depends on the thickness of the mineralized zone and the quantity of development. A single pass mining approach is assumed an overall recovery of 57% is estimated based on the recovery formula given by Itasca.

Figure 1.1: Mine Production Schedule



1.14.5 <u>Mine Operations</u>

To access production panels, four (4) access drifts are excavated along the panels. One (1) of these drifts is used for fresh air ventilation, one (1) for exhaust air ventilation, one (1) for stope conveyors and one (1) for equipment traffic. Each panel has a connection to a feeder breaker, where the mineralized material will be transferred to the main conveyor and up to the surface.

For jumbo mining, the mining cycle includes drilling, blasting, mineralized material mucking, mineralized material transportation to a feeder breaker and the stope conveyor, scaling and finally ground support. For continuous mining, the mining cycle includes moving, grinding, loading trucks, mineralized material transportation to a feeder breaker and the stope conveyor, scaling and finally ground support.

1.14.6 <u>Mine Services</u>

The ventilation system will consist of a push system whereby two (2) 1250 HP parallel main fans will be installed at surface providing approximately 225 m^3/s each at 6.0 kPa. The two (2) main fans will be installed and provide heated air through a 5 m ventilation raise and air will be distributed throughout the mine using ventilation regulators, auxiliary fans, doors and bulkheads.

Water is required underground for the drilling and controlling of dust. It must also be available for firefighting. Water will be distributed underground by an 8 in schedule 40 steel pipe in the main access drift and 2 in light wall steel pipe in the stopes.

A high voltage cable (13.8 kV) will be installed in the conveyor drift access. This high voltage cable will connect to a substation in each production panel which will drop the voltage to 480 V for the electrical needs of the operation.

1.15 Recovery Methods

The process plant design for the White Pine North Project is based on a metallurgical flowsheet designed to produce copper concentrate. The process plant has been designed for a nominal throughput of 15,000 tpd. The overall flowsheet includes the following steps:

- Grinding and classification
- Rougher flotation
- Rougher concentrate regrinding
- Cleaner flotation, using three stages of cleaning with flotation cells and columns
- Concentrate thickening and filtration
- Tailings pumping and disposal in the common Tailings Disposal Facility (“TDF”)

1.16 Project Infrastructure

The White Pine North Project requires several infrastructure elements to support the mining and processing operations. The infrastructure planned for the Project includes the following:

- Roads:
  - Public access road from Michigan Highway 64
  - Main access roads
- Parking lot
- mineralized material and waste stockpiles
- Surface pads
- Event pond
- Covered box-cut for mine access

- Site run-off and spillage control
- Water management:
  - Sewage treatment – existing system
  - Water filtration
  - Tailings
  - Reclaim water system
  - Water treatment plant
  - Potable water – existing system
  - Fire protection
- Power supply, generation, and distribution
- Communications
- Fuel storage
- Security
- On-site buildings:
  - Process plant building
  - Plant workshop & stores
  - Assay laboratory
  - Truck shop, dry, warehouse and offices
  - Mill offices and metallurgical laboratory
  - Explosive magazines
  - Underground support buildings
- Off-site buildings:
  - Administration office
  - Concentrate transload facility
- Tailings Disposal Facility (“TDF”)

1.17 Market Studies and Contracts

The metal prices selected for the economic evaluation in this Report use a constant long-term copper price of USD 4.00/lb and silver price of USD 25.00/oz over the life-of-mine ("LoM").

The copper concentrate produced from White Pine will require downstream smelting and refining to produce marketable copper and silver metal. Several smelters could receive concentrate with the nearby candidates being the Horne smelter located in Noranda, Quebec, or the copper smelter in Sudbury, Ontario. Other alternatives include seaborne export to Asia or Europe. Concentrate transportation charges will be a function of the final destination and will be a combination of trucking, rail and possibly shipping.

A summary of the copper concentrate marketing assumptions is summarized in Table 1.3.

Table 1.3: Concentrate Marketing Assumptions

Copper Concentrate Marketing Assumptions	
Copper Payable Rate	96.5% payment of Cu in concentrate >22% Cu and <32% Cu subject to a 1% minimum deduction
Silver Payable Rate	90% payment of Ag subject to 30 g/dmt minimum deduction
Copper Treatment & Refining Charge (TC/RC)	TC = USD 65/dmt of concentrate, RC = $0.065/lb of Cu
Silver Refining Charge	RC = USD 0.50/oz of Ag

1.18 Environmental Studies and Permitting

The former White Pine Mine ceased operation in 1995 and has been the subject of an extensive remediation program outlined in judicial Consent Decree and Remedial Action Plan agreements between CRC, Michigan's Attorney General and the Michigan Department of Environment, Great Lakes, and Energy. The entire surface area overlying the underground mine along with the associated surface component area and tailings impoundments are listed as a "facility" under Part 201, Environmental Remediation, of Michigan's Public Act 451 of 1994 as Amended, the Natural Resource and Environmental Protection Act.

The Company began mineral exploration and baseline environmental surveys under an access agreement with CRC and under a mining lease with Great Lakes. Historical environmental data for the former White Pine Mine site was reviewed and compared with the Company's initial project plans and Michigan's Part 632 regulatory requirements. CRC had compiled extensive information on surface water, ground water and near-surface soils at the project site. To fulfill a robust data set for permitting, updates to currently held data will be supplemented with surveys needed to delineate wetlands, survey archaeological resources, air quality, flora, and fauna. A hydrological model will need to be completed. Data on geotechnical conditions in areas of surface facilities including the tailings management area will be needed. An understanding of geochemical characteristics will be necessary to design water management and treatment systems.

Once baseline data and characterization are collected and understood, environmental impacts from the proposed mine plan will be developed. Of interest for permitting are approaches to water management, waste management, and closure.

1.19 Capital and Operating Costs

The capital expenditure ("CAPEX") for Project construction, including concentrator, mine equipment, support infrastructure, pre-production activities and other direct and indirect costs is estimated to be USD 880.4M. The total initial Project capital includes a contingency of USD 140.4M, which is 19% of the total CAPEX before contingency, and excludes pre-production revenue of USD 265.3M. Net of pre-production revenue, the initial CAPEX is estimated at USD 615.18M as presented in Table 1.4. The initial Project CAPEX is spent over a period of 3.25 years starting in Q1 2026 and ending in Q1 2029.

Table 1.4: Initial Capital Expenditure Summary

Initial CAPEX	k USD
000 - General	587
100 - Infrastructure	44,369
200 - Power & Electrical	76,091
300 - Water & TSF Mgmt.	97,306
400 - Mobile Equipment	93,211
500 - Mine Infrastructure	93,057
600 - Process Plant	148,888
700 - Construction Indirects	71,456
800 -General Services & Owner's Costs	42,740
900 - Pre-Production, Commissioning	72,307
Sub-Total Before Contingency	740,012
Contingency (19%)	140,425
Total Incl. Contingency	880,437
Less: Pre-Production Revenue	(265,253)
Total Incl. Contingency & Pre-Prod Revenue	615,184

Sustaining capital expenditures during operations are required for additional mine equipment purchases and replacements, water treatment plant, mine development work, tailings storage expansion and general plant sustaining capital allowances. The LoM sustaining CAPEX is estimated at USD 657.8M with the breakdown presented in Table 1.5.

Table 1.5: Sustaining Capital Expenditure Summary

Sustaining CAPEX	LoM ($M)	$/t Ore	$/lb Cu Payable
Tailings Disposal Facility Expansion	87.96	0.79	0.04
Water Treatment Plant	15.00	0.13	0.01
Mine Equipment Purchases	319.27	2.85	0.16
Mine Development Expenditures	98.98	0.88	0.05
Mine Infrastructure Expenditures	136.56	1.22	0.07
Total Sustaining CAPEX	**657.77**	**5.88**	**0.32**

Operating expenditures ("OPEX") include mining, processing, G&A services, concentrate transportation and concentrate treatment and refining charges. The concentrate transportation, treatment and refining charges are deducted from gross revenues to calculate the Net Smelter Return ("NSR"). The NSR for the Project during operations is estimated at USD 8.068M, excluding USD 265.25M of NSR generated during pre-production and treated as pre-production revenue. The average NSR over the LoM is USD 3.97/lb of payable copper. Detailed operating cost budgets have been estimated from first principles based on detailed wage scales, consumable prices, fuel prices and productivity. The operating costs are detailed in Section 21 of this Report. The average OPEX over the LoM is USD 29.60/t of mineralized material or USD 1.63/lb of payable copper with mining representing 59% of the total OPEX, or USD 17.39/t of mineralized material. A summary of operating cash flow and operating costs is presented in Table 1.6.

Table 1.6: Operating Cost Summary

Operating Cash Flow	LOM	$/t Mineralized Material	$/lb Payable
Cu Revenue	8.138	72.76	4.00
Ag Credits	654	5.85	0.32
Revenue	8.792	78.60	4.32
Concentrate Transportation Costs	375	3.36	0.18
Treatment & Refining Charges	349	3.12	0.17

Operating Cash Flow	LOM	$/t Mineralized Material	$/lb Payable
Net Smelter Return	8.068	72.13	3.97
Royalties	205	1.83	0.10
Mining Costs	1.945	17.39	0.96
Processing Costs	711	6.36	0.35
G&A Costs	483	4.31	0.24
Working Capital	-33	-0.30	0.02
Total OPEX	**3.311**	**29.60**	**1.63**
Operating Cash Flow	**4.758**	**42.54**	**2.34**

**Note: mineralized material tonnage and payable copper unit costs during operations period only.*

1.20 Economic Analysis

The undiscounted after-tax cash flow is estimated at USD 2.723M for the White Pine North Project. The pre-tax net present value at 8% (“$NPV_{8\%}$”) is estimated at USD 1,024M with an 23.1% internal rate of return (“IRR”) and 3.2 y payback period. Similarly, the after-tax $NPV_{8\%}$ is estimated at USD 821M with an 20,8% IRR and 3.5 y payback period.

The annual cash flow is summarized in Figure 1.2 and a cash flow waterfall for the White Pine North Project is presented in Figure 1.3.

Figure 1.2: After-Tax Annual Project Cash Flow

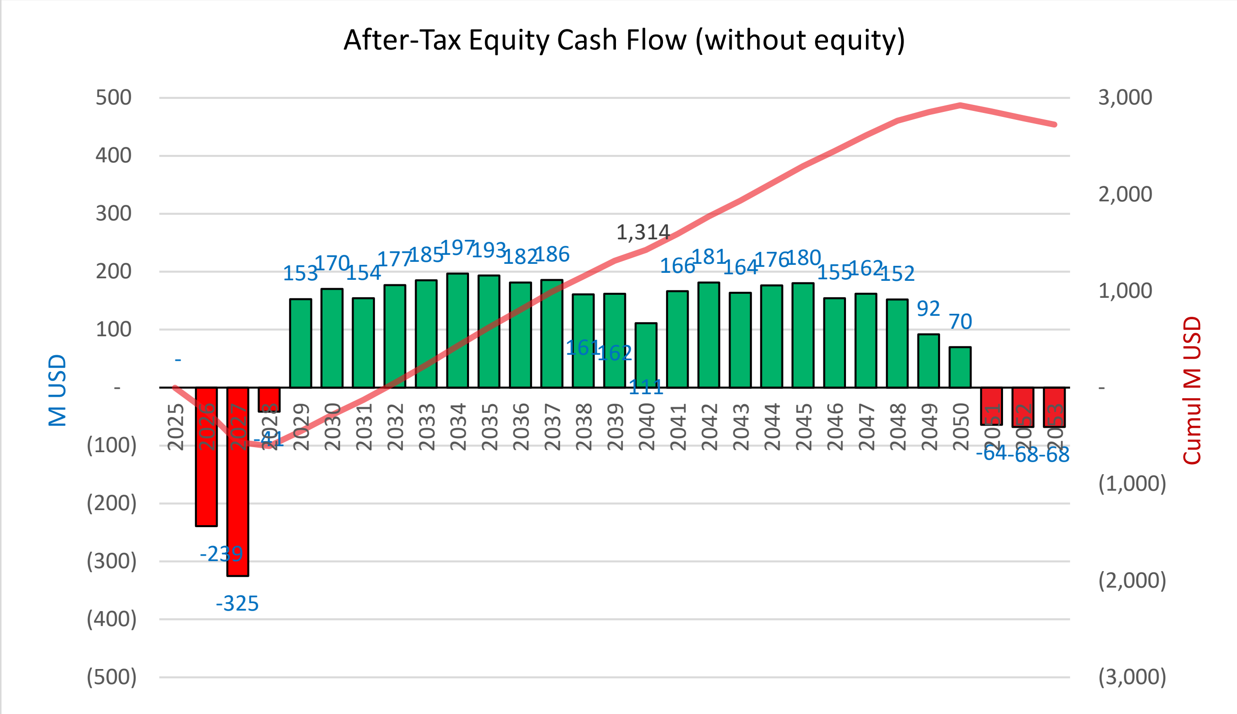
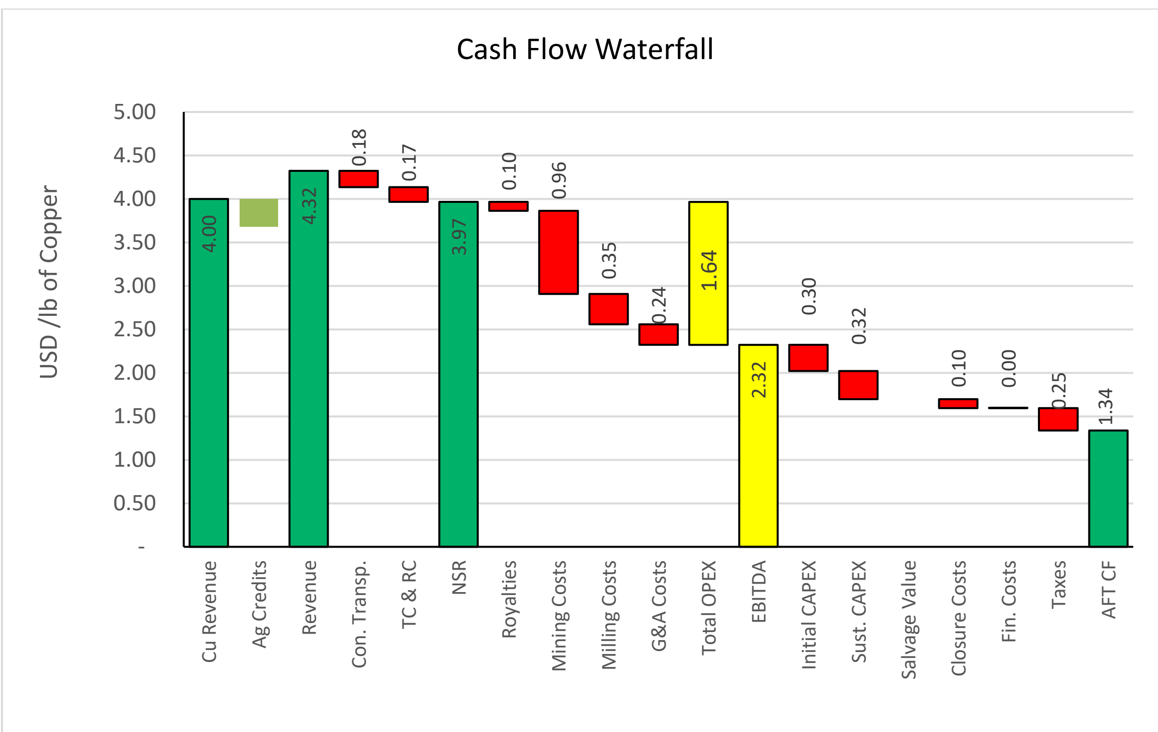


Figure 1.3: After-Tax Project Cash Flow Waterfall



1.21 Other Relevant Data and Information

The reader is cautioned that this PEA is preliminary in nature as it includes Inferred Mineral Resources that are too geologically speculative for the economic considerations that would enable them to be categorized as mineral reserves to be applied, and there is no certainty that the PEA will be realized.

1.22 Risks and Opportunities

The risks and opportunities identification and assessment process are iterative and have been applied throughout the PEA Study phase. The following risks and opportunities are summarized in Table 1.7.

Table 1.7: Project Risks and Opportunities

Project Risks	Project Opportunities
Permit acquisition or delays	Reduction in pillar with former White Pine mine.
Requirement for lining tailings pond	Shaft to accelerate access to the White Pine North mineralized zone.
Lack of local labour availability	Metallurgical recovery improvements from flotation process and SX-EW option.
Insufficient housing to support work force	Underground tailings disposal.
Ability to attract experienced professionals	Funding from State and Federal Grants.
Declining metal prices	Ore Sorting.
Faults creating offsets in the mineralization	Alternative site for the copper concentrate transload operations, closer to White Pine.
Cost inflation	

1.23 Recommendations

Based on the positive results of the PEA, GMS recommends that the White Pine North Project move forward to the next phase which would include the following:

- Infill resource drilling at White Pine North Deposit (eastern sector) to upgrade the current Inferred Mineral Resources to Indicated category in order to support a Feasibility Study.
- Confirm mining methods, ventilation and initiate underground geotechnical rock mechanics analysis studies.

- Establish and execute metallurgical testwork program and confirm process flowsheets including preliminary equipment sizing and trade-off studies and other processing alternatives
- Feasibility engineering designs including infrastructure, preliminary layouts.
- Starting project definition process for permitting.

2 INTRODUCTION

In April 2015, White Pine Copper LLC entered into an agreement with Great Lakes Resources, LLC to lease certain mineral rights covering an area of approximately 1,816 acres within the White Pine North project area. The mineral lease is for 20 years, with an option for an additional five years.

In 2019, WPC hired GMS to prepare a PEA for the White Pine North Project. In July 2021, WPC (Highland) completed the acquisition of the White Pine North copper project from Copper Range Company, a subsidiary of First Quantum Minerals Ltd.

In April 2023, WPC hired GMS to update the PEA issued in 2019. The objectives of this study were to update the economics of the project, and to look at technical alternatives to improve the 2019 study. The findings of this study are described in the following sections.

2.1 Scope of Work

GMS was retained by WPC to prepare a Technical Report in accordance with Canadian Instrument 43-101 (“NI 43-101”) Standards of Disclosure for Mineral Projects for the White Pine North Project located in the western sector of the Upper Peninsula of Michigan, USA.

This Report supports the results of the Preliminary Economic Assessment (“PEA”) and Mineral Resource Estimate (“MRE”) as disclosed in Highland Copper press release entitled “Highland Copper Announces Preliminary Economic Assessment Results for Its White Pine North Project and Joint Venture Transaction with Kinterra” dated July 24, 2023.

The reader is advised that a PEA is preliminary in nature and is intended to provide only an initial, high-level review of the Project potential and design options. The PEA mine plan and economic model include numerous assumptions and the use of Inferred resources. Inferred resources are too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral reserves and to be used in an economic analysis except as allowed for in PEA studies. There is no guarantee that Inferred resources can be converted to Indicated or Measured Resources, and as such, there is no guarantee the Project economics described herein will be achieved.

This Report has several cut-off dates for information:

- The effective date of the Current Mineral Resource is July 12, 2023.
- The effective date of this Report is September 7, 2023.

The PEA is focused on the extraction and processing of potentially economic mineralization from the White Pine North deposit which lies to the north of the former White Pine Mine.

The PEA scope includes the following main aspects:

- Mineral resource drilling and mineral resource estimation
- Geotechnical assessment and updated mine design criteria
- Mine engineering, including mine design and production schedule
- Metallurgical testing confirming historical metallurgical performances of the former White Pine Mine
- Simplified metallurgical flowsheet
- Power supply options evaluation
- Infrastructure requirements
- Tailings disposal evaluation using historical tailings impoundment footprint
- Estimation of operating expenditures (OPEX) and capital expenditures (CAPEX) for the Project
- Economic analysis

2.2 Sources of Information and Data

Some of the information and data contained in this Report were obtained from WPC; sources included the previously published NI 43-101 technical report prepared by Rod Johnson & Associates Inc. in February 2014 and references cited in this report. However, this report did not include a mineral resource estimate.

GMS has sourced information from historical reports and appropriate reference documents as cited in the text and summarized in Section 27 of this Report. GMS has relied upon other experts in the fields of mineral tenure, surface rights, permitting and environment as outlined in Section 3.

2.3 Qualifications and Experience

GMS was responsible for the overall PEA. A summary of the Qualified Persons ("QPs") responsible for each section of the Report is detailed in Table 2.1.

Table 2.1: Summary of Qualified Persons

	Qualified Person	Company	Report Sections
1	Carl Michaud, P.Eng.	G Mining Services Inc.	1.1,1.2,1.3,1.4,1.14,1.17, 1.19,1.20,1.21,1.22,1.23,1,2,3,4,5,6,16,19 ,21.3,21.4.1,21.4.3,22,24,25,26,27
2	Rejean Sirois, P.Eng.	Consultant for G Mining Services Inc.	1.5 to 1.10, 1.12, 1.22, 1.23, 7,8,9,10,11,12,14,23,24,25,26,27
3	Christian Beaulieu, P.Geo.	Consultant for G Mining Services Inc.	1.5 to 1.10, 1.12, 1.22, 1.23, 7,8,9,10,11,12,14,23,24,25,26,27
4	Luc Binette, P.Eng.	G Mining Services Inc.	1.16,18,21.1,21.2,24,25,26,27
5	Martin Houde, P.Eng.	G Mining Services Inc.	1.11,1.15,1.22,13,17, 21.4.2,24,25,26,27
6	Andrea K. Martin, P.E.	Forth Infrastructure & Environment LLC	1.18,20, 25.4

2.4 Site Visits

Mr. Réjean Sirois and Mr. Christian Beaulieu visited the site from January 13th to January 16th, 2014, to review information and to confirm drill logs, assay certificates, sample intervals, downhole survey information and field checks to validate drill collars. Mr. Sirois returned on October 16th to October 18th, 2019, visited the core shack, reviewed drill hole collars and samples, and visited the site aboveground.

- Mr. Carl Michaud has not visited the White Pine site.
- Mr. Luc Binette, P.Eng. has not visited the White Pine site.
- Mr. Martin Houde, P.Eng. has not visited the White Pine site.
- Ms. Andrea K. Martin, P.E. has not visited the White Pine site.

2.5 Units of Measure, Abbreviations and Nomenclature

Unless otherwise indicated, this Technical Report uses Canadian English spelling, US dollar currency and System International (metric) units. Coordinates in this Technical Report are presented in metric units, metres or kilometres using the Universal Transverse Mercator (“UTM”) projection (UTM Zone 16, NAD83 datum). Elevations are reported as metres above mean sea level (“masl”).

A list of the main abbreviations and terms used throughout this Report is presented in Table 2.2**.**

Table 2.2: List of Main Abbreviations

Abbreviations	Full Description
amsl	Above Mean Sea Level
Actlab	Activation Laboratories Ltd.
AX	AX Size Core; Core Diameter 3.01 cm
G	Billion
Ga	Billion years
BCM	Bank Cubic Meter
BSZ	Basic Shear Zone / Basal Gouge Zone
BX	BX Size Core; Core Diameter 4.20 cm
CAPEX	Capital Expenditures
CBS	Copper Bearing Sequence
cm	Centimetre
CN	Canadian National
CFM	Cubic foot per minute
CoV	Coefficient of variation
CPG	Certified Professional Geologist
Chesborough	A.M. Chesborough
CIM	Canadian Institute of Mining Metallurgy and Petroleum
CRI	Copperwood Resources Inc. (formerly known as Orvana Resources US Corp.)
CRM	Control Reference Material
CSA	Canadian Securities Administrators
CSF	Confinement Strength Factor
Cu	Copper
°	Degrees (Azimuth or Dip)
°C	Degrees Celsius
Dmt	Dry metric tonne
E	East
EIA	Environmental Impact Assessment
Eng	Engineering
ERP	Enterprise Resource Planning
FS	Feasibility Study

Abbreviations	Full Description
ft	Feet
FEMA	Federal Emergency Management Agency
Fe-O	Iron Oxide
G&A	General & Administration
GMS	G Mining Services Inc.
Golder	Golder Associates Ltd.
GLGT	Great Lake Gas Transmission
g	Grams
g/t	Grams per Tonne
ha	Hectares
HDPE	High Density Polyethylene
Highland	Highland Copper Company Inc.
HQ	HQ Size Core; Core Diameter 6.35 cm
ICP OES	Inductively Coupled Plasma Optical Emission Spectrometry
IDB	Influent Design Basis
IEC	International Electrotechnical Commission
IRR	Internal Rate of Return
IRS	Internal Revenue Service
ISO	International Organization for Standardization
KLA	Keweenaw Minerals, LLC
Kg	Kilogram
k/t	Kilogram per tonne
km	Kilometre
kV	Kilovolt
LAN	Local Area Network
LCCS	Low-Cost Country Sourcing
LiDAR	Light Detection and Ranging
l	Litre
LHD	Load Haul Dump
LCBS	Lower Copper Bearing Sequence
LLC	Limited Liability Company

Abbreviations	Full Description
LoM	Life of Mine
Lyco	Lycopodium Limited
METCON	Metcon Research
m	Metre
m/d	Metres per day
masl	Metres above sea level
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MDOT	Michigan Department of Transportation
MST	Nonferrous Metallic Minerals Extraction Severance Tax
µm	Micron
mm	Millimetre
Mt	Million Tonnes
Mtpa	Million tonnes per annum
MACRS	Modified Accelerated Cost Recovery System
GEOID03	National Geodetic Survey Geoid 03
N	North
NAD83	North American Datum 1983
NAVD88	North American Vertical Datum 1988
NI 43-101	National Instrument 43-101
NI 43-101CP	National Instrument 43-101 Companion Policy
NI 43-101F1	National Instrument 43-101 Form 1
NNG	Northern Natural Gas
NPV	Net Present Value
NQ	NQ Size Core; Core Diameter 4.80 cm
NREPA	Natural Resources and Environment Protection Act
NSR	Net Smelter Return
NCNST	North Country National Scenic Trail
NREPA	Natural Resources Environmental Protection Act
OK	Ordinary Kriging
OPEX	Operating Expenditures

Abbreviations	Full Description
PMWSP	Porcupine Mountains Wilderness State Park
Osisko	Osisko Gold Royalties Ltd.
Orvana	Orvana Minerals Corp.
lb	Pound(s)
%	Percent
PE	Professional Engineer
Project	Copperwood Project
QA/QC	Quality Assurance/Quality Control
QP	Qualified Person
REI	Resource Exploration Inc
R&P	Room and Pillar
Ag	Silver
S	South
Sage	Sage Minerals Inc.
SG	Specific Gravity
SGS	SGS Lakefield
SGCN	Michigan Species of Greatest Conservation Need
km^2	square kilometre
TC/RC	Treatment Charge and Refining Costs
TDF	Tailings Dam Facility
TSF	Tailings Storage Facility
TDM	Tailings & Water Disposal Management
3D	Three Dimensional
t	Tonnes
tpa	Tonnes per annum
tpd	Tonnes per day
tpy	Tonnes per year
UCBS	Upper Copper Bearing Sequence
USD	United States Dollars
USA	United States of America
USGPM	US Gallon per minute

Abbreviations	Full Description
USG	US Gallon
USFWS	U.S. Fish and Wildlife Service
USMR	United States Metals Refining Company
UTM	Universal Transverse Mercator
WBS	Work Breakdown Schedule
WC	Working Capital
WPC	White Pine Copper LLC.
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant
W	West
wt.%	Weight Percent
y	Year

3 RELIANCE ON OTHER EXPERTS

This Report has been prepared by GMS for White Pine. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to GMS at the time of the preparation of this Report.
- Assumptions, conditions and qualifications as set forth in this Report.
- Data, reports, and opinions supplied by WPC and other third-party sources.

Certain sections of the Report rely on reports and statements from legal and technical experts who are not Qualified Persons ("QP") as defined by National Instruments 43101 ("NI 43-101"). The QPs responsible for preparation of this Report have reviewed the information and conclusions provided and determined that they conform to industry standards, are professionally sound and are acceptable for use in this Report.

The following companies and consultants have been retained by White Pine to prepare some aspects of this Report. Their involvements are listed below:

- GMS has relied upon information provided by White Pine, including legal opinions concerning certain mineral rights, prepared by Kendricks, Bordeau, Adamini, Greenlee & Keefe, P.C.; a Michigan law firm and a commitment for title insurance issued by First American Title Insurance Company for the surface rights.
- GMS has relied on input from KPMG regarding the taxation model and calculations used to estimate after-tax cash flows in the economic model.
- GMS has relied on geotechnical input from a review of historical pillar dimensioning of the former White Pine mine conducted by Itasca Consulting.
- GMS has relied on input from Golder / WSP for water and tailings management, including construction costs.
- GMS has relied on Foth Infrastructure & Environment for support on regulatory, environment and permitting aspects of the project.
- GMS has relied on Orway Mineral Consultants (OMC) for grinding circuit modelling purposes.

This Report is intended to be used by White Pine as a Technical Report with Canadian Securities Regulatory Authorities, pursuant to provincial securities legislation. Except for the purposes contemplated under provincial securities laws, any other use of this Report by any third party is at the party's sole risk.

Permission is given to use portions of this Report to prepare advertisement, press releases and publicity material, provided such advertisement, press releases and publicity material does not impose any additional obligations or create liability for GMS.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 Location

The White Pine North Project is located in the Upper Peninsula of the State of Michigan, USA, approximately 7.5 kilometers (“km”) south of Lake Superior in Ontonagon County at 46° 45’ 42” N latitude and 89° 33’ 52’ W longitude (UTM coordinates 5181816N, 304,170E). The county seat is Ontonagon, 25 km northeast of the Project.

The White Pine North Project covers approximately 4,500 hectares (11,000 acres) of surface rights and approximately 11,990 hectares (29,615 acres) of mineral rights. Surface and mineral rights are located in portions of Township 51N Range 42W, Township 51N Range 41W, Township 50N Range 42W, and Township 50N Range 41W in the Township of Carp Lake, Ontonagon County, Michigan as shown on Figure 4.1. Third party properties are also shown on Figure 4.2. These areas overline mined-out portions of the former White Pine Mine, the mine portal, a refinery and a power plant, none of which are being acquired by the Company.

Figure 4.1: White Pine Location Map

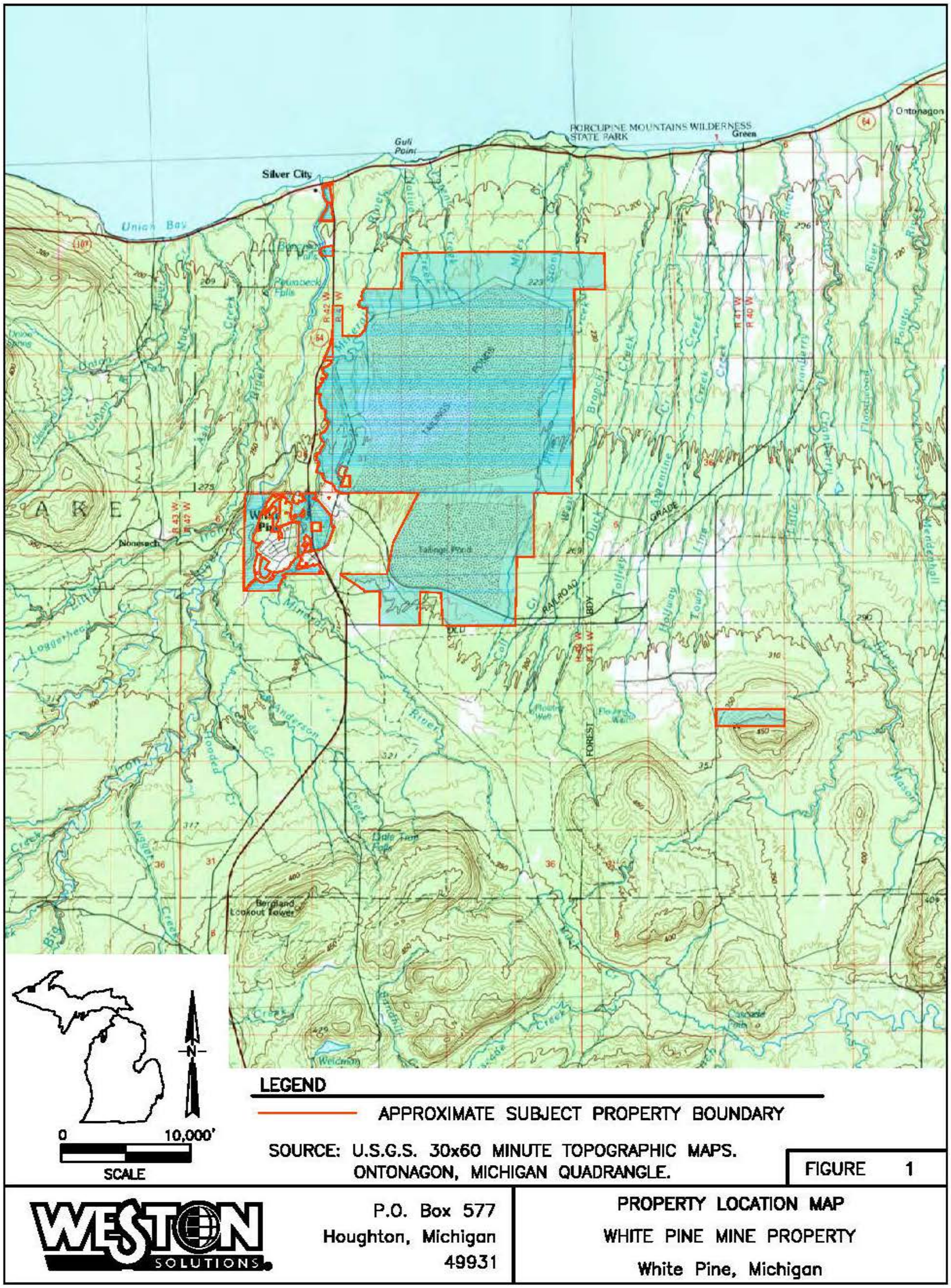
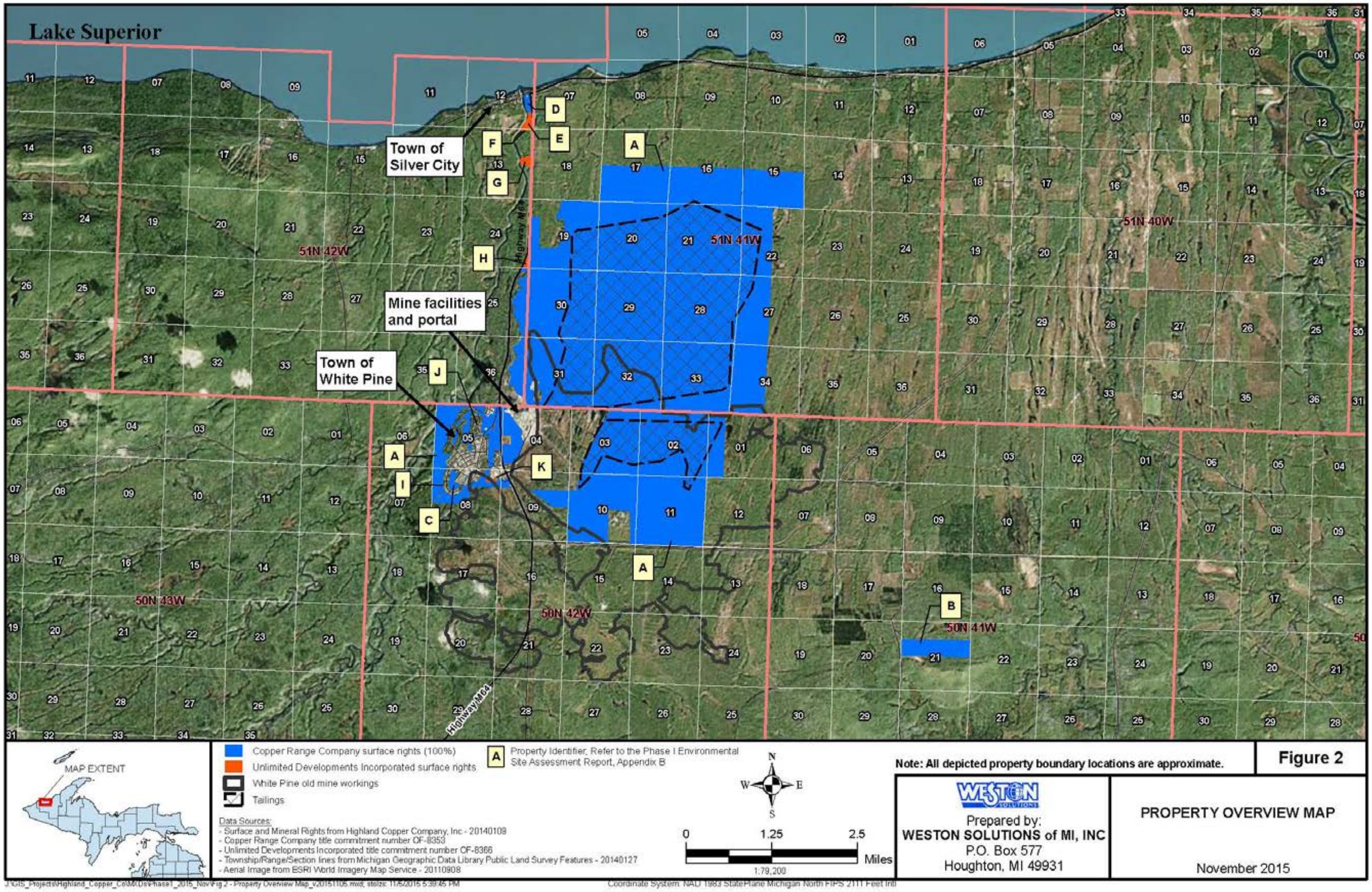


Figure 4.2: White Pine Property Outline (in red) Showing Surface Ownership



4.2 Michigan Property Rights

Ownership of mineral resources in Michigan was originally granted to the persons who owned the surface. These property owners had both "surface rights" and "mineral rights". This complete private ownership is known as a "fee simple estate". Mineral rights may be severed from the surface estate and held by separate parties. Where severed from the surface rights, the mineral rights become subject to Michigan's *Marketable Record Title Act* of 1945, as amended.

Surface and mineral rights in Michigan are located and described with reference to a grid established by the federal government as part of the Public Lands Survey System. Townships are squares of 36 km^2 comprising 6 x 6 arrays of 36 sections, named according to distance and direction from a principal meridian and baseline. Sections are one-mile square, and can be divided into quarters, labeled NE, NW, SE, and SW. Each quarter can also be split into halves or quarters, which are labeled according to the side or corner of the quarter section they encompass (e.g., NE 1/4 of the NW 1/4).

The township and range grid in the White Pine area was established in 1851. Curvature of the earth and survey errors both result in variations in the sizes of the townships and sections. Section boundaries are usually marked in the field by small survey monuments.

4.3 White Pine Copper LLC Interest in the White Pine Project

4.3.1 Mineral and Surface Rights Acquisition

In July 2021, White Pine Copper LLC ("WPC"), a wholly owned subsidiary of Highland at the time, successfully completed the acquisition of rights, title and interest of Copper Range Company ("CRC"), a subsidiary of First Quantum Minerals Ltd., in the White Pine Project.

The properties being acquired from CRC comprise: (i) areas of mineral rights 100% owned by CRC; (ii) areas where CRC holds a fee simple interest in both the surface rights and mineral rights; and (iii) four areas where CRC holds partial (75%) mineral interests. Michigan law provides that, where multiple parties own the mineral rights in a parcel of property, any owner holding at least 75% of the mineral rights may obtain a court decree allowing that owner to explore and develop the minerals under that parcel. As part of the interim closing, a commitment for title insurance on the fee simple interests was issued and the Company received a title opinion to confirm the ownership by CRC.

4.3.2 Mineral Lease Agreement

In April 2015, the Company entered into an agreement to lease certain mineral rights from Great Lakes Resources LLC ("Great Lakes") located in White Pine. The leased mineral rights cover an area of approximately 1,816 acres. No survey has been conducted. The mineral rights are located within portions of Sections 20, 21, 28 and 33 of Town 1 North, Range 41 West and portions of Section 36 of Town 51 North, Range 41 West. A title opinion on the leased mineral rights has been prepared at the Company's request by Ronald Greenlee of Kendricks, Bordeau, Keefe, Seavoy & Larsen, P.C.

Of an initial closing payment of USD 800,000, a balance of USD 165,000 at June 30, 2019 remains to be paid to Great Lakes in equal quarterly payments of USD 27,500. The mineral lease with Great Lakes is for 20 years, with an option for an additional five years. Annual lease payments are $25,000 for the first five years, $30,000 for the sixth and seventh years and $1,000,000 thereafter. Beginning on the eight (8^{th}) anniversary, all annual rentals paid by the Company will be treated as advance royalty payments and will be a credit in favor of the Company against the future production royalty to be paid. Upon commencement of production, the Company will have to pay a sliding scale royalty on copper and silver production from the leased mineral rights with a base royalty of 2% for copper and 2.5% for silver. The Company has an option to repurchase 50% of the royalties.

4.4 Title Over the Mineral Resource Area

The Mineral Resources reported in this Report is covered by mineral rights held by White Pine Copper LLC ("WPC") and Great Lakes leased mineral rights located in portions of Township 51N Range 41W in the Township of Carp Lake, Ontonagon County, Michigan. The Company has obtained a title opinion from Ronald Greenlee of Kendricks, Bordeau, Keefe, Seavoy & Larsen, P.C. confirming that White Pine Copper LLC ("WPC") and Great Lakes owns the mineral rights over the area covering the Mineral Resources.

4.5 Permits

Most of Michigan's environmental regulations are referred to as "Part(s)" and are contained in the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended ("NREPA"). The Oil, Gas, and Minerals Division of the Michigan Department of EGLE administers Part 625, Mineral Wells, of the NREPA. This statute and the promulgated rules govern aspects of well location, drilling, operation, plugging, and restoration for solution mining wells, brine production wells, certain types of disposal wells, and test wells associated with mineral exploration and extraction. In addition, test wells must meet the requirements of other Parts of the NREPA to prevent damage to water, air, soil, wetlands, and other environmental values.

Nonferrous minerals such as copper and silver are regulated by Part 632, Nonferrous Metallic Mining. Part 632 provides a regulatory framework for construction, operation, and reclamation of mining operations required for the safe and environmentally sustainable extraction of these metallic minerals. The Oil, Gas, and Minerals Division of the Michigan Department of EGLE is responsible for the implementation of Part 632.

Activities which impact “regulated wetlands” and/or “inland lakes or streams” may require a joint permit from the EGLE under Part 303 (Wetland) and/or Part 301 (Inland Lakes and Streams) of NREPA.

The nonferrous metallic mining industry is also regulated by other environmental statutes and divisions within the EGLE such as Air Quality Division and Water Resources Division.

4.6 Environmental Liabilities

The historical mining, mineral processing and smelting operations at the former White Pine mine property (the “Mine Property”) until 1995 resulted in releases of hazardous substances on and beneath the former Mine Property and the site is regulated by Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). The Mine Property includes a portion of the area identified as the “White Pine Mine Facility” in a consent decree between WPC, Michigan’s Attorney General, and EGLE, dated October 1997, as amended (the “Consent Decree”). Pursuant to the Consent Decree, WPC and previously CRC, has been addressing the identified environmental impacts at the Mine Property by undertaking certain environmental response activities. These include, soil relocation, source control, capping and re-vegetation, groundwater monitoring, and storm water management with effluent discharges as permitted under a National Pollutant Discharge Elimination System (“NPDES”) permit, and land use restrictions in the form of recorded declarations of restrictive covenants.

The environmental response activities are being implemented through interim response activity plans (“IRAPs”) and a remedial action plan (“RAP”) approved by the MDEQ on October 13, 2005. Extensive remedial actions have occurred to address identified impacts and recognized environmental conditions. To a large extent, the environmental response activities have been completed. However, on-going responsibilities and liabilities remain.

WPC will assume all environmental liabilities related to the Consent Decree and on-going environmental obligations. These on-going responsibilities and obligations include:

- Consent Decree
- Completion of all required environmental response activities

- Maintenance of a financial assurance mechanism to cover the anticipated costs of future environmental response activities
- Completion and EGLE approval of an underground mine closure plan
- IRAPs and RAP
- Compliance with recorded declarations of restrictive covenants
- Quarterly engineered barrier inspection and maintenance
- Complete removal or installation of engineered barrier in Slag Pile Area, as necessary, based either on results of runoff sampling or election of presumptive capping remedy
- Portal Creek biological monitoring to determine recovery status
- On-site response action repository inspection
- Permanent marker maintenance
- National Polluant Discharge Elimination System (“NPDES”) Permit
- Routine monitoring of effluents from the NPDES System and discharge compliance. The NPDES permit issued to CRC was renewed in 2016
- NPDES permit renewal application submitted to EGLE in April 2019, current permit expired October 1, 2019. The expired permit was extended by EGLE with acceptance of an administratively complete renewal application and remains in effect during their ongoing review process. When issued, the renewed permit will be transferred to White Pine Copper LLC.
- Underground Mine Closure Plan
- Maintenance of a “freshwater cap”
- Removal of all contaminants in the underground mine
- Flooding of the underground mine
- Post-flooding sampling and analysis program
- Groundwater Monitoring
- Routine monitoring and data evaluation to assess plume movement and natural attenuation of metals (primarily barium, lithium, manganese, and strontium)
- Monitoring associated with the on-site response action repository
- Re-vegetation of the tailings basins

- Achieve minimum 70% effective vegetation cover and monitor for five years after achieving effective cover
- Achieve diversity of 5+ species in at least three of five years after ceasing augmented management
- North #2 Pond has met objectives, North #1 and North #2 Cyclone Sands Area have not and are surveyed annually
- Dam Safety (to prevent failure and tailings release)
- Routine monitoring (operational inspections) and maintenance.
- Formal third-party inspection of North No. 1 every 5 years (low hazard potential).
- Formal third-party inspection of North No. 2 every 4 years (significant hazard potential).
- Maintenance of an up-to-date emergency preparedness response plan.

Part 201 of NREPA requires that certain “due care” obligations be satisfied in connection with activities on a property that is a “facility” as defined therein. Forty-four of the surface parcels acquired by WPC are “facilities” which include parcels within and outside of the boundary of the “White Pine Mine Facility” as identified in the consent decree.

As listed in Part 201, due care obligations include:

- Undertaking measures as necessary to prevent exacerbation.
- Undertaking response activity necessary to mitigate unacceptable exposure to hazardous substances, mitigate fire and explosion hazards due to hazardous substances, and allow for the intended use of the facility in a manner that protects the public health and safety.
- Taking reasonable precautions against the reasonably foreseeable acts or omissions of a third party and the consequences that foreseeably could result from those acts or omissions.
- Providing reasonable cooperation, assistance, and access to the persons that are authorized to conduct response activities at the facility.
- Complying with any land use or resource use restrictions established or relied on in connection with the response activities at the facility, and,
- Not impeding the effectiveness or integrity of any land use or resource use restriction employed at the facility in connection with response activities.

WPC has in-place a Section 7a Compliance Analysis or “Due Care Plan” (DCP) that addresses due care obligations applicable to WPC’s ownership of and activities on these parcels. The DCP also identifies where additional assessment, potential due care response activities, and other site management considerations may be warranted, including at parcels encompassing the historic ball mill, former Carp Lake Township dump, and an additional historic dump. WPC has been conducting additional assessment and implementing due care measures following the DCP. As planned activities or conditions change, or if previously unknown contamination is discovered, the DCP will be updated and due care response activities implemented as warranted.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Accessibility

The White Pine North Project is in the Upper Peninsula of the State of Michigan, USA, approximately 7.5 kilometres ("km") south of Lake Superior in Ontonagon County at 46° 45' 42" N latitude and 89° 33' 52' W longitude (UTM coordinates 518,816N, 304,170E). The county seat is Ontonagon, 25 km northeast of the Project.

The area is accessible via Michigan State Highway 64, which runs north-south 0.5 km west of the Project footprint. The nearest airports serviced by commercial flights are Ironwood, Hancock and Marquette.

5.2 Climate

The Project area has a humid continental climate strongly influenced by the proximity to Lake Superior, characterized by weather patterns usually known as "lake effect", which affects temperature, precipitation and cloud cover. This lake effect phenomenon exists because the Lake Superior water warms and cools more slowly than the surrounding air. This proximity also results in increased precipitation because large amounts of moisture are available for air masses as they travel across the lake. With the predominant wind direction from the west, the lake effect is exacerbated in the winter as cold air blows across the warmer lake, acquiring moisture and dumping heavy snowfall as it meets the colder land mass.

The average annual rainfall in Ontonagon County is 86 cm (33.9 in.") with snowfall of 459 cm (177 in.) at White Pine. There are on average 185 sunny days and 142 days with precipitation. The average July high temperature is 26°C (78.8°F) and the average January low temperature is -16°C (3.7°F).

5.3 Local Resources

The Project is close to several communities, including White Pine, Ontonagon, Bergland, Wakefield and Ironwood, all suffering from declining economic activity in the region and population loss, particularly young people. These communities offer ample real estate opportunities for the influx of mine workers. The unincorporated town site of White Pine lies immediately across M-64, 0.6 km to the southwest of the mine site and had a population of 446 persons in the 2020 census. The town was built during the construction of the present White Pine Mine in 1952 to service employees of the mine. White Pine underwent an expansion during 1968-1969. The town site provides access to a restaurant and motel complex and a small mall, containing the post office. The major population centers for the region are Houghton, located about 111 km to the northeast with a population of 7,708 in 2010 and Marquette, located about 201 km to the east with a population of 21,355 in 2010.

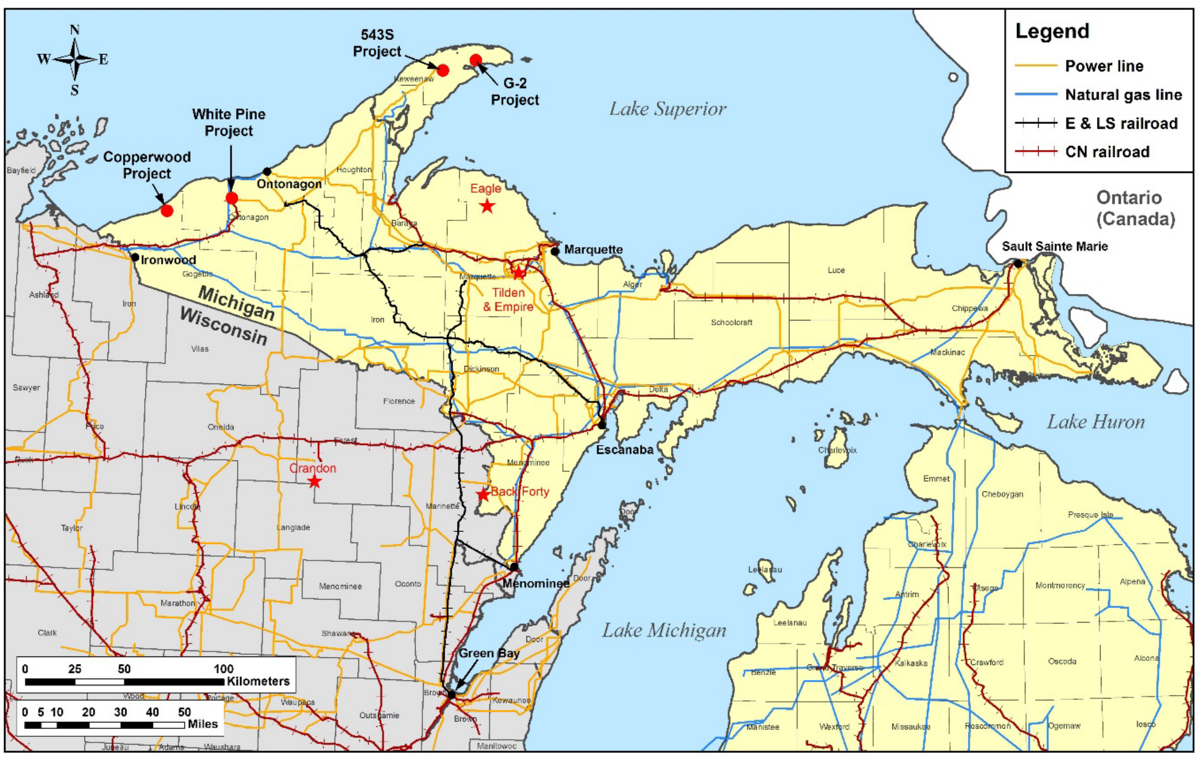
The schooling system in the region is good, with an outstanding engineering university at Houghton (Michigan Tech), a community college at Ironwood and the Northern Michigan University in Marquette.

Even with a relatively low level of economic activity, there are several service groups available in the region, including engineering, environmental, analytical, transportation, etc. In the Marquette area, there are several service companies that cater to the needs of both Cliffs and Eagle mining operations.

5.4 Infrastructure

The Michigan Upper Peninsula has well developed infrastructure, with paved road, optic fiber, natural gas pipelines, power grid and rail assets available (Figure 5.1). There are also lacustrine ports at Marquette and Ontonagon (to be rehabilitated), which could receive and ship bulk goods.

Figure 5.1: Map of Available Infrastructure in the Upper Peninsula of Michigan



5.4.1 Roads and Railroads

Michigan State Highway 64, running north-south along the Project area, is linked to both the Michigan and federal highway systems nationwide.

The Project area is accessible by a formerly Canadian National ("CN"), now owned by Watco, rail spur, which leads to the Morengo junction in Ashland County, Wisconsin (Figure 5.2). The other nearest rail spur is in Ontonagon County, owned by Escanaba and Lake Superior Railroad, which leads southwest to Escanaba and connects to the CN rail grid. Both rail spurs would need to be refurbished if to be used commercially by a new mining operation.

5.4.2 Services Buildings and Ancillary

Copper Range Copper ("CRC") sold existing facilities upon closure in 1995 and several parties bought various buildings and parcels of land of what was called "White Pine Industrial Park" (Figure 5.3). The processing plant and smelter were dismantled, but the power plant, refinery and other accessory buildings were kept and sold. Some of these buildings could be repurposed and used for a new mining operation.

The White Pine copper refinery is a facility that was part of a fully integrated copper producing operation that included a smelter. The refinery treated Hudson Bay anodes from Flin Flon, Canada, until it was sold again in 2011. It has a design capacity of 80,000 tpy and consists of an electrolytic copper refinery using Mt. ISA stainless steel technology, including a modern EMEW electro winning plant commissioned in 2008 with rated capacity of 1,500 tpy, an AISCO anode preparation machine, and a MESCO cathode stripping and Sumitomo anode scrap washing machines.

The White Pine Mine underground facilities and its some of its surface footprints were sold to SubTerra, a subsidiary of a Canadian group that intends to use the available underground opening to support business ventures.

Figure 5.2: Aerial of White Pine "Industrial Park" Facilities as of 2014

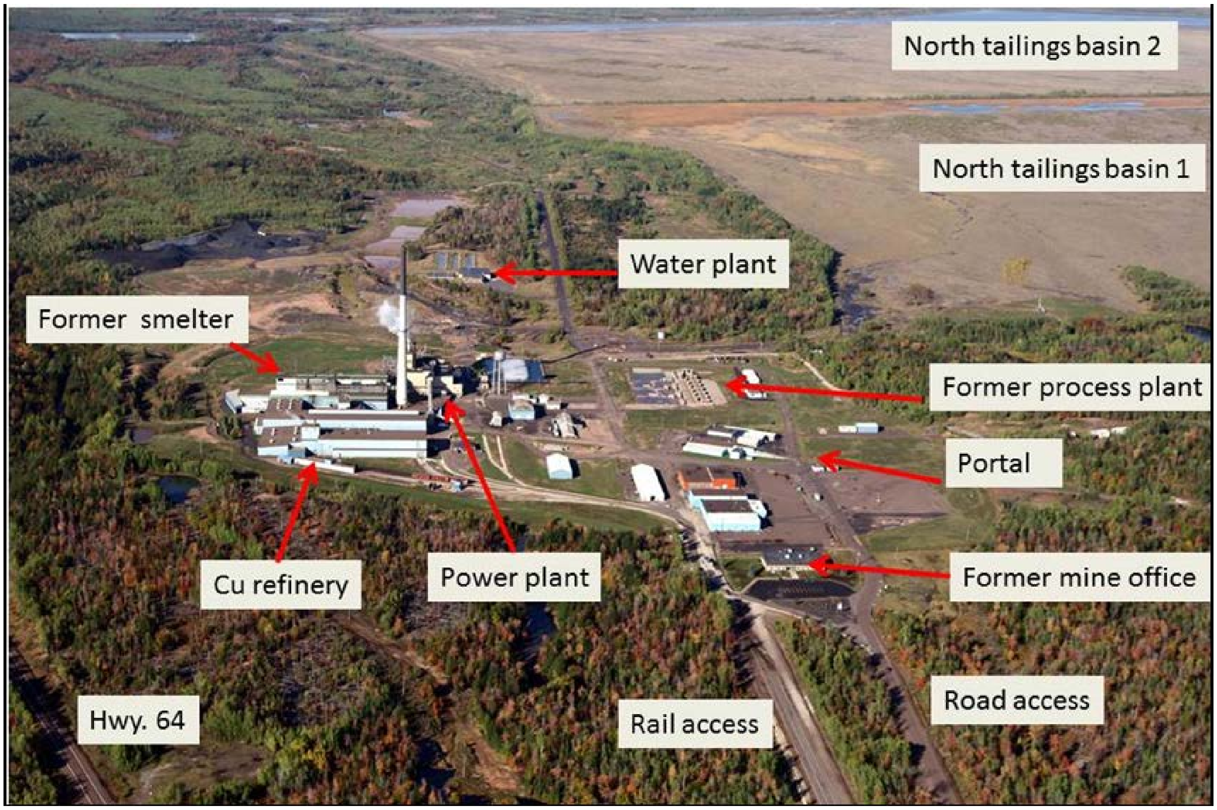
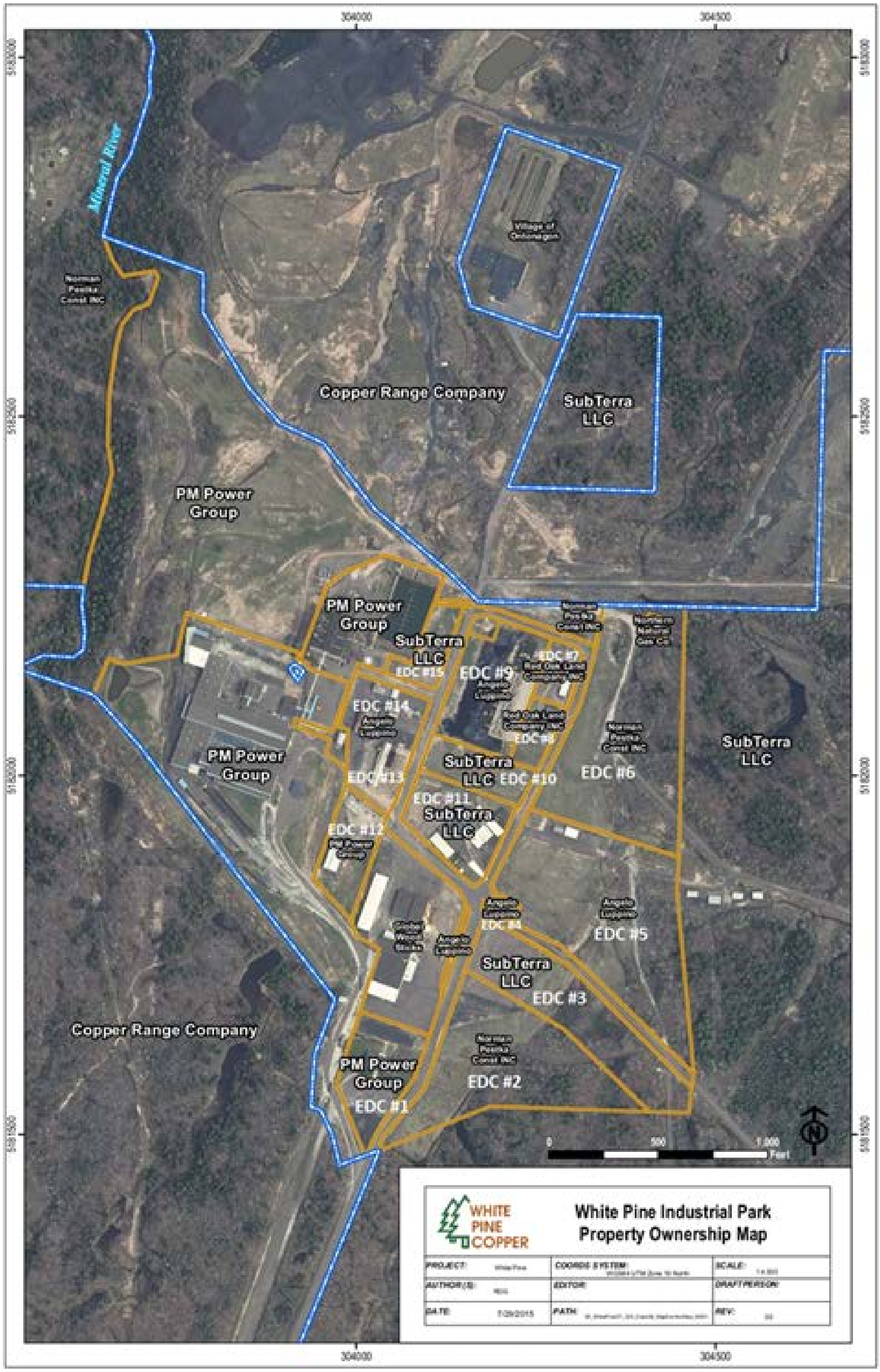


Figure 5.3: Layout of White Pine "Industrial Park" Ownership



5.4.3 Power Supply and Distribution

The White Pine Project site is at the boundary of two utility franchises: Xcel Energy to the west and UPPCO to the east and neither are currently able to supply power at the envisaged loads. Xcel´s grid at 138 kV capacity stops in Ironwood and ATC´s at Ontonagon. The site is currently served by a 69 kV line coming from the east. ATC has medium-term plans to link its 138 kV grid with Xcel´s by constructing a new line, which would run by the vicinity of White Pine.

The Project is served by two natural gas pipeline systems, which could be tapped to produce thermal power. The Northern Natural Gas pipeline reaches White Pine, and the Great Lakes pipeline runs about 20 km to the south. The Northern Natural Gas pipeline services the nonoperational power plant at White Pine (30 MW nominal capacity), which used coal when the mine was in production, and until recently was part of the grid as a “peaking” plant called to service in periods of high demand. This plant could theoretically be used by a mining operation if its refurbishment and operation are economic.

In 2015, the government of Michigan announced an agreement between utilities and the largest power consumer in the Upper Peninsula, Cliffs Natural Resources, by which Cliffs would purchase most of its power from the coal-fed Presque Isle plant in Marquette until the facility's retirement in 2020. A replacement natural gas-fired cogeneration power plant would be built, owned and operated by Invenergy on Cliffs' property in Marquette County and make abundant power available for other industries in the UP.

5.4.4 Water

CRC installed a robust water supply system for all its needs based on water intake from Lake Superior. With the closure of the White Pine Mine, the Village of Ontonagon acquired, in 2001, CRC´s raw water intake, pumping equipment, and supply pipes. The Village also acquired the potable water distribution system for the community of White Pine. A 0.91 m (36 in.) concrete raw water supply pipe from Silver City was repurposed for potable water distribution to serve Silver City and Ontonagon. A 1.07 m (42 in.) steel raw water supply pipe provides water from Lake Superior to the White Pine mine site.

The water intake is located off the mouth of the Big Iron River in Silver City and it was constructed by mining a tunnel under Lake Superior. The current water withdrawal limit, based on pumping capacity, is 26 million gallons per day (“MGPD”), verified by the Michigan Department of Environmental Quality – Drinking Water Division staff. The pumping station is located just west of the intersection of M-64 and M-107 on the south side of the highway - five pumps are on site, but only two of the original pumps are still used (600 hp, 7,000 gpm). The other two original pumps were removed and replaced with three smaller pumps

(2,000 gpm). Power to the pumps is a three phase, 600 A service, 480 V load, backed-up by a 500 kW diesel generator.

The 1.07 m (42 in.) raw water supply pipe is located adjacent to highway M-64 between Silver City and White Pine, climbing about 80 m from the lake. The pipe crosses the highway once and has a length of 7.4 km from the pump house in Silver City to the White Pine site. There is a water tower by the former mine plant with a capacity of 200,000 gallons. Raw water is distributed at various locations by the mine site and pipes would require reconnections to existing or abandoned service lines and pumps.

The Village of Ontonagon owns a water treatment plant a few hundred meters north of the former mine site, with a capacity of 2.1 MGPD of potable water, from where water is redistributed to local communities. The use of raw and treated water for a new mining operation would require a service contract with the Village of Ontonagon.

5.4.5 Procurement & Supply

The Project is in the United States mid-west region and close to major heavy equipment, material and service suppliers, and major contractors.

5.5 Physiography

The elevation at the old White Pine mine portal is 265 masl. The Project area is in the Lake Superior Lake Plain regional ecosystem, consisting of a landscape formed by water-reworked moraine and glacial till, drained by numerous small streams and wetlands, slopping gently north toward Lake Superior. On a larger scale, the region is within the southern boundary of the boreal forest (taiga) ecosystem which, locally, contains a variation noted as northern forest. This variation is characterized by coniferous forests, consisting mainly of pine, spruce, and larch mixed with areas of northern hardwoods, paper birch, and aspen. Nearly all of the virgin white pine in the area was logged off in the late 19th century and the area is now covered by second and third growth forest. The system is noted for the abundance of water but poor topsoil due to repeated glaciation.

6 HISTORY

Native copper mining in the Lake Superior region dates back at least 5,000 years, evidenced by numerous ancient pits found along the length of the Keweenaw Peninsula. These ancient pits contain masses of native copper in various stages of removal together with crude stone tools that were used in mining the copper. The Lake Superior area source of this material is established by the unique presence of silver alloyed with the copper.

The first recorded mining operation started in 1771 with an attempt to recover copper from what turned out to be a large glacial erratic. A sustained copper industry in the Peninsula began in 1830 when Douglas Houghton, Michigan's first State Geologist, visited the region. His report in 1841 led to combined State and Federal topographic and geologic surveys in 1844 and in 1845 the Cliff Mine, the first underground mine on the native copper lodes, was opened. The Calumet and Hecla Mine, the largest by far in the district, was opened in 1864. Most of the native copper production came from a 20 km long belt between the towns of Houghton and Calumet and was mined both from amygdaloidal zones in the tops of basalt lava flows and from interbedded conglomerates. During its productive period, from 1845 to 1977, the Keweenaw district produced 11.5 billion pounds of copper from over 300 Mt of ore. All this production was from underground mines.

Concurrent with the development of the native copper mines, exposures of high-grade silver and copper as chalcocite in siltstone units of the Nonesuch Formation were discovered and mined west of the town of Ontonagon in the western Upper Peninsula. The discovery by the Copper Range Company ("CRC") in the 1930s that lower grade zones of chalcocite mineralization extended over a very large area, coupled with increasingly sophisticated metallurgical techniques for treating fine-grained sulfide mineralization, led to development of the White Pine Mine and subsequent discovery of the Copperwood deposit farther west. The White Pine Mine was in production from 1953 through 1995 with only a two-year interruption in 1984 - 1985. By the time it closed, over 2.04 billion kilograms (4.5 billion pounds) of copper had been produced from the Mine.

6.1 Prior and Current Ownership

In 1865, Frank Cadotte discovered the copper-bearing Nonesuch shale in an outcrop in the bed of the Little Iron River and the Nonesuch Mine was opened 3.2 kilometres west of the White Pine Mine. The copper-bearing shale formation was given the name Nonesuch because "no other deposit like it" existed in the Michigan copper district.

In 1879, Thomas Hooper, a Cornish mining captain, started the original White Pine Mine on the bank of the Mineral River. The property was named for the giant white pine trees in the area. Mining concentrated on the fine-grained native copper in the sandy portion of the conglomerate underlying the shale. The copper sulfide mineralization was known, but no economic method existed for its recovery. Lack of capital forced the closure of the original project in 1881.

In 1907, under the direction of Tom Wilcox, the Calumet and Hecla Mining Company ("C&H") purchased the properties and conducted diamond drilling from the original Nonesuch Mine eastward to the area that became the White Pine Mine. Thomas Hooper's original #1 shaft was deepened, and sandstone with greater than 10% native copper was discovered.

In 1912, an additional shaft was sunk by C&H, but it was discovered that a large fault had displaced the ore horizon to what was considered an unreasonable depth at that time. Two additional shafts were sunk to the east and production increased. In 1915, a railroad spur and 1,000-short ton-per-day capacity ball mill were constructed. Most of the smelting was done in Houghton.

From 1915 to 1920, C&H produced 18 million pounds of native copper and 260,000 oz of silver. In late 1920, the mine was closed because of a recession and depressed copper prices.

In 1929, William Schacht, acting as agent for CRC, attended a sheriff's auction for back taxes in Ontonagon and acquired the White Pine properties. It took another 23 years of research to determine an economic method to recover the copper sulfide that existed in the Nonesuch Shale.

In 1950, the outbreak of the Korean War forced the US to consider increasing domestic sources of copper. The federal government requested that CRC consider the completion of its plans to exploit the deposit at White Pine. Financing consisted of a loan of USD 68M from the federal government under the Defense Production Act and USD 13 M from CRC.

In March 1952, construction of the White Pine Mine began and on March 31, 1953, the first ore was hauled to surface via the portal. The mill was completed in 1954 and the first pour of copper in the smelter was on January 13, 1955.

In 1965, the one-billionth pound of copper was poured in the smelter. An expansion project in that year added an additional mine shaft, an additional mill section, and a second furnace in the smelter.

In 1975, Amax Inc. and CRC agreed to a merger. The US Justice Department followed the next month with an antitrust suit to block the merger and additionally to require Amax to divest itself of its 20% ownership of

CRC. The federal district court in New York later ruled in favor of the Justice Department and the merger failed.

In 1977, the Louisiana Land & Exploration Company ("LL&E") purchased the White Pine Mine and CRC became a wholly owned subsidiary of LL&E.

In 1982, LL&E closed the White Pine Mine and put the mine up for sale after continuing losses due to low copper prices and escalating production costs.

In 1984, Echo Bay Mines, Ltd. ("Echo Bay"), a Canadian company, purchased the LL&E interest in the Round Mountain (Nevada) gold mine. The deal required Echo Bay to acquire ownership of the White Pine Mine and all its legacy environmental concerns. Echo Bay immediately began a plan for permanent closure of the White Pine Mine.

In 1985, Echo Bay agreed to sell CRC and the White Pine Mine assets to a management group and the mine employees. CRC was reorganized as a Delaware corporation owned 70% by an employee stock ownership plan and 30% by a management group called Northern Copper Corporation, headed by Russell Wood, a former Vice President of mining for LL&E.

In 1987, Plans were underway to take CRC public through an initial public offering ("IPO") to obtain a listing and initiate public trading in stock of the company. An unexpected, large, instantaneous ground failure occurred during the summer of 1987. The failed area occurred in an area of second-pass mining of mineralized Lower Sandstone. The system failed simultaneously and explosively in workings that ranged from 460 to 550 metres ("m") (1,500 to 1,800 ft) in depth. Final subsidence on surface ranged from one third to greater than one meter. The ground failure in the southwest part of the mine threatened production and the IPO was postponed indefinitely.

In 1989, Metall Mining Corporation ("Metall") and CRC announced an agreement for Metall to acquire CRC.

In 1993, CRC announced the initiation of studies to determine the viability of solution mining in the White Pine Mine. The MDEQ had issued a permit for this Study.

In 1995, Inmet Mining Corporation (formerly Metall) announced in July 1995 that CRC would suspend all conventional mining and milling operations at the White Pine Mine on September 30th, 1995. The smelter had been idled in February due to environmental concerns. The solution mining pilot program continued, as did operation of the refinery.

In 1996, CRC announced approval of the permit for a solution mining operation. Opposition from environmental groups and regional Native American tribes became so intense that the project was put on hold.

In 1997, CRC announced that it was dropping all plans for solution mining operations within the White Pine Mine and that all operations would cease. Plans for removal of all underground assets were begun. Plans for flooding the mine and negotiations with the State of Michigan for the final environmental agreement were undertaken. Reclamation plans for the tailings disposal sites began.

In 1998, the White Pine refinery was sold to BHP Copper USA who, in 2000, sold the refinery to HudBay Minerals and in 2011, HudBay Minerals ceased operations at the White Pine refinery and sold it to Traxys North America LLC.

In 2013, First Quantum Minerals, Ltd. took over Inmet Mining Corporation, the parent company of CRC, and acquired indirect ownership of what was left of the White Pine mine and the surrounding surface and mineral rights.

In 2014, Highland announced that its wholly owned subsidiary, Upper Peninsula Copper Holdings Inc., had completed the interim closing of the acquisition of the White Pine Project from CRC, a subsidiary of First Quantum Minerals Ltd. The final closing of the acquisition was completed in July 2021. As part of the agreement with CRC, White Pine Copper LLC ("WPC"), a wholly owned subsidiary of Highland at the time, assumed all the rights, responsibilities, and obligations of CRC as stipulated in a judicial Consent Decree established in 1997 and subsequently amended, related to the former White Pine mining facility operated by CRC.

In April 2015, White Pine Copper LLC a wholly owned subsidiary of Highland at the time entered into a 20-year lease agreement over certain mineral rights located within the White Pine North project area. The leased mineral rights cover an area of approximately 1,816 acres.

In July 2023, Highland Copper and Kinterra Copper USA LLC ("Kinterra") signed a joint venture agreement in which Kinterra holds a 66% stake in the White Pine North project. Additionally, the joint venture has agreed to spend a further $30 million to advance the project through permitting, infill drilling and feasibility study.

6.2 Exploration History and Historical Drilling

Despite the copper mineralization crops out along the Mineral River, there are very few exposures of the Nonesuch Shale in the area. Drilling has been necessary to identify the distribution of copper mineralization. CRC conducted a continuous drilling program at the White Pine Mine until the early 1970s. There was a hiatus in drilling until the commencement of a drilling program in 1994-1995. The 1994 drilling program was conducted to provide a resource estimate supporting a feasibility study to build a new smelter at the White Pine site.

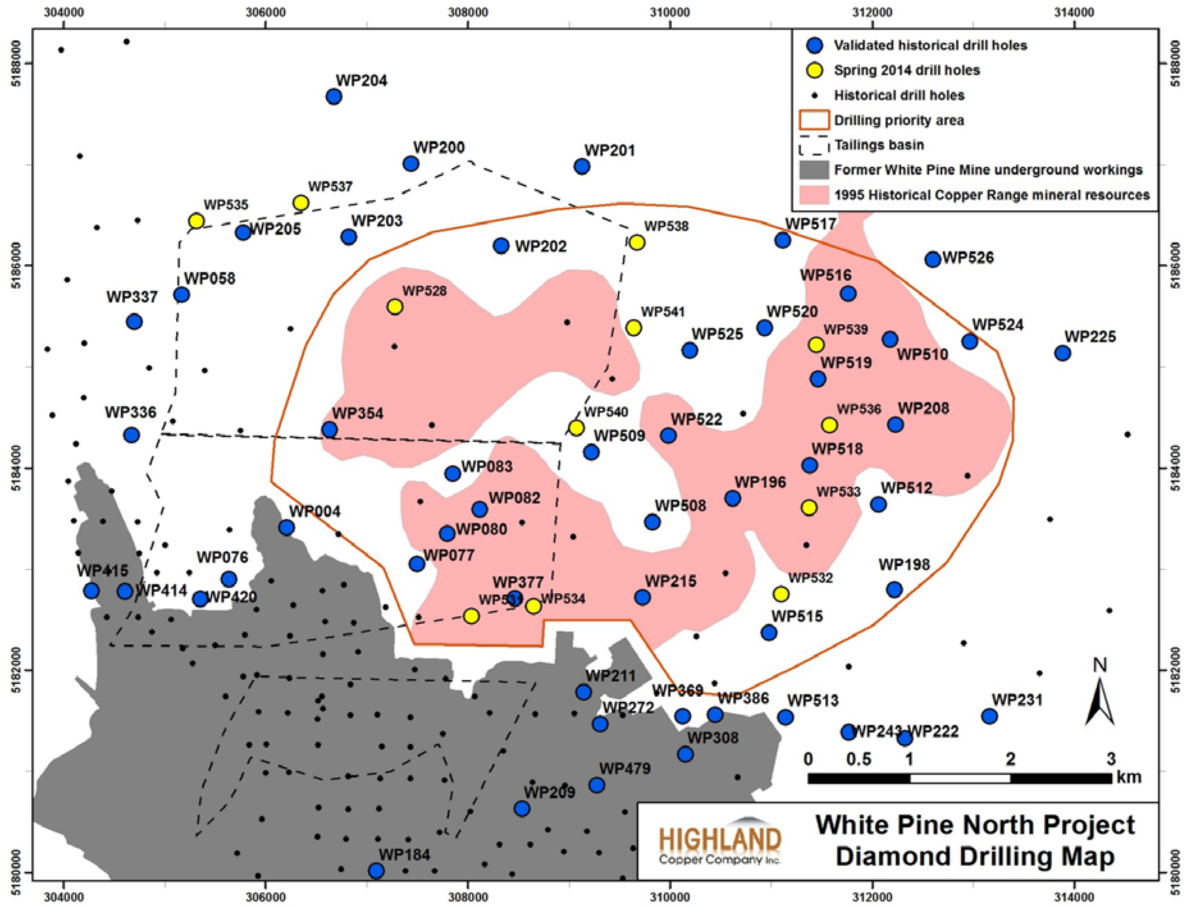
Most of the early drilling was BQ core. The glacial overburden was cased to bedrock. In the pre-1970s drilling, the core from above the ore zone was laid on the ground and logged. The core from the fringe or Top of Mineralization through the Lower Transition units was stored in five-foot-long spruce boxes and the core was transferred to the lab at the White Pine Mine. The core was logged and the beds in the mine stratigraphy were identified.

The 1994-1995 drilling program was conducted using NQ core. The glacial overburden was cased to bedrock. The core was logged in detail and the beds in the mine stratigraphy were identified.

Early diamond drill holes were abandoned without cementing. Later drill holes were cemented through the overburden. The drill holes from the 1994 - 1995 drilling program were cemented from the bottom of the hole to the surface.

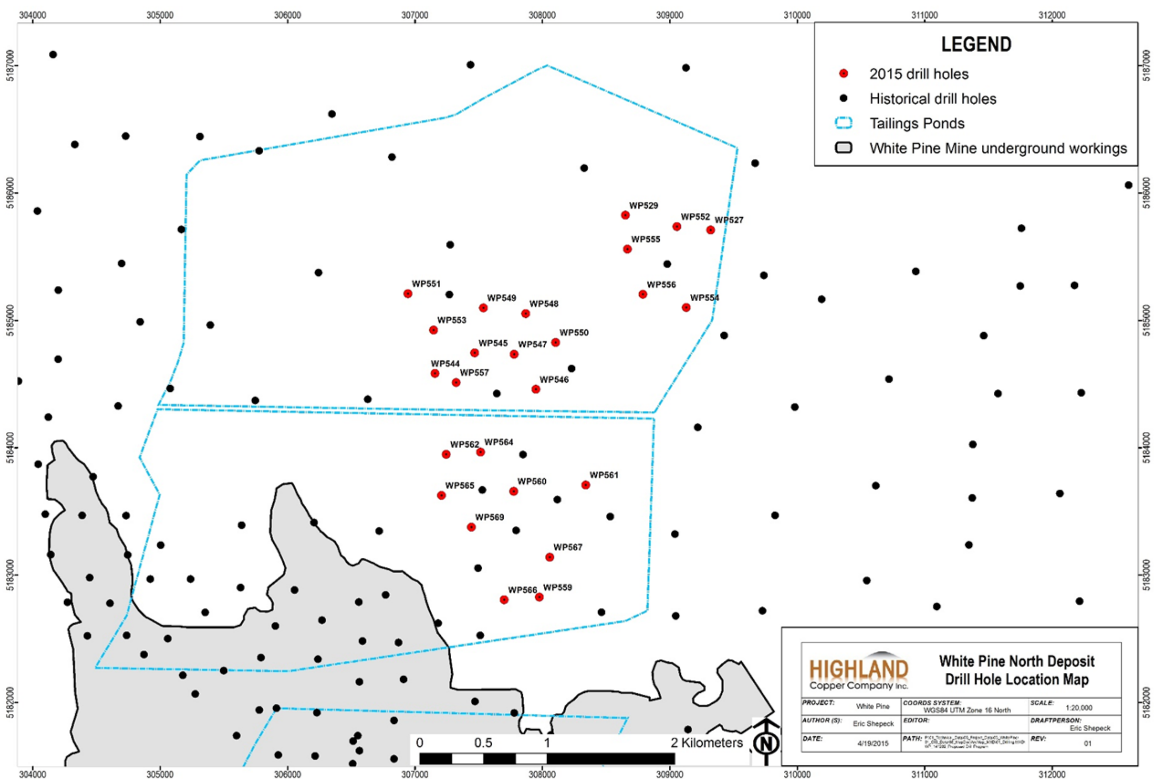
In January 2014, WPC initiated an analytical program to validate historical assay results from 51 diamond drill holes completed by CRC in the White Pine North deposit. Thirty-six of these holes were drilled between 1958 and 1980 with both BQ and AQ core, while the other 15 holes were drilled in 1994 and 1995 with NQ core. WPC's validation program used a ¼ cut of the original whole core from 883 historic sample intervals. This resampling duplicated the exact interval previously sampled and assayed in the historical programs. The remaining ¼ of the original core was retained as reference material. The validation analytical technique used both a screen metallic assay method and a 2.5 g digestion ICP assay method to determine total copper and results from both methods were in good agreement. The location of the validated historical drill holes is shown in Figure 6.1.

Figure 6.1: Historical Diamond Drill Holes Location Map
WPC's Validation Sampling 2014 Drilling Program



During January and February 2015, WPC completed 27 diamond drill holes totaling 19,152 m over an area of about 8 km^2 at White Pine North (Figure 6.2). The program used HQ core size and recoveries averaged over 99%. WPC designed this 2015 winter drilling program to (i) infill the historical drill grid to prepare an estimate of mineral resource and (ii) obtain information to guide mine planning. The program was successful and the results from this second phase infill drilling were consistent with results from WPC Copper 2014 drilling program and confirmed copper-silver mineralization from adjacent historical drill holes completed by CRC. WPC also completed seven wedges to obtain approximately 200 kg of mineralized samples for metallurgical testing.

Figure 6.2: Location Map of Diamond Drill Holes Bored by WPC 2015 Winter Drilling Program



Several reflection seismic surveys were conducted by CRC at the White Pine area, designed to investigate caved areas of the mine or to identify the location and faulted offsets along thrust and strike slip faults. One survey was carried out in 1975, two surveys were conducted in the fall of 1994 and another in the winter of 1995.

6.3 Historical Mineral Resources Estimate

Just prior to the mine closure, CRC extended exploration infill drilling to the north and northeast of the mine limits and in 1995 its chief geologist did a resource estimate (Johnson, 2014). The White Pine geologic model was built by defining the surfaces and thicknesses of individual beds within the mineralized interval based on 526 surface diamond drill holes. Isopachs were plotted for each individual bed within the mineralized interval and interrogated for geologic integrity and honoring of data. Following interrogation, copper and silver grades were composited (accumulated) over individual mining configuration intervals. Isogrades were plotted for bed and mining configuration intervals and interrogated for geologic integrity and honoring of data.

The cut-off copper grade was determined by considering the production costs from the Northeast Mine (a mining area of the White Pine Mine). In June 1995, Northeast Mine production cost of one-pound equivalent cathode was USD 1.28 at an average grade of 19.2 pounds of copper per short ton. This compared favorably with studies indicating a future cost of USD 1.30/lb. Hence, at a copper price of USD 1.30, the break-even grade (and cut-off grade) was approximately 19 lb of copper per ton. This calculation assumed a mill recovery of 87.5% and a payable copper content in the concentrate of 96.5%.

Individual mining blocks were defined, limited either by the cut-off grade of 19 lb of copper per short ton (in situ), by adjacent blocks of different mining configuration or by the arbitrary north limit of the North Mine (latitude 50,000 N, White Pine Mine coordinates). The extraction rate used to calculate the historical estimate was 57%. This extraction rate provided a mine-wide estimate of extraction considering first pass, second pass, and ground left in pillars and barriers. The grades for each mining configuration were diluted based on past mining experience.

The official estimate at the time of closure was calculated for a minimum 2.9 m mining height (Table 6.1). [1]"Proven Reserves" were defined by CRC as those areas containing drill holes on a spacing of 305 m and meeting or exceeding the cut-off grade. This definition was validated by historical comparison of mill grade versus geology estimated grade. The geology estimated grade had predicted mill grade within 3% in the period January 1, 1990, to January 1, 1993. In 1993, CRC began milling "secondaries" (slag), and difficulties in estimating the grade of the slag and copper recovery from the slag introduced error into the reconciliation of mine grade with mill grade. "Probable Reserves" were defined by CRC as those areas which contained drill holes at a spacing between 305 and 914 m and met or exceeded the cut-off grade.

[1] *This historical estimate does not use the categories set out in the CIM Definition Standards on Mineral Resources and Mineral Reserves and mandated by Canadian National Instrument 43-101("NI 43-101). The terms "proven and probable reserves" are historical terms used by CRC, not comparable to the CIM defined Probable Mineral Reserve and Proven Mineral Reserve and should be compared to a potential mineral deposit requiring further exploration drilling to define an initial resource. A qualified person ("QP") has not done enough work to classify this historical estimate as a current mineral resource and the historical estimate is not being treated as current mineral resources and should not be relied upon. The use in this section of the term 'reserves' does not mean to imply that the White Pine Project has reserves as defined in the current CIM Standards.*

Table 6.1: White Pine Mine Historical Resource Estimate (Johnson, 1995)

Area	Class	Owner	Minable Tons	Mining Height (feet)	Dilution (percent)	Mining Grade (pounds/ton)	Contained Copper (pounds)
Central portion of the mine							
FC-17S	**proven**	**CRC**	**6,048,000**	**13.2**	**3.0**	**27.4**	**165,938,000**
Eastern portion of the mine							
MFC-1S	proven	CRC	6,202,000	9.5	3.0	19.3	119,885,000
FC-12S	proven	CRC	3,971,000	10.9	3.0	21.3	84,432,000
FC-13S	proven	CRC	994,000	12.9	3.0	21.0	20,864,000
FC-14S	proven	CRC	1,292,000	10.9	3.0	19.6	25,301,000
FC-15S	proven	CRC	3,741,000	9.5	3.0	21.1	78,924,000
FC-16S	proven	CRC	1,676,000	9.5	3.0	21.1	35,342,000
Subtotal			**17,876,000**			**20.4**	**364,748,000**
Northeast portion of the mine							
FC-8E	probable	CRC	1,925,000	13.9	3.0	19.9	38,388,000
FC-9E	probable	CRC	6,631,000	14.5	3.0	19.8	131,397,000
FC-10E	probable	CRC	214,000	13.6	3.0	19.9	4,261,000
FC-11E	probable	CRC	791,000	14.0	3.0	22.1	17,463,000
USH-2E	probable	CRC	1,412,000	9.5	7.0	18.6	26,208,000
USH-3E	probable	CRC	1,186,000	9.5	7.0	18.7	22,190,000
Subtotal			**12,159,000**			**19.7**	**239,907,000**
Northeast, East and Central Mines							
Total			**36,083,000**			**21.4**	**770,593,000**
North mine							
FC-1N	probable	CRC	11,476,000	17.5	3.0	20.7	237,431,000
FC-2N	probable	CRC	7,970,000	15.2	3.0	21.3	169,691,000
FC-3N	probable	CRC	10,122,000	14.0	3.0	19.6	198,607,000
FC-4N	probable	CRC	13,161,000	15.6	3.0	20.1	264,114,000
PSH-1N	probable	CRC	4,219,000	9.9	3.0	19.9	83,807,000
PSH-2N	probable	CRC	50,000	9.5	3.0	20.9	1,044,000
PSH-3N	probable	CRC	4,286,000	9.5	3.0	19.3	82,558,000
PSH-4N	probable	CRC	28,745,000	10.5	3.0	20.8	597,226,000
USH-1N	probable	CRC	2,566,000	9.5	7.0	19.5	50,097,000
Subtotal			**82,595,000**			**20.4**	**1,684,575,000**
Total: Proven and probable			118,678,000			20.7	2,455,168,000

6.4 Previous Economic Evaluation

Between 1993 and 1995, CRC conducted a feasibility study of both solution mining of exploited areas in the mine and the development of the White Pine North deposit.

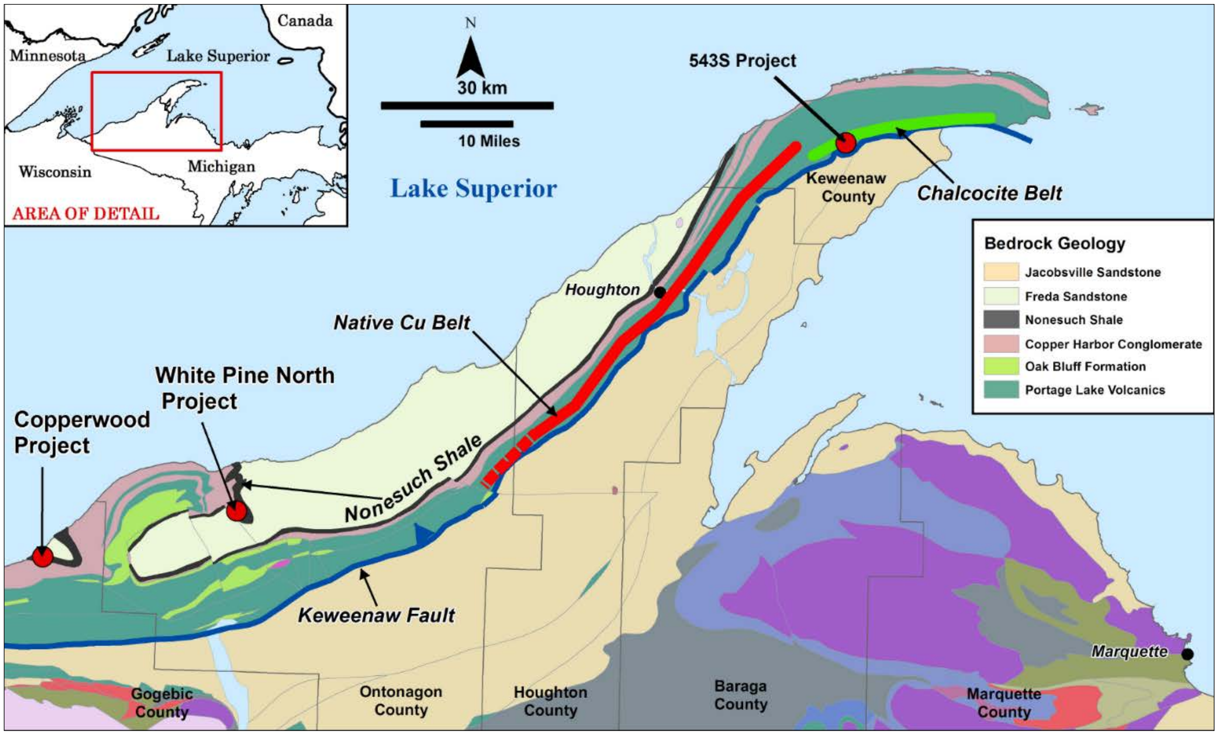
In 2019, Highland Copper conducted a Preliminary economic assessment on the White Pine North deposit.

7 GEOLOGICAL HISTORY AND MINERALIZATION

7.1 Regional Geology

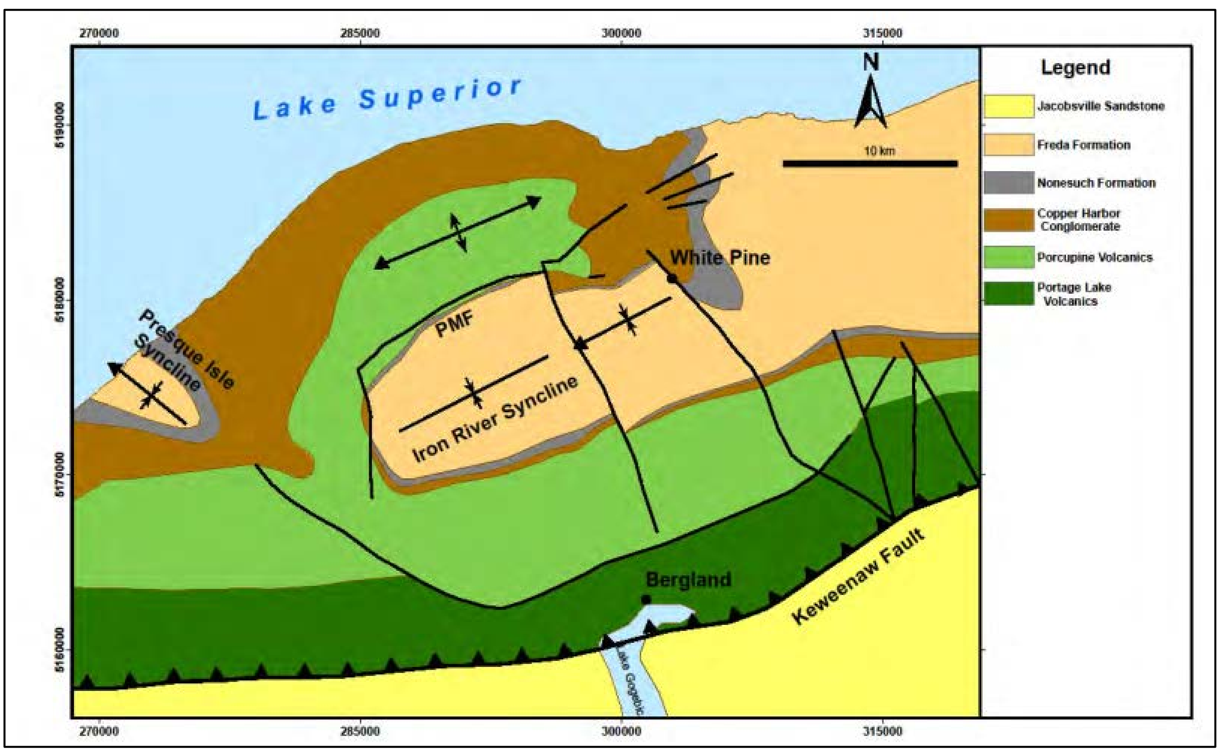
The White Pine North copper deposit is located in the Western Upper Peninsula of Michigan (USA) on the south side of Lake Superior (Figure 7.1) Regionally, White Pine lies on the south flank of the Midcontinent Rift System (MRS), a 2,500 kilometers ("km") long structure of Precambrian age. The Project is located east of the town of White Pine at the east end of the Iron River syncline (Figure 7.2). The Nonesuch Formation, the host of the mineralization, is part of a Keweenawan-aged (~1.1 Ga.) continental rift-fill sequence (Figure 7.3). At the base of the MRS is the Portage Lake Volcanics, which are primarily composed of olivine tholeiite lava flows. In the White Pine vicinity these basaltic volcanic rocks are overlain by the Porcupine Volcanics, which are composed of intermediate to felsic volcanic rocks. The Porcupine Volcanics are in turn overlain by the Copper Harbor Conglomerate, an alluvial fan deposit. In the area of the White Pine Project the Copper Harbor Conglomerate is composed of red (oxidized) lithic sandstone with subordinate amounts of conglomeratic sandstone. Overlying the Copper Harbor Conglomerate is the Nonesuch Formation, composed of grey to black to red-brown thinly interbedded siltstone, mudstone, and minor shale and sandstone. The base of the Nonesuch Formation interfingers with the top of the Copper Harbor Conglomerate. Overlying the Nonesuch Formation is the Freda Formation, composed of red to red-brown fluvial sandstone. The Portage Lake Volcanics are renowned for their native copper lodes (Native Copper Belt) and chalcocite occurrences (Chalcocite Belt) and are bounded to the south-east by the major Keweenaw Fault, a reversely activated thrust fault. This thrust fault put in contact the younger post-rift Jacobsville Sandstone with the older syn-rift volcanic units (Porcupine and Portage Lake Volcanics).

Figure 7.1: Regional Geology – Upper Peninsula of Michigan



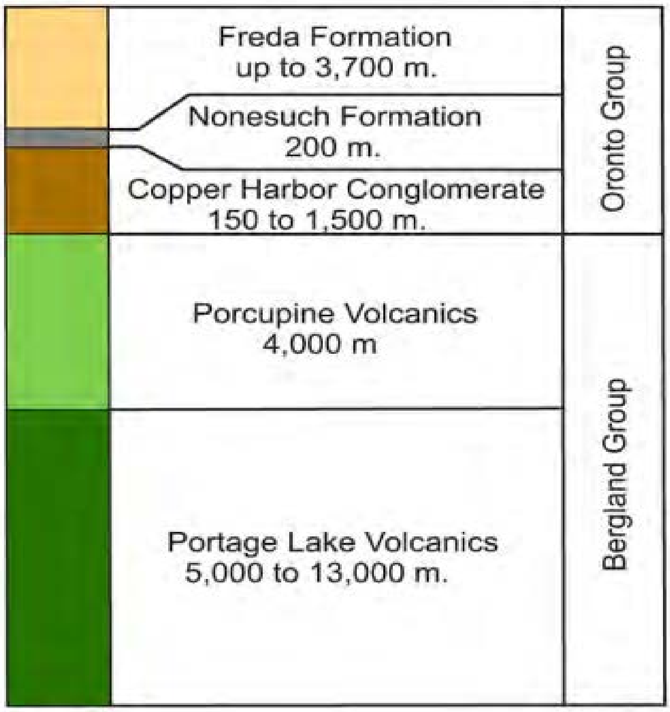
Source: https://www.highlandcopper.com

Figure 7.2: Geologic Map of the White Pine North Project Area



Source: https://www.highlandcopper.com/white-pine-north-project

Figure 7.3: Generalized Stratigraphic Column in the White Pine Area



Source: Redrawn from Daniels (1982) and Cannon and Nicholson (1992)

7.2 White Pine Stratigraphy

The copper mineralization in the former White Pine Mine occurs in the bottom 6 m (20 ft) of the Nonesuch Formation at the contact with the Copper Harbor Conglomerate (Figure 7.3 and Figure 7.4). Beds within the lower 21 m ("m") (70 ft) of the Nonesuch Formation are laterally persistent and can be correlated across the old mine. The shale and siltstone in the lower part of the Nonesuch Formation are divided into two shale units, the lower "Parting Shale" and the upper "Upper Shale", separated by the Upper Sandstone. Both shale units are present throughout the north part of the mine, but the Parting Shale pinches-out in the Southwest mine. The following are descriptions of the recognized beds that compose the top of the Copper Harbor Conglomerate and the lower portion of the Nonesuch Shale.

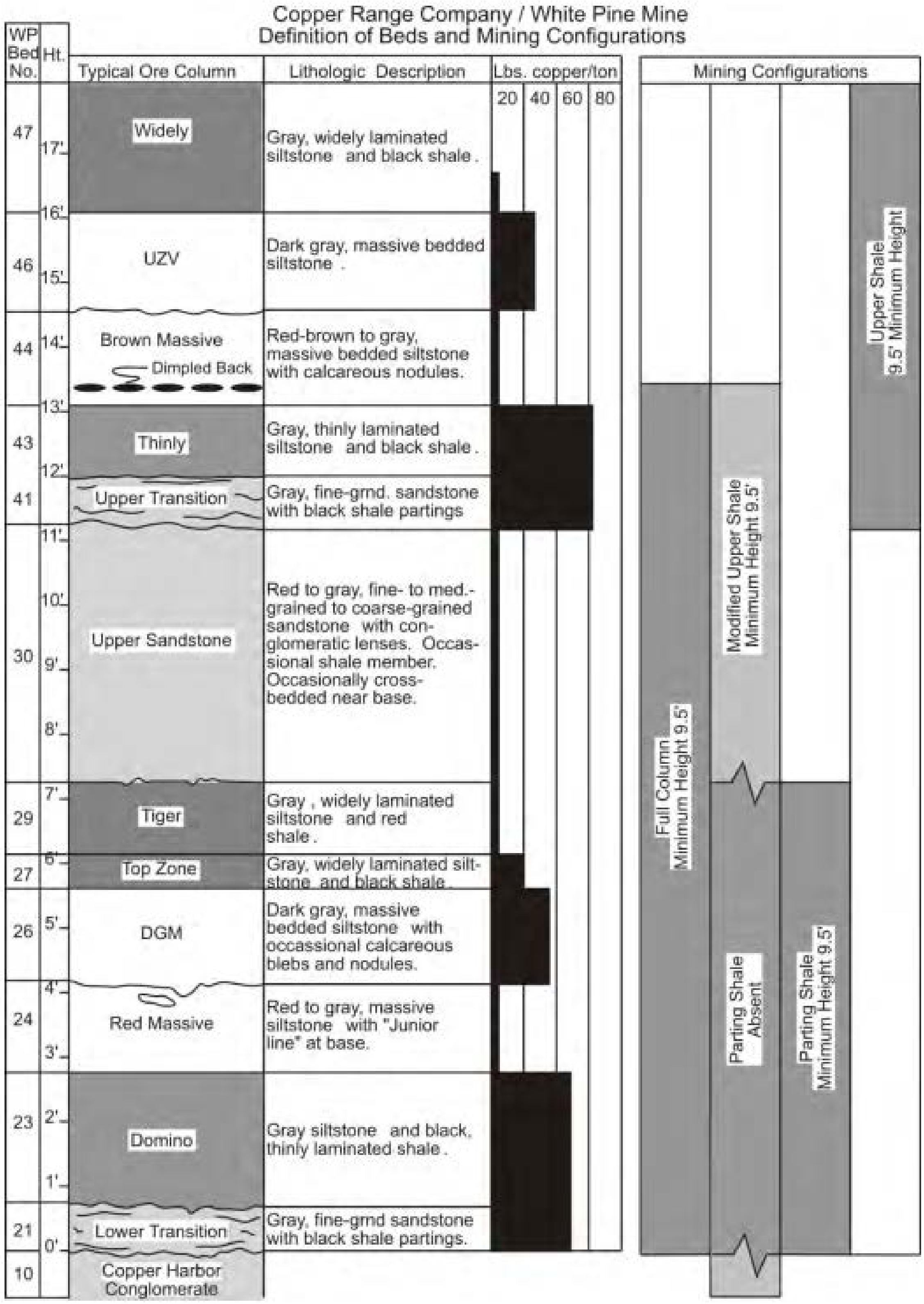
- **Copper Harbor Conglomerate (Lower Sandstone):** Brown-pink to medium grey, coarse- to very fine-grained, calcareous lithic sandstone. The top of the Copper Harbor Conglomerate ("CHC") formed the floor for most mining configurations at the historical White Pine Mine. The nomenclature used to distinguish between the CHC, and the Lower Transition causes some confusion. In the mine, particularly south of the White Pine fault, trapped hydrocarbons cause the sandstones to be locally reduced without containing shale partings.
- **Lower Transition [absent – 2.9 m (9.6 ft.), 0.5 m (1.6 ft.) avg.]:** Interbedded red brown to grey, coarse- to very fine-grained, massive, planar-bedded to micro-trough cross bedded calcareous,

hematitic, lithic sandstone and medium grey to grey black siltstone and shale partings. Historical nomenclature borrowed from the former White Pine Mine includes the Lower Transition as part of the Nonesuch Formation.

- **Domino [absent – 1.1 m (3.6 ft.), 0.3 m (0.6 ft.) avg.]:** Grey green to black, well laminated shale at the base grading upward to chloritic / micaceous, crudely laminated siltstone.
- **Junior Line [0.03 m (0.1 ft.) avg.]:** Light grey, fine-grained limestone. Mud cracks are common in the Junior Line. The Junior Line is laterally persistent and can be identified as far away as Houghton. It was a useful marker within the mine and is used as a reference to help miners keep the floor at the correct height.
- **Red Massive [absent – 1.3 m (4.3 ft.), 0.4 m (1.4 ft.) avg.]:** Grey-brown to grey-green to red-brown, massive, well-indurated siltstone with occasional faint shale partings, hematitic at base becoming increasingly chloritic upward, commonly contains slumped / distorted bedding giving a swirled appearance.
- **Dark Grey Massive [absent – 1.1 m (3.5 ft.), 0.3 m (1.0 ft.) avg.]:** Dark grey-green, massive, well indurated massive siltstone, with calcareous nodules near the base, grading upward to crudely-laminated, chloritic / micaceous siltstone with faint shale partings.
- **Top Zone [absent – 2.1 m (6.8 ft.), 0.2 m (0.6 ft.) avg.]:** Interbedded green-grey, very fine-grained chloritic / micaceous sandstone and micaceous siltstone with grey black, truncated and distorted shale laminae containing load casts and flame structures.
- **Tiger [absent – 1.2 m (4.1 ft.), 0.2 m (0.8 ft.) avg.]:** Green-grey, very fine-grained micaceous sandstone grading upward to red-brown, ferruginous sandy siltstone, siltstone and mudstone containing slumped beds, mud chip clasts, and load casts.
- **Upper Sandstone [absent – 3.8 m (12.5 ft.), 1.1 m (3.7 ft.) avg.]:** Brown-grey, coarse- to very fine grained, moderate to well sorted, planar and cross-trough bedded, calcareous, lithic sandstone. Interbedded, grey-green, sandy siltstone, and siltstone beds.
- **Upper Transition [absent – 1.3 m (4.4 ft.), 0.2 m (0.5 ft.) avg.]:** Interbedded green-grey, medium to very fine-grained calcareous, chloritic sandstone and grey-black siltstone and shale partings.
- **Thinly [absent – 1.7 m (5.7 ft.), 0.4 m (1.4 ft.) avg.]:** Grey-black, thinly laminated shale and siltstone.
- **Brown Massive [0.2-2.5 m (0.5-8 ft.), 0.7 m (2.2 ft.) avg.]:** Grey-brown, massive appearing, well indurated, calcareous, chloritic and micaceous, very fine-grained sandstone, siltstone, and shale. Near the base of the Brown Massive are flattened elliptical to amoeboid calcareous nodules. The casts of these nodules form the “dimpled back” in the mining parlance.

- **Upper Zone of Values (UZV) [0.3-2 m (0.9-6.5 ft.), 0.8 m (2.6 ft.) avg.]:** Laminated green-black shale and dark grey-green, calcareous siltstone.
- **Widely [0.03-4.0 m (0.1-16.2 ft.), 0.9 m (3.0 ft.) avg.]:** Interbedded (widely laminated) grey-black, chloritic / micaceous sandy siltstone and grey-black shale. Very fine-grained pyrite throughout.
- **Red and Grey [0.03-4.5 m (0.1-14.8 ft.), 1.3 m (4.4 ft.) avg.]:** Interbedded olive-grey, planar bedded, chloritic / micaceous, sandy siltstone and siltstone with shale.
- **Tiebel Sandstone:** Interbedded medium-grey to grey-green, medium- to very-fine grained, moderate- to well-sorted calcareous sandstone and chloritic-micaceous siltstone and shale. Massive to horizontally stratified and micro-trough cross-bedded sandstone and siltstone with mudstone drapes, shale partings, rip-up clasts, graded beds, fining-upward sequences, and soft sediment deformation features.
- **Stripey:** Lenticular to planar bedded, medium grey to grey-green, calcareous, very fine-grained sandstone and chloritic / micaceous siltstone and shale with mudstone drapes, partings, and load casts. Fining upward to sandy-siltstone and siltstone-shale couplets (< 1 cm thick).
- **Marker:** Crudely-laminated to well-laminated, light-grey calcareous siltstone and black to dark grey-green, pyritic shale (laminae < 1 mm thick). Siltstone laminae are commonly truncated or discontinuous with numerous load features, giving the unit a blebby appearance.

Figure 7.4: Nomenclature for Mineralized Strata and Conventional Mining Configurations at the Former White Pine Mine



Source: Modified from Ensign et.al. (1968)

7.3 White Pine North Project Structural Geology

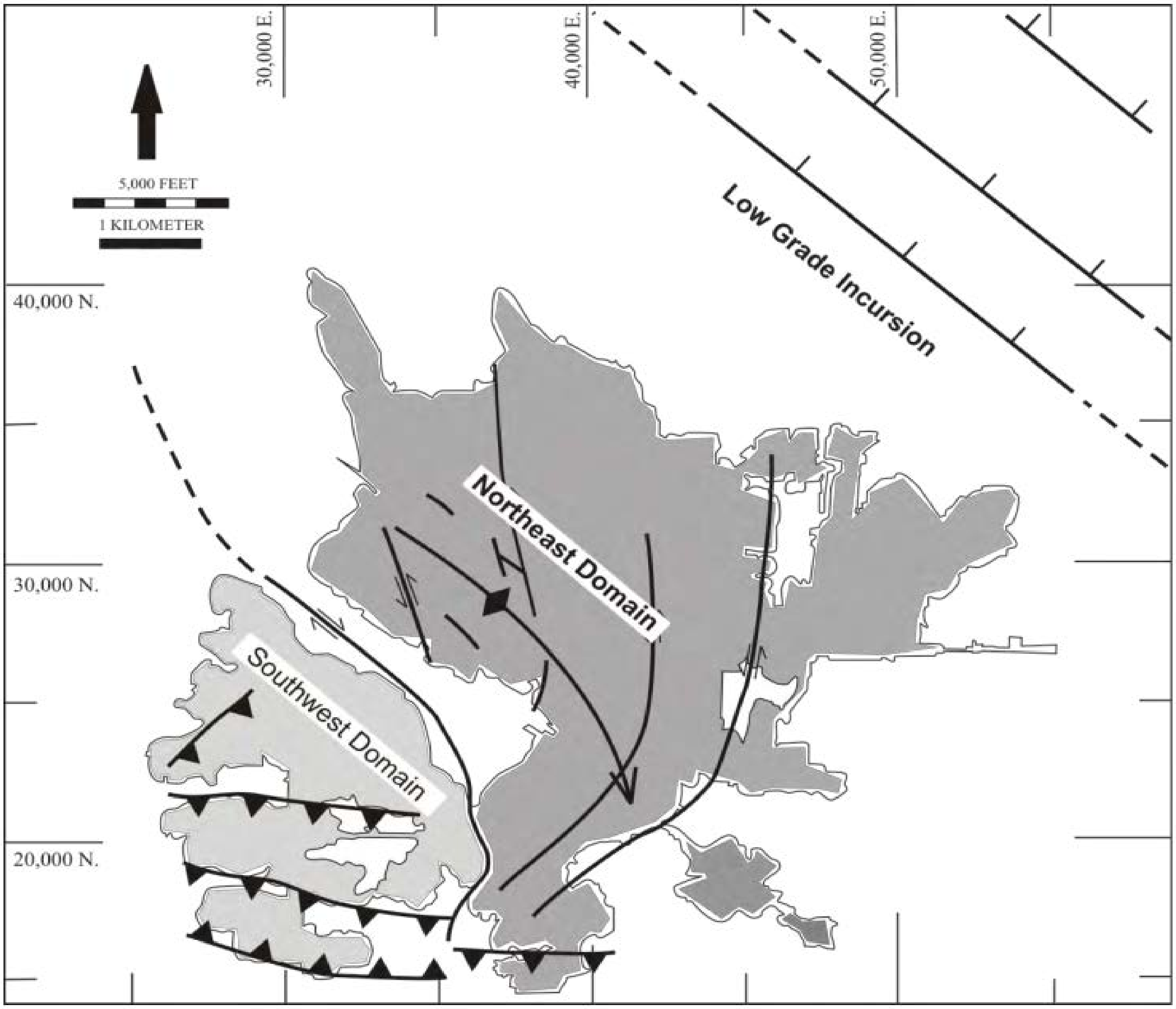
The White Pine Mine area is located at the east end of the Iron River syncline between the Keweenaw Fault and the eastern extension of the Porcupine Mountain Fault (Figure 7.2) – two (2) major north-dipping moderate to steep reverse faults. The major structural features of the area are the White Pine Fault, thrust faults in the Southwest Mine, strike-slip faults in the North Mine, and a shallow east-southeast plunging anticline immediately north of the White Pine Fault.

The Middle Proterozoic rocks of the Mid-Continent rift system (including those of the White Pine Mine area) have been subjected to at least two (2) periods of deformation. An early period of extension contemporaneous with Keweenawan-aged rifting and a later period of compression associated with the development of the Keweenaw Fault and Lake Superior syncline.

The rocks of the White Pine Mine area show the effects of the earliest period of deformation (extension) in soft-sediment deformation features, growth faults, and possibly the development of steep normal faults associated with listric faults. The later stage of deformation can be identified by folds and strike-slip and thrust faults.

- **Domains:** The White Pine Mine area can be divided into two (2) major structural domains, the Northeast and Southwest (Figure 7.5). The domains are separated by the White Pine Fault, the major structural feature of the deposit. The Southwest Domain is distinguished from the Northeast Domain by the presence of north and south dipping thrust faults (Figure 7.5). The Northeast Domain contains few thrust faults but does contain strike-slip faults that can be followed for thousands of feet. Both domains contain abundant strike-slip faults.
- **Folds:** The White Pine Mine area contains a wide range of magnitudes of folds, from major folds associated with right lateral strike-slip faults to drag folds associated with thrust faults. The largest fold in the former mine is an asymmetric, open, shallow east-southeast plunging anticline immediately north of the White Pine Fault, heretofore referred to as the White Pine anticline. The White Pine anticline forms the physical centreline of the former mine. The arcuate shape of the White Pine anticline is due to progressive simple shear (Figure 7.6). The fold formed and, as simple shear proceeded, the strike-slip motion along R Faults produced the right-lateral deformation (southward bend) of the fold. Associated with the thrust faults in the Southwest Domain are drag faults and en-echelon plunging folds. Folds can also be identified above thrust tips.

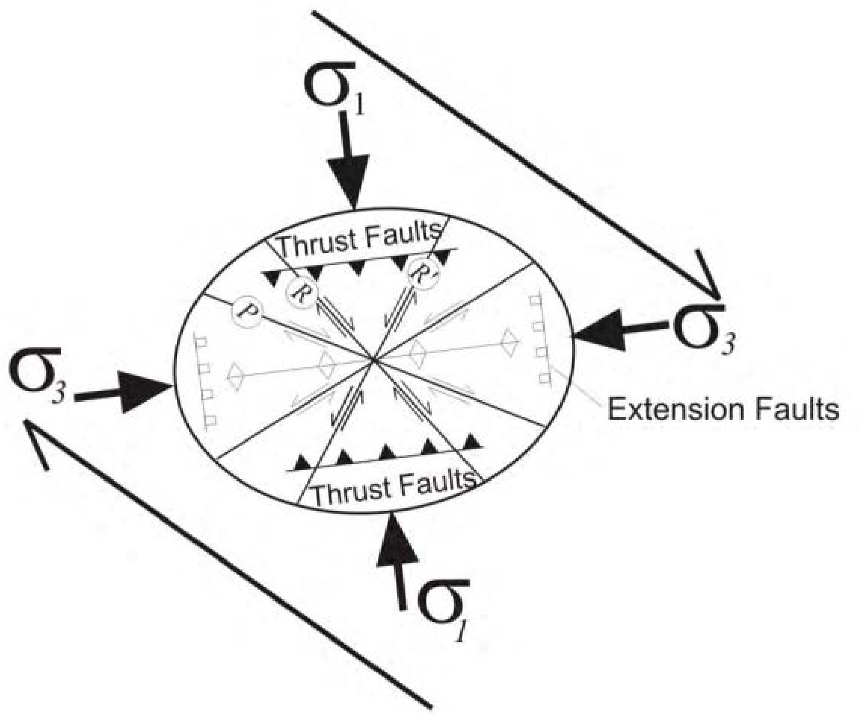
Figure 7.5: Map Showing Structural Domains and Major Structures of the White Pine North Project. Also Shown are the Interpreted Growth Faults and "Low Grade Incursion"



- **Wrench Faults**: Strike-slip and tension faults are found throughout the White Pine Mine area. The geometric relationship of strike-slip and tension faults is characteristic of wrench / strike-slip fault systems (Figure 7.6). In the Northeast Domain, left-lateral faults (R') develop the largest amount of horizontal displacement, e.g., the Pine Creek Fault. The right-lateral (R) strike-slip White Pine Fault separates the Northeast and Southwest Domains and forms a restraining bend within the mine. Tension faults are much less common throughout the mine area but host spectacular specimens of carbonate ± galena, sphalerite, nickel arsenides, native copper, and native silver. The Southwest Domain, particularly adjacent to the White Pine Fault, is bisected by an anastomosing network of wrench faults. The shortening direction in wrench-fault systems is defined by the acute bisector of R and R'. In the Northeast Domain the shortening direction changes from a NNW-SSE direction in the northwest to near N-S in the northwest and rotates to a SSW-NNE direction to the south of the

Northeast Domain. The dogleg in the White Pine Fault forms a restraining bend and results in the formation of thrust faults and folds.

Figure 7.6: Strain Ellipse Showing the Geometric Relationship of Folds R, R' and Thrust Faults in the White Pine North Project



- **Thrust Faults**: Thrust faults are found in the Southwest Domain and to a lesser degree in the Northwest Domain. The thrust faults in the Southwest Domain are both north and south dipping and strike from west-northwest to east-west and dip 30°. The strike of thrust faults form at right angles to the direction of shortening.
- **Growth Faults**: Growth faults are interpreted from rapid changes in thickness of beds. The White Pine Fault is interpreted as a reactivated growth fault. A "low-grade incursion", a northwest southeast trending zone of low-grade mineralization, was identified in the North Mine during the 1994 - 1995 drilling program. To the northeast of the "low-grade incursion" the Upper Sandstone thickens abruptly, indicating a possible nearby growth fault though it has not been directly observed in drill core.
- **Joints and Fractures:** Most joints in the mine are classified as shear joints with fewer extension joints. Shear joints share a similar geometry to those of wrench faults with joints parallel to R' most abundant and those parallel to R second most abundant (Figure 7.6). Extension joints form normal to the principal-shortening axis. On close examination, the joints within the mine share the same

geometric relationship as the wrench faults with the addition of joints developed orthogonal to the shortening direction.

- **Structural Discussion:** All brittle deformation features of the White Pine Mine are compatible with right-lateral simple shear (Figure 7.5) resulting from regional N-S directed shortening and are, therefore, synchronous. The regional N-S directed shortening was deflected about the Porcupine Mountains and resulted in a zone of dextral transpression in the area of the White Pine deposit and sinistral transpression in the area of the Western Syncline west of the Porcupine Mountains.

7.4 Mineralization

Copper mineralization at the White Pine North deposit occurs in two modes -- as very fine-grained sulfide (chalcocite) and as native copper. Sulfide mineralization is estimated to account for 85-90% of the copper in the deposit, but both modes of copper are intimately associated throughout the deposit. The copper mineralization at White Pine North is very consistent. All drill holes within the deposit intercepted mineralized strata. Within the deposit, the grades of the copper mineralization are usually slightly above cut-off grade over normal mining configurations. Most of the beds in the mineralized horizon are interpreted as continuous over the entire deposit. The beds comprising the Parting Shale pinch out in the southwest part of the historical mine. The variation of the thickness of mineralized beds is also low from drill hole to drill hole.

Sulfide Mineralization: The dominant copper mineral in the White Pine North deposit is chalcocite (Cu_2S). It occurs as fine-grained laminae in interbedded sandstone and shale, very-fine grained disseminations and discrete clots in siltstone, and in veinlets and veins. The top of the copper mineralization is identified as the Top of Mineralization (“TOM”) Line or “fringe,” a narrow transition zone between cupriferous and pyritic zones. The fringe is typically very narrow (a few inches) and is identified by the sequence: chalcocite, digenite, bornite, chalcopyrite, and pyrite. Immediately above the cupriferous zone is a narrow zone containing disseminated greenockite, galena, and wurtzite. The yellow color of greenockite is easily spotted in drill core when present. The TOM Line crosscuts stratigraphy. In the shallow areas of the mine to the west near the portal, the TOM Line is typically 9.5 m (30 ft) above the Lower Sand while to the east the TOM Line descends through the otherwise normally mineralized beds.

Native Copper: Native copper mineralization occurs throughout the deposit. The most significant occurrences are sheet copper and mineralized sandstone. Sheet copper forms along thrust surfaces in the southwest mine. The sheet copper in thrust surfaces is bedding parallel as well as cross-cutting stratigraphy. Sheets can reach spectacular sizes. It was observed that some sheets could be traced through entire pillars. Mineralized sandstone occurs in the uppermost part of the Copper Harbor Conglomerate and is invariably associated with trapped hydrocarbons. The greatest amounts of mineralized sandstone were found in areas adjacent to the White Pine fault.

Mixed Sulfide and Native Copper Mineralization: Native copper and chalcocite are found throughout the deposit. Native copper is found in close relationship to copper sulfide in sandy lenses and pods (load casts) in the Lower Transition. Native copper in the Lower Transition is more common in channels incised into the top of the CHC. Both chalcocite and native copper mineralization are ubiquitous features of the mineralization of the Dark Grey Massive bed as well; chalcocite occurs as very-fine grained disseminations; and native copper, as discrete blebs.

Structural Relationship: Structure imposes significant control on the distribution and grade of mineralization. Higher-grade mineralized zone is spatially associated with the White Pine fault and thrust and strike-slip faults in the Southwest mine. Part of the increase in grade is due to the presence of mineralized sandstone and/or sheet copper. In addition, chalcocite mineralization is also enhanced as wider lamellae and cross-cutting veins and veinlets in the laminites.

Formation Water: The formation water encountered in the CHC is an alkaline brine (Table 7.1) with a chloride and TDS content approximately twice that of seawater. These compositions are thought to represent an approximate original composition of the depositional lake water and mineralization bearing fluid. Further support for alkaline brines existing during Nonesuch times is the abundance of carbonate throughout the CHC and Nonesuch Formation.

Hydrocarbons: The White Pine Mine is well-known for its hydrocarbon seeps. In many areas near the White Pine Fault, hydrocarbons seep out of the back, drip, and form puddles of “oil” on the floor. The most prolific seeps were noted in the northwest portion of the mine near and beneath the North Number One tailings dam.

7.5 Hydrology

Water flow into the historical White Pine Mine was through the rock formations, drill holes, caved areas of the mine, and along strike-slip faults. During the 1994 – 1995 drilling all the diamond drill holes flowed to surface and the water flowing from the casings was saline. Packer tests conducted on drill hole 508 confirmed that hydrostatic head was greater than the lithostatic head. Packer tests of underground drill holes across the southernmost thrust fault also indicated that hydrostatic head was greater than lithostatic head. Following closure of the mine, fresh water was pumped into the mine to slow down the rate at which saline formation waters (Table 7.1) would fill the mine. The surface of the water level in the mine is maintained lower than the level of water in Lake Superior by pumping.

Table 7.1: Chemical Analyses of Deep Mine Water from the Historical White Pine Mine*

	MS01[1]	MS02[1]	T4-2-1[2]	T4-2-2[2]	T4-2-3[2]
Field pH	6.6	6.7	NA	NA	NA
Lab pH	6.6	6.5	5.9	5.7	5.9
TDS (mg/l)	195,000	133,000	289,000	296,000	284,000
Density (g/ml)	NA	NA	1.1935	1.1921	1.1931
HCO3 (mg/l)	22	10	12	12	15
CO3 (mg/l)	0	0	0	0	0
Cl (mg/l)	132,000	96,000	170,000	145,000	160,000
SO4 (mg/l)	68	2	470	430	400
Br (mg/l)	1,500	1,080	1,820	1,790	2,120
F (mg/l)	0	0	NA	NA	NA
Ca (mg/l)	44,500	35,300	72,100	61,400	71,300
Mg (mg/l)	1,112	400	935	930	940
Na (mg/l)	12,100	9,700	15,500	18,600	15,800
K (mg/l)	204	<50	125	125	125
$NO_3 + NO_2$ (mg/l)	8.7	0.07 BL	NA	NA	NA
SiO_2 (mg/l)	4	<10	NA	NA	NA
Ag (mg/l)	<0.1	<0.5	NA	NA	NA
Al (mg/l)	0.9	<3	NA	NA	NA
As (mg/l)	0.03	0.02	NA	NA	NA
Ba (mg/l)	14.1	70	NA	NA	NA
Cd (mg/l)	<0.05	<0.3	NA	NA	NA
Cr (mg/l)	<0.1	<0.5	NA	NA	NA
Cu (mg/l)	<0.1	0.5	NA	NA	NA
Fe (mg/l)	0.2	<1	NA	NA	NA
Hg (mg/l)	<0.0002	<0.0002	NA	NA	NA
Mn (mg/l)	25.9	22.5	NA	NA	NA
Pb (mg/l)	<0.2	<1	NA	NA	NA
Se (mg/l)	<0.02	<0.02	NA	NA	NA
Sr (mg/l)	940	770	NA	NA	NA
Zn (mg/l)	<0.1	<0.5	NA	NA	NA

[1] Seeps

[2] Flow from underground diamond drill holes.

Source: Samples are from Seeps (MS) and Flow from Underground Diamond Drill Holes through the Southernmost Thrust Fault (T4) in the Mine (Johnson et.al., 1995).

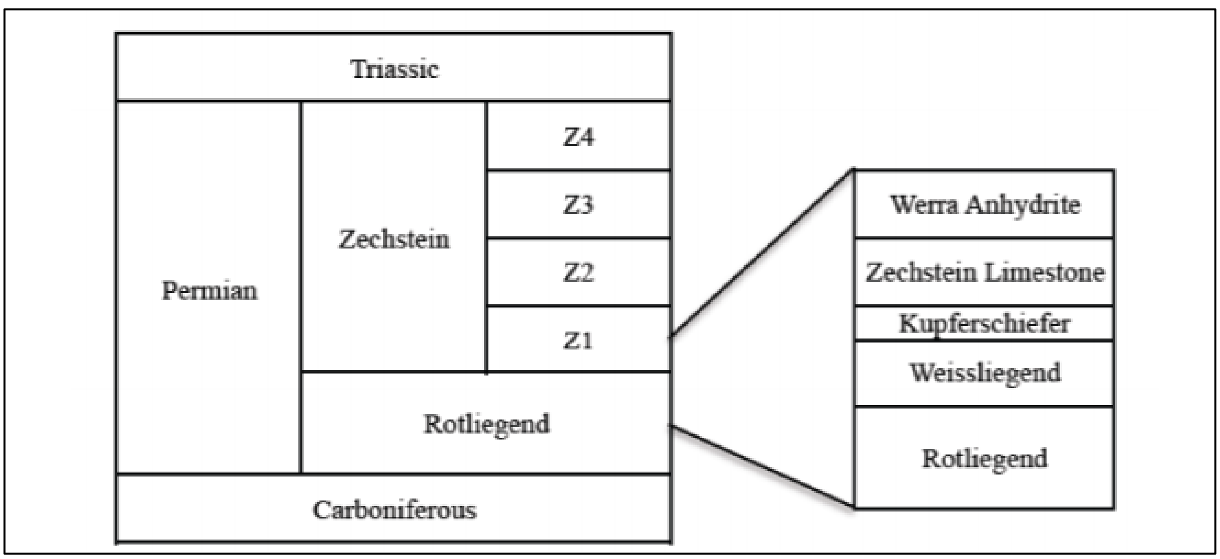
8 DEPOSIT TYPES

The mineralization of the White Pine North Project is classified as a reduced facies stratiform sediment-hosted copper deposit. Another deposit of this type is the famous Kuperschiefer deposit in Germany.

8.1 Kuperschiefer Copper-Silver Mineralization Model

The Kupferschiefer mineralization is a classic example of a sediment-hosted stratiform copper deposit. The shale is an Upper Permian black, organic-rich, fine-grained, and finely laminated (clayey) marl unit of marine origin. The Kupferschiefer is part of the Middle to Late Permian Zechstein group, which is composed of multiple depositional cycles, each beginning with a marine transgression and ending with the restriction of the basin (Ziegler, 1990). The Kupferschiefer is recognized as the basal unit of the first Zechstein cycle, at the transition between the underlying Weissliegend and Rotliegend sandstones and the overlying Zechstein limestone and Werra Anhydrite (Figure 8.1).

Figure 8.1: Stratigraphy of Permian Sediments in Germany

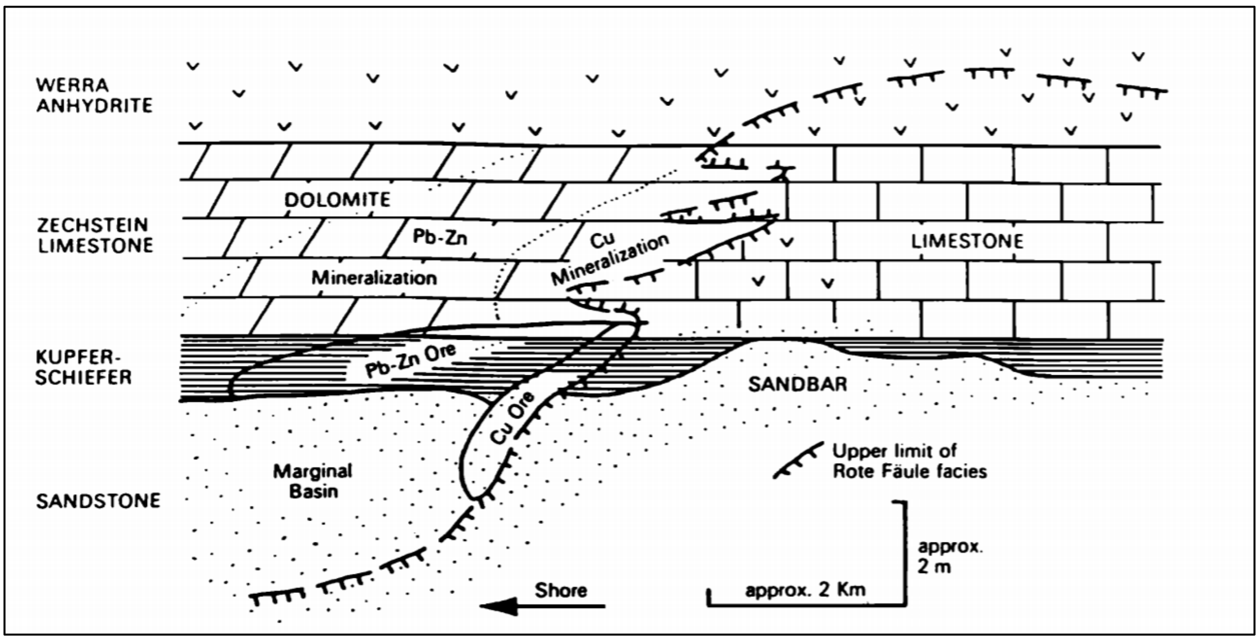


**Note. Z1-4 represents cycles within the Zechstein deposit.*
Source: Modified from Asael (2009)

The Kupferschiefer copper-silver sulphide deposits occur across the contact between the Upper Permain Zechstein (Werra carbonates, dolomite, anhydrite, and saline rocks) restricted marine sequence and the Lower Permian Rotliegende (red sandstone) continental volcanic and clastic sequence. The Kupferschiefer (copper-bearing black shale) mineralized series can be split into two types of deposits, a reduced zone composed of dark-grey, organic rich and metal sulphide containing sediments and an oxidized zone of red-stained organic matter-depleted and iron oxide-bearing sediments, known as the Rote Fäule. The transition zone from oxidized to reduced rocks occurs both vertically and horizontally and is characterized by sparsely disseminated remnant copper sulphides within hematite-bearing sediments, replacements of copper sulphides by iron oxides and covellite, and oxide pseudomorphs after framboidal pyrite. These textural features and copper sulphide replacements after pyrite in the reduced sediments imply that the main oxide / sulphide mineralization postdated formation of an early diagenetic pyrite. The hematite rich sediments locally contain enrichments of gold and platinum group elements. The Kupferschiefer mineralization resulted from upward and laterally flowing fluids which oxidized originally pyritiferous organic matter-rich sediments to form hematitic areas (Rote Fäule) and which emplaced base and noble metals into reduced sediments.

The Rote Fäule distribution and the mineral zoning in relation to the Zechstein lithologies, as shown schematically in Figure 8.2, are useful as exploration guides to favourable areas for both Cu-Ag and new Au-Pt-Pd Kupferschiefer-type deposits.

Figure 8.2: Schematic Cross-section Showing the Position of Rote Fäule in Relation to Lithological Types and Mineralization



Source: Vaughan et Al. – 1989

Copper mineralization in the Kupferschiefer consists of chalcocite, digenite, covellite, bornite, and chalcopyrite associated with copper-arsenic mineralization consisting of tennantite and enargite. Galena and sphalerite commonly occur in the distal areas and only rarely in the Cu high-grade zones. Gold and silver occur as electrum in bornite and digenite. Pyrite occurs in the Kupferschiefer and in the low-grade, mineralized zone distant from the high-grade copper mineralization. Silver and gold occur disseminated in copper sulfides as native metals and as exsolution in the form of electrum. Hematite occurs in the

Rotliegend sediments and as a primary mineral in the Rote Fäule zone. Other minerals in the Kupferschiefer include marcasite, clausthalite, barite, and rutile, and also kerogen, hematite, calcite, quartz, clay minerals, and the detrital relicts of titanite, zircon, and apatite.

8.2 White Pine North Mineralization Model

The Project chalcocite mineralization is usually attributed to the flow of copper rich brines through pyrite-bearing shale. The source of the copper in the brines is either attributed to the Copper Harbor Conglomerate red beds and the underlying mafic volcanic rocks.

Shortly before the mine closing, geologic staff proposed the following model (Johnson et.al. 1995) which satisfies the observations made at the White Pine Mine:

- Accumulation of reduced laminites adjacent to oxidized permeable strata
- Presence of oxidized brines
- Source rock for copper (tholeiites and/or derived sediments)
- Regional burial
- Flow out of the basin due to compaction
- Elevation of pore fluid pressure due to regional shortening and reduction of permeability
- Compression
- Fault development
- Flow towards faults
- Hydrocarbons trapped in anticlines
- Precipitation of copper sulfides as fluids react with pyritic strata
- Precipitation of native copper as fluids react with trapped hydrocarbons

Exploration for additional White Pine style mineralization would concentrate on areas that contain accumulations of reduced sedimentary rocks near major structures and are stratigraphically lower than the TOM (“Top of Mineralization”) line.

9 EXPLORATION

9.1 Historical Exploration (Pre-2014)

All exploration work completed on the White Pine North Project prior to 2014 was performed by the previous owner, Copper Range Company ("CRC"), who is now a wholly-owned subsidiary of First Quantum Minerals Ltd. CRC conducted a regional exploration program in the 1960s and 1970s called the "Trace Drilling Program" designed to identify White Pine style and scale mineralization from White Pine northeastward towards Houghton. This program consisted of drilling vertical holes in approximately one-mile centres to depths of between 150 and 518 meters (500 and 1,700 ft) along the base of the Nonesuch Shale. No economic mineralization was intercepted during this drilling program, and it was believed that no White Pine scale deposits existed northeastward of the old White Pine mine.

A summary of historical exploration activities conducted on the Project is presented in Section 6 of this Technical Report. The following sections focus primarily on the exploration programs implemented by WPC since 2014.

9.2 WPC Exploration Programs

During 2014 and 2015, WPC carried out a drilling program comprising of 42 HQ-diameter and an additional 18 wedges for a total of 30,462 m of core. The drilling provided 1,714 samples for copper and silver assaying and 635 kilograms ("kg") of mineralized samples taken for metallurgical testing. The 2014-2015 drill program was designed to upgrade the historical mineral resource area at the northern section of the deposit, in-fill the historical drill grid, obtain metallurgical samples and carry out geotechnical studies to refine the mining plan. Six (6) holes were surveyed with televiewer technology for an improved understanding of the in situ geotechnical characteristics of the rocks. An additional 3 HQ-diameter drillholes were completed during the winter of 2022-2023 to further upgrade the historical resource. More details on drilling are presented in Section 10.

9.2.1 Sampling Methods and Quality

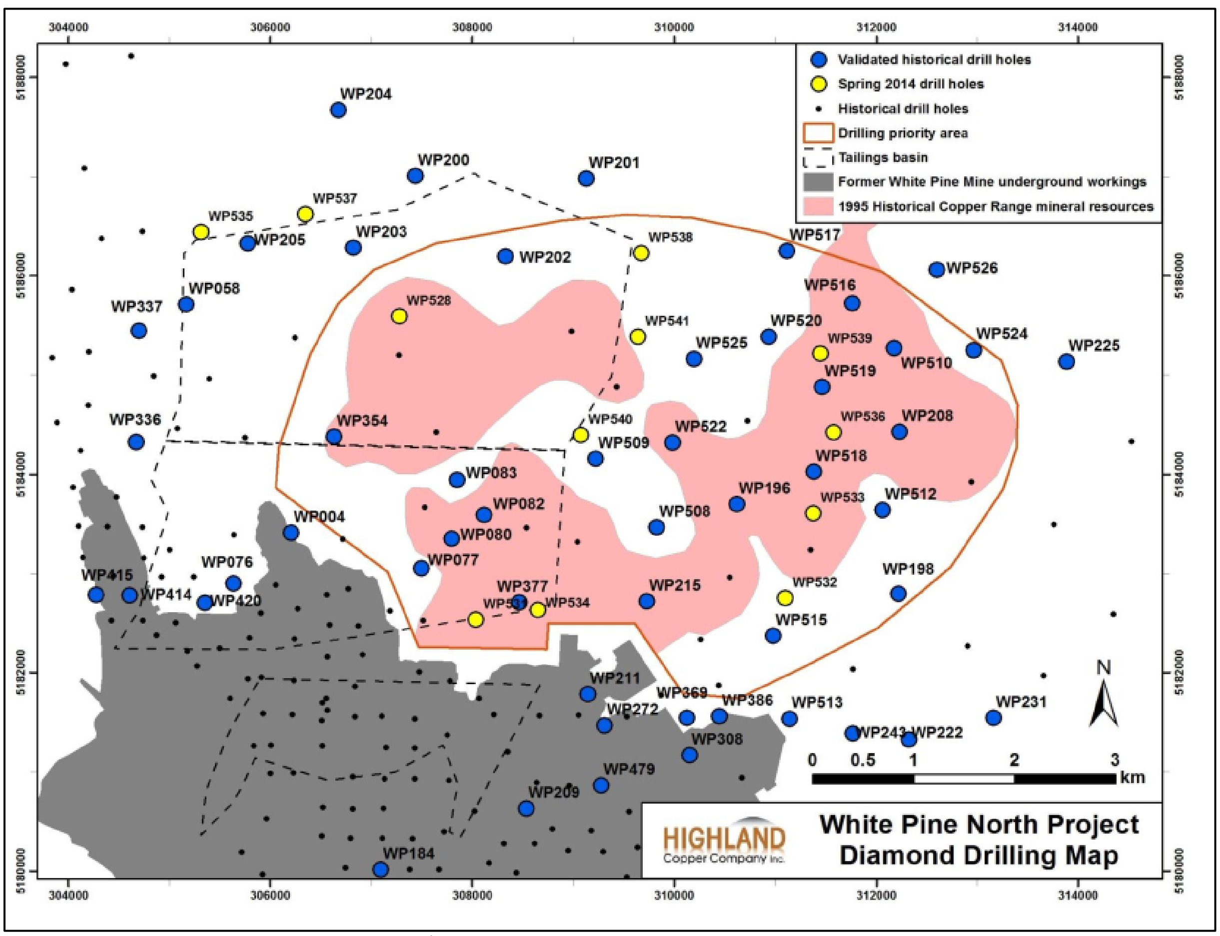
Activation Laboratories in Thunder Bay, Ontario, Canada (IOS 17025 accreditation), assayed all samples from WPC's exploration programs, using an ICP method tailored for the project samples, followed by a metallic procedure for samples containing at least 0.1% Cu. WPC applied industry standard QA/QC protocols to all steps of the drilling program.

9.2.1.1 White Pine North: Validation of Historical Drilling Assays

In January 2014, WPC Copper Company initiated an analytical program to validate historical assay results from 51 diamond drill holes completed by CRC in the White Pine North deposit. Thirty-six of these holes were drilled between 1958 and 1980 with both BQ and AQ core, while the other 15 holes were drilled in 1994 and 1995 with NQ core.

WPC's validation program used a ¼ cut of the original whole core from 883 historic sample intervals. This resampling duplicated the exact interval previously sampled and assayed in the historical programs. The remaining ¼ of the original core was retained as reference material. The validation analytical technique used both a screen metallic assay method and 2.5 g digestion ICP assay method to determine total copper and results from both methods were in good agreement. The location of the validated historical drill holes is shown in Figure 9.1.

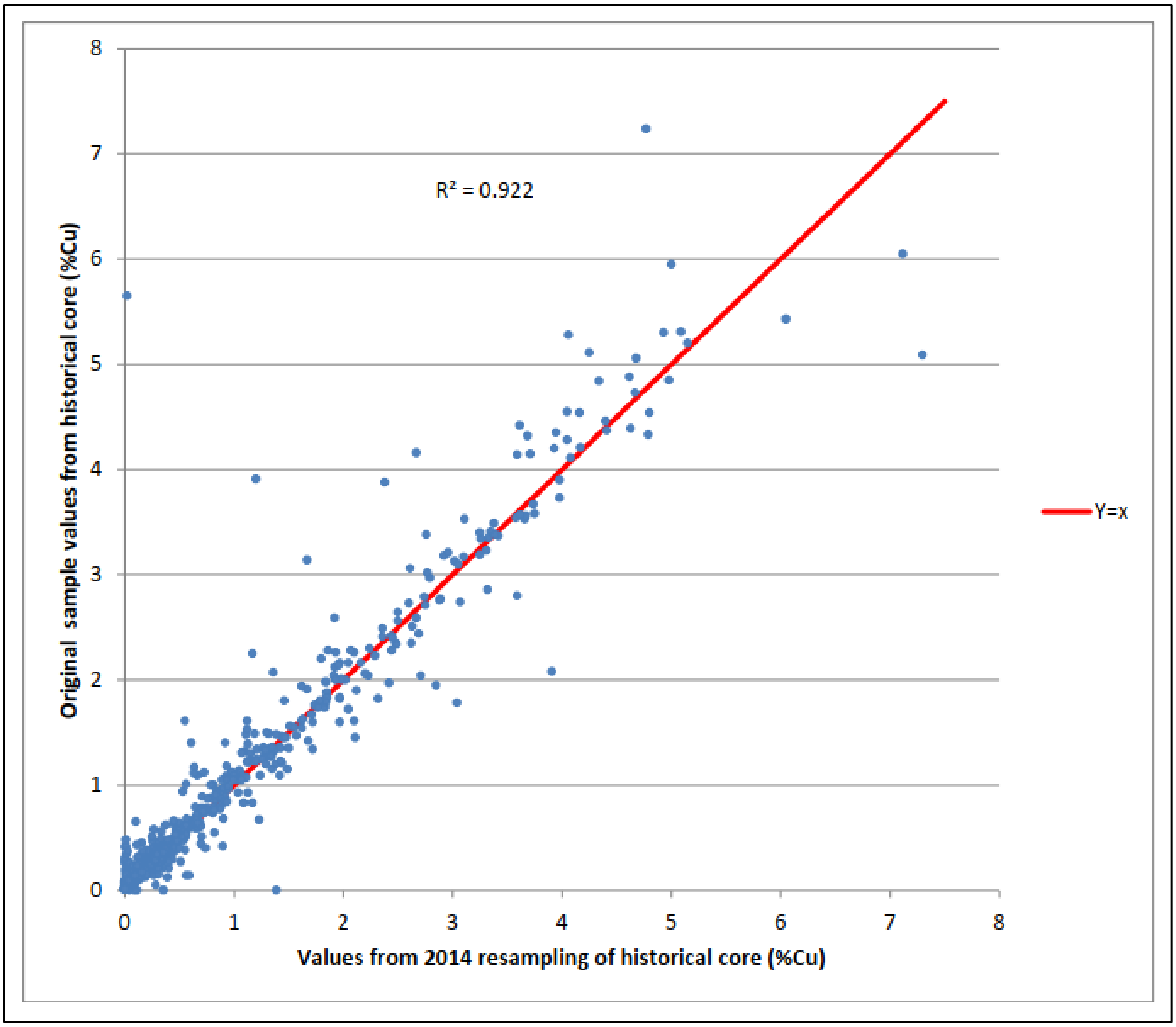
Figure 9.1: Location Map of Holes Completed During 2014 Drilling Program and Historical Diamond Drill Holes Used in WPC's Validation Sampling Program



Source: From Highland announcement, July 3rd, 2014.

The results from this validation program are shown graphically in Figure 9.2. WPC considers the correlation between the historical and validation assays to be excellent, showing no bias between the two groups of assays. WPC planned to use the sample values from the original program for the current Mineral Resource estimate at White Pine North Project.

Figure 9.2: X-Y Plot Comparing Analytical Results from Historical and Validation Sampling of Historical Drill Core from the White Pine North Project (883 Samples)



Source: Highland announcement, July 3rd, 2014.

9.2.1.2 Quality Assurance / Quality Control ("QA/QC")

The Company maintains a rigorous QA/QC program with respect to the preparation, shipping, analysis and checking of all samples and data from the properties. Quality control for drill programs at the Company's projects covers the complete chain of custody of samples, including verification of drill hole locations, core handling procedures and analytical-related work, including duplicate sampling and the insertion of standard and blank materials. The QA/QC program also includes data verification procedures. Activation Laboratories in Thunder Bay, Ontario, Canada (IOS 17025 accreditation) assayed all samples from the 2015 & 2023 winter drilling program using an ICP method tailored for the project samples. This is discussed further in Section 11.

9.3 Airborne Geophysical Studies

There are no known surface geophysical exploration programs for the Project.

9.4 Geochemical Surveys

No surface geochemical exploration programs have been conducted on the Project since closure of the former White Pine Mine.

10 DRILLING

10.1 Drilling History

Before the White Pine Mine was closed in 1997, all drilling activities undertaken on the property were performed by previous owners. In 1907, Calumet and Hecla Mining Co. began an extensive drilling program that discovered locally high grades of native copper. The Copper Range Company ("CRC") conducted a continuous drilling program at the White Pine Mine from 1929 until the early 1970s. There was a hiatus in drilling until the commencement of the 1994-1995 drilling program. That drilling program was conducted specifically to provide a historical estimate supporting a feasibility study to build a new smelter at the White Pine Mine. Limited data are available from historical drilling (i.e., drill holes surveys, QA/QAC programs, sampling methods etc.). The historical drilling programs are discussed in Section 6.

10.2 2014-2015 Drilling Program

WPC carried out two (2) phases of drilling at the White Pine North Project ("WPN" or the "Project") in 2014 and 2015, with the aim of completing a current resource estimate for the Project as well as obtaining information for underground mine planning.

Between March and August 2014, WPC completed 14 diamond drill holes totaling 10,481 metres using HQ core size at the Project. Nine (9) of the 14 holes were drilled vertically, and core recoveries averaged over 99%. WPC's objective for its 2014 winter drilling program was both to in-fill the historical drill grid and to expand the historical mineral resource area.

During January and March 2015, WPC completed an additional 28 diamond drill holes totaling 20,000 m over an area of about 8 square kilometres at White Pine North. An additional three (3) diamond drill holes were drilled but abandoned (WP563, WP570 and WP571). The program used HQ core size and again recoveries averaged over 99%. Six (6) holes were inclined to obtain structural data for geotechnical studies. WPC designed its 2015 winter drilling program primarily to infill the historical drill grid to prepare an estimate of mineral resource and obtain information to guide underground mine planning.

The results of the first and second phases of infill drilling are consistent with one another and the results from previous Copper Range Company ("CRC") drill programs and confirmed copper-silver mineralization from adjacent historical drill holes completed by the previous operator.

WPC also completed a total of 18 wedges in Phases 1 and 2 to obtain approximately 635 kilograms of mineralized samples for metallurgical testing.

Table 10.1 summarizes the historical drilling program and completed drill holes by WPC.

Table 10.1: Drilling Programs by Company and Exploration Campaign

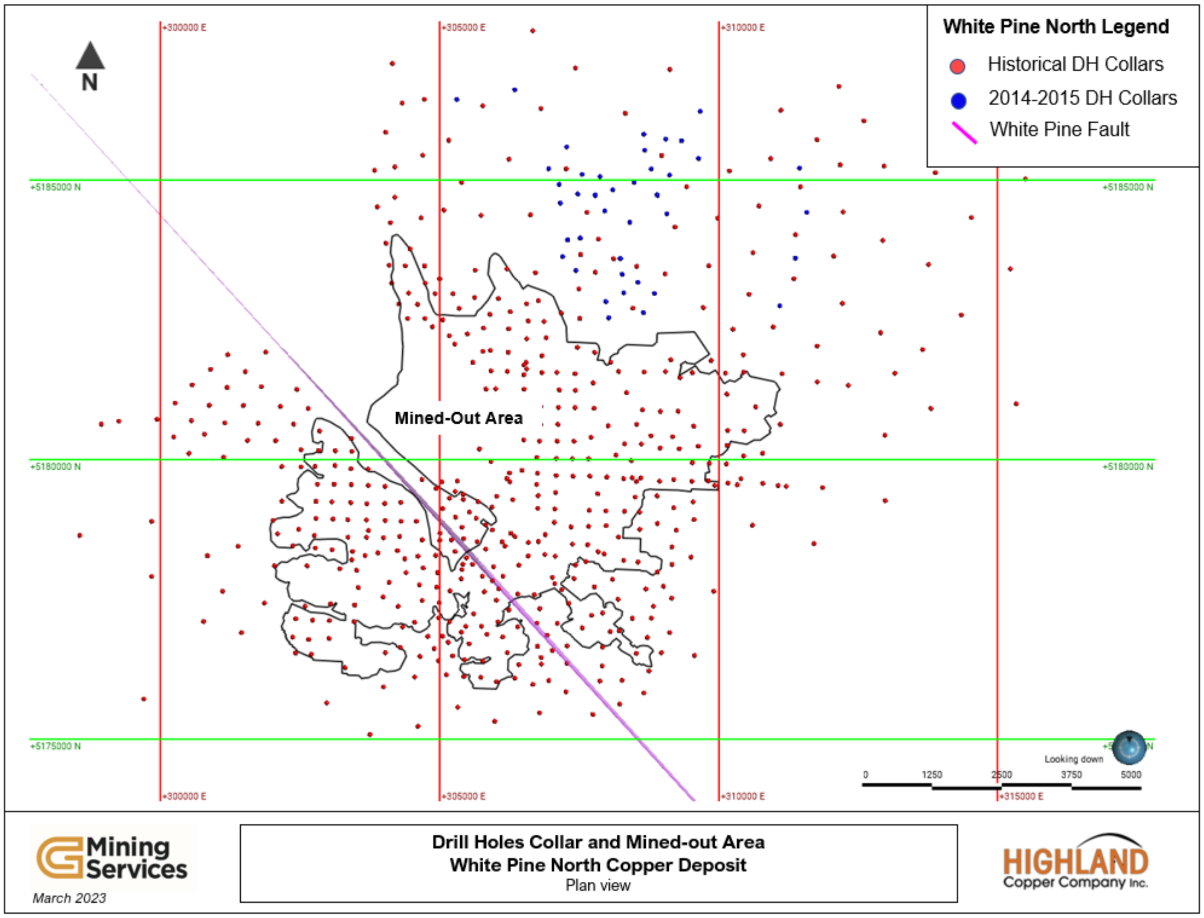
Company	Period	Core Size	Drill Hole Count	Length (m)	% of Total Drilling
Copper Range Company	1956 to 1998	AQ, BQ, NQ	526	248,070	89%
White Pine Copper LLC	2014-2015	HQ	42	30,481	11%
All Programs	**1956 to 2015**	**AQ, BQ, NQ & HQ**	**568**	**278,551**	**100%**

Figure 10.1 shows the location of the legacy drill holes. Historical collars are illustrated in red (1956-1998), while the holes drilled by WPC are shown in blue (2014-2015).

10.3 2022-2023 Winter Drilling Program

WPC performed an infill drilling program in Winter 2022-2023, completing three (3) holes totalling 2,714 m. The main purpose of these holes is resource conversion from Inferred to Indicated. These holes are not included in this current MRE.

Figure 10.1: Plan View of the Historical and WPC Drilling Programs



11 SAMPLE PREPARATION, ANALYSES AND SECURITY

This section is based on information provided by White Pine Copper ("White Pine" or the "Company"). Sample preparation, analyses, and security for the White Pine North Project ("WPN" or the "Project") prior to 2014 are described in the Section 6.

11.1 Sample Preparation

11.1.1 Drill Core Sampling (2014-2015)

For the diamond drill core samples, the sampling intervals were determined by WPC geologists depending on lithological contacts and the presence of mineralization. The sampled intervals were no longer than 0.5 metre ("m") and they did not cross geologic contacts. In addition, the geologist inserted control standards ("Certified Reference Materials" or "CRMs"), blank material and drill core duplicates following the Quality Control ("QC") manual guidelines described in Section 11.3.

The sampling method implemented at White Pine North Project is straightforward. After drill core logging was completed, the core intervals to be assayed were identified in the core box. The core was sawn and the left ½ of the sample placed in a bag by the core cutter. The right ½ was retained for reference and returned to the core box. Half of the sample tag was removed from the box and placed in the sampling bag. When the sample was completed, the bag was sealed. All samples were assigned a unique sample number. The sample number did not include any reference to drill hole number or meterage for security reasons.

GMS validated the exploration methodology and sampling procedures used by WPC as part of an independent verification program. The Qualified Person ("QP") concluded that the drill core handling, logging, and sampling protocols follow conventional industry standard and conform to generally accepted best practices. It is the opinion of GMS that the samples quality is good and that the samples are representative.

11.1.2 Laboratory Sample Preparation

The mass of each sample was recorded prior to crushing. The entire sample up to 7 kilograms ("kg") was crushed to 80% passing 2 millimetres ("mm") with the jaw crusher. A split of 250 grams ("g") sample was then pulverized to 95% passing 140 mesh (105 µm). All remaining pulps were saved and returned to WPC for storage.

11.1.3 Sample Analysis and Geochemistry

All WPC's drill core sample preparation (drying, crushing and pulverising) and assaying was handled exclusively by Activation Laboratories Ltd. ("Actlabs") in Thunder Bay, Ontario, Canada. Actlabs is an independent geochemical laboratory and implements a quality system compliant with the International Standard Organization ("ISO") 9001 Model for Quality Assurance and ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories. Actlabs is also accredited with CAN-P-1579 Requirements for the accreditation of mineral analysis testing laboratories.

The information below was taken entirely and/or summarised from the Actlabs Schedule of Services Brochure 2019 available on their website: http://www.actlabs.com/files/Actlabs_-_Schedule_of_Services_-_Canada_-_2019-07-22.pdf.

All 2014-2015 drill core samples were analyzed for Ag and Cu with 4-Acid ICP-OES (method code 8) and for 36 elements (Ag, Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Sr, Te, Ti, Tl, U, V, W, Y, Zn, & Zr), including Ag and Cu with ICP Total Digestion (method code 1F2). The 4-Acid ICP-OES analysis is the higher ranked analysis for silver and copper. The lower detection limits for the 4-Acid ICP-OES are 0.001% for copper and 3 g/t for silver.

11.2 Density

In-house bulk density was determined per mineralized horizon by measuring specific gravity by the water immersion method on whole core. Samples are dried in a drying oven at 60°C until they are completely free of moisture (4-16 hours). The scale is checked that it is on a level surface and that it is calibrated. The scale is then zeroed with the tray apparatus so that it will not have to be subtracted out later. The core sample is weighed for the dry mass. The water temperature at each measurement is recorded to determine water density more accurately.

Quarter (¼) core was sent to Actlabs for bulk density determination using the wax immersion method following the American Society for Testing and Materials ("ASTM") Designation C914-09. In-house samples were dried in a drying room at 60°C for 4 to 16 hours. Halved (½) core is weighed for a dry weight. A calibrated Radwag balance is used for these measurements. This certified scale has a 0.01 g accuracy and is calibrated and re-certified every year. Each sample is carefully wax coated with care to remove all trapped air from the wax. The cumulative weight of the waxed pieces is measured. The cumulative suspended weight is determined by placing all individually waxed pieces into a submerged wire basket. Specific gravity determined by the wax-immersion method has to be multiplied by the density of water to yield density. The temperature in the laboratory was 23°C, ± 1°C, which results in a water density of 0.997 g/cc.

A total of 518 specific gravity (SG) measurements were taken on the White Pine North Project from 1958 to 2015.

Table 11.1 shows the median and mean obtained for each bed number of WPN project.

Table 11.1: Specific Gravity Statistics by Bed Number – White Pine North

BEDNO	LITHO CODE	Specific Gravity (g/cc)				
		Number	Min.	Max.	Mean	Median
10	LWSA	38	2.54	2.84	2.68	2.68
21	LTRA	48	2.47	3.18	2.73	2.73
23	DOMN	32	2.66	2.80	2.74	2.74
24	RMAS	38	2.70	2.94	2.74	2.74
26	DGMA	55	2.67	2.96	2.77	2.77
27	TOPZ	31	2.68	2.76	2.73	2.73
29	TIGR	51	2.42	2.78	2.74	2.75
30	UPSA	43	2.59	2.82	2.69	2.70
41	UTRA	34	2.67	2.84	2.75	2.75
43	THIN	28	2.69	2.86	2.76	2.75
44	BMAS	42	2.55	2.76	2.72	2.73
46	UZVA	41	2.58	3.19	2.74	2.74
47	WIDE	36	2.55	2.81	2.73	2.73
49	RAGR	1	2.73	2.73	2.73	2.73

Although WPC performed density measurements In-Situ, GMS decided to apply a homogeneous 2.74 g/cc density value for all rock types in the White Pine North block model. An evaluation of the density measurement per mineralized column shows that the median density values for PS 2 m and FC 3 m are both 2.74 g/cc.

Table 11.2 summarizes the values of densities used in the Mineral Resource estimation ("MRE") by GMS.

Table 11.2: Specific Gravity Averages Used in the Resource Estimation

Lithology	Specific Gravity (g/cc)
Air	0.00
Overburden	2.20
Parting Shale (PS)	2.74
Full Column (FC)	2.74
Upper Shale (US)	2.74
Waste	2.74

11.3 Quality Assurance and Quality Control ("QA/QC")

In addition to the Actlabs internal Quality Control ("QC") protocol, WPC implemented a rigorous QA/QC program for its drill core sampling completed in 2014 and 2015. As part of the QA/QC procedure, WPC inserted blank materials, control standards ("Certified Reference materials" or "CRMs"), core sampling stage duplicates and preparation stage duplicates.

WPC QA/QC samples included in the 2014 and 2015 drilling programs are outlined in Table 11.3.

A geologist regularly inserted two CRM's, three coarse blanks, and one core duplicate for each drill hole. CRMs with a high-grade, medium-grade, and low-grade values (% Cu) were inserted in high, medium and low mineralized intervals respectively. Coarse blanks were inserted between high-grade intervals. A quarter (¼) core from the same assay interval was taken for a coarse duplicate.

For 2014 and 2015 drilling campaigns, a total of 171 standards, 94 blanks, 15 drill core duplicates and 120 preparation duplicates were submitted to the laboratory for quality assurance purposes, which together comprise 24% of all drill core samples assayed (1,701) during that period.

Table 11.3: List of QA/QC Samples– 2014 & 2015 Drilling Campaigns for Cu % and Ag g/t

QAQC Sample Type	No of Samples	% of Sampling	Frequency of Insertion
Certified Coarse Blank - BL-10	17	6%	Approx. 1/20
Certified Coarse Blank - OPTA	72	27%	
Certified Coarse Blank – WPB-HC	5	2%	
Certified Blank Material Total[1]	**94**	**6%**	
CRM - OREAS 162	28	11%	Approx. 1/20
CRM - OREAS 95	27	10%	
CRM - OREAS 97	27	10%	
CRM – CDN-ME-1205	18	7%	
CRM – CDN-ME-13	44	17%	
CRM – CDN-ME-19	28	11%	
Certified Reference Material Total[2]	**171**	**10%**	
Sampling Stage Core Duplicate	15	0.9%	Approx. 1/20
Crushing stage duplicate	120	7%	4/100

**Note. the following CRMs were excluded from this list since they have less than three samples inserted in the QA/QC program (CDN-CM-17; CDN-ME-11 and OREAS 98).*

11.3.1 <u>Blanks and Assessment of Contamination</u>

11.3.2 <u>Copper and Silver</u>

To monitor contamination during sample preparation and assaying, WPC inserted three types of blank materials (“OPTA”, “BLK-10” and “WPB-HC”). A total of 94 blanks were analyzed as part of the sample stream between 2014 and 2015 (Table 11.2). Of the 94 blanks, 96% of them returned less than 0.01% Cu which is 10 times the detection limit (10 x DL) of the 4-Acid Total Digestion ICP analytical method. Of the three blanks with analytical value greater than 0.01% Cu (100 ppm), no analytical values were greater than 1% Cu (10,000 ppm). Also, 100% of the coarse blank silver assay values were under the detection limit of 3 g/t Ag. Descriptive statistics of coarse blanks demonstrate no contamination for copper and silver (Table 11.4).

Table 11.4: Descriptive Statistic of Blank Material Assaying Results for Copper (% Cu)

WPC Blank Material (OPTA)	Cu %	Ag g/t
Mean	0.0025	1.5
Standard Error	0.0004	0.0
Median	0.001	1.5
Mode	0.0005	1.5
Standard Deviation	0.003	0.0
Sample Variance	9.9E-06	0.0
Minimum	0.0005	1.5
Maximum	0.015	1.5
Count	72	72
Confidence Level (95.0%)	0.000739	0.0

Figure 11.1 and Figure 11.2 show the analytical results for copper and silver observed by the OPTA certified blank material over time. The majority of copper blanks (96%) is falling below the 10 x DL threshold. All silver blanks' values are below the detection limit of 3 ppm.

Figure 11.1: Blank Material (OPTA) Time Plots with Analytical Results for Copper

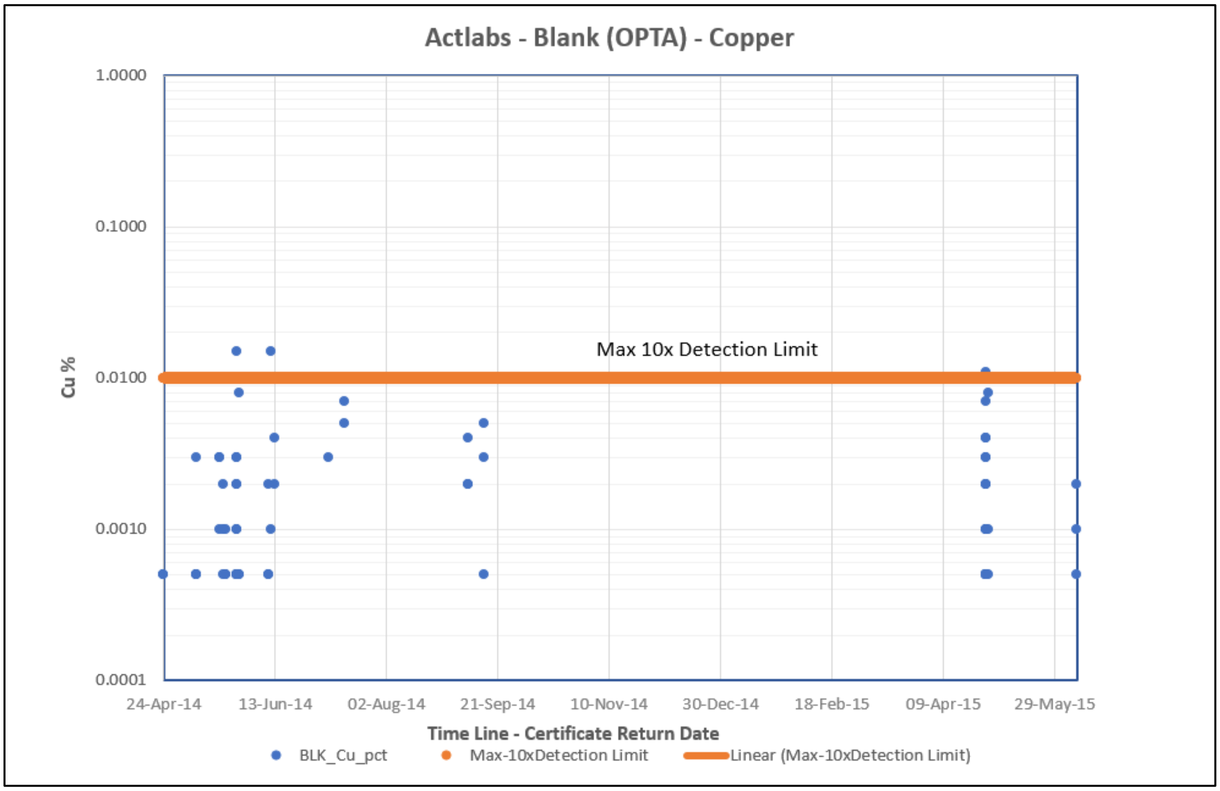


Figure 11.2: Blank Material (OPTA) Time Plots with Analytical Results for Silver

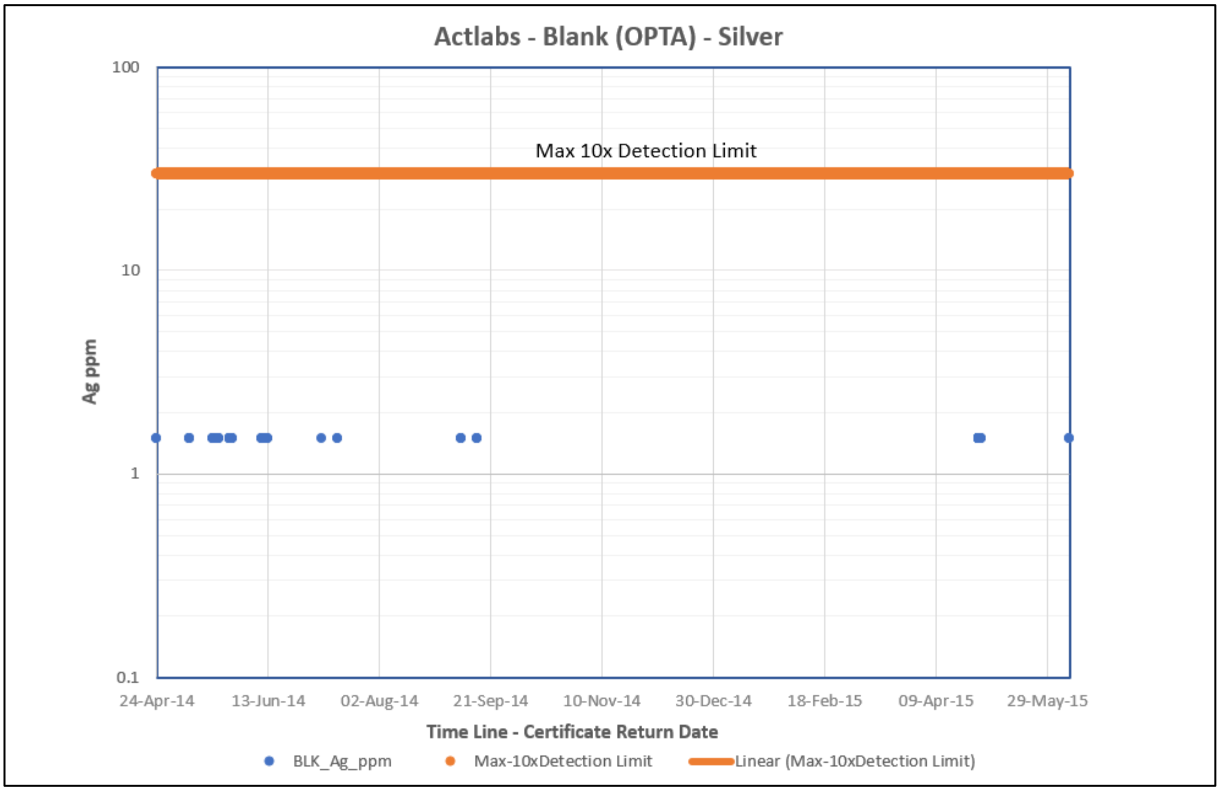


Figure 11.3 to Figure 11.6 show the analytical results for copper and silver observed by the BLK-10 certified blank material over time. In both charts, 100% of copper and silver blanks submitted were under the acceptable limits, and it is assumed that no significant contamination occurred during the sample preparation, delivery, and laboratory analysis.

Figure 11.3: Blank Material (BLK-10) Time Plots with Analytical Results for Copper

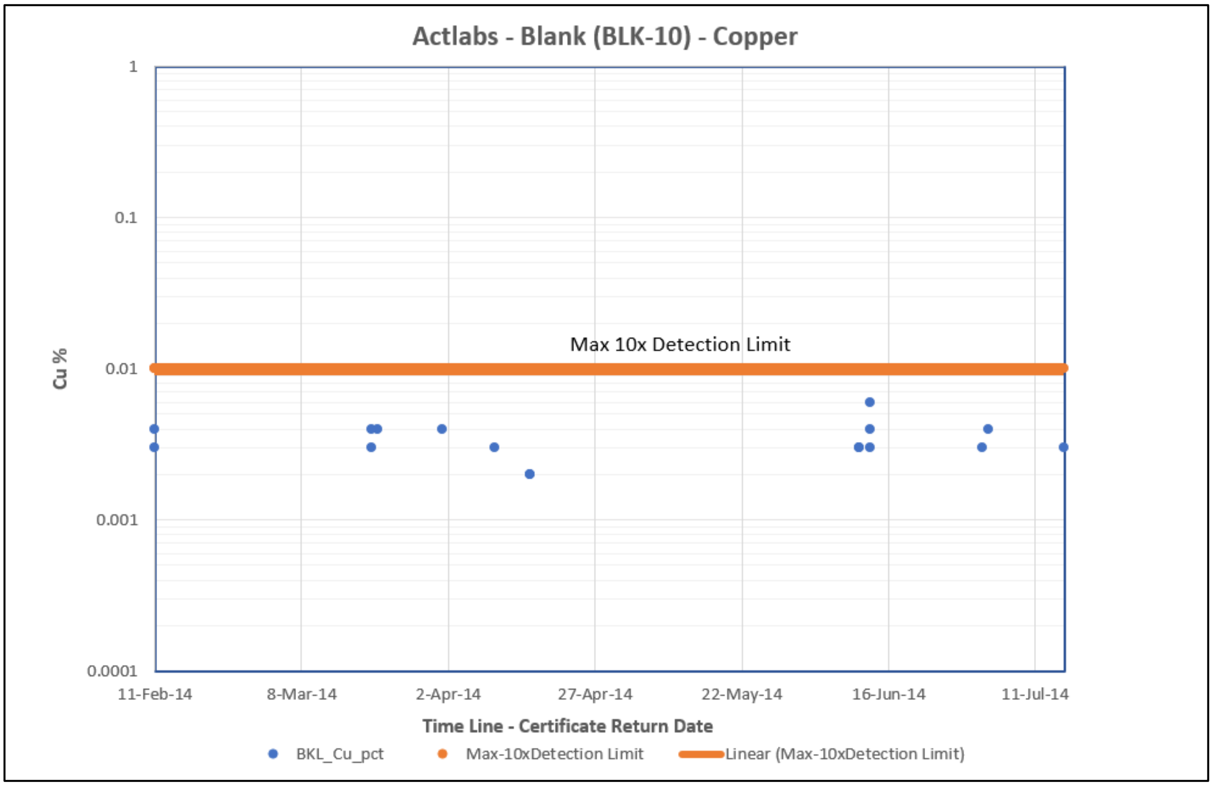


Figure 11.4: Blank Material (BLK-10) Time Plots with Analytical Results for Silver

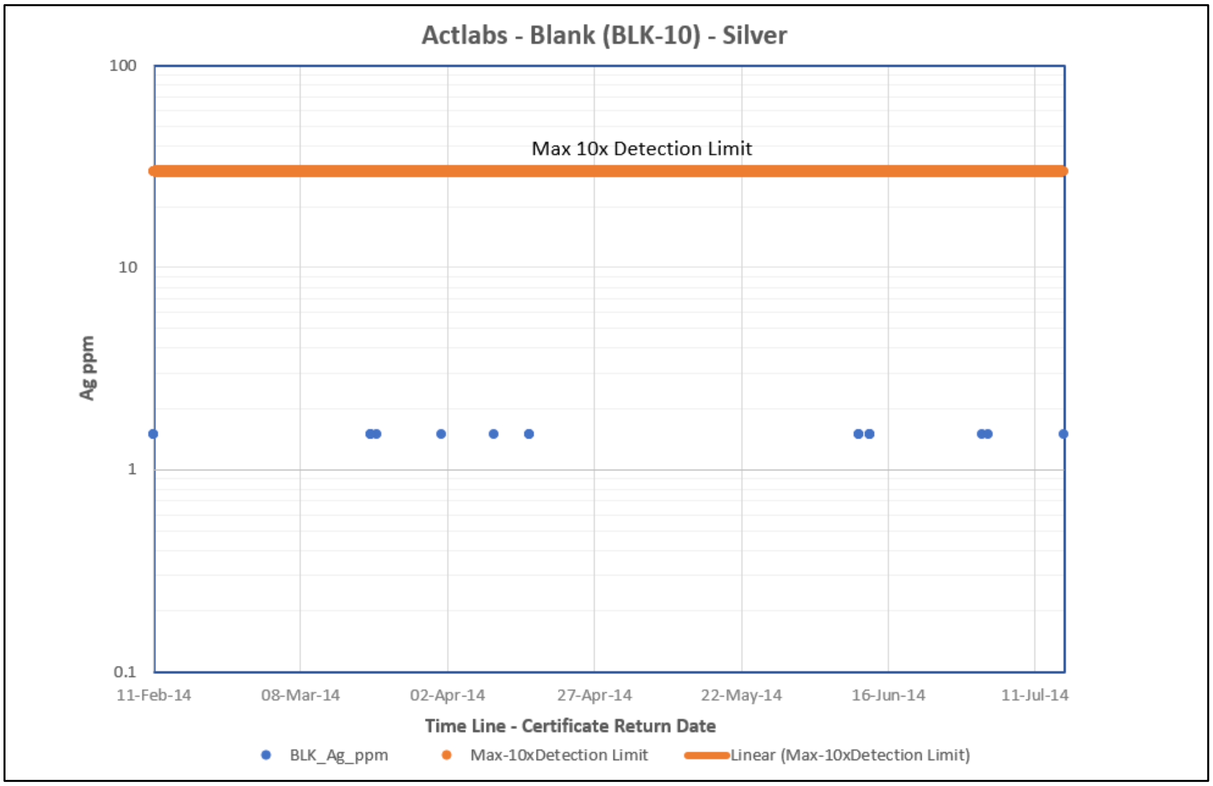


Figure 11.5: Blank Material (WPH-HC) Time Plots with Analytical Results for Copper

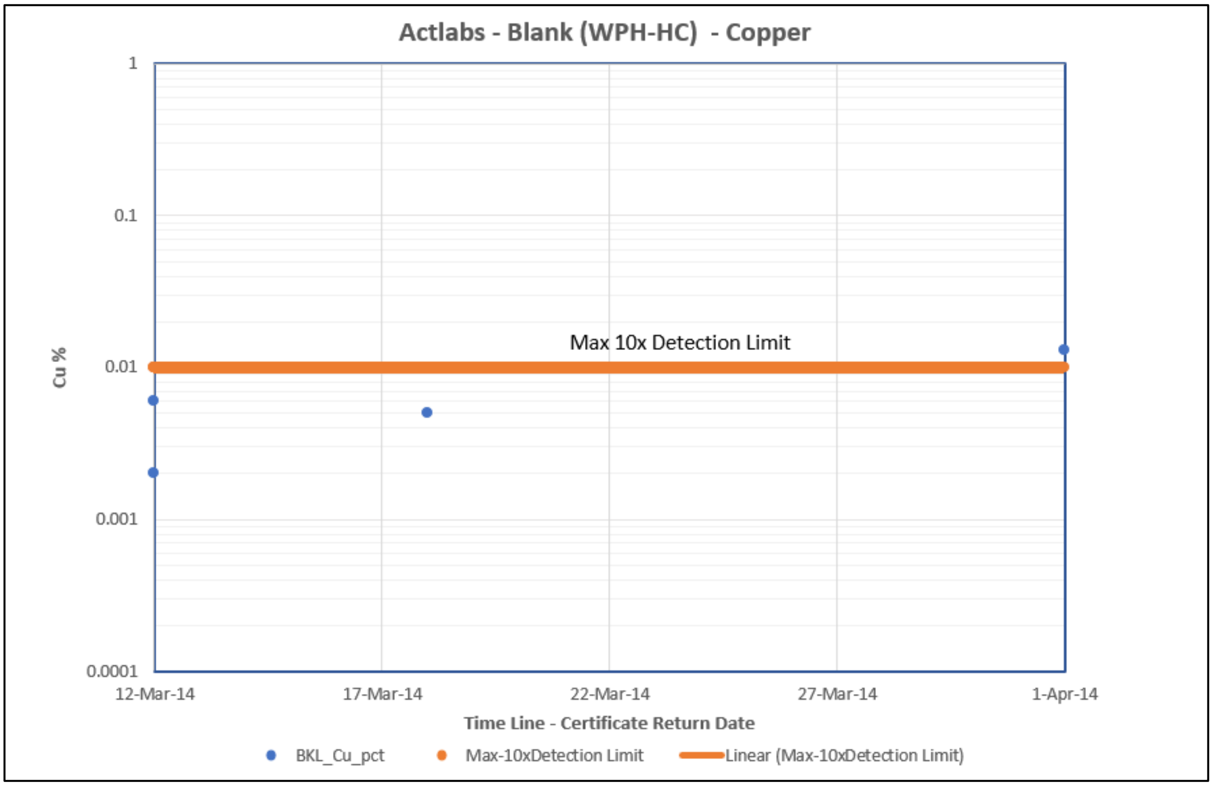
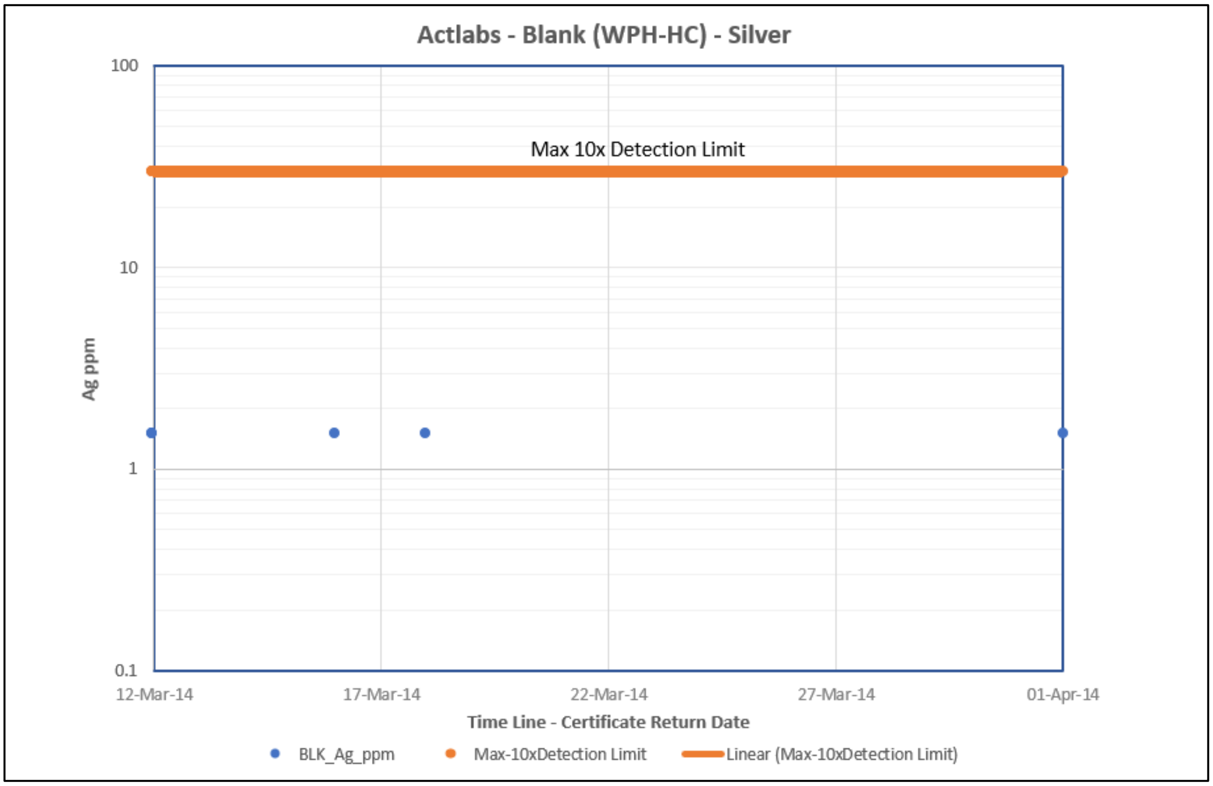


Figure 11.6: Blank Material (WPH-HC) Time Plots with Analytical Results for Silver



11.3.3 Duplicate Sample Performance

The duplicate samples included in 2014 and 2015 drilling program consist of sampling stage core duplicates and crushing stage duplicates. The drill core duplicates were sampled and inserted by the geologists on site. The crushing stage duplicates were collected in the preparation laboratory after jaw crushing. Core duplicates were inserted at a 0.9% rate and crush duplicates at a 7.0% rate.

The core duplicates performance is considered to be acceptable reflecting good overall precision and negligible sampling and analytical error for drill core samples.

Three copper core duplicates out of 15 core duplicates have a mean pair relative difference greater than 20% and possibly highlight variability characteristics of the ore deposit (
Figure 11.7 and Figure 11.8). Three silver core duplicates also have a mean pair relative difference greater than 20% and one of the silver duplicates coincident with one of the three deviating copper core duplicates (
Figure 11.7 and Figure 11.8).

The crush duplicates performance is considered to be acceptable reflecting good overall laboratory precision and negligible preparation and analytical error. 93% copper crush duplicates (111 duplicate samples of 120 in total) have a mean pair relative difference less than 20% while one silver crush duplicate is marginally over 20%. Again, all the majority of crush duplicate silver values for the original sample compares to the duplicate sample are between the acceptable limits ± 20% (Figure 11.9 and Figure 11.10).

According to the statistical analysis, t-Test: Paired Two Samples for Mean, done on the original and duplicate samples values, no bias was detected by GMS during the QA/QC validation. The average copper grade from the selected original values was 1% lower from the duplicate sample values. The average silver grade from the selected original values was 1% lower from the duplicate sample values. The T-Test statistical results for copper and silver preparation duplicates versus original samples are tabulated in Table 11.5 and Table 11.6.

Table 11.5: T-Test - Paired Two Sample for Copper Original vs. Duplicate Sample Means

Statistical Analysis “T-Test”	Cu % Original Sample	Cu % Duplicate Sample
Mean	0.724	0.719
Variance	1.51	1.48
Observations	120	120
Pearson Correlation	0.9997	
t Critical Two-Tail	1.98	

Table 11.6: T-Test - Paired Two Sample for Silver Original vs. Duplicate Sample Means

Statistical Analysis "T-Test"	Ag g/t Original Sample	Ag g/t Duplicate Sample
Mean	11.37	11.21
Variance	1963.37	1880.44
Observations	120	120
Pearson Correlation	0.9994	
t Critical Two-Tail	1.98	

Figure 11.7: Drill Core Duplicate Performance for Copper

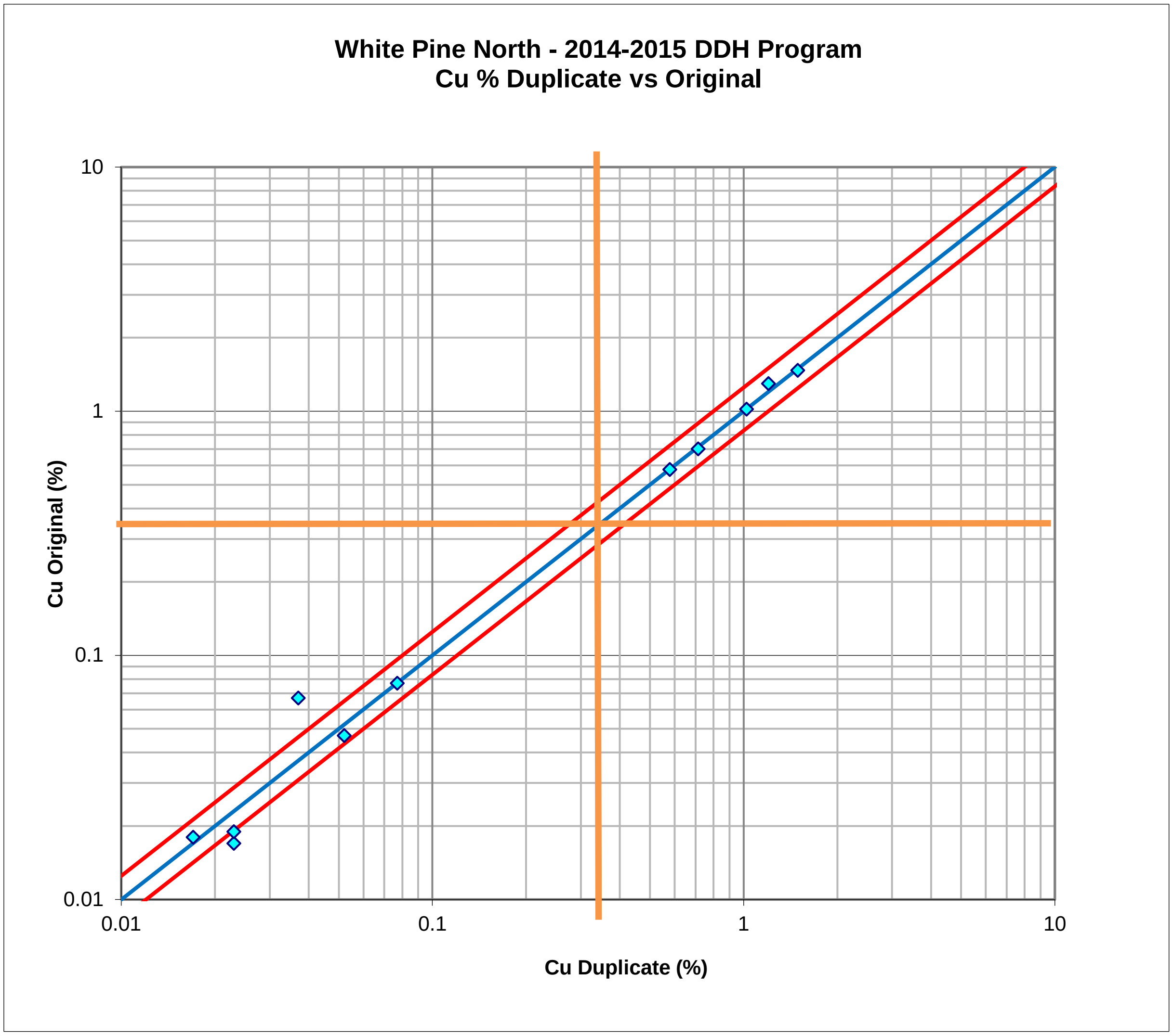


Figure 11.8: Drill Core Duplicate Performance for Silver

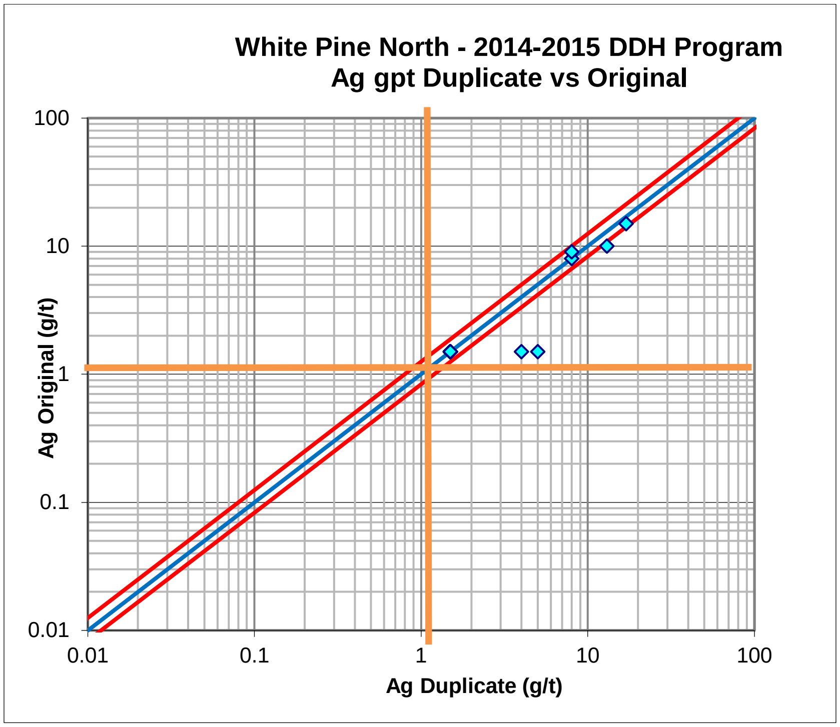


Figure 11.9: Preparation Duplicate Performance for Copper

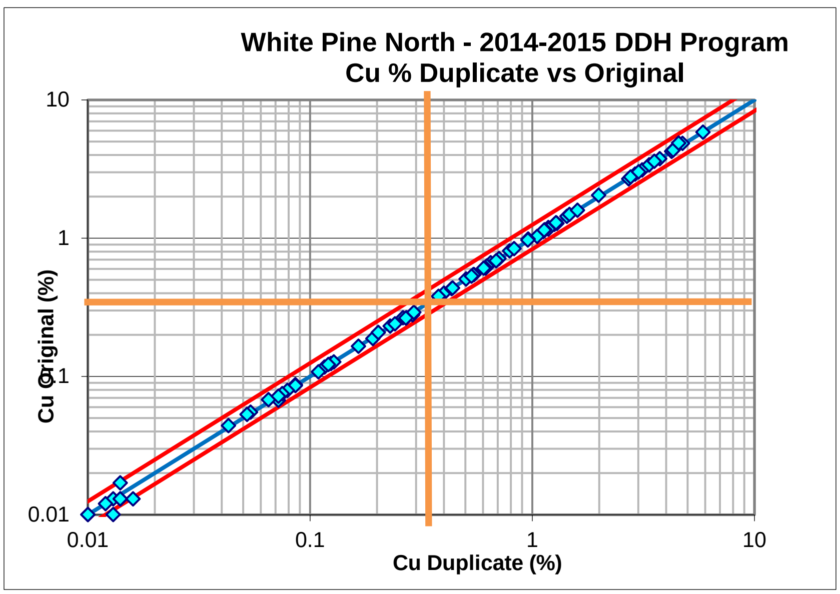
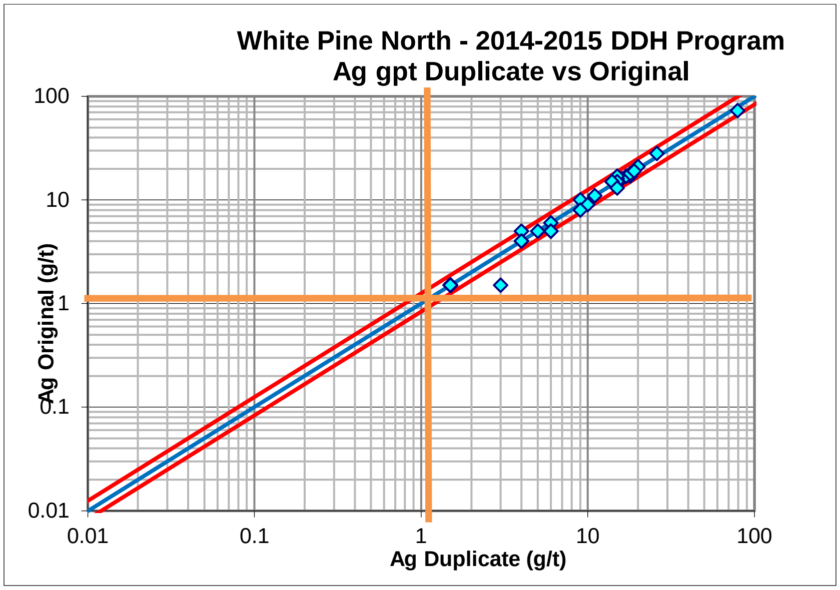


Figure 11.10: Preparation Duplicate Performance for Silver



11.3.4 Performance of Certified Reference Material (CRMs or Standard)

White Pine's protocol is to insert two (2) Certified Reference Materials ("CRMs") with every set of samples from one drill hole (approximately 1 in 20 samples). The site geologist alternated between a low-grade standard, middle grade standard, and a high-grade standard. CRMs were submitted with core samples for assay as control standards to identify any possible problems with specific sample batches or long-term biases in the overall dataset.

In total, six (6) CRMs were used by White Pine to monitor the consistency and accuracy of a laboratory. Three (3) of six (6) CRMs were manufactured by Ore Research & Exploration Pty Ltd ("OREAS"), in Australia. The other three CRMs were produced by CDN Resource Laboratories Ltd. ("CDN Labs"), in Canada. Both OREAS and CDN standards are certified in accordance with International Standards Organization ("ISO") recommendations. The Performance Gates applied for the White Pine North Project are available on the ORE Research & Exploration Pty Ltd. and CDN Resource Laboratories Ltd. website respectively (https://www.ore.com.au/oreas-reports/ and http://www.cdnlabs.com/Cu-Au-standards.htm).

Table 11.7 and Table 11.8 summarizes the CRMs of copper ("Cu") and silver ("Ag") content used for the White Pine North project and the recommended values defined by either ± 3 standard deviations (3σ) or ± 5% acceptable limits. For copper, the three standard deviation limits are used to assess results by assay methods, but the ± 5% range are used to assess geochemical results (i.e., 1F2 method – 4-acid – ICP finish).

Table 11.7: Recommended CRMs Cu (%) Values – White Pine North Drilling Program (2014-2015)

CRMs Code	Laboratory Supplier	Expected Cu Value (%)	Standard Deviation (σ)	Performance Gates			
				3σ		5%	
				Low	High	Low	High
CDN-ME-13	CDN Laboratories Inc.	2.69	0.10	2.39	2.99	2.56	2.82
CDN-ME-19	CDN Laboratories Inc.	0.474	0.009	0.447	0.501	0.450	0.498
CDN-ME-1205	CDN Laboratories Inc.	0.218	0.006	0.200	0.236	0.207	0.229
OREAS 95	Ore Research & Exploration Pty Ltd	2.59	0.01	2.39	2.79	2.46	2.72
OREAS 97	Ore Research & Exploration Pty Ltd	6.31	0.03	5.28	7.33	5.99	6.62
OREAS 162	Ore Research & Exploration Pty Ltd	0.772	0.007	0.694	0.849	0.733	0.810

For Silver (Ag), the range of values in the table below are used to assess QC failures (Table 11.8).

Table 11.8: Recommended CRMs Ag (gpt) Values – White Pine North Drilling Program (2014-2015)

CRMs Code	Laboratory Supplier	Expected Ag Value (g/t)	Standard Deviation (σ)	Performance Gates			
				3σ		5%	
				Low	High	Low	High
CDN-ME-13	CDN Laboratories Inc.	76.5	3.4	66.3	86.7	57.375	80.325
CDN-ME-19	CDN Laboratories Inc.	103	3.5	92.5	113.5	77.25	108.15
CDN-ME-1205	CDN Laboratories Inc.	25.6	1.2	22	29.2	19.2	26.88
OREAS 95	Ore Research & Exploration Pty Ltd	7.70	0.06	6.69	8.70	7.31	8.08
OREAS 97	Ore Research & Exploration Pty Ltd	19.6	0.2	15.7	23.6	18.7	20.6
OREAS 162	Ore Research & Exploration Pty Ltd	3.5	0.6	1.6	5.4	3.3	3.7

A total of 171 standards was submitted to Actlabs for analytical assaying. Figure 11.11 to Figure 11.22 illustrate the assaying results of the six reference materials used by WPC with a rate of 10.1% throughout 2014 and 2015.

The overall CRMs performance is within acceptable industry parameters and indicate no significant lab bias. All 171 CRMs have analytical values less than ± 3 standard deviations (± 3σ) from the certified value for copper and seven of these have an analytical value greater than ± 3 standard deviations (± 3σ) from the certified value for silver. One of the silver standards fail only marginally with an analytical value of 66 g/t Ag. The lower acceptance limit for the standard is 66.3 g/t Ag so the standard was considered to pass the QA/QC.

Figure 11.11: Performance of Control Reference Material OREAS 162 for Copper

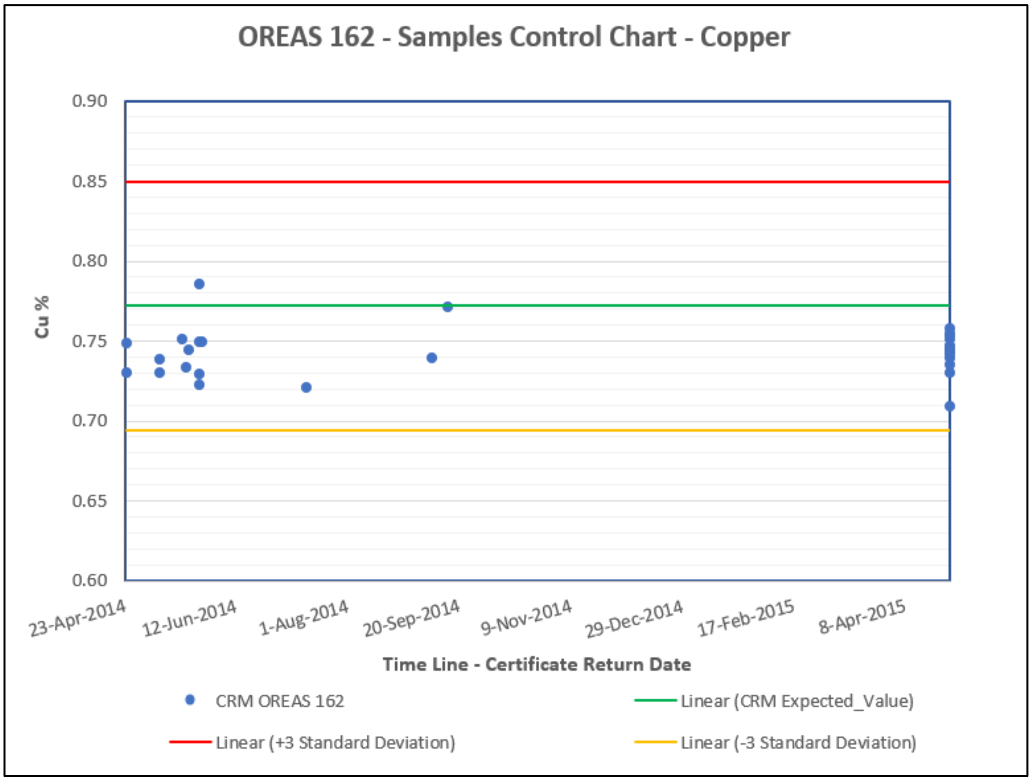


Figure 11.12: Performance of Control Reference Material OREAS 162 for Silver

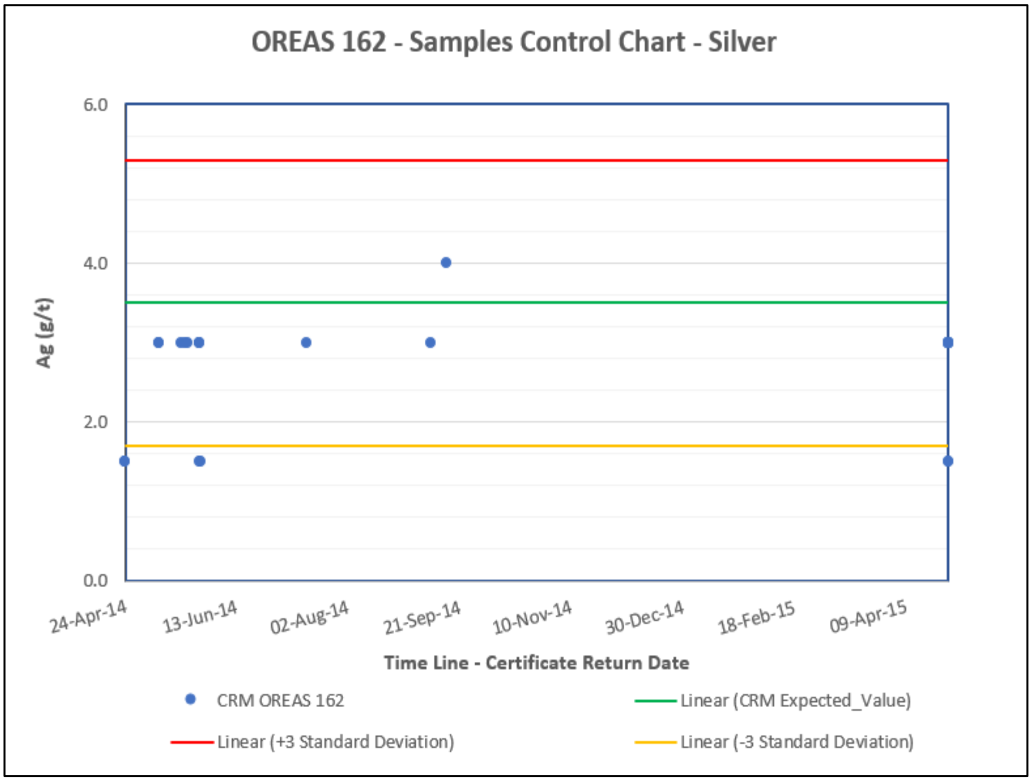


Figure 11.13: Performance of Control Reference Material OREAS 95 for Copper

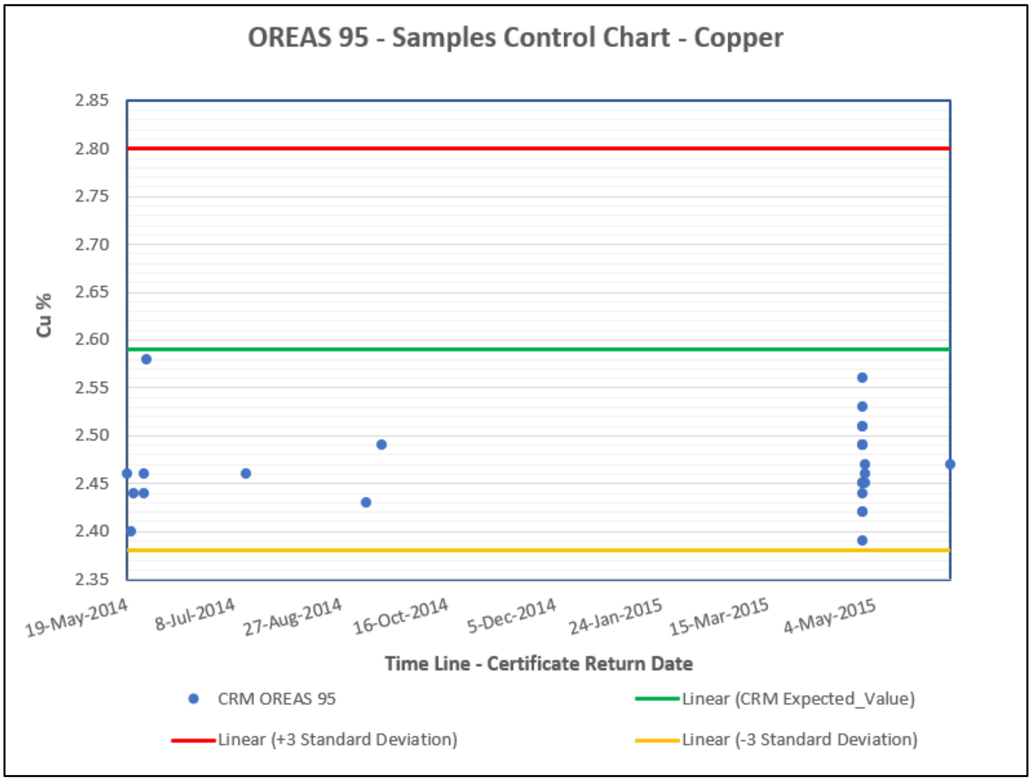


Figure 11.14: Performance of Control Reference Material OREAS 95 for Silver

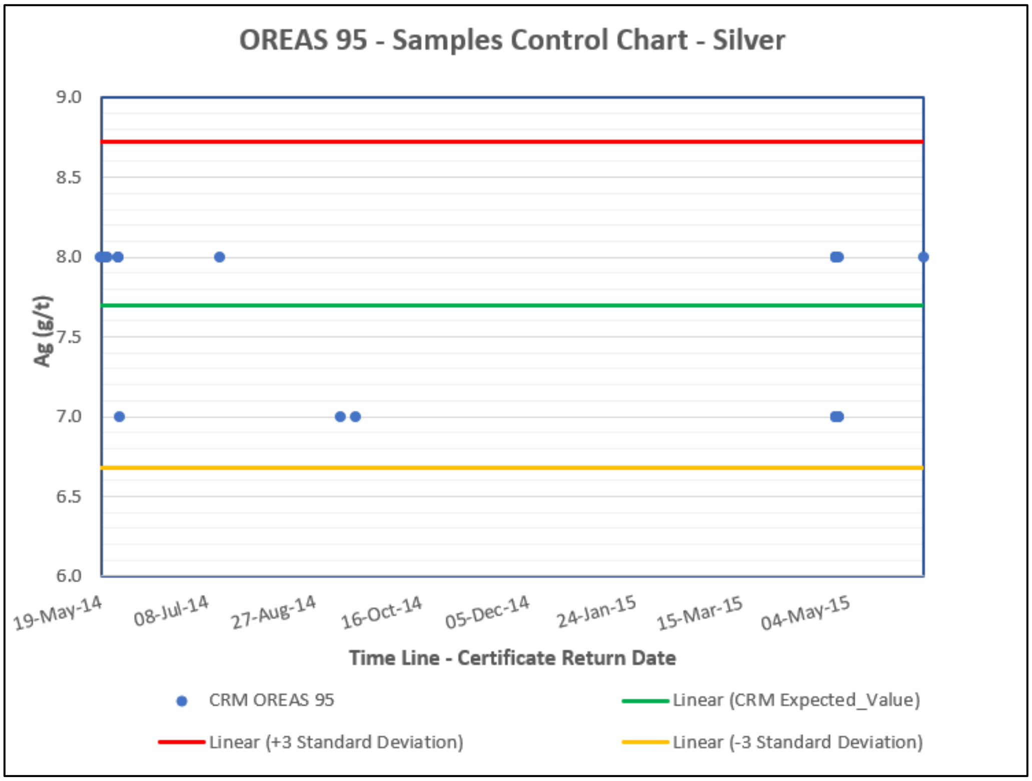


Figure 11.15: Performance of Control Reference Material OREAS 97 for Copper

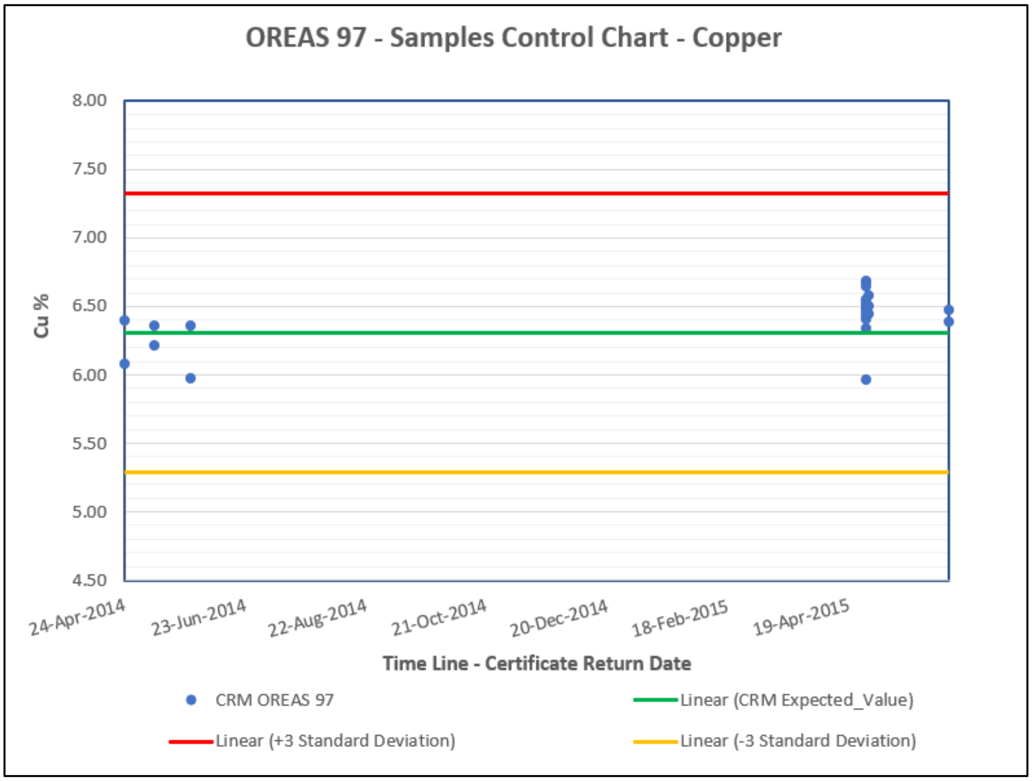


Figure 11.16: Performance of Control Reference Material OREAS 97 for Silver

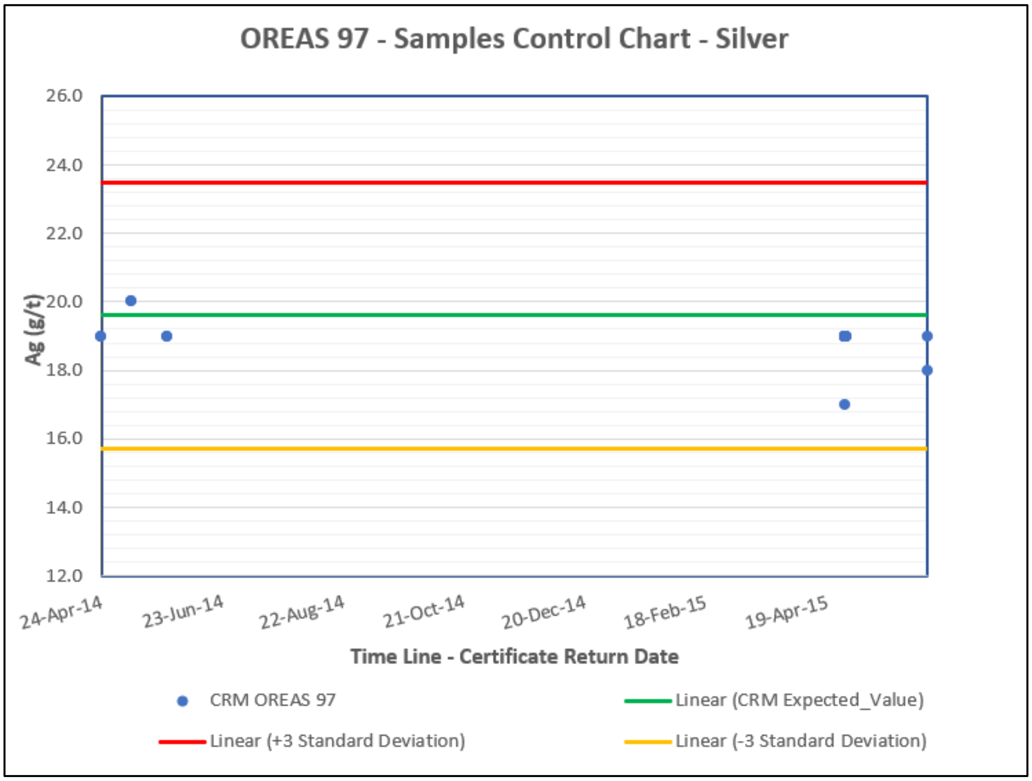


Figure 11.17: Performance of Control Reference Material CDN-ME-1205 for Copper

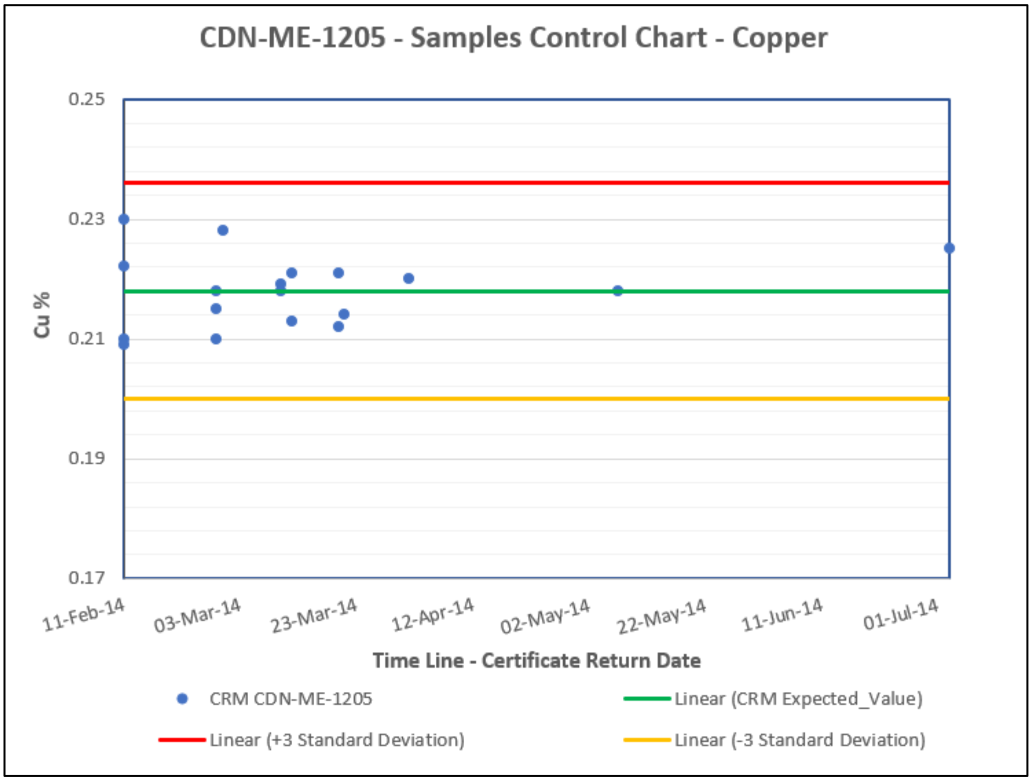


Figure 11.18: Performance of Control Reference Material CDN-ME-1205 for Silver

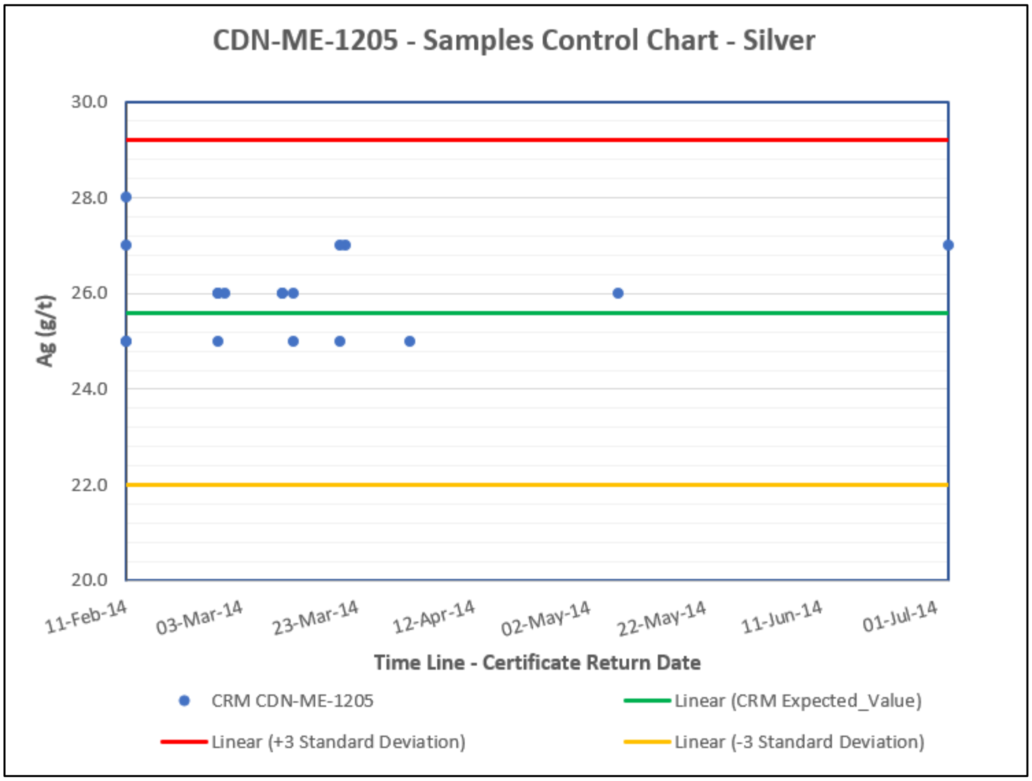


Figure 11.19: Performance of Control Reference Material CDN-ME-13 for Copper

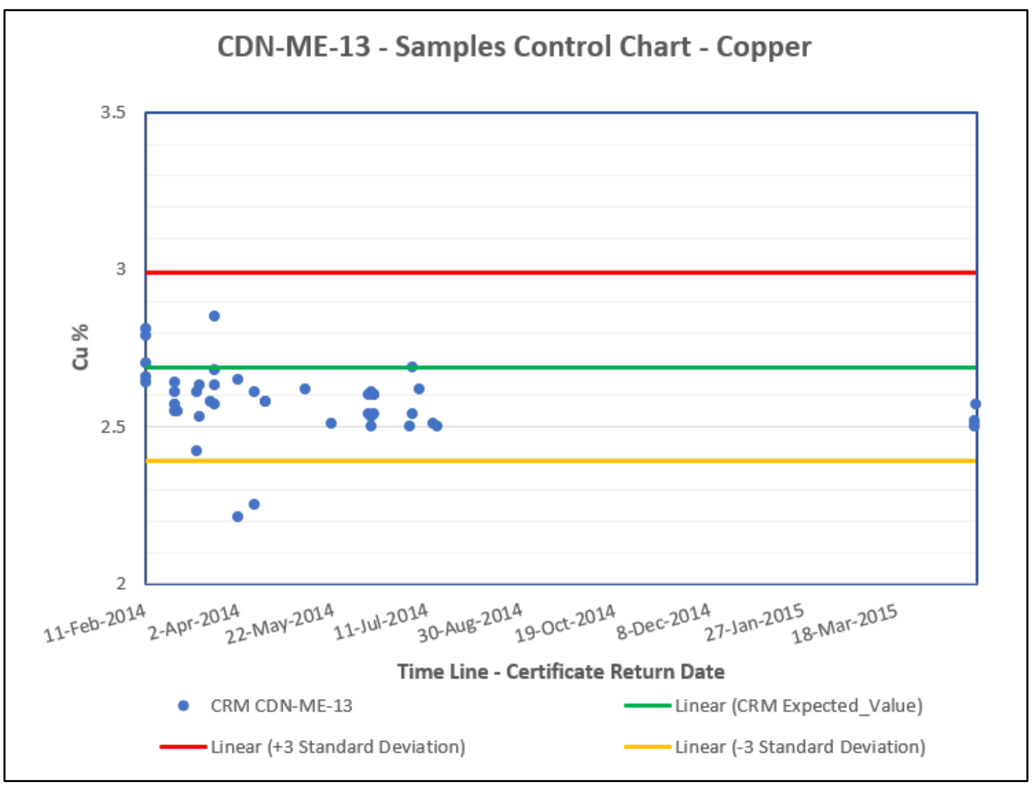


Figure 11.20: Performance of Control Reference Material CDN-ME-13 for Silver

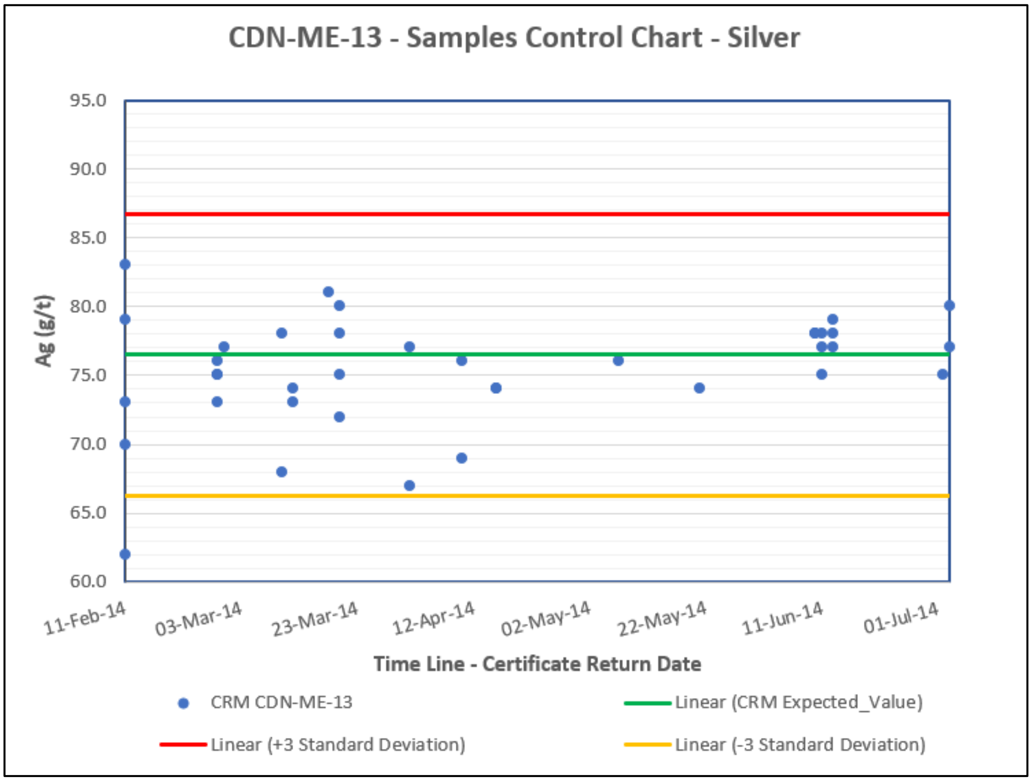


Figure 11.21: Performance of Control Reference Material CDN-ME-19 for Copper

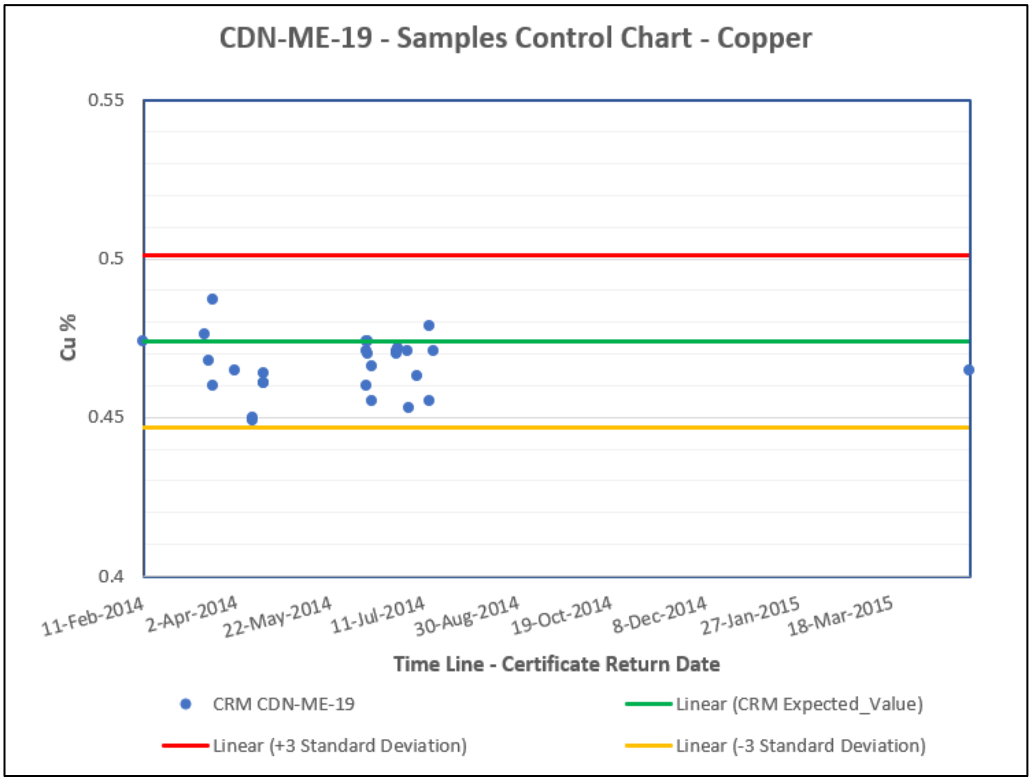
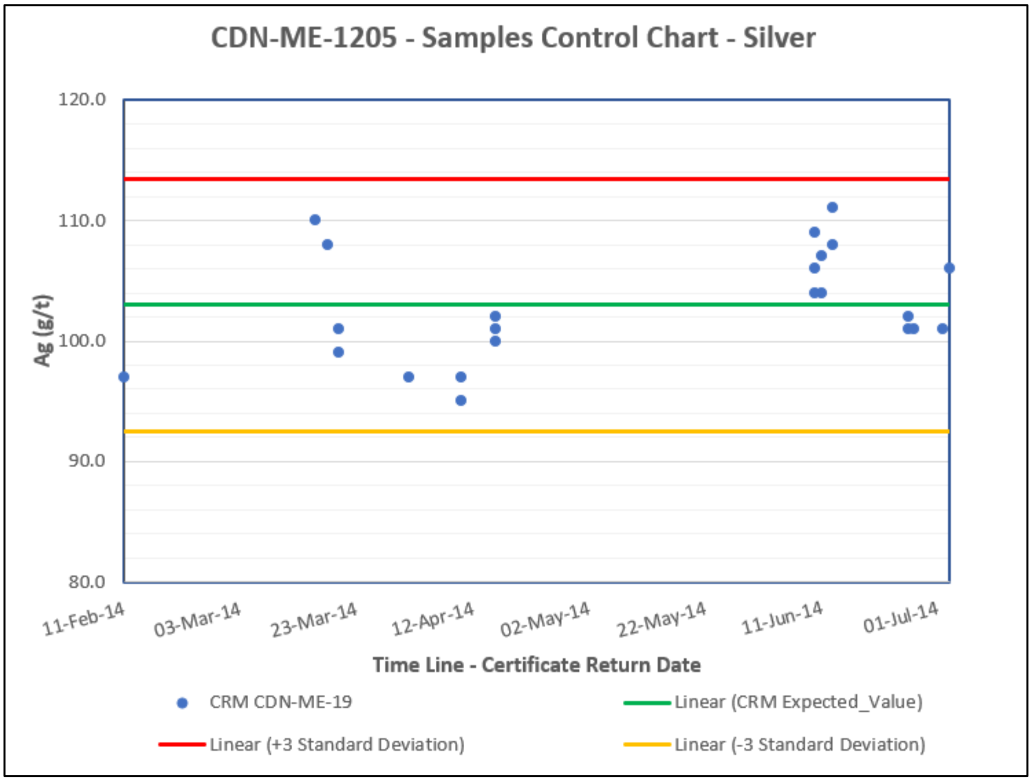


Figure 11.22: Performance of Control Reference Material CDN-ME-19 for Silver



11.4 Security

White Pine maintained sample chain of custody protocols on every step of sample handling, from the drilling site to the delivery of assay results to the database manager.

11.5 2022-2023 Winter Drilling Program

White Pine followed the same procedures described for the 2014-2015 and same analytical package for the recent 2022-2023 drill program. GMS did not review the result of this campaign as part of this mandate and are not included in this MRE.

11.6 GMS Conclusions

GMS is of the opinion that the sample preparation, analysis, and QA/QC protocol used by WPC for the White Pine North Project meet accepted industry standards for the 2014 and 2015 drilling program. The performance of inserted blank materials and standards indicate that the sample preparation and the lab accuracy have been of good quality. Drill core sample and preparation duplicate results were acceptable for use in the current MRE.

12 DATA VERIFICATION

12.1 Database

White Pine Copper ("White Pine") provided GMS the data files for the White Pine North Project, in March 2015. A compilation of bulk density measurements was provided in September 2022 and incorporated into the model at that time. The information consisted of drill hole data in the form of CSV files, the White Pine fault surface trace and a Mine Workings polyline dataset. The drill hole files received were transformed in metric coordinates by White Pine prior to delivery and consisted of the following tables and fields:

- Collar information: Hole ID, coordinates of collar and length of hole
- Down-hole survey: Hole ID, down-hole depth, dip, azimuth
- Lithology information: Hole ID, Sample ID, sample interval (From and To), rock type, bed code and mineralized zone
- Assay: Hole ID, Sample ID, sample interval (From and To), length, Copper (%) and Silver (ppm)

GMS imported the files into a MS Access database using the Geovia GEMS™ software, after converting depth and length values from feet to meters. The database was reviewed, and only minor errors were detected and corrected (mostly too short length in collar file). GMS assumes the translation from imperial to metric coordinates was properly done and that the database is matching the original. Further field investigation is required to confirm the location of drill holes in UTM coordinates.

12.2 Drillhole Database Content

The database includes historic diamond drill holes collected between 1956 and 1995, as well as drilling by WPC up to 2015. The content of the database is summarized in Table 12.1.

Table 12.1: Content of Drill Hole Database Available for the Resource Evaluation

Hole ID	Number of Holes	Min. Length (m)	Max. Length (m)	Average Length (m)	Total Length (km)	Number of Assays	Dip Angle
WP001 to WP569	568	32.00	1,16434	490.41	278.55	15,743	From -48°To -90°

**Note: Three holes have been abandoned by WPC and have therefore been excluded from the table (abandoned holes: WP563, WP570 and WP571).*

A total of 568 diamond drill holes with assay information were available for grade estimation, and only 567 drill holes with lithological data were used to build the geological model for each Mineralization Column. The database was reviewed and corrected, if necessary, prior to final formatting for resource evaluation. The following activities were performed during database validation:

- Validate total hole lengths and final sample depth data
- Verify for overlapping and missing intervals
- Check drill hole survey data for out of range or suspect down-hole deviations
- Visual check of spatial distribution of drill holes and trenches
- Validate lithology codes

12.3 GMS Data Verification

During January 2014, GMS reviewed the historical database, focusing on drilling undertaken in the north-eastern part of the White Pine Deposit.

Thorough checks of the historical information were done by examination of the drill hole logbooks that WPC recovered from the previous owner. The information was validated by comparison between logbooks and the digital database that GMS received from WPC. Overall, the digital database was found to be in good condition and the information contained within is judged to be adequate for a resource estimate. It must be noted, however, that drill hole collar locations (in local mine grid) cannot be validated other than by field investigation.

The Qualified Person ("QP") visually inspected the core logs which consisted of detailed information for each sample interval, including "From-To" intervals in feet, copper and silver grades in lbs/short ton and oz/short ton respectively, lithology / bed information and down-hole survey details. Except for the latter, most of the information was easily recovered for each hole in the Priority Zones Area north-east of the mined-out White Pine Mine (Figure 12.1). These 41 drill holes in question are listed in Table 12.2, by Priority Sector. Holes highlighted in red are holes from the 1994-1995 drilling campaign, logged in different books. All noted errors were transmitted to Kelly Azevedo, database manager at that time.

Figure 12.1: Drill Holes in the Vicinity of White Pine Mined-Out Area

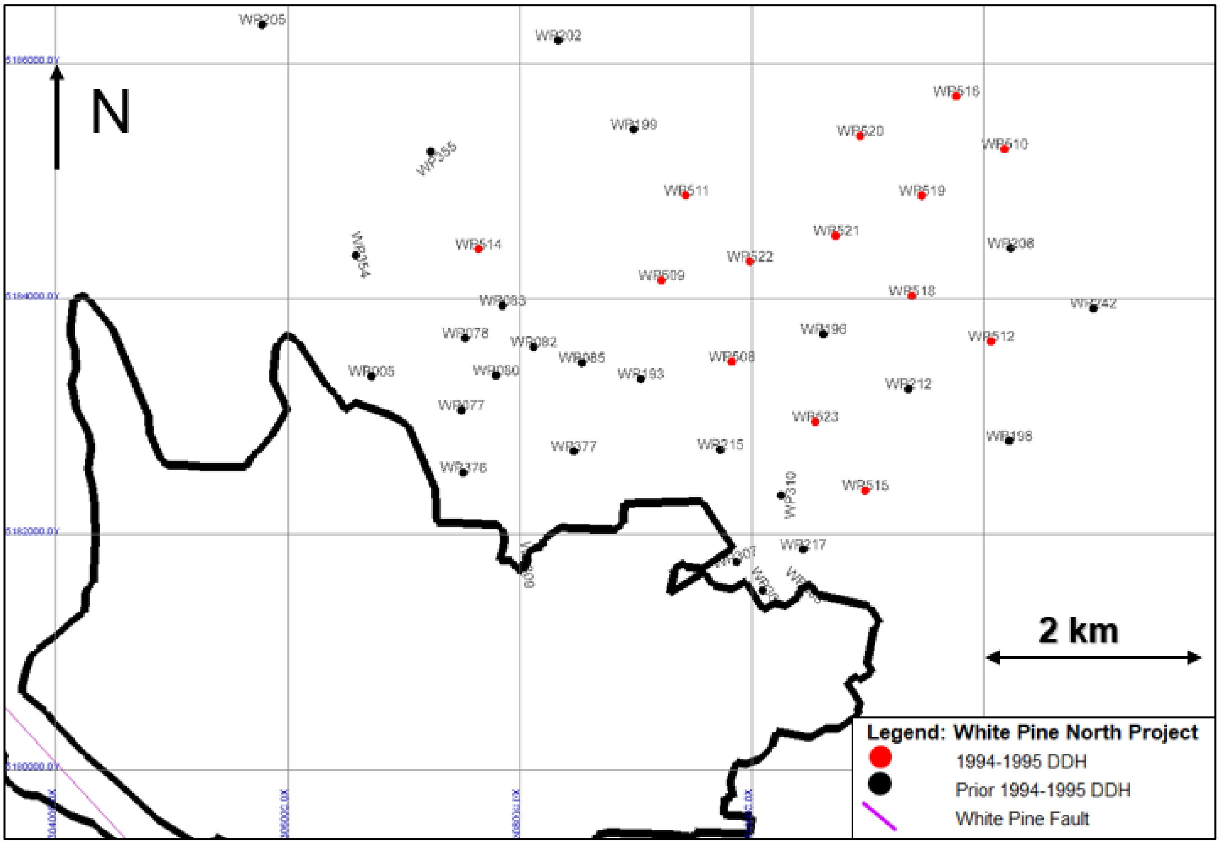


Table 12.2: Drill Holes in the Vicinity of White Pine Mined-Out Area

Historical Drilling Programs	DDH Hole ID						
DDH 1956-1980	WP_005	WP_077	WP_078	WP_080	WP_082	WP_083	WP_085
	WP_193	WP_196	WP_198	WP_199	WP_202	WP_205	WP_208
	WP_212	WP_215	WP_217	WP_242	WP_307	WP_309	WP_310
	WP_354	WP_355	WP_369	WP_376	WP_377	WP_386	
DDH 1994-1995	WP_508	WP_509	WP_510	WP_511	WP_512	WP_514	WP_515
	WP_516	WP_518	WP_519	WP_520	WP_521	WP_522	WP_523

12.3.1 Sample Interval Checks

A simple check of each sample interval was done by visual comparison of the original geological dataset (detailed core logs book) to the digital database. “From” and “To” in feet were used for comparison purpose and verifications were made to assure that the translation to metric system was done properly. Of the 38 drill holes checked, only three errors were found out of 967 intervals, making it for about 0.3% error in this category. It must be noted also that no information was found on drill holes WP_519, WP_522 and WP_523.

The errors found are listed below:

- WP_508: interval 2,814.90 ft – 2,816.16 ft has been manually changed in the logbook to 2,814.50 ft – 2,816.16 ft. The digital database displays the original interval (2,814.90 ft – 2,816.16 ft). This error is of minor importance given that the erroneous interval is above the Full Column (boundary between WID and UZV) and thus outside of grade interpolation range.
- WP_510: interval 3,189.73 ft – 3,191.09 ft is a typographical error in the digital database. It should read 3,189.23 ft – 3,191.09 ft. This error is of minor importance since it delineates a boundary between two samples of the same bed (Domino) with similar grade (2.35% vs. 2.28%)
- WP_511: two identical pages on lithology are in the logbook, with only a change in the two topmost intervals. It is not known which one is the good information, as the original was kept in the books and not deleted. This potential error is of minor importance since the two intervals in question are above the Full Column (Widely (B47) and UZV (B46)) and thus outside of grade interpolation range.

12.3.2 Lithology Checks

Concurrently with the interval checks, lithology validation was also performed systematically on all intervals found in logbooks. Of the 39 drill holes investigated, only one error was found out of 986 samples (0.1% error). No information was found for two holes (WP_522 and WP_523).

The single error found is in drill hole WP_369: a manual modification made in the original paper logbook changed the first occurrence of L SAND (B10, Copper Harbor Conglomerate) to L TRAN (B21, Lower Transition). The digital database displays the original Copper Harbor Conglomerate (B10) data. Visual check with rock core should be made to assess this potential error, because copper grade suggest that the interval should be left as it is in the digital database, i.e., as Copper Harbor Conglomerate (see Table 12.3).

Table 12.3: Possible Error in Data Transcription

HOLE-ID	From (m)	To (m)	From (ft)	To (ft)	Length (m)	Code	Zone	Cu (%)
WP_369	773.69	773.80	2,538.36	2,538.70	0.10	21	LT	0.49
WP_369	773.80	773.95	2,538.70	2,539.22	0.16	21	LT	0.51
*WP_369	774.78	774.90	2,541.92	2,542.32	0.12	10	CHC	0.17
WP_369	775.56	775.67	2,544.50	2,544.84	0.10	10	CHC	0.16

**Note: Potentially erroneous intervals*

12.3.3 Assay Checks

At the same time as sample interval and lithology checks, a visual inspection was also done on copper and silver assays. Only the transcriptions were assessed for most of the holes, since only 9 copies of laboratory certificate were available at the time of database review, with 8 of them pertaining to the area of interest: WP_508 to WP_512 and WP_514 to WP_516. All of the certificates match the digital database. Of the 35 drill holes visually inspected, only one error was found out of 908 samples (0.1% error). The following six drill holes did not contain any sample data to verify: WP_518 to WP_523.

The error found is in drill hole WP_386: a copper assay was mistyped in the digital database at the interval 2,616.50 ft – 2,616.92 ft (797.509 m – 797.6372 m). The copper grade found in the original logbook states a grade of 1.20% Cu, whereas a value of 0.12% Cu is recorded for the same interval in the digital database. A 1.20% Cu for a sample of Upper Sandstone is considered high, especially since it is surrounded by low-grade material, so the 0.12% Cu value was retained.

In addition to visual checks carried out on original documents during the site visit, GMS performed data verification of assay certificates in August 2019. Approximately 50% of the assays that included only drill holes from 2014 and 2015 drilling programs (1,701 assays), was checked against the original laboratory certificates for possible typographical errors, wrong sample numbers or duplicates. No error was found during the verification.

12.3.4 Down-Hole Survey Checks

Down-hole survey verification has been less conclusive than other validations given that few drill holes in the northern sector had their survey logged in the historical logbooks. This is especially true for the 1994-1995 campaign where no information was available at the time of the visit; down-hole surveys are supposedly stored in a warehouse. Out of the 41 drill holes in the Priority Zones area, only seven had down-hole survey information logged in the historical logbooks: WP_307, WP_309, WP_310, WP_354, WP_355, WP_369 and WP_386. Out of 134 deviation intervals (each with depth, azimuth and dip information), only one error was found (about 0.2% error). The first deviation information of drill hole WP_309 reads S70°E (or N110°) in the logbooks, but it is recorded as N250° in the digital file. It may be an error in the original log, given that the following deviations follow the N250° trend.

Erroneous casing readings near the top of the drill hole were also identified in WP_534 and WP_543 and were subsequently removed.

When importing the survey data into GEMS, GMS noted that some inclined drill holes contained a vertical survey reading at the start and end of the drill hole, which created unusual deviations in 3D. These readings were retained for vertical drill holes where no surveys were available, however they were removed for the inclined drill holes.

12.4 Historical Documentation

A brief exploration of historical documents available in Highland's Calumet office was carried out. The objective was to find any piece of document useful for the continuation of the resource evaluation. Several maps were judged valuable and handed over to Highland personnel for digitizing. Those included some maps of fairly good printing quality with fine details on the structural geology of the White Pine Mine (as well as the North-Mine sector). Location of faults in this area will be critical to mine development and mineralization displacement.

12.5 Conclusions

GMS assumes that all the steps leading to the final database were completed following the industry best practices to properly fulfill a Preliminary Economic Assessment for the White Pine North project.

In addition, and based upon the evaluation of the QA/QC program undertaken by WPC, it is GMS' opinion that the results are acceptable for use in the current Mineral Resource estimate.

13 METALLURGICAL TESTING

13.1 Introduction

The update of this preliminary economic assessment study concerning the mineral processing and metallurgical testing was a technical review of the previous work. No tests were performed during this update. Therefore, this section has largely been reproduced from the previous technical report on this project documented in G Mining Services Inc. et al (2019) and provides a description of metallurgical test work, analysis and interpretation of the test work results completed.

13.2 Historical Data

During the first 16 years of White Pine's production history, the belief was that the ore should be grinded to -45 microns in order to obtain a concentrate grading up to 35% Cu with an 85% recovery:

"Ever since work began on White Pine 16 years ago, it has been recognized that the grinding was a major problem. For a long time, it was believed that it was necessary to grind all the ore to minus 325 mesh to get a 35% concentrate with an 85% recovery". (R.H. Ramsey, 1953)

The White Pine flotation concentrate was reported to be free from any penalties.

Because the concentrate was largely copper sulphide and silicates of various kinds, it was necessary to add pyrite and lime rock to make the concentrate produce a more satisfactory slag for efficient smelting.

As sent to the reverberatory furnace, the concentrate would assay typically as follows:

	(%)
Moisture	20
Copper	35
Al_2O_3	8
Sulphur	7
Iron	5
CaO	2
MgO	3
SiO_2	28

Testwork then indicated that, at a 65 mesh grind, about half the copper could be recovered at once in a cleanable concentrate. The other half was contained in a floatable middling. It became apparent that the flowsheet ought to provide for rougher flotation at a coarse grind and for regrinding this rougher concentrate to 325 mesh. Using that method ought to make it possible to recover most of the remaining copper in a satisfactory concentrate.

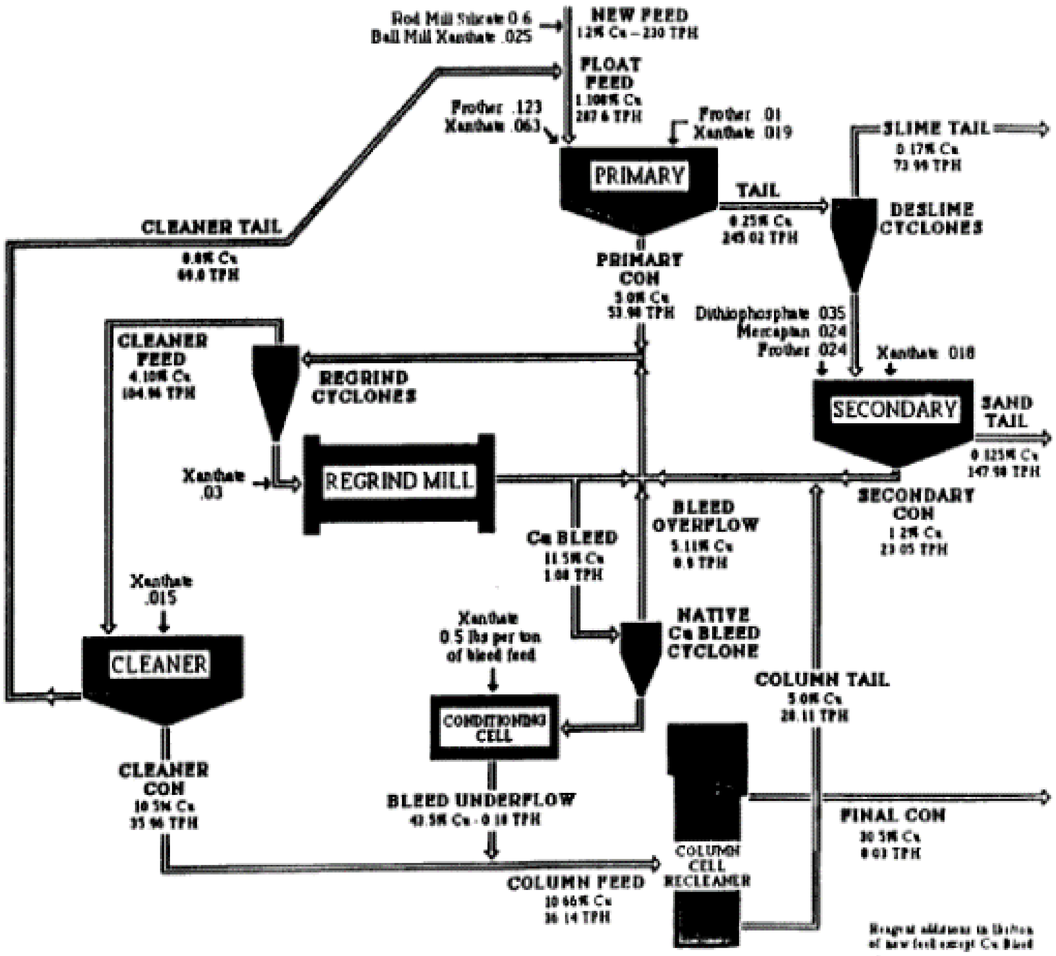
Desliming of the rougher tailing was also considered as a key part of the flotation improvement.

Following the rougher flotation step, the tailing went through a cyclone with the sand portion going to a second rougher float and eventually to regrind. The slimes were discarded. This step was highly important, eliminating about 37% of the feed as a barren tail; by removing the slimes it sped up subsequent flotation and allowed the use of a smaller amount of a strong collector that would otherwise be rapidly absorbed by the slime.

Reagents used consist of lime, fuel oil to cut the action of some bitumen found in the ore; Minerec B and Xanthates for collectors, and pine oil and an alcohol for frothers.

A more recent report was prepared in 1992 and captured the processing flowsheet as shown in Figure 13.1 (US Environmental Protection Agency, 1992).

Figure 13.1: White Pine Historical Flowsheet



The main features of this subsequent processing flowsheet were:

- Flotation feed at P95=152 microns
- Flotation is accomplished in four stages
- The de-sliming of the rougher tailing
- The regrind of the scavenger (middling) concentrate
- A final concentrate grading around 30% Cu at an 87-89% recovery

Used reagents and their dosage were as reported in Table 13.1.

Table 13.1: White Pine Historical Reagent Types and Consumption Rates

1991 Annual Reagent Consumption and 1992 Application Rates at Copper Range Company's White Pine Mine

Reagent	1991 Annual Consumption (tons/year)	1992 Application Rate (lbs/ton)
Xanthate	987,865	0.1821
Test Collectors	87,812	0.0160
n-Dodecyl Mercaptan	158,592	0.0273
Flocculants	62,248	0.0061
Defoamers	7,614	0.0153

13.3 Solution Mining

In the early 1990’s, Copper Range Company (CRC) proposed to use in situ leaching as a supplemental mining method to recover the ore remaining or to be left at White Pine from conventional mining, targeting an annual production of 60 million pounds of copper cathodes. Extensive laboratory and pilot-scale testing for solution mining operation assessment was performed in 1994 by CRC.

Available data indicated that excursions of leaching solution to surrounding formations were unlikely. The direction of ground water movement and natural neutralizing capacity of the surrounding formations favored containment of the leach solution. The poor quality of ground water in the mining horizon would also be documented and monitored as part of the planned studies. Given the groundwater gradient, natural neutralizing capacity of surrounding rock, and existing poor water quality, CRC believes that it was unlikely that in situ leach mining at White Pine will result in degradation of current or potential potable water supplies.

A ferric sulfate leach on White Pine ore was closely investigated as part of a geological master theses in 1988. The thesis primarily looked at a “bio-leach” in which bacterial cultures would perform the oxidation from ferrous to ferric iron. The tests included the bio-leaching of 16 small columns over a period of 112 days. Each ore type was leached in a separate column. Some of the conclusions summarized in this thesis are listed because of their relevance to the recent investigations.

- The iron content was found to increase in the leaching solutions as the tests progressed. The dissolution was directly related to the degree of iron oxide mineralization (hematite) in the ore.

- Iron was kept in solution at pH of 1.8 or lower. Columns cemented at a pH of 2.2 due to iron mineral precipitation.
- The particle size was identified as extremely important for the copper recovery. Extraction rates of 65% were realized in 112 days on ore samples of less than 0.185 inch in size.
- Acid consumption was directly related to copper extraction and the amount of calcite gangue mineralization.

The results of subsequent laboratory tests led to the conclusion that leaching of the White Pine ore body was feasible. The major concern was that the production of ferric iron through bioleaching was slow and questionable in the chloride rich mine water.

Throughout the history of the White Pine Mine, leach mining has been considered several times as a potential method to recover copper from the White Pine ore. This proposed concept was modified and adapted to the recent advances in the hydro-metallurgical technology.

13.4 Historical Copper Production

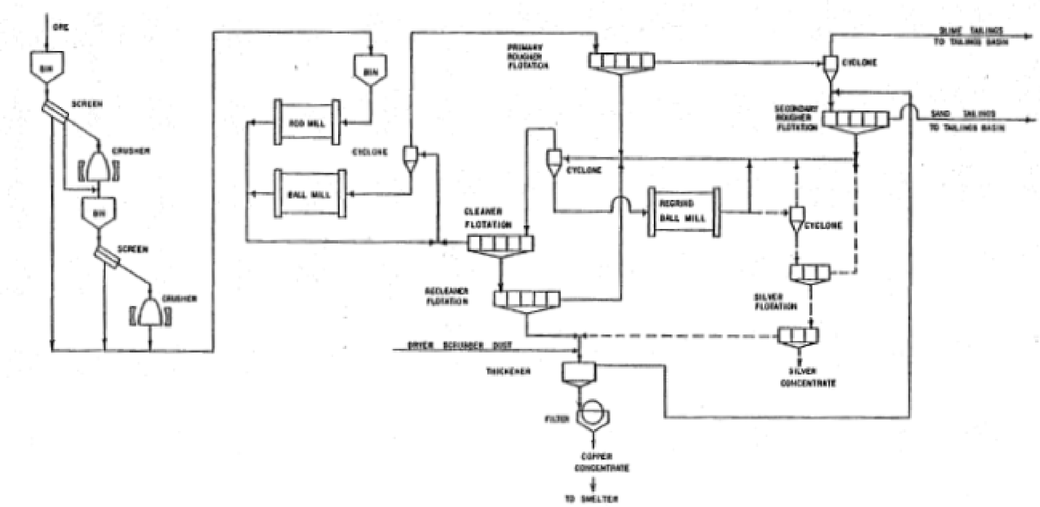
Copper mining was conducted at the White Pine Mine since 1952 and produced over 2 Mt of copper until the mine closure in 1994. In 1993, the mill treated 4.5 Mt of ore at a grade of 1.17% Cu. The average concentrate recovery and grades were 88% and 30% respectively, and the total energy consumption of the mill was approximately 31 kWh/t. Silver recovery was reported to be in the order of 90%.

The general processing scheme used for White Pine copper production consisted of conventional crushing/rod and ball milling followed by staged roughing/regrind and cleaning flotation circuit, subjected to various modifications/improvements throughout the mine operation period. The last reported version of the process flowsheet is outlined in Figure 13.2 with the following highlighted features:

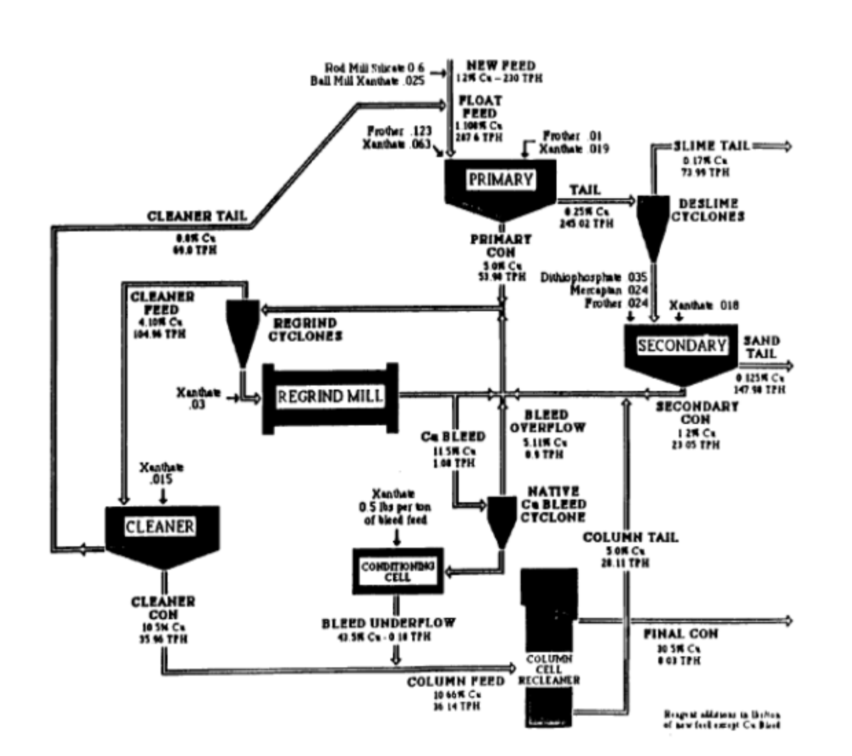
- Simple comminution circuit suitable for control of fines generation (slimes) control through rod milling
- De-sliming/regrinding
- Gravity Circuit (via cycloning) for Native Cu capture and silver recovery
- Possibility to operate the circuit for two separate concentrates (Cu, Ag) production when relevant

Figure 13.2: Historical Processing Scheme (a & b)

(a)



(b)



13.5 Recent Metallurgical Testing

In 2014, WPC initiated a preliminary metallurgical testing program at COREM laboratories. The objective was to validate and improve the historical performances producing a final concentrate grading of approximately 30% Cu at an average 88% recovery. Flotation testing focussed on samples from the Parting Shale ("PS") formation.

13.5.1 Metallurgical Sampling

This first testing phase used the first batch of samples from the White Pine North Mine deposit drilling. The sample locations are reported in Figure 13.3. The samples/composites inventory are listed in Table 13.2.

Figure 13.3: Met Samples Used for PS Mineralization Testing

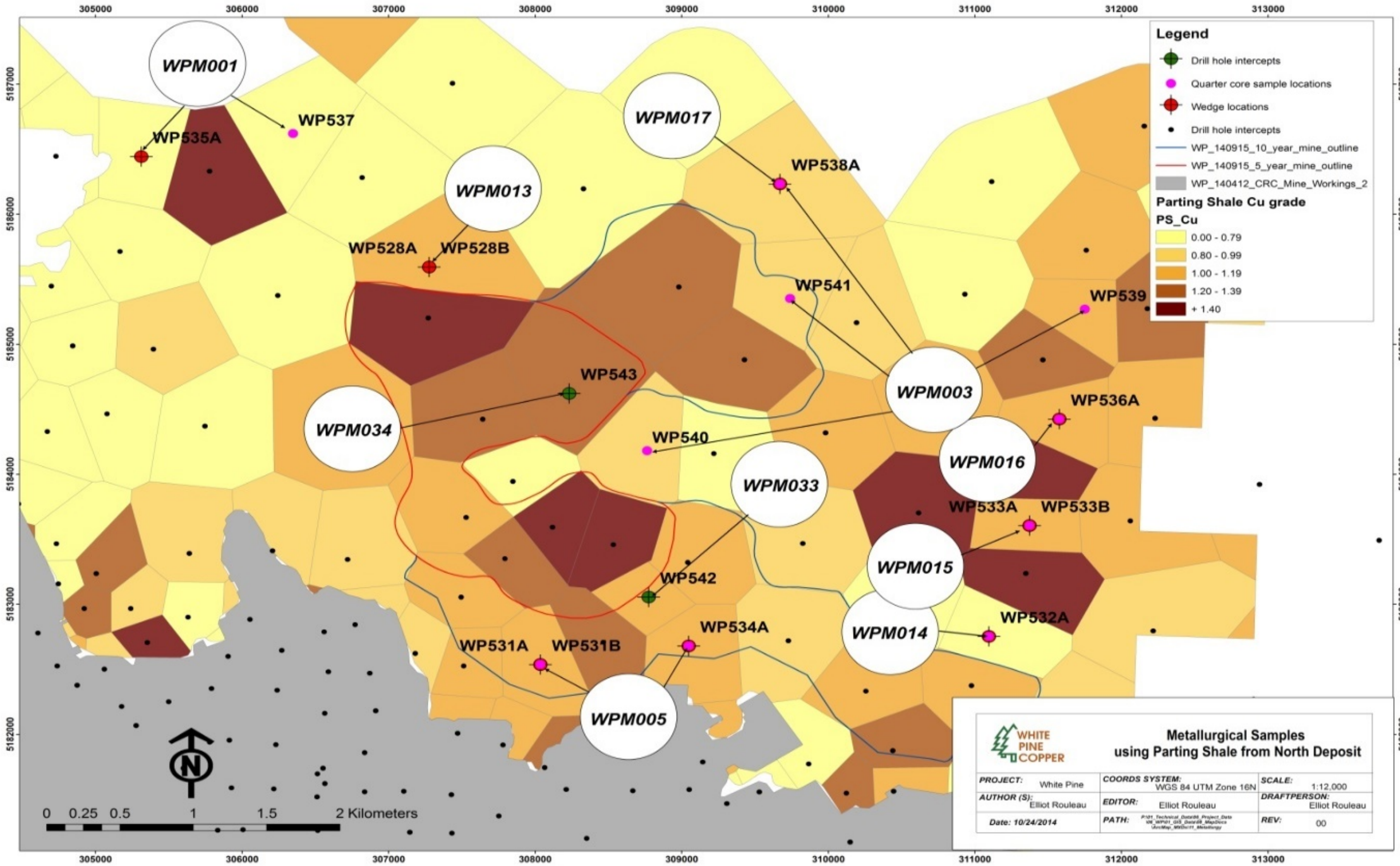


Table 13.2 Met Samples Used for White Pine North Different Mineralization Testing

Sample No.	Complete Description	HoleID	From	Configuration	% Cu	Length
WPM001	Parting Shale Outlier	WP537	quarter core	Parting Shale	0.62	3.52
		WP535A	wedge	Parting Shale	0.66	3.87
WPM002	Full Column for Ball Mill Work Index	WP532	quarter core	Full Column	0.57	4.36
		WP536	quarter core	Full Column	0.75	5.1
WPM003	Parting Shale for Rod Mill Work Index	WP538	quarter core	Parting Shale	0.79	2.80
		WP539	quarter core	Parting Shale	1.13	3.58
		WP540	quarter core	Parting Shale	0.83	2.61
		WP541	quarter core	Parting Shale	0.9	2.40
WPM004	Full Column Rod Mill Work Index	WP531A	wedge	Full Column	1.07	3.79
WPM005	Parting Shale for Ball Mill Work Index	WP531	Quarter	Parting Shale	1.06	2.20
		WP534	Quarter	Parting Shale	1.08	3.05
WPM006	Modified Parting Shale for flotation	WP534A	wedge	Modified Parting Shale	0.99	2.8
WPM007	Modified Parting Shale for flotation	WP531B	wedge	Modified Parting Shale	1.22	1.75
WPM008	UPSA for Rod Mill Work Index	WP537	Quarter	UPSA		2.61
		WP538	Quarter	UPSA		2.01
		WP539	Quarter	UPSA		2.15
		WP540	Quarter	UPSA		1.51
WPM009	UPSA for Ball Mill Work index	WP533	Quarter	UPSA		1.92
		WP534	Quarter	UPSA		2.39
		WP541	Quarter	UPSA		2.03
WPM010	UPSA for diluting (50 grams)	WP531	Quarter	UPSA		1.28
WPM011	Full Column for SMC	WP533A	Wedge	Full Column	0.87	4.24
WPM012	Modified Parting Shale for flotation	WP528A	Wedge	Modified Parting Shale	1.37	2.28
WPM013	Parting Shale for Flotation	WP528B	Wedge	Parting Shale	1.12	2.92
WPM014	Parting Shale for Flotation	WP532A	Wedge	Parting Shale	0.6	1.96
WPM015	Parting Shale for Flotation	WP533B	Wedge	Parting Shale	1.22	2.011
WPM016	Parting Shale for Flotation	WP536A	Wedge	Parting Shale	0.97	2.735
WPM017	Parting Shale for Flotation	WP538A	Wedge	Parting Shale	0.79	2.94
		WP528A	Wedge	Upper Sandstone	0.014	1.85
WPM018	UPSA for SMC Testing	WP528B	Wedge	Upper Sandstone	0.014	1.82
		WP532A	Wedge	Upper Shale	1.05	1.935
WPM019	Upper Shale for SMC Testing	WP536A	Wedge	Upper Shale	0.88	2.215
WPM020	Upper Shale for Flotation	WP528A	Wedge	Upper Shale	1.01	1.9
WPM021	Upper Shale for Flotation	WP528B	Wedge	Upper Shale	1.01	1.9
WPM022	Upper Shale for Flotation	WP531B	Wedge	Upper Shale	1.18	1.8
WPM023	Upper Shale for Flotation	WP533B	Wedge	Upper Shale	1.04	2.4
WPM024	Upper Shale for Flotation	WP534A	Wedge	Upper Shale	1.3	3.1
WPM025	Upper Shale for Flotation	WP535A	Wedge	Upper Shale	1.11	2.7
WPM026	Upper Shale for Flotation	WP538A	Wedge	Upper Shale	0.68	2.4
WPM027	LWSA for dilution	WP534A	Wedge	Lower Sandstone	0.001	0.5
WPM028	WIDE for dilution	WP528A	Wedge	WIDE	0.014	0.19
WPM029	UPSA for Crushability	WP534A	Wedge	UPSA	0	2.4
WPM030	Parting Shale for Crushability	WPU005	Bullk	Parting Shale	~1	2.46
WPM031	Parting Shale for SMC	WPU006	Bulk	Parting Shale	~1	2.12
WPM032	Parting Shale "Pillar Bench Marking" .	WPU014	Bulk	Parting Shale	~1	2.46
WPM033	Parting Shale from deposit	WP542	Half Core	Parting Shale	1.04	3.26
WPM034	Parting Shale from deposit	WP543	Half Core	Parting Shale	1.33	2.96

This campaign was almost entirely performed in Q1 2015 and a second batch of metallurgical samples in the PS was generated and submitted to COREM to be stored for PFS testing. The second sampling campaign captured the first 5-10 years of the potential mining plan.

13.5.2 Comminution Testing

Basic Bond rod and ball mill work index testing was performed at COREM on different lithological mineralized material samples and results are in Table 13.3 and Table 13.4. No significant difference can be observed in terms of mineralized material grindability hardness between the samples, and the mineralized material is generally classified as a hard mineralized material, based on the JKMRC database.

Table 13.3: Bond Ball Mill Work Index

Sample	Litho/ Configuration	Closing Sieve (µm/mesh)	BMWI (kWh/t)	Classification
WPM002	Full Column (FC)	106/150	14.5	Hard
WPM005	Parting Shale (PS)	106/150	13.9	Medium
WPM009	Upper Shale Sandstone (UPSA)	106/150	14.1	Hard
		Average	14.2	Hard

Table 13.4: Bond Rod Mill Work Index

Sample	Litho/ Configuration	Closing Sieve (mm/mesh)	RMWI (kWh/t)	Classification
WPM003	Parting Shale (PS)	1.18/14	15.9	Hard
WPM004	Full Column (FC)	1.18/14	14.8	Hard
WPM008	Upper Shale Sandstone (UPSA)	1.18/14	14.2	Hard
		Average	15	Hard

Sag Milling Comminution (“SMC”) tests were performed by JKTech on samples from Full Column (WPM011), Upper Shale Sandstone (WPM018), and (WPM019), Old mine Pillar PS (WPM031). Results are reported in Table 13.5 and suggest moderate hardness convenient for a SAG milling operation with no foreseen comminution circuit design issues.

Table 13.5: SMC Testing Results

Sample Designation	A*b				t_{10} @ 1 kWh/t			
	Value	Category	Rank	%	Value	Category	Rank	%
WPM011	33.0	hard	975	21.9	26.1	hard	1030	23.1
WPM018	37.6	moderately hard	1434	32.2	28.4	moderately hard	1496	33.6
WPM019	34.3	hard	1105	24.8	26.4	hard	1073	24.1
WMU006 (WPM031)	38.2	moderately hard	1496	33.6	28.4	moderately hard	1495	33.6

Crushing work index ("CWi") tests were conducted at FLSmidth laboratories on samples from Upper Shale Sandstone (WPM029) and old mine Pillar PS (WPU005) for preliminary hardness assessment and results are reported in Table 13.6.

Table 13.6: CWi Testing Results

Sample ID	Number of Samples Tested	Relative Density	Crusher Work Index		Classification
			kWh/short t	kWh/metric t	
WPU005	20	2.72	11.1	12.2	Soft
T-1701 WPM 0029	10	2.68	8.5	9.4	Very Soft

13.5.3 Mineralogy

The two principal copper minerals are chalcocite (Cu2S), accounting for 80-85% of the total copper, and native copper (Cu), accounting for approximately 10% of the copper. Minor sulfide minerals in the mineralized zone consist of covellite (CuS), bornite (Cu5FeS4) and chalcopyrite (CuFeS2). The mineralized material contains approximately 10 g Ag/t. Major constituents of the mineralized zone are sandstone, shale, siltstone and limestone with the components order of magnitude in the studied PS metallurgical samples reported in Table 13.7. Roughly, gangue minerals are as follow:

- 58-60% SiO_2
- 13-14% $Al2O_3$
- 5-7% Fe
- 1-3% CaO
- 3-4% Mgo

Table 13.7: Metallurgical Samples Composition

Samples	SiO2	Al2O3	MgO	CaO	K2O	TiO2	MnO	P2O5	Co	**Cr**	Cu	Fe	Ni	Pb	**S**	**Zn**	Ag
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	**(%)**	(%)	(%)	(%)	(%)	**(%)**	**(%)**	ppm
WPM013-14-16-17	57.02	13.74	3.71	2.14	2.27	1.10	0.10	0.22	0.02	**0.05**	0.95	6.36	0.03	0.02	**0.30**	**0.02**	14.27
PS outlier	62.66	12.86	3.41	1.76	2.06	1.06	0.12	0.22	0.02	0.05	0.80	5.88	0.09	0.02	0.28	0.02	16.84
WPM015	56.44	14.30	3.96	1.76	2.42	1.14	0.11	0.24	0.02	0.05	1.22	6.62	0.03	0.02	0.32	0.02	11.49
WPM013	57.64	13.41	3.78	2.33	2.31	0.99	0.14	0.21	0.02	0.05	1.10	6.30	0.03	0.02	0.23	0.02	38.33
WPM020-21-22-24	57.16	13.58	3.18	2.78	2.45	0.99	0.10	0.19	0.02	0.04	1.05	5.88	0.03	0.02	0.36	0.02	
WPM032	56.64	13.82	4.02	1.82	2.60	1.04	0.11	0.21	0.02	0.04	1.01	6.68	0.02	0.02	0.25	0.02	

A liberation study was performed on samples ground at P80=118 microns. Three size fractions (+75 µm, -75 +38 µm and -38 µm) of two flotation feed samples (PS Outlier, WPM533P) were mounted in polished sections and studied under Mineral Liberation Analyser ("MLA"). Samples were studied to better understand their composition and their copper, silver and iron distributions. Mineral composition of the two samples is given in Table 13.8 and Table 13.9. Chalcocite is the most abundant copper; native copper is in lower concentration and chalcopyrite is mostly undetected in any sample. In these samples, the silicates, mainly represented by the quartz and the feldspars, constitute the main minerals. As indicated in Table 13.10 and Table 13.11, copper seems to be equally concentrated in the size fractions at a level close to 1%.

Table 13.8: Mineral Composition of PS Outlier Sample

PS Outlier - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
Albite	24	28	27	24
Quartz	38	34	27	37
Mixed Feldspars	12	10	11	12
Chlorite	10.3	12	14	11
Orthoclase	7.3	6.8	7.2	7.3
Muscovite	2.3	2.3	2.7	2.3
Amphibole(s)	1.5	0.9	1.5	1.4
Plagioclase	0.4	0.3	0.7	0.4
Chalcocite	0.7	1.0	1.0	0.7
Titanite	1.2	2.0	1.9	1.3
Other silicates	0.4	0.8	2.6	0.5
Calcite	0.9	1.1	0.9	0.9
Ilmenorutile	0.3	0.4	0.6	0.3
Apatite	0.3	0.4	0.4	0.3
Iron hydroxides	0.1	0.1	0.2	0.1
Native_Copper	0.1	0.1	0.0	0.1
Ilmenite	0.1	0.1	0.3	0.1
Iron oxides	0.1	0.2	0.2	0.1
Bornite	0.0	0.1	0.1	0.0
Zircon	<0.1	<0.1	<0.1	<0.1
Native silver	n.d.	n.d.	n.d.	n.d.
Galena	n.d.	n.d.	n.d.	n.d.
Gold	n.d.	n.d.	n.d.	n.d.
Chalcopyrite	n.d.	n.d.	n.d.	n.d.
Greenockite	n.d.	n.d.	n.d.	n.d.
Pyrite	n.d.	n.d.	n.d.	n.d.
Pyrrhotite	n.d.	n.d.	n.d.	n.d.
Total	100.0	100.0	100.0	100.0

Table 13.9: Mineral Composition of WPM533P Sample

WPM533P - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
Albite	27	29	27	27
Quartz	22	27	28	22
Mixed Feldspars	22	16	12	22
Chlorite	9.8	11	12	10
Orthoclase	7.7	7.4	7.7	7.7
Muscovite	3.7	2.7	3.2	3.6
Amphibole(s)	2.0	1.5	1.3	1.9
Plagioclase	1.4	0.8	0.9	1.3
Chalcocite	0.9	1.0	1.4	0.9
Titanite	0.9	1.2	1.7	0.9
Other silicates	0.7	1.0	1.6	0.7
Calcite	0.4	0.7	0.6	0.4
Ilmenorutile	0.3	0.4	0.5	0.3
Apatite	0.2	0.3	0.4	0.2
Iron hydroxides	0.2	0.1	0.2	0.2
Native_Copper	0.2	0.3	0.1	0.2
Ilmenite	0.1	0.1	0.3	0.1
Iron oxides	0.1	0.1	0.4	0.1
Bornite	0.1	0.1	0.2	0.1
Zircon	<0.1	<0.1	<0.1	<0.1
Native silver	n.d.	n.d.	n.d.	n.d.
Galena	n.d.	n.d.	n.d.	n.d.
Gold	n.d.	n.d.	n.d.	n.d.
Chalcopyrite	n.d.	n.d.	n.d.	n.d.
Greenockite	n.d.	n.d.	n.d.	n.d.
Pyrite	n.d.	n.d.	n.d.	n.d.
Pyrrhotite	n.d.	n.d.	n.d.	n.d.
Total	100.0	100.0	100.0	100.0

Table 13.10: Calculated Assay of PS Outlier Sample

PS Outlier - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
O	48.9	48.4	47.7	48.9
Si	33.8	32.5	30.6	33.6
Al	6.5	6.9	7.6	6.6
Na	2.5	2.8	2.8	2.6
Ca	2.0	2.0	2.1	2.0
Mg	1.8	1.9	2.4	1.8
K	1.3	1.2	1.3	1.2
Fe	1.3	1.6	2.6	1.4
Cu	0.6	0.9	0.9	0.7
Ti	0.4	0.5	0.6	0.4
S	0.2	0.2	0.3	0.2
H	0.2	0.2	0.2	0.2
Ta	0.2	0.2	0.3	0.2
Nb	0.1	0.1	0.2	0.1
C	0.1	0.1	0.1	0.1
F	0.0	0.1	0.1	0.0
P	0.1	0.1	0.1	0.1
RE	0.0	0.1	0.1	0.1
Zr	0.0	0.0	0.0	0.0
Total	99.8	99.8	99.7	99.8

Table 13.11: Calculated Assay of WPM533P

WPM533P - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
O	47.8	47.8	47.4	47.8
Si	31.2	31.6	31.1	31.2
Al	8.3	7.7	7.4	8.2
Na	3.3	3.1	2.8	3.3
Ca	2.5	2.2	2.0	2.5
Mg	1.8	1.9	2.0	1.8
K	1.5	1.3	1.4	1.4
Fe	1.4	1.6	2.2	1.4
Cu	1.0	1.2	1.3	1.0
Ti	0.3	0.4	0.5	0.3
S	0.2	0.2	0.4	0.2
H	0.2	0.2	0.2	0.2
Ta	0.1	0.2	0.3	0.1
Nb	0.1	0.1	0.1	0.1
C	0.0	0.1	0.1	0.1
F	0.1	0.0	0.1	0.1
P	0.0	0.0	0.1	0.0
RE	0.0	0.0	0.1	0.0
Zr	0.0	0.0	0.0	0.0
Total	99.6	99.6	99.4	99.6

Typical copper and iron distributions in different size fractions are shown in Table 13.10. Chalcocite is the dominant source of copper contributing to 86% and 76% of the copper in the two samples. It should be noted that chalcocite is evenly distributed into the three size fractions. The second source of copper is the native copper that could represent as much as 27% of the total copper. It could be concluded that native copper is better liberated than chalcocite and almost completely recovered in the two coarser size fractions. Chalcopyrite doesn’t count as a source of copper, except for a very minor contribution in the sample PS Outlier. Table 13.12 presents the iron distribution in the samples. In Table 13.12(a) the hematite only represents less than 10% of the total iron present in these samples. The two main sources of iron are observed in Table 13.12(b) with the chlorite retaining up to 70% of the total iron and the other silicates retaining approximately 15%. In total, the iron locked in the silicate composition represents 80-90% of the total iron present in the samples.

Table 13.12: Iron Distribution in the Three Samples

a. Iron and iron oxide content

Element	PS outlier - Wt%	WPM533P - Wt%	Test11 Tail - Wt%
Fe	1.37	1.42	1.80
Fe2O3	1.96	2.03	2.57
Measured hematite	0.13	0.10	0.26

b. Iron oxide mineral distribution

Mineral	PS outlier - Fe (%)	WPM533P - Fe (%)	Test11 Tail - Fe (%)
Chlorite	69.77	63.16	60.38
Other silicates	13.04	16.62	17.84
Iron oxides	6.7	5.1	9.9
Iron hydroxides	4.1	9.2	4.7
Ilmenite	2.9	2.7	3.9
Ilmenorutile	1.9	1.6	2.1
Titanite	1.3	0.9	1.1
Bornite	0.2	0.5	<0.1
Pyrite	<0.1	<0.1	<0.1
Chalcopyrite	<0.1	<0.1	<0.1
Pyrrhotite	<0.1	0.2	<0.1
Total	100	100	100

The chalcocite liberation and association are summarized in Table 13.13, Table 13.14 and Table 13.15, They indicate that liberation is extremely low, even in the -38 µm size fraction, where it reaches only 20% in the head samples and 0% in the tail sample of a rougher flotation sample. Most of the chalcocite (close to 75%) is locked in ternary (or more) particles, suggesting it is still associated to two minerals or more for a single particle.

Table 13.13: Chalcocite Liberation in PS Outlier

PS Outlier - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
Free	4.1	13.3	18.7	5.0
In binary particle	14.9	50.2	62.7	17.7
In ternary+ particle	81.0	36.6	18.6	77.3
Main binary associations				
Quartz	6.0	9.3	0.0	6.0
Albite	4.2	14.0	0.0	4.6
Mixed Feldspars	3.2	6.6	0.0	3.3
Chlorite	0.2	10.5	0.0	0.7
Orthoclase	0.0	0.0	0.0	0.0
Other silicates	0.0	9.7	62.7	2.0

Table 13.14: Chalcocite Liberation in WPM533P

WPM533P - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
Free	2.3	7.8	51.9	5.5
In binary particle	19.5	35.2	30.7	20.6
In ternary+ particle	78.2	57.0	17.4	73.8
Main binary associations				
Quartz	4.9	6.8	10.1	5.3
Albite	7.6	11.4	5.8	7.6
Mixed Feldspars	1.9	2.9	0.7	1.9
Chlorite	0.5	3.2	2.7	0.7
Orthoclase	0.4	1.0	1.7	0.5
Other silicates	0.5	4.3	2.1	0.7

Table 13.15: Chalcocite Liberation in Test 11 Tail

Test11 Tail - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
Free	0.0	0.0	0.0	0.0
In binary particle	56.2	100.0	0.0	57.5
In ternary+ particle	43.8	0.0	0.0	42.5
Main binary associations				
Quartz	13.4	0.0	0.0	13.0
Albite	42.6	0.0	0.0	41.3
Mixed Feldspars	0.0	0.0	0.0	0.0
Chlorite	0.0	0.0	0.0	0.0
Orthoclase	0.0	100.0	0.0	2.9
Other silicates	0.0	0.0	0.0	0.0

As shown in Table 13.16, Table 13.17 and Table 13.18, liberation of native copper is extremely low, only reaching 14.6, 5.0 and 0.2 % into the PS Outlier, WPM533P and Test 11 Tail respectively. In the three samples, the native copper is mostly locked in ternary particles with albite, quartz and feldspars.

Table 13.16: Native Copper Liberation in PS Outlier

PS Outlier - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
Free	13.4	11.3	40.4	14.6
Binary	23.5	39.7	31.0	24.7
Ternary	63.1	49.1	28.5	60.7
Main binary associations				
Albite	7.9	8.4	5.1	7.8
Quartz	8.5	6.9	2.2	8.1
Muscovite	1.1	1.1	1.6	1.2
Mixed Feldspars	3.2	6.3	3.2	3.3
Chlorite	0.6	10.5	2.8	1.2

Table 13.17: Native Copper Liberation in WPM533P

WPM533P - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
Free	4.1	13.3	18.7	5.0
Binary	14.9	50.2	62.7	17.7
Ternary	81.0	36.6	18.6	77.3
Main binary associations				
Albite	4.2	14.0	0.0	4.6
Quartz	6.0	9.3	0.0	6.0
Muscovite	0.5	0.0	0.0	0.4
Mixed Feldspars	3.2	6.6	0.0	3.3
Chlorite	0.2	10.5	0.0	0.7

Table 13.18: Native Liberation in Test 11 Tail

Test11 Tail - Wt%				
Size fraction	+75 µm	-75 +38 µm	-38 µm	Total
Free	0.3	0.3	0.0	0.2
Binary	19.6	25.9	46.7	28.2
Ternary	80.2	73.8	53.3	71.6
Main binary associations				
Albite	8.2	10.3	1.9	8.1
Quartz	3.6	6.6	20.2	8.4
Muscovite	0.8	0.8	0.0	0.6
Mixed Feldspars	3.9	4.8	8.1	5.1
Chlorite	1.2	1.2	13.2	3.5

Liberation of silver minerals was investigated in one sample. Only 5 native silver grains were observed in PS Outlier. These grains were associated with quartz and feldspars in ternary particles. This tendency was also shared with some chalcocite grains. Table 13.19 presents these associations where only 43% of the native silver grains are "visible" at the edges of particles.

Table 13.19: Native Silver Liberation in PS Outlier

Mineral	Native silver
Quartz	35.15
Albite	1.3
Chlorite	0
Titanite	0
Mixed Feldspars	16.38
Orthoclase	0
Chalcocite	3.85
Calcite	0
Muscovite	0
Other silicates	0
Bornite	0
Amphibole(s)	0
Plagioclase	0
Free Surface	43.32

13.5.4 Flotation Testing

Results from the open circuit bench scale flotation tests are presented in Table 13.20.

Table 13.20: Flotation Testing

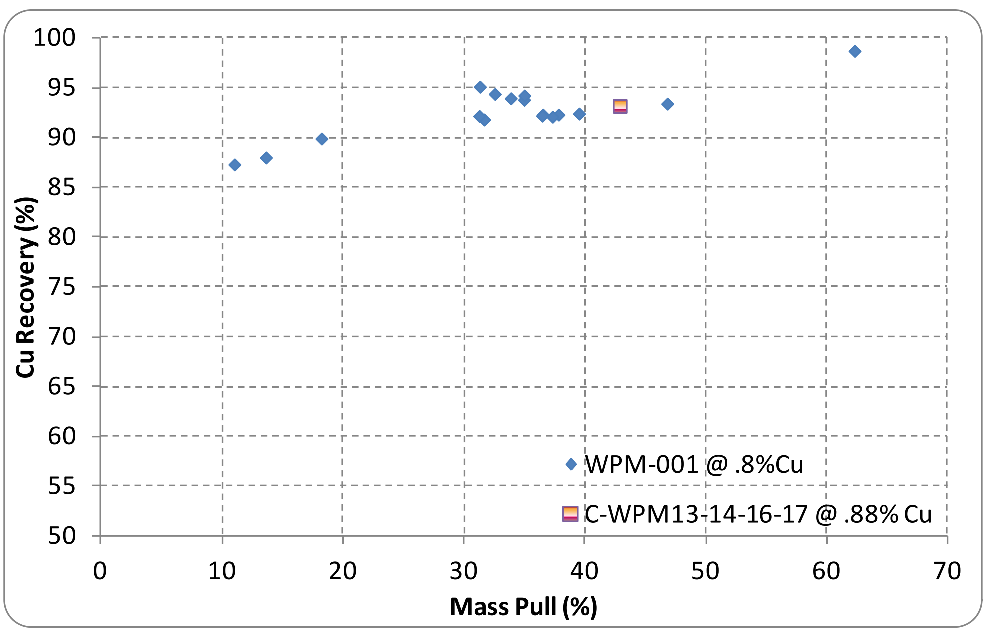
Sample	Head Grade		Primary	Regrind	Open circuit Performances						Expected Closed Circuit	
	Cu	Ag	P_{80}			MP	Copper		Silver		Copper	
	%	g/t	μm			%	% cu	% Rec	g/t	% Rec	% cu	% Rec
WPM-001	0.77	17.5	45.7		Ro conc	35.0	2.1	93.8	48.2	96.3		
				17.0	Final conc	2.1	31.4	87.5	749.6	91.5	30	91
WPM-001	0.80	16.8	36.3		Ro conc	35.0	2.2	92.1	46.1	96.1		
				15.9	Final conc	2.5	28.4	85.8	617.8	91.6	27	89
WPM-013	1.10	38.3	49.0		Ro conc	42.9	2.4	93.2	86.7	97.0		
				18.1	Final conc	3.4	28.3	86.0	984.1	86.3	27	90
WPC-M13-14-16-17	0.95	14.3	70.0		Ro conc	41.8	2.1	92.1	33.7	95.9		
				26.0	Final conc	2.9	27.9	85.1	452.1	91.5	27	89
WPC-M13-14-16-17	0.91	16.0	54.0		Ro conc	42.3	2.1	93.7	36.4	92.8		
				16.5	Final conc	3.0	26.6	86.5	472.1	87.5	26	90
WPC-M13-14-16-17	0.92		40.1		Ro conc	39.4	2.2	93.4	35.5	92.0		
		15.2		15.5	Final conc	2.4	32.3	84.9	535.5	85.3	31	89

*** Assuming 50% of the differences between Ro & Final open recovery will be added to the final close circuit recovery without losing the grade (common industrial correlations) at the cost of 1% Grade loss.*

It was concluded that further investigations focusing on reagents consumption were needed.

Initial tests using PS mineralization samples and looking for rougher flotation conditions and reagents screening indicated that rougher mass pull of 30-40% with 90-95% Cu recovery could be achievable (Figure 13.4), with the run-of-mine ("ROM") primarily ground to P80 = 50-60 microns.

Figure 13.4: Rougher Mass Pull –Recovery Curves



Subsequent open circuit flotation tests show that an FL2 flotation circuit could deliver interesting metallurgical performances. As indicated in Table 13.21 saleable concentrate grading up to 30% Cu could be obtained while recovering up to 90% of the copper in a LCT based projection. The selected reagent list was also very suitable for silver recovery indicating recoveries greater than 90%.

Table 13.21: Preliminary FL2 Open Circuit Outcomes

Sample	Head Grade		Primary	Regrind	Open circuit Performances					
	Cu	Ag	P_{80}			MP	Copper		Silver	
	%	g/t	µm			%	% cu	% Rec	g/t	% Rec
WPM-001	0.77	17.5	45.7		Ro conc	35.0	2.1	93.8	48.2	96.3
				17.0	Final conc	2.1	31.4	87.5	749.6	91.5
WPM-001	0.80	16.8	36.3		Ro conc	35.0	2.2	92.1	46.1	96.1
				15.9	Final conc	2.5	28.4	85.8	617.8	91.6
WPM-013	1.10	38.3	49.0		Ro conc	42.9	2.4	93.2	86.7	97.0
				18.1	Final conc	3.4	28.3	86.0	984.1	86.3
WPC-M13-14-16-17	0.95	14.3	70.0		Ro conc	41.8	2.1	92.1	33.7	95.9
				26.0	Final conc	2.9	27.9	85.1	452.1	91.5
WPC-M13-14-16-17	0.91	16.0	54.0		Ro conc	42.3	2.1	93.7	36.4	92.8
				16.5	Final conc	3.0	26.6	86.5	472.1	87.5
WPC-M13-14-16-17	0.92		40.1		Ro conc	39.4	2.2	93.4	35.5	92.0
		15.2		15.5	Final conc	2.4	32.3	84.9	535.5	85.3
WPC-M13-14-16-17	0.91	16.0	105.0	20.0	slime	21.3	0.1	3.2		
				40.8	Ro tails	54.4	0.09	5.1		
					Ro conc	24.3	3.4	91.6		
				20.2	Clnr 2 conc	2.3	29.4	75.3		

13.5.5 Comminution Circuit Modelling

The comminution test work results were sent to Orway Mineral Consultants (OMC) for grinding circuit modelling purposes. (Orway Mineral Consultants, Report No 7322-RPT-002, 2023).

Four circuits were modelled using OMC's Power Modelling software. The modelling indicates an uneven power distribution between SAG Mill and Ball Mill. A pebble crusher could help shift some of the grinding duty from the SAG mill to ball mill given the hardness of the rock and the coarse ball mill product size. Table 13.22 presents the Grinding Circuit Power Modelling Results.

Table 13.22: Grinding Circuit Power Modeling Results

Parameter	Unit	Sim 1	Sim 2	Sim 3	Sim 4
Description		SAB F80 150 mm	SABC F80 150 mm	Sim 2 in SAB F80 100 mm	Sim 2 in SAB F80 150 mm
Ore Parameters					
CWi	kWh/t	12.2	12.2	12.2	12.2
RWi	kWh/t	15.6	15.6	15.6	15.6
BWi	kWh/t	14.4	14.4	14.4	14.4
Axb		33.6	33.6	33.6	33.6
Ore SG		2.70	2.70	2.70	2.70
Feed Rate	t/h	679	679	679	599
Primary Feed Size, F_{80}	mm	150	150	100	150
Transfer Size, T_{80}	µm	437	945	677	436
Product Size, P_{80}	µm	105	105	105	105
Pebble Crushing	% Feed	-	20.6	-	-
	t/h	-	140	-	-
SAG Mill Specific Energy	kWh/t	**13.78**	**11.66**	**12.15**	**13.78**
Ball Mill Specific Energy	kWh/t	**6.85**	**8.66**	**7.95**	**6.85**
Pebble Crusher Specific Energy	kWh/t		0.13		
Total Specific Energy	kWh/t	20.63	20.45	20.10	20.63
f_{SAG}		1.40	1.40	1.38	1.40
SAG Mill Pinion Power - Duty	kW	9,359	7,921	8,255	8,255
Ball Mill Pinion Power - Duty	kW	4,655	5,881	5,403	4,102
Total Grinding Power - Duty	kW	14,014	13,802	13,658	12,357
Pebble Crusher Power – Duty	kW	-	165	-	-

Source: Orway Mineral Consultants

14 MINERAL RESOURCE ESTIMATES

GMS has prepared a preliminary Mineral Resource Estimate ("MRE") for the White Pine North Project (Figure 14.1) based on data generated up to March 2015 and provided to GMS up to September 2022. The main objective of this assessment is to produce a Mineral Resource for the White Pine North sector. Resource estimation methodologies, results and validations are presented in this section of the Technical Report.

In the opinion of GMS, the MRE reported herein is a reasonable representation of the global Mineral Resources found in the North-East sector at the current level of sampling.

The MRE was prepared by Mr. Réjean Sirois, P.Eng., and Mr. Christian Beaulieu, P.Geo. both consultants for GMS and independent "Qualified Persons" ("QPs") as defined in National Instrument 43-101 ("NI 43-101") *Canadian Standards of Disclosure for Mineral Projects*. Geovia GEMS™ and Leapfrog Geo™ software were used to facilitate the Resource estimation processes.

The Mineral Resource estimate includes Inferred Mineral Resources that are normally considered too speculative geologically to have economic considerations applied to them, which would enable them to be categorized as Mineral Reserves. There is also no certainty that these Inferred Mineral Resources will be converted to the Indicated and Measured categories through further drilling, or into Mineral Reserves once economic considerations are applied.

14.1 Data

The database used in this Technical Report consists of diamond drilling sampling data intersecting the mineralized stratigraphic horizons. GMS received the drill hole database in the form of CSV files from WPC's third-party database management consultant, gDat Applied Solutions.

The current Resource estimate is derived exclusively from the database described in Section 12. GMS reviewed the database and is satisfied with the integrity of the drilling database and judged that it can be used for Resource estimation. Some minor errors were found in the survey table, but these errors were corrected before Resource modelling and are discussed in Section 12.

14.1.1 Drill Hole Spacing

The surface drill hole grid spacing is around 300 metres ("m") in the mined-out area (the historical White Pine Mine), and roughly 700-800 m in the Northeast Sector (Figure 14.1). The drill spacing and distribution are judged adequate to develop a reasonable model of the mineralization distribution, and to quantify its volume and quality with an acceptable level of confidence. Figure 14.2 illustrates a 3D view of drill hole spacing for the White Pine North Project.

Figure 14.1: Plan View of Drill Hole Collars—White Pine North Project

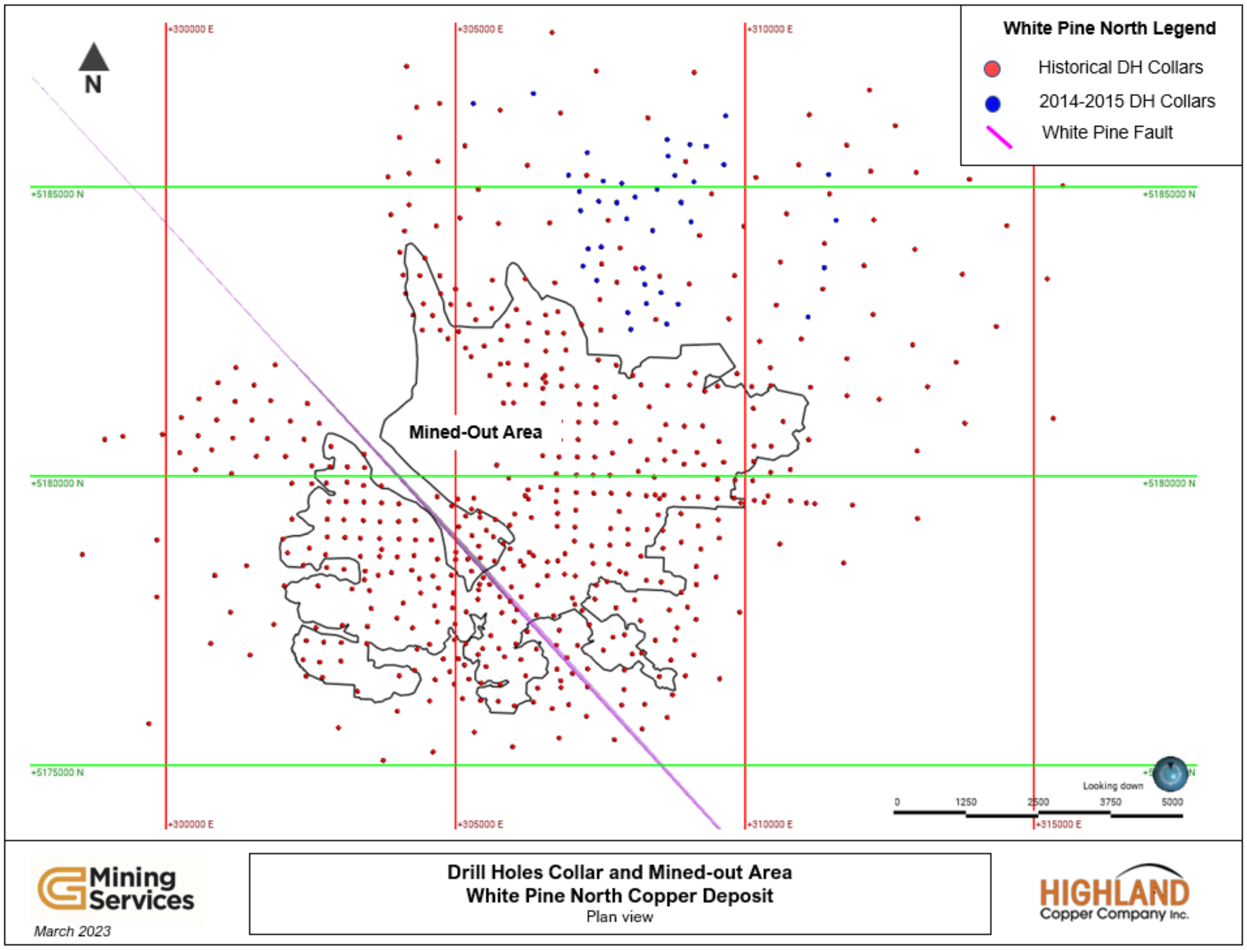
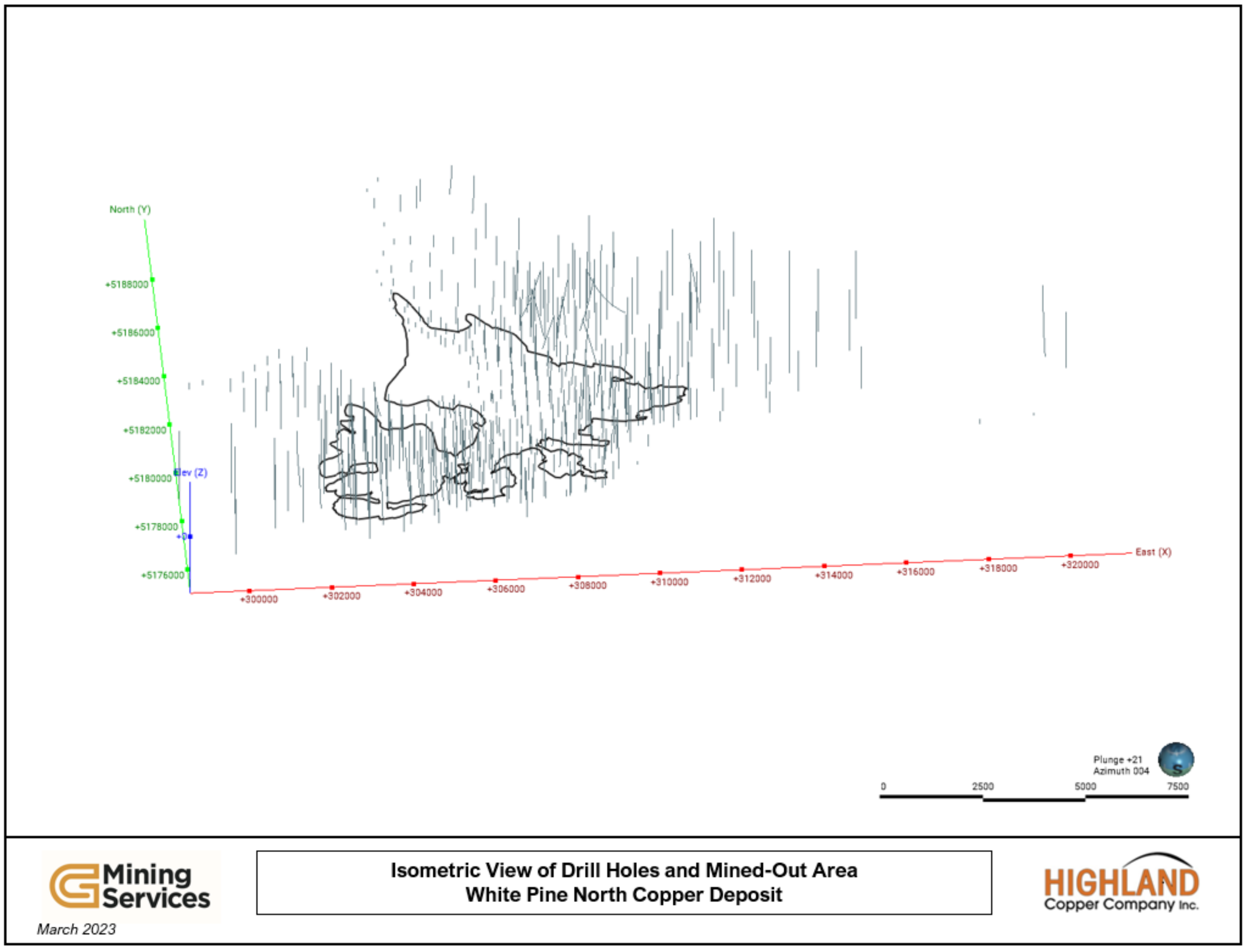


Figure 14.2: 3D View of Drill Holes and Mined-Out Area, View Towards Northeast



14.2 Modelling Approach

The 3D geological modelling performed for the Resource estimate was produced by GMS based on the drill hole database and historical information about the mineralized columns. The modelling of the mineralized zones was carried out by using the 3D geological modelling software Leapfrog Geo™ v.2022.1.1 (“Leapfrog”). The solids were then transferred into Geovia GEMS™ v.6.8.2.2 (“GEMS”) software for block modelling.

14.2.1 Mineralization Column Modelling

The modelling of the copper mineralization horizons was based on the footwall and hanging wall of the three selected columns to model, namely the Parting Shale (“PS”), the Full Column (“FC”) and the Upper Shale (“US”) (Figure 14.3). These intervals will be referred to as “Geological Intervals” (PS-GEO, FC-GEO, and US-GEO).

In some areas, the total true thickness of the PS, the FC and/or the US is less than the minimum height required for underground mining, a minimum true thickness of 2.0 m (PS) and 3.0 m (FC) was applied to all intervals of each mineralization column and stored separately. Those intervals will be referred to as the Minimum thickness Intervals (PS-MINTHICK, FC-MINTHICK, and US-MINTHICK) and are identical to the Geological Intervals (PS-GEO, FC-GEO, and US-GEO) where the minimum height of 2.0 m (PS) or 3.0 m (FC) is reached. The hanging wall contact remained unchanged, and only the footwall contact was adjusted to arrive at a minimum true thickness of 2.0 m (PS) or 3.0 m (FC). The true thickness of each intercept was calculated mathematically using the dip and dip direction of the stratigraphy, and the angle of the drilling.

In both GEO and MINTHICK cases, the hanging wall of the PS is the base of the Upper Sandstone (B30) or the top of the Tiger (B29), whereas the hanging wall of the FC was set at the base of the Brown Massive (B44) or the top of the Thinly (B43). The latter was done to reflect historical mining reaching up to the dimpled back (calcareous nodules in the Brown Massive). As for the US, the hanging wall was set at the top of the Widely unit (B47). In most cases, the footwalls of the PS and the FC were set to the base of the Lower Transition (B21) but extended down to the top of the Copper Harbor Formation (B10) where the height of the column was less than 2.0 m and 3.0 m (PS-MINTHICK and FC-MINTHICK). Regarding the US unit, the footwall was set to the base of the Upper Transition formation (B41). Figure 14.4 shows a view of the PS modelled in Leapfrog GEO™.

Figure 14.3: Mineralized Columns at the White Pine Deposit

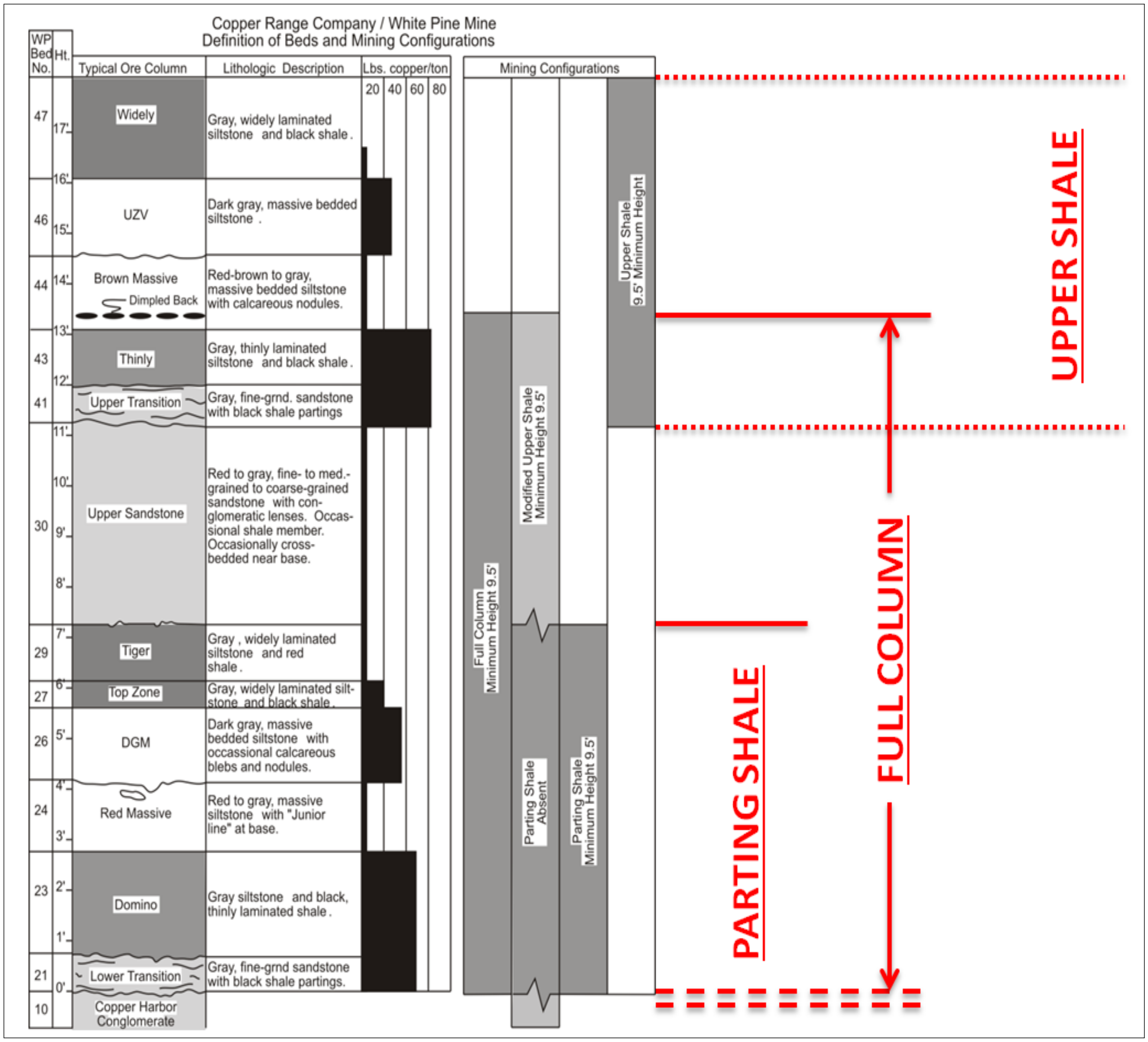
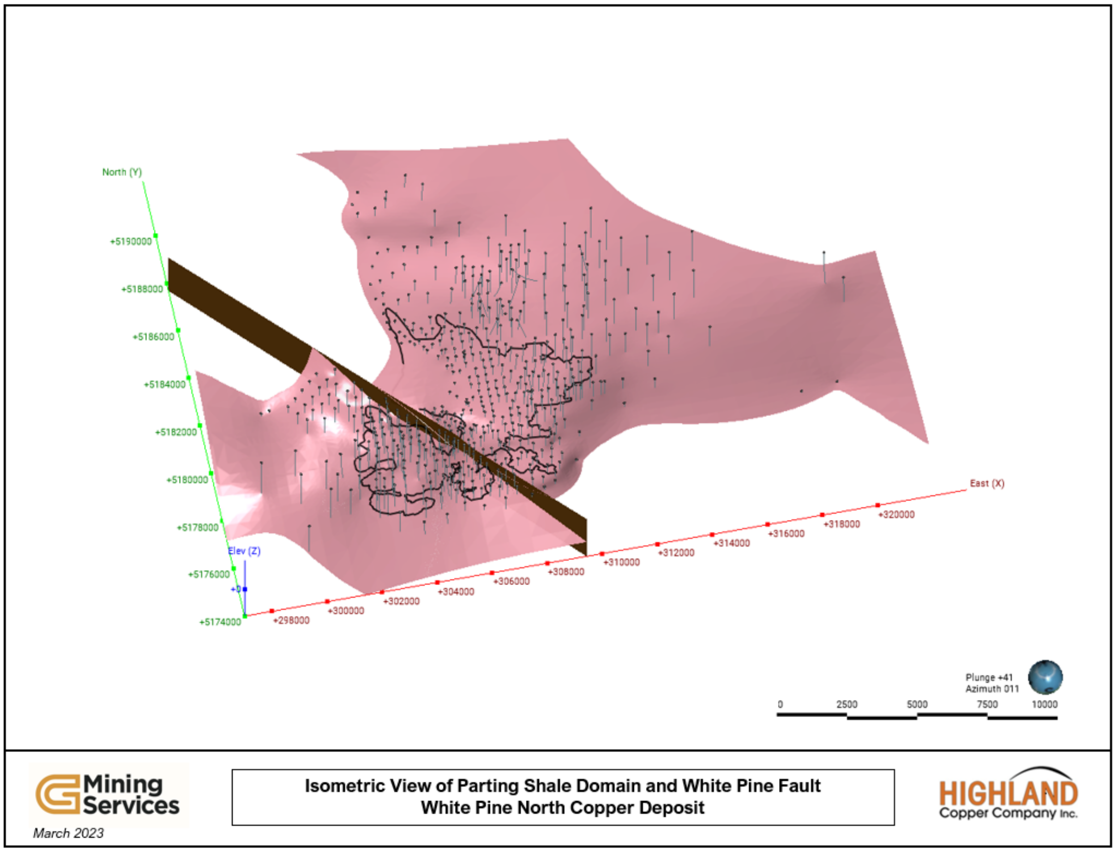


Figure 14.4: Parting Shale Wireframe and White Pine Fault—Leapfrog 3D Model



14.2.2 <u>Additional Datasets</u>

Other than drill holes, only the historical mine workings outline was directly imported in the GEMS database. GMS also received the White Pine fault trace, which was extrapolated in Leapfrog and imported into GEMS. The White Pine fault is shown in Figure 14.4 as the dark brown vertical surface.

14.3 Statistical Analysis

14.3.1 <u>Statistics of Original Assays</u>

Statistical analyses were conducted using the assays available in the drilling database (including the mined-out area). Summary of the statistical analysis for all beds up to B47 inclusively is presented in Table 14.1 and Table 14.2, for copper and silver weighted grades respectively. The silver dataset was trimmed to ease visualization of grade distribution (high coefficient of correlation before trimming), where only grades greater than 0.1 g/t Ag were kept for the tabulations. Highlighted beds (in yellow) are those containing the bulk of copper mineralization.

Table 14.1: Summary Statistics by Bed—All Drill Holes (Copper)

Beds	Number of Assays	Average Thickness	Min. Cu %	Max. Cu %	Wtd. Mean Cu%	Std. Deviation	CoV
B47— Widely	1,715	1.00	0.00	2.85	0.20	0.32	1.58
B46—UZV	1,565	0.85	0.00	4.32	0.62	0.60	0.98
B44— Brown Massive	1,297	0.68	0.00	4.17	0.13	0.20	1.52
B43— Thinly	1,252	0.40	0.00	13.78	3.12	1.89	0.61
B41— Upper Transition	628	0.18	0.00	14.25	2.24	1.67	0.75
B30— Upper Sandstone	1,644	1.45	0.00	4.71	0.18	0.16	0.88
B29— Tiger	463	0.46	0.00	2.56	0.21	0.18	0.86
B27— Top Zone	366	0.42	0.00	3.2	0.69	0.42	0.61
B26— Dark Gray Massive	570	0.46	0.00	5.49	2.10	1.08	0.52
B24— Red Massive	795	0.50	0.00	2.44	0.23	0.17	0.77
B23— Domino	623	0.21	0.03	10.47	2.75	1.57	0.57
B21— Lower Transition	1,148	0.66	0.03	14.92	1.13	1.12	0.99
B10— Copper Harbor Congl.	2,426	1.66	0.00	13.45	0.21	0.72	3.52

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

Table 14.2: Summary Statistics by Bed—All Drill Holes (Silver)

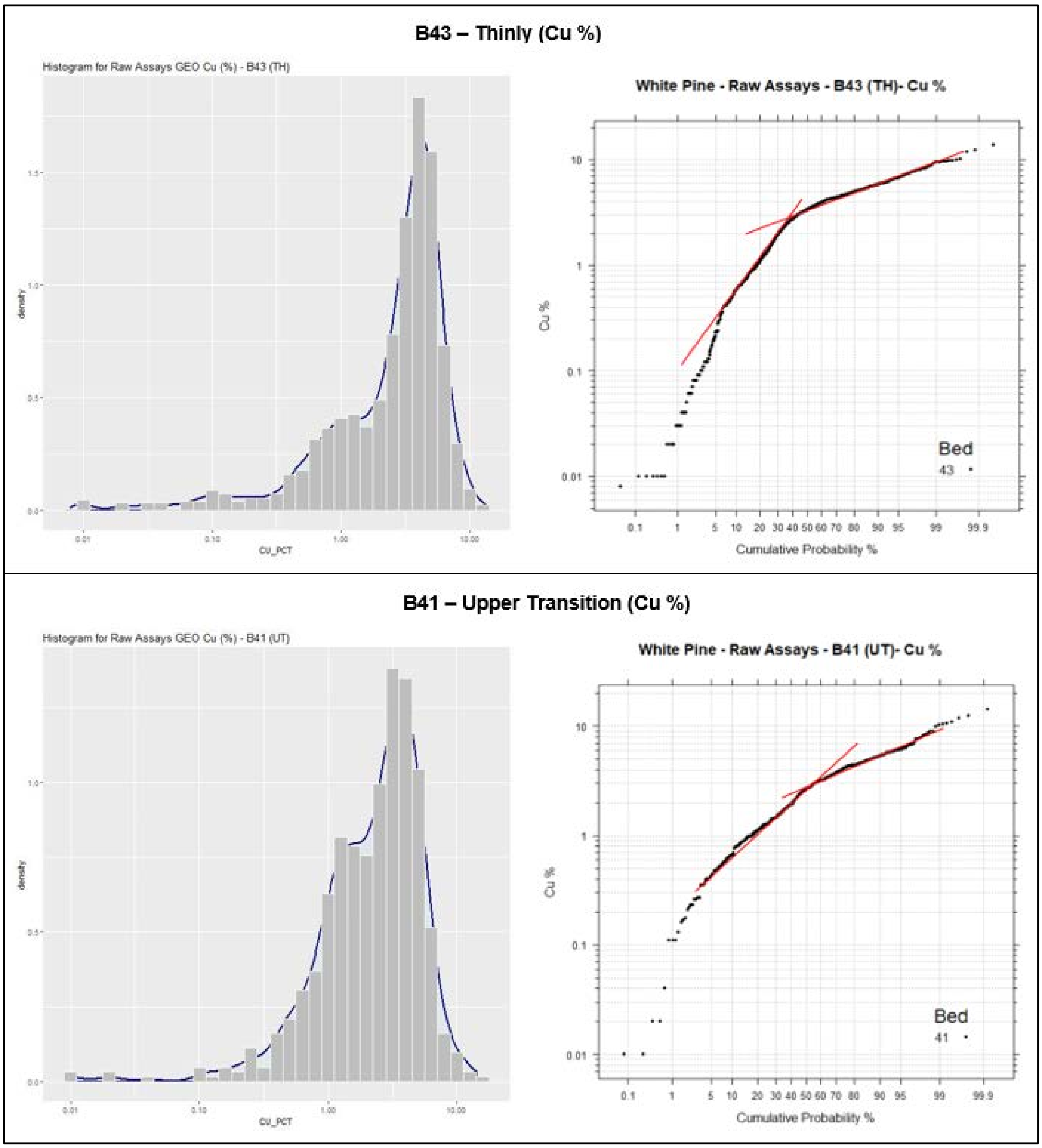
Beds	Dataset	Number of Assays	Min. g/t Ag	Max. g/t Ag	Wtd. Mean g/t Ag	Standard Deviation	CoV
B47— Widely	No trimming	1,715	0.10	64.40	0.77	2.57	3.31
	Only >0.1 g/t Ag	283	0.30	64.40	3.37	4.85	1.44
B46—UZV	No trimming	1,565	0.10	63.80	3.66	5.68	1.55
	Only >0.1 g/t Ag	768	0.30	63.80	7.13	6.28	0.88
B44— Brown Massive	No trimming	1,297	0.10	64.40	0.52	2.47	4.75
	Only >0.1 g/t Ag	184	0.30	64.40	2.84	5.80	2.05
B43— Thinly	No trimming	1,252	0.10	276.30	12.26	17.59	1.44
	Only >0.1 g/t Ag	1,098	0.30	276.30	13.76	18.09	1.31
B41— Upper Transition	No trimming	628	0.10	240.00	9.40	13.09	1.39
	Only >0.1 g/t Ag	539	0.30	240.00	11.86	13.70	1.16
B30— Upper Sandstone	No trimming	1,644	0.10	33.90	0.48	1.44	3.16
	Only >0.1 g/t Ag	335	0.30	33.90	1.85	2.64	1.42
B29— Tiger	No trimming	463	0.10	29.50	0.61	1.83	2.56
	Only >0.1 g/t Ag	90	0.30	29.50	2.39	3.56	1.49
B27— Top Zone	No trimming	366	0.10	72.70	2.13	4.42	2.07
	Only >0.1 g/t Ag	184	0.30	72.70	4.16	5.56	1.33
B26— Dark Gray Massive	No trimming	570	0.10	144.00	12.93	15.24	1.18
	Only >0.1 g/t Ag	455	0.30	144.00	15.43	15.47	1.00
B24— Red Massive	No trimming	795	0.10	241.30	0.77	4.61	5.97
	Only >0.1 g/t Ag	138	0.30	241.30	4.26	10.86	2.55

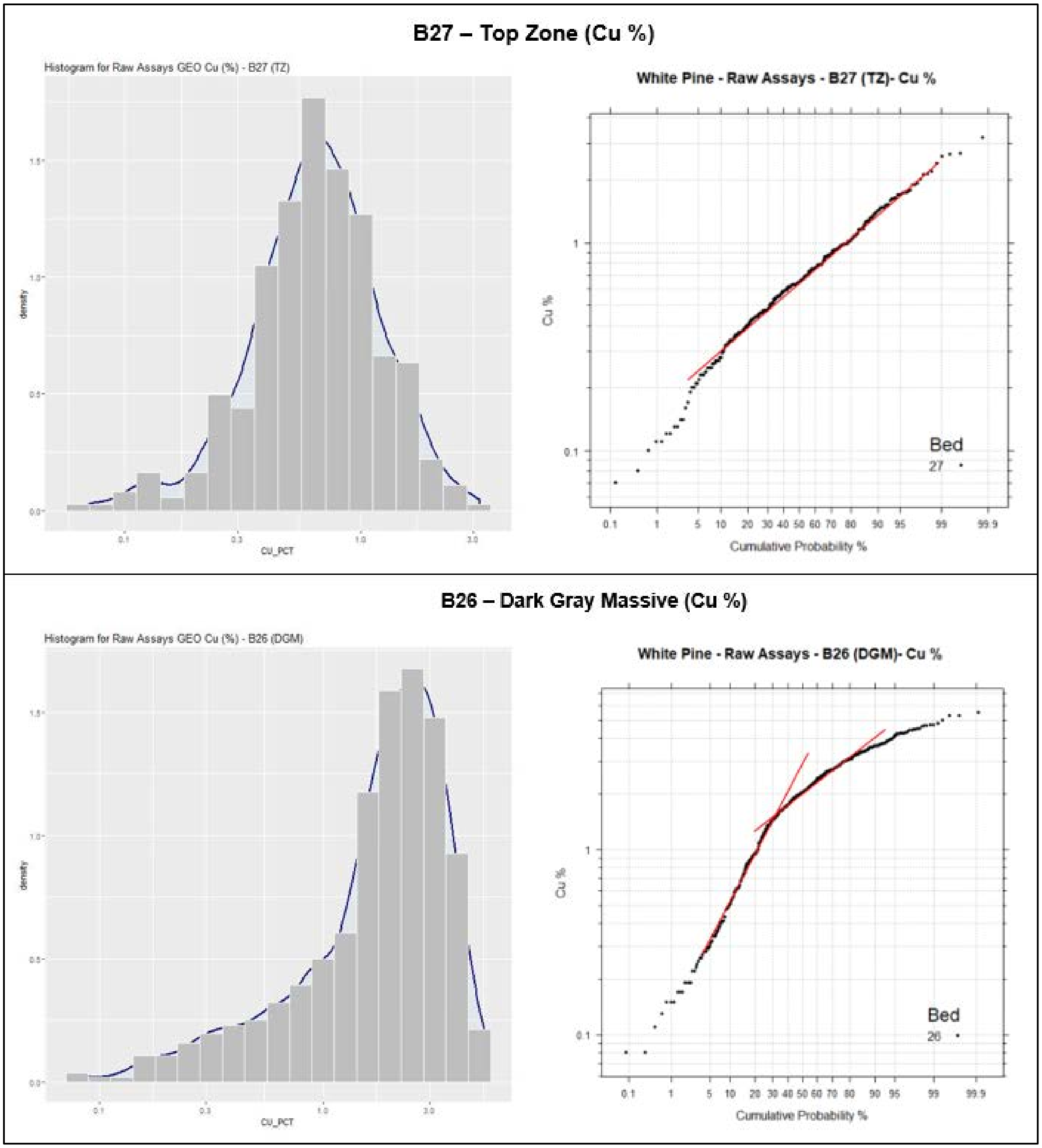
Beds	Dataset	Number of Assays	Min. g/t Ag	Max. g/t Ag	Wtd. Mean g/t Ag	Standard Deviation	CoV
B23— Domino	No trimming	623	0.10	1,327.70	43.39	83.37	1.92
	Only >0.1 g/t Ag	525	0.30	1,327.70	48.53	86.78	1.79
B21— Lower Transition	No trimming	1,148	0.10	1,460.10	13.90	44.84	3.23
	Only >0.1 g/t Ag	767	0.30	1,460.10	20.56	53.35	2.60
B10— Copper Harbor Congl.	No trimming	2,426	0.10	117.90	1.24	5.75	4.65
	Only >0.1 g/t Ag	448	0.30	117.90	5.19	11.31	2.18

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

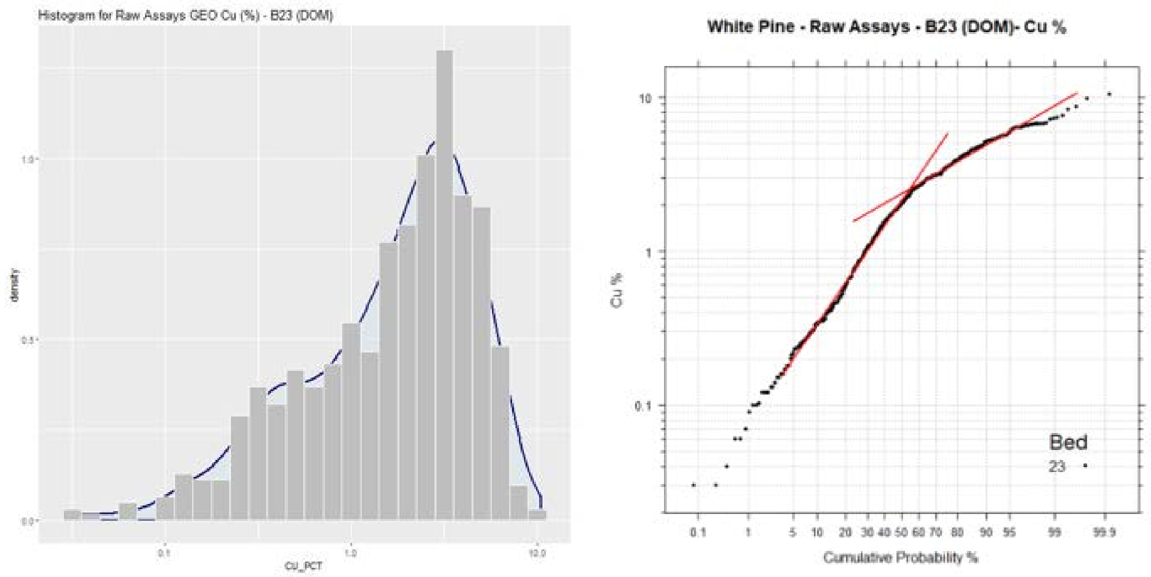
Histogram distributions superposed by normal density curves and probability plot curves of copper and silver grades are presented in Figure 14.5 and Figure 14.6, only for the following selected intervals, from top to bottom: Thinly (B43), Upper Transition (B41), Top Zone (B27), Dark Gray Massive (B26), Domino (B23) and Lower Transition (B21). Since few extreme values are present in the dataset, and high grades are generally very small intervals found in the mined-out areas, it was judged unnecessary to apply a high-grade capping to raw assays at this stage of the MRE. Statistics will be revisited after compositing to determine if any capping is required.

Figure 14.5: Raw Assays Histograms and Probability Plots of Selected Beds—Copper (Cu %)




B27 – Top Zone (Cu %)
Histogram for Raw Assays GEO Cu (%) - B27 (TZ)
density
CU_PCT
White Pine - Raw Assays - B27 (TZ)- Cu %
Cu %
Cumulative Probability %
Bed
27
B26 – Dark Gray Massive (Cu %)
Histogram for Raw Assays GEO Cu (%) - B26 (DGM)
density
CU_PCT
White Pine - Raw Assays - B26 (DGM)- Cu %
Cu %
Cumulative Probability %
Bed
26

B23 – Domino (Cu %)



B21 – Lower Transition (Cu %)

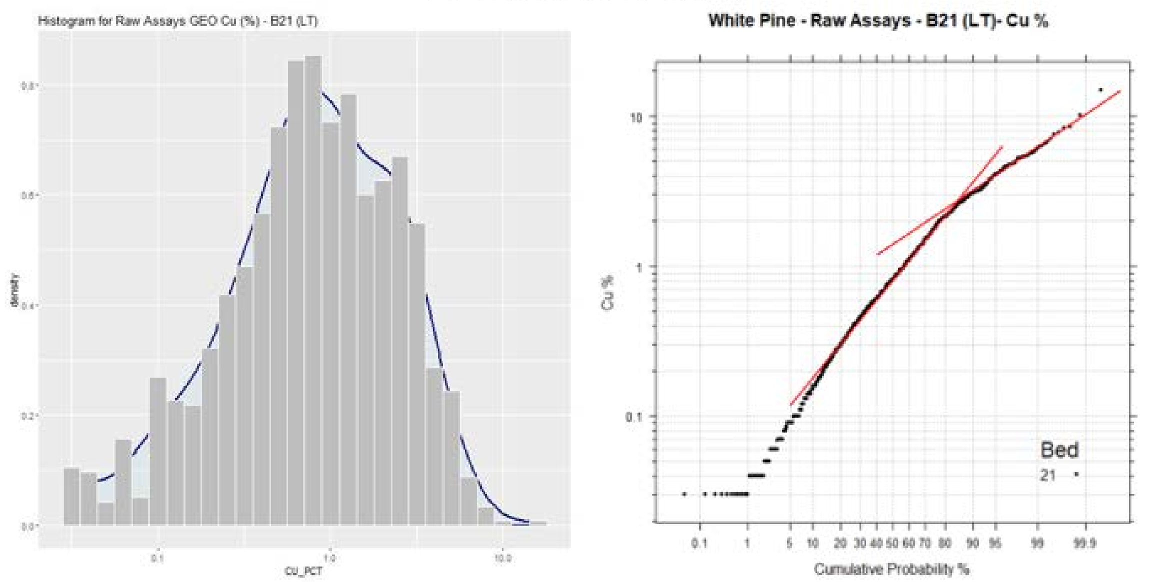
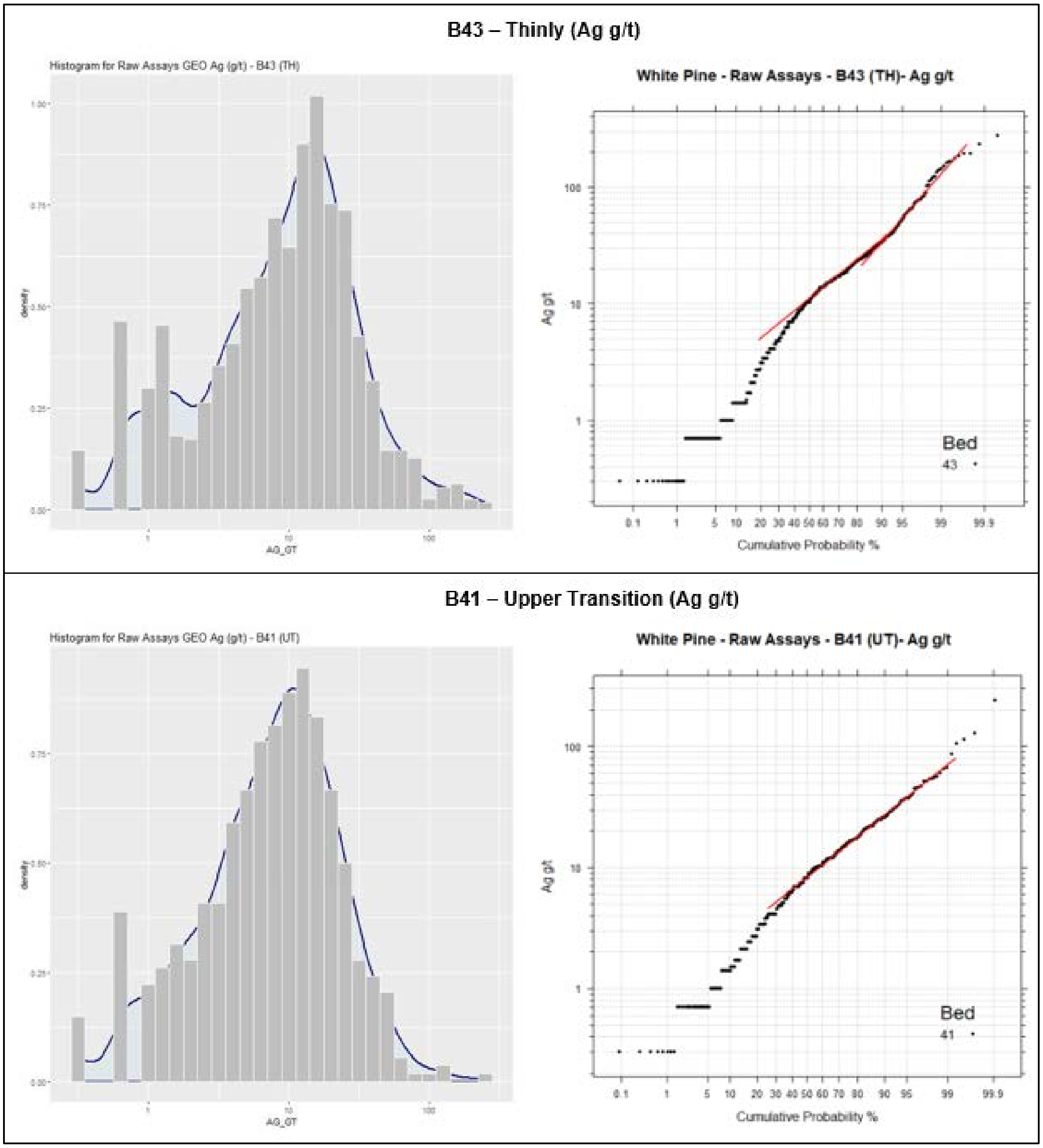
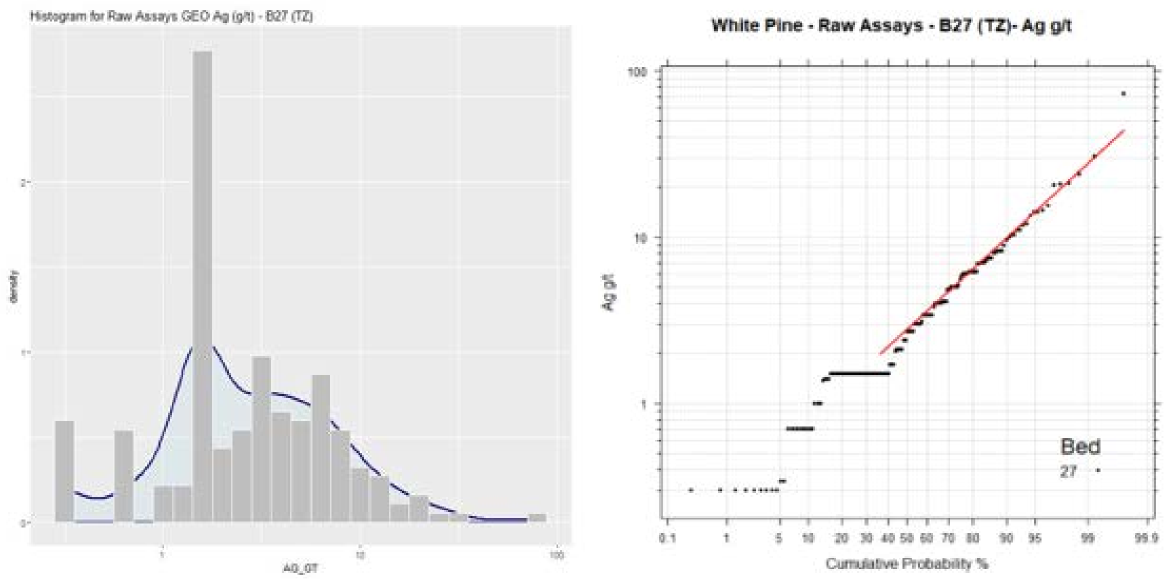


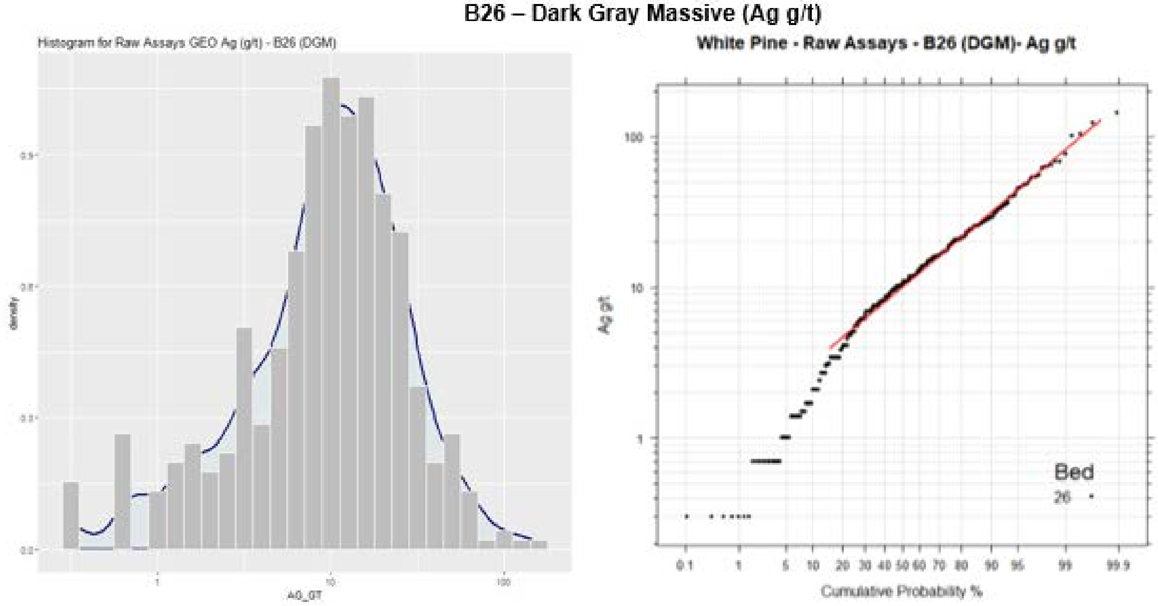
Figure 14.6: Raw Assays Histograms and Probability Plots of Selected Beds—Silver (g/t Ag)

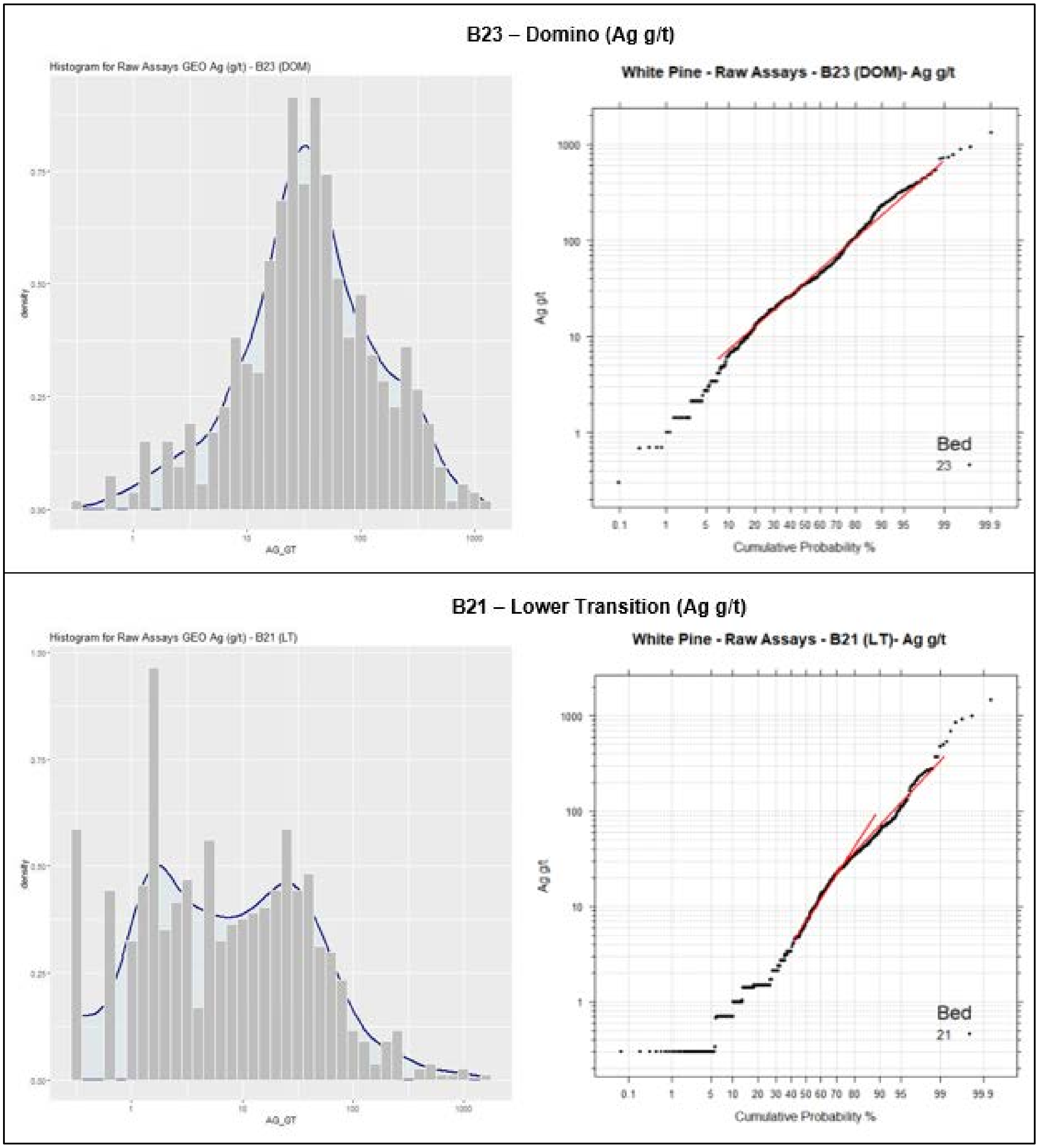


B27 – Top Zone (Ag g/t)



B26 – Dark Gray Massive (Ag g/t)





14.3.2 Statistics of Mined-Out Area

Statistics were calculated separately for the area encompassing the mined-out sector and are presented in Table 14.3 for copper. Copper grades are generally higher in the mined-out sector compared to the entire drilling database. However, some poorly mineralized beds display similar values: Red Massive (B24), Tiger (B29), Upper Sandstone (B30), Brown Massive (B44) and Widely (B47) show little change between the mined area and complete dataset. Beds with the largest copper grade difference are the Lower Transition

(B21), Top Zone (B27), Upper Transition (B41) and Thinly (B43). The average thickness of all beds is mostly the same in the mined-out area. Table 14.4 present silver statistics for the same mined-out area. When considering silver values greater than 0.1 g/t Ag, it is observed that the major differences are in the middle of the upper portion of the FC, where B24 to B44 show higher silver grades in the mined-out area. The Domino (B23) is the only exception since the silver grade in mined-out area is lower than the weighted grades obtained for the entire deposit.

Table 14.3: Summary Statistics by Bed—Mined-Out Area (Copper). Highlighted Units - Most Productive at the Historic White Pine Mine

Beds	Number of Assays	Average Thickness	Min. Cu %	Max. Cu %	Wtd. Mean Cu %	Std. Deviation	CoV
B47— Widely	837	0.90	0.00	2.85	0.22	0.35	1.59
B46—UZV	695	0.75	0.00	4.32	0.67	0.62	0.92
B44— Brown Massive	595	0.66	0.00	2.68	0.14	0.15	1.06
B43— Thinly	623	0.46	0.00	12.19	3.51	1.75	0.50
B41— Upper Transition	271	0.12	0.00	14.25	2.86	1.75	0.61
B30— Upper Sandstone	629	1.16	0.00	3.00	0.21	0.16	0.77
B29— Tiger	209	0.38	0.00	1.30	0.23	0.19	0.80
B27— Top Zone	123	0.27	0.00	3.20	0.87	0.46	0.54
B26— Dark Gray Massive	248	0.43	0.00	5.49	2.05	1.13	0.55
B24— Red Massive	377	0.50	0.00	2.36	0.23	0.18	0.77
B23— Domino	348	0.31	0.07	10.47	2.83	1.53	0.54
B21— Lower Transition	523	0.59	0.03	14.92	1.28	1.21	0.95
B10— Copper Harbor Congl.	1,210	1.58	0.00	13.45	0.32	0.98	3.09

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

Table 14.4: Summary Statistics by Bed—Mined-Out Area (Silver)

Beds	Dataset	Number of Assays	Min. Cu %	Max. Cu %	Wtd. Mean Cu %	Std. Deviation	CoV
B47— Widely	No trimming	837	0.10	64.40	0.59	2.76	4.69
	Only >0.1 g/t Ag	76	0.30	64.40	6.22	7.87	1.27
B46—UZV	No trimming	695	0.10	63.80	3.70	6.41	1.73
	Only >0.1 g/t Ag	299	0.30	63.80	8.28	7.48	0.90
B44— Brown Massive	No trimming	595	0.10	38.40	0.32	2.03	6.26
	Only >0.1 g/t Ag	33	0.30	38.40	4.73	8.36	1.77
B43— Thinly	No trimming	623	0.10	183.40	13.13	15.27	1.16
	Only >0.1 g/t Ag	558	0.30	183.40	14.37	15.41	1.07
B41— Upper Transition	No trimming	271	0.10	240.00	10.46	16.43	1.57
	Only >0.1 g/t Ag	241	0.30	240.00	12.20	17.16	1.41
B30— Upper Sandstone	No trimming	629	0.10	33.90	0.27	1.42	5.21
	Only >0.1 g/t Ag	44	0.30	33.90	4.24	5.74	1.35
B29— Tiger	No trimming	209	0.10	29.50	0.40	2.18	5.45
	Only >0.1 g/t Ag	12	0.30	29.50	6.46	8.55	1.32
B27— Top Zone	No trimming	123	0.10	72.70	1.89	5.64	2.99
	Only >0.1 g/t Ag	43	0.30	72.70	6.19	9.17	1.48
B26— Dark Gray Massive	No trimming	248	0.10	144.00	12.54	16.24	1.29
	Only >0.1 g/t Ag	184	0.30	144.00	15.38	16.76	1.09
B24— Red Massive	No trimming	377	0.10	78.80	0.45	2.56	5.70
	Only >0.1 g/t Ag	28	0.70	78.8	7.19	9.45	1.31

Beds	Dataset	Number of Assays	Min. Cu %	Max. Cu %	Wtd. Mean Cu %	Std. Deviation	CoV
B23— Domino	No trimming	348	0.10	368.20	32.51	39.89	1.23
	Only >0.1 g/t Ag	309	0.70	368.20	35.54	40.40	1.14
B21— Lower Transition	No trimming	523	0.10	854.30	13.52	33.73	2.49
	Only >0.1 g/t Ag	326	0.30	854.30	20.27	39.71	1.96
B10— Copper Harbor Congl.	No trimming	1,209	0.10	72.70	1.41	6.28	4.46
	Only >0.1 g/t Ag	112	0.30	72.70	17.31	15.69	0.91

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

14.3.3 Statistics of Northeast Sector

Drill holes of the northeast sector (see Figure 14.7) were extracted, and descriptive statistics are presented in Table 14.5 and Table 14.6, for copper and silver respectively. Copper weighted mean grades of these 153 drill holes are generally lower than those in the mined-out area, with the exception of the Thinly (B43) with a 17% difference. The higher grade in this bed is shadowed by thinner intervals. Conversely, a higher thickness in the Upper Transition (B47) makes up for a lower copper grade compared to the mined-out area. The Top Zone (B27) and the Upper Sandstone (B30) show increases of 104% and 87% respectively in average bed thicknesses, while hosting low copper grades. While the Top Zone (B27) has a mean copper grade of 0.61% (30% decrease from mined-out area), the Upper Sandstone (B30) has an average grade of 0.16% Cu over an average thickness of 2.17 m. The Domino bed (B23) shows a decrease in both copper grade and bed thickness but has a significant increase of 274% in silver grade. Some other beds also show increases in average silver grade: Lower Transition (B21) and Thinly (B43) for 19% and 33% increase respectively. Figure 14.8 illustrates the average thickness (m) and the average copper grade (%) by bed present in the mined-out and unmined northeast areas.

Figure 14.7: Plan View of Drill Hole Collars—Unmined Northeast Area

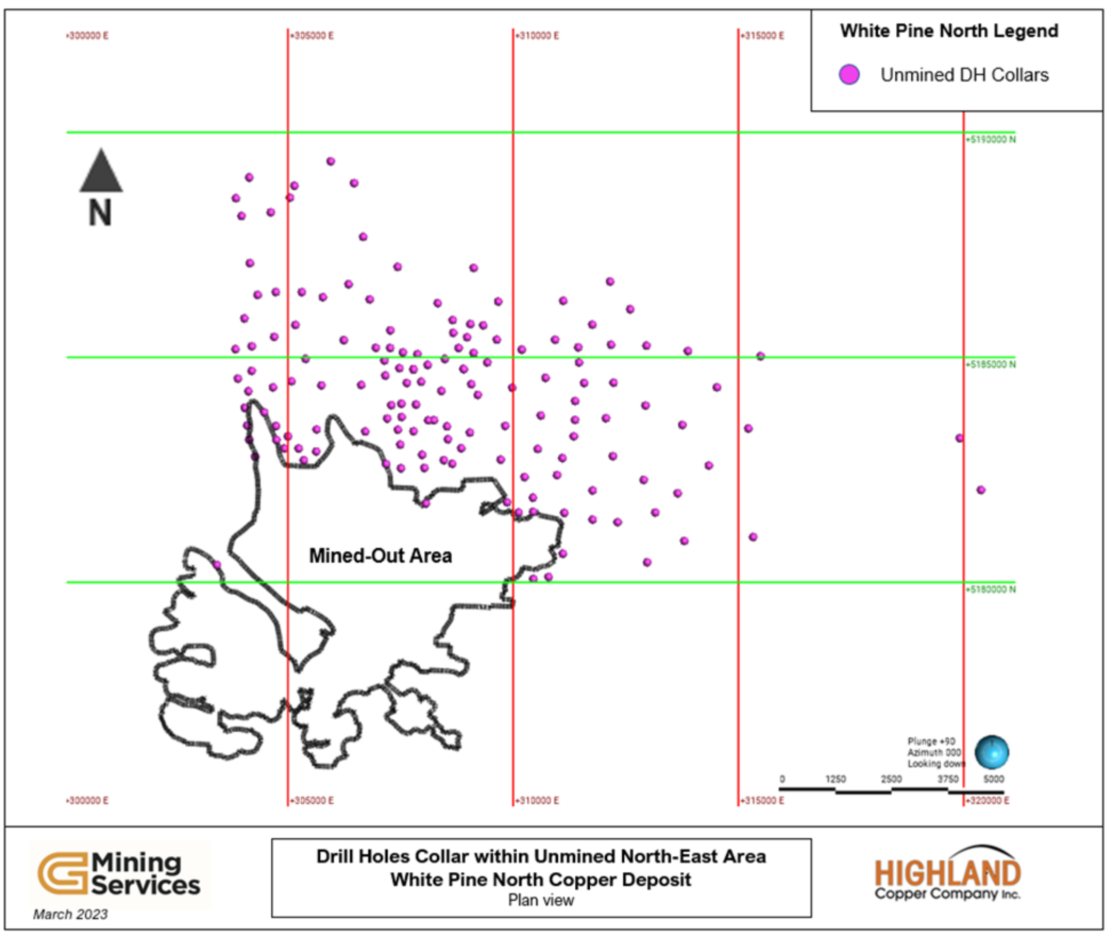
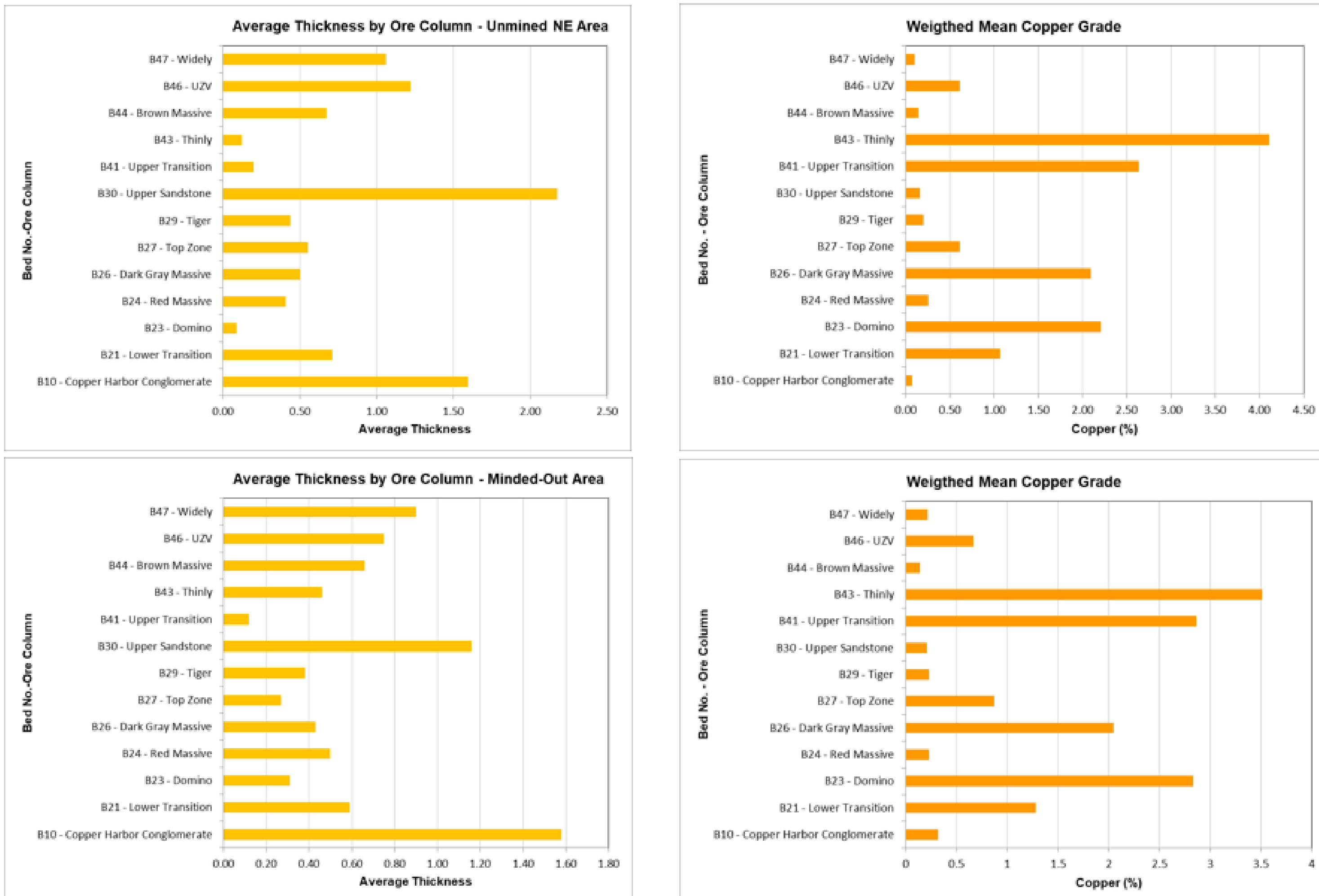


Table 14.5: Summary Statistics by Bed—Northeast Area (Copper)

Beds	Number of Assays	Average Thickness	Min. Cu %	Max. Cu %	Wtd. Mean Cu %	Std. Deviation	CoV
B47— Widely	337	1.06	0.00	1.98	0.10	0.20	1.95
B46—UZV	492	1.22	0.00	3.02	0.61	0.55	0.90
B44— Brown Massive	304	0.67	0.00	4.17	0.14	0.29	1.99
B43— Thinly	175	0.12	0.01	9.95	4.11	1.75	0.43
B41— Upper Transition	175	0.20	0.02	7.91	2.64	1.70	0.64
B30— Upper Sandstone	668	2.17	0.00	4.71	0.16	0.16	0.97
B29— Tiger	196	0.44	0.00	1.24	0.18	0.14	0.79
B27— Top Zone	211	0.55	0.00	2.69	0.61	0.35	0.57
B26— Dark Gray Massive	234	0.50	0.08	5.28	2.09	0.94	0.45
B24— Red Massive	225	0.41	0.00	1.84	0.26	0.15	0.59
B23— Domino	158	0.09	0.06	6.52	2.21	1.50	0.68
B21— Lower Transition	370	0.71	0.03	7.56	1.07	0.96	0.90
B10— Copper Harbor Congl.	530	1.60	0.00	3.75	0.07	0.17	2.24

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

Figure 14.8: Average Thickness by Bed (Mineralization Column) and Mean Copper (%) Grades—Mined-Out vs. Unmined NE Area



Mining Services

March 2023

**Average Thickness compared with Weighted Mean Copper (%) Grades by Bed
White Pine North Copper Deposit**

Table 14.6: Summary Statistics by Bed—Northeast Area (Silver)

Beds	Dataset	Number of Assays	Min. g/t Ag	Max. g/t Ag	Wtd. Mean g/t Ag	Std. Deviation	CoV
B47— Widely	No trimming	337	0.10	17.50	0.92	1.56	1.70
	Only >0.1 g/t Ag	148	0.30	17.50	1.68	1.87	1.11
B46—UZV	No trimming	492	0.10	35.30	4.51	5.47	1.21
	Only >0.1 g/t Ag	319	0.30	35.30	6.93	5.47	0.79
B44— Brown Massive	No trimming	304	0.10	20.20	0.81	1.57	1.94
	Only >0.1 g/t Ag	131	0.30	20.20	1.69	2.03	1.20
B43— Thinly	No trimming	175	0.10	142.00	17.98	22.10	1.23
	Only >0.1 g/t Ag	166	0.70	142.00	19.10	22.31	1.17
B41— Upper Transition	No trimming	175	0.10	127.50	10.41	11.83	1.14
	Only >0.1 g/t Ag	157	0.70	127.50	12.35	11.93	0.97
B30— Upper Sandstone	No trimming	668	0.10	15.80	0.58	0.89	1.53
	Only >0.1 g/t Ag	226	0.30	15.80	1.38	1.04	0.75
B29— Tiger	No trimming	196	0.10	5.00	0.92	0.84	0.91
	Only >0.1 g/t Ag	114	0.30	5.00	1.41	0.70	0.49
B27— Top Zone	No trimming	211	0.10	30.50	2.21	3.88	1.75
	Only >0.1 g/t Ag	130	0.30	30.50	3.59	4.48	1.25
B26— Dark Gray Massive	No trimming	234	0.10	101.71	14.07	13.79	0.98
	Only >0.1 g/t Ag	207	0.30	101.71	15.98	13.63	0.85
B24— Red Massive	No trimming	225	0.10	241.30	1.20	6.75	5.64
	Only >0.1 g/t Ag	96	0.30	241.30	2.49	9.84	3.95

Beds	Dataset	Number of Assays	Min. g/t Ag	Max. g/t Ag	Wtd. Mean g/t Ag	Std. Deviation	CoV
B23— Domino	No trimming	158	0.10	1327.70	120.85	186.16	1.54
	Only >0.1 g/t Ag	132	0.30	1327.70	132.75	191.17	1.44
B21— Lower Transition	No trimming	370	0.10	1460.10	18.28	61.59	3.37
	Only >0.1 g/t Ag	276	0.30	1460.10	24.04	69.73	2.90
B10— Copper Harbor Congl.	No trimming	530	0.10	117.90	1.29	5.28	4.11
	Only >0.1 g/t Ag	275	0.30	117.90	1.89	6.41	3.39

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

14.4 Compositing

Raw data were composited into each mineralized column domain of unequal length, for both Geological and Minimum Thickness Intervals, leading to the creation of six sets of composites: PS-GEO, PS-MINTHICK, FC-GEO, FC-MINTHICK, US-GEO and US-MINTHICK. One composite was generated per drill hole and per column. Each composite was coded using the pertaining column and interval type code.

Statistical checks were undertaken to ensure that the composites were an accurate representation of the raw assays (i.e., length-weighted statistics of assays should be similar to composites for each unit).

14.4.1 Statistics of the Composites (entire White Pine North Deposit)

Statistical analysis for each column and interval type was undertaken to describe the characteristics of copper and silver grades in the entire White Pine North deposit (as undertaken for the assays). The summary of the statistics for all composites is presented in Table 14.7 and Table 14.8 for copper and silver respectively.

Table 14.7: Summary Statistics of Composites—Entire White Pine Deposit (Copper)

Mineralization Column		Number of Composites	Average Thickness (m)	Min. Cu %	Max. Cu %	Wtd. Mean Cu %	Standard Deviation	CoV
Copper	Parting Shale—GEO	485	2.18	0.05	14.92	1.07	0.48	0.45
	Parting Shale—MINTHICK	485	2.41	0.09	2.92	1.07	0.47	0.44
	Full Column—GEO	566	3.69	0.05	9.80	1.04	0.53	0.51
	Full Column—MINTHICK	565	4.09	0.05	2.49	0.96	0.36	0.37
	Upper Shale—GEO	561	3.02	0.00	2.07	0.80	0.32	0.40
	Upper Shale—MINTHICK	561	3.09	0.00	2.07	0.79	0.32	0.41

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

Table 14.8: Summary Statistics of Composites—Entire White Pine North Deposit (Silver)

Mineralization Column		Number of Composites	Average Thickness (m)	Min. g/t Ag	Max. g/t Ag	Wtd. Mean g/t Ag	Standard Deviation	CoV
Silver	Parting Shale—GEO	485	2.18	0.10	239.30	10.49	9.68	0.92
	Parting Shale—MINTHICK	485	2.41	0.10	75.91	9.83	8.75	0.89
	Full Column—GEO	566	3.69	0.10	85.87	7.20	4.98	0.69
	Full Column—MINTHICK	565	4.09	0.08	35.21	6.56	4.61	0.70
	Upper Shale—GEO	561	3.02	0.10	20.40	3.62	2.51	0.69
	Upper Shale—MINTHICK	561	3.09	0.09	20.40	3.45	2.39	0.69

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

Histogram distribution superposed by normal density curves and probability plot curves for copper and silver composites for the PS and FC are illustrated in Figure 14.9, Figure 14.10, Figure 14.11 and Figure 14.12 respectively. Since very few extreme values were found, it was judged unnecessary to apply capping values or restrictions on search ellipses for high-grade composites.

Figure 14.9: Parting Shale Composite Histogram and Probability Plot—Copper

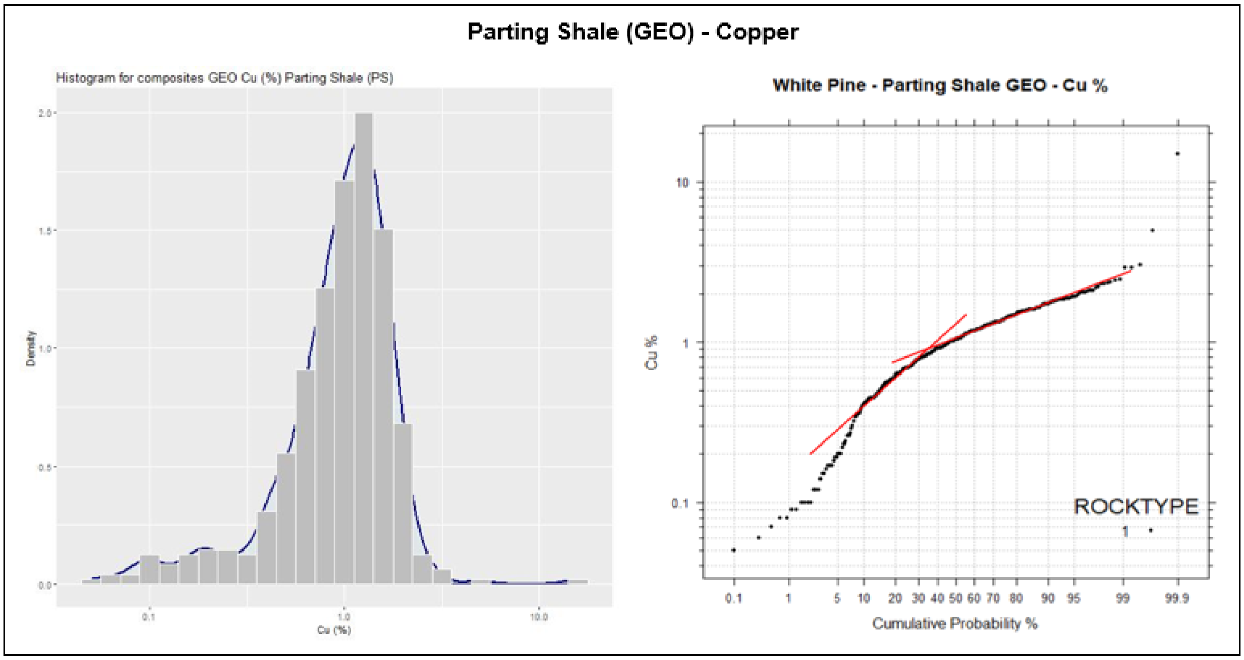


Figure 14.10: Full Column Composite Histogram and Probability Plot—Copper

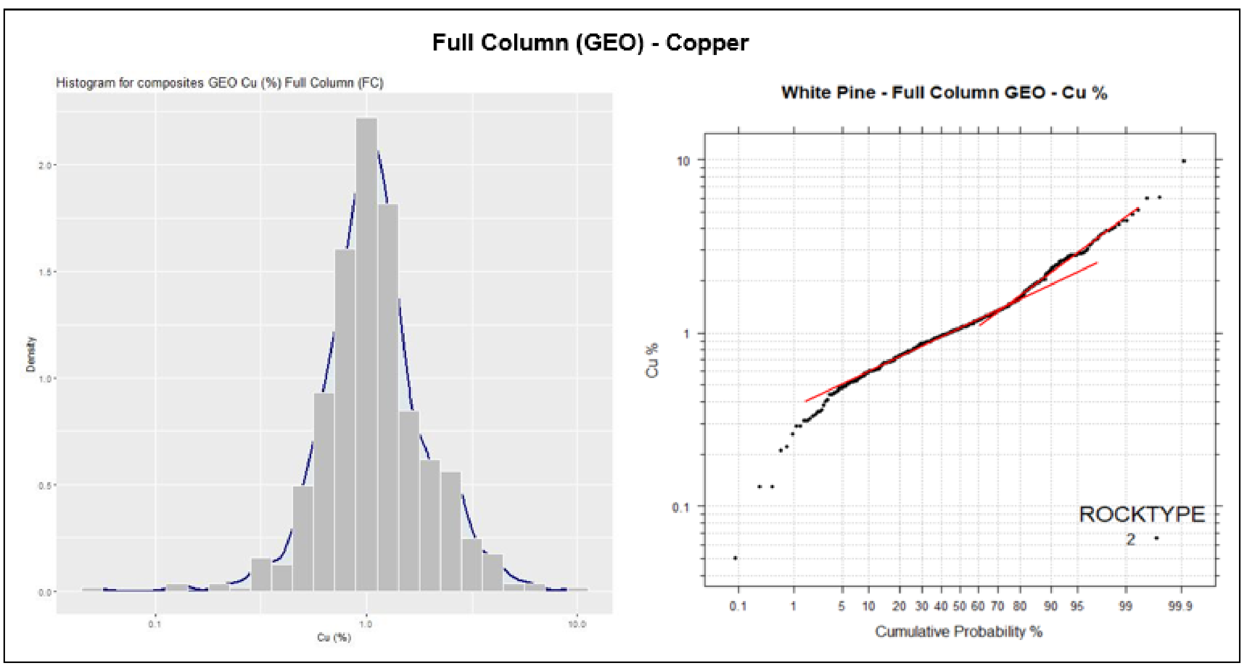


Figure 14.11: Parting Shale Composite Histogram and Probability Plot—Silver

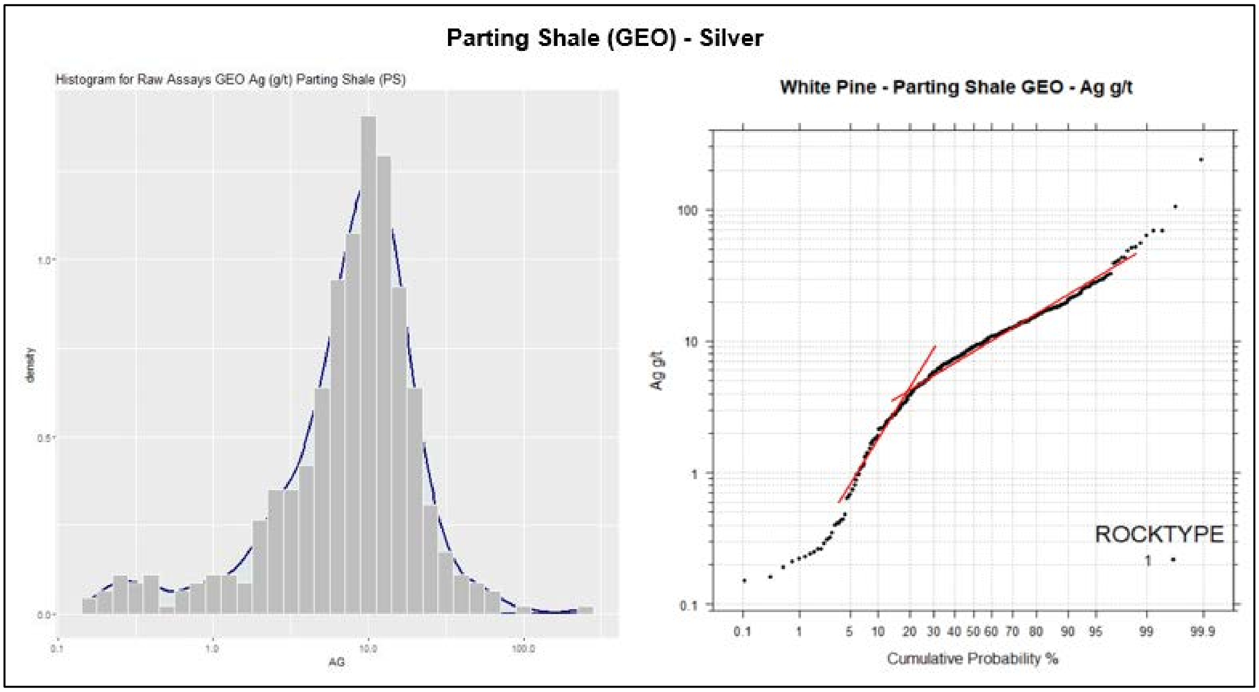
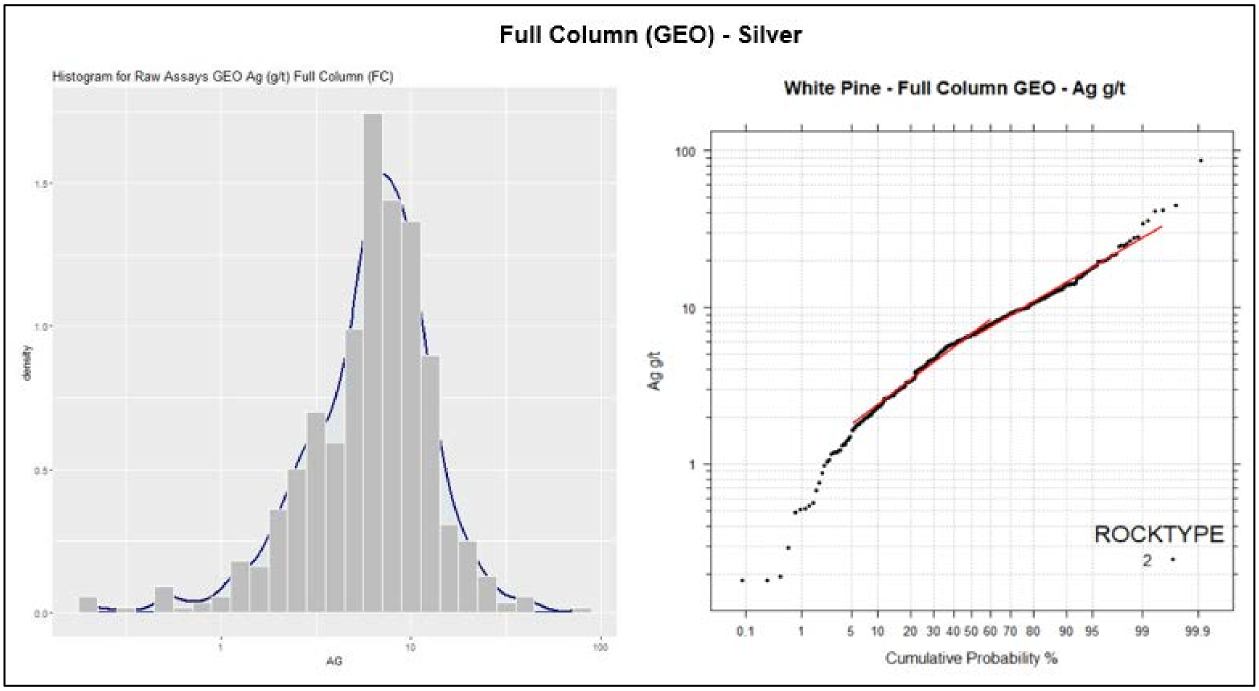


Figure 14.12: Full Column Composite Histogram and Probability Plot—Silver



14.4.2 Statistics of the Composites (Mined-Out Area)

Composites of the mined-out area were extracted, and statistics are presented in Table 14.9 and Table 14.10, for copper and silver respectively. All mean copper and silver grades are higher when compared to the entire drill hole database, with 13% to 22% higher copper grades and 1% to 8% higher silver grades. In both datasets of composites (GEO and MIN), average thicknesses are fairly smaller (5% to 9% thinner) in the mined-out area.

Table 14.9: Summary Statistics of Composites—Mined-Out Area (Copper)

Mineralization Column		Number of Composites	Average Thickness (m)	Min. Cu %	Max. Cu %	Wtd. Mean Cu %	Standard Deviation	CoV
Copper	Parting Shale—GEO	227	2.06	0.06	14.92	1.21	0.50	0.41
	Parting Shale—MINTHICK	227	2.29	0.18	2.92	1.24	0.47	0.38
	Full Column—GEO	260	3.36	0.13	5.99	1.27	0.51	0.41
	Full Column—MINTHICK	259	3.76	0.07	2.49	1.16	0.32	0.28

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

Table 14.10: Summary Statistics of Composites—Mined-Out Area (Silver)

Mineralization Column		Number of Composites	Average Thickness (m)	Min. g/t Ag	Max. g/t Ag	Wtd. Mean g/t Ag	Standard Deviation	CoV
Silver	Parting Shale—GEO	227	2.06	0.10	239.30	10.56	7.77	0.74
	Parting Shale—MINTHICK	227	2.29	0.10	50.50	10.01	7.15	0.71
	Full Column—GEO	260	3.36	0.10	85.87	7.80	4.63	0.59
	Full Column—MINTHICK	259	3.76	0.10	27.68	7.03	4.09	0.58

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

14.4.3 Statistics of the Composites (Northeast Sector)

Mean copper grades in the northeast sector are lower than those of the mined-out area, especially for the FC (Table 14.11), where grades decrease by 40% and 35% for the GEO and MINTHICK configurations, in that order. The average thickness of the composites in the MINTHICK configuration represents an increase of 47% and 14% for the mineralization columns FC and PS respectively. As for silver grades (Table 14.12), the PS configurations (both GEO and MINTHICK) have higher silver grades in the northeast sector. When considering the FC, silver grades stay similar with variations below 6%.

Table 14.11: Summary Statistics of Composites—Northeast Area (Copper)

Mineralization Column		Number of Composites	Average Thickness (m)	Min. Cu %	Max. Cu %	Wtd. Mean Cu %	Standard Deviation	CoV
Copper	Parting Shale—GEO	152	2.47	0.15	2.44	0.96	0.34	0.35
	Parting Shale—MINTHICK	152	2.60	0.13	2.25	0.92	0.33	0.36
	Full Column—GEO	152	4.93	0.26	1.87	0.76	0.24	0.32
	Full Column—MINTHICK	152	4.95	0.26	1.41	0.75	0.24	0.31

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

Table 14.12: Summary Statistics of Composites—Northeast Area (Silver)

Mineralization Column		Number of Composites	Average Thickness (m)	Min. Ag g/t	Max. Ag g/t	Wtd. Mean Ag g/t	Standard Deviation	CoV
Silver	Parting Shale—GEO	152	2.47	0.10	104.14	12.66	12.24	0.97
	Parting Shale—MINTHICK	152	2.60	0.10	75.91	12.06	11.12	0.92
	Full Column—GEO	153	4.93	0.10	35.25	7.46	5.47	0.73
	Full Column—MINTHICK	153	4.95	0.10	35.26	7.42	5.45	0.73

Note: Max = maximum; Min. = minimum; Wtd. = weighted mean by length; CoV = coefficient of variation

14.5 Bulk Density Data

Based on per bed sequence statistics (Table 14.13), a homogeneous 2.74 g/cm^3 density value was used for all rock types in the block model. When grouped by mineralized column (PS or FC), median and average statistics show similar statistics (Table 14.14).

Table 14.13: Specific Gravity Statistics by Bed Number—White Pine North

Bed Number	Lithological Code	Specific Gravity (g/cc)				
		Number	Min.	Max.	Mean	Median
10	LWSA	38	2.54	2.84	2.68	2.68
21	LTRA	48	2.47	3.18	2.73	2.73
23	DOMN	32	2.66	2.80	2.74	2.74
24	RMAS	38	2.70	2.94	2.74	2.74
26	DGMA	55	2.67	2.96	2.77	2.77
27	TOPZ	31	2.68	2.76	2.73	2.73
29	TIGR	51	2.42	2.78	2.74	2.75
30	UPSA	43	2.59	2.82	2.69	2.70
41	UTRA	34	2.67	2.84	2.75	2.75
43	THIN	28	2.69	2.86	2.76	2.75
44	BMAS	42	2.55	2.76	2.72	2.73
46	UZVA	41	2.58	3.19	2.74	2.74
47	WIDE	36	2.55	2.81	2.73	2.73
49	RAGR	1	2.73	2.73	2.73	2.73

Table 14.14: Summary of Specific Gravity Statistics by Mineralized Column

Mineralization Column	Specific Gravity (g/cc)				
	Total of Samples	Min.	Max.	Weighted Mean	Median
PS 2 m	231	2.47	3.18	2.742	2.740
FC 3 m	360	2.42	3.18	2.736	2.739

14.6 Variography

Grade variography was generated in preparation for the estimation of copper grades using the Ordinary Kriging ("OK") interpolation method. The variography was undertaken on the composites for each mineralization column (PS, FC, and US). Geovia GEMS™ was used to perform the variographic analysis.

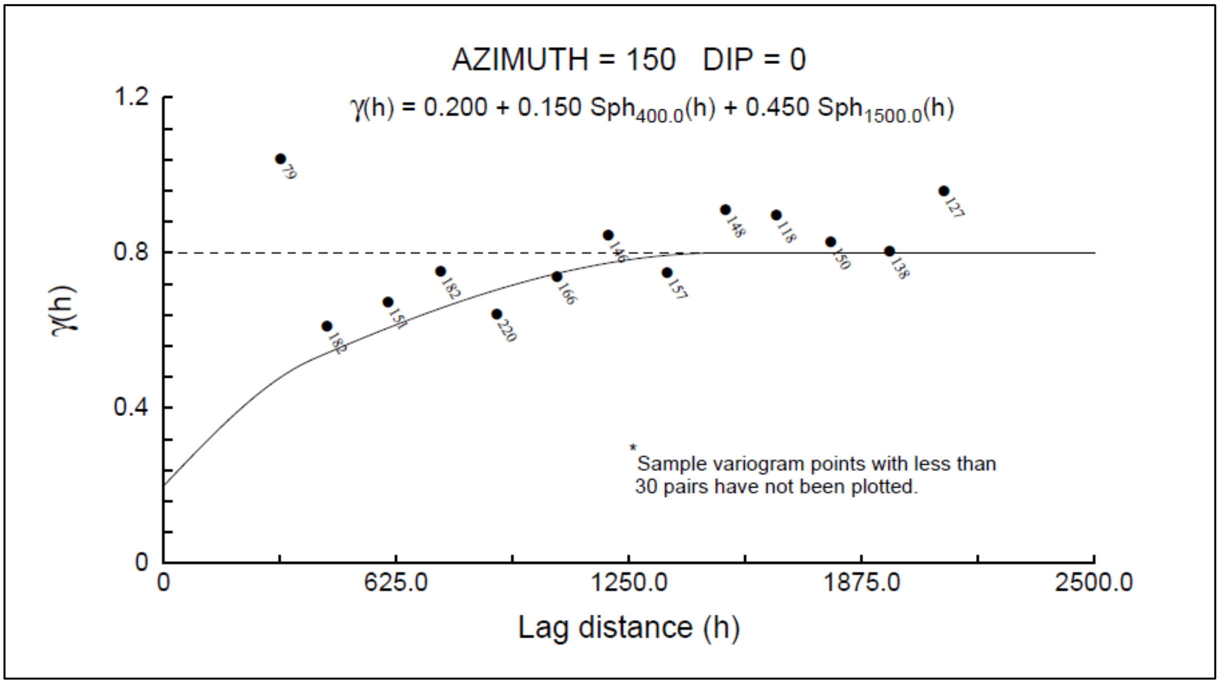
Due to the shallowly dipping nature of the mineralized beds, variograms were unfolded to horizontal and modelled in 2D. A series of variograms was generated from the composites of each column every 30-degree azimuth on the horizontal plane. The spread angle was set to 30 degrees, with a bandwidth of 500 m. A lag distance of 150 m was applied. All composites (mined and unmined areas) were selected to produce the variograms (PS, FC, US). The manually fitted variogram models included a nugget effect and two spherical structures. The variography study highlighted a weakly anisotropic distribution of copper towards the south-east in the PS, and a low nugget effect on copper and silver grades. The results of the models for copper are tabulated in Table 14.15.

Table 14.15: Variogram Models for the Copper and Silver Composites of Mineralized Column

Element	Interval Codes	Variogram Type	Nugget	Ranges of Influence (m)								Rotation		
				1st Structure				2nd Structure				Z	Y	Z
				X	Y	Z	Sill	X	Y	Z	Sill			
Cu	PS	Spherical	0.20	400	300	125	0.15	1500	1000	250	0.45	-60	0	0
	FC		0.10	500	350	125	0.20	2000	1500	250	0.25	20	0	0
	US		0.15	500	400	125	0.45	2000	1000	250	0.2	30	0	0

Figure 14.13 shows an example of a relative semi-variogram for Cu% for the principal direction, orientated towards 150 degrees azimuth.

Figure 14.13: Variogram Model Cu% for the Parting Shale (PS) Column



14.7 Block Modelling

Three block models were constructed for the White Pine North deposit, one for each of the columns: PS_2022, FC_2022 and US_2022. All three block models have the same basic parameters, as displayed in Table 14.16. A block size of 25 m × 25 m × 5 m was chosen by GMS. Blocks were assigned a rock type number based on the Leapfrog model discussed in Section 14.2; 100 for the FC, 200 for the PS and 300 for the US.

Since block height is set at 5 m, and that columns have mean heights between 2.18 m and 3.02 m (see Table 14.17), a percent attribute was used in the grade interpolation process. Each block was assigned a percentage related to the overlapping between the block and the column wireframes. This percent attribute is only used when reporting global Resources. A small block size was chosen to ensure the accuracy of the percentage attribute.

Table 14.16: Block Model Parameters

Description		Number of Blocks	Block Size (m)	Dimension (m)		Rotation	Origin (UTM)	
PS, FC, and US Model	Colum	560	25	Width	14,000	0	East	303,000
	Row	400	25	Length	10,000		North	5,180,000
	Level	300	5	Height	1,500		Elevation	350

A series of attributes were added for all six block models and are presented in Table 14.17. These are incorporated into the block model to capture the various attributes needed during the block modelling development.

Table 14.17: Block Model Attributes

Model Name	Description
Rock Type 2 m/Rock Type 3 m	Domain coding (diluted to 2 m or 3 m)
Density	Specific gravity (2.74 g/cm^3)
Percent 2 m/Percent 3 m	Percent block attribute (diluted to 2 m or 3 m)
CU_2M_OK/CU_3M_OK	Copper grades (in percent, diluted to 2 m or 3 m)
AG_2M_ID2/AG_3M_ID2	Silver grades (in g Ag/t, diluted to 2 m or 3 m)
AVG_DIST	Average distance for sample used
DSTCLOSET	Actual distance to closest point
CATEG	Resource classification (2= Indicated and 3 = Inferred)
PASS	Interpolation pass
TRUETHICKNESS_DIL_2 m/3 m	Thickness of the Mineralized Column (diluted to 2 m or 3 m)
DIP	Dip of stratigraphy
IN_LEASE_2022	Within Lease boundaries
REPORTING_2023	Type of mining method anticipated (PS or FC)

14.8 Grade Estimation Methodology

Two interpolation techniques were selected for the White Pine North Project MRE. The OK method was used for copper grade interpolation and the Inverse Distance Squared (“ID2”) for silver grades.

A percentage block model was used during grade interpolation for copper and silver. All blocks overlapping any mineralized column wireframe are calculated but are weighted with the percentage of volume they occupy inside that wireframe when calculating volumes of material.

The sample search approach used for the estimate of the block model is summarized below and is identical for each block model (also in Table 14.18):

- **First Copper Pass**: A minimum of 5 and a maximum of 16 composites within the search ellipse ranges.
- **Second Copper Pass**: A minimum of 3 and a maximum of 16 composites within the search ellipse ranges. Only blocks which were not estimated during the first pass could be estimated during the second pass.
- **Third Copper Pass**: A minimum of 1 and a maximum of 16 composites within the search ellipse ranges. Only blocks which were not estimated during the first and second pass could be estimated during the third pass.
- **First Silver Pass**: A minimum of 5 and a maximum of 16 composites within the search ellipse ranges.
- **Second Silver Pass**: A minimum of 3 and a maximum of 16 composites within the search ellipse ranges. Only blocks which were not estimated during the first pass could be estimated during the second pass.
- **Third Silver Pass**: A minimum of 1 and a maximum of 16 composites within the search ellipse ranges. Only blocks which were not estimated during the first and second pass could be estimated during the third pass.

Since each hole had a maximum of one composite, no limit of samples per hole was necessary.

Based on GMS data analysis, it was not judged necessary to apply restrictions on the search ellipse distance on composites of higher grades (high-grade restraining).

The various parameters of interpolation and search ellipses utilized in the Resources estimation of the block model are respectively tabulated in Table 14.18 and

Table 14.19.

Figure 14.14 illustrates the interpolation passes within the White Pine North deposit area and Figure 14.15 shows a plan view of the Pass 1 search ellipse used in grade interpolation for the Parting Shale block model.

Table 14.18: Interpolation Profile Parameters

Composites	Metal	Pass	Composites			Rock Code Target
			Min	Max	Max per Hole	
PS, FC and US (GEO and MINTHICK)	Copper	1	5	16	N/A	100 (FC) or 200 (PS) or 300 (US)
		2	3	16	N/A	100 (FC) or 200 (PS) or 300 (US)
		3	1	16	N/A	100 (FC) or 200 (PS) or 300 (US)
	Silver	1	5	16	N/A	100 (FC) or 200 (PS) or 300 (US)
		2	3	16	N/A	100 (FC) or 200 (PS) or 300 (US)
		3	1	6	N/A	100 (FC) or 200 (PS) or 300 (US)

Table 14.19: Sample Search Ellipsoid Settings

Interval Code	Element	Pass	Ellipse Profile Name	Anisotropy Range (m)			Rotation		
				X	Y	Z	Z	X	Z
PS	CU, AG	1	PS_1	750	500	250	-60	0	0
		2	PS_2	1000	750	350			
		3	PS_3	2000	1500	450			
FC		1	FC_1	750	500	250	20	0	0
		2	FC_2	1000	750	350			
		3	FC_3	2000	1500	450			
US		1	US_1	750	500	250	30	0	0
		2	US_2	1000	750	350			
		3	US_3	2000	1500	450			

Figure 14.14: Interpolation Passes within In Lease Area—White Pine North Deposit

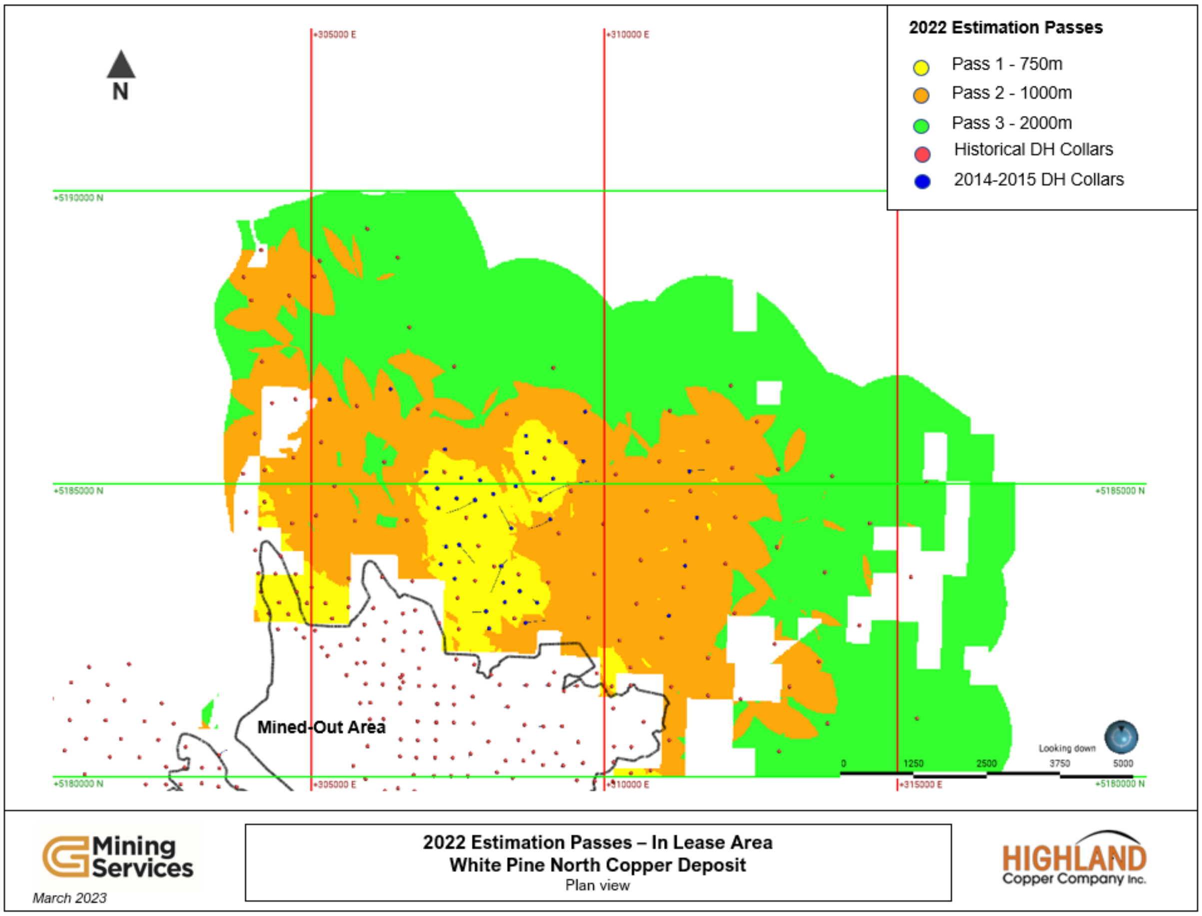
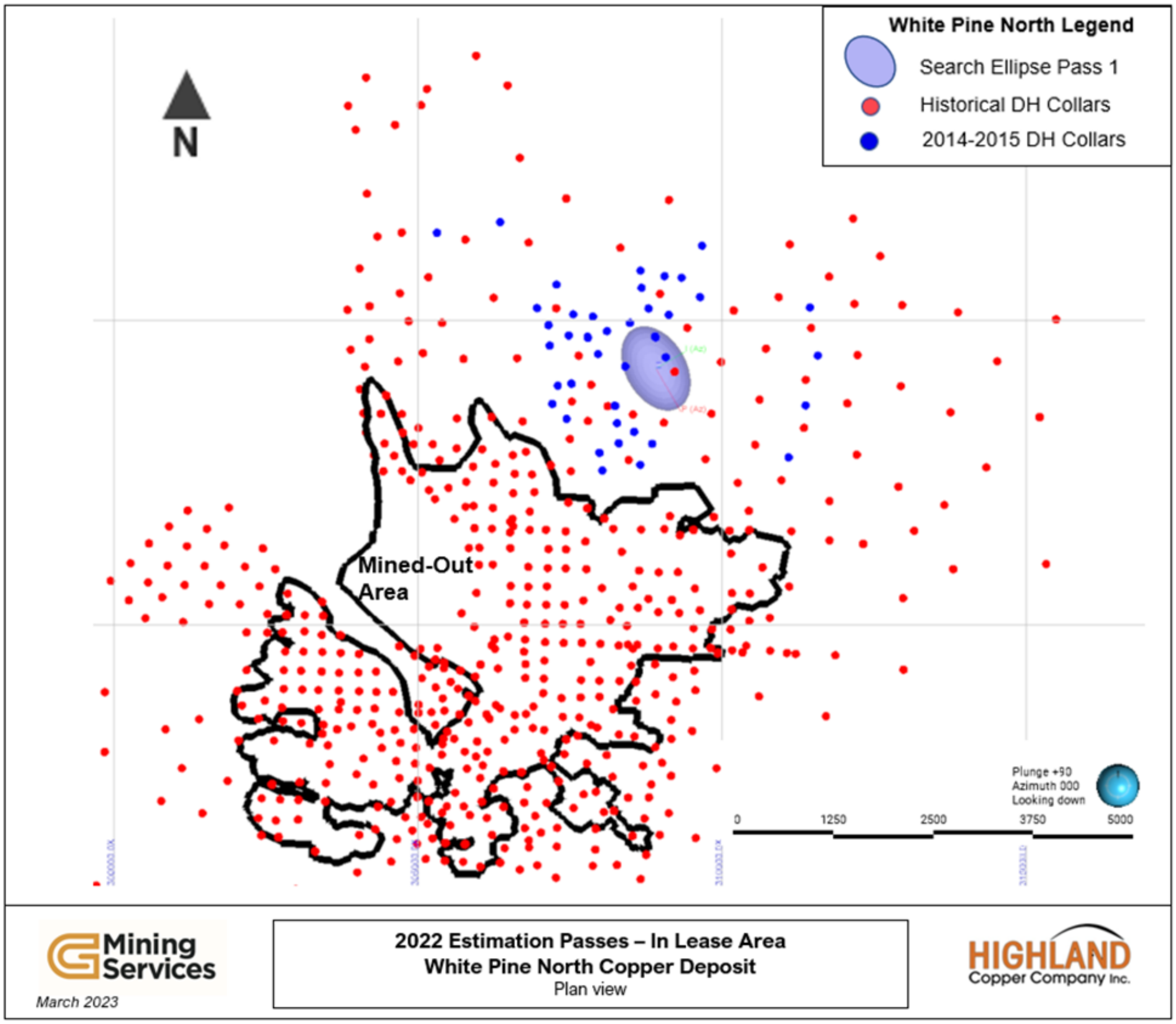


Figure 14.15: Plan View of Pass 1 Search Ellipsoid (Parting Shale)



14.9 Grade Estimation Validation

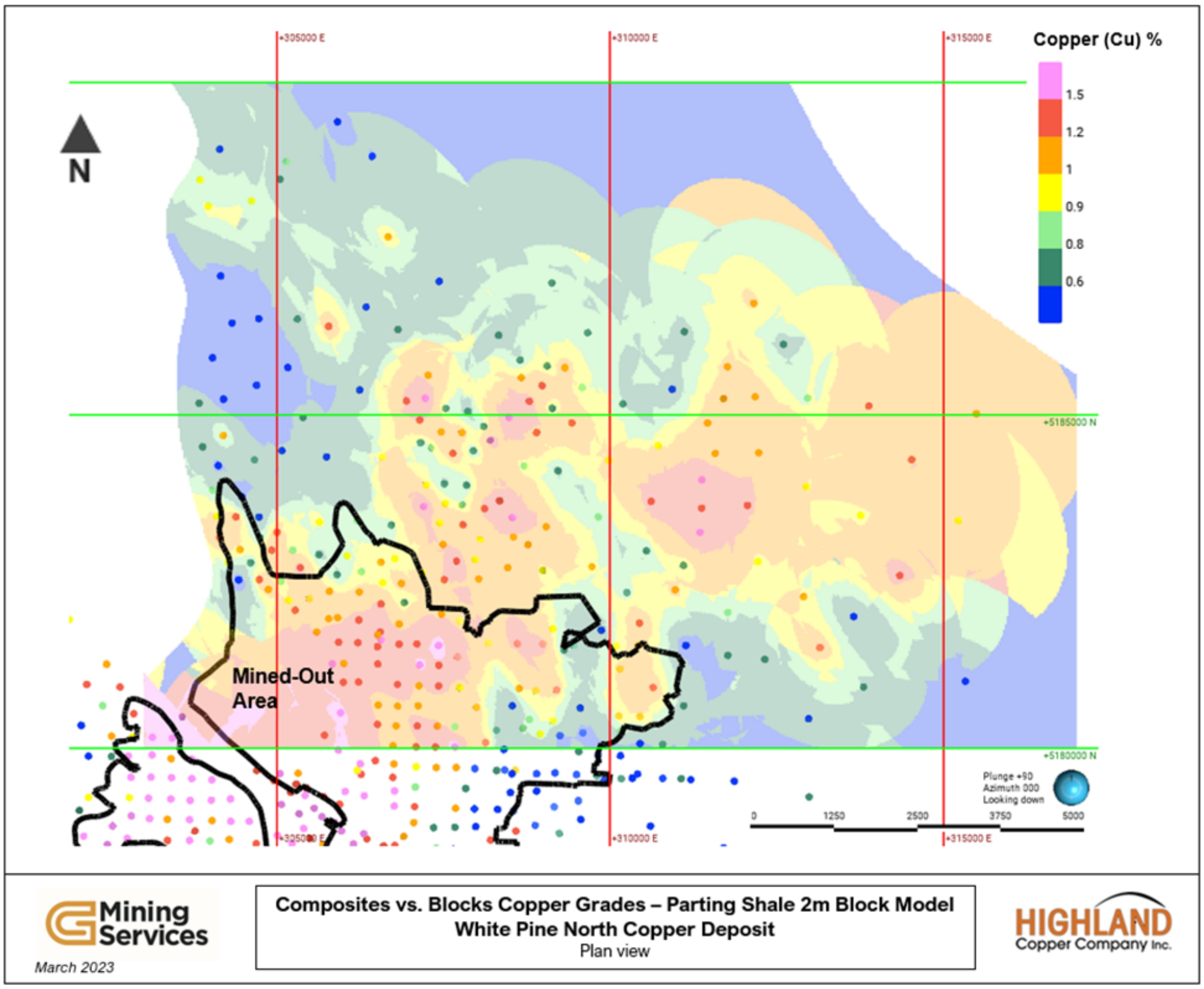
Validation was thoroughly completed on the GMS block models. Various block model validation steps were taken to ensure that the block model is a robust representation of the composite grade values and distributions. The following validations were undertaken:

- Visual checks on section comparing composite copper or silver grades against block copper or silver grades.
- Global statistical checks comparing the copper and silver grades of the block model against the de-clustered composite data.
- Local statistical checks to identify any over-smoothing or areas of grade over-extrapolation.

14.9.1 Visual Validation—Composites Grades vs. Block Grades

A statistical and visual review comparing the average block grade against the average composite grade for each block model was undertaken as a validation tool for the copper grades in each of the interpolation run of the block model. This method of average grade comparison between the estimated results and the composite data sources can indicate a possible distortion in the grade distribution. GMS is of the opinion that there are no major irregularities between the populations of the composites and the interpolated grade results. Figure 14.16 shows an example of copper composite grades (black diamonds, varying sizes) versus copper block grades (in colour).

Figure 14.16: Parting Shale Block Model and Composites by Copper Grade



14.9.2 Statistical Validation

A statistical comparison between composites used in the interpolation and block grades was performed to evaluate if samples used in the estimation are well represented in the block model. Global statistics were calculated for the zones of mineralization (PS, FC, and US), defined by all blocks and composites between 303000mE - 317000mE, and 5180000mN - 5190000mN (within the block model). Declustering of composites is necessary due to the variable sample spacing; therefore, weighting was calculated for each composite and applied during the compilation of descriptive statistics.

Table 14.20 and Table 14.21 compare the weighted mean block and the declustered mean of composite grades for copper and silver considering Passes 1 and 2 for the unmined portion of the deposit.

Table 14.20: Comparative Statistics for Cu % Between Composites and Blocks Grouped by Column (Passes 1 and 2 Only)

Domain	Rock Code	No. of Composites	CU (%) Composites							No. of Blocks	CU (%) Blocks—Passes 1 & 2 Only						
			Min	Max	Declustered Mean	Median	Standard Deviation	Var	CoV		Min	Max	Weighted Mean	Median	Standard Deviation	Var	CoV
FC	100	153	0.23	1.42	0.74	0.76	0.24	0.06	0.32	185,595	0.31	1.45	0.75	0.77	0.18	0.03	0.24
PS	200	152	0.05	2.32	0.91	0.92	0.35	0.12	0.38	149,171	0.11	2.22	0.91	0.90	0.24	0.06	0.27
US	300	150	0.01	1.15	0.57	0.63	0.26	0.07	0.43	162,701	0.02	1.14	0.59	0.60	0.19	0.04	0.33

Table 14.21: Comparative Statistics for Ag (g/t) Between Composites and Blocks Grouped by Column (Passes 1 and 2 Only)

Domain	Rock Code	No. of Composites	Ag (g/t) Composites							No. of Blocks	Ag (g/t) Blocks—Pass 1 & 2 Only						
			Min	Max	Declustered Mean	Media n	Standard Deviation	Var	CoV		Min	Max	Weighted Mean	Median	Standard Deviation	Var	CoV
FC	100	153	0.1	35.26	6.98	6.83	5.54	30.64	0.75	185,595	0.12	35.17	7.4	7.05	3.68	13.54	0.50
PS	200	152	0.07	75.91	11.94	10.82	12.03	144.61	0.96	149,171	0.07	75.67	11.81	11.12	8.32	69.23	0.69
US	300	150	0.09	7.89	3.16	3.49	1.73	3.01	0.51	162,701	0.10	7.88	3.37	3.49	1.18	1.40	0.35

The comparison is considered by GMS as a good match between the block model estimated grades and the declustered composites. The difference in mean grades between the composites and blocks is judged minimal for both copper and silver grades.

14.9.3 Local Statistical Validation—Swath Plots

The swath plot method is considered a local validation, which works as a visual means to compare estimated block grades against composite grades within a 3D moving window. It is used to identify possible bias in the interpolation (i.e., over/under estimation of grades).

Swath plots were generated for all composites of the three columns (PS, FC, and US) at increments of 300 m (Easting) for both Cu% and Ag g/t and only for blocks with indicated classification (Passes 1 and 2 only) within the in Lease unmined area of the deposit. Peaks and lows in estimated grades should generally follow peaks and lows in composite (or point) grades in well-informed areas of the block model, whereas less informed areas can occasionally show some discrepancies between the grades.

Figure 14.17 illustrates an example swath plot of copper grades for the PS mineralized zone by Easting within the in Lease unmined area and, also considering indicated classification which includes only Passes 1 and 2 as described in Section 14.8. In general, the block model reflects the trends very well, as shown by the composite copper grades.

Figure 14.17: Swath Plot of Cu % for the Parting Shale (PS) by Easting—Indicated Resources (Pass 1 & 2) in Lease Area

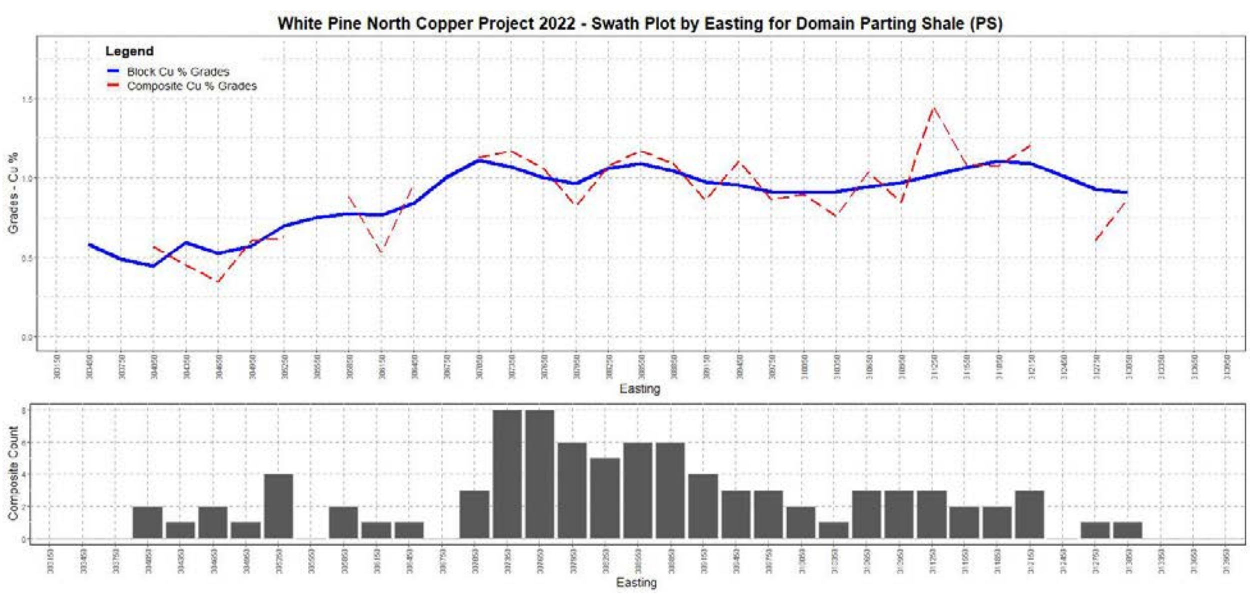
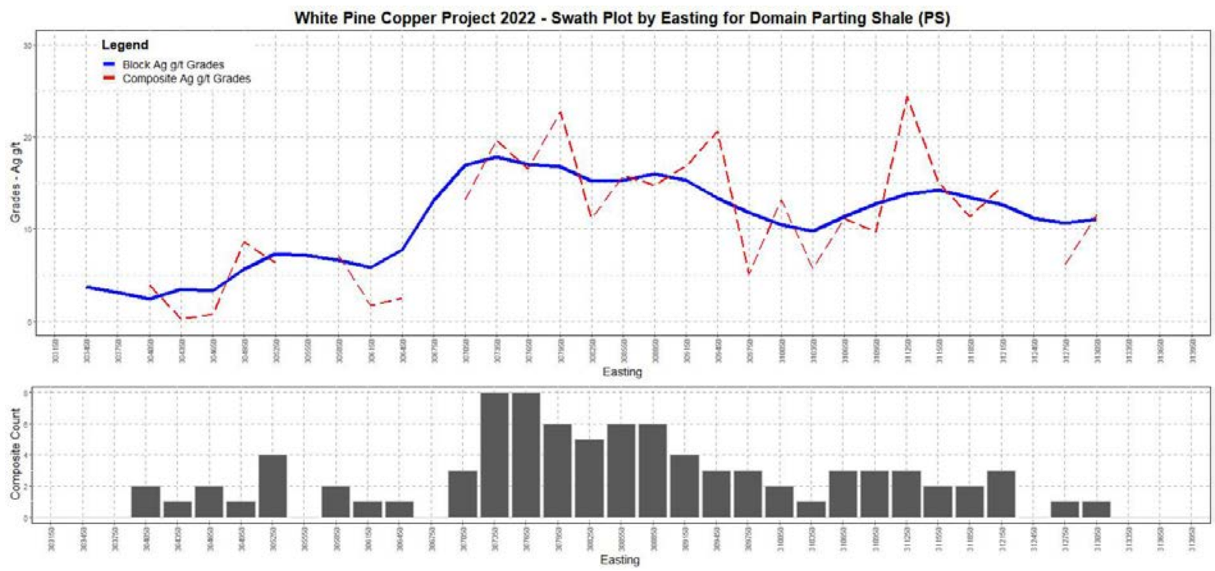


Figure 14.18 illustrates an example swath plot of silver grades for the PS mineralized zone by Easting within the in Lease unmined area and, also considering indicated classification which includes passes 1 and 2, as described in Section 14.8. The silver grades of interpolated blocks are generally lower than the composite grades. Overall, the local statistical validation shown illustrated by the easting (X-direction) swath plots did not identify any bias regarding the Resource estimate.

Figure 14.18: Swath Plot of Ag (g/t) for the Parting Shale (PS) by Easting—Indicated Resources (Passes 1 & 2) in Lease Area



14.10 Classification and Resource Reporting

The resource classification definitions used for this report are those published by the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM"). The "*CIM Definition Standards on Mineral Resources and Mineral Reserves*", prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM council on May 10, 2014, provides standards for the classification of Mineral Resources and Mineral Reserve estimates into various categories. The category to which a Resource or Reserve estimate is assigned depends on the level of confidence in the geological information available on the mineral deposit, the quality and quantity of data available, the level of detail of the technical and economic information which has been generated about the deposit and the interpretation of that data and information. Under CIM Definition Standards:

A *"Measured Mineral Resource"* is that part of a Mineral Resource for which quantity, grade or quality, density, shape, physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of modifying factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation.

An *"Indicated Mineral Resource"* is that part of a Mineral Resource for which quantity, grade or quality, density, shape, and physical characteristics can be estimated with a level of confidence sufficient to allow the application of modifying factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. An indicated mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource.

An *"Inferred Mineral Resource"* is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of limited geological evidence and limited sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity.

In addition, the classification of interpolated blocks is undertaken by considering the following criteria:

- Quality and reliability of drilling and sampling data.
- Distance between sample points (drilling density).
- Confidence in the geological interpretation.
- Continuity of the geologic structures and the continuity of the grade within these structures.
- Statistics of the data population.
- Quality of assay data.

The Resources were classified according to the above-mentioned criteria which also directed the choice of the search parameters for each interpolation pass during the block estimation.

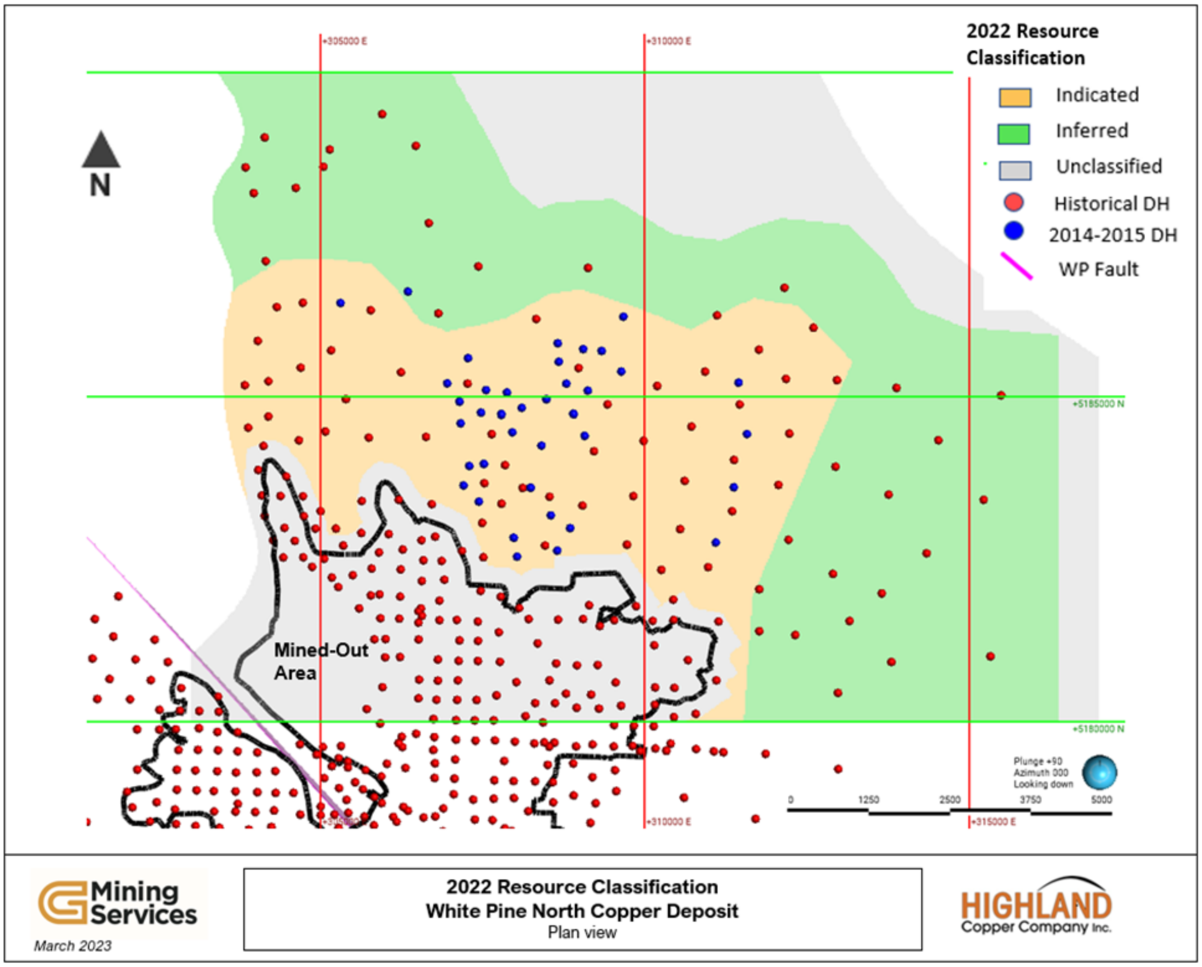
- No Measured Resources are reported for this Mineral Resource since the level of drill definition is judged too large and there is currently no direct access to the mineralized zones via tunnels or crosscuts.
- Indicated Resources correspond to the blocks which were estimated in the first and second copper estimation pass.
- Inferred Resources are the blocks estimated from the third copper estimation pass.

The Mineral Resource classification was subsequently refined manually in plan view to create a coherent classification.

Figure 14.19 shows how the Resource categories are distributed in the deposit. Indicated and Inferred Resources are spatially limited to the northeast of the mined-out area, where lower-density drilling occurs.

A 300 m buffer zone (or boundary pillar) was applied around existing workings. Any blocks within this buffer zone will be tagged as "unclassified." Lastly, only blocks within mineral leases where WPC has a greater than or equal to 25% ownership will be classified as Mineral Resources.

Figure 14.19: Resource Categories in White Pine North Deposit



14.10.1 <u>Discussion on Block Model Validation</u>

Globally, the White Pine North block model is judged to be a good representation of composite copper and silver grades used in the estimation. Global statistical validations show no significant over/under-estimation of copper and silver block grades. Local statistical validations illustrate good local correlation between the interpolated blocks compared to the composite for copper and silver grades, and no overestimation of grades was observed during the validation of estimated grades for the White Pine North Project.

14.11 Underground Constrained Resources

To establish a Mineral Resource estimate, an underground Room and Pillar ("R&P") mining scenario is judged to be the most adapted to the geometry and dip of the PS 2 m and FC 3 m, as well as to the tonnage of the deposit. To assess reasonable prospects of economic extraction by underground mining, GMS considered several parameters such as concentrate prices, process recoveries, operating costs, and mining costs to evaluate and calculate a copper cut-off grade. All blocks below this cut-off grade were removed from the constrained Mineral Resources. As mentioned, a minimum mining height of 2.0 m was used to model the PS column and 3.0 m was used to model the FC column. No mining recovery or dilution was applied to the mineral resources.

After consideration of the mining parameters, it was deemed that only the PS and FC had economic potential; therefore, the US will not be reported in this Mineral Resource. The MRE was thus divided into two extraction scenarios, namely the Parting Shale and Full Column based on mine engineering.

14.11.1 Underground Cut-off Calculation Parameters

The following conceptual mining parameters were considered:

- A flat NSR royalty rate of $0.10/lb. Cu payable was applied, which incorporates three royalties on the project (Osisko Silver Royalties, Osisko Copper Royalties and Longyear Royalty).
- No mining loss and no mining dilution was considered for the Mineral Resources.
- Mineral Resources are reported using a copper price of USD 4.00/lb. and a silver price of USD 25/oz.
- Metallurgical recovery of 88% was set for copper and 73.4% for silver.
- A payable rate of 96.5% for copper and 90% for silver was assumed.
- A cut-off grade of 0.90% Cu was used to report the Mineral Resources.
- Operating costs are based on a processing plant located at the White Pine site.

14.11.2 Underground Mineral Resource Estimate

The White Pine North deposit Underground Indicated Mineral Resources are reported at 150.7 million tonnes grading an average of 1.05% Cu and 13.5 g/t Ag containing 3.5 billion pounds of copper and 65.5 million ounces of silver using a lower cut-off grade of 0.9% Cu for the Parting Shale and Full Column combined Resources. Inferred Mineral Resources are reported at 96.4 Mt grading an average 1.03% Cu and 9.0 g/t Ag containing 2.2 billion pounds of copper and 27.8 Moz of Ag using a cut-off grade of 0.9% Cu.

Table 14.22 and Table 14.23 reports Mineral Resources for an underground R&P mining scenario for the White Pine North deposit by Resource categories and mineralization columns, Parting Shale, and Full Column only. All parameters used in the calculations are presented in the table's notes.

Mr. Réjean Sirois, P.Eng. and Mr. Christian Beaulieu, P.Geo., are not aware of any factors or issues that materially affect the MRE other than normal risks faced by mining projects in terms of environmental, permitting, taxation, socio-economic, marketing, and political factors and additional risk factors regarding Indicated and Inferred resources. Risks inherent to the MRE include, but are not limited to, fluctuations in metal prices and uncertainties in the geological interpretation for Inferred resources.

Mineral Resources are not Mineral Reserves as they have not demonstrated economic viability. The quantity and grade of reported inferred mineral resources in this report are uncertain in nature and there has been insufficient exploration to define these resources as indicated or measured; however, it is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated mineral resources with continued exploration.

Table 14.22: Mineral Resources by Mineralization Column (PS and FC)—White Pine North Deposit 0.9% Cu Cut-off Grade—June 12, 2023

Mineralization Columns	Resource Category	Tonnage (Mt)	Copper Grade (%)	Silver Grade (g/t)	Copper Contained (M lb)	Silver Contained (M oz)
Full Column (3 m)	Measured	-	-	-	-	-
	Indicated	37.8	1.03	10.1	857	12.3
	M + I	**37.8**	**1.03**	**10.1**	**857**	**12.3**
	Inferred	-	-	-	-	-
Parting Shale (2 m)	Measured	-	-	-	-	-
	Indicated	112.8	1.06	14.6	2,640	53.1
	M + I	**112.8**	**1.06**	**14.6**	**2,640**	**53.1**
	Inferred	96.4	1.03	9.0	2,183	27.8

Notes on Mineral Resources:

1. *Mineral Resources are reported using a copper price of USD 4.00/lb and a silver price of USD 25/oz.*
2. *A payable rate of 96.5% for copper and 90% for silver was assumed.*
3. *Metallurgical recoveries of 88% for copper and 73.4% for silver were assumed.*
4. *A cut-off grade of 0.90% copper was used, based on an underground "room and pillar" mining scenario.*
5. *Mineral Resources are reported within the most probable extraction scenario of Full Column or Parting Shale based on mine engineering.*
6. *Operating costs are based on a processing plant located at the White Pine site.*
7. *A flat NSR royalty rate of $0.10/lb Cu payable was applied, which incorporates three royalties on the project (Osisko Silver Royalties, Osisko Copper royalties and Longyear Royalty).*
8. *Minimum mining thicknesses of 2 m and 3 m were applied to the Parting Shale and the Full Column respectively.*
9. *No mining dilution and mining loss were considered for the Mineral Resources.*
10. *Mineralized rock bulk density is assumed at 2.74 g/cc.*
11. *Classification of Mineral Resources conforms to CIM definitions.*
12. *The qualified persons for the estimate are Mr. Réjean Sirois, P.Eng., consultant for GMS and Mr. Christian Beaulieu, P.Geo., consultant for GMS. The estimate has an effective date of June 12, 2023.*
13. *Mineral Resources that are not mineral reserves do not have demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.*
14. *Parting Shale: interval defined from the base of the Lower Transition unit to the top of the Tiger unit.*
15. *Full Column: interval defined from the base of the Lower Transition unit to the top of the Thinly unit.*
16. *The quantity and grade of reported Inferred Resources in this estimation are uncertain in nature and there has been insufficient exploration to define these Inferred Resources as Indicated or Measured Mineral Resources.*

**Table 14.23: Combined Mineral Resources (PS and FC)—White Pine North Deposit
0.9% Cu Cut-off Grade—June 12, 2023**

Deposit	Resource Category	Tonnage	Copper Grade	Silver Grade	Copper Contained	Silver Contained
		(M tonne)	(%)	(g/t)	(M lb)	(M oz)
White Pine North	Measured	-	-	-	-	-
	Indicated	150.7	1.05	13.5	3,497	65.5
	M + I	**150.7**	**1.05**	**13.5**	**3,497**	**65.5**
	Inferred	96.4	1.03	9.0	2,183	27.8

Notes on Mineral Resources:

1. *Mineral Resources are reported using a copper price of USD 4.00/lb and a silver price of USD 25/oz.*
2. *A payable rate of 96.5% for copper and 90% for silver was assumed.*
3. *Metallurgical recoveries of 88% for copper and 73.4% for silver were assumed.*
4. *A cut-off grade of 0.90% copper was used, based on an underground "room and pillar" mining scenario.*
5. *Mineral Resources are reported within the most probable extraction scenario of Full Column or Parting Shale based on mine engineering.*
6. *Operating costs are based on a processing plant located at the White Pine site.*
7. *A flat NSR royalty rate of $0.10/lb Cu payable was applied, which incorporates three royalties on the project (Osisko Silver Royalties, Osisko Copper royalties and Longyear Royalty).*
8. *Minimum mining thicknesses of 2 m and 3 m were applied to the Parting Shale and the Full Column respectively.*
9. *No mining dilution and mining loss were considered for the Mineral Resources.*
10. *Mineralized rock bulk density is assumed at 2.74 g/cc.*
11. *Classification of Mineral Resources conforms to CIM definitions.*
12. *The qualified persons for the estimate are Mr. Réjean Sirois, P.Eng., consultant for GMS and Mr. Christian Beaulieu, P.Geo., consultant for GMS. The estimate has an effective date of June 12, 2023.*
13. *Mineral Resources that are not mineral reserves do not have demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.*
14. *Parting Shale: interval defined from the base of the Lower Transition unit to the top of the Tiger unit.*
15. *Full Column: interval defined from the base of the Lower Transition unit to the top of the Thinly unit.*
16. *The quantity and grade of reported Inferred Resources in this estimation are uncertain in nature and there has been insufficient exploration to define these Inferred Resources as Indicated or Measured Mineral Resources.*

14.11.3 Mineral Resource Sensitivity

Table 14.24, Table 14.25 and Table 14.26 summarize the sensitivity of the constrained underground Mineral Resources of the PS and FC mineralization columns for a series of selected cut-offs (base case highlighted). The sensitivity analysis uses cut-off grades between 0.6% and 1.20% Cu.

Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. The tonnages and grades at differing cut-offs shown below are for comparison purposes only and do not constitute an official MRE.

Table 14.24: Parting Shale Constrained Mineral Resource Sensitivity—Indicated

Cut-off Grade (% Cu)	White Pine North Deposit—Indicated Resources				
	Tonnage (Mt)	Grade Cu (%)	Copper Contained (M lb)	Grade Ag (g/t)	Silver Contained (Moz)
1.20	15.1	1.28	426	19.0	9.2
1.00	70.6	1.13	1,758	16.0	36.3
0.90	**112.8**	**1.06**	**2,640**	**14.6**	**53.1**
0.80	157.8	1.00	3,484	13.3	67.6
0.60	202.4	0.94	4,191	12.0	78.2

Table 14.25: Parting Shale Constrained Mineral Resource Sensitivity—Inferred

Cut-off Grade (% Cu)	White Pine North Deposit—Indicated Resources				
	Tonnage (Mt)	Grade Cu (%)	Copper Contained (M lb)	Grade Ag (g/t)	Silver Contained (Moz)
1.20	0.6	1.21	17	7.7	0.2
1.00	59.9	1.07	1,417	9.1	17.5
0.90	**96.4**	**1.03**	**2,183**	**9.0**	**27.8**
0.80	157.6	0.96	3,323	9.6	48.8
0.60	257.2	0.87	4,921	10.2	84.4

Table 14.26: Full Column Constrained Mineral Resource Sensitivity—Indicated

Cut-off Grade (% Cu)	White Pine North Deposit—Indicated Resources				
	Tonnage (Mt)	Grade Cu (%)	Copper Contained (M lb)	Grade Ag (g/t)	Silver Contained (Moz)
1.20	0.6	1.23	18	12.1	0.3
1.00	23.6	1.06	553	11.2	8.5
0.90	**37.8**	**1.03**	**857**	**10.1**	**12.3**
0.80	40.1	1.02	900	10.1	13.0
0.60	40.1	1.02	900	10.1	13.0

14.11.4 Comparison with Previous Resource Estimate (2019)

Table 14.27 presents the comparison between the MRE 2019 with the MRE 2023 by Mineralization Columns and Table 14.28 compares the Combined Mineral Resources estimated for White Pine in 2019 and 2023. The main differences can be explained by a different mining technique assumption: no Full Column mining was assumed in the previous estimate, yielding more tonnage (higher column height) for the 2023 MRE.

Table 14.27: White Pine MRE 2019 compared to MRE 2023 with Lower Cut-off 0.9% Cu by Mineralization Column

White Pine		MRE 2019 (0.9% Cu Lower Cut-off)					MRE 2023 (0.9% Cu Lower Cut-off)				
Mineralization Columns	Resource Category	Tonnage (Mt)	Copper Grade (%)	Silver Grade (g/t)	Copper Contained (M lb)	Silver Contained (M oz)	Tonnage (Mt)	Copper Grade (%)	Silver Grade (g/t)	Copper Contained (M lb)	Silver Contained (M oz)
Full Column (3 m)	Measured	-	-	-	-	-	-	-	-	-	-
	Indicated	-	-	-	-	-	37.8	1.03	10.1	857	12.3
	M + I	**-**	**-**	**-**	**-**	**-**	**37.8**	**1.03**	**10.1**	**857**	**12.3**
	Inferred	-	-	-	-	-	-	-	-	-	-
Parting Shale (2 m)	Measured	-	-	-	-	-	-	-	-	-	-
	Indicated	133.4	1.07	14.9	3,154	63.8	112.8	1.06	14.6	2,640	53.1
	M + I	**133.4**	**1.07**	**14.9**	**3,154**	**63.8**	**112.8**	**1.06**	**14.6**	**2,640**	**53.1**
	Inferred	97.2	1.03	8.7	2,210	27.2	96.4	1.03	9.0	2,183	27.8

Table 14.28: Combined White Pine MRE 2019 compared to MRE 2023 with Lower Cut-off 0.9% Cu

White Pine		MRE 2019 (0.9% Cu Lower Cut-off)					MRE 2023 (0.9% Cu Lower Cut-off)				
Deposit	Resource Category	Tonnage (Mt)	Copper Grade (%)	Silver Grade (g/t)	Copper Contained (M lb)	Silver Contained (M oz)	Tonnage (Mt)	Copper Grade (%)	Silver Grade (g/t)	Copper Contained (M lb)	Silver Contained (M oz)
White Pine North	Measured	-	-	-	-	-	-	-	-	-	-
	Indicated	133.4	1.07	14.9	3,154	63.8	150.7	1.05	13.5	3,497	65.5
	M + I	**133.4**	**1.07**	**14.9**	**3,154**	**63.8**	**150.7**	**1.05**	**13.5**	**3,497**	**65.5**
	Inferred	97.2	1.03	8.7	2,210	27.2	96.4	1.03	9.0	2,183	27.8

15 MINERAL RESERVE ESTIMATES

This report is a Preliminary Economic Assessment (“PEA”), there is no Mineral Reserve Estimate stated on the White Pine North Project as per National Instrument NI 43-101 *Canadian Standards of Disclosure* for Mineral Projects regulations.

16 MINING METHOD

16.1 Introduction

This chapter of the report describes the parameters, procedures, and assumptions used to conduct the PEA-level mine planning work for White Pine North Project. This Preliminary Economic Assessment considers the north portion of the White Pine Mine, that operated from 1954 to 1995.

The mine plan includes potentially exploitable mineralized materials that are derived from the resources described in Section 14, which are conceptually minable using underground mining methods. Only the portion of the mineralized material that meets the parameters listed in this section is used for the economic analysis of the PEA.

The reader is cautioned that this PEA is preliminary in nature. The PEA includes Inferred Mineral Resources that are too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that the PEA will be realized.

The proposed mining method for the White Pine North Project is room-and-pillar given the relatively sub-horizontal mineralized zone. Based on the mineralized zone thickness, two (2) approaches were selected to carry out the development of the room and pillar: conventional drill and blast, and continuous miner. The drill and blast approach is used whenever the mineralized zone thickness is below 3.0 m, whereas the continuous miner will be used in the areas where the mineralized zone thickness is 3.0 m or greater. The mining method consists of the extraction of a series of entries and crosscuts in the mineralized zone, leaving pillars in place to support the back.

16.2 Geotechnical Criteria

16.2.1 <u>Historical Geotechnical Criteria</u>

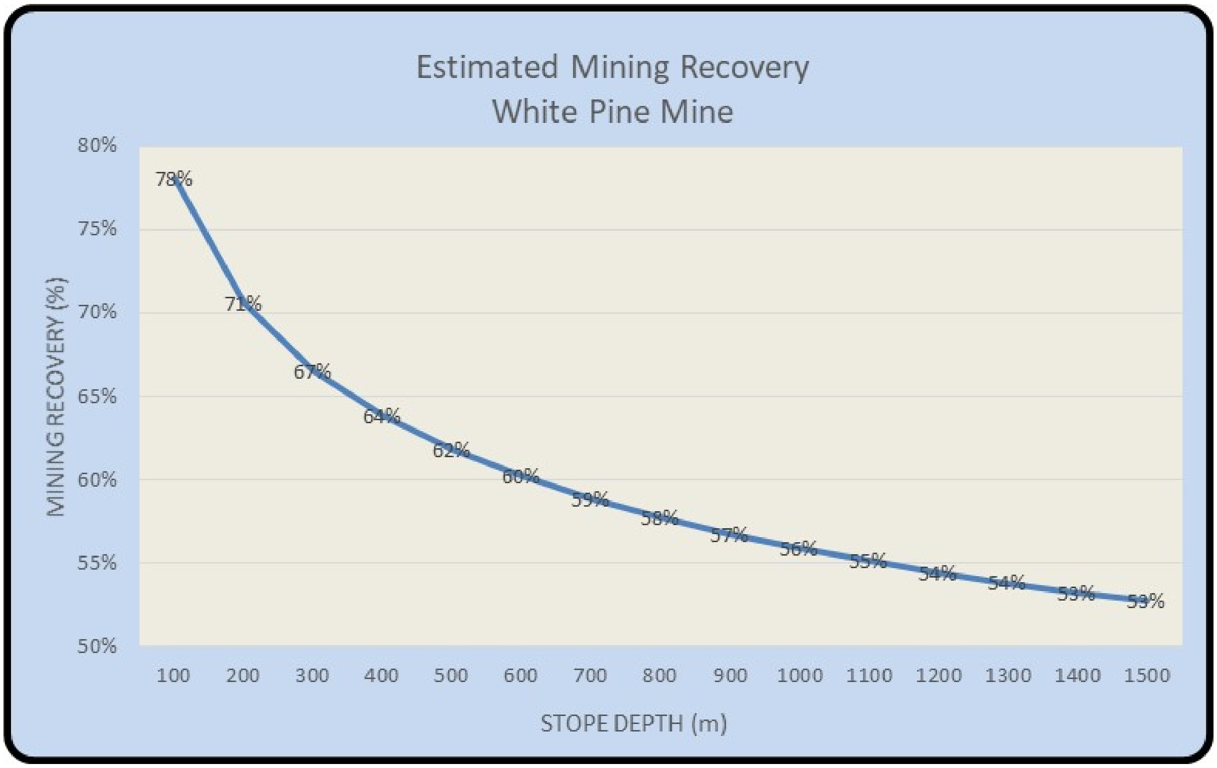
Geotechnical investigations have not been conducted on the White Pine North section of the deposit since the closure of the former White Pine Mine. The previous geotechnical work carried out during the operation of the old White Pine Mine was analyzed and used to produce this Preliminary Economic Assessment. A back analysis of the old White Pine was performed by Itasca at the beginning of the Project. The old White Pine Mine was in operation from 1955 to 1995 as a room and pillar operation. Conditions in the mine were reported as variable, depending on the proximity to major structures and the syncline axis. For the most part, back conditions were observed to be good where the back was formed in sandstone. In general, back stability issues were a problem in an area of faulting that was exacerbated by high horizontal stresses.

Hence the importance of considering the orientation of the stress fields for the future advancement of excavations. The back analysis determined that the rate of mineral recovery was as follows:

$$\text{Mining Recovery\%} = 1.5219 \times \text{depth (m)}^{-0.145}$$

Figure 16.1 depicts the historical mining recovery versus depth relationship in the White Pine Mine.

Figure 16.1: Mining Recovery vs. Stope Depth



As very little analysis has been done at this time, a 300 m pillar has been retained with the former White Pine Mine. Moving forward with the Project, the pillar size will have to be reviewed.

16.2.2 Hydrogeology

No hydrogeological studies have been completed at this study stage to assess groundwater conditions. GMS recommends that a hydrogeological consulting firm be contracted by WPC to study the water conditions at site and generate a plan for future engineering studies.

16.2.3 Ground Support

The proposed standard ground support for the development consists of 1.8 m long rock bolts on a 1.2 m x 1.2 m dice pattern with mesh in the back, and 1.5 m long split sets on a 1.2 m x 1.2 m dice pattern in the walls. Some 2.4 m rebar bolts must also be added at intersections.

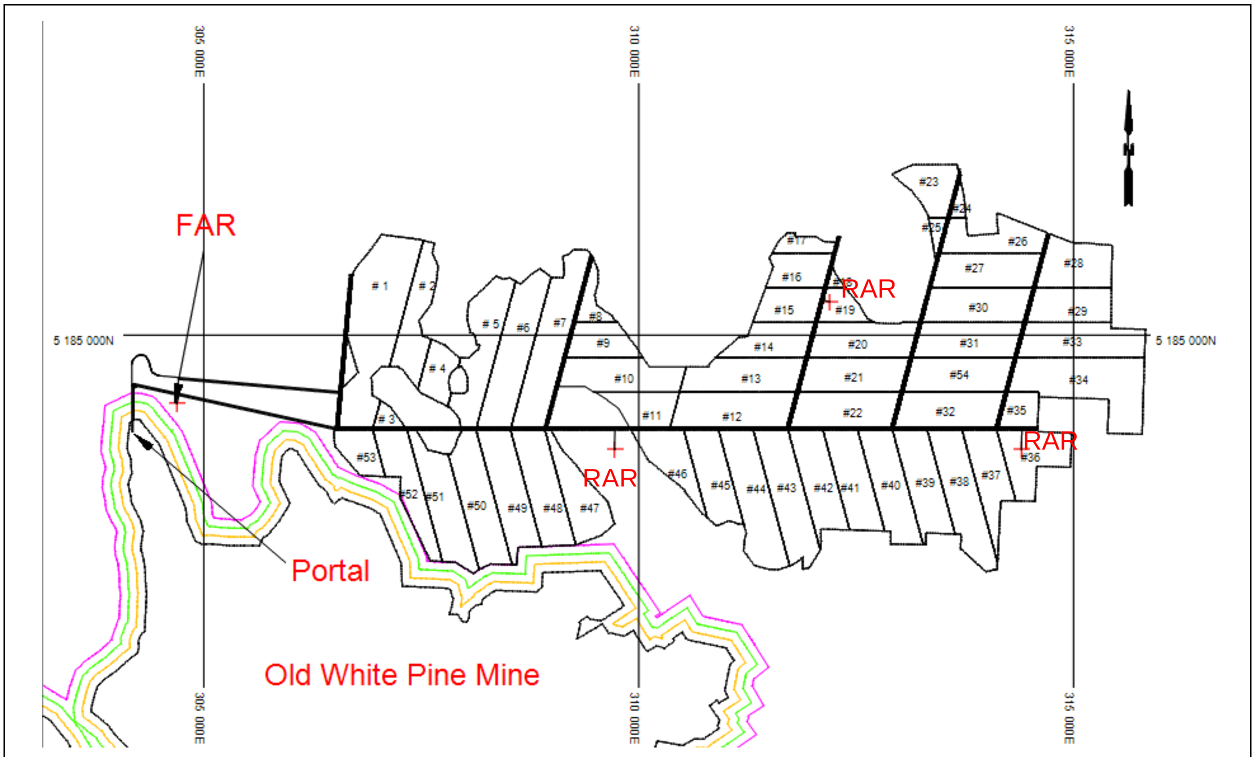
16.3 Mining Method

The proposed mining method for the White Pine North Project is room-and-pillar given the relatively sub-horizontal thin mineralized zone. The principle of this method is to dig horizontal drifts in the mineral layer, leaving intact mineralized material pillars to support the roof of the mine. These pillars are left in place to form a grid of pillars and chambers, hence the name of the method. The size of the pillars, or the mining recovery, is depicted by the above recovery formula.

The mineralized zone drifts can be aligned to form a network of underground passages, allowing miners, equipment, and materials to be transported inside the mine. The mining design was based on a mining rate of approximately 5.475 Mtpy. Two (2) approaches are planned for the extraction of the chambers. In the case of lower-height chambers (<3 m), the approach with low-profile drilling jumbos is recommended. In the case of chambers greater than 3 m, a continuous miner of the road header type is planned.

The rooms are mined with a single pass approach. For the most part, back conditions were observed to be good where the back was formed in sandstone. In general, back stability issues were a problem in an area of faulting that was exacerbated by high horizontal stresses. Hence the importance of considering the orientation of the stress fields for the future advancement of excavations. The mining direction will generally follow the dip of the mineralized zone; however, in some areas the dip is too steep to follow. In the areas where the dip is too steep, the mining will be performed at an angle to the dip direction. The mining direction will have to consider the direction of the field of stress; a wrong mining direction can cause unplanned dilution. Primarily, the mining direction is away from the old White Pine mine, pushing north and to the east. Figure 16.2 illustrates the Mine configuration.

Figure 16.2 : Mine Configuration



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The mining equipment for the project consists of low-profile two (2) boom electro-hydraulic jumbos used for drilling in areas under three (3) metres back height. For higher drifts and stopes, the mineralized material will be excavated using a continuous miner of the Road header type. One (1) boom low-profile electro-hydraulic bolter is considered for ground support installation. Low-profile, 10-tonne (6 m^3) capacity LHDs are planned for removing mineralized material mineralized material from the face and transporting broken mineralized material to a loading point.

At the loading point, a feeder breaker will reduce the size of larger particles of mineralized material, which will be placed on a conveyor belt and transported to surface at the surface, from which the mill will be fed. Main accesses and haulage of mineralized material from certain distant working areas are developed using 30 t underground mining trucks to transport the mineralized material to the feeder breaker or to the surface stockpile.

16.4 Mineralized Material Used for Scheduling

16.4.1 Net Smelter Return

The NSR (Net Smelter Return) represents the net revenue generated from the sale of the mineralized material to a smelter after deducting processing and transportation costs. To calculate the NSR, we begin by estimating the metal grade of the extracted mineralized material, which refers to the amount of metal contained in a unit of mineralized material. Using current market prices for metals, we determine the metal value contained in the mineralized material. Next, we subtract the costs associated with processing and transforming the mineralized material into pure metal, as well as the costs of transporting the mineralized material from the mining site to the processing facilities or buyers.

The NSR therefore represents the net income obtained by subtracting these costs from the revenue generated by the sale of the mineralized material. Table 16.1 shows the metal price assumption used to determine the NSR for different deposits.

Table 16.1: Metal Price Assumption

Metal	Units	Value
Copper	USD/lb	4,00
Silver	USD/oz	25,00

Table 16.2 below presents the metal recovery assumption used to determine the NSR of the different deposits.

Table 16.2: Metal Recovery Assumption

Metal	Units	Value
Cu Recovery	%	88,00
Ag Recovery	%	73,40

Table 16.3 below shows the different assumption on the copper concentrate parameters used to determine the NSR of the different deposits.

Table 16.3 Metal Recovery Assumption

Copper Concentrate	Units	Value
Cu Concentrate Grade	% Cu	30,5
Cu Payable	%	96,50
Ag Payable	%	90,00
Cu Conc. Moisture	%	9,00
Treatment Charges	$/dt	65,00
Cu Concentrate Transportation	$/wt	106,53
Cu Refining	USD/lb	0,065
Ag Refining	USD/oz	0,50

The NSR is integrated into the geological block model to determine the room and pillar mining areas.

16.4.2 Cut-off Grade Estimation

The cut-off grade ("CoG") is the concentration of minerals or metals in the mineralized material below which extraction and processing would not be profitable. It represents the point at which the costs of extraction, processing, and marketing would exceed the economic value of the extracted mineralized material. Table 16.4 and Table 16.5 show the parameters used the determine the CoG.

Table 16.4: Parameter Used for Cog Estimation

Input	Units		Value
Metal Prices	Copper	$/lb	4,00
Metal Prices	Silver	$/oz	25,00
Mining	Mining dilution	%	8,0%
Mining	Silver content	g/t	5
Process Recovery	Copper	%	88,0
Process Recovery	Silver	%	73,4
Concentrate	Cu Grade	%	31,5
Concentrate	Concentration Ratio		41.9
Concentrate	Moisture	%	9,0

Input	Units		Value
Concentrate	Ag grade	g/t	142.25
Payable Rates	Cu	%	96,5
Payable Rates	Ag	%	90,0
Minimum Deductions	Cu	%	1,00
Minimum Deductions	Ag	%	90,00
Refining Rates	Cu	$/lb	0,065
Refining Rates	Ag	$/oz	0,50
Treatment Charges	Cu concentrate	$/t conc	65
Transportation Costs	Cu concentrate	$/t conc	110

Table 16.5: Cost Parameter Used for CoG Estimation

First Estimate Cost	Value
Processing	**10,00**
G&A	**6,00**
Tailings	**3,00**
UG Mining Cost	**25,00**
Royalty	**5**
Sustaining	**10,00**
Total	**59.00**

The calculated cut-off grade with the previous parameters is 0.92%. However, for stope design purposes, the cut-off grade was rounded to 0.95%.

16.4.3 Potentially Extractable Mineralized Material Used for Scheduling

The potentially extractable mineralized material portion of the Mineral Resource comprises 115 Mt at a copper grade of 0.96% Cu and 11.27 g/t Ag and containing 2,46 billion pounds of copper and 41.7 M troy oz Ag. The potentially extractable mineralized material used for scheduling utilized in this PEA contain both Indicated and Inferred Mineral Resources. The reader is cautioned that Inferred Mineral Resources are considered too speculative geologically to have economic considerations applied. Table 16.6 below outlines the tonnes and grades used in the mine plan.

Table 16.6: Potentially Extractable Mineralized Material Estimate

Description	Tonnage (kt)	Cu grade (%)	Ag grade (g/t)	Cu Content (M lb)	Ag Content (M tr.oz)
Development	5,840	0.71	6.92	92	1,3
Measured	109,267	0.98	11.51	2,371	40,42
Total	115,107	0.96	11.27	2,463	41,72

Note: Figures have been rounded and totals may be affected by small rounding errors. to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that value from such Mineral Resources will be realized either in whole or in part.

16.5 Mine Design

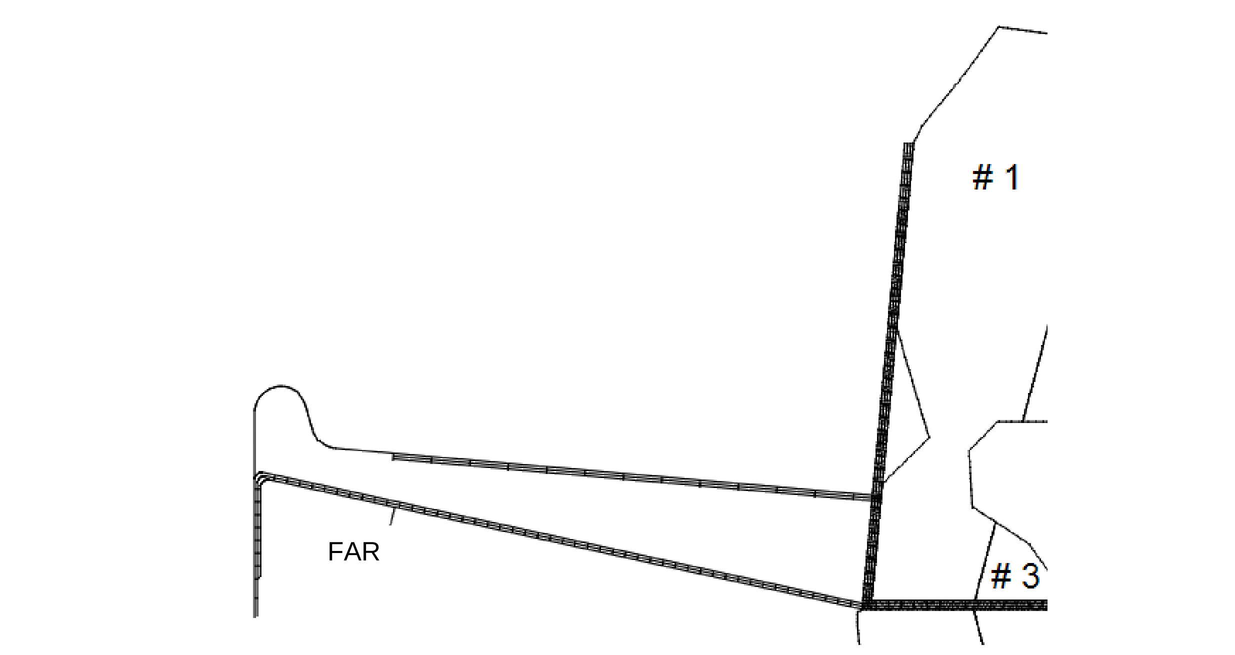
16.5.1 Development Design

The mine will be accessed via an open box-cut portal and declines (drifted at 15%). Only two drifts are excavated from the portal for the first 150 m of development. Four drifts are subsequently excavated down to the fresh air ventilation raise located at a depth of 80 m BSL. From the ventilation raise to the beginning of the West section of the mine, six drifts will be excavated to allow a high ventilation flow rate. The six drifts are excavated simultaneously but are not parallel. Three drifts are excavated to reach panel #1 (crossing its secondary conveying system) and three drifts are excavated to directly reach the main conveying system (Figure 16.3).

The mine access drifts will be excavated in waste from the box-cut to the western section of the mine; this waste will be transported to the surface. Once the development reaches the West section, all the waste rock will be stored underground excavations.

The major vertical development from the surface such as ventilation raises or safety egresses and will be performed by a contractor's raise boring crew. It was assumed that a raise boring crew can drive the raise at an advance rate of 2 m/d.

Figure 16.3: Decline Configuration



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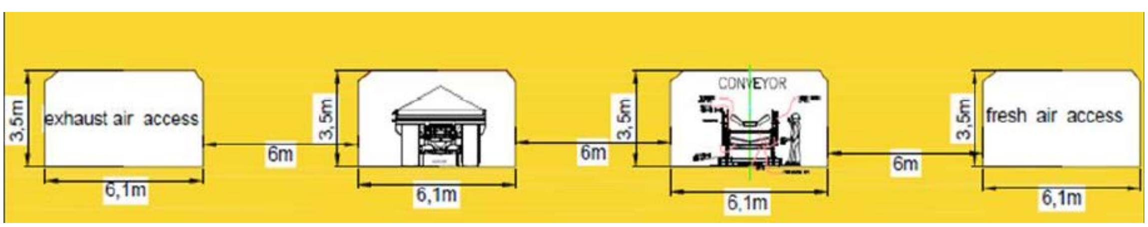
The mine consists of three mining sectors: West, Central and East. There is the main conveying system, and also strategically placed secondary conveying systems that are parallel to the panels. Each system is composed of four parallel drifts including: a fresh air intake drift, a mineralized material conveyor drift, a hauling drift, and a return air drift. Figure 16.4 shows the typical development drift configuration.

Figure 16.4: Drifts Configuration



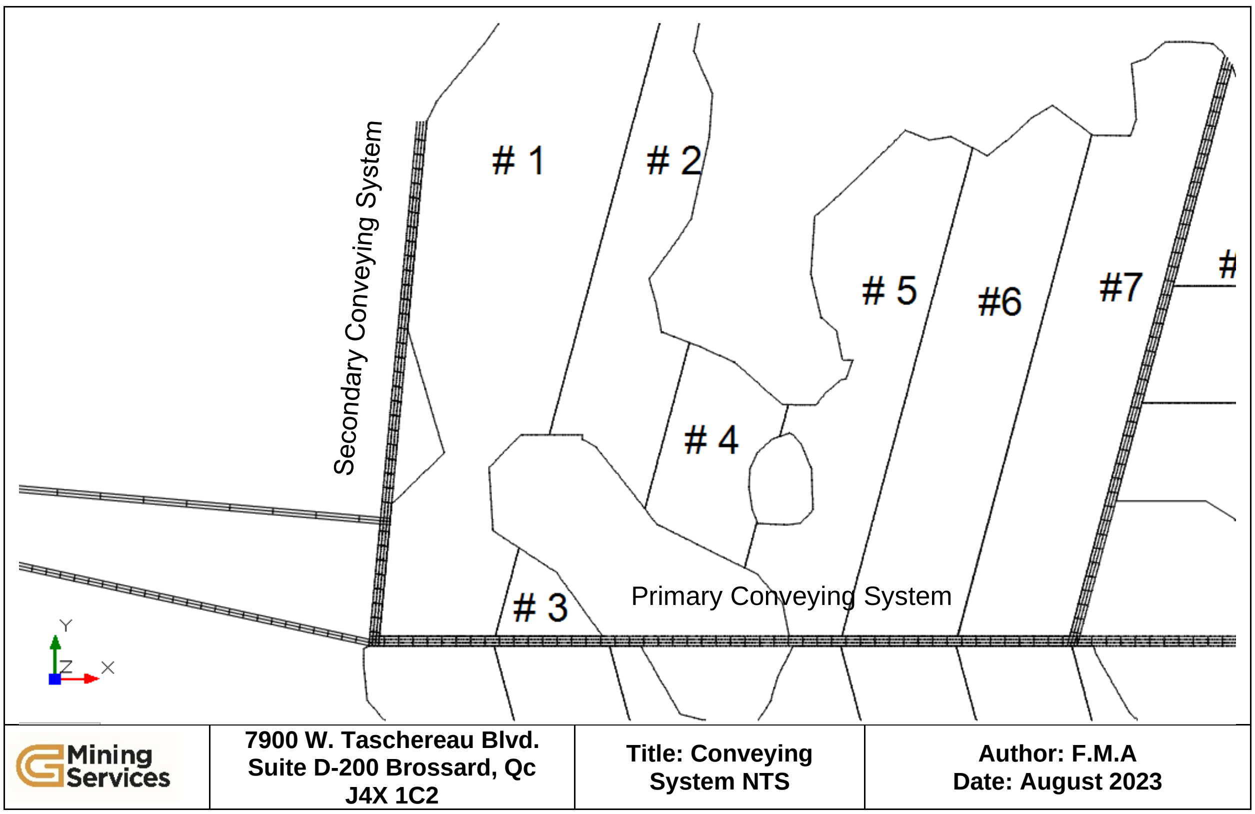
Mining Services	**7900 W. Taschereau Blvd. Suite D-200 Brossard, Qc J4X 1C2**	**Title: Drifts Configuration**	**Author: F.M.A Date: August 2023**

All drifts are set at a 6.1 m width, and their height varies from a minimum of 3.5 m to a maximum of 6.1 m. Most of the development will be performed by continuous miners. Continuous miners require a minimum opening of 3.5 m and can mine up to 5.8 m. Anything higher than 5.8 m would be mined with jumbos.

The main entrance drift back will follow the Full Column geology to allow a better height and mineralized material recovery. The floor, however, will be flat for equipment purposes. The height in the intersections of the two conveyor drifts is set to a minimum of 6 m to allow the installation of a transfer point between the two conveyors. If a drift intersects a conveyor drift, the height of this section of the conveyor drift will also be 6 m to allow for the installation of a steel overpass system. A series of barrier pillars between the main access drift and the stope will remain in place until mining has ended in this mining area. These barrier pillars are designed to be recovered at the end of the mine.

In Figure 16.5, a close focus on the West sector is presented, showcasing the conveying system.

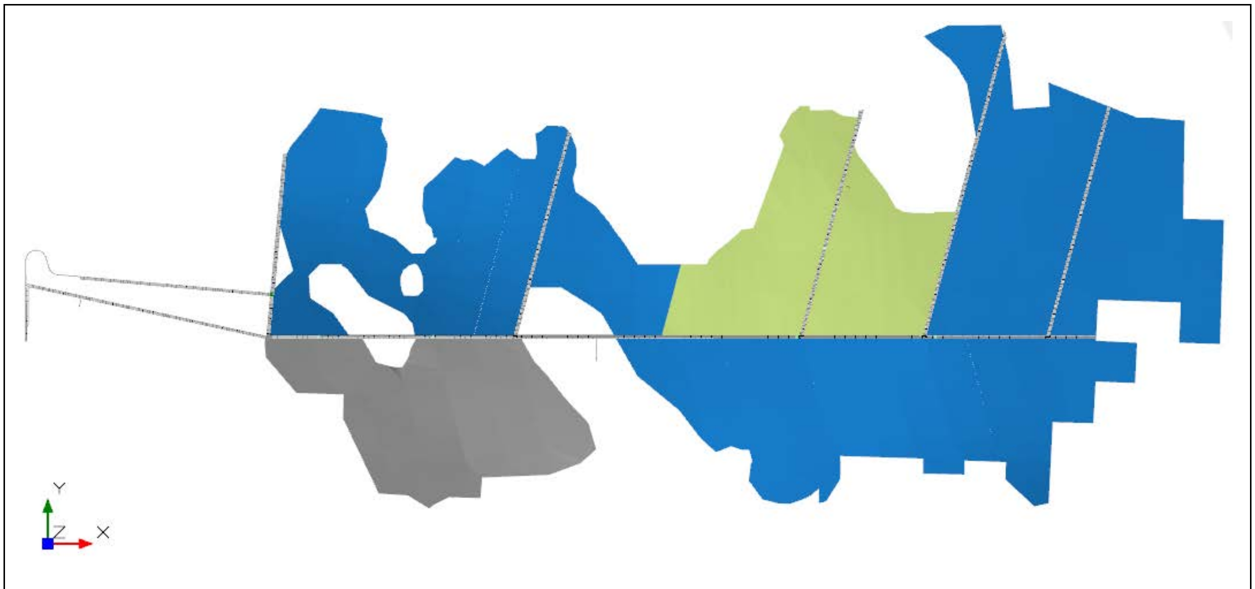
Figure 16.5: Conveying System



16.5.2 Panel Design

As previously mentioned, there is a total of 54 panels, where 18 panels will be mined with continuous miners and 36 with jumbos. Opting if a panel should either be mined with a continuous miner or a jumbo is primarily based on the profitability ratio, that is the profit over the tonnage rendered. Figure 16.6 showcases the panels that are mined with continuous miners (green and grey) and jumbos (blue).

Figure 16.6: Continuous Miners vs Jumbos Panels



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In Table 16.7, the mine design meters summary is showcased.

Table 16.7: Mine Design Summary

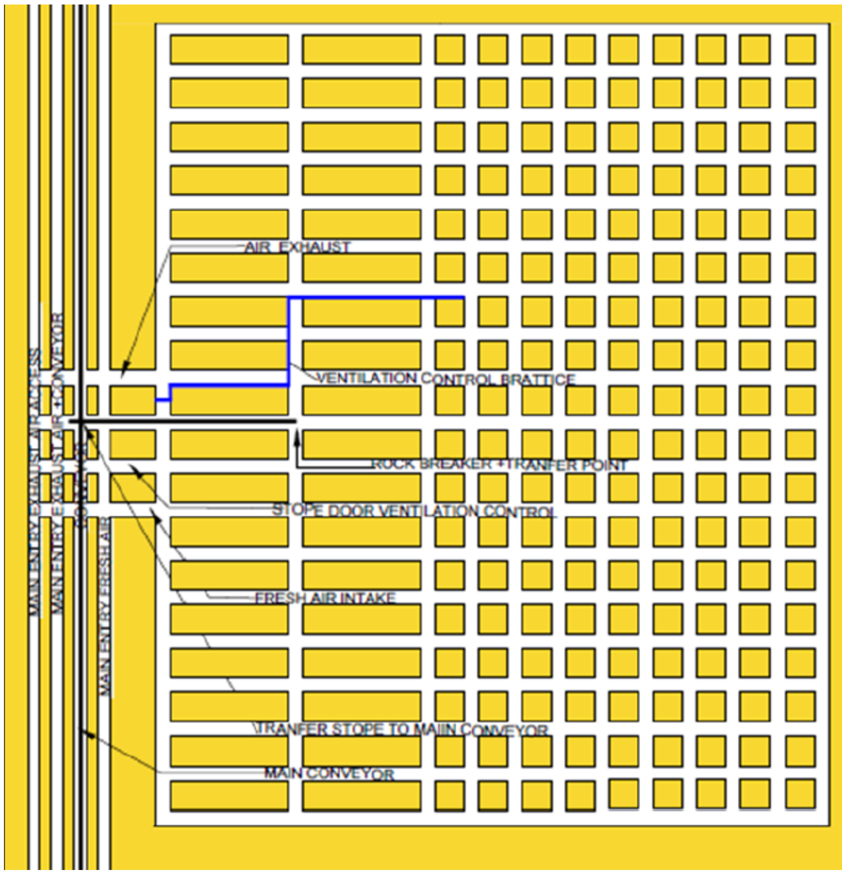
Development Type	Meters (m)
Connection Drifts	14,375
Conveyor Drift	20,987
Haulage Drifts	45,537
Ventilation Access	522
Ventilation Drifts	295

16.5.3 Stoping

The first stope entry drift will be used for fresh air intake, the second one for hauling and traveling, the third, for the stope conveyor and return air. Between the stopes and the main access, a barrier pillar is kept for protecting the main access. From the stope accesses, the panel operation begins with the drilling and blast method or the continuous miner excavation.

To achieve and maintain an adequate level of production of 5.475 Mtpy of mineralized material, multiple mineralized zones should be mined simultaneously. Up to 21 mining panel should be mined at the same time, with jumbos and continuous miners. For jumbo panels, the mining cycle includes drilling, blasting, mineralized material mucking, mineralized material transportation to a feeder breaker and the stope conveyor, scaling and finally ground support. For continuous miners' panels, the mining cycle includes face mining, mineralized material transportation to a feeder breaker and the stope conveyor and finally ground support. The mining of the room will be done with a one pass approach. Figure 16.7 shows the general layout of a room and pillar operation.

Figure 16.7: Room and Pillar Mining



Mining Services	**7900 W. Taschereau Blvd. Suite D-200 Brossard, Qc J4X 1C2**	**Title: Room and pillar mining NTS**	**Author: F.M.A Date: August 2023**

In conventional room-and-pillar mining method, the mining cycle begins with the drilling of the working face. To perform face drilling, a low-profile jumbo with two (2) booms is planned. The drilling technique will use a burn cut to allow drilling a length of 4.25 m with an effective break length of 4.0 m. The drilling diameter is 51 mm; however, this dimension can be adjusted according to blasting results. The drilling penetration rate is evaluated at 1.85 m/min and the average drilling time per round is evaluated at 3.3 h/round.

Blasting crews will load the rounds with explosives and initiate blasts at the end of each shift. Explosives will consist of a mixture of ANFO and emulsion. Emulsion with be used when there is excessive presence of water. A period of two (2) hours is planned between shifts to vent blasting fumes from the mine. The main access and ventilation raises will be monitored with gas detectors.

The third mining activity is to muck the blasted mineralized material from the face and to transport it with a low-profile 10t LHD. To reduce the haulage distance, the unloading point (feeder breakers) will be moved regularly to be normally less than 250 m from the working face.

The final step in the mining cycle of jumbo mining panels, is to scale the back and wall of the excavation and to bolt. To proceed, a smaller low-profile LHD equipped with a scaling arm is used. The LHD's arm repeatedly rubs the roof and wall of the drift to remove the loose rock. This scaling method was used at the old White Pine Mine. After scaling, a low-profile rock bolter is used to install the roof and wall support. Where the roof is too low, connectable bolts should be considered.

In the continuous miner panels, the cycle begins with the cutting of a 3 m-wide section of the mineralized material (room). The continuous miner loads the broken material onto either trucks or LHD’s, which hauls the mineralized material from the panel to the feeder breaker. After all the broken material produced from the cut section is mucked out, the continuous miner operator backs out of the partially formed room and the rock bolting process starts. The continuous miners would move to a parallel section and begin the cutting of an additional 3 m section to produce a wider and final room advance.

16.6 Ore Handling System

The ore handling system comprises of feeder breakers and conveyors. If the mineralized material is from a jumbo panel, a system of load and haul to the nearest feeder breaker is planned. Feeder breakers are mobile and will be placed along the stoping progression. If the mineralized material is from a continuous miner panel, the mineralized material will be directly loaded onto trucks, that will haul the mineralized material to the nearest feeder breaker.

After the feeder breaker size reduction, the mineralized material will be transferred onto stope conveyors. The 42 in wide belt stope conveyor, is comprised of a 500 HP motor that can be extended depending on the progress of the stope. It is currently planned to advance these conveyors every 250 m concurrently to the progression of the stope. The broken mineralized material is then transferred to the principal conveyor located in the main drift conveyor.

16.7 Development Schedule

Development will be divided into two periods: a pre-production development period (from the beginning to Q2 2029) and a production period (from 2029 to the end).

It was assumed that pre-production and production drift development will be excavated by the Owner's mining department. The owner approach is preferred to reduce development costs, mining contractors typically do not have low profile equipment.

Once the portal is built, development of the two main access drifts from the portal will be at 5.7 m/d. Once the main access drift divides into four drifts, production will increase to a maximum of 25 m/d for the first two years of the mine life. Development will continue at a reduced pace once production begins (23 m/d). All the main decline are composed of waste. If any mineralized material pods are hit along the way, they should be stored at the surface. It was estimated that all pre-production development will be completed in 2029.

16.8 Production Schedule

The production schedule is based on mining a fixed target of 5.475 Mtpy. To achieve this annual production, up to 21 production panels must be in production simultaneously. The number of required panels depends on the tonnage from the development, as well as the height of the rooms of each panel. Stope production can begin once the emergency egress is completed, that is, the decline ventilation drift.

In 2027, the first panel will begin to reach a production rate of 2,450 t/d. The production period will start in 2029, reaching a production rate of 12,700 tpd. A ramp up of four years is expected to get to the final 15,000 tpd underground production. Figure 16.8 shows the production profile of the different mining zone.

Figure 16.8: Production Schedule

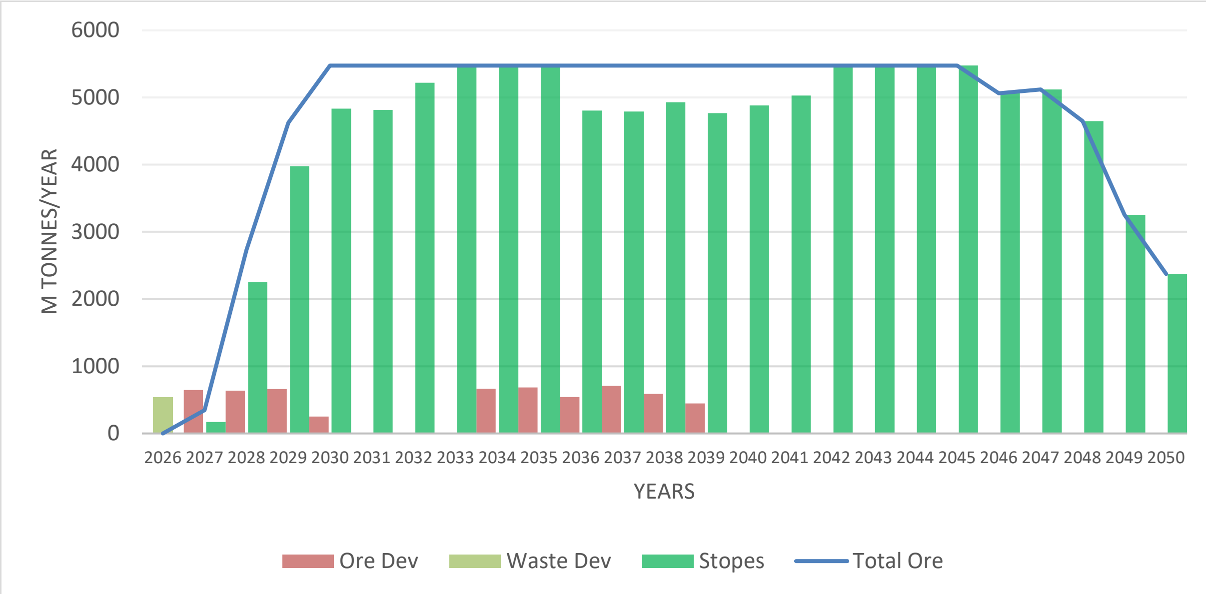


Table 16.8 presents the LOM of the mine.

Table 16.8: Mine Production Plan

Units	Total	Y 2026	Y 2027	Y 2028	Y 2029	Y 2030	Y 2031	Y 2032	Y 2033	Y 2034	Y 2035	Y 2036	Y 2037	Y 2038	Y 2039	Y 2040
Tonnes	115,107,279.6	-	820,294	2,889,416	4,638,896	5,090,572	4,813,601	5,220,762	5,475,000	6,142,193	6,158,308	5,349,836	5,497,721	5,522,943	5,213,850	4,883,116
Cu%	0.96		0.20	0.73	0.81	0.92	0.97	0.99	0.99	0.89	1.00	1.00	0.98	0.99	0.91	0.98
Ag (g/t)	11.23		3.03	10.12	10.98	12.39	12.82	13.21	13.20	11.74	12.61	13.41	13.48	12.68	11.89	11.82

Units	Y 2041	Y 2042	Y 2043	Y 2044	Y 2045	Y 2046	Y 2047	Y 2048	Y 2049	Y 2050
Tonnes	4,883,116	5,028,548	5,474,618	5,475,000	5 474 562	5 475 000	5,062,551	5,120,343	4,650,768	3,254,372
Cu%	0.98	0.99	0.98	0.98	0.98	0.99	0.98	0.98	0.99	0.99
Ag (g/t)	10.97	9.75	9.28	9.59	9.38	9.40	9.36	9.50	9.99	9.57

16.9 Manpower and Working Schedule

Labor levels are estimated based on the production schedule and equipment requirements to reach a production level of 5.475 Mtpy. To achieve the level of productivities used in this study, the workforce must be a mix of skilled labor with an experienced management team.

The mine work schedule is based on working two shifts per day, seven days per week, 360 days per year. A rotation schedule of 7 days in and 7 days out has been selected for mine operation requirements, with rotation days and nights. Several mine services will however be on a 5-2 schedule of 5 or 7 days in and 7 days out on day shifts only. No allowance has been made for absenteeism, sickness, snow days, or dumped shifts. Holidays and vacation expenses are covered in the fringe benefit allowance.

Table 16.9 Underground Mine Labour

Description	Rotation	Worked Hours/year	Maximum
Mine Supervision			
Mine Manager	5 On/2 Off	2,080	1
Mine Ops. Superintendent	5 On/2 Off	2,080	1
Mine Secretary	5 On/2 Off	2,080	1
Mine Ops. Foreman	7 On/7 Off	2,180	3
Mine Ops. Foreman	7 On/7 Off	2,180	16
Mine Ops. Trainer	5 On/2 Off	2,080	2
Mine Operation			
Jumbo Operator	7 On/7 Off	2180	36
Continuous Miner Operator	7 On/7 Off 0	2180	20
Blaster	7 On/7 Off	2180	36
Bolter Operator	7 On/7 Off	2180	64
LHD Operator	7 On/7 Off	2180	56
Truck Operator	7 On/7 Off	2180	20
Mine Services			
Grader Operator	7 On/7 Off	2180	1
Feeder Breaker Operator	7 On/7 Off	2180	8
U/G Constructions Maintenance	7 On/7 Off	2180	16
Material Handling	7 On/7 Off	2180	8
Ventilation Crew	7 On/7 Off	2180	8

Description	Rotation	Worked Hours/year	Maximum
Conveyor Service Man	7 On/7 Off	2180	12
Labour - Lunch Room, Tool Crib, etc.	7 On/7 Off	2180	4
Lamps-Dry	7 On/7 Off	2180	4
Drill Bits Sharpener, Tool Crib, etc.	7 On/7 Off	2180	2
Technical Services			
Chief Mine Engineer	5 On/2 Off	2080	1
Long-Term Planning Engineer	5 On/2 Off	2080	1
Short-Term Planning Engineer	5 On/2 Off	2080	2
Project Engineer	5 On/2 Off	2080	1
Senior Geotechnical Engineer	5 On/2 Off	2080	1
Mine Technician	5 On/2 Off	2080	8
Geotech. Technician	5 On/2 Off	2080	2
Senior Surveyor	5 On/2 Off	2080	1
Surveyor	7 On/7 Off	2080	6
Chief Geologist	5 On/2 Off	2080	1
Senior Geologist	5 On/2 Off	2080	2
Geologist	5 On/2 Off	2080	4
Geology Technician	7 On/7 Off	2180	8
Mechanical Services			
Mine Maint. Superintendent	5 On/2 Off	2080	1
Mine Maint. Foreman	7 On/7 Off	2180	1
Mine Maint. Foreman	7 On/7 Off	2180	4
Mine Maint. Planner	5 On/5 Off	2080	2
Mechanical Engineer	5 On/2 Off	2080	2
Mechanic	7 On/7 Off	2180	50
Mechanics - Fixed Equipment	0	2180	6
Maint. Helper	7 On/7 Off	2180	2
Electrical Services			
Mine Maint. Superintendent	5 On/2 Off	2080	1
Mine Maint. Foreman	7 On/7 Off	2180	1

Description	Rotation	Worked Hours/year	Maximum
Mine Maint. Foreman	7 On/7 Off	2180	4
Electrical Engineer	5 On/2 Off	2080	1
Electrician	7 On/7 Off	2180	15
Electronicians	7 On/7 Off	2180	15

16.10 Mine Equipment

The requirements for underground equipment were determined based on the number of operating hours needed to achieve the projected production and development. Table 16.10 shows the equipment requirements to support the planned 15,000 tpd nominal production rate.

Table 16.10 Mobile Equipment Fleet

Mobile Equipment	Maximum
Low-Profile 2 Booms Jumbo Drill	10
Continuous Miners (Road Header Type)	5
Low Profile 1 Boom Electric-Hydraulic Bolter	19
Low Profile LHD 10 Mt	18
Low Profile LHD 8 Mt	5
Explosive Trucks	4
Scaler	6
Development Truck	4
Lube Trucks	2
Flat Bed Trucks	3
Scissor Lift	8
Grader	1
Tractor - Underground	40
ATV - Underground	28
Ore Handling System	
Loading Point + Feeder Breakers	2
Main Conveyor going to Surface (2,950m) – 500 HP	6x500 m conveyors
Main Conveyor (8,100 m) – 500 HP	17x500 m conveyors

Mobile Equipment	Maximum
Stope Conveyor (11,653 m) – 500 HP	24x500 m conveyors
Dewatering	
Electric-Sumps-Pumps	4
Orca Series Station	2
Ventilation	**Total**
Production Panel Auxiliary Fan	5
15 MBTU Pre-Production Propane-Heater	1
Preproduction Fan	1
Main Ventilation Fan	1
Main Ventilation Propane-Heater	1
Other	
Shotcrete Machine	3
Communication System	1

16.11 Underground Mine Services

16.11.1 Mine Ventilation and Heating

During the pre-production period, air requirements will be supplied through two 300 HP 1.4 m diameter parallel van axial fans at surface. The two fans will be installed on a metallic stand and connected with a vent tube directed to the portal. These two fans will be used until the main fan intake is commissioned. The fresh air will circulate in two of the main drifts, and the exhaust air will be returned to the surface in the two other drifts.

The ventilation system will consist of a push system whereby two 1250HP parallel main fans will be installed at surface. The two main fans will be installed and provide heated air through a 5m ventilation raise and air will be distributed throughout the mine using ventilation regulators, auxiliary fans, doors and bulkheads. The ventilation system includes three, 5m diameter, exhaust ventilation raises distributed in the operating mine. An emergency egress is to be installed in the fresh air raise.

Table 16.11 illustrates the typical ventilation fresh air requirements per equipment used for the project. Preliminary Ventsim designs for maximum productivity have been created. A 125 cfm/hp factor was used to estimate ventilation requirements if the equipment was not MSHA approved.

Table 16.11: Fresh Air Requirements per Equipment

Equipment	Engine	Engine HP	CFM/EQUIP	Utilization (%)
Jumbo	Deutz BF4M2012 (Tier 2)	99	6,500	0.50
Bolter	Deutz BF4M2012 (Tier 2)	99	6,500	0.50
Scooptram 8 t	Deutz BF6M2012C	188	9,000	0.85
Scooptram 10 t	Mercedes-Benz OM906LA	228	21,604	0.85
Development truck	Volvo TAD1342VE (Tier 2)	415	18,500	0.85
Explosives truck	Cummins QSB4.5	147	7,000	0.75
Scaler	Cummins QSB4.5 Tier 4	165	7,000	0.50
Grader	Perkins/Diesel Engine 1104D-E44TA	130	12,327	0.75
Flat Bed Trucks	Cummins QSB4.5	147	7,000	0.75
Lube Trucks	Cummins QSB4.5	147	7,000	0.75
Personnel Carrier	Cummins QSB4.5	147	7,000	0.65
Scissor Lift	Cummins QSB4.5	149	7,000	0.75
ATV - Mine Supervision	D902-E4-UV	22	1,500	0.75
Tractor Development	V2403-M-T, Tier 4i	60	4,000	0.75
TRACTOR Stoping Team	V2403-M-T, Tier 4i	60	4,000	0.75
Tractor Blaster	V2403-M-T, Tier 4i	60	4,000	0.75
Tractor Ventilation Crew	V2403-M-T, Tier 4i	60	4,000	0.75
Constructions Maintenance	Cummins QSB4.5	-	7,000	0.75
Tractor - Surveyors	V2403-M-T, Tier 4i	60	4,000	0.75
Tractor - Mechanics	V2403-M-T, Tier 4i	60	4,000	0.75
Tractor - Electricians	V2403-M-T, Tier 4i	60	4,000	0.75
ATV - Geologists	V2403-M-T, Tier 4i	60	7,000	0.75
ATV- Engineers	V2403-M-T, Tier 4i	60	4,000	0.75
Shotcrete Machine	Manual	-	4,000	0.75
Feeder Breakers	Electric	-	25,000	0.75
Continuous Miner	Electric	-	25,000	0.75

16.11.2 Dewatering

Water in the mine will emanate from the underground water inflow and mining operations (total of 1,877 USGPM). The overall water outflow is coming from process water consumption, based on the equipment list, and the percolating water flow, based on estimates.

The dewatering system will pump commonly called ''dirty water''. This water will be cleaned and sent to sedimentation ponds at the surface preventing mining operations from cleaning sumps underground. Pumping stations have been designed to operate 50% of the time, allowing at least double the maximum required capacity. The White Pine North dewatering system consists of six permanent pumping stations (Figure 16.9). The main pumping station is P1, pumping all underground water towards the surface.

Figure 16.9: White Pine Pumping Diagram

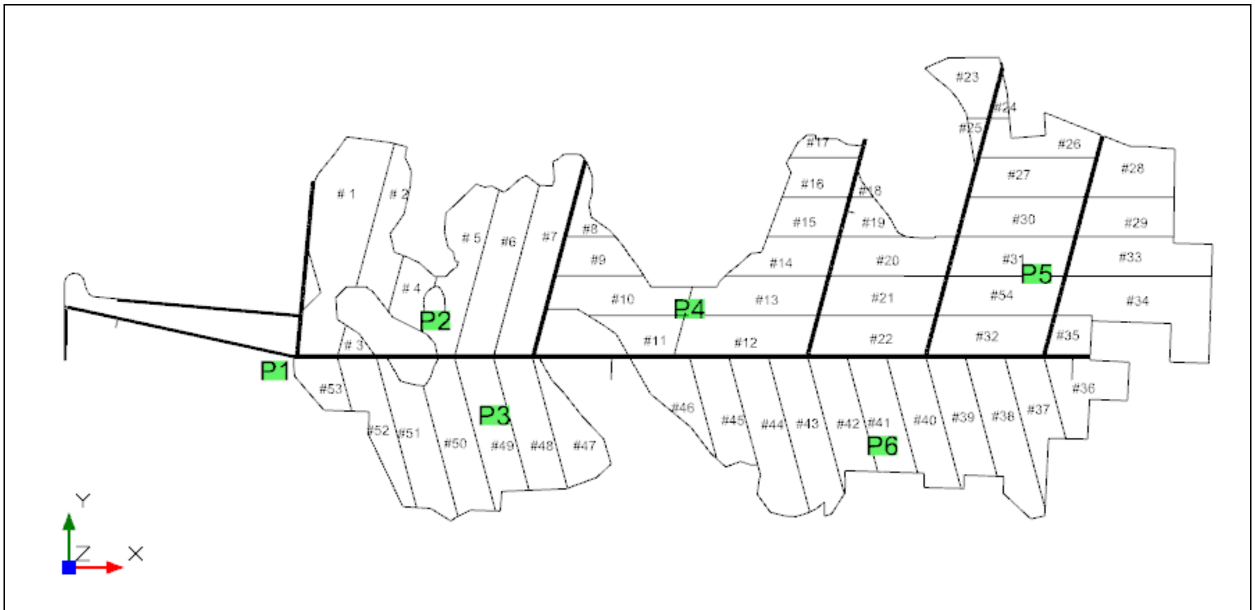


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Table 16.12 shows the dewatering quantities from mine operations and ground infiltration.

Table 16.13 shows the dewatering pumping capacity required.

Table 16.12: Dewatering Quantities

Water Operation	Units	Quantity
Mine Operation	USGPM	343
Natural Ground Water	USGPM	1534
Total Dewatering	USGPM	1877

Table 16.13: Dewatering Pump Capacity

Pump Capacity		
Pipe Length	(m)	2,782
Dewatering Flow Capacity	(USGPM)	469
Vertical Head	(m)	400
Pump Efficiency	(%)	75%
Pump Power	**(hp)**	**315**

Four pumps at station P1 are required to pump out all the water on daily basis.

16.11.3 Compressed Air

Compressed air supply will be provided by electric compressors installed temporarily for the pre-production period. For the production period compressed air supply will be provided by 1,200 cfm electric compressors. The compressed air piping network will be installed along the main access consisting of an 8 in diameter steel pipe. A smaller 4 in line will be installed in the production panel in the main room. Compressed air will provide power to a small pump for dewatering development work. Handheld drills will also provide an emergency supply of air to the refuge station.

16.11.4 Communications

An underground network with leaky feeder radio communication system will be installed on site and will be expanded over the LOM. Mobile equipment operators, light vehicles, and supervisors will be equipped with handheld radios to communicate with personnel on surface.

16.11.5 Fuel Storage and Distribution

Fuel will be stored on surface. There will be no distribution system of fuel in the underground mine. A fuel truck is planned as part of the fleet to distribute the fuel to underground equipment that cannot travel quickly to the surface for refuelling.

16.11.6 Explosives Storage and Handling

During pre-production and at the start of production, the explosives will be stored at surface in permanent magazines. The accessories (detonators) will be stored in a separate magazine at surface. Once panel rooms become available, an underground explosive and detonator magazine will be prepared. The Study provides for two underground explosives storages. One at the West sector of the mine and the other at the East. Explosives will be transported from the surface magazine to the underground magazine by flat bed service trucks. ANFO will be used as the major explosive for the mine development and production. Packaged emulsion will be used as a primer, lifter holes and pre-split blasting.

16.11.7 Personnel and Underground Material Transportation

Supplies and personnel will access the underground via the main access drift. A series of personnel carriers such as access land cruisers will be used to transport workers in the underground mine from surface. Supervisors, engineers, geologists will use diesel-powered all-terrain land cruisers vehicles for transportation underground. Mechanical and electrical personnel will use maintenance tractors. The construction team will use the same type of tractor.

A flat bed with a service boom will be used to move supplies from the surface to the underground active heading / stope.

16.11.8 Equipment Maintenance

All major mechanical maintenance will be performed on surface at the workshop. Only minor maintenance and emergency work will be performed underground by mobile maintenance crews. The existing surface workshop has sufficient warehouse storage for operational requirements.

16.12 Safety Measures

16.12.1 Industrial Hygiene

All employees will perform a health test: audiogram, breath, etc.; to allow the Company to follow their conditions during their tenure at the mine and apply adequate accident prevention programs.

16.12.2 Emergency Exits

Emergency underground exits will consist of the portal ramp and fresh air ventilation raises. The underground alarm system will have a radio alert signal to all the workforce simultaneously when Mercaptan stench gas is introduced in the ventilation system to alert employees they need to reach for safety. Pursuant to Regulation 57.4363, underground workers need to be retrained every 12 months on emergency exit underground requirements. Pursuant to Regulation 57,4361, mine evacuation drills shall be held every six months for each shift. All exercises and instruction records will be kept at least one year.

16.12.3 Refuge Stations

Refuge stations will be positioned in a way that an employee will need 30 minutes or less to access the refuge from the moment they leave the workplace. Engineered mobile refuge stations will be used when a fix refuge cannot be reached in the 30 minutes delay.

Each refuge station will be equipped with the following:

- Telephone or radio to surface, independent of mine power supply.
- Compressed air, water lines and water supply.
- Emergency lighting.
- Hand tools and sealing material.
- Plan of the underground work showing all exits and the ventilation plans.

16.12.4 Fire Protection

Underground mobile vehicles and conveyor belts will be equipped with automatic fire suppression systems in accordance with regulations.

Fire extinguishers will be provided and maintained in accordance with regulations and best practices at the electrical installations, pump stations, service garages and wherever a fire hazard exists. Every vehicle will carry at least one fire extinguisher of adequate size and proper type.

16.12.5 Mine Rescue

Fully trained and equipped mine rescue teams will be established in accordance with MSHA regulations. Mine rescue equipment and a foam generator will be located on site.

Rescue teams will be trained for surface and underground emergencies. An Emergency Response Plan will be developed and will be kept up to date as the mine evolves.

16.12.6 Emergency Stench System

A mine stench gas warning system will be installed in all main surface ventilation system (temporary and permanent system). Another mine stench gas warning system will be installed at the mine compressed air system as a second mean to alert underground workers in the event of an emergency.

16.12.7 Dust Control

Broken mineralized material will be wet down after blasting and mucking. Continuous miners have a sprayer system, but jumbo faces will have to be manually sprayed.

17 RECOVERY METHODS

17.1 Process Design

The process plant design for the White Pine Project ("The Project") is based on a simplified metallurgical flowsheet designed to produce copper concentrate. The flowsheet is based on well proven unit operations in the industry, as well as in the White Pine Column Cell Conversion memorandum from Ronald M. Woody, White Pine Mill Superintendent dated 1991.

The key criteria for equipment selection are suitability for duty, reliability and ease of maintenance. The plant layout provides ease of access to all equipment for operating and maintenance requirements whilst maintaining a layout that will facilitate construction progress in multiple areas concurrently.

The key project design criteria for the plant are:

- Nominal throughput of 15,000 tonnes per day ("tpd")
- Process plant availability of 92% through the use of standby equipment in critical areas and reliable power supply.

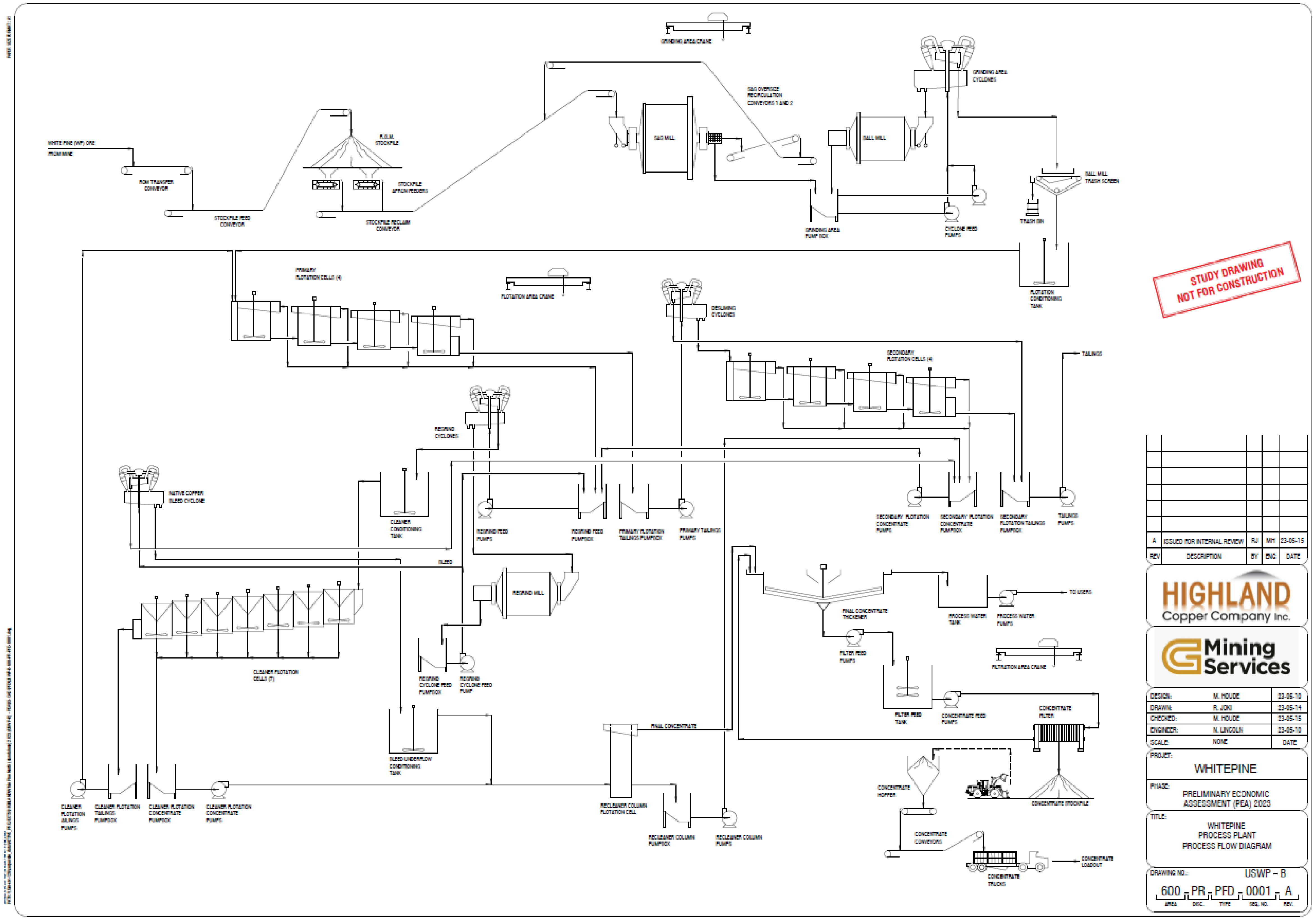
17.1.1 <u>Selected Process Flowsheet</u>

The process plant has been designed for a throughput of 15,000 tpd (dry). The overall flowsheet includes the following steps:

- Mineralized material stockpile
- Grinding SAB Circuit and classification
- Primary flotation
- Desliming primary flotation tailings with secondary flotation circuit
- Primary concentrate regrinding
- Cleaner flotation, using two stages of cleaning with flotation cells and columns.
- Concentrate thickening and filtration.
- Tailings pumping and disposal in the common Tailings Disposal Facility ("TDF")

Figure 17.1 presents a simplified flow diagram depicting the major unit operations incorporated on the selected process flowsheet.

Figure 17.1: Overall Process Flow Diagram



17.1.2 Key Process Design Criteria

The key process design criteria were listed mainly in the Column Cell conversion report and formed the basis of the preliminary process design criteria and mechanical equipment list. Additional metallurgical test work shall confirm the number of flotation stages as well as the use of flotation cells or columns. In addition, flotation residence time, flowsheet configuration and reagents may need adjustments according to the following metallurgical test results.

Table 17.1: Key Process Design Criteria

Parameter	Units	Value
Plant Throughput	tpd	15,000
Head Grade - LOM	% Cu	1.0
Head Grade – Silver (Ag)	g/t	11
Plant Availability	%	92
Crushing Work Index (CWi) – 85th Percentile	kWh/t	11.8
Bond Ball Mill Work Index - 85th Percentile	kWh/t	14.4
Plant Operating Time	hr	8,060
Grind Size (P_{80})	µm	105
Primary Flotation Conditioning Time	min	5
Primary Flotation Residence Time	min	15
Secondary Residence Time	min	5
Cleaner 1 Residence Time	min	5
Regrind Mill Product Size (P_{80})	µm	20
Target Concentrate Grade	% Cu	30.5
Target Overall Recovery	%	88

17.2 General Process Description

The process plant has been designed for a through put of 15,000 tpd (dry). The overall flowsheet includes the following steps:

- Mineralized material stockpile
- SAG Mill, Ball Mill and classification cyclone
- Primary flotation

- Desliming Primary flotation tail with Secondary Flotation
- Rougher concentrate regrind
- Cleaner flotation, using two stages of cleaning
- Concentrate thickening and filtration
- Tailings disposal

17.3 Mineralized material stockpile

Mineralized material from the underground mine will be conveyed with a conveyor equipped with a weight scale. The mineralized material is received on surface into one 4,000 live ton stockpile. The mill feed stockpile is equipped with two apron feeders to regulate SAG mill feed via the SAG mill feed conveyor weight scale.

17.4 Grinding and Classification Circuit

The grinding circuit will be a SABC circuit, comprised of a single variable speed SAG mill and a single fixed speed Ball Mill. The SAG mill will operate in closed-circuit with trommel, followed by a ball mill, operated in closed-circuit with cyclones. The product particle size exiting the grinding circuit cyclone overflow will contain 80% passing 105 µm material. The SAG and ball mill area is serviced by overhead crane.

The reclaimed crushed rock will be conveyed to the SAG mill feed chute via the SAG mill feed conveyor. Water will be added to the mill feed chute to control the in-mill pulp density. A SAG mill size of Ø10.4 m x 5.6 m (Ø34' x 18.5') effective grinding length ("EGL") was selected with a total installed power of 12,000 kW to grind the material. The SAG mill will be fitted with discharge grates and trommel screen.

The SAG Mill trommel oversize pebbles will be conveyed and the undersize discharges into a common pump box with the Ball Mill discharge which then will feed the cyclone cluster. The trommel oversize pebbles are recirculated to the SAG mill feed conveyor via a flexible conveyor.

The cyclone cluster overflow will gravitate, via a trash screen, to the flotation circuit. Underflow slurry, from the classification cyclone underflow launder, will be returning to the ball mill. Ball mill product will discharge to the SAG mill discharge pump box. The cyclone cluster will be fed via a variable-speed centrifugal pump connected to the cyclone feed pump box. Water is added to the cyclone feed pump box to control the slurry density.

A ball mill, Ø6.1 m x 9.3 m (Ø20’ x 30.6’) EGL, fitted with a trommel screen, was selected for secondary grinding. The total installed power is 6,000 kW. The ball mill will be operated in closed- circuit with a cluster of cyclones producing an average product P_{80} of 105 μm.

Two vertical sump pumps will service the grinding and classification area. The concrete floor under the mill area will slope to the sumps to facilitate cleanup. Grinding media for the mills will be introduced by use of a dedicated kibble.

17.5 Primary Flotation

Flotation feed will pass through the trash screen designed to remove foreign material prior to flotation. Trash will report to the trash bin which will be periodically emptied. Screen undersize will gravitate to the rougher conditioner tank. A sampler will be installed on the screen underflow line to take a sample to the On-stream Analyzer (“OSA”) for metallurgical, process control and particle size measurement purposes.

Frother and other flotation reagents will be added into the primary flotation conditioner tank. Process water can be added if required to dilute the feed to the appropriate slurry density.

The primary flotation cells will consist of four 200 m^3 forced air tank cells in series. The primary flotation concentrate will flow to the regrind cyclone feed hopper. A sampler will be installed on the rougher concentrate discharge line to take a sample to the OSA for process control purposes.

The primary flotation tailings will gravitate to the primary flotation tails pump box and a sampler will be installed to take a sample to the OSA for metallurgical and process control purposes. The primary flotation tails will be pumped to the desliming cyclone cluster; the underflow will proceed to four 50 m^3 forced air secondary flotation tank cells in series. The secondary flotation concentrate will also flow to the regrind cyclone feed hopper, to be combined with the primary flotation concentrate. A sampler will be installed on the secondary flotation concentrate discharge line to take a sample to the OSA for process control purposes; the secondary flotation tailings will gravitate to the flotation tails pump box and a sampler will be installed to take a sample to the OSA for metallurgical and process control purposes.

A distribution system to dose reagents along the primary and secondary flotation cells train will be provided so that stage collector and frother can be added if required.

The flotation building overhead crane will be used for all maintenance lifting functions within the flotation area. A vertical spindle sump pump will service this area for spillage cleanup.

17.6 Regrind

Primary and secondary flotation concentrate will report to the regrind cyclone feed pump box. The slurry will be pumped to the regrind cyclone cluster by the regrind cyclone feed pumps. The cyclone underflow will gravitate to the regrind mill where water and lime (if required) will be added to achieve the milling density and desired operating pH. The regrind mill will be an overflow horizontal ball mill, Ø6.1 m x 10 m (Ø20' x 33') EGL, fitted with a trommel screen. The regrind mill installed power will be 7,000 kW. The regrind mill will be operated in closed- circuit with a cluster of cyclones producing an average product P_{80} of 20 µm.

Regrind cyclone overflow will gravitate to the cleaner conditioner tank. A sampler will be installed on the cyclone overflow line to take a sample to the OSA for process control and particle size measurement purposes.

Media will be introduced via the regrind media hopper. A vertical spindle sump pump will service this area for spillage cleanup.

17.7 Cleaner Flotation

Final arrangement regarding recirculation of cleaning streams will be made according to additional testwork program. The final arrangement includes recirculation of the first cleaner scavenger concentrate to the regrinding / first cleaner circuit and tailings to the rougher last cells.

Regrind cyclone overflow will proceed to the cleaner conditioning tank, where reagents will be added to this tank. The facility to add process water to dilute the slurry to the desired density will also be provided.

The first cleaner flotation cells will consist of seven 50 m^3 trough cells in series. The first cleaner concentrate will be pumped to the second cleaner flotation columns, a sampler will be installed on the discharge line of the pump to take a sample to the OSA for process control purposes. The first cleaner tailings will be pumped back to the rougher flotation circuit.

The Cleaner flotation Columns will consist of one column 5 meters diameter by 15 meter high. Frother will be added to the feed box. Column concentrate will be collected in a pump box and be pumped to the concentrate thickener. Flotation Columns tailings will gravitate to a pump box from where the material is pumped to the Slime Cyclone Cluster. A sampler will be installed on this stream to take a sample to the OSA for metallurgical and process control purposes.

Two vertical spindle sump pumps will service the cleaner flotation area for spillage clean-up.

17.8 Concentrate Thickening and Filtration

Final concentrate will be pumped to the high-rate concentrate thickener, along with filtrate return from the filtration area. Flocculant stock solution will be further diluted to 0.25% w/w with process water in an in-line mixer prior to addition to the concentrate thickener. Thickener overflow will gravitate to the process water tank for re-use.

Concentrate thickener underflow, at approximately 60% solids w/w, will be pumped to the agitated concentrate filter feed tank by one operating, with one standby, concentrate thickener underflow pump. This tank will provide 12 hours of surge capacity between the thickener and filter.

Thickened concentrate will be pumped batch wise to the concentrate filter press using one operating, and one standby, filter feed pumps. The filter will remove water from the concentrate to meet the target moisture of approximately 9% w/w using a series of pressing and air blowing steps. After the desired filtration time the filter press will open, and discharge concentrate directly to the floor of the concentrate shed. Following discharge of concentrate, the filter cloth will be washed prior to the next cycle using raw water. Some filtrate from the concentrate filter will be returned to the concentrate thickener by gravity. Filter cloth wash will be drained into the filter area sump pump.

A front-end loader (“FEL”) will be used to remove the concentrate from beneath the filter press and transfer it to the adjacent 542 t concentrate storage areas. Concentrates will be loaded into the loadout hopper by the FEL when required. Concentrate from the load-out hopper will be transferred to the concentrate trucks via a concentrate feeder and truck loading conveyor. The truck loading conveyor will be equipped with a weight scale.

Two vertical spindle sump pumps will be provided in the thickener and filtration area to return spillage to the concentrate thickener.

17.9 Tailings Handling

Slimes overflow and scavenger tailings will be combined in a mixing box from where a final sampler will take a sample to the OSA for metallurgical and process control purposes. The mixing box discharge will combine with a number of intermittent reagent sump pump streams in the flotation tailings pump box. Flotation tailings will be pumped to the TDF.

A vertical spindle sump pump will be provided to return spillage to the flotation tailings pump box.

17.10 Raw Water, Potable Water and Process Water

Raw water make-up will be supplied to the raw water tank.

Raw water will be used for the following duties:

- Filter cloth wash via the raw water pumps
- Reagent make-up via the raw water pumps
- Cooling water, via the raw water pumps

The decant water will be filtered and used for:

- Low pressure gland water, using the low-pressure gland water pumps
- OSA

The quality of filtered water used for GSW and OSA needs to be confirmed by suppliers during detail engineering.

Potable water will be supplied to the potable water tank where a ring main system will be installed to provide potable water to the safety showers and drinking fountains around the plant.

Concentrate thickener overflow and TDF decant water will be sent to the process water tank for re-use in the process plant. Raw water will be used as make-up as required. Anti-scalant will be added to the process water tank as required.

Process water will be used for the following duties:

- Filter manifold wash via the manifold wash water pumps;
- General process uses in the grinding, flotation, and thickener areas via the process water pump.

17.11 Reagents

17.11.1 <u>Frother</u>

Frother will be delivered in bulk and stored in the reagent building until required. Glycol Frother will be dosed at a rate of new feed to the following locations:

- Primary Float Feed 0.037 kg/t of new feed
- Primary Float Mid 0.004 kg/t of new feed
- Secondary Float Head 0.008 kg/t of new feed
- Secondary Float Mid 0.0016 kg/t of new feed
- Column Cell Sparger Water 0.003 kg/t of new feed

Multiple diaphragm style dosing pumps will deliver the reagent to the required locations within the flotation circuit. A dedicated air diaphragm sump pump will be provided for spillage control.

17.11.2 Isobutyl Xanthate ("SIBX")

SIBX will be delivered in pellet form in bulk bags within boxes and stored in the reagent building. Raw water will be added to the agitated SIBX mixing tank. Bags will be lifted into the SIBX bag breaker, located on top of the tank, using the SIBX lifting frame and hoist. The solid reagent will fall into the tank and be dissolved in water to achieve the required dosing concentration. SIBX solution will be transferred to the SIBX storage tank using the SIBX transfer pump. Both the mixing and storage tanks will be ventilated using the SIBX tank fan to remove carbon disulphide gas.

SIBX will be delivered to the flotation circuit using the SIBX circulating pump and a ring main system. Actuated control valves will provide the required SIBX flowrates at a number of locations around the flotation circuit. SIBX will be dosed at a rate of new feed to the following locations:

- Ball Mill Feed 0.029 kg/t of new feed
- Primary Float Feed 0.037 kg/t of new feed
- Primary Float Mid 0.009 kg/t of new feed
- Secondary Float Mid 0.009 kg/t of new feed
- Cleaner Float Mid 0.0012 kg/t of new feed
- Regrind Mill Feed 0.014 kg/t of new feed
- Cu Bleed Conditioner 0.0008 kg/t of new feed

The SIBX mixing area will be ventilated using the SIBX area roof fan. A dedicated air diaphragm sump pump will be provided for spillage control.

17.11.3 Sodium Silicate ("SS")

SS will be delivered in bulk boxes and stored in the reagent building. The solid reagent will fall into the tank and be dissolved in raw water to achieve the required dosing concentration. SS solution will be transferred to the SS storage tank using the SS transfer pump. Both the mixing and storage tanks will be ventilated using the SS tank fan.

Diaphragm style dosing pumps will deliver the solution to the required locations of the circuit. A dedicated air diaphragm sump pump will be provided for spillage control.

17.11.4 N-Dodecyl Mercaptan ("NDM")

NDM will be delivered in bulk boxes and stored in the reagent building until required. NDM will be dosed neat, without dilution. A diaphragm style dosing pump will deliver the reagent to the primary flotation circuit. Top up of the permanent bulk boxes will be carried out manually as required.

A dedicated air diaphragm sump pump will be provided for spillage control.

17.11.5 Flocculant

Powdered flocculant will be delivered to site in 25 kg bags and stored in the reagent shed. A vendor supplied mixing and dosing system will be installed, which will include flocculant storage hopper, flocculant blower, flocculant wetting head, flocculant mixing tank, and flocculant transfer pump. Powder flocculant will be loaded into the flocculant storage hopper using the flocculant hoist. Dry flocculant will be pneumatically transferred into the wetting head, where it will be contacted with water. Flocculant solution, at 0.25% w/v will be agitated in the flocculant mixing tank for a pre-set period. After a pre-set time, the flocculant will be transferred to the flocculant storage tank using the flocculant transfer pump.

Flocculant will be dosed to the concentrate thickener using variable speed helical rotor style pumps. Flocculant will be further diluted to approximately 0.025% w/v just prior to the addition point.

A dedicated vertical spindle sump pump will be provided in this area.

17.11.6 Hydrated Lime

Because the mineral is essentially barren of pyrite, flotation is carried out at a natural pH. No hydrated lime consumption is planned, however a space in the process plant has been reserved if necessary.

17.11.7 Anti-scalant

Anti-scalant will be delivered in bulk boxes and stored in the reagent building until required. Permanent bulk boxes will be installed to provide storage capacity local to each dosing point. Anti-scalant will be dosed neat, without dilution. Positive displacement style dosing pumps will deliver the anti-scalant to the process water tank. Top up of the permanent bulk boxes will be carried out manually as required.

17.12 Services and Utilities

17.12.1 On-stream Analysis ("OSA") System

The performance of the flotation circuit will be monitored by a dedicated OSA system, to allow the operator to make air, level or reagent changes based on real time assays. Analysis will include percent solids, copper, iron, and silver assays.

Cumulative shift samples for laboratory analysis will also be collected via the OSA sampling system. The system will have a stand-alone control, calibration and reporting system but will have the capacity to provide assay data to the plant control system if required.

Process streams that will be analyzed are listed as follows:

- Flotation feed
- Primary flotation concentrate
- Secondary flotation concentrate
- Regrind cyclone overflow
- Cleaner flotation concentrate
- Cleaner flotation tailings
- Flotation columns concentrate
- Primary Flotation tailings
- Flotation tailings

Samples will be collected using a combination of sample pumps, pressure pipe samplers and linear samplers as required. Samples will be logically combined after analysis and returned to the process using vertical spindle style pumps.

17.12.2 High and Low-Pressure Air

High pressure air at 700 kPa (g) will be provided by two high pressure air compressors, operating in a lead-lag configuration. The entire high-pressure air supply will be dried and can be used to satisfy both plant air and instrument air demand. Dried air will be distributed via the main plant air receiver, with an additional receiver in the grinding area.

Rougher flotation air will be supplied by two low-pressure blowers. Cleaner flotation air will be supplied by two low-pressure blowers.

18 PROJECT INFRASTRUCTURE

18.1 General

This section discusses the required infrastructure to support the mining and processing operations and includes the following areas:

- Roads:
    - Public access road from Michigan Highway 64;
    - Main access roads;
- Parking lot;
- Mineralized material and waste stockpiles;
- Surface pads;
- Event pond;
- Covered box-cut for mine access;
- Site run-off and spillage control;
- Water management:
    - Sewage treatment – existing system;
    - Water filtration;
    - Tailings;
    - Reclaim water system;
    - Water treatment plant;
    - Potable water – existing system;
    - Fire protection;
- Power supply and distribution;
- Communications;
- Fuel storage;
- Security;
- On-site buildings;
    - Process plant building;

    - Plant workshop & stores;
    - Assay laboratory;
    - Truck shop, dry, warehouse and offices;
    - Mill offices and metallurgical laboratory;
    - Explosive magazines;
    - Underground support buildings.
- Off-site buildings;
    - Administration office;
    - Concentrate transload facility;
- Tailings Disposal Facility ("TDF").

Figure 18.1 presents the White Pine North Project site general arrangement and Figure 18.2 presents a close-up view of the general arrangement of the plant area.

Figure 18.1: White Pine North General Arrangement

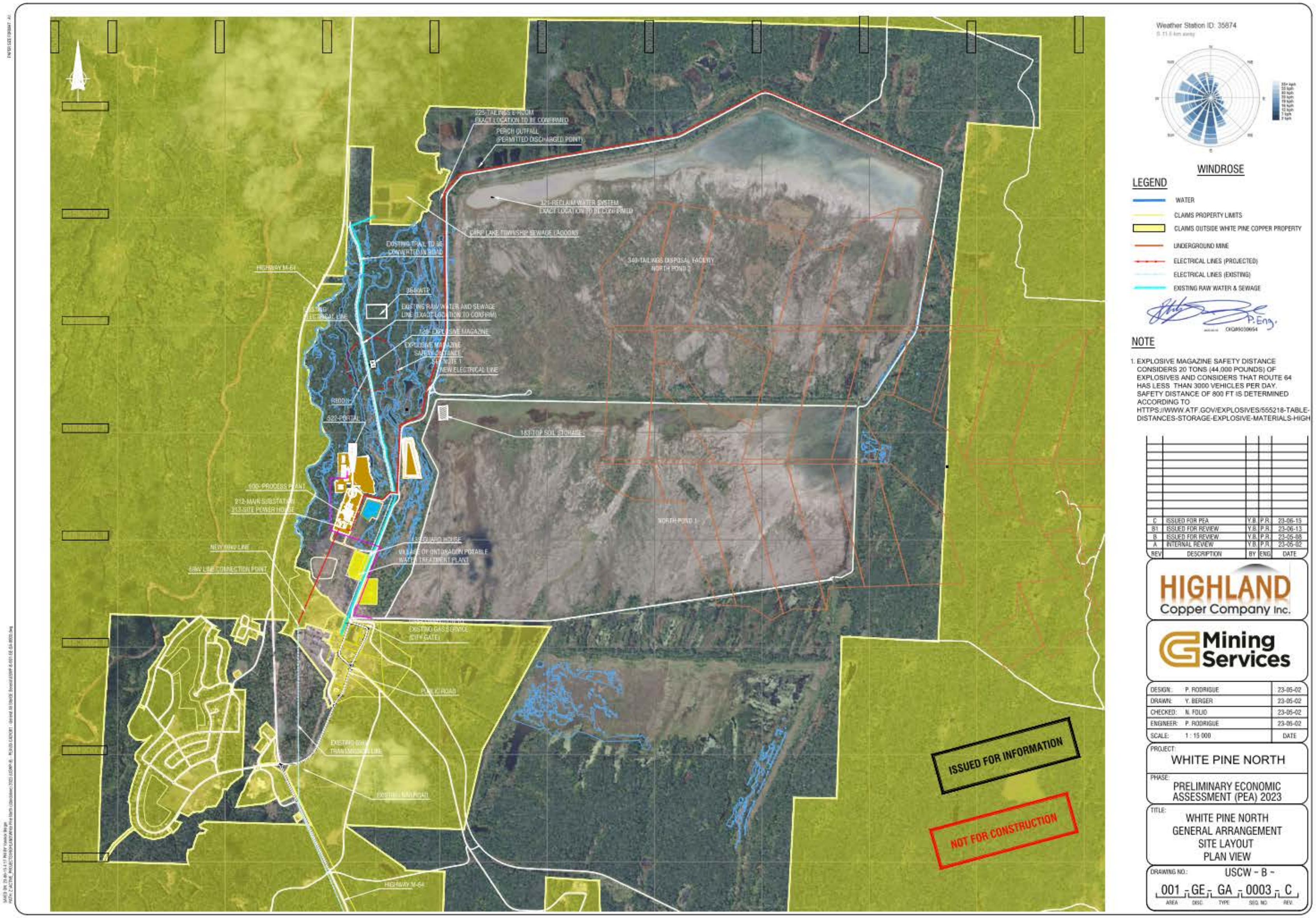
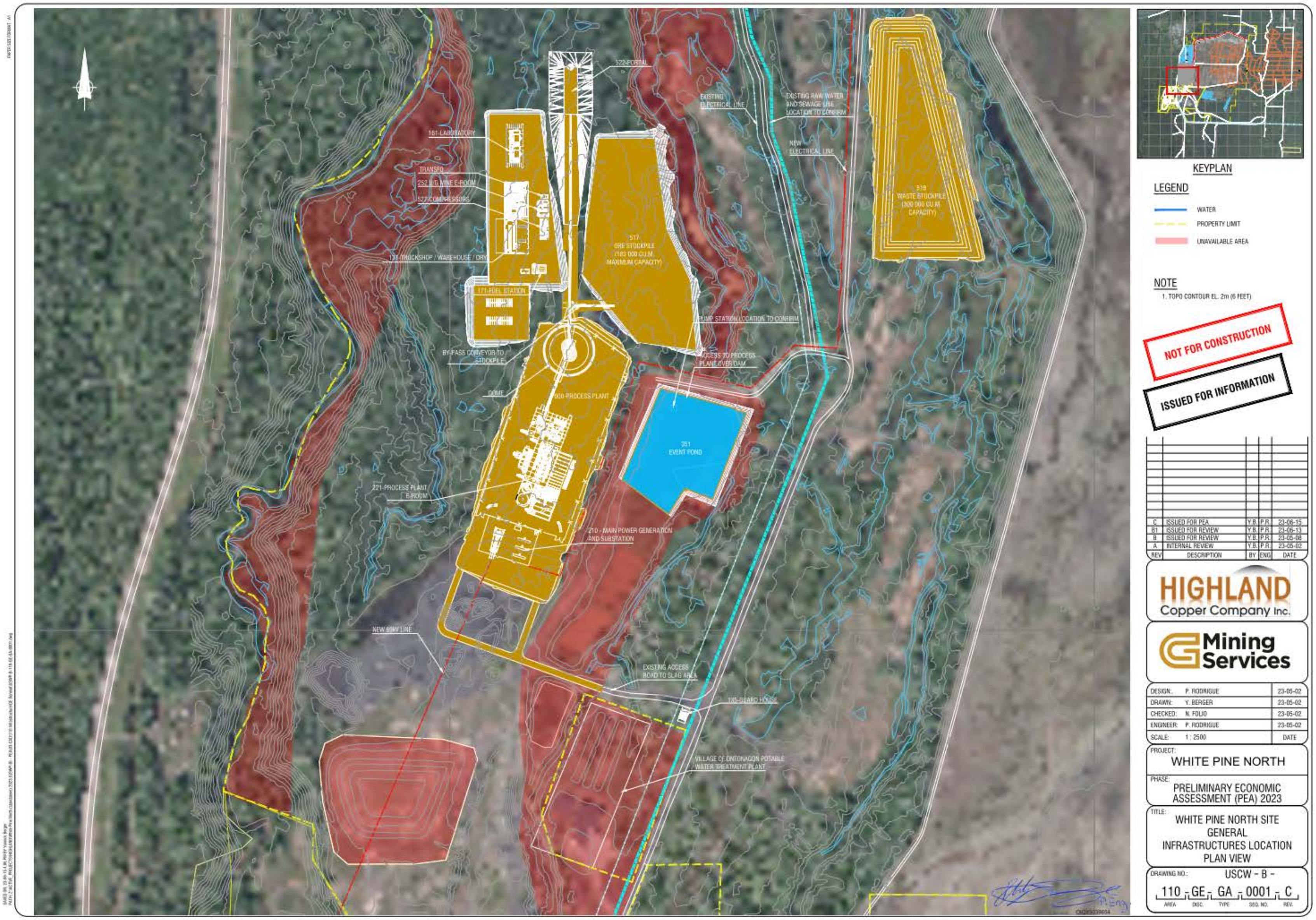


Figure 18.2: White Pine North General Arrangement Plant Area - Close-Up View



18.2 Roads

18.2.1 Public Access Road

The Project is accessed via the existing Michigan Highway 64 ("M-64") located on the west boundary of the site. M-64 connects the site entrance to major roads in the area and will handle all traffic to the site. The site entrance is located approximately 23 km to the north of the intersection with Highway 28 in Bergland, Michigan. Owned and maintained by the Michigan Department of Transportation ("MDOT"), the road is fully paved. A survey performed by MDOT in 2009 showed that the volume of traffic from US2 and the Gogebic-Ontonagon County line was on average 418 vehicles. Therefore, we can assume that White Pine North Project traffic should not have a significant negative impact.

18.2.2 Main Access Road

Access to site is done by taking White Pine's Main Street from HWY 64, which becomes a public road owned by the Ontonagon County Road Commission used to access their water treatment plant infrastructure. White Pine North would be required to build a small section of road off on its property to further expand the site access for future infrastructure.

18.3 Parking Lot Pad

Waste rock from the mine development will be used to develop the parking lot pad which is approximately 6,700 m^2 in area and designed to accommodate 126 vehicles. Grading and ditching will be done to provide the proper drainage system and the topsoil that was initially removed will be used to revegetate the area.

18.4 Mineralized material and Waste Stockpile

The mineralized material stockpile pad is located 200 m southeast of the top of the box cut ramp. The mineralized material stockpile is designed with a capacity of 500,000 tonnes at a maximum height of 15 m. Over the pre-production period, the mineralized material will be hauled with mining trucks to the stockpile pad. After the end of the initial period a stacker will be used to manage the stockpile. mineralized material will be transferred from the mineralized material stockpile to the mill feed conveyors using a front-end loader and a feeding chute.

The pad is approximately 45,000 m^2 in area and will consist of at least 300 mm of low permeability fill placed on top of the existing ground. The fill will be covered by an HDPE geomembrane. Water that contacts mineralized material on the pad is considered contact water and must be directed to the TDF. The stockpile has a cross-slope that directs all runoff water into lined ditches. The water will eventually drain to a collection point on the NW corner of the stockpile where it will be pumped to the event pond and ultimately to the TDF or the water treatment plant later in the life of the mine.

Soil bearing capacity is not defined due to lack of geotechnical information under the proposed infrastructures and hence, the bulk density and angle of repose were established following similar projects in the state.

The waste stockpile is located 500 meters east of the box cut ramp and designed with a capacity of 300,000 cubic meters of waste rock at a maximum height of 14 meters consisting of two benches. The pad is approximately 50,000 square meters without any liner considered. The stockpile is assumed to have a slope of 2.5H:1V. The run-off water will eventually be drained to a collection point using the diversion channels and pumped to the event pond.

18.5 Surface Pads

The work listed below will be performed at the process area and substation pad, parking lot platform, and mine infrastructure area:

- Stripping and grubbing
- Topsoil removal
- Backfilling with suitable material
- Ditch excavation, geotextile, and liner installation
- Revegetation
- Culvert placement
- Final grading

Local roads will be used to access the various sites and services and hauling roads will be used for mining related activities.

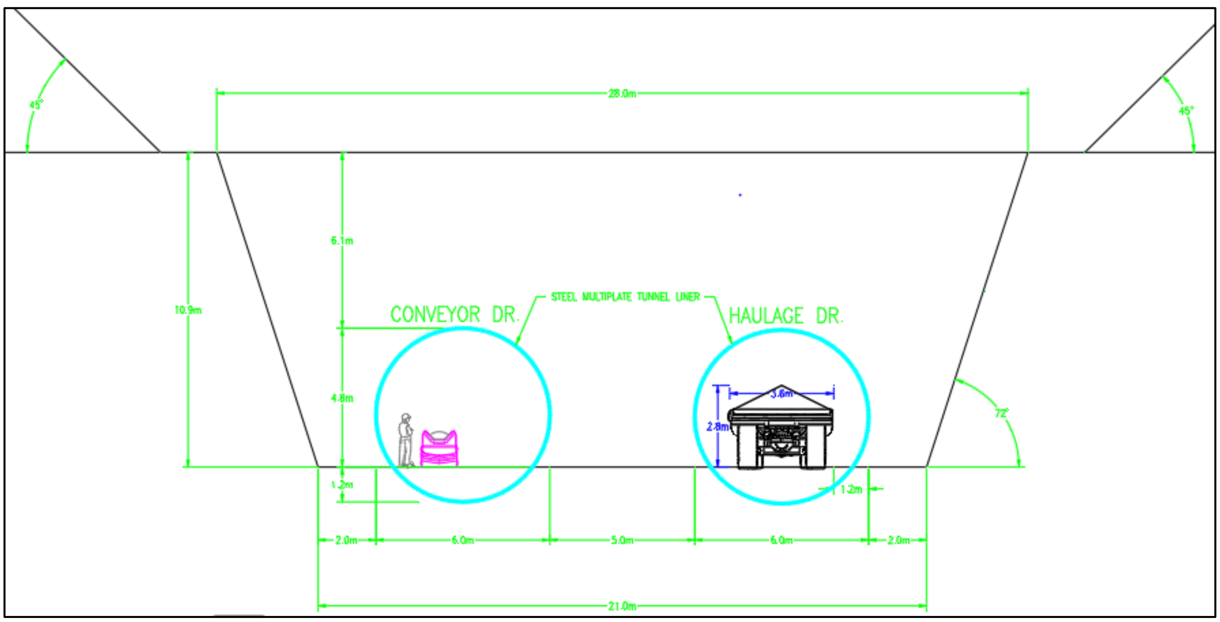
18.6 Event Pond

All contact water collected in the surface pads and stockpiles will be directed to the existing event pond located 300 m southeast of the box cut ramp. It is assumed that this existing pond is not lined and may require a geomembrane liner. The pond is sized to hold 10,000 cubic meters plus a 10% to account for climate change, with a 1-meter minimum freeboard.

18.7 Box Cut

The box cut entrance is located approximately 150 m north of the mill area. The box cut design will have an approximately 250 m long ramp with a 15% gradient that provides access to the mine portal and underground mine. The box cut will be excavated at a minimum of 15 m into the fresh rock, where tunnel multi-plate liners will be placed, and then backfilled for water management. The box cut uses two separate 6 m diameter fully round steel tunnels. The culvert of the steel tunnel is backfilled to create a driving surface for the mine equipment.

Figure 18.3: Box Cut Entrance



18.8 Site Run-Off and Spillage Control

A network of ditches will be designed to drain the stockpiles and the infrastructure pads and direct the run-off contact water to the Event Pond, to the east of the process plant. Sedimentation will occur within the pond and the contact water will be pumped back to the process plant and re-used as process water.

18.9 Water Management

18.9.1 Sewage Treatment – Existing System

Sewage water will be sent to the existing sewage collection line that is connected to the Carp Lake township sewage lagoons, north of the mining site. It is assumed that the sewage lagoons will have the capacity to treat the required volume of sewage that will be produced on-site.

18.9.2 Water Filtration

A water filtration system will be installed upstream from the Gland seal water tank as well as the on-stream analyzer. Reclaim water being pumped from the TDF needs to be filtered to ensure proper water quality for gland seal and OSA requirements.

18.9.3 Tailings

Tailings from the process plant will be pumped to the TDF as a slurry, through an above ground HDPE pipeline. For this study, it was considered that the discharge of the tailings will occur at a single location within the TDF. In the next phase, a more detailed spigot plan could be developed to ensure properly distributed tailings discharge within the TDF.

The decanted water in the TDF will either be returned to the process plant or sent to the WTP for treatment and eventual discharge back into the environment.

18.9.4 Reclaim Water System

To support the water requirements of the process plant, a reclaim water pumping system will be installed at the tailings disposal facility. The reclaim water system will consist of a floating barge with an access platform, two vertical turbine pumps (1 operating and 1 standby), control valves, an anchor system, a trolley beam, and a maintenance hoist. The Reclaim water pumped to the process plant by means of an HDPE pipeline.

18.9.5 Water Treatment Plant

There are three water sources being sent to the TDF that need to be treated at the water treatment plant (WTP) before being released into the environment:

- Water in tailings slurry

- Underground mine dewatering
- Precipitation and runoff water around the TDF

Based on preliminary assumptions, the water treatment system will include:

- Clarification
- pH and hardness adjustment
- Multiflo softening
- Sludge dewatering
- Multimedia filtration
- Weak acid cation exchanger
- Reverse osmosis
- Evaporator / Crystallizer for sludge management
- Chemical dosing and storage

A more in-depth analysis of water quality will need to be conducted during the next phases of the project. Once the influent water quality is better defined, the design basis for the WTP will be updated to ensure that the water being discharged meets the applicable standards and regulations in Michigan.

The WTP will be needed once the mineral processing starts.

18.9.6 Potable Water – Existing System

The existing potable water treatment plant was built to supply water to the previous mining operation and the town of White Pine. The potable water system has since been turned over to the town of Ontonagon. Ontonagon has been operating and maintaining the system. It is assumed that Ontonagon will make potable water available for the new operations and the town of White Pine. A 1-km pipeline will bring potable water from the existing water treatment to the holding tank on-site.

18.9.7 Fire Protection

The water for emergency fire suppression will be stored in a 175 cubic meter holding tank that will be located to the east of the process plant. The fire water distribution system will be a standard containerized skid containing a diesel pump, an electric pump, and a jockey pump that maintains pressure within the distribution network. The distribution network will consist of buried HDPE piping.

Each building will have its own fire protection system that will meet the fundamental requirements of the NFC and NFPA standards. These systems may include any of the following: Hose stations, Extinguishers, Sprinklers, Manual pull stations, Audible and visual horns, Bells.

18.10 Power Supply and Distribution

A new power transmission line of 69 kV, a section of approximately 1 km, is needed to provide power to site. It is assumed that UMERC will support the connection to the existing network in the area. The main substation is supplied through UMERC contract and should be composed of a single train transformer.

Due to the power limitation of 30 MW on the 69 kV network, a natural gas-fired power plant is required to supply the full 38.6 MW average power required at site. Three (3) gensets of 5.56 MWe are planned, in configuration that includes a spare (n+1) for a total of 10 MW available power. Supply of natural gas is already available in the area at the White Pine city gate, and confirmed by the gate owner. The power plant will also be used in case of emergency and power outage from the grid.

Site power consumption is evaluated at 56.8 MW connected which represents an average year load of 38.6 MW. Distribution network is made at 13.8 kV from the main substation and powerhouse. Distribution to the equipment is done at 4.16 kV and 480 V.

18.11 Communications

It is assumed that fiber optic or at least coaxial cables are available close to White Pine. A “backbone” point-to-point (“P2P”) radio wave connection using proprietary dishes at emitting and receiving towers will also be put in place.

A proprietary or leased tower may be built, if not already existing by the start of construction, at the mine site in order to install the P2P receiving dish and the Long-Term Evolution (“LTE”) antennas to cover the area of the property. LTE antennas placed on the tower will be part of a surface / underground Private LTE Network (“PLTEN”) to insure communication between workers (within as well as outside of the mine site). PLTEN will also be used to maximize any potential use of the “Internet of Things” (“IoT”) by connecting mobile and fixed equipment, computers, and telemetries to help in performing live monitoring and data capture.

A traditional Gigabit Wi-Fi connection connected to a Local Area Network ("LAN") will also be installed in the offices, mill, maintenance shop and other specific locations in order to upgrade to the LTE/5G network once all the personnel and routing equipment capable of handling the increased network capacity are in place.

Cloud based software applications, including Enterprise Resource Planning ("ERP") are preferable in limiting CAPEX expenses as well as maintenance/support costs related to the equipment's "On Premise" software licenses.

18.12 Fuel Storage

A fuel storage will be built for mine and support equipment. The dike tanks set-up for diesel will have a 120,000 litres capacity with pumps and concrete pads which are located south of the mine entrance.

18.13 Security

18.13.1 Gate House

The site access will be secured by the gatehouse located adjacent to the main access road in the southern portion of the process area. All traffic coming to or leaving the process and mining area will pass through the gate house.

18.13.2 Fencing

Since the process plant is located close to existing facilities, it is planned to have a fence around the process plant, around the main power generation / substation and around the explosive magazine.

18.14 On-site Buildings

18.14.1 Process Plant Building

Apart from the reclaim tunnel, which will be under a dome, the process will be sheltered inside buildings. A stick-built building over the grinding area (57 m x 44 m), pre-engineered type buildings for the flotation (67 m x 37 m) and concentrate filtration and load-out area (34 m x 46 m). Adjacent to this pre-engineered building will be a section for reagents storage and preparation.

18.14.2 Plant Workshop & Stores

The Plant's workshop & stores will be located under the grinding operating floor inside the process plant building.

18.14.3 Assay Laboratory

The Assay laboratory will be supplied by a third party which will bring their modular laboratory on site.

18.14.4 Truck Shop, Dry, Warehouse and Related Offices

A large pre-engineered building will shelter the mining and maintenance facility in the northwest part of the site. This building will include the truck shop, the dry / change-room for miners, warehouse, and related offices – including for mining technical personnel. The truck shop will be used primarily for heavy-duty vehicle maintenance. The truck shop will have 7 separate bays each equipped with a 6 m wide x 5 m high roll-up door and an overhead crane. One bay will be used for washing purposes. The highest portion of the building including the truck shop will also include the warehouse. The warehouse will include racking to store spare parts and consumables. On a mezzanine, between the two, will be located offices for the technical personnel of those two facilities.

The mine dry will be adjacent to the truck shop and warehouse. The dry will serve as locker rooms for the mine workers between shifts and contain the mine rescue equipment, medical offices, and a few offices for management personnel. The dry has enough locker and basket spaces for a total of 650 workers. Baskets and lockers are considered for all workers, even when on rotations. It includes showers, toilets, urinals, lockers, and baskets.

18.14.5 Mill Offices and Metallurgical Laboratory

The met lab and mill offices are located on the south side of the mill area. This building will provide a metallurgical testing area and office space in the process building. The building can be accessed from inside the mill area or from the outside. It will be located on the second floor of the Process plant electrical room. The control room will be installed on the same floor as the mill offices and will have a view of the processing equipment. A lunchroom for the office and lab worker is included in this building.

18.14.6 Explosive Magazine

The explosive magazine will be located on the south side of the main access road. The dimensions of the explosive magazine are 76 m x 55 m. The design includes protective berms that will ease the traffic in and out of the storage facilities. The explosive material will be stored in a container designed to satisfy safety requirements and will provide a week's worth of explosives storage. It is located at a minimum of 800 ft of any other facilities. This facility is designed to store 20,000 kg of explosives.

18.14.7 Underground Support Buildings

Compressor buildings as well as ventilation raise intake (1x), exhaust (2x) and escapeway shelters are planned as required following the mining sequence.

18.15 Off-Site Buildings

The following areas are considered project infrastructure for mining operations, but are located off White Pine North site:

- Administration offices
- Concentrate Transload facility

18.15.1 Administration Offices

The Administration building will be located in the Town of Marquette using office spaces already built. The actual plan takes into consideration lease spaces. Included in the project costs are major upgrades for plumbing and HVAC as well as architecture renovations and furniture.

18.15.2 Concentrate Transload Facility

The transload facility will be located at a rail siding in Champion MI,161 km from site. The location has been chosen due to the costs and mainly because it provides access of the Canadian National Railway networks, for easy shipment to known smelters or ports. The facility is designed to receive concentrate shipments from site via side-dump haul trucks. Haul trucks enter the building, dump the concentrate, and exit the building. Concentrate is loaded into rail cars using a front-end loader.

Figure 18.4: Transload Building Cross-Section

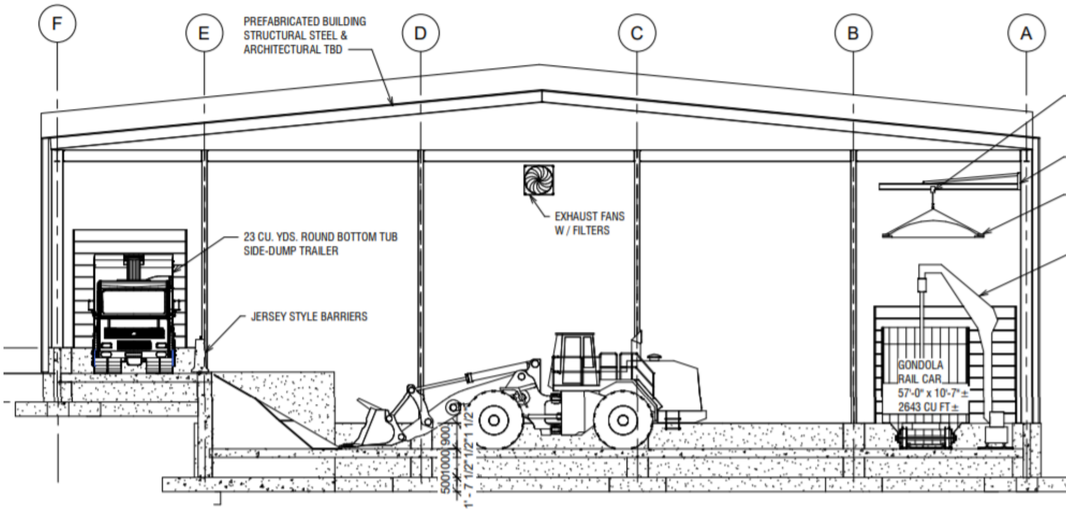
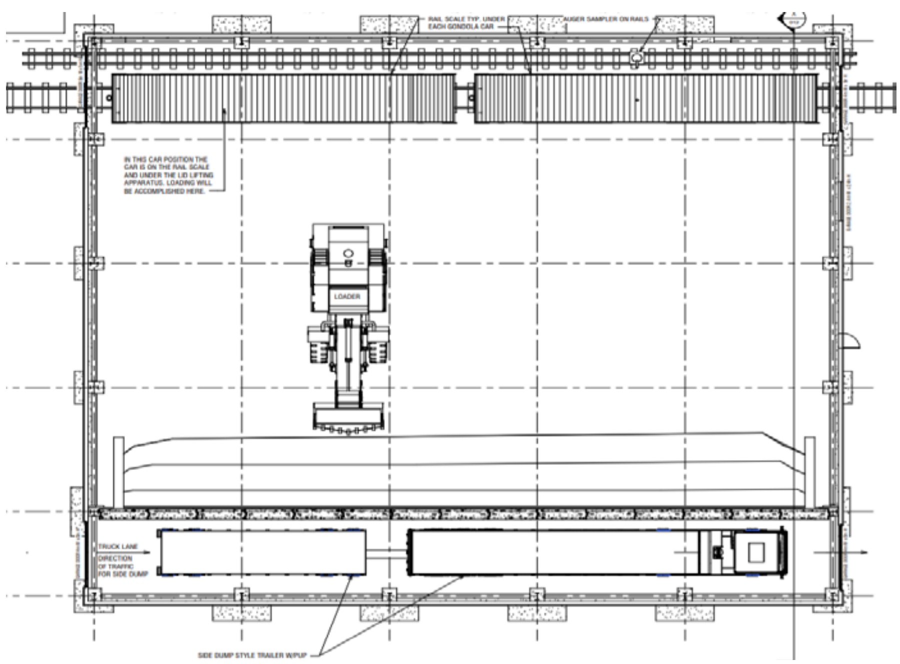


Figure 18.5: Transload Building Plan View



18.16 Tailings Disposal Facility

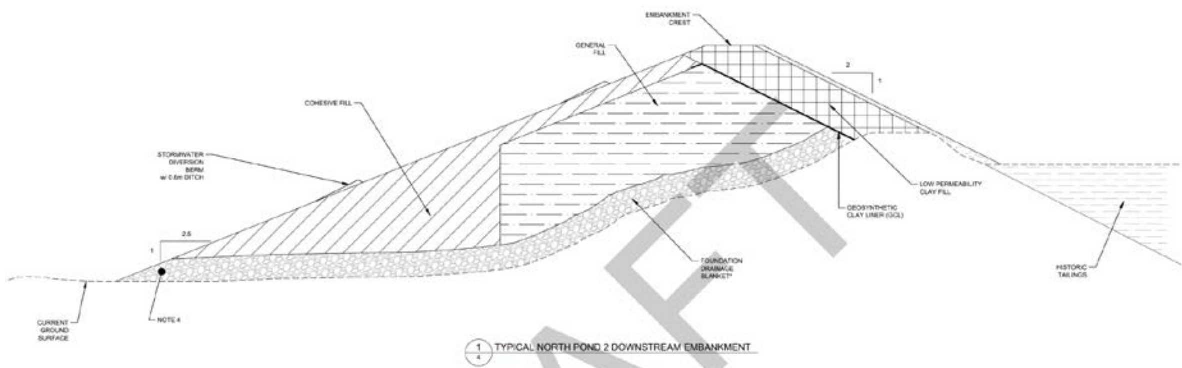
18.16.1 General Arrangement and Development

In its current state, North Pond 2 ("NP2") has approximately 18 million cubic meters (approximately 22 Mt) of storage without considering any dam raises and without freeboard. Storage of the entire tailings volume along with accommodating a two-meter freeboard will require raising the existing NP2 embankment by approximately 8 meters over the life of mine. The embankment will be constructed sequentially using downstream methods, which means that the upstream toe will remain fixed while the downstream toe will progressively advance downstream as the embankment height increases.

The design criteria for slopes as established in the WSP-Golder, January 17, 2023 report are as follows:

- Upstream slope: 2H: 1V
- Downstream slope: 2.5H: 1V - This slope provides an increased factor of safety and reduces the internal seepage system requirements.
- The embankment will consist of a low permeability zone or shell as well as general fill zone.
- The embankment will contain an internal seepage control system consisting of layers of coarse-grained, freely draining material. A piping network will be installed in the seepage control system to collect and direct outflow to specified areas.
- No liner to be installed on top of the existing tails from the historic White Pine mining operations.

Figure 18.6: Typical TDF Cross-Section



19 MARKET STUDIES AND CONTRACTS

19.1 Metal Prices

The metal prices selected for the economic evaluation in this Report are presented in Table 19.1. A constant long-term price of USD 4.00/lb for copper and USD 25.00/oz for silver has been assumed.

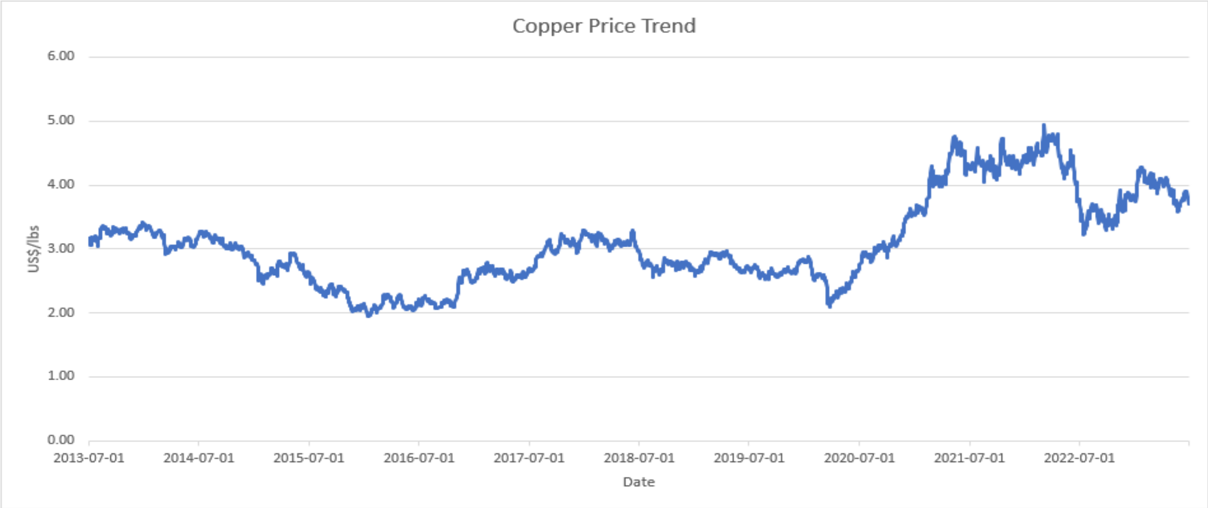
Table 19.1: Metal Price Assumptions

Metal Price Scenario	LOM
Copper (USD /lb)	4.00
Silver (USD /oz)	25.00

There is no guarantee that copper and silver prices used in this Study will be realized at the time of production and will be subject to normal market price volatility and global market forces of supply and demand. Prices could vary significantly higher or lower with a corresponding impact on Project economics.

The 10-year historical price for copper as presented in Figure 19.1 highlights the variable nature of metal prices with a high of approximately USD 4.90/lb seen in March 2022 and a low of USD 1.95/lb in beginning 2016. The 10-year historical price for silver is similarly presented in Figure 19.2.

Figure 19.1: 10-year Historical Copper Prices



Data Source: www.macrotrends.net

Figure 19.2: 10-year Historical Silver Prices

Data Source: www.macrotrends.net

19.2 Market Studies

19.2.1 Copper Concentrate

The copper concentrate produced from White Pine will require downstream smelting and refining to produce marketable copper and silver metal. Several smelters could receive concentrate with the nearby candidates being the Horne smelter located in Noranda, Quebec or the copper smelter in Sudbury, Ontario. Other alternatives include seaborne export to Asia or Europe. Concentrate transportation charges will be a function of the final destination and will be a combination of trucking, rail and possibly shipping.

The concentrate treatment and refining charges (TC/RC) vary depending on the state of the economy and the supply and demand dynamics for copper concentrates available for smelting.

Copper payment is based on copper content of the concentrate. For a concentrate less than 32% but above 22% the payable rate is typically 96.5%, subject to a minimum deduction of 1%. Payment of precious metals in copper concentrates varies by region and customer but typically pays 90% if greater than 30 g/dmt with a 30 g minimum deduction. A summary of the copper concentrate marketing assumptions is summarized in Table 19.2.

Table 19.2: Concentrate Marketing Assumptions

Copper Concentrate Marketing Assumptions	
Copper Payable Rate	96.5% payment of Cu in concentrate >22%Cu and <32%Cu subject to a 1% minimum deduction
Silver Payable Rate	90% payment of Ag subject to 30g/dmt minimum deduction
Copper Treatment & Refining Charge (TC/RC)	TC = USD 65/dmt of concentrate, RC = $0.065/lb of Cu
Silver Refining Charge	RC = USD 0.50/oz of Ag

Penalties may be applied to copper concentrates that have excessive amounts of deleterious elements such as lead, zinc, arsenic, antimony, bismuth, nickel, alumina, fluorine, chlorine, magnesium oxide, and mercury. The White Pine concentrate can be classified as a clean concentrate and no penalties for deleterious elements are foreseen.

19.3 Realization Costs

19.3.1 Concentrate Transportation

In 2017, Concept Consulting LLC conducted a study on concentrate transportation. The assumptions made by Concept in 2017 were reviewed in 2022 and were updated based on discussions with local trucking companies, and rail operators. Final delivery point is still considered as the Horne smelter, in Rouyn Noranda.

The concentrate from White Pine will be loaded into heavy-duty dump trailers with a cover and transported to a truck to rail transload facility located Champion, Michigan approximately 161km from site. The truck configuration consists of an 11 axles road train with two (2) covered side-dump trailers and will transport approximately 46 t per shipment. The location has been chosen due to the reduction in trucking costs associated with the heavier haul limits in Michigan and its proximity to CN’s rail network. The operator of the rails between Champion and Ishpeming is Mineral Range Railroad. The location has been chosen due to the reduction in trucking costs associated with the heavier haul limits in Michigan and its proximity to CN’s rail network. The CN is a Class 1 railroad and its network spans three coasts with over 33,800 km (21,000 mi) of track and access to 75% of the North American continent and currently has operating lines in Michigan and Wisconsin.

The concentrate transportation costs are estimated at USD 106.05/t of concentrate which includes trucking, transload operations, CN rail transportation and gondola lease costs as summarized in Table 19.3.

Table 19.3: Concentrate Transportation Cost (Mine to Horne Smelter)

Concentrate Transportation	Cost (USD /t)
Truck Transportation	22.28
Transload Operations	4.41
CN Rail Transportation	63.61
MRR Rail Transportation	5.56
Gondola Lease Costs	8.01
Lid Rental	2.18
Total Transport Cost	**106.05**

19.3.2 Insurance

An insurance rate of 0.10% was applied to the provisional value of the concentrate to cover transport from the mine site to the smelter.

19.4 Contracts

There are no mining, concentrating, smelting, refining, transportation, handling, sales and hedging, forward sales contracts, or arrangements for the Project. This situation is typical for a development stage project still several years away from production.

20 ENVIRONMENTAL STUDIES, PERMITTING, SOCIAL OR COMMERCIAL IMPACT

20.1 Introduction

Mining and mineral processing occurred at the White Pine location from the late 1800s through 1995. The underground mine workings extend under an area of approximately 16,000 acres and from the surface to a maximum depth of approximately 2,800 ft. The surface components of the mine were located on approximately 400 acres and the tailings impoundments occupy approximately 5,500 acres.

To permit and construct a new facility, an understanding of environmental baseline conditions is needed. The potential environmental impacts of a new facility will need to be evaluated in permitting, specifically the Environmental Impact Assessment (EIA), which is part of the Mining Permit. This section summarizes environmental studies and significant topics including the project's plan for waste and water management, closure, monitoring, permit requirements, and financial assurance. As well, social and community impacts of the proposed Project are described.

20.2 History and Environmental Issues at the Site

The White Pine Mine ceased operation in 1995 and has been the subject of an extensive remediation program outlined in judicial Consent Decree ("CD") and Remedial Action Plan ("RAP") agreements between the Copper Range Company ("CRC") and the State of Michigan. The entire surface area overlying the underground mine along with the associated surface components area and tailings impoundments are listed as a "facility" under Part 201, Environmental Remediation, of Michigan's Public Act 451 of 1994 as Amended, the Natural Resource and Environmental Protection Act ("NREPA").

The CD issued to CRC has a stipulated order for assignment and assumption of CD dated July 2021, prompted by Highland Copper (dba White Pine Copper LLC [WPC]) interest in the property. The order notes long-term obligations pertaining to operation, monitoring, maintenance, and financial assurance that were part of a transaction enabling WPC to use the property.

Several remediation reports have been prepared including a Remedial Investigation (MFG, 1999), a RAP (MFG, 2005), Phase I and Phase II Environmental Site Assessment reports prepared in 2020 by Mannik & Smith Group, Inc.; five Baseline Environmental Assessment reports prepared in 2021 on various parcels by Mannik & Smith Group, Inc., and numerous supporting reports.

WPC has completed the transactions required to take ownership of the White Pine North property. Existing environmental liabilities and obligations will need to be factored into future design and operations of the

White Pine North Project. Table 20-1 lists remedial actions outstanding as of March 2021 (State of Michigan Circuit Court for the 30th Judicial Circuit, Ingham County, 2021).

Table 20.1: **Outstanding Remedial Actions to be Performed under the RAP as of March 2021**

List of Remedial Actions to be Performed
Maintain compliance with CRC NDPES permit.
Implement runoff sampling in Slag Pile Area.
Complete removal or installation of engineered barrier in Slag Pile Area, as necessary, based either on results of runoff sampling or election of presumptive capping remedy by CRC.
Complete delineation testing and any required removal of sediments from Portal Creek.
Complete delineation testing and any required removal of sediments from South Diversion Ditch.
Re-vegetation activities including augmentation as necessary of North No. 1 Tailings Basin each year until the effective cover and long-term sustainability components of the performance standard is achieved.
Re-vegetation activities including augmentation as necessary of Cyclone Sands on the external slopes of North 2 Tailings Basin each year until the effective cover and long-term sustainability components of the performance standard is achieved.
Implement RAP monitoring program including any required well installations.
Implementation of inspections.
Submit annual inspection and maintenance reports.
Submit annual inspection and maintenance reports.
Filing to remove existing groundwater restrictive covenants in areas where they are no longer applicable or notice to landowners of the process for such removal.
5-year cost review.
IRAP October 1998; Includes capping/revegetation of South Dam.
Underground Mine Closure Plan to address release or threat of release of a hazardous substance from underground workings of the mine.
Continued implementation of underground Mine Closure Plan or as modified.
Completion of all RAP activities except ongoing O&M.
O&M activities required by the CD and RAP

Notes:
CD = Consent Decree
CRC = Copper Range Company
NPDES = National Polluant Discharge Elimination System
O&M = Operation & Maintenance
RAP = Remedial Action Plan

Historical reports are available documenting environmental conditions at the former CRC mine site workings and nearby areas including:

- Environmental Assessment Report – White Pine Copper Division, Baker, August 1978,
- Environmental Aspects of the Proposed Solution Mining Operation, Shepard Miller Inc., February 1995, and
- Remedial Investigation Report – White Pine Mine, MFG, Inc., December 1999.

These reports, ongoing CRC monitoring reports required by the RAP, and information gathered during WPC's baseline monitoring efforts in 2014 and 2015 are relied upon to describe site conditions at the White Pine North Project area. Additional discussion of baseline environmental study requirements is provided throughout this section. Baseline environmental surveys require updating and additional field work completed before WPC can proceed with the permitting process under Michigan's NREPA. Among all the major permits, applications for a Part 632 Nonferrous Metallic Metal Mining permit and Part 301/303 Streams and Wetlands permit in particular need to include current data.

20.3 Landscape

The western Upper Peninsula is rural with low population. Over 75% of the total land area is covered in dense, second growth forest. The U.S. Forest Service (Ottawa National Forest) and State of Michigan {Porcupine Mountain Wilderness State Park ("PMWSP") and Copper Country State Forest} own a combined 41% of land in the western Upper Peninsula. Other significant landowners include CRC's holdings in the former White Pine Mine area and those of forest management companies engaged in timber harvesting activities. Topography in Ontonagon County ranges from nearly level lake plains to steep bedrock hills and bluffs. The lowest elevation is Lake Superior at 602 ft amsl; the highest is Summit Peak in the PMWSP at 1,950 ft amsl.

20.4 Environmental Baseline Studies

Historical environmental data for the White Pine Mine site was reviewed and compared with WPC's initial Project plans and Michigan's Part 632 regulatory requirements. Currently, White Pine data is being assembled and consolidated. The data inventory will include all the baseline groundwater and surface water quality; sediment; and soils sampling that has been collected at White Pine. As this is currently a work in progress, it has not been assessed for completeness.

Since 2014, several environmental studies have been undertaken. The following topics have been studied and will need further assessment for the need to update and in some cases complete to meet the data requirements of Part 632.

20.4.1 Hydrology and Hydrogeology

The Project site is located approximately five miles from Lake Superior. The surface water system in the vicinity includes the Mineral River, Perch Creek, and smaller perennial and intermittent streams, all of which flow principally south to north in a parallel drainage pattern and empty into Lake Superior. Other surface water features of interest include the tailings pond impoundments which cover over six square miles, flooded borrow pits and depressions from tailings impoundment construction and numerous swampy areas often related to beaver activity. Streams that historically flowed through the areas that became tailings impoundments have been rerouted to streams flowing near the east and west perimeters.

The Mineral River receives the majority of its water from surface runoff, including the North Pond 2 (NP2) Outfall into Perch Creek (Current CRC National Pollution Discharge Elimination System (“NPDES”) Permit MI0006114). The outfall is permitted for a maximum discharge of 12 million gallons per day (“MGD”) of mine dewatering water and an unspecified amount of storm water runoff although total flow typically averages around six MGD. Base flow is supported throughout most dry seasons via influent groundwater from the shallow aquifer.

The groundwater system in the vicinity of the Mine property can be divided into two basic hydrostratigraphic units:

- the shallow aquifer consisting of unconsolidated overburden sediments and the underlying, shallow, fractured bedrock, and
- the lower bedrock units consisting of low permeability siltstone, sandstone, and shale with relatively few open fractures.

The unconsolidated sediments that comprise the upper portion of the shallow aquifer consist of low permeability clay, silt, and sand of glacial and lacustrine (lake-deposited) origin. Recharge to the unconsolidated sediments occurs mostly by direct infiltration of precipitation. Because of the low productivity of these sediments, very few wells in the region derive groundwater solely from the unconsolidated sediments but rely, in part, on the underlying shallow fractured bedrock for adequate water supply. The permeability of the Precambrian bedrock in the vicinity of the Project is low. Groundwater from the upper bedrock is derived almost entirely from secondary fracture permeability formed as a result of glacial loading and unloading. As a result, the hydraulic characteristics of the shallow bedrock are similar, despite a wide range of bedrock lithologies. Fracturing of this type decreases rapidly with depth until permeability of the bedrock is too low to yield groundwater in usable quantities.

Groundwater in the deep unit is hydraulically disconnected from the shallow aquifer except where drill holes and faults may provide localized points of interconnection between the deeper bedrock and shallow bedrock systems. While the faults and drill holes may present a pathway for deeper groundwater to affect shallow groundwater and/or surface water, the extent of these effects is relatively insignificant. The deeper aquifer is high in TDS and does not represent a usable aquifer.

CRC's 1995 Shepard Miller solution mining report provided a detailed analysis of groundwater hydrology in both the near surface shallow aquifer and the deep bedrock aquifer and will provide a useful reference for groundwater hydrology of the White Pine North Project and vicinity.

Additional baseline data and environmental effects analysis will need to be collected and completed for permitting. This includes:

- WPC will need to confirm Shepherd Miller (1995) data and if need be, collect additional baseline data related to the hydrogeological system to characterize potential impacts related to the underground mine. This may entail a hydraulic testing program and geophysical/hydrophysical logging of bedrock boreholes in the vicinity of Project infrastructure. This work should be sufficient to address the following issues:
- Groundwater inflow to the mine during operations.
- Groundwater drawdown during operations due to mine inflow.
- Baseflow impacts to nearby streams due to mine dewatering.
- Storm water runoff impacts to stream flows due to surface operations.
- Groundwater quality impacts due to potential seepage from the tailings facility.
- Groundwater quality impacts from the closed mine.
- Hydrologic impacts to nearby wetlands due to mine dewatering and alteration of local wetland watersheds due to site construction/operations.
- One year of annual baseline groundwater and surface water quality monitoring.
- A program for hydraulic characterization of the bedrock in the vicinity of the proposed underground mine.

20.4.2 Water Quality

Surface water sampling in stream segments and drainage areas of the former White Pine Mine surface facilities was completed as part of CRC's remedial investigation. A limited amount of sampling occurred in off-site streams considered to have had no impacts from historic mining activity. Constituents of concern identified were boron, copper, lithium, manganese, strontium and zinc.

Elevated copper concentrations are common in surface waters of the White Pine Mine area, especially the Mineral River. Some of this can be attributed to naturally occurring Nonesuch formation outcrops in stream beds with contributions from recent and historic mining and mineral processing operations. Duck Creek to the east, and away from, mine influenced areas also exhibits elevated copper concentrations.

Perch Creek is influenced by the current tailings pond discharge that includes precipitation runoff from the North and South Tailings Ponds and a significant amount of underground mine water that is pumped into the NP1 to maintain water level in the mine. The deep bedrock water infiltrating into the former mine workings is high in dissolved solids (mainly chlorides) and is mixing with a freshwater cap that CRC flooded most of the former mine workings with as part of their site closure activities.

CRC completed groundwater sampling in the vicinity of the White Pine Mine as part of its remedial investigation including a limited number of monitoring wells considered to be outside the influence of mining activities. Constituents of concern identified were barium, boron, manganese, lithium, and strontium. These elements are naturally present as trace metals in deep bedrock groundwater at the White Pine Mine and throughout the Canadian Shield. Historical data show that groundwater quality is poor in local areas outside the influence of the mine, in particular for elevated chloride content.

20.4.3 Mineralization and Acid Rock Drainage Potential

The White Pine copper deposit mineralized units occur in two modes: as very fine-grained sulfide (chalcocite) and as native copper. Sulfide mineralization is estimated to account for 85-90% of the copper in the deposit, but both modes of copper are intimately associated throughout the deposit. The geochemical characteristics of the deposit are important contributors to the metallurgy and to water management. In particular, the potential acid generating characteristics of mineralized material, waste rock, and tailings should be understood for permitting and throughout operations and closure.

Acid Base Accounting ("ABA") and synthetic precipitation leaching procedure ("SPLP") tests were performed on samples of White Pine tailings as part of CRC's remedial investigation to evaluate acid generation and leaching potential. Neutralization potential of the tailings was found to be high and acid generation potential was calculated as zero with pyritic sulfur in the samples less than the analytical detection limit (0.01%). The SPLP test results were less definitive due to reasons of analytical detection limits and the SPLP test only being an indicator of short-term mobility of leachable metals. The historic White Pine tailings are permanently disposed of and are interacting with interstitial pore water, precipitation and, to a limited extent, ambient oxygen.

A test program needs to be completed as part of the environmental impact study that includes bulk characterizations and both short-term and long-term tests under static and kinetic conditions as appropriate to simulating planned environmental conditions. Low detection limit analytical methods need to be used, e.g., EPA method 1631 for ultra low-level mercury analysis. This information will be important in the design of the water management system.

The geochemical testing program completed for Highland Copper's Copperwood Project (formerly Orvana Minerals) can serve as a model and indicator of expected results for the White Pine North Project as the geologic settings for both mines are very similar, i.e., glacial lakebed plain overlying Freda, Nonesuch and CHC bedrock formations with ore mined from the base of the Nonesuch formation. Air Quality

The White Pine North Project is located in an attainment area for all criteria pollutants and there are no active major sources of air pollution in close proximity. The nearest major source is a natural gas transmission station 41 km (26 mi) southwest of White Pine and a newly commissioned natural gas engine power plant 72 km (45 mi) to the east. A meteorological station was installed at the White Pine North Project location in December 2022. In addition to the onsite weather station current and historical local weather data is available from stations located in Ironwood (56 km (35 mi) west southwest) and Bergland (19 km (12 mi) south) which can provide a longer meteorological record.

20.4.4 Soil Quality

Near surface soils in the White Pine area are described by the US Natural Resources Conservation Service the Forest Service in the publication *Soil Survey of Ontonagon County, Michigan*, *2010*. In the White Pine North Project area, there are four soil units that comprise approximately 60% of survey map units described as loamy to fine-loamy with varying clay contents.

CRC's remedial investigation included both gridded and targeted soil sampling, mostly for metals and organics. Not surprisingly, copper content was found to be elevated above background levels, especially in the former surface facilities areas and in clusters along the Mineral River. Elevated levels of petroleum products were noted at locations in the surface facilities area. Other metals, including arsenic and lead, were found above various Michigan's Part 201 screening levels. The bulk of these were in the surface facilities area. Remediation for these risks identified in CRC's RAP was placement of an engineered barrie (either compacted clay or asphalt) and deed restrictions for industrial property use only.

20.4.5 Flora

In the early summer of 2015, biological consultant White Water Associates ("WWA") competed a set of early season meander surveys of understory and ground level vegetation in the Project area west of the North Tailings Ponds. Financial constraints precluded the typical follow up surveying in late summer and no report was produced. The early field work identified a possible state threatened plant species (Sweet Cicely) present in low abundance. Since early growth of this species can be confused with similar non-listed plants in the same family, its identity was to be confirmed in the late summer round when the plants had produced seeds.

Flora surveys in the White Pine North Project area will need to be re-initiated according to Part 632 requirements. The Copperwood Project area, located in a similar lake plain setting can be used for comparison and a single field season of surveys should satisfy the Part 632 requirements.

20.4.6 Fauna

Fauna information for the White Pine North area in the 1978 Baker report describe typical western Upper Peninsula wildlife and species known to inhabit in the region. Baker noted that migratory waterfowl that passed through the area and that resident populations of Blue Herons and Canada Geese were present. Baker also provided an appendix listing all mammal, bird, reptile and amphibian species known to be present in the White Pine area.

Species listed under the Endangered Species Act known to be present in 1978 are still present in the area. A query of the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) tool returns the following:

The following endangered species are potentially affected by activities in this location:

- Canada Lynx - threatened species
- Gray Wolf – endangered species
- Northern Long-eared Bat – endangered species
- Tricolored Bat – proposed endangered species
- Red Knot – threatened species

- Monarch Butterfly – candidate species

There are no listed critical habitats in the Project area.

The following species are protected under the Bald and Golden Eagle Protection Act or the Migratory Bird Treaty Act:

- Bald Eagle
- Black-billed Cuckoo
- Canada Warbler
- Chimney Swift
- Eastern Whip-poor-will
- Evening Grosbeak
- Lesser Yellow
- Wood Thrush

Wolf presence was noted during winter mammal tracking surveys that WWA competed in 2014-2015. While they are considered as being recovered but still listed as endangered. In 2015, the presence of Northern Long eared Bats was noted in the Project area. Stream surveys for aquatic life were also completed in eight locations but final analyses of field collected macroinvertebrates was not completed.

A new biological monitoring program will have to be initiated to meet Part 632 requirements. Field data from 2015 Copperwood Project data set can be used for reference, as with water quality and flora, and a single field season of surveys should satisfy requirements.

20.4.7 Archaeology and Cultural Resources

WPC is not aware of any Phase I Archeological Surveys that have been completed in the White Pine Mine area. Published information has established a history of native copper mining from Ontonagon to the Keweenaw Peninsula going back as far a 7,000 years ago. When the US government ratified the 1842 Treaty of LaPointe with the local Ojibwa Tribes, the area was opened to exploration and commercial exploitation of these same copper deposits. In the Treaty of LaPointe, the Ojibwa natives retained rights to hunt, fish, gather and otherwise use natural resources in the ceded territory of the treaty. In legal terms these are referred to as usufructuary rights.

WPC participated in a scoping meeting hosted by the State of Michigan in May of 2015 that included tribal representatives. A report prepared by the Great Lakes Indian Fish and Wildlife Commission was shared with WPC. The title of the report is *Cultural and Economic Importance of Natural Resources Near the White Pine Mine to the Lake Superior Ojibwa*, June 1998. Most of the document is based on activities of the Ojibwa natives after arrival of Europeans in the early 1600's. Activities noted in the White Pine Mine area centered around seasonal encampments at the mouths of the Big Iron and Ontonagon Rivers. There was an established foot trail that headed south from the Big Iron River (8 km (5 mi) north-northwest of the mine) that was used for access to the Lake Gogebic area (19 km (12 mi) to the south of the mine). The report does not provide indications of the trail route. For reference, the Big Iron River is west of State Highway M-64 and outside of the White Pine North Project area.

At a minimum, Phase I Archeological Surveys will be required in any area of the project that will have direct impacts on the land surface or water resources. Outreach with Native American Tribes regarding the project should be consistently pursued throughout life of mine starting as early as practical.

20.4.8 Socioeconomic

Ontonagon County is one of Michigan's least populated counties with the village of Ontonagon, population 1,285 (2020 census) the county seat and largest municipality in the county. Adjacent to Lake Superior and heavily forested, portions of Keweenaw National Historical Park and Ottawa National Forest lie in Ontonagon County. Additionally, the Porcupines State Wilderness State Park lies in a large portion of the county. This state park has a ski area and amenities that attract year-round visitors, making it a significant economic draw in the county. Besides leisure activities including hunting and fishing, logging is part of the economic activity. Industrial activities are comparatively minimal.

Ontonagon County and the area of the former White Pine Mine have been experiencing a steadily declining population since the mine closed in 1995 followed by the Ontonagon kraft pulp mill closing in 2010. U.S. Census data for Ontonagon County confirms this decline in total population (rounded data): Year 2000 - 7,800 residents, Year 2010 - 6,800 residents, Year 2020 - 5,800 residents. Even more telling from a socio-economic viewpoint is the median age estimate from the 2020 Census was 59 years. The townsite of White Pine has seen a population decline from 1,100 residents in 1995 when the mine closed to 446 in 2020 with a median age of 57. A number of residential dwellings in White Pine are owned by non-residents and used as vacation/recreation homes.

There are limited employment opportunities in Ontonagon County with the larger employers focused on healthcare, government, and education: Aspirus Ontonagon Hospital, various units of the Ontonagon

County Government, and the two Ontonagon County school districts. Neighboring Gogebic County provides some employment for Ontonagon citizens.

Rejuvenating the White Pine Mine and the investment, construction, operations, labor needs, and impact on the community would be significant. A report prepared by Labovitz School of Business and Economics prepared for the Copperwood Project (2011) estimated annual economic impacts in terms of hundreds of millions of dollars on Michigan counties of Gogebic, Houghton, and Ontonagon along with Wisconsin counties of Iron and Ashland. Updated to current terms, the economic impact of this project will be significant on the county and surrounding region.

20.5 Mining Waste Management

Mine waste management is a focal point of permitting and assessment of environmental issues. Mine waste includes tailings and waste rock. Waste rock is typically stored temporarily as it will be either returned to the excavated mine or deposited in the tailings facility. Waste rock will be stockpiled in the northeast corner of the surface facility. Under the Part 632, reactive material stockpiles must be underlain with a liner or an alternative system. Part 632 defines reactive as materials susceptible to reacting, dissolving, or otherwise forming a leachate that may be harmful to the environment or human health. Waste rock will need to be demonstrated as either non-reactive or the stockpile will need a satisfactory liner system or equivalent.

Tailings facilities become permanent structures and must be managed from both structural integrity and environmental protection perspectives. North Pond 2 will be vertically raised to accommodate tailings from White Pine North. NP2 ability to physically accommodate additional tailings is described in Section 18.16. Based on results of the geochemical testing program, tailings may fall into the reactive category of materials under Part 632. As such without a liner system under the current or new tailings system, a perimeter containment system may need to be upgraded. Any upgrade in the containment system will likely be driven by potential legacy water quality impacts from prior and future mining activities. As noted in Section 20.4.2, it is likely that any historic water quality effects related to copper in shallow groundwater and downgradient streams will need to be addressed as part of the expanded tailings management operation at NP2. Furthermore, Michigan recently established a chloride standard that may need to be addressed as it pertains to long-term operations with new tailings being generated and managed. Documentation on the geotechnical and geochemical behavior of the stored tails, both short term and long term will be needed.

20.6 Water Management

Water management at a mine site is based on collecting and containing water that contacts or potentially contacts sources of contaminants such as water pumped from the mine, mineralized material, waste rock, tailings, and runoff from the operations area. Underlying environmental studies discussed in the EIA are used to develop a facility water balance. The water balance considers:

- Water entering the facility includes precipitation, mine water inflow from both new and historic, seepage from the tailings facility, and water supply.
- The tailings facility seepage capture will be of interest in the context of USEPA interpretation of the Supreme Court's opinion in County of Maui v. Hawaii Wildlife Fund. That case addresses the question of whether a NPDES permit is required for releases of pollutants from a point source to a jurisdictional water through seepage to shallow groundwater.
- Water storage structures will need to be lined and meet storm water and storm event requirements. Storm event intensity and duration upon which to plan should include climate change scenarios.
- Water basins and ponds containing process water (excluding the TDF) will need to be lined.

Water treatment facilities must operate under a variety of conditions and operate consistently according to permit limits. The Copperwood NPDES permit serves as a model to an anticipated White Pine NPDES permit. Several considerations applicable to White Pine are:

- The tailings facility currently in place is not lined. Water sourced from a variety of sources is routed to the outfall. Placing the new tailings facility on top will introduce water management issues that will need to be understood.
- A water quality model should be developed to estimate the water quality of influent to the treatment system and seepage from the tailings facility that could affect water quality in adjacent streams and the need for a seepage containment system around the perimeter of the tailings facility. An adequate data set will be needed to gain confidence in system design and cost development.
- Geochemical characteristics of materials including waste rock, mineralized material, tailings will need to be understood to account for their contribution to contaminants in the facility water and to design the WWTP.
- A groundwater model will be needed to inform the expectation of mine water inflow. An understanding of the hydrogeological systems surrounding the facility will be needed.

20.7 Closure

In the Part 632 application, final reclamation including schedule, sequence, and duration of reclamation will be needed. This does not have to be detailed, however, should include the proposed actions needed to restore the land to as natural a condition as possible. Closing off the underground mine excavation for both health and safety as well as environmental risk should be addressed. Decommissioning and removing the surface facility such that only permanent structures such as the tailings facility are part of reclamation, leaving open future negotiations with area stakeholders for other rehabilitation approaches. Stabilizing, regrading, and revegetating the White Pine site, disposition of all toxic and hazardous wastes, refuse, tailings, and other solid waste must be addressed. Long-term monitoring will continue as part of closure and costs are tied to financial assurance requirements. Closure costs are provided in Section 22.3.3.

20.8 Environmental Monitoring

The Part 632 application will need to include a comprehensive environmental monitoring plan that addresses monitoring groundwater, surface water, and other environmental conditions to demonstrate compliance and protection of the environment during operations and for 20 years after completion of mine closure. During permit processing, various EGLE experts contribute to permit condition details to outline monitoring requirements. The permit holder will need to submit detailed sampling and analysis plans for approval. Data collected is also required to be submitted on various frequencies.

20.9 Permitting

Nonferrous mining in Michigan can be permitted entirely under delegated state programs if federal actions can be avoided. In most states, wetland permits are typically needed and are issued by US Army Corp of Engineers thus initiating an environmental review under National Environmental Protection Act (NEPA). NEPA requirements can extend approvals and require additional coordination and regulatory risk. It is anticipated that permitting at White Pine can be accomplished entirely under state permitting regimes. That said, the US Environmental Protection Agency can elect to review and comment on the NPDES, wetland, and air permits.

The following major permits will be necessary for the project, all under Michigan Natural Resources Environmental Protection Act (NREPA):

- Part 632 Non-Ferrous Metallic Mining Permit and Environmental Impact Assessment
- Part 55 Air Permit to Install
- Part 31 National Pollutant Discharge Elimination System Permit
- Part 301 Inland Lakes and Streams /303 Wetland Permit
- Part 315 Dam Safety Permit.

20.9.1 Part 632 Mining Permit

Two parts of the application are needed: Volume I addresses the description of the project including production rates, mining methods, equipment, tailings design, infrastructure needs, environmental protection, reclamation and closure, contingency plans, and financial assurance.

Volume II the EIA, describes baseline conditions, supporting data, and the environmental impacts and mitigation methods anticipated from the project. The EIA requirements include data on environmental media, including surface and groundwater, biological resources, air, and cultural resources. The Oil, Gas, and Mineral Division (OGMD) of EGLE administers this permit.

Mining permits are overarching in that they consider the facility as a whole and incorporate the other permits. Mining permits address the entire life of mine and although they can be adjusted or revised by the agency at any time, they do not need renewal as do the other permits. The financial assurance requirements enable the agency to administer the site through a third party should the permittee become unable to do so. Additional discussion is provided in Section 20.9.6.

20.9.2 Part 55 Air Permit to Install

EGLE Air Quality Division (AQD) administers this permit, currently anticipated to be a Permit to Install. Should certain emissions exceed 100 tons per year, a Renewable Operating Permit (typically recognized as a major air permit) may be required. The permit is based on emissions inventoried from operations and equipment. Dispersion modeling demonstrates compliance with health-based standards.

20.9.3 Part 31 NPDES Permit

This permit is administered by EGLE Water Resources Division (WRD), focuses on the water discharges from the facility in both quantity and quality. Water managed throughout the facility will be collected for use, storage, or treatment prior to discharge. White Pine also has water discharges from the NP1 and NP2 discussed in Section 20.5 and 20.6. Under current and anticipated water quality standards, the water treatment needs will need to be engineered for consistent performance. Capturing all contact water for treatment will be important for this permit and minimizing water quality related impacts in the surrounding environment.

The permit addresses industrial stormwater management practices and infrastructure. The agency also reviews and approves the WWTP design prior to construction.

20.9.4 Part 301 Inland Lakes and Streams /303 Wetland Permit

The area is rich with wetlands and streams, therefore the new facility is anticipated to need a 301/303 permit. Wetland delineations were completed in 2014 for an approximately 900-acre area thought likely to be utilized for new development. Additional field delineation of wetlands will be required adjacent to the north and east embankments of the NP2 if expansion by downstream construction is chosen to provide increased disposal capacity. Any future wetland permit application will need current wetland reports addressing delineation with borders confirmed by WRD.

Wetland applications address both wetland impacts and must contain commensurate mitigation measures. Additionally, these permits entail financial assurance requirements. This permit is administered by WRD and when a Part 315 permit is required, this permit is coordinated with it.

20.9.5 Part 315 Dam Safety Permit

Structures greater than 6 feet in height with a surface water of five acres or more requires a Part 315 Dam Safety Permit. This applies to both the tailings facility as well as the event ponds. With the expansion of the NP2 and encroachment on adjacent wetlands, this permit is linked to the Part 301/303 permit and is administered by WRD as well. The Dam Safety Permit addresses both structural engineering, monitoring, hazard/emergency management, and environmental aspects of this structure focusing on impacts to downstream resources. The application requires a Project assessment, a version of the EIA with focus on aquatic resources and habitat. Although WRD can issue a permit based on a conceptual design, they can also require a more detailed design package at time of application. It is anticipated that a more detailed design will be needed for this project.

Other minor and local permits and approvals are also required to start construction and mine operation that include:

- Local building and zoning permits
- Explosives handling permit from the US Bureau of Alcohol, Tobacco, and Firearms
- Storage tank permits
- Mine Safety and Health Administration registration

20.9.6 Financial Assurance

Part 632 regulations require a financial assurance instrument must be sufficient to cover the cost to administer and to hire a third party to implement the reclamation, remediation, and post closure monitoring plan for the mine site. An approved portion of the assurance instrument must be in place prior to starting what Part 632 defines as "mining activity" that includes earthworks activity for site construction. The assurance can be negotiated in staged amounts commensurate with the amount of reclamation effort each stage of project construction will cause.

Financial assurance is proposed in the MPA and finalized upon issuance of a permit. As noted above, obligations continuing under the CD may interact with financial assurance dedicated to mining and reclamation operations subject to the Mining Permit.

Release of the financial assurance instrument will be made based on restoration of the site and satisfactory reclamation of the tailings disposal facility. Full release of the financial assurance instrument can take place upon documentation of successful completion of the 20-year post closure monitoring plan and agreement by the State of Michigan that all requirements of the Part 632 regulations have been satisfied.

20.10 Permitting Process

The permit process administered by EGLE will include coordination between three divisions within EGLE. These include OGMD, WRD, and AQD. OGMD is overall coordinator of the agency review team. Generally, each division reviews the application, determines its completeness, issues comments to the applicant, and reviews applicant responses. Upon resolution of agency comments, EGLE will schedule and conduct public meetings and public hearings to solicit public input and render proposed and final decisions. Issued permits can be challenged within certain time frames and contested case hearings are overseen by an Administrative Law Judge.

21 CAPITAL AND OPERATING COSTS

21.1 Capital Expenditures

The capital cost estimate was established using a hierarchical work breakdown structure. Estimates are based on benchmarks and scaling from the Copperwood Feasibility Study. This is a Class 5 estimate prepared in accordance with AACE International's Cost Estimate Classification System. The accuracy range of the capital cost estimate is +/-35%. The base currency of the estimate is US dollars (USD). No escalation was built into the capital cost estimates. The estimates are as of Q2 2022 with a few updates done in Q1 2023 (Reagents, Structural Steel. Underground Mining Ground support steel).

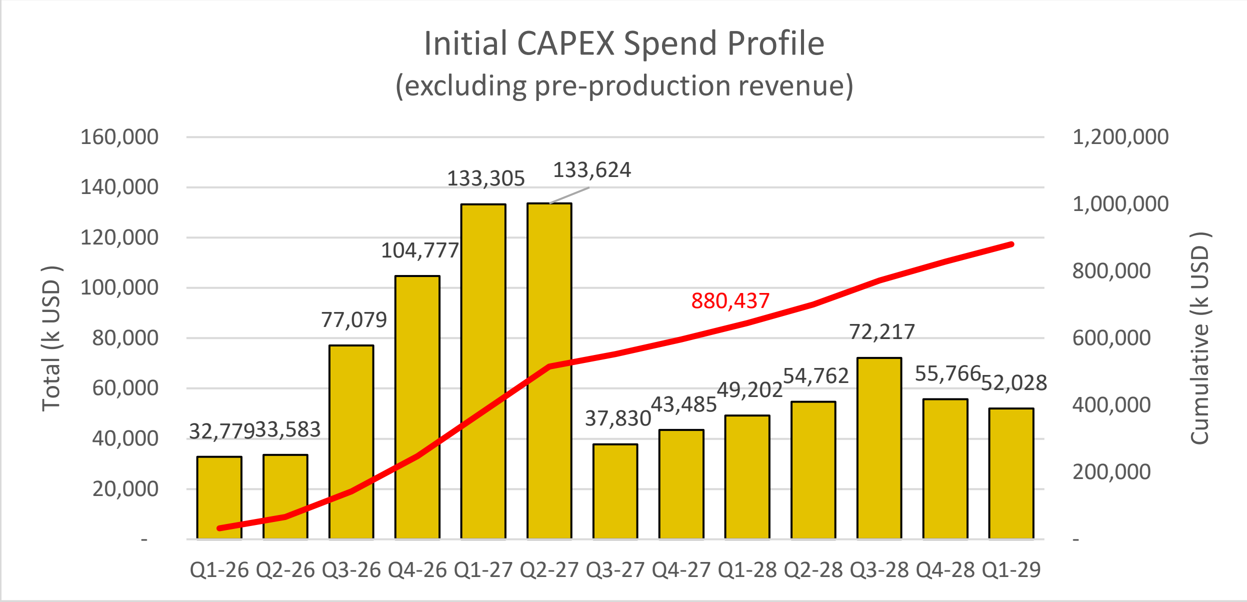
This capital cost is estimated at USD 615.18M net of pre-production revenue as presented in Table 21.1.

Table 21.1: Capital Expenditures Summary

Initial CAPEX	k USD
000 - General	587
100 - Infrastructure	44.369
200 - Power & Electrical	76.091
300 - Water & TSF Mgmt.	97.306
400 - Mobile Equipment	93.211
500 - Mine Infrastructure	93.057
600 - Process Plant	148.888
700 - Construction Indirects	71.456
800 -General Services & Owner's Costs	42,740
900 - Pre-Production, Commissioning	72,307
Sub-Total Before Contingency	740.012
Contingency (19%)	140.425
Total Incl. Contingency	880.437
Less: Pre-Production Revenue	(265.253)
Total Incl. Contingency & Pre-Prod Revenue	615.184

The initial capital expenditures spend schedule over a 3.25-year period (Q12026 to Q1 2029) is presented in Figure 21.1.

Figure 21.1: Initial Capital Expenditures Spend Schedule



21.1.1 <u>Infrastructures</u>

A capital expenditure ("CAPEX") summary for infrastructures is presented in Table 21.2. The detailed description of infrastructures and roads are presented in Section . Notable infrastructures include roads, explosive plant, plant workshop, truck shop and warehouse, admin building, laboratory, natural gas farm, topsoil storage area, and more. A total of USD 44.4M is estimated for site infrastructure.

Table 21.2: Infrastructure CAPEX

Area	k USD
110 – Infrastructure	**2.179**
111 - Main Access Road	579
112 - Site Roads	344
113 - External Site Roads	-
114 - Fencing	658
115 - Site Drainage & Trenches	422
117 - Employee Parking Lot	176
120 – Workshops / Storage	**1.593**
121 - Terrace	519
123 - Plant Workshop & Stores	653

Area	k USD
124 - Reagents Storage Building (if no building required, see 670)	3
128 - Explosive Plant / Magazine	419
130 - Support Buildings	**36.310**
131 - Truckshop & Warehouse	20.029
132 - Dry and Changeroom	-
133 - Mill Office / Met Lab / Control Room	6.868
135 - Main Gatehouse	546
138 - Concentrate - Transload Building & facilities - includes truck washout	8.867
139 - Admin Building	-
160 - Laboratories	**127**
161 - Assay, Environmental Laboratory	127
170 - Fuel Systems	**4.117**
170 - Fuel systems (Mining and Light vehicle combined)	1.558
171 - Mining Equipment Fuel Storage	-
174 - Light Vehicle Fuel Storage	-
175 - Natural Gas	2.559
180 - Other Facilities	**42**
181 – Recycling / Sort Facility	-
182 - Landfill	-
183 - Top Soil Storage area	42
Grand Total	**44.369**

21.1.2 Power Supply and Communications

A summary of the CAPEX for electrical and communications is presented in Table 21.3. They include all equipment and installations for power supply and distribution. The power line and main site substation costs are negotiated with the power rates with the utility company and therefore are not shown in this table. The electrical infrastructures are detailed in Section 18 of this Report. A total of USD 76.1M is estimated for the power supply and electrical capital expenditures.

Table 21.3: Power Supply and Electrical Capital Expenditures

Area	k USD
210 - Main Power Generation	**24.459**
212 - Main Substation - UMERC Supply on power cost	346
213 - Site Power Plant	23.762
215 - Main Powerline (from Grid)	350
217 - Emergency Power Generation	-
220 - Electrical Rooms Process Plant	**21.532**
222 - Main Process Plant Electrical Room	15.846
225 - Reclaim Water Electrical Room (at TDF)	2.274
226 - Portal Pad Electrical Room	2.744
227 - Water treatment Plant (in Golder Estimate)	-
228 - Seepage Collection	511
229 - U/G Heating Ventilation Intake Electrical Room	158
240 - Site Power Distribution	**1.973**
241 - Site Powerlines	1.973
250 – U/G Power Distribution	**11.333**
252 - U/G Mine E-room	3.827
255 - U/G Distribution	7.506
260 - IT & Site Communications (surface)	**2.798**
261 - IT & Site Communications	2.798
270 - U/G Communication Network	**8.744**
271 - U/G Comm Network (incl Mine Eq Monitoring)	8.744
280 - Automation Network	**3.156**
281 - Automation Network	213
282 - Process Monitoring System	2.943
290 - IT Network & Fire Detection	**2.096**
293 - Fire Detection Network Process Plant	1.958
295 - Server Room	138
Grand Total	**76.091**

21.1.3 Water and Tailings Disposal Management

21.1.3.1 Portable Water and Reclaim System

The existing potable water system will need infrastructural update to provide potable water to the Project.

The reclaim water system will need a pumping system at the TDF. A floating barge with an access platform, two (2) vertical turbine pumps (1 operating and 1 standby), control valves, an anchor system, a trolley beam, and a maintenance hoist will need to be purchase for the project.

21.1.3.2 Tailings Disposal Facility

Details and description of Tailings and Water Disposal Facility(“TDF”) installation and systems are provided in Section 18. The Tailings Disposal Facility “(TDF”) is built within the existing Tailings facility called North Pond 2 (NP2). It is assumed, suggested by Golder’s report, that with the removal of the superior layer capping the tailings, the dams will provide sufficient volume to cover 2 to 3 years of production.

The surface water management system is constructed to gather all contact water generated on site. It includes the lined ditches, pumping station and pipelines from pumping stations to the event pond. From the event pond, the plan is to ultimately pump the water to the TDF.

21.1.3.3 The Fire water, Domestic Sewage and Water Intake

The fire water estimate includes the fire pumps, the distribution network within the processing and mine plant.

The domestic sewage system will require an additional update in terms of pumping and piping to bring the dirty water of the mine site to the town sewage water.

The existing Lake Superior water in-take works include works at the pumping station only.

A CAPEX summary for water management is presented in Table 21.4. A total of USD 97.3M is estimated for tailing and water management for the project.

Table 21.4: Tailings & Water Capital Expenditures

Area	k USD
310 - Process & Raw Water	**1.406**
311 - Process Water	393

312 - Fresh Water Intake	453
313 - Gland Water	561
315 - Potable Water	**960**
320 - Reclaim Water	**7.511**
321 - Reclaim Water System	3.836
322 - Reclaim Pipeline	3.675
330 - U/G Water Management	**1.483**
331 - U/G Mine Dewatering	1.353
332 - U/G Mine Water Supply	130
340 - Tailings Disposal Facility	**15.770**
342 - TDF Main Dams (From Golder)	10.000
343 - TDF Water Pumphouse & Seepage Tank	200
346 - TDF Pipeline	5.570
350 - Surface Water Mgmt	**1.273**
351 - Event Ponds	666
353 – Pumping / Pipelines systems	607
360 - Effluent Water Management	**63.490**
364 - Water Treatment Plant (From Golder)	62.500
368 - Final Effluent Pipeline and Diffuser	990
370 - Fire Water	**4.482**
371 - Pumping system & Reservoir	1.675
372 - Fire Water Distribution	2.807
380 – Domestic Sewage	**931**
381 - Sewage Treatment System	931
Grand Total	**97.306**

21.1.4 Surface Operations

The surface operation category includes surface and production equipment. It includes all capital expenditures related to the acquisition of primary mining and support equipment. Equipment CAPEX include the purchasing cost, assembly cost and all safety and optional installs on the equipment.

A summary for the capital expenditures for mobile equipment is presented in Table 21.5.

Table 21.5: Mobile Equipment Capital Expenditures

Area	USD
430 - Surface Mobile Equipment	**5.208**
431 - Surface Mobile Equipment	5.208
440 - U/G Mining Equipment & Maintenance	**88.003**
441 - U/G Mining Equipment	41.253
444 - U/G Support Equipment	31.141
449 - Mining Equipment Capital Spares	15.609
Grand Total	**93.211**

21.1.5 Mine Infrastructure

Mine infrastructure CAPEX includes the surface mine infrastructure (stockpile), underground mine infrastructure (portal, level development, compressors, lunchrooms), ventilation raises and escapeways, underground dewatering system, underground maintenance shop, underground explosive storage and the conveying system.

Mine development includes labour, consumables to complete the drifts to reach mining panels. A summary of the CAPEX for mine infrastructure is presented in Table 21.6.

Table 21.6: Mine Infrastructure Capital Expenditures

Area	k USD
510 - Surface Mine Infrastructure	**1.169**
517 - mineralized material Stockpile Pad	833
518 - Waste Stockpile Pad	336
520 - U/G Mine Infrastructure	**34.158**
522 - Portal (Boxcut)	6.670
526 - Level Development	25.264
527 - Underground compressors	1.913
529 - U/G Mine Refuge / Lunchroom	311
530 - Ventilation raise & Escapeways	**12.220**
533 - Power Supply / HVAC	5.366
535 - Building, Gas supply and civil works	354

Area	k USD
Ventilation Raise & Escapeways Mining	6.500
550 - U/G Mine Dewatering System	**832**
551 - U/G Mine Dewatering System	832
560 - U/G Maintenance Shop	**4.000**
561 - U/G Maintenance Shop	4.000
570 - U/G Explosive Storage Facility	**53**
571 - 570 - U/G Explosive Storage Facility	53
580 - U/G conveying/crushing system	**37.901**
581 - Feeder breakers and Primary Conveyors	37.901
590 - Other Mining Costs	**2.723**
Grand Total	**93.057**

21.1.6 Process Plant and Related Infrastructures

The initial capital cost estimate for the processing facility is provided in Table 21.7. The estimate covers all costs and construction works related to the processing plant, earthworks, concrete, structural steel, mechanical, piping, electrical / instrumentation and architecture equipment and labor.

Quantities for earthwork, concrete, structure, piping, electrical, instrumentation and architecture material take-offs were estimated as per similar project, namely the Copperwood project. The unit rates for material were estimated by GMS. The list of mechanical equipment was derived from PFDs. All related plant auxiliary services and reagents are also included.

Table 21.7: Processing Capital Expenditures

Processing Capital Costs	k USD
601 - Process Plant Building	10.711
603 - Buried Services	781
610 - Crushing & Ore Handling	**17.326**
611 - Ore Handling	5.028
613 – Stockpile / Reclaim - Ball Mill Feeder- Line 1	12.297
620 - Grinding	**46.484**
621 - Grinding	45.186

Processing Capital Costs	k USD
622 - Media Storage	648
623 - Recirculation Conveyors	650
630 – Flotation / Regrind Circuit	**38.594**
630 – Flotation / Regrind Circuit	9.076
631 - Conditioning Tank	2.894
632 - Primary Flotation Cells	5.834
633 - Secondary Flotation Cells	2.779
634 - 1st Cleaner Flotation Cells	3.898
635 - 2nd Cleaner Flotation Cells	2.462
636 - Regrind	11.652
640 – Tailings	**3.838**
642 - Flotation Tailings	3.838
650 – Copper Concentrate Filtration; Thickening & Handling	**10.506**
650 - Copper Concentrate Filtration, Thickening & Handling	987
651 - Cu Concentrate Thickening	1.631
652 - Cu Concentrate Filtration	5.703
653 - Concentrate Load-out	2.185
670 – Reagents	**11.009**
670 - Reagents	3.915
671 - Lime Circuit	1.949
672 - MIBC	810
673 - PAX	1.843
674 - NaHS	396
675 - Na_2SiO_3	942
676 - Flocculant	1.016
677 - Anti-scalant	137
680 - Process Plant Services	**9.640**
680 - Process Plant Services	5.716
681 - Plant Compressed Air	1.546
682 - Low Pressure Compressed Air	2.378
Grand Total	**148.888**

21.1.7 Construction Indirect Costs

Construction indirect costs include all the engineering activities as well as site construction management. A full suite of temporary facilities is also included, as well as tools and operating and maintenance costs for construction equipment. The fuel cost is also included in the indirect costs.

Construction Indirect Costs are presented in Table 21.8.

Table 21.8: Construction Indirect Capitals

Construction Indirects	k USD
710 - Engineering, CM, PM	**38,733**
711 - Site CM staff and Consultants	10,551
715 - External Engineering	16,684
716 - Surveying	2,317
717 - QA/QC	2,726
718 - Commissioning and Vendor’s Rep	400
719 - Induction / Travel / Visas / Working Permits	6,055
720 - Construction Facilities & Services	**25,070**
722 - Construction Temporary Services	11,161
723 - Concrete Batch Plant	271
726 - Construction Offices	1,395
727 - Construction Tools / Consumables	4,948
728 - Construction Equipment Operations	2,299
729 - Construction Equipment Rentals	4,995
760 - Energy	**7,653**
761 - Fuel	7,653
Grand Total	**71,456**

21.1.8 General Services

General Services include all support departments, generally hired directly by WPC, that will be staffed and organized to assist during the Project development stage and will continue their functions during the operating phase. This includes the following:

- General Administration (GM)
- Supply Chain Local
- HR & Training
- Health and Safety
- ESR
- Security
- IT
- Accounting and Finance
- First Fill
- Process Capital Spares

All freight is estimated from quotations or similar recent projects. Corporate costs are not charged to the Project. International travel and roads maintenance are included in the general services. Cost estimates are presented in Table 21.9.

Table 21.9: General Services Expenditures

General Service's Owner's Costs	k USD
810 - G&A Departments	**14.105**
811 - General Administration	2.060
812 - Supply Chain Management	2.012
813 - HR & Training	2.412
814 - ESR	911
815 - Health & Safety	3.551
816 - Security	934
817 - Corporate	-
818 - IT & Communications	6.901
Cost Transferred to Capex	(4.677)
820 - Logistics / Taxes / Insurance	27.549
822 - Logistics, Taxes & Insurance	4.465
823 - Freight	21.929
824 - Customs, Taxes & Duties	693

General Service's Owner's Costs	k USD
825 - Insurance	462
830 - Pre-Production Operating Expenses	**1.086**
832 - International Travel	620
834 - Roads Maintenance / Snow Removal	466
Grand Total	**42.740**

21.1.9 Pre-production and Commissioning Expenditures

The pre-production and commissioning cost includes the pre-production development, the process plant commissioning. The process plant pre-production includes salaries and reagents and fuel during the commissioning and ramp-up period to commercial production.

Pre-production and commissioning expenditures are presented in Table 21.10.

Table 21.10: Pre-Production and Commissioning Expenditures

Area	k USD
910 - Mining Pre-Prod	**44.128**
914 - Mine Operations Pre-prod	44.128
950 - Process Plant Pre-Prod. & Commissioning	**26.579**
954 - Process Plant Commissioning	24.429
955- First fill	1.349
959 - Commissioning Spares	800
961 - Process Spare Parts Capital	**1.600**
Grand Total	72.306

A 19% contingency on all costs was included for a total of USD 140,425.

21.2 Sustaining Capital

Sustaining capital of USD 657.8M is required over the life-of-mine ("LoM") for the following main items:

- TDF expansion

- Water treatment plant
- Mine equipment purchases (additions and replacements)
- Mine development expenditures
- Mine infrastructure expenditures

A summary of sustaining capital is presented in Table 21.11 and on an annual basis in Table 21.12.

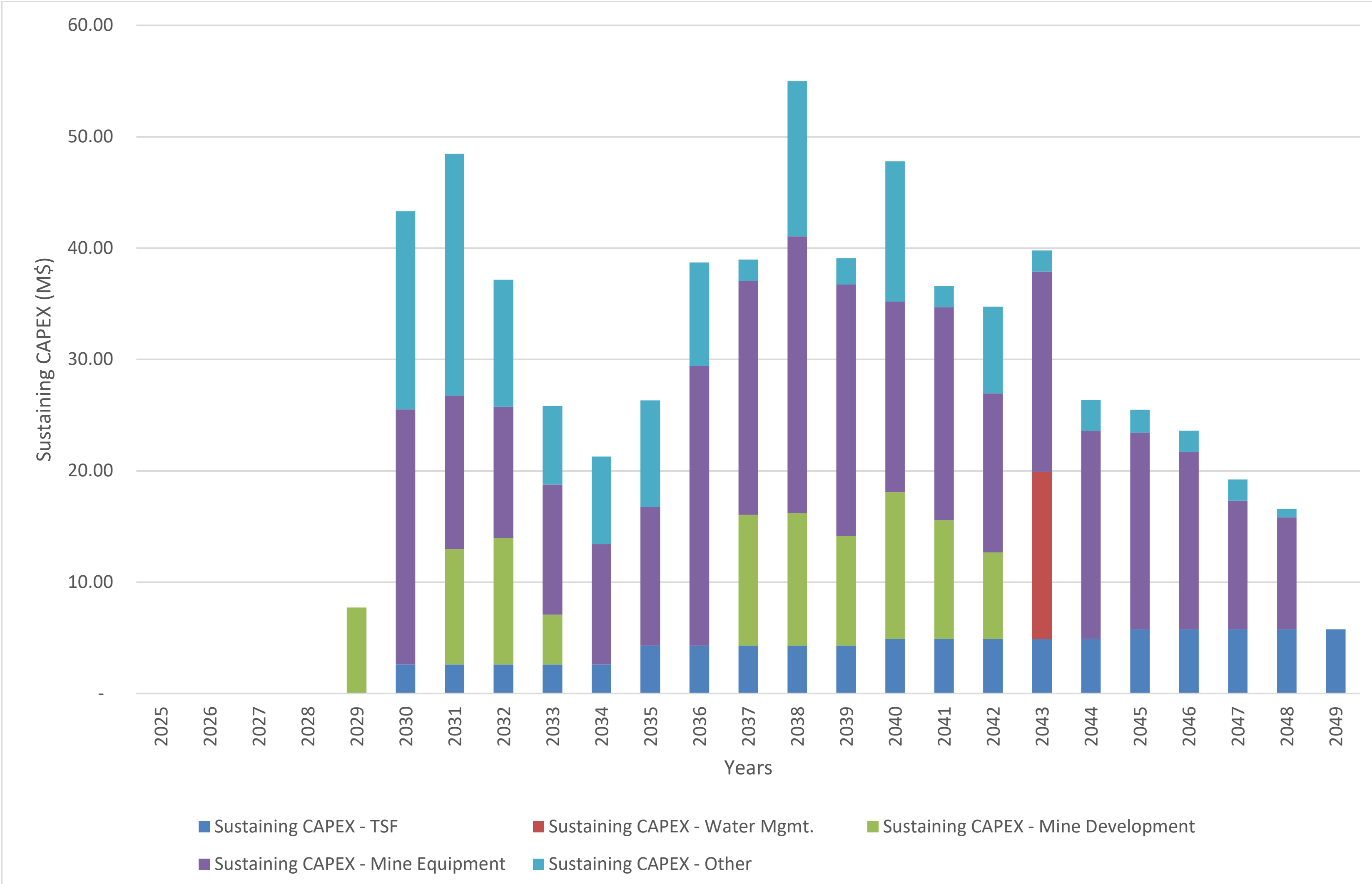
Table 21.11: Summary of Sustaining Capital Costs

Sustaining CAPEX	LoM ($M)	$/t mineralized material	$/lb Cu Payable
Tailings Disposal Facility Expansion	87.96	0.79	0.04
Water Treatment Plant	15.00	0.13	0.01
Mine Equipment Purchases	319.27	2.85	0.16
Mine Development Expenditures	98.98	0.88	0.05
Mine Infrastructure Expenditures	136.56	1.22	0.07
Total Sustaining CAPEX	**657.77**	**5.88**	**0.32**

Table 21.12: Sustaining Capital Expenditures

Sustaining CAPEX (M$)	Total	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
TSF Mgmt.	87.96	-	-	-	-	-	2.61	2.61	2.61	2.61	2.61	4.31	4.31	4.31	4.31	4.31	4.91	4.91	4.91	4.91	4.91	5.76	5.76	5.76	5.76	5.76
Water Mgmt.	15.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.00	-	-	-	-	-	-
Mine Development	98.98	-	-	-	-	7.73	-	10.36	11.35	4.47	-	-	-	11.74	11.90	9.83	13.17	10.66	7.76	-	-	-	-	-	-	-
Mine Equipment	319.27	-	-	-	-	-	22.90	13.79	11.79	11.69	10.81	12.45	25.10	20.97	24.84	22.57	17.12	19.11	14.26	17.98	18.65	17.67	15.95	11.56	10.06	-
Process Plant - Other	136.56	-	-	-	-	-	17.78	21.70	11.40	7.05	7.86	9.56	9.30	1.96	13.93	2.38	12.61	1.90	7.80	1.90	2.81	2.05	1.90	1.90	0.77	-
Total Sustaining Capital	657.77	-	-	-	-	-	2.61	2.61	2.61	2.61	2.61	4.31	4.31	4.31	4.31	4.31	4.91	4.91	4.91	4.91	4.91	5.76	5.76	5.76	5.76	5.76

Figure 21.2: Sustaining Capital Expenditures



21.3 Closure Costs and Salvage Value

The closure costs are estimated to USD 203.9M net and excludes salvage value from plant major equipment.

Closure costs would cover the following activities:

- Tailings reclamation
- Site closure, dismantling and reclamation
- Post closure monitoring
- MDEQ oversight

The closure cost estimate is presented in Table 21.13 with these costs incurred over a two-year period after commercial operations (i.e., during 2050 and 2051).

Table 21.13: Closure Cost & Salvage Value

Closure Cost Estimate	Cost (k $)
TDF Reclamation	
TDF Disposal Area Reclamation Stage 1	34,141
TDF Disposal Area Reclamation Stage 2	49,129
TDF Disposal Area Reclamation Stage 3	78,460
Sub-Total	161,730
Site Closure & Reclamation	
Place and Compact Soil Cover	400
Place and Hydroseed Topsoil	5,010
Structural Steel Demolition	1,500
Concrete Demolition	280
Concrete Disposal	70
Modular Building Removal	10
Mechanical Pipelines	500
Electrical Distribution	500
Removal and Disposal of Tanks	10
Admin Support	1,242

Closure Cost Estimate	Cost (k $)
Sub-Total	9,521
General Reclamation	**9,722**
Post Closure Monitoring (DCF 5%)	**3,924**
MDEQ Admin Oversight	**18,952**
Total Cost	**203,850**

21.4 Operating Costs

Operating expenditures ("OPEX") are summarized in Table 21.14. The operating costs include mining, processing, General and Administration ("G&A") and royalties. The costs for concentrate transportation to smelters and smelting and refining charges are not considered site operating costs and are therefore excluded from site direct costs.

The transportation costs and smelter conversion charges ("TC/RC") are deducted from gross smelter revenues to estimate the Net Smelter Return ("NSR"). These costs are detailed in Section 19 on Market Studies and Contracts.

The LoM operating cost summary is presented in Table 21.14 and the OPEX by year is presented in Table 21.15. The LoM unit operating cost is estimated at USD 1.64/lb of payable copper. The cost profile per lb of copper is relatively stable over the LoM due to the consistent grade profile of the deposit except for the last two years where throughput decreases from the mine.

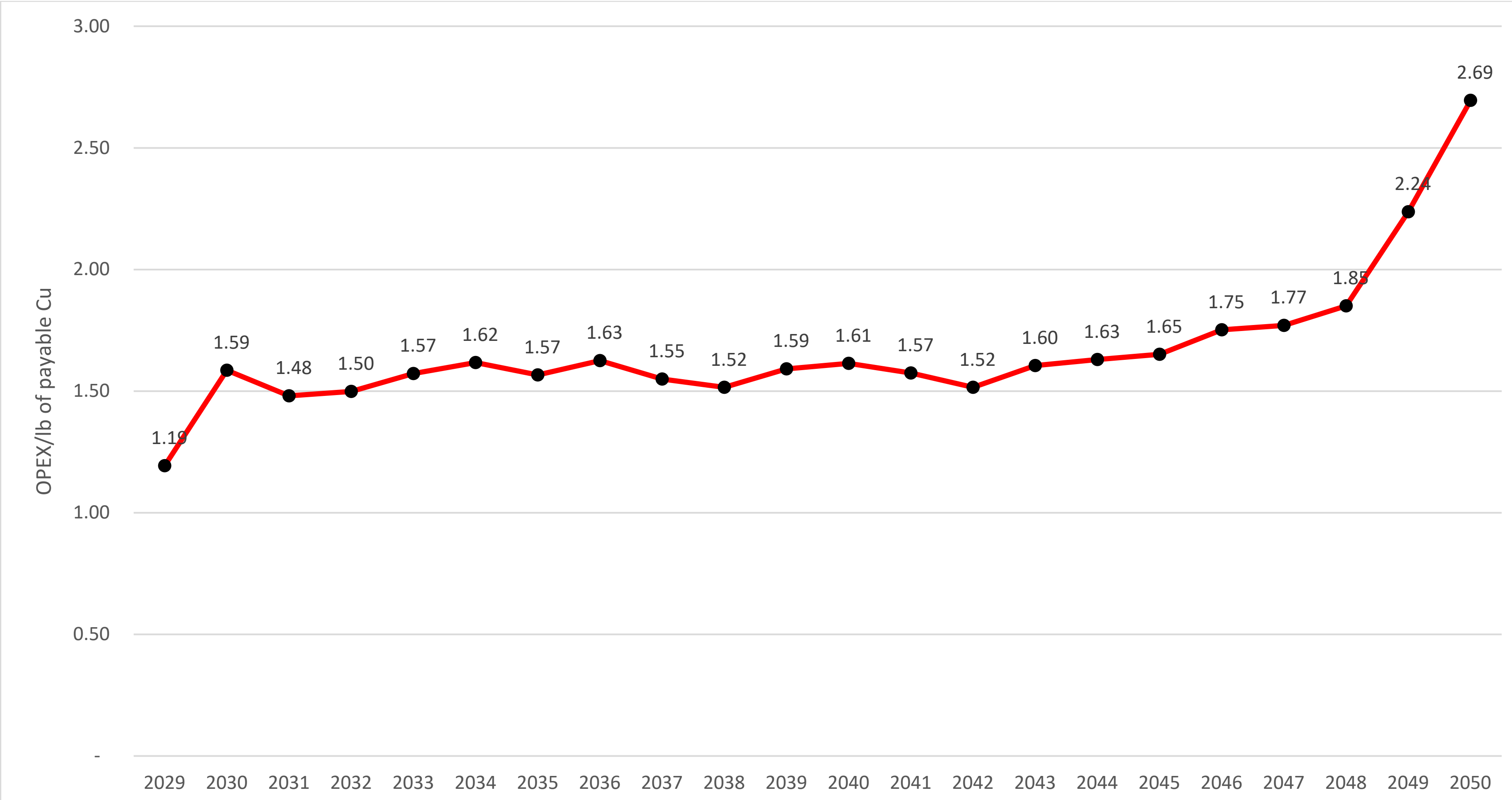
Table 21.14: LoM Operating Cost Summary

LoM OPEX by Area	Total Cost ($M)	Unit Cost ($/tonne milled)	Unit Cost ($/payable lb)	%
Royalties	205	1.83	0.10	6.1%
Mining	1.945	17.39	0.96	58.2%
Processing	711	6.36	0.35	21.3%
General & Administration	483	4.31	0.24	14.4%
Total Site Costs (incl. Royalties)	**3.344**	**29.90**	**1.64**	**100%**

Table 21.15: Annual Operating Costs

OPEX Summary (M$)	Total	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Royalties	**205**	-	-	-	-	7.08	10.10	10.05	13.42	13.49	13.35	11.89	11.87	10.46	9.71	9.38	9.23	8.65	8.66	8.44	8.56	8.52	7.90	7.93	7.27	5.22	3.75
Mining	**1.945**	-	-	-	-	51.91	87.40	78.53	82.61	91.84	98.31	95.12	96.44	84.56	83.42	89.32	88.79	88.05	87.45	95.01	97.30	100.61	100.13	101.62	96.72	81.05	69.23
Processing	**711**	-	-	-	-	22.92	34.15	34.15	34.15	34.15	34.15	34.15	34.15	34.15	34.15	34.15	34.15	34.15	34.15	34.15	34.15	34.15	32.42	32.66	30.69	24.82	21.13
G&A	**483**	-	-	-	-	13.51	22.64	22.15	21.16	19.67	19.81	20.36	20.89	21.34	21.78	22.08	22.33	22.49	22.81	23.01	23.20	23.37	23.50	23.64	23.89	24.05	24.89
Total	**3.344**	**-**	**-**	**-**	**-**	**95.41**	**154.29**	**144.89**	**151.35**	**159.16**	**165.62**	**161.52**	**163.36**	**150.53**	**149.06**	**154.94**	**154.51**	**153.34**	**153.08**	**160.62**	**163.21**	**166.66**	**163.94**	**165.85**	**158.58**	**135.14**	**119.00**
Unit Cost ($/t milled)	**53.5**	**-**	**-**	**-**	**-**	**20.63**	**28.18**	**26.46**	**27.64**	**29.07**	**30.25**	**29.50**	**29.84**	**27.49**	**27.23**	**28.30**	**28.22**	**28.01**	**27.96**	**29.34**	**29.81**	**30.44**	**32.38**	**32.39**	**34.10**	**41.52**	**50.10**
Unit Cost ($/pay. lb Cu)	**2.92**	**-**	**-**	**-**	**-**	**1.19**	**1.59**	**1.48**	**1.50**	**1.57**	**1.62**	**1.57**	**1.63**	**1.55**	**1.52**	**1.59**	**1.61**	**1.57**	**1.52**	**1.60**	**1.63**	**1.65**	**1.75**	**1.77**	**1.85**	**2.24**	**2.69**

Figure 21.3: Operating Cost per lb of Payable Copper



21.4.1 Mining Costs

The operating mining costs were evaluated based on the LoM and is supported by supplier budgetary quotations, a detailed wage scale and productivity estimates. Table 21.16 presents the annual mining costs over the LoM which average $17.39/t.

Table 21.16: Mining Operating Cost Summary

Mine OPEX Summary	LoM Cost (M$)	$/t Mineralized Material Milled	$/lb Payable	%
Mine Operation Labour	354	3.16	0.17	18%
Equipment Parts & Fuel	259	2.32	0.13	13%
Supplies & Accessories	650	5.81	0.32	33%
Mining Services	226	2.02	0.11	12%
Mechanical Services	191	1.70	0.09	10%
Electrical Services	178	1.60	0.09	9%
Technical Services	88	0.79	0.04	5%
Total Mining Cost	**1.945**	**17.39**	**0.96**	**100%**

The four (4) main costs for mining are supplies and accessories (33%), labour (18%), equipment parts and fuel (13%) and mining services (12%).

21.4.2 Processing Costs

The process plant operating costs were evaluated based on estimated reagent consumption rates, supplier quotations, a detailed wage scale and standard industry practice. The process costs are divided into seven (7) categories: labour, reagents, grinding media, liners, maintenance supplies and electrical power. The costs include tailings and water pumping but exclude water treatment costs which are included in the G&A environmental costs.

Total process operating cost summary is presented in Table 21.17 and the annual expenditures over the LoM in Table 21.14.

Reagents are the principal cost item in the mill OPEX represent 15.2% of cost or USD 0.97/t of mineralized material. The reagent consumption rates, reagent prices and resulting unit costs is presented in Table 21.18.

The process plant manpower comprises 50 people.

The power consumption is estimated based on historical power consumption rates for the former White Pine mine. The process plant power includes power for the mill only as power for G&A and mining are provisioned for in each respective budget. The power supply is planned from an owner operated natural gas power plant with an estimated cost of USD 0.0684/kWh based on current natural gas prices. The power consumption at 15,000 tpd is estimated at 37.87 kWh/t milled.

Table 21.17: Process Operating Cost Summary

Mill OPEX	LoM Cost ($M)	Avg. Cost ($M/y)	$/t Mineralized Material	$/lb	%
Mill Labour	93.05	3.97	0.83	0.046	13.1%
Reagents	108.42	4.63	0.97	0.053	15.2%
Grinding Media	71.86	3.07	0.64	0.035	10.1%
Liners	32.63	1.39	0.29	0.016	4.6%
Maintenance Supplies	58.00	2.48	0.52	0.029	8.2%
Operating Supplies	57.38	2.45	0.51	0.028	8.1%
Power	289.76	12.37	2.59	0.142	40.7%
Total Mill OPEX	711.08	30.37	6.36	0.350	100.0%

Table 21.18: Process Plant Reagent Consumption

Reagents	Dosage		Reagent Pricing		Reagent Consumption		Unit Cost (USD /t)
Sodium Isobutyl Xantante (C-3430)	100.00	g/t	3.744	USD /t	547.50	tpy	0.37
Methyl Isobutyl Carbinol (MIBC)	53.60	g/t	2.753	USD /t	293.46	tpy	0.15
Alkylaryl Dithiophosphate (A-249)	13.00	g/t	7.709	USD /t	71.18	tpy	0.10
n-Dodecyl Mercaptan (NDM)	13.00	g/t	9.912	USD /t	71.18	tpy	0.13
Sodium Silicates	300.00	g/t	683	USD /t	1,642.50	tpy	0.20
Flocculant	0.30	g/t	5.396	USD /t	1.64	tpy	0.00
Anti-scalant	4.27	L/h	2.753	USD /m^3	23.40	m^3/y	0.01
Total							**0.97**

Table 21.19: Grinding Media and Liner Consumption

Grinding Media & Liners	Dosage		Consumable Pricing		Media & Liner Consumption		Unit Cost (USD /t)
Steel Ball 5 inch	185	g/t	1.422	USD /t	238	t/y	0.26
Steel Ball 2 inch	280	g/t	1.323	USD /t	360	t/y	0.37
Steel Ball 1,0 inch or 0.5 inch	5	g/t	1.786	USD /t	6		0.01
						SAG Mill Liner	0.19
						Ball Mill Liner	0.07
						Regrind Mill Liner	0.03
						Total	**0.93**

21.4.3 General and Administration

General and administration ("G&A") includes general management, finance and accounting, supply chain, IT, human resources, health, safety and environment, surface support and corporate and insurance costs.

In most cases, these services represent fixed costs for the site as a whole. The G&A costs exclude certain costs, such as transport of concentrates and environmental rehabilitation costs. Water treatment costs are included in environment which represents USD 1.80 M/y over the LoM.

The G&A labour includes 39 people, whose total labour cost represents 13.9% of the G&A OPEX.

A summary of G&A costs is presented in Table 21.20 and the annual expenditures over the LoM in Table 21.14.

Table 21.20: General Management and Administration Cost Summary

G&A OPEX by Department	LoM Cost ($M)	Avg. Cost ($M/y)	$/t Mineralized Material	$/lb	%
General Management	3.973	170	0.04	0.002	0.8%
Finance & Accounting	7.218	308	0.06	0.004	1.5%
Supply Chain	43.432	1.855	0.39	0.021	9.0%
Information Technology	19.900	850	0.18	0.010	4.1%
Human Resources	14.894	636	0.13	0.007	3.1%
Health & Safety	28.971	1.237	0.26	0.014	6.0%

G&A OPEX by Department	LoM Cost ($M)	Avg. Cost ($M/y)	$/t Mineralized Material	$/lb	%
Environment	193.114	8.247	1.73	0.095	40.0%
Surface Support	144.213	6.159	1.29	0.071	29.9%
Insurance	26.861	1.147	0.24	0.013	5.6%
Total G&A Costs	**482.575**	**20.608**	**4.31**	**0.237**	**100.0%**

22 ECONOMIC ANALYSIS

The economic analysis presented in this Report uses an economic model that estimates cash flows on an annual basis for the life of the Project at a level appropriate to a scoping study level of engineering and design.

Cash flow projections are estimated over the life-of-mine ("LoM") based on the sales revenue, operating expenses ("OPEX"), capital expenses ("CAPEX") and other cost estimates. CAPEX is estimated in three categories, initial, sustaining, and closure and reclamation. OPEX estimates include labour, reagents, maintenance, supplies, services, fuel and electrical power. Other costs such as royalties, depreciation and taxes are estimated in accordance with the present stage of the Project.

The financial model results are presented in terms of Net Present Value ("NPV"), payback period, and internal rate of return ("IRR") for the Project. The economic analysis is carried out in real terms (i.e., without inflation factors) in Q1 2023 US Dollars with equipment financing assumptions. The economic results are calculated as of the start of initial capital expenditures with all prior costs treated as sunk costs but considered for purposes of taxation calculations.

22.1 Assumptions

22.1.1 Metal Prices

Metal prices and price scenarios are presented in Section 19.1. The base case copper price for economic evaluation follows a constant price of USD 4.00/lb. The silver price is also kept constant at USD 25.00/oz.

22.1.2 Fuel

The reference diesel fuel price used for estimating operating costs is USD 0.73/L. The diesel fuel price is for off-road or off-highway use by the mine equipment that will not be operated on public roadways. The off-road diesel fuel is not subject to state and federal excise taxes that are applied to retail sales of diesel fuel or for use in vehicles operated on public roadways (Table 22.1). The off-road diesel fuel is dyed red to make it distinguishable. Under the Nonferrous Metallic Minerals Extraction Severance Tax Act, the operation would be exempt of sales tax once in operation.

Table 22.1: Off-Highway Diesel Fuel Price Assumption

Fuel Price	Pre-Production & Operations	
	USD /gal.	USD /L
Retail Diesel Fuel Price	3.30	0.87
Less: Federal Excise Tax	(0.244)	(0.064)
Less: State Tax	(0.286)	(0.076)
Less: Prepaid Sales Tax	-	-
Less: Petroleum Transfer Fee	-	-
Off-Highway Diesel Fuel Price	**2.763**	**0.73**

22.1.3 Exchange Rates

Exchange rates are used to convert certain capital cost and operating cost items in US dollars. The exchange rate assumptions are summarized in Table 22.2.

Table 22.2: Exchange Rate Assumptions

Exchange Rate	Base Value
USD/CAD	0.8

22.2 Metal Production and Revenue

Payable copper produced over the Project life is 953 kt (2,101 M lb) with an annual average of 42.6 kt (93.9 M lb) over the 24-year life which includes two-years of commissioning and ramp-up. The average payable copper rate is 96.5%. Payable silver production over the LoM is 27.03 M oz with an annual average of 1,215 k oz with an average payable rate of 90%. The metal production is presented on an annual basis in Table 22.3.

Table 22.3: Metal Production

Production Physicals	Total	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Tonnage Processed	**115,764**	-	-	345	2,730	4,625	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,063	5,120	4,651	3,254	2,375
Cu Head Grade	**0.97**	-	-	0.85	0.92	0.92	0.95	0.95	0.99	0.99	1.00	1.01	0.98	0.95	0.96	0.95	0.93	0.95	0.99	0.98	0.98	0.98	0.99	0.98	0.98	0.99	0.99
Ag Head Grade	**11.09**	-	-	5.24	10.94	11.01	11.52	11.27	12.60	13.20	13.17	12.46	13.42	13.47	12.67	11.32	10.54	10.08	9.75	9.28	9.59	9.38	9.40	9.36	9.50	9.99	9.57
Concentrate (dry)	**3,232**	-	-	8.4	72.1	122.9	149.6	150.5	155.3	155.7	157.5	158.6	154.6	149.4	151.3	149.7	147.2	149.8	155.4	153.9	154.0	155.3	143.9	144.1	131.8	92.9	67.9
Concentrate (wet)	**3,551**	-	-	9.3	79.2	135.1	164.4	165.4	170.7	171.1	173.1	174.3	169.9	164.1	166.3	164.5	161.8	164.6	170.7	169.2	169.2	170.6	158.2	158.3	144.8	102.1	74.6
Cu Contained Metal	**1,122**	-	-	3	25	43	52	52	54	54	55	55	54	52	53	52	51	52	54	53	53	54	50	50	46	32	24
Cu Contained Metal	**2,474**	-	-	6.45	55.18	94.13	114.56	115.23	118.90	119.21	120.58	121.42	118.37	114.36	115.85	114.62	112.73	114.68	118.95	117.85	117.91	118.88	110.19	110.32	100.90	71.14	52.00
Ag Contained Metal	**41,267**	-	-	58	961	1,638	2,028	1,984	2,217	2,324	2,318	2,193	2,362	2,372	2,230	1,993	1,856	1,774	1,717	1,633	1,688	1,651	1,531	1,541	1,421	1,046	731
Cu Recovery	**88.00**	-	-	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0
Ag Recovery	**73.40**	-	-	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4	73.4
Cu Metal Production	**988**	-	-	2.6	22.0	37.6	45.7	46.0	47.5	47.6	48.1	48.5	47.2	45.6	46.2	45.8	45.0	45.8	47.5	47.0	47.1	47.5	44.0	44.0	40.3	28.4	20.8
Cu Metal Production	**2,177**	-	-	5.7	48.6	82.8	100.8	101.4	104.6	104.9	106.1	106.9	104.2	100.6	101.9	100.9	99.2	100.9	104.7	103.7	103.8	104.6	97.0	97.1	88.8	62.6	45.8
Ag Metal Production	**30,290**	-	-	43	705	1,202	1,489	1,456	1,627	1,706	1,702	1,610	1,734	1,741	1,637	1,463	1,362	1,302	1,260	1,199	1,239	1,212	1,123	1,131	1,043	767	537
Cu Payable Rate	**96.50**	-	-	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50	96.50
Ag Payable Rate	**89.24**	-	-	80.96	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	89.58	88.91	88.11	87.61	88.01	87.64	87.64	87.71	87.81	88.32	87.79
Cu Payable Metal	**953**	-	-	2.5	21.3	36.3	44.1	44.4	45.8	45.9	46.4	46.8	45.6	44.0	44.6	44.1	43.4	44.2	45.8	45.4	45.4	45.8	42.4	42.5	38.9	27.4	20.0
Cu Payable Metal	**2,101**	-	-	5.5	46.9	79.9	97.3	97.9	101.0	101.2	102.4	103.1	100.5	97.1	98.4	97.3	95.7	97.4	101.0	100.1	100.1	101.0	93.6	93.7	85.7	60.4	44.2
Ag Payable Metal	**27,031**	-	-	34.6	634.5	1,081.8	1,339.9	1,310.8	1,464.6	1,535.2	1,531.5	1,448.8	1,560.4	1,566.7	1,473.0	1,316.8	1,220.3	1,157.8	1,110.3	1,050.2	1,090.5	1,062.4	984.7	992.3	915.6	677.8	471.0
Operating Periods	**23.42**	-	-	0.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Note: 2023 is part of pre-production and commissioning period

Figure 22.1: LoM Payable Metal Profile

The commissioning and ramp-up schedule to achieve the steady state throughput of 15 ktpd takes place over a four-year period (2025 to 2029). The first year is dedicated to the pre-construction and study phase. The following next three years are dedicated to pre-development and site construction.

22.3 Capital Expenditures

The capital expenditures include initial CAPEX as well as sustaining capital to be spent after commencement of commercial operations.

22.3.1 Initial Capital Expenditures

The CAPEX for Project construction, including concentrator, mine equipment, support infrastructure, pre-production activities and other direct and indirect costs is estimated to be USD 615.2 M. The total initial Project capital includes a contingency of USD 140.4 M, which is 19% of the total CAPEX. A pre-production revenue of $265.3M is deducted from the initial capex. The initial CAPEX is presented in Table 22.4. The initial Project CAPEX is spent over a period of four years (2025 to 2027).

Table 22.4: Initial Capital Expenditure Summary

Initial CAPEX	USD k
000 - General	587
100 - Infrastructure	44,369
200 - Power & Electrical	76,091
300 - Water & TSF Mgmt.	97,306
400 - Mobile Equipment	93,211
500 - Mine Infrastructure	93,057
600 - Process Plant	148,888
700 - Construction Indirects	71,456
800 - General Services & Owner's Costs	42,740
900 - Pre-Production, Commissioning	72,307
Sub-Total Before Contingency	**740,012**
Contingency	**140,425**
Total Incl. Contingency	**880,437**
Less: Pre-Production Revenue	**(265,253)**
Total Incl. Contingency & Pre-Prod. Revenue	**615,184**

22.3.2 Sustaining Capital Expenditures

Sustaining capital expenditures during operations are required for additional mine equipment purchases, mine development work, and tailings storage expansion. The LoM sustaining CAPEX is estimated at $657.8 M with the breakdown presented in Table 22.5.

Table 22.5: Sustaining Capital Expenditure Summary

Sustaining CAPEX	LoM ($M)	$/t Ore	$/lb Cu Payable
Tailings Disposal Facility Expansion	87.96	0.79	0.04
Water Treatment Plant	15.00	0.13	0.01
Mine Equipment Purchases	319.27	2.85	0.16
Mine Development Expenditures	98.98	0.88	0.05
Mine Infrastructure Expenditures	136.56	1.22	0.07
Total Sustaining CAPEX	**657.77**	**5.88**	**0.32**

Note: mineralized material tonnage and payable copper unit costs during operations period only

22.3.3 Closure and Reclamation

The reclamation and closure cost estimate include the following scope:

- TDF reclamation
- Site closure and reclamation
- Demolition of infrastructures
- Post closure monitoring

The closure and reclamation activities are planned over a three-year period at the end of the mine life (2051+) with an overall estimate of USD 203.9M without any salvage value considered.

Table 22.6: Closure and Reclamation Cost Estimate by Stage

Closure Cost Estimate	Cost ($k)
TDF Reclamation	161,730
Site Closure & Reclamation	9,521
General Reclamation	9,722
Post Closure Monitoring (DCF 5%)	3,924
MDEQ Admin Oversight + Contingency	18,952
Total Cost	**203,850**

22.3.4 Working Capital

Working capital ("WC") is required to finance supplies in inventory. A maximum $57.69M is calculated for the working capital.

22.4 Operating Cost Summary

OPEX includes mining, processing, G&A services, concentrate transportation and concentrate treatment and refining charges. The concentrate transportation, treatment charges and refining costs are deducted from gross revenues to calculate the Net Smelter Return ("NSR"). The NSR for the Project during operations is estimated at USD 8,068M excluding USD 265.3M of NSR generating during pre-production and treated as a reduction of initial capital expenditures.

The average NSR over the LoM is USD 3.97/lb of payable copper net of silver credits. Detailed operating cost budgets have been estimated from first principles based on detailed wage scales, consumable prices, fuel prices and productivities. The operating costs are detailed in Section 21 of this Report. The average OPEX over the LoM is USD 29,60/t of mineralized material or USD 1.63/lb of payable copper with mining representing 58% of the total OPEX, or USD 17.39/t of mineralized material. A summary of operating cash flow and operating costs is presented in Table 22.7.

Table 22.7: Operating Cost & Summary

Operating Cash Flow	LOM	$/t Mineralized Material	$/lb Payable
Cu Revenue	8,138	72.76	4.00
Ag Credits	654	5.85	0.32
Revenue	8,792	78.60	4.32
Concentrate Transportation Costs	375	3.36	0.18
Treatment & Refining Charges	349	3.12	0.17
Net Smelter Return	8,068	72.13	3.97
Royalties	205	1.83	0.10
Mining Costs	1,945	17.39	0.96
Processing Costs	711	6.36	0.35
G&A Costs	483	4.31	0.24
Working Capital	-33	-0.30	0.02
Total OPEX	**3,311**	**29.60**	**1.63**
Operating Cash Flow	**4,758**	**42.54**	**2.34**

Note: mineralized material tonnage and payable copper unit costs during operations period only

Table 22.8: Life-of-Mine C1 & C3 Cost Summary

LoM Costs	Total Cost (USD M)	Unit Cost ($/Tonne Milled)	Unit Cost ($/Payable lb)
Mining	1,945	17.39	0.96
Processing	711	6.36	0.35
G&A	483	4.31	0.24
Offsite Costs (transport, TC/RCs)	723	6.47	0.36
By-product Credits	(654)	(5.85)	(0.32)
C1 Cost	**3,208**	**28.69**	**1.58**
Total CAPEX and Closure	1,477	13.20	0.73
Royalty Costs	205	1.83	0.10

LoM Costs	Total Cost (USD M)	Unit Cost ($/Tonne Milled)	Unit Cost ($/Payable lb)
Interest Cost (3rd party debt)	19	0.17	0.01
C3 Cost	**4,909**	**43.89**	**2.41**

22.5 Taxes and Royalties

22.5.1 Income Tax

Income for tax purposes is defined as metal revenues minus operating expenses, royalties, Michigan severance tax, reclamation and closure expenses, depreciation and depletion. Depreciation is calculated using the Modified Accelerated Cost Recovery System ("MACRS") method and the unit of production method in accordance with the current U.S. Internal Revenue Service ("IRS") regulations. The federal income tax rate based on new tax reform is 21%. There is no state income tax which is exempt under the Michigan Nonferrous Metallic Minerals Extraction Severance Tax Act. The estimated federal tax paid over the Project life is USD 301.6 M.

22.5.2 Michigan Severance Tax

The Nonferrous Metallic Minerals Extraction Severance Tax Act ("MST"), PA 410 of 2012, as amended, levies a specific tax on certain nonferrous metallic minerals for mineral producing properties in the state of Michigan. The tax levied on the eligible mine owner is the Minerals Severance Tax and includes exemption from property taxes levied in this state, taxes levied under part 2 of the Income Tax Act, PA 281 of 1967, Sales tax as levied under PA 167 of 1933, and Use tax as levied under PA 94 of 1937.

The minerals Severance Tax is 2.75% of gross income from mining or the net smelter return, less third-party royalty payments. Over the LoM, the Severance Tax represents USD 216.3 M.

22.5.3 Royalties

The owners of the mineral rights (Longyear Mineral Lease) are entitled to fixed annual rental payments and royalty payments. The annual rental fees are USD 1,000,000. The rental payments are deductible from the royalty payments.

Royalties are paid on 82% of contained metal in mineralized material mined in the Longyear blocks. The royalty is based on a sliding scale linked to the COMEX price of copper starting at 2% and increasing by one basis point for every cent increase above $3.25/lb. The silver royalty is 2.5% and increasing by same percentage above $18.00/oz with a cap of 4%. The rental payments are deductible from royalty payments. Over the LoM, the total payments are estimated at USD 22.81 M.

Under a transaction with Osisko Gold Royalties, Osisko is to receive a 1.5% NSR royalty which is fixed regardless of the copper price. Over the LoM, the Osisko royalty represents a cost of USD 115.07 M. Osisko Stream Royalties holds a royalty of 11.5% NSR on silver net revenue. Over the LOM, the Osisko royalty represents a cost of USD 76.2 M.

22.6 Economic Model Results

The economic model results are presented in terms of NPV, IRR, and payback period in years for recovery of the initial CAPEX. These economic indicators are presented on both pre-tax and after-tax basis. The NPV is presented both undiscounted ($NPV_{0\%}$) and using a discount rate of 8% ($NPV_{8\%}$). The annual cash flow is summarized in Table 22.10 and graphically in Figure 1.2. A cash flow waterfall for the Project is summarized in Figure 22.3.

The undiscounted after-tax cash flow is estimated at USD 2,723.5 M for the Project. The economic results on a before-tax and after-tax basis are presented in Table 22.9.

Table 22.9: Economic Results Summary

Economic Results Summary	Unit	Before-Tax Results	After-Tax Results
NPV 0%	$M	3241	2 723
NPV 8%	$M	1 024	821
IRR	%	23,1%	20,8%
Payback	y	3,2	3,5

Figure 22.2: After-Tax Annual Project Cash Flow

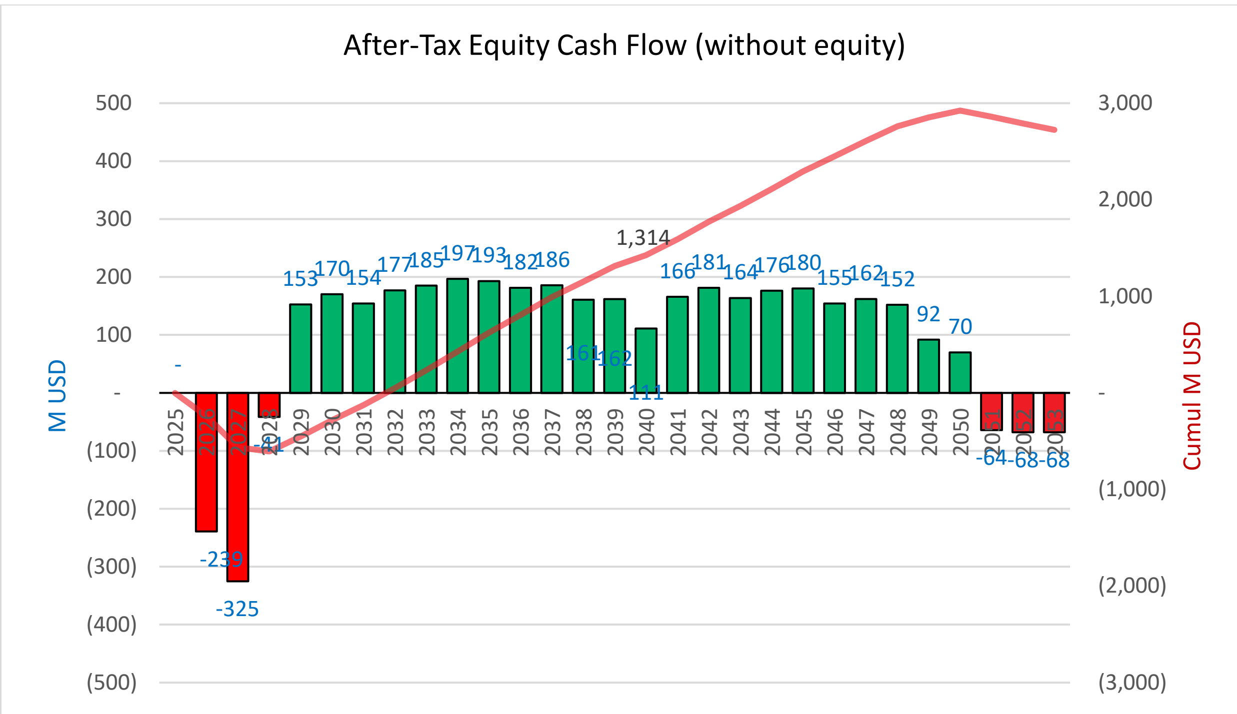


Figure 22.3: After Tax Project Cash Flow Waterfall

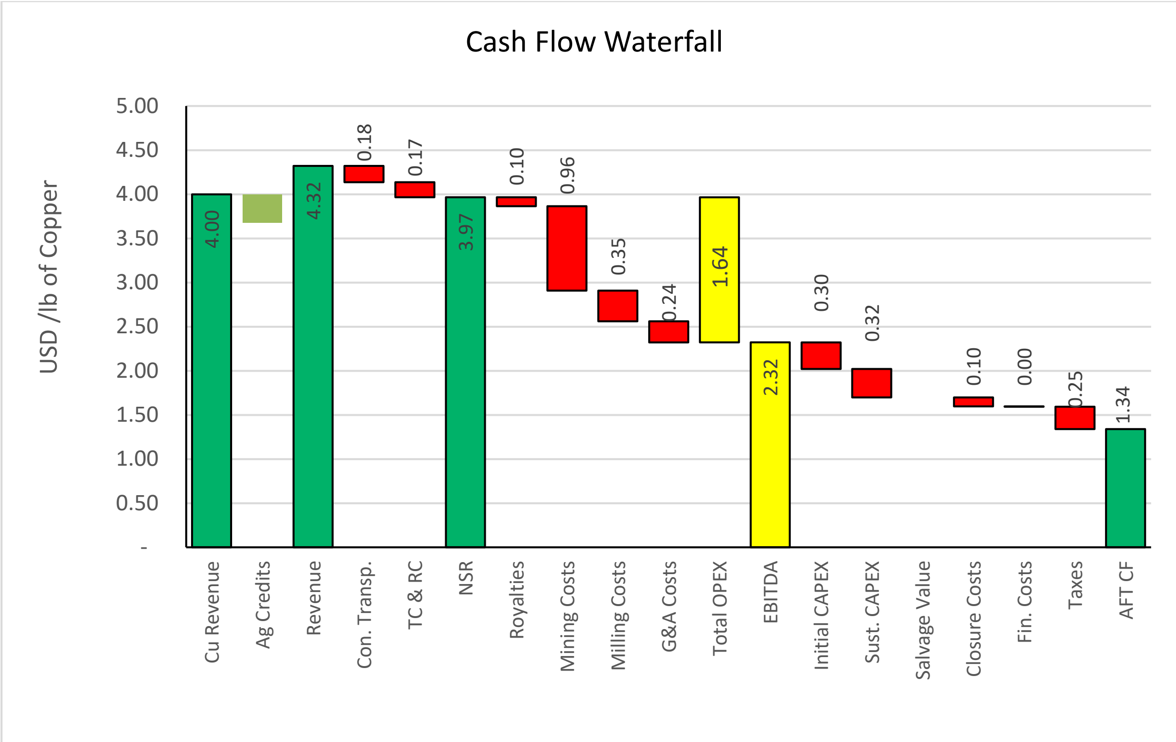


Table 22.10: After-Tax Annual Cash Flow Summary

Cash Flow		Total	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057
Revenue	M $	8,792	-	0	0	0	284	423	424	441	443	448	449	441	428	430	422	413	418	432	427	428	430	399	400	366	259	188	0	0	0	-	-	-	-
Concentrate Transportation Costs	M $	(375)	-	0	0	0	-12	-18	-18	-19	-19	-19	-19	-19	-18	-18	-18	-18	-18	-19	-18	-18	-19	-17	-17	-16	-11	-8	0	0	0	-	-	-	-
Treatment & Refining Charges	M $	(349)	-	0	0	0	-11	-17	-17	-17	-17	-18	-18	-17	-17	-17	-17	-16	-17	-17	-17	-17	-17	-16	-16	-15	-10	-8	0	0	0	-	-	-	-
Net Smelter Return	M $	8,068	-	0	0	0	261	388	389	405	407	411	412	405	393	395	388	379	384	396	391	392	395	366	366	335	237	173	0	0	0	-	-	-	-
Royalties	M $	(205)	-	0	0	0	-7	-10	-10	-13	-13	-13	-12	-12	-10	-10	-9	-9	-9	-9	-8	-9	-9	-8	-8	-7	-5	-4	0	0	0	-	-	-	-
Mining Costs	M $	(1,945)	-	0	0	0	-52	-87	-79	-83	-92	-98	-95	-96	-85	-83	-89	-89	-88	-87	-95	-97	-101	-100	-102	-97	-81	-69	0	0	0	-	-	-	-
Processing Costs	M $	(711)	-	0	0	0	-23	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-32	-33	-31	-25	-21	0	0	0	-	-	-	-
G&A Costs	M $	(483)	-	0	0	0	-14	-23	-22	-21	-20	-20	-20	-21	-21	-22	-22	-22	-22	-23	-23	-23	-23	-24	-24	-24	-24	-25	0	0	0	-	-	-	-
Total Operating Costs	M $	(3,344)	-	0	0	0	-95	-154	-145	-151	-159	-166	-162	-163	-151	-149	-155	-155	-153	-153	-161	-163	-167	-164	-166	-159	-135	-119	0	0	0	-	-	-	-
Working Capital	M $	(0)	-	-3	-8	-16	-26	-1	0	-2	0	0	0	1	2	0	1	1	-2	0	0	0	4	0	4	13	7	22	4	0	0	-	-	-	-
Operating Cash Flow	M $	4,724	-	-3	-8	-16	140	233	244	251	248	245	250	243	244	246	234	226	229	243	230	229	232	202	205	189	109	76	4	0	0	-	-	-	-
Investment Capital incl. Contingency	M $	(615)	-	-248	-327	-45	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
Sustaining Capital	M $	(658)	-	0	0	0	-8	-43	-48	-37	-26	-21	-26	-39	-39	-55	-39	-48	-37	-35	-40	-26	-25	-24	-19	-17	-6	0	0	0	0	-	-	-	-
Closure Costs	M $	(204)	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-68	-68	-68	-	-	-	-
MLA receipts / (disbursements)	M $	(6)	-	12	10	20	23	-6	-13	-9	-8	2	-1	6	9	-3	-6	-42	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
Taxes	M $	(518)	-	0	0	0	-8	-13	-28	-28	-29	-29	-30	-29	-28	-27	-27	-24	-26	-27	-27	-26	-26	-24	-23	-21	-12	-6	0	0	0	-	-	-	-
Project Cash Flow	M $	2,723	-	-239	-325	-41	153	170	154	177	185	197	193	182	186	161	162	111	166	181	164	176	180	155	162	152	92	70	-64	-68	-68	-	-	-	-
Cumul AFT Cash Flow	M $		-	(239)	(564)	(606)	(453)	(283)	(128)	49	234	431	624	806	991	1,152	1,314	1,425	1,592	1,773	1,937	2,113	2,293	2,448	2,610	2,762	2,854	2,924	2,859	2,791	2,723	-	-	-	-
Equity		(0.00)	-	-	-	-	(0)	0	0	(0)	(0)	(0)	0	0	0	0	(0)	0	(0)	(0)	(0)	0	0	0	0	(0)	(0)	(0)	0	(0)	(0)	-	-	-	-
Project Cash Flow with Equity		2,723	-	(239)	(325)	(41)	153	170	154	177	185	197	193	182	186	161	162	111	166	181	164	176	180	155	162	152	92	70	(64)	(68)	(68)	-	-	-	-
Cumul AFT Cash Flow with Equity			-	(239)	(564)	(606)	(453)	(283)	(128)	49	234	431	624	806	991	1,152	1,314	1,425	1,592	1,773	1,937	2,113	2,293	2,448	2,610	2,762	2,854	2,924	2,859	2,791	2,723	-	-	-	-

Notes:
Pre-production revenue included in investment capital offsetting pre-production costs.
Taxes include federal income tax and Michigan Severance Tax.

22.7 Sensitivity Analysis

The sensitivity analysis of the economic model was tested with respect to copper prices, initial CAPEX and OPEX for each case. The Copper price was raised and lowered by $0.50/lb to evaluate the impact on the NPV and IRR. The value of Capital Cost cand Opex Cost was raised and lowered 20% to evaluate the impact of such changes on the NPV and IRR. The pre-tax sensitivity results are presented in Table 22.11 and the after-tax sensitivity results in Table 22.12.

The after-tax NPV of the Project is most sensitive to changes in revenue, which is manifested as changes in metal prices or metal grades. For example, a 12.5%% increase in copper price or copper grade increases the $NPV_{8\%}$ from USD 821 M to USD 1184 M. Similarly, a decrease of 12.5% in copper price or copper grade reduces the $NPV_{8\%}$ to USD 457 M.

Table 22.11: Pre-Tax Sensitivity Results

Variance	Before-Tax Results			
	$NPV_{0\%}$ (M$)	$NPV_{8\%}$ (M$)	IRR (%)	Payback (y)
Copper Price Sensitivities				
$3.5/lb	2,214	611	17.8%	4.3
$3.75/lb	2,728	817	20.5%	3.6
$4.00/lb	3,241	1,024	23.1%	3.2
$4.25/lb	3,755	1,230	25.5%	2.8
$4.5/lb	4,268	1,436	27.9%	2.4
Initial Capital Cost Sensitivities				
-20%	3,417	1,182	29.2%	2.3
-10%	3,329	1,103	25.8%	2.7
0%	3,241	1,024	23.1%	3.2
10%	3,153	945	20.8%	3.6
20%	3,065	866	18.9%	4.0
Operating Cost Sensitivities				
-20%	2,614	786	20.4%	3.6
-10%	2,927	905	21.8%	3.4
0%	3,241	1,024	23.1%	3.2
10%	3,555	1,142	24.4%	3.0
20%	3,869	1,261	25.6%	2.8

Table 22.12: After-Tax Sensitivity Results

Variance	After-Tax Results			
	$NPV_{0\%}$ (M$)	$NPV_{8\%}$ (M$)	IRR (%)	Payback (y)
Copper Price Sensitivities				
$3.5/lb	1,822	457	15.8%	4.7
$3.75/lb	2,273	639	18.4%	4.0
$4.00/lb	2,723	821	20.8%	3.5
$4.25/lb	3,174	1,003	23.1%	3.1
$4.5/lb	3,624	1,184	25.4%	2.7
Initial Capital Cost Sensitivities				
-20%	2,881	971	26.5%	2.5
-10%	2,802	896	23.4%	3.0
0%	2,723	821	20.8%	3.5
10%	2,645	746	18.7%	3.9
20%	2,566	671	16.9%	4.4
Operating Cost Sensitivities				
-20%	3,287	1,034	23.2%	3.1
-10%	3,005	928	22.1%	3.3
0%	2,723	821	20.8%	3.5
10%	2,442	714	19.5%	3.7
20%	2,159	607	18.2%	4.0

23 ADJACENT PROPERTIES

There are no other mineral exploration or development projects adjacent to the White Pine North Project area.

24 OTHER RELEVANT DATA AND INFORMATION

24.1 Project Schedule

This section discusses the project development schedule to lead White Pine North from a Preliminary Economic Assessment (PEA) to commercial production.

The project development schedule is provided in Figure 24.1. The major activities leading to production are listed below:

- Permitting
- Feasibility Study
- Detailed Engineering
- Procurement
- Construction
- Mine Development and Ramp-up
- Commercial Production

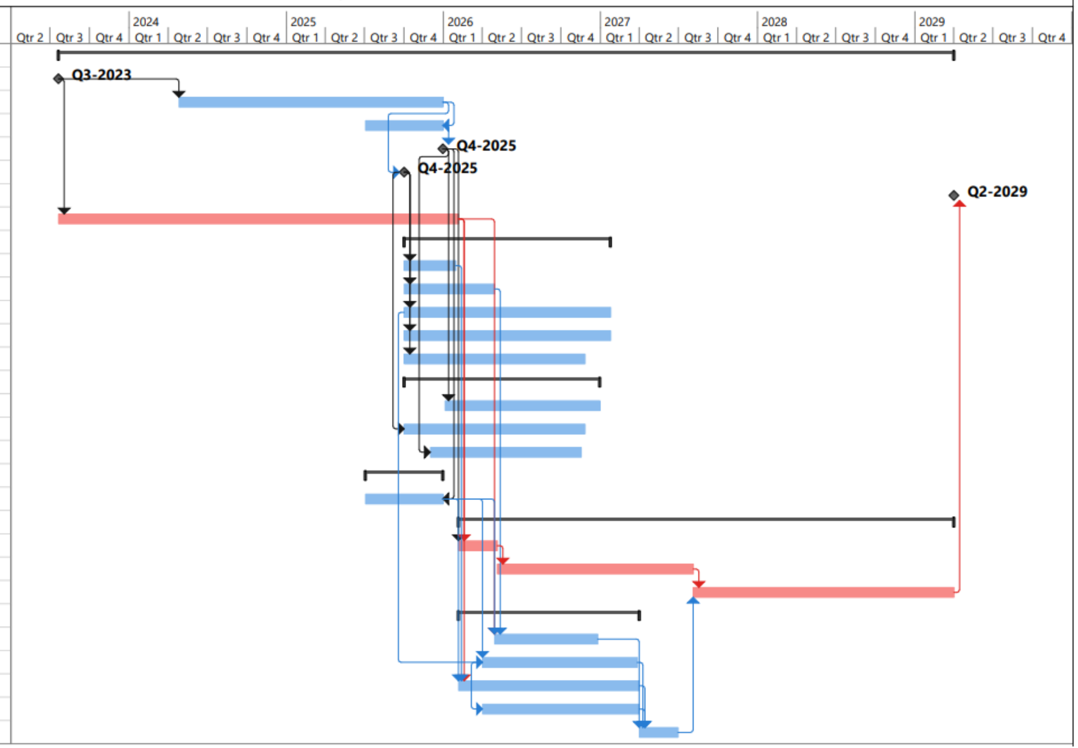
24.1.1 Permitting

Engineering and data collection activities to support the permit application for White Pine North will begin in Q3 2023. The environmental and permitting activities include the production of an Environment Impact Assessment (EIA) and an on-site data collection. Additional engineering activities pertaining to water and tailings management, mine planning and support infrastructure will be executed concurrently with the EIA. The objective is to complete all activities to support the permit application by Q4 2024. Permits issuance are expected for Q1 2026. For additional information on Environmental Studies and Permitting, please refer to Section 20 of this report.

Figure 24.1: Project Development Schedule

USWP - White Pine North Project

ID	Task Name	Start Date	Finish Date
1	**Milestones**	Q3-2023	Q2-2029
2	PEA Completion	Q3-2023	Q3-2023
3	Feasibility Study	Q2-2024	Q4-2025
4	Financing	Q3-2025	Q4-2025
5	Construction Decision	Q4-2025	Q4-2025
6	Detailed Engineering Kick-Off	Q4-2025	Q4-2025
7	Commercial Production	Q2-2029	Q2-2029
8	EIA & Permitting	Q3-2023	Q1-2026
9	**Detailed Engineering**	Q4-2025	Q1-2027
10	Power Supply Engineering	Q4-2025	Q1-2026
11	TDF Engineering	Q4-2025	Q2-2026
12	Processing Facilities	Q4-2025	Q1-2027
13	Mine	Q4-2025	Q1-2027
14	Support Infrastructure	Q4-2025	Q4-2026
15	**Procurement**	Q4-2025	Q4-2026
16	Mining Equipment	Q1-2026	Q4-2026
17	Process Equipment	Q4-2025	Q4-2026
18	Generators	Q4-2025	Q4-2026
19	**Early works**	Q3-2025	Q4-2025
20	Site Prepartion	Q3-2025	Q4-2025
21	**Mine Development**	Q1-2026	Q2-2029
22	Box Cut	Q1-2026	Q2-2026
23	Level Development	Q2-2026	Q3-2027
24	Pre-Production (Ramp Up)	Q3-2027	Q2-2029
25	**Construction**	Q1-2026	Q1-2027
26	Tailings Storage Facility	Q2-2026	Q4-2026
27	Processing Facilities	Q2-2026	Q1-2027
28	Main and Site power Distribution	Q1-2026	Q1-2027
29	Infrastructures	Q2-2026	Q1-2027
30	**Commissioning**	Q2-2027	Q2-2027



24.1.2 Feasibility Study

The following phase of development of the project is to go through a feasibility study (FS). The feasibility study would be initiated in Q2 2024 with a target to be completed by Q4 2025.

Additional data may be required to support a FS:

- Drilling to increase Measured and Indicated resources.
- Geotechnical investigation – Mine Design.
- Geotechnical investigation – Surface infrastructure and TDF.
- Metallurgical testwork to support processing facility design.

Recommendations to support a feasibility study are provided in Section 26 of this report.

24.1.3 Detailed Engineering

Once the FS is completed, detailed engineering can proceed to support procurement of equipment, material, and installation packages. Detailed engineering would be initiated in Q4 2025.

The main engineering packages are listed below:

- Tailings disposal facility (TDF)
- Underground mine and infrastructure
- Processing facility
- Power generation and distribution
- Water treatment plant
- Support infrastructure

24.1.4 Procurement – Long Lead Items

The procurement of long lead items will be critical to meet the schedule. Detailed engineering activities will initially be focused on supporting the procurement of equipment whose delivery can impact the project schedule. The main long lead item packages are listed below:

- Mining equipment (continuous mining equipment)

- Grinding equipment
- Flotation circuit
- Filtration equipment
- Generators

24.1.5 Construction & Mine Development

Construction is set to begin in Q1 2026. The most critical construction items driving the schedule are listed below:

- Box cut and mine portal
- Mine infrastructure and level development
- Power supply
- Power plant
- Processing facility
- Tailings disposal facility

Mineral processing is expected to begin in Q3 2027. At this stage, the construction of the process plant, power plant, and tailings disposal facility must be completed. The mine will start feeding the process plant with reduced throughput, ramping up through 2028 and reaching commercial production in Q2 2029.

25 INTERPRETATION AND CONCLUSIONS

25.1 Geology and Mineral Resources

GMS has prepared a Mineral Resource estimate for the White Pine North Project based on data provided up to and including September 2022. WPC performed three (3) new drill holes as part of an infill drilling program in Winter 2022-2023 but are not included in this MRE update. The goal of this program was to convert Mineral Resource from Inferred to Indicated.

The resource estimate was prepared in accordance with CIM Standards on Mineral Resources and Reserves (adopted May 19, 2014) is reported in accordance with Canadian National Instrument 43-101 - Standards of Disclosure for Mineral Projects ("NI 43-101"). The Mineral Resource estimate was prepared by Mr. Réjean Sirois, P.Eng., and Mr. Christian Beaulieu, consultants for GMS, and independent "qualified persons" ("QP") as defined in NI 43-101. Geovia GEMS™ and Leapfrog GEO™ software were used to facilitate the Resource estimation process.

In the process of completing the Mineral Resource estimate of the White Pine North Project, GMS came to the following conclusions:

- GMS reviewed the available data used in the Mineral Resource estimate, including drill logs, assay certificates, down-hole surveys and additional supporting information sources. GMS concludes that the drill hole database could be used with confidence in the Mineral Resource Estimate ("MRE").
- The MRE is based on a database that includes 526 drill holes from available historical drilling by Copper Range Company ("CRC"), and an additional 42 diamond drill holes (with 18 additional wedges) in HQ and NQ diameter core completed by WPC. A total of 278,551 metres ("m") was drilled by the companies between 1956 and 2015.
- The modelling of the copper mineralization horizons was based on the footwall and hanging wall of the three (3) selected "columns" (sedimentary sequences), namely the Parting Shale ("PS"), the Full Column ("FC") and the Upper Shale ("US"). These columns were modelled with a minimum true thickness of 2 m (PS and US) and 3 m (FC). Only the PS and FC columns were reported as a Mineral Resource.
- The statistical analysis of the copper and silver assays revealed that the use of grade capping was not necessary.
- Copper and silver uncapped raw assays were composited to the full thickness of the column.

- The variography study based on the zone composites highlighted a weakly anisotropic distribution of copper towards the south-east in the PS column, and a low nugget effect on copper and silver grades.
- The block size dimension (25 m x 25 m x 5 m) was chosen to ensure sufficient definition of mineralization during block modelling. Since block height is set at 5 m, and that columns have mean heights between 2.18 and 3.69 m, a percent attribute was used in the grade interpolation process. This percent attribute is used when reporting Mineral Resources.
- Grade estimation was undertaken using Ordinary Kriging ("OK") and Inverse Distance Squared ("ID^2") into a percentage block model based on the wireframes of the three columns. A three-pass estimation strategy was adopted, with increasingly large search ellipses and relaxed estimation parameters.
- The block model was validated visually and statistically and was found to be a good representation of the composites.
- The Mineral Resources were classified in Indicated and Inferred Mineral Resources, based primarily on estimation pass, and other considerations, such as drill spacing, quality of historical data and confidence in grade continuity.
- A 300 m buffer zone around existing workings was excised from the Mineral Resource and only blocks within mineral leases, where WPC has a greater than 25% ownership of the mineral rights, were classified as Mineral Resources.
- An underground room-and-pillar mining scenario is judged to be the most adapted to the geometry and dip of the PS and FC, as well as to the tonnage of the deposit.
- The following conceptual mining parameters were used to calculate block values: 1) A flat net smelter return ("NSR") royalty rate of $0.10/lb. Cu payable was applied, which incorporates three (3) royalties on the project (Osisko Silver Royalties, Osisko Copper Royalties and Longyear Royalty); 2) No mining loss / dilution; 3) Copper price of $4.00/lb and a silver price of $25/oz; 4) Recovery of 88% for copper and 73.4% for silver; 5) A payable rate of 96.5% for copper and 90% for silver; 6) A cut-off grade of 0.9% Cu; and 7) Operating costs based on an operating plant at the White Pine site.
- The White Pine North Deposit Underground Indicated Mineral Resources are reported at 150.7 Mt grading an average 1.05% Cu and 13.5 g/t Ag, containing 3.50 billion pounds of copper and 65.5M oz of silver using a lower cut-off grade of 0.9% Cu for the Parting Shale and Full Column combined. Inferred Mineral Resources are reported at 96.4 Mt grading an average 1.03% Cu and 9.0 g/t Ag, containing 2.18 billion pounds of copper and 27.8M oz of Ag using a cut-off grade of 0.9% Cu.

- Mineral Resources that are not Mineral Reserves have not demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio- political, marketing, or other relevant issues.

GMS concludes that the Resource evaluation reported in the present Technical Report is a reasonable representation of the Mineral Resources found in the White Pine North Copper Project at the current level of sampling. GMS believes that there are no significant risks associated with the Project's Mineral Resource estimate, and the varying uncertainties are identified by their respective resource classifications (Indicated and Inferred).

25.2 Mining

Based on geotechnical information, White Pine mine history and mineralization geometry, an underground room-and-pillar method is selected for the White Pine North deposit. The proposed mining method for the White Pine North Project is a mix of continuous mining and conventional jumbo driven room-and-pillar mining. This mining method allows for both a good mineralized material selectivity and productivity. However, a series of pillars are left in place to provide roof stability. The mining design was based on a mining rate of approximatively 15,000 tpd. Historically the old White Pine Mine has reached the proposed mining rate. In addition, many assumptions are based on historical data from the old White Pine Mine. The main conclusions on the mining are as follows:

- The production schedule is based on mining a fixed target of 5.475 Mtpy. To achieve this annual production, up to 21 production panels must be in production simultaneously.
- The mining method consists of the extraction of a series of entries and cross cuts in the mineralized zone leaving pillars in place to support the back. The entries, cross cuts and pillars are sized using a geotechnical analysis of the rock, and experience from the old White Pine Mine with similar ground conditions.
- No geotechnical investigation has been conducted on the underground operations at White Pine North since the closure of the former White Pine Mine. The previous geotechnical work carried out during the operation of the old white pine mine was analyzed and it was used to produce this preliminary study. In addition, a back analysis of the old White Pine was done by Itasca at the beginning of the project.
- The mine is divided into three (3) sectors: the Eastern, Center and Western parts. The mine will be accessed via a new covered box-cut to establish a portal at the mine entrance from the surface, located at the western side of the deposit.

- The pre-production period requires 18,193 m of development to establish the main entry panel requiring four to six (6) drifts according to the ventilation requirements.
- A single pass mining approach is assumed an overall recovery of 57% is estimated based on the recovery formula given by Itasca.
- The mining plan includes 115.1 million tonnes of mineralized material with an average grade of 0.96% Cu and 11.27 g/t of Ag.

25.3 Infrastructure

The White Pine North Project requires several infrastructure elements to support the mining and processing operations.

The infrastructure planned for the project includes the following:

- Roads:
  - Public access road from Michigan Highway 64
  - Main access roads
- Parking lot
- mineralized material and waste stockpiles
- Surface pads
- Event pond
- Covered box-cut for mine access
- Site run-off and spillage control
- Water management:
  - Sewage treatment – existing system
  - Water filtration
  - Tailings
  - Reclaim water system
  - Water treatment plant
  - Potable water – existing system
  - Fire protection

- Power supply and distribution
- Communications
- Fuel storage
- Security
- On-site buildings:
    - Process plant building
    - Plant workshop & stores
    - Assay laboratory
    - Truck shop, dry, warehouse and offices
    - Mill offices and metallurgical laboratory
    - Explosive magazines
    - Underground support buildings
- Off-site buildings:
    - Administration office
    - Concentrate transload facility
- Tailings Disposal Facility (“TDF”)

25.4 Environmental and Permitting

25.4.1 Baseline Studies and Impact Analysis

- WPC identified information gaps in 2014 and initiated but has not completed required environmental studies.
- Legacy data from CRC archives useful for reference, but dated and insufficient to fulfill legal requirements for permitting.
- Time frame to complete studies, analyzes and applications is 12 to 18 months.

25.4.2 Permitting Requirements

Michigan’s Public Act 451, the Natural Resource and Environmental Protection Act, sets the framework for all major permit requirements:

  - No Federal permits required under Michigan's delegated authorities.
- Required major permits for the White Pine North Project:
  - Part 632 Nonferrous Mining
  - Part 31 Wastewater Discharge
  - Part 55 Air Permit
  - Part 301 Inland Lakes and Streams
  - Part 303 Wetlands
  - Part 315 Dam Safety
- Based on recent Highland experience with the Copperwood Project and other Part 632 project in Michigan, estimate is 12 to 18 months from application to issue permits.

25.5 Capital Expenditures, Operating Expenditures and Economic Analysis

- The capital expenditure ("CAPEX") for Project construction, including concentrator, mine equipment, support infrastructure, pre-production activities and other direct and indirect costs is estimated to be USD 880.4M. The total initial Project capital includes a contingency of USD 140.4M, which is 19% of the total CAPEX before contingency, and excludes pre-production revenue of USD 265.3M. Net of pre-production revenue, the initial CAPEX is estimated at USD 615.18M.
- Sustaining capital expenditures during operations are required for additional mine equipment purchases and replacements, water treatment plant, mine development work, tailings storage expansion and general plant sustaining capital allowances. The LoM sustaining CAPEX is estimated at USD 657.8M.
- The NSR for the Project during operations is estimated at USD 8.068M, excluding USD 265.25M of NSR generated during pre-production and treated as pre-production revenue.
- The average NSR over the LoM is USD 3.97/lb of payable copper.
- The average OPEX over the LoM is USD 29.60/t of mineralized material or USD 1.63/lb of payable copper, with mining representing 59% of the total OPEX or USD 17.39/t of mineralized material.
- The undiscounted after-tax cash flow is estimated at USD 2.723M for the White Pine North Project. The pre-tax net present value at 8% ("NPV8%") is estimated at USD 1,024M with a 23.1% internal rate of return ("IRR") and 3.2 y payback period. Similarly, the after-tax NPV8% is estimated at USD 821M with a 20.8% IRR and 3.5 y payback period.

25.6 Risks and Opportunities

The identification and assessment process of risks and opportunities is iterative and has been applied throughout the PEA Study.

Like all projects, there remain risks and opportunities that could affect the economic results of the Project. Many of the risks and opportunities are general to mining projects and some are specific to the Project, which typically need additional information, testing or engineering to confirm assumptions and parameters.

25.6.1 Risks

The risks for the Project that are general or specific include:

- Permit acquisition or delays
- Requirement for lining tailings pond
- Lack of local labour availability
- Insufficient housing to support work force.
- Ability to attract experienced professionals
- Declining metal prices
- Faults creating offsets in the mineralization
- Cost inflation

25.6.2 Opportunities

The White Pine North Project has several opportunities that have not been incorporated in the current Feasibility Study Update, which would require further engineering, technical information or modifications to current permitting applications.

The significant project opportunities identified are as follows:

- Reduction in pillar with former White Pine mine
- Shaft to accelerate access to the White Pine North mineralized zone
- Metallurgical recovery improvements from flotation process and SXEW option
- Underground tailings disposal

- Funding from State and Federal Grants
- Ore Sorting
- Alternative site for the copper concentrate transload operations, closer to White Pine

26 RECOMMENDATION

GMS recommends that further work be undertaken to compliment the current Preliminary Economic Assessment ("PEA") and support a future Feasibility Study ("FS"), focusing on further upgrades of Inferred resources into the Indicated category.

The PEA is preliminary in nature and includes Inferred Mineral Resources that are too speculative geologically to have economic considerations applied to them that would enable them to be categorized as Mineral Reserves.

The following work is recommended to reduce geological risks, initiate feasibility engineering, metallurgical testwork and environmental baselines, and evaluate further opportunities for the White Pine North Project:

- Infill resource drilling at White Pine North Deposit (eastern sector) to upgrade most of the current Inferred Mineral Resources to Indicated category in order to support a Feasibility Study (Figure 26.1). It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.
- Confirm mining methods, ventilation and initiate underground geotechnical rock mechanics analysis studies.
- Establish and execute metallurgical testwork program and confirm process flowsheets including preliminary equipment sizing and trade-off studies and other processing alternatives such as heap leaching.
- Feasibility engineering designs including infrastructure, preliminary layouts.
- Starting project definition process for permitting.

The total costs of the recommended work program related to the Mineral Resource are estimated at USD 12.65M.

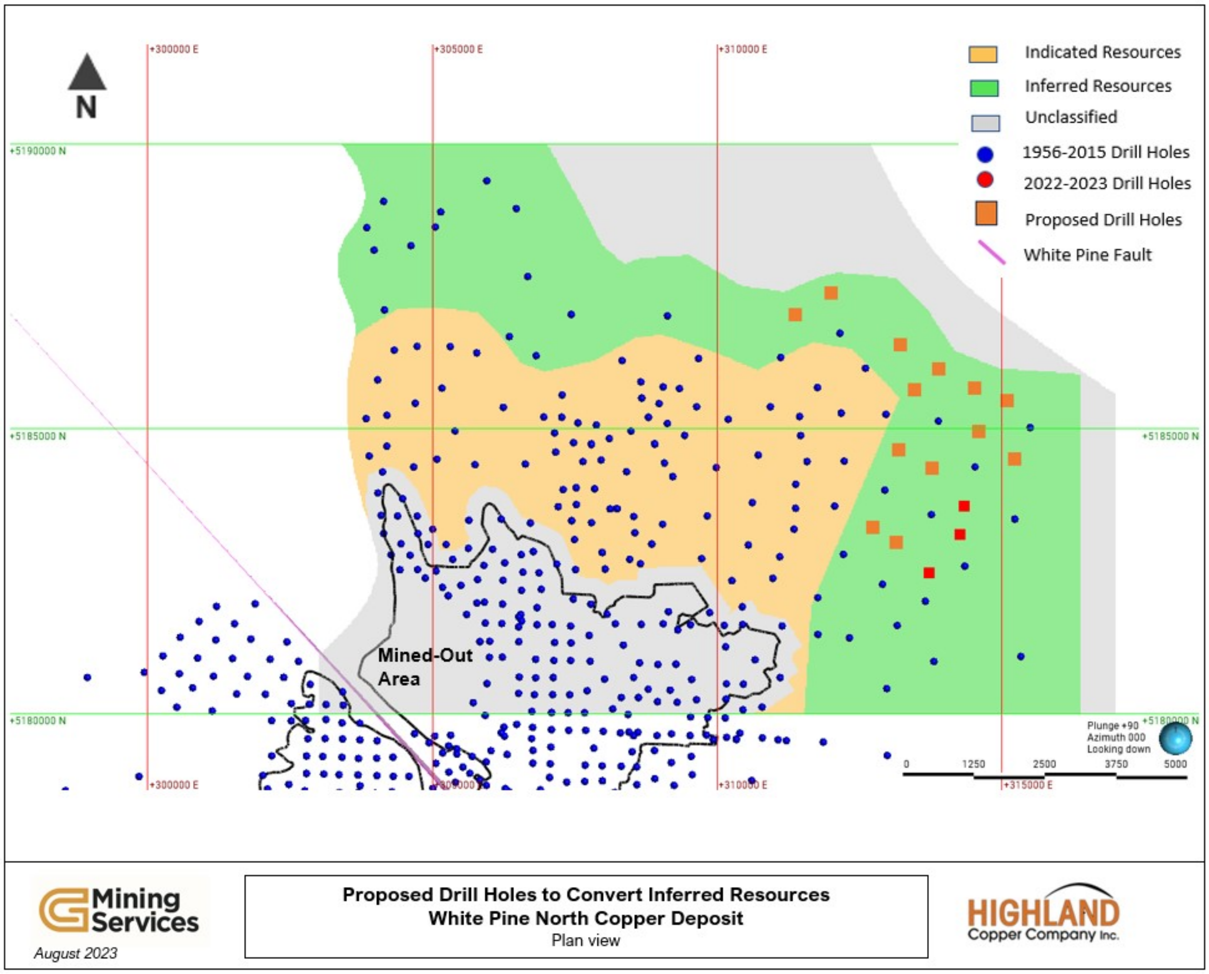
GMS also recommends beginning the permitting process. An environmental baseline study should be initiated, along with additional engineering activities required to support the EIA and permits application. The following activities are expected to be required to support the permitting process:

- Acid rock drainage and geochemistry evaluations
- Wetland delineations
- Tailings and water management plans
- Mine plan and surface infrastructure

- Ground water modelling

The costs of the workplan to support the EIA and permitting process is evaluated at $3M.

Figure 26.1: Proposed Drill Hole Plan to Convert Inferred to Indicated Mineral Resources



26.1 Metallurgy

It is recommended to consider the following elements:

- Perform testwork on sample selected based on future mining plan to reflect mineralization. Variability samples are also required to understand the responses of the various mineralized zones to grind size, flotation kinetics and concentrate element correlations.
- Comminution tests (e.g., SMC, Bond ball work index, and abrasion index) are recommended on representative samples from the first years of planned operation and to ensure that sufficient

material hardness information is spatially representative of variability within the various mineralized zones.

- The historical process plant flowsheet selected should be validated by selecting a composite sample representative of first operation years. This composite sample should undergo flotation testwork on flowsheet selected, including the reagent selection, cleaner stages, desliming and circuit loops. This will confirm flotation parameters.
- Perform vendor test work as rheological tests, thickening tests, concentrate filtration rate to confirm the equipment's performances.
- Perform bulk locked cycle flotation test to produce final concentrate to confirm quality for marketing purposes.

The estimated cost for a metallurgical testing program is around $500,000.

Table 26.1: Recommended Work Programs – Feasibility Study and EIA/Permitting

Description	Included Costs (USD)	Total Costs (k USD)
Geology & Mineral Resources		
Infill Resource drilling at White Pine North Deposit (East portion of the North-East area) to upgrade current Inferred Mineral Resources to Indicated category. 13,000 m of total drilling	Drilling Costs (drilling, logging, assays, etc.) - USD 330/m.	4,290
Update Mineral Resource Estimate		40
Mining & Mineral Reserves and Geotechnical		
Geotechnical, rock mechanics study	Drilling and analysis	2,500
Mining Engineering	Including trade-offs	400
Metallurgy & Mineral Processing		
Metallurgical testwork to confirm actual information		500
Mineral Process & recovery methods - feasibility level		800
Drilling test work	Drilling Costs (drilling, logging, assays, etc.) - USD 330/m.	1,250
ESR & Permitting		
Initiating Acid Rock Drainage and geochemistry evaluations, Environmental baseline Study and Wetland delineations, TDF investigation, mine plan and surface infrastructure, ground water modelling, water management, geotechnical investigations		3,000
Start permitting process		

Description	Included Costs (USD)	Total Costs (k USD)
Project PFS		
Remaining work to complete PFS	Mainly infrastructure, CAPEX, OPEX, financial model, etc.	6,500
Total Costs		**19,280**

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