REPORT

NI 43-101 Technical Report on the Eagle Mine, Michigan, USA

Submitted to:
Lundin Mining Corporation
150 King Street West, Suite 2200
Toronto, ON
M5H 1J9

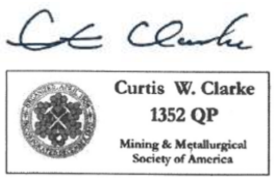
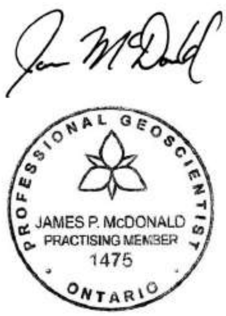
Effective Date: December 31, 2022
Reporting Date: February 22, 2023

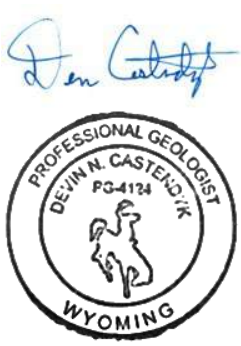
Prepared by:

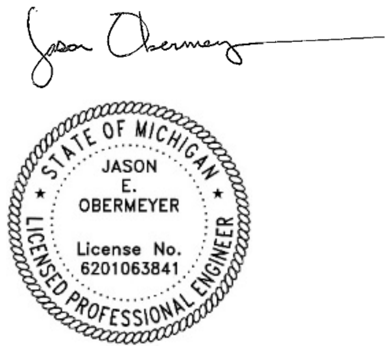
Curtis Clarke	Project Manager	MMSA QP
Brian Thomas	Mineral Resources	P. Geo.
James McDonald	Geology	P. Geo.
Stephan Blaho	Mineral Reserves	P.Eng.
Ewald Pengel	Mineral Processing	P. Eng.
Jason Obermeyer	Tailings Storage	P.E.
Dr. Devin Castendyk	ESG	P.G.
Ibrahim Karajeh	Infrastructure	P. Eng.

Date and Signature Page

This technical report on the Eagle Mine is submitted to Lundin Mining Corporation and is effective as of December 31, 2022.

Qualified Person	Responsible for Parts
 *Curtis Clarke, MMSA 1352QP* *WSP Canada Inc.* Date Signed: February 22, 2023	1.1, 1.2, 1.11, 2, 3, 4, 5, 19, 22, 23, 24, 27
 *James McDonald, P.Geo.* *WSP Canada Inc.* Date Signed: February 22, 2023	1.3, 6, 7, 8, 9, 10, 11, 12
 *Brian Thomas, P.Geo.* *WSP Canada Inc.* Date Signed: February 22, 2023	1.4, 14, 25.1, 26.1

Qualified Person	Responsible for Parts
 *Stephan Blaho, P.Eng.* *WSP Canada Inc.* Date signed: February 22, 2023	1.5, 1.6, 1.10, 6.4, 15, 16, 18.2, 21.1, 21.2.1, 21.2.4, 25.2, 26.2
 *Ewald Pengel, P.Eng.* *WSP Canada Inc.* Date signed: February 22, 2023	1.7, 1.10, 13, 17, 21.1, 21.2.2, 21.2.3, 21.2.4, 25.3
 *Devin Castendyk, PhD, PG* *Professional Geologist, State of Wyoming* *WSP USA Inc.* Date Signed: February 22, 2023	1.9, 20, 21.1.2, 25.6, 26.4

Qualified Person	Responsible for Parts
 *Jason Obermeyer, PE* *WSP USA Inc.* Date Signed: February 22, 2023	1.8.2, 1.8.3, 1.10, 18.1, 25.4, 26.3
 *Ibrahim Karajeh, P.Eng.* *WSP Canada Inc.* Date signed: February 22, 2023	1.8.1, 18.3 – 18.7, 25.5

CERTIFICATE OF QUALIFIED PERSON CURTIS CLARKE

I, Curtis W. Clarke, state that:

(a) I am a Senior Mining Consultant at:

WSP Canada Inc.
6925 Century Blvd
Mississauga, ON Canada

(b) This certificate applies to the technical report titled "Technical Report on the Eagle Mine, Michigan, USA, Mineral Resources and Mineral Reserves Update" (the "Technical Report"), with an effective date of December 31, 2022.

(c) I am a "qualified person" for the purposes of National Instrument 43-101 ("NI 43-101"). My qualifications as a qualified person are as follows. I am a graduate of Michigan Technological University with Bachelor degree in mine engineering (1986), and a QP Member in good standing with the Mining and Metallurgical Society of America (1352QP). I am a Project Management Professional (PMP), registered with the PMI. My relevant experience after graduation and over 36 years for the purpose of the Technical Report includes Mine Production Engineer at United Keno Hill Mines, Mines Project Engineer at Falconbridge Limited, Engineering Studies Manager at Coffey Mining Pty, President and CEO of Behre Dolbear Canada Ltd., and Senior Mining Consultant with WSP.

(d) The author has not visited the site.

(e) I am responsible for Items 1.1, 1.2, 2, 3, 4, 5, 19, 22, 24 of the Technical Report.

(f) I am independent of the issuer as described in section 1.5 of NI 43-101.

(g) I have not had prior involvement with the property that is the subject of the Technical Report.

(h) I have read NI 43-101 and the parts of the Technical Report for which I am responsible have been prepared in compliance with NI 43-101.

(i) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the parts of the Technical Report for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Mississauga, Ontario this 22nd day of February, 2023.

"signed and sealed"

Curtis Clarke, PMP, MMSA 1352QP

CERTIFICATE OF QUALIFIED PERSON JAMES MCDONALD

I, James McDonald, state that:

(a) I am a Senior Resource Geologist at:

WSP Canada Inc
33 Mackenzie Street,
Sudbury, Ontario, Canada
P3C 4Y1

(b) This certificate applies to the technical report titled "Technical Report on the Eagle Mine, Michigan, USA, Mineral Resources and Mineral Reserves Update" (the "Technical Report"), with an effective date of December 31, 2022.

(c) I am a "qualified person" for the purposes of National Instrument 43-101 ("NI 43-101"). My qualifications as a qualified person are as follows. I am a graduate of Laurentian University with Honours Bachelor of Science (Geology), 1994, and a Member in good standing with the Professional Geoscientists of Ontario. My relevant experience after graduation and over 25 years for the purpose of the Technical Report includes Geologist at Golder Associates, Holt McDermott Mine (Barrick Gold), Chief Geologist North and South Mines (Vale), VP Resources Talon Metals and Senior Resource Geologist with WSP.

(d) My most recent personal inspection of each property described in the Technical Report occurred on May 10, 2022 and was for a duration of 2 days.

(e) I am responsible for Items 1.3, 6, 7, 8, 9, 10, 11, 12, 23 of the Technical Report.

(f) I am independent of the issuer as described in section 1.5 of NI 43-101.

(g) I have not had prior involvement with the property that is the subject of the Technical Report.

(h) I have read NI 43-101 and the parts of the Technical Report for which I am responsible have been prepared in compliance with NI 43-101.

(i) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the parts of the Technical Report for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Sudbury, Ontario this 22nd day of February, 2023.

"signed and sealed"

James McDonald, PGO 1475

CERTIFICATE OF QUALIFIED PERSON BRIAN THOMAS

I, Brian Thomas, state that:

(a) I am a Geologist at:

WSP Canada Inc
33 Mackenzie Street, Suite
100 Sudbury, Ontario,
P3C4Y1

(b) This certificate applies to the technical report titled "Technical Report on the Eagle Mine, Michigan, USA, Mineral Resources and Mineral Reserves Update" (the "Technical Report"), with an effective date of December 31, 2022.

(c) I am a "qualified person" for the purposes of National Instrument 43-101 (the "Instrument"). My qualifications as a qualified person are as follows. I am a graduate of Laurentian University with a B.Sc. in Geology from 1994, am a member in good standing of the Professional Geoscientists of Ontario (#1366). My relevant experience after graduation includes over twenty-seven years of mine geology, mineral resource estimation and consulting experience in a variety of mineral projects nationally and internationally covering gold and base metal deposits including 9 years of direct nickel-copper, magmatic sulphide deposit experience with Vale in Sudbury, Ontario.

(d) The author has not visited the site.

(e) I am responsible for Items 1.4, 14, 25.1, 26.1 of the Technical Report.

(f) I am independent of the issuer as described in section 1.5 of NI 43-101.

(g) I have not had prior involvement with the property that is the subject of the Technical Report.

(h) I have read NI 43-101 and the parts of the Technical Report for which I am responsible have been prepared in compliance with NI 43-101.

(i) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the parts of the Technical Report for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Sudbury, Ontario this 22nd day of February, 2023.

"signed and sealed"

Brian Thomas, P. Geo.

CERTIFICATE OF QUALIFIED PERSON STEPHAN BLAHO

I, Stephan Blaho, state that:

(a) I am a Senior Principal Mining Engineer at:

WSP Canada Inc.
100 Commerce Valley Dr W
Thornhill, Ontario
L3T 0A1 Canada

(b) This certificate applies to the technical report titled "Technical Report on the Eagle Mine, Michigan, USA, Mineral Resources and Mineral Reserves Update" (the "Technical Report"), with an effective date of December 31, 2022.

(c) I am a "qualified person" for the purposes of National Instrument 43-101 ("NI 43-101"). My qualifications as a qualified person are as follows. I am a graduate of Queen's University with a degree in Mining Engineering in 1980 and am licensed member of Professional Engineers Ontario. My relevant experience after graduation and over 35 years for the purpose of the Technical Report includes managing technical studies, mining operations, and mine development projects, and contributing as a qualified person to Mineral Reserve estimates.

(d) My most recent personal inspection of each property described in the Technical Report occurred on September 20 and 21, 2022 and was for a duration of two days.

(e) I am responsible for Items 1.5, 1.6, 1.10, 6.4, 15, 16, 18.2, 21.1, 21.2.1, 21.2.4, 25.2 and 26.2 of the Technical Report.

(f) I am independent of the issuer as described in section 1.5 of NI 43-101.

(g) I have not had prior involvement with the property that is the subject of the Technical Report.

(h) I have read NI 43-101 and the parts of the Technical Report for which I am responsible have been prepared in compliance with NI 43-101.

(i) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the parts of the Technical Report for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Markham, Ontario this 22nd day of February, 2023.

"signed and sealed"

Stephan Blaho, P.Eng.

CERTIFICATE OF QUALIFIED PERSON EWALD PENGEL

I, Ewald Pengel, state that:

(a) I am a Principal Metallurgical Process Specialist at:

WSP Canada Inc.
1600 Blvd Rene Levesque Montreal, QC,
H3H 1P9

(b) This certificate applies to the technical report titled "Technical Report on the Eagle Mine, Michigan, USA, Mineral Resources and Mineral Reserves Update" (the "Technical Report"), with an effective date of December 31, 2022.

(c) I am a "qualified person" for the purposes of National Instrument 43-101 ("NI 43-101"). My qualifications as a qualified person are as follows. I am a graduate of Queen's University, Kingston, Ontario with a B. Sc. in Metallurgical Engineering in 1982 and the University of Pittsburgh, Pittsburgh, Pennsylvania (USA) with a M.Sc. in Mining Engineering in 1985. I am a registered member of Professional Engineers Ontario (90520297). My relevant experience after graduation and over a period of 36 years for the purpose of the Technical Report includes:

i. Surface Tour: The QP toured the Humboldt Coarse Ore Stockpile Area and concentrator. And hand the opportunity to observe firsthand all aspects of the operation, including crushing, grinding, flotation, dewatering and shipping facilities of the for the filtered concentrates. The tailings disposal facility was visited as well.

ii. Review laboratory: The QP visited the metallurgical laboratory as well as the analytical laboratory. Both meet the standards of good operations.

iii. Metallurgical Accounting: The QP reviewed the accounting methods to ensure that this was done by best practices.

(d) My most recent personal inspection of each property described in the Technical Report occurred on September 20, 2022, and was for a duration of one day.

(e) I am responsible for Items 1.7, 1.10, 13, 17, 21.1, 21.2.2, 21.2.3, 21.2.4, 25.3 of the Technical Report.

(f) I am independent of the issuer as described in section 1.5 of NI 43-101.

(g) I have not had prior involvement with the property that is the subject of the Technical Report.

(h) I have read NI 43-101 and the parts of the Technical Report for which I am responsible have been prepared in compliance with NI 43-101.

(i) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the part of the Technical Report I am responsible for, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Brossard, QC this 22nd day of February, 2023.

"signed and sealed"

Ewald Pengel, P.Eng.

CERTIFICATE OF QUALIFIED PERSON DEVIN CASTENDYK

I, Devin Castendyk, state that:

(a) I am a Licensed Professional Geologist (State of Wyoming) at:

WSP USA Inc. 7245 W
Alaska Dr.
Suite 200
Lakewood, CO, 80226
USA

(b) This certificate applies to the technical report titled "Technical Report on the Eagle Mine, Michigan, USA, Mineral Resources and Mineral Reserves Update" (the "Technical Report"), with an effective date of December 31, 2022.

(c) I am a "qualified person" for the purposes of National Instrument 43-101 ("NI 43-101"). My qualifications as a qualified person are as follows. I am a graduate of the University of Auckland, New Zealand with a PhD in Environmental Science in 2005, and of the University of Utah, with an MSc in Geology in 1999. I am a member of the Society for Mining, Metallurgy and Exploration, and of the Acid Drainage Technology Initiative, Metal Mining Sector. My relevant experience after graduation and over 1999 to 2022 for the purpose of the Technical Report includes 23 years of experience as an international Subject Matter Expert on mine pit lakes, 10 years of experience as an environmental consultant specializing in mine water geochemistry, and 10 years as an Assistant/Associate Professor of Water Resources at the State University of New York, relevant to the subject matter prepared in the Technical Report.

(d) My most recent personal inspection of each property described in the Technical Report occurred on September 7 and 9, 2022 and was for a duration of two days.

(e) I am responsible for Items 1.9, 20, 25.6, 26.4 of the Technical Report.

(f) I am independent of the issuer as described in section 1.5 of NI 43-101.

(g) My prior involvement with the property that is the subject of the Technical Report is as follows. I reviewed limnological predictions of the HTDF pit lake at the Mill Site during the preparation of the Mine Permit application. I have continuously served as the lead geochemistry consultant for Eagle Mine Inc. since August 2015. Over this period, I developed water quality monitoring programs at the Mine Site and Mill Site, provided interpretations of environmental monitoring data, supported conversations with regulators, participated in closure meetings and ITRB review meetings, and supervised the generation of predictive geochemistry models for the operations and closure periods at both sites.

(h) I have read NI 43-101 and the parts of the Technical Report for which I am responsible have been prepared in compliance with NI 43-101.

(i) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the part of the Technical Report I am responsible for, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Lakewood, Colorado, USA, this 22nd day of February, 2023.

"signed and sealed"

Devin Castendyk, Licensed Professional Geologist, PG-4124, Wyoming Board of Professional Geologists

CERTIFICATE OF QUALIFIED PERSON JASON OBERMEYER

I, Jason Obermeyer, state that:

(a) I am a Vice President, Geotechnical Engineer at:

WSP USA Inc.
7245 West Alaska Drive, Suite 200
Lakewood, Colorado 80226

(b) This certificate applies to the technical report titled "Technical Report on the Eagle Mine, Michigan, USA, Mineral Resources and Mineral Reserves Update" (the "Technical Report"), with an effective date of December 31, 2022.

(c) I am a "qualified person" for the purposes of National Instrument 43-101 ("NI 43-101"). My qualifications as a qualified person are as follows: I am a graduate of The University of Texas at Austin with a Bachelor of Science degree in civil engineering (2001) and a Master of Science degree in geotechnical engineering (2002). My relevant experience after graduation and over 20 years for the purpose of the Technical Report includes leading or assisting with engineering evaluations, design work, and operational support for tailings and waste rock management at numerous mine sites. This work has included geotechnical characterization, seepage analysis, slope stability analysis, tailings deposition planning, reclamation cover evaluation and design, dam safety inspection, and other related work.

(d) My most recent personal inspection of the mill site described in the Technical Report occurred on September 6 through 8, 2022, and was for a duration of three days.

(e) I am responsible for Item(s) 1.8.2, 1.8.3, 1.10, 18.1, 25.4, 26.3 of the Technical Report.

(f) I am independent of the issuer as described in section 1.5 of NI 43-101.

(g) My prior involvement with the property that is the subject of the Technical Report is as follows: Since August 2019, I have served as a representative of WSP USA Inc. (or a predecessor) in the role of Engineer of Record for the Humboldt Tailings Disposal Facility. In that capacity, I have reviewed performance-related data for the facility and led or assisted with engineering evaluations pertaining to the facility.

(h) I have read NI 43-101 and the parts of the Technical Report for which I am responsible have been prepared in compliance with NI 43-101.

(i) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the parts of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Lakewood, Colorado, this 22nd of February, 2023.

"signed and sealed"

Jason Obermeyer, PE

CERTIFICATE OF QUALIFIED PERSON IBRAHIM KARAJEH

I, Ibrahim Karajeh, state that:

(a) I am a Senior Engineer at:

WSP Canada Inc.
6925 Century Blvd
Mississauga, ON, Canada

(b) This certificate applies to the technical report titled "Technical Report on the Eagle Mine, Michigan, USA, Mineral Resources and Mineral Reserves Update" (the "Technical Report"), with an effective date of December 31, 2022.

(c) I am a "qualified person" for the purposes of National Instrument 43-101 ("NI 43-101"). My qualifications as a qualified person are as follows: I am a graduate of the University of Jordan with a Bachelor's degree in Mechanical Engineering. I earned an MBA from the Edinburgh Business School, Heriot Watt University (Scotland). I am a Certified Cost Professional (CCP) with the AACE and a Project Management Professional (PMP), registered with the PMI. My relevant experience after graduation and over 25 years for the purpose of the Technical Report includes design, construction and project management for large scale and heavy industrial applications for infrastructure and industrial projects in the Oil & Gas, Pulp & Paper, Mining & Mineral Processing, and Energy & Power industrial sectors.

(d) The author has not visited the site.

(d) I am responsible for Items 1.8.1, 18.3 – 18.7, 25.5 of the Technical Report.

(e) I am independent of the issuer as described in section 1.5 of NI 43-101.

(g) I have not had prior involvement with the property that is the subject of the Technical Report.

(h) I have read NI 43-101 and the parts of the Technical Report for which I am responsible have been prepared in compliance with NI 43-101.

(i) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the parts of the Technical Report for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Mississauga, Ontario this 22nd day of February, 2023.

"signed and sealed"

Ibrahim Karajeh, P.Eng., PMP

NOTICE TO READERS:

This Technical Report was prepared in accordance with National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* (NI 43-101) for Lundin Mining Corporation and executed by the Qualified Persons named herein as Authors. This report contains the expressions of professional opinions of the Authors based on (i) information available at the time of preparation, (ii) data supplied by Lundin Mining Corporation, and (iii) the assumptions, conditions, and qualifications set forth in this report. The Authors have reviewed such information, conclusions, and estimates and have used all means necessary in their professional judgement to verify it and have no reasons to doubt its reliability and have determined it to be adequate for the purposes of this Technical Report. The authors do not disclaim any responsibility for the information, conclusions, and estimates contained in this Technical Report. This Report was prepared in accordance with a contract between Golder Associates Ltd., a member of WSP, and Lundin Mining Corporation which permits Lundin Mining Corporation to file this report as a Technical Report with Canadian securities regulators pursuant to NI 43-101.

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FIGURES

1.0 SUMMARY

1.1 Executive Summary

WSP Golder (WSP) was retained by Lundin Mining Corporation (LMC) to prepare an independent Technical Report on the Eagle Mine (Eagle) property, located in the Upper Peninsula of Michigan, USA. The Eagle Mine, including the Eagle, Eagle East, and Keel deposits (collectively, the Eagle Mine), is 100% owned and operated by Eagle Mine LLC, an indirect wholly owned subsidiary of LMC. The purpose of this report is to support the public disclosure of the Mineral Resource and Mineral Reserve estimates of the Eagle Mine. This Technical Report was prepared in accordance with National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101).

The Mineral Resources estimates for the Eagle Mine which includes the Eagle, Eagle East and Keel deposits, effective December 31, 2022, are summarized in Table 1.1. This Technical Report includes the first Mineral Resource estimate disclosure for the Keel deposit.

The Eagle Mine and Eagle East Mineral Reserve estimates as of December 31, 2022, are summarized in Table 1.2.

The Qualified Persons (QPs) consider that the Mineral Resource and Mineral Reserve estimates are classified and reported in accordance with Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves, dated May 10, 2014 (CIM definitions), and CIM Estimation of Mineral Resources & Mineral Reserves Best Practice Guidelines, dated November 29, 2019, and NI 43-101 guidelines.

The QPs are not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource and Mineral Reserve estimates.

The Mineral Reserves will support the Mine Plan for the period 2023-2027, following which the mine is scheduled to close unless more economic mineralization is discovered, delineated, and evaluated to be feasibly mined.

Recommendations provided herein may, for the most part, be addressed by operating staff and budgets given the operational status of the Eagle mine. The recommendations are expected to be considered by operations management and, as such, have not been costed out individually.

Unless otherwise specified, all dollar references and amounts in this technical report are U.S. dollars.

1.2 Property Description, Location, History and Ownership

1.2.1 Property Description and Location

The Eagle Mine property, measuring approximately 0.63 square kilometers (km^2) in area, is located in the Upper Peninsula of Michigan, USA, at geographic co-ordinates 46° 45' north latitude by 87° 54' west longitude (UTM Zone 16N coordinates 5177557 m N, 432639 m E), in Michigamme Township, Marquette County. The Humboldt Mill property, measuring approximately 1.42 km^2, is located 61 kilometers (km) west of Marquette and approximately 105 km by road from the mine site. The centre point of the Humboldt Mill area (including all ownership of land) is 46º 29’ north latitude, 87º 54’ west longitude (UTM Zone 16N Zone coordinates 5148824 m N, 430843 m E). Eagle has a geological field office located in Negaunee, 15 km west of Marquette as well as an information center in Marquette.

1.2.2 Ownership

The Eagle Mine, including the Eagle, Eagle East and Keel deposits, is 100% owned and operated by Eagle Mine LLC, an indirect wholly owned subsidiary of LMC. Eagle Mine LLC holds surface and mineral rights over a wide district encompassing portions of Sections 4-9 and 16-18, Township 50N, Range 28W, and Sections 1-5 and 8-17, Township 50N, Range 29W. The overall footprint of land controlled by Eagle Mine LLC comprises leases, agreements, or ownership totalling approximately 4,565 hectares (ha) of mineral rights and approximately 3,080 ha of surface rights.

While the surface of the Eagle Mine is on Eagle Mine LLC property or property leased from the State of Michigan, the minerals comprising the Eagle Mine are either owned or leased from private owners or the State of Michigan. The state leases were renewed in 2022 for a period of 10 years. The private leases have various expiry dates that are extendable by continued payments or production. The Eagle deposit is situated on state and private mineral leases with the Mineral Resource estimates split approximately equally between them. An annual lease payment is currently made, in addition to a royalty payment based on a percentage of the Net Smelter Return (NSR), to the owners while in production.

Lease payments would remain for the duration of mining at the Eagle Mine, although royalty payments related to Eagle would cease when production from the Eagle Mine ends. The royalties for the Eagle Mine follow mining industry norms.

Aside from lease and royalty payments, the QPs are not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform work at the Eagle Mine.

1.2.3 History

KEX started working in the region in 1991. Nickel exploration in the vicinity of Eagle was started in 1995, and in 2002, the Eagle deposit was first drilled by Rio Tinto with economic grade mineralization being intersected. By the end of 2003, two separate high grade sulphide zones were identified at Eagle. The lower zone was defined by 15 drill intercepts and the upper zone was defined by six drill intercepts. This formed the basis of an order of magnitude study that was completed in early 2004. Following the order of magnitude study, an extensive resource and geotechnical drill program was completed in 2004, supplying the data to connect the former upper and lower zones and better establish the geometries of the massive sulphide, semi-massive sulphide, and host intrusive bodies. The result of this work was a pre-feasibility study.

Construction of the Eagle Mine commenced in 2010 and underground development began in September 2011. The Humboldt Mill was refurbished, and the Eagle Mine achieved commercial production in November 2014. To the end of 2021, a total of approximately 143.7 thousand tonnes (kt) of nickel and 142.3 kt of copper have been produced since the start of the operation. The nickel and copper concentrates are sold under long term contracts directly to smelters or to traders in North America, Europe, and Asia.

LMC acquired the Eagle Mine in 2013 and commercial production of nickel and copper concentrates was achieved in November 2014.

During 2015, exploration drilling discovered high grade massive and semi-massive nickel-copper sulphide mineralization approximately 600 meters (m) beneath and two km east of the Eagle deposit. Referred to as Eagle East, this is a separate intrusion from the Eagle deposit. Eagle East Mineral Reserves were first disclosed in the Technical Report prepared by Roscoe Postle Associates (RPA) at the effective date of December 31, 2016. The Eagle East deposit has been included in the Mine Plan since 2017.

1.3 Geology, Exploration and Mineralization

The Eagle intrusion, Eagle East intrusion, and the Keel zone of Eagle East are all part of the same ultramafic intrusive system and all host high grade primary magmatic Ni-Cu sulphide mineralization. These intrusions are related to the feeder system for the Keweenawan flood basalts, a Large Igneous Province (LIP) resulting from mantle-tapping extension during the Midcontinent Rift.

Mineralization styles are similar in Eagle and Eagle East, consisting of mineralized peridotite bodies with concentrations of semi-massive sulphide in the center of the intrusions and massive sulphides at the base. Massive sulphides can extend for short distances outwards beyond the contact of the peridotite, into the surrounding sedimentary country rocks as sills along bedding planes.

Exploration activities at Eagle have included geological mapping, geochemistry (indicator mineral sampling and Mobile Metal Ion (MMI) studies from basal tills, dyke geochemistry, sulphur isotype studies, QEMSCAN studies), and geophysics (airborne, surface, and underground borehole electromagnetics, resistivity and gravity). The main and most successful exploration tool has been diamond drilling in combination with a very robust and predictive conduit deposit model. The conduit has been traced eastward of Eagle East for approximately 1 km, at which point a gabbro intrusion occupies the intrusive plumbing system. This gabbro intrusion is approximately 350 m in width in the east-west direction and 225 m in the north-south direction and extends vertically to at least the drilled depth of 2,070 m below surface (1,550 m below the mineralized conduit). The hole defining this depth bottomed in gabbro, and the intrusion continues near vertically to an unknown depth. This gabbro intrusion frequently has a “rind” of pyroxenite, peridotite, or mineralized peridotite. This is interpreted as evidence that the gabbro has intruded and blocked the structural plumbing that was exploited by the mineralized peridotite intrusion. Based on this, it is expected that additional accumulations of high-grade sulphide exist at depth.

Exploration geology work and mineral resource definition has continued at Eagle Mine. Early success was realized with the discovery and development of Eagle East into a producing ore zone. The recent discovery and delineation of the Keel Zone, at a shallower depth than Eagle East, has added to the mineral resource inventory of Eagle. The QP has conducted a review of the data collection processes, procedures and data management records, with the following observations and conclusions:

- The drilling at Eagle and Eagle East has been conducted in a competent manner using appropriate equipment and techniques.
- Core handling, logging, and sampling have been carried out to a standard that meets or exceeds common industry practice.
- Drill core and samples are stored and transported in a secure fashion.
- Assaying has been performed by accredited commercial laboratories using conventional methods commonly used in the industry.
- An adequate level of assay quality assurance/quality control (QA/QC) sampling has been carried out, and the results of this sampling have been used appropriately to ensure that the accuracy and precision of the analyses are within acceptable limits.
- The database is properly managed and validated, in a secure manner.

1.4 Mineral Resources

The Mineral Resource estimate for the Eagle Mine is reported in accordance with NI 43-101 and has been estimated in conformity with generally accepted CIM Estimation of Mineral Resource and Mineral Reserves Best Practices guidelines.

Table 1.1 provides a summary of the categorized Mineral Resource estimate for the entirety of the Eagle Mine. The Mineral Resource Estimate is reported at NSR cut-offs of $137.86/t, $140.15/t, and $155.98/t for Eagle, Keel and Eagle East respectively. The Mineral Resource estimates are inclusive of Mineral Reserves but excludes mineralization within previously mined (depleted) areas.

Table 1.1: Eagle Mine Mineral Resources Estimate (Effective December 31, 2022)

Domain	Category	Tonnes (kt)	Ni (%)	Cu (%)	Co (%	Au (g/t)	Ag (g/t)	Pt (g/t)	Pd (g/t)
Eagle	Measured (M)	357	2.23	1.82	0.06	0.16	10.71	0.28	0.21
Eagle East		0	0	0	0	0	0	0	0
Keel		0	0	0	0	0	0	0	0
Sub Total		**357**	**2.23**	**1.82**	**0.06**	**0.16**	**10.71**	**0.28**	**0.21**
Eagle	Indicated (I)	323	1.91	1.42	0.05	0.14	7.74	0.23	0.17
Eagle East		1,718	2.37	1.90	0.06	0.21	7.57	0.58	0.40
Keel		1,457	1.21	0.81	0.03	0.09	2.76	0.21	0.15
Sub Total		**3,498**	**1.84**	**1.40**	**0.05**	**0.15**	**5.58**	**0.39**	**0.27**
Eagle	M+I	680	2.08	1.63	0.06	0.15	9.30	0.26	0.19
Eagle East		1,718	2.37	1.90	0.06	0.21	7.57	0.58	0.40
Keel		1,457	1.21	0.81	0.03	0.09	2.76	0.21	0.15
Total	**M+I**	***3,855***	***1.88***	***1.44***	***0.05***	***0.15***	***6.06***	***0.38***	***0.27***
Eagle	Inferred	26	0.95	0.87	0.03	0.09	3.63	0.19	0.17
Eagle East		0	0	0	0	0	0	0	0
Keel		0	0	0	0	0	0	0	0
Sub Total		**26**	**0.95**	**0.87**	**0.03**	**0.09**	**3.63**	**0.19**	**0.17**

Note: Metal prices used for Eagle and Eagle East: $9.00/lb Ni, $4.02/lb Cu, $25.00/lb Co, $1600/oz Au, $22.00/oz Ag, $1000/oz Pt, $1400/oz Pd. Metal prices used for Keel: $9.60/lb Ni, $4.02/lb Cu, $25.00/lb Co, $1600/oz Au, $22.00/oz Ag, $1000/oz Pt, $1400/oz Pd.

1.4.1 Risks to Mineral Resources Estimates and Opportunities

Eagle Mine has been a producing mine since 2014 and has either mitigated or placed controls on many of the identified geological risks during that period. The followings risks and opportunities associated with this Mineral Resources estimate are considered by the QP to be minor:

- The Eagle East resource classification is conservative. Multiple cut and fill levels of the deposit have been mined, providing detailed information on continuity, contacts, and recovery. Coupled with a drill density approaching 10 m^2, a majority of the deposit could reasonably be considered to be of the Measured classification.

- There are minor risks associated with modeled contacts and continuity of mineralization in Eagle or Eagle East deposits. The Keel deposit has not been mined to date and mineral thickness and continuity may vary on the drill hole interpreted mineral wireframes (either positively or negatively).
- The peridotite is pervasively mineralized and at the current mineral prices and mining methods, only certain areas are economic. There may exist opportunities either via bulk mining, or via an increase in nickel price, whereby more of the mineralized peridotite becomes economic. A study of the opportunities and cascading mine/mill effects should be kept current so that the Mine can react appropriately in a rapid manner.

1.5 Mineral Reserves

The Mineral Reserve estimate, effective December 31, 2022, includes that portion of the Measured and Indicated Mineral Resource which can be mined economically. Economic criteria and constraints are applied to the Mineral Resource blocks, based on the selected mining methods, to define mineable blocks. In addition, the estimate includes dilution and mining recovery, which are modifying factors that affect the quantity and quality of the material extracted during mining operations.

Mining dilution comes from three principal sources: planned dilution, unplanned dilution, and backfill dilution. The Mineral Reserve estimate for the Eagle Mine includes planned dilution for the Eagle Zone but not for the Eagle East or Keel Zones. All three zones include unplanned dilution from backfill only. The Mineral Reserve estimate is based on a 95% mining recovery for transverse sub-level open stoping (SLOS) and longitudinal SLOS methods and 98% mining recovery for drift and fill mining.

Deswik Stope Optimizer (DSO) software was used to determine the mineable portion of the Mineral Resource. The software optimizes the stope design based on the mining method, the resource geometry, dilution and mining recovery parameters, the NSR value of the blocks, and the NSR cut-off. Multiple DSO scenarios and iterations were run to obtain the best results in terms of tonnage and grade. The Mineral Reserves were then sequenced and scheduled into an integrated life-of-mine (LOM) schedule using Deswik interactive scheduling software and exported to spreadsheets for financial analysis.

The mine design is based on the following mining methods:

- Eagle Zone: Transverse sublevel open stoping
- Eagle East Zone: Transverse and longitudinal sublevel open stoping and drift-and-fill mining
- Keel Zone: Drift-and-fill mining and sublevel open stoping

The NSR value of each block was calculated considering metal prices, parameters, and costs. NSR refers to the proceeds received from the sale of the mineral product net of deductions for costs incurred before the sale of the product and after it leaves the mining property. For estimating Mineral Reserves, the NSR value of the metal contained in a tonne of concentrate is applied to the metallic content of the corresponding run-of-mine (ROM) production tonnes.

For a block to be included in the Mineral Reserve, its NSR value must exceed the NSR cut-off. The NSR cut-off for each zone was calculated considering the unit costs for mining, processing, transportation, general &

administration, and sustaining capital related to mine development. Closure costs were not included as they are accounted for in the Asset Retirement Obligation (ARO).

Table 1.2 presents the Eagle Mine Mineral Reserve estimate as of December 31, 2022. It is based on stope wireframe shapes applied to the depleted Mineral Resource block model using Deswik mine design software. The estimate incorporates planned dilution, unplanned dilution, backfill dilution, and mining recovery.

Table 1.2: Eagle Mine Mineral Reserves Estimate (Effective December 31, 2022)

Zone	Category	Tonnes (kt)	Grade				Contained Metal			
			Ni (%)	Cu (%)	Au (g/t)	Ag (g/t)	Ni (kt)	Cu (kt)	Au (koz)	Ag (koz)
Eagle	Proven	303	1.89%	1.54%	0.13	9.62	5.7	4.7	1.26	93.62
Eagle East		0	0.00%	0.00%	0.00	0	0.0	0.0	0.00	0.00
Keel		0	0.00%	0.00%	0.00	0	0.0	0.0	0.00	0.00
Sub Total		**303**	**1.89%**	**1.54%**	**0.13**	**9.62**	**5.7**	**4.7**	**1.26**	**93.6**
Eagle	Probable	328	1.25%	0.91%	0.13	5.29	4.1	3.0	1.37	55.7
Eagle East		2,034	1.86%	1.51%	0.15	6.12	37.8	30.7	9.81	400.2
Keel		765	1.13%	0.72%	0.08	2.47	8.6	5.5	1.97	60.8
Sub Total		**3,127**	**1.62%**	**1.25%**	**0.14**	**5.14**	**50.6**	**39.2**	**13.15**	**516.7**
Total	**P+P**	**3,430**	**1.64%**	**1.28%**	**0.14**	**5.54**	**56.3**	**43.9**	**14.41**	**610.3**

Notes:

1. Mineral Reserves are estimated at an NSR cut-off of $137.86/t for Eagle Zone, $155.98/t for Eagle East Zone, and $140.15/t for Keel Zone.
2. Mineral Reserves are estimated using average long-term prices of $7.50/lb Ni, $3.35/lb Cu, $1,600/oz Au.
3. Bulk density interpolated in block model ranges from 2.98 t/m^3 to 4.44 t/m^3 and averages 4.11 t/m^3.
4. Numbers may not add due to rounding.

Compared to the Mineral Reserves effective as of June 30, 2021, disclosed in LMC's annual information form for the year ended December 31, 2021 (2021 AIF), the Mineral Reserves have been increased by approximately 1,243 kt, primarily by the addition of the Keel deposit, with estimates of contained metals rising 11 kt Ni and 7 kt Cu (Table 1.3). These changes include the Mineral Reserve depletion due to production between July 2021 to December 2022.

Table 1.3: Change in Mineral Reserves from June 30, 2021, to December 31, 2022

	Tonnes (kt)	Nickel (%)	Copper (%)
June 30, 2021	3,280	2.36	1.94
Depleted	-1,093	2.95	2.47
Eagle and Eagle East	2,187	2.07	1.68
Keel	1,243	0.89	0.58
December 31, 2022	3,430	1.64	1.28

1.6 Mining

1.6.1 General

The Eagle Mine is an underground mine producing about 2,000 tonnes per day (tpd) of high-grade nickel-copper ore. The ore is hauled to surface in diesel-powered trucks via the ramp and then trucked to the Humboldt processing plant at a separate site. Underground workings are accessed via the main ramp, which has its portal entrance within the mine site industrial area. The mine has two active mineralized zones called Eagle and Eagle East. A third zone, Keel, is expected to be developed and begin producing mill feed in 2024. The Eagle Mine has Mineral Reserves to support production until 2027, when the mine is scheduled to be closed.

1.6.2 Geomechanics

The general rock quality at the Eagle Mine is classified as "Good to Excellent," according to the RQD_{76} system, "Good to Very Good" according to the RMR76 system, and "Fair to Good," according to the Q-system. The Eagle zone has post-mineralization faults within the intrusive near the footwall peridotite-siltstone contact. Eagle East zone has a post-mineralization fault, which has been intruded by a gabbro dike. An overcoring study using the Sigra biaxial deformation method indicated a higher horizontal in-situ stress occurring close to and within the Eagle ore zone.

1.6.3 Geomechanics Keel Zone

Lithologic units within the Keel are largely identical to those in Eagle, except that the predominant waste rock is Feldspathic Peridotite. Although no geotechnical drilling has been conducted at Keel, given that there is significant experience at the site, its geotechnical conditions are expected to be similar to those in the other zones. However, a review of core photographs and logging data within the Keel identified a zone of poor-quality rock at the intrusive/sediment contact.

1.6.4 Crown Pillar

The Eagle crown pillar extends from the bedrock surface to the back of the 381 Level, resulting in a 29-m thickness. The crown pillar has been the subject of extensive geotechnical studies, which were required to obtain the necessary permitting. Eagle Technical Services monitors the crown pillar regularly, using geotechnical, hydrogeological, and seismic methods. The back of the crown pillar of the 381 Level is supported.

1.6.5 Hydrogeology

Eagle Mine is a relatively dry mine, and daily dewatering volumes are typically less than 10 gpm. The groundwater-inflow volume is calculated as the difference between the daily volume of water provided underground and the daily volume pumped to the surface. This volume is regularly monitored as a sudden increase could indicate inflow from the crown pillar.

1.6.6 Ground Support

The primary ground support procedures are based on the rock mass quality "Q" index, ranging from Type 1 support for Q ≥ 4 to Type 3 support for Q < 1. The ground support generally consists of 2.4 m (8 ft) inflatable bolts installed on a 1.5 m by 1.8 m (5 ft by 6 ft) spacing with galvanized welded wire mesh and an overlapping "5-spot" pattern. Type 3 ground requires applying 5 cm (2 in) of shotcrete. Secondary support for intersections and other mine openings with a wide span consists of a pattern of either 3.7 m (12 ft) premium inflatable bolts or 6 m (20 ft) cable bolts. For Eagle East, the mine is converting from inflatable bolts to pumpable resin-grouted rebar as the excessive corrosion of inflatable bolts has resulted in extensive rehabilitation.

1.6.7 Mine Design

The Eagle Mine uses Deswik software for mine design. The design undertaking requires estimation of numerous parameters related to production rates and determination of the dimensions of underground excavations. The Eagle Mine uses the Modified Stability Graph Method to predict stability and determine stope dimensions.

1.6.8 Backfill

Eagle Mine employs cemented (CRF) and uncemented rockfill (URF) to backfill stope voids. CRF is used to backfill the drifts in drift and fill mining (D&F) and the primary stopes in transverse sublevel open stoping (TSLOS). URF is used to backfill secondary stopes in TSLOS. The backfill is hauled to stopes by the same mine trucks that transport ore to surface. About half of the backfill aggregate comes from development waste, while the remainder is purchased from two local quarries.

1.6.9 Mine Access

The underground workings are accessed via the main ramp, which measures 5.65 m wide by 5.35 m high and has a grade of -13%. The mine's escapeway routes consist of the main ramp, a borehole raise extending to surface equipped with an Alimak elevator, the twin ramps connecting Eagle East to the Eagle Zone, and borehole raises extending between sublevels equipped with Laddertube™ manways. In addition, the Keel Zone will have two escape routes connecting with the Eagle Mine's main ramp.

1.6.10 Underground Infrastructure

A compressor plant situated on surface at the mine site supplies the mine's compressed air. The underground mine's data and communications systems consist of a leaky feeder system for two-way radio communication and a fibre-optic network; however, the mine is currently replacing the existing systems with an LTE cellular network. Mining equipment is mainly serviced and repaired at the maintenance shop on surface; however, there is an underground maintenance shop in the East Eagle Zone. The dewatering system consists of pumping stations connected in series along the main decline such that the water is pumped upward from station to station and finally to the Surface Control Water Basin. Underground electrical power is fed by two separate 13.8-kV distribution systems, one from the portal and the second down the fresh-air raise (FAR). The mine's explosives magazines are located in the underground mine.

1.6.11 Ventilation

Fresh air enters the mine via the portal of the main ramp and a FAR. The return air is exhausted via a return-air raise (RAR), with twin 522 kW fans installed at the collar. The portal is equipped with a 186-kW fan. The ventilation system has been extended via twin ramps from the Eagle Zone to the Eagle East zone. For the Keel Zone, fresh air will be drawn to its upper level via a ventilation drift extending from the main ramp, and the return air will be exhausted via the spiral ramp and discharged to the main ramp.

1.6.12 Mining Methods

Eagle Mine uses three mining methods, transverse sublevel open stoping (TSLOS), longitudinal sublevel open stoping (LSLOS) and drift and fill mining (D&F). For TSLOS, the portion of the deposit between two sublevels is mined by dividing the ore into alternating primary and secondary stopes, which extend in parallel from the footwall to the hangingwall. Longitudinal stopes are typically 6 m wide and are mined along strike in panels up to 45 m in length. D&F is similar to overhand cut-and-fill method except that the lifts are mined one drift at a time rather than by excavating the ore from footwall to hangingwall.

1.6.13 Mining Equipment

The Eagle Mine is a mechanized mine with rubber-tired diesel equipment utilized for all phases of mining operations. The LHDs are equipped for radio remote control operation, which is required for mucking in TSLOS stopes. The mine trucks are equipped with ejector boxes, permitting them to dump CRF and URF directly in stopes. The drilling fleet includes electric/hydraulic face drill jumbos, longhole blasthole drills, a cable bolter, and rock bolting rigs for ground support.

While maintenance costs are linked to equipment operating hours, diesel fuel costs are linked to ore production, segmented by mining area. The diesel usage factor for the Keel zone, which matches that of the Eagle zone, is based on ore tonnage from that area. It is noted that the Eagle East diesel factor is twice that of the Eagle zone. The elevation of Keel relative to Eagle and Eagle East indicates Keel haulage costs, and diesel consumption, should be expected to be closer to that of Eagle than Eagle East. A link of diesel fuel cost to equipment hours and cross-referenced by working location could provide a more accurate measure of operating cost for each zone.

1.6.14 Mine Development

The LOM development plan calls for 6,479 m of lateral development, of which 5% is required for Eagle, 29% for Eagle East, and 66% for the Keel Zone. The Eagle Zone development requirement is relatively low as it is almost entirely developed for mining. Eagle East still requires development for its uppermost sublevels. The Keel Zone is a new deposit that accounts for the majority of planned development activity.

1.6.15 LOM Production

Eagle is expected to produce approximately 755,000 tonnes throughput per annum (tpa) of ore from 2023 to 2026, then reduced to half of that tonnage in 2027, which is the last year of scheduled production. Eagle and Eagle East will continue producing ore until the end of the mine life; however, their combined annual tonnage will decline yearly. The declining output from these zones will be augmented by production from the Keel Zone.

1.6.16 Mine Personnel

Staff personnel, including management and technical services, are LMC employees who generally work a four-day week, ten hours daily. Mine operations personnel are contractor employees who work 12-hour shifts, seven days a week, on a two-weeks-on two-weeks-off rotation schedule.

1.7 Mineral Processing

The Humboldt processing facility operates at or near metallurgical budget. The remaining reserves at Eagle and Eagle East are similar mineralogy as the material already processed, with the exception of Eagle Keel, which is lower grade material. The processing facility will have no issues treating future material as it maintains a consistent grade/performance relationship with other Eagle ore.

1.8 Infrastructure

The Eagle Mine is considered a mature operation, which has endeavoured to add Mineral Reserves to the mine plan as a means of extending mine life. The added Mineral Reserves have placed minimal burden on existing infrastructure, with investment limited to Sustaining Capital.

- The area is served by an extensive network of paved roads, rail service, excellent telecommunications facilities, national grid electricity, and an ample supply of water. All infrastructure to operate the mine is in place and no significant investments are required for the balance of the mine life, aside from the water treatment plant, described below.

- There is no additional infrastructure required for the Keel deposit. The Eagle Mine infrastructure will be used for the Keel mining zone as it has been for Eagle East.
- The Humboldt Mill will be used to process Keel material, comingled with ore from Eagle and Eagle East, and it is anticipated that the existing unit operations of the process plant would remain largely unchanged.
- Tailings produced at the Humboldt Mill are deposited subaqueously into the Humboldt Tailings Disposal Facility (HTDF), which is a pit lake that formed in the open pit of a former iron ore mine. Tailings deposition locations are prescribed in the tailings deposition plan, which is updated periodically as needed (typically about once per year).
- HTDF inputs and outputs (i.e., water and tailings) must be carefully managed and monitored to help preserve the quality of the near-surface water and limit the potential for impacts to groundwater around the HTDF.
- Eagle is currently enacting plans to construct an enhanced water treatment system at the Humboldt Mill that is expected to reduce and ultimately eliminate the layer of reverse osmosis brine that has been produced by the existing water treatment plant and deposited at depth near the southern end of the HTDF. The enhanced water treatment system is expected to be operational in 2023.
- The surveillance program for the HTDF involves inspecting and monitoring the operation, structural integrity, safety, and environmental performance of the facility. It includes routine visual observation, monitoring of tailings slurry and reclaim water flows, monitoring of the HTDF water level, monitoring of water chemistry in the HDTF, monitoring of groundwater quality around the HTDF, and semi-annual bathymetric surveys.

A well-established tailings deposition methodology exists at the HTDF, which is used for permanent disposal of tailings generated from processing of ore from the Eagle Mine at the Humboldt Mill. An effective surveillance program is in place to inspect and monitor the operation, structural integrity, safety, and environmental performance of the facility. The tailings deposition plan shows that sufficient capacity exists in the HTDF to dispose of tailings produced at the Humboldt Mill through the LOM with limited or no tailings deposited above an elevation of 452.6 m (1,485 feet) above mean sea level (amsl), which is desirable for preservation of near-surface water quality. About 1.9 million cubic meters (2.5 million cubic yards) of capacity is available up to an elevation of 452.6 m (1485 feet) amsl as of December 31, 2022, to accommodate an estimated in-place tailings volume of 1.3 million cubic meters (1.7 million cubic yards) from that date through the remaining LOM. In addition, approximately 1.8 million cubic meters (2.4 million cubic yards) of capacity exists above an elevation of 452.6 m (1,485 feet) amsl up to the maximum permitted tailings elevation of 461.8 m (1,515 feet) amsl.

1.9 Environmental and Social Considerations

Since the start of operations, Eagle has been in compliance with environmental and social commitments at both the Mine site and the Mill site. This has resulted in a strong social licence to mine exemplified by continued compliance with regulatory requirements, generally positive community opinions of Eagle Mine and a precipitous decline in opposition group attendance at public hearing since the start of operations. Environmental monitoring (e.g., groundwater wells, water quality) has continued at both the Mine and Mill sites to ensure environmental performance. Data are used for regulatory compliance purposes and to routinely update predictive models of operational and closure conditions.

1.9.1 Environment

Major environmental features at the mine site include active and future underground mine workings (the Ramp, Eagle, Eagle East, and soon, the Keel), the temporary development rock disposal area (TDRSA) which provides waste rock for underground backfill, two contact water basins (CWBs) that store water pumped from the underground and site runoff prior to treatment, the Mine water treatment plant, and the treated water irrigation system (TWIS) which adds water back to the local glacial aquifer. Eagle actively monitors water levels and water quality in groundwater wells surround the Mine site, and water quality in the underground mine, and has used this information to routinely update groundwater models and water quality predictions.

Major environmental features at the Mill site include the Mill, the HTDF, a pit lake used for the subaqueous disposal of tailings, the Mill WTP, and the Middle Branch of the Escanaba River which receives treated water from the Mill WTP and flows southeast into Lake Michigan. Eagle actively monitors water levels and water quality in groundwater monitoring wells across the Mill site, plus the water quality and mixing status within the HTDF. There is a strong correlation between observed water quality and mixing status within the HTDF and predicted water quality and mixing status, which provides confidence in the current water management strategy and Eagle's ability to predict future impacts.

1.9.2 Waste Disposal

At the mine site, waste rock generated by the mining process in stored in the TDRSA before being used as backfill underground. Ore is trucked from the Mine site to the Mill site for processing. Tailings produced by the Mill are rich in the reactive sulfide mineral pyrrhotite. To prevent sulfide oxidation, tailings are sub-aqueously deposition in the HTDF for permanent disposal. The concentration of total dissolved solids (TDS) in ore pore-water increases with depth in the Mine such that ore tailings slurry produced from the Eagle deposit has a lower TDS than slurry produced from Eagle East. Since the Keel deposit is shallower than Eagle East, no major changes in the chemical composition of ore or tailings slurry are expected.

The Mill WTP contains all necessary infrastructure to produce effluent compliant with regulatory permits. The plant contains a reverse osmosis system that removes TDS from effluent and produces a brine which is returned to the bottom of the HTDF. A zero liquid discharge system will be added in 2023 which will eliminate the brine stream and will reduce the volume of the brine layer at the bottom of the HTDF prior to the end of operations. At this time, no additional water treatment equipment or capacity are expected to be needed to treat waste streams associated with mining the Keel deposit.

1.9.3 Permits

Eagle is not required to submit an updated environmental impact statement (EIS) in order to mine the Keel deposit. However, Eagle will need to submit a permit amendment request to complete production mining. The permit amendment will comment on all aspects of regulation that are typically covered in an EIA such as any changes to potential environmental impacts. Eagle holds a Groundwater Discharge Permit which allows treated mine water effluent to be discharged to the TWIS. Records show very few exceedances of this permit since the start of operations. Eagle also holds a National Pollutant Discharge Elimination System (NPDES) permit for the discharge of treated effluent from the Mill site to the Middle Branch of the Escanaba. Records show very few exceedances of this permit since the start of operations. Due to continued high performance with respect to ecotoxicity, regulators have recently decreased the frequency required for whole effluent toxicity testing on fathead minnow.

1.9.4 Social and Community

The Keweenaw Bay Indian Community (KBIC) of the Lake Superior Band of Chippewa Indians is located approximately 110 km (65 miles) north of Marquette. The L'Anse Reservation, established in 1854, is both the oldest and the largest reservation in Michigan. KBIC recognizes Eagle Rock, a prominent topographic feature at the Mine Site and the location of the underground mine portal, as a sacred native place of worship. Since the start of operations, Eagle has worked with KBIC to provide periodic access to Eagle Rock for ceremonies and will preserve Eagle Rock during closure activities.

The trucking route between the Mine and the Mill passes through the City of Marquette, the Town of Ishpeming, and the Town of Negaunee. Vehicle traffic associated with the shipment of ore is recognized as the number one community impact associated with mining operations. The most recent ITRB site visit was completed in September 2022.

1.9.5 Governance

Eagle adheres to corporate governance principles specified by the parent company, Lundin Mining Corporation. These include: Principle 4, a commitment to promote environmental stewardship throughout the mining life cycle; and Principle 8, a commitment to the safe and responsible management of tailings facilities through adoption and implementation of the 2020 Global Industry Standard on Tailings Management (GISTM). Eagle holds an annual Independent Tailings Review Board (ITRB) meeting which reviews both tailings management practices and environmental performance.

1.9.6 Closure

The mine plan includes $79.8 million in expenditures for closure activities to be initiated within the remaining five years of operation and to continue in the two ensuing post-closure years with ARO expenditures, followed by ongoing site monitoring until 2047. At the mine site at the end of operations, the underground mine will be backfilled with remaining waste rock and clean fill from the demolition of mine site facilities, and the mine will be allowed to fill with water. The surface footprint will be restored to a greenfield property. Predictive groundwater, water balance and groundwater modeling show the flooded mine will have a downward hydrogeologic gradient, away from the overlying glacial aquifer. Any discharge will slowly migrate through the bedrock hydrogeologic unit to the north of the site and will discharge to the Salmon Trout River hundreds of years after the end of operations. Prior to reaching the surface environment, mine impacted water will be heavily diluted such that no detectible impacts to the environment are expected.

The exact closure strategy for the Humboldt Mill site depends upon Eagle's ability to sell the mill site to an interested party who would use the site for continued material processing and waste disposal. In the event that this does not happen, Eagle has prepared an alternative closure strategy involving the continued operations of the mill WTP to treat water stored in the surface layer of the HTDF until it complies with discharge criteria specified in the original mine permit. Modeling suggests this restoration period will take approximately three years or less. Following the restoration period, HTDF water will be allowed to discharge to an adjacent wetland through an engineered outlet at an elevation of 438 m (1438 ft) amsl and will ultimately discharge by gravity to the Middle Branch of the Escanaba River.

1.9.7 Conclusions

The QP inspected the Eagle Mine site and Humboldt Mill site in early September 2022 and conducted a review of environmental data and predictions of future conditions at both sites. The following observations and conclusions are provided:

- Eagle has a nine-year track record of meeting discharge permit water quality criteria at both the mine and mill sites.
- There is a strong correlation between observed and predicted water quality at the mill site which builds confidence in both water quality predictions and water management practices.
- Ore from the Keel is unlikely to be geochemically different from ore from Eagle or Eagle East deposits. As such, no environmental changes are expected to be associated with mining the Keel deposit.
- All infrastructure required to treat ore from the Keel zone is currently in place. The addition of a ZLD system in 2023 will accelerate site closure in the future.
- Mining of the Keel zone will increase the mine life and will reduce the thickness of the water cover overlying tailings at the end of operations. However, the cover thickness will still be larger than 3 m (approximately 9 feet) similar to other tailings ponds. As such, no significant environmental changes are expected at this time.
- Predictive models of closure conditions indicated that both the Mine site and Mill site will meet water quality and environmental criteria specified in the mine permit within a few years of the end of operations.

1.10 Capital and Operating Costs

All capital and operating costs are expressed in United States Dollars ($).

Currently there are no expansion plans requiring project capital expenditures in the LOM plan.

The Eagle Mine is in operation and comprise three mining areas: Eagle, Eagle East, and Keel (in development). Sustaining capital and operating costs are based on the mine plans prepared as part of the LOM work up and current operating experience.

Underground development cost is directly correlated with development meters with unit rates for lateral and vertical development applied to the number of meters of mine development required in each year. Mine development is scheduled to be substantially complete by 2025, with only 777 meters of development in 2026 – 2027. The current mine plan requires $52.2 million of sustaining capital for continuing underground mine development, mine other, mill, and other expenditures.

Table 1.4 summarizes the capital expenditures planned for the balance of the mine life. The QP has reviewed the planned annual expenditures and agrees with their reasonableness. The short remaining LOM does not necessitate significant new equipment purchases. Spending for the sustaining capital categories, Mine Other, Mill, and Other, will be completed by 2025 and show no expenditures in the final two years of the LOM.

Table 1.4: LOM Sustaining Capital Derivation

Item	Unit	2023	2024	2025	2026	2027	Total
Mine Development Meters							
Vertical							
Raisebore Ventilation	m	84	94	108	39		325
Raisebore with Escapeway	m	88	89	147			325
Total Vertical	**m**	**172**	**183**	**255**	**39**		**650**
Lateral							
Eagle	m	6	233	82	0	33	354
Eagle East	m	805	495	436	113	15	1,864
Keel	m	1,145	1,589	949	543	35	4,260
Total Lateral	**m**	**1,956**	**2,317**	**1,467**	**656**	**83**	**6,478**
Waste Tonnes	t	224,723	325,202	295,578	215,448	71,110	1,132,060
Expenditures, $M							
Underground Development	$M	12.1	11.3	8.3	3.1	0.3	35.1
Mine Other	$M	6.0	5.4	0.7			12.1
Mill	$M	1.8	0.1	0.4			2.3
Other	$M	2.1	0.2	0.4			2.7
Total Sustaining Capital, $M	**$M**	**22.0**	**17.1**	**9.8**	**3.1**	**0.3**	**52.2**

Note: Columns and rows may not sum precisely due to rounding.

The Keel area is being established as an extension of the current mine and accordingly has no project capital. Its sustaining capital and operating costs are based upon unit cost factors established with the mining of Eagle and Eagle East that are then applied against the mining activities derived from the LOM plans for the Keel area. No additional infrastructure will be required other than that normally installed with development headings – electrical stations, sumps, etc. Ventilation for Keel will be integrated into the existing mine ventilation system, described in Section 16.6.

The QP considers the Eagle, Eagle East, and Keel estimates to be appropriate.

LMC provided a cash flow model, which shows the LOM operating cost for the Eagle Mine and processing plant, including general and administrative (G&A) and ore transportation, to be $166.20 per tonne milled.

In addition to the Sustaining Capital, the mine plan includes $79.8 million in expenditures for closure activities to be initiated within the remaining five years of operation and to continue in the two ensuing post-closure years with asset retirement obligation expenditures, followed by ongoing site monitoring until 2047.

Table 1.5 summarizes the closure expenditures planned for the balance of the mine life and beyond, with $35.6 million of closure expenditures during the LOM shown within the box border. The QP has reviewed the planned annual expenditures and agrees with their reasonableness.

Table 1.5: LOM Closure Costs, $Million

Closure Line Items	Totals $M	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Ongoing
Employee Severance	12.0	0.0	0.0	2.0	8.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asset Retirement Obligations (ARO)	63.3	0	0	1.4	1.5	16.2	20.8	6.7	1.3	1.3	1.3	1.3	11.6
Crystallizer	4.5	0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**79.8**	**0**	**4.5**	**3.4**	**9.5**	**18.2**	**20.8**	**6.7**	**1.3**	**1.3**	**1.3**	**1.3**	**11.6**

Operating expenses at LMC Eagle have been reviewed by the QP and found to be reasonable for a mechanized mine utilizing the drift-and-fill and bulk longhole mining methods. The plant has demonstrated typical operating costs for a facility of its size. The following tables summarize operating costs, segmenting by major cost centre - the Mine, the Processing Plant, and G&A.

The LOM ore tonnes are based upon depletion using second half 2022 projections. Carryovers due to adverse production variances during that period result in the Mineral Reserve estimate providing more diluted mineable tonnes than the 3.3M tonnes shown by the LOM than was used by LMC to derive the cash flow model.

Table 1.6 summarizes the total expected operating expense to mine and process the 3.3M tonnes of ore as defined by the LOM and the cashflow model.

Table 1.6: Projected Operating Costs

Cost Centre	LOM Cost, $M Total	Unit Cost, $/t Average
Mining	307.0	92.16
Ore Transport to Mill	40.2	12.07
Plant	118.3	35.50
G&A	88.2	26.47
Total Operating Costs	**553.7**	**166.19**

Table 1.7 shows the operating costs by year as compared to the production plan by mining area.

Table 1.7: Projected Operating Costs by Year

Item	Unit	2023	2024	2025	2026	2027	Totals
Ore Tonnes Mined							
Eagle	t	58,128	103,598	358,516	51,465	32,836	604,543
Eagle East	t	695,362	611,845	201,846	382,477	37,467	1,928,998
Keel	t	2,026	39,609	194,752	320,986	240,603	797,977
Total Ore Tonnes*	**t**	**755,517**	**755,052**	**755,114**	**754,928**	**310,907**	**3,331,518**
Cost Center							
Mining	$M	69.0	70.4	69.3	69.7	28.6	307.0
Ore Transport to Mill	$M	9.1	9.1	9.1	9.1	3.8	40.2
Plant	$M	26.8	26.8	26.8	26.8	11.1	118.3
G&A	$M	20.0	20.0	20.0	20.0	8.3	88.2
Total Operating Costs	**$M**	**124.8**	**126.3**	**125.1**	**125.5**	**51.9**	**553.7**
Total Cost per Total Tonne	**$/t**	**165.23**	**167.27**	**165.73**	**166.30**	**166.81**	**166.19**

*Note: Ore tonnes are less than Mineral Reserve tonnes as a result of carryovers from production variances experienced in the second half of 2022 positively impacting the Mineral Reserves determination.

Operating costs of the underground mine are estimated to be $307.0 million over the LOM which averages to $92.16/tonne of processed material, itemized in Table 1.8.

Table 1.8: Mine Operating Cost Projection

Activity Related	LOM Cost, $M Total	Unit Cost, $/t Average
Drill Bits	4.7	1.40
Ground Support	6.7	2.00
Explosives	6.7	2.02
Subcontractor Labour	108.1	32.45
Subcontractor Other	12.4	3.73
Maintenance	29.4	8.81
Power	14.2	4.25
Diesel & Propane	33.3	10.00
Backfill	42.8	12.85
Mine WTP Costs	4.3	1.30
Labour (owner)	27.5	8.25
Other Costs	17.0	5.10
Total	**$307.0**	**$92.16**

Operating costs of the processing plant are estimated to be $118.3 million over the LOM or average $35.50/tonne, with major cost elements provided in Table 1.9.

Table 1.9: Processing Plant Operating Cost Projection

Cost Center	LOM Cost, $M Total	Unit Cost, $/t Average
Reagents / Grinding / Chemicals	14.4	4.33
Maintenance	19.0	5.69
Power	11.2	3.37
Contract Services	16.2	4.87
Salaries	56.6	16.98
Admin	0.9	0.27
Total Mill Opex	**$118.3**	**$35.50**

Current G&A costs along with current ore transportation costs have been carried forward for the LOM based on annualized costs for the G&A and unit costs per tonne of ore produced for the transportation. G&A amounts to a yearly cost of $20.0 million and the final year of the LOM is a partial year of five months duration providing an annualized cost for that year of $8.3 million. G&A for the remaining LOM totals $88.2 million, which equates to an average of $26.47/t processed.

Ore transportation from the mine to the mill is $12.07/t over the LOM providing a total operating expense of $40.2 million for the LOM.

1.11 Economic Analysis

LMC has opted to exclude reporting this item as producing issuers may exclude the information required under Economic Analysis for technical reports on properties currently in production, unless the technical report includes a material expansion of current production.

The QP notes that LMC is a producing issuer, the Eagle Mine is currently in production, and, although the Keel area extends the mine life, a material expansion to the operation is not being planned.

1.12 Recommendations

1.12.1 Mineral Resources

- Cut-off values used as inputs to mineral resource estimation should be re-evaluated in the next year, given the current inflationary period.

1.12.2 Mineral Reserves

- For future Mineral Reserve estimates, include planned dilution for all zones and mining methods and the over-excavation of rock in the unplanned dilution parameters.
- For future Mineral Reserve estimates, base the NSR cut-off values on the most current cost information. The cut-off discussion should involve the LMC financial analyst if the actual or projected costs deviate significantly from historical data.

- For future Mineral Reserve estimates, include the Sustaining Capital costs referred to as Mine Other, Mill, and Other in the calculation of NSR cut-off values. However, the QP notes that these cost items represent only about 3% of the NSR cut-offs; consequently, their omission does not materially affect the current Mineral Reserve estimate.
- Base future Mineral Reserve estimates on full-cost, marginal, and incremental NSR cut-off values rather than a single cut-off for each zone to more effectively analyze how marginally economic material (i.e., valued below full-cost cut-off) can contribute positively to cash flows and be included in the Mineral Reserve.

1.12.3 Mining

- Replace the inactive instrumentation for the crown pillar.
- The Ground Control Management Plan and Crown Pillar Management Plan should be periodically reviewed and approved by Eagle Mine management.
- Annually or at least every second year, conduct independent audits of ground control practices and records by an external consulting firm to address the occurrence of high-stress indications and issues.
- Review ground support practices and mining sequences in Eagle East regularly and implement changes to mitigate stress issues and damage as necessary.
- Consider positioning the Keel Zone ramp and sublevel development in the footwall rather than at the end of the deposit. Accessing from the footwall would enable mining the orebody in two directions instead of one, contributing to higher productivity.
- Independent geotechnical audits at the mine are estimated at $20-25,000 per audit. Other recommendations herein could be implemented by Eagle staff.
- Develop more accurate diesel usage factors by linking diesel consumption with equipment use hours and working zone.

1.12.4 Mineral Processing

- Due to limited metallurgical testwork on Keel mineralized material, it is recommended that the Humboldt Mill conduct a two-day run of Keel mineralized material a few months before it will become the predominant feedstock. Analysis of the results of the live test would then be used to prepare the mill for unexpected features that could be mitigated by adjustment in the operating routines.

1.12.5 Infrastructure

- HTDF inputs and outputs (i.e., water and tailings) must continue to be carefully managed and monitored to help preserve the quality of the near-surface water and limit the potential for impacts to groundwater around the HTDF. Continual ability of the WTP to treat water from the HTDF and achieve discharge requirements throughout the LOM is important for maintaining a suitable water balance.

1.12.6 Environmental and Social

- Continue to monitor mine Site groundwater wells and underground water quality during operations, specifically, the development of the Keel zone.
- On a routine basis, use Mine Site monitoring data to validate and/or revise the groundwater model and closure water quality prediction for the flooded workings.

- Install monitoring wells into the Eagle workings to enable the monitoring of vertical groundwater gradients and water quality during closure and post-closure.
- Continue monitoring Mill Site groundwater wells and HTDF water quality during operations.
- On a routine basis, use HTDF monitoring data to validate and/or revised the operational and closure groundwater and water quality prediction for the HTDF. Integrate the results into updates for the downgradient, fate and transport groundwater model.
- Revise the HTDF water quality predictions for operations and closure each time the tailings deposition plan significantly changes, and each time the water treatment strategy significantly changes. Integrate the results into updates for the downgradient, fate and transport, groundwater model.
- Continue investigations into the stabilization of, and disposal options for, sodium sulfate salt produced by the ZLD.
- Conduct a long-term prediction of circulation and water quality within the HTDF spanning at least 100 years post-operations (e.g., 2028 to 2128) which accounts for local climate change.
- Investigate post-closure, future-use options for the HTDF and Mill Site which will add a benefit (e.g., economical, ecological, recreational, etc.) to the local community following the end of Eagle operations.

1.12.7 Economic Analysis

- Segment operating cost by mining zone to provide a more transparent and specific NSR cut-off and assist in future LOM planning.
- QP recommendations primarily relate to protocols and processes to best define future Mineral Resources and Mineral Reserves. Implementation of the recommendations is not expected to incur additional costs to the mine and mill, outside of normal operational and technical work efforts, except where noted above.

2.0 INTRODUCTION

2.1 Sources of Information and Data

This Technical Report is based on information made available to WSP by LMC and Eagle Mine LLC in an electronic data room, and on information collected during the site visits. The authors have no reason to doubt the reliability of the information provided by LMC. Other information was obtained from the public domain. The authors have used all means necessary in their professional judgment to fulfill their responsibilities and do not disclaim any responsibility for the information contained herein.

This Technical Report is based on the following sources of information:

- Information provided by LMC and Eagle Mine LLC.
- Site visits conducted by the Qualified Persons listed on Table 2.1 during September 2022.
- Discussions with LMC and Eagle Mine personnel.
- Additional information from public domain sources.

The Qualified Persons have reviewed such technical information and have no reasons to doubt the reliability of the information provided by LMC and Eagle Mine LLC and have determined it to be adequate for the purposes of this Technical Report. The Qualified Persons do not disclaim any responsibility for this information. The documentation reviewed, and other sources of information, are listed at the end of this Technical Report in Item 27, References.

2.2 Units of Measure

2.3 Site Inspections by Qualified Persons

Site Inspections were conducted by those individuals identified on Table 2.1.

Table 2.1: Site Inspection

Name	Specialization	Role	Site Visited	Site Visit Dates
Devin Castendyk	Environmental Scientist	Environmental Studies, Permitting, and Social or Community Impact	Mine, Mill	Sep 5-9, 2022
Jason Obermeyer	Geotechnical Engineering	Tailings Storage	Mill	Sep 5-9, 2022
James McDonald	Geologist	Geology, Exploration, Data Verification	Mine	May 10-12, 2022
Steve Blaho	Mine Engineering	Mineral Reserves	Mine	Sep 20-21, 2022
Ewald Pengel	Mineral Processing	Metallurgical Testing and Mineral Processing	Mill	Sep 20-21, 2022

2.4 WSP Golder Declaration

The opinions of Qualified Persons in the employ of WSP contained herein and effective December 31, 2022, are based on information collected throughout the course of investigations by the Qualified Persons. The information in turn reflects various technical and economic conditions at the time of writing the Technical Report. Given the nature of the mining business, these conditions can change significantly over relatively short periods of time. Consequently, actual results may be significantly more or less favourable.

This Technical Report may include technical information that requires subsequent calculations to derive subtotals, totals, and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, the Qualified Persons do not consider them to be material.

Neither WSP, nor the QPs responsible for this Technical Report, are insiders, associates or affiliates of LMC Corporation, or Eagle Mine, LLC. The results of the technical review by the Qualified Persons are not dependent on any prior agreements concerning the conclusions to be reached, nor are there any undisclosed understandings concerning any future business dealings.

2.5 Forward-Looking Information and Non-GAAP Measures

2.5.1 Forward-Looking Information

This Technical Report contains “forward-looking information” and “forward-looking statements” within the meaning of applicable Canadian and United States securities legislation which involve a number of risks and uncertainties. Forward-looking information and forward-looking statements include, but are not limited to, statements with respect to the future prices of nickel and copper, the estimation of mineral resources and reserves, the realization of mineral estimates, the timing and amount of estimated future production, costs of production, capital expenditures, costs (including capital costs, operating costs and other costs) and timing of the LOM, rates of production, annual revenues, requirements for additional capital, government regulation of mining operations, environmental risks, unanticipated reclamation expenses, title disputes or claims, and limitations on insurance coverage.

Often, but not always, forward-looking statements can be identified by the use of words such as “plans”, “expects”, or “does not expect”, “is expected”, “budget”, “scheduled”, “estimates”, “forecasts”, “intends”, “anticipates”, or “does not anticipate”, or “believes”, or variations of such words and phrases or state that certain actions, events or results “may”, “could”, “would”, “might” or “will” be taken, occur or be achieved.

Forward-looking statements are based on the opinions, estimates and assumptions of contributors to this Technical Report. Certain key assumptions are discussed in more detail. Forward looking statements involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance, or achievements of LMC to be materially different from any other future results, performance or achievements expressed or implied by the forward-looking statements.

Such factors include, among others: the actual results of current development activities; conclusions of economic evaluations; changes in project parameters as plans continue to be refined; future prices of nickel and copper; possible variations in ore grade or recovery rates; failure of plant, equipment or processes to operate as anticipated; accidents, labour disputes and other risks of the mining industry, delays in obtaining governmental approvals or financing, or in the completion of development or construction activities; shortages of labour and materials, the impact on the supply chain and other complications associated with pandemics, including the COVID-19 (coronavirus) pandemic; as well as those risk factors discussed or referred to in this Technical Report and in LMC’s documents filed from time to time with the securities regulatory authorities in Canada.

There may be other factors than those identified that could cause actual actions, events or results to differ materially from those described in forward-looking statements, and there may be other factors that cause actions, events or results not to be anticipated, estimated or intended. There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. Accordingly, readers are cautioned not to place undue reliance on forward-looking statements. Unless required by securities laws, the authors undertake no obligation to update the forward-looking statements, if circumstances or opinions should change.

2.6 Abbreviations

Abbreviations and acronyms used in this Technical Report are included in Table 2.2.

Table 2.2: Abbreviations and Acronyms

Abbreviation	Description
°	degree
°C	degrees Celsius
3D	three-dimensional
CAGR	compound annual growth rate
CCP	Cumulative probability plots
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
cm	centimetre
CN	Canadian National Railway
COG	cut-off grade
COSA	Coarse ore storage area
CRF	Cemented rock fill
CV	Coefficients of Variation
DDH	diamond drill holes
DI	de-ionized water
EGLE	Michigan Department of Environment, Great Lakes, and Energy (EGLE)
ESG	Environmental, social, and governance
E-W	east-west
EOR	Engineer of Record
g	gram
G&A	General and Administrative
GISTM	Global Industry Standard on Tailings Management
GOB	Uncemented rock fill (i.e. waste rock)
Golder	Golder Associates Ltd., a member of WSP
GPM	US gallons per minute
GPS	global positioning system
Ha	hectare
HCl	hydrochloric acid
HTDF	Humboldt Tailings Disposal Facility
Hwy	highway
ICP-MS	inductively coupled plasma mass spectrometry
IRR	internal rate of return
kg	kilogram
kg/m^3	kilograms per cubic metre
km	kilometre
kt	kilotonnes
ktpy	thousand tonnes per year
kVA	kilovolt amperes
LOM	life-of-mine
m	metre
M	million
M+I	Measured and Indicated
m^3	cubic metre
masl	metres above sea level
mg/L	milligrams per litre
mm	millimetre
MDEQ	State of Michigan Department of Environmental Quality
Mt	million tonnes
NI 43-101	National Instrument 43-101
NNC	Nearest Neighbor Corrected
NPC	Normal Portland cement

Abbreviation	Description
NPV	net present value
N-S	north-south
NSR	net smelter return
OK	Ordinary Kriging
P.Eng.	Professional Engineer
PEA	Preliminary Economic Assessment
PFS	Prefeasibility Study
PPC	Preparedness, Prevention and Contingency
ppm	parts per million
PPV	Peak particle velocity
QP	Qualified Person
RC	reverse circulation
RQD	rock quality designation
SEDAR	System for Electronic Document Analysis and Retrieval
Sedex	sedimentary exhalative
sg	specific gravity
SGA	Selling, general and administration
SR	strip ratio
t	tonne
t/m^3	tonnes per cubic metre
tpd	tonnes per day
tph	Tonnes per hour
TARP	Trigger Action Response Plan
TMF	tailings management facility
tpy	tonnes per year
TR	Technical Report
$	United States Dollar

3.0 RELIANCE ON OTHER EXPERTS

The authors have followed standard professional procedures in preparing the contents of this Technical Report. Data used in this Technical Report have been verified and the authors have no reason to believe information has been withheld that would affect the conclusions made herein. The QP's opinion contained herein is based on information provided to the QPs by LMC throughout the course of the investigations. The QPs have taken reasonable measures to confirm information provided by others and take responsibility for the information.

The QPs used their experience to determine if the information from previous reports was suitable for inclusion in this Technical Report and adjusted information that required amending. The QPs do not disclaim any responsibility with respect to the inclusion of the information from the previous reports.

The QPs relied on LMC for guidance on applicable taxes, royalties, and other government levies or interests, applicable to revenue or income from the Eagle Mine. The QPs have not performed an independent verification of land title and tenure as summarized in Item 4.0 of this Technical Report. The QPs did not verify the legality of any underlying agreement(s) that may exist concerning the permits or other agreement(s) between third parties but have relied on information provided by LMC and Eagle Mine LLC, as of February 06, 2023, for land title issues.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 Location

The Eagle Mine property, measuring approximately 0.63 km^2, is located in the Upper Peninsula of Michigan, USA, at geographic co-ordinates 46° 45' north latitude by 87° 54' west longitude (UTM Zone 16N coordinates 5177557 m N, 432639 m E), in Michigamme Township, Marquette County. The Humboldt Mill property, measuring approximately 1.42 km^2, is located 61 km west of Marquette and approximately 105 km by road from the mine site. The centre point of the Humboldt Mill area (including all ownership of land) is 46º 29’ north latitude, 87º 54’ west longitude (UTM Zone 16N Zone coordinates 5148824 m N, 430843 m E).

Eagle Exploration used to own an office at the core handling/logging facility in Negaunee. This facility has now been converted into a training room and for core storage. The property location is shown in Figure 4.1 and the locations within the Upper Peninsula are shown in Figure 4.2.

The first Eagle Mine leases were held by Kennecott Exploration Company (KEX) and were later assigned to Kennecott Eagle Minerals Company (KEMC). On October 4, 2012, the company’s legal name was changed from KEMC to Rio Tinto Eagle Mine, LLC (RTEM). On July 17, 2013, LMC, through its indirect U.S. subsidiary Lundin Mining Delaware Ltd. (LMDL), acquired all of the membership interests of RTEM. Subsequently, on July 17, 2013, the name of RTEM was changed to Eagle Mine LLC.

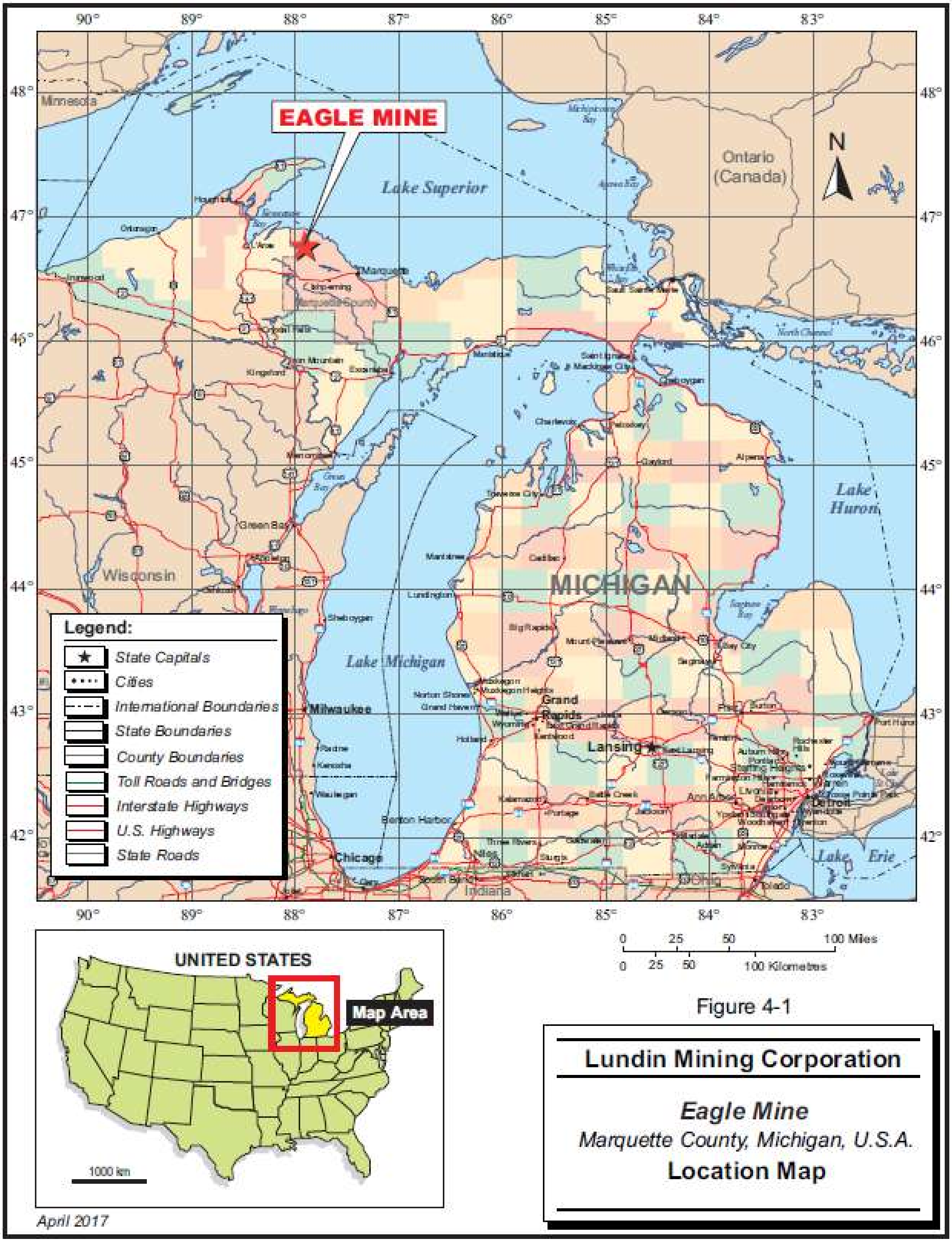

Figure 4.1: Eagle Mine Location Map

Note: Each block = 1.61 km per side

Figure 4.2: Eagle Mine Location

4.2 Mineral Title and Land Ownership

Land ownership in Michigan allows for severed ownership, i.e., the owner of the surface rights may be different than the owner of the minerals beneath that same surface parcel. Where multiple people own minerals, they typically share an undivided interest for the entire parcel versus subsections of the property.

Lease payments are required for all parcels impacted by any decline, surface facility, or underground development, unless the parcel is wholly owned by Eagle Mine LLC. Agreements in place with private landowners related to the Eagle Mine and the Eagle East resource do not require an annual lease payment if production has begun on their property and the royalty payment is greater than their annual lease payment. The State of Michigan mineral properties, however, require an annual payment for mineral lease areas not included in a "mining operation area" (in 40-acre increments), i.e., the area without active production.

Surface and mineral rights in Michigan are held in units based on the Public Land Survey System. Townships comprise 6 by 6 arrays of 36 Sections, named according to distance and direction from a Principal Meridian and Baseline. Sections are generally one-mile squares, and can be divided into quarters, labelled NE, NW, SE, and SW. Each quarter may also be split into halves or quarters, which are labelled according to the side or corner of the quarter-section they encompass (e.g., NE quarter of the NW quarter).

4.2.1 Land Tenure

Eagle Mine LLC holds surface and mineral rights over the Eagle Mine, Eagle East, Keel and Humboldt Mill properties via a number of leases and agreements with the State of Michigan and private owners. In addition, Eagle Mine LLC owns some surface and mineral rights through previous purchases via various types of deeds. There are separate agreements in place with the owners of both the surface and mineral rights, as required.

4.2.2 Surface And Mineral Rights

Eagle Mine LLC holds surface and mineral rights over a wide district encompassing portions of Sections 4-9 and 16-18, Township 50N, Range 28W, and Sections 1-5 and 8-17, Township 50N, Range 29W. The overall footprint of land controlled by Eagle Mine LLC comprises leases, agreements, or ownership totalling approximately 4,565 ha of mineral rights and approximately 3,080 ha of surface rights.

Land impacted by operations of the Eagle Mine and potential development for Eagle East is listed in Table 4.1 and shown in Figure 4.3. Vertices, in UTM Zone 16N coordinates, are listed in Table 4.2. Figure 4.3 also shows the overall footprint of land controlled by Eagle Mine LLC (both mineral and surface rights).

Table 4.1: Surface and Mineral Rights, Eagle Mine

Block	Description	Depicted Acres/km^2	Mineral Owner	Lease Origin Date	Primary Term Expiry	Surface Owner
A	Twp 50 N, Range 29 W, W ½ Section 11 (Block A on map)	320/1.29	State of Michigan, Leased to Eagle Mine LLC under M-00602	July 8, 1992	July 7, 2033, extendable by production	100% Eagle Mine LLC
B	Twp 50 N, Range 29 W, E ½ Section 11 (Block B on map)	320/1.29 (56.25%)	Three private owners with 56.25% ownership; leased to Eagle Mine LLC	November 15, 1995	November 14, 2015, but are extendable by continuation of payments and production	100% Eagle Mine LLC
B	Twp 50 N, Range 29 W, E ½ Section 11 (Block B on map)	320/1.29 (25%)	One private owner with 25% ownership; leased to Eagle Mine LLC	May 15, 2002		100% Eagle Mine LLC
B	Twp 50 N, Range 29 W, E ½ Section 11 (Block B on map)	320/1.29 18.75%)	18.75% Eagle Mine LLC			100% Eagle Mine LLC
C	Twp 50 N, Range 29 W, N ½ of NW ¼ and SW ¼ of NW ¼, Section 12 (Block C on map)	120/0.49	State of Michigan, Leased to Eagle Mine LLC under M-00603	July 8, 1992	July 8, 2032, extendable by production	100% State of Michigan (See Table 4.3 below)
D	Twp 50 N, Range 29 W, SE ¼ of NW ¼ and N ½ of SW ¼, Section 12 (Block D on map)	120/0.49	100% ownership via 12 private owners under lease to Eagle Mine LLC or owned by Eagle Mine LLC	Multiple	Multiple – extendable by cross-mining and production from other properties.	100% Eagle Mine LLC
E	Twp 50 N, Range 29 W, N ½ of the NE ¼, Section 12 (Block E on map)	80/0.32	State of Michigan, Leased to Eagle Mine LLC under M-00603	July 8, 1992	July 7, 2032, extendable by production	100% State of Michigan
F	Twp 50 N, Range 29 W, S ½ of NE ¼, Section 12 (Block F on map)	80/0.32	One private owner with 100% ownership; leased to Eagle Mine LLC	May 25, 2005	May 25, 2055	100% State of Michigan

Table 4.2: Eagle Land Block Vertices

Vertex ID	Easting	Northing	Vertex ID	Easting	Northing
A1	430695.78	5177968.02	C7	432292.15	5177149.41
A2	431098.59	5177964.85	C8	432300.28	5177552.23
A3	431501.41	5177961.68	D1	432700.63	5177546.77
A4	431494.05	5177559.25	D2	433101.10	5177541.30
A5	431486.74	5177156.80	D3	433093.28	5177138.35
A6	431083.58	5177160.48	D4	433085.48	5176735.65
A7	430680.47	5177164.18	D5	432684.65	5176741.22
A8	430687.97	5177567.93	D6	432283.82	5176746.79
B1	431501.41	5177961.68	D7	432292.15	5177149.41
B2	431904.91	5177958.35	D8	432692.59	5177143.80
B3	432308.41	5177955.03	E1	433108.95	5177944.22
B4	432300.28	5177552.23	E2	433509.33	5177938.43
B5	432292.15	5177149.41	E3	433909.75	5177932.70
B6	431889.45	5177153.10	E4	433902.28	5177529.97
B7	431486.74	5177156.80	E5	433501.69	5177535.61
B8	431494.05	5177559.25	E6	433101.10	5177541.30
C1	432308.43	5177955.04	F1	433101.10	5177541.30
C2	432708.66	5177949.64	F2	433501.69	5177535.61
C3	433108.95	5177944.22	F3	433902.28	5177529.97
C4	433101.10	5177541.30	F4	433894.80	5177127.24
C5	432700.63	5177546.77	F5	433494.04	5177132.78
C6	432692.59	5177143.80	F6	433093.28	5177138.35

While the surface of the Eagle Mine is on Eagle Mine LLC property or property leased from the State of Michigan, the minerals comprising the Eagle Mine are either owned or leased from private owners or the State of Michigan. The state leases were renewed in 2022 for a period of 10 years. The private leases have various expiry dates that are extendable by continued payments or production. An annual lease payment is currently made, in addition to a royalty payment based on a percentage of the NSR, to the owners while the mine is in production.

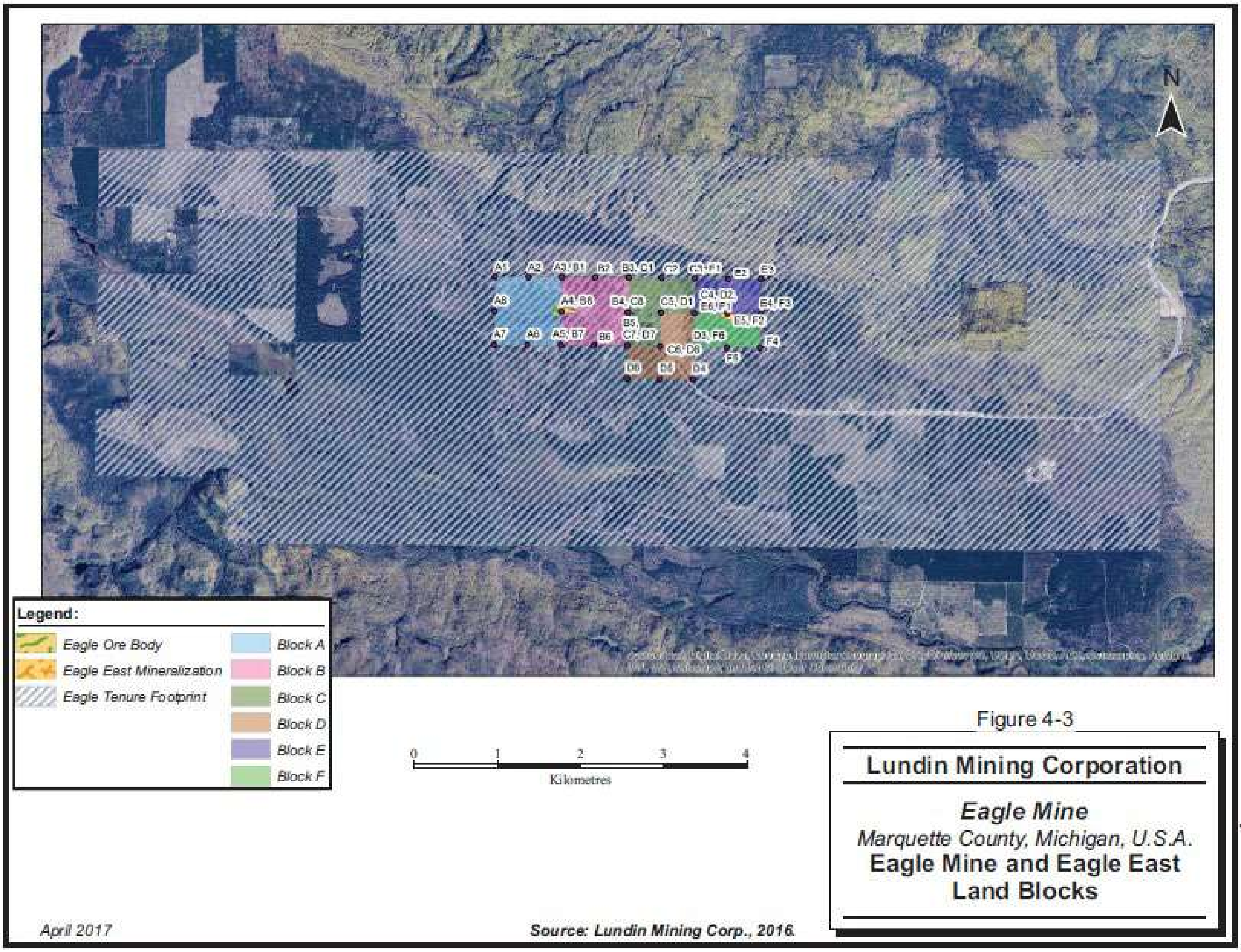

Figure 4.3: Eagle Mine Land Blocks

Lease payments would remain for the duration of mining at Eagle East, although royalty payments related to Eagle would cease when production from Eagle ends.

The Eagle deposit lies within the NW and NE quarters of Section 11, Township 50 North, Range 29 West. In the NW quarter (Block A), the deposit straddles the boundary between quarter-quarter NENW and SENW. Mineral rights for this area are leased from the State of Michigan. In the NE quarter of Section 11 (Block B), the surface is owned by Eagle Mine LLC and the mineral rights are held through lease agreements with individuals (81.25%) and ownership by Eagle Mine LLC (18.75%).

The Eagle East deposit lies against the northern border of the southern half of the northeastern quarter of Section 12 (Block F).

The Keel orebody is a newly defined zone located on the East side of the mine between Eagle East and Eagle orebodies. The deposit lies within northern border of the southern half of the northwestern quarter of section 12.

4.2.3 Surface Rights

Surface rights are owned by Eagle Mine LLC in Blocks A, B, and D. Block C is controlled by Eagle Mine LLC through a Surface Use Lease with the State of Michigan, while Blocks E and F are available for lease through the State of Michigan, if required.

The Eagle Mine surface rights are summarized in Table 4.3.

Table 4.3: Surface Land Tenure (production related), Eagle Mine

Description	Depicted Acres/km^2	Surface Owner	Lease Origin Date	Expiration Date
Twp 50 N, Range 29 W, N 1/4 Section 11 (Block B on map)	160/0.65	Eagle Mine LLC		None
Twp 50 N, Range 29 W, N ½ of NW ¼ and SW ¼ of NW ¼, Section 12 (Block B on map)	120/0.49	Three private owners with 56.25% ownership; leased to Eagle Mine LLC	July 8, 1992	July 8, 2022, extendable by production and reclamation/post closure monitoring requirements
Twp 50 N, Range 29 W, SE ¼ of the NW ¼ and the N ½ of the SW ¼, Section 12 (Block B on map)	40/0.26	Eagle Mine LLC		None

Note: Areas given in this table are only reflective of the areas depicted in Figure 4.3 and may not be indicative of the fully leased area.

A detailed description of blocks impacted by production at Eagle and potential production at Eagle East, as shown in Figure 4.3, is given below. Note that areas given in the descriptions below may not be representative of the entirety of ownership associated with the involved leases.

4.2.3.1 Block A

Eagle Mine LLC owns the surface with mineral rights from State of Michigan Metallic Minerals Lease M-00602 dated July 8, 1992, from the State of Michigan in favour of Terence W. Quigley, as lessee, as assigned to KEX pursuant to the Assignment of Metallic Minerals Leases dated August 27, 1993, and assigned to KEMC pursuant to the Assignment of Metallic Minerals Leases dated August 24, 2006. The primary term of this lease was extended to July 7, 2032, and is extendable by production. The area of interest for the purpose of this Technical Report is the 160 acres (64.7 ha) comprising the northwest ¼ of Section 11, Township 50 North, Range 29 West as defined by the following coordinates (UTM Zone 16N) given in Table 4.3.

A sliding scale production royalty of based on the Adjusted Sales Value per tonne of ore applies to this parcel.

4.2.3.2 Block B

Eagle Mine LLC has surface ownership with mineral rights leased from a total of four owners, three of which own a 3/16th undivided interest (18.75%) each and a fourth owns the remaining 25%. Eagle Mine LLC owns 18.75%. Various NSR royalties are payable on each of the leased mineral estates.

Three owners own 56.25% of the gross mineral estate of, for the purpose of this Technical Report, 160 acres (64.7 ha), situated in the northeast ¼ of Section 11, Township 50 North, Range 29 West, as defined in Table 4.3. These three Mineral Lease Agreements, dated November 15, 1995, were executed in favour of KEX, as amended by the First Amendment to Mineral Lease dated June 25, 2001 by and between KEX, as assigned to KEMC pursuant to an unrecorded Assignment Agreement dated April 1, 2004. These leases are also subject to the Second Amendment to Mineral Lease dated March 1, 2014. The aforementioned leases each expired on November 14, 2015, and are extended by continuation of payments.

The additional 25% ownership is held by a single owner in a Mineral Lease Agreement dated May 1, 2002, in favour of KEX, as assigned to KEMC pursuant to an unrecorded Assignment Agreement dated April 1, 2004, expiring May 15, 2037 and extendable to May 15, 2054 by continuing payments, after which active mining must occur.

4.2.3.3 Block C

Surface ownership is by the State of Michigan through Surface Use Lease L-9742 (a/k/a SUL No. 11) dated July 8, 2008. Mineral rights, for the purpose of this Technical Report, comprise 120 acres (48.6 ha), being the north ½ of the northwest ¼ and the southwest ¼ of the northwest ¼ of Township 50 North, Range 29 West, Section 12 (as defined in Table 4.3), from State of Michigan Metallic Minerals Lease M-00603 dated July 8, 1992 from the State of Michigan in favour of Terence W. Quigley, as lessee, as assigned to KEX pursuant to the Assignment of Metallic Minerals Leases dated August 27, 1993, as assigned to KEMC pursuant to the Assignment of Metallic Mineral Leases dated August 24, 2006. The primary term of M-00603 was extended to July 7, 2032, and is extendable by production. The expiration date of the Surface Use Lease coincides with the expiration dates of M-00602 and M-00603, July 8, 2022. These state leases were renewed in 2022 for a period of 10 years and are extendable by production or reclamation and closure activities.

4.2.3.4 Block D

Eagle Mine LLC owns the surface with 100% of mineral rights shared among 12 people and undivided ownership by Eagle Mine LLC. These leases have variable extents, expiration dates, proportional interests, execution dates, and extension provisions, as well as various amendments with variable dates. The area of interest for the purpose of this Technical Report is 120 acres (48.6 ha) composed of the Southeast ¼ of the Northwest ¼ and the North ½ of the Southwest ¼ of Section 12, Township 50 North, Range 29 West, as defined in Table 4.3.

4.2.3.5 Block E

Surface is owned by the State of Michigan with mineral rights from State of Michigan Metallic Minerals Lease M-00603 for lands in Township 50 North, Range 29 West, N ½ of the NE ¼, Section 12, dated July 8, 1992 from the State of Michigan in favour of Terence W. Quigley, as lessee, as assigned to KEX pursuant to the Assignment of Metallic Minerals Leases dated August 27, 1993, as assigned to KEMC pursuant to the Assignment of Metallic Mineral Leases dated August 24, 2006. The primary term of M-00603 was extended to July 7, 2032, and is extendable by production. The block is defined as listed in Table 4.3, containing 80 acres (32.4 ha) for the purpose of this Technical Report.

4.2.3.6 Block F

Surface is owned by the State of Michigan with mineral rights held by a single owner and leased to Eagle Mine LLC for lands in Township 50 North, Range 29 West, S ½ of the NE ¼, Section 12, dated May 25, 2005, for a period of 30 years. The block is defined as listed in Table 4.3 and is subject to a sliding scale NSR royalty. The area of interest for the purpose of this Technical Report is 80 acres (32.4 ha).

4.2.4 Humboldt Mill

The Humboldt Mill property, measuring approximately 1.42 km^2, is located 61 km west of Marquette in Sections 2 and 11, Township 47 North-Range 29 West, Township of Humboldt, Marquette County, Michigan. The centre point of the Humboldt Mill area (including all ownership of land) is 46º 29’ north latitude, 87º 54’ west longitude (UTM Zone 16N Zone coordinates 5148824 m N, 430843 m E). The land is held by both Humboldt Land LLC and Eagle Mine LLC through a series of deeds.

4.3 Royalties

4.3.1 Eagle Mine

Eagle Mine LLC is 100% owned by LMC.

While the surface of the Eagle Mine is on Eagle Mine LLC property or leased from the State of Michigan, the minerals comprising the Eagle Mine are either owned or leased from private owners or the State of Michigan. Private interests and the 18.75% undivided interest owned by Eagle Mine LLC are located in the northeast quarter of Section 11, Township 50 North, Range 29 West, while the State of Michigan owns minerals in the northwest quarter of the same section. The distribution of the Eagle Mine Mineral Resources is approximately 50:50 between the two quarters of the section. The leases have various expiry dates that are extendable by continued payments or production.

An annual lease payment is currently made, in addition to a payment based on a percentage of the NSR to the owners while in production. Royalty payments related to Eagle will cease when production from Eagle ceases. The QP has reviewed the confidential NSR rates; and in the QP’s opinion, they are within industry norms.

The QP is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the property .

4.3.2 Eagle East

Eagle East payments are based on a percentage of NSR to the owners while in production, which falls within the same range of royalty rates as Eagle. Lease payments will remain for the duration of mining at Eagle East. Eagle Mine LLC has all required land access approvals to conduct the proposed work on the property.

Annual lease payments are currently made on the Keel area and any production at the Keel zone falls within the same range of royalty rates as Eagle and Eagle East on a percentage of NSR to the owners upon production.

The QP is not aware of any environmental liabilities on the property.

4.4 Additional Significant Factors

The QP has not identified additional factors which may impact the continued property tenure of Eagle Mine LLC.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Access

The closest full-service community to the Eagle Mine is Marquette, Michigan, 53 km from the mine, a city with a population of approximately 21,000. Marquette has shipping and rail facilities; and daily air service to Detroit, and Chicago from the Sawyer International Airport, which is located approximately 16 km to the south. Road access to the Eagle Mine property, occupying approximately 63 ha, is excellent, with maintained loose surface and paved roads from the communities of Big Bay to the east, L'Anse to the west, and Marquette to the south. The closest community is Big Bay, 24 km from the property by road. Big Bay is primarily a cottage community with limited services.

The Humboldt Mill property, a former iron ore processing facility, occupying approximately 142 ha, is located approximately 61 km west of Marquette, close to the main US Highway 41. Ore from the Eagle Mine is trucked approximately 105 km to the Humboldt Mill for processing, starting from the mine, east on Triple A Road, north on County Road (CR) 510, south on CR 550, through the city of Marquette and west on US Route 41.

There is no rail access at the Eagle Mine, but the Humboldt Mill is connected by rail to the CN Rail system at Ishpeming.

5.2 Local Resources

The region is served by an extensive network of paved roads, rail service, excellent telecommunications facilities, national grid electricity, and an ample supply of water. The property benefits by having access to an educated workforce.

Logging and mining have been a major part of land use activities for over 150 years. Copper and iron mining in the Marquette Range created many large open-pit mines and associated landforms. Logging is ongoing throughout the region. Agriculture is relatively limited and there is minor commercial fishing of white fish and lake trout on Lake Superior. Urban development is concentrated around Marquette.

Recreation is an important land use, both along the shoreline and inland. The forested, hilly land with lakes and streams attracts hunters, fishermen, hikers, and other recreational users. The region is also very popular for snowmobiling in the winter. The mine is located five kilometres east-northeast of the McCormack Tract, a Federal wilderness reserve.

Extensive third-party archeological studies revealed no Native American artifacts or evidence of areas of cultural significance. The Eagle Mine is located in the Ceded Territories and the Keweenaw Bay Indian Community (KBIC) has claimed that the main outcrop of peridotite on State Mineral Lease M-00603 is of cultural significance. While there is no entry in the State historical records of any feature of Native American cultural significance, Eagle Mine LLC has committed to protect the rock outcrop from mining and offered access to the rock for cultural ceremonies.

5.3 Site Infrastructure

The area is served by an extensive network of paved roads, rail service, excellent telecommunications facilities, national grid electricity, and an ample supply of water. The surface and underground infrastructure at the Eagle Mine includes the following:

- Powerhouse
- Supply Storage Facility
- Water Treatment Plant
- Truck Wash
- Mine Services Building
- Mine Dry Facilities
- 3 bay mobile maintenance shop
- Underground mobile maintenance shop
- Surface Sprung Maintenance workshop
- Contact Water Basins (CWB)
- Non-Contact Water Infiltration Basins (NCWIB)
- Coarse Ore Storage Area (COSA)
- Temporary Development Rock Storage Area (TDRSA)
- Crushed Aggregate Storage
- Concrete Backfill Batch Plant
- Mine portal connected by decline and levels to the Eagle deposit
- Mine air heater and fresh air intake fan
- Surface Raise Site with exhaust fans
- Mine Security Gatehouse

There is no additional infrastructure required for the Eagle East deposit as the existing Eagle Mine infrastructure would be used for the Eagle East Project.

At the time of QP's site visit, the infrastructure at the Humboldt Mill included the following:

- A 2,000-tpd flotation mill.
- Primary, secondary, and tertiary crushing circuit.
- Concentrate storage shed.
- Rail yard for rail car storage.
- Rail siding.
- Reclaim water system from tailings area.
- Tailings disposal to the HTDF.
- Water Treatment Plant.
- Mill Administration Building.
- Mill Services Building.
- Electrical power supply and distribution.
- SGS contract laboratory for mill and underground sample preparation and assaying.
- Coarse Ore Storage Area (COSA).
- Mill Security Gatehouse.

Eagle Exploration formerly maintained an office at the core handling/logging facility in Negaunee. This facility has now been converted into a training room and for core storage. Currently, core logging and sampling activities are done at the mine. Eagle Mine has an Information Centre for visitors in Marquette.

5.4 Power

The mine site is serviced by grid power provided by the Alger Delta Electric Co-operative (ADEC). An agreement was signed between ADEC and KEMC on January 15, 2008, to provide power to the mine site. ADEC provides power from the city of Marquette to the town of Big Bay and the overhead lines and associated substation were upgraded to provide 24.9/14.4 kV service to the mine site. The new line from the Big Bay line tap to the mine site is an underground line which supports the estimated 6.3 MVA requirement of the site. A powerhouse constructed at the mine site to step down the 24.9/14.4 kV utility power to 4.16 kV to support mine surface distribution and 13.8 kV to support mine portal, underground, and vent raise distribution. Emergency backup power is provided to portions of the mine by a 4.16 kV, 2,500-kVA diesel generator.

The Humboldt Mill site is predominantly serviced by the Upper Peninsula Power Company with some power being supplied from WE Energies. The Upper Peninsula Power Company service is fed from a 69 kV American Transmission Company transmission line to an on-site, utility-owned substation. The substation steps down the incoming 69 kV power to 13.8 kV through two 10.5 MVA transformers situated into two redundant banks. This 13.8 kV is fed into the main concentrator building's 13.8 kV switchgear. This switchgear feeds 13.8 kV distribution to the reclaim water area for the mill as well as pad-mounted transformers that step down the voltage to 4.16 kV and 480 V to support the mill process in a fully redundant design.

5.5 Water

An existing non-potable well, in conjunction with a potable well, provides service and drinking water to the mine site. Each is capable of delivering 100 USgpm. There are two wells at the mill: a potable well and a non-potable industrial well. Each is capable of delivering 100 USgpm. Currently, mill operations are supplied by recycled water from the HTDF but can utilize the industrial well as needed. Hydrology studies at both sites indicate viable long term aquifers. Both the mine and mill sites utilize septic systems.

5.6 Climate

The climate of northern Michigan is typical for the Great Lakes region, with warm summers and long, cold winters. The Eagle Mine and Humboldt Mill sites are located in a temperate region. The area’s weather is characterized by variable weather patterns and large seasonal temperature variations. Summers are often warm and humid and winters can be very cold with frequent snow showers and significant snow cover.

Mean high and low temperatures in Marquette range from -11.6ºC (11ºF) in January to a maximum of 24.2ºC (75.6ºF) in July. Mean daily temperatures vary from -7.7ºC (18ºF) in January to 19.1ºC (66.4ºF) in July. Snowfall in the region can be high, from 1971 to 2000 average annual snowfall was 307 cm (120.9 in.). Mean annual precipitation for the same period was 763 mm (30 in.).

Lake Superior causes an identifiable lake effect on the area’s climate during much of the year, increasing cloudiness and snowfall during the autumn and winter. This aspect, combined with the higher surface elevation, yields much higher snowfall amounts at the Eagle Mine and Humboldt Mill than recorded at the city of Marquette.

Exploration and mining activity can be carried out throughout the year.

5.7 Physiography

The Eagle Mine is on the watershed divide of the Yellow Dog River and Salmon Trout River. The Eagle Mine is located on the Yellow Dog Plains, where two hillocks of peridotite resistant to erosion protrude through the sandy glacial outwash till. The area is covered principally by boreal forest and wetlands with limited outcrop exposure. Lakes, rivers, and smaller streams are numerous in the area. Most of the streams have steep gradients, and many have waterfalls near Lake Superior. The Eagle Mine is at approximately 440 masl and there is little relief in the surrounding area. Elevations drop to 200 masl at Marquette and rise again to approximately 500 masl at the Humboldt Mill.

Primary land use in the area of the Eagle Mine is logging, and much of the timber in the area has been logged and replanted. There are no operating metal mines in the immediate vicinity of the Eagle deposit. No permanent residences exist in the immediate area, although a handful of seasonal recreational cabins are within a few kilometres of the mine site.

The QP is of the opinion that Eagle Mine LLC has sufficient mineral and surface rights for the planned work to continue mining the Eagle Mine.

6.0 HISTORY

6.1 Prior Ownership

Kennecott Exploration (KEX) started working in the region in 1991. In 2004, the project was transferred to Kennecott Minerals (Rio Tinto Copper Group) under the name Kennecott Eagle Minerals Company (KEMC). KEMC began construction of the Eagle Mine in April 2010 and began underground development in September 2011. On October 4, 2012, the company's legal name was changed from KEMC to Rio Tinto Eagle Mine LLC (RTEM). On July 17, 2013, LMC, through its indirect US subsidiary LMDL, acquired all of the membership interests of RTEM. Subsequently, the name of RTEM was changed to Eagle Mine LLC.

6.2 Previous Exploration and Development

The Baraga Basin region has until recently been subject to only sporadic exploration efforts. The earliest historical accounts of exploration in the basin date back to the mid-1800s when a group of investors tried to develop slate quarries along the Slate River. Little documented exploration work took place in the Baraga basin between 1910 and 1950. During the 1950s, Jones and Laughlin conducted an exploration program along the northern portion of the east branch of the Huron River, investigating uranium-silver-mercury mineralization associated with a graphitic shear exposed in the river. During the 1960s and 1970s, various interests conducted exploration programs on Ford Motor Company mineral lands in the Baraga Basin and the western portion of the Marquette Trough. The programs were primarily focused on uranium and zinc. The U.S. Department of Energy provided funding to drill a number of deep holes in the Baraga Basin during the 1970s, presumably to provide stratigraphic information for the uranium exploration effort.

Concurrently, the U.S. Geological Survey (USGS) began a bedrock-mapping program of the basin, focusing primarily on exposures in rivers, which produced an open file outcrop map with little interpretation and no report. In 1976, Michigan Technological University drilled a 31 m hole on the east end of the Yellow Dog (Eagle East) outcrop. The hole bottomed in coarse-grained peridotite with only traces of sulphides. In 1979, the Michigan Department of Natural Resources (DNR), in conjunction with the USGS, published a report on the Yellow Dog peridotite describing the results of geochemical, petrographic, and geophysical studies of the peridotite (Klasner, et Al., 1979). The authors concluded that the anomalous sulphur and copper contents of the outcropping peridotite indicated a potential for a copper-nickel ore deposit. KEX started working in the region in 1991 and actively explored for sedimentary exhalative (Sedex) zinc deposits through 1994. During the course of mapping, float boulders of peridotite with sulphides were discovered that indicated the potential for magmatic sulphide mineralization. KEX partially shifted to magmatic nickel exploration in 1995 and drilled four holes to test the Yellow Dog peridotite (Eagle East). One hole (YD95-2) intersected 10 m of moderate to heavy disseminated sulphide mineralization along the southern contact. Two more angle holes (YD95-3 and YD95-4) collared on the east end of the Yellow Dog East outcrop demonstrated that the peridotite widened to the east but only intersected a metre or two of weak sulphide mineralization along the north and south contacts.

The more recent nickel exploration program was started late in 2000. Drilling at the neighbouring Eagle East target in July 2001 intersected 30 m of disseminated, semi-massive, and massive sulphides averaging 1.03% Ni and 0.75% Cu (YD01-01) and one of three holes on the east end of Eagle intersected 85 m of disseminated sulphides averaging 0.6% Ni and 0.5% Cu (YD01-06). In 2002, drilling at Eagle targeted the centre of a magnetic anomaly defined by ground surveys in 2001. The first hole, YD02-02, intersected 84.2 m of massive pyrrhotite-pentlandite-chalcopyrite averaging 6.3% Ni and 4.0% Cu, firmly establishing the presence of economic grade and width mineralization at Eagle. Subsequent definition drilling continued through the summer and autumn of 2002 and resumed in 2003. By the end of 2003, two separate high grade sulphide zones were identified at Eagle. The lower zone was defined by 15 drill intercepts and the upper zone by six drill intercepts. This formed the basis of an order of magnitude study that was completed in early 2004. Upon Rio Tinto's acceptance of the order of magnitude study in early 2004, ownership of the Eagle project was transferred from KEX to KEMC for additional evaluation. KEMC conducted an extensive resource and geotechnical drill program in 2004 supplying the data to connect the former upper and lower zones and better establish the geometries of the massive sulphide, semi-massive sulphide, and host intrusive bodies. The result of this work was the completion of a pre-feasibility study.

Construction of the Eagle Mine, an underground nickel and copper mine, commenced in April 2010 and underground development began in September 2011. The Humboldt Mill was refurbished, and the Eagle Mine achieved commercial production in November 2014.

From 2002 to 2008, Rio Tinto drilled more than 50 holes in the Eagle East intrusion, identifying uneconomic and largely disseminated mineralization. In June 2015, LMC announced the discovery of very high-grade magmatic nickel-copper mineralization similar in style to the Eagle deposit, located approximately two kilometres east of the Eagle Mine. The Eagle East deposit was discovered in an undrilled area approximately 960 m deep.

In 2016, LMC reported the initial Mineral Resource estimate for the Eagle East deposit together with a positive PEA supporting further work on the deposit. Eagle Mine continued drilling from surface to delineate the deposit and undertook technical studies in support of the Eagle East Feasibility Study.

In 2019, the Resource drilling was executed for the Keel zone and a more detailed evaluation was completed. Although the zone has been known since early 2000, the grades at that time, were less attractive compared to the other zones and was not prioritized for further investigation. The forecasted 5-year Nickel price has made the zone more economically attractive and included in the 2023 Mineral Reserves and LOM plan.

6.3 Historical Mineral Resource and Reserve Estimates

In 2005, RPA was retained by Rio Tinto Technical Services (RTTS) to provide an independent audit of a Mineral Resource estimate for the Eagle Ni-Cu deposit. In a technical report, dated March 15, 2005, the Mineral Resource estimate was based on a total of 79 holes drilled on the Eagle deposit and a $25.00/t NSR cut-off value.

A number of internal and independent Mineral Resource estimates were prepared by and for RTEM (KMEC) between 2006 and 2012. To support LMC's purchase of Eagle in July 2013, an independent technical report was prepared by Wardell Armstrong International (WAI) (WAI, 2013). An independent NI 43-101 Mineral Resource estimate completed in accordance with NI 43-101 supporting the Eagle East mineralization was completed by RPA with an effective date of December 3, 2016.

LMC is not treating the historical estimate as a current resource estimate. LMC personnel have updated the Mineral Resource estimates for the Eagle, Eagle East and the new Keel deposits, effective December 31, 2022. The December 31, 2022, Mineral Resource estimate supersedes the 2016 estimate and will be discussed in more detail in Item 14 of this Technical Report.

6.4 Historical Production

The historical production mined by Rio Tinto from the Eagle Mine is summarized in Table 6.1.

Table 6.1: Eagle Mine Production – Eagle Mine

Eagle Mine Production					
	Mill Feed	Feed Grade		Metal in Concentrates	
Year	(t)	Ni (%)	Cu (%)	Ni (t)	Cu (t)
2014	173,648	3.16	2.4	4,178	3,877
2015	746,466	4.31	3.36	27,167	24,331
2016	748,485	3.82	3.21	24,114	23,417
2017	754,096	3.44	2.88	22,081	21,303
2018	753,751	2.8	2.46	17,573	17,974
2019	747,061	2.2	1.99	13,494	14,297
2020	761,093	2.62	2.54	16,718	18,663
2021	699,134	3.12	2.71	18,353	18,419
Total	5,383,734	3.19	2.72	143,678	142,281

Copper in concentrates includes copper contained in copper and nickel concentrates.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

The Eagle intrusion, Eagle East intrusion, and the Keel zone of Eagle East are all part of the same ultramafic intrusive system and all host high grade primary magmatic Ni-Cu sulphide mineralization. These intrusions are related to the feeder system for the Keweenawan flood basalts, a Large Igneous Province (LIP) resulting from mantle-tapping extension during the Midcontinent Rift.

Mineralization styles are similar in Eagle and Eagle East, consisting of mineralized peridotite bodies with concentrations of semi-massive sulphide in the center of the intrusions and massive sulphides at the base. Massive sulphides can extend for short distances outwards beyond the contact of the peridotite, into the surrounding sedimentary country rocks as sills along bedding planes.

7.1 Geological Setting

The Midcontinent Rift formed when the North American continent began to split apart 1.1 billion years ago, resulting from the upward impact of a mantle plume. Rifting continued for 15 to 22 million years, at which point the rift failed. The rifting process consists of three main stages: mantle plume impact and upwelling, initial extension and flood basalt volcanism, and ongoing passive extension resulting in ocean basin formation.

In the first stage, upwelling, occurs from the buoyant mantle plume under-plating the crust. This results in the formation of tension cracks above the upwelling zone which are often injected by magma, resulting in dyke swarms. At the onset of rift extension, the crust thins as the crust on either side of the mantle plume begins to move apart, and the blocks bounded by tension cracks begin to subside into the rift depression. This results in normal fault movement which accommodates the extension (Figure 7.1).

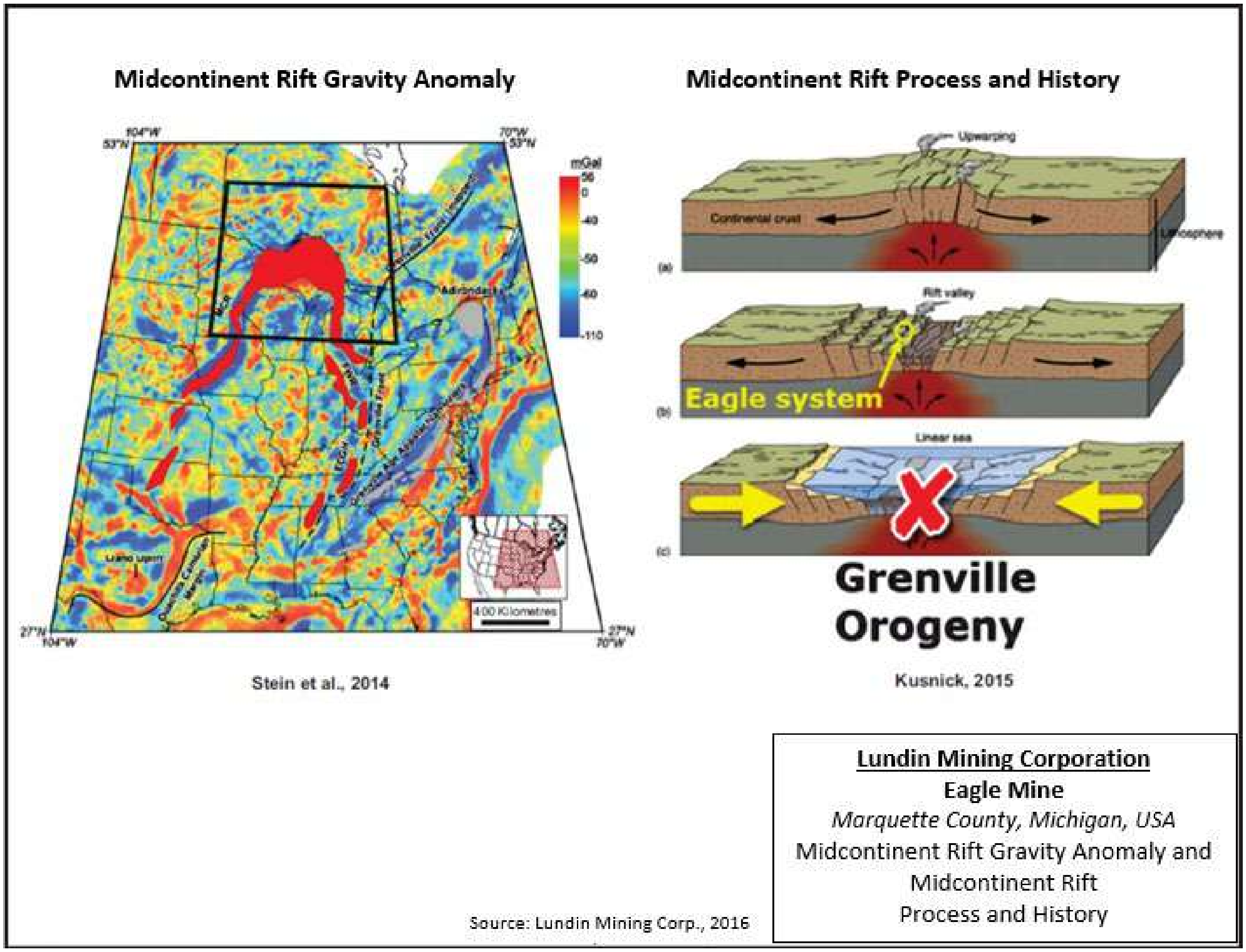

Figure 7.1: Midcontinent Rift Gravity Anomaly and Midcontinent Rift Process and History

During the second phase, significant partial melting of underlying mantle and lower crust occurs, resulting in volcanic eruptions and the formation of a flood basalt province. These large eruptions are often associated with the venting of large quantities of gas including SO_2, which is important in the ore forming process as magmas must be driven to sulphur saturation before sulphide droplets can form. Eagle and Eagle East are more mafic than the flood basalts and are likely related to partial melting of the mantle in the feeder zone to the flood basalts. These magmas migrate from deep staging chambers upward to episodic small volcanic vents along the edge of the main flood basalt province. These small, hot, low viscosity magmas exploit small, dilated spaces resulting from movement along faults, and can erupt vertically if the magma pressure overcomes the lithostatic pressure. This results in a structurally controlled but unpredictable magma conduit path to surface. In conduit style systems, sulphide droplets settle out from sulphur-saturated magma wherever the velocity of the magma slows down due to a significant change in direction or change in conduit size such as a small conduit entering a larger chamber or a conduit turning horizontal.

In the third stage of rifting, the rift is fully formed, and a passive crustal spreading centre is formed on the ocean floor, similar to the mid-Atlantic ridge. Ongoing volcanism at the spreading centre can form other types of ore deposits such as VMS style mineralization.

Further active volcanism can build islands such as Iceland, which continues to be a well studied analogue for Eagle-like volcanism. In the case of the Midcontinent, rifting halted prior to the influx of seawater into the basin.

7.2 Regional Geology

The Eagle property is located in the Baraga Basin on the south side of Lake Superior (Figure 7.2). Three depositional periods are well represented in the region. These occurred in the Archean, Early Proterozoic, and Middle Proterozoic and are separated by pronounced unconformities related to major regional tectonic events.

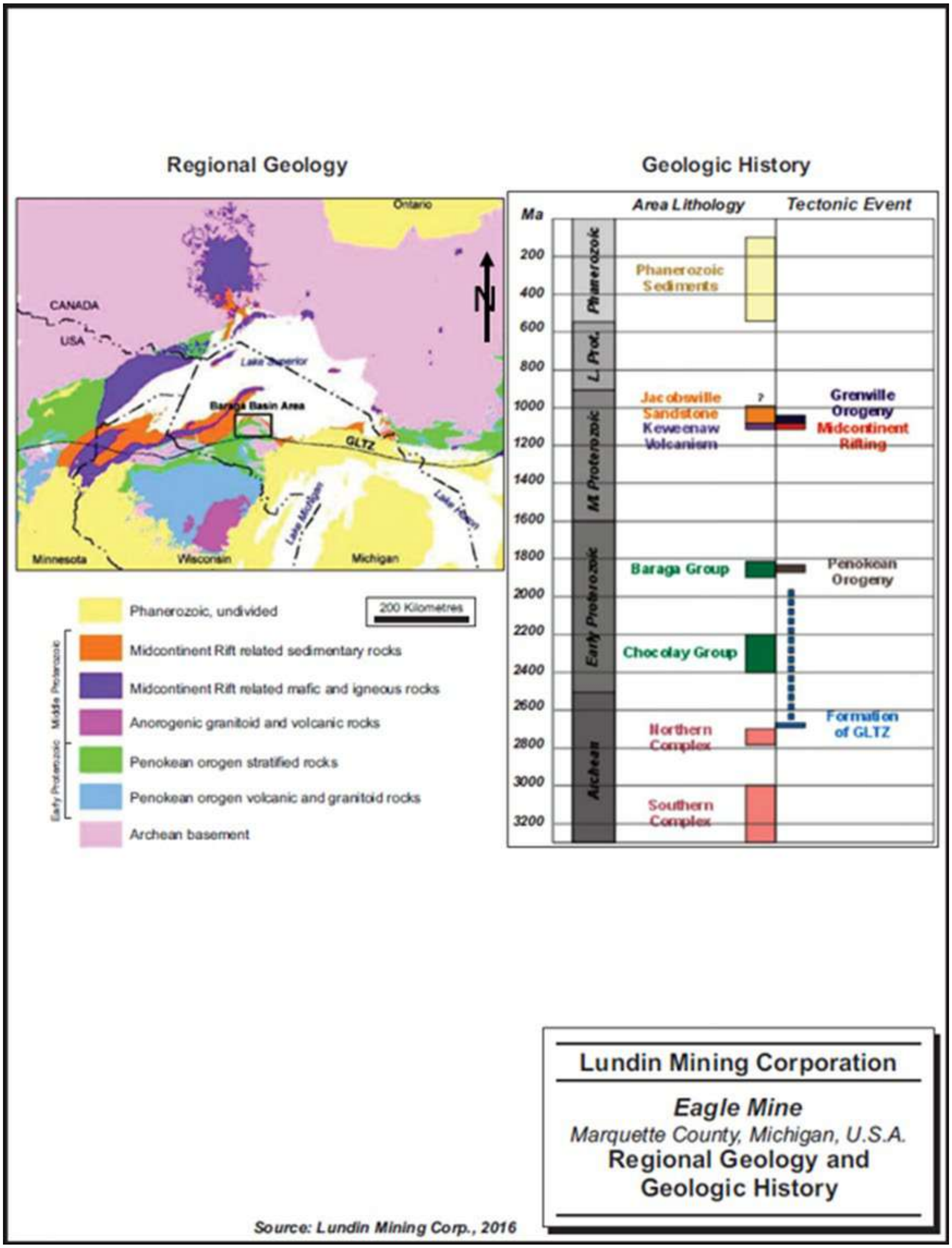

Figure 7.2: Regional Geology and Geological History

7.2.1 Archean

The Archean basement rocks consist of two terranes separated by an ancient crustal suture zone known as the Great Lakes Tectonic Zone (GLTZ). The terranes consist of gneiss and granitoid to the north and migmatite to the south.

7.2.2 Paleoproterozoic

The Marquette Range Supergroup (MRS) consists of a package of sediments that unconformably overlie the Archean basement. The base of the MRS is a package of quartzite and chert carbonate (Goodrich Quartzite) which forms a distinct marker bed and strong seismic reflector. This is overlain by a package of barren sulphide-bearing black slates and greywackes which comprise the Baraga Basin. The Baraga Basin sediments are the country rock in which the Eagle Mine intrusions reside.

7.2.3 Mesoproterozoic

The Keweenaw Flood Basalt province represents the exposed portion of the Midcontinent Rift system in the Lake Superior region (Figure 7.2, left). The Midcontinent Rift forms a prominent gravity anomaly (Midcontinent gravity high) that can be traced southwest from the Lake Superior region into central Kansas and southeastward into southern Michigan. The total length of this geophysical feature is in excess of 2,000 km (Hinze et al, 1997). Seismic data indicate the rift below Lake Superior is filled with more than 25 km of volcanics buried beneath a total thickness of up to 8 km of rift filling sediments (Bornhorst et al., 1994).

The estimated volume of magmatic rocks associated with the rift is greater than two million km^3 (Cannon, 1992).

The Midcontinent Rift was previously thought to have failed because of regional compression associated with the Grenville Orogeny. New age dating suggests that the compressional event which inverted the basin postdates the Grenville Orogeny (Malone et al., 2016).

The Eagle deposit is located in the northern portion of the Mesoproterozoic Baraga-Marquette dyke swarm. The Baraga-Marquette dyke swarm comprises more than 150 primarily east-west trending dykes (Green et al., 1987). Although most dykes in the swarm are less than 30 m thick, individual dykes are up to 185 m thick and can be traced on magnetic maps for up to 59 km (Green et al., 1987). Compositionally the dykes and associated intrusions of the Baraga-Marquette dyke swarm can be broadly categorized into two groups, gabbroic and picritic. Gabbroic dykes are generally quartz normative tholeiites with relatively low Al_2O_3 contents, similar to early phase basalts of the Midcontinent rift. The picritic intrusions comprise elongate plugs, with maximum dimensions of a few hundred metres, and discontinuous dykes that range in thickness from less than a metre to over 70 m.

The picritic intrusions are typically more altered than the gabbroic intrusions. In some places the picritic intrusions have been incorporated into later breccia dykes. Age dating of the dykes of the Eagle intrusive yielded an age of 1,107.2 ± 5.7 million years (Ma) and the gabbro that occupies the intrusive plumbing system below and east of the Eagle East deposit has an U-Pb baddeleyite date of 1103.4 ± 1.2 Ma. A gabbroic dyke north of Eagle was dated at 1,120 Ma, which represents the start of rift-related intrusive activity.

7.2.4 Paleozoic

Paleozoic sediments in the eastern half of the Upper Peninsula cover the Precambrian basement. These gently south-southeast dipping sediments form the northern edge of the large Michigan Sedimentary Basin.

The entire Yellow Dog Plains area is covered by sandy till deposited in an outwash plain. Till thickness ranges from nil at the peridotite outcrop to greater than 100 m. Drilling in the wetland area directly above the Eagle peridotite indicates a till thickness of 10 m to 12 m. Till thickness increases to the east and is over 100 m thick above the Eagle East conduit zone. The till was locally reworked by later fluvial action into broad meandering stream channels.

7.3 Local And Project Geology

The Eagle deposit is located at the east end of the Baraga Basin, the northernmost basin of Paleoproterozoic sediments in Michigan (Figure 7.3). The host intrusions are part of the Mesoproterozoic Baraga-Marquette dyke swarm.

The Eagle and Eagle East conduit zones are hosted in two peridotite intrusions. The Eagle East intrusion forms a prominent outcrop (historically known as the Yellow Dog Peridotite) that rises above the Yellow Dog Plains and is the site of the Eagle Mine portal. The western intrusion, 650 m to the west and host to the Eagle deposit, is only poorly exposed in a small subcrop on the north side of Salmon Trout River and is the site of the Eagle Mine ventilation raise. The intrusions are characterized by very prominent magnetic highs relative to the surrounding sedimentary rocks.

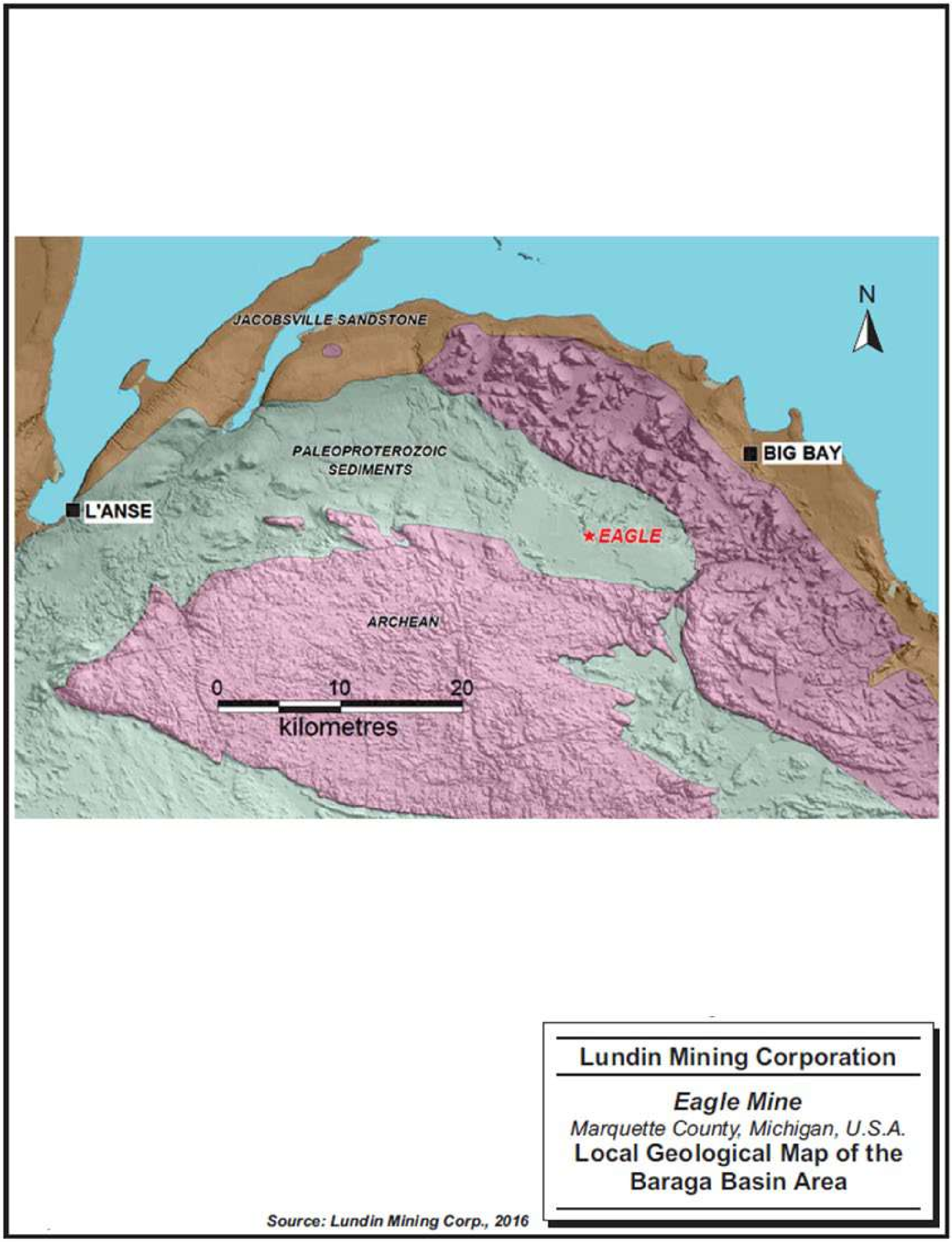

Figure 7.3: Local Geological Map of the Baraga Basin Area

The Eagle and Eagle East peridotite intrusions are hosted in Paleoproterozoic metasediments of the Baraga Basin which rest unconformably on the Archean basement rocks. These sediments are assigned to the Upper Fossum Creek Unit and are mainly composed of an upper siltstone sequence with fine grained turbiditic greywacke sandstone interbeds, which comprises the main sedimentary lithology found in Eagle Mine. A lower sequence of dark grey to black thin laminated slates and shales, medium grey thin bedded siltstone, and rare fine grained turbiditic sandstone is seen deeper and lateral to the intrusive rocks.

The Eagle East deposit is located deeper than the Eagle deposit, between -374 m and -550 m elevations (814 m to 990 m below surface). The host sediments encountered in the surroundings of the Eagle East mineralized zone are mainly siltstones with low proportions of sandstone interbeds. The assignment of these deeper sediments to the Lower Fossum Formation is not yet evaluated. Bedding and foliation are the main structural features present in the sediments and represent the weakest planar orientation found. All of these features are seen both in the Eagle and Eagle East drill core. Generally, the sediments exhibit hornfels within 10 cm to 20 m of the intrusive contact as a result of metasomatism. The presence of these can be confirmed around the Eagle intrusive, though the hornfels unit rarely exceeds 10 m in width.

The main intrusive types encountered in Eagle East are peridotites and pyroxenites, similar to those encountered in the Eagle Mine, with minor intrusives/dykes of mafic (mainly gabbroic) composition. All these mafic dykes are grouped together as they are not related to the mineralization.

7.3.1 Lithology

A summary of lithological, mineralization, and zone abbreviations is shown in Table 7.1. A brief summary of the major lithological units is also presented.

Table 7.1: Summary of Geological Domains – Eagle Mine

Domain	Abbreviation
Overburden	OB
Sediments	SLST
Mafic Dykes	PRX
Gabbro Intrusive	GAB
Peridotite (0-25% Sulphide)	PER
Semi-massive (25-85% Sulphide)	SMSU
Massive (85-100% Sulphide)	MSU

7.3.1.1 Sedimentary Units

The peridotites intrude siltstone assigned to the Upper Fossum Creek unit. The upper parts of the siltstone sequence are competent, light to medium grey and mostly thick bedded, with minor fine grained turbiditic greywacke sandstone interbeds (up to a few metres thick). Minor soft-sediment deformation features such as flame structures, slumping, and rip-ups are common. There are infrequent thin laminated horizons or interbeds. Syngenetic sulphide is typically pyrite with minor pyrrhotite as thin laminae. Foliation in the sedimentary sequence is a dominant feature that forms the weakest planar orientation. Near the hanging wall contact to the Eagle peridotite (within 10 m to 20 m) foliation in the rock is not visible and the rock becomes weakly hornfels altered. More proximal to the contact (0 m to 5 m) hornfels alteration is fairly strong, although the protolith can usually still be identified. Small-scale folds are both post-foliation (though possibly pre-mineral) and syn-foliation. Other notable features in the upper siltstone are one to two thin 10 cm to 20 cm banded quartz-silica beds that may be useful as markers within the Eagle deposit area.

The sediments are upright and slightly tilted dipping 10° to 25° to the east-northeast. A lower sequence (seen deeper and lateral to the intrusions) is defined by a dominance of dark grey to nearly black thin laminated slates/shales, syngenetic sulphide laminae (pyrite giving way to pyrrhotite+/-pyrite- chalcopyrite), medium grey thin bedded siltstone, and rare fine grained turbiditic sandstone. Subtle soft sediment structures are present in the lower sequence. Foliation, absent within 5-10 m of the peridotite contacts, is less obvious in the dark shales than in the upper grey siltstone, though visibly present. This sequence has been tentatively assigned to the Lower Fossum Creek unit in some Eagle drill logs but is more likely a portion of the Upper Fossum Creek unit. The closest outcrop of sedimentary rocks is 10 km to the west of Eagle at the Huron River.

7.3.2 Peridotite

Medium to coarse-grained massive peridotite and feldspathic peridotite are the most common rock types and form the cores of both intrusions. The peridotite in the cores of the intrusions lacks obvious layering, banding, or foliation. The lack of penetrative, tectonic foliation is an important indication that the intrusions are not Paleoproterozoic in age. In hand sample, the peridotite is dark greenish grey on fresh surfaces. In core, feldspathic peridotite can have a mottled white and dark grey colour (salt and pepper). In thin section, the peridotite comprises approximately 30% to 60% olivine. The olivine typically occurs as 2 mm to 5 mm round to ovoid grains, and is dominantly altered to serpentine. Textural evidence suggests that olivine is an early cumulate phase (Klasner et al., 1979). Chrome spinel occurs as inclusions in olivine suggesting that it is also an early cumulus phase. Megacrystic and glomeroporphyritic olivine have also been noted, indicating that there might be multiple generations of olivine (Klasner et al., 1979). Pyroxene makes up 25% to 45% of the peridotite. Clinopyroxene is slightly more abundant than orthopyroxene in most samples. Both clinopyroxene and orthopyroxene are typically poikilitic or sub-poikilitic to olivine with pyroxene oikocrysts up to a centimetre across. USGS geologists in an early study (Klasner et al., 1979) described euhedral orthopyroxenes that could have also formed as an early cumulate phase. Anhedral plagioclase forms an intermediate to late intercumulus phase. In many places the plagioclase is patchy, but over some significant intervals it can average 25% to 30% (feldspathic peridotite). Other probable late intercumulus minerals include biotite, which can average up to a few percent, some possibly minor primary amphibole, Fe-Ti oxides, and sulphides. Early microprobe work on samples of unmineralized peridotite showed that olivine compositions ranged from Fo79 to Fo82 with NiO contents from 0.24% to 0.49% (Morris, 1977). A negative correlation between MgO and NiO contents in olivines could be an indication of subsolidus re-equilibration with co-existing sulphides. Clinopyroxenes have the compositions of low chrome diopside, with Cr_2O_3 contents ranging from 0.46% to 1.02%. Orthopyroxenes are compositionally enstatites. Plagioclase compositions range from An57-65 (Klasner et al., 1979).

7.3.3 Pyroxenite

In drill hole YD01-01 (Eagle East), near the lower contact, the core alternates rapidly between intervals of coarse-grained peridotite and a much finer-grained, less magnetic rock. Similar patterns of alternating intervals of coarse-grained peridotite and fine-grained rock were observed near the contacts in mineralized portions of Eagle. Subsequent drilling indicates that some, or possibly all, of the fine-grained intervals may be xenoliths of an earlier phase(s) of the intrusion that have been mechanically incorporated into the peridotite. A similar fine-grained rock has also been noted along the contacts with the surrounding sediments in both intrusions. Primary mineralogy is difficult to infer in these fine-grained intervals. Magnetic susceptibility was often used as an aid in estimating original primary olivine content. This assumes that the bulk of the magnetite formed during the serpentinization of primary olivine. When the primary mineralogy is not obvious, core with relatively low magnetic susceptibility is often assumed to be pyroxenite. In thin section, most primary silicates have been altered to secondary assemblages. Based on relict textures, estimated original olivine contents ranged from 3% to 10% (Jago, 2002). This is significantly less than the peridotites, and consistent with their low magnetic susceptibility. Pyroxenes were the predominant primary mineral phase in these sections. In one sample, however, feldspar was estimated at 35% to 40% indicating that possible compositions for pyroxenite might range from pyroxenite to olivine metagabbro. A number of thin dykes, ranging from less than a meter to a few meters in width, have been noted in drilling in close proximity to the Eagle intrusions. Little is known about the extent, orientation, or composition of these predominantly fine-grained dykes. One thin section, taken from a thin dyke along the margin of the massive sulphide intersection in YD02-02, was described as being re-crystallized (hornfelsed) and comprises secondary minerals with no obvious primary mineralogy preserved (Jago, 2002). This suggests that at least some dykes predate the main stages of intrusion of the peridotite and massive sulphides. High chrome values (>500 parts per million [ppm]) for some of these dykes suggest that they are related to the other picritic dykes in the Baraga Basin. Thin dykes have been noted at the contacts of massive sulphide horizons peripheral to both Eagle intrusions. These dykes may have formed barriers, or zones of weakness, that played a role in localizing later massive sulphide mineralization external to the main intrusions. Drilling identified two larger gabbroic dykes to the immediate south of the Eagle intrusion. The dykes correspond with a paired, linear magnetic low and magnetic high that can be traced for several kilometres. The dykes have traces of pyrite and chalcopyrite, but very low values of chrome and nickel. They resemble other gabbroic dykes of the Baraga-Marquette dyke swarm.

7.3.4 Structure

In general, there is no significant post-mineralization structural deformation affecting the Eagle and Eagle East systems. One post-mineralization fault has been identified at the west end of the Eagle East mineralized zone, and has been intruded by a gabbro dyke. This dyke/fault offsets the east side of the conduit approximately 20 m north and appears to spatially coincide with the western terminus of the massive sulphide zone. The structural deformation prior to the emplacement of the Eagle and Eagle East intrusions is relatively complex, resulting from multiple island arc accretion episodes during the Penokean Orogeny. This results in the sedimentary basin being folded into a gently eastward plunging syncline. The sediments have a strong foliation and local isoclinal folding, which results in significant deviation in drill holes. In general, the sedimentary rocks immediately adjacent to Eagle show a regular bedding orientation with an average strike of 340° dipping 15° to the east. Foliation, like bedding, is consistent with an average orientation striking 100° and dipping 40° to 45° to the south, similar to the measurements from the rest of the Baraga Basin. Both open and closed joints show a broad range of orientations with no dominant set. Most open joints strike east-southeast parallel to the trend of the Eagle peridotite and have flat to moderate dips both north and south. A second preferred orientation strikes north-northeast; with very steep to vertical dips both east and west. Cemented joints are dominantly flat lying but show a similar very broad range of orientations. Cemented joints (typically serpentinite) within massive sulphides preferentially strike at 065° and dip from 0° to 60° to the southeast. Within peridotite, they preferentially strike at approximately 280° and dip from 0° to 70° to the north.

7.3.5 Deformation Zone

A regionally consistent 1 m thick horizontal zone of mottled quartz veining is present throughout the drilled area of the Baraga Basin. This zone is not conformable with bedding and is likely related to ancient thrust faulting, although this interpretation is speculative.

7.3.6 Alteration

All samples of the two intrusions show evidence of significant but variable degrees of alteration. Alteration includes serpentinization of olivine, alteration of pyroxene to secondary amphibole, chloritization of amphibole, chloritization and saussuritization of plagioclase, and minor talc-carbonate alteration (Klasner et al., 1979). There is no hydrothermal alteration halo around the peridotite, however, there is a large bleaching zone above and lateral to the deep gabbro intrusive. Thermal alteration in the form of hornfelsed sediments occurs within ten metres of the intrusive units.

7.4 Mineralization

Eagle and Eagle East are part of the same ultramafic intrusive complex and both host high grade primary magmatic nickel copper sulphide mineralization. Mineralization styles are similar at Eagle and Eagle East, consisting of ovoid to pipe-like bodies of mineralized peridotite with concentrations of sulphide mineralization along the base of the intrusion resulting in the accumulation of semi-massive sulphide, and a central core zone of massive sulphide. Two types of potentially economic mineralization are found in Eagle and Eagle East: semi-massive sulphides and massive sulphides. Disseminated mineralization is also encountered in the peridotite intrusive, however, because it is not economic, the mineralized peridotite with disseminated sulphides has been considered as an intrusive and not a mineralized unit.

7.5 Eagle

The intrusion hosting Eagle is elongated east-west with a maximum length of 480 m and maximum width of approximately 100 m near surface. The intrusion narrows to approximately 10 m wide at the limit of drilling, 290 m below surface (145 m RL). The sulphide bodies within the intrusion comprise an irregular mass broadly aligned with the strike and dip of an ovoid dilatant zone occupied by the peridotite. The bodies subtend a volume measuring 330 m in strike length by 270 m vertically, abruptly terminating on the west and tapering to the east with a maximum thickness in the middle of approximately 135 m. At the east and west ends of this volume are two bodies of semi-massive sulphides (SMSU), termed SMSUE and SMSUW, respectively. The SMSUW is somewhat pipe-like in shape, oriented vertically within the peridotite. The SMSUE is more tabular in aspect, extending eastwards from the central core of the deposit, again, at roughly the same orientation as the host intrusion. Although these units are distinguished from one another for the purposes of geological interpretation and Mineral Resource estimation, the SMSU bodies do appear to be a single contiguous mass.

A single irregular body of massive sulphide (MSU) occupies the central portion of the deposit, more or less between the SMSUE and SMSUW. The MSU extends outside of the semi-massive bodies, and in many cases has intruded the sedimentary rocks adjacent to the peridotite. This has resulted in several flat sill-like protuberances at the margin of the deposit.

7.6 Eagle East

Eagle East has identified nickel and copper rich massive and semi-massive sulphide mineralization concentrated along a horizontal conduit at the bottom of the main Eagle East intrusion. Prior to the exploration program initiated in 2013, no semi-massive sulphide had been found at Eagle East and MSU lenses of only one-to-two meters have been found along the 45° plunging keel of the intrusion. The Eagle East intrusion can be categorized into two components: the funnel shaped upper peridotite intrusion outlined prior to 2013 and the sub-horizontal conduit zone defined since 2013.

The conduit zone contains massive sulphide and semi-massive sulphide similar to Eagle, whereas the main intrusion consists of barren peridotite with low grade disseminated and thin massive sulphides along the keel. The conduit exploration program has identified a 500 m long horizontal section of the Eagle East feeder conduit, where the peridotite conduit is cored by semi-massive sulphide with massive sulphide accumulations at its base, as well as massive sulphide sills into the sediments. The conduit is up to 30 m thick, and its vertical extent is in the order of 75 m.

7.7 Mineralizing System

Sulphides are deposited as dense droplets in the primary magma due to decreased flow rate in the magma, or a change from laminar to turbulent flow due to changes in the conduit geometry. Multiple pulses likely occur in the same plumbing system, resulting in three discrete mineralization types which typically have hard contacts. The mineralizing intrusion is Mineralized Peridotite (MPER), which transports sulphides within large volumes of magma, and in this way is able to transport significant quantities of dense sulphides upward through the crust in a diluted form. This results in the conduits between mineralized zones consisting of barren peridotite or weakly mineralized peridotite, such as the upper zone of Eagle East.

Typical mineralization zoning at both Eagle and Eagle East consists of a mineralized peridotite conduit with a core of SMSU and a base of crosscutting MSU that also sills out into the surrounding sediments (Figure 7.4). The massive sulphide remains liquid for a significant time, so it can crosscut other units after emplacement is complete.

7.7.1 Metal Distribution

Limited petrography and Quantitative Evaluation of Materials by Scanning Electron Microscopy (QEMSCAN) work indicates that most of the nickel is in pentlandite with a small portion in millerite group minerals and secondary violarite. The majority of pentlandite occurs in granular form with less than 1% to 2% as flame or exsolution lamellae.

Copper is primarily in chalcopyrite with lesser secondary cubanite. Chalcopyrite occurs as anhedral inclusions in pyrrhotite and as coarse patches with granular pentlandite around pyrrhotite grains. Chalcopyrite also occurs as veins that locally crosscut SMSU and sedimentary units, however, these are volumetrically minor.

The distribution of platinum group metals (PGM), gold, and cobalt is still poorly understood but assay and metallurgical test correlations indicate the cobalt is associated with the pyrrhotite/pentlandite. PGMs and gold appear to be related to late-stage veining/intrusion and tend to be most abundant in areas with chalcopyrite enrichment.

Eagle East is observed to be significantly higher in grade for both precious and base metals than Eagle, with the exception of cobalt (see Table 14.1). Average nickel and copper grades are in the order of 60% higher at Eagle

East compared to Eagle. Gold averages approximately 87% higher, while platinum and palladium are well over double. While silver is not reported in the Mineral Resource estimate for Eagle, silver is present at Eagle in roughly the same abundance as at Eagle East (see Table 14.3, Table 14.4, and Table 14.5).

7.7.2 Peridotite (PER) And Mineralized Peridotite (MPER)

The mineralized intrusion is sulphur saturated PER which carries disseminated sulphide blebs in abundances ranging from trace to 25%. MPER (Figure 7.4) as a discrete lithological unit has never been ore grade at Eagle or Eagle East; however, the disseminated sulphide blebs are very high metal tenor, which was an important factor in the decision to follow Eagle East to depth. The accumulation of high tenor droplets results in high grade massive sulphide zones.

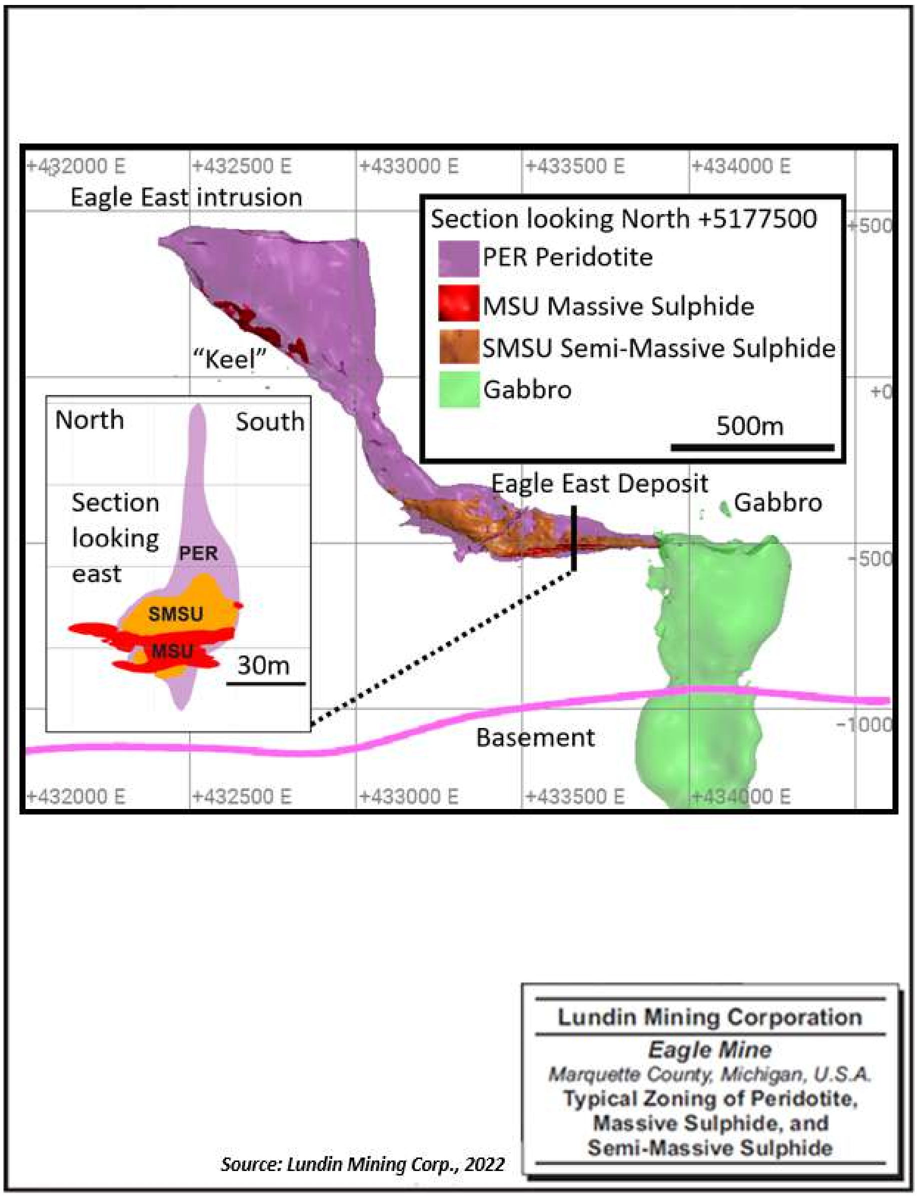

Figure 7.4: Typical Zoning of Peridotite Massive Sulphide, and Semi-Massive Sulphide

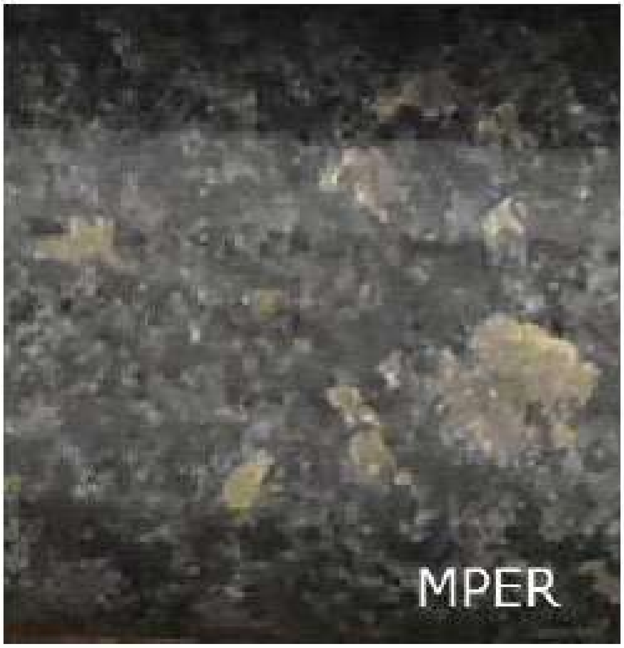

Figure 7.5: Mineralized Peridotite

Scattered blebs of sulphide are found throughout the peridotite sections of both of the Eagle intrusions. At Eagle, zones of abundant disseminated sulphide (3% to 15%) are localized along the margins of the intrusions, above and below the Upper Sulphide Zone and above the Lower Sulphide Zone. Cloud-like zones of low-grade, disseminated sulphides occur throughout the eastern portion of Eagle, concentrated on intrusion margins and commonly bordering possible rafts of fine-grained pyroxenite.

The transition from peridotite with only rare blebs of sulphide, to peridotite with several percent sulphides, typically happens over less than one metre. The geological control for this boundary is not obvious. The boundary of the disseminated mineralization, for modelling purposes, is based on metal value, not sulphide content.

7.7.3 Massive Sulphide (MSU)

MSU shows considerable variation in composition. Chalcopyrite content can vary from less than 10% to more than 50%. In most of the MSU (Figure 7.6), pyrrhotite is the dominant sulphide. Pyrrhotite occurs as coarse, anhedral grains with minor pentlandite and chalcopyrite.

Pentlandite typically occurs as discrete crystals up to five millimetres in diameter.

Chalcopyrite typically forms rings around the pyrrhotite crystals, except in the high copper massive sulphide zones where chalcopyrite is volumetrically dominant.

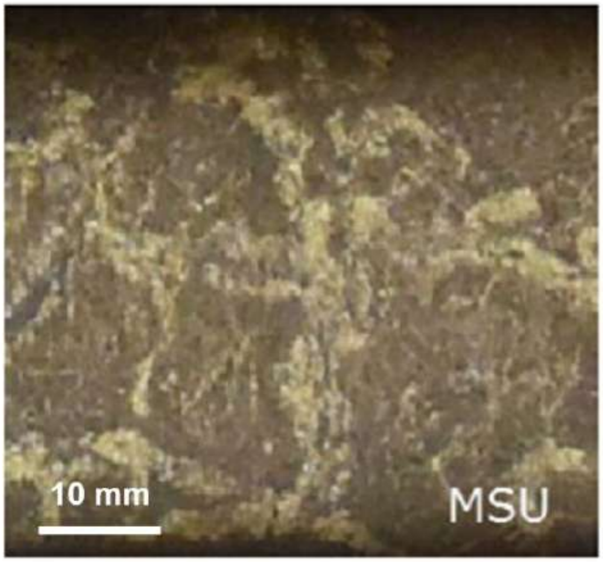

Figure 7.6: Massive Sulphide

7.7.4 Semi-Massive Sulphide (SMSU)

SMSU occurs throughout the core of the Eagle East conduit zone. The SMSU comprises zones of 30% to 50% sulphide that forms a net textured matrix enclosing altered olivine and pyroxene.

Disseminated mineralization generally increases toward zones of SMSU (Figure 7.7). However, the transition between the disseminated mineralization and SMSU is typically abrupt, with sulphide contents increasing from 5% to 10% to over 40% over a distance of less than 1 m.

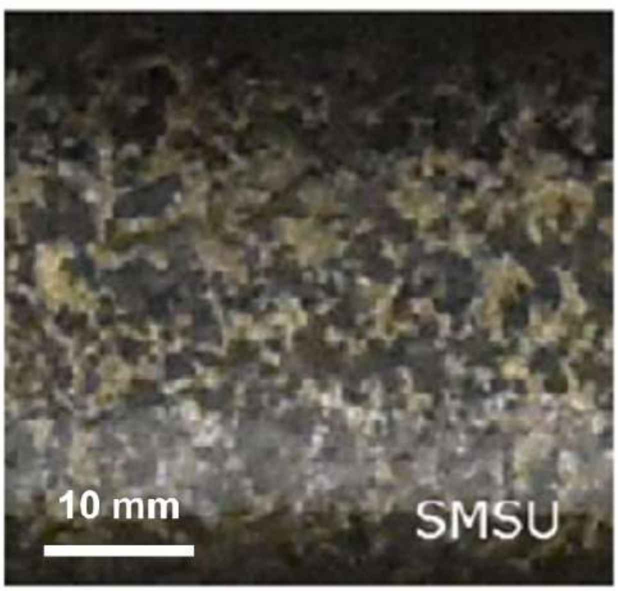

Figure 7.7: Semi-Massive Sulphide

8.0 DEPOSIT TYPES

Magmatic sulphide deposits containing nickel and copper, with or without PGMs, account for approximately 60% of the world's nickel production and are active exploration targets in the United States and elsewhere. On the basis of their principal metal production, magmatic sulphide deposits in mafic rocks can be divided into sulphide rich and sulphide poor. Sulphide rich deposits typically have 10% to 90% sulphide minerals and have economic value primarily because of their nickel and copper contents. Sulphide poor deposits typically contain 0.5% to 5% sulphide minerals and are exploited principally for Platinum Group Metals (PGM).

The Eagle and Eagle East deposits are sulphide rich and high-grade magmatic sulphide accumulations containing nickel-copper mineralization and minor amounts of cobalt and PGMs. The economic minerals associated with these deposits are predominately pentlandite and chalcopyrite.

The mineralization process common to all primary magmatic sulphide deposits consists of: 1) Metal-rich ultramafic magma intruding into the crust, typically in an extensional environment; 2) Sulphur saturation through geochemical contamination by crustal rocks resulting in primary sulphide droplets forming; 3) Metal enrichment of sulphides by interaction with large volumes of subsequent magma flow; and 4) Deposition of sulphides by density settling where magma flow slows due to structural traps or major changes in the geometry of the plumbing system (going from a small conduit to a large chamber, etc.).

Several varieties of this deposit type occur within the primary magmatic sulphide model, ranging from komatiite lava flow deposits like Raglan, to meteor impact triggered partial melting like Sudbury, to conduit style mineralization like Eagle and Voisey's Bay, and layered mafic complex mineralization like the Duluth complex. Figure 8.1 shows idealized representations of these deposit types.

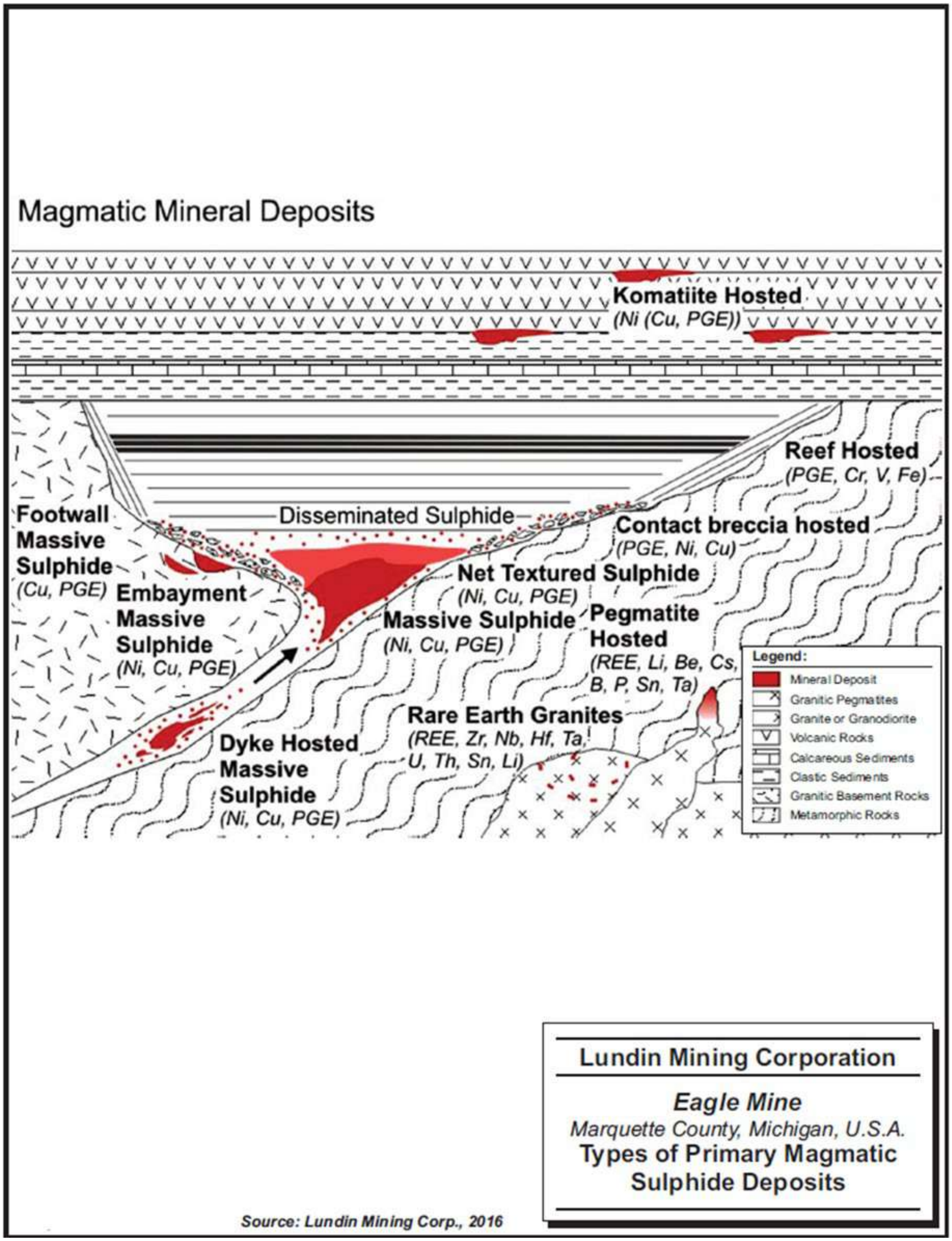

Figure 8.1: Types of Primary Magmatic Sulphide Deposits

The magmatic sulphide model focuses on deposits hosted by small to medium-sized mafic and (or) ultramafic dykes, sills, and conduit shaped “chonoliths” that are related to picrite and tholeiitic basalt magmatic systems generally emplaced in continental settings as a component of Large Igneous Provinces (LIPs). World-class examples (those containing greater than one million tonnes Ni) of this deposit type include deposits at Noril’sk-Talnakh (Russia), Jinchuan (China), Pechenga (Russia), Voisey’s Bay (Canada), and Kabanga (Tanzania).

At Eagle, the conceptual model is that of a series of magma conduits connect several larger magma chambers (Figure 8.2) and exploring for high grade orebodies is reliant on tracing the conduits from one chamber to the next. The model has proven successful with the discovery of the Eagle East deposit which was discovered as the result of directional drilling to follow the conduit from the much larger and lower grade Eagle East peridotite. Drilling between 2016 and 2018 defined a large gabbroic intrusion that truncates the Eagle East peridotite at depth (marked with the red X in Figure 8.3) and is interpreted to be a younger intrusion which occupies the same structural plumbing as Eagle East, locally obliterating the peridotite intrusion.

The likely depositional process for the formation of the Eagle East deposit is that mineralized peridotite moving upward along a vertical intersection of mantle-tapping structures (now occupied by the gabbro intrusion) carried disseminated sulphide droplets in a high-volume magma flow, and the sulphides were dropped from the magma when they exited the small 90-degree bend in the magma conduit at the east end of Eagle East (Figure 8.3). This likely resulted in a significant pressure and velocity gradient, resulting in high velocity magma slowing down significantly in the horizontal portion of the conduit, dropping dense sulphides. Additionally, back-draining of sulphides from higher in the intrusion and ponding of sulphides in the horizontal section is likely to be a contributing factor to the formation of high-grade massive sulphide and semi-massive sulphide.

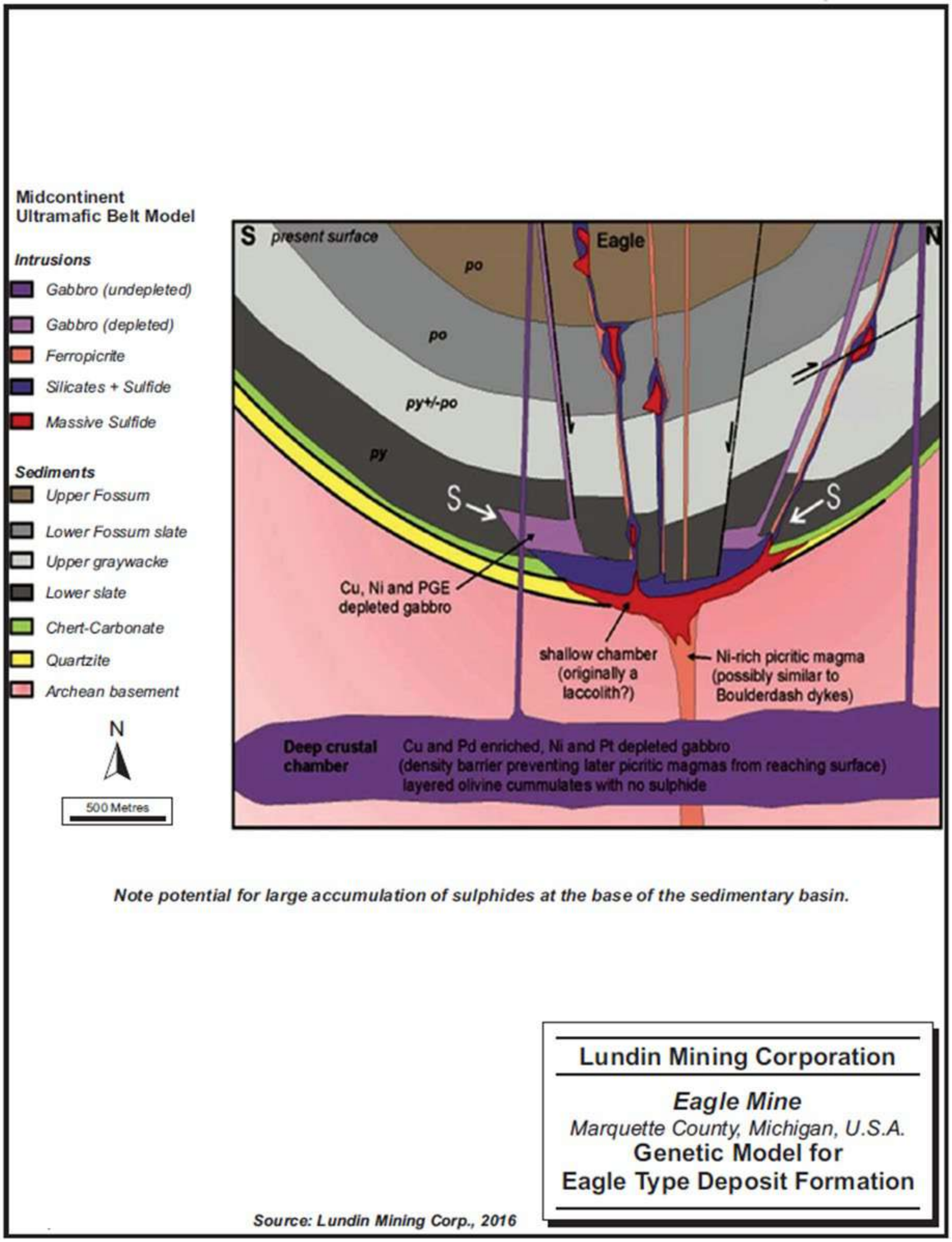

Figure 8.2: Genetic Model for Eagle Type Deposit Formation

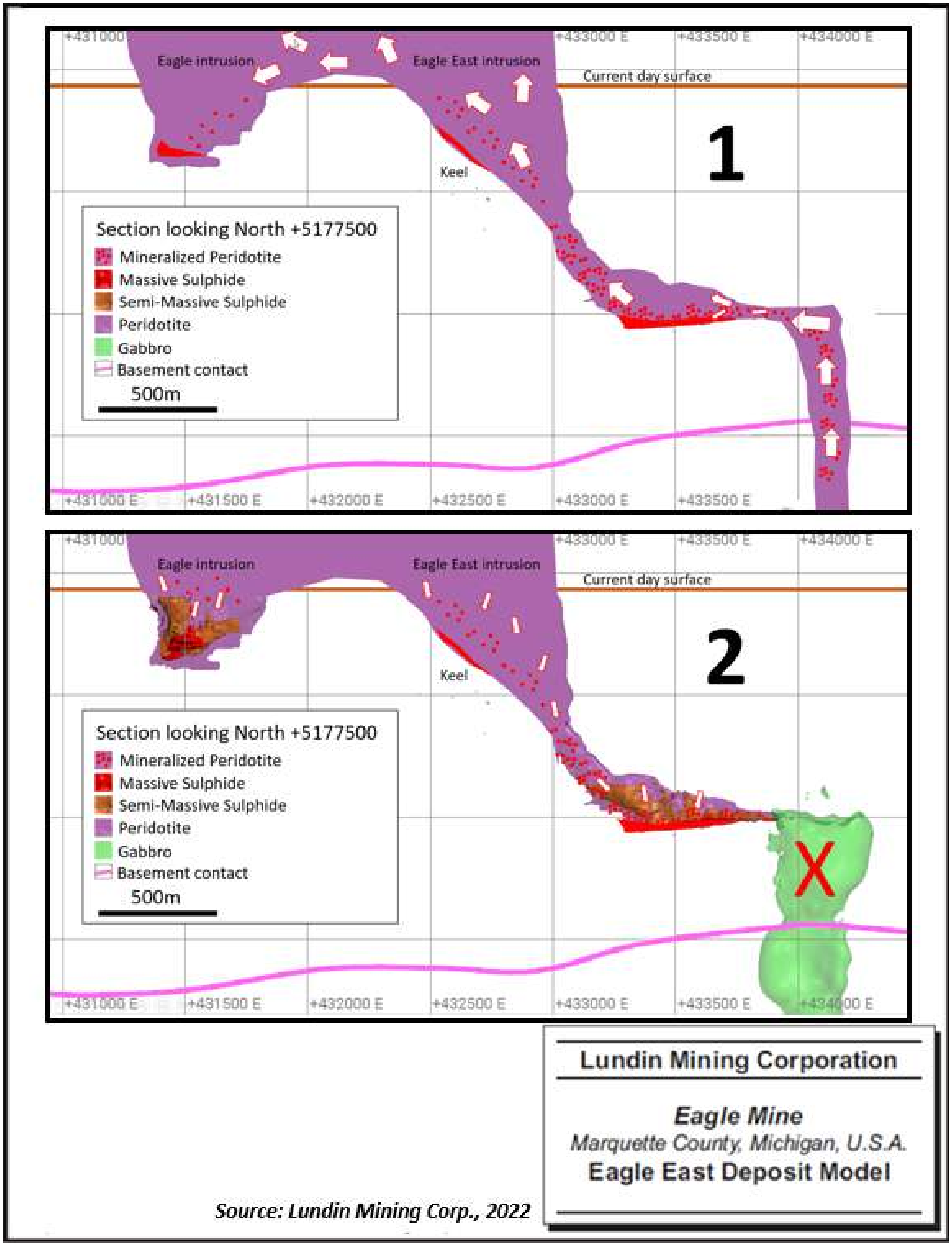

Figure 8.3: Eagle East Deposit Model

9.0 EXPLORATION

Exploration activities at Eagle have included geological mapping, geochemistry (indicator mineral sampling and Mobile Metal Ion (MMI) studies from basal tills, dyke geochemistry, sulphur isotype studies, QEMSCAN studies), and geophysics (airborne, surface, and underground borehole electromagnetics, resistivity and gravity). The main and most successful exploration tool has been diamond drilling in combination with a very robust and predictive deposit model (Figure 9.1).

Historical exploration conducted by Rio Tinto (Kennecott Exploration and Kennecott Eagle Minerals Company) is described in Section 6, History. LMC acquired Eagle in 2013 and subsequently completed construction and brought Eagle into production in 2014. Eagle Mine LLC continued with near mine exploration with a focus on extending mine life. Using the conduit model, the most direct and expedient exploration target was to follow the mineralized peridotite conduit at Eagle East to depth with directional drilling. With Eagle as a model, the Eagle East conduit was traced downward to a location where the conduit flattened to horizontal and high metal tenor sulphide droplets had settled to the base of the conduit, resulting in the discovery of the Eagle East deposit.

Directional drilling was used to drill a fan pattern horizontally, adjusting subsequent holes up or down based on the location within the conduit as determined by the zoning patterns identified at Eagle. The conduit has been traced eastward for approximately 1 km, at which point a gabbro intrusion occupies the intrusive plumbing system. This gabbro intrusion is approximately 350 m in width in the east-west direction and 225 m in the north-south direction and extends vertically to at least the drilled depth of 2,070 m below surface (1,550 m below the mineralized conduit). The hole defining this depth bottomed in gabbro, and the intrusion continues near vertically to an unknown depth. This gabbro intrusion frequently has a “rind” of pyroxenite, peridotite, or mineralized peridotite. This is interpreted as evidence that the gabbro has intruded and blocked the structural plumbing that was exploited by the mineralized peridotite intrusion. Based on this, it is expected that additional accumulations of high-grade sulphide exist at depth.

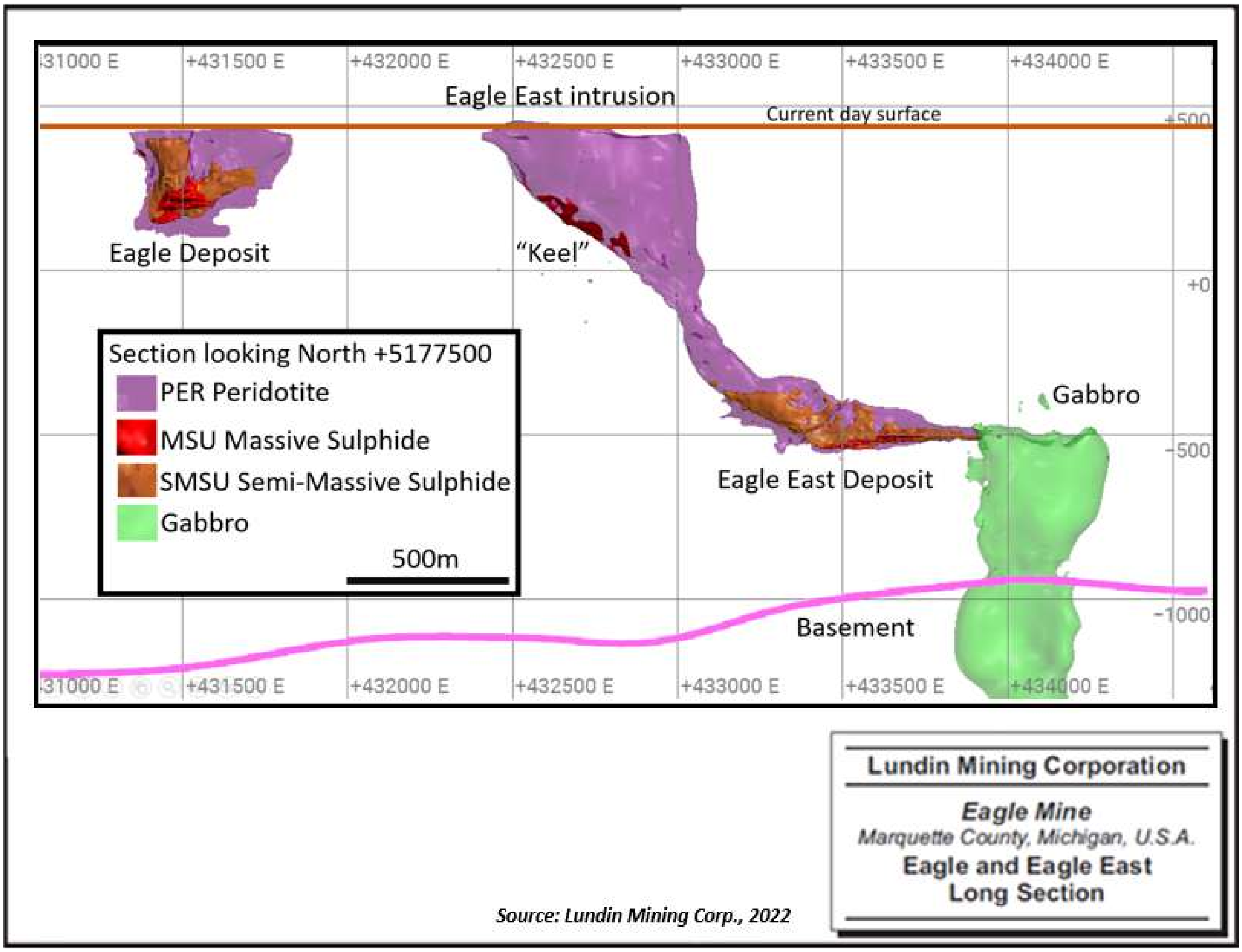

Figure 9.1: Eagle and Eagle East Long Section

9.1 Eagle East

9.1.1 2022 Exploration Summary

Between 2016 and 2019, 187 holes and 134,127 m of surface drilling were completed with between four and seven diamond drill rigs, using directional drilling. The objective was to test all existing targets in the local vicinity of Eagle Mine, as well as to continue with the successful "follow the conduit" model. The program successfully defined the extents of the gabbro unit and associated "rind" mineralization to a depth of 885m below the Eagle East deposit (Figure 9.2), including over 400 m into the Archaean basement. An encouraging zone of mineralization was found on the east side of the gabbro just above the basement, in a recessed portion of the gabbro known as the "embayment zone". This mineralization was intersected by at least 10 holes, however no clear conduit geometry or exploration vector was identified. Mineralized "rind" intercepts continue at depth, providing reasonable evidence that the mineralized intrusive system continues vertically down. The gabbro unit appears to be a depleted gabbro, which is significant in that it is common for overlying intrusions to be depleted in metal due to the accumulation of those metals as massive sulphide at the base of the intrusion. The exploration program was discontinued in 2019 and all surface drilling ceased.

Between 2012 and 2022, underground drilling continued with a strong focus on infill. In mid-2021 underground exploration drilling was initiated from west to east through the gabbro. This program was increased to four rigs upon the completion of the infill drilling, culminating in an underground exploration program of 32,265 m at the time of writing (ongoing) in order to fully test the system to a reasonable mining depth and conduct borehole electromagnetic (EM) surveys in the majority of the holes. In addition, a magnetotelluric survey was conducted over the gabbro and along the strike direction of the conduit eastward. The objective of this program was to provide robust EM coverage over the intrusive system to depth in order to identify any new sulphides.

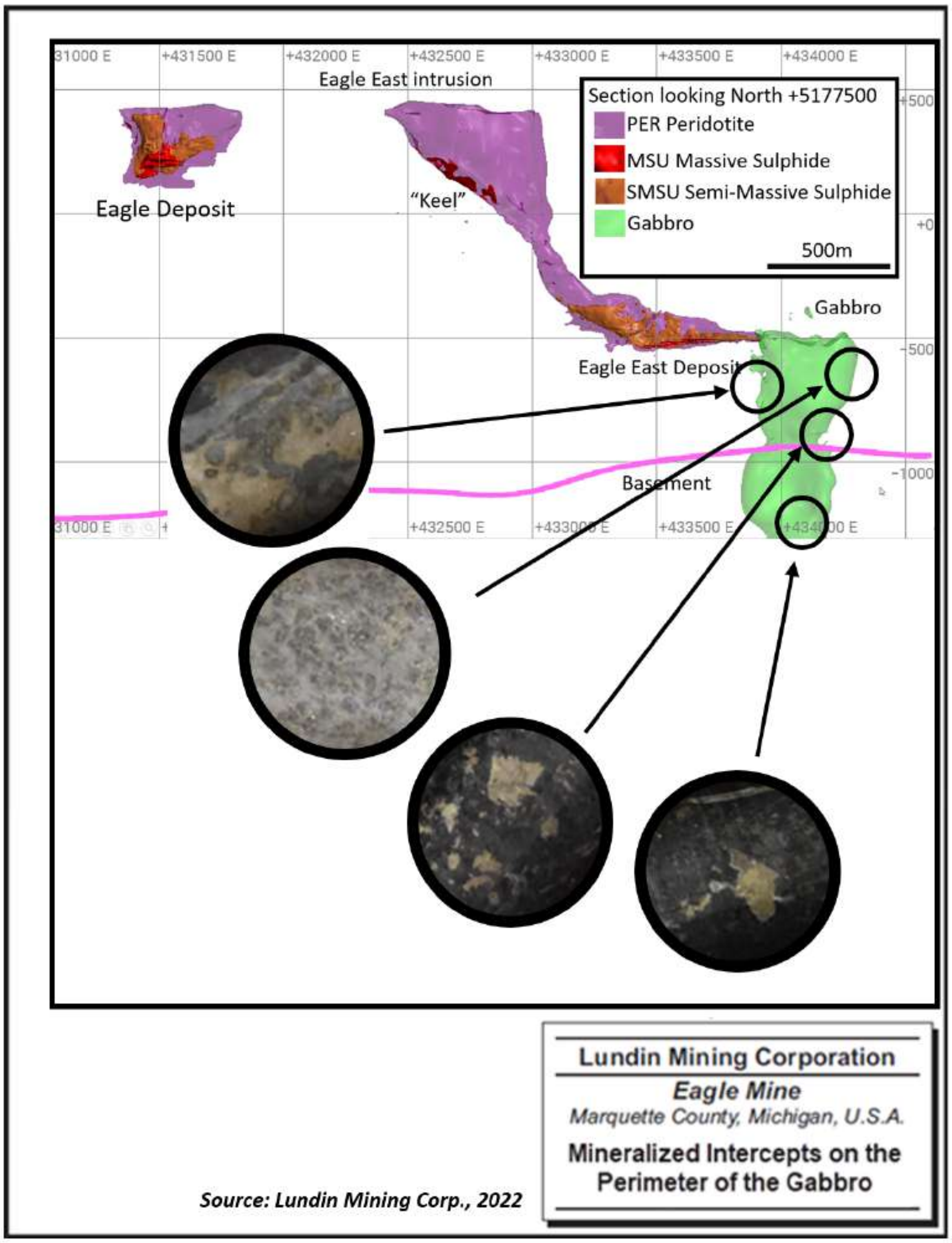

Figure 9.2: Mineralized Intercepts on the Perimeter of the Gabbro

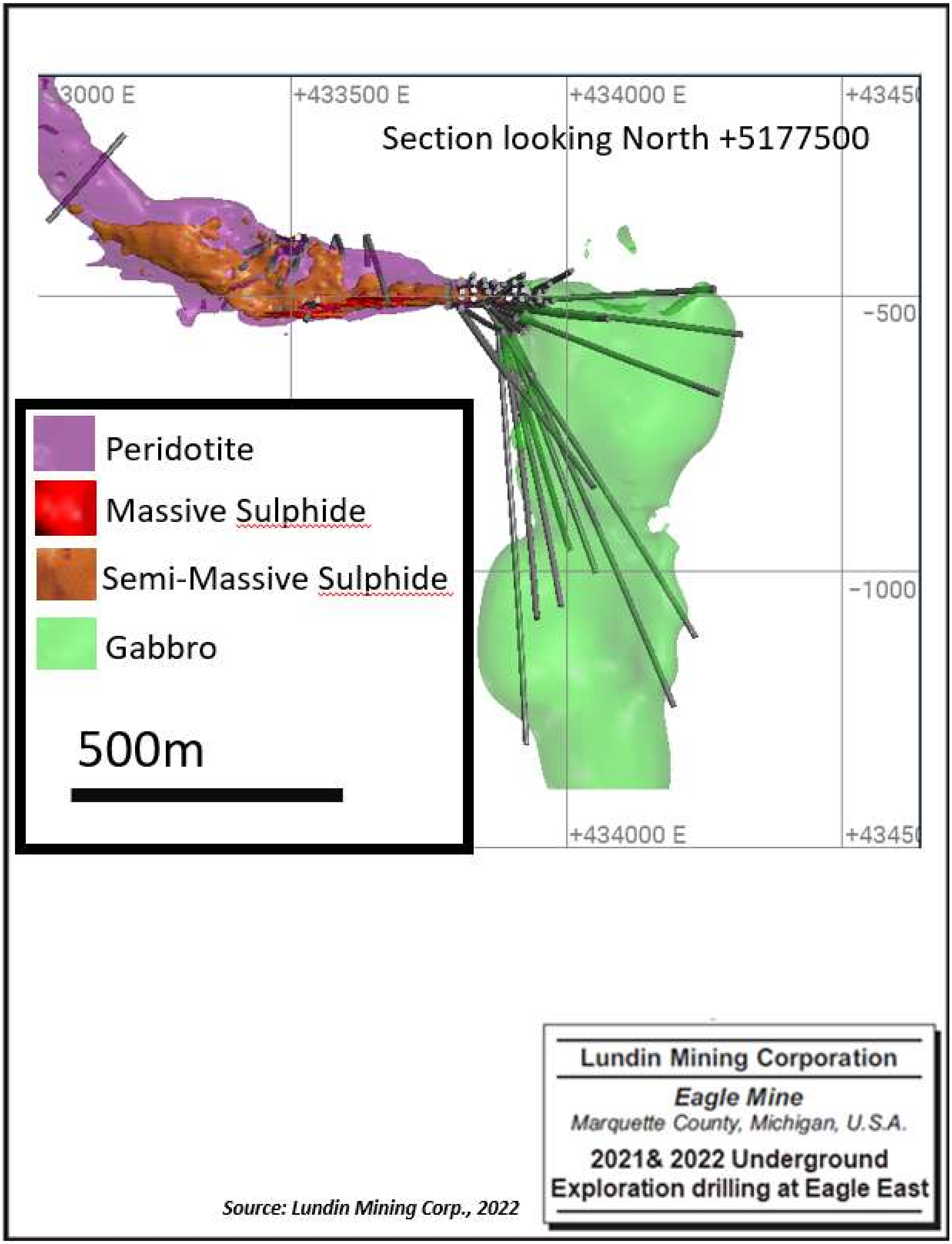

Figure 9.3: 2021 and 2022 Underground Exploration Drilling at Eagle East

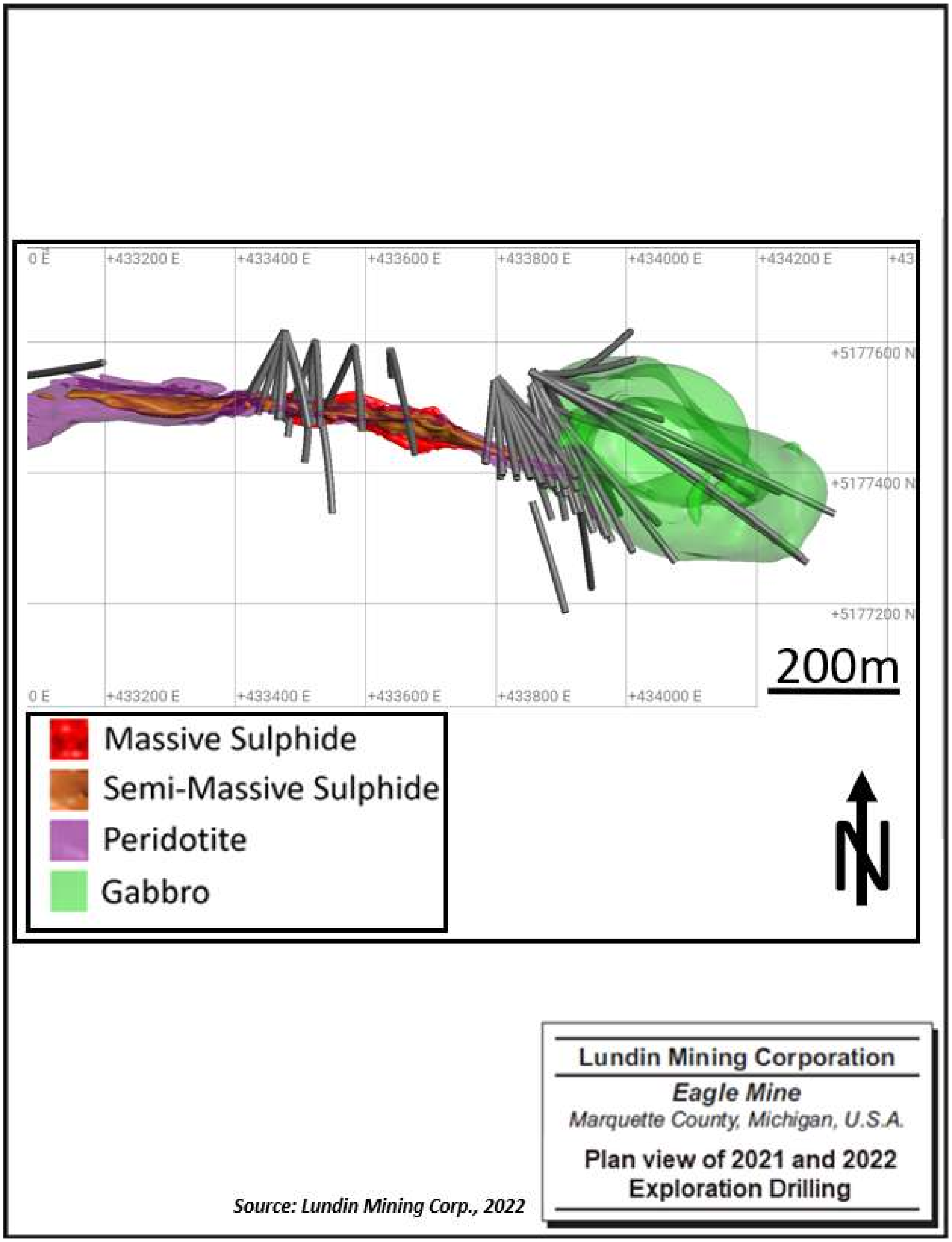

Figure 9.4: Plan View of 2021 and 2022

10.0 DRILLING

All exploration and Mineral Resource definition drilling at Eagle and Eagle East has been conducted by diamond core drilling. Sonic drilling was historically conducted to test depth to bedrock and define lithologies at the paleo-bedrock surface. Since its acquisition by LMC in 2013, Eagle Mine LLC has carried out drilling at Eagle and Eagle East. Seven surface drill rigs were utilized in 2016 during the Eagle East resource drilling campaign, reducing to four surface rigs through August of 2019. The drilling was primarily to investigate controlling structures for the Eagle East mineralization and to look for extensions of the Eagle East conduit. Between 2016 and 2019 a total of 134,127 m of surface drilling was completed on both deposits with 187 holes and wedges (Table 10.1).

Between 2016 and 2022 an additional 12,628 m of underground drilling consisting of 172 holes was completed in Eagle and 91,180 m from 426 holes were completed in Eagle East (Table 10.2).

Total drilling at Eagle and Eagle East comprises 436,575 m in 1,410 total holes (surface and underground) drilled between 2001 and 2022. Note that not all holes listed in Table 10.1 and Table 10.2 were included in the Mineral Resource estimates. A plan view in Figure 10.1 shows the locations of those holes that were used for modelling and resource estimation.

Table 10.1: Drilling Summary Eagle Mine

Table 10-1 DRILLING SUMMARY - EAGLE MINE
Eagle Mine

	Surface		Underground		Total	
Year	Holes	Metres	Holes	Metres	Holes	Metres
2001	4	667	-	-	4	667
2002	18	5,496	-	-	18	5,496
2003	14	3,781	-	-	14	3,781
2004	45	11,947	-	-	45	11,947
2005	17	4,262	-	-	17	4,262
2006	7	3,083	-	-	7	3,083
2007	20	7,911	-	-	20	7,911
2008	8	8,737	-	-	8	8,737
2010	3	1,049	-	-	3	1,049
2011	13	6,650	-	-	13	6,650
2012	74	40,586	7	1,337	81	41,923
2013	6	2,911	46	8,081	52	10,992
2014	2	567	56	5,269	58	5,836
2015	3	980	108	3,330	111	4,310
2016	10	5,677	89	5,505	99	11,182
2017	2	1,676	52	5,226	54	6,902
2018	16	13,279	5	420	21	13,699
2019	7	4,753	2	47	9	4,800
2021	-	-	24	1,430	24	1,430
Total	**269**	**124,012**	**389**	**30,645**	**658**	**154,657**

Source: LMC

Table 10.2: Drilling Summary – Eagle East

Table 10-2 DRILLING SUMMARY - EAGLE EAST AND KEEL PROJECTS Eagle Mine						
	Surface		Underground		Total	
Year	Holes	Metres	Holes	Metres	Holes	Metres
1995	4	894	-	-	4	894
2001	3	594	-	-	3	594
2002	10	3,540	-	-	10	3,540
2003	1	547	-	-	1	547
2004	3	1,598	-	-	3	1,598
2005	3	3,947	-	-	3	3,947
2006	30	9,337	-	-	30	9,337
2007	19	7,375	-	-	19	7,375
2008	29	16,997	-	-	29	16,997
2010	8	3,649	-	-	8	3,649
2011	14	8,302	-	-	14	8,302
2021	3	4,608		-	3	4,608
2013	3	1,175	-	-	3	1,175
2014	8	3,683	9	3,237	17	6,920
2015	27	12,513	-	-	27	12,513
2016	75	41,865	-	-	75	41,865
2017	49	39,457	-	-	49	39,457
2018	24	25,864	47	12,381	71	38,245
2019	4	1,556	206	39,156	210	40,712
2020	-	-	43	7,378	43	7,378
2021	-	-	32	9,528	32	9,528
2022	-	-	98	22,737	98	22,737
Total	**317**	**187,501**	**435**	**94,417**	**752**	**281,918**

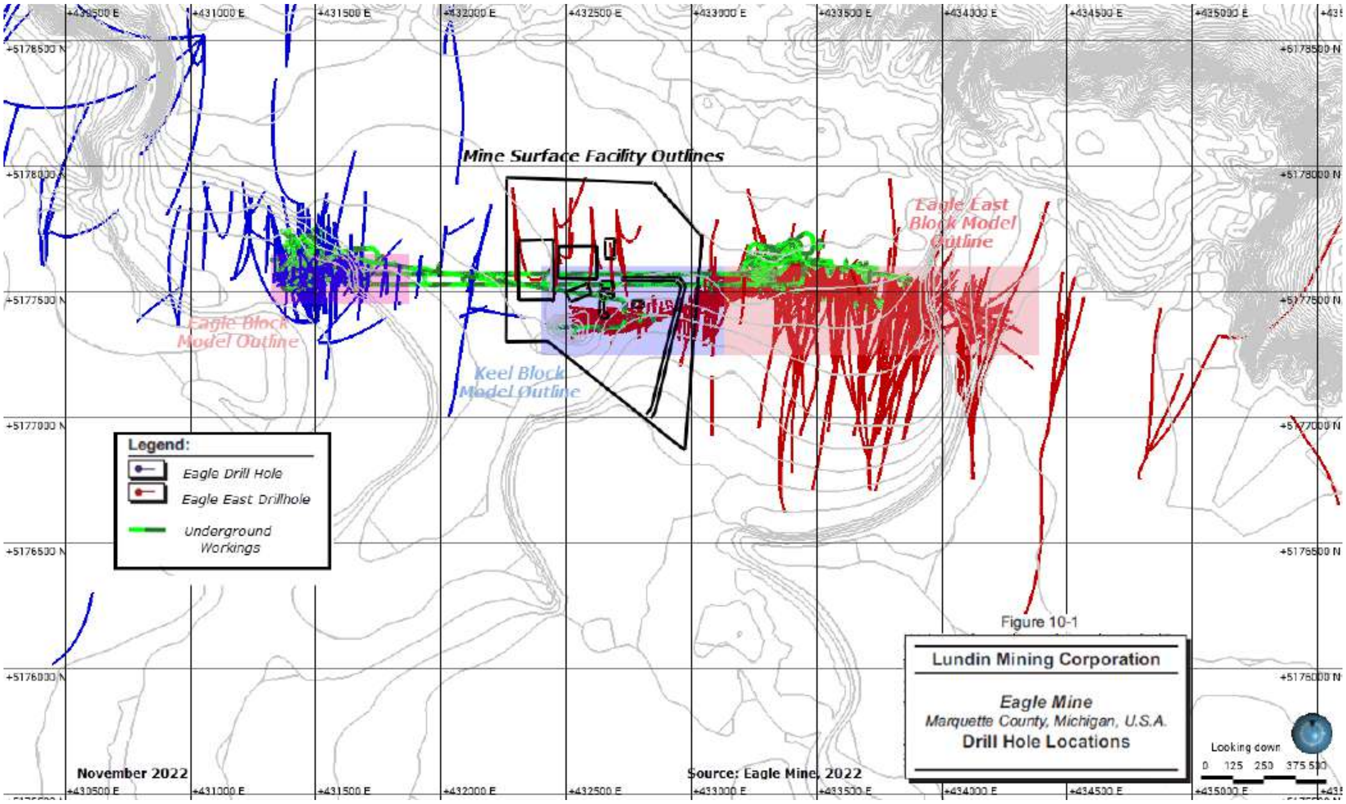

Figure 10.1: Drill Hole Locations (showing only holes used for Mineral Resource Estimation)

See Figure 10.2 for section displaying drilling associated geological interpretation.

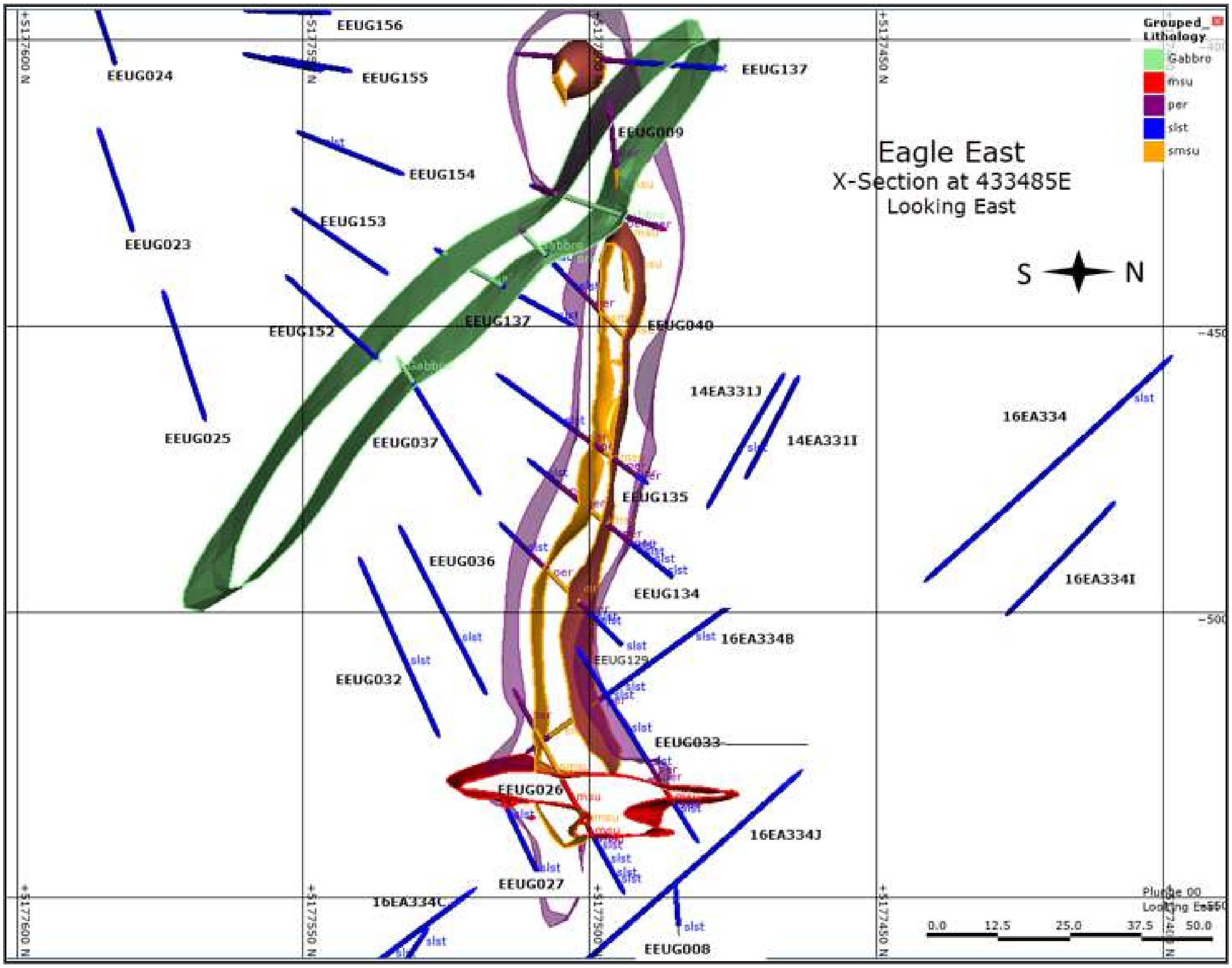

Figure 10.2: Typical Diamond Drill Cross-Section Displaying Lithology in Eagle East

10.1 Diamond Drilling

At Eagle, the surface drilling was initially conducted on 25-m intervals with pierce-points at approximately 20 m to 25 m spacing along with drill hole fans on 25 m and 12 m centres. The overall drill hole spacing is not uniform owing to the orientation of the mineralized body and the environmental constraints (trees, boulders, water, etc.) on collar placement.

Underground preliminary development drilling, which began in 2012, is generally completed at a nominal 20 m spacing for achieving a Measured category for the resource model. Holes are not typically aligned along cross section planes owing to the necessity to fan holes from a relatively few stations. The style of mineralization is such that it is not necessary for the drill holes to be rigorously oriented perpendicular to the overall trend of the mineralization. The deposit is traversed in a wide range of directions in such a fashion that the samples, taken as a whole, should be representative of the grades of the mineralization.

Both surface and underground drilling has been carried out by contract drillers. The most recent contractors have been Boart Longyear (surface) and First Drilling (underground). Surface drilling programs employed truck mounted LF90 and LF230 rigs (Boart Longyear). Underground drilling is conducted using skid mounted U8 rigs.

Drilling includes HQ (6.35 cm core diameter) and NQ (4.76 cm core diameter) sized core. Initially, limited wedge work and directional drilling was undertaken at Eagle to obtain twinned hole data and steer holes to desired target points. In 2013 directional drilling was used for precision drilling of a few small targets, and the use of directional drilling and wedging became routine practice as the precision requirements increased to follow the Eagle East conduit to depth. Directional drilling was routinely employed on all surface rigs between 2016 and 2019.

Directional drilling (using DeviDrill) has been utilized by a Norwegian contractor Devico (who were permanently based on site) to drill deflection holes for multiple intersections out of a single hole. The Devico directional drilling tool was used to guide surface drilled holes to targets and maintain an even grid spacing. During the directional drilling process, parts of the hole are surveyed independently by the Devico sub-contractors, providing an additional verification on the FLEXIT MultiSmart multi-shot tool survey data. All holes are gyro surveyed upon completion.

10.2 Core Recovery

Core recovery is recorded in the geotechnical logs. Generally, recovery is considered excellent at Eagle when advancing in bedrock. Recovery is poor to zero in the glacial tills while core drilling. Where till geology is required, drilling was completed using a sonic rig with a resulting recovery of close to 100%.

10.3 Surveys

10.3.1 Survey Grids

UTM coordinates based on the NAD83 (Zone 16N) datum are used at Eagle. The 0 RL elevation is based on mean sea level (MSL).

10.3.2 Diamond Drilling

Diamond drilling was planned by the exploration department using Vulcan 3D geological modelling software and Seequent Leapfrog 3D geological modeling software.

Surface collars were located initially by handheld GPS and oriented by Brunton compass, then surveyed by contract surveyors. From 2003 to 2019, the collars were surveyed by a local registered land surveyor who also established several control points on the property.

KEMC reported that some of the 2002 collars were lost at the time of this survey. The onsite staff made their best estimate as to the locations of these collars. Accuracy for the surveyed locations of these collars is reported to be within two metres.

Underground diamond drill collars are initially marked by the Eagle Mine LLC Surveyors or Eagle Mine LLC geology personnel utilizing a Leica TS-14 total station. Foresight and backsight survey plugs are installed in the drift walls and marked with yellow paint or the drill rig is directly sighted in with the total station. After completion of drilling, the hole collar location is surveyed.

Downhole surveys were carried out by a variety of instruments throughout the exploration history of the property. The survey methods and dates are listed below:

- 2001: Sperry Sun single-shot camera.
- 2001 and 2002: Sperry-Sun gyroscopic survey tool.
- 2002: Flexit MultiSmart multi-shot tool.
- 2003 to 2013: IDS gyroscopic survey tool and rate gyros plus Flexit surveys.
- 2014 to 2019: Reflex gyroscopic tool.

Downhole surveys are taken at three metre intervals for underground drilling and three metre intervals on average for surface drilling.

The collar and downhole surveys, as reported, have been carried out in a manner that is consistent with industry-standard methods.

10.4 Core Handling Protocols

Core boxes are labelled by the drillers with box and hole number. The core is removed from the tube, washed, and placed in the box. Core boxes are waxed cardboard. Footage blocks are placed at the end of the run. Breaks are marked with an X with a red pencil. For oriented core, the driller is responsible for orienting the core to the EzyMark pins, recording the oriented core survey information, and marking a line on the pin block and the core. The pin block is placed in the core box. Alternatively, the ACT tool is used. In the case of the ACT tool, the driller is responsible for marking the ACT core orientation mark on the core and recording associated information.

Drill core is collected by Eagle Mine LLC personnel and delivered to the logging and sampling facility located at Eagle Mine. Core is stacked on pallets up to a maximum of 60 boxes per pallet. The drill core is in the custody of Eagle Mine LLC personnel or Company designates at all times. The drill sites and core storage areas are generally secure and supervised continuously.

10.5 Logging

For logging, the core is transferred to the logging tables. All data is captured via laptop computers and stored in an acQuire database. Footage blocks are converted to meters, and the core is inspected and re-oriented to fit together. Open and cemented joint data is recorded, and large-scale structures are logged. The core is photographed, both wet and dry, with a digital camera. Sample locations are marked for point load tests and density measurements. Point load tests are taken every five metres down the hole for the first 130 m, and every 15 m thereafter. Bulk density measurements are made every 15 m for the first 130 m, and every 20 m from there on. These specimens consist of a 15 cm length of whole core. The measurements are made by taking the ratio of the weight of a core specimen in air to the difference between the dry and submerged weights. Geotechnical data, comprising recovery, intact rock strength, number of joints (open and cemented) and number of joint sets, are logged for all intervals and entered into acQuire.

Other features deemed as “Not Required” in the protocol documentation may also be logged and include magnetic susceptibility, micro-defects, open fractures/joints and cemented joints. Breaks in the core made by the drillers, and marked as such, are ignored. Joint angles to the core axis are recorded as are the roughness, alteration, and infill material. Cemented joints must be at least one millimetre thick and cross the entire core axis to be included. Geotechnical data, comprising recovery, intact rock strength, number of joints (open and cemented) and number of joint sets, are logged for all intervals and entered into acQuire.

Major structures are defined as those encompassing a core length of at least 50 cm. The depth, interval length, and character (e.g., gouged, sheared, broken, or jointed) are recorded. Domain intervals for the geotechnical data are the run lengths, or major lithological or structural breaks. No oriented core was collected between 2016 and 2022.

Oriented core is placed in a v-rail, aligned to the marks, and a reference line is drawn longitudinally along the core. Angles of structural features to both the core axis and the reference line are then measured and recorded in the database. Historically, the geotechnical data was validated by plotting on strip logs and visually inspecting for missing intervals or unusual data. Errors were corrected by referring to the core photographs.

Geology logging includes the principal rock type, formation, texture, colour, gross mineralogy, structures, and alteration. The data entry fields in the acQuire software are configured to restrict the entries to a specific set of codes for consistency in the logs.

Alteration is logged for both type and intensity, which is denoted by a scale from one (weak) to four (pervasive). Mineralization type is recorded, as are visual estimates of the average and maximum percent abundance. Since the structural information is captured in some detail during the geotechnical logging, the structural logging for the lithological table tends to be less rigorous.

Validation of the geological logging includes the following:

- Running acQuire validation scripts and reports on the data to check for missing and/or overlapping intervals.
- Load the data into Vulcan or Oasis and run the validation utilities in those packages.
- Compare to the geotechnical logs.

After logging and sampling, the core is stored in either the warehouse in Negaunee, Michigan, or in a warehouse in Sawyer, Michigan. Figure 10.3 depicts a core handling and logging flow sheet, as designed in 2012, which is near identical to the protocols employed at present. In the QP’s opinion, the core logging protocols used at Eagle meet or exceed industry standards.

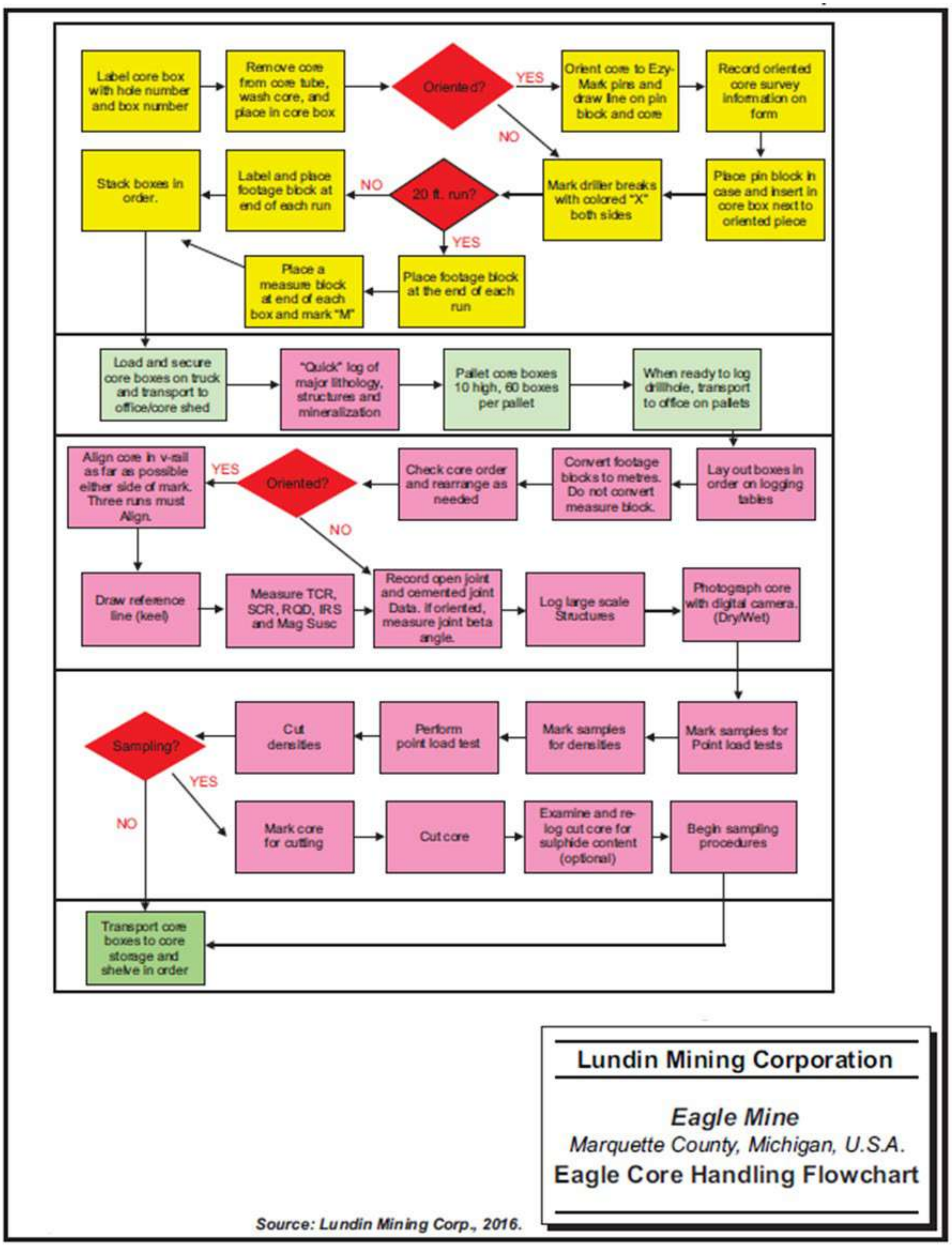

Figure 10.3: Eagle Core Handling Flowchart

11.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Historical Diamond Drill Sample Preparation and Analysis

11.1.1 Sampling

Between 2004 and 2010 the core samples comprised half-cores cut longitudinally using a diamond saw. Sampling was carried out with breaks for lithology or changes in mineralization type. Minimum sample size was 0.5 m and most samples were 1.5 m, or less.

All sampled intervals were selected, marked up, and inspected after sawing by the logging geologist prior to sampling. Intervals were tagged by the geologist by stapling a duplicate of the paper ID tag and the placement of a metal tag in the box for future reference. The core was also marked with indelible pen or lumber crayon.

11.1.2 Sample Transport

Samples were placed in bags along with an identification tag, the bags were tied, labelled, and placed in plastic pails for shipment to ALS Chemex (ALS) in Thunder Bay, Ontario or Reno, Nevada. Shipment descriptions, including sample numbers, were recorded on tracking sheets, which were faxed to the laboratory and to the Vancouver office at the time of shipping. Prior to 2004, samples were transported by KEMC personnel to Duluth, Minnesota, and placed in storage for pick-up by ALS. After 2004, samples were transported by commercial carrier directly to Thunder Bay. Sample pick-up was confirmed by telephone, and ALS was required to inspect the samples, note discrepancies, and fax back the tracking sheet as a confirmation receipt of the samples.

11.1.3 Sample Preparation

Prior to 2003, drill core samples were shipped to ALS in Reno, Nevada, for crushing, splitting, and pulverization. From 2004 to 2015, samples were prepped for analysis at ALS in Thunder Bay, and from 2015 to 2019, some of the samples were sent to Minerals Processing Corporation (MPC), located in Carney, Michigan.

Prior to 2004, the entire sample was crushed to 70% minus 2 mm. Subsequently, the standard was set at ALS for the sample to be crushed to 90% minus 2 mm. A 1,000 gram (g) subsample was then split out with a riffle and pulverized using a ring mill to 85% passing a 75 micron (µm) screen. The entire pulp was then sent to ALS in Vancouver for analysis.

The current protocols employed by ALS for sample crushing and pulverizering, are described in more detail below.

11.2 Current Diamond Drill Sample Preparation and Analysis

11.2.1 Sampling

Eagle has Standard Operating Procedures (SOPs) with respect to the geologic functions at the mine. The geology SOP focuses on the sampling procedures and sampling interface with the acQuire™ database. The sampling takes place at the Core logging facility at Eagle Mine. Filled core boxes are brought to surface from the drill at the end of shift and placed in a protected, marked location near the portal entrance. Eagle Staff collect the core and transport to the core shack where it is placed on inspection (core) tables. The drill core is then remeasured and marked in metric with all Imperial distance/length blocks of the driller converted. The boxes are numbered, and from-to lengths written on the outside of the box. The core is then geologically logged, samples marked and photographed. The majority of core sample lengths are 1.5 m or less with breaks for lithological contacts or changes in mineralization, such as a transition from SMSU to MSU. The minimum sample length is 0.5 m and the maximum is 2.0 m. The core is then halved inside an automated core cutter, in approximately 40 cm lengths whereupon both halves are returned to the core box. The core boxes, with split samples are then returned to the table where the sampling procedure begins. Eagle generates their own bar-coded adhesive sample tags for use with the samples coordinated via the acQuire^{TM} database logging and sampling program. One is affixed to the core box at the beginning of a specific sample that matches the same depth in the geologic log and the twin is affixed to a cloth sample bag with the corresponding half core. The bags are tied shut and placed in a reusable plastic pallet sized transport bin.

Eagle Mine employs a QA/QC Standard Operating Procedure (SOP) with respect to the sampling of core. The current SOP indicates an insertion rate of one in ten QA/QC sample on a rotating basis between blanks, duplicates, and standards (each at a rate of one in thirty and at the discretion of the logging geologist). These are logged into the acQuire system as part of the regular logging and sampling of core. Sample dispatch and lab results are also integrated using the same acQuire system. There is a written procedure for taking the QA/QC sample results and inserting them into the appropriate spreadsheet for graphing error analysis. Except in cases of obvious errors all re-assay triggering events are at the discretion of the Senior Geologist.

11.2.2 Sample Transport

Once the plastic pallet sized transport bin has been filled with samples a lid is placed on top and coloured, numbered seals are affixed to the outside securing the lid to the bin. A despatch of numbered samples along with the colour and lid seal numbers are placed inside the container prior to being sealed as a check against possible tampering.

The sample container is picked up and transported by Line C transport to the ALS Prep Lab in Thunder Bay, Ontario, Canada. Representative pulps are sent to ALS Vancouver for final lithogeochemical analysis. ALS employs their own laboratory information management (LIMs) system, thus each Eagle Sample received will get its own unique ALS LIM ID number. The corresponding number follows the sample through the preparatory and analysis process. Certified sample results with both corresponding sample ID numbers are sent to the Eagle mine via email as an un-editable .PDF file and as an .XLS file. Sample rejects and pulps are returned to Eagle Mine and stored at the LMC secure warehouse facility in Negaunee Michigan. Once the sampling and logging process is completed, the core boxes are palleted, wrapped in plastic, and transported to the core warehouse in Negaunee. The Negaunee warehouses are locked and located within a gated industrial property.

The QP finds that the sampling procedures and chain of custody meets industry standards. It is recommended that any pulps required for future analysis or metallurgical testing be stored in vacuum sealed bags, or refrigerated, to prevent oxidation.

Figure 11.1 presents a flowchart for the Eagle diamond drill core sampling process.

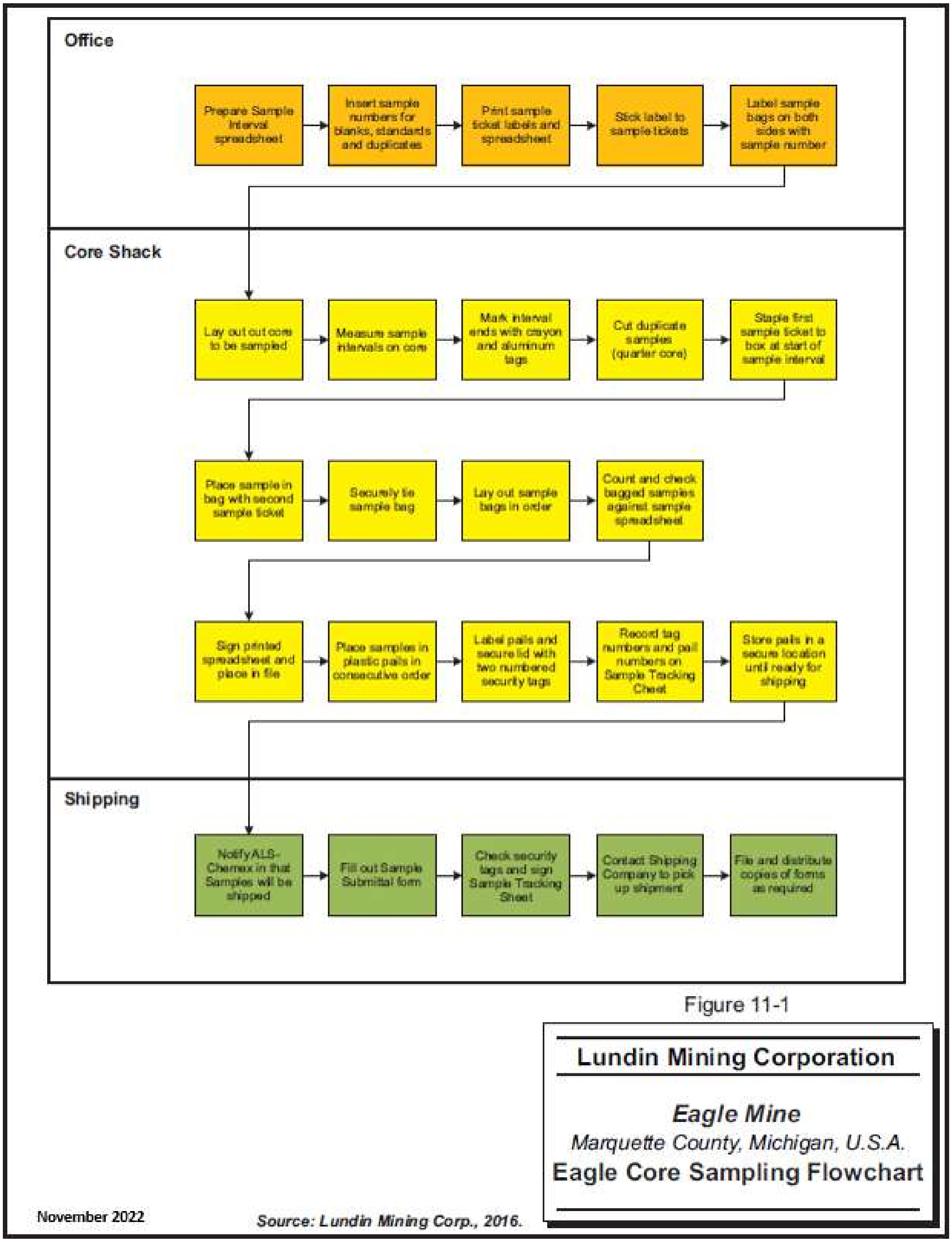

Figure 11.1: Eagle Core Sampling Flowchart

11.2.3 Sample Preparation

Samples are shipped to the ALS laboratory in Thunder Bay, Ontario for preparation ahead of assaying.

The facility has standard procedures and quality controls for sample preparation to ensure compliance with industry and client standards. ALS has a digital Laboratory Information Management System (LIMS) and a web-based data retrieval system for customers to obtain assay results. The sample preparation procedures carried out on Eagle's diamond drill core samples at the Thunder Bay facility consisted of the following:

- Upon arrival, each sample is logged in the LIMS system and a bar code label is attached.
- Drying of excessively wet samples in drying ovens.
- Fine crushing of samples to better than 70% of the sample passing two millimetres (CRU-31).
- Split sample using riffle splitter (SPL-21).
- A sample split of up to 250 g is pulverized to better than 85% of the sample passing 75 µm (PUL-31).

11.2.4 Analysis

Pulps are sent to the ALS laboratory in Vancouver for analysis. ALS Vancouver is an accredited laboratory in accordance with the International Standard ISO/IEC 17025:2017.

Samples are analyzed by a variety of methods for specific elements and ore types. The ALS assay codes and methods used include:

- **OA-GRA08** – Bulk density on whole core by water immersion method. Used as a check on the density measurements made by LMC personnel.

  ME-ICP81 – Sodium peroxide fusion with inductively-coupled atomic emission spectroscopy (ICP-AES). Al, As, Ca, Co, Cr, Cu, Fe, K, Mg, Mn, Ni, Pb, S, Si, Ti, Zn.
- **ME-OG46** – Ag by aqua regia digestion with ICP-AES or atomic absorption spectroscopy (AAS). Triggered by over limits on As, Cd, Co, Cu, Fe, Mn, Ni, Pb, S, Zn.
- **Ag-OG46** – Ag by aqua regia digestion with ICP-AES or atomic absorption spectroscopy
- **PGM-ICP23** – Pt, Pd, and Au by fire assay with ICP-AES finish.

It is the QP's opinion that the assaying at Eagle is conducted at an accredited commercial laboratory using industry accepted practices.

11.3 Quality Assurance/Quality Control

Quality Assurance (QA) consists of evidence to demonstrate that the assay data has precision and accuracy within generally accepted limits for the sampling and analytical method(s) used in order to have confidence in the Mineral Resource estimation. Quality control (QC) consists of procedures used to ensure that an adequate level of quality is maintained in the process of sampling, preparing, and assaying the exploration drilling samples. In general, QA/QC programs are designed to prevent or detect contamination and allow analytical precision and accuracy to be quantified. In addition, a QA/QC program can disclose the overall sampling – assaying variability of the sampling method itself.

Accuracy is assessed by a review of assays of certified reference materials (CRMs), and by check assaying at outside accredited laboratories. Assay precision is assessed by reprocessing duplicate samples from each stage of the analytical process from the primary stage of sample splitting, through sample preparation stages of crushing/splitting, pulverizing/splitting, and assaying.

Standardized protocols of QA/QC sample insertion using certified reference material, blanks, and duplicates have been used throughout the history of the Eagle project to monitor the quality of the sampling process and assay results. KEX initiated assay QA/QC protocols for the early exploration drilling at Eagle beginning in 2001. Initially, standards, blanks and duplicates were inserted into the sample stream at an interval of one every ten samples. Currently the insertion rate is one in thirty samples consistent with mature mine protocols.

Blanks were also inserted following obvious high-grade samples. Over time, the QA/QC protocols have been modified to address specific concerns, however, the procedures used today are very similar to those used in past programs.

11.3.1 Blanks

The regular submission of blank material is used to assess contamination during sample preparation and to identify sample numbering errors. Blank material initially was derived from “barren” rocks from the area, but these were found to contain traces of mineralization; and therefore, deemed unsuitable. Since that time (post drill hole eewe007), industrial silica sand, purchased from a local source, has been used. Blanks are now inserted into the sample stream at a rate of one in thirty samples, or just after an obviously high-grade sample. The blanks are assayed for Au, Co, Cu, Ni, Pd, Pt, and S.

11.3.2 Duplicates

Duplicate samples are used to test for contamination in the laboratory and for overall consistency in performance. These duplicates can be made of the original sample material (termed field duplicates), the crushed reject material (reject), or the pulverized sample material (pulp). Each type of duplicate tests for inaccuracy at different stages in the sample preparation and assay.

Field duplicates at Eagle are quarter-core splits taken from the original half-core samples.

These are also taken at a rate of one in thirty but are offset from the standards and blanks by four or five samples. Splits of the rejects are made by ALS every 20th sample, and a pulp duplicate is taken approximately every 30th sample for the purposes of internal lab QA/QC. The acQuire database exports data to excel which produces scatter diagrams which compare the duplicate value with the original. Also plotted on these diagrams were regression lines to check for bias, as well as error limits.

The QP inspected the scatter diagrams up to 2022 field duplicates and noted that, while there are instances of significant differences between duplicate pairs, Au in particular displays a distinct nugget effect through all years but no bias.

Insofar as the mill grade reconciliation with the block model is observed to be very good, it does not appear to be an issue at this time.

The duplicates are assayed for Au, Co, Cu, Ni, Pd, Pt, and S.

11.3.3 Certified Reference Material (Standards)

Results of the regular submission of certified reference material (CRMs) are used to monitor analytical accuracy and to identify potential problems with specific batches. Specific pass/fail criteria are determined from the standard deviation (SD) provided for each CRM. The conventional approach for setting standard acceptance limits is to use the mean assay ± two standard deviations (SD) as a warning limit and ± three SD as a failure limit. Results falling outside of the ± three SD failure limit must be investigated to determine the source of the erratic result, either analytical or clerical. Eagle mine uses a threshold of two Standard Deviations from the mean standard value on plots to gauge lab bias however it is at the discretion of the Senior Geologist to gauge whether to triggering a sample, or batch re-assay.

Standards, consisting of 100 packets of material, are inserted every thirtieth sample in the same fashion as blanks. Only custom-made standards are currently applied although a combination of commercial and custom (seven different ones) has been used in the past. The standards are assayed for Au, Co, Cu, Ni, Pd, Pt, and S. See Table 11.1 for the current CRM.

Table 11.1: Current Certified Reference Material at Eagle Mine

CRM	Expected Grades						
	Au (g/t)	Pt (g/t)	Pd (g/t)	Co (%)	Cu (%)	Ni (%)	S (%)
EA-01	0.050	0.073	0.054	0.020	0.429	0.517	2.750
EA-02	0.100	0.185	0.119	0.033	0.949	1.100	5.920
Ea-03	0.102	0.316	0.193	0.062	1.660	2.380	12.220
EA-S	0.171	0.503	0.289	0.065	1.771	2.308	12.368

Note: Smee and Associates conducted the certification.

11.4 Discussion And Recommendations

Independent reviews of QA/QC procedures and results have been conducted several times in the past. The QP conducted a review of the QA/QC results in 2022. RPA has conducted reviews in 2004, 2006, 2009 and 2016. In each case, there were no serious concerns found that would preclude the use of the drill data in resource estimation. WAI (WAI, 2012) reviewed the QA/QC data in 2012 and found no issues.

Failures are considered to be two consecutive samples outside of the confidence limits in the case of a standard, or above the designated upper limit for blanks. Control data are generated from acQuire into excel depicting the QA/QC results plotted in chronological order with lines to show the expected values along with the failure limits. Eagle mine uses a threshold of two Standard Deviations from the mean standard value on plots to gauge lab bias however the current practice leaves it to the discretion of the Senior Geologist to gauge whether to triggering a sample, or batch re-assay. The QP recommends that using a three standard deviation threshold to automatically trigger a re-assay.

In the QP's opinion, the QA/QC program as designed and implemented by Eagle Mine LLC meets or exceeds common industry practice and the assay results within the database are acceptable for use in a Mineral Resource estimate.

The success of the mining operations and the satisfactory reconciliation results indicate that the drill hole samples are adequately predicting ore grades.

11.5 Underground Sampling

Muck samples are collected from underground sills and stopes for grade control, reporting, and monitoring purposes. They are not used for estimation of Mineral Resources.

Underground sampling procedures aim to collect one sample per 150 to 200 tonnes of ore produced per month. Sampling protocols employed depend on the source of the ore.

11.5.1 Stope Sampling

Four samples are collected for each mucking event (by shift). The material is either collected from re-muck, from the loader actively mucking the stope, or from a haul truck as it is dumped in the COSA. Care is taken to ensure that all material types present in the muckpile are representatively added to the sample bag. Sample bags are filled to approximately half capacity (10 in x 17 in sample bag). Sample weights range from 10 lb to 30 lb depending on ore type.

11.5.2 Sill Sampling

The number of samples collected is dependent on the width of the round shot. For six metre primary and five metre secondary rounds, four samples are collected. For four metre primary rounds, two samples are collected. The sample is collected from either fresh muckpile, or remuck.

Sill samples can also be collected from a haul truck as it is dumped in the COSA. If a round was not sampled from these methods, rib samples may take the place of muck samples. Face samples are taken occasionally, however, the primary form of sample for reporting is from muckpile. Due care is taken that all material types in the muckpile are representatively added to the sample bag. Sample weights range from 10 lb to 30 lb dependent on ore type.

11.5.3 Underground Sampling QA/QC

Muck samples are submitted to the assay laboratory at the Humboldt Mill on a daily basis.

Each submittal includes one sample for QA/QC: on a rotating basis, either a silica sand blank or one of two standards purchased from CDN Resource Laboratories, Canada. The standards are certified reference material in 60 g packets which are sealed until submission to the mill laboratory.

11.5.4 Security

The QP is not aware of any major security issues at the Eagle Mine or the Negaunee Exploration Office\Warehouse. Access to these sites is restricted to authorized personnel and they are staffed continuously. Drill and mine samples are handled and transported only by LMC personnel or contractors. Samples are picked up and transported to the laboratory by commercial carrier. Logging, sampling, and analytical data are captured in an acQuire database, which resides on the company servers, and is backed up daily. The integrity of this database is the responsibility of a Database Manager, who has exclusive access.

11.6 Discussion

In the QP’s opinion, the sample preparation, analysis, and security procedures at Eagle, Eagle East and Keel orebodies are acceptable for use in the estimation of Mineral Resources.

12.0 DATA VERIFICATION

12.1.1 Environmental Data Collection

The QP conducted several verification checks at Eagle Mine and Negaunee core storage facility during a two day site visit on May 10 and 11, 2022. The verification process included a review of:

- Confirmation core logging and independent assay verification on selected drill core samples
- Chain of custody of drill core samples and storage and security of historic drill core
- QA/QC performance of the assay database for the metal suite
- Data verification including spot check comparisons of metal assays from the drill hole database against the original assay lab certificates
- Visiting underground orebody contacts
- Drill collar inspections

Details of the Site visit and data verification are summarized in the subsequent sub-sections.

12.2 Independent Logging and Sample Verification

Prior to the site visit the QP selected six individual samples, each from a unique hole representing the various mineralization domains and spatially spread out from the others in both the Eagle and Eagle East Deposits. During the Site Audit each were logged, photographed, quarter sawn, and then sampled and tagged in a manner consistent with the SOP at Eagle Mine. These six samples as well as one prepared standard (EA-2) were then submitted and analyzed at ALS laboratories in Sudbury (preparation) and Vancouver (lithogeochemical analysis). The analytical procedures for determining Ni, Cu, Co, and S is a Sodium Peroxide Fusion/ ICP finish (ALS methods **ME-ICP81**), for Au, Pt, Pd a fire assay with ICP finish (ALS method **PGM-ICP23**), and for Ag an Aqua Regia digestion/ICP finish (**ME-OG46**). Specific gravity tests were performed on all samples via the gravimetric process (**OA-GRA08**) The results compared to the original assays are summarized in Table 12.1. Figure 12.1 and Figure 12.2 provide a graphical comparison of the QP verification and Eagle mine assays for Ni and Cu, respectively. All the duplicate samples selected by the QP demonstrate acceptable precision and reproducibility consistent with the Eagle mine database.

Table 12.1: Verification Sampling of Eagle Mine Assay Intervals

Drillhole	Sample ID	From	To	Length	Eagle Cu (wt. %)	Golder Cu (wt. %)	Eagle Ni (wt. %)	Golder Ni (wt. %)	Eagle Au (ppm)	Golder Au (ppm)	Eagle Pt (ppm)	Golder Pt (ppm)	Eagle Pd (ppm)	Golder Pd (ppm)	Eagle Co (wt. %)	Golder Co (wt. %)	Eagle S (wt. %)	Golder S (wt. %)
EEUG133	EUD20112	160.91	162.4	1.51	4.68	4.69	7.85	7.98	0.165	0.16	0.961	1.25	0.608	0.737	0.193	0.198	36.30	36.2
EEUG094	EUD19062	173.88	175.5	1.58	3.76	3.99	6	6.46	0.383	0.625	1.12	1.065	0.806	0.904	0.149	0.158	29.10	30.7
EAUG0285	EUD4933	95.65	97.15	1.5	2.55	2.86	6.12	6.8	0.047	0.031	0.18	0.203	0.146	0.169	0.181	0.206	36.00	36.9
EEUG0169	EUD11930	114.89	116.4	1.5	2.37	2.47	3.56	4.19	0.08	0.125	1.095	1.08	0.618	0.677	0.072	0.09	14.05	17.2
EEWE067	EUD9793	189.26	190.8	1.5	4.35	4.48	2.52	2.81	0.911	1.07	1.265	1.25	0.743	0.837	0.046	0.051	10.00	10.8
EAUG0191	EUD3861	81.64	83.14	1.5	1.225	1.275	1.5	1.595	0.097	0.1	0.29	0.335	0.22	0.224	0.043	0.043	7.77	8.09
EA-2					0.949	0.942	1.1	1.115	0.1	0.097	0.185	0.186	0.119	0.12	0.032	0.035	5.92	5.9

Eagle Site Audit Golder Samples

Ni vs Ni Dupl

	% Ni	% Ni Dupl			
Pairs	7	7		Total Mean	4.257 % Ni
Mean	4.093	4.421	% Ni	Average bias	-0.329 % Ni
Minimum	1.100	1.115	% Ni	Regression slope Y on X	1.04
Maximum	7.850	7.980	% Ni	Maximum HARD	100.00 %
Variance	5.757	6.293	% Ni sq	Average HARD	3.87 %
CV	0.586	0.567		% Average HRD	-3.87 %

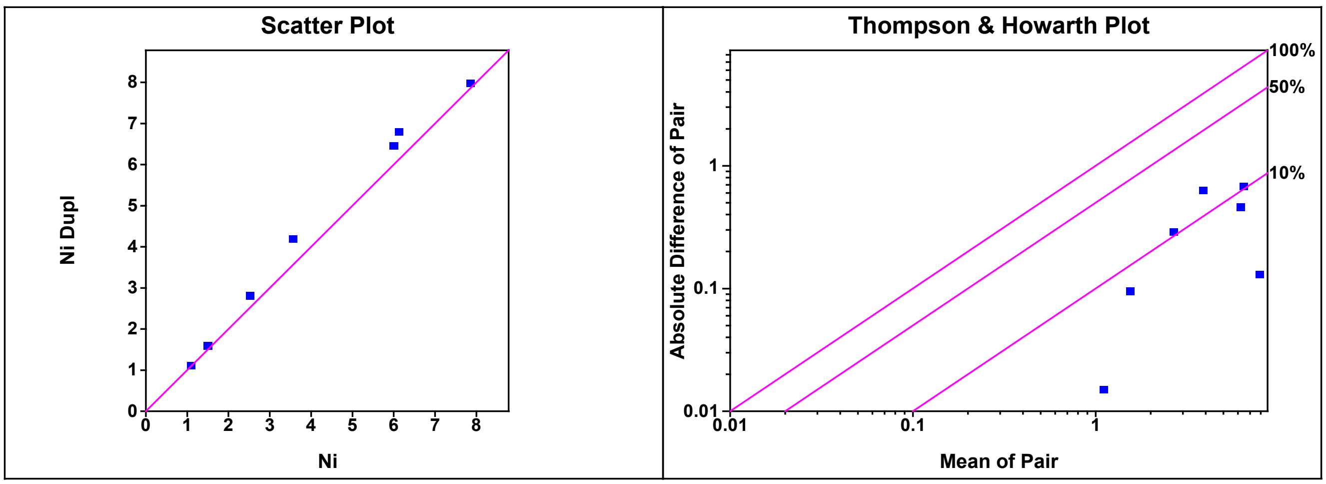

Figure 12.1: Comparison of Original Versus Verification Sampling Ni Values

Eagle Site Audit Golder Samples

Cu vs Cu Dupl

	% Cu	% Cu Dupl			
Pairs	7	7		Total Mean	2.899 % Cu
Mean	2.841	2.958	% Cu	Average bias	-0.118 % Cu
Minimum	0.949	0.942	% Cu	Regression slope Y on X	1.02
Maximum	4.680	4.690	% Cu	Maximum HARD	100.00 %
Variance	1.857	1.932	% Cu sq	Average HARD	2.10 %
CV	0.480	0.470		% Average HRD	-2.00 %

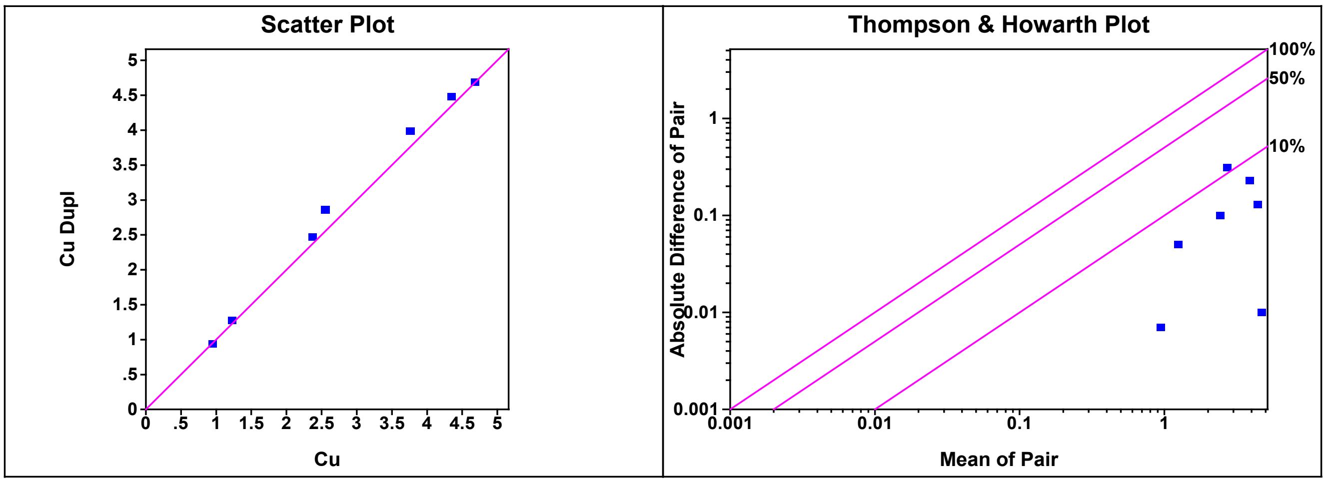

Figure 12.2: Comparison of Original Versus Verification Sampling Cu Values

12.3 Geological Data Verification

All logging and sampling data is captured and stored in an acQuire database. The database manager is responsible for importing the assay data via the internet directly from the laboratory, validating the data, compiling the QA/QC results, and resolving QA/QC failures. Much of the validation work is done using scripts and utilities run from within acQuire. The database manager also provides export files to downstream users for import into other software packages such as Vulcan or Leapfrog. The QP reviewed seven elements (Ni, Cu, Co Au, Pt, Pd, Ag) of the original ALS Certificate of Assay values against the drill hole sample database. Records selected were primarily from drill holes that support the current resource in Eagle, Eagle East, and Eagle East Keel. The QP found no discrepancies between the original certificates and the database in the approximately 895 individual samples audited.

12.4 QA/QC Review

Eagle Mine employs a QA/QC Standard Operating Procedure (SOP) with respect to the sampling of core. The current SOP indicates an insertion rate of one in ten QA/QC samples on a rotating basis between blanks, duplicates and standards (each at a rate of one in thirty). These are logged into the acQuire system as part of the regular logging and sampling of core. Sample dispatch and lab results are also integrated using the same acQuire system. There is a written procedure for taking the QA/QC sample results and inserting them into the appropriate spreadsheet for graphing error analysis. Except in cases of obvious errors all re-assay triggering events are at the discretion of the Senior Geologist.

12.4.1 Field Duplicates

Quarter core field duplicates are currently inserted in the sample stream at a rate of one in thirty samples. Originally (during the initial years of the mine) field duplicates were inserted at a rate of one in twenty. A review of field duplicate analyses conducted by Eagle demonstrates a reasonable correlation to the original sample (Ni, Cu, Co, Pt, Pd, S, SG) except for Au which showed a distinct nugget effect through all years. The QP considers an average HARD value (half absolute relative difference) between 10-20% to indicate marginal precision (See Figure 12.3).

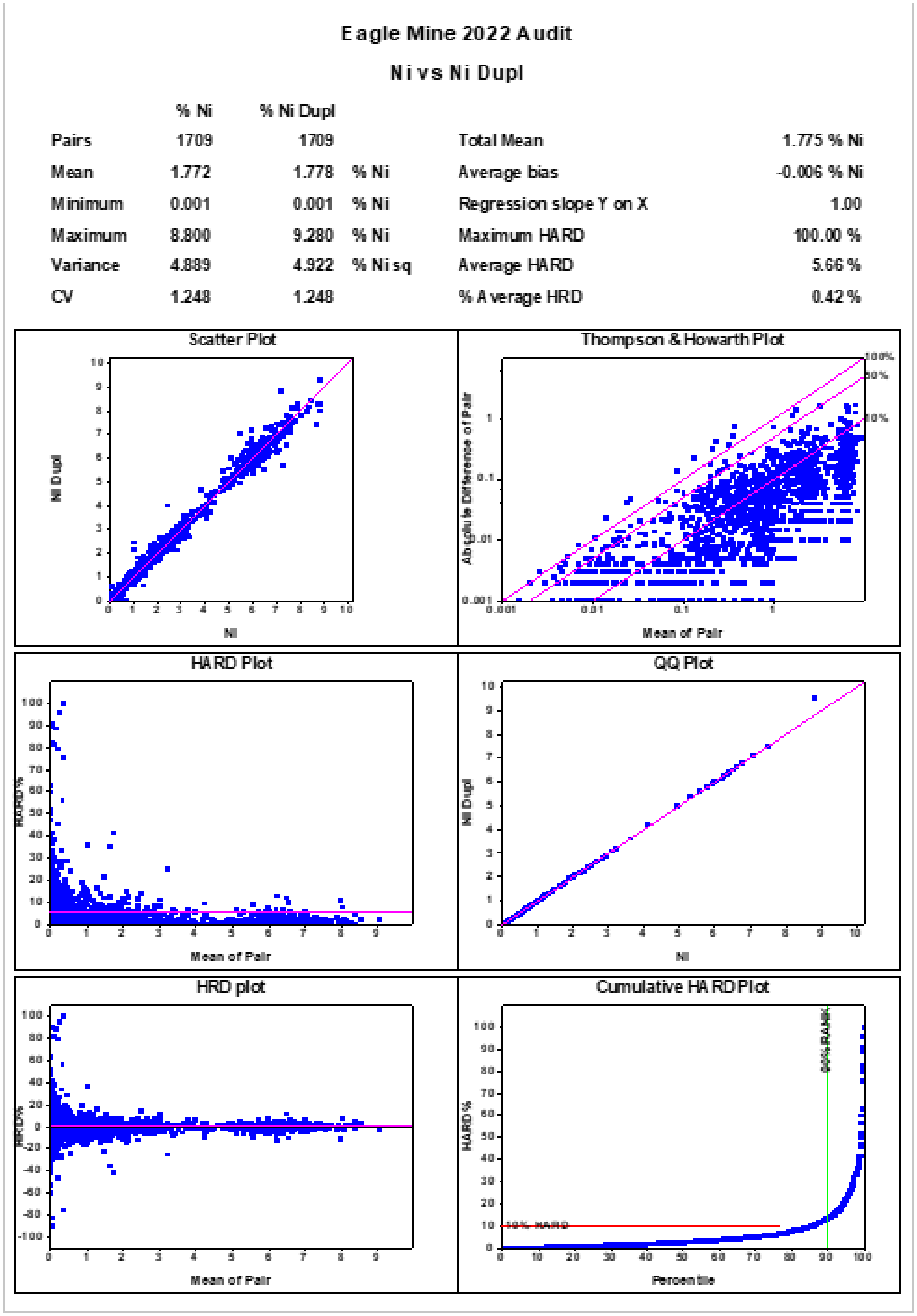

Figure 12.3: QA/QC Analysis of Eagle Ni Duplicates

12.4.2 Blanks

A review of the current blanks analyses conducted by Eagle indicates a fairly successful cleaning procedure by the prep lab. However, reviewing historical data, elevated Cr values in blank analyses did occur regularly up until hole eewe007 (September 2019). This seems to have been resolved with the Mine switching to a commercially produced pure silica sand instead of a locally sourced sandstone as their blank sample source (See Figure 12.4). Early in the mine life blank samples were inserted every ten samples or after an obvious high-grade sample. The current practice is to insert a blank at a rate of one in thirty samples or at the discretion of the logging geologist.

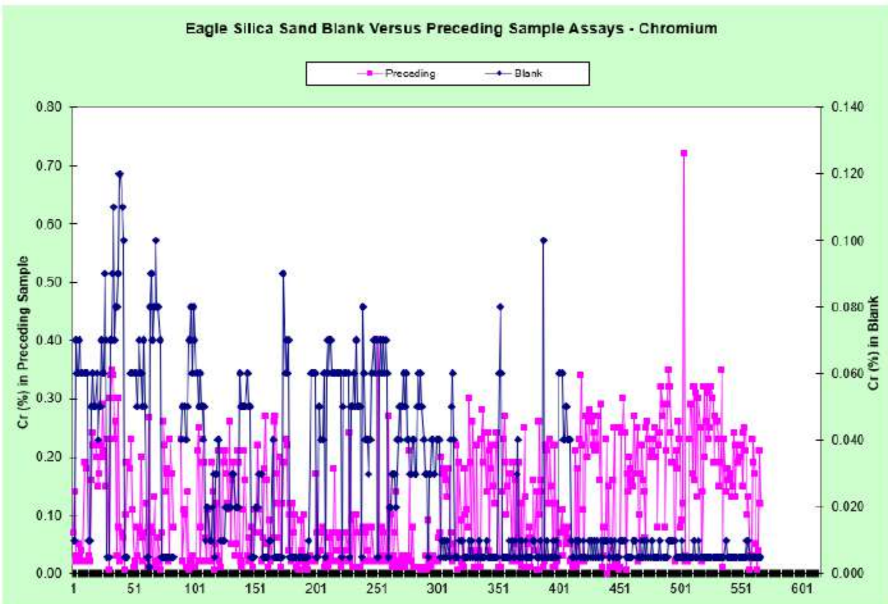

Figure 12.4: Cr Values in QA/QC Blanks

12.4.3 Standards

Eagle Mine has used up to seven different standards in the past, of which four are still used. The four were custom made for the mine site and are shown in Table 12.2. Standards are inserted at a rate of one in thirty and correspond to rock types. It was noted that within the Eagle Mine Standards QA/QC spreadsheet the mean value for Copper in EA-1 and Cobalt for EA-2 differed from the Certificate of Assay (COA) values produced by Smee and Associates for Eagle Mine. Eagle Mine uses a threshold of two Standard Deviations from the mean standard value on plots to gauge lab bias however, as mentioned previously, it is at the discretion of the Senior Geologist to determine whether to trigger a sample or batch re-assay.

Figure 12.5 provides a graphical history of over 400 EA-2 standard samples assayed for nickel and Figure 12.6 depicts the same QA/QC control graph for over 550 EA-1 standard samples assayed for gold.

Table 12.2: Summary of Mean Grades for Certified Reference Materials

CRM	Expected Grades						
	Au (g/t)	Pt (g/t)	Pd (g/t)	Co (%)	Cu (%)	Ni (%)	S (%)
EA-1	0.050	0.073	0.054	0.020	0.429	0.517	2.750
EA-2	0.100	0.185	0.119	0.033	0.949	1.100	5.920
EA-3	0.102	0.316	0.193	0.062	1.660	2.380	12.220
EA-S	0.171	0.503	0.289	0.065	1.771	2.308	12.368

COA: 2006 Smee & Associates

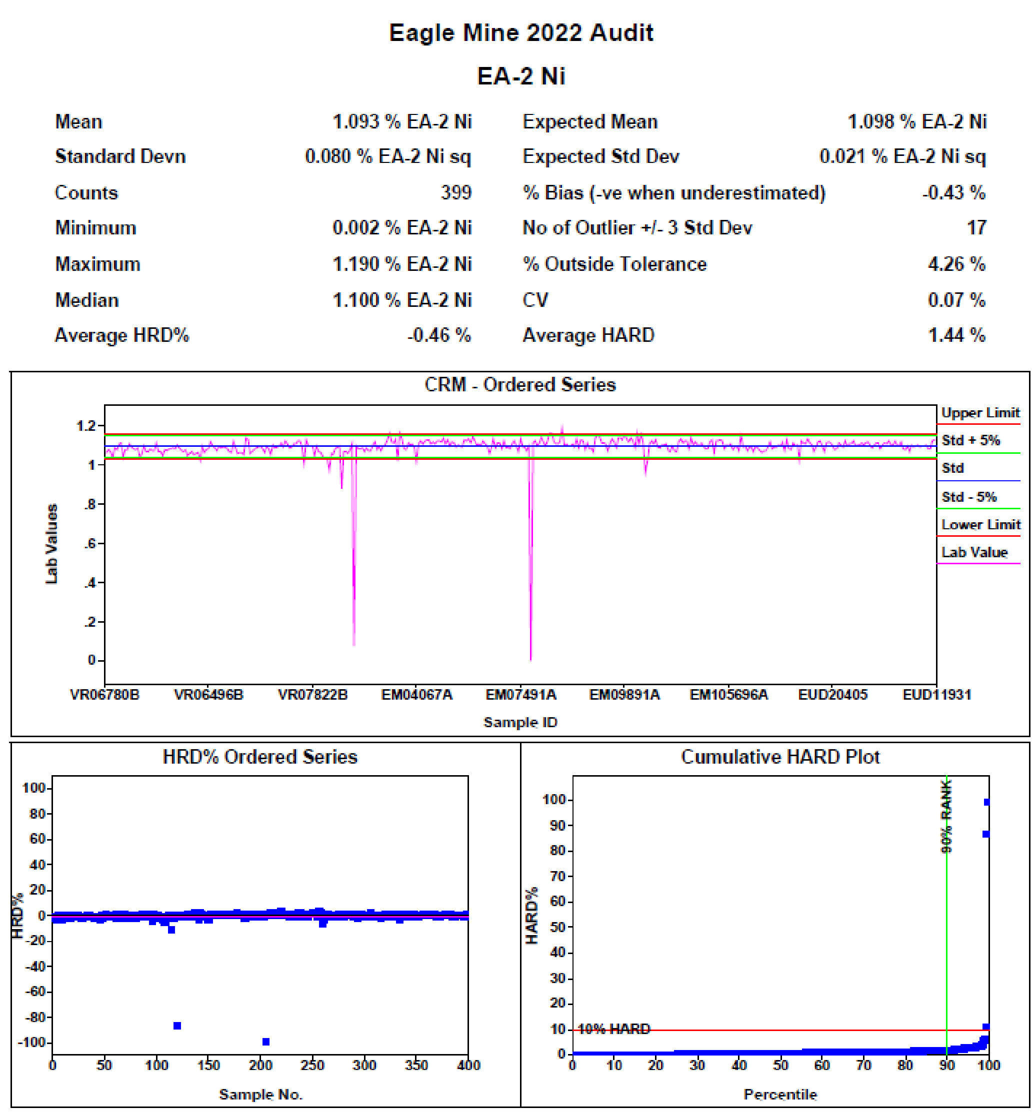

Figure 12.5: QA/QC Ni Values for Eagle Standard EA-2

Eagle Mine 2022 Audit

EA 1 Au

Mean	0.050 ppm EA 1 Au	Expected Mean	0.050 ppm EA 1 Au
Standard Devn	0.012 ppm EA 1 Au sq	Expected Std Dev	0.008 ppm EA 1 Au sq
Counts	563	% Bias (-ve when underestimated)	0.73 %
Minimum	0.001 ppm EA 1 Au	No of Outlier +/- 3 Std Dev	21
Maximum	0.235 ppm EA 1 Au	% Outside Tolerance	3.73 %
Median	0.048 ppm EA 1 Au	CV	0.25 %
Average HRD%	-0.74 %	Average HARD	6.64 %

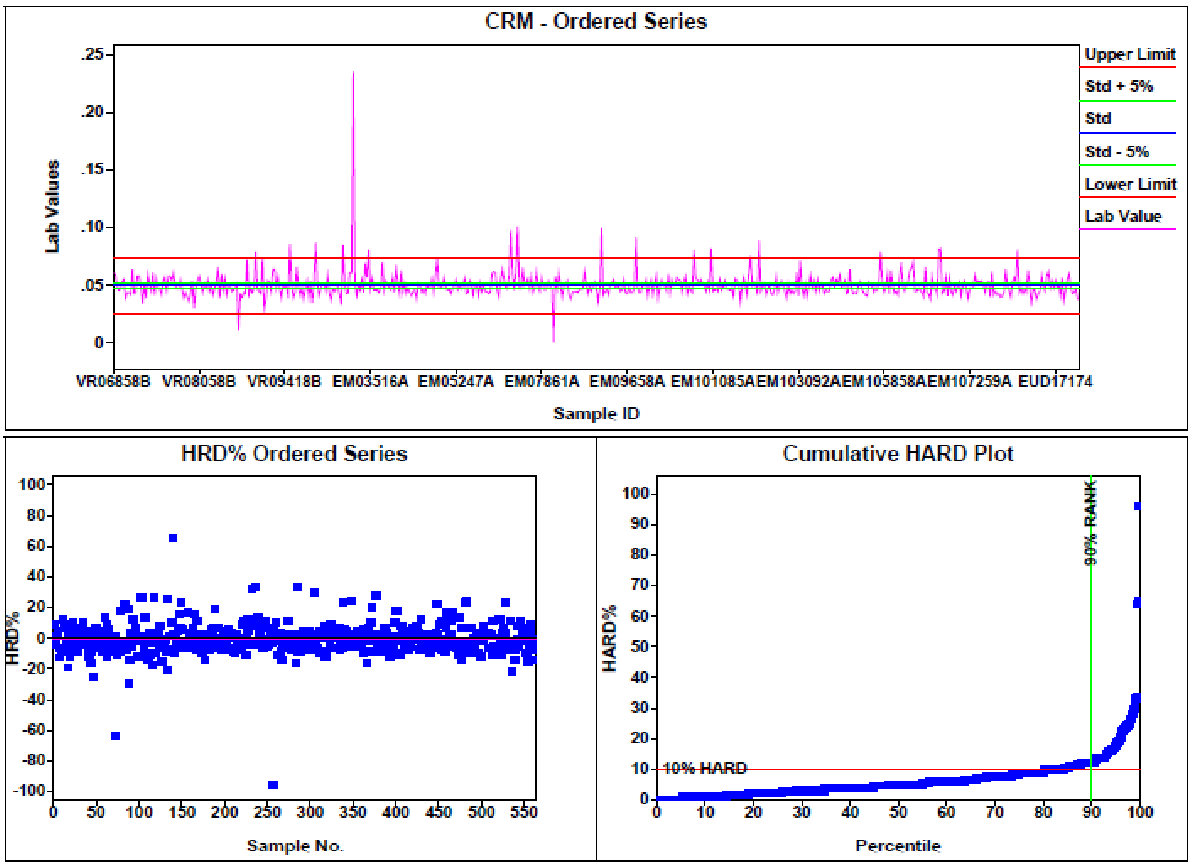

Figure 12.6: QA/QC Au values for Eagle Standard EA-1

The QA/QC insertion rate of one in thirty is consistent with industry standards for mature drilling programs. The QP finds the QA/QC program meets industry standards.

12.5 Drill Collar Inspection

At Eagle Mine the last surface diamond drill hole was completed in 2019 with all subsequent drilling occurring from underground drill stations. Prior to 2019 and since, Eagle Mine has pursued diligent reclamation of most surface drill sites (See Figure 12.7) as part of their legislative requirements.

Figure 12.7: Current and Rehabilitated Former Drill Hole Collar Locations

Three surface drill hole collars were located and were surveyed using a handheld Global Positioning System (GPS) unit (Garmin GPSMAP 62S). See Table 12.3 for a comparison of the results. Eagle Mine uses only UTM NAD 83 Zone 16 datum with mean sea level as 0 RL elevation.

Table 12.3: Comparison of Surface Drill Hole Collar Coordinates

	Hole ID	Easting	Northing	Elevation
Golder GPS	16EA341	433750.0	5176932.0	444.1
Eagle Mine Survey		433746.9	5176930.0	437.9
Difference		3.1	2.0	6.2
Golder GPS	15EA336	433444.0	5176963.0	444.4
Eagle Mine Survey		433446.7	5176963.0	435.1
Difference		-2.7	0.0	9.3
Golder GPS	15EA337	433544.0	5176943.0	445.9
Eagle Mine Survey		433545.0	5176944.3	437.6
Difference		-1.0	-1.3	8.4

GPSMap62
NAD 83 Zone 16

The results demonstrate a close validation of the mine survey collar coordinates. Handheld GPS elevation values are barometer based and can be affected by changing weather fronts. The QP finds no issues with the mine surface collar coordinates.

12.6 Underground Geology

The QP travelled underground at Eagle to review the interpretated geology and mineralization. An active stope in Eagle and an active drift and fill location in Eagle East were visited. The Keel was not visited due to mine activity. The observed geology and mineralization are consistent with the general interpretation of the mineral domains supporting the resource (See Figure 12.8). The underground paper mapping was also referenced and judged to accurately represent the observed geology. Stope sampling, drift wall sampling, and muck pile sampling all occur to support short- and mid-term mine production. Samples taken during production mining are sent to an SGS contract laboratory, located at the Humboldt mill, for base metal analysis. No precious metals are analyzed. The underground samples are used strictly for grade control and not used in the resource estimation. Eagle staff suggested that there is one sample for every two hundred tonnes of production.

Figure 12.8: Eagle East 515 Zone 3 Lift 2 MSU, Mineralized Peridotite, and Siltstone Contact

12.7 Data Validation Conclusions

On completion of the data verification process for Eagle Mine, it is the opinion of the QP that the geological data collection, analytical methods, and QA/QC procedures used by Eagle Mine are consistent with CIM best practice guidelines.

The drill hole database has been reviewed and verified by the QP and significant efforts have been made by Eagle Mine to ensure the drill collar location and downhole survey information is consistent with current drilling best practices.

Eagle actively monitors the QA/QC samples through the sampling process and ensures that any batches that require re-assaying are flagged and followed up with the laboratory in a timely fashion.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Mineralogy

Two styles of mineralization have been identified for Eagle Mine, namely Massive Sulfide (MSU) ore that is predominantly made up of sulfide minerals and Semi Massive (SMSU) ore composed of disseminated sulfides in ultramafic gangue. Eagle Keel is a lower grade version of Eagle East ore.

13.2 Sampling And Mineralogical Analysis

Figure 13.1 illustrates the location of the drill holes for the samples used in metallurgical testing and confirms the spatial representativeness of these drill holes in the Eagle East deposit.

Table 13.1 lists the Eagle East composite samples and assays. Four representative composite samples of Eagle East drill core were selected from four material types consisting of MSU, SMSU, High Copper Massive Sulfide (CMSU), and waste. Composites were selected to be representative of the average grade of all available core from each composite zone. The waste rock composite was selected from drill samples adjacent to potential ore to best represent potential dilution in the mining process.

Table 13.1: Eagle East Composite Samples and Assays

Composite Sample	F_{80} (µm)	%Ni	%Cu	%S	%Fe	%MgO
MSU	1 166	8.01	5.03	33.2	48.7	0.45
SMSU	1 230	2.65	2.17	13.1	25.7	17.7
CMSU	951	6.49	14.2	31.1	42.5	0.24
Waste	1 303	0.68	0.86	3.56	14.0	13.0

Note. F_{80} – passing size before grinding

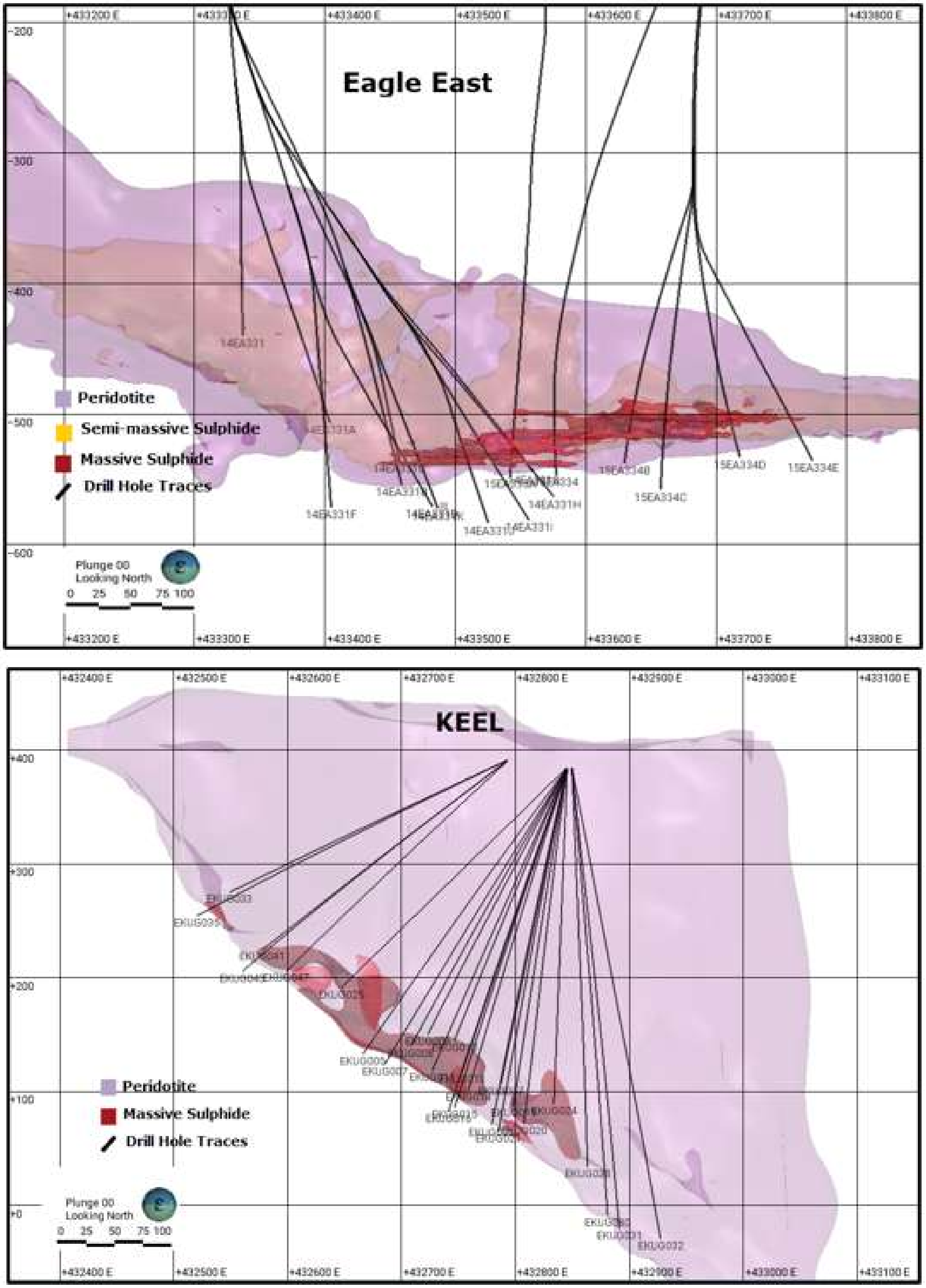

Figure 13.1: Location of Metallurgical Drill Holes and Samples at Eagle and Keel Zones

Nickel and copper mineralization in Eagle East samples are comprised of pentlandite (Pn) and chalcopyrite, respectively (XPS, 2017a). Pyrrhotite (Po), serpentine, pyroxene, plagioclase, olivine, amphibole, and iron oxides are considered gangue minerals. There were no minerals found in the Eagle East samples that are not known in the Eagle ore.

The Po/Pn ratio for Eagle East material is lower than that for Eagle MSU and SMSU samples due to the higher Pn grades and equivalent or lower Po grades (Table 13.2). Higher sulfide content was observed in the Eagle East samples. Higher grades and lower Po/Pn ratios are favourable and may present opportunities to achieve higher concentrate grades at equivalent recoveries.

Table 13.2: Pyrrhotite/Pentlandite Ratios in Eagle and Eagle East Samples

Sample	Eagle	Eagle East
MSU	3.9	2.2
SMSU	3.4	2.8
CMSU	n/a	2.0

X-ray diffraction (XRD) analysis of MSU, SMSU, and CMSU samples indicated a range of proportions of monoclinic and hexagonal pyrrhotite are present in the ores, which may impact the flotation performance of the mineral.

Eagle Keel samples are similar to those observed in Eagle East samples. Pentlandite primary association is with pyrrhotite followed by the non-sulfide gangue (NSG), then chalcopyrite.

Waste rock adjacent to Eagle East mineralization is similar in mineralogy to NSG found currently in Humboldt Mill feed and may be classified as a pyroxenite, as opposed to the peridotite found around the Eagle deposit.

Platinum group metal (PGM) grades are higher in Eagle East material in comparison to Eagle ore. Preliminary mineralogical analysis shows inclusions of several PGM minerals within other sulphides present in the material. The size of the inclusions range from 10 µm to 100 µm. The following minerals were identified as being present in Eagle East material: maslovite (Pt-Bi- Te), michenerite (Pd-Bi-Te), sperrylite ($PtAs_2$), silver telluride (Ag-Te), volynskite (Ag-Bi-Te), and electrum (Au-Ag). The platinum and palladium minerals would be recoverable through conventional flotation and may benefit from the use of co-collectors along with xanthate to increase recoveries. The presence of silver requires further metallurgical analysis and testing to assess the potential for recovery.

13.3 Grinding Test Work

Grinding test work was completed on Eagle East ore samples to determine if the mineralization could be processed through the Humboldt Mill grinding circuit without circuit modification. For onsite testing, samples of Eagle and Eagle East ores were subjected to batch grinding tests under identical conditions and the particle size distribution of the products were analyzed. At XPS, Eagle East core samples were submitted for Bond Ball Mill Work Index testing to confirm the onsite test results.

Core samples were crushed to 100% passing 10 mesh (2 mm) in stages in a laboratory jaw crusher. The samples were then mixed and split into 1 kg charges using a rotary splitter.

Eagle core samples that had been previously crushed to 100% passing 2 mm were used as baseline samples for comparison to Eagle East samples. The size distribution of each crushed composite sample was determined, and the material assayed (refer to Table 13-1) and the 80% passing size (P_{80}) was determined.

The 80% passing size of samples was determined before grinding (F_{80}) and after grinding (P_{80}) and the reduction ratio, F_{80} / P_{80}, was calculated for different material types and blends of MSU to SMSU samples. The grinding tests results can be summarized as follows:

- Reduction ratios for the Eagle East SMSU composite and 2:1 (MSU:SMSU) blend were both within 20% of the reduction ratios obtained for Eagle ores.
- The Eagle East MSU sample showed higher reduction ratios than Eagle MSU ore, indicating that the Eagle East MSU sample was less competent. Therefore, it will be possible to treat Eagle East mineralization in the Humboldt Mill grinding circuit and achieve equivalent product size with potential upside when processing MSU.
- Rosin-Rammler modelling of size distributions and comparison showed similar grinding performance for Eagle and Eagle East samples.
- Batch grinding tests showed that the grindability for the Eagle East mineralization is similar to or higher than that of Eagle samples.
- Bond Ball Mill Work Index results for Eagle East samples were comparable to historical Eagle results.
- Problems are not anticipated when processing Eagle East material in the current grinding circuit at processing rates similar to current operations.

Also, SGS had tested one Eagle Keel sample of 30 kg. The standard work index test results were in metric units:

- Rod Mill Work index RWi = 16.5 kWh/t and Ball Mill Work index BWi = 19.2 kWh/t.
- Further, XPS performed a liberation study on Eagle Keel samples and reported that locked particle associations for Keel are similar to those observed in Eagle East samples.

13.4 Flotation Test Work

A series of samples from Eagle, Eagle East and Eagle Keel were subjected to batch flotation tests in the metallurgical laboratory at the Humboldt Mill to determine if Eagle East and Keel samples have comparable overall recoveries and kinetics to Eagle ore. For onsite testing, batch flotation tests on both Eagle and Eagle East composite samples were completed. At XPS, a comprehensive program of flotation testing (batch tests, locked cycle tests, copper/nickel separation, and mineralogy) on Eagle East composite samples was completed.

Coarse rejects from drill core samples were used for Eagle East flotation test work. These samples were not used in the grinding test work, because the size distribution of the samples was considered questionable due to the presence of a large proportion of fines. A larger proportion of fines could also bias the flotation tests and provide less than optimal results.

Batch rougher flotation tests were conducted on all material types in addition to the 2:1 (MSU:SMSU) blends from Eagle and Eagle East samples. Cleaner flotation tests were also carried out on 2:1 blends from Eagle and Eagle East samples.

Eagle samples were collected from core samples representing the first year of Eagle's mine life. The following material types and blends were tested: MSU, SMSU, CMSU (from Eagle East), and 2:1 (MSU:SMSU) and the head grades of the samples are shown in Table 13.3.

Table 13.3: Average Head Grades for Flotation Test Work

Composite Sample	%Ni	%Cu	%S	%Fe	%MgO
Eagle Keel	1.78	0.94	8.11	18.8	15.6
Eagle East					
MSU	8.01	5.03	33.2	48.7	0.45
SMSU	2.65	2.17	13.1	25.7	17.7
CMSU	6.49	14.2	31.1	42.5	0.24
2:1 (MSU:SMSU)	5.97	3.44	25.2	39.5	6.92
Eagle					
MSU	6.39	5.39	33.42	51.5	0.12
SMSU	2.19	1.90	12.31	25.8	15.87
2:1 (MSU:SMSU)	4.78	4.39	27.55	42.4	5.03

Flotation testing was carried out using reclaim water from the HTDF, rather than plant process water, to avoid any variation that would be introduced by changes in process water chemistry.

Table 13.4 shows the grades and recoveries for the batch rougher flotation tests conducted on the Eagle, Eagle East and Keel samples. Mass pulls and metal recoveries were comparable for each sample pair and metal recoveries were similar to that observed for Eagle ores. As expected, the nickel recovery varies with material type and the copper recovery achieved was greater than 97%. Eagle East CMSU material would require significant blending with other ore types to lower copper grades in the mill feed to meet plant capabilities.

Table 13.4: Batch Rougher Flotation Test Results

Sample	Mass Recovery (%)	Concentrate Grade (%)		Recovery (%)	
		Ni	Cu	Ni	Cu
Eagle Keel	17.4	8.9	5.3	86.5	96.3
MSU					
Eagle	91.3	6.8	5.8	97.1	98.2
Eagle East	92.6	8.4	5.4	97.8	98.5
SMSU					
Eagle	31.7	6.0	5.8	86.2	97.5
Eagle East	28.4	8.4	6.6	87.8	97.4
2:1 (MSU:SMSU)					
Eagle	65.6	6.6	6.5	92.7	98.1
Eagle East	69.4	8.0	5.0	92.0	97.7
CMSU					
Eagle East	90.0	6.7	15.0	91.1	98.4

Flotation kinetics show that the recovery of nickel over time for each test sample indicated that Eagle Keel and Eagle East mineralization are similar to Eagle ore and can be processed in the Humboldt Mill.

13.5 Grade-Recovery Relations

The nickel and copper recovery models were updated to be in line with recent mill performance. Data from January 2018 to May 2022 was used to model the updated recoveries. Next, adjustments were made to the if in formulae for nickel recovery to the nickel concentrate; a 0.6% variation to the indicated recovery per percent change in Nickel grade, away from the 14% Ni used as the base case scenario; and an additional 0.3% variation in recovery per percent of copper grade, away from a base case set at 3%Cu. See the equations in Table 13.5.

Table 13.5: Metallurgical Bulk Flotation Recovery Formulas (2022)

Nickel

If Ni head grade < 1.5242%, then

$$\text{Ni Rec} = 92.1271 \times \frac{\text{Ni Head Grade}}{0.176766 + \text{Ni Head Grade}} + [0.6 \times (14 - \text{Ni Grade in Ni Conc})] + [0.3 \times (3 - \text{Cu Grade in Ni Conc})]$$

If Ni head grade ≥ 1.5242%, then

$$\text{Ni Rec} = 90 - 19.6567e^{(-0.63681 \times \text{Ni Head Grade})} + [0.6 \times (14 - \text{Ni Grade in Ni Conc})] + [0.3 \times (3 - \text{Cu Grade in Ni Conc})]$$

Copper

If Cu head grade < 1.3673%, then

$$\text{Cu Recovery} = 99.7364 \times \frac{\text{Cu Head Grade}}{0.0717297 + \text{Cu Head Grade}}$$

If Cu head grade ≥ 1.3673%, then

$$\text{Cu Recovery} = 98.5 - 11.1274e^{(-0.798395 \times \text{Cu Head Grade})}$$

14.0 MINERAL RESOURCE ESTIMATES

This Technical Report represents an update to the April 26, 2017, National Instrument 43-101 Technical Report titled "Technical Report on the Eagle Mine, Michigan, U.S.A." It provides a Mineral Resource update for the Eagle and Eagle East orebodies as well as a maiden Mineral Resource estimate for the Keel deposit.

The Mineral Resource update for Eagle Mine has been prepared by Eagle Mine technical staff, using both historical and recent drilling results, in accordance with NI 43-101 and following the requirements of Form 43-101F1. The Mineral Resource estimate follows the CIM Estimation of Mineral Resource and Mineral Reserve Best Practice Guidelines (2019) and was classified following the CIM Definition Standards for Mineral Resources and Mineral Reserves (2014). The QP for this Mineral Resource is Mr. Brian Thomas, P. Geo, an independent QP, as defined under NI 43-101 and an employee of WSP Golder based in Sudbury, Ontario, Canada. The Effective Date of this Mineral Resource estimate is December 31, 2022.

Eagle Mine currently consists of three deposits (Eagle, Eagle East, and Keel) and the geological interpretations and Mineral Resource estimate outlined in the following sections were derived from drill hole data, underground mapping, and geological models provided by Eagle mine technical staff, using Seequent Leapfrog Edge™ and Maptek Vulcan Geomodeler™ software.

14.1 Key Assumptions and Data used in the Estimate

14.1.1 Drill Hole Data

The Eagle Mine drill hole database that supports the Mineral Resource update includes collar, downhole survey, assay, and lithology data. The elements and oxides of interest included in the assay data are Cu, Ni, Co, Ag, Au, Pt, Pd, S, Fe_2O_3, MgO, Cr, Zn, TiO_2, SiO_2 as well as bulk density measurements. Drill hole data is stored in an acQuire relational database and was exported as CSV files on May 25, 2022, for the purposes of this update. Summary statistics of available drillholes in the Eagle Mine drill hole database are provided in Table 14.1.

Table 14.1: Summary of Eagle Drill Hole Database May 25, 2022

Drilling Type	Number of Drill Holes	Total Meterage (m)	Number of Samples	Average Depth of Drill Holes (m)
DDH (Surface and Underground	1,323	386,858	33,360	307

Within the database and for the purposes of Mineral Resource estimation, un-assayed values within the mineral wireframes were assumed to be waste and assigned a metal value of one-half the detection limit (of the determining methodology currently used) as shown in Table 14.2.

Table 14.2: Element Half Detection Values

Element	Detection Limit
Ag	1 ppm
Au	0.001 ppm
Co	0.002%
Cu	0.002%
Ni	0.002%
Pd	0.001 ppm
Pt	0.001 ppm
S	0.01%

The drill hole database was reviewed and validated by the QP and significant efforts have been made by Eagle Mine to ensure the drill collar location and downhole survey information is consistent with current drilling best practices. The geological data collection, analytical methods, and QA/QC procedures used by Eagle Mine are consistent with CIM best practice guidelines. It is the opinion of the QP that the drill hole database is robust and bias free for use in the updating of the Mineral Resource estimate.

14.2 Geological Interpretation

Wireframe solids representing the three deposits (Eagle, Eagle East, and Keel) were constructed primarily in Leapfrog Geo modeling software (version 2021.2.5). The wireframes were generated by snapping to drill hole contacts utilizing the implicit modelling module and refining the final shapes by the use of interpretive polylines (structural trends) and underground mapping where applicable. Table 14.3 shows wireframe domains in each ore body.

Table 14.3: Wireframe Solids Utilized for Each Deposit

Geological Domains	Eagle	Eagle East	Keel
Siltstone	X	X	X
Gabbro		X	
Peridotite (<25% Sulphides)	X	X	X
SMSU (25-85% Sulphides)	X	X	
MSU (>85% Sulphides)	X	X	X

The Eagle deposit (Figure 14.1) is predominately a pod like shape dominated by semi-massive sulphide (SMSU, 25-85% sulphide) with a central massive sulphide (MSU, 85-100% sulphide) core within a mineralized peridotite (PER) host. An iterative updating process of using both Leapfrog and Vulcan (version 12.0.4) for the legacy wireframes was employed on the Eagle deposit. The host peridotite was a new wireframe for this update as shown in Figure 14.2.

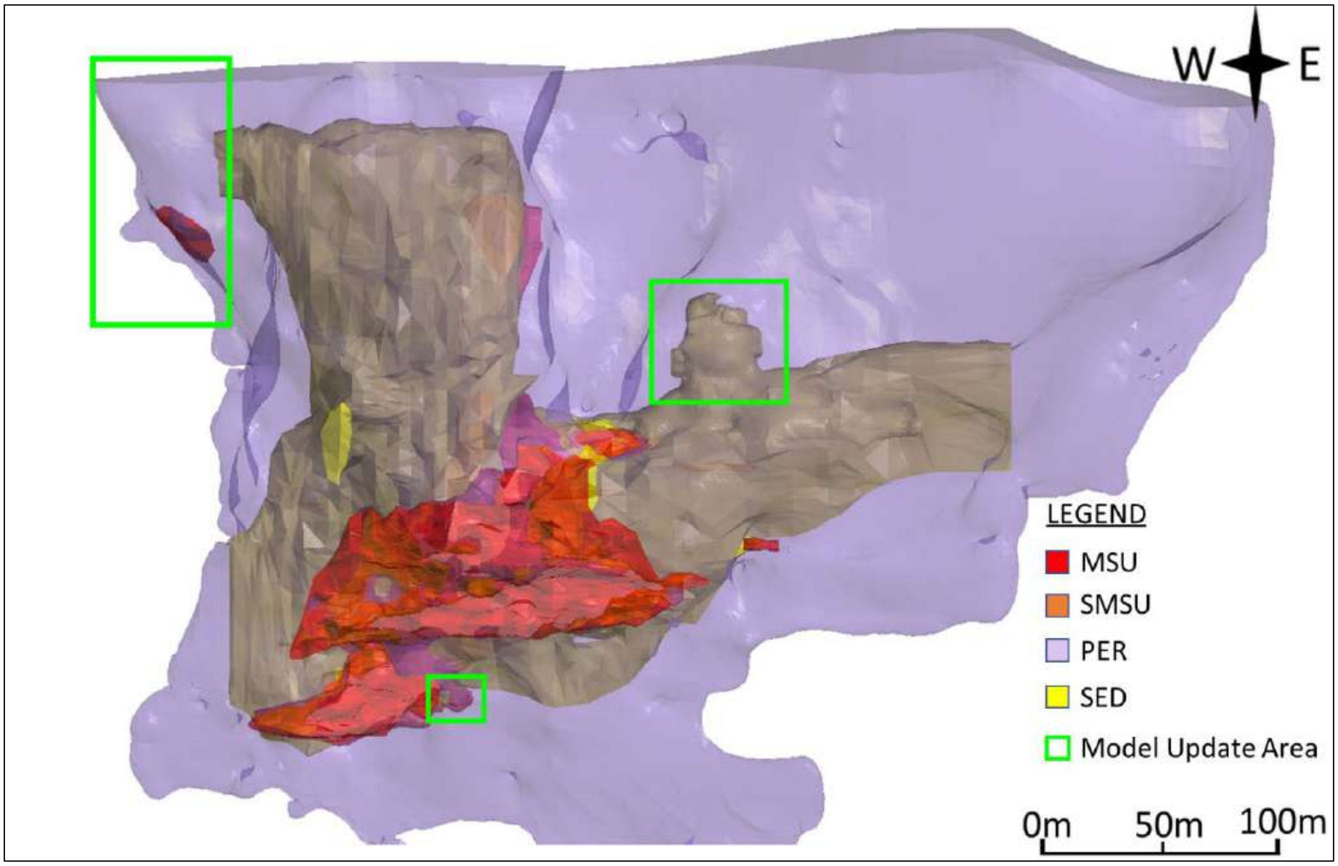

Figure 14.1: View looking North at Updated Mineral Zones within the Eagle Orebody

The Eagle East deposit is an east-west trending lenticular shape dominated by a narrow, vertically oriented SMSU with a distinctly laterally flat, high tenor MSU. The Eagle East SMSU and MSU is hosted within mineralized peridotite proximal to the basal siltstone contact. The deposit crosscut by a later gabbro dyke trending southeast-northwest. Using Leapfrog Geo, the SMSU and PER domains were assigned a structural trend to accommodate the natural East/West bend in the intrusive unit. The MSU domain was given a global trend to accommodate its long and flat orientation.

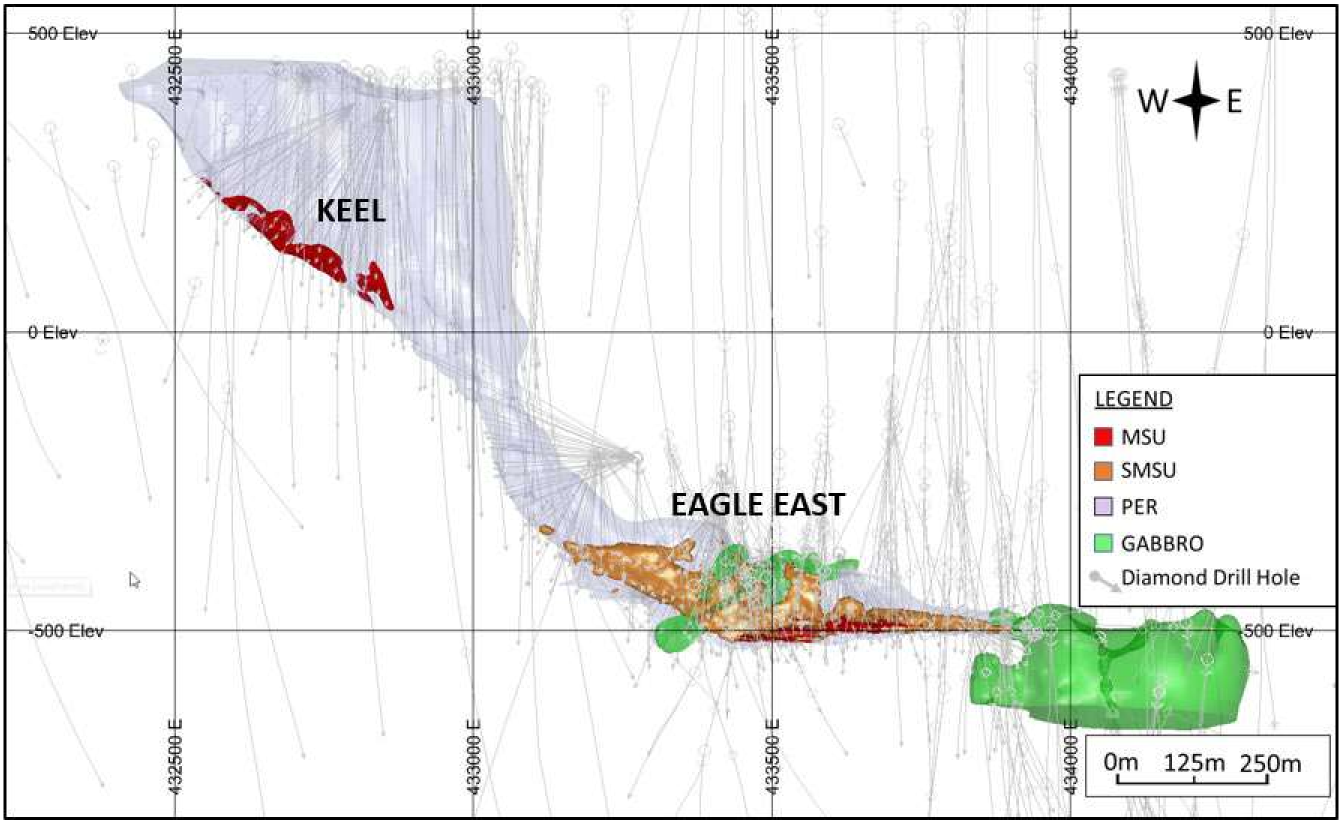

Figure 14.2: Looking North at Eagle East and Keel Deposits

The Keel deposit is a newly defined zone located between Eagle East and Eagle deposits along the East-West trending peridotite siltstone basal contact. The Keel exhibits as a thin trough shaped accumulation of MSU (KMSU) along the mineralized peridotite/siltstone contact. While creating the geologic domains, the PER was assigned a structural trend to accommodate the natural East/West bend in the intrusive unit. The KMSU domain modelled as a vein to accommodate its thin and curved orientation. See Figure 14.2 for the Keel and Eagle East deposit.

The metasediment (siltstone) country rock is non-mineralized and was not modelled for the purposes of this resource update.

14.3 Capping and Outlier Restrictions

14.3.1 Eagle

Previous versions of the Eagle (EA) model used grade capping top-cuts of 3.0 ppm Au, 3.5 ppm Pt, and 2.5 ppm Pd. The use of top-cuts was reviewed by analysis of histograms, cumulative distribution plots and log-probability plots, and these values were considered reasonable and were not changed. In addition, a top-cut of 80 ppm for Ag was implemented for this 2022 Mineral Resource update. Top-cuts were applied to samples after compositing. Table 14.4 shows the restrictions utilized in the Eagle deposit. In addition to these top-cuts, limits were placed on the radii of influence of high-grade samples as follows:

- In the MSU and SMSU domains, samples assaying greater than 10% Cu were constrained to 10% of the search ellipse distance.

- In the PER domain, a 10% distance limit was placed on samples greater than 1.0 g/t Au, 0.25 g/t Pd, 3 g/t Pt, 3% Ni, or 3% Cu.

Table 14.4: Outlier Restrictions in Eagle Deposit Mode

General		Outlier Restrictions		
Domain	Element	Method	Distance (m)	Threshold
Peridotite	Au ppm	Discard	10	1
Peridotite	Cu %	Discard	10	3
Peridotite	Ni %	Discard	10	3
Peridotite	Pd ppm	Clamp	10	0.25
Peridotite	Pt ppm	Clamp	10	3
MSU	Cu %	Discard	10	10
SMSUE	Cu %	Discard	10	10
SMSUW	Cu %	Discard	10	10

Notes: Discard indicates that Samples outside the Distance and above the Threshold are ignored.
Clamp indicates that Samples outside the Distance and above the Threshold are set to the Threshold value.
Distance indicates a % of the Search Distance Parameters.

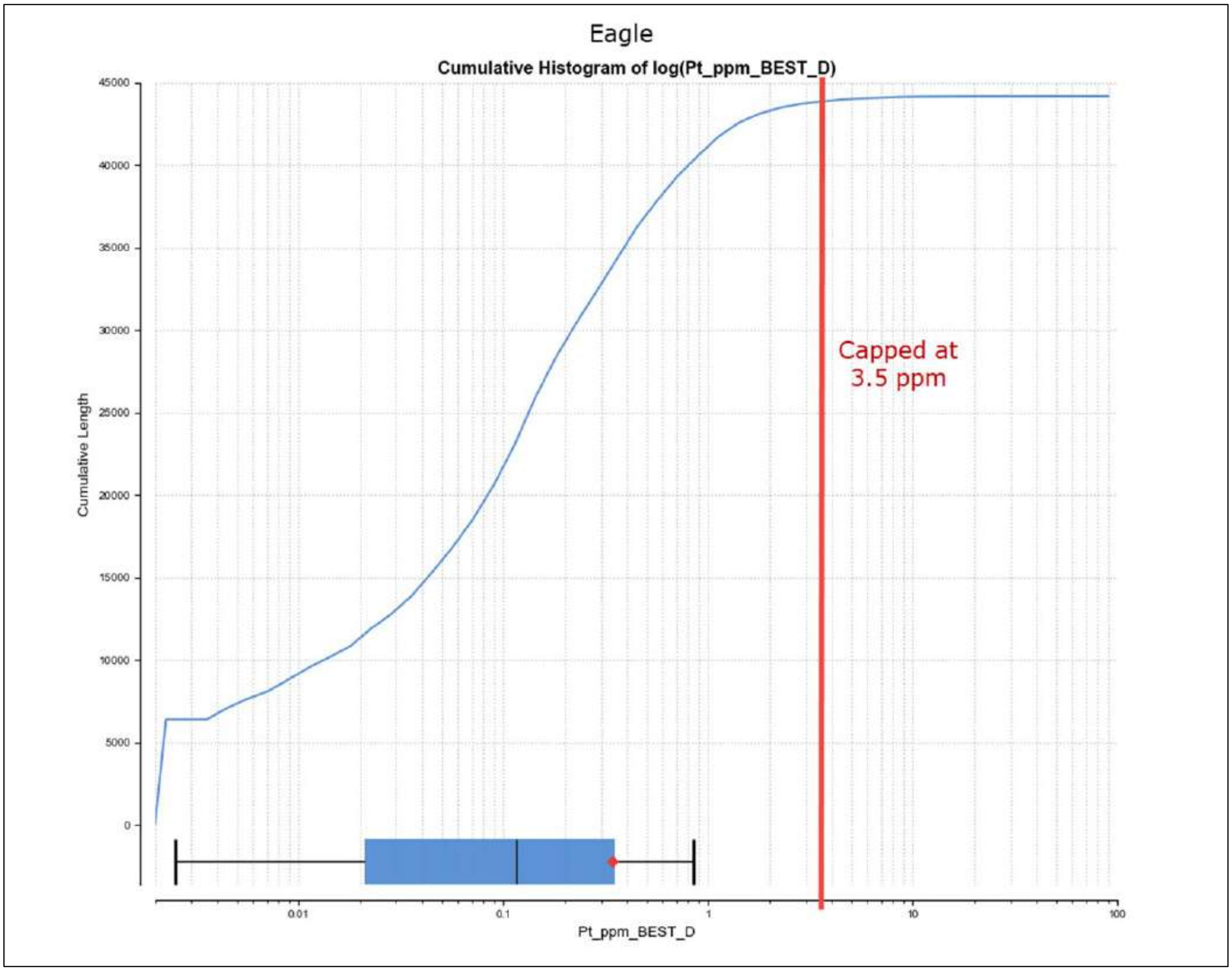

Figure 14.3: Cumulative Histogram of Pt Used in Determining Pt Top-Cut Value

Several methodologies were reviewed in the evaluation and determination of metal top-cut values. Figure 14.3 demonstrates the use of cumulative histograms in determining top-cuts for Eagle Pt values. Table 14.5 summarizes the top-cuts used in each of the different geological domains and shows the number of sample assays capped compared to the total number of samples.

Table 14.5: Number of Eagle Samples Affected by Top-Cuts

Domain	Samples	Elements			
		Ag	Au	Pd	Pt
Peridotite	Total	1822	5994	5965	5978
	Capped	4	8	9	15
MSU	Total	1093	2344	2344	2344
	Capped	18	55	147	116
SMSUE	Total	1002	1685	1685	1685
	Capped	5	8	9	7
SMSUW	Total	918	3696	3696	3696
	Capped	7	32	16	39

14.3.2 Eagle East

The use of top-capping was reviewed by analysis of histograms, cumulative distribution plots and log-probability plots. In addition, a comparison of estimated block grades with the input data was conducted. Outlier distance restriction was applied to all elements in the PER domain to limit the influence of high-grade samples along imperfect domain shape margins. See Table 14.6 for the restrictions utilized in Eagle East.

Table 14.6: Outlier Restrictions in Eagle East

General		Outlier Restrictions		
Domain	Element	Method	Distance (m)	Threshold
Peridotite	Ag ppm	Discard	2	10
Peridotite	Au ppm	Discard	2	2.5
Peridotite	Co %	Discard	2	0.07
Peridotite	Cu %	Discard	2	2.5
Peridotite	Ni %	Discard	2	2
Peridotite	Pd ppm	Discard	2	1.5
Peridotite	Pt ppm	Discard	2	1.5
Peridotite	S %	Discard	2	20
Peridotite	SG	Discard	2	3.5
Siltstone	SG	Discard	0	3.2

Notes: Discard indicates that Samples outside the Distance and above the Threshold are ignored.
Clamp indicates that Samples outside the Distance and above the Threshold are set to the Threshold value.
Distance indicates a % of the Search Distance Parameters.

14.3.3 Keel

The use of top-cuts was reviewed by analysis of histograms, cumulative distribution plots and log-probability plots. In addition, a comparison of estimated block grades with the input data was conducted. Outlier distance restriction was also tested during the grade estimation. Outlier distance restriction was applied to all elements in the PER domain to limit the influence of elevated grades caused by sulphide veins. See Table 14.17 for the restrictions used.

Table 14.7 :Outlier Restrictions in the Keel

General		Outlier Restrictions		
Domain	Elements	Method	Distance (m)	Threshold
Peridotite	Ag ppm	Discard	2	10
Peridotite	Au ppm	Discard	2	0.502
Peridotite	Co %	Discard	2	0.07
Peridotite	Cu %	Discard	2	2.5
Peridotite	Ni %	Clamp	2	2
Peridotite	Pd ppm	Discard	2	1.342
Peridotite	Pt ppm	Discard	2	1.5
Peridotite	S %	Discard	2	20
Peridotite	SG	Discard	2	3.5

Notes: Discard indicates that Samples outside the Distance and above the Threshold are ignored.
Clamp indicates that Samples outside the Distance and above the Threshold are set to the Threshold value.
Distance indicates a % of the Search Distance Parameters.

14.4 Compositing

A 1.5 m composite length was used to standardise the sample length; this corresponds to the predominant sampling interval (see Figure 14.4).

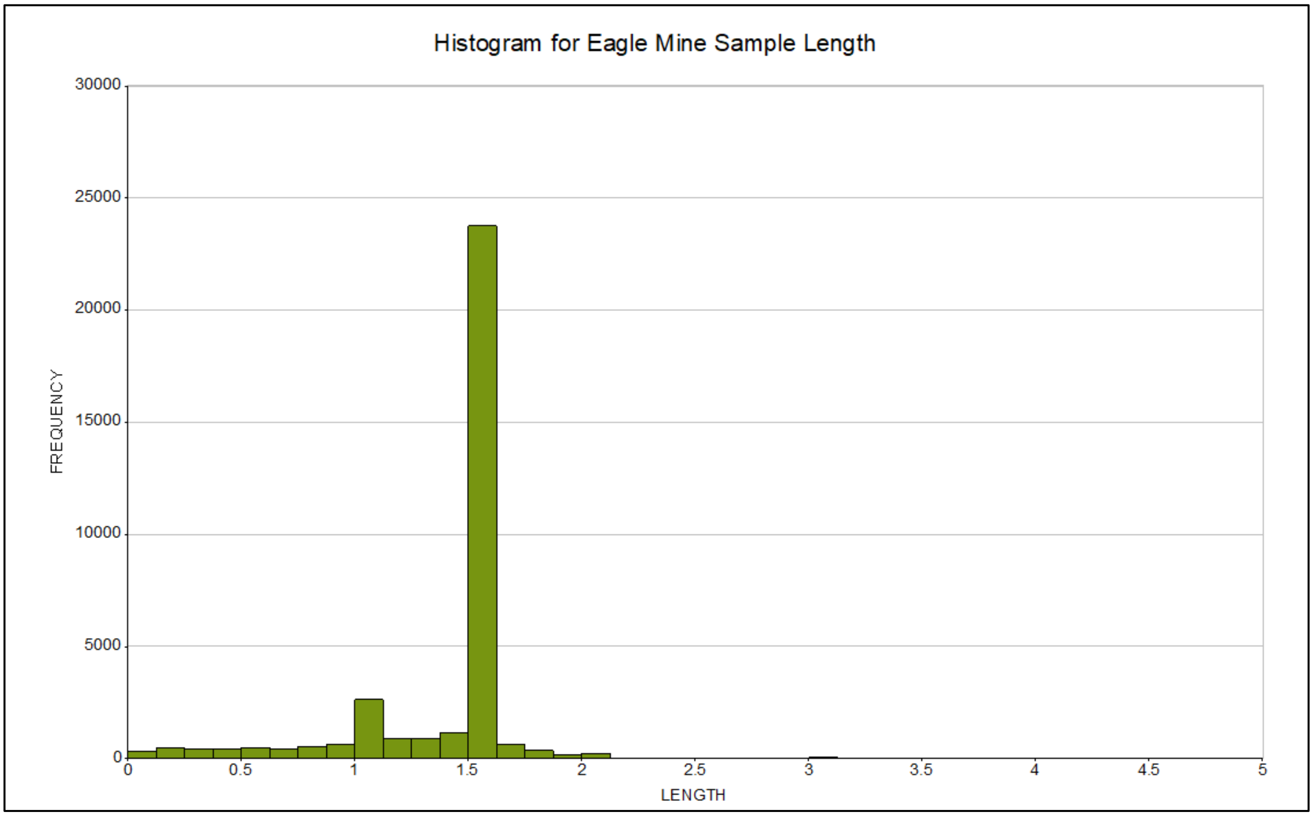

Figure 14.4: Histogram for Eagle Mine Sample Length

Compositing was carried out by domain. Residual composite segments less than 0.75 m had their length distributed equally amongst the other intervals. Where this occurred, the resulting composite lengths were longer than 1.5 m. Due to the lack of sampling in the sediment domain any un-sampled or un-assayed intervals were assigned very low values (0.001) before compositing to prevent grade extrapolation into un-sampled areas. Table 14.8, Table 14.9, and Table 14.10 present comparisons of raw assay data versus composites for the Eagle, Eagle East and Keel deposits, respectively.

Table 14.8: Summary of Eagle Deposit Sample Statistics by Domain (weighted by length)

MSU										
Element	Type	Ni %	Cu %	Co %	Au g/t	Pt g/t	Pd g/t	Ag g/t	S %	SG
Count	Raw	2635	2635	2635	2344	2344	2344	1093	2635	2097
	Composite	2450	2450	2450	2255	2255	2255	1041	2450	2043
Minimum	Raw	0.02	0.04	0.00	0.00	0.00	0.00	5.00	0.21	2.53
	Composite	0.03	0.04	0.00	0.00	0.00	0.00	0.50	0.21	2.74
Maximum	Raw	7.96	24.30	0.24	18.80	23.40	12.25	213.00	44.70	4.99
	Composite	7.88	24.23	0.23	3.00	3.50	2.50	80.00	42.13	4.96
Mean	Raw	5.94	4.53	0.16	0.40	1.23	0.88	16.48	34.51	4.51
	Composite	5.93	4.52	0.16	0.36	1.12	0.78	15.84	34.45	4.51
Standard Deviation	Raw	0.90	2.81	0.03	0.92	1.35	1.06	16.87	4.23	0.27
	Composite	0.84	2.76	0.03	0.53	0.82	0.65	13.25	3.93	0.26
Coefficient of Variation	Raw	0.15	0.62	0.21	2.28	1.10	1.20	1.02	0.12	0.06
	Composite	0.14	0.61	0.20	1.50	0.73	0.83	0.84	0.11	0.06

SMSUE										
Element	Type	Ni %	Cu %	Co %	Au g/t	Pt g/t	Pd g/t	Ag g/t	S %	SG
Count	Raw	1938	1938	1938	1685	1685	1685	1002	1938	1140
	Composite	1768	1777	1777	1609	1609	1609	968	1777	1088
Minimum	Raw	0.01	0.01	0.00	0.00	0.00	0.00	0.50	0.09	1.64
	Composite	0.01	0.01	0.00	0.00	0.00	0.00	0.50	0.34	1.64
Maximum	Raw	8.09	19.00	0.18	8.16	14.10	7.29	158.00	37.10	4.91
	Composite	7.70	18.90	0.15	3.00	3.50	2.50	80.00	34.31	4.87
Mean	Raw	2.05	1.66	0.06	0.20	0.48	0.31	7.55	11.16	3.39
	Composite	2.05	1.67	0.06	0.20	0.47	0.31	7.43	11.15	3.39
Standard Deviation	Raw	0.84	0.99	0.02	0.34	0.48	0.33	8.72	4.53	0.24
	Composite	0.81	0.94	0.02	0.27	0.34	0.26	6.42	4.37	0.23
Coefficient of Variation	Raw	0.41	0.60	0.36	1.66	1.00	1.06	1.15	0.41	0.07
	Composite	0.39	0.57	0.35	1.34	0.72	0.86	0.86	0.39	0.07

SMSUW										
Element	Type	Ni %	Cu %	Co %	Au g/t	Pt g/t	Pd g/t	Ag g/t	S %	SG
Count	Raw	4378	4378	4378	3696	3696	3696	918	4347	1538
	Composite	4036	4043	4043	3582	3582	3582	871	4023	1482
Minimum	Raw	0.17	0.14	0.01	0.00	0.00	0.00	0.50	1.09	2.34
	Composite	0.19	0.15	0.01	0.00	0.00	0.00	0.71	1.19	2.48
Maximum	Raw	11.75	28.50	0.20	16.05	23.60	9.76	107.00	49.40	4.60
	Composite	8.09	24.16	0.19	3.00	3.50	2.50	80.00	41.99	4.49
Mean	Raw	1.91	2.15	0.05	0.30	0.52	0.31	13.04	9.97	3.28

	Composite	1.91	2.16	0.05	0.28	0.50	0.31	13.06	9.97	3.28
Standard Deviation	Raw	0.76	1.69	0.02	0.73	0.85	0.43	14.23	3.86	0.23
	Composite	0.70	1.61	0.02	0.42	0.58	0.34	13.75	3.59	0.21
Coefficient of Variation	Raw	0.39	0.79	0.37	2.39	1.62	1.36	14.23	0.39	0.07
	Composite	0.36	0.75	0.35	1.48	1.16	1.09	1.05	0.36	0.06
PER										
Element	Type	Ni %	Cu %	Co %	Au g/t	Pt g/t	Pd g/t	Ag g/t	S %	SG
Count	Raw	6479	6484	6476	5994	5978	5965	1822	6487	2894
	Composite	6143	6142	6137	5809	5796	5789	1651	6145	2819
Minimum	Raw	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.01	1.07
	Composite	0.01	0.00	0.00	0.00	0.00	0.00	0.50	0.02	1.29
Maximum	Raw	9.48	19.70	0.20	43.10	82.00	10.85	165.00	39.70	4.80
	Composite	6.92	8.75	0.19	3.00	3.50	2.50	69.00	37.60	4.50
Mean	Raw	0.55	0.44	0.02	0.06	0.12	0.06	2.21	2.81	3.04
	Composite	0.55	0.44	0.02	0.06	0.11	0.07	2.22	2.83	3.04
Standard Deviation	Raw	0.41	0.48	0.01	0.40	0.85	0.14	3.48	2.42	0.19
	Composite	0.37	0.40	0.01	0.15	0.21	0.11	2.40	2.19	0.17
Coefficient of Variation	Raw	0.74	1.09	0.52	6.42	7.17	2.14	1.57	0.86	0.06
	Composite	0.68	0.91	0.47	2.55	1.93	1.73	1.08	0.78	0.06

Table 14.9: Summary of Eagle East Deposit Sample Statistics by Domain (weighted by length)

MSU

Element	Type	Ni %	Cu %	Co %	Au g/t	Pt g/t	Pd g/t	Ag g/t	S %	SG
Count	Raw	699	699	699	699	699	699	681	699	249
	Composite	649	649	649	649	649	649	633	649	265
Minimum	Raw	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.01	2.65
	Composite	0.08	0.09	0.00	0.00	0.02	0.02	2.00	1.25	3.00
Maximum	Raw	10.65	28.10	0.24	13.40	49.50	58.80	194.00	38.90	6.06
	Composite	10.36	19.40	0.23	11.60	18.15	36.31	116.00	38.90	6.06
Mean	Raw	7.34	5.88	0.16	0.58	2.19	1.73	20.28	33.41	4.48
	Composite	7.34	5.89	0.16	0.58	2.19	1.74	20.29	33.42	4.45
Standard Deviation	Raw	1.55	3.50	0.04	1.29	2.37	2.88	16.05	5.44	0.37
	Composite	1.43	3.50	0.04	1.22	2.22	2.67	15.66	4.67	0.32
Coefficient of Variation	Raw	0.21	0.60	0.24	2.21	1.08	1.66	0.79	0.16	0.08
	Composite	0.19	0.60	0.23	2.09	1.01	1.54	0.77	0.14	0.07

SMSU

Element	Type	Ni %	Cu %	Co %	Au g/t	Pt g/t	Pd g/t	Ag g/t	S %	SG
Count	Raw	2086	2086	2086	2086	2086	2086	2086	2086	407
	Composite	1981	1987	1987	1987	1987	1987	1987	1987	513
Minimum	Raw	0.11	0.04	0.00	0.00	0.00	0.00	0.50	0.38	2.63
	Composite	0.12	0.04	0.00	0.00	0.00	0.00	0.50	0.37	2.63
Maximum	Raw	9.75	16.55	0.22	10.05	13.15	10.30	62.00	36.50	5.42
	Composite	6.71	16.55	0.18	6.14	8.12	10.30	62.00	37.20	5.11
Mean	Raw	2.21	1.78	0.05	0.22	0.60	0.42	7.35	9.32	3.37
	Composite	2.21	1.78	0.05	0.22	0.60	0.42	7.35	9.32	3.35
Standard Deviation	Raw	1.15	1.13	0.02	0.39	0.58	0.54	5.20	4.77	0.25
	Composite	1.09	1.07	0.02	0.34	0.54	0.50	5.20	4.50	0.25
Coefficient of Variation	Raw	0.52	0.64	0.43	1.75	0.96	1.28	0.71	0.51	0.08
	Composite	0.49	0.60	0.40	1.52	0.90	1.17	0.71	0.48	0.07

PER

Element	Type	Ni %	Cu %	Co %	Au g/t	Pt g/t	Pd g/t	Ag g/t	S %	SG
Count	Raw	7682	7680	7664	7693	7685	7680	5573	7683	3021
	Composite	7634	7634	7624	7646	7636	7627	5492	7636	3378
Minimum	Raw	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	1.81
	Composite	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.01	2.21
Maximum	Raw	9.46	16.40	0.20	24.30	6.19	10.50	62.00	36.60	4.64
	Composite	8.22	11.40	0.15	18.70	6.48	8.48	44.00	33.20	4.60
Mean	Raw	0.57	0.44	0.02	0.06	0.14	0.10	2.25	2.28	3.06

	Composite	0.56	0.44	0.02	0.06	0.14	0.10	2.22	2.25	3.06
Standard Deviation	Raw	0.44	0.40	0.01	0.29	0.17	0.17	1.87	1.99	0.16
	Composite	0.40	0.36	0.01	0.23	0.16	0.14	1.67	1.81	0.15
Coefficient of Variation	Raw	0.77	0.90	0.48	4.96	1.21	1.69	0.83	0.87	0.05
	Composite	0.72	0.84	0.45	4.05	1.16	1.43	0.75	0.81	0.05

Table 14.10: Summary of Keel Deposit Sample Statistics by Domain (weighted by length)

MSU										
Element	Type	Ni %	Cu %	Co %	Au g/t	Pt g/t	Pd g/t	Ag g/t	S %	SG
Count	Raw	47	47	47	47	47	47	30	47	19
	Composite	42	42	42	28	42	42	27	42	17
Minimum	Raw	1.82	0.09	0.05	0.02	0.02	0.02	2.00	12.85	3.45
	Composite	1.82	0.09	0.05	0.02	0.02	0.02	2.00	45.50	3.45
Maximum	Raw	9.79	4.97	0.22	0.34	1.42	1.18	26.00	37.70	4.60
	Composite	9.79	4.97	0.21	0.25	1.17	1.18	26.00	37.20	4.58
Mean	Raw	5.45	2.08	0.15	0.11	0.43	0.30	6.13	28.89	4.14
	Composite	5.41	2.06	0.15	0.11	0.43	0.30	6.02	28.72	4.15
Standard Deviation	Raw	1.55	0.81	0.05	0.07	0.26	0.21	3.70	6.88	0.38
	Composite	1.45	0.72	0.04	0.06	0.25	0.21	3.44	6.54	0.35
Coefficient of Variation	Raw	0.29	0.39	0.40	0.65	0.61	0.71	0.79	0.24	0.09
	Composite	0.27	0.35	0.28	0.59	0.58	0.69	0.57	0.23	0.08

PER										
Element	Type	Ni %	Cu %	Co %	Au g/t	Pt g/t	Pd g/t	Ag g/t	S %	SG
Count	Raw	3981	3978	3964	3991	3982	3975	1927	3981	2047
	Composite	4060	4058	4048	4069	4060	4049	1958	4060	2264
Minimum	Raw	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.01	1.81
	Composite	0.01	0.00	0.00	0.00	0.00	0.00	0.50	0.01	2.21
Maximum	Raw	8.06	5.68	0.18	0.50	1.65	1.51	25.00	31.30	4.09
	Composite	7.26	5.10	0.15	0.50	1.65	1.34	22.48	28.18	3.99
Mean	Raw	0.58	0.42	0.02	0.05	0.11	0.07	2.15	2.14	3.03
	Composite	0.57	0.41	0.02	0.05	0.10	0.07	2.11	2.10	3.03
Standard Deviation	Raw	0.40	0.31	0.01	0.04	0.09	0.06	1.33	1.75	0.15
	Composite	0.38	0.30	0.01	0.04	0.08	0.06	1.25	1.66	0.14
Coefficient of Variation	Raw	0.69	0.76	0.41	0.86	0.83	0.86	0.62	0.82	0.05
	Composite	0.66	0.74	0.40	0.83	0.82	0.83	0.59	0.79	0.04

14.5 Bulk Density

Eagle Mine bulk density measurements are determined by a certified laboratory (ALS) as part of the regular drill hole sampling program. The resultant values reside within the acQuire drill hole database. The bulk density is interpolated into domain model blocks via ordinary kriging (OK) with sample weighting based on modelled variography. Blocks that remain un-estimated are filled with average domain values unique to each deposit. Table 14.11 displays the average domain values for each deposit at Eagle Mine.

Table 14.11: Average Bulk Density for Each Unique Domain

Domain	Eagle	Eagle East	Keel
	Density (g/cm^3)	Density (g/cm^3)	Density (g/cm^3)
Massive Sulphide (MSU)	4.49	4.46	4.46
Semi-massive Sulphide (SMSU)	3.23	3.37	3.37
Peridotite (PER)	3.00	3.14	3.14
Sediment (SED)	2.80	2.95	2.95

The QP validated the bulk density values by reviewing the drillhole database and by visually comparing estimated block values against drill hole values. The bulk density estimates were found to be representative of the data for each domain.

14.6 Variography

The spatial continuity of the capped composite grades, in each mineralized domain and for each orebody, was assessed using Leapfrog Edge software. A two structure, spherical variogram was modelled for each domain as shown in the example in Figure 14.5. Contacts between the domains were defined as “hard” boundaries. Geometric anisotropy was determined for each domain and grade item from the contoured variograms, and subsequent ellipses were checked against the geological structural to confirm validity and alignment. Examples of the anisotropy and modelled variograms are shown in Figure 14.5 and Figure 14.6. All variogram models are on file at Eagle Mine. A table of resultant search ellipses and estimation parameters can be found below in Table 14.12, Table 14.13, and Table 14.14.

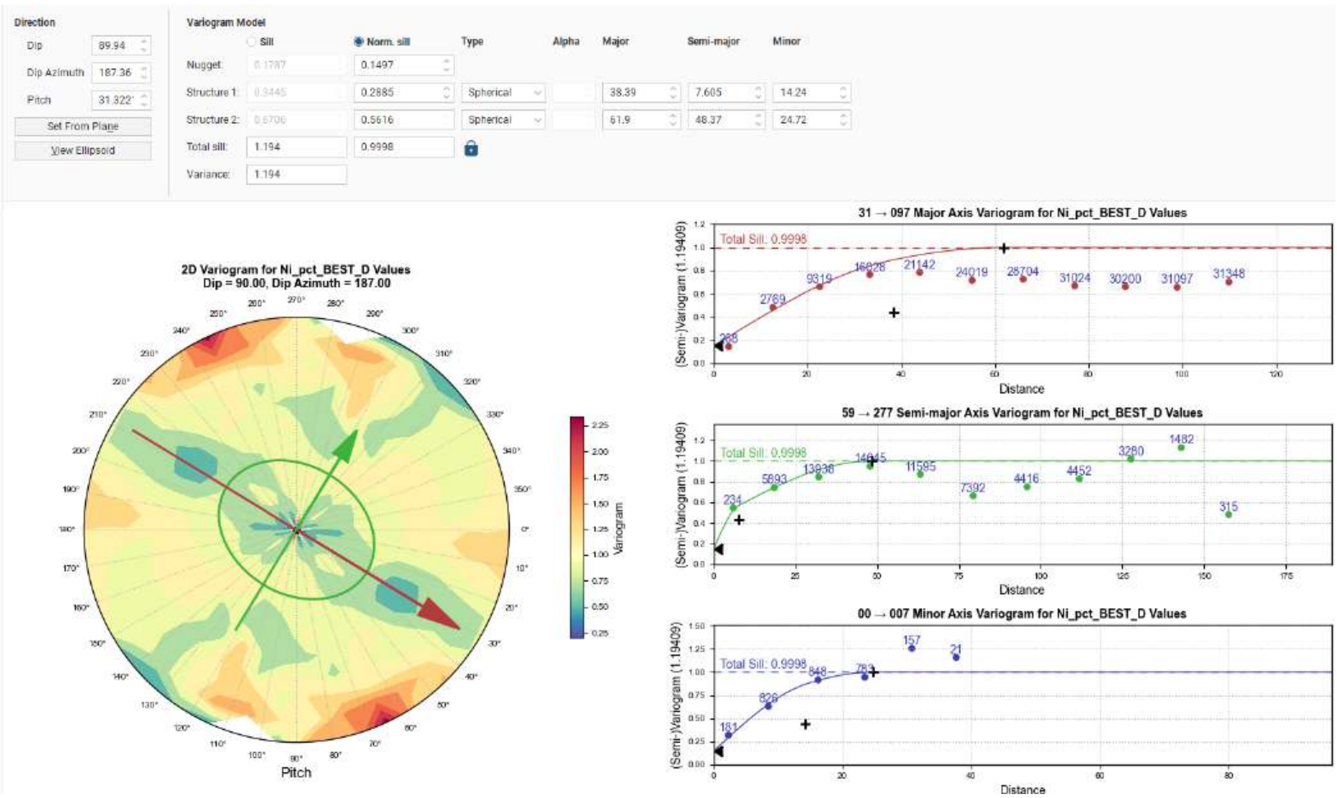

Figure 14.5: Eagle East SMSU Ni Variogram Model

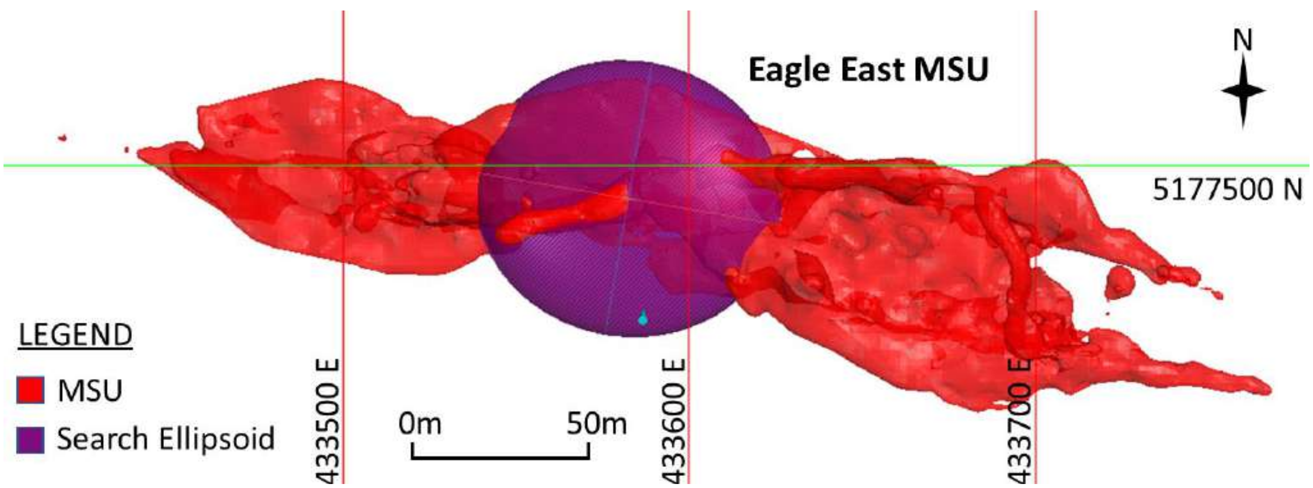

Figure 14.6: Plan View of Eagle East MSU Domain Ni Grade Search Ellipse Derived from Variogram Model

14.7 Block Model Interpolations

All models at Eagle Mine use 5m x 5m x 5m parent cell blocks. Eagle and Keel models sub cell to a 1m x 1m x 1m block size whereas the Eagle East model is sub celled to a 2.5m(X) x 2.5m(Y) x 1.25m(Z) block size reflecting the lateral nature of the mineralization. The sub-cells use parent cell grade values. No block rotations were utilized. Table 14.12 depicts block model extents and parameters for each deposit. The orientation, block sizes and sub-celling applied to the Eagle deposits are reasonable for the geologic domains, the style of mineralization and the mining methods employed.

Table 14.12: Block Model Extents and Parameters

Deposit	Co-ordinate	Origin (UTM)	Extents (m)	Parent Cell Size (m)	No. of blocks	No. of Subcell Splits	Minimum Cell Dimension (m)
Eagle	Easting (X)	431,325	550	5 m	110	5	1
	Northing (Y)	5,177,450	200	5 m	40	5	1
	Elevation (Z)	100	450	5 m	90	5	1
Eagle East	Easting (X)	433,130	1,255	5 m	251	2	2.5
	Northing (Y)	5,177,225	355	5 m	71	2	2.5
	Elevation (Z)	-645	545	5 m	109	4	1.25
Keel	Easting (X)	432,400	730	5 m	146	5	1
	Northing (Y)	5,177,225	355	5 m	71	5	1
	Elevation (Z)	-495	960	5 m	192	5	1

Each model contained similar variable fields. The variables common to all block models are summarized in Table 14.13.

Table 14.13: Parameter Fields Common to all Models

Summary of Common Block Model Fields	
Variables	**Description**
ni_k	Ordinary Kriged Nickel value in percent
cu_k	Ordinary Kriged Copper value in percent
den_k	Ordinary Kriged bulk density value in tonnes/m^3
pd_k	Ordinary Kriged Palladium value in gpt
pt_k	Ordinary Kriged Platinum value in gpt
au_k	Ordinary Kriged Gold value in gpt
co_k	Ordinary Kriged Cobalt value in percent
ag_k	Ordinary Kriged Silver value in gpt
zone	MSU,PER,SLST,SMSU,OB,OUT lithologies
ag_nn	Nearest Neighbor Silver value in gpt
au_nn	Nearest Neighbor Gold value in gpt
co_nn	Nearest Neighbor Cobalt value in percent
cu_nn	Nearest Neighbor Copper value in percent
ni_nn	Nearest Neighbor Nickel value in percent
pd_nn	Nearest Neighbor Palladium value in gpt
pt_nn	Nearest Neighbor Platinum value in gpt
sg_nn	Nearest Neighbor bulk density value in tonnes/m^3
ni_var	Kriging Variance for Nickel
ni_min_d	Distance to Closest Sample for Nickel
ni_ns	Number of Samples Used in Kriging Estimation for Nickel
ni_avg_d	Average number of Samples Used in Kriging Estimation for
cu_var	Kriging Variance for Copper
cu_min_d	Distance to Closest Sample for Copper
cu_ns	Number of Samples Used in Kriging Estimation for Copper
cu_avg_d	Average number of Samples Used in Kriging Estimation for
pt_var	Kriging Variance for Platinum
pt_min_d	Distance to Closest Sample for Platinum
pt_ns	Number of Samples Used in Kriging Estimation for Platinum
pt_avg_d	Average number of Samples Used in Kriging Estimation for
class	Resource Classification: 1 is Measured, 2 is Indicated, 3 is
ee_nsr_22*	**Eagle East and Keel NSR Value Calculated from Script in US$**
ea_nsr_22*	**Eagle NSR Value Calculated from Script in US$**

Note: *NSR values unique to each model

The Ordinary Kriging method of interpolation was used to estimate Cu, Ni, Co, Ag, Au, Pt, Pd, and bulk density block grades within the Eagle 3D block models in single passes. Grade estimation was completed utilizing Leapfrog Edge software. The search ellipses were based on the geometric anisotropy derived from the variogram models for each of the grade items and domains, an example for the Eagle East SMSU Ni is shown in Table 14.14. The initial search distances were based on the modelled variogram ranges and increased up to 1.5 times the variogram ranges on an ad-hoc basis when it was noted that grades were not being interpolated into blocks distal to the composites.

Table 14.14: Eagle Estimation Parameters

		Leapfrog Ellipsoid Parameters						Leapfrog Estimation Parameters						
		Dip	Maximum Distance (m)	Dip Azimuth	Intermediate Distance (m)	Pitch	Minimum Distance (m)	Minimum # Samples	Maximum # Samples	Maximum samples per DDH	1st Pass (%)	TopCut (g/t)	Threshold (g/t or %)	Distance (%)
MSU	Cu %	80	77	10	77	0	22	4	10	3	100		10	10
	Ni %	80	77	10	77	0	22	4	10	3	100			
	Co %	80	77	10	77	0	22	4	10	3	100			
	Au g/t	80	77	10	77	0	22	4	10	3	100	3		
	Pd g/t	80	77	10	77	0	22	4	10	3	100	2.5		
	Pt g/t	80	77	10	77	0	22	4	10	3	100	3.5		
	S %	80	77	10	77	0	22	4	10	3	100			
	SG	80	77	10	77	0	22	4	10	3	100			
SMSUE	Cu %	80	80	10	80	0	30	4	10	3	100		10	10
	Ni %	80	80	10	80	0	30	4	10	3	100			
	Co %	80	80	10	80	0	30	4	10	3	100			
	Au g/t	80	80	10	80	0	30	4	10	3	100	3		
	Pd g/t	80	80	10	80	0	30	4	10	3	100	2.5		
	Pt g/t	80	80	10	80	0	30	4	10	3	100	3.5		
	S %	80	80	10	80	0	30	4	10	3	100			
	SG	80	80	10	80	0	30	4	10	3	100			
SMSUW	Cu %	80	75	10	75	0	39	6	10	3	100		10	10
	Ni %	80	60	10	60	0	45	6	10	3	100			
	Co %	80	79	10	79	0	22	6	10	3	100			
	Au g/t	80	110	10	110	0	25	6	10	3	100	3		

		Leapfrog Ellipsoid Parameters						Leapfrog Estimation Parameters						
		Dip	Maximum Distance (m)	Dip Azimuth	Intermediate Distance (m)	Pitch	Minimum Distance (m)	Minimum # Samples	Maximum # Samples	Maximum samples per DDH	1st Pass (%)	TopCut (g/t)	Threshold (g/t or %)	Distance (%)
	Pd g/t	80	121	10	121	0	25	6	10	3	100	2.5		
	Pt g/t	80	143	10	143	0	40	6	10	3	100	3.5		
	S %	80	80	10	80	0	30	6	10	3	100			
	SG	80	80	10	80	0	30	6	10	3	100			
PER	Cu %	80	108	10	108	0	31	6	10	3	100		3	10
PER	Ni %	80	100	10	100	0	30	6	10	3	100		3	10
PER	Co %	80	81	10	81	0	14	6	10	3	100			
PER	Au g/t	80	121	10	121	0	44	6	10	3	100		1	10
PER	Pd g/t	80	143	10	143	0	55	6	10	3	100		0.25	10
PER	Pt g/t	80	143	10	143	0	55	6	10	3	100		3	10
PER	S %	80	100	10	100	0	30	6	10	3	100			
PER	SG	80	80	10	80	0	30	6	10	3	100			

Notes: Discard indicates that Samples outside the Distance and above the Threshold are ignored.
Clamp indicates that Samples outside the Distance and above the Threshold are set to the Threshold value.
Distance indicates a % of the Search Distance Parameters

Table 14.15: Eagle East Estimation Parameters

		Leapfrog Ellipsoid Parameters						Leapfrog Estimation Parameters						
		Dip	Maximum Distance (m)	Dip Azimuth	Intermediate Distance (m)	Pitch	Minimum Distance (m)	Minimum # Samples	Maximum # Samples	Maximum samples per DDH	1st Pass (%)	TopCut (g/t)	Threshold (g/t or %)	Distance (%)
MSU	Cu %	89.88	55	8.44	27	3.15	27	4	20	3	100	0	0	
	Ni %	89.97	45	9.77	15	6.02	40	4	20	3	100	0	0	
	Co %	89.77	71	6.17	14	9.65	27	4	20	3	100	0	0	
	Au g/t	90.00	45	11.00	17	3.00	17	4	20	3	100	0	0	
	Pd g/t	89.79	62	7.88	18	8.35	25	4	20	3	100	0	0	
	Pt g/t	90.00	60	7.00	15	5.00	25	4	20	3	100	0	0	
	S %	89.67	70	7.54	15	7.61	30	4	20	3	100	0	0	
	SG	89.70	45	6.62	21	8.45	35	4	20	3	100	0	0	
SMSU	Cu %	88.16	65	7.60	32	149.09	36	4	20	3	100	0	0	
	Ni %	89.94	55	187.36	49	31.32	16	4	20	3	100	0	0	
	Co %	88.16	70	9.03	30	152.10	30	4	20	3	100	0	0	
	Au g/t	88.61	49	186.77	20	34.70	34	4	20	3	100	0	0	
	Pd g/t	89.81	75	187.07	50	28.31	30	4	20	3	100	0	0	
	Pt g/t	88.94	50	184.07	30	3.23	25	4	20	3	100	0	0	
	S %	88.16	75	5.08	50	149.75	35	4	20	3	100	0	0	
	SG	88.90	45	184.07	40	12.49	30	4	20	3	100	0	0	

		Leapfrog Ellipsoid Parameters						Leapfrog Estimation Parameters						
		Dip	Maximum Distance (m)	Dip Azimuth	Intermediate Distance (m)	Pitch	Minimum Distance (m)	Minimum # Samples	Maximum # Samples	Maximum samples per DDH	1st Pass (%)	TopCut (g/t)	Threshold (g/t or %)	Distance (%)
PER	Cu %	83.10	65	6.29	45	150.25	35	4	18	3	100	0	2.5	2
	Ni %	83.10	70	6.29	75	147.60	50	4	18	3	100	0	2.0	2
	Co %	84.70	60	3.48	45	147.24	32	4	18	3	100	0	0.1	2
	Au g/t	89.00	65	188.00	40	22.21	40	4	18	3	100	0	2.5	2
	Pd g/t	89.60	65	184.20	65	27.49	35	4	18	3	100	0	1.5	2
	Pt g/t	88.90	40	184.07	30	20.84	20	4	18	3	100	0	1.5	2
	S %	83.10	80	6.29	70	158.06	45	4	18	3	100	0	20.0	2
	SG	83.50	75	6.30	50	129.14	50	4	18	3	100	0	3.5	2

Notes: Discard indicates that Samples outside the Distance and above the Threshold are ignored.
Clamp indicates that Samples outside the Distance and above the Threshold are set to the Threshold value.
Distance indicates a % of the Search Distance Parameters
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Table 14.16: Keel Estimation Parameters

		Leapfrog Ellipsoid Parameters						Leapfrog Estimation Parameters							
		Dip	Maximum Distance (m)	Dip Azimuth	Intermediate Distance (m)	Pitch	Minimum Distance (m)	Minimum # Samples	Maximum # Samples	Maximum samples per DDH	1st Pass (%)	TopCut (g/t)	Threshold (g/t or %)	Distance (%)
KMSU	Cu %	33.28	91.14	77.12	21.83	90.59	5.89	4	20	3	100	0	0	
	Ni %	32.58	115.10	79.09	37.32	90.00	7.66	4	20	3	100	0	0	
	Co %	31.90	85.75	81.71	45.29	90.00	10.32	4	20	3	100	0	0	
	Au g/t	32.10	110.20	79.38	55.21	90.00	27.00	4	20	3	100	0	0	
	Pd g/t	33.84	95.20	80.75	18.04	90.00	3.79	4	20	3	100	0	0	
	Pt g/t	32.16	46.27	80.14	33.78	90.00	6.77	4	20	3	100	0	0	
	S %	33.20	59.14	83.56	41.31	90.00	8.10	4	20	3	100	0	0	
	SG	35.41	170.00	78.29	100.00	90.00	34.00	4	20	3	100	0	0	
KPER	Cu %	83.08	65	6.29	45	150.25	35	4	18	3	100	0	2.5	2
	Ni %	83.08	70	6.29	75	147.60	50	4	18	3	100	0	2.0	2
	Co %	84.69	60	3.48	45	147.24	32	4	18	3	100	0	0.1	2
	Au g/t	89.00	65	188.00	40	22.21	40	4	18	3	100	0	0.5	2
	Pd g/t	89.62	65	184.20	65	27.49	35	4	18	3	100	0	1.3	2
	Pt g/t	88.94	40	184.07	30	20.84	20	4	18	3	100	0	1.5	2
	S %	83.08	80	6.29	70	158.06	45	4	18	3	100	0	20.0	2
	SG	83.52	75	6.30	50	129.14	50	4	18	3	100	0	3.5	2

Notes: Discard indicates that Samples outside the Distance and above the Threshold are ignored.
Clamp indicates that Samples outside the Distance and above the Threshold are set to the Threshold value.
Distance indicates a % of the Search Distance Parameters

All estimation parameter values were restricted to a single pass of the full ellipsoid range and if the cell was not filled a factor of 1.5x ellipsoid range was used on an ad hoc basis. After kriging any negative block values were set to the half detection value for that particular element (except for SG which was discussed previously See Table 14.13,Table 14.14, and Table 14.15 for estimation parameters. The Keel MSU (KMSU) used a Radial Basis Function method for grade interpolation, which allowed a structural trend to be used in conjunction with the search ellipsoid (see Table 14.15).

14.8 Mineral Resource Classification

Definitions for resource categories used in this Technical Report are consistent with CIM Definition Standards for Mineral Resources and Mineral Reserves (2014). The classification of Mineral Resources at Eagle Mine incorporated the confidence in the drill hole data, the geological interpretation, data distribution, geostatistical analysis, detailed underground geological mapping of drifts and stopes, and the confidence in the grade estimation. While all the factors previously stated support confidence at Eagle Mine, the classification primarily relies on a combination of maximum distance to nearest sample and the average distance of samples interpolating grade into a block as outlined in Table 14.17.

Table 14.17: Eagle Mine Mineral Resource Classification Protocol

Class	Classification	Average Distance (m)	Maximum Distance (m)
1	Measured	<10	10
2	Indicated	10 to 20	20
3	Inferred	20 to 30	30

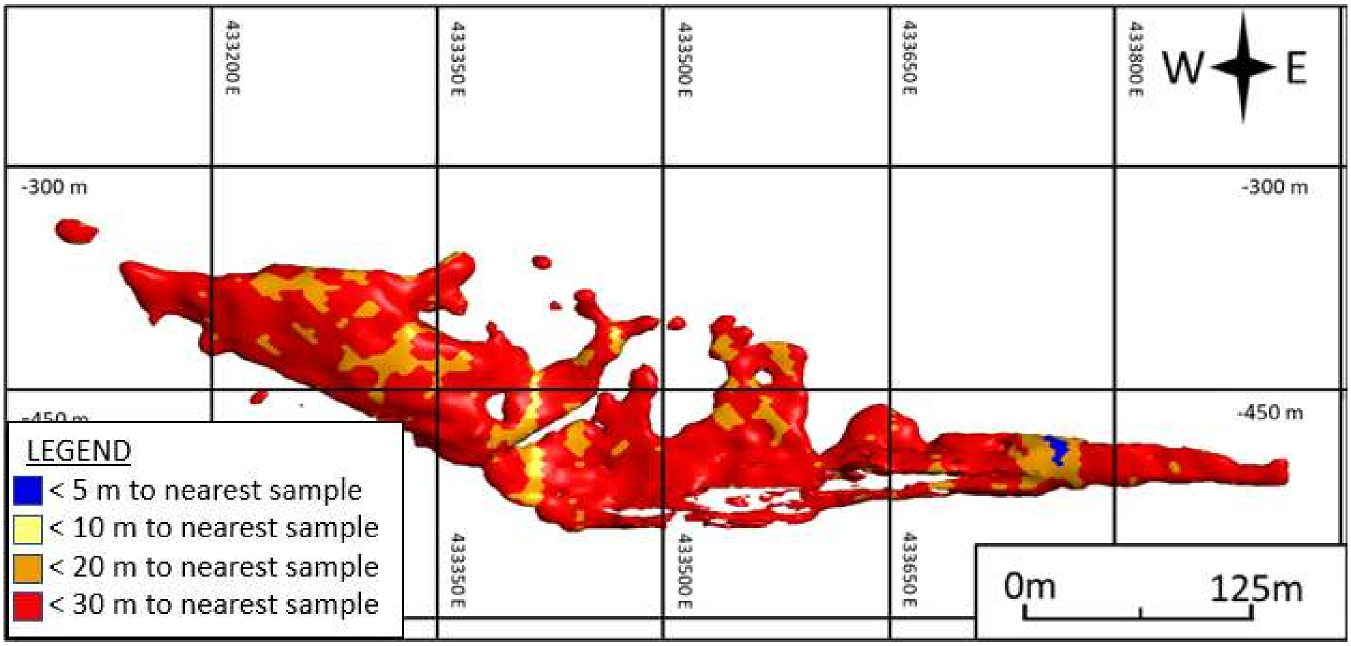


Figure 14.7: View looking North showing Coding of Mineral Resource Class in Eagle East

Mineral Resources have only been classified and reported for the SMSU, MSU and PER domains. The SED and GAB domains have not been classified due to lack of mineralization and confidence. Table 14.18, Table 14.19, and Table 14.20 present the respective classifications for each deposit. Figure 14.7 illustrates how the distance to nearest sample Eagle East deposit provides support to the resource classification (see Table 14.5). The Eagle deposit contains a mix of resource classifications in which secondary smoothing was employed in upgrading the Inferred designation in small areas that occurred within a larger zone of Indicated Resource. In the case of Eagle East and despite sample distance, as well as previous cut and fill mining levels, supporting partial tonnage in a Measured classification (Figure 14.7), Eagle Mine technical staff felt more confident in conservatively designating the Eagle East deposit entirely as an Indicated classification. The Keel deposit was also entirely designated as Indicated which seems appropriate given the drill density and knowledge of the deposit.

In the opinion of the QP the Eagle, Eagle East and Keel deposits are reasonably classified and are consistent with CIM Definition Standards for Mineral Resources and Mineral Reserves (2014).

14.9 Block Model Validation

A statistical and visual assessment of the block model was undertaken to; 1) assess successful application of the estimation passes 2) to ensure that as far as the data allowed, all blocks within mineralized domains were estimated and 3) ensure that model estimates were representative of the data and performed as expected. The grade model was validated using the following techniques:

- The global de-clustered mean grades of the input data were compared with the global mean grades of the output block model. Table 14.18 provides an example of the numerical validation reviewed.
- Visual validation by comparison of the drill hole composite grades with the block model grades on vertical sections and plans. Figure 14.8 provides an example of the visual comparison performed.

- A Nearest Neighbor model was created and compared to the Kriged model using sectional swath plots. In Leapfrog Edge, Swath Plots of metal grades were used to compare the declustered Nearest Neighbor model with the Kriged block model in east-west, north-south and vertical slices through the deposit. Figure 14.9 offers an example of the format that swathplot visualization provides.

Table 14.18: Comparison of Input and Model Grade Means for Eagle East

Element	Source	Nrec	Nsamp	Min	Max	Mean	Std.Dev	Var.	C.V.
Cu%	Raw	728	726	0.010	28.10	5.91	3.46	11.96	0.00
	Composite	602	602	0.330	19.40	6.06	3.40	11.58	0.56
	NN Model	11752	11752	0.330	19.40	6.09	3.20	10.26	0.53
	OK Model	11752	11752	0.001	16.08	6.04	2.43	5.90	0.00
Ni%	Raw	728	726	0.004	10.65	7.26	1.76	3.08	0.00
	Composite	602	602	0.090	10.36	7.41	1.40	1.96	0.19
	NN Model	11752	11752	0.849	9.80	7.50	1.16	1.33	0.15
	OK Model	11752	11752	0.001	8.57	7.46	0.66	0.43	0.00
Co%	Raw	728	726	0.001	0.24	0.16	0.04	0.00	0.00
	Composite	602	602	0.003	0.23	0.16	0.04	0.00	0.23
	NN Model	11752	11752	0.014	0.21	0.16	0.03	0.00	0.21
	OK Model	11752	11752	0.001	0.20	0.16	0.02	0.00	0.00
Au ppm	Raw	728	704	0.001	13.40	0.61	1.33	1.76	0.00
	Composite	602	602	0.001	11.60	0.60	1.23	1.51	2.05
	NN Model	11752	11752	0.001	7.89	0.61	0.99	0.97	1.62
	OK Model	11752	11752	0.003	4.25	0.61	0.59	0.35	0.00
Pd ppm	Raw	728	726	0.003	58.80	1.76	2.84	8.08	0.00
	Composite	602	602	0.052	36.31	1.85	2.85	8.15	1.54
	NN Model	11752	11752	0.052	17.90	1.86	2.33	5.43	1.26
	OK Model	11752	11752	0.003	8.63	1.89	1.40	1.97	0.00
Pt ppm	Raw	728	726	0.003	49.50	2.21	2.32	5.38	0.00
	Composite	602	602	0.177	18.15	2.28	2.26	5.10	0.99
	NN Model	11752	11752	0.177	11.27	2.40	1.94	3.76	0.81
	OK Model	11752	11752	0.003	9.26	2.41	1.54	2.38	0.00
S%	Raw	728	726	0.150	38.90	32.90	6.71	45.04	0.00
	Composite	602	602	1.337	38.90	33.54	4.70	22.10	0.14
	NN Model	-	-	-	-	-	-	-	-
	OK Model	11752	11752	0.005	37.08	33.51	2.09	4.39	0.00

Block grades were checked visually onscreen in Leapfrog Geo and viewed on a series of sections and plans against the drill hole composites grades (see Figure 14.8). This comparison showed a good correlation between the input data and estimated values. The trends in the mineralization were honoured by the estimated grades and no obvious discrepancies were observed.

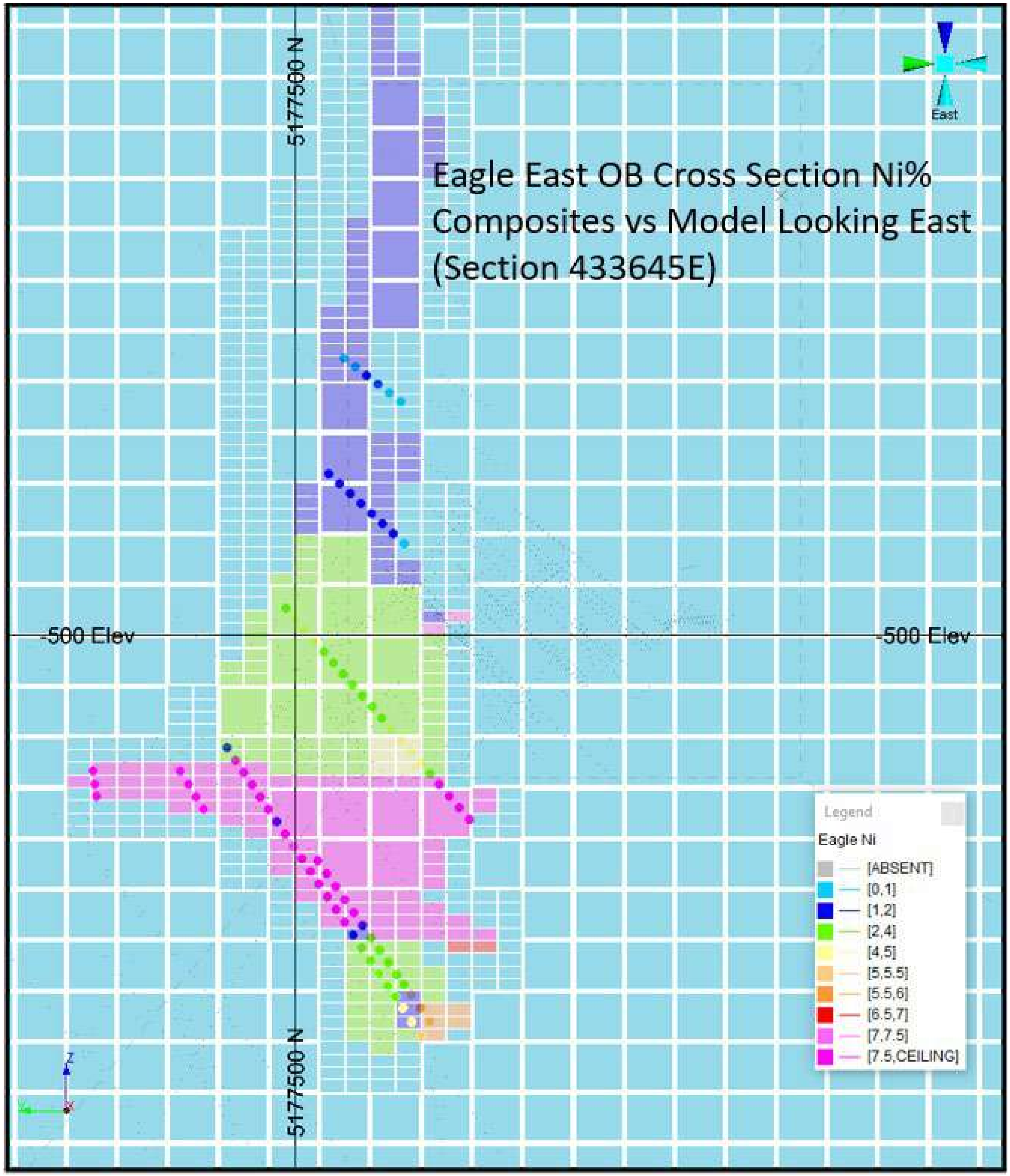


Figure 14.8: Visual Comparison of Input Composites and Resulting OK Estimates for Ni

The sectional swath plots indicate that the trend of the estimated block grades generally honours the trend of input grades and is smoother as expected from the effects of the Ordinary Kriging interpolation. Portions of the graphs where the block grades deviate from the input grades are generally associated with areas of low data, as expected.

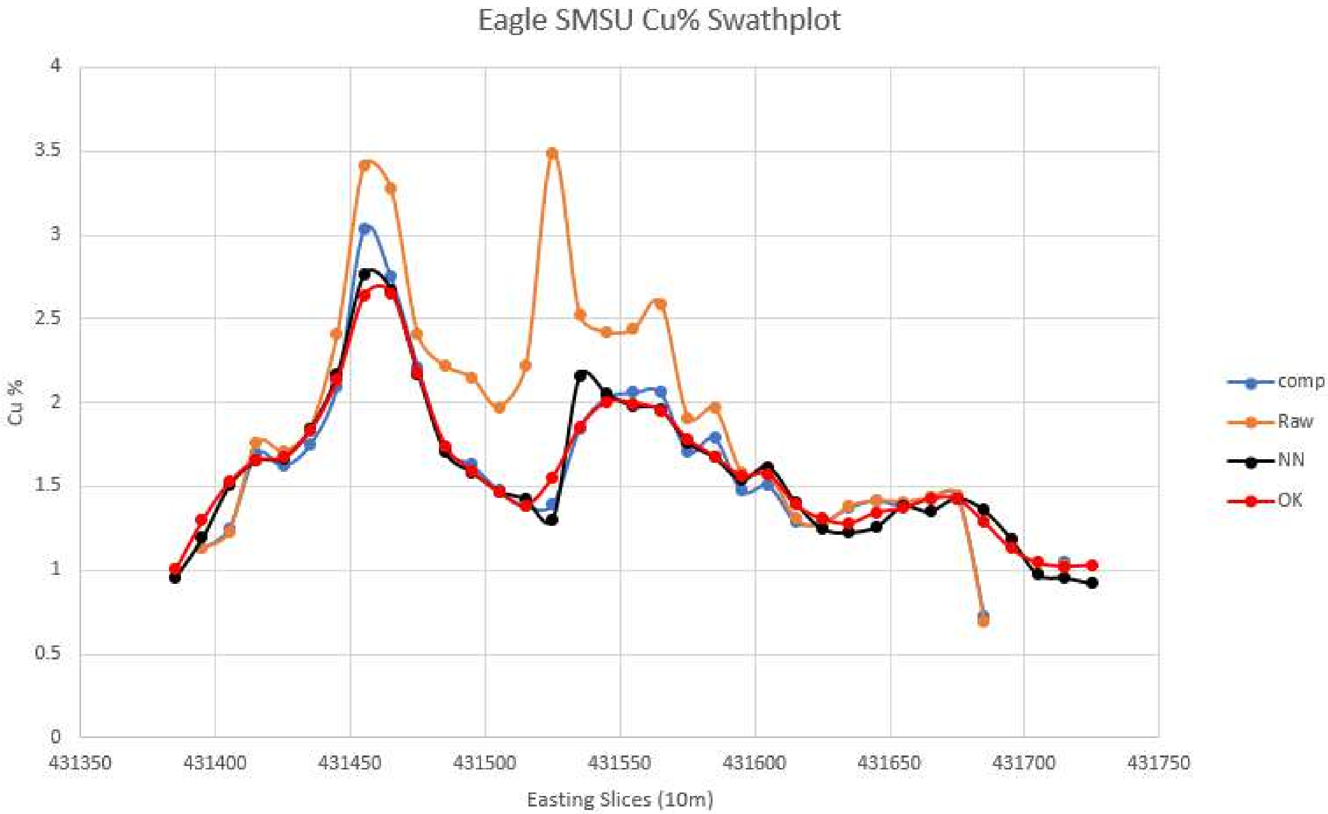


Figure 14.9: Swathplot of the Means of Input Value Versus Declustered and Model Means for Cu% in the Eagle Deposit

Globally no indications of significant over or under estimation were apparent in the model for any orebody models. There were no obvious interpolation issues identified.

14.10 Reasonable Prospects of Eventual Economic Extraction

LMC used an estimated block NSR value to apply a cut-off to the Mineral Resource estimate. The calculation was applied by means of a script that was run from within Vulcan mining software. The script included provisions for metal prices, metallurgical recoveries, smelter terms, transportation costs, and royalties.

Metallurgical recoveries were derived from the performance characteristics of the mill and included formulae for the estimated deportments of all components to the various concentrates. Smelter terms included payables, treatment and recovery charges, and penalties for the estimated production of both nickel and copper concentrates. Transport costs reflected the present costs for the operation. Royalties were based upon the agreements in place at the time of reporting.

The QP reviewed the script and the inputs and considers them to be reasonable and well within the level of detail generally acceptable for the estimation of Mineral Resources. Metal prices used for Mineral Resource estimates are based on consensus, long term forecasts from banks, financial institutions, and other sources (see Table 14.19). Mining in the Keel zone will commence in late 2023 to early 2024 and therefore uses a higher projected nickel price. Metal prices used for the Mineral Resource estimation are twenty percent higher than those used for Mineral Reserve estimates.

Table 14.19: Metal Prices Used for NSR Calculation in 2022 Mineral Resource Estimation

Element	Eagle	Eagle East	Keel
Nickel $/lb	$9.00	$9.00	$9.60
Copper $/lb	$4.02	$4.02	$4.02
Cobalt $/lb	$25.00	$25.00	$25.00
Gold $/oz	$1,600	$1,600	$1,600
Platinum $/oz	$1,000	$1,000	$1,000
Palladium $/oz	$1,400	$1,400	$1,400
Silver $/oz	$22.00	$22.00	$22.00

Note: All values in US dollars.

The NSR cut-off values of $137.86/t for Eagle, $140.15/t for Keel, and $155.98/t for Eagle East were used for reporting the Mineral Resource estimates. Deswik Stope Optimizer was run with 10m x 10m x 10m minimum dimensions as a tool to approximate and visualize mineability and continuity. There were only a few minor satellite blocks from Eagle East and the Keel models that demonstrated no economic prospects for extraction and were removed from the current Mineral Resource estimates.

14.11 Mineral Resource Estimate

The Mineral Resource Estimate for the Eagle Mine is reported in accordance with NI 43-101 and has been estimated in conformity with generally accepted CIM Estimation of Mineral Resource and Mineral Reserves Best Practices guidelines,

The Mineral Resource estimate is reported at NSR cut-off values of $137.86/t for the Eagle deposit (Table 14.20), $140.15/t for the Keel deposit (Table 14.21), and $155.98/t for the Eagle East deposit (Table 14.22). The Mineral Resource estimates are inclusive of Mineral Reserves but excludes mineralization within previously mined (depleted) areas.

Table 14.20: Eagle Mineral Resource Estimate (Effective December 31, 2022)

Category	Domain	Tonnes (kt)	Ni (%)	Cu (%)	Co (%	Au (g/t)	Ag (g/t)	Pt (g/t)	Pd (g/t)
Measured	MSU	27	5.85	3.41	0.17	0.20	6.45	0.71	0.56
	SMSU	311	1.99	1.74	0.05	0.16	11.57	0.25	0.18
	PER	19	1.02	0.77	0.03	0.08	2.87	0.13	0.09
Total Measured		**357**	**2.23**	**1.82**	**0.06**	**0.16**	**10.71**	**0.28**	**0.21**
Indicated	MSU	22	5.75	2.65	0.18	0.11	2.53	0.34	0.27
	SMSU	216	1.88	1.55	0.05	0.16	10.14	0.26	0.19
	PER	86	1.01	0.77	0.03	0.08	2.99	0.13	0.10
Total Indicated		**323**	**1.91**	**1.42**	**0.05**	**0.14**	**7.74**	**0.23**	**0.17**
Total M and I		**681**	**2.08**	**1.63**	**0.06**	**0.15**	**9.30**	**0.26**	**0.19**
	SMSU	1	1.47	1.48	0.04	0.19	7.44	0.40	0.24
	PER	25	0.94	0.85	0.03	0.09	3.52	0.18	0.17
Total Inferred		**26**	**0.95**	**0.87**	**0.03**	**0.09**	**3.63**	**0.19**	**0.17**

Note: Mineral Resources quoted above are above a NSR cut-off value of $137.86/t.
Metal Prices used: $9.00/lb Ni, $4.02/lb Cu, $25.00/lb Co, $1600/oz Au, $22.00/oz Ag, $1000/oz Pt, $1400/oz Pd

Table 14.21: Eagle East Mineral Resource Estimate (Effective December 31, 2022)

Category	Domain	Tonnes (kt)	Ni (%)	Cu (%)	Co (%	Au (g/t)	Ag (g/t)	Pt (g/t)	Pd (g/t)
Measured	MSU								
	SMSU								
	PER								
Total Measured		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Indicated	MSU	96	7.57	4.86	0.16	0.34	14.49	1.55	1.12
	SMSU	1,530	2.12	1.77	0.05	0.21	7.38	0.53	0.36
	PER	92	0.99	0.87	0.03	0.10	3.50	0.33	0.23
Total Indicated		**1,718**	**2.37**	**1.90**	**0.06**	**0.21**	**7.57**	**0.58**	**0.40**
Total M and I		**1,718**	**2.37**	**1.90**	**0.06**	**0.21**	**7.57**	**0.58**	**0.40**

Note: Mineral Resources quoted above are above a cut-off of $155.98/t NSR.
Metal Prices used: $9.00/lb Ni, $4.02/lb Cu, $25.00/lb Co, $1600/oz Au, $22.00/oz Ag, $1000/oz Pt, $1400/oz Pd

Table 14.22: Keel Mineral Resource Estimate (Effective December 31, 2022)

Category	Domain	Tonnes (kt)	Ni (%)	Cu (%)	Co (%	Au (g/t)	Ag (g/t)	Pt (g/t)	Pd (g/t)
Measured	MSU								
	SMSU								
	PER								
Total Measured		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Indicated	MSU	66	5.45	2.12	0.15	0.11	7.20	0.46	0.33
	SMSU	5	1.15	0.77	0.03	0.10	3.55	0.27	0.18
	PER	1,385	1.00	0.74	0.03	0.08	2.55	0.20	0.14
Total Indicated		**1,457**	**1.21**	**0.81**	**0.03**	**0.09**	**2.76**	**0.21**	**0.15**
Total M and I		**1,457**	**1.21**	**0.81**	**0.03**	**0.09**	**2.76**	**0.21**	**0.15**

Note: Mineral Resources quoted above are above a NSR cut-off value of $140.15/t.
Metal Prices used: $9.60/lb Ni, $4.02/lb Cu, $25.00/lb Co, $1600/oz Au, $22.00/oz Ag, $1000/oz Pt, $1400/oz Pd

Table 14.23 provides summary totals of the Mineral Resources estimates for all three zones at Eagle Mine.

Table 14.23: Eagle Mine Mineral Resource Estimate (Effective December 31, 2022)

Domain	Category	Tonnes (kt)	Ni (%)	Cu (%)	Co (%	Au (g/t)	Ag (g/t)	Pt (g/t)	Pd (g/t)
Eagle	Measured (M)	357	2.23	1.82	0.06	0.16	10.71	0.28	0.21
Eagle East		0	0	0	0	0	0	0	0
Keel		0	0	0	0	0	0	0	0
Sub Total		**357**	**2.23**	**1.82**	**0.06**	**0.16**	**10.71**	**0.28**	**0.21**
Eagle	Indicated (I)	323	1.91	1.42	0.05	0.14	7.74	0.23	0.17
Eagle East		1,718	2.37	1.90	0.06	0.21	7.57	0.58	0.40
Keel		1,457	1.21	0.81	0.03	0.09	2.76	0.21	0.15
Sub Total		**3,498**	**1.84**	**1.40**	**0.05**	**0.15**	**5.58**	**0.39**	**0.27**
Eagle	M+I	680	2.08	1.63	0.06	0.15	9.30	0.26	0.19
Eagle East		1,718	2.37	1.90	0.06	0.21	7.57	0.58	0.40
Keel		1,457	1.21	0.81	0.03	0.09	2.76	0.21	0.15
Total	**M+I**	***3,855***	***1.88***	***1.44***	***0.05***	***0.15***	***6.06***	***0.38***	***0.27***
Eagle	Inferred	26	0.95	0.87	0.03	0.09	3.63	0.19	0.17
Eagle East		0	0	0	0	0	0	0	0
Keel		0	0	0	0	0	0	0	0
Sub Total		**26**	**0.95**	**0.87**	**0.03**	**0.09**	**3.63**	**0.19**	**0.17**

It is the opinion of the QP that the Mineral Resource has reasonable prospects for economic extraction based on reasonable grade continuity at the selected economic reporting cut-off. The QP is unaware of any known environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant factors that could materially affect the Mineral Resource estimates.

14.12 Change from Previous Estimate

The previous Mineral Resource estimate was dated effective June 30, 2021, and included in LMC's 2021 AIF. Changes since that estimate include eighteen months of mining of the Eagle and Eagle East deposits and the maiden estimate of the lower grade Keel deposit. Mining of the Eagle and Eagle East deposits depleted Mineral Resources primarily in the Measured and Indicated categories with little exploration additions. The reduction in Indicated Mineral Resources was offset by the introduction of the Keel deposit although at a much lower grade. Table 14.24 shows the change in tonnes and grade.

Table 14.24: Changes in Quantity of Mineral Resources from Previous Estimate

Classification	Nickel (kt)	Copper (kt)	Cobalt (kt)	Gold (koz)	Silver (koz)
Measured	-4	-3	0	-1	-84
Indicated	-7	-10	0	-5	-73
M&I	**-11**	**-13**	**0**	**-19**	**-29**
Inferred	0	0	0	0	3

15.0 MINERAL RESERVE ESTIMATES

15.1 Introduction

The Mineral Reserve estimate, effective December 31, 2022, includes that portion of the Measured and Indicated Mineral Resource that can be mined economically. Economic criteria and mining constraints, based on the mining methods, are applied to the Resource blocks to define mineable blocks. Mineral Reserves are determined after applying dilution and recovery factors to these mineable blocks.

The Mineral Reserve presented herein has been calculated from the mine plan created from the 2022 Mineral Resource Model update. The Mineral Reserve estimate is consistent with the standards established by the CIM (CIM 2019).

15.2 Dilution and Mining Recovery

The Mineral Reserve estimate includes dilution and mining recovery, which are modifying factors that affect the quantity and quality of the material extracted during mining operations. Table 15.1 presents the parameters that the Eagle Mine used to estimate dilution and mining recovery.

Mining dilution comes from three principal sources: planned dilution, unplanned dilution, and backfill dilution.

Planned dilution is defined as material below the cut-off grade included within a mining block. It represents areas included within and outside of the mineralization area required to optimize the mining geometry. Planned dilution is intended to be mined with the ore and is included in the Mineral Reserve estimate of a stope.

Unplanned dilution is defined as uneconomic material coming from inadvertent rock breakage outside the profile of the mining block in the hanging and footwall. The estimation of unplanned dilution is based on underground operating experience. It can be expressed as a percentage or as an ELOS (Equivalent Linear Overbreak /Slough) value applied through the process of DSO.

Regarding backfill dilution, some of the cemented rock fill (CRF) is expected to fall into the stope and be removed from an adjacent stope and/or be inadvertently scraped off stope floors during loading of the mineralized material.

Mining recovery represents material loss in the mining process and is defined as the percentage of actual mineable material extracted from the planned mining shape.

It is important to have a good balance between dilution and mining recovery to optimize the profitability of a deposit.

Since Eagle Mine contains various mining zones and mining methods, different values of dilution and recovery are defined.

The Mineral Reserve estimate for the Eagle Mine includes planned dilution for the Eagle Zone but not for the Eagle East or Keel Zones. All three zones include unplanned dilution from backfill only, as indicated in Table 15.1.

The Mineral Reserve estimate is based on a 95% mining recovery for transverse SLOS and longitudinal SLOS methods, applying to stopes in the Eagle Zone and part of Eagle East. The Mineral Reserve for part of Eagle East and the Keel Zone is based on a 98% mining recovery for drift and fill mining.

For future Mineral Reserve estimates, the QP recommends that the Eagle Mine include planned dilution for all zones and mining methods and that the unplanned dilution parameters account for the over excavation of rock.

Table 15.1: Mining Recovery and Dilution Parameters

Dilution Source	%	Comments
Planned & Unplanned Dilution	16.6%	Combined Eagle and Eagle East
Eagle Unplanned Dilution	5%	Drift and Fill dilution into backfill
Eagle East/Eagle Unplanned Primary Stoping Dilution	6.6%	Historical stoping dilution into backfill
Eagle East/Eagle Unplanned Secondary Stoping Dilution	13.1%	Historical stoping dilution into backfill
Mining Recovery - SLOS	5%	Applied in both Eagle and Eagle East stoping areas
Mining Recovery – Drift & Fill	2%	Applied in Eagle East Drift & Fill areas and the Keel Zone

15.3 Stope Optimization

DSO software was used to determine the mineable portion of the Mineral Resource. DSO is a mine planning tool that generates and optimizes the design of stope shapes for a range of underground mining methods. The goal is to determine a Mineral Reserve from the Block Model by applying specified mining methods and design parameters. The software optimizes the stope design based on the mining method, the resource geometry, the dilution and mining recovery parameters, the NSR value of the blocks, and the NSR cut-off.

Multiple DSO scenarios were run to obtain the best results in terms of tonnage and grade. The Mineral Reserves were sequenced and scheduled into an integrated LOM schedule using Deswik interactive scheduling software and exported to spreadsheets for financial analysis.

The mine design is based on the following mining methods:

- Eagle Zone: Transverse longhole/sublevel open stoping
- Eagle East Zone Transverse and longitudinal sublevel stoping, and drift-and-fill mining
- Keel Zone Drift and fill mining and longhole/sublevel stoping

The QP notes that the classification variables and classification tab in Deswik need to be fixed. Currently, the Deswik model cannot be used to report the Mineral Reserves classification properly. For this reason, the QP requested the mine team interrogate the Mineral Reserves and report the results by Mineral Resources categories in Vulcan software. The overall Mineral Reserves results were then matched with those in Deswik. While the QP does not believe that this issue compromises the accuracy of the Mineral Reserve, it is recommended that Eagle Mine resolve this issue as soon as possible prior to the next Mineral Reserve estimate.

15.4 NSR Values

Table 15.2 summarizes the metal prices, parameters, and costs used to determine the NSR value of each block. NSR refers to the proceeds received from the sale of the mineral product net of deductions for costs incurred before the sale of the product and after it leaves the mining property. These costs include transportation, insurance, penalties, sampling and assaying, refining and smelting, and marketing. For estimating Mineral Reserves, the NSR value of the metal contained in a tonne of concentrate is applied to the metallic content of the corresponding ROM tonnes.

Table 15.2: Parameters and Costs Used to Calculate NSR Value

Parameter		Eagle	Eagle East	Keel
Recoveries in Bulk Flotation				
Ni	%	81.2	89.5	88.1
Cu	%	95.7	98.5	96.9
Co	%	82.4	90.7	89.3
Au	%	71.8	73.9	72.7
Pt	%	73.1	80.6	79.3
Pd	%	81.2	89.5	88.1
Nickel Concentrate				
Ni recovery from bulk to Ni conc	%	94.0	93.7	98.4
Ni recovery from ore to Ni conc	%	76.4	83.8	86.7
Cu recovery from ore to Ni conc	%	9.2	6.4	24.1
Copper Concentrate				
Cu recovery from bulk to Cu conc	%	90.4	93.5	75.1
Cu recovery from ore to Cu conc	%	86.5	92.1	72.8
Ni recovery from ore to Cu conc	%	4.9	5.7	1.4
Price				
Nickel	$/lb	7.50	7.50	8.00
Copper	$/lb	3.35	3.35	3.35
Cobalt	$/lb	25.00	25.00	25.00
Platinum	$/oz	1,000	1,000	1,000
Palladium	$/oz	1,400	1,400	1,400
Gold	$/oz	1,600	1,600	1,600
Silver	$/oz	22.00	22.00	22.00

Commercial Terms Nickel Concentrate		
Payable Metal	Ni price $/t	Pay
Ni	< 10,000	74.60%
Ni	< 15,000	76.60%
Ni	< 20,000	79.60%
Ni	< 25,000	81.20%
Ni	< 30,000	82.70%
Ni	< 30,000	82.70%
Ni	>= 30,000	84.20%
	Conc grade	Pay
Cu	>= 2%	45%
Cu	< 2%	0%
Co	>= 0.2%	45%
Co	< 0.2%	0%
Pt	>= 1 ppm	45%
Pt	< 1 ppm	0%
Pd	>= 1 ppm	45%
Pd	< 1 ppm	0%
Au	>= 1 ppm	45%
Au	< 1 ppm	0%
Ag	>= 15 ppm	0%
Ag	< 15 ppm	0%
Penalties	content	cost
MgO in Conc	> 6%	$2.5/1%

Commercial Terms Copper Concentrate			
Payable Metal	Conc grade	Pay	Minimum Deduction
Cu	>= 30%	96.65%	1 grade unit
Cu	< 30%	96.50%	1 grade unit
Au		90%	1 grade unit
Ag		90%	30 grade unit
Pt		90%	3 grade unit
Pd		90%	4 grade unit
TC/RC			Reserve Memo
TC	$/dmt		90.00
RC copper	$/lb		0.09

15.5 NSR Cut-Off Values

Table 15.3 presents the calculation of the NSR cut-off values for the Eagle, Eagle East, and Keel deposits. The NSR cut-off values consist of the unit costs for mining, processing, and general & administration. The NSR value of any given block must exceed the NSR cut-off to be included in the Mineral Reserve.

Table 15.3: Calculation of Eagle Mine NSR Cut-Off Values, $/t

Cost Center	Cost Segmentation	Eagle	Eagle East	Keel
Mining	Materials	3.89	5.33	10.76
	Contractor Labour	28.02	33.94	29.54
	Maintenance	3.73	8.03	11.64
	Power	2.37	2.41	1.66
	Diesel	1.45	1.45	1.45
	Backfill	18.75	11.74	5.44
	Mine Water Treatment		1.87	
	Labour		7.16	
	Other		4.40	
Subtotal Mining		58.21	76.33	60.50
Processing		37.50	37.50	37.50
Transportation		13.44	13.44	13.44
General & Administrative		28.71	28.71	28.71
Total ($/t)		**137.86**	**155.98**	**140.15**

Source: Lundin Mining Corporation, 2022

Metal prices used for Mineral Reserve estimates are based on consensus, long term forecasts from banks, financial institutions, and other sources.

The QP notes a discrepancy between the average unit mining cost in the 2023 LOM Financial Model for the Eagle Mine and the mining costs for the zones in the NSR cut-off calculation. The Financial Model mining cost is about 33% higher. The deviation is particularly evident for power and diesel costs.

The Mineral Reserves evaluation started early in the year and the mine planners used recorded costs from the previous year of operations to estimate future costs, in combination with first principle calculations, where necessary. The 2023 Financial Model reflects the latest records and estimates, which are normally compiled at the end of the year and may differ from estimates made for previous Mineral Reserves estimates. Furthermore, the 2023 Financial Model and cost estimates have been influenced by and taken into account the current inflationary trends which resulted in significant variances when compared to historical information.

For future Mineral Reserve estimates, the QP recommends basing NSR cut-off values on the most current cost information. The cut-off discussion should involve the company's financial analyst if the actual or projected costs deviate significantly from historical data.

In the calculation for NSR cut-off, Eagle has elected to allocate 100% of the following costs to Eagle East, considering that it is the principal mining zone and contains 59% of the current Mineral Reserves:

- Labour cost for the CRF batch plant
- Mine water treatment
- Labour costs of Eagle employees
- Certain other costs

In the NSR cut-off calculation, the Eagle deposit presents a relatively high backfill cost as the zone must be filled entirely with CRF due to permit restrictions for the crown pillar. On the other hand, Keel has a relatively low backfill cost because the labour cost for operating the batch plant was allocated to Eagle East. The reasoning behind this allocation is that the labour cost for running the batch plant is fixed while Eagle East is in production, regardless of whether mining occurs at Keel. The QP agrees with this logic and cost allocation.

The NSR cut-off includes Sustaining Capital for Mine Development as Contract Labour includes both operations and capital development. The NSR cut-off does not include Sustaining Capital costs referred to as Mine Other, Mill, and Other. The QP recommends including these costs in the future; however, it is noted that they represent only about 3% of the NSR cut-offs and therefore omission does not materially affect the Mineral Reserve estimate.

The NSR cut-off calculation does not include Closure costs even though some Closure costs are incurred during the LOM starting in 2024. Eagle Mine explained that the Closure cost does not apply to the NSR cut-off, because the funds are accounted for in the ARO (Asset Retirement Obligation).

The Mineral Reserve is estimated using a single NSR cut-off for each of the three deposits comprising the mine. The QP recommends basing future estimates on full-cost, marginal, and incremental NSR cut-offs to analyze more effectively how marginally economic material (i.e., valued at or below full-cost cut-off) can contribute positively to cash flows and be included in the Mineral Reserve.

15.6 Mineral Reserve Estimate

Table 15.4 presents the Eagle Mine Mineral Reserve estimate effective as of December 31, 2022. It is based on stope wireframe shapes applied to the depleted Mineral Resource block model using Deswik mine design software. The estimate incorporates planned dilution, unplanned dilution, backfill dilution, and mining recovery. It considers mining with transverse sublevel stoping, longitudinal sublevel stoping, and drift and fill mining, and backfilling with cemented and uncemented rockfill.

The Mineral Reserve is based on a reserve estimate as of November 30, 2022, which Eagle Mine depleted to December 31, 2022, using the scheduled December mine plan task solids from Deswik to estimate depletion for the final month of the year.

The author considers that the Mineral Reserve estimates are classified and reported in accordance with CIM definitions.

The author is not aware of any mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate (Table 15.4).

Table 15.4: Summary of Mineral Reserves as of December 31, 2022

Site	Category	Tonnes (kt)	Grade				Contained Metal			
			Ni (%)	Cu (%)	Au (g/t)	Ag (g/t)	Ni (kt)	Cu (kt)	Au (koz)	Ag (koz)
Eagle	Proven	303	1.89%	1.54%	0.13	9.62	5.7	4.7	1.26	93.62
Eagle East		0	0.00%	0.00%	0.00	0	0.0	0.0	0.00	0.00
Keel		0	0.00%	0.00%	0.00	0	0.0	0.0	0.00	0.00
Sub Total		**303**	**1.89%**	**1.54%**	**0.13**	**9.62**	**5.7**	**4.7**	**1.26**	**93.6**
Eagle	Probable	328	1.25%	0.91%	0.13	5.29	4.1	3.0	1.37	55.7
Eagle East		2,034	1.86%	1.51%	0.15	6.12	37.8	30.7	9.81	400.2
Keel		765	1.13%	0.72%	0.08	2.47	8.6	5.5	1.97	60.8
Sub Total		**3,127**	**1.62%**	**1.25%**	**0.14**	**5.14**	**50.6**	**39.2**	**13.15**	**516.7**
Total	**P+P**	**3,430**	**1.64%**	**1.28%**	**0.14**	**5.54**	**56.3**	**43.9**	**14.41**	**610.3**

Notes:
1. Mineral Reserves are estimated at an NSR cut-off of $137.86/t for Eagle Zone, $155.98/t for Eagle East Zone, and $140.15/t for Keel Zone.
2. Mineral Reserves are estimated using average long-term prices of $7.50/lb Ni, $3.35/lb Cu, $1,600/oz Au.
3. Bulk density interpolated in block model ranges from 2.98 t/m3 to 4.44 t/m3 and averages 4.11 t/m^3.
4. Numbers may not add due to rounding.

Compared to the previous Mineral Reserves estimate effective of June 30, 2021 disclosed in LMC's 2021 AIF, the Mineral Reserves have been increased by approximately 1,243 kt, primarily by the addition of the Keel deposit, with estimates of contained metals rising 11 kt nickel and 7 kt copper. These changes have included the actual depletion due to production between July 2021 to December 2022, as shown in the Table 15.5 and Figure 15.1. The increase in Mineral Reserves tonnage is mainly driven by the addition of the Keel deposit into the 2022 Mineral Reserves.

Table 15.5: Change in Mineral Reserves to December 31, 2022

Item	Tonnes (kt)	Ni (%)	Cu (%)	Ni (kt)	Cu (kt)
June 30, 2021 Mineral Reserve	3,280	2.36	1.94	77.3	63.7
Material Mined July 2021 to December 2022	-1,093	2.95	2.47	-32.2	-26.9
Additional reserves	+1,243	0.89	0.58	11.3	+7.1
December 31, 2022 Mineral Reserve	3,430	1.64	1.28	56.4	43.9

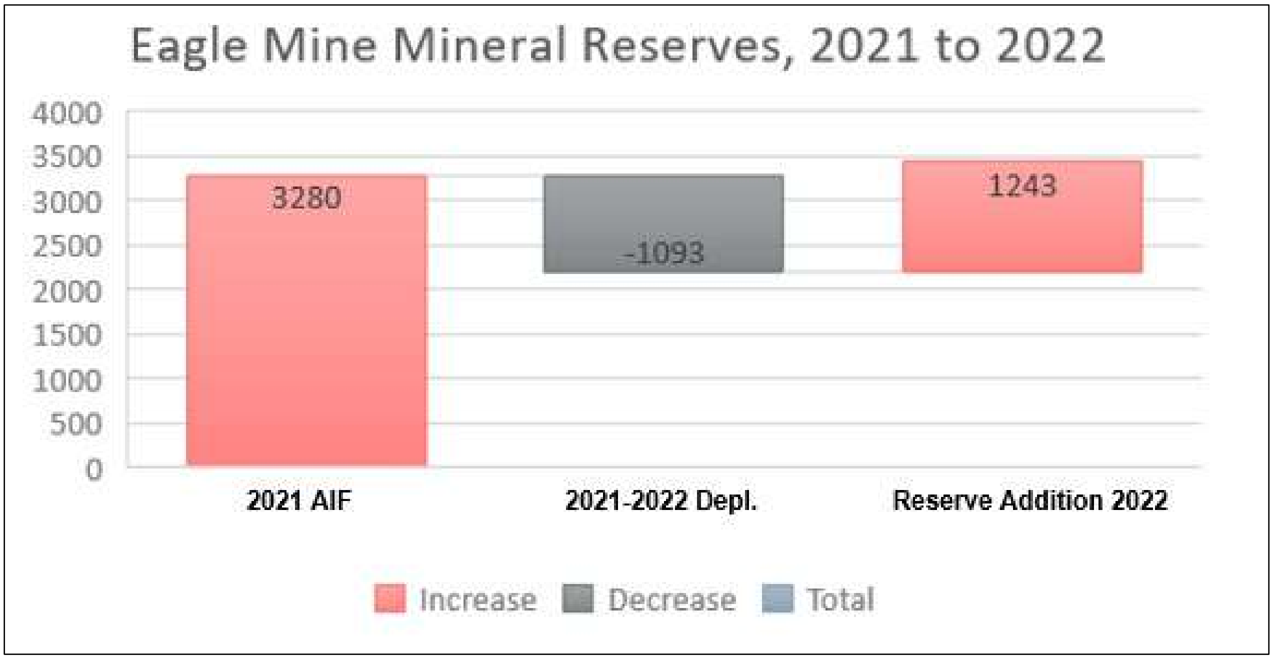


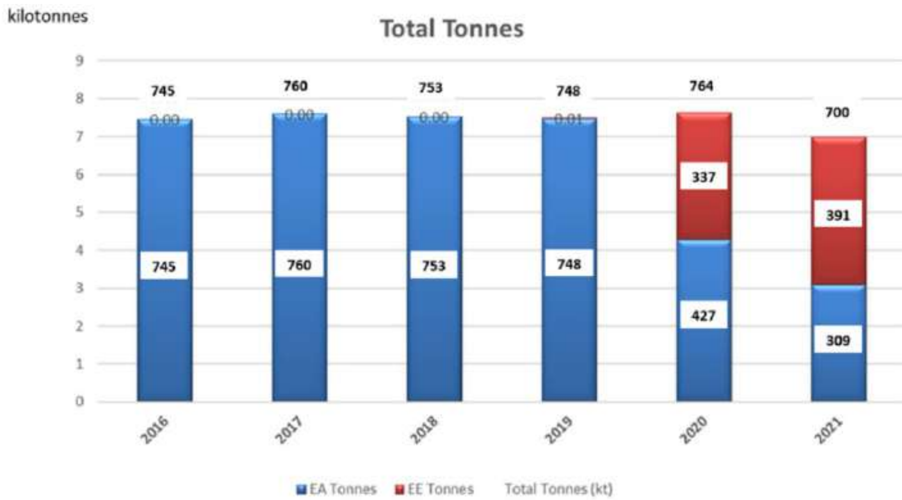
Figure 15.1: Change in Mineral Reserves Since June 30, 2021

The QP has not reviewed the June 30, 2021, Mineral Reserves statement and the numbers for the purpose of this comparison are based on Mineral Reserves estimates made publicly available on SEDAR in LMC's 2021 AIF.

16.0 MINING METHODS

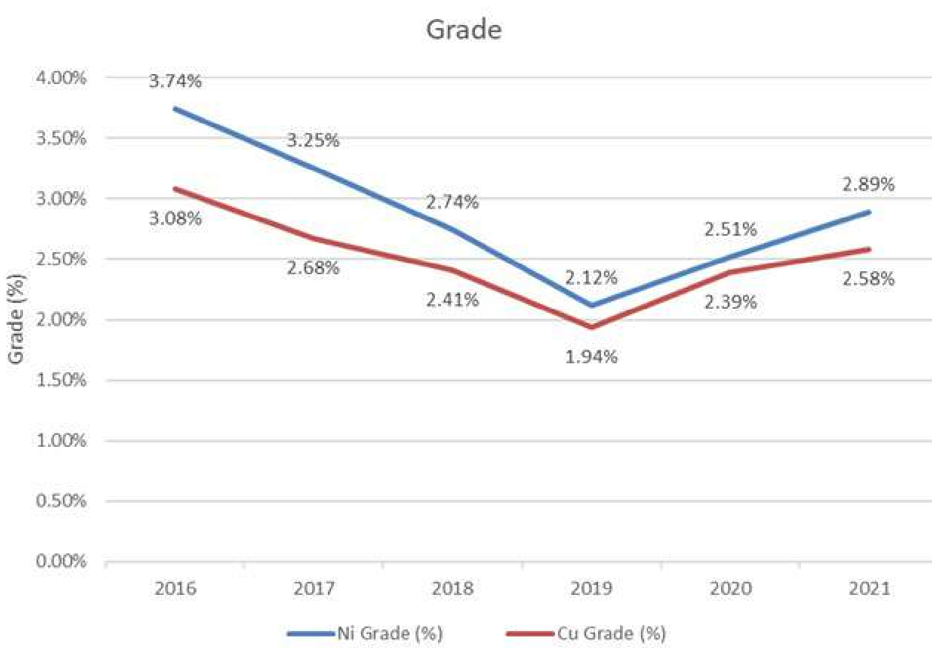
16.1 Introduction and Mining History

The Eagle Mine is an underground mine producing about 2,000 tpd of high-grade nickel-copper ore. The ore is hauled to surface in diesel-powered trucks via the ramp and then trucked to the Humboldt processing plant at a separate site. Figure 16.1, Figure 16.2, and Figure 16.3 summarize the production history of the mine in terms of ore production, grade, and contained metal. EA refers to the Eagle deposit; EE denotes Eagle East.



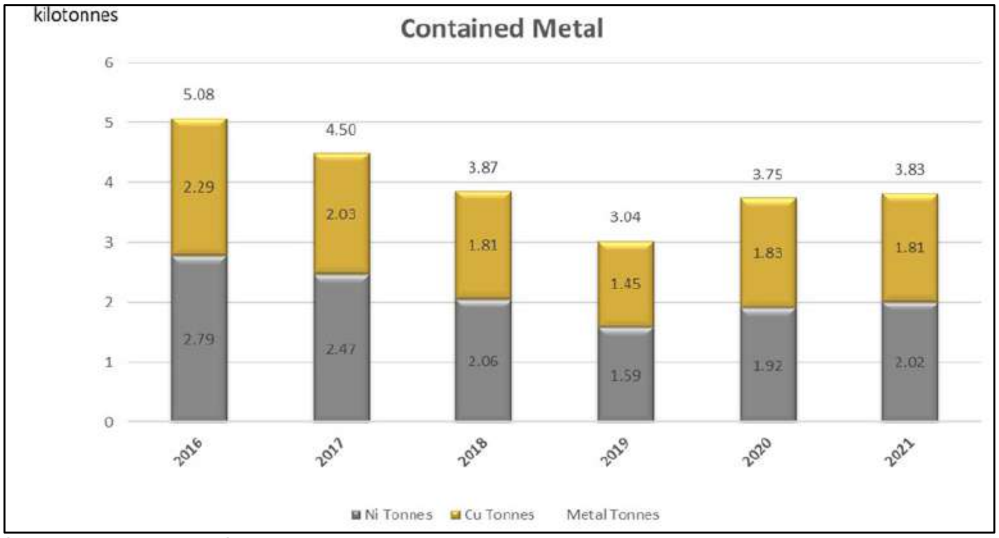
Source: Lundin Mining Corporation, 2022

Figure 16.1: Eagle Mine Production History – Ore Production



Source: Lundin Mining Corporation, 2022

Figure 16.2: Eagle Mine Production History – Grade

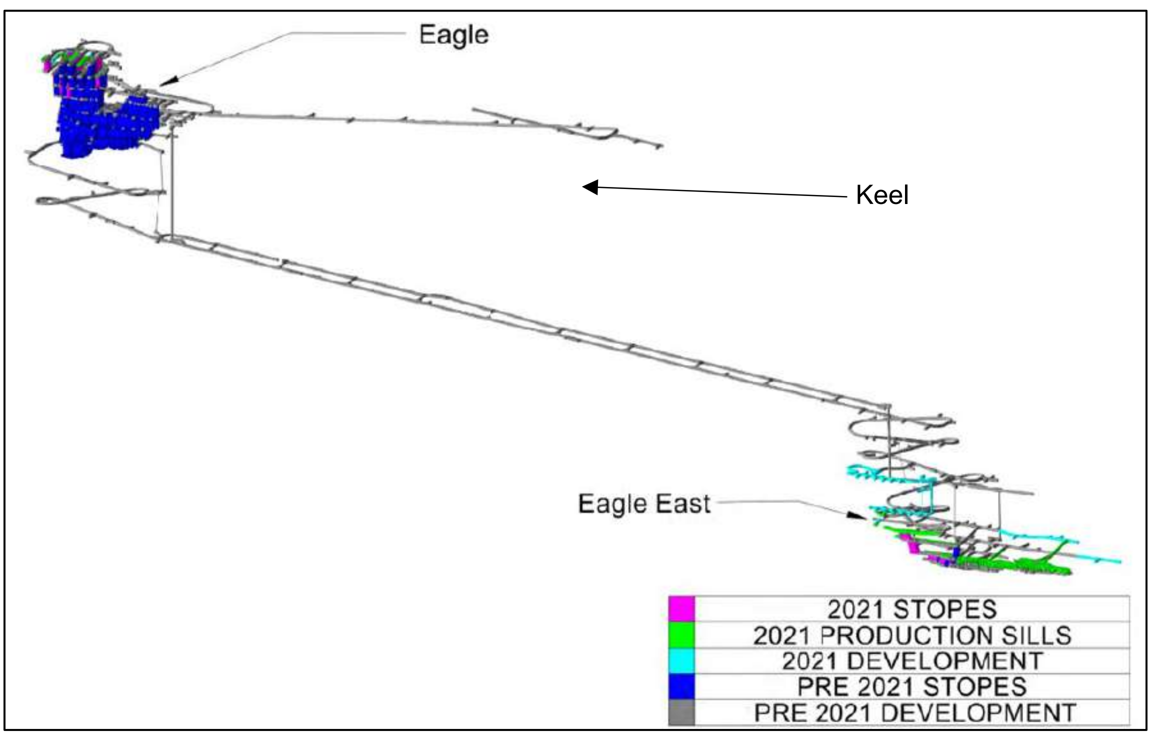


Source: Lundin Mining Corporation, 2022

Figure 16.3: Eagle Mine Production History – Contained Metal

16.2 Deposit Descriptions and Relative Locations

Figure 16.4 provides an isometric view of the Eagle Mine. Underground workings are accessed via the main ramp, which has its portal entrance within the mine site industrial area. The mine has two active mineralized zones called Eagle and Eagle East. A third zone called Keel will be developed and begin producing mill feed in 2024.



Source: Lundin Mining Corporation, 2022

Figure 16.4: Isometric View of Eagle Underground Mine

The Eagle Zone is a near-surface deposit situated between 40 and 370 m below the surface. The deposit is about 250 m long and ranges from 15 to 85 m in width. Eagle was the first zone discovered and mined. Development of the main ramp began in September 2011, and commercial production was achieved in November 2014. The zone remains in production to the present. The mining methods used at the Eagle Zone are SLOS and D&F.

The Eagle East Zone is located approximately 2 km east of the Eagle deposit and 900 m below the surface. The deposit is a sub-horizontal conduit 30 to 70 m wide and 720 m in length, with thickness of 50 to 120 m. It was discovered as a result of exploratory drilling conducted from the Eagle Zone. Eagle East was developed from 2018 to 2020 and remains in production to the present. It is accessed from the lowest level of the Eagle Zone via twin ramps, one providing access, the other return ventilation. Both SLOS and D&F mining methods are employed at Eagle East.

The Keel Zone is situated about 1.5 km east of the Eagle Zone. It consists of two distinct deposits referred to as Upper Keel and Lower Keel. As their names suggest, Lower Keel is situated at greater depths than Upper Keel. Only Upper Keel has mineralized material included in the Mineral Reserve and for the remainder of the report, Upper Keel will be referred as the Keel Zone. Looking forward, about 23% of the Eagle Mine ore production will come from the Keel Zone during the remainder of its LOM. Figure 16.5 illustrates the location of the Keel Zone relative to the current production areas of the mine. Development of the Keel Zone is scheduled to commence in the first quarter of 2023.

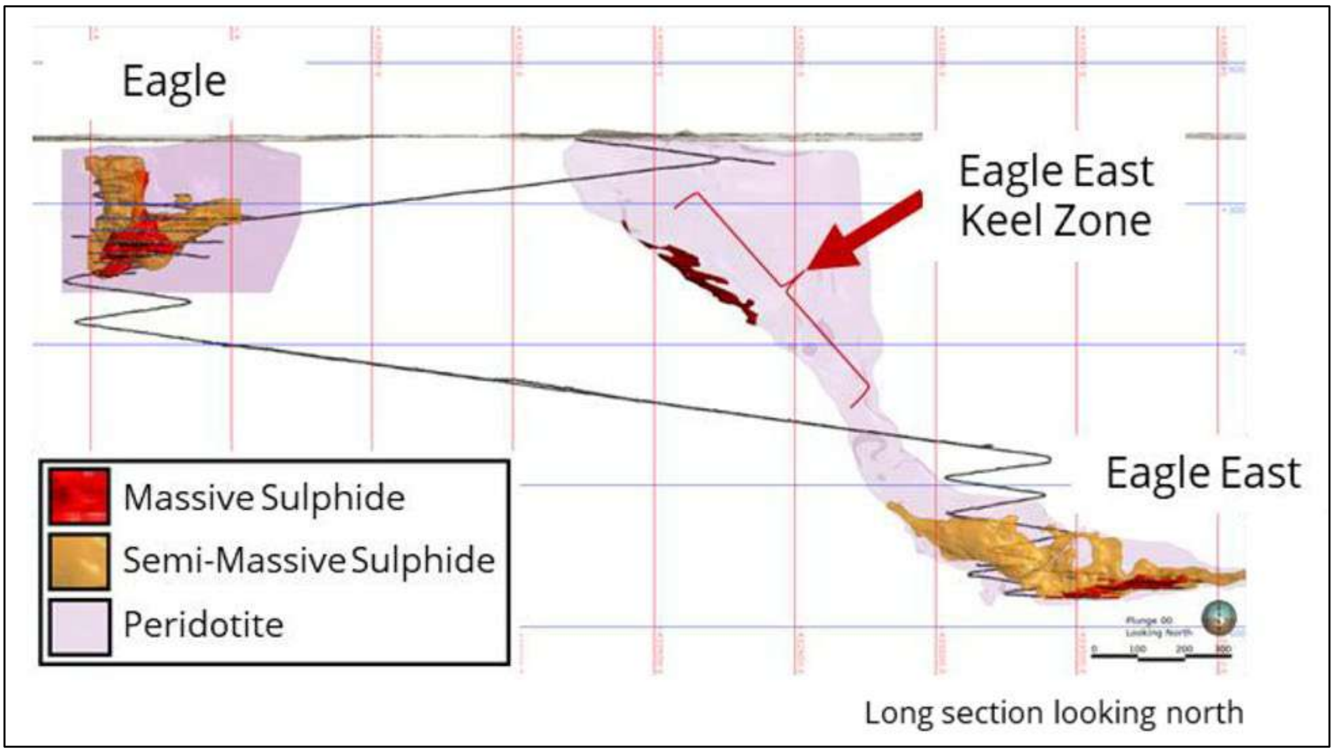


Figure 16.5: Location of the Keel Zone

The Eagle Mine has Mineral Reserves to support production until 2027 when the mine is scheduled to be closed, unless additional ore is discovered. A crown pillar will be left between the uppermost stoping level and the bedrock surface below the overburden.

16.3 Geomechanics

The lithology and rock mass character are similar for both producing deposits (the Keel deposit is discussed in Section 16.3.6), so the same geotechnical domains are used for each. Table 16.1 presents geotechnical domains used by Eagle engineers and geologists.

Table 16.1: Geotechnical Domains

<table>
<tr><th>Domain</th><th>Lithologies</th><th>Description</th></tr>
<tr><td rowspan="2">Sedimentary (SED)</td><td>Siltstone (SLST)</td><td rowspan="2">Very strong (> 100 MPa) rock, typically brittle in nature, with distinct bedding and foliation, and one dominant joint set with near vertical dip to the east. Discontinuities are smooth and planar.</td></tr>
<tr><td>Hornfels (HFLS)</td></tr>
<tr><td rowspan="3">Intrusive (INT)</td><td>Peridotite (PER)</td><td rowspan="3">Very strong (> 100 MPa) rock, typically brittle in nature. One dominant joint set dipping near-vertically to the south, and several minor joint sets. Discontinuities are typically continuous, undulating, rough, and clean, though serpentinite infill is sometimes present and several millimeters in thickness.</td></tr>
<tr><td>Mineralized peridotite (MPER)</td></tr>
<tr><td>Semi-massive sulphide (SMSU)</td></tr>
<tr><td>Massive (MSU)</td><td>Massive sulphide (MSU)</td><td>Strong, brittle rock typically having one dominant sub-vertical joint set plus minor random sets. Discontinuities are typically undulating and rough, and seldom contain any infill.</td></tr>
</table>

16.3.1 Geomechanical Parameters

Laboratory testing including Unconfined Compressive Strength (UCS), Triaxial Compressive Strength (TCS), and Brazilian Tensile Strength (BTS) has been performed to obtain strength and material parameters for Eagle's main rock types of Table 16.2 presents typical rock properties for Eagle's three geotechnical domains:

Table 16.2: Geomechanical Parameters for the Three Geotechnical Domains

Item	UCS (MPa)	Specific Weight (kN/m^3)	Tensile Strength (MPa)	Young's Modulus E_i (GPa)	Poisson's Ratio
SED	188	26.7	13.0	67.5	0.22
INT	165	30.4	13.0	67.1	0.22
MSU	128	44.1	5.1	67.1	0.18

16.3.2 Joint Sets

The majority of joint orientation data has been collected from geotechnical mapping of underground development. Geotechnical mapping is ongoing, and jointing data is regularly reviewed by mine personnel. Table 16.3 and

Table 16.4 summarize dominant orientations of Eagle and Eagle East joint sets considering mapping data collected up until 2022.

Table 16.3: Joint Sets for Geotechnical Domains: Eagle Zone

			Joint sets according to cardinal points (dip/dip direction)							
Domain	Bedding	Foliation	North	North-East	East	South-East	South	South-West	West	North-West
SED	27/052	23/201	54/018	62/062		82/138			89/275	
INT			60/009	65/066	86/094		85/187			
MSU						75/124			69/282	

Table 16.4: Joint Sets for Geotechnical Domains: Eagle East Zone

			Joint sets according to cardinal points (dip/dip direction)							
Domain	Bedding	Foliation	North	North-East	East	South-East	South	South-West	West	North-West
SED	13/060	61/203			78/096	90/151			82/257	82/284
INT				78/072	45/102		88/187	81/213		83/302
MSU						82/142	84/195			82/307

16.3.3 Major Structures

In the Eagle zone, post mineralization faults have been noted near the footwall (south) Peridotite-Siltstone contact and appear to parallel to the contact, within the intrusive rather than defining the contact. Faulting within massive sulphides is rare and faults and joints adjacent to the massive sulphides are infrequent. Faults within the Peridotite are present, but with no observable relative displacement. Veins consisting of quartz-dolomite, calcite-talc, and rare sphalerite-galena have been seen near the margins of the massive sulphide and may represent faults occupied by vein material.

In the area of Eagle East zone, during the preliminary structural evaluation of the drill core for Eagle East, one post-mineralization fault, which has been intruded by a gabbro dike, was identified at the west end of the mineralized zone. The orientation of the dike is approximately 60°/335° (Dip/Dip Direction), cross-cutting the host rock and ore zone. In the host rock, observations of increased rock noise were reported as mining approached the dike, but the gabbro was of good quality, consistent with the host rock sediments. When the dike was encountered in the ore zone, the gabbro was of very poor quality, soft, and highly altered. Excavations through the dike exhibited extensive stress damage, primarily presenting as bulging and convergence of the ribs,

16.3.4 Rock Mass Classification

The geotechnical mapping of excavations provides the input parameters for the classification of the rock mass quality according to rock mass classifications including RQD (Deere and Deere 1989), RMR_{76} (Bieniawski, 1976) and the Q-system (Barton et. Al., 1974). These input parameters include the following:

- RQD values – from geotechnical core logging data
- Intact rock strength – from laboratory and point load testing
- Number of joint sets – from mapping and oriented core logging
- Joint spacing – inferred from fracture frequency using geotechnical core logging data
- Joint surface characterization – from geotechnical core logging data
- Joint orientation – from oriented core and mapping data
- Groundwater – assumed to be dry conditions

The RQD system, which considers only the fracturing of the rock, suggests that the rock mass units are classified as "Good to Excellent" quality (Deere and Deere 1989). The RMR_{76} system, which considers Intact Rock Strength, RQD, joint spacing, joint surface conditions and groundwater conditions (assumed to be dry), suggests that the rock mass units are of "Good to Very Good" quality. The Q-system, which considers RQD, the number of joint sets, joint condition, joint water reduction factor, and stress reduction factor, suggests that the rock mass units are of "Fair to Good" quality (for a Jw/SRF ratio of 1.0). These quality indexes are not uncommon in the Precambrian Shield, where the igneous rock is often both strong and moderately jointed. Overall, high rock mass strengths can be expected but these strengths can result in stress damage in the vicinity of excavations, which can in turn cause elastic strain to build up, and possibly release energy suddenly. Table 16.5 represents the mean values and lower bound (LB) of rock mass classification based on domain.

Table 16.5: Lower Bound (LB) and Mean Values of Rock Classification For Geotechnical Domains

Domain	RQD		RMR_{76}		Q[1]	
	LB	Mean	LB	Mean	LB	Mean
SED	47	73	54	58	5	7
INT	80	91	64	65	16	19
MSU	75	100	74	77	23	31

Notes: [1] Q values based on Eagle SRF (0.5-2.5) only

Triaxial testing was completed with a maximum confining stress of 20 MPa. This is less than the recommended confinement based on a mine's stress regime and intact rock strength. Nevertheless, these triaxial tests are needed to conduct numerical simulations using Hoek and Brown criteria, amongst others.

16.3.5 In-situ stress

Stress measurements were conducted at Eagle mine by Golder in 2013, 2016 (L172), and 2019. The CSIRO hollow inclusion (HI) cell overcoring method was used in all three cases. In 2018, Agapito Associates conducted an additional overcoring study at 677 m (2,220 ft) below surface from Drill Bay 2 using the Sigra biaxial deformation method. Results from this last study report a higher horizontal stress occurring close to and within the ore zone. Table 16.7 summarizes the stress field conditions typically used on site for numerical modeling, which are based on the 2016 overcoring study.

Table 16.6: Eagle Mine Stress Field Condition

Stress	Dip (°)	Dip Azimuth (°)	Gradient (MPa/m)	K (stress constants)
σ1 (major horizontal)	05	276	0.0745	K_H = 2.76
σ2 (intermediate horizontal)	01	006	0.0373	K_h = 1.38
σ3 (minor vertical)	85	093	0.0270	K_v = 0.027

Where:
K_H = σ1 / σ3
K_h = σ2 / σ3
K_v = σ3 / depth

16.3.6 Keel Zone

This zone is located between the Eagle and Eagle East orebodies, slightly deeper than Eagle and shallower than Eagle East. Although considerable orebody definition drilling has been performed, no dedicated geotechnical drilling has been conducted. Given that there is significant experience at the site, the likelihood of encountering conditions that are significantly different than at Eagle or Eagle East is probably low.

To assess the risk, Eagle conducted an internal review of available borehole data and past geotechnical characterization for the Keel zone.

Lithologic units within the Keel are largely identical to those in Eagle with the exception that Feldspathic Peridotite is the predominant waste rock in the new deposit, while Eagle and Eagle East were developed in metasediment and Peridotite units. With limited mining experience in the Feldspathic Peridotite, PLT data from drillholes within the Keel footprint were used to estimate unit strength values for the Feldspathic Peridotite unit. Compared to strength estimates developed by Golder in 2005 (Eagle Project Geotechnical Study, April 2005), the Feldspathic Peridotite in the Keel was found to be slightly stronger than the average Feldspathic Peridotite encountered at Eagle (106 MPa vs 92 MPa) and slightly weaker than the typical Peridotite (106 MPa vs 120 MPa).

The rock mass quality for the Keel was assessed using Bieniawski's RMR_{76}, consistent with the method used for Golder's 2005 Geotechnical Study and 2015 Phase 3 Crown Pillar Engineering Assessment. The results indicate higher quality in the Keel than in Eagle's crown pillar, as summarized in Table 16.7.

Table 16.7: Comparison of RMR_{76} values for the Eagle and Keel Deposits

Rock Type	Average RMR_{76}	
	Eagle	Keel

	(Golder, 2015)	
Feldspathic Peridotite	65	79
Peridotite	71	77
Siltstone	70	78
Massive Sulphide	73	84

A review of core photographs and logging data within the Keel did identify a zone of poor quality at the intrusive/sediment contact. While data is insufficient to definitively characterize the rock mass in this area, the RQD appears to be consistently lower than the remainder of the deposit and should be considered during mine design and planning.

16.3.7 Eagle Crown Pillar

The Eagle crown pillar extends from bedrock surface (reference elevation 415 masl) to the back of the 381 Level, resulting in a pillar thickness of 29 m. There is no stipulation of a crown pillar at Eagle east due to its depth below surface.

At Eagle, mining activities have proceeded upwards through a phased approach, with extensive geotechnical studies undertaken, to obtain the necessary permits, prior to the mining of each phase.

The study of the surface pillar, undertaken by Golder (Golder 2019), demonstrates stability of the pillar. This conclusion follows numerous geomechanical studies resulting from several data collections. These include stress measurements in the vicinity of the pillar, additional boreholes (geological and geotechnical data), hydrogeological investigations, roof stability calculations of long-hole workings (Potvin, 1988), and recognized surface pillar stability calculations (Golder 1990, Carter 1992, Carter and Miller 1995, Carter et. Al., 2008). In addition, the workings below this pillar are backfilled tightly to add support, thereby increasing stability. The roof of the workings is also supported with 6.1 m (20 ft) long anchor cables in a 2.1 m by 2.1 m (7 ft by 7 in) pattern.

To ensure crown pillar stability, the QP supports the strategy of Eagle to continue its instrumentation plan as specified in its Preparedness, Prevention, and Contingency (PPC) Plan and Trigger Action Response Plans (TARPS). Eagle should also continue to gather geomechanical information to ensure that the models suggested for the various simulations correspond to the conditions of the surface pillar. It is also recommended that hydrogeology studies continue and be instrumented periodically to improve the models used in the simulations.

The Multiple Point Borehole Extensometers (MPBX) initially installed from the surface are non-functional. In order to continue monitoring the behavior of the pillar, as mentioned in the Crown Pillar Management Plan (CPMP), the surface installations will be replaced by new extensometers installed underground. Surface surveys are used to monitor movement at surface. Amongst them, S1, S2, and S3 are installed to follow the crown pillar area (Figure 16.6).

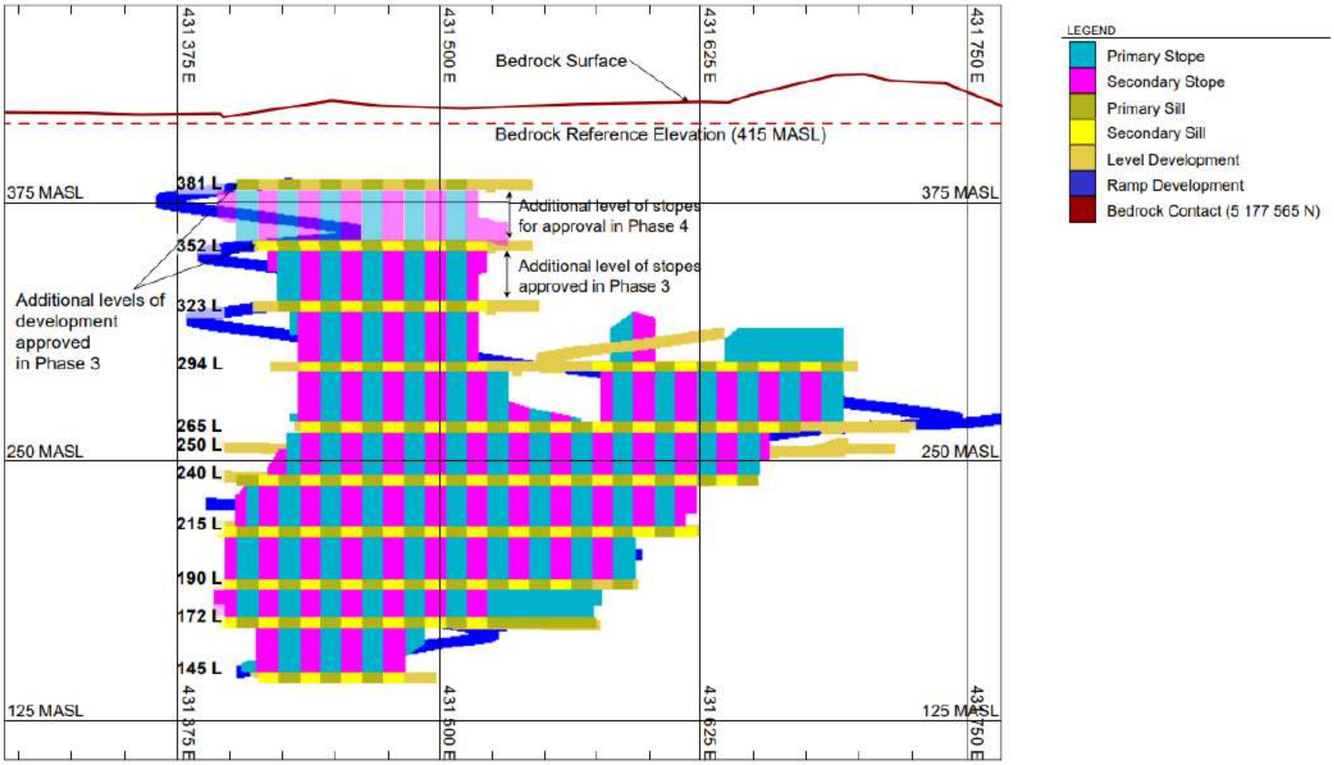


Figure 16.6: Crown Pillar (longitudinal section)

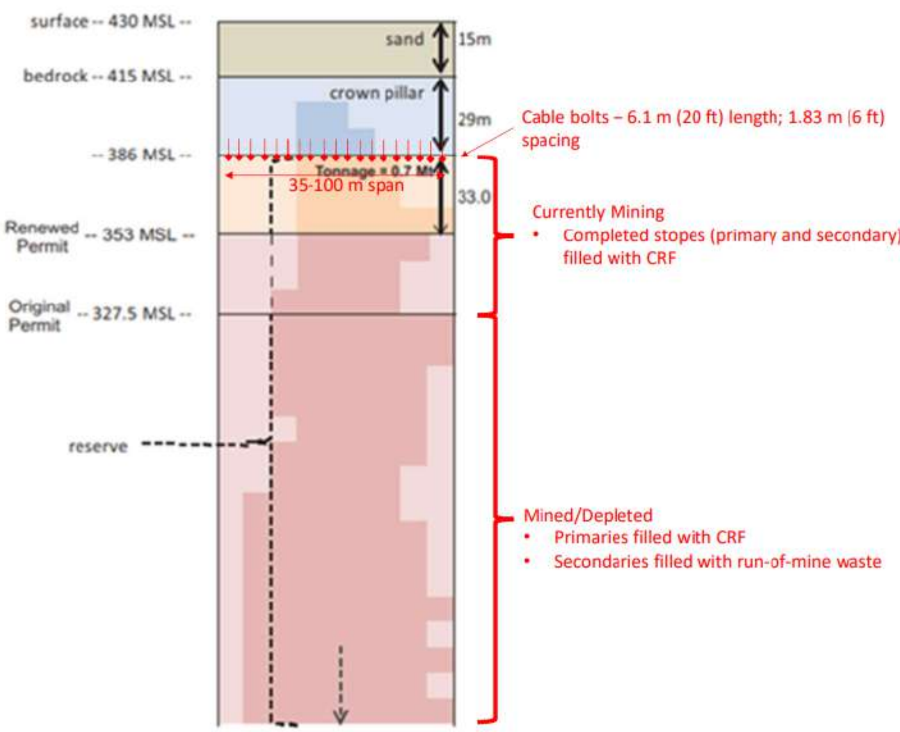


Figure 16.7: Crown Pillar Section View with General Arrangement

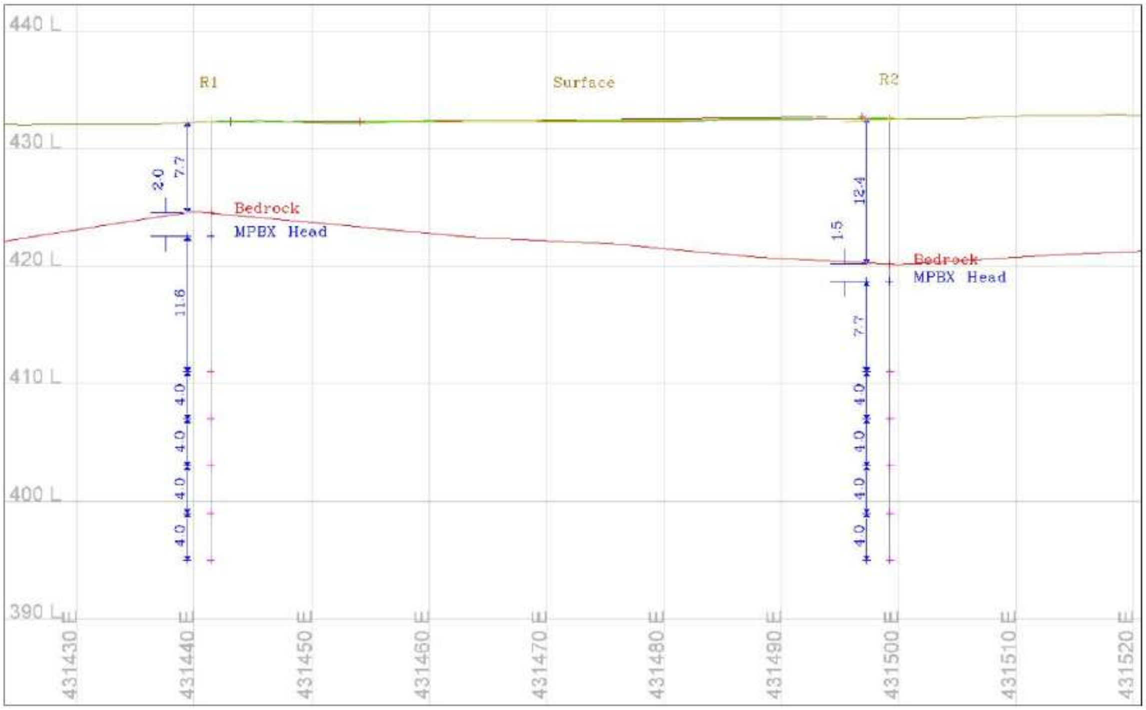


Figure 16.8: Location and Arrangement of the Two MPBX in the Crown Pillar

Eagle Technical Services monitors the crown pillar on a regular basis or as needed, using geotechnical, hydrogeological and seismic methods. Surface surveying prisms were installed in the crown pillar area to monitor ground movement above the crown pillar bedrock and in the overburden. Five surface prisms (S1-S5) were installed directly over the crown pillar. Figure 16.9 shows the locations in plan view of monitors (S1 to S7) and geotechnical monitoring stations employing the two MPBX cables. The original extensometer locations (no longer operational) are labelled R1 and R2. S6 is the location of the fixed total station mount from which measurements are taken, and S7 is the control point outside the crown pillar boundary.

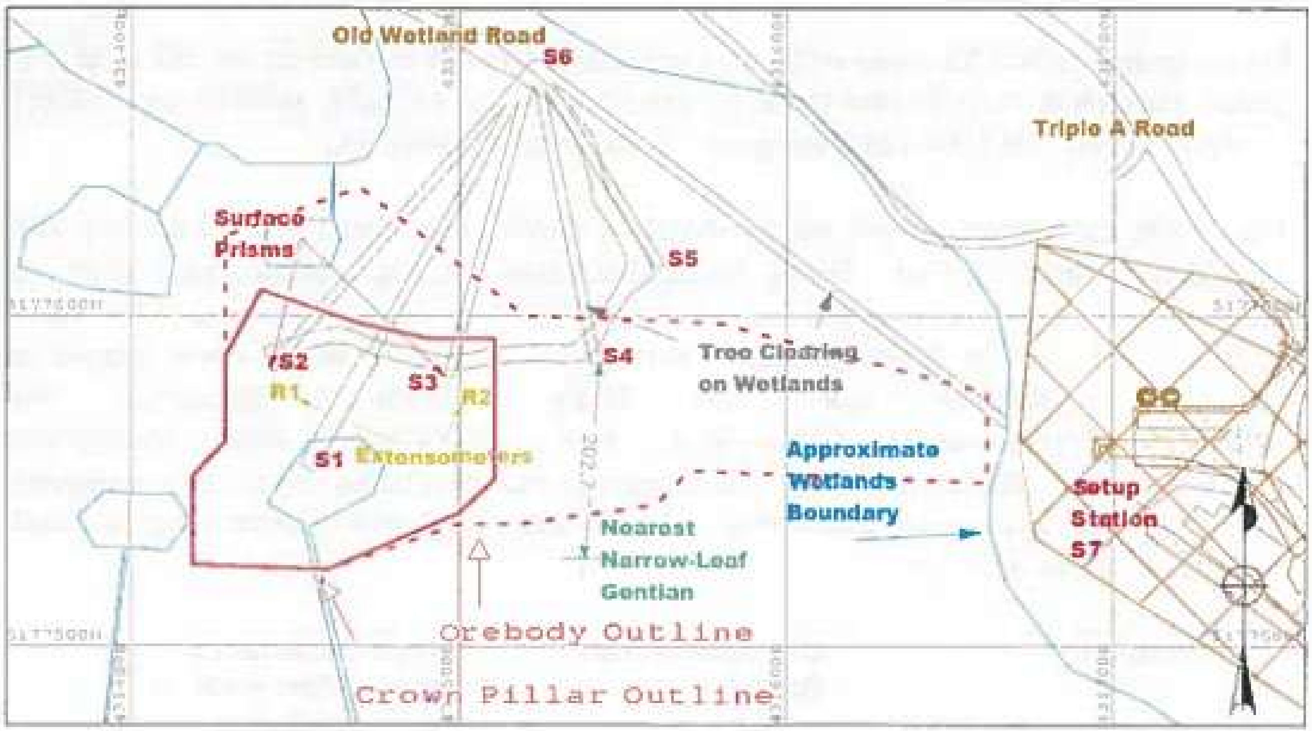


Figure 16.9: Eagle Mine Crown Pillar Monitoring Stations at Surface

Eagle Mine has implemented a Trigger Action Response Plan (TARP) for management of the crown pillar. The purpose of the TARP is to provide a tool for Eagle personnel and contractors to appropriately respond to measured or observed changes in groundwater or ground displacement data in the uppermost levels of the mine and the crown pillar; the objective being to implement controls at early stages and correct deficient conditions prior to reaching critical or irreversible levels. The TARP is divided into five modules:

1. Ground movement
2. Mine dewatering
3. Discrete inflows
4. Wetland well levels
5. Ground conditions

Each of the four first modules are divided into trigger levels from 1 to 4, whereas the last module, ground conditions, refers mainly to observations taken underground.

Trigger levels are:

- **Normal:** State in which ground and groundwater behavior and visual status are acceptable and considered to be sustainable long term.
- **Level 1:** Changed state from normal conditions
- **Level 2:** Further deterioration of conditions is observed

- **Level 3:** Conditions continue to deteriorate (threshold stated by the State of Michigan Department of Environmental Quality (MDEQ) on December 14, 2007, Permit No MP 01 2007)
- **Level 4:** A permit threshold has been exceeded which may indicate instability of the crown pillar deteriorate (threshold stated by d by the State of Michigan Department of Environmental Quality (MDEQ) on December 14, 2007, Permit No MP 01 2007)

The five following figures (Figure 16.10 to Figure 16.14) present the Crown Pillar TARP modules.

MODULE 1: GROUND MOVEMENT

MODULE 1: GROUND MOVEMENT	Response Level	Triggers	Geotechnical Engineer Response	Management Response	Survey
	Normal	-All crown pillar MPBX displacements within 0.1 cm (1 mm) of previous month and 0.5 cm (5 mm) of baseline on all nodes AND -Surface monument elevation within 0.3 cm (3 mm) of previous month and 2.0 cm (20 mm) of baseline	-Continue routine monitoring and assessment	-No direct action required	-Continue monthly survey of suface monuments
	1	-Cumulative displacement of crown pillar MPBX >0.5 cm (5 mm) on any node -Monthly displacement of crown pillar MPBX >0.1 cm (1 mm) on any node -Cumulative displacement of surface monument >2.0 cm (20 mm) -Monthly elevation change of surface monument >0.3 cm (3 mm)	-Evaluate if readings are real or result of equipment failure or human error -If real, notify Mine Superintendent -Increase frequency of MPBX and surface monument measurements to bi-weekly -Investigate ground conditions, structural data, condition of existing ground support, and possible causes such as proximity to stope blasts and/or mining -Recommend appropriate operating requirements and installation of supplemental support or monitoring if required based on investigation findings	-No direct action required	-Increase frequency of surface monument measurements to bi-weekly
	2	-Cumulative displacement of crown pillar MPBX >1.0 cm (10 mm) on any node -Monthly displacement of crown pillar MPBX >0.3 cm (3 mm) on any node -Cumulative elevation change of surface monument >3.0 cm (30 mm) -Monthly elevation change of surface monument >0.5 cm (5 mm)	Level 1 response plus: -Pause drilling and blasting activity above 352 Level while investigation is conducted -Notify Crown Pillar Steering Committee -Work with Mine Planner to de-rate crown pillar mining and reduce open ground in the crown pillar -Utilize numerical modeling to predict probability and extent of deformation -Assist in recommendation and evaluation of mitigation options	-Provide support in evaluation and implementation of mitigation	-Increase frequency of surface monument monitoring to weekly
	3	Cumulative displacement of surface MPBX >1.5 cm (15 mm) on any node -Monthly displacement of surface MPBX >0.5 cm (5 mm) on any node -Cumulative elevation change of surface monument >4.0 cm (40 mm) -Monthly elevation change of surface monument >1.0 cm (10 mm)	Level 2 response plus: -Stop drilling and blasting activities above the 352 Level -Initiate 90 day assessment monitoring period -Investigate if deformation is a result of mining -Develop Corrective Action Plan -Submit monitoring data and Corrective Action Plan to management for review	-Stop drilling and blasting activities above the 352 Level -Notify Lundin representatives -Within 7 days, notify EGLE that "measurable subsidence" has been recorded, and that 90 day assessment monitoring has begun -Plan, review, and approve Corrective Action Plan -Submit monitoring data and Corrective Action Plan to EGLE at the end of the 90 day assessment monitoring period	-Continue weekly survey of surface monuments
	4	-Visible Surface Subsidence	-Stop mining -Notify Mine Superintendent and Environmental Manager -Investigate if deformation is a result of mining -Update predictive modelling -Develop Corrective Action Plan	-Stop mining -Notify Lundin representatives -Notify EGLE -Plan, review, and approve Corrective Action Plan -Submit Corrective Action Plan to EGLE -Implement Corrective Action Plan within 30 days of EGLE approval	-Increase frequency of surface monument and surface MPBX monitoring to daily

Note: Only one trigger is required to initate a given TARP Level.

Figure 16.10: TARP for Ground Movement

MODULE 2: MINE DEWATERING

MODULE 2: MINE DEWATERING	Response Level	Triggers	Geotechnical Engineer Response	Management Response
	Normal	-Mine dewatering flows < 150,000 GPD every day for 30-day period	-Continue routine monitoring and assessment	-No direct action required
	1	Mine dewatering flow > 150,000 GPD, but less than 200,000 GPD for more than 2 days in any 10-day period -Mine dewatering flow >150,000 GPD, but less than 200,000 GPD for more than 5 days in any 30-day period	-Determine if increased dewatering is the result of increased influx or solely the result of temporary accelerated drainage of stored water -If a result of increased influx, increase review of wetland water elevations to weekly -If discrete inflow is identified as source of increased influx, initiate the Inflow TARP	-No direct action required
	2	-Mine dewatering flows > 200,000 GPD for more than one day in any 10-day period -Mine dewatering flows > 200,000 GPD for more than 2 days, but less than 5 days in any 30-day period	Level 1 response plus: -Notify Crown Pillar Steering Committee	-Provide support in evaluation
	3	-Mine dewatering flows > 200,000 GPD for more than 2 days in any 10-day period -Mine dewatering flows < 200,000 GPD for more than 5 days in any 30-day period	Level 2 response plus: -Prepare and submit monthly reports containing mine dewatering flow information, daily transducer ground water elevation information, and wetland water elevation information to Environmental Manager	Level 2 response plus: -Submit monthly reports to EGLE containing mine dewatering flow information, daily transducer ground water elevation information, and wetland water elevation information
	4	-Mine dewatering flows > 300,000 GPD for more than 2 days in any 10-day period -Mine dewatering flows > 300,000 GPD for more than 5 days in any 30-day period	-Increase Level 3 reporting frequency to weekly -Initiate revision of the predictive ground water model per guidance in Permit L10c -Within 30 days, prepare a remedy proposal to ensure that wetlands above and around the entire facility will not be impacted by continued mine dewatering	-Increase frequency of EGLE report submission from monthly to weekly -Provide revised modeling report to EGLE -Submit remedy proposal to EGLE within 30 days of commencing weekly reporting

Note: Only one trigger is required to initate a given TARP Level.

Figure 16.11: TARP for Mine Dewatering

MODULE 3: DISCRETE INFLOWS

MODULE 3. DISCRETE INFLOWS

Response Level	Triggers	Geotechnical Engineer Response	Management Response	Shift Supervisor	Environmental Advisor
Normal	-No discrete underground inflows observed -Discrete underground inflows are measured at less than 5 gpm -Discrete inflow with rate greater than 5 gpm but sustained for less than 30 minutes	-Continue routine monitoring and assessment	-No direct action required	-No direct action required	-No direct action required
1	-Discrete water inflow >5 gpm sustained for more than 30 minutes -Discrete water inflow exceeding 25 gpm at time of occurrence	-Provide sample kit to Shift Supervisor as requested -Document inflow event in Water Inflow Log -Check monitoring wells for associated drops in water levels -Obtain incremental flow rate updates from shift supervisor based on flow rate	-No direct action required	-Follow discrete water inflow flowchart for operations including: -Measure conductivity -Notify WTP of flow rate and conductivity -Collect water samples -Notify key personnel of inflow -Deploy pumps as necessary to manage collection of water	-Deliver inflow samples and associated documentation to lab for testing. -Increase reporting frequency of mine dewatering log from monthly to bi-weekly
2	-Discrete underground inflow >5 gpm sustained for more than 24 hours -Inflow > 25 gpm sustained for more than 8 hours -Discrete inflow > 50 gpm sustained for more than 1 hour	Level 1 response plus: -Notify Crown Pillar Steering Committee -Stop blasting activities within 50 m radius of inflow -Prepare and implement probe hole drilling plan -Assess the need for grouting based on: -deteriorating ground conditions as a result of inflows -decreased surface water levels coinciding with inflow event -acceleration of sustained inflow rates -If appropriate, prepare grouting design	-Provide support in evaluation, preparation, and implementation of probe hole drilling and grouting plans	Level 1 response plus: -Delegate personnel and equipment for conducting probe drilling -Begin staging equipment and preparing for grouting operations should they commence	-Report daily mine dewatering volumes to Geotechnical Engineer and Management
3	-Inflow > 25 gpm sustained for more than 72 hours -Discrete inflow >50 gpm for more than 24 hours -Additional probe holes resulting in cumulative flow greater than 140 gpm, and not decreasing over an 8 hour period	Level 2 response plus: -If inflow is in 352L or 381L, drilling and blasting activity in those levels -Submit mitigation design and recommendations to Management for review (grouting, pressure bulkhead, etc.) -Monitor daily dewatering volumes per Module 2	Level 2 response plus: -Review and approve grouting plan	Level 2 response plus: - Grout probe holes and implement curtain grouting or mitigation plan	-No additional action required
4	-Rapid inundation of heading due to discrete water inflow	-Stop mining. -Evacuate underground personnel.	-Stop mining. -Notify MSHA, EGLE, and Lundin representatives	-Stop mining -Evacuate underground personnel	-No direct action required

Note: Only one trigger is required to initate a given TARP Level.

Figure 16.12: TARP for Discrete Inflows

MODULE 4: WETLAND WELL LEVELS

MODULE 4. WETLAND WELL LEVELS	Response Level	Triggers	Geotechnical Engineer Response	Management Response	Environmental Advisor
	Normal	-Water levels in wetland wells not more than 3 inches below pre-mining baseline	-Continue routine monthly monitoring and assessment	-Report water elevations quarterly to EGLE	-No direct action required
	1	-Water levels in wetland wells not more than 4 inches below pre-mining baseline	-Determine if there has been additional water inflow based on mine dewatering reports and discrete inflow reports. If so, refer to Inflows or Mine Dewatering TARPs for response. -Evaluate if water level change is mining induced or typical seasonal decline -Increase monitoring frequency to bi-weekly	-No direct action required	-Increase reporting frequency of mine dewatering log from monthly to bi-weekly
	2	-Water levels in wetland wells not more than 6 inches below pre-mining baseline	Level 1 response plus: -Notify Crown Pillar Steering Committee -If decreased water levels are mining induced, work with Mine Planners to de-rate crown pillar mining -Increase monitoring frequency to weekly	-Provide support in evaluation and mitigation planning	-Increase reporting frequency of mine dewatering log from bi-weekly to weekly
	3	-Water levels in wetland wells more than 6 inches below pre-mining baseline	Level 2 response plus: -Communicate weekly water elevations to management -Prepare plan for additional monitoring or mitigation measures and send to management for review	Level 2 response plus: -Review Geotechnical Engineer's monitoring and mitigation plan -Submit weekly wetland well water elevations to EGLE	-No direct action required
	4	Water levels in wetland wells remain more than 6 inches below pre-mining baseline after four weeks of increased monitoring	-Implement additional monitoring and/or mitigation measures upon approval from EGLE	-Communicate plan for additional monitoring and mitigation measures to EGLE for review.	-No direct action required

Note: Only one trigger is required to initate a given TARP Level.

Figure 16.13: TARP for Wetland Well Levels

MODULE 5: GROUND CONDITIONS

MODULE 5. GROUND CONDITIONS	Trigger	Geotechnical Engineer Response	Management Response	Shift Supervisor
	-Ground in the 381L is identified as Type III (Q<1)	-Notify Shift Supervisor to install Type III ground support -Collect geotechnical mapping data prior to application of shotcrete -Recommend appropriate operating requirements and installation of supplemental support or monitoring if required	-No direct action required	-Install appropriate support for Type III ground, per the GCMP -Shorten round length if appropriate
	-A fall of ground occurs in the back of the 381L	-Investigate ground conditions, structural data, condition of existing ground support, and possible causes such as proximity to stope blasts and/or mining -Assist in investigation, as requested -Prepare a memorandum summarizing the fall of ground	-If reportable, notify MSHA within 15 minutes -Submit Eagle Mine Incident Report -Review investigation findings, root causes, and corrective actions	-Immediately notify Cementation Safety/Management
	-Excessive overbreak (>10%) indicative of potential unraveling observed during 381L development	-Investigate ground conditions, structural data, condition of existing ground support, and possible causes such as proximity to stope blasts and/or mining -Recommend installation of supplemental support or monitoring if required -Recommend blasting controls based on investigation findings	-No direct action required	-Manage installation of supplemental support and instrumentation if required -Manage implementation of blasting controls
	-Surface seismograph reports blast PPV>2 inches per second	-Check monitoring wells for associated drops in water levels -Review blast design and available actual data for factors contributing to higher PPV -Recommend blasting controls based on findings to prevent future occurrences	-No direct action required	-Manage implementation of blasting controls
	-Stress-induced damage observed in Eagle	-Record observations -Calibrate Eagle Map3D model based on observations -Verify that modeled stresses do not surpass ground support capacity. Recommend additional support if required.	-No direct action required	-Manage installation of additional support if required

Figure 16.14: TARP for Ground Conditions

16.3.8 Hydrogeology and Mine Dewatering

Eagle Mine is a relatively dry mine compared to similar mines, with typical daily dewatering volumes of less than 10 GPM. The dewatering volume is calculated by subtracting the daily total volume of water provided to the underground from the daily water volume pumped to the surface. This volume is regularly monitored using Module 3 of the crown pillar TARP (Figure 16.12), as a sudden or rapidly increasing volume of pumped water from the mine could be a sign of water inflow from the crown pillar.

Discrete underground inflows due to water-conducting geologic structures can occur when direct activity (including diamond drill) breaches such structures. Although rare, the occurrence of water inflow into the mine must be monitored in compliance with the permit, according to state regulations. Discrete inflows are managed via Module 3 of the Crown Pillar TARP (see Figure 16.12).

Mine dewatering is usual and normal in underground operations when drill rigs, and other equipment are working. Consequently, the amount of water pumped from the mine is regular and can be explained. But a sudden, or rapidly increasing volume of pumped water from the mine, can be a sign of an important issue like a new water inflow from surface or something linked to the crown pillar. Therefore, this situation is foreseen of crown pillar management in the previous section. Threshold water volumes measured in gallons of water pumped per day (GPD) are used to trigger a given TARP level.

The impact of discrete inflows and mining activities on groundwater levels is monitored via a network of vibrating wire piezometers (VWPs) installed in crown pillar wells.

16.3.9 Ground Support

Ground support at Eagle (Main and East) is based on the rock mass quality ''Q'' index. Three categories of support exist: Type 1 support for Q ≥ 4, Type 2 support for 1 ≤ Q < 4 and Type 3 for Q < 1. Specifications for the installed rock support for each rating category are defined below.

Type 1 Ground (Q≥4) – Pattern bolting consisting of 2.4 m (8 ft) inflatable bolts on a 1.5 m by 1.8 m (5 ft by 6 ft) spacing with galvanized welded wire mesh (6 gauge with 10 cm (4 in) wire spacing). In addition, there is an overlapping "5-spot" pattern of the same dimensions with an offset of 0.75 m by 0.9 m (2.5 ft by 3 ft).

Type 2 Ground (1 ≤ Q < 4) - Pattern bolting consisting of 2.4 m (8 ft) inflatable bolts on a 1.5 m by 1.8 m (5 ft by 6 ft) spacing with galvanized welded wire mesh (6 gauge with 10 cm (4 in) wire spacing). In addition, there is an overlapping "5-spot" pattern of the same dimensions with an offset of 0.75 m by 0.9 m (2.5 ft by 3 ft) and an optional 5 cm (2 in) thick application of shotcrete. All shotcrete contains fiber additive at a dosage of 1.5 lbs/yard batched.

Type 3 Ground (Q < 1) - Pattern bolting consisting of 2.4 m (8 ft) inflatable bolts on a 1.5 m by 1. 8 m (5 ft by 6 ft) spacing with galvanized welded wire mesh (6 gauge with 10 cm (4 in) wire spacing). In addition, there is an overlapping "5-spot" pattern of the same dimensions with an offset of 0.75 m by 0.9 m (2.5 ft by 3 ft and a mandatory 5 cm (2 in) thick application of shotcrete. All shotcrete contains fiber additive at a dosage of 5 lbs/yard batched.

Additional ground support measures, such as "spot" bolting to increase tightness of the mesh to the back, may be installed in areas were deemed necessary by the miner(s) or underground supervisors. Where appropriate, resin-grouted rebar bolts, are acceptable supplements or substitutes for inflatable bolts. In all cases, bolting and mesh is installed across the back and down the ribs, to the survey grade line. Figure 16.15 summarizes the three types of support based on the Q index.

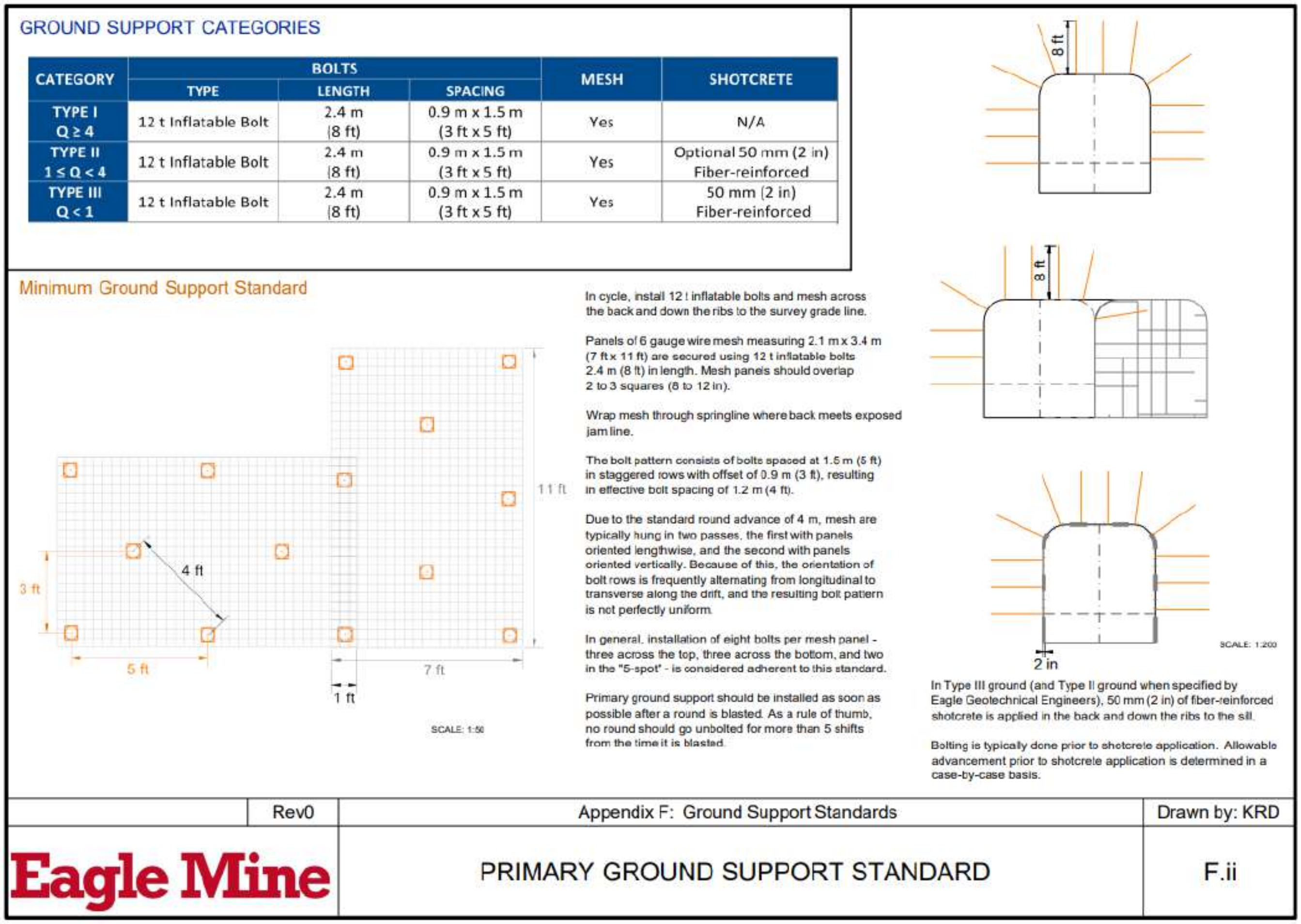


Figure 16.15: Example of Ground Support Representing the Three Types of Support

The dimensions of Eagle underground openings are listed on Table 16.8.

Table 16.8: Underground Opening Dimensions

Underground openings	Width (m)	Height (m)
Decline	5.5 (18 ft)	5.5 (18 ft)
Muck bays	5.5 (18 ft)	6.0 (20 ft)
Level access	5.0 (16 ft)	5.5 (18 ft)
Footwall drive	5.0 (16 ft)	6.0 (20 ft)
Stope accesses	5.0 (16 ft)	5.3 (17.5 ft)
Eagle Sill cuts (primary)	10.0 (33 ft)	5.3 (17.5 ft)
Eagle East Sill cuts (primary)	5.0 (16 ft)	5.3 (17.5 ft)
Sill cuts (secondary)	5.0 (16 ft)	5.3 (17.5 ft)

Secondary support at Eagle consists of a pattern of either 3.7 m (12 ft) premium inflatable bolts or 6 m (20 ft) cable bolts. Both are installed on a 1.83 m by 1.83 m (6 ft by 6 ft) pattern through the primary support pattern. Cable bolts are plated and tensioned (5 tons). Secondary support is typically installed at Eagle in intersections, critical excavations, and excavations with spans greater than 7.2 m.

Face support in development headings is also a standard practice at Eagle mine. It consists of installing support (screen and bolts) before drilling the round. Screen is installed with a 0.6 m (2 ft) overlap on the back to within 3 m (10 ft) from the floor. The bolting pattern is 1.2 m by 1.5 m (4 ft by 5 ft). The screen is installed on the face as tight as possible to side walls with bolts installed at a maximum of 1.5 ft from walls.

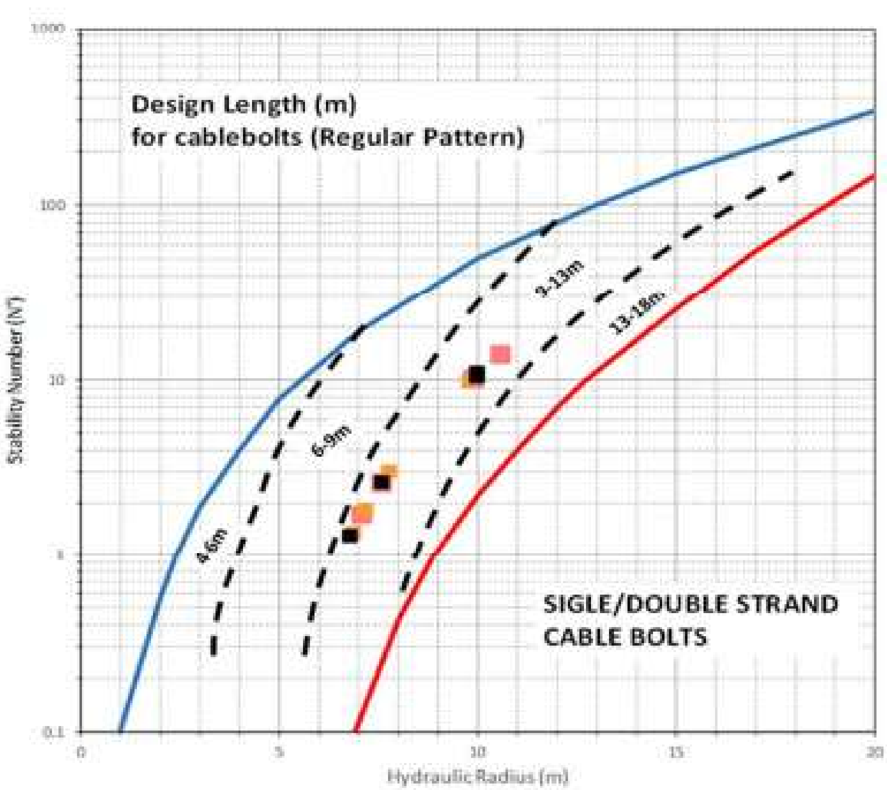
Starting in 2022, the mine plans to transition the primary ground support from inflatable bolts to pumpable resin-grouted rebar, primarily in Eagle East. The primary reason for this change is due to excessive corrosion observed in inflatable bolts, which has resulted in extensive rehabilitation of long-term excavations in Eagle East, including the main decline. By fully encapsulating the ground support in resin, the bolts are expected to be less vulnerable to corrosion, reducing the amount of time and money required for rehabilitation activities. At the time of writing, a rock bolting rig was in the surface maintenance shop undergoing the conversion for installing rebar.

Verification of ground support is achieved in several ways. Routine ground inspection is conducted by underground personnel and technical staff. All relevant information about rock mass, support or other data linked to ground control is recorded in the Ground Control Log Book. A follow-up is done by Technical Services.

Installed ground support, like rock bolts, are randomly tested, monthly, to ensure consistent and effective installation methods are used. The bolts tested must be representative of all types of ground support used in the mine and under normal circumstances.

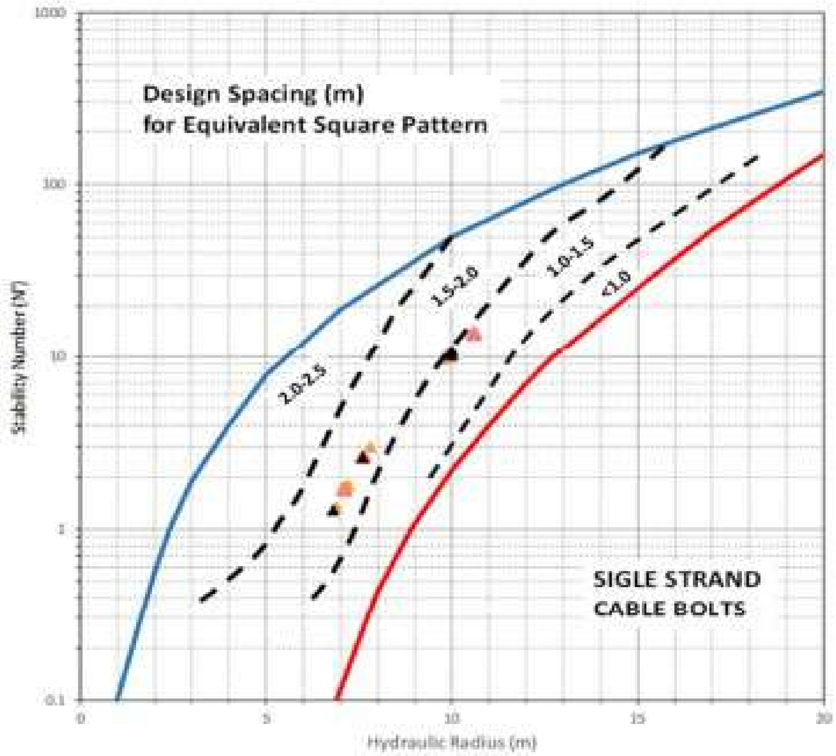
16.3.10 Support of Open Stopes

Support of the back (roof) of open stopes is based on a semi-empirical cable bolt support layout overlay. The Modified Stability Graph is used for this application (Diederichs, 1996). The overlay provides spacing and length guidelines which account for multiple rock failure modes, such as unravelling, slabbing, and caving. Eagle Technical Services has segmented by rock domain the minimum and maximum design lengths of cables, as shown in Figure 16.16 and Figure 16.17. The spacing of cable bolts was segmented in the same way. Additional data have been collected since this graph was developed which have not been included in this Technical Report. The cable bolt design charts used at Eagle are for single strand 15.7 mm (5/8 inch) diameter cables.



	msu		smsu		sulphides	
Q'	HR	N'	HR	N'	HR	N'
Q1	7.1	1.7	6.9	1.34	6.8	1.28
median	7.6	2.6	7.2	1.8	7.6	2.6
Q3	10.6	13.8	7.8	3	10	10.3
mean	9.9	10.1	9.8	9.7	10	10.9

Figure 16.16: Minimum Design Length (m) for Grouted Cable Bolts



	msu		smsu		sulphides	
Q'	HR	N'	HR	N'	HR	N'
Q1	7.1	1.7	6.9	1.34	6.8	1.28
median	7.6	2.6	7.2	1.8	7.6	2.6
Q3	10.6	13.8	7.8	3	10	10.3
mean	9.9	10.1	9.8	9.7	10	10.9

Figure 16.17: Maximum Design Spacing (m by m) for Cable Bolts

16.4 Mine Design

The Eagle Mine conducts mine designs with Deswik software. The design undertaking requires estimation of numerous parameters related to production rates and the determination of dimensions of underground excavations, from input provided by geotechnical engineers. Figure 16.18 presents the dimensions used for ramps, level development, in-ore drifts, and other excavations. Figure 16.19 shows plan views and the dimensions of transverse sublevel open stopes.

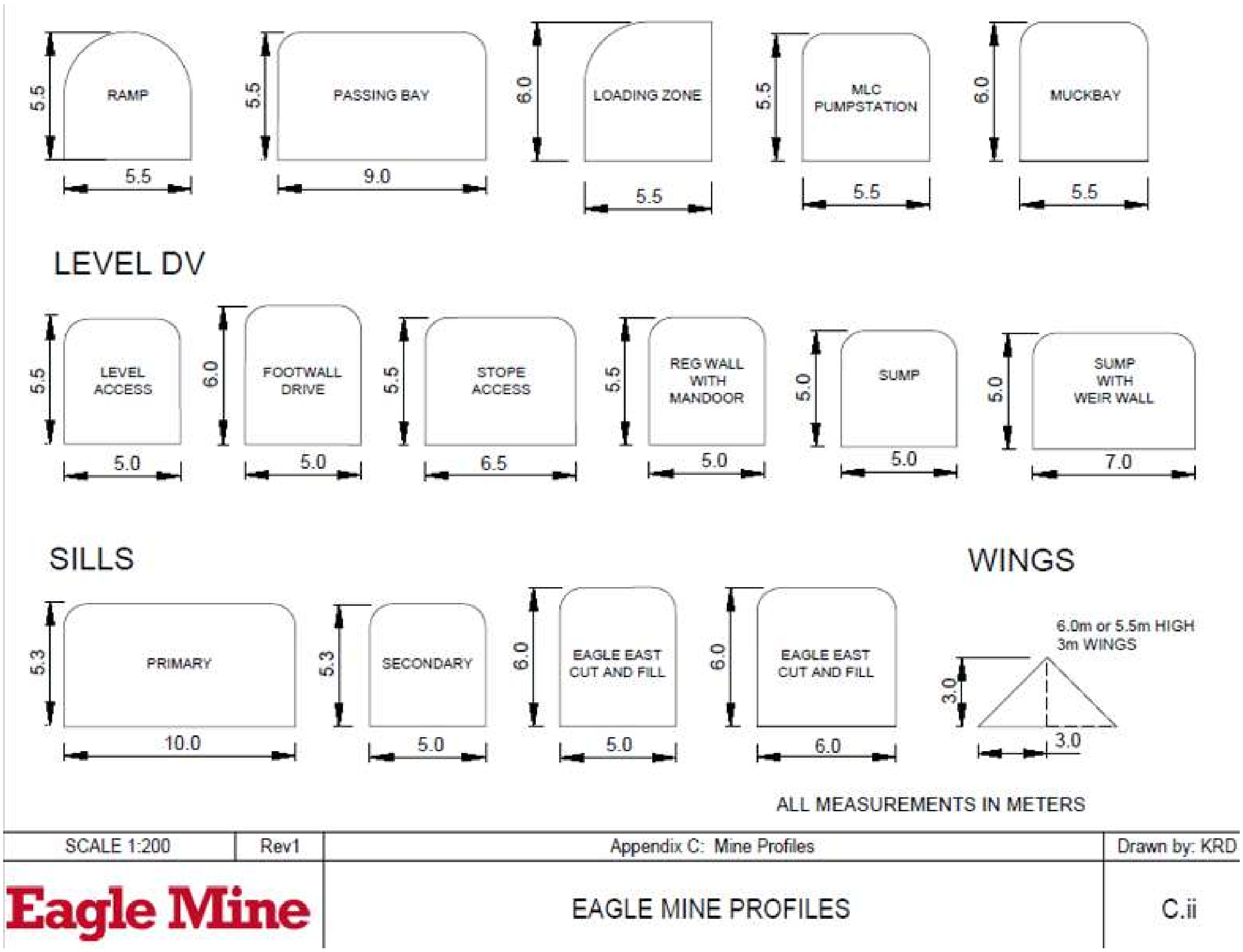


Figure 16.18: Drift Dimensions

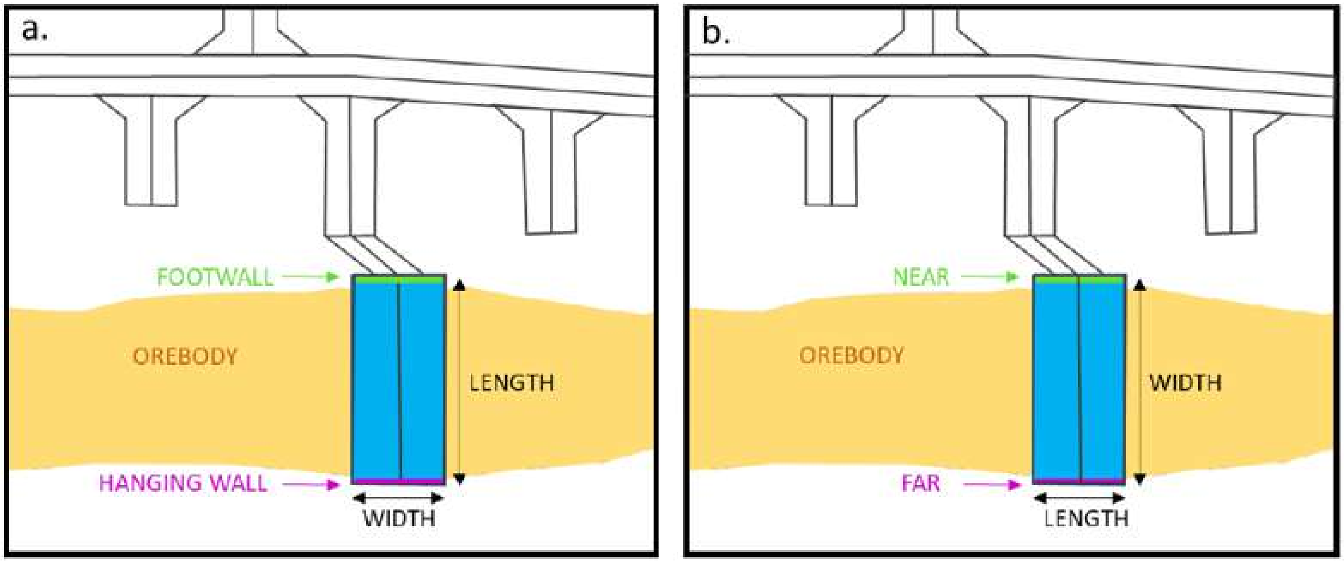


Figure 16.19: Dimensions for Transverse Sublevel Open Stopes (plan view)

Table 16.9: Dimensions for Transverse Sublevel Open Stopes

Stope Height	Determined by level spacing which ranges between approximately 25 and 28 meters
Stope Width	10 m for primary and secondary stopes
Stope Length	Limited to 20 m for primary stopes and 35 m for secondary stopes. Primary stopes longer than 20 m are broken into multiple panels. Golder also recommended that the -395-3160 primary be split into multiple panels, despite being less than 20 m in length.
Strike and dip	Strike and dip of the stope walls are defined using the apparent dip convention. Angle limitations for Western Extension stopes are summarized in Table 16.10.

Table 16.10: Limiting Angles for Western Extension Stope Surfaces

Surface	Strike		Dip	
	Min	Max	Min	Max
Footwall (near)	-45	+45	80	100
Hanging Wall (far)	-45	+45	65	130

Table 16.11 lists the production constraints due to truck haulage capacity that apply to ore, waste, and backfilling in the three zones.

Table 16.11: Deswik Constraints for Production Due to Truck Haulage

Zone	Limit
Eagle	
Ore tonnes	2,300 tonnes per day (51 trucks per day @ 45 t/truck)
Waste tonnes	2,160 tonnes per day (77 trucks per day @ 28 t/truck)
CRF drop fill tonnes	2,240 tonnes per day (66 trucks per day @ 33 t/truck) *
CRF jam fill tonnes	1,682 tonnes per day (45 trucks per day @ 33 t/truck) *
Eagle East	
Ore tonnes	2,300 tonnes per day (51 trucks per day @ 45 t/truck)
Waste tonnes	1,415 tonnes per day (51 trucks per day @ 28 t/truck)
CRF drop fill tonnes	1,682 tonnes per day (45 trucks per day @ 33 t/truck) *
CRF jam fill tonnes	1,682 tonnes per day (45 trucks per day @ 33 t/truck) *
Keel	
Ore tonnes	2,300 tonnes per day (51 trucks per day @ 45 t/truck)
Waste tonnes	1,415 tonnes per day (51 trucks per day @ 28 t/truck)
CRF drop fill tonnes	2,240 tonnes per day (66 trucks per day @ 33 t/truck) *
CRF jam fill tonnes	1,682 tonnes per day (45 trucks per day @ 33 t/truck) *
	* Assumption: each truck of ore will return to the mine with a load of backfill

Table 16.12 presents the yearly production and development rates for each zone. The parameters and assumptions for dilution and mining recovery are discussed in Item 15 of this Technical Report.

Table 16.12: Production and Development Rates

Zone	Type	2022	2023	2024	2025	2026	2027	AVG
Eagle	Lateral Advancement (m/day)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	Stope Mucking (tonnes/ day)	1,200	1,500	1,500	2,000	1,500	1,500	1,533
	Stope Backfilling - CRF (m^3/day)	967	967	967	967	967	967	967
	Stope Backfilling - GOB (m^3/day)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Jamming - CRF (m^3/day)	725	725	725	725	725	725	725
	Jamming - GOB (m^3/day)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Long Hole Drilling (m^3/day)	5.2	5.2	5.2	5.2	5.2	5.2	5.2
Eagle East	Lateral Advancement (m/day)	20.4	20.4	20.4	20.4	20.4	20.4	20.4
	Stope Mucking (tonnes/ day)	1,500	1,500	1,500	1,500	2,000	1,500	1,583
	Stope Backfilling - CRF (m^3/day)	725	725	725	725	725	725	725
	Stope Backfilling - GOB (m^3/day)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Jamming - CRF (m^3/day)	725	725	725	725	725	725	725
	Jamming - GOB (m^3/day)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Long Hole Drilling (m^3/day)	5.2	5.2	5.2	5.2	5.2	5.2	5.2
	Vertical Development - Egress (m/day)	4.3	4.3	4.3	4.3	4.3	4.3	4.3
	Vertical Development - Vent (m/day)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Keel	Lateral Advancement (m/day)	-	3.8	7.6	11.4	11.4	12.5	7.8
	Stope Mucking (tonnes/ day)	-	-	1,000	-	1,500	-	417
	Stope Backfilling - CRF (m^3/day)	967	967	967	967	967	967	967
	Stope Backfilling - GOB (m^3/day)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Jamming - CRF (m^3/day)	550	550	550	550	550	550	550
	Jamming - GOB (m^3/day)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Long Hole Drilling (m^3/day)	5.2	5.2	5.2	5.2	5.2	5.2	5.2
	Vertical Development - Egress (m/day)	4.3	4.3	4.3	4.3	4.3	4.3	4.3
	Vertical Development - Vent (m/day)	2.5	2.5	2.5	2.5	2.5	2.5	2.5

16.4.1 Open Stope Design and Mining

Successful mining of open stopes depends largely on the original stope dimensioning. The Modified Stability Graph Method is based on rock mass modified quality Q' (where $SRF/J_w = 1$ in Q index). The face exposed (Hydraulic Radius) is also considered. This method considers stress applied on a considered surface (A factor), relative orientation of the dominant joint with respect to the surface exposed (B factor) and influence of gravity on the stability of the face being considered (C factor). N' is the modified stability number representing rock mass conditions and environment.

$$N' = Q' \times A \times B \times C$$

Hydraulic radius (HR) is a stability analysis parameter which considers the influence of the size compared to the shape of an excavation. Figure 16.20 represents calculations and Figure 16.21 dimensions to be considered.

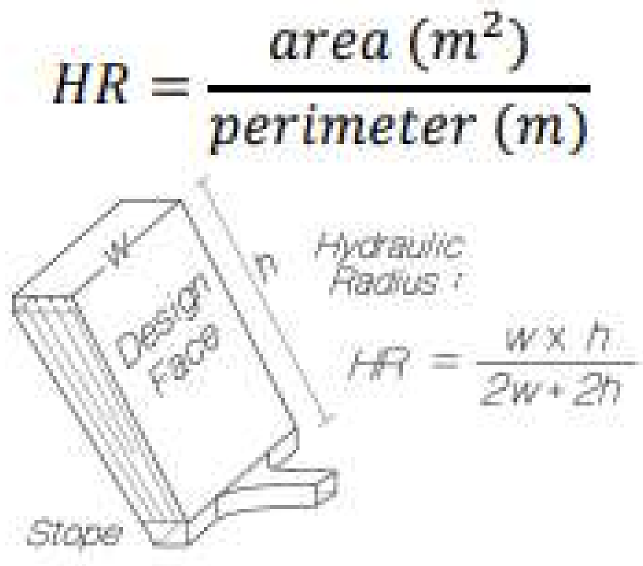


Figure 16.20: Hydraulic Radius Formula

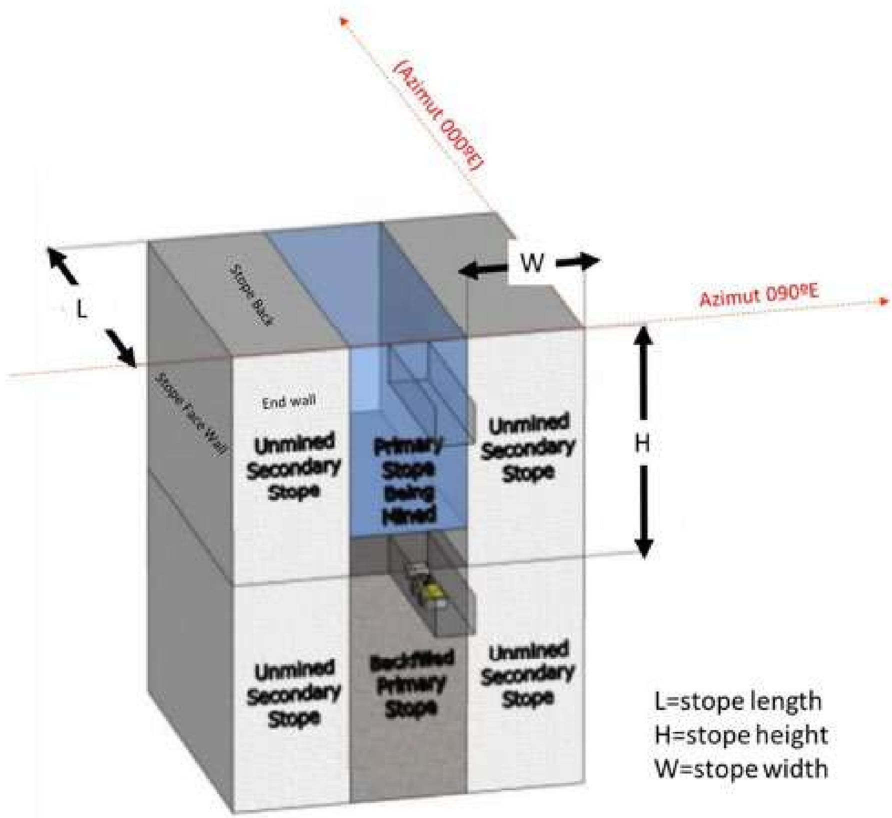


Figure 16.21: Dimensions of Open Stopes

The stability graph (Figure 16.22) is used for stability prediction, based on plots of HR vs N’ of case histories of unsupported stopes, cable bolted stopes and the limits of stability proposed by Potvin in 1988 (Diederichs, 1996). The cable bolting limits for the supported cases represent the average performance of all the cable bolted stopes and do not consider array density (cable bolt spacing), orientation or quality control.

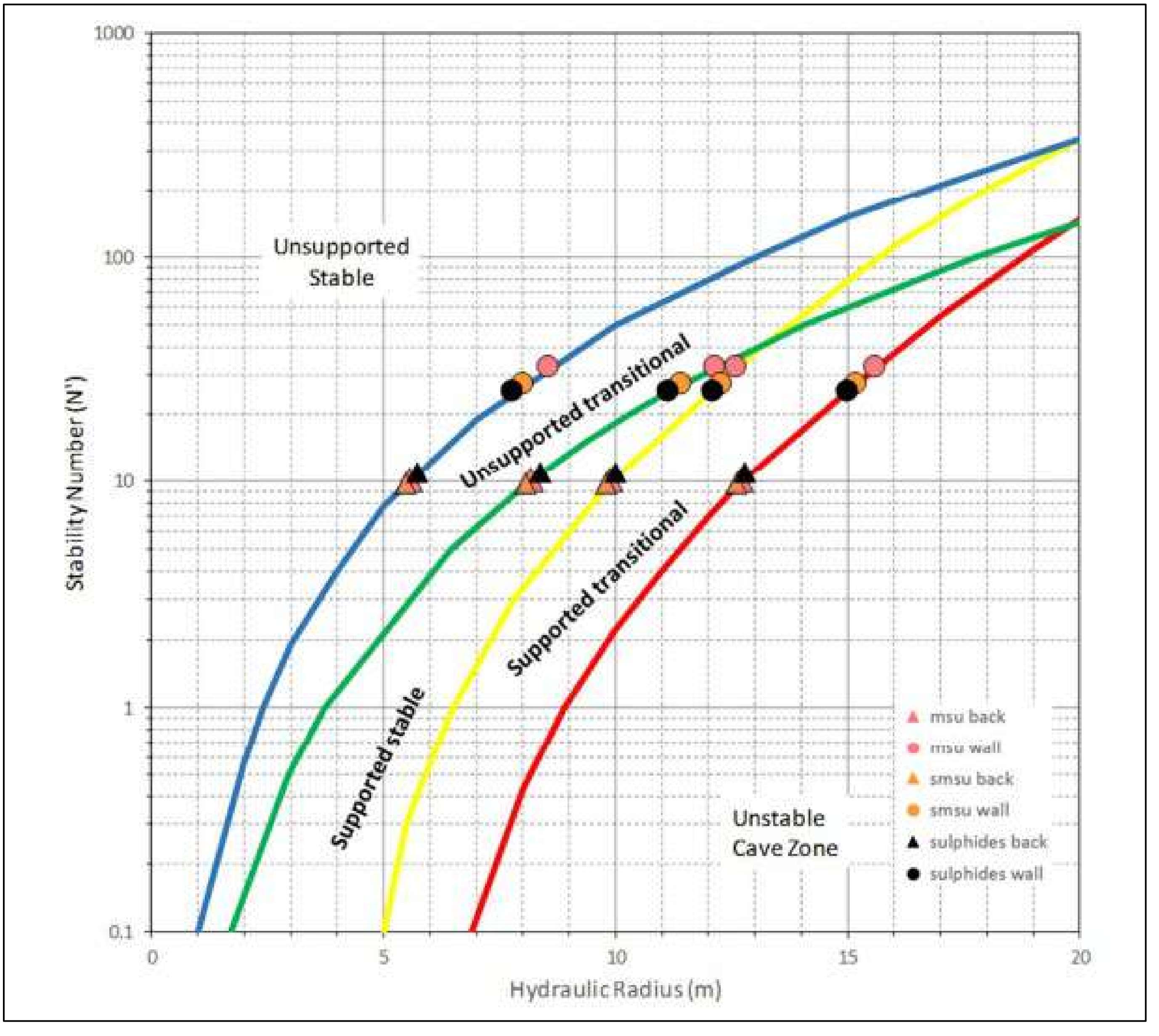


Figure 16.22: Open Stopes Stability Graph for Eagle Mines

Eagle has conducted many simulations of main domain (N’) for different dimensions (HR). Figure 16.23 is an example of HR simulations. Results from these dimensioning simulations are then plotted on the stability graph to verify the calculated stability of the exposed face (Figure 16.24). All dimensions are in meters.

massive sulphides-msu

width	Stope Length 10	20	30	40	50	60
5	1.7	2.0	2.1	2.2	2.3	2.3
8	2.2	2.9	3.2	3.3	3.4	3.5
10	2.5	3.3	3.8	4.0	4.2	4.3
20	3.3	5.0	6.0	6.7	7.1	7.5
30	3.8	6.0	7.5	8.6	9.4	10.0
40	4.0	6.7	8.6	10.0	11.1	12.0
50	4.2	7.1	9.4	11.1	12.5	13.6
60	4.3	7.5	10.0	12.0	13.6	15.0
70	4.4	7.8	10.5	12.7	14.6	16.2

semimassive sulphides-smsu

width	Stope Length 10	20	30	40	50	60
5	1.7	2.0	2.1	2.2	2.3	2.3
8	2.2	2.9	3.2	3.3	3.4	3.5
10	2.5	3.3	3.8	4.0	4.2	4.3
20	3.3	5.0	6.0	6.7	7.1	7.5
30	3.8	6.0	7.5	8.6	9.4	10.0
40	4.0	6.7	8.6	10.0	11.1	12.0
50	4.2	7.1	9.4	11.1	12.5	13.6
60	4.3	7.5	10.0	12.0	13.6	15.0
70	4.4	7.8	10.5	12.7	14.6	16.2

sulphides

width	Stope Length 10	20	30	40	50	60
5	1.7	2.0	2.1	2.2	2.3	2.3
8	2.2	2.9	3.2	3.3	3.4	3.5
10	2.5	3.3	3.8	4.0	4.2	4.3
20	3.3	5.0	6.0	6.7	7.1	7.5
30	3.8	6.0	7.5	8.6	9.4	10.0
40	4.0	6.7	8.6	10.0	11.1	12.0
50	4.2	7.1	9.4	11.1	12.5	13.6
60	4.3	7.5	10.0	12.0	13.6	15.0
70	4.4	7.8	10.5	12.7	14.6	16.2

Figure 16.23: Simulations of Different Dimension to be Considered for Stability

		N'-Stope Backs msu	smsu	sulphides
		10.1	9.7	10.9
Stable	HR	5.6	5.5	5.7
Unsupported Transitional		8.2	8.1	8.4
Stable with support		9.9	9.8	10.0
Supported transitional		12.7	12.6	12.8
Unstable		12.7	12.6	12.8

Figure 16.24: Example of Stability Prediction for Stope Backs and Walls in Sulphides

Open stopes at Eagle are typically 20-30 m (66-98 ft) long by 10 m (33 ft) wide by 25-30 m (82-98 ft) high. The hydraulic radius (3.3 m to 3.8 m) of those dimensions represents a stable zone (in blue), referring to Figure 16.23. Primary stopes are mined in two or three shorter length panels to ensure high quality backfill emplacement. Short panels result in a more consistent CRF. Once primary stopes have cured, secondary stopes are blasted, mucked and backfilled with gob or uncemented rock fill (URF).

The mined length of open stopes varies from 32 m long at Eagle and 20 m long at Eagle East. For Eagle the stope length is mainly driven by operational constraints so a complete cycle can be attained within a 60-day period. The tonnage associated with the aforementioned stope lengths is used for LOM planning and scheduling. Nevertheless, each stope is assessed with the Matthew's method. According to a geotechnical report by Golder (June 2022, Eagle East geotechnical support 22513889-006-TM-RevA-2000), open stope lengths are limited to 20 m due to a potential for increase in stress concentrations and dilution of the mineralized material.

In general, the mining of open stopes follows an inverted V sequence. The mineralized zone is divided in primary and secondary stopes. Primary stopes are extracted from the bottom up and slowly extend outward, creating a pyramidal shape (Figure 16.25). Secondary stopes follow the sequence and are extracted once the two closest primary stopes on the same horizon have been filled (CRF) and cured.

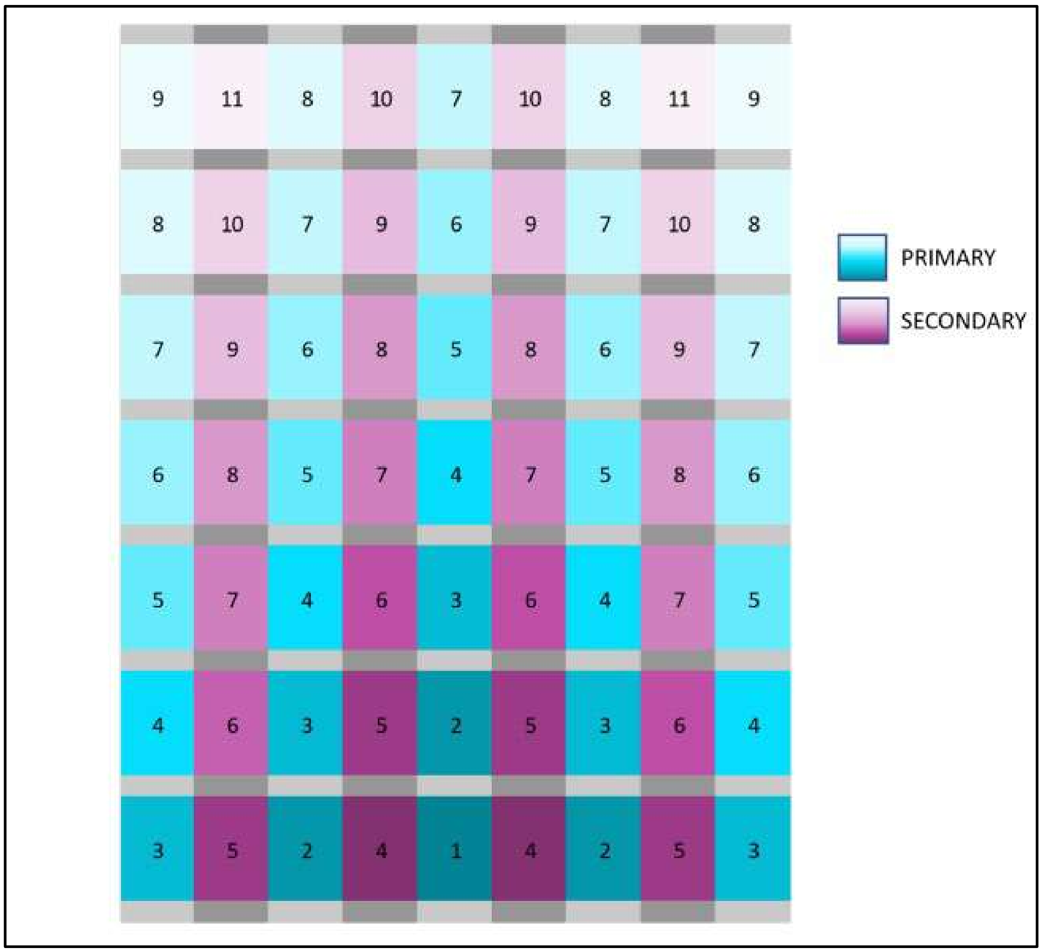


Figure 16.25: General Progression of Open Stope Mining According to Pyramidal Shape

The mining sequence relies on the ability to properly manage backfill practices. Curing time for backfilled stopes is managed such that blasting activities of proximal stopes do not commence until cemented backfill is adequately cured. Figure 16.26 represents the curing time recommended for a production blast in a stope (left hand side) and a smaller slot blast (right hand side).

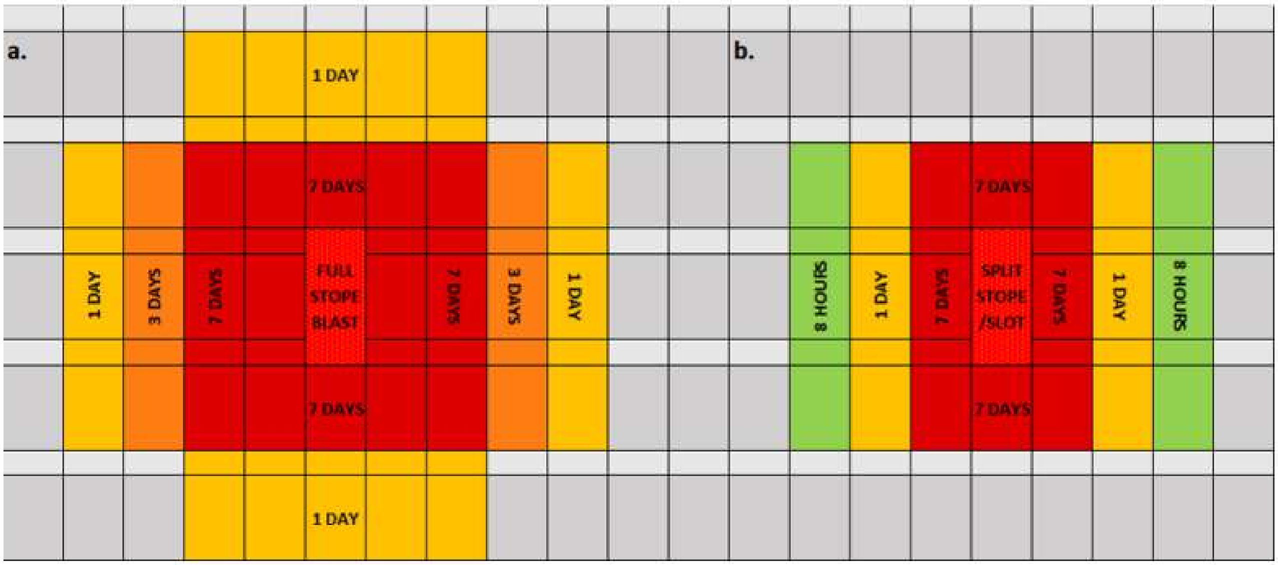


Figure 16.26: Cure Time Delay Visualizers for a) Full Stope Blast and b) Slot Blast

16.4.2 Backfill

Eagle Mine uses cemented rockfill and uncemented rockfill to backfill mined stope voids. CRF is used to backfill the drifts in D&F mining and the primary stopes in transverse sublevel open stoping (TSLOS). URF is used to backfill secondary stopes in TSLOS. The backfill is hauled to stopes and D&F drifts by the same mine trucks that transport ore to surface. Trucks are equipped with ejector boxes, which permit them to dump backfill directly in the location where it is required, in areas of low back clearance, without having to raise the truck box.

CRF is prepared on surface at a backfill plant located at the mine site. The plant is a continuous mixer type plant, capable of producing 2,000 tonnes per day. The CRF is prepared using recipes dependent on the mining zone and mining method. For example, the CRF used in D&F requires a less-fluid, stickier consistency than that used in TSLOS so that it can be tightly placed at a steep angle up to the back of the excavation.

The CRF composition utilizes mine development rock as a principal component, with sand added to improve gradation. The physiochemical composition of the CRF is:

1. Approximately 90% mine development rock or an approved substitute aggregate
2. Approximately 10% screened natural sand
3. 3-7% Type 1-11 Normal Portland cement (NPC)
4. Water:cement ratio (w:c) = 0.5 to 1.0
5. 2.5 oz/hundred weight NPC Euco-Fill 25 (Euclid Chemical Company) admixture

For quality control, CRF used in SLOS, and D&F headings is tested utilizing ASTM test method C39 for compressive strength. These tests consist of filling 6-inch cylinder casts (L:D = 2) with material sampled from underground trucks. Samples are typically collected every other day on which CRF batching occurs, and are cured for 24 hrs, 72 hrs, 7 days and 28 days prior to testing. A database exists at the mine for the recording of test results.

About half of the aggregate for backfill comes from development waste hauled to surface and stockpiled at the mine site. It is crushed to less than 75 mm (3 in) before being fed to the backfill plant. The mine does not presently generate sufficient development waste to meet its backfilling requirements, so the remainder is purchased from two local quarries. This material, crushed to the required size, is delivered to the mine site by trucks.

The URF used for backfilling secondary stopes can be run of mine development waste without crushing. As much as possible, waste from development headings is hauled directly to and dumped into the stopes. In other cases, waste stockpiled on the surface is loaded into mine trucks and hauled back underground.

The site has established guidance concerning required CRF cure times in proximity of blasting. The guidance is based on historical CRF cure data and provides recommended cure times based on anticipated blasting PPVs calculated for typical blasting charge weights over a range of distances.

16.5 Mine Infrastructure

During the site visit, the QP observed the underground infrastructure, mine services, and fixed equipment described in Item 18 of this Technical Report. The QP is of the opinion that they are appropriate for the scale of the Eagle Mine. Furthermore, these installations were observed to be of high quality and were in working order and functioning normally during the underground tour.

16.5.1 Mine Access

The underground workings are accessed via the main ramp, which has its portal entrance within the industrial area of the mine site. The ramp measures 5.65 m wide by 5.35 m high in profile and has a grade of -13%. The ore produced in the mine and some of the development waste is hauled to surface in diesel-powered trucks via the ramp. In addition, the CRF and a portion of the URF used to backfill the stopes are hauled underground via the ramp.

16.5.2 Compressed Air

A compressor plant situated on surface at the mine site supplies the mine’s compressed air. The compressor plant has three Ingersoll Rand compressors, which provide a total capacity of 150 L/s (318 cfm) at 120 psi. Usually, two compressors operate at any given time with the third unit on standby.

16.5.3 Data and Communications

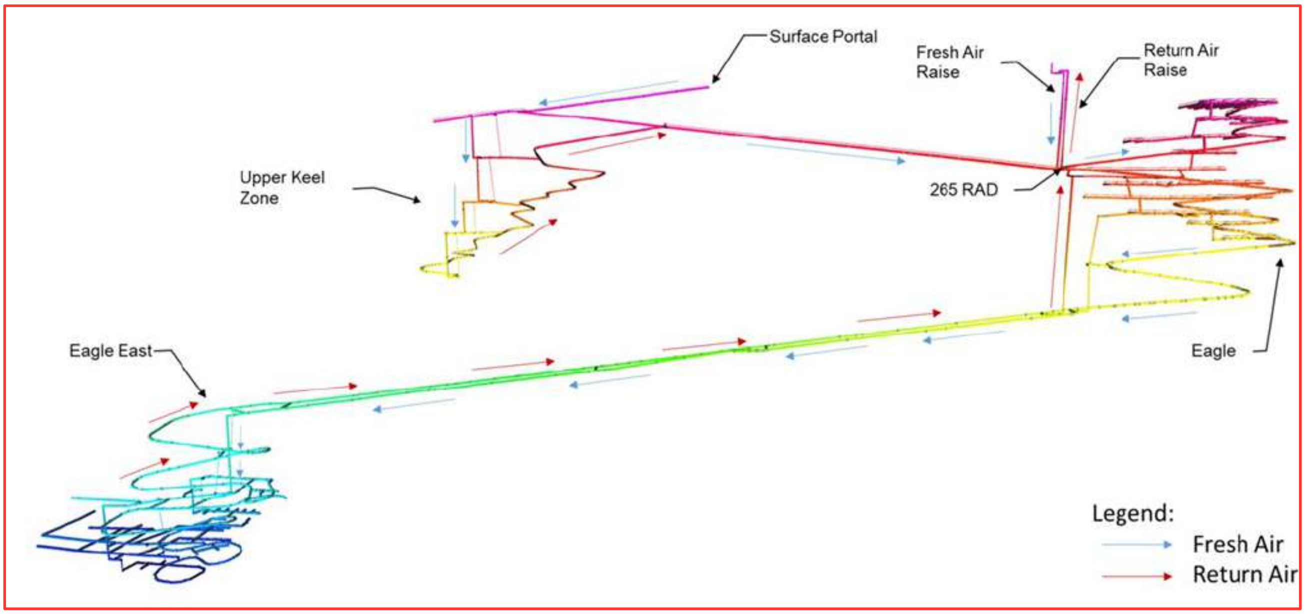
The underground mine data and communications systems consist of a leaky feeder system for two-way radio communication and a fibre-optic network. All underground equipment is equipped with radios, and hand-held units are also available. The fibre-optic network supports the control and monitoring system, such as mine environmental monitoring, main ventilation fans, and dewatering monitoring. Eagle Mine is presently replacing the existing systems with an LTE cellular network and plans to have it fully installed by June 2023. This commutations upgrade project is in the budget and can be considered sustaining capital.

16.5.4 Maintenance Shop

Mining equipment is mainly serviced and repaired at the maintenance shop on surface. There is, however, an underground maintenance shop in the East Eagle Zone. It is mainly used for servicing and repairing equipment that cannot easily be moved to surface, such as jumbos, bolters, and longhole drills.

16.5.5 Ventilation

Figure 16.27 illustrates the ventilation system. Fresh air enters the mine via the portal of the main ramp and a fresh-air raise (FAR), consisting of a vertical, 4.5 m diameter borehole. The FAR is equipped with an Alimak elevator, which provides a secondary means of emergency egress from the mine. The return air is exhausted via a return-air raise (RAR), consisting of a second vertical, 4.5 m diameter borehole.



Source: Lundin Mining Corporation, 2022

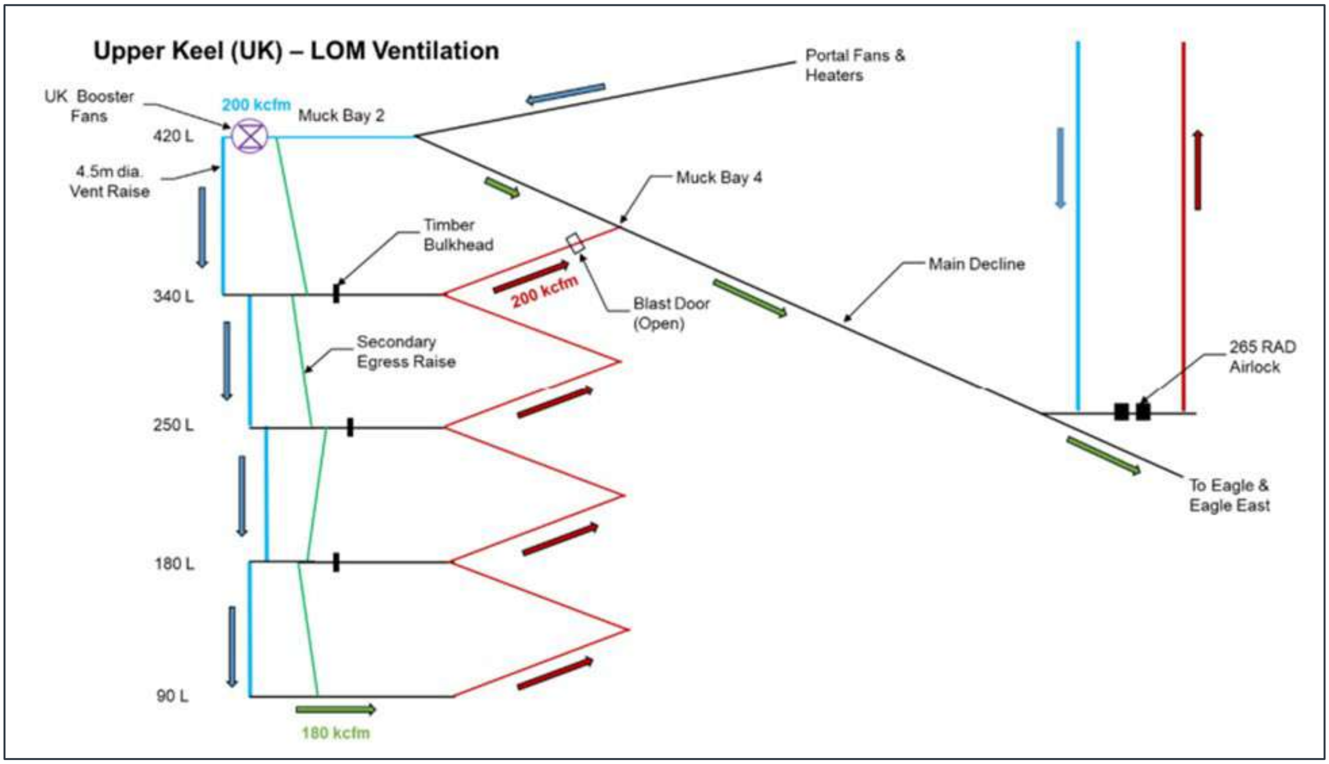
Figure 16.27: Eagle Mine Ventilation System, Isometric View

The return air is exhausted via the RAR by twin 522 kW fans installed at the collar of the raise. The portal is equipped with a 186-kW fan. The portal and the FAR are equipped with propane heaters which maintain the air entering the mine above freezing temperature during the winter.

Fans in the main ramp direct fresh air to the lower levels of the mine. Return air is exhausted via 4 m by 4 m raises that connect the sublevels. The airflow is controlled with bulkheads and louvres installed at the exhaust-raise crosscuts. Auxiliary fans supply air to the crosscuts and development headings. Fresh air is provided to headings requiring auxiliary ventilation through 1.2 m diameter ducting, which is either flexible textile ducting or semi-rigid polymer ducting.

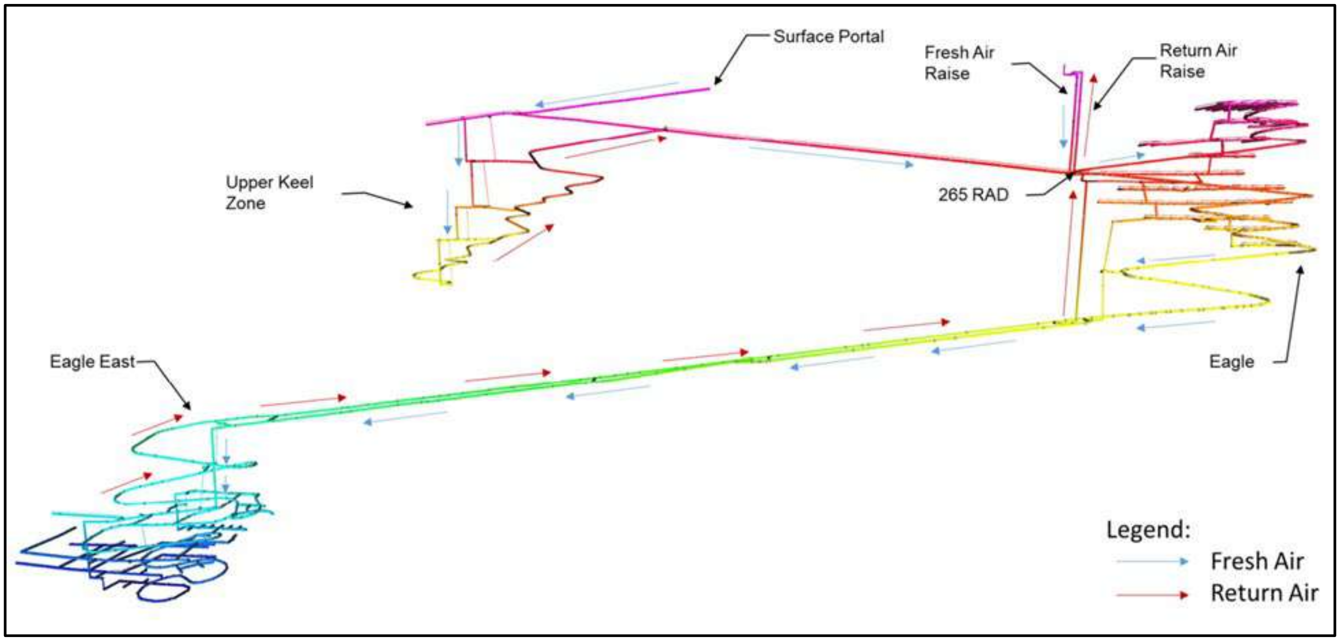
The ventilation system has been extended via twin ramps from the Eagle Zone to the Eagle East zone. One of the ramps serves as the principal access to the zone and exhausts return air. The adjacent ramp provides intake ventilation and provides a secondary means of egress from the zone.

Figure 16.28 illustrates the ventilation system planned for the Keel Zone, and Figure 16.29 shows how it would fit in with mine-wide ventilation system. Fresh air will be drawn to the upper level of the Keel Zone via a ventilation drift extending from the main ramp at muck bay #2 (420 level). The air will be drawn by two 168 kW ventilation fans set up in a bulkhead in the drift. Air will be distributed down to the Keel workings via 4.5 m diameter ventilation raises connecting the sublevels. The return air will flow from the lowermost 90 level and be exhausted via the ramp and discharged to the main ramp at muck bay #4, down-ramp from the ventilation drift. The design avoids developing a ventilation raise connection to surface and the permitting the raise would require.



Source: Lundin Mining Corporation, 2022

Figure 16.28: Upper Keel LOM Ventilation

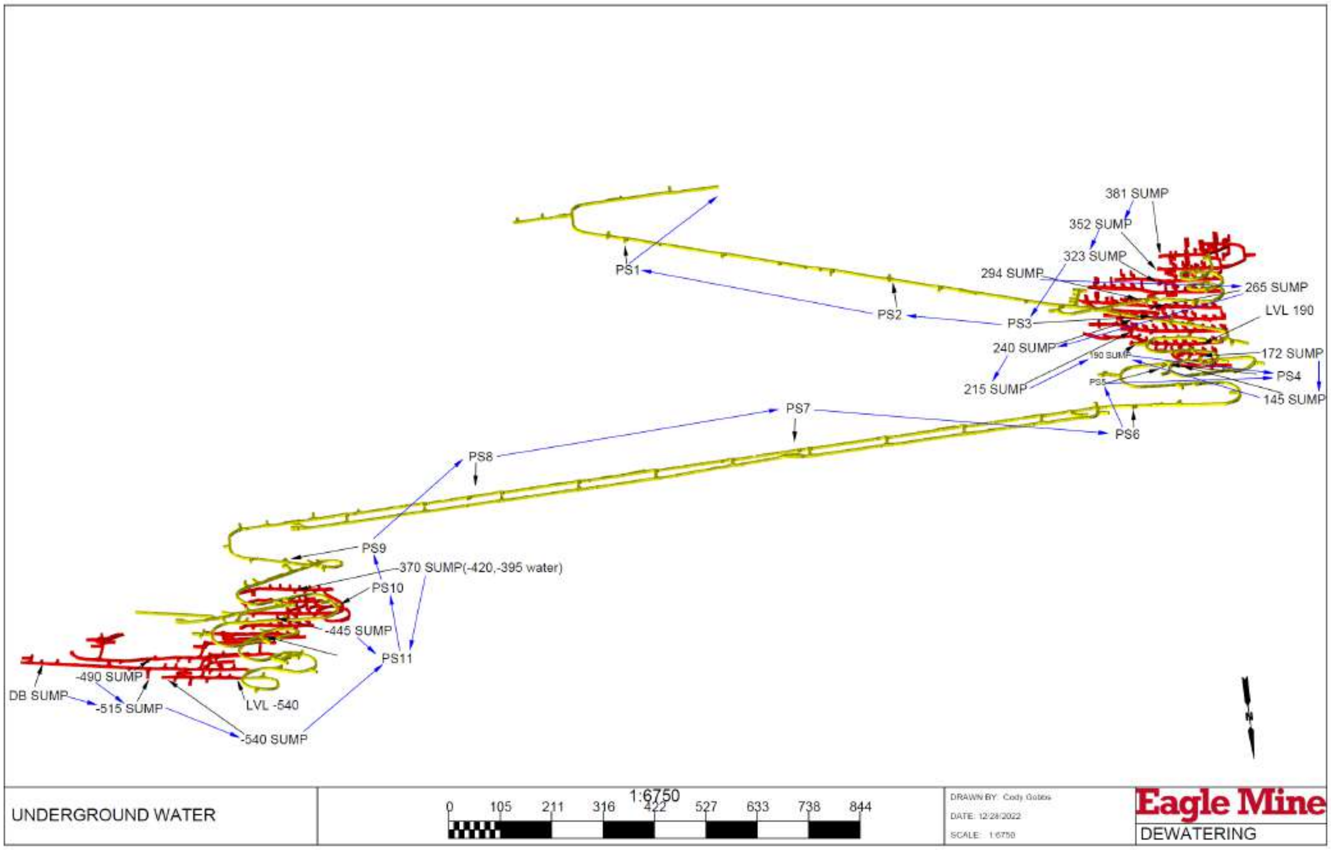


Source: Lundin Mining Corporation, 2022

Figure 16.29: Eagle Mine Ventilation Network Schematic

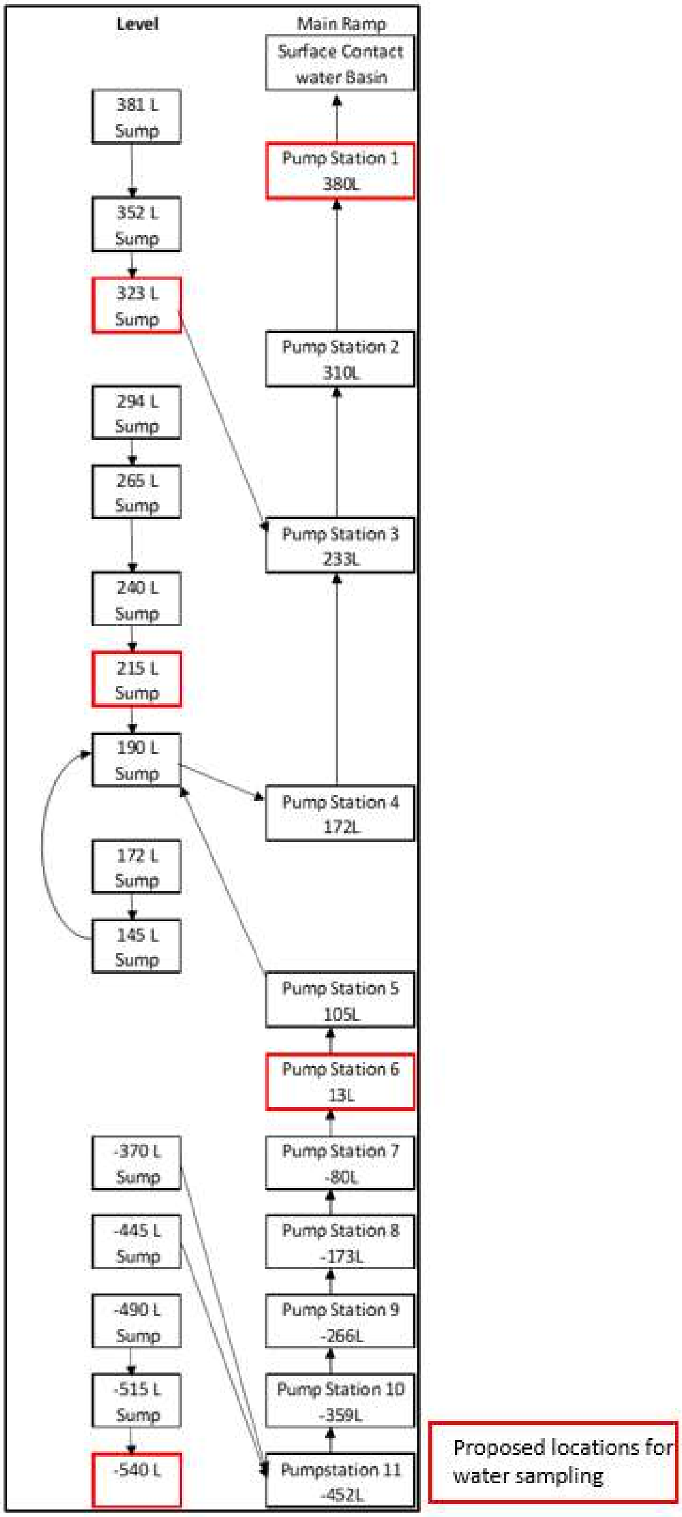
16.5.6 Dewatering System

Figure 16.30 and Figure 16.31 illustrate the dewatering system in isometric view and schematic, respectively. The Eagle Mine is relatively dry, with low groundwater inflows compared to most mines. Consequently, a significant portion of the water that the dewatering system handles originates from mining operations such as drilling and dust control from washing down muck piles.



Source: Lundin Mining Corporation, 2022

Figure 16.30: Eagle Mine Dewatering System – 3D View



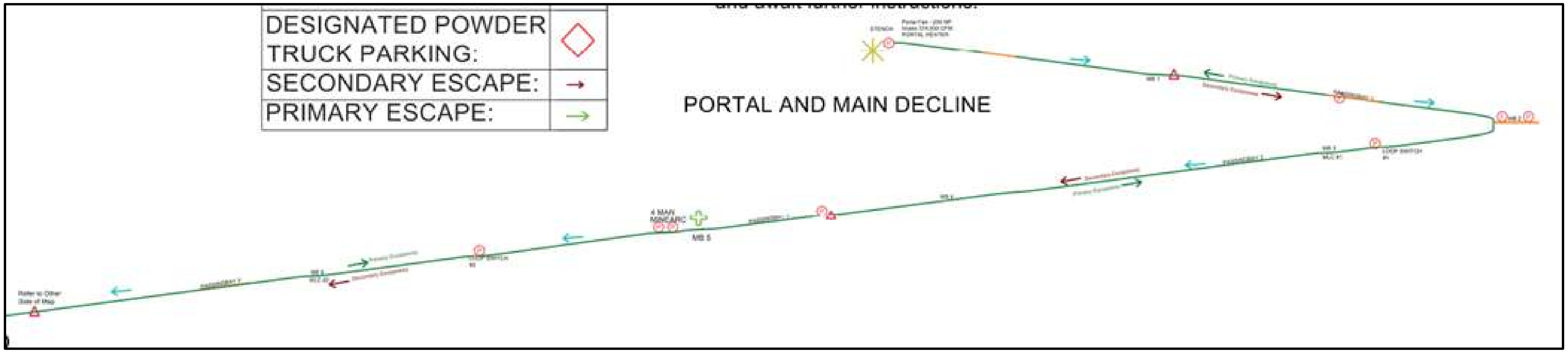
Source: Lundin Mining Corporation, 2022

Figure 16.31: Eagle Mine Dewatering System - Schematic

The dewatering system consists of pumping stations connected in series along the main decline. The water is pumped upwards from station to station and finally to the Surface Control Water Basin. The stations are spaced along the ramp at vertical intervals ranging from 70 m to 93 m. A main settling sump on the 190 level receives water pumped from the Eagle East Zone.

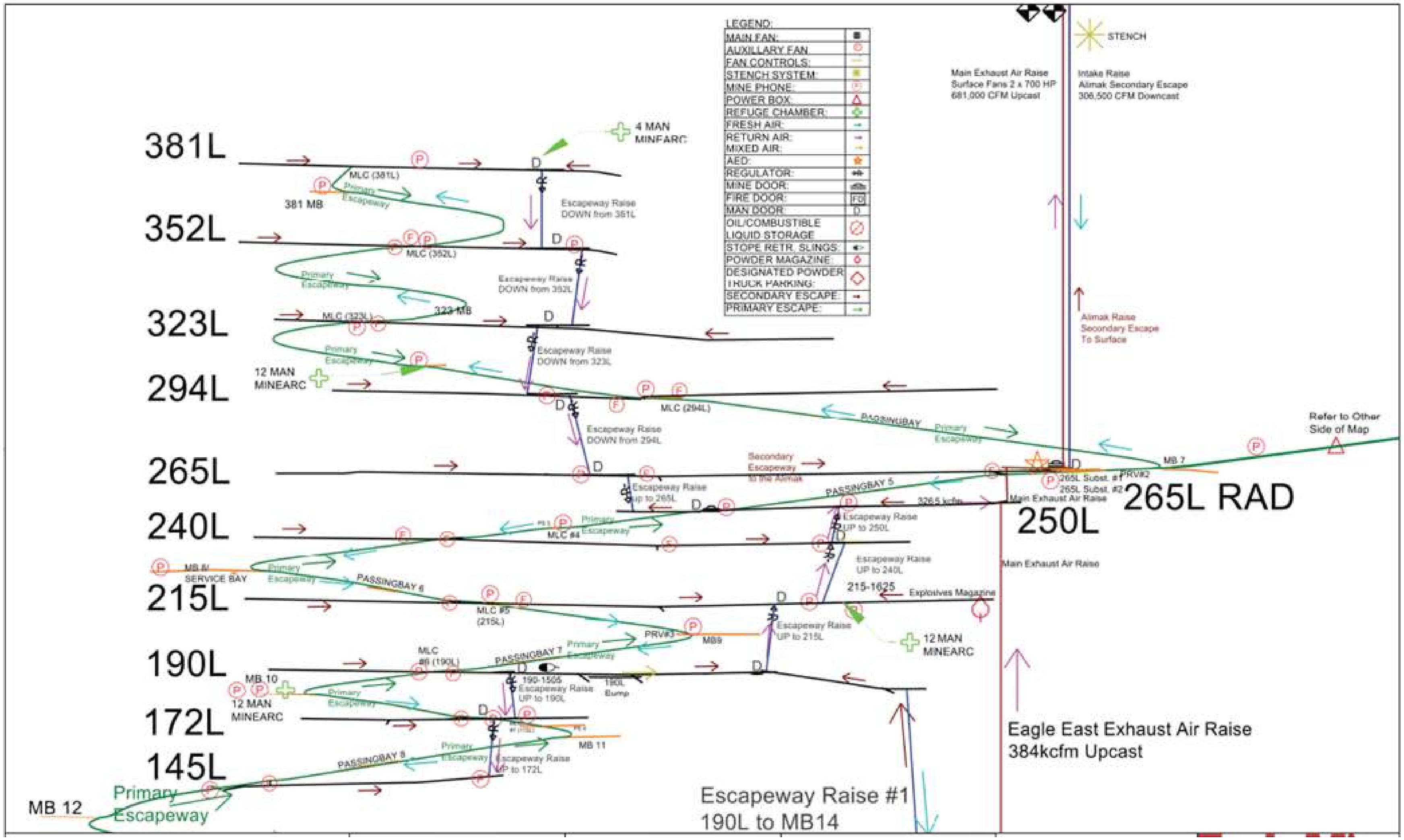
16.5.7 Escapeways

Figure 16.32, Figure 16.33, and Figure 16.34 illustrate the escapeways in the upper zone, Eagle Zone and Eagle East Zone, respectively. The routes available for exiting the Eagle Zone in an emergency are the main ramp, 1.2 m diameter borehole raises equipped with Laddertube manways, and a 4.5 m diameter borehole raise extending from surface equipped with an Alimak elevator. The Alimak elevator has a 2,000 kg capacity and can transport up to 20 individuals.



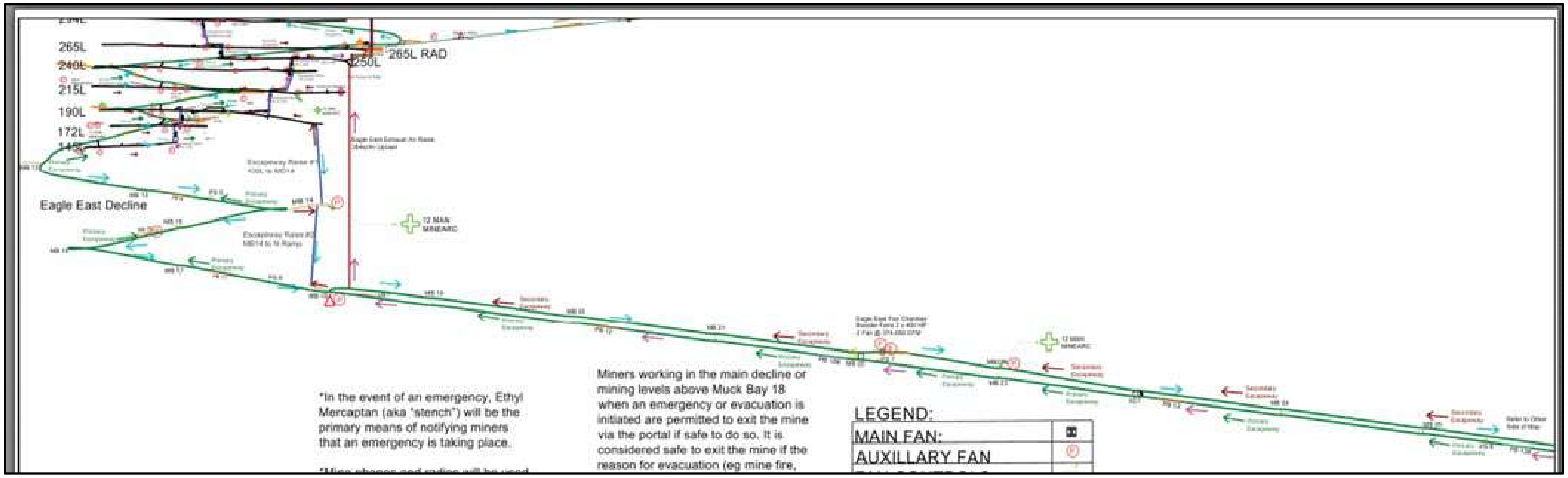
Source: Lundin Mining Corporation, 2022

Figure 16.32: Eagle Mine Escapeways – Portal and Main Ramp



Source: Lundin Mining Corporation, 2022

Figure 16.33: Eagle Mine Escapeways – Eagle Zone



Source: Lundin Mining Corporation, 2022

Figure 16.34: Eagle Mine Escapeways – Eagle East Zone

The routes available for exiting the Eagle East Zone in an emergency are the spiral ramp, 1.2 m diameter borehole raises equipped with Laddertube manways, and the twin ramps connecting Eagle East to the Eagle Zone. Portable mine refuge chambers supplied by MineARC are set up at strategic locations in the mine. They are equipped to provide breathable air supply to occupants in the event of an underground fire. The mine has eight portable mine refuge chambers with a 12-person capacity and four units with a four-person capacity.

The Keel Zone will have two escape routes connecting with the Eagle Mine's main ramp (Figure 16.35 and Figure 16.36). The routes are the Keel Zone's main ramp and the zone's ventilation drift on the 420 level. In addition, 1.2 m diameter borehole raises equipped with Laddertube manways will connect the sublevels along with additional 8-person refuge chambers positioned at the base of each laddertube.

The Eagle Mine has a warning system using ethyl mercaptan gas in case of an emergency requiring personnel to evacuate the mine or report to a refuge station. Release points for Ethyl Mercaptan gas are located at the ramp portal,bottom of the Alimak raise, and in the Eagle East fan chamber.

Personnel entering the underground mine wear belt-mounted, self-contained self-rescuers (CSE Model SRLD), which provide the user with one hour of chemically generated oxygen. The Eagle Mine has a mine rescue station on surface equipped with 20 Draeger BG-type closed-circuit breathing apparatus.

16.5.8 Underground Electrical System

Underground electrical power is fed by two separate 13.8 kV distribution systems, one from the portal and the second down the fresh-air raise (FAR). Both systems are fed from the site powerhouse.

The portal switchgear feed supplies power down the decline to Switchgear B. Transformers along the main decline provide 480 V power for the pump stations and a transformer located at the portal for the portal fan and heater. From the main Switchgear B at the 265 level, the power is fed down the main decline to provide electricity for pumps, ventilation fans, and mining equipment.

A 13.8 kV substation is installed at the ventilation raise collar to provide power to the main ventilation fans, heating units, Alimak elevator, and general surface facilities. The ventilation raise power supply is fed from the Vent Raise substation down the FAR to Switchgear A located at the 265 level. From the main Switchgear A, the power is fed up the main decline to the upper portion of the mine (294 to 381 levels) to provide power for pumps, ventilation fans, and mining equipment.

Each production level has a 750 kVA Mine Load Centre (MLC) to feed ventilation and electro-hydraulic loads. Levels are equipped with breakers that allow for isolation from the main system. The underground feeds from the surface to the main underground substations on both systems are sized for full mine loads for redundancy in case of failure of the other system. A tie-in breaker is installed between the two substations on the 265 level.

16.5.9 Explosives Magazines

The explosives magazines are located in the underground mine. They are licensed to and managed by the mining contractor, Cementation USA. The magazine has a capacity to store 11.8t emulsion and 5.4t stick powder, sufficient to support 17 rounds and one stope, which is equivalent to five days of sill advance production and two weeks of stope production. Eagle mine uses an emulsion blasting agent for both production stopes and development headings. In 2021, Eagle consumed 725t of emulsion and 37.5t of powder products as well as 87,345 Nonel Detonators, 4,236 electronic detonators, and 41.8km of detonating cord.

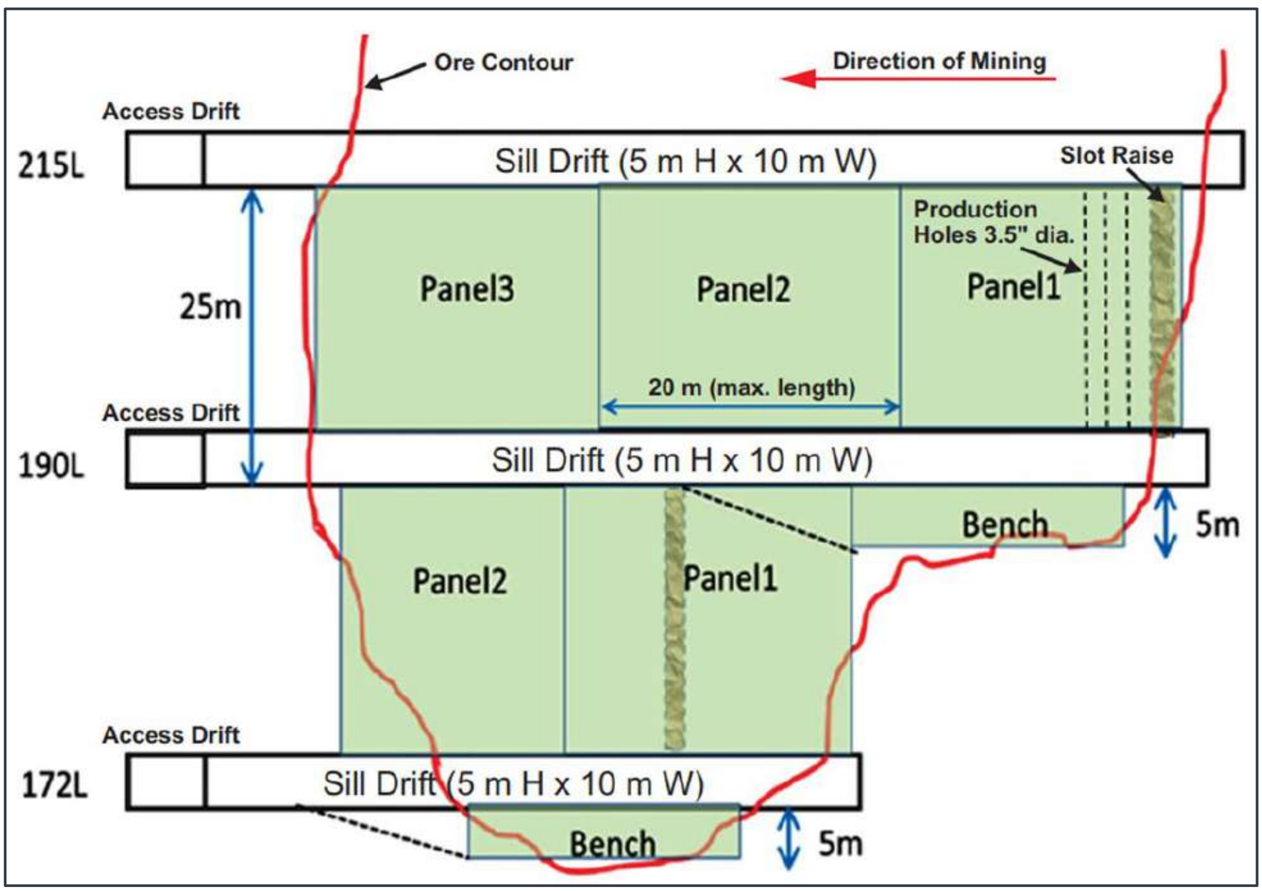
16.6 Mining Methods

Eagle Mine uses three mining methods, TSLOS, LSLOS and D&F. Combinations of all three methods are used in Eagle, Eagle East, and the Keel Zone.

During his visit to the site, the QP had the opportunity to visit active TSLOS and D&F stopes and review plans for mining parts of Eagle East with LSLOS. The QP is of the opinion that Eagle Mine is using appropriate mining methods for the zones and mining conditions where they are applied and agrees that D&F is a suitable method for mining the Keel Zone.

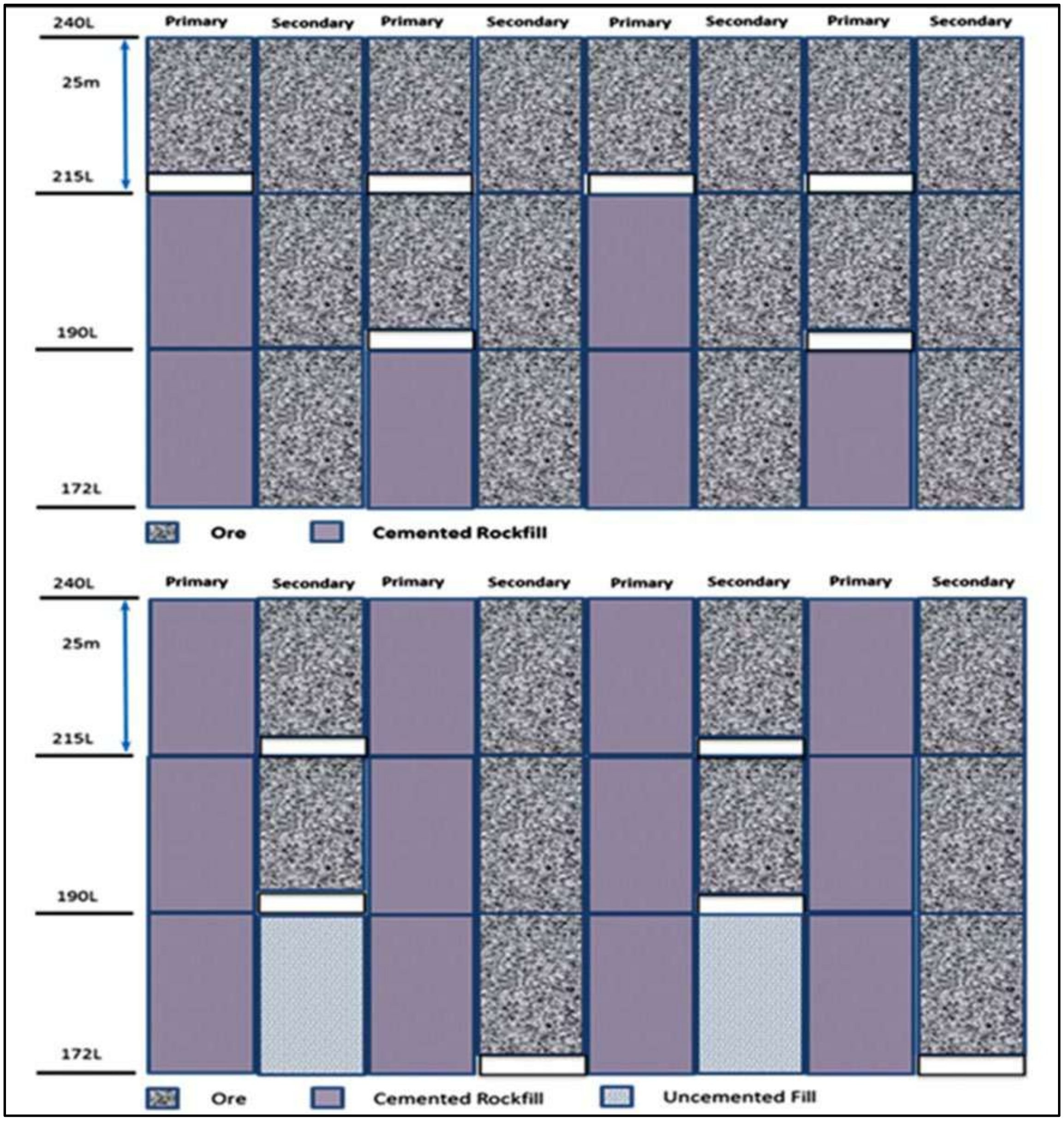
16.6.1 Transverse Sublevel Open Stoping (TSLOS)

Figure 16.35 and Figure 16.36 illustrate how TSLOS is employed in the Eagle and Eagle East Zones with cross-sectional and longitudinal views. Figure 16.37 provides a longitudinal view of the stopes in the Eagle Zone. The portion of the deposit between two sublevels is mined by dividing the ore into alternating primary and secondary stopes, extending in parallel from the footwall to the hangingwall. The stopes in Eagle Zone are 10 m wide and range in height from 18 to 29 m, depending on the sublevel internal. The stopes in Eagle East Zone are also 10 m wide but range in height from 25-28 m.



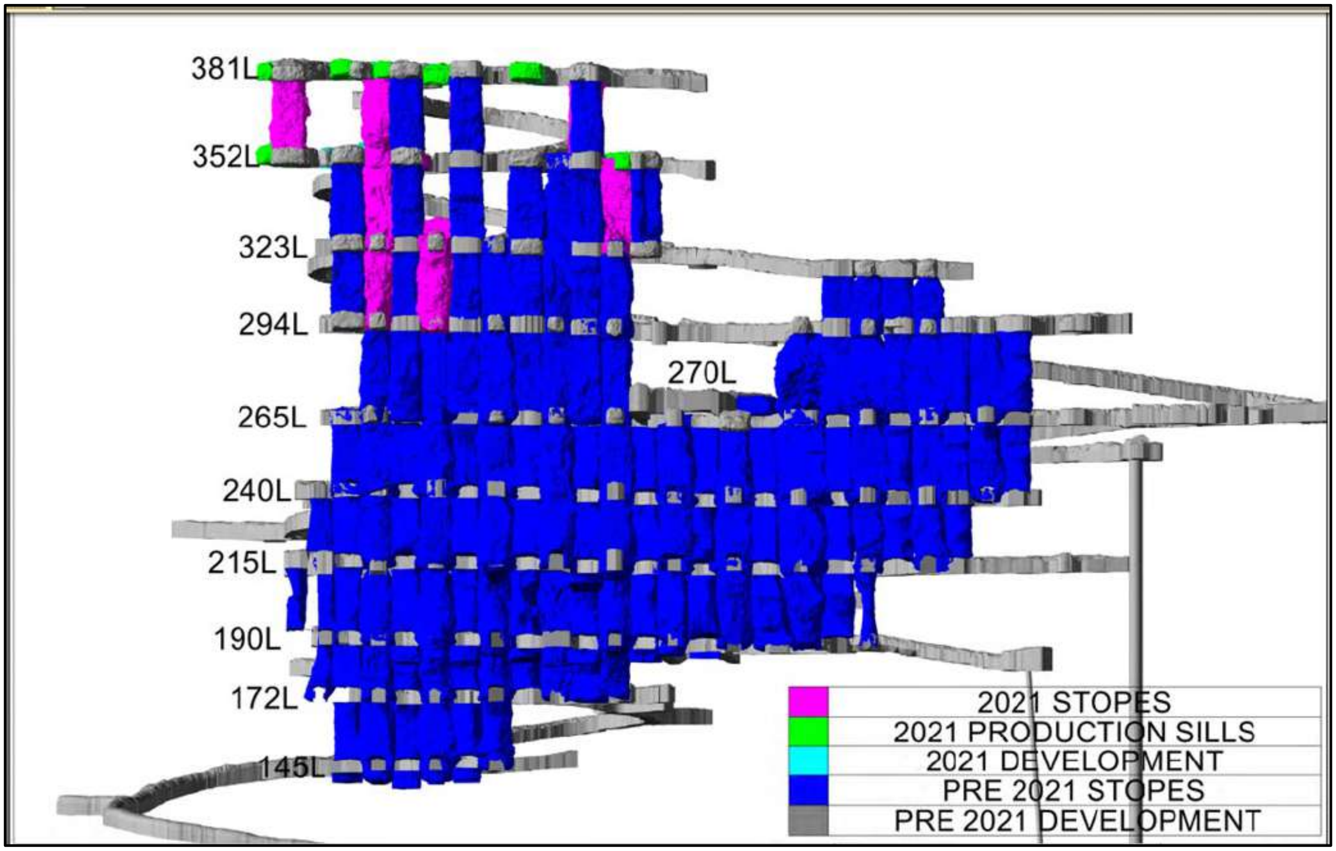
Source: Lundin Mining Corporation, 2022

Figure 16.35: Transverse Sublevel Open Stoping Method at the Eagle Mine – Cross Section



Source: Lundin Mining Corporation, 2022

Figure 16.36: Transverse Sublevel Open Stoping Method at the Eagle Mine – Longitudinal Section



Source: Lundin Mining Corporation, 2022

Figure 16.37: Longitudinal View of Eagle Zone Stopes

In wider parts of the deposit, the stopes are not mined as single excavations extending from footwall to hangingwall. Instead, each one is divided into panels, thereby limiting the length of the opening to a maximum of 32 m. This distance is based on the ability to complete the stope cycle in less than 60 days at typical mucking and backfilling rates. Multiple panels are mined one after the other in a retreating fashion from the hangingwall to the footwall.

The primary stopes are mined first, leaving ore pillars of the same dimension between primary stopes that will subsequently be mined as secondary stopes. Then, the mined-out panels of primary stopes are backfilled with cemented rockfill, forming engineered pillars on either side of each secondary stope. The mined-out secondary stopes can be backfilled with uncemented rockfill in Eagle East; however, secondary stopes in the Eagle zone are filled with cemented rockfill due to the permitting requirements for mining near the crown pillar.

After mining the secondaries with multiple panels, CRF is dumped at the bottom entrance to the stope to establish a dam at the angle of repose before placing URF. This way, the next panel can be blasted without introducing waste from the previous panel into the current one. The stopes are backfilled by backing up mine trucks equipped with ejector boxes at the upper sublevel and dumping the material into the opening. The primary sills are jammed with CRF before beginning adjacent secondary sills.

The stopes are accessed by driving crosscuts to the orebody from footwall drives on the upper and lower sublevels. The footwall drives are located on the north side of the mineralization and are driven off the main ramp.

Primary stopes are silled out to the full 10-m stope width at the upper and lower sublevels. When mining a secondary stope, a 5 m wide drift is driven down its centre from footwall to hangingwall at each upper and lower sublevel. In the Eagle East Zone, primary stopes are silled out to 7m on top and bottom cuts in order to better control the elevated stress at the face.

The primary and secondary stopes are mined by drilling and blasting longholes. Figure 16.38, Figure 16.39, and Figure 16.40 show a typical layout for a line of longholes in plan, longitudinal and cross-sectional views. The longholes are 88 mm in diameter and are drilled as downholes from the upper sublevel with an ITH production drill rig. Primary stopes are drilled off with rows of vertical longholes. Secondary stopes, on the other hand, are drilled off with inverted fans due to the limited width of the top-sublevel drift. Each panel is blasted in two steps using emulsion explosives and millisecond detonators. First, a drop raise is advanced to provide a slot, and then the remainder of the panel is blasted, usually in a single shot.

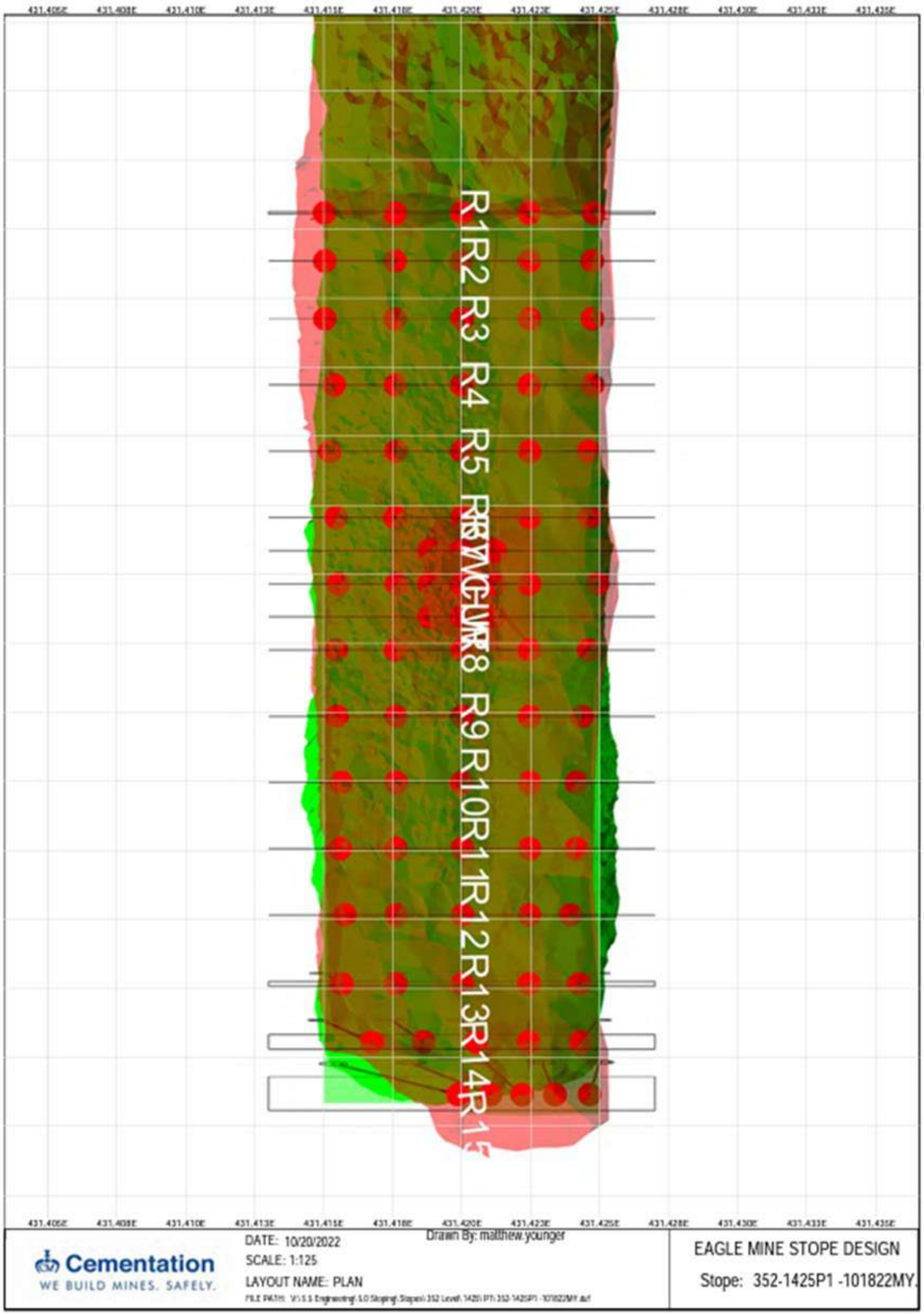


Figure 16.38: Typical Longhole Drilling Layout in a TSLOS Stope – Plan View

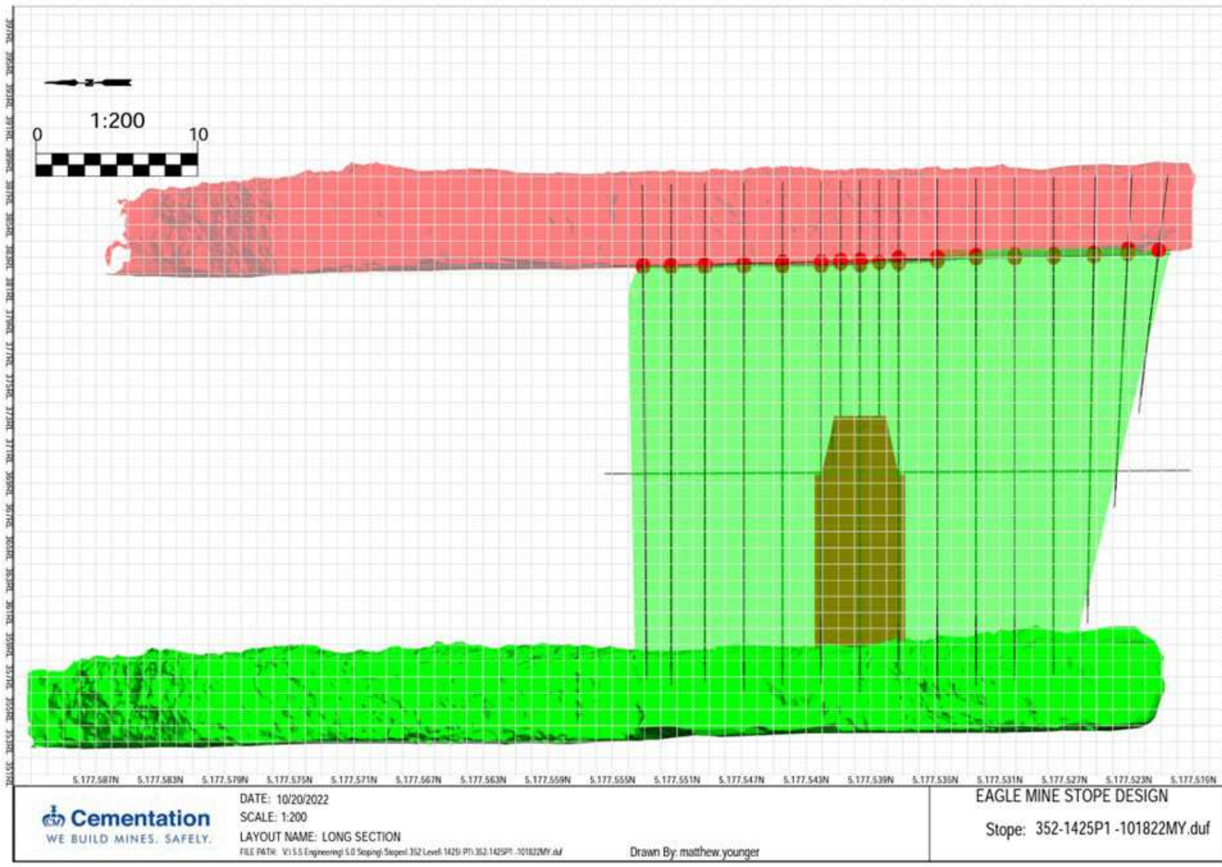


Figure 16.39: Typical Longhole Drilling Layout in a TSLOS Stope – Longitudinal Section

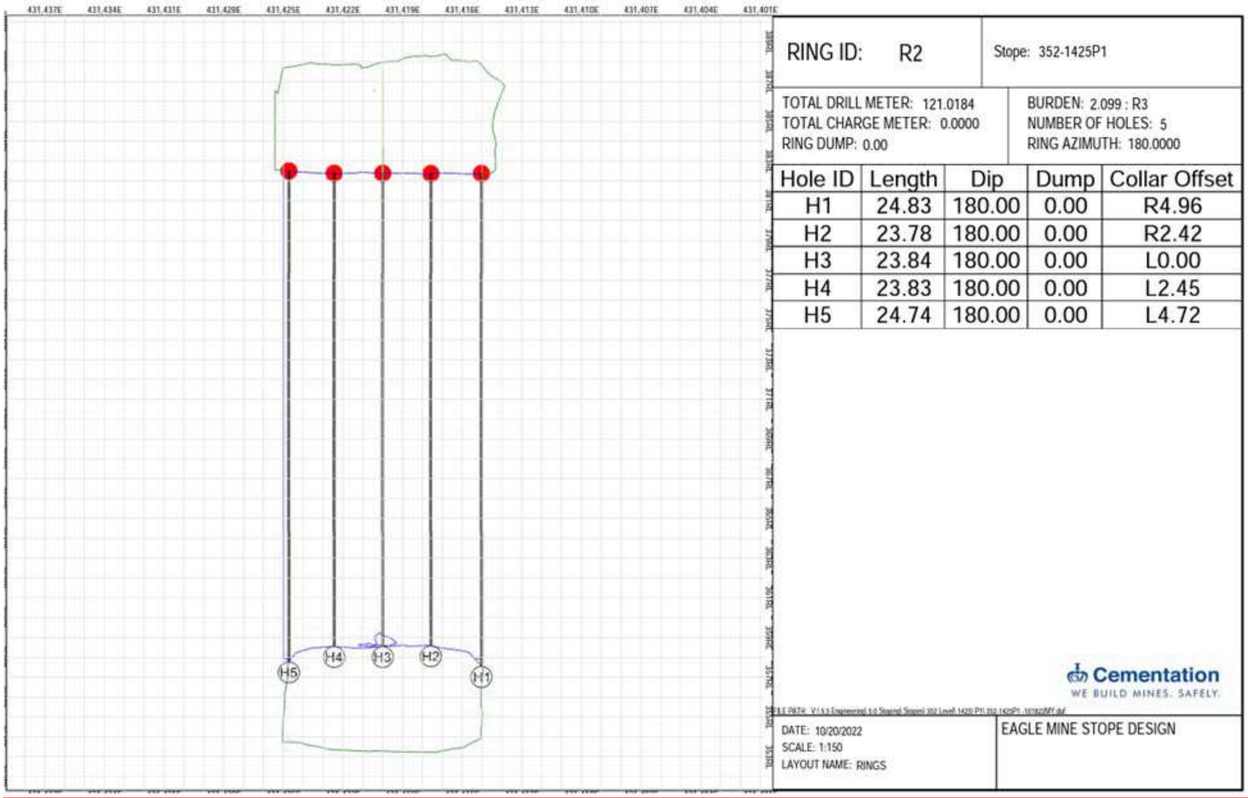


Figure 16.40: Typical Longhole Drilling Layout in a TSLOS Stope – Cross Section

An LHD mucks the broken ore from the access crosscut on the lower sublevel. A portion of the broken ore can be mucked with the operator on the machine; however, the majority of blasted ore must be mucked by teleremote control when the LHD operates inside the stope opening. The broken ore is hauled out of the stope and is either stockpiled in a muck bay or loaded directly into mine trucks.

The mine has implemented guidelines for blasting stopes to maintain ground stability. The guidelines specify whether a stope can be blasted according to the number of open stopes in the zone and how advanced they are in the mining cycle. For example, if there is one open stope, the other stope can only be blasted if the open stope is at least 80% mucked or is being backfilled. The blasting restrictions become tighter with more than one open stope. With four open stopes, a stope should not be blasted until one of them is completed.

16.6.2 Longitudinal Sublevel Open Stoping (LSLOS)

Longitudinal stopes are currently only utilized in Eagle East and are typically 6 m wide and 16 to 30 m in height. The stopes are mined along strike in panels up to 45 m in length.

Primary longitudinal sills are designed and mined primarily at widths of 6 m but can be widened to 10 m in some areas depends on the width of the orebody. Some of these wide areas are included in the design, while site geologists recommend others based on field observations and geologic modelling. Primaries have also been narrowed down to a minimum width of 4.5 m to minimize dilution when in waste, provided this change will not impact an adjacent secondary sill.

After drilling, blasting, and mucking, primary stopes are backfilled with CRF containing 5% cement, and primary sills are jammed to the stope access.

Secondary longitudinal sills are mined at 6 m widths from fill-to-fill and are backfilled with gob.

16.6.3 Drift and Fill (D&F) Mining

D&F is one of the mining methods used at Eagle East and is also planned for the Keel Zone. There are three designated D&F zones at Eagle East. The D&F is appropriate for the Keel Zone as the footwall contact of the deposit is shallower than desirable for mining with SLOS.

D&F is similar to the overhand cut-and-fill method. Both methods mine the deposit in successive lifts from bottom to top and access the lifts via attack ramps of variable inclination. The methods differ in the approach used to mine the ore in each lift. Overhand cut-and-fill excavates the complete width of the lift from footwall to hangingwall, whereas D&F mines it by advancing through the ore more or less one drift width (~5 m) at a time. Consequently, with D&F, the size of the opening is limited to the width of a drift rather than the span from footwall to hangingwall.

After a drift through the ore is completed, it is backfilled with cemented backfill. In this way, the backfilled drift serves as an engineered pillar for advancing the next drift adjacent to it. D&F is used in preference to overhand cut-and-fill for mining wider deposits and zones with unfavourable ground conditions.

The D&F mining method was implemented in the Eagle East Zone following a trade-off study, which concluded that it had several advantages over TSLOS. These advantages include:

- Flexibility to chase high-grade ore sills that cannot be fully defined by underground delineation drilling.
- Less cement is required for CRF as there is no aggregate segregation from drop filling and because of the compacting produced by jam filling.
- Lower dilution reduces overland ore transport cost and tailings volume.
- Reduced underground broken inventory lowers the risk of an underground fire from self-heating of the broken ore.

Figure 16.41 illustrates how D&F is employed in the Eagle East Zone. The sublevel interval is 24 m, and four 6-m high lifts are mined from each sublevel. The orebody is accessed from each sublevel by driving attack ramps with a 5.0 m wide x 5.5 m high profile. An attack ramp is a crosscut driven initially at a negative grade. Its inclination, however, progressively rises with each successive lift in a fan-like fashion. Access to subsequent higher lifts is achieved by slashing the attack ramp back and leaving part of the muck on the ground for the roadway floor. Figure 16.44 illustrates the footwall development in the East Zone providing access to the D&F stopes.

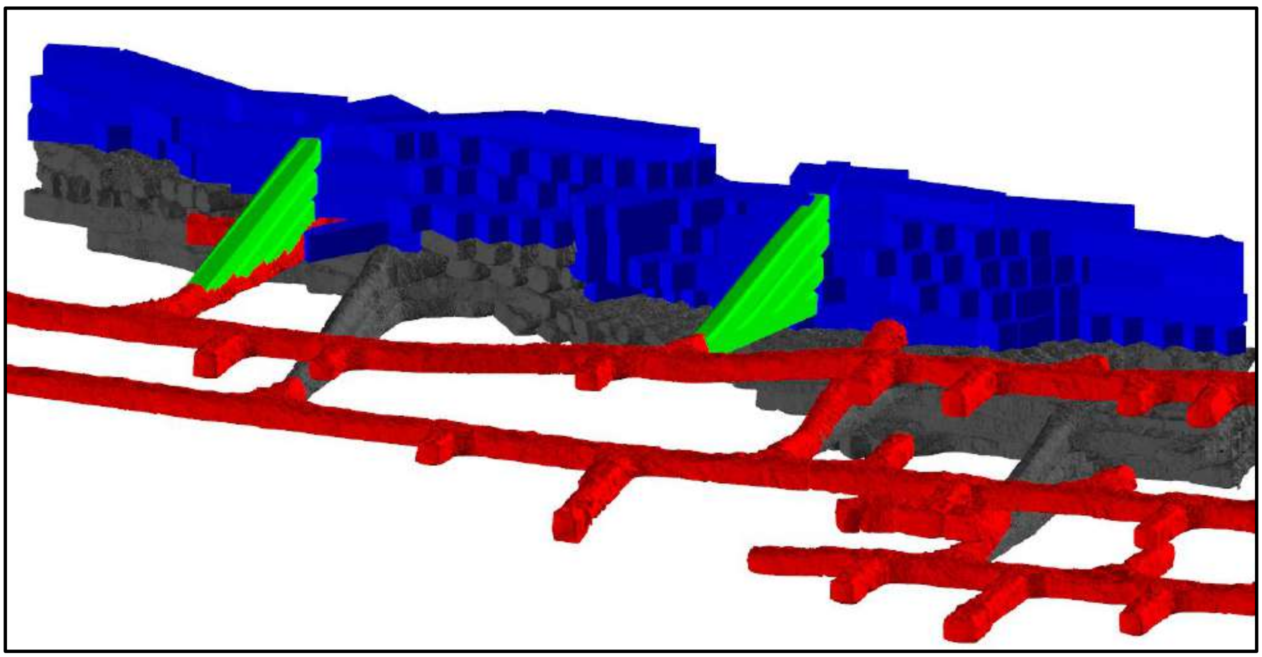
Within the orebody, the lift is mined by driving drifts with a 5.0 m wide by 6.0 m high profile. First, a level access drift is advanced from the end of the attack ramp to the hangingwall to establish approximate ore boundaries. Next, main level drifts are driven left and right along from the level access along the strike of the deposit until they encounter waste or an adjacent D&F zone. Then, shorter drifts referred to as herringbones are driven from the main level drifts at about a 45˚ angle to them and advanced until they encounter waste at the footwall or hangingwall contact.

Once a drift has advanced to the contact, it is backfilled with cemented rockfill, and a new drift can be driven adjacent to it. The new drift will have a wall of CRF from the previous drift on one side and a wall of ore on the other. The herringbone drifts are mined one after the other, starting from the ends of the stope and retreating back towards the level access. Figure 16.41 illustrates a typical D&F stope in plan view.

Mine trucks haul the backfill underground from the CRF plant and dump it as close as possible to the point in the drift where the material is to be placed. An LHD equipped with a jammer attachment pushes the CRF into place by ramping it upwards and packing it as tightly as possible to the back of the drift, leaving a void of no more than 15 cm.

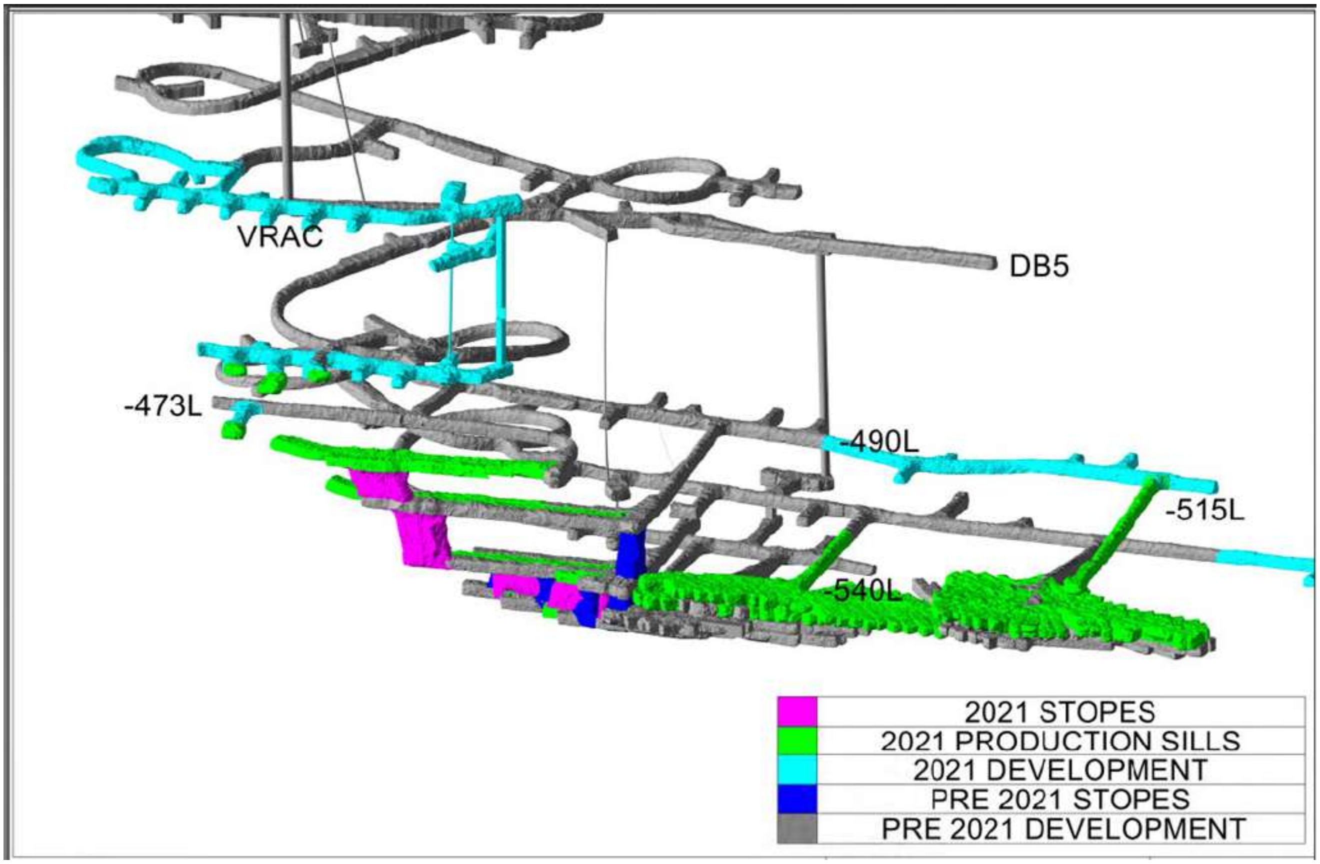
The level access and main level drifts are jam-filled incrementally as adjacent herringbone drifts are filled. Jam toes are cut with an LHD before fully curing to prevent having to blast out any backfill material to access the next herringbone drift. Jam-fill is allowed to cure for a minimum of 18 hours before resuming mining activity in the next adjacent herringbone drift. Once the lift has been mined and backfilled, the attack ramp is backslashed to access the next higher-up lift.

D&F in the Keel Zone will be similar to how it is used at Eagle East. As Keel is a relatively small deposit, it will be accessed by a single attack ramp from each sublevel. The access to Keel will be from one end of the deposit rather than from the footwall side.



Source: Lundin Mining Corporation, 2022

Figure 16.41: Drift and Fill Method at the Eagle Mine, Isometric Diagram



Source: Lundin Mining Corporation, 2022

Figure 16.42: 3D View of Eagle East Zone Stopes

Figure 16.43 shows a typical layout for a D&F stope in plan view.

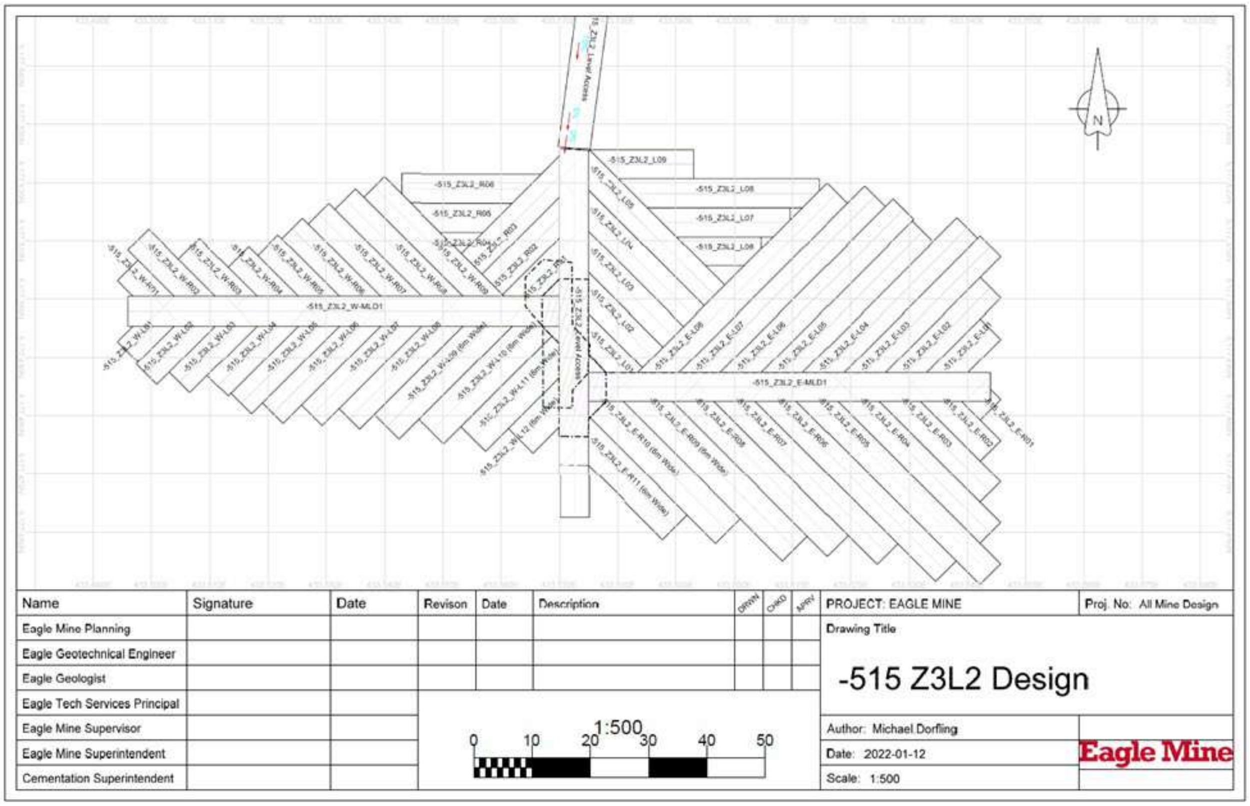


Figure 16.43: Typical Drift and Fill Stope – Plan View

16.6.4 Mining Equipment

Table 16.13 lists the mobile equipment operating in the underground mine. The Eagle Mine is a mechanized mine employing rubber-tired diesel equipment for all phases of mining operations. CAT R1700 and R2900 LHDs are equipped for radio remote control operation, which is required when the units muck in TSLOS stopes. CAT AD45 mine trucks are equipped with ejector boxes, which permit the dumping of CRF and URF directly in stopes with low headroom.

For rock support, the mine has a cable bolter and rock bolting rigs, which install mesh, swellex bolts, and resin rebar bolts. All of the rock bolting rigs are being converted to install rebar bolts with pumpable resin and will be used in the East Eagle Zone instead of inflatable Swellex bolts which have experienced excessive corrosion.

The QP reviewed the underground equipment fleet and observed many of the machines in operation. The QP is of opinion that the number of equipment units in the fleet and the types, makes, and models are appropriate for the mining methods and development requirements at the Eagle Mine.

Table 16.13: Underground Mobile Equipment

Fleet	Operating Units	Equipment	Make	Model
Loaders	3	LHD	Caterpillar	R1700G
	3		Caterpillar	R2900G
Trucks	13	UG Hauling	Caterpillar	AD45B
Drills	1	Longhole	Atlas Copco	Simba M7C
	1	Longhole	Atlas Copco	Simba E7C
	1	Longhole	Atlas Copco	Cabletech LC
	2	Jumbo-2B	Sandvik	DD420-40C
	2	Jumbo-2B	Sandvik	DD420-60C
	2	Jumbo-Bolter	Sandvik	DD410-C
	1	Jumbo-Bolter	Sandvik	DD411-C
	1	Jumbo-Bolter	Sandvik	DS311DE
	1	Jumbo-Bolter	Sandvik	DS412I
Explosives	1	Development	Getman	A64 2-500S
	2	Production	Getman	A64 Ex-C 2-500
Utilities	1	Fan Hanger	Getman	A64
	2	Pallet Handler	Getman	A64
	1	Scissor Truck	Getman	A64
	1	Lube Truck	Getman	A64
Shotcrete	2	Trans Mixer	Normet	Utimec LF500
	1	Shotcrete Sprayer	Normet	Spraymec 1050 WP
Miscellaneous	1	Grader	Caterpillar	M135H
	1	Grader	Caterpillar	UG20M
	4	Telehandler	Caterpillar	TL1055
	1	Miller Welder	Miller	Trailblazer 302D
	1	Diesel Hydraulic Pack	Kohler	KDW1003
	1	Portable Generator	Generac	XD5000E
	1	MineArc EnviroLAV Pump	MineArc	Waste Transfer Tank
Tractors	1	Survey Tractor	Kubota	M7040
	1	Construction Tractor	Caterpillar	420D
	1	Stope Backhoe #1	Kubota	RS520S
	1	Stope Backhoe #2	Kubota	CS430
	2	Personnel carrier	Minecat	UT99
	3	UG Truck	Minecat	UT99
UG Pickups	3	LMC	Chevrolet	Silverado 2500HD
	1	LMC	GMC	Sierra 2500
	3	LMC	Ford	F-250
	2	LMC	Chevrolet	Silverado 1500
	2	UG Crew Van	GMC	Savana 2500
	4	Contractor - Operations	Ford	F-250
	3	Contractor - Operations	Chevrolet	Silverado 2500HD
	1	Contractor - Operations	Chevrolet	Silverado 3500HD
	2	Contractor - Operations	Jeep	J8
Contractor Equipment	2	Contractor - Drilling	Ford	F250
	1	Contractor - Drilling	John Deere	5065M
	1	Contractor - Drilling	John Deere	5065E
	1	Contractor - Drilling	Kubota	L4400
	1	Contractor - Drilling	Caterpillar	TL943-0
	1	Contractor - Drilling	Caterpillar	CUV 105D
	89			

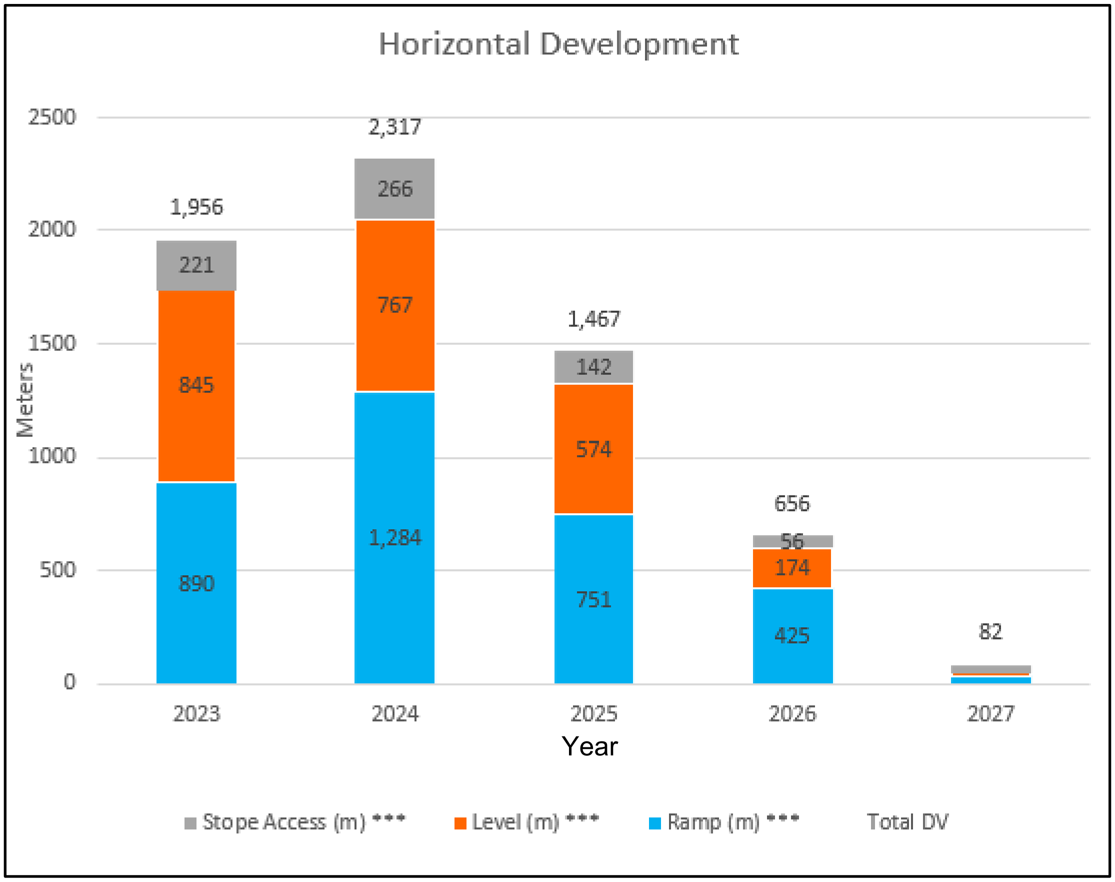
16.6.5 Mine Development

Table 16.14 presents the LOM development plan. Figure 16.44 and Figure 16.45 show the LOM development as bar charts for lateral and vertical development, respectively. The LOM development plan calls for 6,479 m of lateral development, of which 5% is required for Eagle, 29% for Eagle East, and 66% for the Keel Zone. Mine development for the Eagle Zone is relatively low as the zone is almost entirely developed for mining. Eagle East still requires development for its uppermost sublevels. The Keel Zone is a new deposit and consequently accounts for most of the remaining development activity.

Table 16.14: Eagle LOM Development Schedule

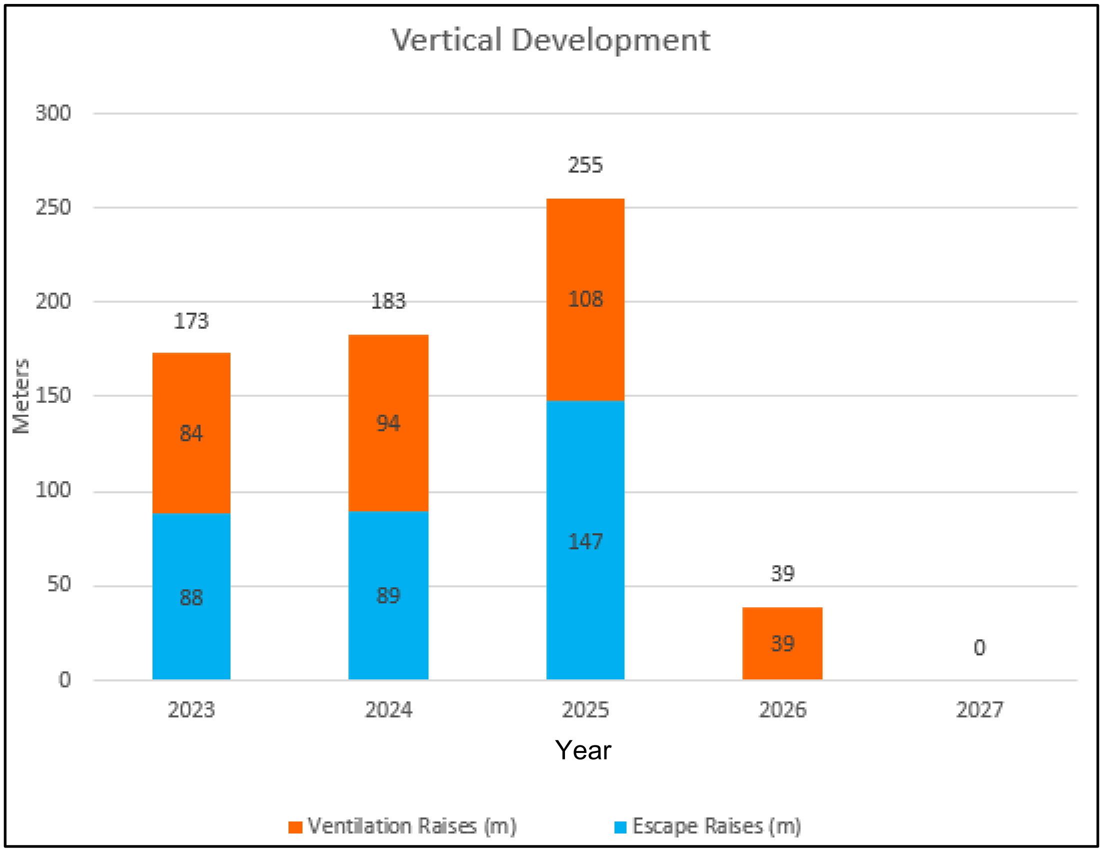
		2023	2024	2025	2026	2027
Lateral Development (m)	Eagle	6	233	82	0	33
	Eagle East	805	495	436	113	15
	Keel	1,145	1,589	949	543	35
	Sub Total	**1,956**	**2,317**	**1,467**	**656**	**82**
Escape Raise (m)	Eagle	0	0	0	0	0
	Eagle East	0	0	0	0	0
	Keel	88	89	147	0	0
	Sub Total	**88**	**89**	**147**	**0**	**0**
Vent Raise (m)	Eagle	0	0	0	0	0
	Eagle East	0	0	0	0	0
	Keel	84	94	108	39	0
	Sub Total	**84**	**94**	**108**	**39**	**0**
All Vertical: Vent + Escape (m)	Eagle	0	0	0	0	0
	Eagle East	0	0	0	0	0
	Keel	173	183	255	39	0
	Sub Total	**173**	**183**	**255**	**39**	**0**
All Meters	**Total**	**2,129**	**2,500**	**1,722**	**695**	**82**

Source: Lundin Mining Corporation, 2022



Source: Lundin Mining Corporation, 2022

Figure 16.44: LOM Lateral Development

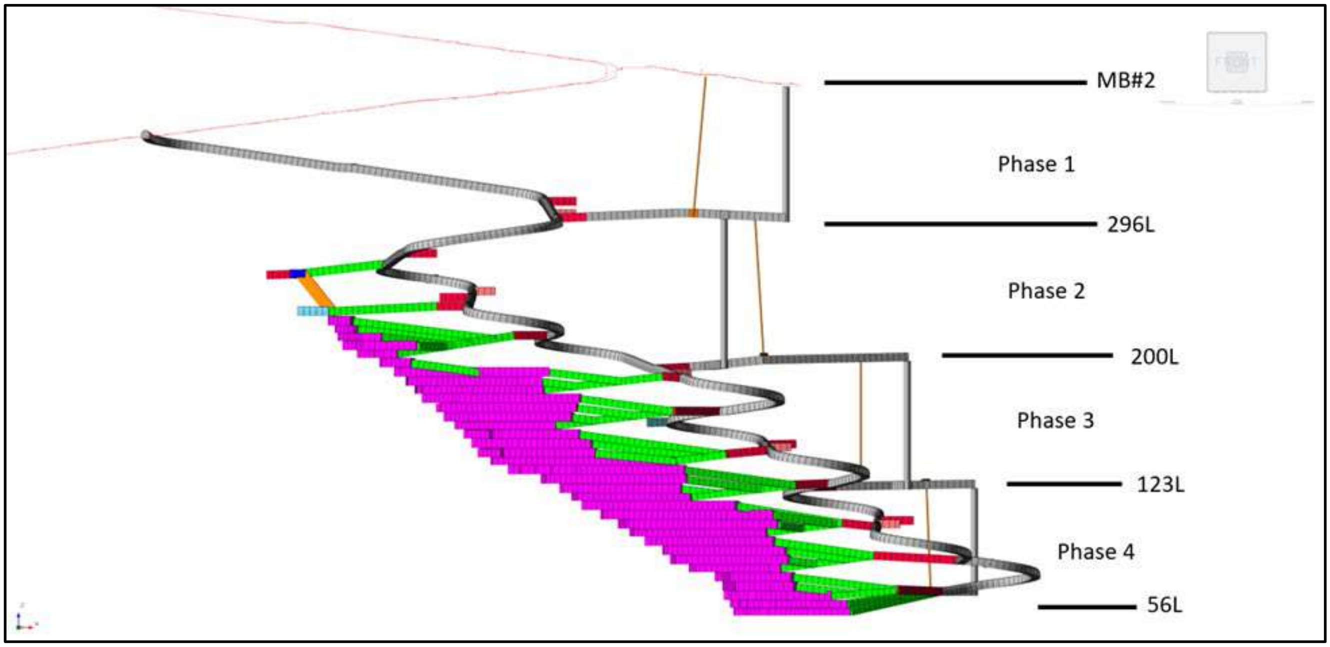


Source: Lundin Mining Corporation, 2022

Figure 16.45: LOM Vertical Development

Only the Upper Keel Zone has been added to the Mineral Reserve and Mine Plan. All mining references related to Keel refer solely to the Upper Keel. Figure 16.46 illustrates the plan for developing the Upper Keel Zone and Figure 16.47 presents the mining schedule for Keel. The Upper Keel Zone will require the following development:

- **Ramp**: A ramp will be developed on the east side of the deposit rather than in the footwall. It will extend from the Eagle Mine main ramp to the bottom level of the Keel Zone. The ramp will be developed with a switchback configuration, minimizing development meters to gain access to the sublevels.
- **Sublevels**: Eight sublevels will be developed at 24 m sublevel intervals. Each sublevel will consist of a drift providing access to the attack ramp required for drift and fill mining.
- **Ventilation drift**: A ventilation drift will be developed, extending from the Eagle Mine main ramp to an elevation above the deposit.
- **Ventilation Raises**: The development plan calls for four ventilation raises consisting of 4.5 m diameter boreholes. The uppermost ventilation raise will connect the uppermost level of the zone with the ventilation drift at MB#2. The other three will connect with every third sublevel.
- **Escape Raises**: Four escapeway raises will be required, each consisting of a 1.2 m diameter borehole equipped with a Laddertube manway. These raises will be developed parallel to the ventilation raises, with the uppermost one connecting to the ventilation drift and the lower three connecting with every third sublevel.



Source: Lundin Mining Corporation, 2022

Figure 16.46: Keel Zone Development Plan

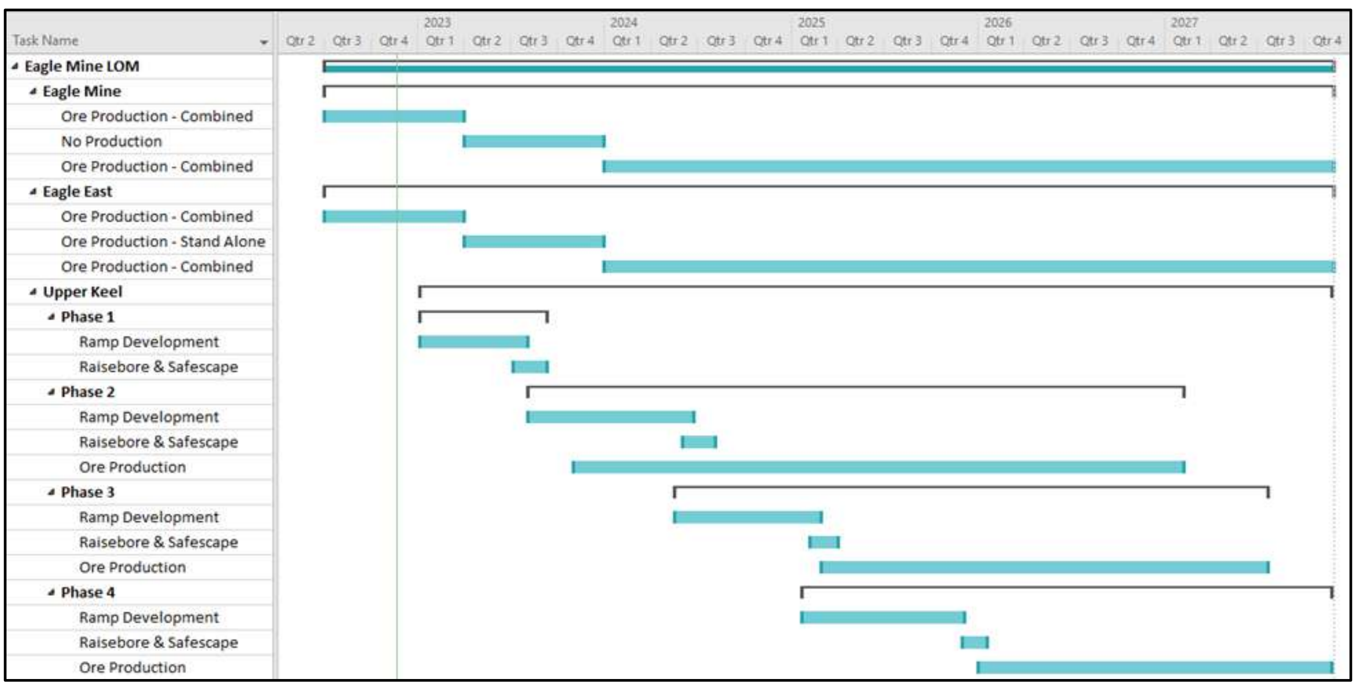


Figure 16.47: Keel Zone Development Schedule

Table 16.15 presents the maximum development rates used to develop the schedule.

Table 16.15: Maximum Development Rates Used to Determine the Mine Schedule

Horizontal Development Type	Width (m)	Height (m)	Development Rates
Decline	5.5	5.5	3.8 m/day
Level Infrastructure (MLC bays, muck bays, ventilation / egress drives)	5.5	5.5	3.8 m/day
Passing bays	9.0	5.5	3.8 m/day
Vertical Development Type	**Diameter (m)**		**Development Rates**
Ventilation Raise	4.5		2.5 m/day
Escape Raise	1.5		4.3 m/day

16.6.6 LOM Production Schedule

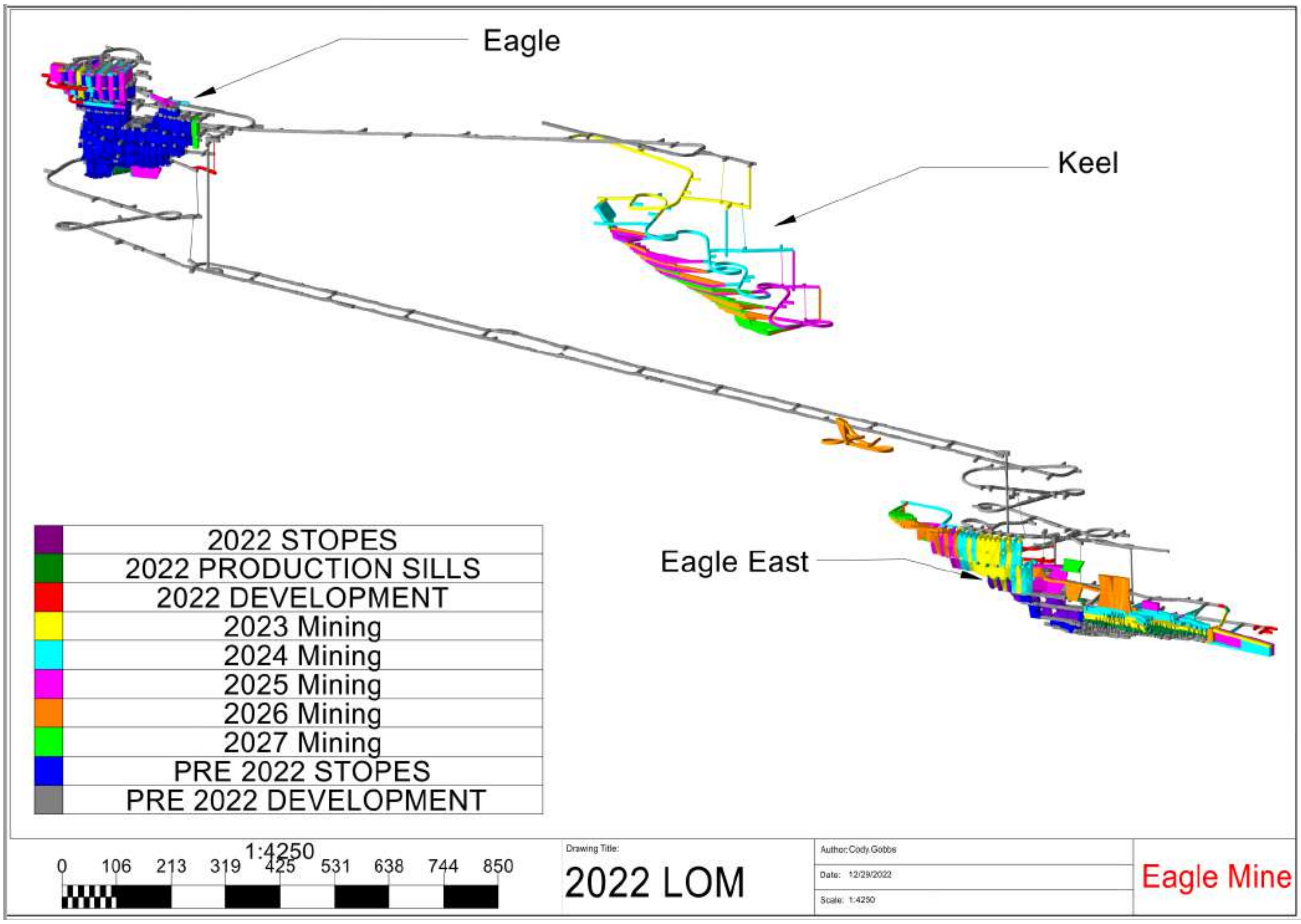
Table 16.16 presents the LOM production schedule. Based on the Mineral Reserves estimate, mining operations continue until 2027, when mine closure is anticipated. The mine is expected to produce approximately 755,000 tonnes of throughput from 2023 to 2026. Its output will drop to less than half that tonnage in 2027, the year Mineral Reserves are scheduled to be exhausted. The two zones presently being mined, Eagle and Eagle East, will continue producing ore until the end of the mine life; however, their combined annual tonnage will decline yearly. The Keel Zone will augment production from the aged zones to maintain the annual mine production rate. Keel Zone production will commence in 2023, attain its peak output in 2026, and drop off in the final year of the mine life.

Eagle East plans to develop the ramp on one end of the Keel deposit and access the orebody via one attack ramp per sublevel. The QP recommends that Eagle East consider positioning the Keel Zone ramp and sublevel development in the footwall rather than at the end of the deposit. Accessing from the footwall would enable mining the deposit in two directions instead of one, contributing to higher productivity.

Table 16.16: LOM Production Schedule

Item	2023	2024	2025	2026	2027	Total
Eagle Zone	58,128	103,598	358,516	51,465	32,836	714,038
Eagle East Zone	695,362	611,845	201,846	382,477	37,467	2,217,588
Keel Zone	2,026	39,609	194,752	320,986	240,603	797,977
Ore Tonnes (t)	**755,517**	**755,052**	**755,114**	**754,928**	**310,907**	**3,729,604**
Nickel (%)	2.54	1.79	1.39	1.12	1.06	1.77
Copper (%)	2.00	1.49	1.03	0.85	0.80	1.39

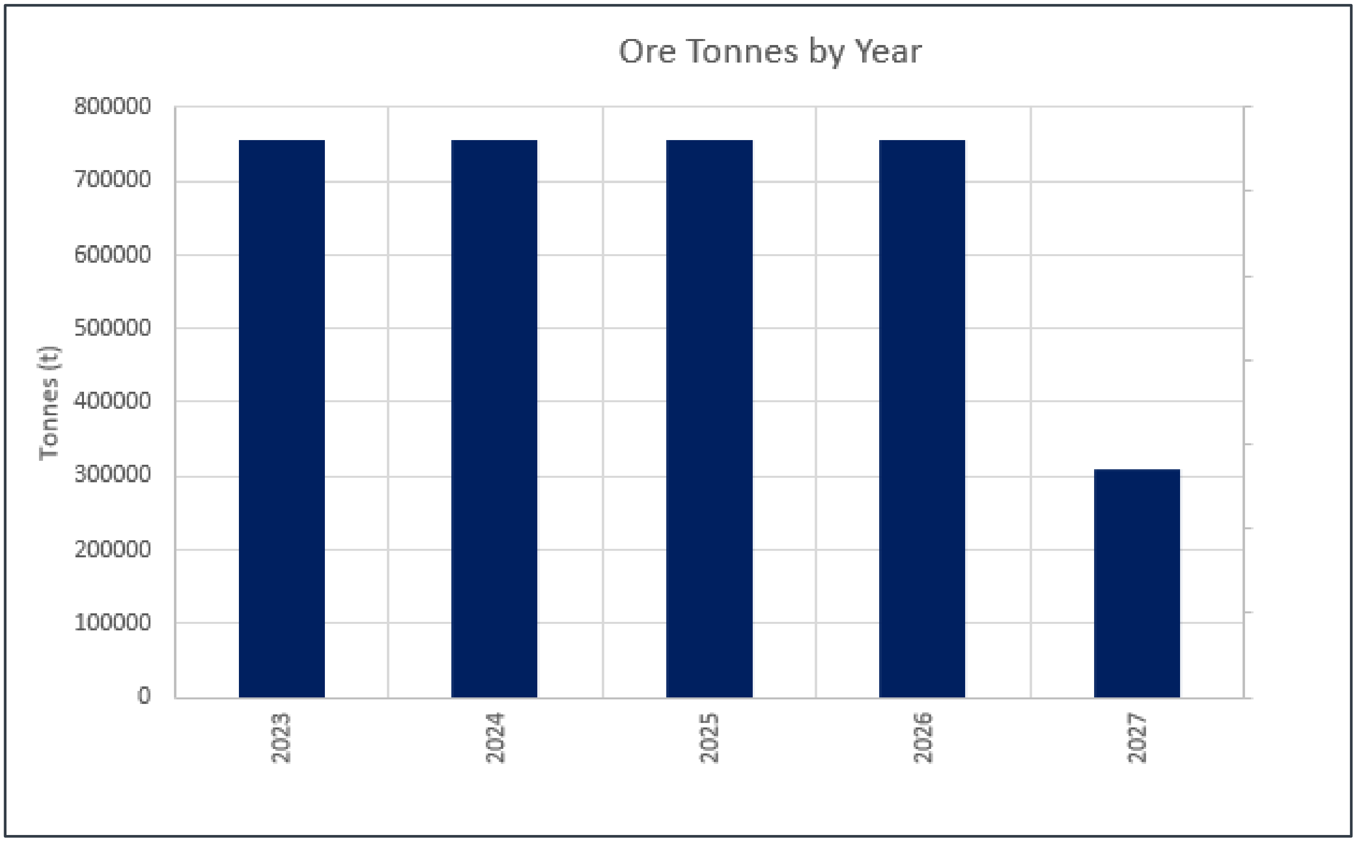
Figure 16.48 illustrates the LOM production schedule using an orthographic view of the mine.



Source: Lundin Mining Corporation, 2022

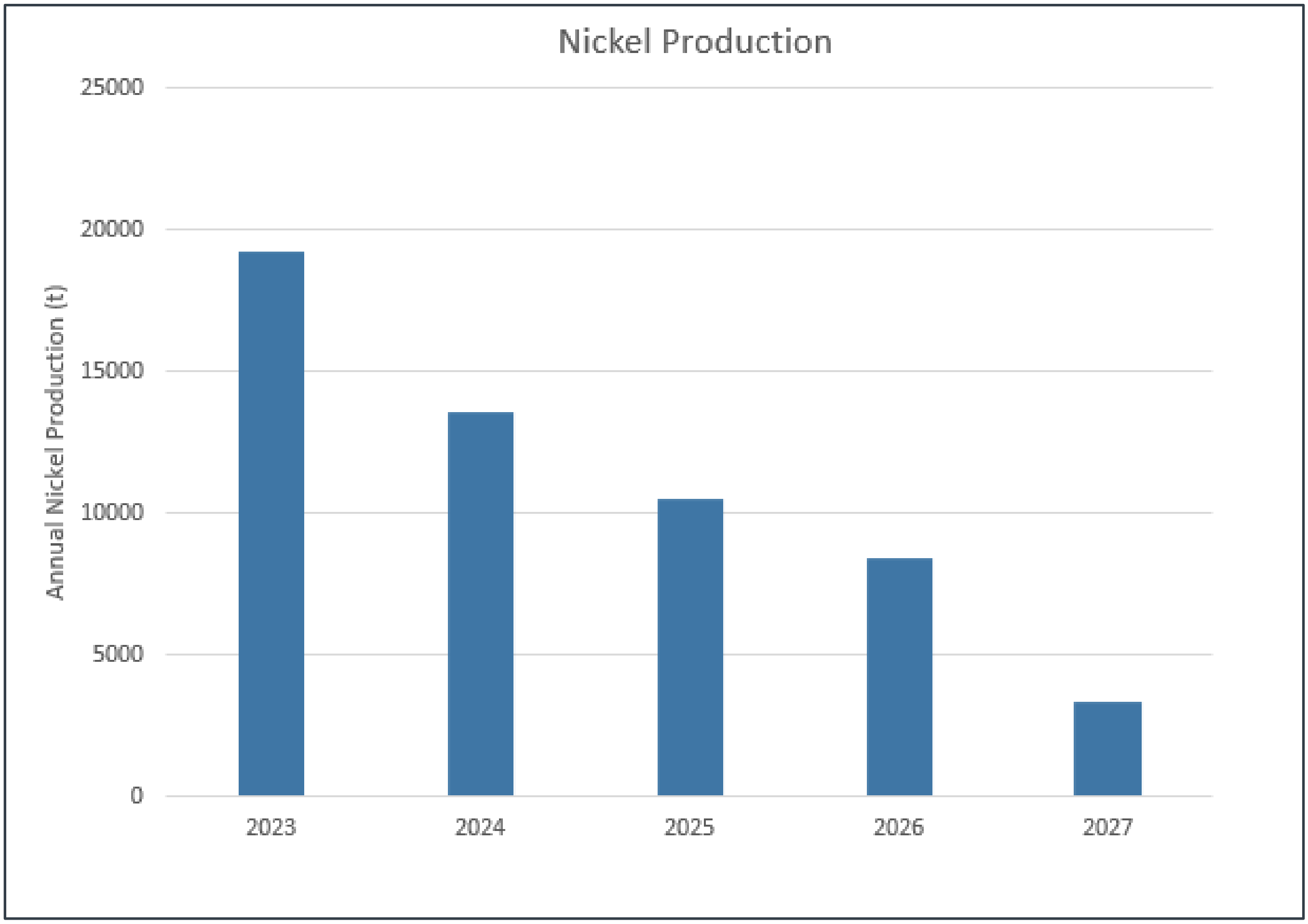
Figure 16.48: LOM Production Plan – Orthographic View

The bar charts in Figure 16.49, Figure 16.50, and Figure 16.52 show the LOM production of ore, nickel, and copper, respectively.



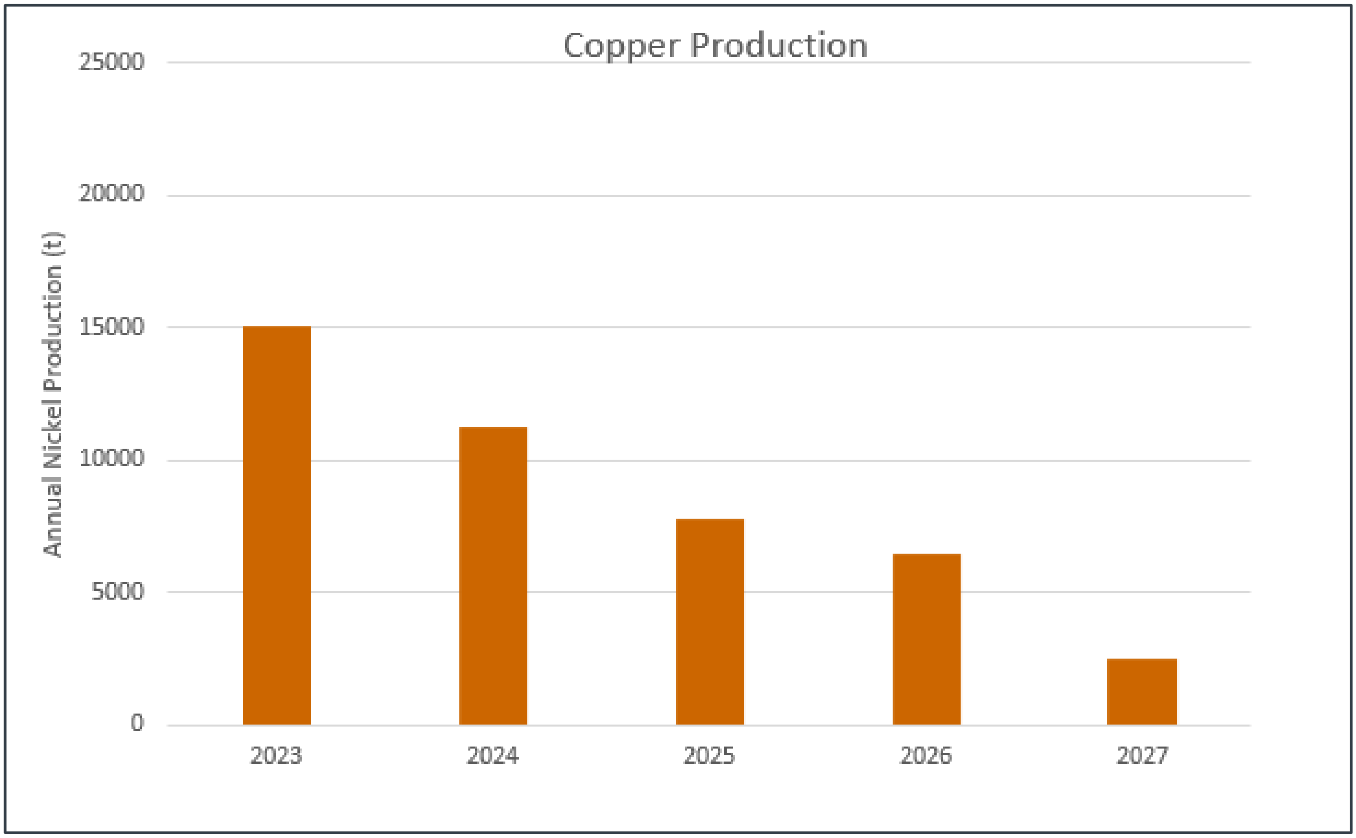
Source: Lundin Mining Corporation, 2022

Figure 16.49: LOM Production Plan – Ore Production



Source: Lundin Mining Corporation, 2022

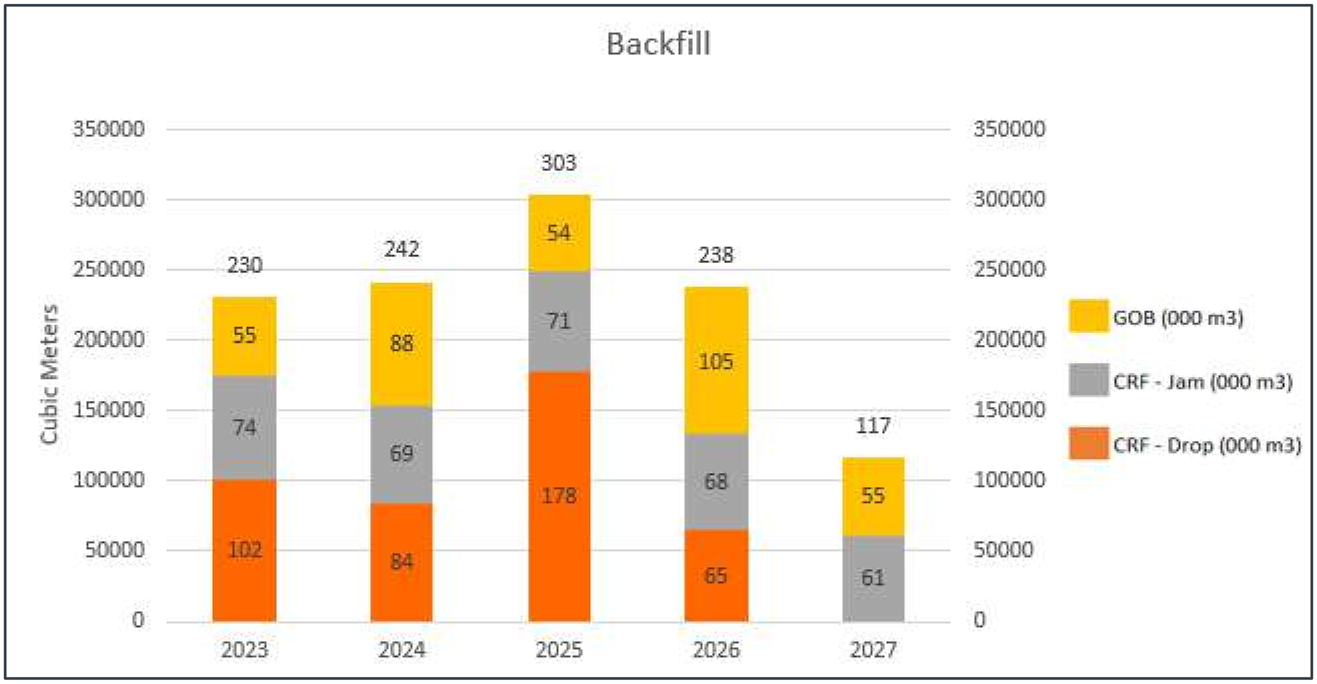
Figure 16.50: LOM Production Plan – Nickel Production



Source: Lundin Mining Corporation, 2022

Figure 16.51: LOM Production Plan – Copper Production

Figure 16.52 presents the LOM plan for backfill.



Source: Lundin Mining Corporation, 2022

Figure 16.52: LOM Production Plan – Backfill

16.7 Mine Operations and Management

Table 16.17 lists the personnel dedicated to underground mining operations. Staff personnel, including management and technical services, are LMC employees who generally work a four-day week, ten hours daily, from Monday to Friday.

Table 16.17: Personnel Dedicated to Underground Mine Operations

Area	Eagle	Contractors
Management/ Supervision/Safety	8	13
Geology & Technical Services	19	1
Mine Operations	0	50
UG Haulage	0	36
Mine Maintenance (Surface / UG)	12	36
Over Road Haulage	0	12
Security	0	9
Batch Plant Operators	0	4
COSA Operator	0	3
Total	**39**	**164**

Mine operations personnel work for contractors, including supervisors and those working in production, mine development, maintenance, and diamond drilling. Generally, work rosters are comprised of 12-hour shifts, seven days a week, on a two-weeks-on two-weeks-off rotation schedule. There are four rotating shifts such that the mine operates continuously on a 24/7 basis. The mining contractor at the Eagle Mine is Cementation USA.

Eagle maintains a policy of prioritizing the hiring of residents from local communities. There is no cafeteria or camp at the mine, and the Company does not provide transportation to the site. Contractors and Eagle employees provide their own transportation to travel to and from the mine site every day. Eagle provides light vehicles for transportation of its employees to underground and contractors manage their own vehicles. There is ample parking space available for private vehicles on the surface. Most of the personnel reside in Marquette or other local communities and bring their lunches to work. The personnel at the mine are non-union.

The QP reviewed the personnel organization and is of the opinion that it is appropriate for the scale of an underground mining operation, such as the Eagle Mine.

17.0 RECOVERY METHODS

17.1 Processing

The Humboldt Mill is a former iron ore processing plant that was converted to process Eagle ore. The ore is transported from the Eagle Mine to the Humboldt Mill (see Figure 17.1) in special highway haul trucks and is delivered to the Coarse Ore Storage Area (COSA) near the Humboldt Mill (see Figure 17.2). Here it undergoes a conventional three-stage crushing process and is then stored in bins. The ore then progresses through a single-stage ball milling process then bulk flotation followed by separation flotation to produce separate nickel and copper concentrates. Metallurgical recoveries of nickel and copper average 85% and 97% respectively for Eagle Mine ore. Tailings from the plant are deposited sub-aqueously in the adjacent former Humboldt iron ore mine open pit, now known as the HTDF.

Nickel and copper concentrates are stored in a covered concentrate building on site prior to being transported via rail car to smelter facilities within North America.

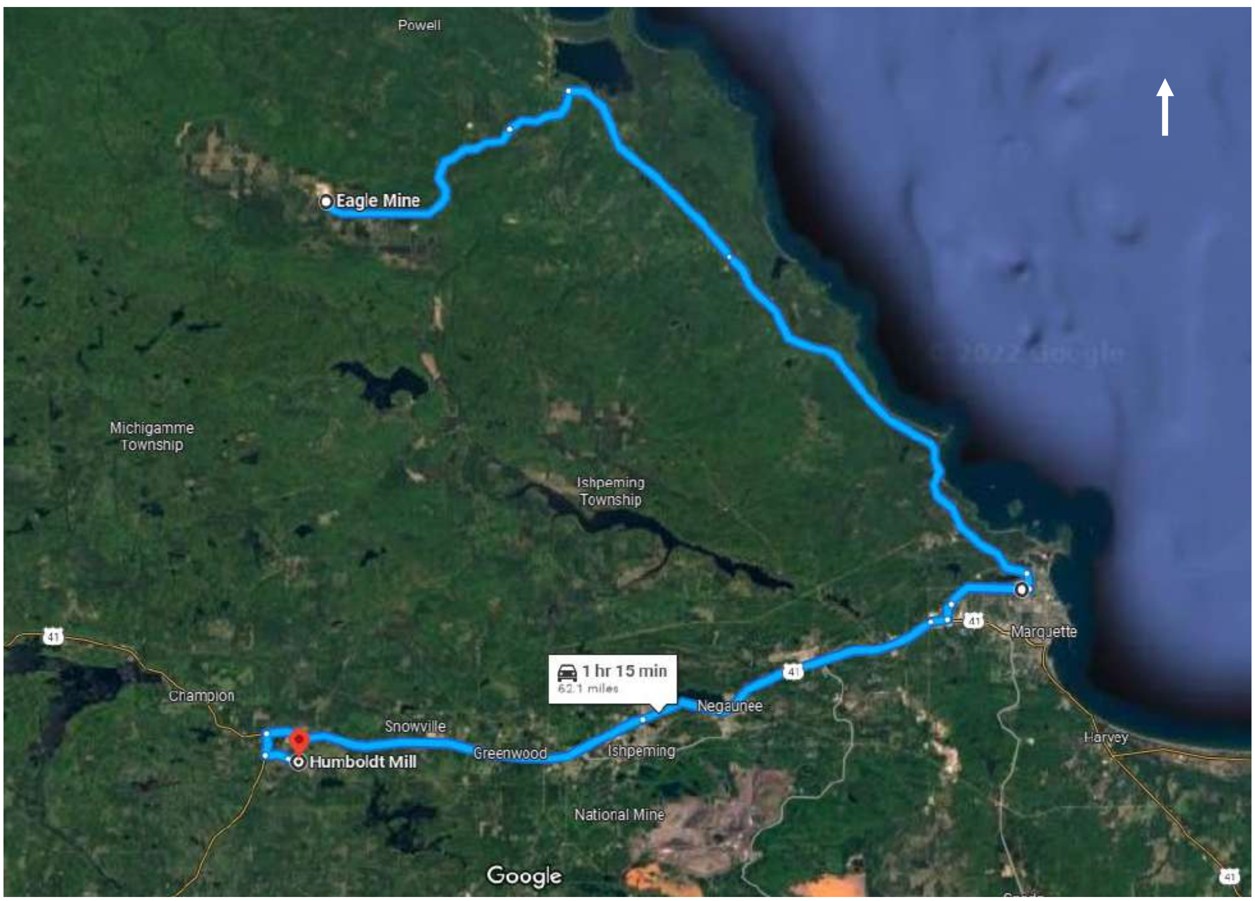


Figure 17.1: Humboldt Mill in Relation to the Eagle Mine

Source: LMC

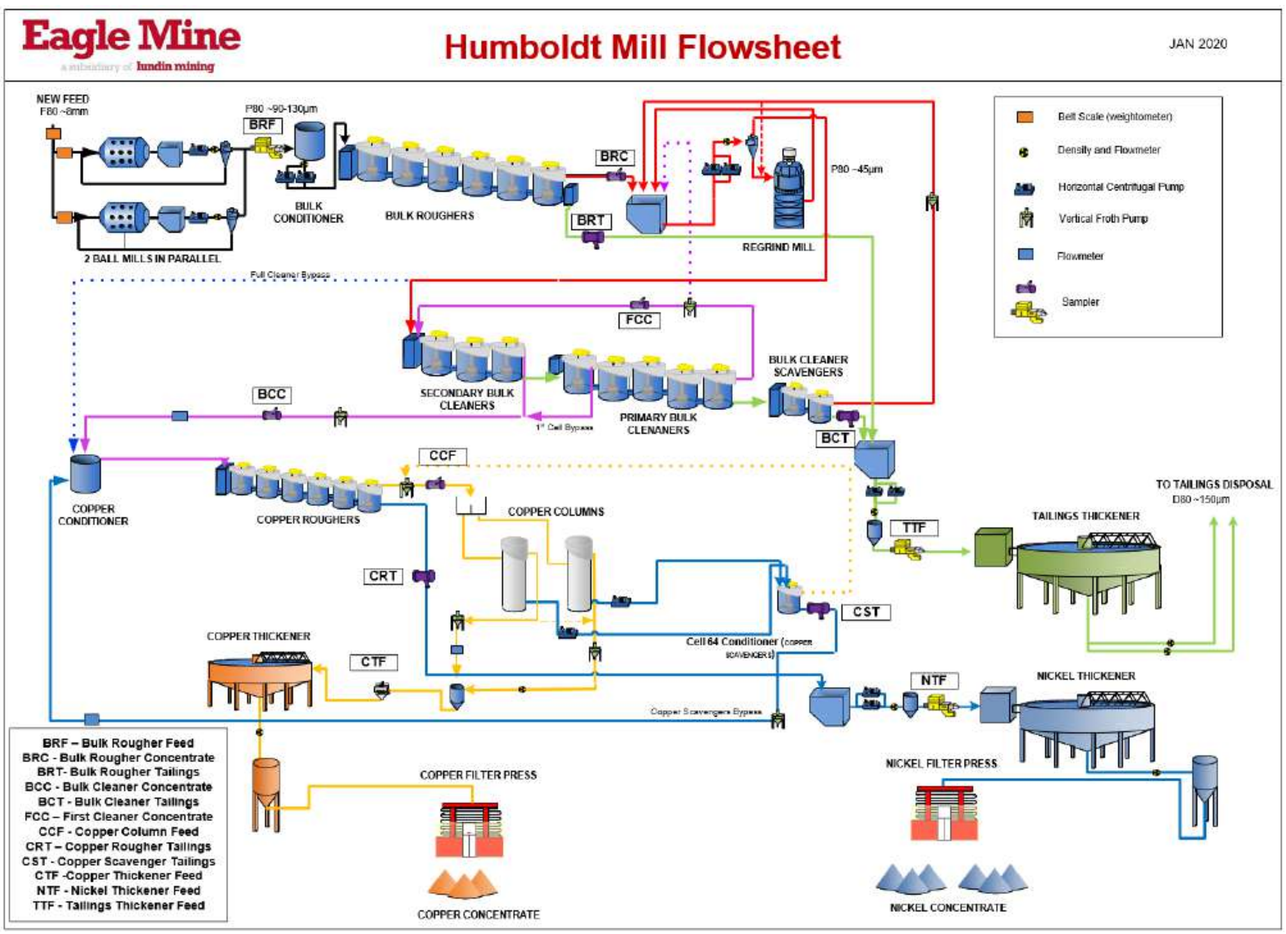
Figure 17.2: Humboldt Mill Complex

The Eagle process flowsheet has remained virtually unchanged and uses conventional technologies to produce separate copper and nickel concentrate with a nameplate throughput of 2,000 tpd (730,000 tpa). A simplified process flowsheet is shown in Figure 17.3. Key elements of the process flowsheet are summarized below:

ROM ore in the mine COSA is loaded by front end loader into road haul trucks to transport ore to the milling facility. There are 10,000 tonnes of storage capacity in the COSA at the mill:

- Initial size reduction of the ore is carried out by a primary jaw crusher to reduce the ore size from nominal minus 450 mm ROM to a P_{80} = 100 mm.
- Further size reduction of primary crushed ore is carried out in a secondary and tertiary cone crushing circuit to reduce the ore size from F_{80}= 100 mm to P_{80} = 8 mm
- The tertiary crushed ore is stored in bins and then reclaimed by feeders to feed the grinding circuit.
- Ball mill feed is ground in two, single stage ball mill grinding circuits working in parallel. The ball mills operate in closed circuit with hydrocyclones, targeting a P_{80} of 100 microns. Sodium carbonate is added to the mills for pH and water chemistry control.
- A bulk copper-nickel concentrate is produced by separating the copper and nickel minerals from gangue material by flotation. The copper-nickel bulk concentrate is reground, followed by cleaning stages to reject further gangue minerals. The bulk cleaner concentrate is then subjected to a final flotation stage where the copper and nickel minerals are separated from one another through the addition of lime. Final concentrate grades are 14% Ni and 2% Cu in the nickel concentrate and 31% Cu and 0.8% Ni in copper concentrate.

- An on-stream analyzer provides real time analysis from 12 streams in the mill and collects a 12-hour shift composite sample for analysis at the onsite analytical laboratory operated by SGS.
- Copper and nickel concentrates are dewatered to 8% to 10% moisture content by independent thickeners and filter press circuits, then loaded into rail cars for shipment. Concentrates are transported by rail directly to smelter facilities.
- Flotation tailings are thickened and the slurry is pumped to the existing HTDF for subaqueous deposition.
- Facilities are also present for storing, preparing, and distributing reagents used in the process. Reagents include sodium isopropyl xanthate (SIPX), methyl isobutyl carbinol (MIBC), soda ash, lime, flocculant, and carboxymethylcellulose (CMC).
- Water from the concentrate dewatering operations, tailings dewatering and the HTDF are recycled for reuse in the plant process. Plant water stream types include process water, fresh water, reclaim water, and potable water.



Source: LMC

Figure 17.3: Humboldt Mill Flowsheet

17.1.1 Production Rate and Product Quality

During the period from January 2021 to September 2022, the mill average throughput was 59,380 tonnes per month versus 62,333 budgeted. Table 17.1 provides additional performance indicators. It needs to be noted that the actual target was modified from the original budget in 2022.

Table 17.1: Average Monthly Performance for the Humboldt Mill – January 2021 to September 2022

Item	Units	Actual	Budget
Throughput	tonnes	59 380	62 233
Ni concentrate grade	%	13.04	14.00
Cu concentrate grade	%	30.5	30.5
Ni Metal production	tonnes	1 511	1 512
Cu Metal production	tonnes	1 487	1 559
Ni Recovery	%	84.9	84.1
Cu Recovery	%	97.4	97.4

Figure 17.4 shows the variation of the throughput rate and nickel and copper recovery.

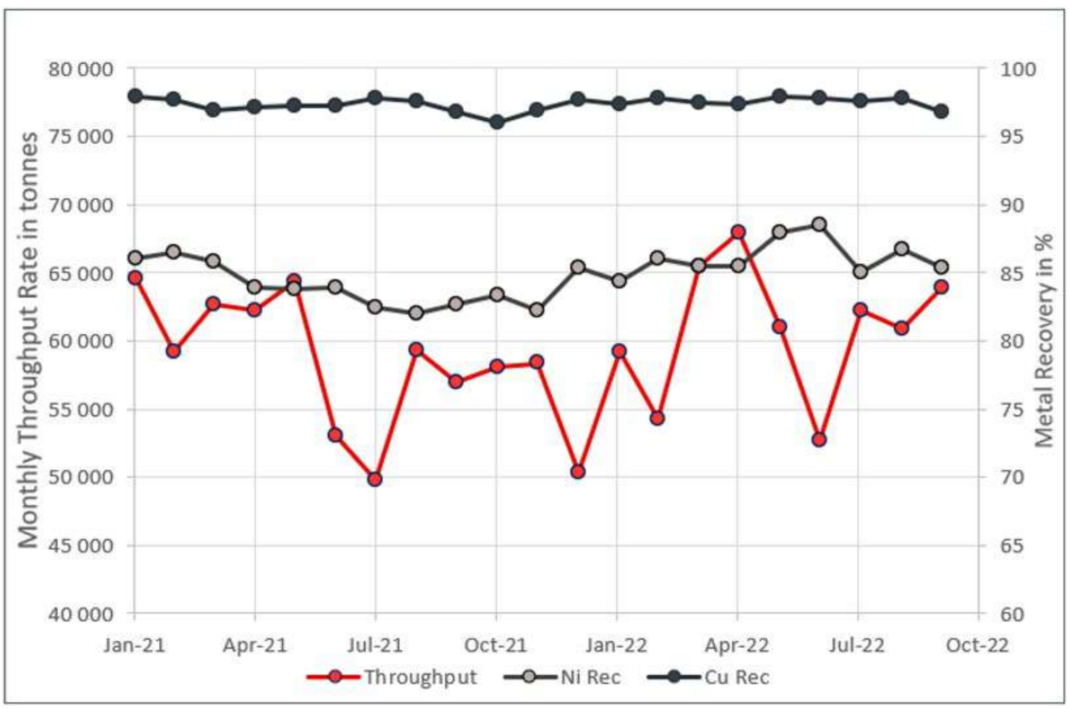


Figure 17.4: Recent Humboldt Mill Performance

Figure 17.5 shows the monthly variations in the produced volume and grade of nickel in concentrate. Lower grade concentrate was produced in 2022 due to the increase in metal price. Economically, it is more attractive to produce concentrate at lower grades than maintaining the original budget of 14%.

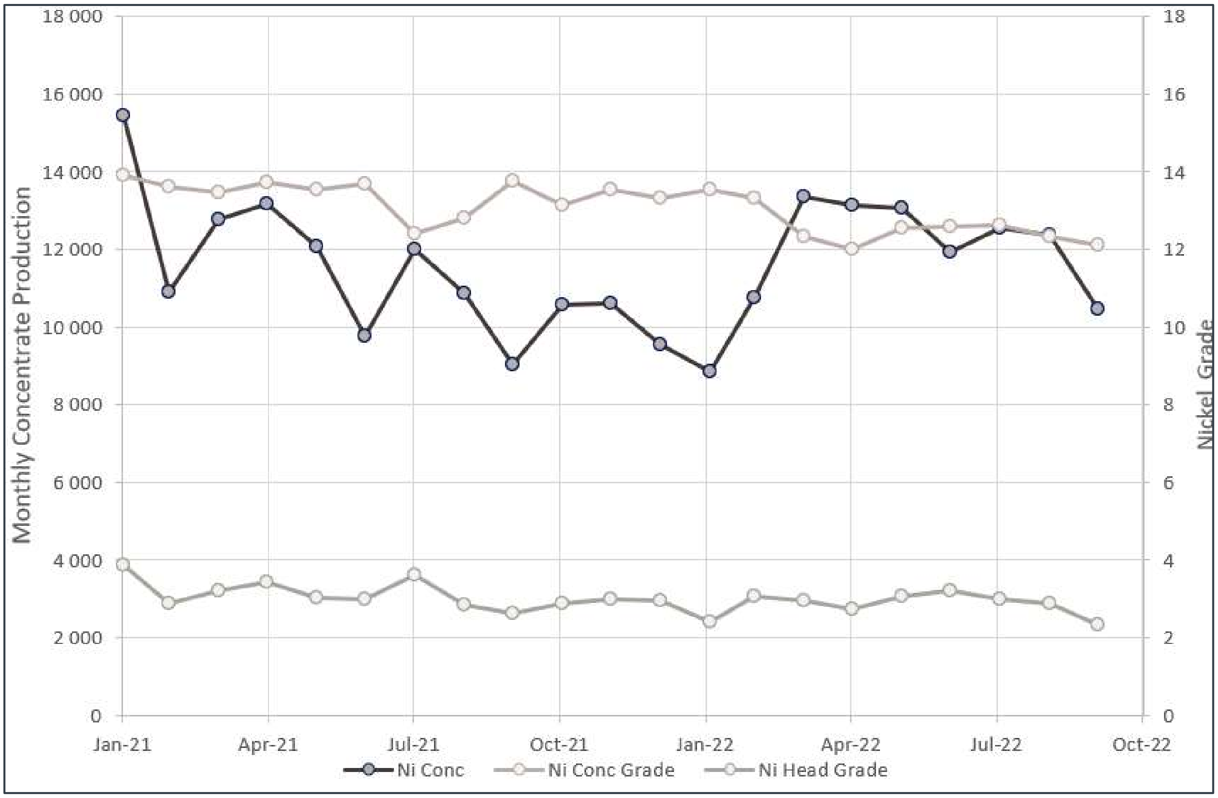


Figure 17.5: Nickel Circuit Performance

Figure 17.6 shows the monthly variations in the production of copper concentrate.

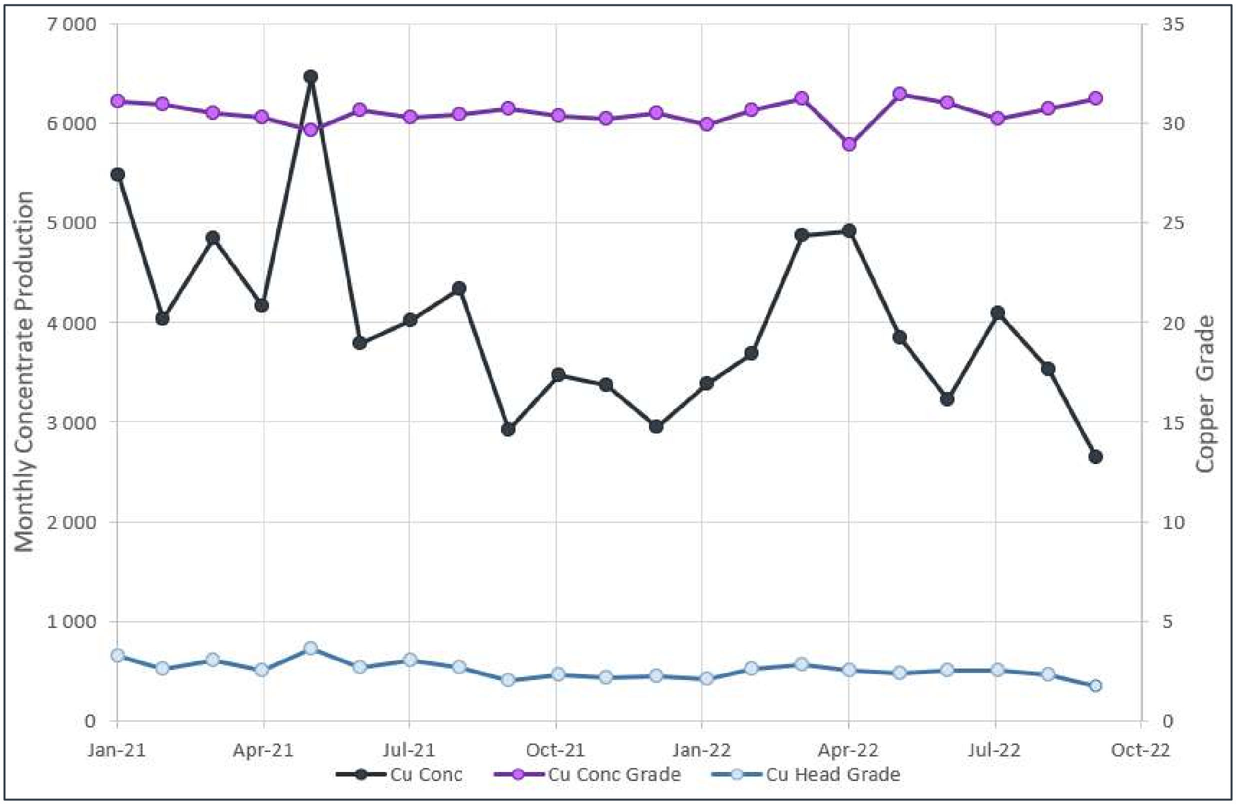


Figure 17.6: Copper Circuit Performance

17.2 LOM Production Schedule

Table 17.2 shows the LOM production of metals in concentrate.

Table 17.2: LOM Processing Plan – Eagle Mine

Item	Unit	2023	2024	2025	2026	2027	Total
Feed	kt	756	755	755	755	311	4822
Ni	%	2.54	1.79	1.39	1.12	1.06	1.14
Cu	%	2.00	1.49	1.03	0.85	0.80	0.89
Co	%	0.06	0.04	0.04	0.03	0.03	0.03
Au	ppm	0.21	0.17	0.10	0.09	0.09	0.10
Pt	ppm	0.57	0.41	0.22	0.24	0.21	0.24
Pd	ppm	0.40	0.28	0.16	0.17	0.15	0.17
MgO	%	18.02	18.25	14.95	17.72	15.44	11.79
Contained Metal							
Ni	t	24,641	21,534	19,221	13,535	10,522	8,420
Cu	t	22,374	18,056	15,094	11,287	7,789	6,438
Co	t	565	559	437	325	306	234
Au	oz	8,964	6,923	5,020	4,132	2,491	2,274
Pt	oz	26,366	24,165	13,957	9,927	5,429	5,940
Pd	oz	19,831	17,323	9,805	6,899	3,868	4,197
Recovery							
Ni	%	86.9	84.8	83.0	80.9	80.4	84.3
Cu	%	96.4	95.2	93.3	92.0	91.6	94.6
Co	%	88.1	86.0	84.2	82.1	81.6	85.3
Au	%	72.3	71.4	70.0	69.0	68.7	70.9
Pt	%	78.2	76.4	74.7	72.8	72.4	76.0
Pd	%	86.9	84.8	83.0	80.9	80.4	84.4
Metal Recovered to Nickel Concentrate							
Ni	t	16,332	11,196	8,555	6,660	2,600	45,343
Cu	t	2,994	2,053	1,568	1,221	477	8,313
Co	t	377	272	253	188	75	1,165
Pt	oz	8,122	5,594	2,969	3,137	1,111	20,933
Pd	oz	5,577	3,783	2,049	2,137	749	14,295
Metal Recovered to Copper Concentrate							
Cu	t	11,550	8,692	5,698	4,702	1,810	32,453
Au	oz	2,881	2,387	1,367	1,246	487	8,367
Nickel Concentrate Grade							
Ni	%	12.0	12.0	12.0	12.0	12.0	12.0
Copper Concentrate Grade							
Cu	%	30.5	30.5	30.5	30.5	30.5	30.5

17.3 Concentrate Quality

The recent production results can be used to extrapolate into the future. The copper concentrate is of high quality with an average grade above 30%copper, which is nearly 90% chalcopyrite. The nickel concentrate produced is on average 12% nickel. The concentrate target is reviewed regularly to account for nickel price and smelting conditions to optimize revenues. There have been no issues with talc in the concentrate. The target is to remain below 6% MgO in concentrate. The processing facility has no problem with obtaining this result with an average of 3.44% MgO shipped to the smelter during the period of January 2021 to September 2022.

18.0 PROJECT INFRASTRUCTURE

18.1 Tailings Storage

The HTDF is used for permanent disposal of the tailings produced at the Humboldt Mill. The HTDF is a pit lake that formed in the open pit of a former iron ore mine (the Humboldt Mine) when mining operations ceased in the late 1970s. It was used in the 1980s for subaqueous disposal of tailings produced from ore mined at the Ropes Mine, a historical gold mine. Since 2014, tailings produced by Eagle at the Humboldt Mill have been deposited subaqueously into the HTDF. In addition, Eagle uses water from the HTDF in the milling process and manages process water produced at the site in the HTDF. Water management includes treatment and discharge under a NPDES permit.

The key components of the HTDF are:

- Tailings delivery system
- Tailings vault and deposition system
- Pit lake
- Water reclaim system
- Cut-off wall
- Water treatment plant (WTP)

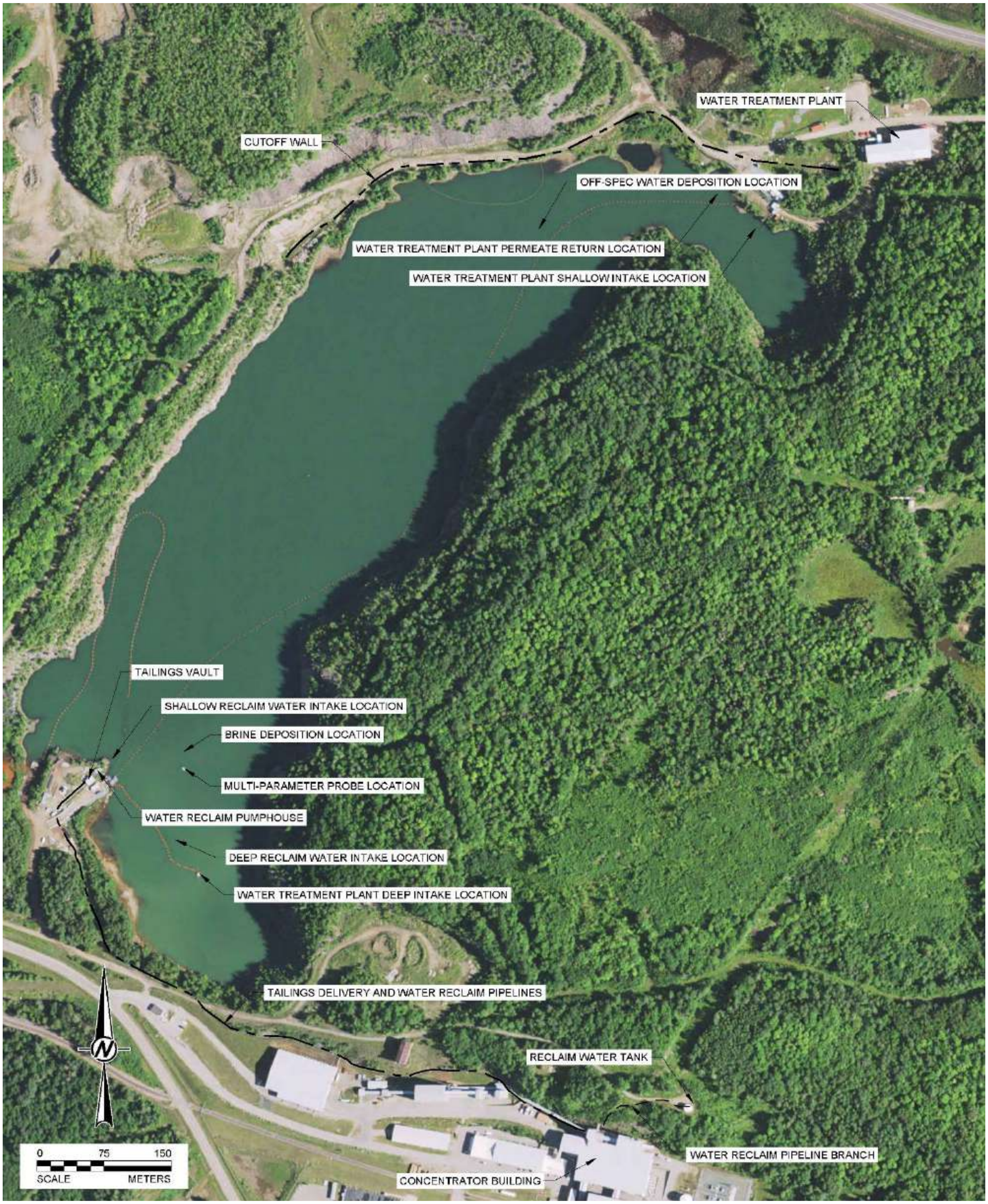


Figure 18.1: Humboldt Tailings Disposal Facility and Related Features

18.1.1 Tailings Delivery System

Flotation tailings are collected and pumped to the tailings thickener at the concentrator building. Thickener underflow is pumped from the tailings thickener to the tailings vault, which is situated along the southwestern perimeter of the pit lake. The tailings slurry is delivered in one of two double-containment high-density polyethylene (HDPE) pipelines (one duty, one standby). For each pipeline, the outer containment pipe is approximately 203 mm (8 inches) in diameter, and the carrier pipe is approximately 102 mm (4 inches) in diameter. The pumps (one duty, one standby) are Warman centrifugal slurry pumps with the design point at a flow rate of 83 cubic meters per hour (365 US gallons per minute) and a head of 42.7 m (140 feet), driven by TECO motors. For redundancy, either pump can deliver tailings through either pipeline. The tailings delivery pipelines are routed across the ground surface (and through a culvert at an access road crossing) from the mill to the HTDF. The approximate alignment of the pipelines is shown in Figure 18.1.

18.1.2 Tailings Vault and Deposition System

The tailings vault is a small building located along the southwestern perimeter of the HTDF that houses piping, valves, instrumentation, and electrical equipment used for tailings deposition within the HTDF. The tailings delivery pipelines from the mill enter the tailings vault below grade from the south. Knife gate valves can be configured to route tailings into any of three tailings deposition pipelines. Tailings flow by gravity in the pipeline from the tailings vault to the selected deposition point, as the subaqueous deposition points are lower in elevation than the tailings vault. The pipelines consist of DR 17 HDPE pipe with a diameter of approximately 152 mm (6 inches). Typically, one of the pipelines routes to a barge that allows downward deposition, one of the pipelines routes to a winter deposition point on the floor of the HTDF, and one of the pipelines routes to a backup deposition point on the floor of the HTDF for use in the event of an upset condition. Specific deposition locations are prescribed in the tailings deposition plan, which is updated periodically as needed (typically about once per year).

18.1.3 Pit Lake

The pit lake is a former open-pit iron ore mine that filled with water when mining operations ceased in the 1970s. It was used in the 1980s for subaqueous disposal of tailings produced from ore mined at the Ropes Mine, a historical gold mine. Since 2014, it has been used for subaqueous disposal of tailings produced at the Humboldt Mill and for management of process water associated with the milling operation, as well as precipitation, surface water runoff, and groundwater. Because the process water streams and groundwater and surface water managed in the HTDF range in density due to differences in water chemistry, several strata exist through the water column. Inputs and outputs (i.e., water and tailings) are carefully managed and monitored to help maintain this stratification, preserve the quality of the near-surface water, and limit the potential for impacts to groundwater around the HTDF.

The surface area of the pit lake is approximately 27 ha (67 acres), and the maximum depth of water is approximately 35 m (115 feet) as of December 31, 2022. The volume in the HTDF occupied by tailings deposited by Eagle is approximately 2.6 million cubic meters (3.4 million cubic yards) as of December 31, 2022.

18.1.4 Water Reclaim System

The water reclaim system includes a water reclaim pumphouse, situated adjacent to the tailings vault, that houses two Pioneer PP63C17-75-4 pumps, which are used to return water from the HTDF to the mill for reuse in the milling process. The suction pipeline for one of the pumps is situated at a shallow depth in the HTDF, while the suction pipeline for the other pump is situated deeper. Piping and valves are in place between the discharge side of the deep-water pump and the suction side of the shallow-water pump to enable blending at the desired ratio based on the water chemistry at the two depths and the needs of the mill. The blend between the shallow water and the deep water is controlled with a proportional-integral-derivative (PID) loop on the distributed control system (DCS) for the mill. Shallow reclaim water is typically the predominant source for reuse in the mill. Reclaim water is routed from the reclaim pumphouse to the mill in a DR 11 HDPE pipeline that has a diameter of approximately 203 mm (8 inches), with a branch that can also route reclaim water to the reclaim water tank, which is situated on a hill adjacent to the mill. The water reclaim pipeline is routed across the ground surface along the same alignment as the tailings delivery pipelines, with the branch to the reclaim water tank routing along an access road up the hill. The approximate location of the pipeline is shown in Figure 18.1. The deep-water pump is also used to provide a continuous flow of approximately 6.9 to 11.3 cubic meters per hour (30 to 50 US gallons per minute) to the unused tailings deposition pipelines to prevent tailings from collapsing over the outlets.

18.1.5 Cut-off Wall

A cut-off wall, approximately 685 m (2,247 feet) in length, was constructed adjacent to the pit lake along its northwestern perimeter in 2014. The purpose of the cut-off wall is to reduce the potential for migration of water from the HTDF into the shallow groundwater aquifer north of the HTDF. The cut-off wall included construction of a 1-m-wide (3-foot-wide) soil-bentonite slurry wall in the overburden materials and construction of a grout curtain below portions of the soil-bentonite slurry wall. The location of the cut-off wall is shown in Figure 18.1.

18.1.6 Water Treatment Plant

A WTP is operated for removal of total dissolved solids (TDS), metals, and suspended solids prior to discharge in accordance with the NPDES permit. An oxidation reactor is the initial treatment step to destruct thiosulfates and reduce the chemical oxygen demand. However, the oxidation reactor has been idled during the past year due to lower thiosulfate levels. Following this step, neutralization and metals precipitation occurs in a coagulation reaction tank. Then, particulates are removed using a lamella clarifier with polymer aid and an ultrafiltration system. Finally, a reduction in TDS concentration is accomplished with a brackish water reverse osmosis (BWRO) system. The BWRO system produces brine with elevated TDS concentrations. The brine is deposited at depth near the southern end of the HTDF at the location shown in Figure 18.1 and remains deep in the water column because it is relatively dense. The WTP also produces off-spec water that is currently deposited at depth near the northern end of the HTDF at the location shown in Figure 18.1.

18.1.7 Tailings Deposition Strategy

The primary design requirements for the HTDF are:

- Provide sufficient volume to contain the tailings produced during the mine life:
    - The maximum permitted tailings elevation is 461.8 m (1,515 feet) amsl (Michigan Department of Environmental Quality 2018a).
    - For preservation of near-surface water quality, Eagle endeavors to limit tailings deposition below an elevation of 452.6 m (1,485 feet) amsl.
- Provide a tailings ridge of sufficient height across the HTDF in an east-west direction to establish a southern basin that can contain brine produced by the WTP below the lowest section of the ridge (i.e., without spilling into the northern basin or mixing appreciably with the near-surface water).

    - The elevation of the top of the brine layer is routinely assessed, primarily by evaluating periodic water chemistry measurements through the water column, as described in Section 18.1.8.
    - The tailings ridge elevation increases in accordance with the tailings deposition plan and is routinely assessed, primarily by evaluating bathymetric survey data, as described in Section 18.1.8.
    - Eagle is currently enacting plans to construct an enhanced water treatment system that is expected to reduce and ultimately eliminate the brine layer. After the brine layer is sufficiently reduced or eliminated, tailings deposition will expand into the southern basin. The enhanced water treatment system is expected to be operational in 2023.
- Maintain a water surface elevation that provides adequate freeboard and ideally establishes an inward hydraulic gradient from the groundwater regime surrounding the HTDF (i.e., groundwater flow into the HTDF, rather than outward flow from the HTDF into the surrounding environment) during operation. The water level is primarily managed through discharge of water treated by the WTP. Thus, continual ability of the WTP to treat water from the HTDF and achieve discharge requirements throughout the LOM is important for maintaining a suitable water balance and water level.
    - For the freeboard requirement, the maximum water elevation is 469.24 m (1,539.5 feet) amsl (Eagle Mine LLC 2020).
    - For establishment of an inward hydraulic gradient, the maximum water elevation is typically about 468 m (1,535 feet) amsl.
    - Eagle generally targets a water elevation of about 466.49 to 466.65 m (1,530.5 to 1531.0 feet) amsl to provide a margin of safety and enhanced operational flexibility.

Table 18.1 summarizes the dry tonnage of tailings expected to be produced in each year of the mine life. Projections for 2023 and 2024 were provided by Eagle Mine LLC (2019). Projections for 2025 and 2026 are similar to the projection for 2024, based on information provided by Eagle Mine LLC (2022).

Table 18.1: Tailings Deposition Schedule for the HTDF

Year	Tailings Production (dry tonnes per year)
2023	584,487
2024	640,927
2025	640,927
2026	640,927

Deposition modeling is predicated on an in-place (long-term, consolidated) tailings density of 1.90 t/m^3 (119 lb/ft^3), which is based on densities calculated from bathymetric surveys over time and the results of laboratory slurry consolidation testing (Golder Associates Ltd. 2020). Subaqueous tailings deposits (which form “cones” at the deposition points) are modeled with a slope of 15 percent.

Generally, one of two tailings deposition methods can be used; these are referred to as the winter deposition method and the summer deposition method. The presence of lake ice (generally from early to mid-November through late April or early May) prevents or hinders the repositioning of tailings deposition pipelines to change the deposition location over the winter. Therefore, the goal of the winter deposition method is to utilize a single deposition location (or sometimes two deposition locations) that can accommodate the tailings volume produced during the entire winter deposition period. To accomplish this, a tailings deposition pipeline is installed along the floor of the HTDF to the deposition point and tailings are deposited such that a cone forms upward from the outlet. The tailings deposition pipeline is weighted with concrete cylinders to keep it from moving or floating. A new pipeline is installed for each winter deposition point, typically the summer before it is needed. A backup deposition point is also established prior to each winter deposition period based on conditions at that time. Backup points are established in the same way, with previous winter deposition points sometimes serving as backup points. The goal of the summer deposition method is to fill between the cones generated during the winter deposition period to maximize the storage capacity of the HTDF. Eagle uses floating pipelines to deposit tailings at targeted locations during the summer deposition period, which enables more rapid changes between deposition points and more efficient filling of the HTDF without leaving large gaps between cones.

Other operational constraints considered in the tailings deposition plan include:

- Tailings deposition is kept as low in the water column as possible to limit thermal effects from the elevated temperature of the tailings slurry in the upper layers of the HTDF.
- Tailings deposition is kept far enough away from the WTP intake location to limit agitation and suspension of particulates in this area that could be caused by nearby tailings deposition.
- As an added precaution to limit potential seepage rates from the HTDF into surrounding groundwater, the deposition points adjacent to the cut-off wall alignment are located so that tailings material will only come into contact with the pit wall where there is interpreted to be competent (i.e., low-permeability) bedrock. The lowest elevation where the top of the competent bedrock unit intersects the pit wall is estimated to be approximately 457.2 m (1,500 feet) amsl along the cut-off wall alignment. Tailings deposition is planned to occur far enough away from the pit wall that the tailings deposit should not contact the pit wall above an elevation of 455.7 m (1,495 feet) amsl.

The tailings deposition plan shows that sufficient capacity exists in the HTDF to dispose of tailings produced at the Humboldt Mill through the LOM with limited or no tailings deposited above an elevation of 455.7 m (1,485 feet) amsl. Specifically, about 1.9 million cubic meters (2.5 million cubic yards) of capacity is available up to an elevation of 452.6 m (1485 feet) amsl as of December 31, 2022, to accommodate an estimated in-place tailings volume of 1.3 million cubic meters (1.7 million cubic yards) from that date through the remaining LOM. In addition, approximately 1.8 million cubic meters (2.3 million cubic yards) of capacity exists above an elevation of 452.6 m (1,485 feet) amsl up to the maximum permitted tailings elevation of 461.8 m (1,515 feet) amsl.

18.1.8 Monitoring

The surveillance program for the HTDF involves inspecting and monitoring the operation, structural integrity, safety, and environmental performance of the facility. It is intended to identify deviations from expected performance and facilitate evaluation, selection, implementation, and monitoring of mitigation measures if needed. It consists of both qualitative and quantitative comparison of actual versus expected conditions.

Routine visual observations are conducted by trained Eagle personnel. Some facility components are observed daily or weekly, while others are observed monthly (at a minimum). Additionally, a camera is mounted inside the tailings vault and can be monitored from the on-site control room, which is staffed at all times. Daily visual observations are conducted, with different components observed on different days such that each key component is observed no less frequently than once each week, to the extent that safe access can be achieved based on weather, ground, and/or road conditions. Observing the HTDF on a daily basis from a variety of vantage points provides opportunities to identify deviations from typical conditions that may indicate a developing issue.

Instrumentation for monitoring of tailings delivery includes sensors to measure the tailings flow rate and pressure, as well as sensors at the tailings vault to detect moisture in the annular spaces of the double-containment pipelines. These instruments are connected to the DCS and can be monitored from the on-site control room.

Instrumentation for the HTDF includes a water level sensor. This instrument is connected to the DCS and can be monitored from the on-site control room.

Instrumentation for the water reclaim system includes sensors to measure flow rates. These instruments are connected to the DCS and can be monitored from the on-site control room.

A YSI EXO multi-parameter probe is moored near the southern end of the HTDF and is raised and lowered four times per day when there is not ice across the surface of the HTDF (generally from May into November each year). The probe measures temperature, specific conductance, pH, dissolved oxygen content, oxidation-reduction potential, turbidity, fluorescent dissolved organic matter content, chlorophyll *a* content, and blue-green algae content with depth. These parameters are used for geochemical analysis. The location of the probe is shown in Figure 18.1.

Eagle personnel routinely lower a YSI CastAway conductivity-temperature-depth (CTD) probe through the water column near the southern end of the HTDF when there is not ice across the surface (generally from May into November each year) to support geochemical analysis. Additionally, Eagle personnel lower the CTD probe along a transect through the HTDF at least once per year to support analysis of spatial variability in geochemical conditions. Eagle personnel sometimes lower the CTD in other locations in response to specific requests for additional data.

Groundwater quality is monitored quarterly for compliance with Nonferrous Mineral Mining Permit MP 01 2010 (Michigan Department of Natural Resources and Environment 2010) through a network of 24 monitoring wells in 14 physical locations (several of the wells are nested). Ten of the well locations are positioned to monitor the performance of the cut-off wall, with two of them situated inside the cut-off wall to enable comparison between groundwater conditions inside and outside the cut-off wall. Four of the well locations are positioned around the mill infrastructure.

Bathymetric surveys are conducted semi-annually to map the tailings surface within the HTDF and allow for comparison of actual conditions against the tailings deposition plan. Bathymetric surveys are generally conducted in late spring (May or early June) and early fall (late September or October). Analyses are carried out to evaluate the apparent tailings volume placed since the previous bathymetric survey, the apparent in-place density associated with this volume (based on the tailings tonnage deposited during the same period), and the apparent range of slope angles associated with recent tailings deposition. The actual tailings surface is also compared against the planned tailings surface to enable evaluation of whether adjustments to the tailings deposition plan are needed.

18.1.9 Regulatory Compliance

The HTDF is regulated by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The HTDF does not include a regulated dam under EGLE regulations. Eagle is authorized to discharge from the HTDF through a pipeline to a wetland contiguous to the Middle Branch Escanaba River and directly to the Middle Branch Escanaba River in accordance with NPDES effluent limitations and monitoring requirements included in Permit No. MI0058649 (Michigan Department Environment, Great Lakes and Energy 2022). Nonferrous Metallic Mineral Mining Permit No. MP 01 2010 (Michigan Department of Natural Resources and Environment 2010) also includes provisions related to tailings disposal in the HTDF, as well as groundwater monitoring around the HTDF.

18.1.10 Corporate Governance

Eagle has established policies, technical standards, and guidance for tailings management that are generally aligned with global industry standards and guidance. Eagle has appointed a Responsible Tailings Facility Engineer and an Accountable Executive for the HTDF, as well as an external Engineer of Record (EOR). Eagle and the EOR have established a consequence classification of Low for the HTDF in accordance with the Global Industry Standard on Tailings Management (GISTM) framework (Eagle Mine LLC 2021). Accordingly, Eagle expects to fully implement the GISTM no later than August 2025.

18.2 Site Roads

The Mill site is located approximately 61 km west of the town of Marquette and accessible by US Highway 41. The Mill is connected to the Eagle Mine, located to the north to north-west, via a 105 km road system that includes the stretch of US Highway 41 from Maquette, County Roads 510 and 550, and Triple A Road. The Mill is also connected to the CN Rail system at Ishpeming (see Figure 18.2).

Within the Mine and Mill sites, internal roads of adequate quality connect facilities and provide reliable year-round access.

Figure 18.2: Aerial View of the Humboldt Mill

Figure 18.3: Aerial View of the Eagle Mine

18.3 Power Supply

The mine site is serviced by grid power provided by the Alger Delta Electric Co-operative (ADEC). An agreement was signed between ADEC and KEMC on January 15, 2008, to provide power to the mine site. ADEC provides power from the city of Marquette to the town of Big Bay and the overhead lines and associated substation were upgraded to provide 24.9/14.4 kV service to the mine site. The new line from the Big Bay line tap to the mine site is an underground line which supports the estimated 6.3 MVA requirement of the site. A powerhouse constructed at the mine site to step down the 24.9/14.4 kV utility power to 4.16 kV to support mine surface distribution and 13.8 kV to support mine portal, underground, and vent raise distribution. Emergency backup power is provided to portions of the mine by a 4.16 kV, 2,500-kVA diesel generator. This generator supplies backup power to the mine administration offices, mine dries, and maintenance sprung building; and supplies the 13.8kV to the mine portal, underground, and vent raise through a step-up transformer located at the powerhouse.

The Humboldt Mill site is predominantly serviced by the Upper Peninsula Power Company with some power being supplied from WE Energies. The Upper Peninsula Power Company service is fed from a 69 kV American Transmission Company transmission line to an on-site, utility-owned substation. The substation steps down the incoming 69 kV power to 13.8 kV through two 10.5 MVA transformers situated into two redundant banks. This 13.8 kV is fed into the main concentrator building's 13.8 kV switchgear. This switchgear feeds 13.8 kV distribution to the reclaim water area for the mill as well as pad-mounted transformers that step down the voltage to 4.16 kV and 480 V to support the mill process in a fully redundant design. Critical mill equipment is backed up by a 480 V, 1250 kVA diesel generator to prevent flooding and freezing during the event of a power outage. The mill reclaim area is also backed up by a 480 V 500 kVA diesel generator to ensure proper water supply to the mill and Water Treatment Facility. The Mill Services Building, Mill Administration Building, Mill Guard House, and Water Treatment Plant Facilities on the mill site property are fed from 24.9/14.4 kV distribution supplied by WE Energies and is stepped down to the various building nominal voltages through various pole-mounted and pad-mounted transformers.

In 2021, Eagle Mine consumed approximately 64.98 GWh of electrical energy.

18.4 Water

An existing non-potable well, in conjunction with a potable well, provides service and drinking water to the mine site. Each is capable of delivering 100 USgpm. There are two wells at the mill: a potable well and a non-potable industrial well. Each is capable of delivering 100 USgpm. Currently, mill operations are supplied by recycled water from the HTDF but can utilize the industrial well as needed. Hydrology studies at both sites indicate viable long-term aquifers. Both the mine and mill sites utilize septic systems.

18.5 Ancillary Facilities

The Eagle Mine and Humboldt Mill sites are equipped with ancillary facilities necessary to support and sustain reliable operations. These include:

- Water infiltration system for slow release of treated water into the environment at the mine site
- A reverse osmosis water unit for treatment of water to allow discharging water at the mine site
- Powerhouses that include the grid primary connection, emergency generation, and distribution networks
- Mine and Mill, administration, laboratory and service buildings
- Mine and Mill dry facilities
- Maintenance shops
- Consumables, spares and supplies warehouses
- Truck Wash
- Storage basins for contact and non-contact surface water
- Cemented crushed rock batch plant for mine backfill
- Mine ventilation fans and heating system
- Mine and Mill security gatehouses
- Rail siding and marshalling yard, complete with concentrate storage and loadout
- Surface tailings disposal facility complete with reclaim water return system

18.6 Concentrate Shipping

The nickel and copper concentrates are stored in a concentrate storage/loadout building immediately adjacent to the mill. The storage capacity of the building is approximately 3,000 wet metric tonnes (wmt) for nickel concentrates and 1,000 wmt for copper concentrates.

A rail spur connecting the mill site to the CN railway network runs through the concentrate storage/loadout building. Railcars are loaded by front-end loaders inside the loadout building and the railcars are covered by a fiberglass lid. There are additional rail tracks used to store empty and loaded railcars.

An independent contractor is the rail service provider, managing the rail spur and railing the concentrates to the east side of the city of Ishpeming where they are transferred to the CN rail network for onward railing to Canadian non-ferrous smelters.

19.0 MARKET STUDIES AND CONTRACTS

The principal commodities at Eagle are nickel, copper, cobalt, and precious metals contained in nickel and copper concentrates. These products are freely traded at prices that are widely known.

The Eagle nickel and copper concentrates have been sold under long-term contracts directly to smelters or to traders in North America, Europe, and Asia since the start of production.

Both the nickel and the copper concentrates are of clean quality with low levels of impurities and good by-product credits.

Currently, Eagle has nickel concentrate contracts in place with two smelters in Canada to accept 100% of the production until December 31, 2025.

Management is of the opinion that the Eagle concentrate quality makes the concentrate saleable if current contracts are not extended.

All the copper concentrate is sold to a single smelter in Canada for the LOM.

20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

This Item contains forward-looking information related to applications, permits, approvals and consents required and time to approvals for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the following material factors or assumptions that were applied in drawing the conclusions or making the estimates, designs, forecasts or projections set forth in this Item: regulatory framework is unchanged for Study period; no unforeseen environmental, social or community events disrupt timely approvals.

The Eagle underground Ni-Cu mine has been in operations since 2014. The project consists of two distinct locations where environmental studies have been undertaken: the Eagle Underground Mine Nickel Copper Site (Mine Site) located on Triple A Road in Big Bay, Michigan, and the Humboldt Mill Site (Mill Site) located on 4547 County Road 601, Champion, Michigan, approximately 64 km (40 miles) southeast of the Mine Site. The QP toured both the Mine Site and the Mill Site during the preparation of this document. The following section describes recent and ongoing environmental studies which have occurred at both locations since the previous NI 43-101 Technical Report filed in 2017 with an emphasis on water-related studies. The section also addresses Waste Disposal, Permitting, Social and Community Impacts, Governance, and Closure plans for each site.

20.1 Environmental

20.1.1 Mine Site

The Mine Site is located within the Yellow Dog Watershed which spans Baraga and Marquette Counties and drains north into Lake Superior. Major underground workings that will store water following mine closure include the: (1) the Upper Ramp; (2) the Eagle mine workings; (3) Eagle East mine workings; and (4) the declines connecting the Eagle and Eagle East mine workings. The addition of the Keel will add a fifth mine working which will be developed in 2023. During a site visit on September 9, 2022, the QP inspected underground water quality monitoring sites at the -540 Level Sump, the -515 Level Sump, the 215 Level Sump, and the 323 Level Sump. Major surface features include: the temporary development rock storage area (TDRSA), two contact water basins (CWBs), the Mine Water Treatment Plant (Mine WTP), and the treated water infiltration system (TWIS). With the exception of TWIS, the QP visited each of these sites on January 31, 2019.

A groundwater model was developed during the mine permitting process in 2006 and has been updated multiple times over the mine life. These studies have shown that the underground mine workings penetrate three distinct hydrogeological units: a thin Quaternary glacial aquifer; an upper bedrock, non-saline hydrogeological unit; and a lower bedrock, saline hydrogeological unit. Three unique aspects of the hydrogeology of the underground mine include the following:

- The metamorphic rocks of the upper and lower bedrock hydrogeological units have very low hydrogeologic conductivity. This results in a very low inflow rate to the underground mine of approximately 18 gallons per minutes (gpm).
- The salinity of groundwater increases with depth. Most likely, this is due to the presences of a Canadian Shield Brine within the porewater of bedrock. Based on salinity, the boundary between the upper and lower bedrock units has been specified at approximately 335 m above mean sea level (m amsl). This elevation marks the boundary between the upper and lower Eagle mine workings.

- Vertical fractures within the bedrock units have the potential to store saline groundwater. When intercepted by mining activities, these factures can rapidly drain into the mine workings.

The groundwater model was updated in 2021 using FEFLOW during the preparation of a Closure Study for the underground mine. The Closure Study included a GoldSim water balance model of the flooded of mine workings used to predict the water level over time, and a PHREEQC geochemical model that predicted the water quality of the post-flooding mine workings. A model revision is currently underway which will expand the groundwater model, the water balance model, and the water quality model to include the Keel mine workings. See Section 20.6 for additional information on the closure prediction.

Since September 2011, Eagle has maintained a daily record of water addition and removal from the underground mine in a spreadsheet titled “Eagle Mine Dewatering Logs.” Given the low rate of groundwater discharge to the underground, the main source of water to the underground mine is water pumped from a utility well screened in the Quaternary glacial aquifer, called “utility water.” This water is used for mining operations including drilling exploration boreholes, bolting, and mucking ore and waste rock. As such, the amount of water used underground varies depending on exploration and mining activities. In August 2022, during the exploration of the Keel deposit, an average of 75 gpm was pumped into the mine. The volume of water added is normally between 30 and 50 gpm in the absence of exploration activities.

Underground water drains by gravity into multiple sumps at different levels. Sump water is pumped back to the surface via a system of eleven skid-mounted pump stations, each consisting of a 3,200-gallon-dewatering tank connected to a 1,200-gpm-capacity pump. The average pump rate back to the surface was only 77 gpm in August 2022. The difference between the inflow rate (75 gpm utility water plus 18 gpm groundwater) and the outflow rate (77 gpm) indicates that a portion of inflow water is lost to evaporation and porewater within ore and waste rock. Given the capacity of each pump station, Eagle has significantly higher capacity to dewater the underground mine relative to the combined inflow rates of groundwater plus utility water. The limitation on underground pumping is a factor of the storage volume of the CWB’s and the capacity of the Mine WTP to process this water.

Eagle has completed mining in the deepest level of Eagle East (deepest point has an elevation of -542 m amsl), which is called the -540 Level. At present, water from exploration boreholes and fractures has been allowed to drain into the -540 Level for storage, flooding the -540 Level workings and creating the -540 Level Sump. Eagle maintains a record of the water level within the sump. As of September 9, 2022, the sump had a water elevation of approximately -528 m amsl. The current plan is to allow the water level to rise during operations as mining concludes in subsequently shallower levels of the Eagle East mine. This approach will minimize the demand on the Mine WTP during operations and will minimize the time and volume of water required to flood the workings at the end of operations. Eagle is considering using water from the -540 Level Sump for mining operations where possible, to further reduce the demand for fresh utility water, and subsequently, the demand on the Mine WTP.

Water from the underground is pumped into one of two CWB’s located adjacent to the Mine WTP. Inside the Mine WTP, water passes through a clarifier, multimedia filtration system, and an ion exchange system before passing through a reverse osmosis (RO) system, followed by an evaporator/crystallizer system. Permeate from the RO system is returned to the Quaternary glacial aquifer via the TWIS. The TWIS is the regulatory point of compliance for mine effluent, and the water quality of the TWIS is routinely monitored by Eagle (see Section 20.3, Permitting Requirements).

In 2019, Eagle prepared a GoldSim water balance for the underground mine which tracked both the volume, concentration, and load of water added to the CWB's. At the same time, Eagle initiated a surface and underground water monitoring program to track water quality over time including five points underground:

- -540 Level Sump (the bottom of the Eagle East mine workings)
- Pump Station 6 (top of Eagle East mine workings)
- 215 Level Sump (the bottom of the lower Eagle mine workings)
- 323 Level Sump (the bottom of the upper Eagle mine workings), and
- Pump Station 1 (final point prior to discharge to the CWBs).

This monitoring program was developed to track rising levels of sulfate, hardness, and total dissolved solids (TDS) in CWB water, and to estimate additional equipment needed (if any) in the Mine WTP. The rise in TDS appeared to be a function of the depth of mining associated with mining Eagle East. Hardness was attributed to underground water leaching through cemented backfill. Sulfate was attributed to sulfide oxidation in backfill sourced from the TDRSA. Eagle acquired a third crystallizer system to process this additional load. The underground locations are still monitored monthly, and the data have been used to develop and calibrate the water quality prediction for the Closure Study (see Item 20.6 of this Technical Report).

Since 2014, Eagle has also monitored groundwater elevations from an extensive network of compliance wells surrounding the Mine Site as part of the regulatory monitoring program. Sample points include: (1) surface water elevations in the wetland located above the underground mine; (2) groundwater elevations in the Quaternary glacial aquifer; and (3) groundwater levels in the upper bedrock hydrogeological unit. Water quality in groundwater central to the mine site has slightly elevated concentrations of chloride due to the use of de-icers in the operational area, and groundwater generally has higher alkalinity due to changes in recharge patterns from paving. Both groundwater conditions are expected to naturally attenuate prior to or after reclamation of the site, and neither condition affects the license to operate.

20.1.2 Mill Site

The Mill Site is located within the Escanaba River watershed which drains south into Lake Michigan. The HTDF is the formal name given to a pit lake which developed in 1950's following the closure of an open pit, iron mine operated by Cleveland Cliffs. In the late 1980's to early 1990's, the HTDF was used for the storage of cyanide-leached tailings from the Ropes Gold Mine, owned an operated by Callahan Mining Company. Approximately 200 feet of tailings from the Ropes Mine were added to the bottom of the HTDF which reduced the maximum depth to approximately 160 feet. At the conclusion of Ropes operations, the surface elevation was 1538 feet above mean sea level (ft amsl) and the bottom elevation was approximately 1380 ft amsl. (Note, elevations at the Mine Site are in meters whereas elevations at the Mill Site are in feet; we have retained these units herein for consistency).

Prior to the operations commencing within the HTDF, a soil-bentonite cut-off wall was constructed through the Quaternary glacial aquifer along the north-northwest-west perimeter of the HTDF to minimize the discharge of water from the HTDF to the downgradient groundwater aquifer. The cut off wall achieved significant reductions in hydraulic conductivity of the HTDF, however, due to unforeseen challenges associated with the heterogeneity of the Quaternary glacial aquifer, the intended hydraulic conductivity was not uniformly achieved along the breadth and depth of the cut-off wall. Therefore, the operations of the HTDF are designed to maintain the water surface of the HTDF at an operational elevation of 1532 ft amsl, approximately six feet lower than the surrounding groundwater elevation (1538 ft amsl). The resulting, inward, hydrogeological gradient directs all groundwater flow inward, toward the HTDF during operations when the Mill WTP is operating. To date, groundwater quality wells surrounding the cut off wall continue to indicate containment of water within the facility. Observed changes in water quality in the wells are indicative of the use of road salt de-icers (e.g., chloride), but are not indicative of the primary indicators of HTDF-influenced water (e.g., sodium and sulfate).

Due to vertical changes in the density of water, the HTDF is classified as a "meromictic pit lake" which does not mix from top to bottom on an annual basis. The lake consists of six distinct layers:

- A Surface Layer that thermally stratifies into epilimnion and hypolimnion sub-layers during summer and winter months, and completely mixes during spring and fall turnover events
- A Middle Layer with a warmer water temperature and a distinct water chemistry
- A Chemocline, or upper transitional layer, which exhibits a rapid increase in TDS concentration over a narrow depth range
- A Deep Layer which exhibits a homogeneous temperature and TDS concentration due to whole-layer, thermohaline convection driven by the heat content of the tailings slurry
- A Pycnocline, or lower transitional layer, which exhibits a rapid increase in TDS concentration over a narrow depth range
- A Brine Layer immediately overlying the tailings.

Since the start of operations in 2014, the major water-related features at the Mill Site include the Mill, the Mill WTP, the cut-off wall and the HTDF. The QP toured the cut-off wall and HTDF on September 6, 2022, toured the Mill WTP on November 9, 2021, and toured the Mill several times in previous years. The Mill adds a warm tailings slurry composed of sulfidic-tailings and process water to the Deep Layer of the HTDF. During winter and early spring months, the slurry is injected upwards through a pipe on the floor of the pit. During late spring to late fall, slurry is piped downwards from pipelines suspended from buoys floating on the surface of the HTDF. Both injection procedures produce "cones" rising from the floor of the HTDF which result from the solids fraction of the tailings setting out of the water column at the injection point. The tailings slurry has an elevated TDS concentration as a function of ore porewater, soda ash added in the Mill (contributes sodium and alkalinity), and the partial oxidation of sulfide minerals within the ore (contributes sulfate). The elevated TDS concentration of the tailings slurry produces the stratified layers and meromictic conditions observed in the HTDF. Reclaim water for the Mill is pumped from the Surface Layer. Water from the Deep Layer is recirculated through the slurry pipes on the lake floor to keep these pipes from collapsing from the weight of overlying tailings.

The Mill WTP removes water from two depths, the Surface Layer and the Deep Layer, and discharges treated effluent to the Middle Branch of the Escanaba River, the point of environmental compliance for the Mill Site (see Section 3). Alternative compliance points Outfalls 001 and 003 discharge to a wetland contiguous to the Middle Branch Escanaba River. The original plant includes a reaction tank where pH is adjusted and a polymer is added to remove metal concentrations, followed by a clarifier and an ultra-filtration (UF) system. Filter cleaning wastes from the Mill WTP, along with plant process water from occasional maintenance shut down periods, are injected to the Deep Layer of the HTDF. This input is called "Off Spec" water.

To preserve the thickness and water quality of the Surface Layer, in 2016, Eagle began to operate a small RO system to treat elevated TDS water from the Deep Layer prior to discharge. The Mill WTP was expanded and an additional, permanent RO system and a second clarifier were added over time. Brine from the RO is pumped to the floor of the HTDF resulting in the Brine Layer. The Pycnocline is the transitional boundary layer between the Brine Layer and the Deep Layer.

From 2018 to 2021, water in the Deep Layer exhibited elevated concentrations of thiosalts (i.e., trithionate, thiosulfate, and tetrathionate). Although not regulated, these are partially-oxidized sulfur compounds which could potentially affect the toxicity of Mill WTP effluent. The source of these compounds is likely to be the partial oxidation of sulfide minerals, notably pyrrhotite, within the Mill. As a result, Eagle began operating a Fenton's reactor at the front end of the Mill WTP in 2018 in order to fully oxidize thiosalts to sulfate. The process was discontinued in 2021 due to an apparent decline in thiosulfate concentrations within the HTDF but could be restarted in the future if thiosulfate levels rebound.

By late 2023, a zero liquid discharge (ZLD) plant will be installed to treat the RO brine stream and to remove the Brine Layer and dissolved mass present within deeper layers of the HTDF. Construction is underway to install this system. The ZLD plant will produce a sodium sulfate salt. Eagle is currently exploring disposal approaches which include blending the salt with cement to generate a stabilized solid waste with minimal sulfate leachability. Additionally, several other beneficial re-use opportunities for the sodium sulfate salt are being explored by Eagle's consultants.

The Mill WTP plays two critical roles in the operational performance of the Mill Site: (1) minimizing effluent toxicity and (2) maintaining the surface elevation of the HTDF below an elevation where groundwater discharge can occur (1538 ft amsl). Since 2018, Eagle has recognized that the hardness concentration (calcium plus magnesium ions) in the Mill WTP effluent directly influences the toxicity of Mill WTP effluent. However, RO permeate, has little to no hardness. To raise effluent hardness, from 2018 to 2021, Eagle began blending surface water with RO permeate prior to discharge. Since this approach was employed, whole effluent toxicity (WET) tests have shown no acute or chronic toxicity results (see Section 20.3, Permitting requiremetns). In 2021, a remineralization system was added to the effluent stream which provides the ability to raise the effluent hardness and minimize or eliminate the need for blending based on the WTP operating strategy.

To maintain the water level, Eagle has increased the capacity of the Mill WTP over time to allow for more water from the Deep Layer to be treated. The HTDF has been maintained near or below the target operational elevation of 1532 ft amsl except for a period of time in 2019 when abnormal snowmelt and precipitation occurred coincident with lagging plant throughput upgrades raising the water surface elevation to 1537.5 ft amsl for a brief period. There was no evidence of changes in groundwater quality in downgradient monitoring well sets proximal to the HTDF during or after that time.

With respect to the HTDF, in addition to inflows and outflows from the Mill and the Mill WTP, the pit lake water balance includes the Mill stormwater collection system, Mill lab waste, pit wall runoff, groundwater inflow, direct precipitation, and direct evaporation. Ore drainage flowing to a sump in the coarse ore storage area (COSA) contributes a mass load to the stormwater system, as does de-icing road salt applied to Mill Site's parking lots and roadways during the winter. Wastes from the metallurgical lab are currently combined with the tailings slurry. The leach field of the septic system, located west of the administration building, is known to have elevated levels of nickel resulting from the showers used by Mill employees. However, groundwater monitoring wells installed in 2019 have not detected a plume connecting the septic field to the HTDF. Seepage from a wetland pond located in the southwest corner of the HTDF is thought to provide representative, background, groundwater quality discharging to the HTDF. Most constituents are below discharge limits with the exception of naturally elevated manganese. Dust from the crushing of ore is thought to increase the concentration of dissolved metals in runoff to the HTDF. Rainwater landing on the HTDF has low concentrations of most constituents with the notable exception of mercury. The mercury concentrations in rainwater are approximately two to three times higher than the mercury discharge limit for the Mill WTP. This point has been raised with regulators.

Between 2017 and 2019, employees noted distinct odors in ambient air near the Mill during periods of fall turnover. On two occasions between 2017 and 2018, motorists passing the Mill Site mistook this smell for a propane or natural gas leak and called the local fire department. Subsequent investigations of dissolved gases in the Middle Layer identified hydrogen sulfide, carbon disulfide and carbonyl sulfide, each of which can have a strong odor. Among these, hydrogen sulfide caused the greatest concern due to its potential health impacts. Although levels were not exceptionally high, Eagle implemented new health and safety measures for employees working on or near the HTDF, developed an air dispersion model to explore the potential affect of a shallow degassing event, and began annual monitoring of dissolved sulfide (assumed to be associated with hydrogen sulfide) within water in the Middle Layer (between 1480 and 1473 ft amsl). Monitoring occurs each spring, prior to any work on the HTDF. Concentrations of dissolved sulfide peaked in 2019 at 39 mg/L and have steadily decreased thereafter.

Multiple aspects of the HTDF are routinely monitored for regulatory compliance and non-regulatory purposes:

- On a quarterly basis, water quality samples are collected from 24 compliance wells located inside and outside the cut-off wall, and groundwater levels are continuously monitored in all 24 compliance wells. Water quality samples and groundwater levels are also collected quarterly from 4 non-regulatory wells located outside of the cut-off wall.
- HTDF: Physicochemical parameters in the HTDF water column are monitored on approximately a monthly basis from March to November using a hand-held conductivity-temperature-depth (CTD) sonde which generates high-resolution, in situ profiles of temperature, electrical conductivity and density. These data provide the foundation for monitoring the elevation and thickness of individual layers in the HTDF. Between May and November, an auto-profiler buoy deploys a YSI EXO multiparameter probe four times a day which measures in situ profiles of temperature, electrical conductivity, pH, dissolved oxygen, turbidity, oxidation-reduction potential, fluorescent dissolved organic carbon (a proxy for total organic carbon), chlorophyll *a*, and blue green algae. These data are combined to provide high-resolution, temporal heat maps showing each parameter as a function of depth and time. Eagle reviews these data on a monthly basis to identify any changes in the water column. Water samples are collected from eight depths at two locations in the HTDF each summer and are analyzed for total and dissolved concentrations of approximately 47 constituents. The main constituents of interest include TDS and nickel. Lake water elevation is also routinely monitored.
- Mill WTP Influent: The concentration of select parameters in the shallow and deep influent to the Mill WTP are routinely sampled. The flow rate is also monitored.
- Mill WTP Effluent: Effluent chemistry and flow rate to the Escanaba River are routinely monitored from a point inside the Mill WTP for regulatory compliance purposes. Once a month, samples are collected for WET tests on effluent toxicity.
- Non-Regulatory Monitoring Points: To estimate mass loading to the HTDF, water samples are routinely collected from the: (1) tailings slurry tank overflow; (2) RO brine line returning to the HTDF; and (3) Off Spec

line returning to the HTDF. In 2020, it was estimated that the Off Spec line provided a higher load of nickel to the HTDF relative to the tailings slurry. This was likely caused by the ultra-filtration backwash process. Since that time, backwash water has been re-routed to the head of the Mill WTP plant.

- Bathymetry: Each spring and fall, the bathymetry of the HTDF is measured. These 3-D models are used to calibrate the annual tailings deposition plan and form the basis for the transient limnology model.
- Air Quality: Eagle has emissions control equipment and programs to maintain emissions below permitted limits.

Eagle has multiple ongoing studies aimed at predicting future conditions, improving water management, and estimating closure time and costs. These include the following:

- Tailings deposition plans: New tailings deposition plans are generated each time ore production estimates are increased. The most recent plan generated in 2022 accounted for the increase in ore production generated by mining the Keel. These plans define the bathymetry used in the transient limnology model.
- HTDF transient limnology model: In 2021, Eagle generated a transient limnology model of the HTDF using the 2-D hydrodynamic model CE-QUAL-W2. The model predicts the physics and chemistry (conservative) during operations, remediation and closure periods. Predicted and observed data from 2021 to 2022 have shown a strong correlation. Eagle is in the process of updating this model to include the latest 2022 deposition plan inclusive of the Keel.
- Water Balance: A detailed GoldSim water balance was developed by Barr Engineering Company (Barr) in 2018 which integrates daily precipitation and evaporation rates with Mill and Mill WTP processes, predicted groundwater inflow, and predicted runoff and stormwater inflows. The model output has been used to define groundwater, runoff and stormwater inflows used in the transient limnology model.
- Groundwater Fate and Transport Model: Barr also developed a groundwater flow model to estimate the groundwater inflow and discharge rates as a function of the HTDF surface elevation. These inflow rates have been incorporated into the water balance and transient limnology model. The same model has been expanded to predict the downgradient fate and transport of dissolved constituents from the HTDF which could potentially migrate from the HTDF during closure. After the transient model is completed, the predicted water quality in the HTDF will be used as the initial conditions in the fate and transport model.

20.2 Waste Disposal

20.2.1 Mine Site

The main waste disposal feature at the Mine Site is the TWIS where treated effluent from the Mine WTP infiltrates to the local groundwater aquifer. This discharge is regulated under the mine groundwater discharge permit (see Section 20.3.1, Permits Requirements – Mine Site).

Solid wastes produced by the Mine WTP include a filter-cake associated with the clarifier and evaporator/crystallizer solids. These wastes are disposed offsite in a landfill.

The TDRSA provides a temporary storage location for waste rock extracted from the underground. Lime was historically added to TDRSA to provide buffering for any future pH changes by waste rock, but the regulatory agency approved Eagle to discontinue this practice unless monitoring indicates leachate water quality is becoming acidic. Leachate from the TDRSA drains to the CWB's. During operations, this waste rock is returned underground for use as either cemented-backfill or uncemented-backfill.

The CWB's collect all mine site runoff including precipitation, snowmelt, impacted stormwater in contact with mine residues, mine water, and truck wash water which are treated as wastewater in the mine WTP.

Other waste streams produced at the mine site include metal, cardboard, and wood streams for recycling, universal wastes (light bulbs, batteries), used oil and lubricants, and general municipal waste.

20.2.2 Mill Site

The three main waste types disposed at the Mill Site are: (1) tailings slurry disposal in the HTDF; (2) wastewater added to the HTDF; and (3) treated effluent discharged to the Middle Branch of the Escanaba River. The latter is regulated under the Humboldt Mill's National Pollutant Discharge Elimination System (NPDES) permit (see Section 20.3, Permitting Requirements).

A slurry of solid tailings and mine process water is added to the HTDF via pipes along the floor of the HTDF (used for winter deposition) or pipes suspended from floating pipelines (used for summer deposition). The solid fraction of tailings contains the highly-reactive sulfide mineral pyrrhotite, hence the need for sub-aqueous disposal. Both methods produce cone-shaped, sub-aqueous deposits of tailings solids. Most of the process water associated with the slurry becomes Deep Layer water, however, a fraction becomes trapped as porewater within the tailings. A portion of this porewater is returned to the Brine Layer within one year of deposition as a product of primary tailings consolidation.

Under the current mine permit, tailings are not allowed to be deposited above 1515 ft amsl, which places an upper regulatory limit on deposition. However, modeling predicts the rapid deterioration of the water quality in the Surface Layer if tailings are placed directly within the Surface Layer. In an effort to preserve the quality of the Surface Layer, the current tailings deposition plan (2022) limits tailings placement below a depth of 1485 ft amsl (i.e., below the Surface Layer) through the end of operations. Depending on the final year of operations, some deposition above 1485 ft may be required, not to exceed 1515 ft amsl.

The principal liquid waste streams include RO brine and Off Spec water. Both waste streams are added to the HTDF. Discrepancies between measured RO brine injection volumes and measured brine layer volumes indicate that a portion of the brine may be sinking into tailings due to differences in density. Groundwater models predict the same process should be occurring. Additional liquid wastes added to the HTDF include COSA sump water, site stormwater, and metallurgical lab waste.

Presently, the Mill WTP generates minor solid wastes in the form of a filter cake (a product clarification) plus spent ultra-filtration filters and spent RO membranes. These wastes are sent to a landfill. Upon completion of the ZLD system in late 2023, the Mill WTP will also produce a sodium sulfate salt. Eagle is currently exploring disposal options for the sodium sulfate salt. The stabilized waste will be stored in an offsite landfill, returned to the HTDF, or potentially beneficially re-used.

Other wastes generated at the Mill site include metal, cardboard, and wood recycling streams, municipal wastes, universal wastes, and used oils and lubricants.

20.3 Permitting Requirements

Activities at the Mine and Mill sites are permitted under Michigan's Part 632 Nonferrous Metallic Mining law. The Department of Environment, Great Lakes & Energy (EGLE), formerly known as the Michigan Department of Environmental Quality (MDEQ), oversees the environmental regulation of the operations.

20.3.1 Mine Site

Eagle is not required to submit an updated environmental impact statement (EIS) in order to mine the Keel deposit. However, Eagle will need to submit a permit amendment request to complete production mining. The permit amendment will comment on all aspects of regulation that are typically covered in an EIA such as any changes to potential environmental impacts.

Most environmental impacts considered by the permit amendment address surface disturbances and changes to the surface and alluvial water resources. During the permit amendment for Eagle East, no increased environmental impacts were identified because there were no changes to surface disturbances and no changes to surface and alluvial water resources. The major focus was on air emissions, specifically whether air emissions would change as a function of increased mining. Eagle sought an exemption from air permitting during the permit amendment for Eagle East.

The permit amendment for the Keel zone is expected to be similar to the permit amendment for Eagle East. Development of an access ramp leading to the ore body does not require a permit amendment but does require a notification and approval from EGLE. Approval was received in December 2022 to commence development activities in 2023. There will be no changes to surface disturbances and no changes to the surface and alluvial water resources, therefore, Eagle does not expect an increase in environmental impacts. Eagle pursued an exemption from air permitting. The EGLE retains regulatory authority to require Eagle to demonstrate compliance with the air permit by requiring an emissions test.

Discharge of Mine WTP effluent to the TWIS is regulated under the MDEQ (2015a) Groundwater Discharge Permit. Water samples are collected on a weekly basis and results are submitted to the State each month. The permit specifies the pH range for effluent plus daily maximum concentrations and monthly maximum average concentrations for total arsenic, total boron, total cadmium, total copper, total iron, total mercury, total selenium, total silver and total vanadium. There were no exceedances of discharge limits in a review of weekly constituent concentrations measured from 2019 to 2022.

Operations of the mine are limited by conditions of Air Permit to Install 50-06D, which effectively limits the mining throughput to approximately 2,000 tonnes per day via a limit on the number of ore haul trucks entering and leaving the facility on a 12-month rolling average basis. The air permit also stipulates maximum particulate matter and nickel emissions being discharged to the environment from the mine ventilation system. Eagle maintains dust control activities underground by applying water or brine on underground roadways year-round.

20.3.2 Mill Site

The conditions of Eagle’s mine permit specify maximum limits of tailings deposition in the HTDF as well as the source of tailings placed therein being limited to ore from Eagle and Eagle East. As such, there is no regulatory trigger for Eagle to complete a permit amendment request to place tailings from the Keel Zone in the HTDF under allowances of the current mine permit. However, Eagle intends to submit technical information to the EGLE describing the expected changes in operations of the HTDF from milling ore from the Keel Zone as well as a brief review of the environmental impacts. The EGLE retains the authority to process this information as an insignificant permit amendment or as information for the agency's files.

Discharge of the Mine WTP effluent to the Middle Branch of the Escanaba River is currently regulated under the EGLE (2022), Authorization to Discharge under the National Pollutant Discharge Elimination System (NPDES) permit. This load-based permit defines concentrations which the Mill WTP can discharge as a function of the seasonal stream flow in the Middle Branch of the Escanaba River. As such, higher concentrations may be discharged during wetter months with higher stream flow, and lower concentrations are required during dryer months with lower stream flow.

Relative to earlier NPDES permits, the EGLE (2022) permit: (1) removed the requirement to monitor amenable cyanide and (2) decreased the required frequency of toxicity testing (from monthly to quarterly) on the fathead minnow from monthly to quarterly. The first change resulted from Eagle's documentation of laboratory interferences between sulfur species (e.g., hydrogen sulfide) and cyanide species which can result in false-positive values for amenable cyanide. The second change resulted from the absence of acute or chronic impacts on fathead minnow reported since the start of operations.

The EGLE (2022) permit specifics upper and lower limits for pH plus maximum monthly and maximum daily concentration limits for total suspended solids, total dissolved solids, total arsenic, total cadmium, total cobalt, total copper, total lead, total manganese, total mercury, total nickel, total phosphorous, total selenium, and total zinc. A minimum daily concentration is also provided for dissolved oxygen. Most constituents require monthly sampling, which are collected from a point inside the Mill WTP. A review of Mill WTP effluent chemistry collected from 2019 to 2022 found one isolated exceedance of the discharge permit: total manganese had a reported concentration of 1,600 µg/L on January 15, 2020, whereas the stated limit is 1,300 µg/L. Concentrations of all other constituents were below permitted discharge limits.

The permit also specifies monthly acute and chronic toxicity limits for *Ceriodaphnia dubia* (water flea) and quarterly acute and chronic toxicity limits for fathead minnow. Since September 2019, Eagle has not observed toxicity (acute or chronic) in any effluent samples for either the *Ceriodaphnia dubia* or the fathead minnow. This was largely due to Eagle's revised effluent water quality blending procedure which was informed by a Toxicity Identification Evaluation (TIE) performed between March and August of 2019.

Eagle is also required to sample the water quality of 24 compliance wells located across the Mill site on a quarterly basis.

Operations of the Mill are limited under conditions of an Air Permit to Install (Michigan PTI 405-08B). The permit limits the number of ore haul trucks entering and leaving the facility in a 12-month rolling average and specifies the maximum hourly throughput for the crushing system. This effectively limits particulate matter and Toxic Air Contaminants (TACs) discharging from permitted stacks on the property. The PTI also describes limitations on visible emissions in terms of opacity limits.

20.4 Social and Community Impacts

20.4.1 Indigenous Communities

The Keweenaw Bay Indian Community (KBIC) of the Lake Superior Band of Chippewa Indians is located approximately 65 miles north of Marquette, Michigan in the L'Anse/Baraga area, and has land on both sides of the Keweenaw Bay Peninsula in Baraga County. Their area includes the reservation as well as members in Ontonagon, Gogebic, Marquette, Houghton and Keweenaw Counties. The L'Anse Reservation is both the oldest and the largest reservation in Michigan. It was established under the treaty of 1854. KBIC was one of the four original member tribes in Michigan that founded the Inter-Tribal Council of Michigan, Inc. in 1966, and has remained a member since. Their constitution, by-laws and corporate charter were adopted on November 7, 1836, pursuant to the terms of the 1934 Indian Reorganization Act that established tribal governments.

KBIC recognizes Eagle Rock, a prominent topographic feature at the Mine Site and the location of the underground mine portal, as a sacred native place of worship. Since the start of operations, Eagle has worked with KBIC to provide periodic access to Eagle Rock for ceremonies and will preserve Eagle Rock during closure activities.

20.4.2 Local Communities and Groups

The Upper Peninsula of Michigan has a long history of both mining and ore shipment which drove initial settlement and commerce. Near the Mine and Mill Sites, most of historic activity has been associated with iron ore mining which extracted ore from the banded iron formation exposed in the Marquette Range.

The City of Marquette (population 20,629), the county seat for Marquette County, is located approximately 40 km southeast of the Mine Site and approximately 40 km due east of the Mill Site, and is the largest urban center closest to both operations. Marquette is located on the shore of Lake Superior, and is home to Northern Michigan University, a public liberal arts university with approximately 7,600 undergraduate and graduate students offering 170 academic programs and 25 graduate degrees.

The City of Marquette sits along the ore trucking route connecting the Mine Site and the Mill Site. Other municipalities along the trucking route include the town of Ishpeming (population 6,470), home of the U.S. National Ski Hall of Fame, and the town of Negaunee (population 4,568). Traffic and vehicle impacts along the ore trucking route constitute the most noticeable community impact associated with the Eagle Mine within Marquette County. Iron mining continues today within Marquette County at the Tilden Mine, located five miles south of Ishpeming, owned and operated by Cleveland Cliffs.

Between 2011-2025, Eagle Mine is estimated to generate an additional $4.3 billion for Michigan's economy, most of this going to Marquette County. Over the same period, it is estimated that Eagle will spend $570 million on local procurement and will generate $240 million in state/local taxes and royalties. Eagle employs approximately 400 people, 75% of whom are from the local community.

To build community trust and confidence, Eagle operates an information center in Marquette, and hosts spring and fall community forums to engage the local community. These forums provide a two-way dialogue with the community, provide updates on operations, and introduce attendees to members of the Eagle team.

Eagle Mine has made several social investments in the local community intended to generate a local economy outside of mining which will continue to be an economic driver after the end of operations. The Lundin Foundation, Eagle Mine, and Northern Initiatives have partnered to create a program to benefit area entrepreneurs, called the Eagle Emerging Entrepreneurs Fund. Launched in 2013, the fund provides loans and technical assistance to micro and small enterprises in Marquette County. The fund is managed by Northern Initiatives, who is responsible for assessing and approving loans. Eagle also contributes to Accelerate UP, a grassroots community project which offers free and confidential business coaching within Marquette County to promote entrepreneurial success. In addition, Eagle supports Marquette Alger Technical Middle College which enables students from Marquette and Alger counties to earn a high school diploma, a significant number of college credits, and a Technical Certificate from Northern Michigan University at no cost. The goal of the program is to increase technical skills in demand in Marquette County and create jobs for local people.

Eagle provides $300,000 per year to support the Community Environmental Monitoring Program (CEMP) which provides transparency on environmental impacts. The CEMP is composed of three local groups:

- KBIC (described above)
- The Superior Watershed Partnership (SWP), a local non-profit organization serving the Upper Peninsula (UP) of Michigan. The SWP completes a wide range of projects that benefit UP communities, enhance the UP environment, and help protect the three Great Lakes adjacent to the UP (Superior, Michigan and Huron). The SWP is focused on completing projects that provide documented, measurable results (e.g., cleaner water, more fish, less pollution, etc.). The SWP has a dedicated staff of biologists, planners and educators that provide creative, science-based solutions to address a variety of water quality, land use and community challenges.
- The Community Foundation of Marquette County (CFMC), a local non-profit that helps people invest in the future of Marquette County.

Through the CEMP, the SWP and KBIC monitor Eagle's environmental performance and report back to the community. The CFMC ensures that the program funding is managed correctly.

During the permitting process in 2012, local opposition groups to the Eagle Mine included the Yellow Dog Watershed Preserve (YDWP), National Wildlife Federation (NWF), KBIC, the Huron Mountain Club (HMC), and Save the Wild UP, now called the Mining Action Group, a volunteer, grassroots effort to defend the clean water and wild places of the UP from risk associated with sulfide mining. Since the start of operations, public opposition to mining activities and amendments to mine permits has steadily declined. This is assumed to be a product of: (1) Eagle's record for environmental performance; and (2) community outreach activities and social investment programs.

20.5 Governance

Eagle's parent company, LMC, Canada, is committed to a high standard of governance. Their website provides a Responsible Mining Policy which states 17 principles including: Principle 4, a commitment to promote environmental stewardship throughout the mining life cycle, and Principle 8, a commitment to the safe and responsible management of tailings facilities through adoption and implementation of the GISTM.

In pursuit of Principle 8, LMC hosts an annual Independent Tailings Review Board (ITRB) meeting at the Mill Site to focus on tailings storage in the HTDF. Because the HTDF stores tailings below grade and the down stream end of the facility is not considered to be a dam by state regulators, the risk of a tailings dam failure similar to Mount Polley in British Columbia, Canada, Samarco in Brazil, or Feijão in Brazil is non-existent. As such, in addition to due diligence on tailings issues, the ITRB devotes considerable time to evaluating the environmental performance of the HTDF with respect to HTDF water quality, groundwater, and closure. The ITRB recognizes the importance of the Mill WTP in maintaining the water level during operations. The current board is composed of one geotechnical engineer, one hydrogeologist, and one geochemist. This composition reflects the importance of environmental stewardship (Principle 4) in the achievement of corporate objectives.

20.6 Mine Closure

20.6.1 Mine Site

Eagle's stated closure objective for the Mine Site is to reclaim the site to its natural state to produce a greenfield property after closure. To achieve this objective, all development rock plus clean fill from buildings, liners and other surface infrastructure, will be placed in the underground mine as part of the site reclamation process. The surface footprint will then be restored to the pre-mining landscape using native vegetation to promote and enhance wildlife habitat. The final land use will be compatible with existing uses on adjacent properties. Post closure management and monitoring will be conducted for 20 years after the completion of surface reclamation.

Eagle is in the process of evaluating locations for the installation of engineered bulkheads/plugs in the underground mine that will be constructed during closure. At a minimum, these will be located at the mine portal, the base of 265 exhaust raise, and the base of the air intake raise. The underground workings will be progressively flooded during operations and closure.

To achieve closure criteria from a water quality perspective, Eagle must demonstrate that the water quality of the Quaternary glacial aquifer has not degraded below drinking water quality guidelines as a product of the upward migration of water from the Eagle flooded mine workings. In 2021, a Closure Study (exclusive of the Keel zone) investigated the impact of flooding the underground mine on regional groundwater flow and water quality in the flooded mine workings (Golder 2021a; 2021b). This study found:

- The post-closure, vertical hydrological gradient is likely to be downward. As such, water from the flooded Eagle workings is not expected to discharge to the Quaternary glacial aquifer, and the drinking water quality in the Quaternary glacial aquifer is not expected to be impacted.
- Water from the flooded mine workings is expected to slowly migrate to the north through the upper bedrock, hydrogeological unit. This water will ultimately discharge to the Salmon Trout River hundreds of years in the future.
- Due to the low mass load from the Eagle mine workings plus considerable dilution and dispersion occurring along the flow path, the discharge of water to the Salmon Trout River will have little to no impact on the drinking water quality and aquatic health of the Salmon Trout River.
- As such, additional treatment of the flooded mine may not be necessary to achieve permit conditions.
- Additional bulkheads within the Eagle Mine workings may not provide significant improvements to post-mining water quality.

Eagle is currently expanding the Closure study (groundwater inflow, water balance, and water quality) to include the Keel mine workings. Modeling results are expected in early 2023.

20.6.2 Mill Site

Eagle is exploring two potential closure options for the Mill Site:

- Option 1: Sell the Mill property to a mining company or other industry that wishes to use the existing Mill, HTDF and Mill WTP for ore processing and disposal of tailings or other wastes. Achieving this objective requires a prospective buyer plus available room within the HTDF for the storage of additional tailings or other wastes.

- Options 2: Close the facility after the end of Eagle operation. This would involve: (1) the removal or demolition of existing infrastructure; (2) treatment of at least the Surface Layer of the HTDF until water could freely discharge from the Mill Site without treatment; and (3) construction of a permanent spillway at an elevation of 1536 ft amsl which would allow untreated water from the HTDF to flow by gravity into wetlands contiguous to the Middle Branch of the Escanaba River. During closure activities, the Mill WTP would operate until the water quality criteria are achieved prior to being decommissioned. The existing perimeter fence would be maintained for mine safety purposes.

Eagle is thoroughly investigating and preparing to execute Option 2 in fulfillment of the conditions specified under the existing mine permit. However, given recent regional exploration for mineral resources within or near the Upper Peninsula, Option 1 cannot be ruled out at this time. Hence, the exact closure plan for the Mill Site remains under development.

The closure plans are further complicated by the competing desires to both: (1) store as much tailings as possible and (2) minimize the time and cost of water treatment during closure when the site is no longer producing revenue. The water quality of the Surface Layer is expected to deteriorate once the tailings slurry is deposited in this layer, leading to longer treatment times and costs. Other variables include the start date of the ZLD system. Changes to the price of copper and nickel may affect the mine plan and the tailings deposition plan. Often this fundamental condition changes in a shorter period of time than the time required to update environmental models. Nevertheless, all predictions to date suggest that HTDF water will be treatable. Ultimately, a cost-benefit analysis may be needed to compare the value of an additional unit volume of ore production relative to the cost of disposing the resulting volume of slurry.

To achieve closure criteria under Option 2, Eagle must demonstrate that the surface water quality in the HTDF will comply with water quality discharge limits specified in the NPDES (2022) permit. Importantly, the permit has a lower concentration limit for total dissolved solids of 500 mg/L for discharged to the wetland system relative to the limit for discharge to the Escanaba River (2,200 mg/L).

As such, the operational strategy for water treatment at the Mill Site has focused on minimizing the concentration of TDS stored in the Surface Layer of the HTDF at the end of operations in order to minimize the time and expense required to treat water during closure. Conceptually, this approach has involved: (i) minimizing the load of TDS to the Surface Layer during operations, (ii) maintaining the thickness of the Surface Layer by focusing water treatment on the Deep Layer, and (iii) removing and treating all of the Brine Layer and most of the Pycnocline using a ZLD system prior to the end of operations in 2027.

In addition to halting the injection of tailings slurry to the HTDF, Eagle is evaluating several potential mechanisms to shorten the time required to improve water quality during closure:

- Reclamation or restoration of the Mill Site and/or demolition of the Mill is expected to improve the quality of stormwater and runoff by removing sources of nickel.
- Eagle is considering lowering the water surface elevation to approximately 1525 ft amsl which will increase the inflow of fresh groundwater into the HTDF.
- Eagle is considering returning a portion of treated water back into the HTDF to promote dilution. This will allow the Mill WTP to run at full capacity during reclamation without lowering the surface elevation.

- Eagle is considering pumping fresh groundwater from the onsite well into the HTDF during reclamation o promote dilution and restore hardness.

In 2022, Eagle expanded the operational transient limnology and water quality prediction of the HTDF to estimate the duration of the closure period. The model predicted the water quality of the Surface Layer could achieve closure criteria by mid-2030, or 2.5 years after the end of operations. The model was then extended for an addition 23 years until 2053 and did not show a resurgence of constituents of interest over this period.

The transient limnology model spans the operational and closure periods and is currently under review by Eagle. Future revisions will likely include: an updated bathymetry resulting from the updated tailings deposition plan; updated slurry addition rates which reflect mining of the Keel; and a sensitivity analysis of the treatment time and costs associated with the various closure mechanisms listed above. Eagle currently plans to project a future, 100-year HTDF water balance using a local climate-change prediction and to integrate the results into the groundwater and limnology/water quality predictions.

Once the water quality of the HTDF at the end of closure is predicted with reasonable confidence, the groundwater fate and transport model will be updated to predict the long-term downgradient water quality in the aquifer between the northern boundary of the Mill Site and the Middle Branch of the Escanaba River. This model will include the effects of the cut-off wall on groundwater discharge flow rates.

21.0 CAPITAL AND OPERATING COSTS

All capital and operating costs are expressed in United States dollars ($).

21.1 Capital

Currently there are no expansion plans requiring project capital expenditures in the LOM Plan.

21.1.1 Sustaining Capital

The Eagle Mine is in operation. It requires sustaining capital of $52.2 million for continuing underground mine development, mill, and other expenditures.

Table 21.1 summarizes the capital expenditures planned for the balance of the mine life. The QP has reviewed the planned annual expenditures and agrees with their reasonableness. The short remaining LOM does not necessitate significant new equipment purchases. Sustaining capital categories, Mine Other, Mill, and Other are complete by 2025 and show no expenditures in the final two years of the LOM.

Underground development cost is directly correlated with development meters with unit rates for lateral and vertical development applied to the number of meters of mine development required in each year. Mine development is scheduled to be substantially complete by 2025, with only 777 m of development in 2026 – 2027.

Table 21.1: LOM Sustaining Capital, $M

Item	Unit	2023	2024	2025	2026	2027	Total
Mine Development Meters							
Vertical							
Raisebore Ventilation	m	84	94	108	39		325
Raisebore with Escapeway	m	88	89	147			325
Total Vertical	**m**	**172**	**183**	**255**	**39**		**650**
Lateral							
Eagle	m	6	233	82	0	33	354
Eagle East	m	805	495	436	113	15	1,864
Keel	m	1,145	1,589	949	543	35	4,260
Total Lateral	**m**	**1,956**	**2,317**	**1,467**	**656**	**83**	**6,478**
Waste Tonnes	t	224,723	325,202	295,578	215,448	71,110	1,132,060
Expenditures, $M							
Underground Development	$M	12.1	11.3	8.3	3.1	0.3	35.1
Mine Other	$M	6.0	5.4	0.7			12.1
Mill	$M	1.8	0.1	0.4			2.3
Other	$M	2.1	0.2	0.4			2.7
Total Sustaining Capital, $M	**$M**	**22.0**	**17.1**	**9.8**	**3.1**	**0.3**	**52.2**

Note: Columns and rows may not sum precisely due to rounding.

21.1.2 Mine Closure

In addition to the Sustaining Capital, the mine plan includes $79.8 million in expenditures for closure activities, to be initiated in the remaining five years of operation and continuing in the two ensuing post-closure years of asset retirement obligation expenditures, followed by ongoing site monitoring.

Table 21.2 summarizes the closure expenditures planned for the balance of the mine life and beyond, with $35.6 million of closure expenditures during the LOM shown within the box border. The QP has reviewed the planned annual expenditures and agrees with their reasonableness.

Table 21.2: LOM Closure Costs, $M

Closure Line Items	Totals $M	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Ongoing
Employee Severance	12.0	0.0	0.0	2.0	8.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asset Retirement Obligations (ARO)	63.3	0	0	1.4	1.5	16.2	20.8	6.7	1.3	1.3	1.3	1.3	11.6
Crystallizer	4.5	0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	**79.8**	**0**	**4.5**	**3.4**	**9.5**	**18.2**	**20.8**	**6.7**	**1.3**	**1.3**	**1.3**	**1.3**	**11.6**

21.2 Operating Costs

Site operating cost estimates were developed based on recent actual costs with specific adjustments for business improvement initiatives underway. They were prepared on an annual basis using a detailed build-up of individual cost centres and considering specific mine site activity levels and cost drivers. The estimates consider current and expected labour headcount and salaries, major consumables and unit prices, power costs based on the recently established renewables contract, and equipment and maintenance costs. The total operating cost estimate includes all site costs related to mining, processing, and general and administrative activities, as well as regional office costs. The total operating cost excludes costs beyond the mill such as concentrate transportation costs, smelter and refining charges, royalties, and severance taxes.

Processing costs include expected direct costs for ore processing including crushing and conveying, grinding, flotation, tailings thickening and deposition, nickel concentrate preparation, and copper concentrate preparation prior to shipping. General and administrative costs relate to costs associated with indirect support of the operation including G&A personnel and functions, administrative facilities, site services and other support costs.

Operating expenses at Eagle have been reviewed by the QP and found to be reasonable for a mechanized mine utilizing the longhole and drift-and-fill mining methods. The plant has demonstrated typical operating costs for a facility of its size. The following tables summarize operating costs, segmenting by major cost centres - the Mine, the Processing Plant, and General and Administrative.

The LOM ore tonnes are based upon depletion using second half 2022 projections. Carryovers due to adverse production variances during that period then result in the mineral reserve estimate providing more dilute mineable tonnes than the 3.3 million tonnes shown in the LOM and the cash flow model.

Table 21.3 summarizes the total expected operating expense to mine and process the 3.3 million tonnes of ore defined by the Mineral Reserves statement and scheduled in the LOM plan informing the cash flow model.

Table 21.3: Projected Operating Costs

Cost Center	LOM Cost, $M Total	Unit Cost, $/t Average
Mining	307.0	92.16
Ore Transport to Mill	40.2	12.07
Plant	118.3	35.50
G&A	88.2	26.47
Total Operating Costs	**553.7**	**166.19**

Table 21.4 shows the operating costs by year as compared to the production plan by mining area.

Table 21.4: Projected Operating Costs by Year

Item		2023	2024	2025	2026	2027	Totals
Annual Ore Tonnes by Mining Area							
Eagle	t	58,128	103,598	358,516	51,465	32,836	604,543
Eagle East	t	695,362	611,845	201,846	382,477	37,467	1,928,998
Keel	t	2,026	39,609	194,752	320,986	240,603	797,977
Total Ore Tonnes*	**t**	**755,517**	**755,052**	**755,114**	**754,928**	**310,907**	**3,331,518**
Cost Centre							
Mining	$M	69.0	70.4	69.3	69.7	28.6	307.0
Ore Transport to Mill	$M	9.1	9.1	9.1	9.1	3.8	40.2
Plant	$M	26.8	26.8	26.8	26.8	11.1	118.3
G&A	$M	20.0	20.0	20.0	20.0	8.3	88.2
Total Operating Costs	**$M**	**124.8**	**126.3**	**125.1**	**125.5**	**51.9**	**553.7**
Unit Operating Cost	**$/t**	**165.2**	**167.3**	**165.7**	**166.3**	**166.8**	**166.2**

*Note: Ore tonnes are less than Mineral Reserve tonnes as a result of carryovers from production variances experienced in the second half of 2022 positively impacting the reserves determination.

21.2.1 Mine

Mine operating costs include direct costs of the mining process. They do not include capitalized mine development costs, which are presented in Section 21.1.1. Mine operating costs were developed individually by work type and activity based upon applying unit costs and work measures for estimation of the costs of activities and consumables such as ground support, subcontractor labour and other, maintenance, Owner's labour, explosives, drill bits, power, diesel, propane, backfill, water treatment, and Other Costs for each of the excavations defined in the Mine Plan. For estimation purposes, costs are built up for primary stopes, secondary stopes, 5 m production sills, 6 m production sills, 10 m production sills, slashes, and drift-and-fill mining methods. The resulting activity cost estimates then provide a total cost for the production tonnages extracted for each year.

Operating costs of the underground mine are estimated to be $307.0 million over the LOM or average $92.16/t of processed material, itemized in Table 21.5.

Table 21.5: Mine Operating Cost Projection

Activity Related	LOM Cost, $M Total	Unit Cost, $/t Average
Drill Bits	4.7	1.40
Ground Support	6.7	2.00
Explosives	6.7	2.02
Subcontractor Labour	108.1	32.45
Subcontractor Other	12.4	3.73
Maintenance	29.4	8.81
Power	14.2	4.25
Diesel & Propane	33.3	10.00
Backfill	42.8	12.85
Mine WTP Costs	4.3	1.30
Labour (owner)	27.5	8.25
Other Costs	17.0	5.10
Total Mine Opex	**307.0**	**92.16**

21.2.2 Processing Plant

The annual and unit processing costs for the Humboldt Mill are part of the general operating costs. The mill operating costs are based on the production results at Humboldt operations and are in line with mill operating costs in the industry for similar projects. The processing of Keel mineralized material is not expected to deviate from established operating costs.

Operating costs of the processing plant are estimated to be $118.3 million over the LOM, an average of $35.50/t, with major cost elements provided on Table 21.6.

Table 21.6: Processing Plant Operating Cost Projection

Cost Center	LOM Cost ($M)	Unit Cost ($/t)
Reagents / Grinding / Chemicals	14.4	4.33
Maintenance	19.0	5.69
Power	11.2	3.37
Contract Services	16.2	4.87
Salaries	56.6	16.98
Admin	0.9	0.27
Total Mill Opex	**118.3**	**35.50**

21.2.3 General and Administrative, Ore Transportation

Current G&A costs along with current Ore Transportation costs have been carried forward for the LOM based on annualized costs for the G&A and unit costs per tonne of ore produced for the transportation. G&A amounts to a yearly cost of $20.0 million. The final year of the LOM is a partial year of five months duration resulting in a cost of $8.3 million. G&A over the LOM totals $88.2 million, equating to an average over the LOM of $26.47/t processed.

Ore transportation from the mine to the mill is $12.07/t over the LOM providing a total operating expense estimate of $40.2 million for the remaining LOM.

21.2.4 Level of Accuracy of the Estimates

Sustaining capital cost estimates have been developed from mine experience with underground mine development over the past number of years. The unit cost of all lateral development varies dependent upon the size of the headings being excavated and is, on average, $4,716/m over the LOM, which is above the historical $4,036/m realized in the previous two years of operation. Only capital development activities for the Keel area continue over the final two years of the mine life. During that period, equipment and facilities are not expected to be replaced or rebuilt. The equipment and facilities put in place for the mining of the Eagle and Eagle East areas of the mine will be used for the mining of the Keel area, prioritizing on low-cost equipment units.

Operating costs of the mine are sensitive to numerous factors, primarily mining method, backfill type, ventilation, mine dewatering and labour costs in addition to fluctuations in the cost of consumables, not least of which are diesel fuel, electrical power, ground support implements, and explosives and accessories. Future mine costs have been based on actual costs realized to date, with some consideration for business improvement initiatives underway, and established supply contracts.

Processing plant costs consist primarily of electrical power, labour, grinding media (including crusher and grinding mill wear components), reagents, chemicals, and maintenance. The estimated cost for grinding media (including crusher and grinding mill wear components), reagents, chemicals, and maintenance are based upon the tonnes milled while the other costs are annualized fixed costs carried forward on a yearly basis with only the final year reduced due to a 5-month duration of mill operation that year. The operation is in a steady state and, as shown in Section 21.2.2, future cost estimates are considered reasonable and expected by the QP.

General and Administrative costs are based on historical costs projected to the end of the mine life, with consideration for site activity levels and with no real variation predicted in overall headcount over the remaining LOM that would impact the G&A requirements.

Some items show little if any variability while others can be seen to vary over the LOM. There is no real variation predicted in overall headcount over the remaining LOM with the development miners transitioning into production activities as the development activities lessen towards the later stages of the LOM. With this transition there is also a downward trend in equipment operating hours and associated equipment maintenance costs. As such, business improvement initiatives are evident for mobile equipment maintenance, backfill and mine water treatment. For mobile maintenance, costs are linked to equipment operating hours, so when the equipment hours are reduced with completion of development activities, there will be a corresponding reduction in mobile maintenance costs. For backfill, the peak consumption of sand and cement is aligned with an Eagle production peak mid-LOM as a result of mining in proximity to the crown pillar. Costs then subside in tandem with reduced Eagle Zone ore production. The mine water treatment plant costs are linked to the Eagle East ore production and reduce mid-LOM in alignment with a similar reduction in Eagle East ore production. There is no assumed inflation and price escalation consideration applied.

Opportunity exists to further delineate these business improvement initiatives. While maintenance costs are linked to equipment operating hours, diesel fuel costs are linked to the ore production by mining area. The Keel Zone diesel consumption factor is based on ore tonnage from that zone, which matches that of the Eagle Zone. The Eagle East Zone is allocated twice the diesel consumption factor owing to its deeper depth and longer uphill hauls. While these factors come from experience, it is suggested that linking diesel cost to the equipment hours could provide a better measure of accuracy.

Mine power cost of $3.2 million per year is fixed and allocated evenly by month based upon months of operation. In a similar manner, the mill power cost is based upon months of operation. An estimation of electricity consumption against fixed equipment, including ventilation fans, pumps, and crushing, would allow power costs to fluctuate with the reduction in development equipment, reduction in mine water treatment and increased milling of the non-SMSU Keel material.

22.0 ECONOMIC ANALYSIS

LMC have opted to exclude reporting this section as producing issuers may exclude the information required under Economic Analysis (Item 22 of Form 43-101F1) for technical reports on properties currently in production unless the technical report includes a material expansion of current production.

23.0 ADJACENT PROPERTIES

There are no adjacent properties to the Eagle Mine.

24.0 OTHER RELEVANT DATA AND INFORMATION

To the knowledge of the QPs, there is no additional information or explanation necessary to make this Technical Report understandable and not misleading.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 Property and Title

The QP is not aware of any significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the property or its constituent Eagle, Eagle East and Keel zones.

25.2 Mineral Resources

The QP notes that the procedures for drilling, sampling, sample preparation, and analyses are appropriate for the type of mineralization and estimation of Mineral Resources.

Combined Measured and Indicated Mineral Resources total 3.86 Mt at 1.88% nickel and 1.44% copper. Inferred Mineral Resources total 26 kt at 0.95% Ni and 0.87% Cu.

The classification of Mineral Resources conforms to CIM Definition Standards and Mineral Resources are reported in accordance with NI 43-101.

The Mineral Resources were estimated as of December 31, 2022, constrained within conceptual geological wireframes and are reported inclusive of Mineral Reserves. The estimates take into consideration metallurgical recoveries, concentration grades, transportation costs, smelter treatment charges and forecasted metal prices in determining economic viability.

The Mineral Resources have been estimated in conformity with CIM Estimation of Mineral Resource and Mineral Reserve Best Practices Guidelines (2019) and are reported in accordance with NI 43-101.

Risks associated with the Mineral Resource estimate are:

- Minor risks associated with modeled contacts, and continuity of mineralization in the Eagle and Eagle East deposits. The Keel deposit has not been mined to date and mineral thickness and continuity may vary on the drill hole interpreted mineral wireframes (either positively or negatively).
- The mining of the Keel deposit is projected to commence in late 2023 - early 2024 and peak in 2026. Given the current inflationary period, assumed costs may be under-estimated.

25.3 Mineral Reserves and Mining

The Eagle Mine is an underground mine that has been in continuous operation since commercial production was achieved in 2014. The mine produces approximately 2,000 tpd of high-grade nickel-copper ore.

The mine presently has two active zones called Eagle and Eagle East. A new zone called Keel will be developed starting in 2023 and will contribute to the mine's production until its closure in 2027. Some sustaining capital expenditures are anticipated for equipment replacement and development of the Keel Zone.

According to the LOM plan, the Mineral Reserves will be exhausted in 2027, when mine closure is anticipated.

Eagle and Eagle East have low geological and operating risks as they are established mining zones with years of operating history. Keel, on the other hand, is a new, undeveloped zone and consequently has a higher degree of risk related to geology and operations than the zones currently in production.

Eagle Mine has and continues to manage ground control effectively through accumulated geotechnical information, monitoring and programs applied to collecting and analyzing geotechnical data. Eagle Mine maintains a good record of geotechnical issues through a ground control logbook and performs thorough investigations of falls of ground.

The mine has begun experiencing high stress indications and issues in Eagle East and observations of signs of rock stress and damage have been documented. A micro seismic system was installed in August 2022. The mine has performed sufficient geotechnical testing and numerical analyses to be confident in the current stoping and drifting sequences and design.

The QP is of the opinion that the Mineral Reserve estimate is consistent with the standards established by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM 2014).

The QP is of the opinion that the NSR cut-off estimates should be based on the most current cost information. Future discussion on cut-off values should involve the Eagle Mine financial analyst if the projected costs deviate significantly from historical data.

The QP is of the opinion that the underground infrastructure, mine services, and fixed equipment are appropriate for the scale of the underground operation. During the site visit, the QP observed that these installations were of high quality, in working order and functioning normally. Eagle Mine has most of the infrastructure to support operations to the end of the mine life.

Eagle Mine uses three mining methods, LSLOS, TSLOS and D&F. Currently, the mine uses transverse SLOS at the Eagle Zone and D&F at Eagle East. In addition, the mine plans on using D&F and SLOS for mining the Keel Zone.

The QP is of the opinion that Eagle Mine is using appropriate mining methods for the zones and mining conditions where they are applied and agrees that D&F and SLOS are suitable methods for mining the Keel Zone. During his visit to the site, the QP had the opportunity to visit active TSLOS and D&F stopes and review plans for mining parts of Eagle East with LSLOS.

The QP is of opinion that the number of equipment units in the fleet and the types, makes, and models are appropriate for the mining methods and development requirements at the Eagle Mine. The QP reviewed the underground equipment fleet and observed many of the machines in operation.

The QP reviewed the personnel organization and is of the opinion that it is appropriate for the scale of an underground mining operation, such as the Eagle Mine.

Eagle Mine effectively manages ground control through accumulated geotechnical information, monitoring, and different programs for collecting and analyzing geotechnical data.

The Ground Control Management Plan and Crown Pillar Management Plan are effective tools utilized by Eagle and should be continued throughout the LOM.

Eagle Mine maintains a good record of geotechnical issues through a ground control logbook and performs thorough investigations of falls of ground. In the past, Eagle has regularly pursued independent audits of ground control practices and should continue these practices.

The mine has begun experiencing high-stress indications and issues in Eagle East, and observations of signs of rock stress/ and damage have been documented. As a result, the mine installed a microseismic system in August 2022.The mine has performed sufficient geotechnical testing and numerical analyses to be confident in the current stoping and drifting sequences and design.

The following risks may impact the Mineral Reserve:

- The Mineral Reserve estimate has a degree of risk corresponding with its high proportion of Probable versus Proven Mineral Reserves.
- Operating costs represent a significant risk to the Mineral Reserve in this period of inflation and price instability as costs directly impact the NSR cut-off.
- Metal price and currency exchange fluctuations represent a significant risk to Mineral Reserves that are beyond the control of LMC and Eagle Mine LLC.
- Eagle and Eagle East have relatively low geological, geotechnical, and operating risks as they are established mining zones with years of operating history.
- Keel is a new, undeveloped zone and consequently has a higher degree of risk related to geology, geotechnical conditions, and operations than the zones currently in production.
- Relative to the other zones, Keel has a higher degree of risk associated with geotechnical conditions as no geotechnical drilling has been conducted on the deposit, there is limited mining experience in the Feldspathic Peridotite, and core photography and logging data have identified poor-quality rock at the intrusive/sediment contact.
- Keel has a higher degree of geological risk than the other zones because knowledge about it is based on diamond drilling alone, as mining experience is yet to be acquired within the deposit.
- Any geotechnical or hydrogeological occurrences in the crown pillar that depart from the permitting specifications could interrupt production in the Eagle Zone.
- Metal prices and currency exchange fluctuations identified as risks could act to benefit the Mineral Reserve.
- The Eagle Mine has 699 kt of Indicated Mineral Resources that could potentially be converted to Mineral Reserves in the future.
- The underground drilling program underway in the Gabbro intrusive system could identify new sulphide deposits that could contribute to the Mineral Resources and Mineral Reserves.

25.4 Mineral Processing

The Humboldt Mill as it is currently configured will be able to process the ore as described in this Technical Report. The processing facility operates at or near metallurgical budget. The remaining Mineral Reserves are similar to the material already processed, with the exception of Eagle Keel, which is lower grade material. The processing facility will have no issues treating this incoming material as it maintains a consistent grade/performance relationship with other Eagle ore.

25.5 Tailings Management

A well-established tailings deposition methodology exists at the HTDF. An effective surveillance program is in place to inspect and monitor the operation, structural integrity, safety, and environmental performance of the facility.

The tailings deposition plan shows that sufficient capacity exists in the HTDF to dispose of tailings produced at the Humboldt Mill through the LOM with limited or no tailings deposited above an elevation of 452.6 meters (1,485 feet) amsl, which is desirable for preservation of near-surface water quality. About 1.9 million cubic meters (2.5 million cubic yards) of capacity is available up to an elevation of 452.6 meters (1485 feet) amsl as of December 31, 2022, to accommodate an estimated in-place tailings volume of 1.3 million cubic meters (1.7 million cubic yards) from that date through the remaining LOM. In addition, approximately 1.8 million cubic meters (2.4 million cubic yards) of capacity exists above an elevation of 452.6 m (1,485 feet) amsl up to the maximum permitted tailings elevation of 461.8 m (1,515 feet) amsl.

25.6 Infrastructure and Services

The established infrastructure and services to support the Eagle Mine and the Humboldt Mill are adequate for the continuation of operations until mine closure.

25.7 Environmental and Social

The Eagle Mine Site and Mill Site are well managed from an ESG perspective. Since the start of operations, few exceedances of discharge permit requirements have been observed at either site. Closure modeling is in progress for both sites and a clear plan is in place for the closure of the Mine Site. A general plan is in place for the closure of the Mill Site. Existing environmental models are routinely updated as tailings production estimates are increased, and additional tailings slurry is added to the HTDF. Although the exact duration of treatment time increases or decreases slightly as a function of changes to the mine plan, all models to date indicate that the Mill Site can achieve closure criteria with several years of the end of operations.

25.8 Cost Estimates

Quantities and cost estimates are of a high level of confidence. Operating quantities are well defined and understood, as are mining and processing productivities. Unit cost estimates are based on supply contracts and operating history. Little risk of operating cost variances is anticipated, aside from periodic spikes in the unit prices of certain commodities and supplies. The QP considers the forward-looking estimates to be of sound basis and reasonable for continued operations of the mine and mill.

26.0 RECOMMENDATIONS

26.1 Mineral Resources Estimates and Opportunities

Eagle Mine has been a producing mine since 2014 and has either mitigated or placed controls on many of the identified geological risks during that period. The risks associated with this estimate are considered by the QP to be minor. Recommendations provided herein may, for the most part, be addressed by operating staff and budgets given the operational status of Eagle. The following recommendations are expected to be considered by operations management and, as such, have not been costed out individually:

- The Eagle East Mineral Resource classification is conservative. Multiple cut and fill levels of the deposit have been mined, providing detailed information on continuity, contacts, and recovery. Coupled with a drill density approaching $10m^2$, a majority of the deposit could reasonably be considered to be of the Measured classification.
- The mining of the Keel zone is projected to commence in late 2023 to early 2024, and peak in 2026. Given the current inflationary period, assumed costs factored into cut-off values should be re-evaluated in the next year.
- The peridotite is pervasively mineralized and at the current metal prices and mining methods, only certain areas are economic. There may exist opportunities either via bulk mining or via an increase in nickel price whereby more of the mineralized peridotite becomes economic. A study of the opportunities and cascading mine/mill effects should be kept current so that the Mine can react appropriately in a rapid manner.

26.2 Mineral Reserves and Mining

QP recommendations related to mining and Mineral Reserves are:

- The Ground Control Management Plan and Crown Pillar Management Plan are effective tools utilized by Eagle and should be continued throughout the LOM. These plans should be periodically reviewed and approved by Eagle Mine management.
- Continuation of independent audits on a regular basis of ground control practices.
- It is recommended that ground support practices and mining sequences in Eagle East are regularly reviewed and changes necessary to mitigate stress issues/damage are implemented by the mine.
- For future Mineral Reserve estimates, include planned dilution for all zones and mining methods and the over-excavation of rock in the unplanned dilution parameters.
- For future Mineral Reserve estimates, base the NSR cut-off values on most current cost information. The cut-off discussion should involve the LMC financial analyst if the current or projected costs deviate significantly from historical data.
- For future Mineral Reserve estimates, include the Sustaining Capital costs referred to as Mine Other, Mill, and Other in the calculation of NSR cut-off values. However, the QP notes that these cost items represent only about 3% of the NSR cut-offs; consequently, their omission does not materially affect the current Mineral Reserve estimate.

- Base future Mineral Reserve estimates on full-cost, marginal, and incremental NSR cut-off values rather than a single cut-off for each zone to more effectively analyze how marginally economic material (i.e., valued below full-cost cut-off) can contribute positively to cash flows and be included in the Mineral Reserve.
- The Ground Control Management Plan and Crown Pillar Management Plan should be periodically reviewed and approved by Eagle Mine management.
- Annually or at least every second year, conduct independent audits of ground control practices and records by an external consulting firm to address the occurrence of high-stress indications and issues.
- Review ground support practices and mining sequences in Eagle East regularly and implement changes to mitigate stress issues and damage as necessary.
- Consider positioning the Keel Zone ramp and sublevel development in the footwall rather than at the end of the deposit. Accessing from the footwall would enable mining the orebody in two directions instead of one, contributing to higher productivity.
- Consider standardizing the ground support procedure by converting all rockbolt jumbos for installing pumpable resin-grouted rebar bolts.

26.3 Mineral Processing

The QP makes the following recommendation for processing improvement:

- Due to limited metallurgical testwork on Keel mineralized material, it is recommended that the Humboldt Mill conduct a two-day run of Keel mineralized material a few months before it will become the predominant feedstock. Analysis of the results of the live test would then be used to prepare the mill for unexpected features that could be mitigated by adjustment in the operating routines.

26.4 Tailings Management

HTDF inputs and outputs (i.e., water and tailings) must continue to be carefully managed and monitored to help preserve the quality of the near-surface water and limit the potential for impacts to groundwater around the HTDF. Continual ability of the WTP to treat water from the HTDF and achieve discharge requirements throughout the LOM is important for maintaining a suitable water balance.

26.5 Environmental and Social

Recommendations for additional work related to the environment include:

- Predict the filling rate and water quality in the underground mine as a function of the addition of the Keel (in progress).
- Predict the water quality and treatment time of the HTDF as a function of the latest tailing deposition plan inclusive of the Keel (in progress).

The authors make no social recommendations at this time.

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