NI 43-101 Technical Report

Mineral Resources and Mineral Reserves for the Bloom Lake Mine

Fermont, Québec, Canada

Prepared for:

Quebec Iron Ore Inc. on behalf of Champion Iron Limited

Effective Date: April 1, 2023

Signature Date: September 28, 2023

Prepared by the following Qualified Persons:

- André Allaire, P.Eng., PhD. .... BBA Inc.
- Benoit Ouellet, P.Eng. .... BBA Inc.
- Vincent Blanchet, P.Eng. .... Quebec Iron Ore
- Olivier Hamel, P.Eng. .... Quebec Iron Ore
- Erik Ronald, P.Geo. .... SRK Consulting (U.S.), Inc.
- Jérôme Martin, P.Eng. .... Soutex

BBA srk consulting SOUTEX

Date and Signature Page

This Technical Report is effective as of the 1st day of April 2023.

Original signed and sealed on file	September 28, 2023
André Allaire, P. Eng., PhD. BBA Inc.	Date
Original signed and sealed on file	September 28, 2023
Benoit Ouellet, P.Eng. BBA Inc.	Date
Original signed and sealed on file	September 28, 2023
Vincent Blanchet, P.Eng Quebec Iron Ore	Date
Original signed and sealed on file	September 28, 2023
Olivier Hamel, P.Eng. Quebec Iron Ore	Date

Original signed and sealed on file	September 28, 2023
Erik C. Ronald, P.Geo. SRK Consulting (U.S.). Inc.	Date

Original signed and sealed on file	September 28, 2023
Jérôme Martin, P.Eng. Soutex	Date

2020 Robert-Bourassa Blvd.
Suite 300
Montréal, QC H3A 2A5
T +1 514.866.2111
F +1 514.866.2116

BBA.CA

CERTIFICATE OF QUALIFIED PERSON

André Allaire, P.Eng., PhD.

This certificate applies to the NI 43-101 Technical Report titled "Mineral Resources and Mineral Reserves for the Bloom Lake Mine, Fermont, Québec, Canada" (the "Technical Report"), prepared for Quebec Iron Ore, dated September 28, 2023, with an effective date of April 1, 2023.

I, André Allaire, P.Eng., PhD., as a co-author of the Technical Report, do hereby certify that:

1. I am currently employed as a Senior Process Engineer in the consulting firm BBA Inc. located at 2020 Robert-Bourassa Blvd., Suite 300, Montréal, Québec, Canada, H3A 2A5.
2. I graduated from McGill University of Montreal with a B.Eng. in Metallurgy in 1982, an M. Eng. In 1986 and a Ph.D. in 1991. I have practiced my profession continuously since my graduation.
3. I am a member in good standing of the Order of Engineers of Québec (# 38480) and of the Canadian Institute of Mining Metallurgy and Petroleum.
4. I have practiced my profession continuously since my graduation in 1999. My relevant experience includes open pit mining operations and many NI 43-101 studies.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for the preparation of Chapters 2, 3, 4, 5, 18, 19, and relevant sections of Chapters 1, 25, 26 and 27.
8. I have visited the Bloom Lake property that is the subject of the Technical Report on June 20, 2022.
9. I have had prior involvement with the property that is the subject of the Technical Report as I participated in the Bloom Lake Mine Feasibility Study Phase 2 dated August 2, 2019.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and guidelines.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 28th day of September 2023.

Original signed and sealed on file

André Allaire, P.Eng., PhD.

900 de l'Église Rd.
Suite 590
Québec, QC G1V 3V5
T +1 418.657.2110
F +1 450.464.0901

BBA.CA

CERTIFICATE OF QUALIFIED PERSON

Benoit Ouellet, P.Eng.

This certificate applies to the NI 43-101 Technical Report titled "Mineral Resources and Mineral Reserves for the Bloom Lake Mine, Fermont, Québec, Canada" (the "Technical Report"), prepared for Quebec Iron Ore, dated September 28, 2023, with an effective date of April 1, 2023.

I, Benoit Ouellet, P.Eng., as a co-author of the Technical Report, do hereby certify that:

1. I am a Mining Engineer with the consulting firm BBA Inc., located at 900 de l'Église Rd, Suite 590, Québec, QC G1V 3V5.
2. I graduated from the Mining Engineering program at École Polytechnique de Montreal in 2009 and have practiced my profession continuously since then.
3. I am a member in good standing of the Ordre des ingénieurs du Québec (OIQ # 5007925).
4. My relevant experience includes working as a mining engineer and being involved in various aspects of the project in 2010-2011. I have also held various engineering and operations positions on mining projects.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am responsible for the preparation of Chapter 20 as well as the relevant portions of Chapters 1, 2, 3, 25, 26 and 27 of the Technical Report.
8. I have not visited the Bloom Lake property as it was not required for the purpose of this mandate.
9. I have had prior involvement with the property that is the subject of the Technical Report as I participated in water management and water treatment infrastructure construction between 2010 and 2011.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and regulations.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 28th day of September 2023.

Original signed and sealed on file

Benoit Ouellet, P.Eng.

MINERAI DE FER QUÉBEC
QUEBEC IRON ORE

CERTIFICATE OF QUALIFIED PERSON

Vincent Blanchet, P.Eng.

This certificate applies to the NI 43-101 Technical Report titled "Mineral Resources and Mineral Reserves for the Bloom Lake Mine, Fermont, Québec, Canada" (the "Technical Report"), prepared for Quebec Iron Ore, dated September 28, 2023, with an effective date of April 1 2023.

I, Vincent Blanchet, P.Eng., as a co-author of the Technical Report, do hereby certify that:

1. I am employed as Director Mineral Resource Growth, with Quebec Iron Ore, located at Suite 3300, 1155 René-Levesque Blvd. West Montreal, QC, H3B 3X7.
2. I am a graduate of Université Laval in 2008 with a Bachelor's degree in geological engineering (B.Eng.) am a member in good standing of Ordre des Ingénieurs du Québec (#5027502) and of the Canadian Institute of Mining Metallurgy and Petroleum.
3. I have practiced my profession continuously since graduation. My relevant experience includes resource estimation, production geology and open pit mining
4. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
5. I am not independent of the issuer, as I am a full-time employee since 2020.
6. I am author and responsible for the preparation of Chapters 6 to 11, 23 and 24. I am also co-author and responsible for the relevant portions of Chapters 1, 2, 3, 25, 26 and 27 of the Technical Report.
7. I have visited the Bloom Lake property that is the subject of the Technical Report, on a regular basis.
8. I have had prior involvement with the property that is the subject of the Technical Report as I am a full-time employee since 2020.
9. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and regulations.
10. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 28th day of September 2023.

Original signed and sealed on file

Vincent Blanchet, P.Eng.

MINERAI DE FER QUÉBEC
QUEBEC IRON ORE

CERTIFICATE OF QUALIFIED PERSON

Olivier Hamel, P.Eng.

This certificate applies to the NI 43-101 Technical Report titled "Mineral Resources and Mineral Reserves for the Bloom Lake Mine, Fermont, Québec, Canada" (the "Technical Report"), prepared for Quebec Iron Ore, dated September 28, 2023, with an effective date of April 1 2023.

I, Olivier Hamel, P.Eng., as a co-author of the Technical Report, do hereby certify that:

1. I am employed as Chief Engineer, Strategic Planning, with Quebec Iron Ore, located at Suite 3300, 1155 René-Levesque Blvd. West Montreal, QC, H3B 3X7.
2. I am a graduate of McGill University, Montreal, in 2013 with a bachelor's degree in mining engineering.
3. I am a member in good standing of Ordre des Ingénieurs du Québec (#5027502) and of the Canadian Institute of Mining Metallurgy and Petroleum.
4. I have practiced my profession continuously since graduation. My relevant experience includes open-pit life-of-mine planning at the Rosebel, Essakane and Bloom Lake Mine.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am not independent of the issuer, as I am a full-time employee since 2021.
7. I am author and responsible for the preparation of Chapters 15, 16, 21 and 22. I am also co-author and responsible for the relevant portions of Chapters 1, 2, 24, 25, 26 and 27 of the Technical Report.
8. I have visited the Bloom Lake property that is the subject of the Technical Report, on a regular basis, most recently on February 14, 2023.
9. I have had prior involvement with the property that is the subject of the Technical Report as I am a full-time employee since 2021.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and regulations.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 28th day of September 2023.

Original signed and sealed on file

Olivier Hamel, P.Eng.

SRK Consulting (U.S.) Inc.
999 17th Street, Suite 400
Denver, CO, USA
80202
T: +1.303.985.1333
denver@srk.com
www.srk.com

CERTIFICATE OF QUALIFIED PERSON

Erik C. Ronald, P.Geo.

This certificate applies to the NI 43-101 Technical Report titled "Mineral Resources and Mineral Reserves for the Bloom Lake Mine, Fermont, Québec, Canada" (the "Technical Report"), prepared for Quebec Iron Ore, dated September 28, 2023, with an effective date of April 1, 2023.

I, Erik C. Ronald, P.Geo., as a co-author of the Technical Report, do hereby certify that:

1. I am employed as a Principal Consultant (Geology) with the consulting firm SRK Consulting (U.S.), Inc., located at 999 17th Street, Suite 400, Denver, CO 80005 USA.
2. I am a graduate of the University of California, Santa Barbara with a Bachelor of Science degree in Geological Sciences in 1997, a graduate of the Colorado School of Mines with a Master's of Engineering in Geological Engineering in 2001, and a graduate of the Edith Cowan University with a Graduate Certificate in Geostatistics in 2015. .
3. I am a member in good standing of the Professional Geoscientists Ontario (#3050), a Registered Member of the Society of Mining, Metallurgy, and Exploration (#4129819) and Ordre des géologues du Québec (Special Authorization).
4. My relevant experience includes my work as a geologist for 25 years since my graduation from university in 1997. I have worked in exploration, mine geology, and resource geology at various companies and mines. This includes 12 years with Rio Tinto, including four years with Rio Tinto Iron Ore. Additionally, I have worked with SRK Consulting for nearly six years performing a variety of exploration, resource geology, auditing, and due diligence on a variety of iron ore projects in Canada, USA, Brazil, and Australia.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for the preparation of Chapters 12 and 14. I am also co-author and responsible for the relevant portions of Chapters 1, 2, 3, 25, 26 and 27 of the Technical Report.
8. I have visited the Bloom Lake property that is the subject of the Technical Report on February 20, 2022 for four days as part of this current mandate..
9. I have had prior involvement with the property that is the subject of the Technical Report as I provided general technical advisory for Quebec Iron Ore through various projects on Bloom Lake and other properties in the vicinity.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and regulations.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 28th day of September 2023.

Original signed and sealed on file

Erik C. Ronald, P.Geo.

SOUTEX

CERTIFICATE OF QUALIFIED PERSON

Jérôme Martin, P.Eng.

This certificate applies to the NI 43-101 Technical Report titled "Mineral Resources and Mineral Reserves for the Bloom Lake Mine, Fermont, Québec, Canada" (the "Technical Report"), prepared for Quebec Iron Ore, dated September 28, 2023, with an effective date of April 1, 2023.

I, Jérôme Martin, P.Eng., as a co-author of the Technical Report, do hereby certify that:

1. I am employed as a metallurgist with the consulting firm Soutex Inc., located at 1990 Cyrille-Duquet, Local 204, Québec City, Qc, G1N 4K8.
2. I am a graduate of Laval University, Québec City, in 2006 with a bachelor's degree in chemical engineering.
3. I am a member in good standing of Ordre des ingénieurs du Québec (# 140591).
4. My relevant experience includes engineering and on-site metallurgical support to Bloom Lake (2018-2023) as well as to other iron ore, gold and nickel producers since 2011.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for the preparation of Chapters 13 and 17. I am also co-author and responsible for the relevant portions of Chapters 1, 2, 3, 25, 26 and 27 of the Technical Report.
8. I have visited the Bloom Lake property that is the subject of the Technical Report on multiple occasions, and most recently on May 9, 2023 as part of this current mandate.
9. I have had prior involvement with the property that is the subject of the Technical Report as I participated in the Phase 1 start-up and Phase 2 engineering and start-up since 2018.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and regulations.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 28th day of September 2023.

Original signed and sealed on file

Jérôme Martin, P.Eng.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

List of Abbreviations and Units of Measurement	
Abbreviation	**Description**
$ or CAD	Canadian dollar (examples of use: CAD2.5M / $2.5M)
$/t	Canadian dollar per tonne
%	percent
°C	degree Celsius
3D	three dimensional
AC	active hours
AISC	all-in sustaining costs
Al_2O_3	aluminum oxide
AMMC	ArcelorMittal Mines Canada
AMP	amphibolite
AT	available time
Avg.	average
B	billion
BAPE	*Bureau d'audience publique sur l'environnement du Québec*
BBA	BBA Inc.
BC	Bloom Chief's Peak
BID	bedded iron deposits
BIF	banded iron formation
BLH	Bloom Lake high-grade
BLL	Bloom Lake low-grade
BLM	Bloom Lake medium-grade
BLR	Bloom Lake Railway
BP	Bloom Pignac
BPH	booster pumphouse
BW	Bloom West
Ca	calcium
CaO	calcium oxide
CAPEX	Capital expenditure
CCAA	Companies' Creditors Arrangement Act
CCIC	Cleveland-Cliffs Iron Company
CFR	cost and freight
CIAA	Canadian Impact Assessment Act

List of Abbreviations and Units of Measurement

Abbreviation	Description
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
Cliffs	Cliffs Natural Resources
CLM	Consolidated Thompson-Lundmark Gold Mines Limited
cm	centimetre
cm^3	cubic centimetre
CMMS	Computerized Maintenance Management System
CoG	cut-off grade
conc.	concentrate
Consolidated Thompson	Consolidated Thompson Iron Mines Ltd.
CoV	coefficient of variation
Cr_2O_3	chromium oxide
CRM(s)	certified reference material(s)
CSR	Corporate Social Responsibility
d	day (24 hours)
D	diameter
DCF	discounted cash flow
DDH	diamond drillhole
deg or °	angular degree
DFO	Department of Fisheries and Oceans Canada
Directive 019	MELCC - *Directive 019 sur l'industrie minière* (Provincial guidelines for the mining industry) (now MELCCFP)
dmt	dry metric tons
dmtpy	dry metric tons per year
DRPF	Direct Reduction Pellet Feed
DT	downtime
ECCC	Environment and Climate Change Canada
EEM	Environmental Effects Monitoring
EIA	Environmental Impact Assessment
EQA	Environmental Quality Act
et al.	et alla (and others)
Fe	iron
Fe_2O_3	hematite

List of Abbreviations and Units of Measurement	
Abbreviation	**Description**
FEL	front-end loader
FIOD	Fermont Iron Ore District
FOB	free on board
FS	feasibility study
ft or '	feet (12 inches)
FY	financial year
G	giga
g	gram
G&A	General and Administration
Ga	billion years or giga-annum
GEO	Great Oxidation Event
GIS	gas-insulated switchgear
GMG	Global Mining Guidelines
GN	gneiss
GOE	Great Oxidation Event
Golder	Golder Associates Ltd.
GPS	Global Positioning System
Gt	gigatonne
h	hour (60 minutes)
H	height
ha	Hectare
HDPE	high-density polyethylene (pipe)
HEM	hematite iron formation
HEN	H. E. Neal & Associates Ltd.
HLS	heavy liquid separation
hp	horsepower
HPA	hydraulic placement area
HQ	Hydro-Québec
HRI	Hydro-Ressources Inc.
IBA	Impact and Benefit Agreement
ID	inverse distance
$ID^{2/3}$	inverse distance squared / cubed

List of Abbreviations and Units of Measurement	
Abbreviation	**Description**
IF	iron formation
IFG	iron formation grunerite
IFM	iron formation magnetite
in. or "	inch
IOC	Iron Ore Company of Canada
IRA	inter-ramp angle
IRR	internal rate of return
ISO	International Organization for Standardization
IT	Information Technology
J&L	Jones and Laughlin Steel Corporation
Jalore	Jalore Mining Company Limited
k	thousand (000)
K_2O	potassium oxide
kg	kilogram
km	kilometre
KPI	key performance indicator
kt	kilotonne
kV	kilovolt
kW	kilowatt
kWh/t	kilowatt hour per tonne
L	litre
Lakefield	Lakefield Research
lb	pound(s)
LIMO	limonite
LIMS	low intensity magnetic separators
LOI	loss of ignition
LOM	life of mine
m	metre
M	million
M&I	Measured and Indicated
m^2	square metre
m^3	cubic metre

List of Abbreviations and Units of Measurement

Abbreviation	Description
mag	magnetic
MARC	Maintenance and Repair Contract
MBtu	Million British thermal units
MDMER	Metal and Diamond Mining Effluent Regulations
MELCC	*Ministère de l'Environnement, et de la Lutte contre les changements climatiques (now MELCCFP)*
MELCCFP	*Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs (formerly MELCC)*
MERN	*Ministère de l'Énergie et des Ressources naturelles* (now MRNF)
mesh	US mesh
Mg	magnesium
MgO	magnesium oxide
min	minute (60 seconds)
mm	millimetre
MMU	mobile manufacturing unit
Mn	manganese
MnO	manganese oxide
MPa	mega pascals
MRE	Mineral Resource Estimate
MRNF	*Ministère des Ressources naturelles et des Forêts (formerly MERN)*
Mt	million tonnes
MTO	material take-off
Mtpy	million tonnes per year
MVA	mega volt ampere
MW	megawatt
Na_2O	sodium oxide
NL	Newfoundland and Labrador
NN	nearest neighbour
No. or #	number
NPV	net present value
NQ	NQ- Caliber drillhole
Ø or dia.	diameter

List of Abbreviations and Units of Measurement

Abbreviation	Description
OD	Operational delay
OIQ	*Ordre des ingénieurs du Québec*
OK	ordinary kriging
OPEX	operational expenditure
OS	operating standby
OSA	overall slope angle
OT	operating time
oz	troy ounce
P_2O_5	diphosphorus pentoxide
PEO	Professional Engineers Ontario
PFD	process flow diagram
PGO	Professional Geoscientists Ontario
pH	potential of hydrogen
PhD	Doctor of Philosophy
PN	Pointe-Noire
ppm	parts per million
Q-Q	quantile-quantile
QA/QC	quality assurance / quality control
QC	quality control
QIO	Quebec Iron Ore
QNS&L	Quebec North Shore and Labrador
QP	qualified person
QR	quartz rock
QRIF	quartz rock iron formation
QRMS	quartz rock mica schist
QUECO	Quebec Cobalt and Exploration Limited
R&D	Research and Development
Rec.	recovery
RF	revenue factor
ROM	run of mine
RPEEE	reasonable prospects for eventual economic extraction
RQD	rock quality designation

List of Abbreviations and Units of Measurement	
Abbreviation	**Description**
s	second
S	sulphur
SARA	Species at Risk Act
SAT	Satmagan
SD	scheduled delay
SEDAR	System for electronic document analysis and retrieval
SFPPN	*La Société ferroviaire et portuaire de Pointe-Noire*
SIF	silicate iron formation
SiO_2	silicon dioxide / silica
SMC	Sursho Mining Corporation
SMU	selective mining unit
SPI	SAG power index
SQL	structured query language
SRK	SRK Consulting (U.S.), Inc.
SRM(s)	Standard reference material(s)
st	short ton (2,000 lb)
t	tonne (1,000 kg) (metric ton)
t/m^3	tonne per cubic metre
Tacora	Tacora Resources Inc.
TiO_2	titanium dioxide
TMF	tailings management facility
tpd	tonne per day
tph	tonne per hour
tpy	tonne per year
TR	technical report
TSF	tailings storage facility
UCC	up-current classifier
UCS	uniaxial compressive strength
UD	unscheduled delay
UG	underground
USD	United States dollar (examples of use: USD2.5M / US$2.5M)
UTM	Universal Transverse Mercator

List of Abbreviations and Units of Measurement	
Abbreviation	**Description**
V	volt
var	variable
vs.	versus
W	watt
WGM	Watts, Griffis and McOuat Ltd.
WHIMS	wet high intensity magnetic separators
wk	week
wmt	wet metric tons
wmtpy	wet metric tons per year
WGS	World Geodetic System
WSIF	waste silicate iron formation
WTP	water treatment plant
XRF	X-ray fluorescence
y	year (365 days)

1. Summary

Quebec Iron Ore (QIO) has updated the Mineral Resource and Mineral Reserve Estimate for the Bloom Lake Mine to better reflect operational experience, iron ore price trends, expected operating costs as the company completes the ramp-up of the recently completed Phase II expansion project, and depletion following the successful launch of Phase II. This reserve update is not due to a change in the scope of infrastructure, technology, or pit size. It is an update and refinement of the reserves and mine plan laid out in the 2019 Feasibility Study (2019 FS) (Allaire et al., 2019).

Since 2019, additional diamond drilling was done, understanding of the deposit was improved through modelling techniques, mining and processing, and iron ore prices have been higher than the 2019 FS forecast. This led to a re-estimation of the mineral resource at the Bloom Lake mine, which suggested an increase of over 30%. This was considered a material change and therefore triggered a more advanced study (this Technical Report) to confirm and publicly disclose this increase.

While the life of mine plan has been reworked and the pit designs have been readjusted, the change in mineral reserve is not material. This Report, however, includes all the required sections to justify reserves despite this non-material change.

This Report, titled "Mineral Resources and Mineral Reserves for the Bloom Lake Mine, Fermont, Québec, Canada" (the "Report"), was prepared by qualified persons (QPs) following the guidelines of the "Canadian Securities Administrators" National Instrument 43-101 (effective June 30, 2011), and in conformity with the guidelines of the Canadian Mining, Metallurgy and Petroleum (CIM) Standard on Mineral Resources and Reserves.

All monetary units in the Mineral Resources and Mineral Reserves for the Bloom Lake Mine are in Canadian dollars (CAD or $), unless otherwise specified.

1.1 Contributors

The major report contributors and their respective areas of responsibility are presented in Table 1-1.

Table 1-1: Report contributors

Qualified person / Consulting firm	General overview of responsibilities
Quebec Iron Ore	
Vincent Blanchet	▪ History, geological settings and mineralization, deposit type adjacent properties and other relevant information; ▪ Mineral titles, exploration and drilling; ▪ Sample preparation, analyses, and security.
Olivier Hamel	▪ Mineral reserve estimate; ▪ Mining methods, capital and operating costs.
BBA	
André Allaire	▪ Technical report integration; ▪ Market studies; ▪ Property and infrastructure description.
Benoit Ouellet	▪ Environmental Studies, Permitting and Social or Community Impact.
Soutex	
Jérôme Martin	▪ Mineral Processing and Metallurgical Testing; ▪ Recovery Methods.
SRK	
Erik Ronald	▪ Mineral resource estimate; ▪ Data verification.

1.2 Key Outcomes

The following list details the key outcomes as determined from the Technical Report:

- Mineral resources, effective April 1, 2023, were updated with recent data obtained in drill campaigns between 2018 and 2022;
- Economic cut-off grade of 15% Fe was retained based on current and historical production practices;
- Measured and Indicated Mineral Resources for the Bloom Lake mine are estimated at 1,252.2 Mt with an average grade of 28.7% Fe;
- Mineral reserve for the Bloom Lake Mine is estimated at 716 million tonnes at an average diluted grade of 28.6% iron (Fe);

- Current mine plan forecasts a life of mine (LOM) of 18 years;
- Phase I and Phase II combined average iron metallurgical recovery of 82.0% relative to average plant feed grade of 28.6% Fe and concentrate grade of 66.2% Fe;
- Average yearly production of 15.2 million wet tonnes (14.8 million dry tonnes) of iron ore concentrate at 66.2% Fe;
- Total LOM average operating costs (total cash cost) of $64.58/dmt concentrate;
- LOM average iron ore price of USD100.83/dmt concentrate at 66.2% Fe. The FOB price at the Port of Sept-Îles is USD76.34/dmt and converts to CAD97.09/dmt.

1.3 Property Description and Ownership

The Bloom Lake property is in the Côte-Nord administrative region of the province of Québec, adjacent to the Labrador and Newfoundland border, in Normanville Township, Kaniapiskau County. The property is centred at latitude 52° 50' North and longitude 67° 16' West, 13 km west of the town of Fermont and 30 km southwest of the municipalities of Wabush and Labrador City.

QIO has owned the property and the facilities at the Bloom Lake Mine site since April 12, 2016.

All reserves and resources disclosed in Chapters 14 and 15 of this Report are within the Bloom Lake Mine lease (BM877). This lease covers 6,858 ha and will expire in 2029. It can be renewed twice for 10 years if all required conditions are met.

The property is not subject to any royalties. The Impact Benefit Agreement, which is a confidential agreement with First Nations in the area, is in effect and further described in Chapter 20. Most permits have been obtained, as the mine and mill are currently in operation. Some remain to be obtained with regards to future waste dumps and tailings expansions.

1.4 Property History

In December 2006, an environmental impact assessment (EIA) of the Bloom Lake Mine project was submitted to the agencies. Decree 137-2008 authorizing the project was adopted on February 20, 2008 by the provincial government. Consolidated Thompson Iron Mines Limited began the construction of the mining infrastructure in 2008 and commenced mining operations in 2010 with the Phase I concentrator plant.

The mine was sold to Cliffs Natural Resources Inc. (Cliffs) in 2011, which continued the Phase II (Cliffs) construction project until the project was halted in November 2012, and conducted mining operations until they were suspended in December 2014. The site was employing approximately 600 people.

In January 2015, Cliffs sought creditor protection under Companies' Creditors Arrangement Act (CCAA), resulting in the mine being put on a care and maintenance program and placed into creditor protection.

In April of 2016, Champion Iron Limited (Champion or "the Company") acquired the Bloom Lake assets through its subsidiary Quebec Iron Ore and the Quinto Claims for a cash consideration of $10.5M ($9.75M for Bloom Lake and $0.75M for Quinto) and the assumption of liabilities. Quebec Iron Ore Inc. was 63.2% owned by Champion Iron Limited, with the remaining 36.8% equity interest owned by Ressources Québec (RQ), acting as a mandatory of the Government of Québec. On May 29, 2019, the Company announced a transaction to acquire RQ's 36.8% equity interest in QIO and the transaction increased Champion's stake in QIO to 100%.

Following the acquisition of the Bloom Lake assets by QIO, a feasibility study to identify areas for improvement or correction was completed in February 2017 and resulted with the restart of the operation in February 2018 on time and on budget.

During its first full year of operation (2019 Fiscal Year (FY)), the Bloom Lake site produced 6,994,500 wet metric tons (wmt) of 66.4% iron ore concentrate, which is an improvement of approximately 1,000,000 wmt over 2014 production. The production total cash cost during 2019 was $49.40/dmt and the all-in sustaining cost was $55.80/dmt.

As part of an expansion plan to increase the mine production, the design and construction of a second concentrator plant (referred to as "Phase II plant" in this document) was initiated to increase nominal capacity. QIO was authorized by the Decree 849-2011 to increase its production to 16 million tonnes (Mt) of concentrate per year. The Phase II concentrator construction was completed and reached commercial production in December 2022.

1.5 Data Verification

QIO has an internal set of quality control procedures and verifications on the drilling database used to support geological and resource modelling. QIO internal controls include the continuous review of diamond drill core logging, sampling, measurements, and analyses. Starting in 2022, QIO engaged SGS Laboratories to provide three commercially prepared standard reference materials (SRMs) across a range of iron grades to implement as part of the analytical quality control program at the Bloom Lake mine.

In accordance with NI 43-101 guidelines, Erik Ronald, P.Geo., [PGO#3050], a Principal Consultant (Geology) with SRK Consulting (U.S.), Inc. based in Denver visited the Bloom Lake Mine between February 21 and 25, 2022. SRK assessed among others the analytical quality control (QC) data produced on resource drilling by QIO on the property since 2008, the reconciliation practices as well as the data verification procedures related to drilling, logging and sampling for resources.

Based on the various verification procedures and results, it is the opinion of the QP for mineral resources that the data used in support of mineral resources is considered acceptable and applicable with any identified uncertainties accounted for in the resource classification.

1.6 Mineral Processing and Metallurgical Testing

In 2018, the Phase I (QIO) restart showed that the flowsheet, which was based on the original Phase II (Cliffs) flowsheet along with improvements proposed by Mineral Technologies, allows for high-iron recoveries and an excellent final concentrate grade control. Further improvements to the Phase I (QIO) flowsheet were applied in the Phase II (QIO) design. Although recent, the Phase II (QIO) start-up in 2022 showed that its flowsheet can achieve higher iron recoveries while maintaining excellent final concentrate grade control.

The QIO ore has been extensively tested over the past several decades. The historical testwork prior to this project consisted in:

- Testwork prior to Phase I (Consolidated Thompson) (before 2010);
- Original Phase II (Cliffs) Testwork (2010 – 2014);
- Phase I (QIO) Restart Testwork (2016 - 2017);
- Phase II (QIO) Testwork (2018 – 2019).

As there was no testwork program undertaken since the Phase II study, the current metallurgical performance was evaluated and compared to the historical testwork results and recovery models developed in the previous phases. The evaluation consisted in:

- Comparing the previous studies' LOM feed grades with the new ones;
- Comparing the HLS database to the new LOM feed grades and rock type composition to ensure it is still representative of the forecasted feed material;
- Analyzing production data from the Phase I and Phase II concentrators and comparing it to the models' expected recoveries.

In order to use a single model that represents production from both Phase I and Phase II concentrators, the models developed for each phase were combined into one, assuming that Phase II has a higher capacity than Phase I due to its design improvements over Phase I. The following recovery equation was determined:

$$\%FeRec. = -0.05673Fe\hat{}2 + 4.4027Fe - 0.59683MgO - 0.00495MgO\hat{}2 + 0.01424FeMgO + 2.863$$

As in the Phase II study, this equation takes into account the MgO feed grade and assumes it as actinolite, which contains iron that is not recoverable. The model is applied on the life of mine annual averages iron feed grades of 27% to 32% and MgO feed grades up to 3.90%.

Recovery models developed for Phase I and Phase II match the filtered production data relatively well, especially within the 28% to 29% Fe feed grade range, which is where the LOM average feed grade is.

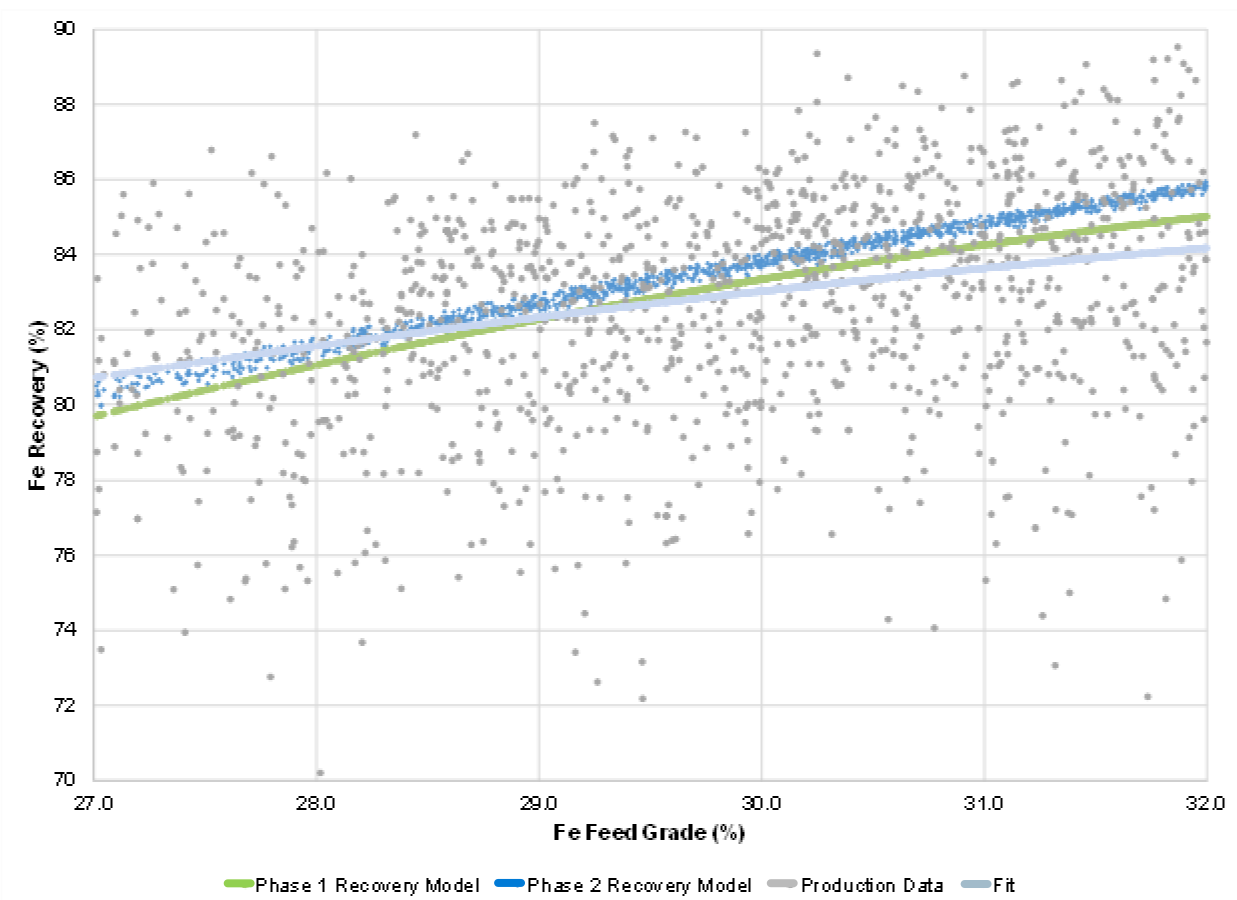


Figure 1-1: Iron recovery vs. Feed iron grade – Filtered data

1.7 Mineral Resource Estimate

The mineral resources have been estimated following the generally accepted Canadian Institute of Mining, Metallurgy, and Petroleum (CIM) Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines (November 2019) and are reported in accordance with the Canadian Securities Administrators' National Instrument 43-101. Mineral resources are not mineral reserves and have not demonstrated economic viability. There is no certainty that all or any part of the mineral resource will be converted into mineral reserve.

Since the 2019 mineral resource model, QIO has drilled an additional 106 core boreholes (18,465 m), representing an increase of 13%. The infill drilling on the Bloom Lake property has been successful in converting Inferred resources to the Indicated category. Further, this infill drilling has demonstrated continuity of iron mineralization, allowing for grade continuity to be established and estimated. The resource shell based on the updated model and the increased long-term iron price of USD110.24/dmt (CFR China 65%) was significantly larger compared to the 2019 pit, resulting in a considerable gain of Inferred resources.

The Measured and Indicated Mineral Resources for the Bloom Lake project are estimated at 1,252.2 Mt with an average grade of 28.7% Fe and Inferred Mineral Resource at 246.3 Mt with an average grade of 26.6% Fe.

For mineralized units, the density values were calculated with a density regression formula established and used as part of regular mining operations based on total iron content:

$$\text{Bulk Density} = \text{Fe\%} \text{ x } 0.0284 + 2.5764$$

In unmineralized lithologies, a constant bulk density was assigned per lithology. Unmineralized material was assigned fixed bulk densities varying from 2.32 t/m^3 to 3.16 t/m^3 based on historical measurements from different laboratories.

Table 1-2 presents the audited Mineral Resource Statement for the Bloom Lake Iron Ore Mine. The price assumption made for the Mineral resource estimate (USD110.24/dmt for 65% Fe with a premium of USD2.04/dmt for the 66.2%) was higher than the reference iron ore price for the Mineral reserve estimate (USD99.00/dmt for 65% Fe with a premium of USD1.83/dmt for the 66.2%) as it is a common industry practice.

Table 1-2: Audited Mineral Resource Statement, Bloom Lake Iron Ore Mine SRK Consulting (Canada) Inc., April 1, 2023

Classification	Tonnage	Fe	CaO	Sat	MgO	Al_2O_3
	Mt	%	%	%	%	%
Measured	186.7	30.4	1.3	5.5	1.3	0.3
Indicated	1,065.5	28.4	1.3	6.1	1.2	0.5
Total M&I	**1,252.2**	**28.7**	**1.3**	**6.0**	**1.2**	**0.5**
Inferred	**246.3**	**26.6**	**1.4**	**6.4**	**1.2**	**0.5**

Notes on Mineral Resources:

1. Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures have been rounded to reflect the relative accuracy of the estimates. Reported at open pit resource cut-off grade of 15% iron. The resource shell is based on a long-term iron price of USD110.24/dmt for 65% Fe content, a premium of USD2.04/dmt for the 66.2% Fe concentrate and an exchange rate of 1.27 CAD/USD.

The long-term iron ore prices assumed for the mineral resource estimate as well as for the mineral reserve estimate remain conservative for the 65% Fe content considering the historical 3-year and 5-year moving average prices shown in Table 1-3. It should be noted that these values do not account for the volatility to which the market was subjected with the Covid-19 pandemic.

Table 1-3: Iron ore prices: 3 and 5-year moving averages

Year	62% Index CFR China	65% Index CFR China	Realized 66.2% CFR China
2018	69.46	90.38	92.05
2019	93.41	104.47	106.40
2020	108.87	122.01	124.26
2021	159.49	185.15	188.57
2022	120.16	138.70	141.26
3-year average	**129.51**	**148.62**	**151.36**
5-year average	**110.28**	**128.51**	**130.51**

1.8 Mineral Reserve Estimate

The mineral reserve for the Bloom Lake Mine is estimated at 716 Mt at an average grade of 28.6% Fe as summarized in Table 1-4. The mineral reserve estimate was prepared by QIO and the resource block model was generated by QIO and audited by SRK.

The mineral reserve estimate stated herein is consistent with the CIM definitions and is suitable for public reporting. As such, the mineral reserves are based on Measured and Indicated (M&I) Mineral Resources, and do not include any Inferred Mineral Resources. The Inferred Resources contained within the mine design are classified as waste.

Table 1-4: Mineral reserve estimate

Classification	Diluted tonnage	Diluted Fe	CaO	Sat	MgO	Al_2O_3
	Mt	%	%	%	%	%
Proven	183.7	30.0	1.3	5.6	1.3	0.3
Probable	532.5	28.1	2.1	9.2	2.0	0.5
Total Proven & Probable	**716.2**	**28.6**	**1.9**	**8.3**	**1.8**	**0.4**
Waste (Includes Inferred)	*685.7*	-	-	-	-	-

Notes on Mineral Reserves:

1. The mineral reserves were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Standards for Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council on May 10, 2014.
2. The qualified person (QP) for the mineral reserve estimate, as defined by NI 43 101, is Olivier Hamel, P. Eng., from QIO. The effective date of the estimate is April 1, 2023.
3. In the ultimate pit design, all Measured Resources and associated dilution/ore loss were converted to Proven Mineral Reserves. All Indicated Resources and associated dilution/ore loss were converted into Probable Mineral Reserves.
4. Stockpiles are excluded from reserve calculations due to their small size (<1 Mt).
5. Bulk density of ore is variable but averages 3.39 t/m^3 (pre-dilution).
6. Remaining strip ratio is 0.96:1 (including overburden).
7. Mineral reserves are based on a mining surface projected to April 1, 2023. The last survey was done in Q3 2022.
8. Mineral reserves are estimated at a cut-off grade of 15% Fe (diluted).
9. Mineral reserves are estimated using a long-term iron ore reference price (Platt's 65%) of USD99/dmt and an exchange rate of 1.27 CAD/USD. A price adjustment to 66.2% of USD1.83/dmt was added.
10. Bulk density of ore is variable but averages 3.39 t/m^3 (pre-dilution).
11. Mining dilution was calculated using a 2-m contact skin.
12. The average mining dilution is 1.73% at a grade of 0% Fe. Dilution was applied block by block and shows a wide range of local variability.
13. The average ore loss is 1.91% at a grade of 29% Fe. Ore loss was applied block by block and shows a wide range of local variability.
14. Numbers may not add up due to rounding.
15. SAT stands for Satmagan, an industry standard device that measures the magnetic content by weight of a sample. This value is assumed to be the magnetite content by weight.
16. The author is not aware of any known environmental, permitting, legal, title-related, taxation, socio-political or marketing issues, or any other relevant issues not reported in the Technical Report, that could materially affect the Mineral Reserve Estimate.

Open pit optimization was conducted to determine the optimal economic shape to guide the pit design process. Only Measured and Indicated Resource blocks were considered valuable for optimization purposes.

A summary of the pit optimization parameters is presented in Table 1-5 for a milling rate of 41.9 Mtpy based on a reference iron ore price (Platt's 65% CFR China) of USD99.00/dmt concentrate. A price adjustment of USD1.83/dmt was applied as a premium for 66.2% iron concentrate and USD24.48/dmt ocean freight cost were subtracted. The final FOB revenue at the Port of Sept-Îles is USD76.34/dmt and converts to CAD97.09/dmt.

The cost model used in the optimization is based on a fully costed internal LOM exercise done in 2021. Costs have been adjusted to fit into Whittle software inputs and cannot be exactly reconciled with cost of goods sold, economic cut-off grades or the all-in sustaining costs (AISC).

Table 1-5: Optimization cost and revenue model

Parameters	Base values	Unit
Mining Costs		
Mining Cost	3.80	$/dmt mined
Incremental Bench Cost	0.041	$/dmt /14m
Processing & G&A Costs		
G&A Cost	2.96	$/dmt milled
Concentrator Cost	4.52	$/dmt milled
Tailings Cost	1.50	$/dmt milled
Total Processing Cost	**8.98**	**$/dmt milled**
Concentrate Costs		
Rail, Port and Ship Loading	22.25	$/dmt concentrate
Corporate Costs	1.31	$/dmt concentrate
Total Concentrate Costs	**23.56**	**$/dmt concentrate**
Net Value & Payment		
CFR 65% Iron	99.00	USD/dmt
Concentrate Premium	1.83	USD/dmt
Ocean Freight Costs	24.48	USD/dmt
FOB Sept-Iles 66.2% Concentrate	76.34	USD/dmt
Exchange Rate	1.27	CAD/USD
FOB Sept-Iles 66.2% Concentrate	**97.09**	**$/dmt**
Iron Recovery	varies	%Fe * 0.84 + 57.9
Discount Rate	8.0	%

1.9 Mining Methods

The operation consists of a conventional surface mining method using an owner mining approach with electric hydraulic shovels, wheel loaders and trucks. The owner mining open pit operation is planned with the outsourcing of certain support activities such as explosives manufacturing, blasthole loading, pre-split drilling and overburden removal. The primary objective is to sustain the mill feed every year at a rate of 41.9 Mtpy within ore quality constraints.

Mining of the Bloom Lake project is now planned with 13 sub-stages in three pits. While sub-stages and naming conventions have changed compared to the previous technical report (Allaire et al., 2019), the ultimate pit design has barely changed in scope. The ultimate pits contain 716 Mt of ore at an average grade of 28.6% Fe with an average strip ratio of 0.96. This mineral reserve is sufficient for an 18-year mine life.

A total of 685 Mt of waste material is mined throughout the remaining LOM. Four dumps are planned in the mine life. The average density of the dumps is 2.08 t/m^3 based on a swell factor of 1.45 from in situ to dump. During operations, an allowance for material requirements for the tailings management facility (TMF) construction will be placed on the containment dike. Those requirements have been detailed year-by-year and total 10.4 Mt.

The mine production schedule is on a yearly basis. Pre-stripping is included in the mine plan and is done on a just-in-time basis. The initial mining equipment ramp-up outlined in the 2019 FS is near-complete at the start of the plan. The objectives of the LOM plan are to build upon and refine the plan outlined in the feasibility study (Allaire et al.,2019), mostly by changing the internal stages to allow a reduced maximum mining rate. As shown in Figure 1-2, the initial ex-pit mining rate is 75 Mtpy and stays stable for 3 years. The mining rate then gradually increases to reach 90 Mtpy in financial year (FY) 2030. The mining rate declines, starting in FY2038, as sufficient ore for the mill is accessible.

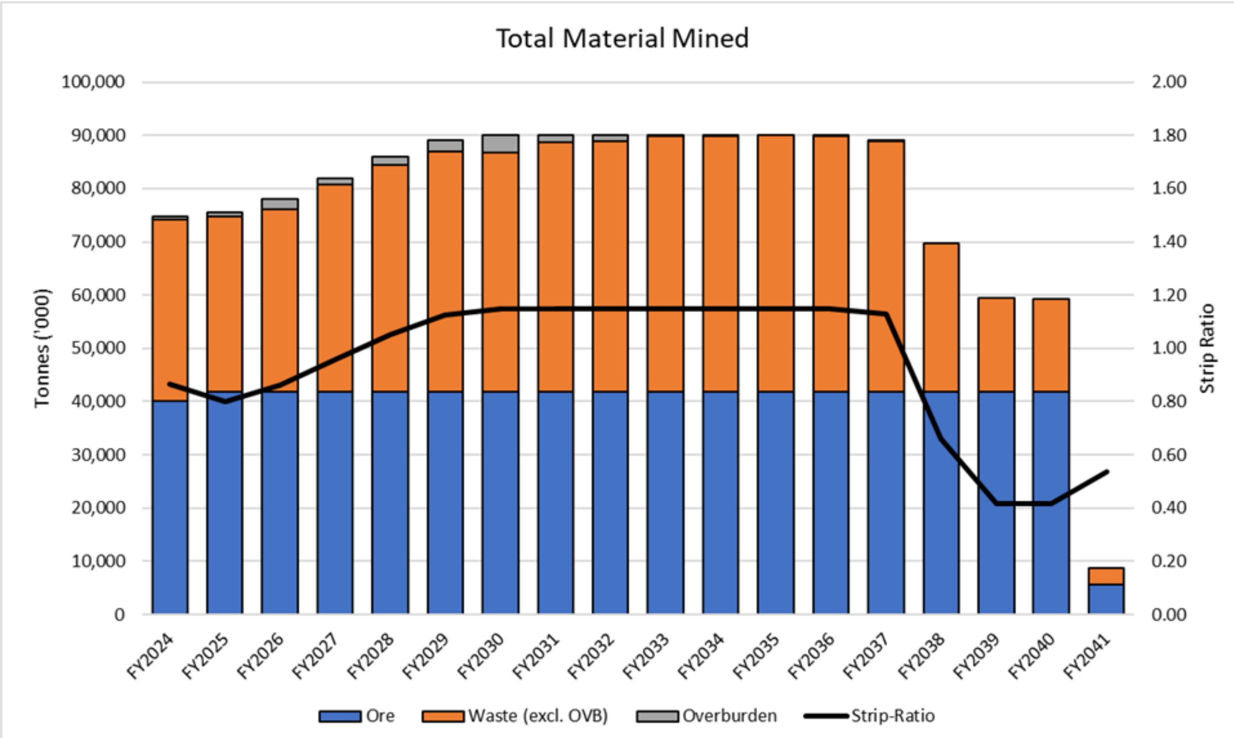


Figure 1-2: Material mined by financial year

Drill and blast specifications are established to effectively single pass drill and blast a 14 m bench. For this bench height, a 311-mm blasthole size is proposed with a variable burden and spacing, and 1.5 m of subdrill. Because of the changing rock properties and size requirements between waste and ore, powder factors vary between 0.35-0.5 kg/t. Blastholes are initiated with electronic detonators and are double primed with 450 g boosters. The bulk emulsion product is a gas sensitized pumped emulsion blend specifically designed for use in wet blasting applications.

The ore control program consists of establishing dig limits for ore and waste in the field to guide loading unit operators. Most of the loading in the pit will be done by four electric drive hydraulic face shovels with 28 m3 bucket, which are currently on site. The shovels (CAT 6060 or equivalent) are matched with a fleet of mining trucks with a capacity 240 tonnes (217 dmt effective payload). The hydraulic shovels will be complemented by five production front-end wheel loader (FEL). Two Komatsu WA-1200 and two LeTourneau 1850 are on site.

Haulage is performed with 240-tonne class trucks. The existing truck fleet are Caterpillar 793D or 793F. There are currently three 90-tonne CAT 777 trucks in use, mostly for non-production work, but they have been converted to 240-tonne equivalent to simplify haulage modelling (0.4:1 ratio). CAT 777 have been considered explicitly in the final fleet estimates (Section 16.4).

1.10 Project Infrastructure

All mine infrastructure required for current mining operations is built and operational. Two items are to be constructed in the near-term to support future mining operations:

- Mine maintenance garage expansion (2023-2024);
- Additional 34,5-7,2 kV electrical substation (2025-2026).

Major infrastructure located on the Bloom Lake site are shown on Figure 1-3.

The existing 2,485 m^2 (35 m x 71 m) service building attached to the Phase I concentrator building provides the following services:

- Maintenance shops;
- Unloading and warehousing completely stocked with parts and supplies;
- Electrical/instrument repair shop;
- Boiler plant to provide steam to both plants for heating and filter cake drying. The boiler plant also hosts the boiler water treatment system;
- Offices for administration, purchasing, human resources, technical services (engineering and geology), training and plant operating personnel;
- Laboratory equipped for metallurgical testwork, wet and dry assaying;
- Lunchroom, men and women change rooms, sanitary and locker facilities;
- Communications room;
- Compressor room to provide service air and instrument air to both concentrators;
- Fresh water storage tank and water treatment facilities;
- Electrical room;
- Various utility domes used as warehouses or shops for contractors.

Concentrate produced in the Phase I plant is currently discharged to a series of conveyors and transported to a 24,000-t silo at the train load-out station. The train loading station fills one 240-railcar train (100 t capacity railcars). The Phase II expansion involved a second silo having a capacity of 30,000 t and linked to the existing load-out station. Phase II can feed both silos allowing greater operational flexibility, while Phase I can only feed silo 1.

The rail network consists of three separate segments to transport iron ore concentrate from the mine site to the port. The current fleet is composed of 1,285 insulated ore cars dedicated to move Bloom Lake concentrate, which includes a 5% spare fleet allowance. As of the effective date of this report, three locomotives are due to arrive in June 2023, which will complete the fleet and increase the hauling capacity of the network. Besides maintenance, no changes to the rail infrastructure are planned. All railroad infrastructure construction detailed in the previous technical report (Allaire et al., 2019) is either complete or not required anymore.

The concentrate is unloaded from railcars at Pointe Noire, which is owned by SFPPN and controlled by the Government of Québec, and can be either loaded directly onto a vessel or stockpiled to be reclaimed and loaded at a later time. As part of the expansion project, the infrastructure has been upgraded to accommodate an average yearly throughput of 16 Mt of concentrate. To allow efficient and reliable operations, modifications have been performed to increase the stockpiling capacity, reduce the railcars unloading cycle and increase the stacking and reclaiming performance.

Electrical power for Bloom Lake operation is supplied by Hydro-Québec (HQ) from a T-tap off the 315 kV transmission line L3039 (Montagnais-Normand), which terminates in an existing 315-34.5 kV substation (Substation W) owned by QIO and feeding the existing concentrator plant and mine site. Two 34.5 kV distribution overhead lines also come from the HQ Normand substation to provide backup power supply to the QIO distribution system in case of emergency. The peak power demand of the entire installations should not exceed 90 MW, with an average power demand of approximately 70 MW, excluding the 22 MW electrical boiler that is used on non-firm power.

The site's surface water management infrastructure is used to collect the process and run-off waters generated throughout the site, to prevent any unauthorized discharges to the environment and ensure sufficient water supply to the mill. This water is contained in a system of retention basins that is eventually transferred to basins RC1 and RC2. The water is then either recirculated to the mineral processing plants or discharged into the environment after being treated in the water treatment plant.

Bloom Lake's tailings management strategy is developed around the hydraulic deposition of separated coarse and fine tailings streams. The coarse portion of the feed is pumped to three tailings storage facilities (*HPA-Sud*, *HPA-Ouest*, and *HPA-Nord*), where pervious dikes are built to contain tailings and impervious dikes to retain water. The fine portion of the feed is pumped during the life of mine to the current containment area, basin A, confined by impervious dikes. This containment area also holds a fine particle sedimentation pond. To achieve this deposition strategy, additional pumping capacity will be required for both fine and coarse tailings. The tailings and surface water management infrastructure are currently under detailed engineering.

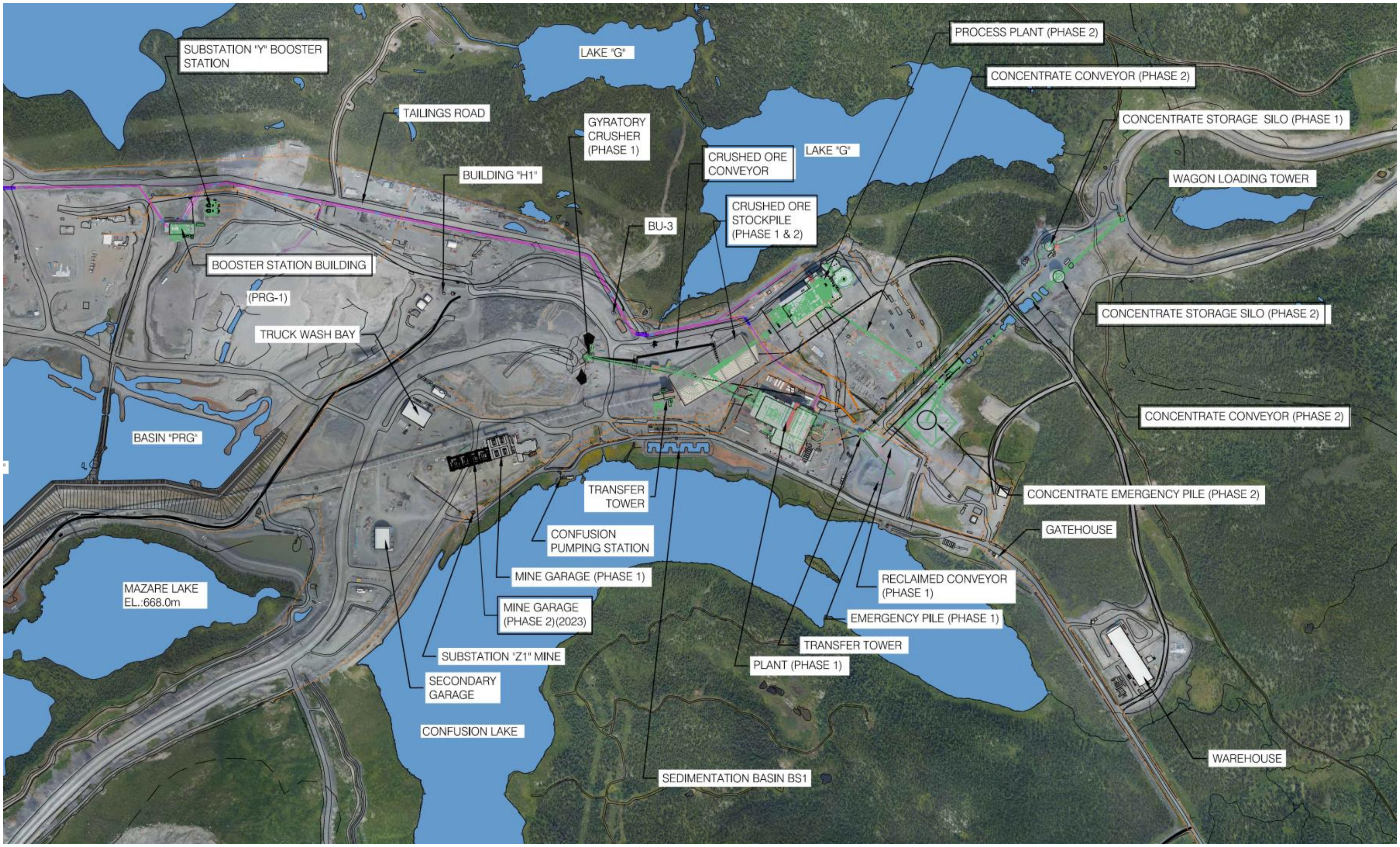


Figure 1-3: Major infrastructure on site

1.11 Environmental and Permitting

The mine has been authorized for operation under the federal environmental authorities and provincial governments.

An Environmental Impact Assessment (EIA) for the tailings and waste management has been submitted to MELCC in August 2019. Following the BAPE environmental examination procedure, Decree 166-2022 for the increase of tailings and waste rocks storage capacity was issued by the Government of Québec on February 16, 2022. The decree specifies various conditions to be respected.

Fish habitats are present within the *HPA-Nord* TSF and the *Halde Sud* waste stockpile locations. Metal and Diamond Mines Effluent Regulations (MDMER) includes provisions (regulatory amendment) allowing the use of a natural water body frequented by fish for mine waste disposal. Therefore, in 2022, Quebec Iron Ore submitted various documents to ECCC in order to be authorized to dispose of mining wastes in fish habitats through inclusion of the MDMER Schedule 2. An Alternatives Assessment report (WSP, 2022a) and a Fish Habitat Compensation Plan report (WSP, 2022b) were submitted.

ECCC has carried out public consultation sessions in February 2023. A Government Cabinet and publication in the Canada Gazette is expected in the near-term.

According to the project development schedule, disposal of tailings in the *HPA-Nord* TSF and waste rocks in the *Halde Sud* stockpile will not be required before some years, thus allowing sufficient time for QIO to complete the federal permitting process.

According to Québec Mining Act, QIO shall submit a revised closure plan to the Minister for approval every 5 years or whenever amendments to the plan are justified by changes in the mining activities. QIO must also provide a financial guarantee covering the closure plan cost to the provincial government in accordance with the Regulation Respecting Mineral Substances other than Petroleum, Natural Gas and Brine.

The last version of the closure plan has been sent to the MERN at the beginning of September 2021. MELCCFP (formerly MELCC) has provided favourable opinion on January 20, 2022. The MRNF (formerly MERN) has approved the closure plan on February 28, 2023.

The financial guarantee has been estimated by the MRNF at $131,716,031. By the end of February 2023, $51,258,281 was already deposited in the financial guarantee. The provision of the financial guarantee will be as follows: $40,228,875 at the end of May 2023, $20,114,437 at the end of February 2024, and $20,114,437 at the end of February 2025, for a total of $80,749,750.

1.12 Market Studies and Contracts

Iron ore is commonly sold on a Cost and Freight (CFR) or Free on Board (FOB) basis. Under a CFR sale, the product changes hands as it is unloaded at the arrival port and the pricing includes shipping costs. In recent years, there has been a strong trend to CFR sales, as this gives sellers control over shipping. An FOB sale is for iron ore delivered on board a vessel at the loading port, and the price is usually determined by netting back the cost of ocean freight (to China) from the CFR price.

It has been determined that a conservative value of USD99/t for the 65% Fe in line with the consensus and with Wood Mackenzie's calculations should be used in order to assess the long-term price of the future Bloom Lake concentrate. This value corresponds to a CFR selling price of USD100.83/t after a linear adjustment to an Fe grade of 66.2%.

As the vast majority of Quebec Iron Ore's Bloom Lake concentrate customers are in Asia, the basis for the calculation of freight costs is the C3 Capesize Freight Index, as published daily by the Baltic Exchange. Considering the moisture adjustments, the ocean freight costs are estimated at USD24.48/dmt, finally yielding an FOB selling price of the Bloom Lake concentrate of USD76.34/dmt.

As Bloom Lake is an operating mine, all contracts necessary for development and operations are in place. All contracts are under terms and rates that are within the industry norms.

1.13 Capital and Operating Costs Estimates

The life of mine capital expenditures (CAPEX) were estimated by each department as part of the budgeting process (Figure 21-1). Phase II infrastructure is now built and reached commercial production in December 2022. Further to recent delivery of mining equipment, Bloom Lake is expected to reach its expanded nameplate capacity of 15 Mtpy by the end of calendar year 2023. However, sustaining capital remains to be spent.

All capital expenditures as well as the exclusions to the CAPEX and OPEX are presented under Chapter 21.

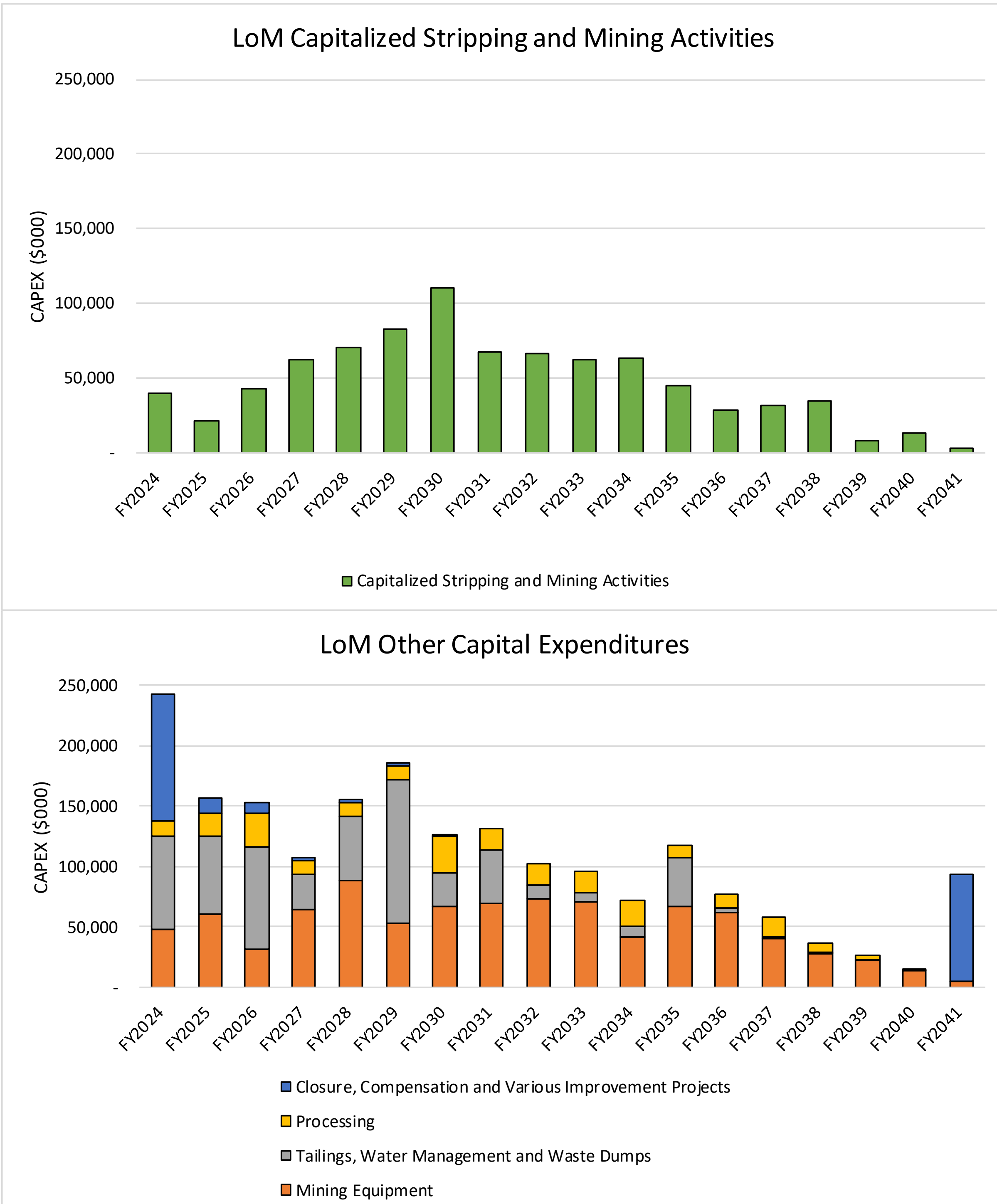


Figure 1-4: Capital expenditures required (CAD)

The LOM operating costs (OPEX) are determined based on current costs and contracts using a simplified budget cost model. As this study is based on a 100% FOB sales basis, the costs of shipping are deducted from the selling price rather than added to operating costs.

Costs presented in Table 1-6 are directly comparable to cash costs, as they include adjustments for capitalized stripping. They are presented as an undiscounted LOM average.

Table 1-6: LOM operating costs

Cost centre	Unit cost (CAD)	Reference unit
Mining	$3.30/t	dmt mined
Processing	$4.75/t	dmt processed
Tailings and Water Management	$0.83/t	dmt processed
G&A	$3.35/t	dmt processed
Rail & Port	$21.14/t	dmt concentrate
Total	**$64.58/t**	**dmt concentrate**

1.14 Project Economics

The Bloom Lake Mine is currently in production and this Technical Report does not include a material expansion of the current production. Therefore, economics are not presented.

1.15 Interpretations and Conclusions

- The QP is satisfied that the classification at Bloom Lake is a reasonable reflection of the overall mineral resource risks associated with geologic understanding and confidence, data support, and grade continuity associated with the varying levels of resource categories assigned.
- The mineral resources may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent mineral resource estimates. The mineral resources may also be affected by subsequent assessments of mining, environmental, processing, permitting, taxation, socio-economic, and other factors.
- Only Measured and Indicated Resource blocks were considered valuable for optimization purposes.

1.16 Recommendations

- Infill drilling in shallow, within-pit regions of Bloom West and Chief's Peak is recommended for consideration of increasing confidence in zones of Inferred Mineral Resources.
- Review historical logging and assays to determine potential for mineralization continuity in Pignac area (to the south).
- Improve the QA/QC process to align with current good practices for iron ore evaluation, including increasing overall insertion rates of QC samples, obtaining certified blank materials (CRMs), and consistent use of CRMs appropriate for the deposit style and grade ranges observed at Bloom Lake.
- Improve the QA/QC process with additional focus on deleterious materials such as CaO, MgO, and S.
- Re-assay all available historical samples for S and update the database with analyses. Remove all high detection limit historical S data.
- A geometallurgical model should be further developed to provide material type prediction for mine and process planning including iron-bearing minerals (oxide, silicate, sulphide, and carbonate), iron oxide mineralogy and modal composition (magnetite, hematite, goethite, and limonite), and other potentially deleterious materials. This model should incorporate geological, lithological, mineralogical, and chemical data.
- A feasibility study for a Direct Reduction Pellet Feed (DRPF) project was conducted in partnership with BBA, to further remove silica from iron oxides while reducing energy consumption and improving iron recovery compared to traditional flowsheets. However, it has not been considered in any way in this Report. Once the design has reached a sufficient level of detail, its impact on the profitability of currently marginal ore should be assessed. Ultimate pit size, as cut-off grades and material routing, should be modified accordingly.
- Complete sampling campaigns should be performed under various feed conditions to fully understand the impact of magnetite on recovery and identify mitigation solutions. Depending on the sampling campaigns' results, the undertaking of a metallurgical testwork program could be recommended.
- An investigation into the causes of recovery losses resulting from plant operation methods and equipment performances should continue to be performed to optimize operation and implement mitigating actions.
- Haulage cycle time studies have shown that truck requirements will be significant at the end of the mine life. Efforts should be undertaken to identify alternative waste dump areas.
- Authorizations will be required at provincial and federal levels for various project infrastructure. Permits are required by spring 2024 for *Halde Sud* and by spring-summer 2025 for *Halde Sud-Ouest*, *Halde Nord*, Basin A and increase of the wastewater treatment plant capacity. Therefore, the permitting process should continue as a high-priority component.

2. Introduction

2.1 Ownership

In April of 2016, Champion Iron Limited (Champion or "the Company") acquired the Bloom Lake assets through its subsidiary Quebec Iron Ore (QIO) and the Quinto Claims for a cash consideration of $10.5M ($9.75M for Bloom Lake and $0.75M for Quinto) and the assumption of liabilities. Quebec Iron Ore Inc. was 63.2% owned by Champion Iron Limited, with the remaining 36.8% equity interest owned by Ressources Québec (RQ), acting as a mandatory of the Government of Québec. On May 29, 2019, the Company announced a transaction to acquire RQ's 36.8% equity interest in QIO and the transaction increased Champion's stake in QIO to 100%.

2.2 Basis of Technical Report

The following Report presents the results of the Mineral Resources and Mineral Reserves (MRMR) for the development of the Bloom Lake Mine. Quebec Iron Ore mandated engineering consulting group BBA to perform some chapters and lead the preparation of this Technical Report, based on contributions from QIO and independent consulting firms, namely SRK Consulting (U.S.), Inc. and Soutex.

As of the date of this Report, Quebec Iron Ore is a Canadian mineral exploration company trading on the TSX, through Champion Iron Ltd., under the trading symbol (CIA), with its head office situated at:

Quebec Iron Ore
1155 René-Lévesque Blvd. West
Suite 3300
Montréal, Québec H3B 3X7

This Report, titled "Mineral Resources and Mineral Reserves for the Bloom Lake Mine, Fermont, Québec, Canada" (the "Report"), was prepared by qualified persons (QPs) following the guidelines of the NI 43-101 and of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Standards on Mineral Resources and Reserves.

2.3 Scope of Study

Since 2019, additional diamond drilling was done, understanding of the deposit was improved through modelling techniques, mining and processing, and iron ore prices have been higher than the 2019 FS forecast. This led to a re-estimation of the mineral resource at the Bloom Lake mine, which suggested an increase of over 30%. This was considered a material change and therefore triggered a more advanced study (this Technical Report) to confirm and publicly disclose this increase.

While the life of mine plan has been reworked and the pit designs have been readjusted, the change in mineral reserve is not material. This Report, however, includes all the required sections to justify reserves despite this non-material change.

2.4 Report Responsibility and Qualified Persons

The following individuals, by virtue of their education, experience and professional association, are considered QPs as defined in NI 43-101, and are members in good standing of appropriate professional institutions.

- André Allaire, P.Eng., PhD. BBA Inc.
- Benoit Ouellet, P.Eng. BBA Inc.
- Vincent Blanchet, P.Eng. Quebec Iron Ore
- Olivier Hamel, P.Eng. Quebec Iron Ore
- Erik Ronald, P.Geo. SRK Consulting (U.S.), Inc.
- Jérôme Martin, P.Eng. Soutex

The preceding QPs have contributed to the writing of this Report and have provided QP certificates, included at the beginning of this Report. The information contained in the certificates outlines the sections in this Report for which each QP is responsible. Each QP has also contributed figures, tables and portions of Chapters 1 (Summary), 2 (Introduction), 3 (Reliance on Other Experts), 25 (Interpretation and Conclusions), 26 (Recommendations), and 27 (References). Table 2-1 outlines the responsibilities for the various sections of the Report and the name of the corresponding qualified person.

Table 2-1: Qualified persons and areas of report responsibility

Chapter	Description	Qualified Person	Company	Comments and exceptions
1.	Summary	A. Allaire	BBA	
2.	Introduction	A. Allaire	BBA	
3.	Reliance on Other Experts	A. Allaire	BBA	
4.	Project Property Description and Location	A. Allaire	BBA	
5.	Accessibility, Climate, Local Resource, Infrastructure and Physiography	A. Allaire	BBA	
6.	History	V. Blanchet	QIO	
7.	Geological Setting and Mineralization	V. Blanchet	QIO	
8.	Deposit Types	V. Blanchet	QIO	
9.	Exploration	V. Blanchet	QIO	

Chapter	Description	Qualified Person	Company	Comments and exceptions
10.	Drilling	V. Blanchet	QIO	
11.	Sample Preparation, Analyses and Security	V. Blanchet	QIO	
12.	Data Verification	E. Ronald	SRK	
13.	Mineral Processing and Metallurgical Testing	J. Martin	Soutex	
14.	Mineral Resource Estimate	E. Ronald	SRK	
15.	Mineral Reserve Estimate	O. Hamel	QIO	
16.	Mining Methods	O. Hamel	QIO	
17.	Recovery Methods	J. Martin	Soutex	
18.	Project Infrastructure	A. Allaire	BBA	
19.	Market Studies and Contracts	A. Allaire	BBA	
20.	Environmental Studies, Permitting, and Social or Community Impact	B. Ouellet	BBA	
21.	Capital and Operating Costs	O. Hamel	QIO	
22.	Economic Analysis	O. Hamel	QIO	
23.	Adjacent Properties	V. Blanchet	QIO	
24.	Other Relevant Data and Information	V. Blanchet	QIO	
25.	Interpretation and Conclusions	A. Allaire	BBA	
26.	Recommendations	A. Allaire	BBA	
27.	References	A. Allaire	BBA	

2.5 Effective Dates and Declaration

The Mineral Resource Statement effective date, as well as the overall effective date of this Report, is April 1, 2023.

2.6 Sources of Information

This Report is based in part on internal company reports, maps, published government reports, company letters and memoranda, and public information, as listed in Chapter 27 "References" of this Report. Sections from reports authored by other consultants may have been directly quoted or summarized in this Report and are so indicated, where appropriate.

This Report has been completed using available information contained in, but not limited to, the following reports, documents and discussions:

- Technical discussions and information provided by Quebec Iron Ore;
- QPs personal inspection of the Bloom Lake property;
- 2019 Feasibility Study.

2.7 Site Visits

The following list describes which qualified persons visited the Bloom Lake site, the date of the visit, and the general purpose of the visit:

- Olivier Hamel, QP (QIO), visits the property on a regular basis being a full-time employee of Quebec Iron Ore.
- Vincent Blanchet, QP (QIO), visits the property on a regular basis being a full-time employee of Quebec Iron Ore.
- André Allaire, QP (BBA) visited the property on June 20, 2022. The purpose was to visit the mine and concentrator for general information exchanges and have a meeting as part of a separate mandate.
- Benoit Ouellet, QP (BBA) did not visit the property as it was not required for the purpose of this mandate.
- Jérôme Martin, QP (Soutex), visited the property on various occasions and most recently on May 9, 2023 as part of this current mandate. The purpose of the visit was to support the Phase II concentrator operations.
- Erik Ronald, QP (SRK), visited the property on February 22, 2022, for four days. The purpose of the site visit was to observe site geology and review current procedures related to ore control, short range mine planning, reconciliation, site analytical work, and resource modelling. The site visit included a tour of the mine, core preparation, mill, site laboratory, stockpiles, and rail loadout facilities.

2.8 Currency, Units of Measure, and Calculations

Unless otherwise specified or noted, the units used in this Report are metric. Every effort has been made to clearly display the appropriate units being used throughout this Report.

- Currency is in Canadian dollars (CAD or $), unless otherwise stated;
- A Canadian dollar (CAD) to United States dollar (USD) exchange rate of CAD1.27 for USD1.00 was used;
- This Report may include technical information that required 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 QPs consider them immaterial.

2.9 Definitions

The Mineral Resources and Mineral Reserves definitions used for this Report follow the May 19, 2014 "CIM Definition Standards – for Mineral Resources and Mineral Reserves" and the November 29, 2019 "CIM Estimation of Mineral resources and Mineral Reserves Best Practice Guidelines". The QPs believe that these definitions are important with respect to understanding Resources and Reserves and how they are applied within the context of a Mineral Resources and Mineral Reserves study.

3. Reliance on Other Experts

3.1 Introduction

The authors have written this Technical Report using existing information gathered from previous studies and engineering design work undertaken for the Phase I and II operations, historical operational data from the Phase I concentrator, historical data from the operation of the Bloom Lake mine, technical field surveys, a metallurgical testwork campaign and additional infill drilling on the Bloom Lake property.

The existing technical data and information was sourced from the document archives located at the Bloom Lake mine. The authors of this Report have not carried out a thorough review of each consultant's work. The sections provided for this Report were supplied by reputable consultants, and there is no reason to doubt the validity of the information.

3.2 Mineral Tenure and Surface Rights

BBA has not verified the legal titles of the property nor any underlying agreement(s) that may exist concerning the licenses or other agreement(s) between third parties but has relied on Quebec Iron Ore (QIO) for conducting the proper legal due diligence. The status of the mining claims under which QIO holds title to the mineral rights for the Bloom Lake project has been compiled and verified by QIO. The description of the property is provided for general information purposes only.

3.3 Taxation

The Bloom Lake Mine is currently in production and this Technical Report does not include a material expansion of the current production. Therefore, the economic analysis was not reviewed in this Report.

3.4 Markets

The long-term iron ore price of the future Bloom Lake concentrate was determined in line with the consensus prices of 17 well recognized global research firms and with Wood Mackenzie's calculations. This firm was elected as a benchmark as it has historically gathered the largest amount of data to deliver market forecasts. Wood Mackenzie generally holds conservative assumptions.

4. Property Description and Location

The Bloom Lake property is in the Labrador Trough area on the edge of the border between Québec and Labrador. There are several active iron ore mines in the area:

- Mont-Wright and Fire Lake, owned by ArcelorMittal Mines Canada (AMMC), in Québec;
- Carol Lake, owned by Iron Ore Company of Canada (IOC), in Labrador;
- Scully Mine, owned by Tacora Resources Inc. (Tacora), in Labrador. Tacora has recently reactivated operations at Scully Mine; the first train of concentrate from the concentrator arrived in Pointe Noire at the end of June 2019.

The Bloom Lake property is owned by Quebec Iron Ore (QIO). QIO has owned the property and the facilities at the Bloom Lake mining site since April 12, 2016.

QIO's parent company, Champion Iron Limited (Champion), owns a significant number of claims in the region. These claims are too numerous to list, hence only the QIO claims and lease are explicitly listed in this chapter. However, a map of all claims and properties owned by Champion in the Labrador Trough is presented in Figure 4-1.

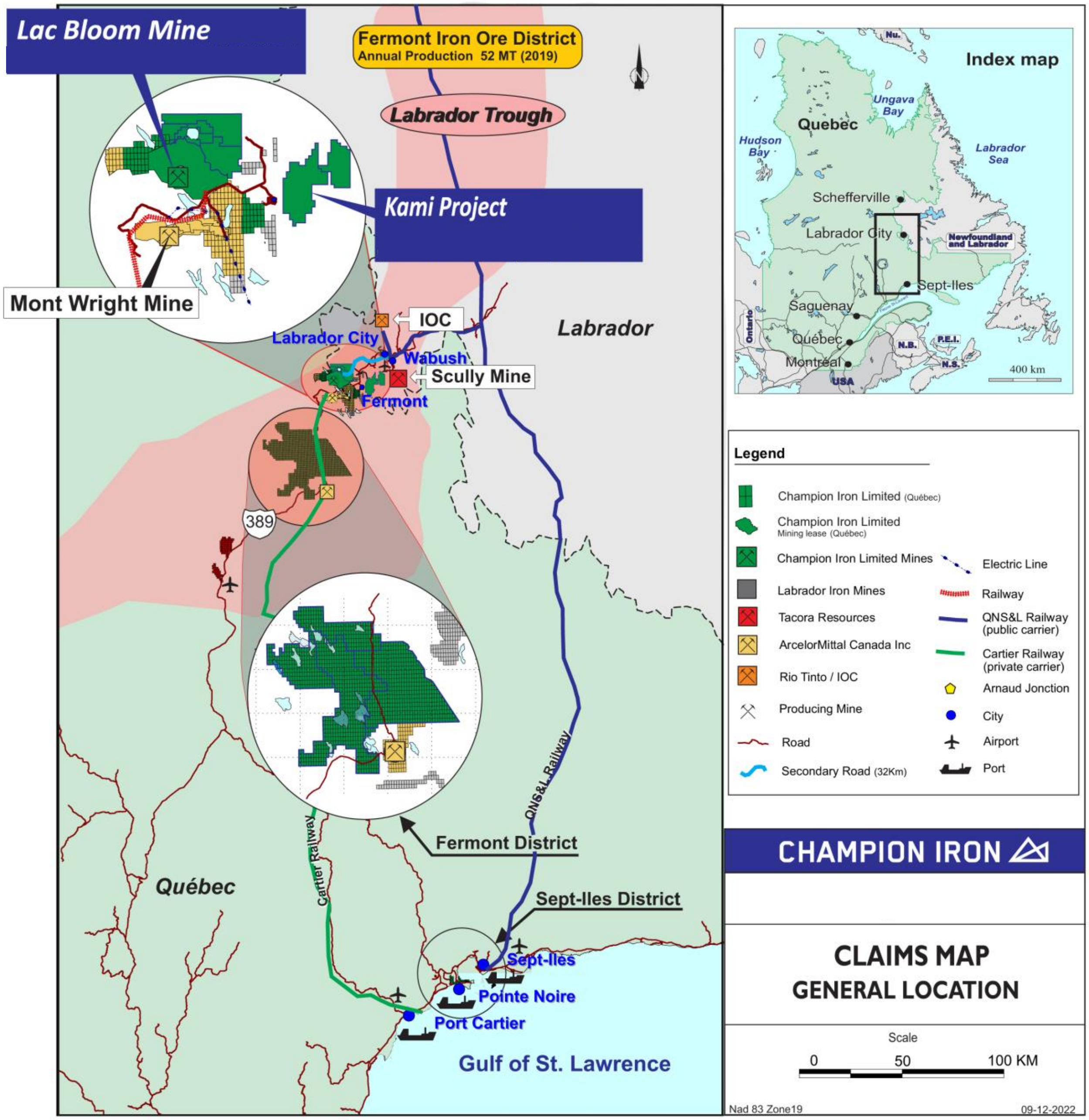


Figure 4-1: All Champion's claims and leases

4.1 Property Description and Location

The mining site is in the Côte-Nord administrative region of the province of Québec, adjacent to the Labrador and Newfoundland border, in Normanville Township, Kaniapiskau County. The property is centred at latitude 52° 50’ North and longitude 67° 16’ West, 13 km west of the town of Fermont and 30 km southwest of the municipalities of Wabush and Labrador City.

All surface rights for claims/lease explicitly listed in Table 4-1 and Table 4-2 are property of the Crown, that is, the Federal Government of Canada.

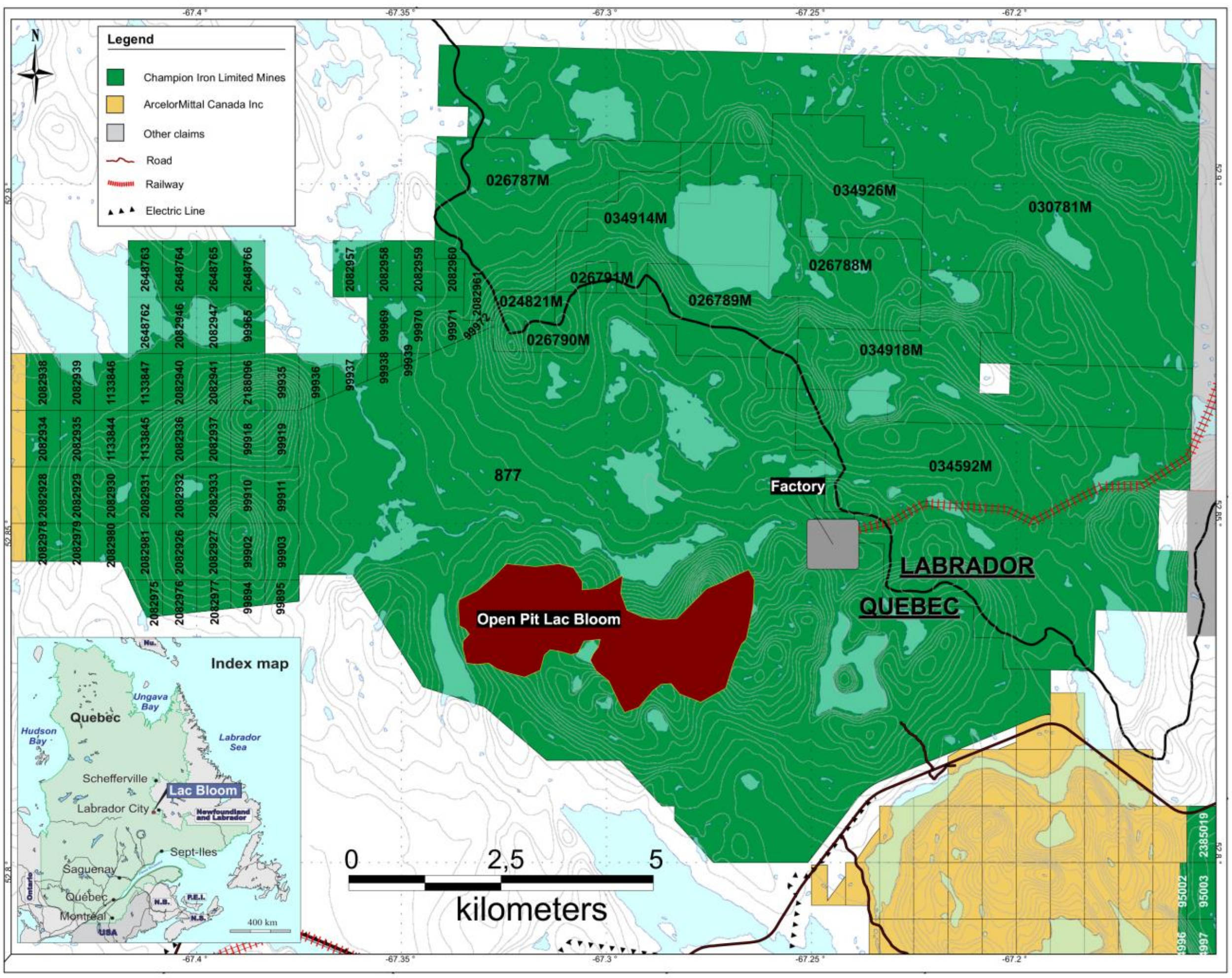


Figure 4-2: Bloom Lake overview map

4.2 Mineral Titles

4.2.1 Nature and Extent of Issuer's Interest: Bloom Lake Mine Lease

All reserves and resources disclosed in Chapters 14 and 15 of this Report are within the Bloom Lake mine lease (BM877).

This lease covers 6,858 ha and will expire in 2029. It can be renewed thrice for 10 years if all required conditions are met.

4.2.2 Nature and Extent of Issuer's Interest: Québec

As of January 2023, QIO holds 100% of 58 claims located north and northwest of the Mining Lease (BM877); these mining claims cover a total of 2,696 ha. The claims outside the mining lease are in good standing and are listed, with the Mining Lease, in Table 4-1.

Table 4-1: QIO Mining lease and claims (Québec)

BM 877	CDC 99938	CDC 2082927	CDC 2082939	CDC 2082977
CDC 99894	CDC 99939	CDC 2082928	CDC 2082940	CDC 2082978
CDC 99895	CDC 99965	CDC 2082929	CDC 2082941	CDC 2082979
CDC 99902	CDC 99969	CDC 2082930	CDC 2082946	CDC 2082980
CDC 99903	CDC 99970	CDC 2082931	CDC 2082947	CDC 2082981
CDC 99910	CDC 99971	CDC 2082932	CDC 2082957	CDC 2188096
CDC 99911	CDC 99972	CDC 2082933	CDC 2082958	CDC 2648762
CDC 99918	CDC 1133844	CDC 2082934	CDC 2082959	CDC 2648763
CDC 99919	CDC 1133845	CDC 2082935	CDC 2082960	CDC 2648764
CDC 99935	CDC 1133846	CDC 2082936	CDC 2082961	CDC 2648765
CDC 99936	CDC 1133847	CDC 2082937	CDC 2082975	CDC 2648766
CDC 99937	CDC 2082926	CDC 2082938	CDC 2082976	

4.2.3 Nature and Extent of Issuers' Interest: Labrador

Following the acquisition of Supreme Metals Corp. in 2020, QIO now holds a significant claim area on the north side of the border. Unlike other properties, these mining claims are contiguous with the Bloom Lake Mine Lease and are therefore detailed in this Report.

As of January 2023, QIO holds 100% of five Claim Groups, themselves containing a total of 152 mining claims and covering a total of 3,776 ha. Champion Iron Limited holds 100% of six Claim Groups, themselves containing 193 mining claims and covering 4,701 ha.

Table 4-2: QIO and Champion's mining claim groups (Labrador)

QIO	Champion
024821M	026787M
034592M	026788M
034914M	026789M
034918M	026790M
034926M	026791M
	030781M

4.2.4 Notes

Due to different legislative entities being involved with the claims (Québec and Newfoundland & Labrador), the area and coverage of some claims overlap.

As displayed on Figure 4-2, Claim Group 034918M is missing one claim due to a suspected clerical error in claim grouping. It is expected to be resolved by the time the Report is published.

4.2.5 Other Claims

In the Labrador Trough, Champion Iron Limited holds, in addition to claims already listed in Table 4-1 and Table 4-2, the following:

- Directly — On the Québec side of the border: 1,596 additional claims (111 of which are held with Cartier Resources inc. 45%-55%) covering a total area of 82,472 ha.
- Through Kami General Partner Limited — On the Labrador side of the border: 3 Claim Groups containing 288 claims and covering a total area of 7,202 ha. Within those claims: Mining Lease #234 covering 404 ha and Surface Lease #142 covering 4,236 ha

These claims are shown on Figure 4-1.

4.3 Royalties

The property is not subject to any royalties.

4.4 Property Agreements

The Impact Benefit Agreement, which is a confidential agreement with First Nations in the area, is in effect and further described in Chapter 20.

4.5 Permitting

Most permits have been obtained, as the mine and mill are currently in operation. Some remain to be obtained with regards to future waste dumps and tailings expansions. More details are presented in Chapter 20.

5. Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Accessibility

The mine site lies approximately 13 km west of the town of Fermont (central geographical coordinates 52° 50' N and 67° 16' W). A 5-km access road has been constructed to connect the Bloom Lake mine with Highway 389. It is accessible by road from Baie-Comeau on the north shore of the Saint Lawrence River, as well as by road from the Wabush airport in Newfoundland & Labrador. The Wabush airport is located approximately 30 km from the Bloom Lake mine. The mine site is located approximately 950 km northeast of Montreal.

The rail access to port consists of three separate segments. The first segment is the rail spur on site, consisting of a 31.9-km long segment that is operational and connects to the Quebec North Shore and Labrador (QNS&L) railway at the Wabush Mines facilities in Wabush, Labrador. This first segment belongs to QIO. The second segment employs the QNS&L railway from Wabush to Arnaud Junction in Sept-Îles. The third section is from Arnaud junction to Pointe-Noire (Sept-Îles), property of *Les Chemins de Fer Arnaud* in Sept-Îles, Québec, where the concentrate is unloaded, stockpiled, and loaded onto vessels. The third segment is owned by the SFPPN (*Société Ferroviaire et Portuaire de Pointe-Noire*), a limited partnership composed by the Government of Québec through the *Société du Plan Nord* and other industrial partners. The assets were acquired by the SFPPN from Cliffs' CCAA. QIO is a current member of the SFPPN board of directors.

5.2 Climate

The climate at Fermont is defined as sub-arctic with temperatures ranging from -40°C to +25°C. The prevailing winds are mostly from the west at an average speed of 14 km/h. Average daily maximum temperatures above freezing normally starts in April and falls below freezing by end of October.

5.3 Local Resources

The town of Fermont has a population of 2,256 according to Statistics Canada's 2021 survey (Statistics Canada, 2021) and is the residential town for employees working for ArcelorMittal's Mont-Wright mine operations. The town has all the required infrastructure to support employees and families who live there. QIO currently owns a total of 839 rooms in the town of Fermont distributed among installations listed in Table 5-1.

Table 5-1: Housing infrastructure

Description	Location	Number of buildings	Total Rooms
Housing Complex	Rue du Fer	2 + Cafeteria, Offices, Gym	195
Construction Camp	Mine Lease	10 + Cafeteria, Gym	300
Houses	Rue des Bâtisseurs	22	156
House	Rue Bougainville	1	7
House	Rue Alexandre	1	3
Houses	Rue Mélèzes	4	28
Houses	Rue Graphite	4	24
Apartment Blocks	Rue des Bâtisseurs	16	94
Apartment Blocks	Rue Carrefour	8	32

Current accommodations are fully equipped with furniture, linen, and wiring for communications and entertainment.

Electrical power for the project is supplied by Hydro-Québec from a T-tap off the 315 kV transmission line L3039 (Montagnais-Normand), which terminates in an existing 315-34.5 kV substation (Substation W), owned by QIO. The substation is located along Provincial Route 389 and includes two 315-34.5 kV, 48/64/80 MVA, oil-filled power transformers. It feeds the existing concentrator plant and mine site via 34.5 kV distribution lines. Further description of power delivery is in Chapter 18.

5.4 Physiography

The topography of the lease area is relatively hilly. The typical elevations vary between 671 m and 762 m and the highest peak culminates at about 845 m.

6. History

6.1 Prior Ownership and Exploration

In 1951, following the discovery of a cobalt showing at Bloom Lake, James and Michael Walsh staked mining claims for Mr. Bill Crawford of Sursho Mining Corporation (SMC). In February 1952, Quebec Cobalt and Exploration Limited (QUECO) was incorporated to acquire the claims held by SMC.

In 1952, a crew of six prospectors, under the supervision of Mr. K. M. Brown, began a program to prospect an area that included the Bloom Lake property. In June 1952, Mr. R. Cunningham, a mining geologist with Québec Metallurgical Industries, began to map the various cobalt occurrences at Bloom Lake. Although the results for cobalt were disappointing, several zones of magnetite-hematite iron formation (IF) were identified between Bloom Lake and Lac Pignac and were sampled. Further exploration was conducted in 1953.

In 1954, Mr. Cunningham supervised a program to investigate the iron occurrences through line cutting, geological mapping, and magnetometer surveys (Cunningham, 1954). In 1955, Jones and Laughlin Steel Corporation (J&L) optioned the property from QUECO. Cleveland-Cliffs Iron Company (CCIC) joined with J&L and conducted a diamond drill program from 1956 through 1957. Two drills were brought to the property and two series of holes, the "QC" and the "X" series, were drilled to test IF on the Bloom Lake property. Holes X-1 to X-11 (XRT - ¾" diameter core) amounted to 446 m and Holes QC-1 to QC-30 (AXT size 1.28" diameter core) totalled 4,769 m. The holes were largely drilled on sections of 800 ft to 1,000 ft apart (244 m to 305 m). Four of these drillholes were drilled on the west part of the property.

More drilling was conducted in 1966 by Boulder Lake Mines Incorporated, a subsidiary of CCIC, and Jalore Mining Company Limited (Jalore), a subsidiary of J&L. Holes X-12 to X-20, totalling 175 m, and other holes were drilled as part of this campaign, but these were not on the present property. Some ground magnetometer surveying was also conducted in 1966. J&L's option on the property was terminated in 1968.

In 1971, exploration on the property was renewed by a QUECO-sponsored program that was managed by H. E. Neal & Associates Ltd. (HEN). The exploration program consisted of line cutting, geological mapping, gravity and magnetometer surveys, and diamond drilling in 1971 and 1972.

These holes were drilled to investigate the potential for IF beneath the amphibolite on the eastern side of the property. Nine drillholes were done in 1971 for a total of 1,834.23 m (341 samples) and 12 were drilled in 1972 (3,497.79 m and 341 samples). Eight of the drillholes were done on Bloom Lake West in 1971 and five were drilled in 1972. The mapping and magnetometer surveys were designed to fill in areas not previously surveyed. The gravity survey was conducted to help evaluate the potential for IF beneath the amphibolite.

In 1973, Republic Steel Corporation optioned the property and HEN prepared a "Preliminary Evaluation" of the property that consisted of currently held property and claims further to the west. This work was conducted until 1976 (H. E. Neal & Associates, 1976). The evaluation included "mineral reserve" estimates, a metallurgical test program, and a preliminary mine design. The mine design included pit outline, dump area, access roads, and railway spur. Dames and Moore prepared the mine design and "reserve" estimates. Lakefield Research (Lakefield) conducted the metallurgical testwork.

In 1998, a major exploration program was conducted by Watts, Griffis and McOuat (WGM) for QCM (Risto et al., 1998), which then held the Bloom Lake property under option from Consolidated Thompson-Lundmark Gold Mines Limited (CLM). QCM held the option on the property until 2001, but no work was conducted between 1998 and 2005. The 1998 program included line cutting, surveying, road building, camp construction, diamond drilling, geological mapping, mini-bulk sampling, bench-scale preliminary metallurgical testwork, preparation of a "mineral resource" estimate, camp demobilization, and site clean-up.

In 2005, CLM retained WGM to conduct a technical review, including the preparation of a mineral resource estimate for the Bloom Lake iron deposit to assist CLM in making business decisions and future planning (Risto et al., 2005). The technical review was prepared in compliance with the standards of NI 43-101 in terms of structure and content. The mineral resource estimate was prepared in accordance with NI 43-101 guidelines and CIM standards. In 2006, Consolidated Thompson-Lundmark Gold Mines Limited changed its name to Consolidated Thompson Iron Mines Limited (Consolidated Thompson). This name change reflected the company's focus on iron ore mining and exploration.

From 2006 to 2007, Consolidated Thompson drilled 17 drillholes (2,884.36 m) on the site of the future pit in order to get a sample for metallurgical testwork. The Lakefield laboratory performed these tests. In 2006, bulk sampling took place in the area of the future pit.

Overall, 243 drillholes were made between 1957 and 2009 for a total of 45,386 m, and 273 drillholes in 2010, 2012 and 2013 for a total of 89,197 m. Four geotechnical holes were drilled in 2014. The complete description of the drill programs are described in Chapter 10.

The construction of the Bloom Lake mining started in 2008 and the plant was commissioned by Consolidated Thompson Iron Mines Limited in December 2009.

Almost immediately after start-up, Consolidated Thompson started a feasibility study to double the Bloom Lake site production by the addition of a second concentrator. The study was completed in June 2010 and the construction of the Phase II concentrator started in Q4 of 2010 under CLM and continued after the acquisition of the Bloom Lake site by Cliffs Natural Resources (Cliffs) in May 2011.

The Phase II concentrator construction was halted in November 2012 due to falling iron ore prices. Operations at the Bloom Lake site were halted in December 2014 due to the declining iron ore concentrate prices and high operating costs.

On April 12, 2016, Quebec Iron Ore acquired the Bloom Lake assets under the Companies' Creditors Arrangement Act (CCAA) proceeding and restarted the operations on February 16, 2018.

6.2 Operations Under Current Ownership

Operations at the Bloom Lake site were resumed in February 2018 after completing major modifications to the beneficiation circuit and other parts of the site with the objective of increasing concentrate production while ensuring a low production cost. The site achieved a concentrate production of 6,994,500 wet metric tons for its first full year of operation (fiscal year ending March 31, 2019).

The Phase II concentrator construction was completed and reached commercial production in December 2022.

6.3 Historical Production

Table 6-1 shows the historical mining extraction and concentrate production from 2010 to 2022 in dry metric tons per year unless otherwise stated.

Table 6-1: Historical mining extraction and concentrate production (2010 to 2022)

	2010	2011	2012	2013	2014 (1)	2015 to 2017	2018 (2)	2019 (2)	2020 (2)	2021 (2)	2022 (2)
	dry metric tons (dmt)						wet metric tons (wmt)				
Iron Ore Mined	10.3	16.9	17.0	17.6	19.3	0	2.7	19.7	20.8	21.6	22.3
Iron Ore Processed	8.2	15.6	15.8	18.4	18.9	0	1.8	18.5	19.7	20.6	21.0
Iron Ore Concentrate Production	3.2	5.5	5.5	5.9	5.9	0	0.6	7.0	7.9	8.0	7.9

(1) Production halted in mid-December 2014.

(2) Fiscal years ending on March 31, 2018 and 2019 respectively.

7. Geological Setting and Mineralization

7.1 Regional Geology

The Bloom Lake Iron Deposit lies within the Fermont Iron Ore District (FIOD), a world-renowned iron-mining camp at the southern end of the Labrador Trough within the geological Grenville Province. The Labrador Trough extends along the margins of the eastern boundary of the Superior-Ungava craton for more than 1,200 km and is up to 75 km wide at its central part. The Bloom Lake deposit is located within the Parautochtonous Deformation Belt of the Grenville Province of the Canadian Shield, just south of the Grenville Front. The Grenville Front, the northern limit of the Grenville Province, truncates the Labrador Trough, separating the Churchill Province greenschist metamorphic grade part of the Labrador Trough rocks from their highly metamorphosed and folded counterparts in the Grenville Province.

The western half of the Labrador Trough, consisting of a thick sedimentary sequence, can be divided into three sections based on changes in lithology and metamorphism (north, central and south). The Trough is comprised of a sequence of Proterozoic sedimentary rocks including iron formations (IF), volcanic rocks and mafic intrusions known as the Kaniapiskau Supergroup. The Kaniapiskau Supergroup consists of the Knob Lake Group in the western part of the Trough and the Doublet Group, which is primarily volcanic, in the eastern part. The Kaniapiskau Supergroup within the Grenville Province is highly metamorphosed and complexly folded. It was named Gagnon Group before correlations were made between sequences located on each side of the Grenville Front. It occurs as numerous isolated segments. From the base to the top, it includes a sequence of gneisses and schists, a group of chemically precipitated sediments, and more schists, including some distinctive aluminous varieties. Gabbro sills intrude parts of the sequence, and granites are found in the gneiss.

The Central or Knob Lake Range section extends for 550 km south from the Koksoak River to the Grenville Front located 30 km north of Wabush Lake. The principal iron formation unit, the Sokoman Formation, part of the Knob Lake Group, forms a continuous stratigraphic unit that thickens and thins from sub-basin to sub-basin throughout the fold belt.

Iron deposits in the Grenville part of the Labrador Trough comprise Bloom Lake, Lac Jeannine, Fire Lake, Mont Wright and Mount Reed, and the Luce, Humphrey and Scully deposits in the Wabush area. The high-grade metamorphism of the Grenville Province is responsible for recrystallization of both iron oxides and silica in primary iron formation, producing coarse-grained sugary quartz, magnetite, specular hematite schists (meta-taconites) that are of improved quality for concentrating and processing. Figure 7–1 shows the simplified geological map of the Labrador Trough.

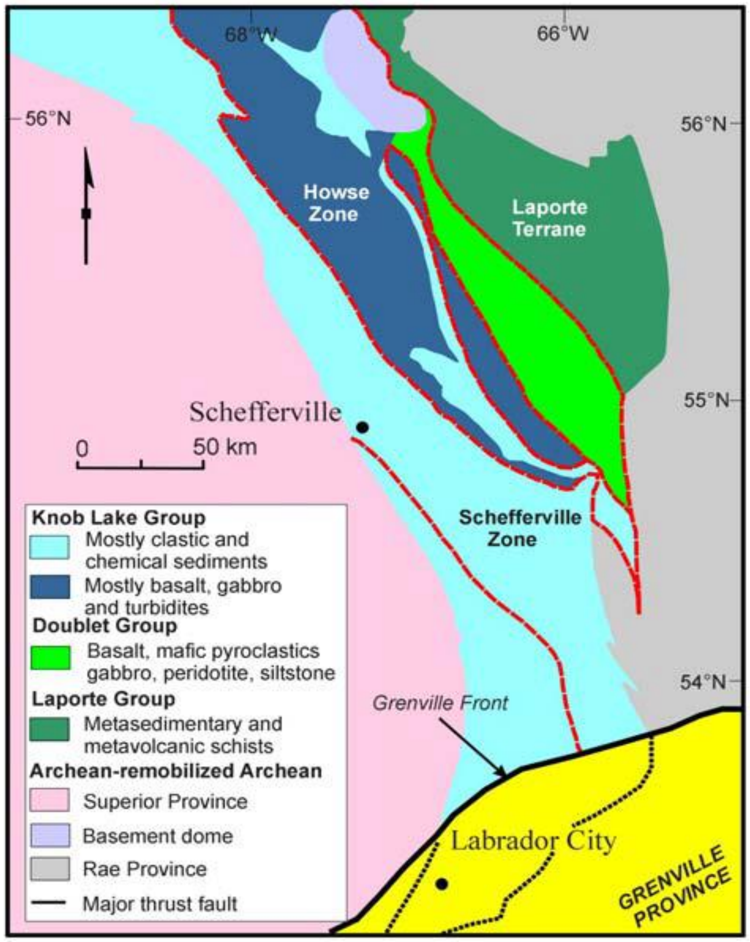


Figure 7–1: Simplified geological map of the Labrador Trough (Gross, 2009)

In the region, at least two stages of deformation are recognized. The first stage produced linear belts that trend northwest, like the well-defined structural trends in the central part of the Labrador geosyncline; the second stage formed linear belts that trend east to northeast, parallel with the major structural trends developed in the Grenville Province. Folds now present both stages of deformation in form and orientation. For example, in the Wabush Lake area, folds trend N20°E and in the central part of the area, around Lamêlée Lake and Midway Lake, they trend N35°W. Isoclinal and recumbent folds overturned to the west or southwest are common, and it is inferred that this deformation produced thrust faults striking northwest and dipping east. Structures developed during the earlier stage of deformation are believed to have been like those now seen in the central part of the Labrador geosyncline, and it is highly probable that the structures produced by this early stage of deformation, in the south and those in the central and northern regions, were the result of the same orogeny.

The second stage of structural deformation took place during the Grenville orogeny between 0.8 and 1.2 Ga years ago. Its effects are not so intense north of Wabush Lake near the margin of the Grenville belt as they are throughout the region to the south. Near the margin of the Grenville belt, cross-folds trending east or northeast appear to be superimposed on the earlier northwest-trending structures. Around Mont Wright and farther south, the trend of the overall structure is east to northeast and the prevailing dip of foliation is 55°N. Tightly folded and faulted structures developed during the earlier stage of deformation were further deformed by folding and faulting during the Grenville orogeny. Oblique sections through the resulting complex fold structures are exposed at the present erosion surface. Many of the minor folds appear to plunge steeply to the northwest, but the axes of these folded folds are not straight for any appreciable distance.

Regional structures developed during the Grenville orogeny play out against the stable craton area of the ancient Superior Province. Folds and faults along the northwest margin of the Grenville Province trend west, and the general pattern of folds overturned to the south or southeast formed in conjunction with north-dipping reverse faults indicates overriding of the northerly blocks towards the southeast. The relative amount of movement between adjacent fault blocks is suggested by the position of iron formation in local structures. At Bloom Lake, iron formation is present in a relatively simple syncline that extends to a much greater depth than that in the Boulder Lake basin situated at the north. Still farther south at Mont Wright, the erosion surface cuts the upper part of steeply plunging folds. Southeast from the margin of the Grenville belt, the dips of westerly striking faults are progressively less steep, and the greatest amount of movement appears to have taken place between the Bloom Lake fault block and the Mont Wright block.

The iron formation and associated metasedimentary rocks, which were derived from an assemblage of continental shelf-type sediments, do not appear to extend south beyond a line trending northeast from the Hart-Jaune River linear to Plaine Lake and northeast to Ossokmanuan Lake. Granite-gneisses, charnockites and anorthosites are part of the rock assemblage south of this line. These typical deep-seated Grenville rocks may have been thrust northwest along a system of faults that coincide with this line. The large suite of gabbro intrusions in the area between Wabush Lake and Ossokmanuan Lake were probably intruded along faults in this linear zone.

7.2 Local Geology

7.2.1 General

The geology and geological interpretations for the Bloom Lake property are based on data from a number of sources. These sources include the diamond drilling and mapping done on the property as part of the 1998 program, presented by WGM (Risto et al., 1998), as well as the drilling conducted in 1956, 1957, 1967, 1971, 1972 and 2007-2014 programs. The geological interpretation relies heavily on the mapping programs conducted in 1952 and the ground magnetic surveys carried out in 1967 and 1971/72 as compiled in 1973 and the survey done in April 2008. The calculated magnetic vertical gradient in the Bloom Lake area is presented in Figure 7-2.

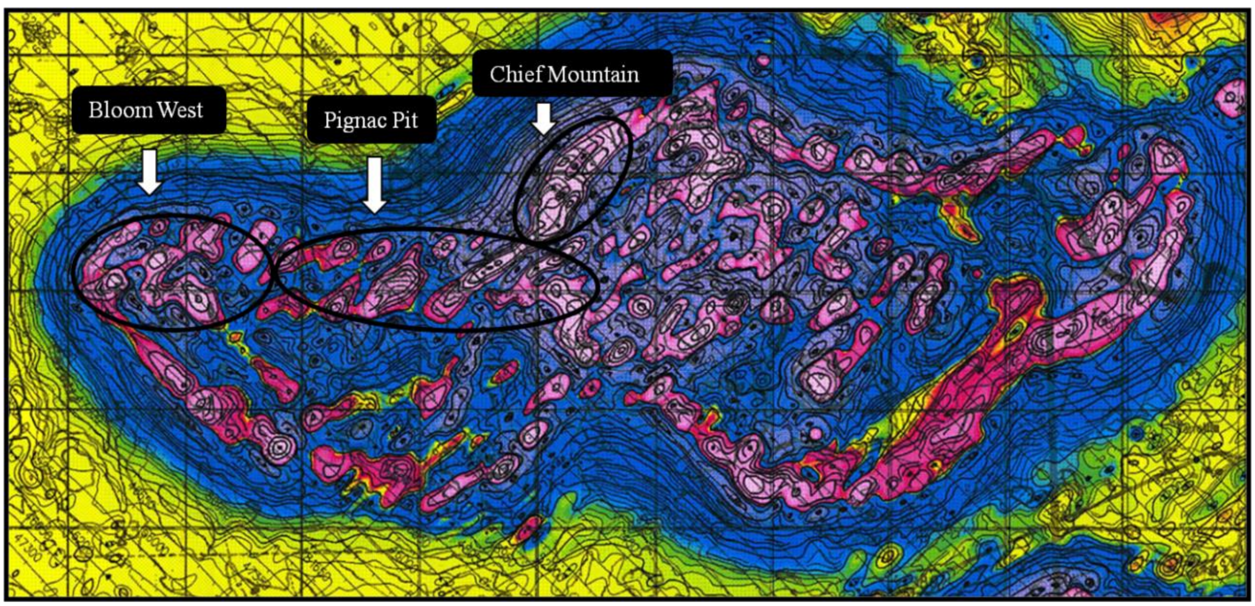


Figure 7-2: The calculated magnetic vertical gradient in the Bloom Lake area (From GM 57129)

The following local geology description and structural interpretation are mostly from Rioux (2009).

Several rock type codes are hybrid codes of the main rock types and are not described separately. Iron formations are described in Section 7.3 of this chapter.

Gneiss (GN)

With the current knowledge, gneiss constitutes the basic unit for metasedimentary rocks. This rock presents a typical banding varying from 1 cm to 2 m. Most of its composition is mafic and the felsic bands are dominated by feldspars with quartz in minor quantity. Biotite is abundant through the gneiss and many transitions to mica schists occur. The gneiss contains less mica but more feldspar and quartz than QRMS (see below). The basal QRMS sequence consists mostly of muscovite and biotite schist with characteristic porphyroblasts of garnet and feldspar.

Quartz Rock (QR) and its Related Variant Quartz Rock Iron Formation (QRIF)

QR is used to define a rock type consisting mostly of quartz, 95%+, vitreous, grey or pinkish colour, with minimal to no specularite and/or magnetite content. This material may have been derived from chert, quartzite or quartz pebble conglomerate and the various textural varieties are not distinctly coded or distinguished.

QRIF intervals were defined on the basis of a quartz dominant rock containing less than 15% of total iron but containing some iron in the form of specularite and/or magnetite or silicate. QRIF is therefore a rock often transitional between IF and QR, or SIF and QR. The QRIF may contain minor actinolite-SIF.

Quartz Rock Mica Schist (QRMS)

It is used mainly for the schist sequence at the base of the IF sequence beneath the QR unit. QRMS has occasionally, however, been used for coding thin mica-rich units within the IF sequence.

Silicate Iron Formation (SIF)

Two main types have been recognized on the property. One of them is dominated by actinolite, while in the other, grunerite is most prevalent. The two types can be transitional into one another and likely there is also some tremolite-rich SIF present. The IF in these areas is also often enriched in magnetite as compared with specularite. These units are less abundant in the west part of the property than in the eastern half of the Bloom Lake pit area and Chief’s Peak.

Amphibolite (AMP)

It is dominantly a competent, dark green to black, medium to coarse grained rock consisting mainly of hornblende, biotite and feldspar. This rock is relatively homogeneous and marked by a very pronounced foliation. Grain size varies widely. The occurrence of millimetric reddish garnet is observed over distances of 10 m. The amphibolite-IF contacts are sharp. A narrow argillized zone of amphibolite often occurs immediately above the IF contact.

Gabbro

Bodies of medium-grained gabbro and amphibolite stand as hills among the quartz-bearing rocks of the Gagnon Group. They were apparently injected into the competent rocks during deformation and themselves remobilized during the later stages of metamorphism. The gabbro was originally ophitic in texture with speckled textures into foliated amphibolite. Gabbro is more common in the northern part of the injected zone and amphibolite is more present in the southern part. In places, gabbro cores remain in the centre of thick amphibolite sills. The typical gabbro of this type contains 40% to 50% plagioclase with other mafic minerals (olivine, hypersthene) and a few percent of opaque oxides.

7.2.2 Structural Geology

The Bloom Lake deposit comprises gently plunging synclines on a main east-west axis separated by a gently north to northwest plunging anticline. One of these synclines is centred on Triangle Lake, while the centre for the other is located just north of Bloom Lake. The Bloom Lake property is centred primarily on the eastern syncline but covers a portion of the northern limb of the western one.

These synclines are the result of a minimum of two episodes of folding and are of regional scale.

In addition to these regional scale folds, which have created the large-scale shape of Bloom Lake deposit, there are several other folds of diverse orientation on the property. It is not clear if all folding directions represent distinct folding episodes or progressive change in fold orientation with time.

Clearly visible on the ground magnetic survey map, a major discontinuity oriented north-northeast can be seen in the central portion of the west part. In drillhole, many zones of gravel, gouges, muddy and brecciated are clearly associated with it, suggesting a fault zone. More so, difficulties in correlating orebodies on each side of the possible fault strongly militate in that direction.

Also, thorough interpretation of geomorphic lineaments from aerial photographs demonstrates a north-northeast tendency, it is important to note that Triangle Lake and associated stream configuration suggest a north-northwest discontinuity associated with the north-northeast one.

7.3 Mineralization

The Bloom Lake deposits are about 24 km southwest of Labrador City and about 8 km north of the Mont Wright range. The western 6 km of this range contains very large reserves of specular hematite-magnetite iron formation in a synclinal structure that is regarded as a southwest extension of the Wabush Lake ranges.

The iron formation and quartzite are conformable within a metasedimentary series of biotite-muscovite-quartz-feldspar-hornblende-garnet-epidote schists and gneisses in a broad synclinal structure. This succession, following the first stage of folding and faulting, was intruded by gabbroic sills that were later metamorphosed and transformed into amphibolite gneiss with foliation parallel with that in adjacent metasediments. Two separate iron formation units are present; these join northwest of Bloom Lake, but are separated by several dozen metres of gneiss and schist in the southern part of the structure. Quartzite, present below the upper member throughout the eastern part of the area, pinches out near the western end. Folded segments and inclusions of iron formation in the central part of the syncline, which are surrounded by amphibolite, are in most cases thought to be part of an overlying sheet that was thrust over the main syncline during the first period of deformation. The large amphibolite mass in the central part of the area was apparently emplaced along the zone of weakness created by this early thrust fault.

Iron formation in the western 5 km to 6 km of the structure is predominantly the hematite-quartz facies that form the major zones of potential ore. The hematite is of the specularite type and has a silvery-grey colour and is non-magnetic. It is most often occurring as anastomosing to discontinuous stringers and of bands less than 10 cm thick in a quartz or actinolite-quartz matrix. Bands tend to be folded and deformed but also can be regular and tabular. Quartz is milky and granular.

Magnetite is scarce and typically occurs in narrow millimetric veinlets associated with quartz-carbonate veining material. The crystals are sub- to euhedral and demonstrate the typical dull to sub-metallic luster. When associated to hematite-enriched mineralization, the magnetite occurs as blebs of porous grains, often granoblastic, that may extend up to several centimetres. Enriched magnetite horizons are mostly found, but not always, in the upper portion of the iron formations in close contact with the amphibolite mass.

In the western sector of the Bloom Lake deposit, magnetite-rich IF is less important in volume than in the eastern half of the Bloom Lake pit area. The thickness of drillhole intercepts is lower than 10 vertical metres. Many drillholes did not return significant magnetite intersections. Very few actinolite or grunerite minerals associated with magnetite mineralization were described in the western holes.

A fairly abrupt change in facies takes place along strike east of a line passing northwest across Bloom Lake, east of where the grunerite-Ca-pyroxene-actinolite-magnetite-carbonate facies predominates.

The lower unit is less than 30 m thick in some places and is considerably thinner than the upper unit. The iron content ranges from 32% to 34% in this facies. In places, the silicate facies to the east contain more than 50% cummingtonite, which in part is magnesium rich, and the manganese content ranges from 0.1% to more than 2.0%. Mueller (1960) studied the complex assemblage of minerals in this rock and discussed chemical reactions during metamorphism in considerable detail. He has shown that a close approach to chemical equilibrium in the amphibolite metamorphic facies is indicated by the orderly distribution of Mg, Fe and Mn among coexisting actinolite, Ca-pyroxene and cummingtonite, and the restriction in the number and type of minerals in association with each other. Furthermore, a comparison between the composition of the silicates and the presence or absence of hematite shows that the Mg to Mg plus Fe ratio is increased but is much less variable when hematite is present.

The iron formation forms a long doubly plunging syncline that is canoe-shaped but buckled across the centre to produce two distinct oval-shaped basins. Although this structure appears to be relatively simple in form, it seems to have been developed during two stages of deformation. Folding along northwest-trending axes and overthrusting of the upper iron formation during the first stage of deformation appear to have been followed by gabbro intrusion, folding along east-west axes, faulting, and metamorphism during the Grenville orogeny.

8. Deposit Types

The Bloom Lake property mineralization style is a deposit typical of the Superior Lake-type.

The peaks in iron sedimentation took place between ~2.65 and 2.32 Ga and again from ~1.90 to 1.85 Ga. Their deposition is linked to the geochemical and environmental evolution of the planet such as the Great Oxidation Event (GOE) at ca. 2.4 Ga, the growth of continents, as well as the mantle plume activity and rapid crustal growth (see Figure 8-1).

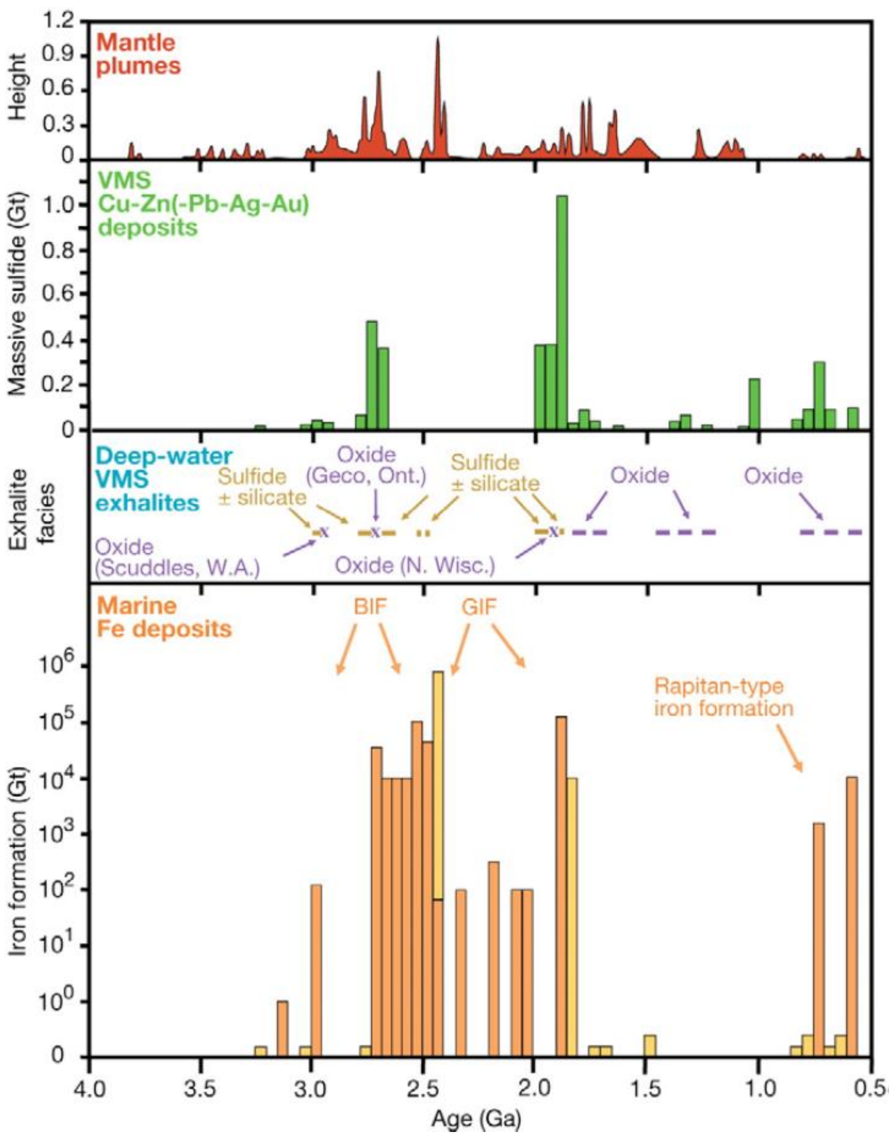


Figure 8-1: Time distribution of the iron formation deposition (Bekker et al., 2011)

The Labrador Trough contains four main types of iron deposits:

1. Soft iron ores formed by supergene leaching and enrichment of the weakly metamorphosed cherty iron formation (IF); they are composed mainly of friable fine grained secondary iron oxides (hematite, goethite, limonite).
2. Taconites, the fine-grained, weakly metamorphosed iron formations with above average magnetite content; they are commonly called magnetite iron formation.
3. More intensely metamorphosed, coarser-grained iron formations, termed metataconites that contain specular hematite and subordinate amounts of magnetite as the dominant iron minerals.
4. Minor occurrences of hard high-grade hematite ore occur southeast of Schefferville.

Secondary enrichment included the addition of secondary iron and manganese that appear to have moved in solution and filled pore spaces with limonite-goethite. Secondary manganese minerals, i.e., pyrolusite and manganite, form veinlets and vuggy pockets. The types of iron ores developed in the deposits are directly related to the original mineral facies. The predominant blue granular ore was formed from the oxide facies of the middle iron formation. The yellowish-brown ore, composed of limonite-goethite, formed from the carbonate-silicate facies, and the red painty hematite ore originated from mixed facies in the argillaceous slaty members.

All iron ore deposits in the Labrador Trough formed as chemical sediments on a continental margin that were lithified and variably affected by alteration and metamorphism that had important effects on grade, mineralogy and grain size. Faulting and folding led to repetition of sequences in many areas, increases the surface extent and mineable thicknesses of the iron ore deposits. Underlying rocks are mostly quartzite or mica schist. Transition from these rocks and the mineralized iron formation may happen up to over 10 m vertically. All rock sequences have been heavily metamorphosed by intense folding phases that are part of the Grenville Orogen.

IF sequences range commonly from 25% to 40% iron oxide, mainly hematite of the specularite type with minor amount of magnetite (remainder mostly quartz) and can have thicknesses (ignoring minor intercalated bands of schist and quartz rock) of up to 200 m. These are the sequences that are of economic importance.

For iron formation to be mined economically, the iron content must be close to or greater than 30%, but also iron oxides must be amenable to concentration (beneficiation) and the concentrates produced must be low in manganese and deleterious elements such as silica, aluminum, phosphorus, sulphur and alkalis. For bulk mining, the silicate and carbonate lithofacies, as well as other rock types interbedded within the iron formation, must be sufficiently segregated from the magnetite. Iron formations repeated by folding are often required to produce sufficiently thick sections for mining in the Mont Wright / Wabush area.

9. Exploration

This chapter of the Report briefly describes all relevant exploration work other than drilling conducted by Quebec Iron Ore on the Bloom Lake project or in the proximity of the mine from the last 10 years. The complete description of the drill programs is described in Chapter 10.

9.1 Regional Exploration

Regional exploration near Bloom Lake aims to define regional targets that currently have no Mineral Resource. Geological mapping, rock sampling and regional surveys have been conducted in the vicinity and close to the Bloom Lake claims. Table 9-1 summarizes the regional exploration activities, excluding drilling.

Table 9-1: Regional exploration activities (excluding drilling)

Year	Area	Company	Type
2016	Roach Hill	Quebec Iron Ore	Outcrop & Landform determination survey
2016	Roach Hill	Quebec Iron Ore	Outcrop sampling
2018	Lac Boulder (Roach Hill and North West of Sudbury	Champion Iron	Drone magnetic survey
2018	Bloom Lake East North	Supreme Metals Corp.	Airborne magnetic survey Inversion
2019	Bloom East	Champion Iron	Outcrop sampling
2022	Roach Hill	Quebec Iron Ore	Channel sampling

10. Drilling

Drilling has been carried out on Bloom Lake deposit for over 60 years. The complete drilling database consists of 678 surface drillholes from historical and recent drilling programs that occurred between 1957 and 2022 for a total of 157,865 m.

10.1 2021-2022 Drilling Programs

10.1.1 Bloom Lake Drilling

In 2021-2022, diamond drilling was carried out mainly for conversion purpose. A first campaign targeted mineralization at depth of Bloom West, below actual pit optimization to assess continuity of mineralized iron formation. The second campaign targeted the eastern part of Chief's Peak mainly to confirm mineralization. Table 10-1 summarizes drilling campaigns since the last feasibility study.

Table 10-1: 2019-2022 Drilling campaigns

Year	Area	Number of holes	Metrage
2019	Bloom Lake	35	4,304.50
2020	Chief's Peak and Pignac	50	8,309.10
2021	Chief's Peak	12	1,426.00
2022	Chief's Peak and Bloom West	12	2,444.15
	Total	**109**	**164,83.75**

10.1.2 Exploration Drilling Near the Mine

In 2021-2022, exploration drilling in the vicinity of the mine was carried out to define the targets identified in the geophysical survey. Three diamond drillholes were completed at Roach Hill and 12 diamond drillholes at Sudbury Hill, totalling 1,177 m. Holes drilled are listed in Table 10-2.

Table 10-2: Holes drilled near the mine

Area	Hole ID	UTM Easting	UTM Northing	Elevation	Depth	Dip	Azimuth
Roach Hill	RH-21-06	606915	5858297	606	139	330	-55
	RH-21-07	606812	5858409	675	151	330	-55
	RH-21-12	606588	5858419	672	94	330	-65

Area	Hole ID	UTM Easting	UTM Northing	Elevation	Depth	Dip	Azimuth
Sudbury Hill	SH-22-01	612831	5859594	757	32	270	42
	SH-22-02	612900	5859596	765	41	90	42
	SH-22-03	612879	5859647	776	94	270	55
	SH-22-04	612886	5859645	776	94	90	60
	SH-22-05	612892	5859753	792	86	270	50
	SH-22-06	612856	5859795	797	65	90	43
	SH-22-07	612860	5859795	797	98	270	45
	SH-22-08	612834	5859750	792	80	90	90
	SH-22-09	612821	5859902	797	74	90	45
	SH-22-10	612821	5859902	797	47	270	90
	SH-22-11	612815	5859900	797	44	90	55
	SH-22-12	612840	5860002	776	38	270	58

10.2 Drilling Methodology

10.2.1 Drillhole Location / Set-up

Drillholes were collared on-site with a portable Garmin GPS. The drillhole collar location (coordinates) could vary from a few metres to accommodate drilling, depending on the ground conditions, but still maintains the relative position and spacing relative to the other holes.

10.2.2 Drillhole Orientation at Start-up

Drilling azimuth reference were provided through calculation of points of coordinates. A traditional compass was not used due to the high-level of magnetism developed by some horizons of the underlying iron formations.

10.2.3 Downhole Deviation Tests

Deviation and inclination tests were carried out in the holes. A Flexit instrument was used to measure the orientation and inclination of all the drillholes.

Readings were taken every 15 m to 30 m with an overall average of 24.6 m. All data obtained with the Flexit instrument were analyzed and all inappropriate data were eliminated if the deviation was too large and/or if the magnetic susceptibility was too high.

10.2.4 Coring

Drill cores were provided by the Drilling Contractor in NQ size (47.6 mm). The core was collected in a standard drilling tube and the drillers placed the core into wooden core boxes. The driller marked the depth in metres (m) after each run, usually every 4 m.

The drillhole was terminated by the Bloom Lake site geologist once the targeted depth was reached and the core at the drill site was reviewed with respect to target lithologies, alteration and mineralization.

10.2.5 Collar Surveying

All drillhole collars were surveyed in-house by the mine site surveying team. Surveyors used a Trimble R8 instrument to survey the drillhole collars.

The inclination and direction of the drill collars were measured using a clinometer and then the direction was verified against Flexit readings for most holes.

10.2.6 Core Handling

At the drill rig, all core boxes used were carefully sealed with tape and transported by snowmobile or ATV to a pickup truck that brought them to the core shack at the end of each shift.

All boxes were labelled and photographed in lots of five. The core boxes were systematically measured to validate the marks of the drillers. Measuring was also done to calculate the rock quality designation (RQD) and the core recovery. Cores were stored at the mine.

10.2.7 Core Logging

The core was logged using standard methods. Rock types were identified and intervals were measured according to the marks done by the drillers. Geological logging took into account the general colour of the rock, relative percentage of constituents, grain size distribution, alteration, contact with other rocks, texture, and the variation of these elements, when significant. A particular attention was given to the orientation of foliations relative to the core axis. Geotechnical features in the core, such as RQD were noted.

The mineralized units to be sampled were marked with a grease pencil at 3 m to 6 m intervals, depending on the mineral content, with some exceptions as low as 1.25 m and as long as 15 m.

11. Sample Preparation, Analyses, and Security

11.1 Sampling Methods

11.1.1 Assay Samples

11.1.1.1 Sampling (Core Sample Selection)

In general, only mineralized intervals are sampled. The iron content of samples must be equal to or greater than 15%. This estimate is done visually by the person core logging.

The two factors that are taken into consideration are the grade cut-off for samples and the length of the samples. Samples are taken before, during and after the potentially mineralized zone.

To create representative and homogenous samples, sampling honors lithological contacts. The protocol states that the minimum sample interval in the hole will not be less than 1.0 m, and the maximum sample interval will not exceed 6.0 m. No sample will cross a major rock boundary, alteration boundary or mineralization boundary.

Sampling intervals are determined by the geologist during logging and marked on the core boxes or on the core itself using coloured lumber pencils with a line drawn at right angles to the core axis.

The sample sequence includes duplicate and blank material that are inserted into the sample stream using sample numbers that are in sequence with the core samples. Standard Reference Materials (SRMs) were also added in 2020 exploration program sampling sequence.

The sample length for most intervals collected varies from 3.0 m to 6.0 m.

11.1.1.2 Core Sampling (Core Saw Splitting)

A geotechnician trained in core cutting procedures executes the core cutting at the core shack. The logging geologist has already clearly marked out all pertinent cores for cutting and sampling. The sampling booklet contains three reference tags: 1) one that will remain in the booklets; 2) one that will be stapled in the core box; and 3) one that will be stapled in the sample bag. The geologist puts a paper sample tag containing a sample number and meterage corresponding to the required sample interval at the end of the sample interval. The geotechnician staples the paper sample tag in the box and places a tag from the booklet inside the plastic bag.

For campaigns previous to 2022, the core is divided in half using a hydraulic splitter. Since 2022, all core samplings are cut in half using a core cutting saw. One half is retained and kept in the core box for later reference and the other half is put into a plastic sample bag. A sample assay tag is placed in the plastic sample bag and the bag is tied off.

11.1.2 Density Samples

Specific gravity was determined using an air comparison pycnometer. It should be noted that this method does not take into account existing porosity in a rock and some of the oxide iron formation does contain vugs due to calcite removal.

Although the degree of porosity has not been quantified, it is estimated on the basis of visual examination of the drill core to be generally less than 2%. It should be noted that specific gravity was not measured for all drillholes.

Since 2022, density samples were taken and sent to SGS Laboratory for analysis. Samples of 10 cm were taken approximately every 20 m.

11.1.3 Lab Methods of Preparation, Processing and Analysis

Core samples were shipped to the Corem Laboratory in Québec City, Québec, for analysis in 2018 and SGS Laboratory in Québec City in 2020, 2021 and 2022.

11.1.3.1 Lab Accreditation and Certification

For the 2020, 2021 and 2022 campaigns, core samples were sent to Corem and SGS Laboratories in Québec City, Québec, for analysis. Both Corem and SGS are accredited laboratories.

11.1.3.2 Sample Analysis Procedure

At Corem and SGS, the samples were crushed to reduce each sample to 3.35 mm (6 mesh).

A whole rock analysis was done on each sample to measure the following parameters (in %): FeTotal, SiO_2, Al_2O_3, Fe_2O_3, MgO, CaO, Na_2O, K_2O, TiO_2, MnO, P_2O_5, Cr_2O_3, V_2O_5, ZnO, S, C and loss on ignition (LOI). The LOI at 400°C and 1,000°C is determined during the procedure. Additional analyses included determination of magnetic iron with a Satmagan magnetic analyzer. Fe_2+ by titration were added in QIO analysis suite from 2022.

11.1.4 Sample Shipping and Security

At the Bloom Lake site, sample bags are stored in a core shack, inside a mega bag on wooden pallets until they are brought to the designated area on site for shipping.

11.2 Quality Assurance and Quality Control (QA/QC)

Since 2020, results are imported in a Fusion database.

11.2.1 Laboratory QA/QC

Quality control for the routine sample analysis included Corem's and SGS's own quality control procedures, involving internal and external checks.

11.2.2 Quebec Iron Ore QA/QC

Since 2020, quality control samples are inserted into the sample batches sent to the laboratory, including blank, duplicate and standard samples.

Duplicates are quarter split NQ core.

Laboratory sample booklets are used. Tags are prepared and inserted by the geologist.

Each type of QA/QC sample is inserted approximately every 20 samples. Thus, in a block of 20 samples, there is one blank, one standard and one duplicate. Standards are alternated while keeping in mind observations and grades.

Standards and blanks are prepared in advance. A small quantity (between 25 and 50 grams) is placed in an unlabelled paper bag and then placed in a plastic bag where the sample number will be written, and the tags inserted.

Results were received by email in CSV and PDF files by representatives of QIO.

11.2.2.1 Blanks

Blanks are used to monitor for potential sample contamination that may take place during sample preparation and/or assaying procedures at the primary laboratory. There are three types of blanks commonly used in QC programs, these being "Coarse Blanks", "Fine Blanks", and "Pulp Blanks". Only coarse blanks were used for the 2018, 2021 and 2022 drilling programs.

Blanks were purchased from Sitec North America and sourced from barren quartz from a quarry.

11.2.2.2 Standards

Standards are inserted in the sampling protocol to control the accuracy of laboratory results. Standards have been selected to reflect iron content of the Bloom Lake mineralized zone. They were custom made by SGS with Bloom Lake West material. Three targeted grades of 50 kg each were taken and shipped to SGS Laboratory in Québec City. Material was dried, crushed, grinded to 100% passing 75 µm. After homogenization, the sample was divided into batches of 2 kg. A total of 20 subsamples weighing approximately 250 grams were taken out and sent to two other SGS laboratories for analysis. A total of 120 samples were analyzed (3 grades x 20 subsamples x 2 laboratories). Samples were analyzed for main oxides with LOI at 1,050°C, total S and C and Satmagan. Analysis were compiled by the Laboratory Quality Services International group and certificates were provided to QIO. The standards were shipped in three boxes containing 1,000 g bottles. The 1,000 g bottle was then divided in 20 g to 50 g subsamples that were inserted in the sampling sequence.

The three standards prepared were:

- 21% FeT: BLL;
- 29% FeT: BLM;
- 37% FeT: BLH.

11.2.2.3 Duplicates

Duplicate samples are submitted to assess both assay precision (repeatability) and homogeneity of mineralization. QIO utilizes core duplicates with one quarter of the core being used for the primary analysis and the other quarter for the subsequent duplicate analysis, leaving half the core in the box for record keeping.

11.3 Assessment of Results

11.3.1.1 Conclusion

The QP reviewed the sample preparation, analytical and security procedures, as well as the insertion rates and the performance of blanks and duplicates for the drilling programs, during discussions with on-site geologists, and concluded that no significant assay biases are present. In the opinion of the QP, the procedure and the quality of the data are adequate to industry standards and support the Mineral Resource Estimate.

12. Data Verification

This section provides an overview of data verification performed by Quebec Iron Ore (QIO) and SRK Consulting (SRK). Based on the various verification procedures and results, it is the opinion of the QP for mineral resources that the data used in support of mineral resources is considered acceptable and applicable with any identified uncertainties accounted for in the resource classification.

12.1 Verifications by Quebec Iron Ore

QIO has an internal set of quality control procedures and verifications on the drilling database used to support geological and resource modelling. QIO internal controls include the continuous review of diamond drill core logging, sampling, measurements, and analyses.

Core logging procedures include capturing drillhole survey (collar and downhole), lithology, geotechnical information, sampling intervals lengths, and specific gravity measurements using Access based entry forms linked to the Bloom Lake server that enforce code integrity and identify any gaps or overlaps during data entry errors. The information is then housed in a structured query language (SQL) database format and is further checked for errors by QIO geologists using queries.

Starting in 2022, QIO engaged SGS Laboratories to provide three commercially prepared standard reference materials (SRMs) across a range of iron grades to implement as part of the analytical quality control program at Bloom Lake. This process of quality control is covered in more detail in Chapter 11.

12.2 Verifications by SRK

12.2.1 Site Visit

In accordance with NI 43-101 guidelines, Erik Ronald, P.Geo., [PGO#3050], a Principal Consultant (Geology) with SRK Consulting (U.S.), Inc. based in Denver visited the Bloom Lake project between February 21 and 25, 2022.

Key aspects that may materially impact the integrity of the exploration database (i.e., core logging, sampling, security, and database management) were reviewed with QIO staff. Mr. Ronald was given full access to all relevant project data and was able to interview exploration staff to ascertain exploration procedures for data processing, validation, data security, storage and retrieval, and safety.

SRK's review included an initial desktop review of procedures followed by detailed observation of actual practices during a site visit. SRK staff was accompanied by QIO personnel to active mining locations to review ore control practices including blast cone sampling, shot geology mapping, and ore control data management practices. The current ore control procedures in place at the Bloom Lake property are considered good industry practices and satisfactory for the short-range evaluation of ore types, analytical sampling, and tracking of grade and lithology during mining activities.

Items and activities covered during the site visit include the following:

- Overview discussion of site production reconciliation procedures and current points of data measurement from resource model, short-range model, ore control, drill & blast design, mine planning, survey, laboratory, processing, and train load-out.
- Observations and discussion of blasthole cone sampling, logging, and ore control data management activities by QIO staff.
- Tour and discussion of the on-site laboratory facilities including drying, preparation, analyses, and data management.
- Tour of the processing plant with a focus on sampling points for reconciliation.
- Interviews with geology, mine technical services (ore control, drill & blast, short-term planning, etc.), plant/metallurgy, and finance team representatives.
- Visit and discussion on concentrate stockpiling management, rail load-out facilities, and final rail sampling.
- Observation and discussion on exploration drill logging, sample cutting, safety, and management.

In this review, SRK identified several areas for improvement primarily focused on documented procedures, and/or the process ownership of the production reconciliation program on-site. The importance of clear documentation and administrative control will aid in clarifying responsibilities, accountabilities, and ownership as it pertains to tracking operational performance and implementing improvement actions. Additionally, a number of staff responsible for exploration logging were relatively new to QIO and Lake Superior-type BID deposits with recommended oversight by more experienced personnel.

12.2.2 Verifications of Analytical Quality Control Data

SRK assessed the analytical quality control (QC) data produced on resource drilling by QIO on the property since 2008. All data were provided to SRK in Microsoft Excel spreadsheets. SRK aggregated the assay results of the external analytical control samples for further analysis. QC samples including blanks and standard reference materials were summarized on time series plots to review performance. Field duplicates were analyzed using bias charts, quantile-quantile (Q-Q), and relative precision plots.

The external analytical QC data produced for the Bloom Lake project are summarized in Table 12-1 and a selection of these charts are presented in graphical format in Section 12.4. The external QC data represents less than 4% of the total number of core samples collected on the Bloom Lake project and submitted for assaying since 2008.

No information on analytical quality control data exists prior to 2008, which accounts for 27% of data by assay length. Likewise, no analytical quality control data were available for grade control data.

Table 12-1: Summary of analytical quality control data produced by Quebec Iron Ore on the Bloom Lake project (2008-2022)

	2008-2013	(%)	2018-2020	(%)	2022	(%)	Total	(%)	Comment
Sample Count	8,507		1,941		354		**10,802**		
Blanks	69	0.81	40	2.06	13	3.67	**122**	**1.13**	
QC Samples	27	0.32	0	0.00	13	3.67	**40**	**0.37**	
Standard 1	27								Internal
BLL					3				SGS Prepared
BLM					6				SGS Prepared
BLH					4				SGS Prepared
Field Duplicates	163	1.92	91	4.69	9	9	**263**	**2.43**	
Total QC Samples	**259**	**3.04%**	**131**	**6.75%**	**35**	**9.89%**	**425**	**3.93%**	

12.2.2.1 Blanks

Blank material used between 2008 and 2013 were sourced on the property from iron oxide-barren rock, mainly amphibolite, and were only used as a general indication of iron contamination since they were not certified. The material source was not considered homogenous, and this is evident in the varied performance of blank assay results.

Between 2018 and 2020, 40 blanks were inserted during the 2020 core drilling program only. Although this material had a consistently lower iron content as compared to the material used prior to 2013, the results exhibit variability ranging from 0.5% to 1.5% Fe and consistently above 10 times the detection limit. The precision of this material improved slightly over time, indicating that the variability observed may be due to the precision of the laboratory analyses. However, the blank material is not considered truly blank with respect to iron and thus not effective in understanding potential sample contamination during preparation and analyses.

Blank material used in 2022 was inserted every 25 samples (4% insertion rate), preferentially after mineralized zones, to monitor evidence of potential contamination. The blank results returned indicate potential contamination for samples analyzed in September 2022, which should be investigated further with the external laboratory.

12.2.2.2 Standard Reference Materials

For historical drilling campaigns between 2008 to 2013, 27 standards were used, implemented only in the 2013 campaign. The certification of these reference materials used is unknown. As such, QIO has relied solely on field duplicate samples to give an indication of the performances of assays during this period.

No reference materials were used during the drilling campaigns between 2018 and 2020.

In 2022, a total of three standard reference materials generated by SGS were used representing a range of iron grades (low, medium, and high (Table 12-2). These were inserted after blank samples at a frequency of 1 in 25 samples (4%), with at least one SRM inserted per assayed drillhole. The performance of SRMs is considered poor considering the control limits provided by SGS, with between 33% and 50% failures for this period. However, since only 354 core samples were analyzed as part of this program, the number of SRMs used is considered minimal thus no meaningful conclusions were made.

Table 12-2: Summary of standard reference materials prepared by SGS for Quebec Iron Ore (2022)

Reference material	Analyte	Method	Expected value (%)	95% Confidence interval	Inserts
BLL	SiO_2	XRF - borate fusion	62.2	0.1	3
	Al_2O_3	XRF - borate fusion	0.17	0.00	
	Fe_2O_3	XRF - borate fusion	37.6	0.06	
	MgO	XRF - borate fusion	0.04	0.005	
	CaO	XRF - borate fusion	<0.01	-	
	Na_2O	XRF - borate fusion	0.05	0.01	
	K_2O	XRF - borate fusion	<0.01	-	
	TiO_2	XRF - borate fusion	<0.01	-	
	P_2O_5	XRF - borate fusion	<0.01	-	
	MnO	XRF - borate fusion	<0.01	-	
	Cr_2O_3	XRF - borate fusion	0.01	0.00	
	V_2O_5	XRF - borate fusion	<0.01	-	
	LOI	XRF - borate fusion	0.21	0.03	
	S	LECO	<0.01	-	
	C	LECO	0.012	0.001	
	Fe_3O_4	Satmagan	0.88	0.03	

Reference material	Analyte	Method	Expected value (%)	95% Confidence interval	Inserts
BLM	SiO_2	XRF - borate fusion	45.2	0.09	6
	Al_2O_3	XRF - borate fusion	0.33	0.01	
	Fe_2O_3	XRF - borate fusion	54.1	0.05	
	MgO	XRF - borate fusion	0.05	0.005	
	CaO	XRF - borate fusion	0.03	0.002	
	Na_2O	XRF - borate fusion	0.05	0.012	
	K_2O	XRF - borate fusion	0.03	0.002	
	TiO_2	XRF - borate fusion	0.06	0.002	
	P_2O_5	XRF - borate fusion	0.02	0.001	
	MnO	XRF - borate fusion	0.01	0.001	
	Cr_2O_3	XRF - borate fusion	0.01	0.001	
	V_2O_5	XRF - borate fusion	0.01	0.002	
	LOI	XRF - borate fusion	0.19	0.04	
	S	LECO	<0.01	-	
	C	LECO	0.012	0.001	
	Fe_3O_4	Satmagan	0.99	0.04	
BLH	SiO_2	XRF - borate fusion	43.5	0.05	4
	Al_2O_3	XRF - borate fusion	0.19	0	
	Fe_2O_3	XRF - borate fusion	56.4	0.11	
	MgO	XRF - borate fusion	0.04	0.02	
	CaO	XRF - borate fusion	<0.01	-	
	Na_2O	XRF - borate fusion	0.03	0.008	
	K_2O	XRF - borate fusion	0.01	-	
	TiO_2	XRF - borate fusion	0.02	0.002	
	P_2O_5	XRF - borate fusion	<0.01	-	
	MnO	XRF - borate fusion	<0.01	-	
	Cr_2O_3	XRF - borate fusion	0.01	0.000	
	V_2O_5	XRF - borate fusion	<0.01	-	
	LOI	XRF - borate fusion	0.18	0.03	
	S	LECO	<0.01	-	
	C	LECO	0.014	0.001	
	Fe_3O_4	Satmagan	0.85	0.03	
Total					**13**

12.2.2.3 Duplicates

All duplicate samples were collected from quartered drill core and used to assess the sampling variance and repeatability of analyses. Since 2008, field duplicate samples have been inserted at a frequency of approximately 1 in 50 (2%).

In general, the performance of field duplicate samples collected between 2008 and 2013 exhibit acceptable reproducibility, with minor evidence of analytical bias. A few samples (approximately 10 sample pairs) exhibit poor reproducibility for iron and contaminant elements. It is difficult to know whether this may be due to the variability of the rock composition between core duplicate samples, possible sample mix-ups or another reason. These samples should be investigated further.

Field duplicate sample pairs analyzed between2018 and 2020 show acceptable performance, with minor or no analytical bias.

The performance of field duplicate pairs collected in 2022 are difficult to assess since the dataset consists of only nine pairs. However, the pairs available performed acceptably for iron and contaminants.

No umpire duplicate samples were available for review.

12.2.3 Other Verification Work

Upon review of the classification of the audited mineral resource model, SRK highlighted two areas of Indicated classification that required clarification with QIO: 1) an area to the south and central to the deposit (south area of Pignac zone) that is informed by slightly wider-spaced drilling; and 2) an area to the north east in Chief's Peak with elevated MgO+CaO that may not pass the requirement for 'reasonable prospects for eventual economic extraction'. In the former area, QIO demonstrated that a recent drillhole campaign, after the closure of the resource database, has provided some infill support to support the geologic confidence of the iron formation. In the latter region of elevated MgO+CaO, QIO did not classify any blocks with MgO+CaO>16%.

12.3 SRK Comments

It is the QP's opinion that data verification procedures have yielded confidence in site procedures related to drilling, logging, and sampling for resources. Additionally, SRK's audit on the reconciliation practices has yielded confidence in ore control procedures with minor areas for operational improvement. The QP recognizes the historically poor implementation of QC samples in resource drilling and recommends QIO to improve the QA/QC process to align with current good practices for iron ore evaluation. This includes increasing overall insertion rates of QC samples, obtaining certified blank materials, and consistent use of certified reference materials (CRMs) appropriate for the deposit style and grade ranges observed at Bloom Lake. The QP has accounted for identified uncertainty related to QA/QC for analytical data though resource classification.

Historically, the insertion of control samples (blanks, standard reference materials, and duplicate samples) should be at a rate of 5%. The datasets produced for QC samples submitted for the 2022 drilling campaign are minimal (13 blank samples, between 3 to 6 SRMs, and 9 field duplicates), which result in no meaningful conclusions on quality for this drilling campaign. SRK understands that this dataset will grow with additional drilling,

The insertion rate of blank material in 2022 was increased to 1 in 25 (4%) to align with good practices; however, the material appears to be inappropriate for use as a blank, as it consistently returned results above 10 times the detection limit with respect to iron. The monitoring of blank material should involve a thorough understanding of the expected material composition and have defined limits for triggering failures and resultant investigations with the laboratory for iron and all major deleterious variables. SRK suggests that QIO obtains certified blank material and increases the overall rate of QC sampling insertion.

Although field duplicate samples have been collected regularly since 2008, these samples alone are not appropriate to test the precision and accuracy of the preparation and analyses performed by the laboratory. SRK strongly suggests implementing a regular pulp duplicate testing program at an independent commercially certified laboratory.

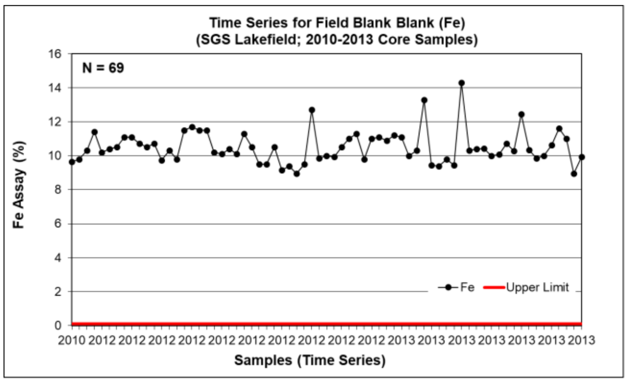
12.4 Graphics of External Analytical Quality Control Data

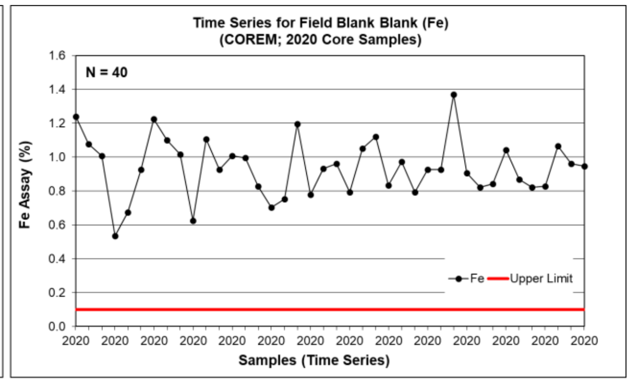
A selection of external analytical QC data produced for the Bloom Lake project are presented graphically in this section.

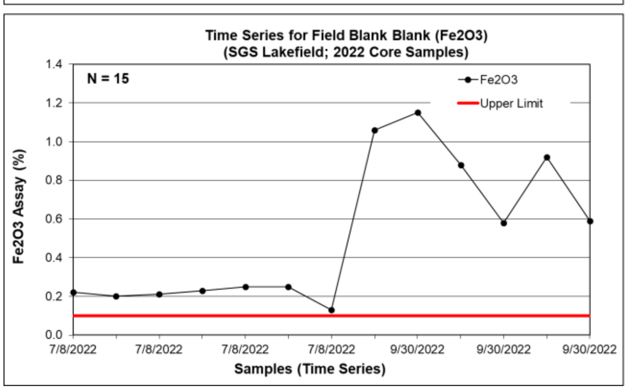
srk consulting

Project	Bloom Lake
Data Series	2016-2019
Data Type	Core Samples
Commodity	Fe & Fe2O3
Laboratory	SGS Lakefield and COREM
Analytical Method	Fire Assay
Detection Limit	0.01%

Statistics	**Fe**	**Fe**	**Fe2O3**
Sample Count	69	40	15
Expected Value	0.010	0.010	0.010
Standard Deviation	-	-	-
Data Mean	10.503	0.938	0.503
Upper Limit (10xDL)	100%	100%	100%



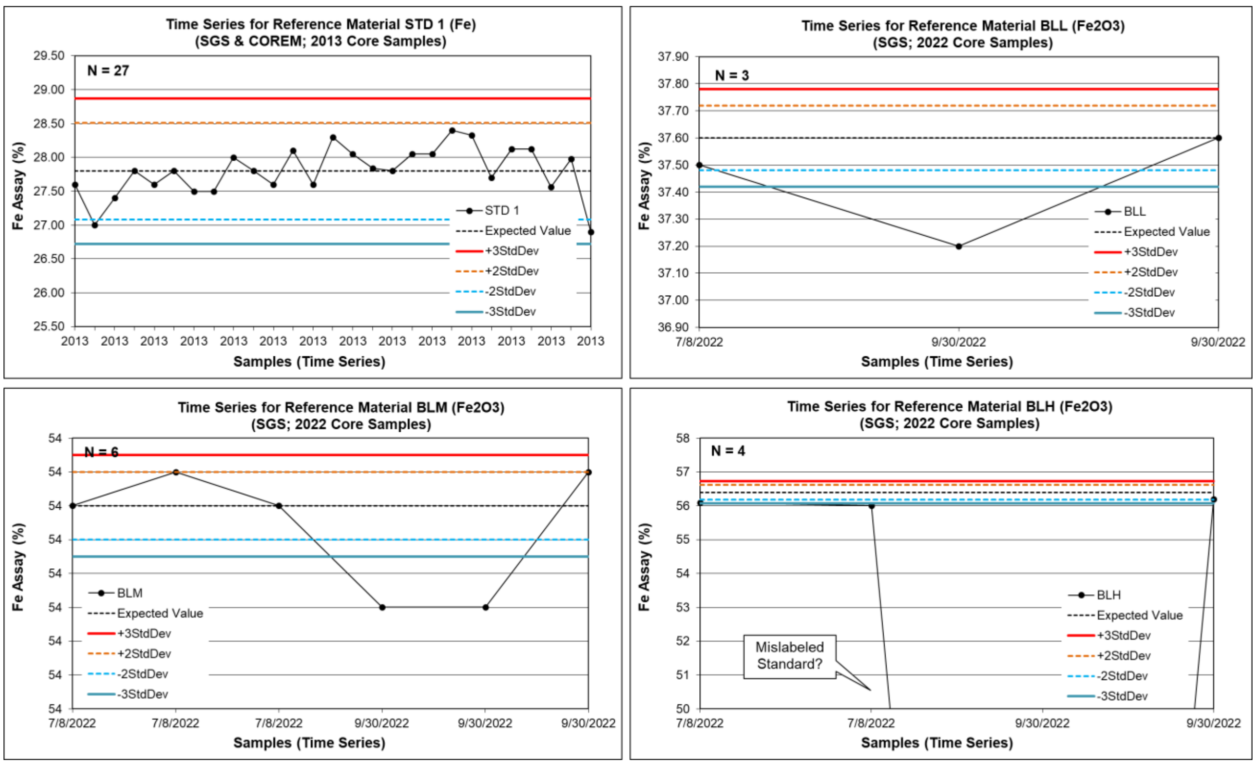




srk consulting

Project	Bloom Lake
Data Series	2008-2020
Data Type	Core Samples
Commodity	Fe & Fe2O3
Laboratory	SGS & COREM
Analytical Method	ICP & XRF
Detection Limit	0.01%

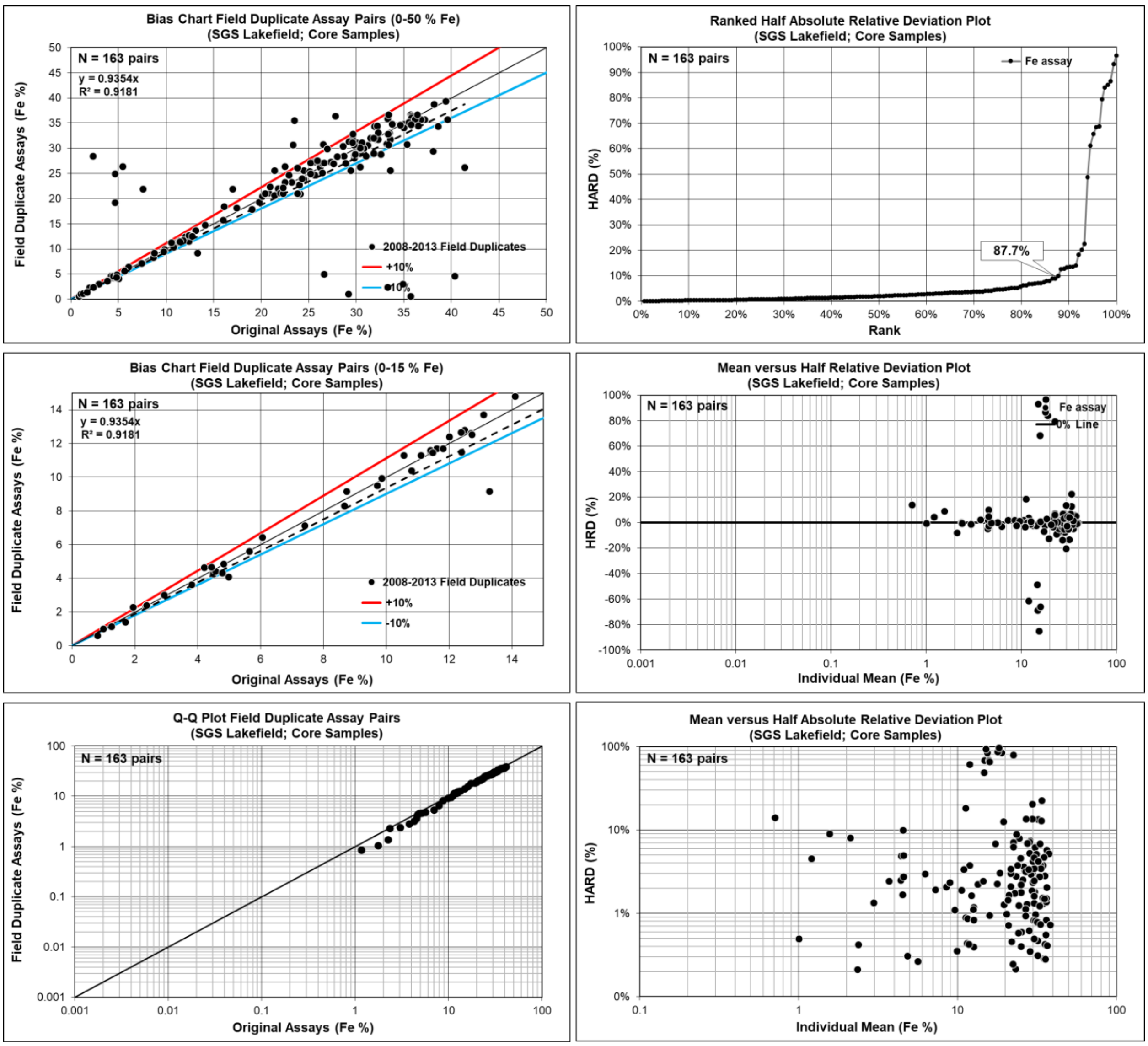
Statistics	**STD 1**	**BLL**	**BLM**	**BLH**
Sample Count	27	3	6	4
Expected Value	28	38	54	56
Standard Deviation	0.4	0.1	0.1	0.1
Data Mean	28	37	54	42
Outside 3StdDev	0%	33%	33%	50%
Below 3StdDev	0	1	2	2
Above 3StdDev	0	0	0	0



srk consulting

Project	Bloom Lake
Data Series	2008-2013 Field Duplicates
Data Type	Core Samples
Commodity	Fe in %
Analytical Method	XRF
Detection Limit	0.05 % Fe
Original Dataset	Original Assays
Paired Dataset	Field Duplicate Assays

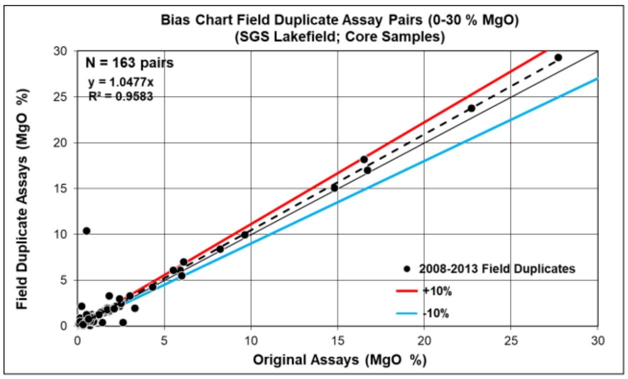
Statistics	**Original**	**Field Duplicate**
Sample Count	163	163
Minimum Value	0.810	0.610
Maximum Value	41.40	39.40
Mean	22.955	22.344
Median	25.600	25.600
Standard Error	0.875	0.864
Standard Deviation	11.166	11.033
Correlation Coefficient	0.7830	
Pairs ≤ 10% HARD	87.7%	

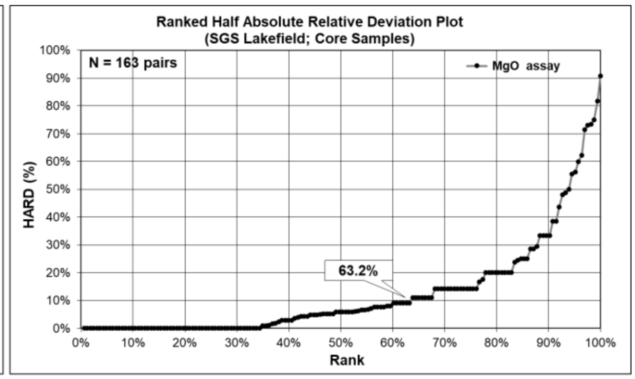


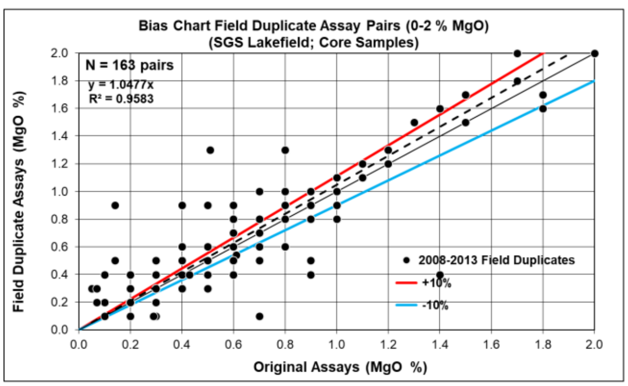
srk consulting

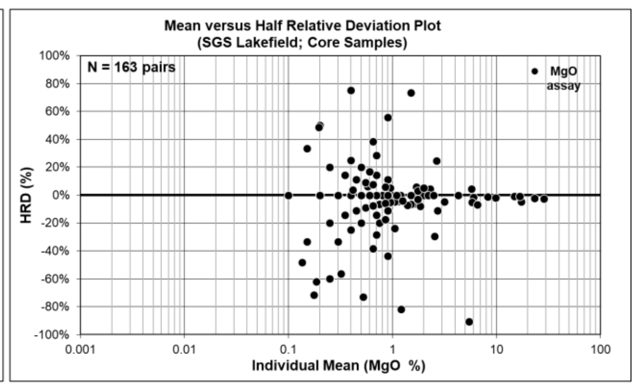
Project	Bloom Lake
Data Series	2008-2013 Field Duplicates
Data Type	Core Samples
Commodity	MgO in %
Analytical Method	XRF
Detection Limit	0.01 % MgO
Original Dataset	Original Assays
Paired Dataset	Field Duplicate Assays

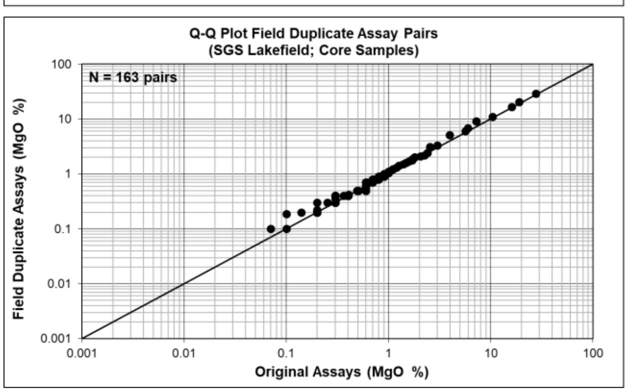
Statistics	**Original**	**Field Duplicate**
Sample Count	163	163
Minimum Value	0.050	0.100
Maximum Value	27.70	29.30
Mean	1.566	1.698
Median	0.600	0.600
Standard Error	0.282	0.301
Standard Deviation	3.605	3.849
Correlation Coefficient	0.9749	
Pairs ≤ 10% HARD	63.2%	

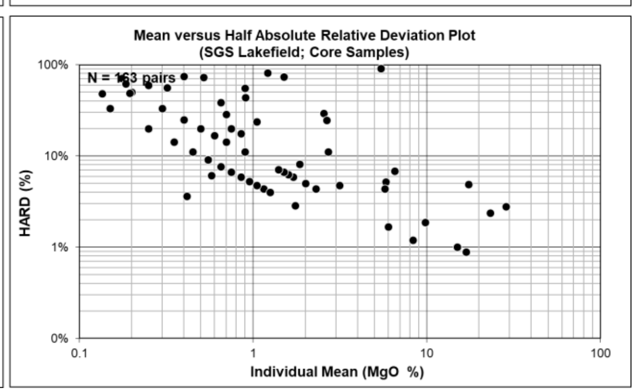






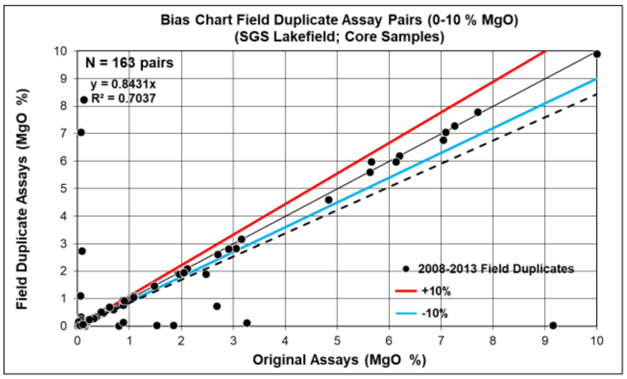


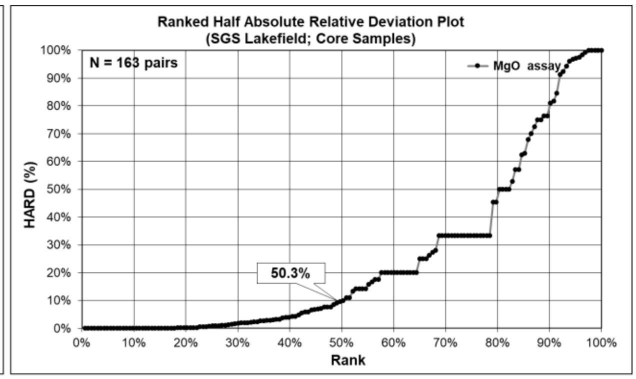


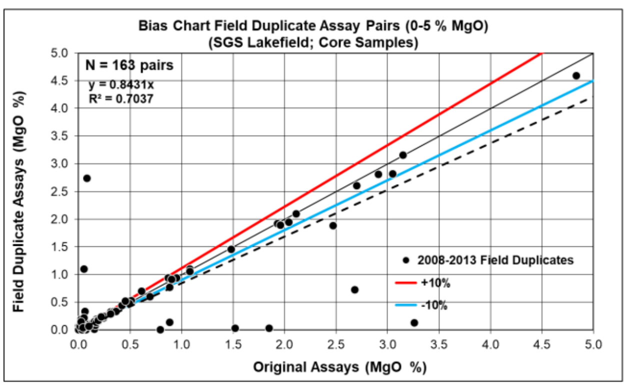


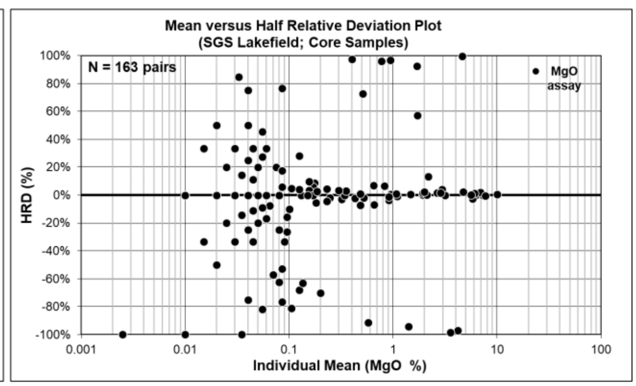
srk consulting

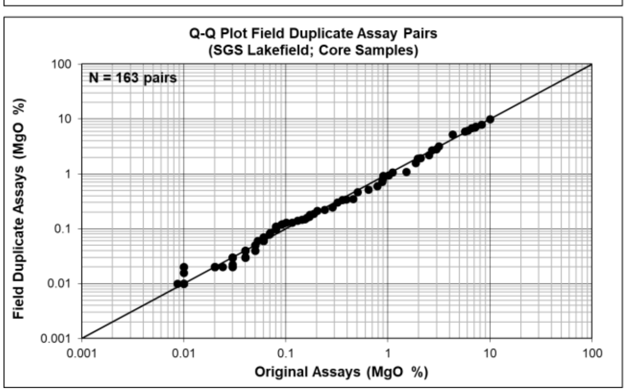
		Statistics	Original	Field Duplicate
		Sample Count	163	163
Project	Bloom Lake	Minimum Value	0.000	0.005
Data Series	2008-2013 Field Duplicates	Maximum Value	10.00	9.90
Data Type	Core Samples	Mean	0.840	0.834
Commodity	MgO in %	Median	0.060	0.070
Analytical Method	XRF	Standard Error	0.149	0.150
Detection Limit	0.01 % MgO	Standard Deviation	1.905	1.919
Original Dataset	Original Assays	Correlation Coefficient	0.8078	
Paired Dataset	Field Duplicate Assays	Pairs ≤ 10% HARD	50.3%	

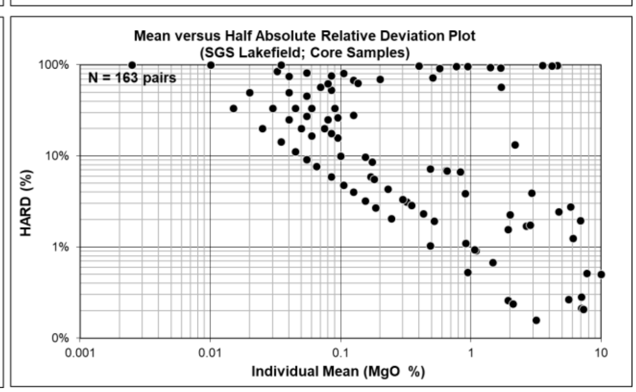






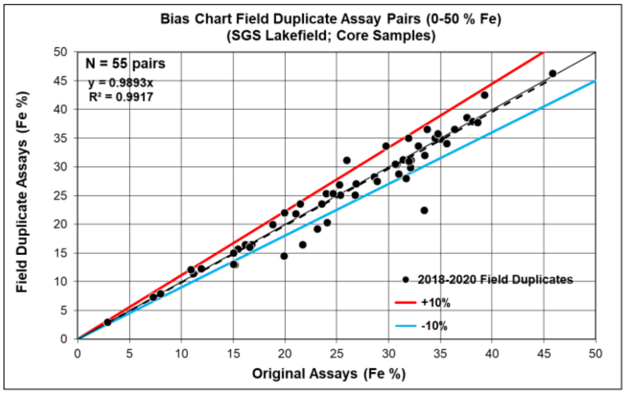


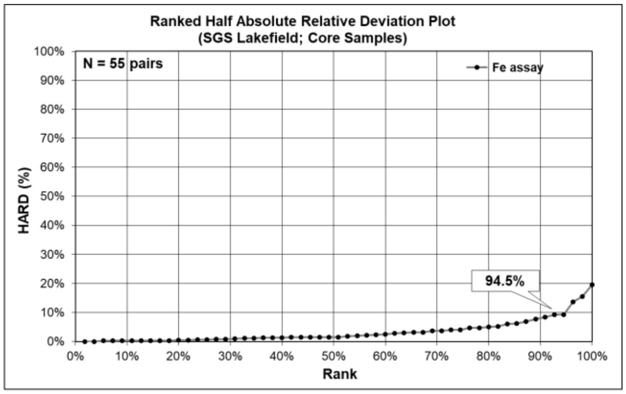


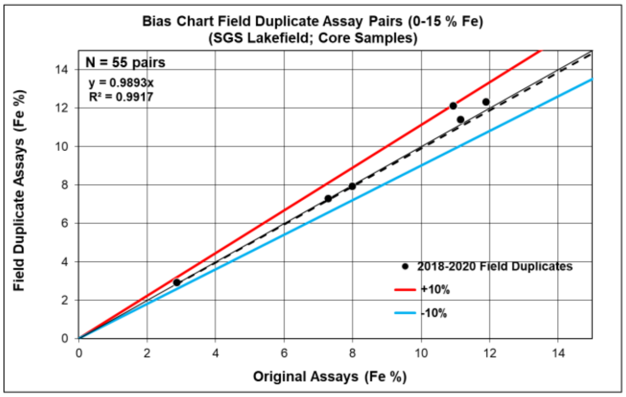


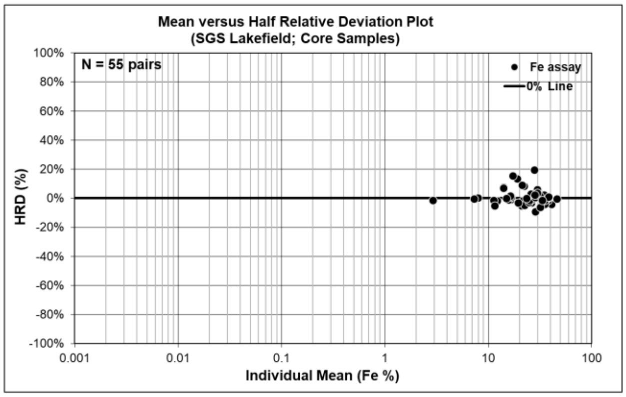
Project	Bloom Lake
Data Series	2018-2020 Field Duplicates
Data Type	Core Samples
Commodity	Fe in %
Analytical Method	XRF
Detection Limit	0.01 % Fe
Original Dataset	Original Assays
Paired Dataset	Field Duplicate Assays

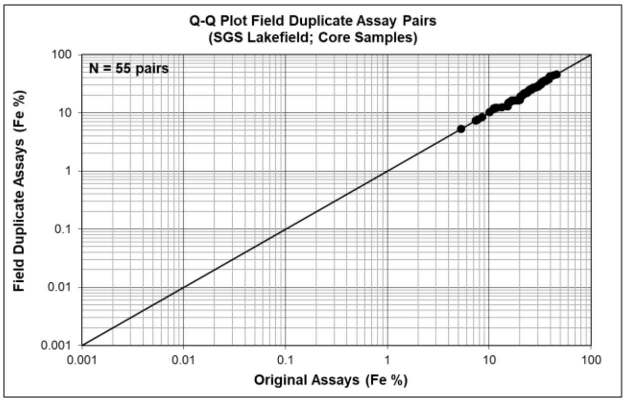
Statistics	Original	Field Duplicate
Sample Count	55	55
Minimum Value	2.862	2.945
Maximum Value	45.82	46.31
Mean	25.719	25.410
Median	26.741	26.881
Standard Error	1.267	1.311
Standard Deviation	9.396	9.719
Correlation Coefficient	0.9665	
Pairs ≤ 10% HARD	94.5%	

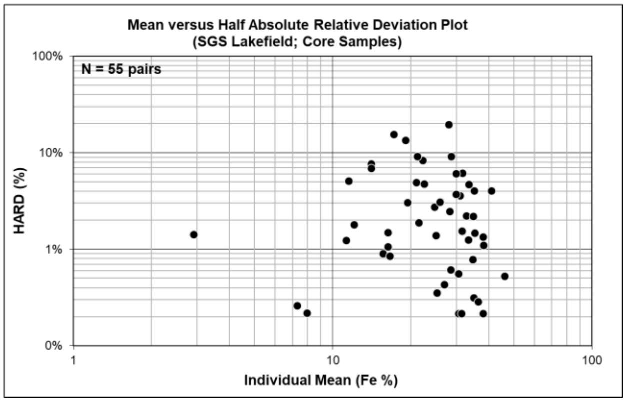








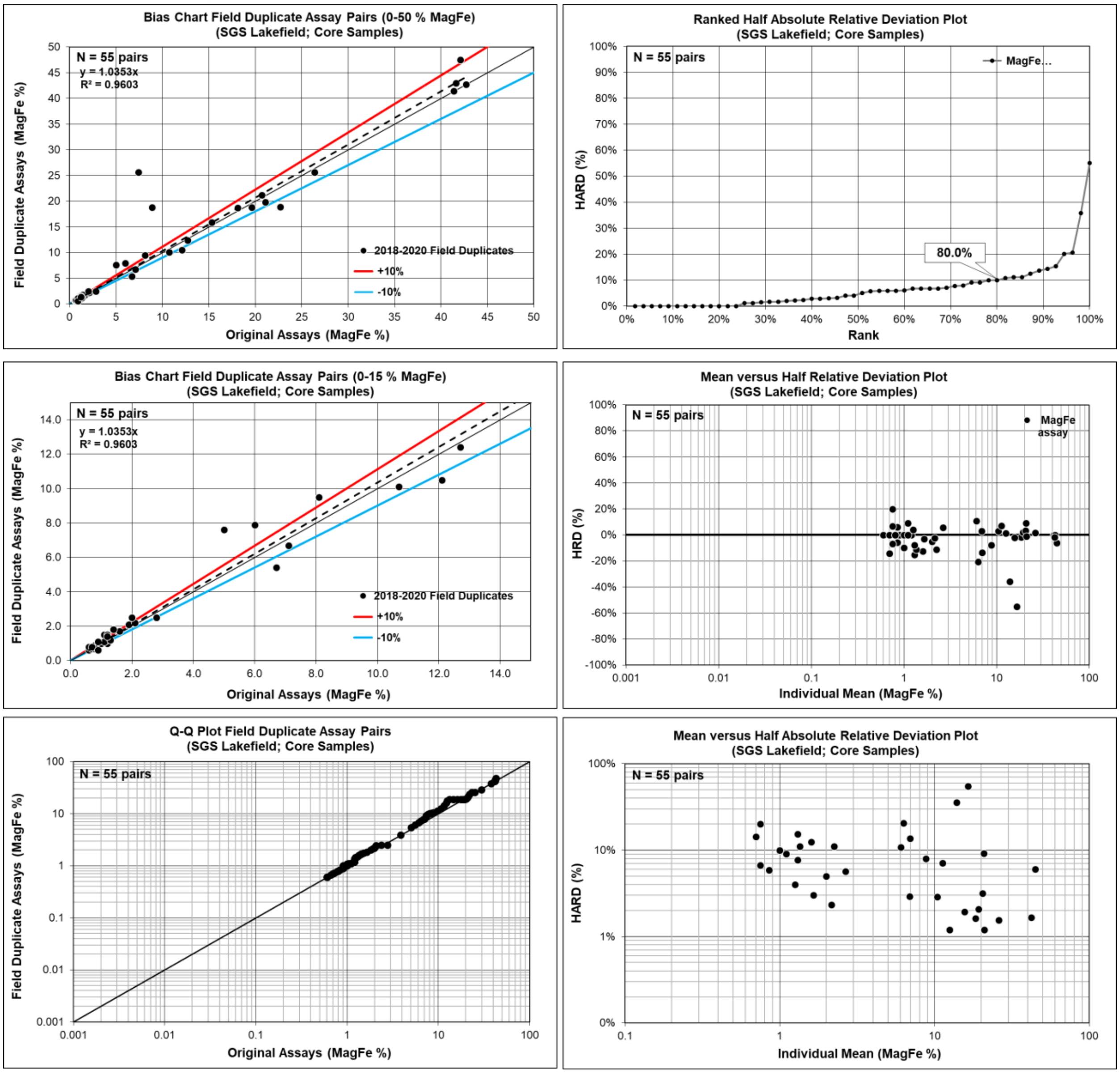




srk consulting

Project	Bloom Lake
Data Series	2018-2020 Field Duplicates
Data Type	Core Samples
Commodity	MagFe in %
Analytical Method	XRF
Detection Limit	0.01 % MagFe
Original Dataset	Original Assays
Paired Dataset	Field Duplicate Assays

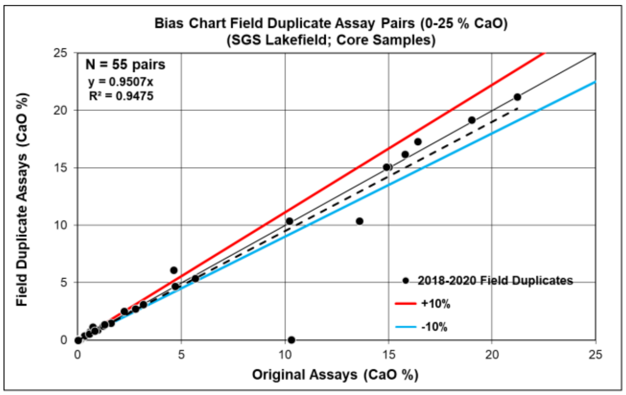
Statistics	**Original**	**Field Duplicate**
Sample Count	55	55
Minimum Value	0.600	0.600
Maximum Value	42.70	47.50
Mean	7.900	8.509
Median	1.300	1.500
Standard Error	1.586	1.660
Standard Deviation	11.760	12.312
Correlation Coefficient	0.9706	
Pairs ≤ 10% HARD	80.0%	

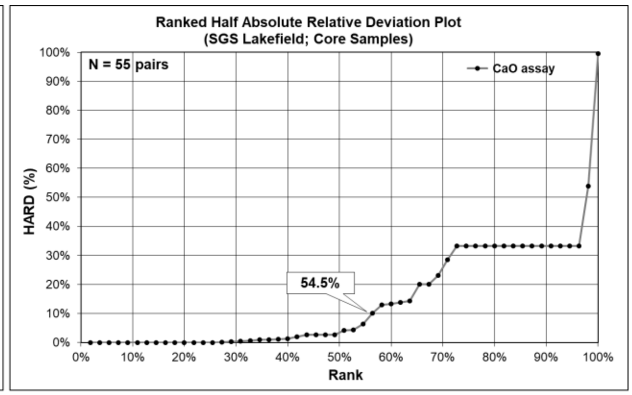


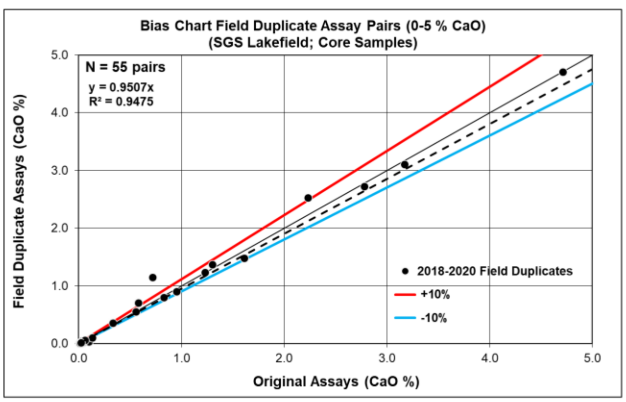
srk consulting

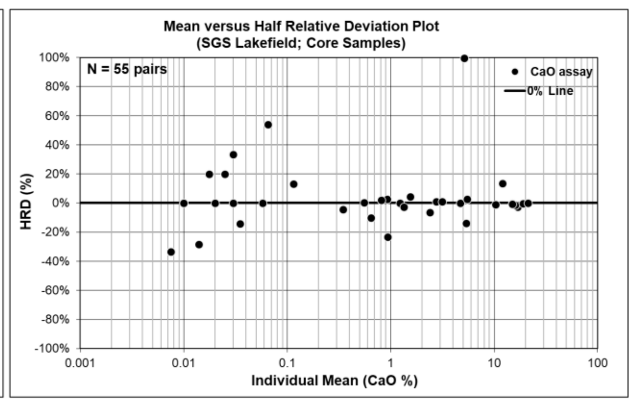
Project	Bloom Lake
Data Series	2018-2020 Field Duplicates
Data Type	Core Samples
Commodity	CaO in %
Analytical Method	XRF
Detection Limit	0.01 % CaO
Original Dataset	Original Assays
Paired Dataset	Field Duplicate Assays

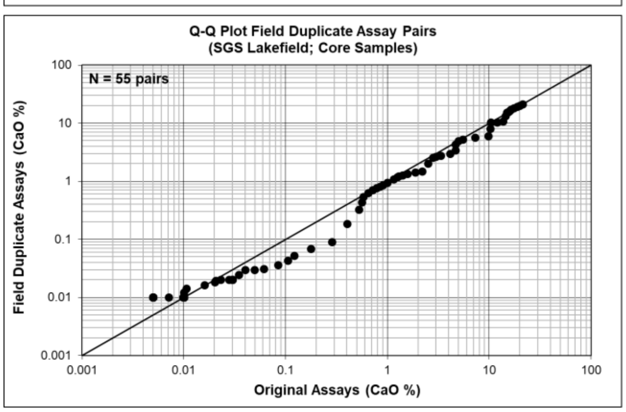
Statistics	**Original**	**Field Duplicate**
Sample Count	55	55
Minimum Value	0.005	0.010
Maximum Value	21.20	21.20
Mean	3.060	2.883
Median	0.040	0.030
Standard Error	0.771	0.760
Standard Deviation	5.714	5.637
Correlation Coefficient	0.9662	
Pairs ≤ 10% HARD	54.5%	

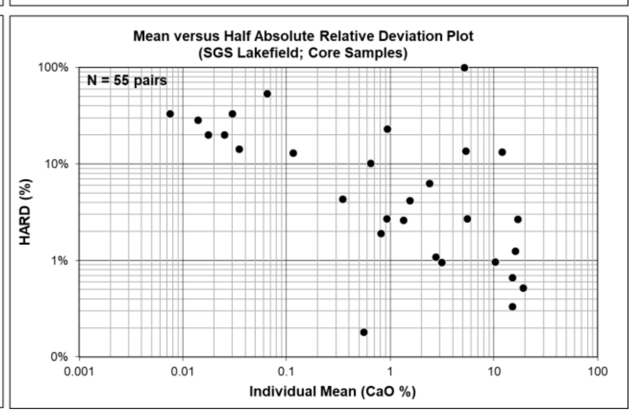








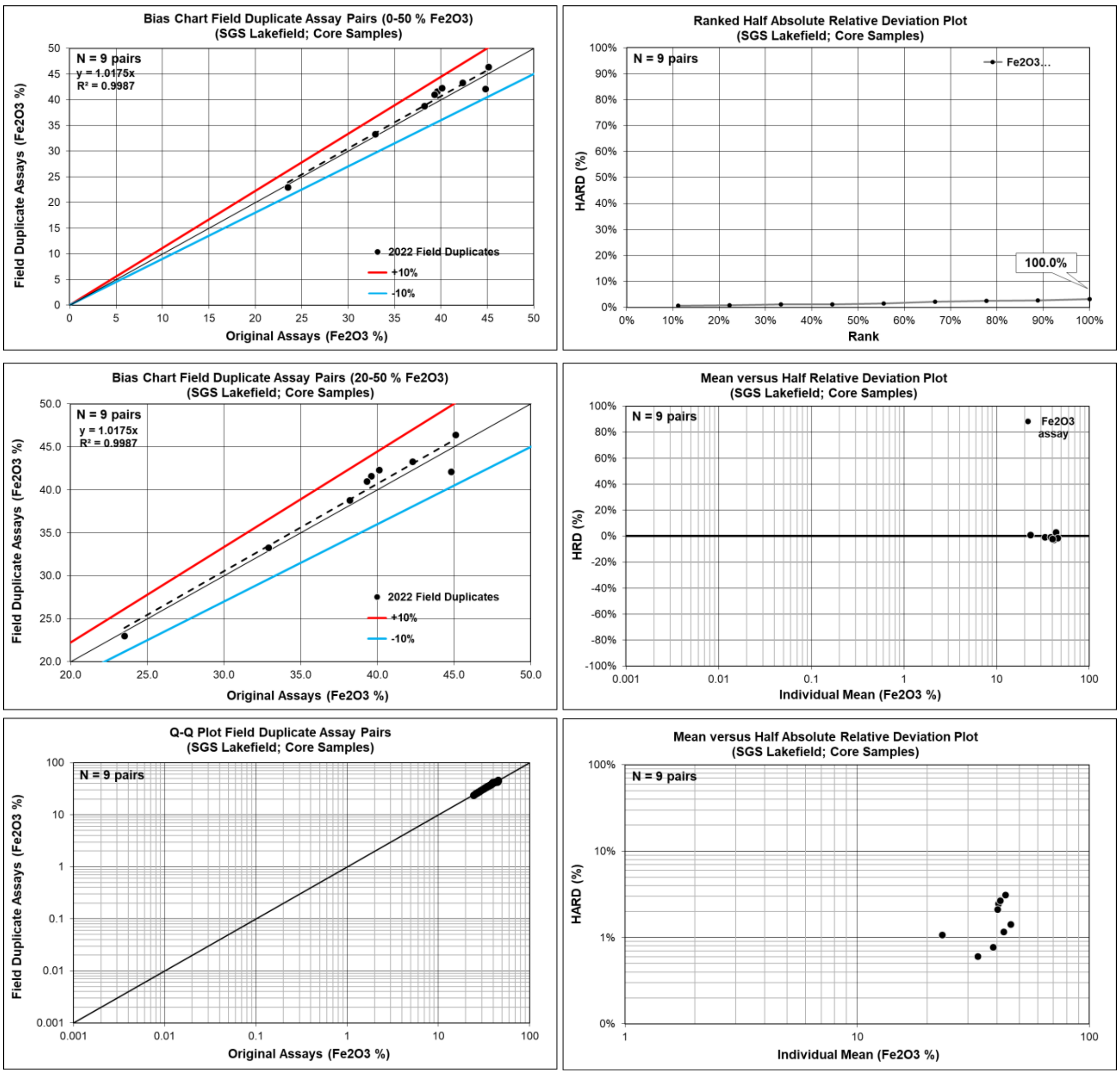




srk consulting

Project	Bloom Lake
Data Series	2022 Field Duplicates
Data Type	Core Samples
Commodity	Fe2O3 in %
Analytical Method	XRF
Detection Limit	0.01 % Fe2O3
Original Dataset	Original Assays
Paired Dataset	Field Duplicate Assays

Statistics	**Original**	**Field Duplicate**
Sample Count	9	9
Minimum Value	23.500	23.000
Maximum Value	45.10	46.40
Mean	38.422	39.089
Median	39.600	41.600
Standard Error	2.231	2.336
Standard Deviation	6.694	7.009
Correlation Coefficient	0.9764	
Pairs ≤ 10% HARD	100.0%	



13. Mineral Processing and Metallurgical Testing

The following nomenclature is used in the current chapter to differentiate the various operation of the Bloom Lake Mine:

- Phase I (Consolidated Thompson): Phase I operation as designed and started under the Consolidated Thompson ownership and operated until 2014;
- Phase I (QIO): Phase I operation as designed and started under the Quebec Iron Ore ownership and operated since 2018;
- Phase II (Cliffs): Phase II project as designed and partially constructed under the Cliffs Natural Resources;
- Phase II (QIO): Phase II operation as designed and started under the Quebec Iron Ore ownership and operated since 2022.

13.1 Introduction

In 2018, the Phase I (QIO) restart showed that the flowsheet, which was based on the original Phase II (Cliffs) flowsheet along with improvements proposed by Mineral Technologies, allows for high-iron recoveries and an excellent final concentrate grade control. Further improvements to the Phase I (QIO) flowsheet were applied in the Phase II (QIO) design. Although recent, the Phase II (QIO) start-up in 2022 showed that its flowsheet can achieve higher iron recoveries while maintaining excellent final concentrate grade control.

This chapter presents a summary of the historical testwork performed on the QIO ore leading to the design of Phase I (QIO) and Phase II (QIO), and a review of their performances so far. Finally, the recovery model used in this study is presented.

13.2 Historical Testwork

The QIO ore has been extensively tested over the past several decades. This section covers the historical testwork prior to this project, presented in the light of Bloom Lake successive development phases:

- Testwork prior to Phase I (Consolidated Thompson) (before 2010);
- Original Phase II (Cliffs) Testwork (2010 – 2014);
- Phase I (QIO) Restart Testwork (2016 - 2017);
- Phase II (QIO) Testwork (2018 – 2019).

13.2.1 Testwork Prior to Phase I (before 2010)

Several engineering studies were carried out before the Phase I start-up in early 2010. BBA conducted a Conceptual Study for the development of a 5 Mtpy iron ore concentrate mine and concentrator in 2005-2006. In the feasibility that followed in 2007 the project was expanded to 7 Mtpy. Another feasibility study was realized in 2008 to produce 8 Mtpy of iron ore concentrate (BBA, 2008-09). The testwork performed to support each study was as follows:

- In 1975-1976, Republic Steel Corporation requested a metallurgical testwork program from Lakefield Research on 17 drill core samples from the Bloom Lake property for Wilfley Table testwork.
- In 1998, Watts, Griffis and McOuat (WGM), on behalf of Québec Cartier Mining, requested Lakefield Research Limited to carry out metallurgical testwork on drill core samples of the Bloom Lake property. A total of 75 holes were drilled and heavy liquid tests were done on 1,267 samples.
- In 2005, WGM, on behalf of Consolidated Thompson-Lundmark Gold Mines Ltd. (CLM), requested metallurgical testwork at SGS Laboratory (Lakefield). Eleven mini-bulk samples were taken from outcroppings on Bloom Lake property and were sent to the SGS Laboratory for gravity separation testwork.
- In 2006, Breton Banville & Associés (BBA), on behalf of Consolidated Thompson Iron Mines Limited (Consolidated Thompson), requested a metallurgical testwork program at the SGS Laboratory. Thirty two (32) drill core samples for metallurgical testing and 32 drill core samples for grindability testing were obtained from 12 bore holes located in the west, central, northeast and southeast areas of the Bloom Lake pit.

13.2.1.1 Gravity Separation

Table 13-1 summarizes the different weight recovery relations that were obtained over the different studies performed for the Phase I (Consolidated Thompson) gravity circuit.

Table 13-1: Gravity separation weight recoveries

Testwork	Average Concentrate Fe Grade (%)	Weight Recovery Relationship	Weight Recovery (%)	Fe Recovery (%)
1975-1976	67.1	WR = 1.16 * % Fe (head) + 2.48	37.3	83.3
2005	67.2	WR = 1.3788 * % Fe (head) - 3.1746	38.2	85.6
2006	67.8	WR = 1.3015 * % Fe (head)	39.0	88.3

13.2.1.2 Magnetic Separation

At 10% Fe_3O_4 feed grade, the magnetic confirmatory testwork results showed that an additional weight recovery of 2.5% could be accounted for if a magnetite plant was implemented. The magnetite plant, planned for Year 3 of Phase I, was not implemented due to lower magnetite content in the magnetite plant feed and lower than expected Phase I production rates.

13.2.1.3 Grindability

The grindability confirmatory tests confirmed that a 36' x 19'-9" AG mill with an installed power of 10,071 kW (13,500 hp) was appropriate for processing the tonnage required for the 7 Mtpy iron ore concentrate production. The average mill feed rate was 2,156 tph and the power consumption in primary grinding was 3.82 kWh/t of concentrator feed. In the 8 Mtpy study, the AG Mill selected was a 36' x 20' long mill driven by dual 5,590 kW (7,500 hp) motors. The average mill feed rate was 2,372 tph and the power consumption in primary grinding was 4.2 kWh/t of concentrator feed.

13.2.2 Phase II (Cliffs) Testwork (2010-2011)

The Phase I concentrator commenced operations in 2010 at a production target of 8 Mtpy of concentrate. As part of an expansion plan to increase the mine production, the design of a second concentrator plant (Phase II) was then initiated to increase the nominal capacity to about 16 Mtpy of concentrate (Soutex, 2012). To support Phase II engineering, testwork was realized to characterize the future zones to be mined and to support flowsheet improvements from Phase I. The subsections below summarize the testwork that was conducted.

13.2.2.1 West Pit (2010) Characterization

In 2010, 40 samples were utilized in testwork to characterize the ore from the West pit. The objective was to compare West pit samples' characteristics to the ones of the Chief's Peak pit, which was processed in the Phase I (Consolidated Thompson) concentrator. These tests included mineralogy analysis, heavy media separation tests, Wilfley Table tests, and grindability testwork (Soutex, 2011a).

From a mineralogical point of view, grinding the ore at 100% passing 850 µm, as done in the Phase I concentrator, enabled adequate hematite liberation for recovery by a subsequent gravity separation process.

Samples were tested on a Wilfley Table. The West pit test results were better or comparable to the results from the Chief's Peak pit samples.

Thirty-eight (38) samples from West pit were subject to SAG Power Index (SPI) grindability tests. The results are compared to the Chief's Peak pit Confirmatory Testwork realized in 2006 in Table 13-2.

Table 13-2: West pit grindability hardness data

Zone	Year	Ci (kWh/t)	SPI (minutes)	Standard Deviation (%)
West Pit	2010	14.7	7.1	3.9
Chief's Peak Pit	2006	9.2	21.8	18.1

The results showed that the Chief's Peak pit samples were harder (with higher SPI values) than the West Pit samples.

13.2.2.2 Phase II Piloting

Pilot tests were conducted in the Phase I (Consolidated Thompson) concentrator to evaluate the performance and operational ease of new process equipment at different locations according to a proposed more efficient flowsheet. The Phase II (Cliffs) flowsheet was designed with the following modifications:

- Classification screens at 35 mesh (425 µm) were replaced by classification up-current classifiers and classification screens.
- Cleaner spirals were replaced by up-current classifiers and the up-current classifiers overflow was to be processed through scavenger spirals.

13.2.2.3 Magnetite Plant Testwork

In the previous Phase I 8-Mtpy study, a magnetite plant was planned in order to recover 600,000 tpy of magnetite concentrate (for one phase). This assumption was based on:

- The Chief's Peak pit mine plan that stated the crude ore contains approximately 30% iron and 10% magnetite (it had since been revised to 8%);
- A very limited amount of mineral concentration testwork.

To develop a process flowsheet for the magnetite plant processing the gravity tailings from the Phase I and II concentrators, a bench scale testwork program was conducted at SGS (Lakefield, Ontario) in 2011 (Soutex, 2013a) and a pilot plant testwork program was conducted at Corem (Soutex, 2013b).

The magnetite plant testwork (Soutex, 2013c) showed that:

- The iron under the magnetite form, in the gravity separation circuit, concentrates in a similar way to the hematite;
- The weight recovery obtained, in the magnetite separation circuit, increases linearly with the magnetite grade in the magnetite separation circuit feed.

Considering the gravity plant weight recovery, the weight yield obtained of 1.4% from crude ore at the nominal magnetite grade of 8% is significantly lower compared to the 2.5% value predicted in the original 8-Mtpy study. The magnetite plant was judged to be non-economically viable and was therefore never built.

13.2.2.4 Phase II (Cliffs) Settling and Filtration Testwork

In September 2011, FLSmidth undertook sedimentation and rheology testing on fine tailings samples from the Bloom Lake concentrator (FLSmidth, 2011). All the tests were conducted with a thickener feed at 3.3% solids. The results from the testing program indicated that one 45 m diameter high-rate thickener with a sidewall of 4.3 m is sufficient to handle 351 tph of tailings.

In 2011, Bokela undertook a study to evaluate the performance of the XL-Type filters (68 m^2) for the Bloom Lake Phase II Expansion (Bokela, 2011). Bokela confirmed that the maximum design throughput of 342 tph can be achieved with this filter and indicated that the XL-Type filter could filter up to 500 tph.

13.2.3 Phase I (QIO) Testwork

After QIO acquired the Bloom Lake assets from Cliffs in early 2016, Mineral Technologies was mandated to design an upgraded flowsheet for the Phase I concentrator (Ausenco, 2017). The Phase I upgrade would be facilitated by making use of the process equipment already bought in the Phase II concentrator, which was under construction when the mine had stopped operations.

The Phase I (QIO) upgraded flowsheet development was initially based on historical Phase I (Consolidated Thompson) data, Phase II (Cliffs) piloting and the proposed Phase II (Cliffs) flowsheet design as well as Mineral Technologies experience.

The proposed and tested flowsheet is presented in Figure 13-1.

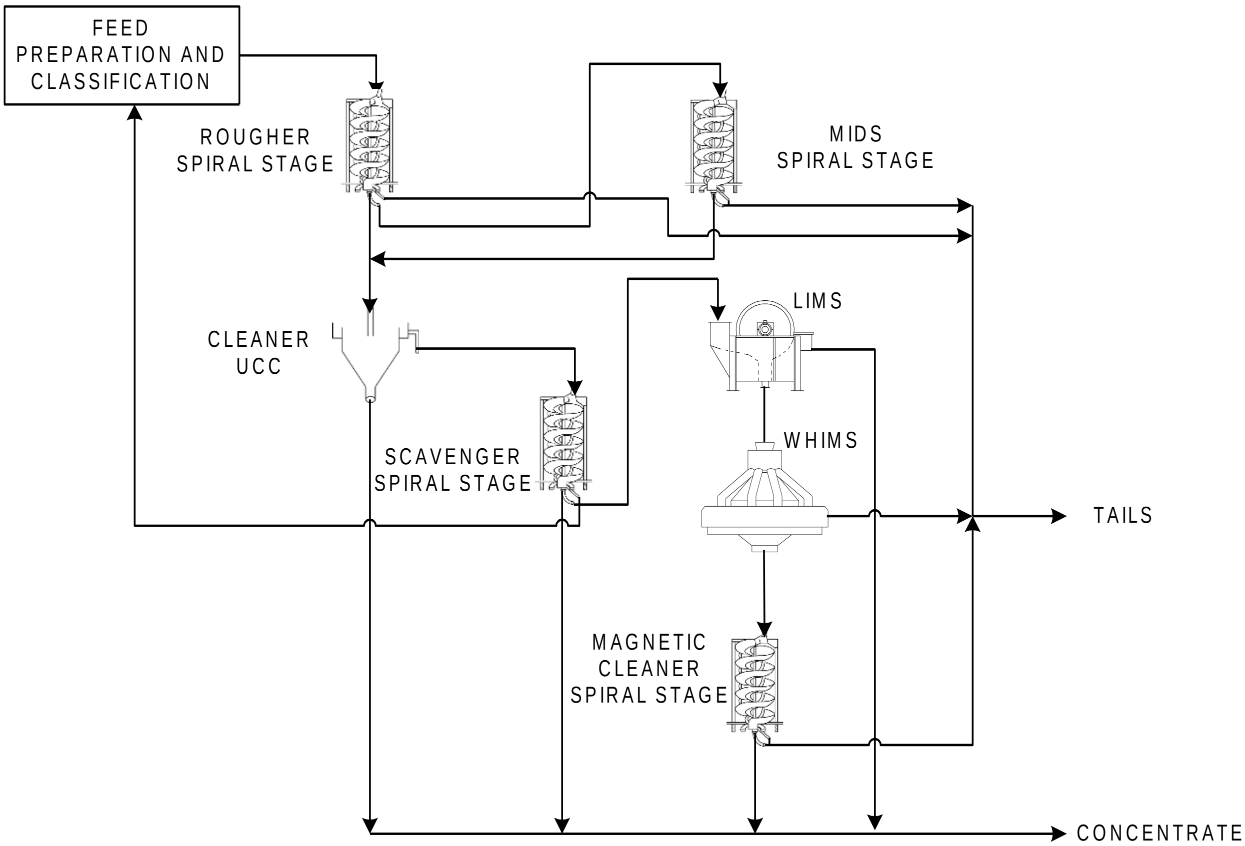


Figure 13-1: Phase I (QIO) tested flowsheet

Table 13-3 presents the metallurgical balance resulting from the testwork. The results showed a weight yield to the gravity concentrate of 37.8% with an additional 1% coming from the LIMS/WHIMS scavenger circuit and translates to an overall iron recovery of 81.1%.

The testwork data was used to update a metallurgical model developed by Mineral Technologies. The model predicted a theoretical maximum iron recovery from the flowsheet of 85.3% and an expected plant recovery of 83.3% from a continuous plant operation treating ore of similar characteristics to the sample tested at the expected life of mine (LOM) feed grade of 30% Fe. This recovery of 83.3% for a 30% Fe feed grade was used for Phase I (QIO) design.

Table 13-3: Testwork global metallurgical balance

Product	%	Assays						
	Weight	Fe (%)	SiO_2 (%)	Al_2O_3 (%)	CaO (%)	TiO_2 (%)	Mn (%)	MgO (%)
Gravity Concentrate (total)	37.8	66.9	3.53	0.27	0.09	0.16	0.08	0.09
Magnetic Circuit Concentrate	1.0	48.2	29.3	0.40	0.31	0.26	0.09	0.30
Magnetic Circuit Rejects	13.5	7.5	85.8	1.29	0.81	0.11	0.03	0.77
Gravity Circuit Rejects	47.6	10.5	82.3	0.98	0.43	0.09	0.03	0.53
Calculated Feed	100.0	31.8	52.4	0.75	0.35	0.12	0.05	0.39

13.2.4 Phase I (QIO) Flowsheet Audit at QIO

Sampling campaigns were conducted in the Bloom Lake Phase I (QIO) concentrator in November 2018.

A total of 41 samples were gathered for each of the four sampling campaigns performed between November 12 and 15, 2018 (Soutex, 2019). The North and South circuits were sampled individually to allow comparison. Size by size assays were performed on every sample and data reconciliation was performed.

Mining operations were adjusted throughout the campaigns to produce ore blends that were representative of typical concentrator feed blends such as a blend containing limonite, a life of mine blend and a blend containing silicates.

The results from the campaigns were compared to the Phase I (QIO) design values. Table 13-4 presents the comparison between the campaigns and the design. The detailed results are presented in the sampling campaigns report.

Table 13-4: Sampling campaigns results vs. design values

Stream	Campaigns Average					Design Values				
	Weight Rec.	Grade		Fe Recovery		Weight Rec.	Grade		Fe Recovery	
	Global	Stage	Fe	Global	Stage	Global	Stage	Fe	Global	Stage
Fresh Feed	94.7	-	33.2	98.0	-	96.0	-	29.9	99.5	-
Tailings Cyclones Feed	54.4	54.4	9.2	15.6	15.6	58.3	58.3	7.1	14.4	14.4
Pan Filters Concentrate	40.3	40.3	65.5	82.4	82.4	37.0	37.0	66.2	85.0	85.0

13.2.5 Phase II (QIO) Testwork

Testwork at Corem was started in November 2018 (Corem, 2019). The testwork program was based on the experience acquired through the Phase I (QIO) operation and results from the sampling campaigns. Sections of the Phase I (QIO) process that were performing well were tested without modifications and the ones that needed optimization were more extensively tested. The testwork program flowsheet overview is shown in Figure 13-2.

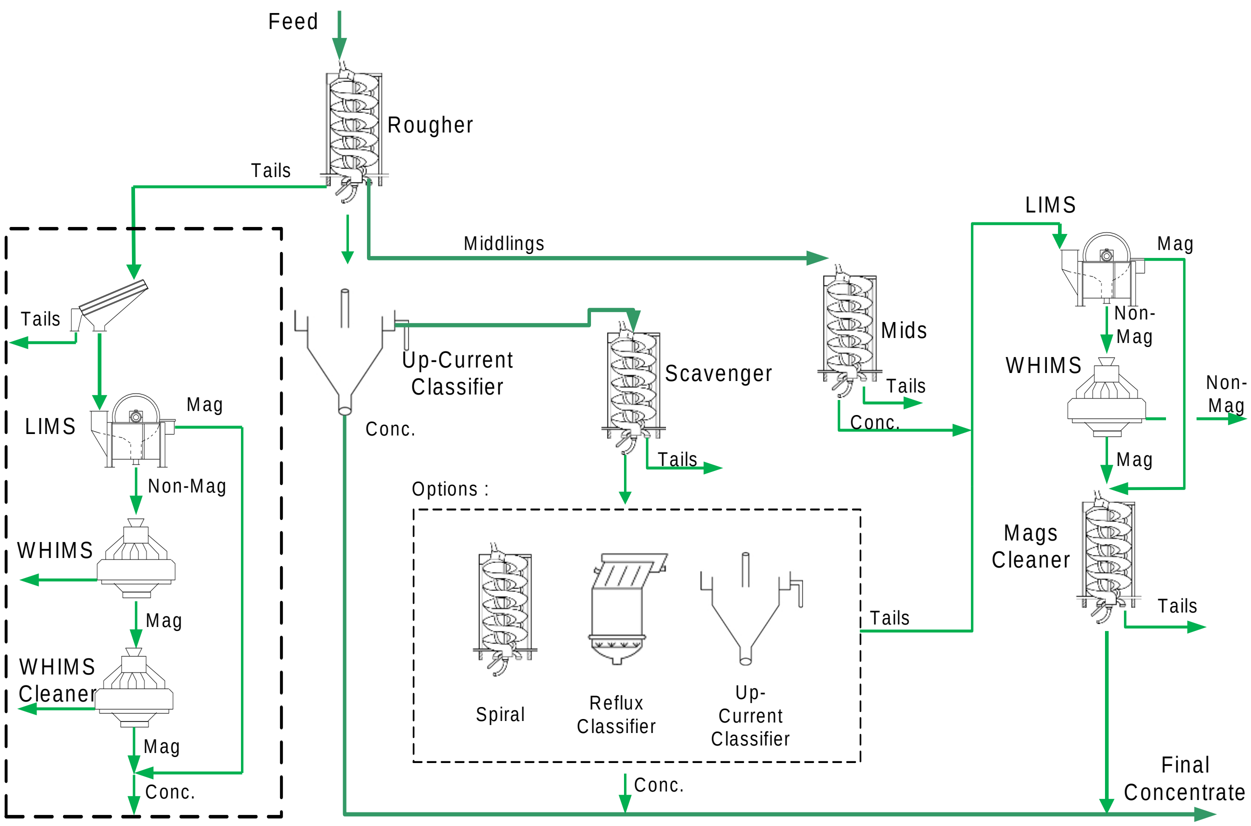


Figure 13-2: Testwork flowsheet

13.2.5.1 Step by Step Testwork

As a first step, optimization tests were conducted for each stage. In the case where a significant quantity of material was required for a downstream process, a production run was also used to generate an adequate sample mass.

The results showed that:

- The addition of a cleaner-scavenger UCC to process the scavenger spirals concentrate allowed the production of a final grade concentrate at a high-iron recovery;
- Reducing the load on the scavenger and magnetic cleaner spirals improved their performances;
- Sending the middling spirals concentrate to the magnetic scavenging circuit improved the circuit's robustness;
- Sending the LIMS concentrate to the magnetic cleaner spirals improved the circuit's robustness.

13.2.5.2 Variability Testwork

Variability testwork was conducted on different ore blends to assess the metallurgical performance of each blend. Five ore blends were prepared from eight mine samples collected from selected zones. Eight samples of approximately 2 to 3 tonnes each, and representing different lithologies, were taken from the three pits in the mine: West, Pignac and Chief's Peak. Figure 13-3 shows the locations where the variability samples were collected in the different pits.

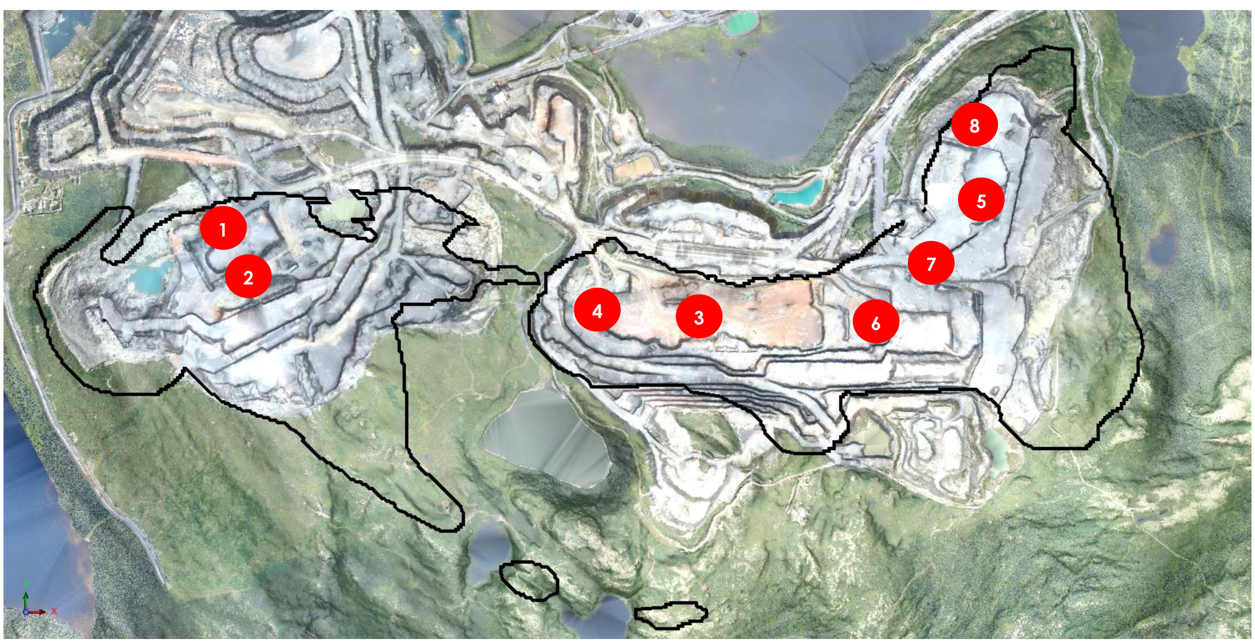


Figure 13-3: Bulk variability samples location

The descriptions and chemical composition of the eight samples are presented in Table 13-5.

Table 13-5: Variability bulk samples head grades

Sample No.	Sample	Analysis				
		Fe (%)	SiO_2 (%)	MgO (%)	CaO (%)	Mag. (%)
1	Hematite 1 West Pit	34.4	51.1	-	-	0.9
2	Hematite 2 West Pit	32.9	51.2	0.2	0.2	1.8
3	Hematite 1 Pignac Pit	29.9	55.4	0.3	0.3	1.8
4	Hematite 2 Pignac Pit	25.5	62.9	0.1	0.1	2.8
5	Hematite Chief's Peak Pit	37.8	41.4	2.0	1.4	7.5
6	Silicates Pignac Pit	19.9	56.5	6.5	4.9	9.4
7	Silicates 1 Chief's Peak Pit	30.6	46.8	4.3	3.5	8.1
8	Silicates 2 Chief's Peak Pit	26.9	52.9	3.4	2.5	29.5

The eight variability samples were submitted to heavy liquid separation (HLS) and results were compared to Bloom Lake heavy liquid results database for the corresponding lithologies: iron formation (IF), mostly consisting of hematite, and silicate iron formation (SIF). Separation was performed at a density of 3.3 and the -75 µm fraction was removed, as for the historical HLS tests. The HLS database consists of testwork results from drill core samples taken throughout the deposit.

The comparison of the sink iron grade and HLS iron recovery for the eight variability samples with the Bloom Lake HLS results database are presented in Figure 13-4 and Figure 13-5 respectively. The dots appearing above the distributions' bars represent the variability samples. Their colour matches the pit and lithology they represent. Their location on the X axis indicates the sample Fe grade or Fe recovery, while their location on the Y-axis is arbitrary and was selected for clarity purposes.

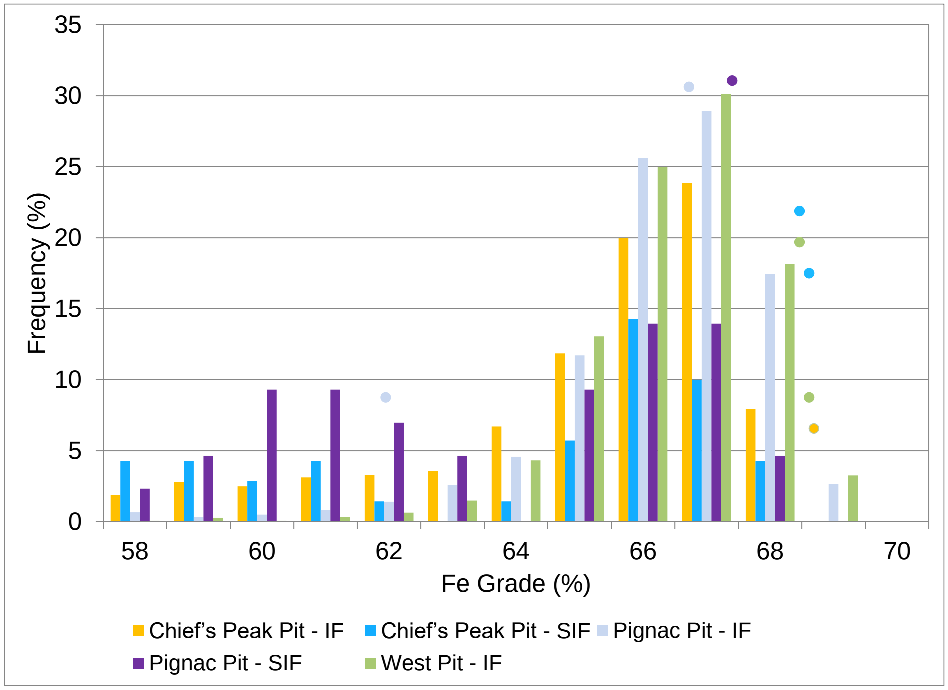


Figure 13-4: HLS sink iron grade comparison

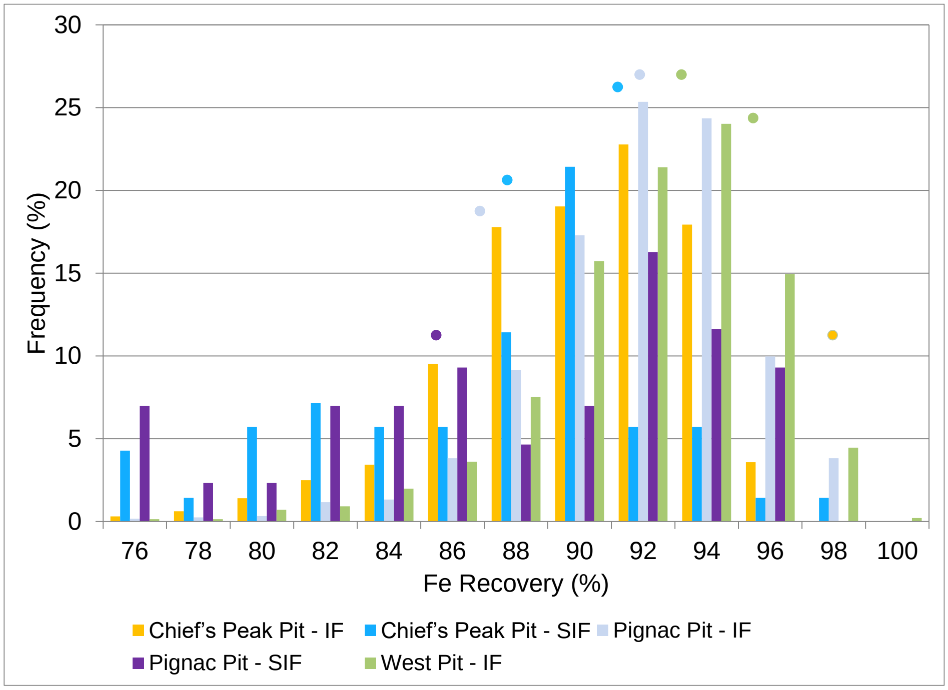


Figure 13-5: HLS iron recovery comparison

The variability samples HLS sink iron grades and recoveries were well distributed within the high frequency range of the historical HLS iron grades and recoveries. The eight variability samples were combined into five ore blends based on operational experience and LOM plan to assess the developed flowsheet performance robustness to ore type variations.

For the variability testing, the five ore blends were combined as indicated in Table 13-6

Table 13-6: Variability sample composition

Blend	Proportion %	Sample	Assays			
			Fe %	SiO_2 %	MgO %	CaO %
1	50	Hematite 1 West Pit	34.6	46.6	1.6	1.4
	50	Silicates 1 Chief's Peak Pit				
2	60	Hematite 2 Pignac Pit	26.9	56.7	1.5	1.2
	40	Silicates 2 Chief's Peak Pit				
3	50	Hematite 1 West Pit	30.9	54.4	0.2	0.2
	50	Hematite 1 Pignac Pit				
4	40	Silicates 1 Chief's Peak Pit	32.6	47.4	2.1	1.7
	30	Hematite Chief's Peak Pit				
	30	Hematite 1 Pignac Pit				
5	50	Silicates Pignac Pit	27.7	51.1	3.5	2.7
	20	Hematite Chief's Peak Pit				
	30	Hematite 2 West Pit				

A summary of the testwork results of the variability samples is provided in Table 13-7.

Table 13-7: Variability blend testwork summary of results

Blend	Stream	Analysis				Recovery (Global)			
		Fe (%)	SiO_2 (%)	MgO (%)	CaO (%)	Fe (%)	SiO_2 (%)	MgO (%)	CaO (%)
1	Feed	34.6	46.6	1.6	1.4	100.0	100.0	100.0	100.0
	Final concentrate	66.9	3.9	0.3	0.2	88.3	3.8	8.2	8.0
	Final tails	7.2	82.8	2.8	2.3	11.7	96.2	91.8	92.0
2	Feed	26.9	56.7	1.5	1.2	100.0	100.0	100.0	100.0
	Final concentrate	63.5	8.0	0.3	0.3	78.4	4.7	7.5	9.1
	Final tails	8.8	80.9	2.0	1.5	21.6	95.3	92.5	90.9
3	Feed	30.9	54.4	0.2	0.2	100.0	100.0	100.0	100.0
	Final concentrate	66.9	4.0	0.0	0.1	84.6	2.9	10.5	15.5
	Final tails	7.4	87.3	0.3	0.3	15.4	97.1	89.5	84.5
4	Feed	32.6	47.4	2.1	1.7	100.0	100.0	100.0	100.0
	Final concentrate	65.3	4.6	0.5	0.5	83.6	4.0	10.1	11.0
	Final tails	9.1	78.2	3.3	2.6	16.4	96.0	89.9	89.0
5	Feed	27.7	51.1	3.5	2.7	100.0	100.0	100.0	100.0
	Final concentrate	66.0	4.1	0.8	0.6	83.5	2.8	7.6	7.1
	Final tails	6.9	76.8	5.0	3.8	16.5	97.2	92.4	92.9

All the blends gave very good results with respect to the concentrate silica target of 4.5% and iron recoveries except blend #2, which consisted in hematite from the Pignac pit, and silicates and magnetite from Chief's Peak pit.

Of the five blends, blend #2 was the one with the lowest feed iron grade (26.85%), which was also lower than the rougher feed bulk sample iron grade (31.84%) used for the optimization and production testwork.

13.2.5.3 Screening and Settling Testwork

A composite sample was taken of the classification screen feed and sent to Derrick for testing (Derreck, 2019). The test objective was to determine the optimum screen operating conditions for an 850 µm screen opening application. The testing was conducted on a full-scale (1.2 m wide by 1.5 m long) single deck machine.

A confirmatory testing program was carried out by FLSmidth in February 2019 (FLSmidth, 2019) and the results from the testing program were similar to the results of 2011.

13.3 Current Metallurgical Performance Evaluation

As there was no testwork program undertaken since the Phase II study (Allaire et al., 2019), the current metallurgical performance was evaluated to and compared to the historical testwork results and recovery models developed in the previous phases. The evaluation consisted in:

- Comparing the previous studies' LOM feed grades with the new ones;
- Comparing the HLS database to the new LOM feed grades and rock type composition to ensure it is still representative of the forecasted feed material;
- Analyzing production data from the Phase I and Phase II concentrators and comparing it to the models' expected recoveries.

13.3.1 LOM Feed Grades Comparison

Table 13-8 shows the comparison between the average feed grades of the 2017 Phase I study, the 2019 Phase II study, and the new LOM.

Table 13-8: Average LOM mill feed grades

Element	Head Grade (%)								
	Phase I LOM (2017)			Phase II LOM (2019)			New LOM		
	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.
Fe	28.24	30.01	31.44	26.7	28.95	31.10	27.25	28.59	31.70
CaO	0.06	1.33	3.30	0.40	2.17	4.50	0.15	1.93	2.94
MgO	0.08	1.33	3.17	0.50	2.03	3.90	0.18	1.80	2.46
SAT	0.8	4.31	10.07	2.90	6.46	10.10	2.18	8.32	10.00

The LOM average feed grades comparison shows that:

- The average Fe feed grade is decreasing from one study to the next. Its minimum value was at its lowest in the Phase II study;
- CaO and MgO average and maximum head grades were at their highest in the Phase II study;
- Magnetite head grades have doubled on average since Phase I study while the maximum values remained at around 10%.

The changes from 2017 to 2019 are mainly due to the increase in reserve tonnage in Chief's Peak Pit. The changes in 2023 are due to remodelling of the deposit and dilution factors after years of operations. See Chapters 14, 15 and 16 for more details.

The Fe feed grades are lower and magnetite feed grades higher on average, but the ranges remain similar. As presented in Section 13.2.2.3, the conclusions drawn from the bench-scale and pilot plant at SGS and Corem showed that magnetite concentrates in a similar way to hematite in the gravity separation circuit.

The new LOM Fe, CaO, MgO and magnetite feed grade ranges are similar to the ones from the previous studies suggesting the new LOM ore should behave in the separation circuits as determined during the previous studies.

13.3.2 Heavy Liquid Separation Database Review

The new LOM feed rock types and grades were compared with the HLS database to ensure the forecasted feed material is similar to what it was in the past and that the historical testwork can be assumed valid for the new LOM's ore.

The three main rock types representing 84.6% of the new LOM are iron formation (IF), iron formation – magnetite (IFM) and silicates iron formation (SIF). The HLS database contains 3,821 samples of those three rock types. The head grades weighted averages of those samples are compared to the new LOM in Table 13-9.

Table 13-9: HLS Database and new LOM head grades

Rock Type	New LOM	HLS Database Average Head Grade				
	Avg. Ratio (%)	Fe_2O_3 (%)	MgO (%)	CaO (%)	Al_2O_3 (%)	SAT (%)
IF	41.74	29.74	0.65	0.63	0.54	4.14
IFM	26.03	25.49	2.03	2.62	0.76	9.42
SIF	16.85	24.16	4.42	3.58	1.01	12.69
HLS Database Weighted Average		27.32	1.82	1.83	0.70	7.46
New LOM Average		28.59	1.81	1.93	0.43	8.32

The head grades from the HLS historical database and those forecasted in the new LOM are very similar for the three main rock types suggesting that there is no significant change in the feed material of the new LOM. HLS tests were performed as part of the Phase II variability testwork allowing comparison of its samples with the HLS database, but it did not include IMF samples. Figure 13-6 shows the comparison of the head magnetite grades of the eight variability samples with the HLS results database. The dots appearing above the distributions' bars represent the variability samples. Their colour matches the pit and lithology they represent. Their location on the X axis indicates the sample magnetite feed grade, while their location on the Y-axis is arbitrary and was selected for clarity purposes.

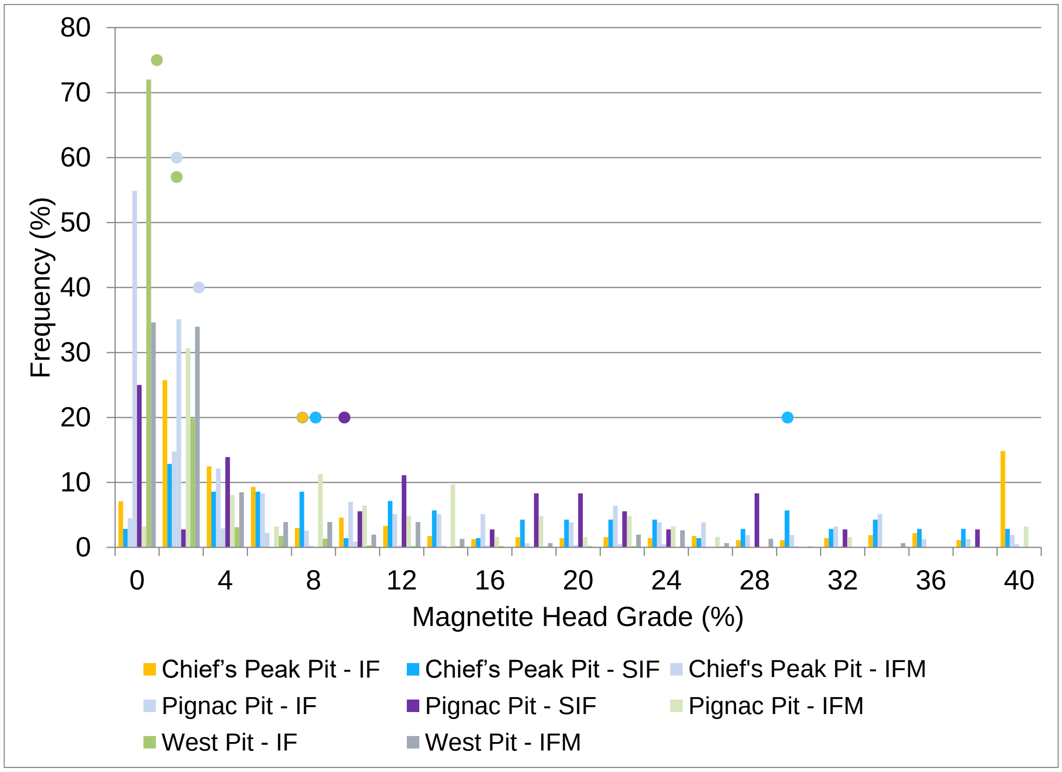


Figure 13-6: HLS Magnetite head grade comparison

It can be seen from Figure 13-6 that the samples used for the variability testwork included high-magnetite head grades that are representative of those associated with IFM ore. Furthermore, the sink grades and recoveries of the IMF formations are similar to that of IF and SIF formations as shown on Figure 13-7 and Figure 13-8.

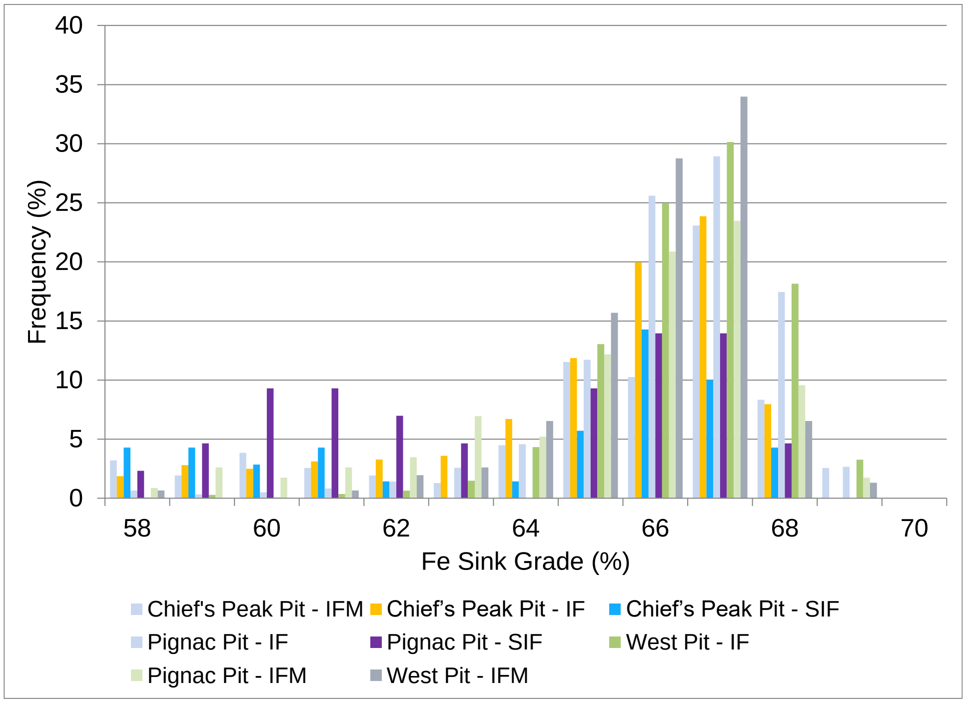


Figure 13-7: HLS sink iron grade

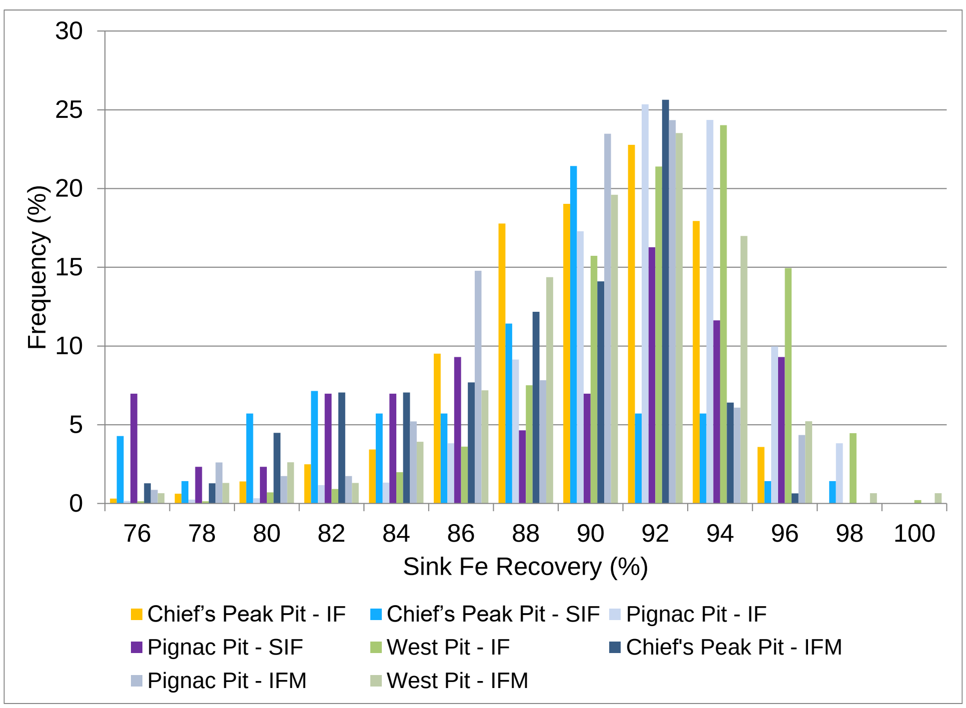


Figure 13-8: HLS iron recovery

As a result, the variability testwork described in Section 13.2.5.2 can be considered representative of the new LOM even though it did not include IMF samples.

13.3.3 Production Data Review

Production data was analyzed for a period starting in February 2019 until February 2023 for the Phase I concentrator, and from July 2022 until February 2023 for Phase II. Reconciled data from each 12-hour shifts were used. The concentrator's feed grade comparison to the new LOM average is shown on Table 13-10.

Table 13-10: Production data and LOM head grades

	Average Head Grade			
	Fe (%)	MgO (%)	CaO (%)	SAT (%)
Production Data	29.74	1.44	1.40	5.02
Phase I LOM (2017)	30.01	1.33	1.33	4.31
Phase II LOM (2019)	28.95	2.03	2.17	6.46
New LOM	28.59	1.81	1.93	8.32

Operation during that period has been consistent with the previous studies' LOM head grades. The feed ore contained on average 1.15% more Fe, 0.47% less MgO, 0.53% less CaO, and 3.30% less magnetite than what will be fed on average with the new LOM.

The production dataset needed to be filtered to assess the plants' performances relating to the feed material since it includes process upsets, mechanical breakdown and other events that negatively impact recovery and are unrelated to the ore itself. Furthermore, only the head grades within the LOM ranges were used for comparison purposes since the recovery models were developed to be accurate within that range. The following filters were applied:

- Fe feed grades below 27% and above 32% were eliminated. This filter is meant to keep data within the new LOM range;
- SiO_2 concentrate grades below 4.0% and above 5.0% were eliminated. This filter is meant to remove bad recoveries resulting from over-quality concentrate production as well as eliminate high recoveries resulting from poor quality concentrates;
- Magnetite feed grades above 10% were eliminated. This filter is meant to keep data within the new LOM range;

- Mill feed tonnages below 24,000 t per 12 h shift was eliminated. This filter is meant to eliminate most of the feed tonnage upsets and lower feed rates that are outside of the efficient operation range of the separation circuits;
- Early operation data of Phase II prior to the optimization of its separation circuit was not used.

As a result, 1,240 data points out of a total of 3,360 were kept. The comparison of the recovery models developed for each phase with production data is shown on Figure 13-9.

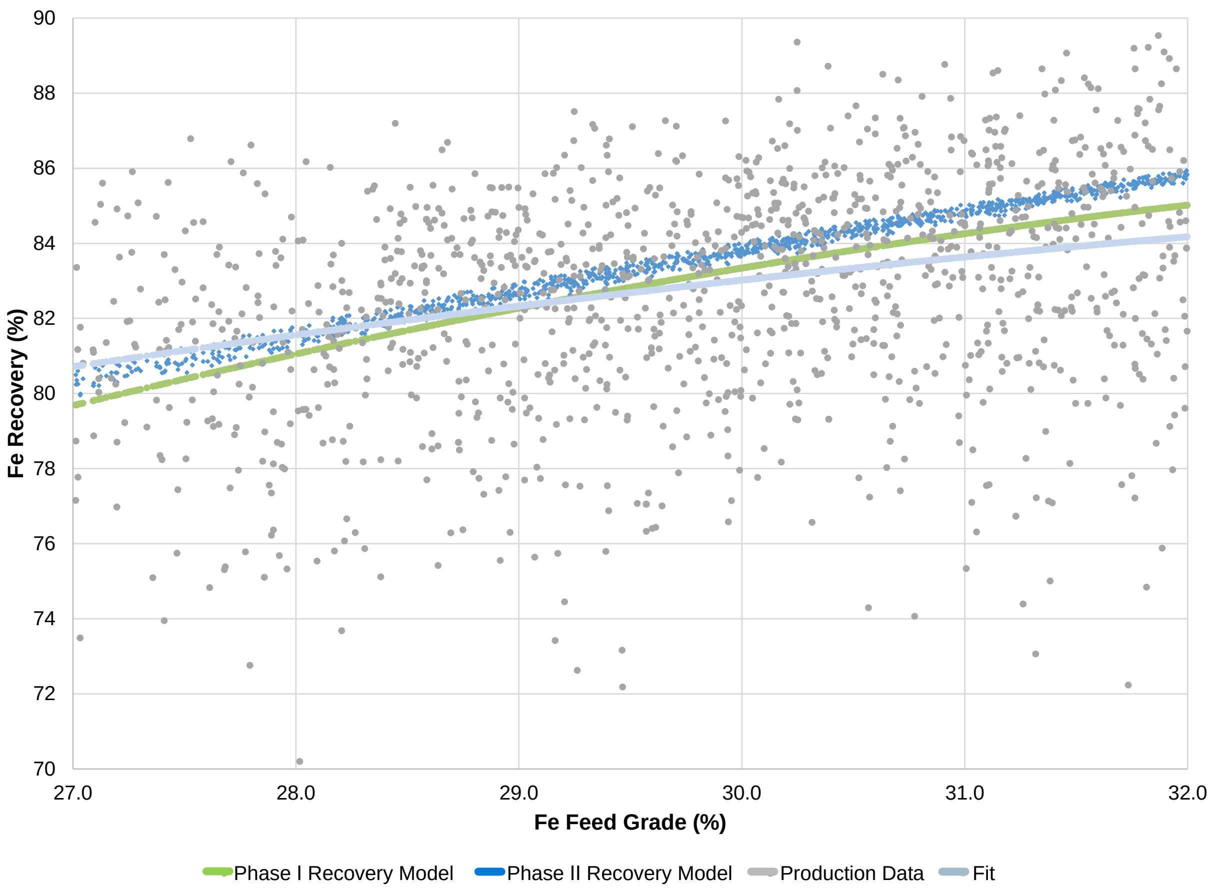


Figure 13-9: Iron recovery vs. Feed iron grade – Filtered data

It can be observed that:

- The slope of both models is steeper than that of the production data, suggesting that the operation is less sensitive to Fe head grade than anticipated from testwork results;
- The models predict similar recoveries to the production dataset within the 28% to 29% Fe range;
- Actual Fe recoveries were on average higher than what the models predicted for the lower Fe feed grades;
- Actual Fe recoveries were on average lower than what the models predicted for the higher Fe feed grades.

The filtered production data iron recovery weighted average is 82.7%, while the Phase I model predicted 83.0% and the Phase II model 83.5%. This recovery gap was further investigated.

The production data shows there is a lower magnetite than Hematite recovery in the concentrators, which is not in line with the testwork results presented in Section 13.2.2.3. Analysis of some of the sampling campaigns conducted on the whole separation circuits over the years suggests that there would be a decrease in magnetite recovery with increasing magnetite feed grades in the rougher and cleaner circuits. At the same time, an increase in magnetite recovery is observed in the scavenging circuits (scavenger spirals and magnetic separation circuits), which does not compensate for the loss in the rougher and cleaner circuits. The campaigns also show lower Fe recoveries at the rougher spirals than the design values, at least at the time the campaigns were conducted.

There are many plausible causes that would explain the lower Fe and magnetite recoveries at the rougher stage. It could be the result of the concentrate grade control plan applied by operations, possibly increasing wash water at the rougher stage on occasions when it could have been increased elsewhere for a similar impact on grade and less impact on recovery, or by using spiral cutters and splitters positions that are different than those used during testwork. The performances of the rougher stage are also positively impacted by maintaining the spirals clean.

There are not enough sampling campaigns available, especially ones that include magnetite assays, to confirm this observation or identify its causes. Data available suggests the gap in recovery could be to the result of operational factors and it is likely that it is independent of the feed ore. Putting emphasis on understanding the root causes and implementing mitigation actions would likely bring the recovery closer to that predicted by the models.

13.3.4 Current Metallurgical Performance Conclusions

The recovery models developed in the previous phases can be considered valid to be used with the new LOM considering that:

- The LOM feed grades ranges have remained the same since the Phase I study;
- Despite an increase of the average magnetite feed grade, historical testwork has shown that magnetite recoveries are similar to hematite recoveries in the separation circuit. This similarity is not observed on production data;
- The HLS database shows that the new LOM ore is not different from the past LOMs, thus validating historical testwork results application on the new LOM;
- The Phase II variability testwork was performed on samples that are representative of the new LOM;
- Production data suggests that although recoveries are on average lower that what the models predict, causes are likely independent of the feed ore. Further investigation is needed to understand the process' behaviour;
- Recovery models developed for Phase I and Phase II match the filtered production data relatively well, especially within the 28% to 29% Fe feed grade range which is where the LOM average feed grade is.

13.4 Recovery Model

In order to use a single model that represents production from both Phase I and Phase II concentrators, the models developed for each phase were combined into one assuming that Phase II has a higher capacity than Phase I due to its design improvements over Phase I. The following recovery equation was determined:

$$\%FeRec. = -0.05673Fe^2 + 4.4027Fe - 0.59683MgO - 0.00495MgO^2 + 0.01424FeMgO + 2.863$$

As in the Phase II study, this equation takes into account the MgO feed grade and assumes it as actinolite, which contains iron that is not recoverable. The model is applied on the life of mine annual averages iron feed grades of 27% to 32% and MgO feed grades up to 3.90%.

14. Mineral Resource Estimates

The mineral resource model for Bloom Lake was prepared by Antoine Teixeira de Carvalho, P.Geo. (OGQ #2179), a Senior Geologist with Quebec Iron Ore (QIO) in November 2022. SRK Consulting (Canada) Inc. (SRK) was retained to audit the mineral resource model constructed by QIO.

Erik Ronald, P.Geo. (PGO #3050, OGQ SA), qualified person (QP) of this chapter, visited the property from February 21 to 25, 2022, accompanied by Vincent Blanchet and Antoine Teixeira of QIO. The data, mineral resource model, and mineral resource classification were reviewed, and the audited Mineral Resource Statement was reviewed by SRK, under the supervision of Erik Ronald. Mr. Ronald is an independent qualified person as this term is defined in National Instrument 43-101. The effective date of the Mineral Resource Statement is April 1, 2023.

This chapter describes the resource estimation methodology and summarizes the key assumptions considered by QIO and audited by SRK on behalf of QIO. In the opinion of the QP, the resource evaluation reported herein is a reasonable representation of the mineral resources contained on the Bloom Lake Iron Ore project at the current level of sampling. The mineral resources have been estimated in conformity with generally accepted Canadian Institute of Mining, Metallurgy, and Petroleum (CIM) Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines (November 2019) and are reported in accordance with the Canadian Securities Administrators' National Instrument 43-101. Mineral resources are not mineral reserves and have not demonstrated economic viability. There is no certainty that all or any part of the mineral resource will be converted into mineral reserve.

14.1 Resource Database

SRK performed a review and audit of the drilling database utilized for this mineral resources, effective April 1, 2023. The drilling database was updated with recent data obtained in drill campaigns between 2018 and 2022.

All final collar locations were surveyed and reported in World Geodetic System 1984 (WGS84) Zone 19 North, Universal Transverse Mercator (UTM) coordinates. Table 14-1 provides a summary and comparison of databases available for the 2019 and the 2022 mineral resource models. Overall, the database includes a 13% increase in drill meterage available for geological modelling and mineral resource estimation. Figure 14-1 shows the spatial distribution of drillhole collars completed since the previous Mineral Resource Statement (Allaire et al., 2019).

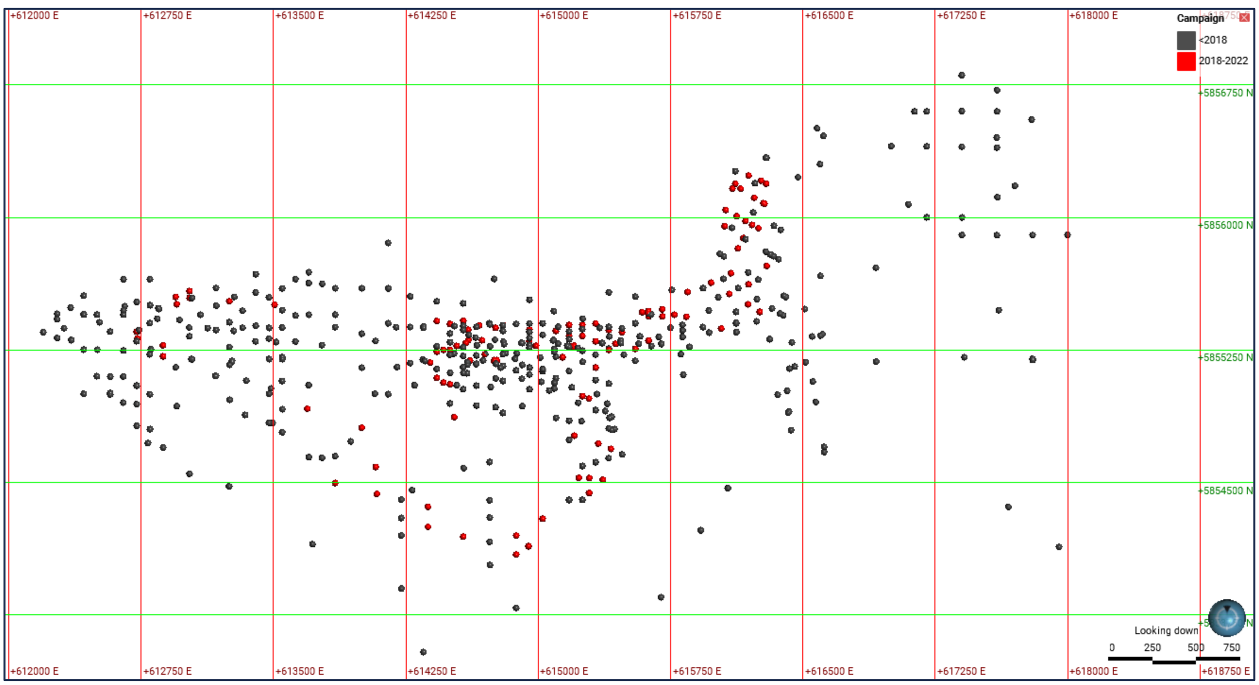
Table 14-1: Resource database summary

Database	2019 MRE(1)	2018-2022	2023 MRE	% Difference
Number of Drill Collars	569	106	675	19%
Length (m)	141,288	18,465	159,753	13%

Source: SRK, 2023

Notes:

(1) 2019 Mineral Resource Estimation (MRE) count is based on the 2019 Technical Report (Allaire et al., 2019).



Source: SRK, 2023

Figure 14-1: Plan view of drillhole collars showing drill collars since the 2019 mineral resource model

Based on the QP's site visit completed in February 2022, it is the QP's opinion that drilling, logging, core handling, core storage, and analytical quality control (QC) protocols used by QIO meet generally accepted industry practices. As a result, the QP considers that the drilling data collected by QIO and former project operators are of sufficient quality to support mineral resource disclosure.

14.2 Geological Model

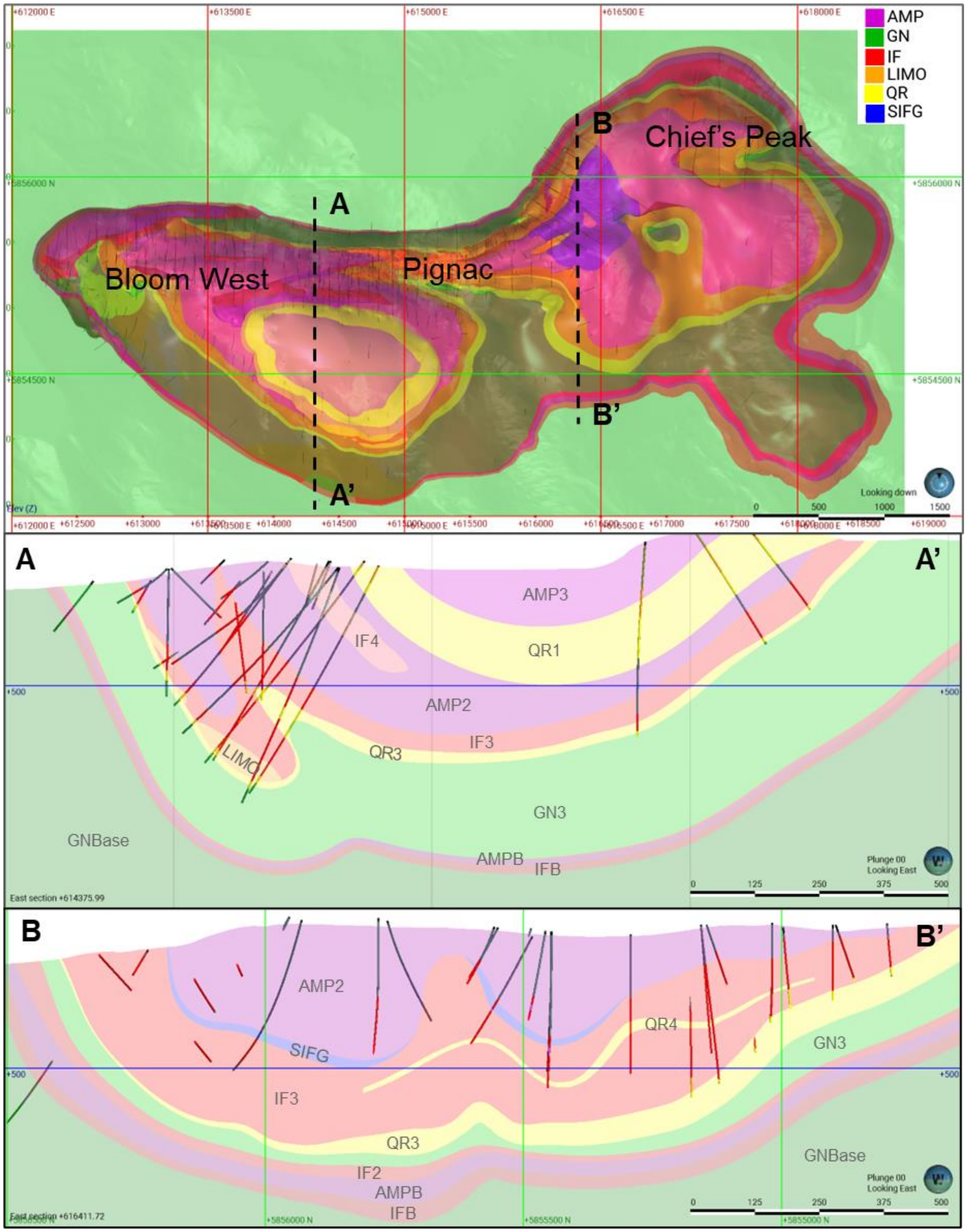
The geological model for Bloom Lake consists of a lithology model, grunerite model, sulphur model, and the iron formation (IF) estimation domain model. All 3D digital geological modelling was performed using Leapfrog Geo™ software. Interpretations were based on lithological logging, geochemical assays from core and grade control data, geological maps, historical models, and ground magnetic surveys.

The lithology model comprises four main rock types, including amphibolite, gneiss, a silica rich unit termed "quartz rock", and iron formation domains (Figure 14-3). The mineralized iron formation units in the lithology model include iron formation, silica iron formation, and limonite. The unmineralized quartz rock, gneiss, and amphibolite units occur above, below, and intercalated with the iron formations throughout the property. Finally, an overburden surface is modelled based on geological logging. Volumetric summary of the lithologies is provided in Table 14-2.

Table 14-2: Lithology model volumetrics

Rock Types	Description	Nov-22
		Volume (m^3)
OB:	Overburden	126,640,000
QR1:	Quartz Rock 1	44,502,000
QR2:	Quartz Rock 2	56,566,000
QR10:	Quartz Rock 10	3,233,200
AMP2:	Amphibolite 2	616,390,000
AMP3:	Amphibolite 3	36,773,000
AMP4:	Amphibolite 4	757,280
AMPB:	Amphibolite Base	2,668,600,000
IF3:	Iron Formation 3	725,368,000
IF4:	Iron Formation 4	17,123,000
IFB:	Iron Formation Base	398,050,000
LIMO:	Limonite	5,753,800
LIMO_IFG	Limonite Iron Formation Grunerite	4,404,700
SIFG	Silica Iron Formation Grunerite	8,430,240
GNBase:	Gneiss Base	15,804,000,000
Total		**20,516,591,220**

Source: SRK, 2023



Source: SRK, 2023

Figure 14-2: Plan and cross-sectional views of the lithology model for Bloom Lake

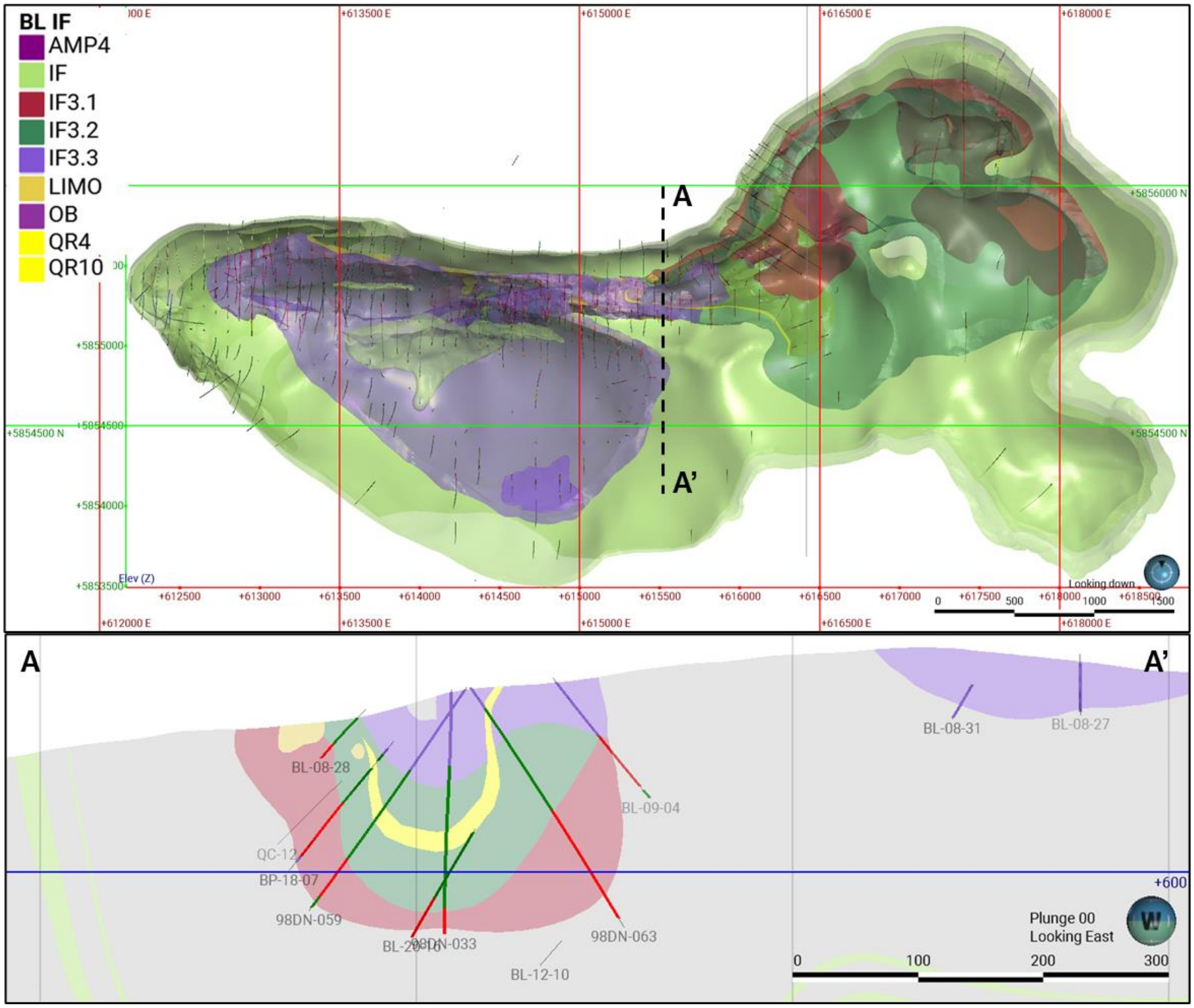
The iron formation model comprises the five primary mineralized domains used for mineral resource estimation, summarized in Table 14-3 and shown in Figure 14-2.

The iron formation model further differentiates the iron formation units into compositional categories. Overall, the deposit is spatially divided into three main zones: Bloom West, Pignac, and Chief's Peak, from west to east respectively (Figure 14-1). Bloom West is characterized by lower CaO + MgO (< 0.6%) content represented by domains IF and IF3.3, whereas Chief's Peak exhibits elevated CaO +MgO concentrations, represented by a combination of domains IF, IF3.2 and IF3.3. The central zone, Pignac, represents a transitional area containing all iron formation domain types.

Table 14-3: IF domain model volumetrics

BL_IF Domain	Nov 2022 Volume (m^3)
IF	812,050,000
IF3.1	94,810,000
IF3.2	250,770,000
IF3.3	380,490,000
LIMO	10,147,000
Subtotal IF	**1,548,267,000**
OB	126,640,000
QR10	3,233,600
QR4	7,430,300
Unknown	18,834,000,000
Subtotal Waste	**18,971,303,900**

Source: SRK, 2023



Source: SRK, 2023

Figure 14-3: IF model domains utilized in resource estimation

The sulphur model contains domains used in the estimation of sulphur concentration, modelled as offset surfaces along stratigraphic contacts, where sulphides are typically concentrated. Four sulphur domains were constructed along the major contacts using limited sulphur analyses data from drilling; volumetric summary of these four domains is provided in Table 14-4. Sulphur analyses were completed with a laboratory detection limit of 100 ppm, which is considered inappropriate to provide acceptable confidence in the results. Therefore, QIO uses the sulphur model as a broad indication of sulphur content only, with plans for future refinement.

Table 14-4: Sulphur model volumetrics

BL_Soufre	Nov. 2022 Volume (m^3)
S_IF:	1,037,700,000
S_IF3:	160,130,000
S_AMP2:	125,250,000
AMP4:	757,280
Subtotal	**1,323,837,280**
S_OB:	126,640,000
Unknown:	19,066,000,000
Total	**20,516,477,280**

Source: SRK, 2023

14.3 Bulk Density

For the five primary mineralized IF units, bulk density values were calculated based on a formula established and used as part of regular mining operations based on total iron content:

$$\text{Bulk Density} = \text{Fe\%} \times 0.0284 + 2.5764$$

In unmineralized lithologies, a constant bulk density was assigned per lithology (see Table 14-5). Unmineralized material was assigned fixed bulk densities varying from 2.32 t/m³ to 3.16 t/m³ based on historical measurements from different laboratories.

Table 14-5: Constant density values assigned to un-estimated lithologies

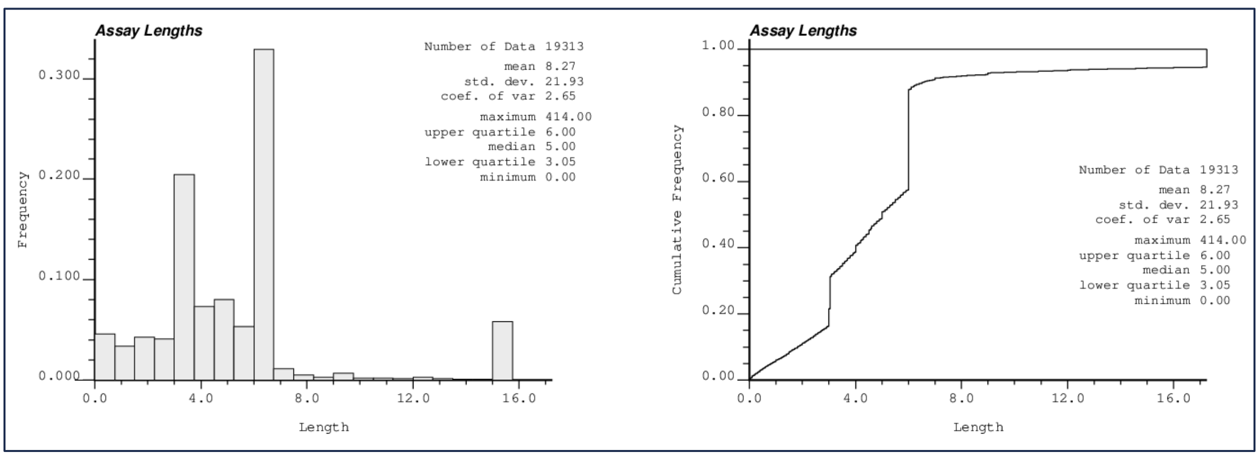
Lithology	Lith Code	Density (t/m^3)
Limonite Iron Formation Grunerite	LIMO_IFG	3.03
Limonite	LIMO	2.34
Overburden	OB	2.32
Iron Formation	IF	2.88
Quartz	QR	2.77
Amphibolite	Amp	3.16
Gneiss	Gn	2.81

Source: QIO, 2023

SRK reviewed the available density data and past reports for limonite, quartzite, gneiss, and amphibolite. As well, SRK reviewed the density regression formulation used for the iron formation to confirm that it is reasonable for use in the current Mineral Resource Estimate. QIO confirmed that the bulk density values are used daily in production with no issues identified in tonnage forecasts and production reconciliation.

14.4 Assays, Composites and Capping

Drilling composites are calculated at 6.0 m length, with residuals added to previous intervals. SRK reviewed the distribution of assay lengths and confirms that assays are generally sampled at varying intervals, with over 87% sampled at 6 m intervals or shorter (Figure 14-4). A composite length of 6 m is deemed reasonable given the sample lengths, the selective mining unit (SMU), and anticipated block size.



Source: SRK, 2023

Figure 14-4: Histogram and cumulative histogram of assay length (m)

Table 14-6 shows the comparison of summary statistics for assays and composites for each variable within the five resource domains. As expected with compositing, there is immaterial differences in the mean grades while the variance is reduced. Grade capping was not performed nor warranted based on SRK's data review.

SRK reviewed the assay and composite database and the QP finds that the statistics in Table 14-6 are acceptable. SRK undertook a capping analysis review per variable per domain, using a combination of probability plots, capping sensitivity plots, and 3D visual inspection of data distribution to determine if capping was required. For some variables, a low coefficient of variation suggests there is no need to cap. For other variables with higher coefficient of variation, an inspection of the spatial distribution of composites shows a naturally higher-grade population that is spatially clustered; capping should not be required for these variables. Based on these observations, the QP agrees that capping is not required for this property.

Table 14-6: Comparison of assay and composite summary statistics

Domain	Variable	Unit	Assays (Length Weighted)					Composites (6 m)					%Difference (Assay/Comp)		
			Count	Length (m)	Mean	Var[1]	CoV[1]	Count	Length (m)	Mean	Var[1]	CoV[1]	Length (m)	Mean	Var[1]
IF	Al_2O_3	%	2,696	13,084	0.596	3.60	3.18	2,179	13,034	0.607	2.45	2.58	0	2	-32
IF3.1	Al_2O_3	%	774	3,645	0.606	3.75	3.19	610	3,611	0.596	3.20	3.00	-1	-2	-15
IF3.2	Al_2O_3	%	2,921	14,860	0.404	1.78	3.31	2,485	14,827	0.406	1.27	2.78	0	0	-29
IF3.3	Al_2O_3	%	4,896	23,686	0.292	0.64	2.74	3,933	23,430	0.293	0.39	2.14	-1	0	-38
LIMO	Al_2O_3	%	384	1,684	0.498	1.82	2.71	282	1,660	0.499	1.57	2.51	-1	0	-14
IF	CaO	%	2,756	13,244	1.164	6.14	2.13	2,206	13,190	1.168	5.79	2.06	0	0	-6
IF3.1	CaO	%	774	3,645	9.174	23.21	0.53	610	3,611	9.182	21.34	0.50	-1	0	-8
IF3.2	CaO	%	2,920	14,851	3.220	7.55	0.85	2,483	14,818	3.227	6.84	0.81	0	0	-9
IF3.3	CaO	%	5,154	24,463	0.061	0.12	5.55	4,063	24,207	0.062	0.09	4.84	-1	1	-22
LIMO	CaO	%	384	1,684	0.151	0.66	5.40	282	1,660	0.149	0.59	5.17	-1	-1	-11
IF	CR_2O_3	%	2,287	11,110	0.038	0.00	1.16	1,859	11,066	0.038	0.00	1.14	0	0	-3
IF3.1	CR_2O_3	%	518	2,481	0.053	0.01	1.53	414	2,456	0.053	0.01	1.53	-1	0	-1
IF3.2	CR_2O_3	%	1,310	6,531	0.071	0.00	0.87	1,096	6,502	0.071	0.00	0.86	0	0	-3
IF3.3	CR_2O_3	%	3,743	17,837	0.048	0.00	1.00	2,959	17,588	0.048	0.00	0.97	-1	0	-5
LIMO	CR_2O_3	%	301	1,385	0.065	0.00	0.80	234	1,375	0.064	0.00	0.79	-1	-2	-5
IF	Fe	%	2,840	13,500	26.354	82.71	0.35	2,248	13,447	26.354	69.93	0.32	0	0	-15
IF3.1	Fe	%	1,016	4,323	19.546	51.41	0.37	722	4,285	19.542	43.86	0.34	-1	0	-15
IF3.2	Fe	%	3,681	17,064	27.776	55.89	0.27	2,854	17,026	27.770	46.94	0.25	0	0	-16
IF3.3	Fe	%	5,499	25,454	30.071	65.52	0.27	4,227	25,197	30.014	51.71	0.24	-1	0	-21
LIMO	Fe	%	407	1,738	30.559	97.71	0.32	291	1,712	30.398	85.93	0.30	-2	-1	-12

Note:
[1] Var = Variance; CoV = Coefficient of Variation

Domain	Variable	Unit	Assays (Length Weighted)					Composites (6 m)					%Difference (Assay/Comp)		
			Count	Length (m)	Mean	Var(1)	CoV(1)	Count	Length (m)	Mean	Var(1)	CoV(1)	Length (m)	Mean	Var(1)
IF	K_2O	%	2,696	13,084	0.127	0.38	4.86	2,179	13,034	0.130	0.27	3.96	0	3	-30
IF3.1	K_2O	%	774	3,645	0.070	0.08	4.03	610	3,611	0.069	0.07	3.79	-1	-1	-14
IF3.2	K_2O	%	2,897	14,691	0.050	0.05	4.63	2,455	14,658	0.050	0.03	3.74	0	0	-34
IF3.3	K_2O	%	4,886	23,609	0.025	0.01	4.57	3,918	23,350	0.025	0.01	3.62	-1	0	-37
LIMO	K_2O	%	381	1,668	0.018	0.01	4.79	279	1,644	0.018	0.00	3.98	-1	0	-31
IF	LOI	%	2,677	12,972	1.072	6.16	2.31	2,160	12,922	1.072	5.66	2.22	0	0	-8
IF3.1	LOI	%	773	3,642	5.591	21.94	0.84	609	3,607	5.585	20.08	0.80	-1	0	-8
IF3.2	LOI	%	2,850	14,396	2.119	8.97	1.41	2,401	14,363	2.126	8.26	1.35	0	0	-8
IF3.3	LOI	%	4,820	23,247	0.269	0.19	1.62	3,856	22,991	0.270	0.14	1.39	-1	0	-26
LIMO	LOI	%	378	1,653	0.896	1.48	1.36	276	1,629	0.892	1.25	1.25	-1	0	-16
IF	SAT	%	1,708	7,968	5.15	58.72	1.47	1,325	7,928	5.197	50.42	1.37	-1	1	-14
IF3.1	SAT	%	1,046	4,402	12.60	98.58	0.83	733	4,364	12.541	82.61	0.72	-1	0	-16
IF3.2	SAT	%	3,701	16,861	11.67	182.58	1.16	2,819	16,831	11.616	166.13	1.11	0	0	-9
IF3.3	SAT	%	5,815	25,387	1.93	19.77	2.35	4,211	25,118	1.924	17.28	2.16	-1	-1	-13
LIMO	SAT	%	419	1,703	2.45	13.40	1.53	285	1,665	2.453	13.07	1.47	-2	0	-2
IF	MgO	%	2,756	13,244	0.968	3.55	1.95	2,206	13,190	0.968	3.29	1.87	0	0	-7
IF3.1	MgO	%	774	3,645	7.103	11.31	0.47	610	3,611	7.119	10.50	0.46	-1	0	-7
IF3.2	MgO	%	2,921	14,860	3.053	4.72	0.71	2,485	14,827	3.059	4.21	0.67	0	0	-11
IF3.3	MgO	%	5,152	24,452	0.098	0.20	4.58	4,060	24,193	0.099	0.17	4.15	-1	0	-17
LIMO	MgO	%	381	1,668	0.278	1.07	3.71	279	1,644	0.267	0.92	3.60	-1	-4	-13
IF	MnO	%	2,756	13,244	0.104	0.07	2.55	2,206	13,190	0.105	0.07	2.45	0	0	-7
IF3.1	MnO	%	774	3,645	0.488	0.17	0.85	610	3,611	0.489	0.16	0.83	-1	0	-5
IF3.2	MnO	%	2,921	14,860	0.192	0.08	1.45	2,485	14,827	0.192	0.07	1.41	0	0	-6
IF3.3	MnO	%	5,148	24,409	0.035	0.02	4.04	4,053	24,153	0.035	0.02	3.64	-1	-1	-20
LIMO	MnO	%	384	1,684	0.096	0.03	1.90	282	1,660	0.098	0.03	1.84	-1	2	-3

Note:
(1) Var = Variance; CoV = Coefficient of Variation

Domain	Variable	Unit	Assays (Length Weighted)					Composites (6 m)					%Difference (Assay/Comp)		
			Count	Length (m)	Mean	Var[(1)]	CoV[(1)]	Count	Length (m)	Mean	Var[(1)]	CoV[(1)]	Length (m)	Mean	Var[(1)]
IF	Na_2O	%	2,696	13,084	0.068	0.05	3.24	2,179	13,034	0.069	0.03	2.52	0	1	-38
IF3.1	Na_2O	%	774	3,645	0.121	0.08	2.31	610	3,611	0.120	0.07	2.13	-1	-1	-16
IF3.2	Na_2O	%	2,898	14,691	0.087	0.03	2.13	2,453	14,658	0.087	0.03	1.82	0	1	-26
IF3.3	Na_2O	%	4,887	23,624	0.051	0.01	1.86	3,920	23,368	0.051	0.01	1.57	-1	0	-28
LIMO	Na_2O	%	379	1,662	0.057	0.00	1.00	278	1,638	0.057	0.00	0.99	-1	0	-3
IF	P_2O_5	%	2,696	13,084	0.044	0.01	1.66	2,179	13,034	0.045	0.00	1.37	0	0	-31
IF3.1	P_2O_5	%	774	3,645	0.072	0.02	2.16	610	3,611	0.074	0.02	2.13	-1	2	2
IF3.2	P_2O_5	%	2,920	14,854	0.050	0.01	1.90	2,484	14,821	0.050	0.01	1.65	0	0	-25
IF3.3	P_2O_5	%	4,898	23,704	0.026	0.00	1.73	3,936	23,448	0.026	0.00	1.46	-1	0	-28
LIMO	P_2O_5	%	384	1,684	0.054	0.00	1.22	282	1,660	0.054	0.00	1.12	-1	-1	-18
S_AMP2	S	ppm	1,088	4,853	307	403,622	2.07	781	4,456	334	401,818	1.90	-8	9	0
S_IF	S	ppm	2,029	8,567	426	34,045,290	13.68	1,515	8,739	423	32,462,522	13.45	2	-1	-5
S_IF3	S	ppm	1,721	7,529	375	5,581,648	6.29	1,288	7,352	392	3,432,118	4.73	-2	4	-39
IF	SiO_2	%	2,696	13,084	58.334	159.08	0.22	2,179	13,034	58.319	136.94	0.20	0	0	-14
IF3.1	SiO_2	%	774	3,645	48.416	155.66	0.26	610	3,611	48.424	137.77	0.24	-1	0	-11
IF3.2	SiO_2	%	2,921	14,860	51.531	110.16	0.20	2,485	14,827	51.507	93.00	0.19	0	0	-16
IF3.3	SiO_2	%	4,898	23,704	56.560	127.11	0.20	3,936	23,448	56.634	101.11	0.18	-1	0	-20
LIMO	SiO_2	%	384	1,684	53.997	216.64	0.27	282	1,660	54.289	192.68	0.26	-1	1	-11
IF	TiO_2	%	2,756	13,244	0.058	0.06	4.32	2,206	13,190	0.059	0.04	3.36	0	2	-38
IF3.1	TiO_2	%	774	3,645	0.099	0.16	4.09	610	3,611	0.097	0.14	3.82	-1	-2	-17
IF3.2	TiO_2	%	2,900	14,706	0.067	0.10	4.81	2,458	14,673	0.068	0.07	4.02	0	1	-29
IF3.3	TiO_2	%	5,145	24,410	0.036	0.02	4.35	4,053	24,154	0.036	0.02	3.45	-1	1	-36
LIMO	TiO_2	%	379	1,662	0.057	0.04	3.70	278	1,638	0.054	0.03	2.94	-1	-5	-43

Source: SRK, 2023

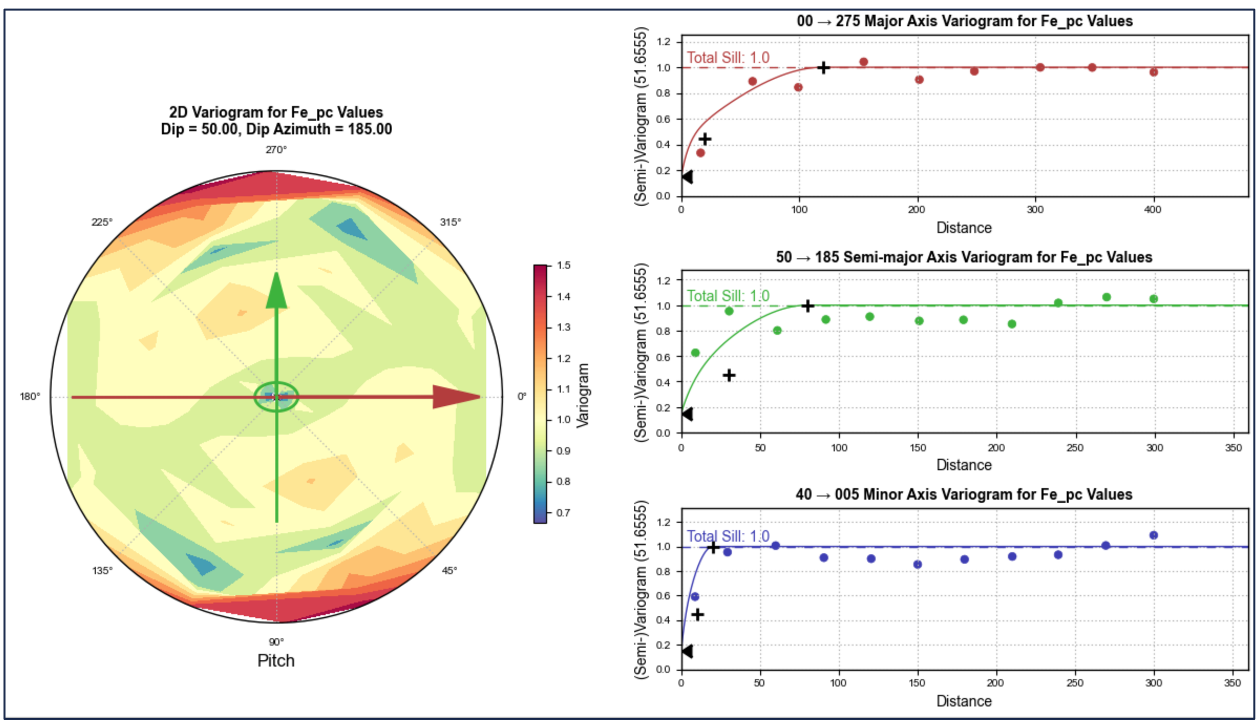
Note:

(1) Var = Variance; CoV = Coefficient of Variation

14.5 Variogram Analysis

QIO calculated and modelled semi-variograms to understand the spatial correlation structures for Fe, CaO, MgO, Satmagan (SAT), MnO, Na_2O, P_2O_5, and SiO_2 within each of the five resource domains. For all other variables (Al_2O_3, Cr_2O_3, K_2O, S and LOI), QIO chose to estimate them using an inverse distance (ID) weighting scheme, which does not require variogram input. An example of the variogram analysis and model for Fe in IF3.3 is shown in Figure 14-4, and all modelled variograms are summarized in Table 14-7. Given the folded nature of the iron formation, QIO calculated the variograms based on a subset of the data, in a relatively unfolded region, to permit inference of a reasonable variogram.

The variograms modelled by QIO are generally characterized by low nugget effect, combined with two structures that capture: 1) a shorter scale structure up to a nominal range of 200 m; and 2) a longer range structure within 400 m for most attributes, but can be as far as 700 m for S and for CaO. Preliminary estimation sensitivities to slight changes in variogram models showed no material impact to the average estimated Fe grade. Upon review of the variogram and inference rationale, the QP is of the opinion that the variogram models are reasonable and appropriate for use in grade estimation.



Source: QIO, 2023

Figure 14-5: Example of variogram model plots for Fe in IF3.3 domain

Table 14-7: Summary of standardized variogram model[(1)] for select variables

Variable	Zone	Nugget	Structure 1 (Exponential)				Structure 2 (Spherical)			
			Sill	Major	Semi-major	Minor	Sill	Major	Semi-major	Minor
Fe	IF	0.15	0.30	100	40	10	0.55	250	180	25
	IF3.1	0.15	0.30	20	30	10	0.55	120	80	20
	IF3.2	0.15	0.30	45	30	30	0.55	220	175	45
	IF3.3	0.15	0.30	80	30	30	0.55	290	175	30
	LIMO	0.10	0.40	200	170	60	0.50	200	250	60
CaO	IF	0.05	0.20	200	60	35	0.75	600	250	70
	IF3.1	0.05	0.20	200	60	35	0.75	600	250	70
	IF3.2	0.05	0.20	200	60	35	0.75	600	250	70
	IF3.3	0.05	0.20	200	60	35	0.75	600	250	70
	LIMO	0.10	0.40	200	170	60	0.50	200	250	60
MgO	IF	0.10	0.15	100	50	30	0.75	350	220	80
	IF3.1	0.10	0.15	100	50	30	0.75	350	220	80
	IF3.2	0.10	0.15	100	50	30	0.75	350	220	80
	IF3.3	0.10	0.15	100	50	30	0.75	350	220	80
	LIMO	0.10	0.40	200	170	60	0.50	200	250	60
Mag Fe	IF	0.05	0.20	70	30	20	0.75	200	90	30
	IF3.1	0.05	0.20	70	30	20	0.75	200	90	30
	IF3.2	0.05	0.20	70	30	20	0.75	200	90	30
	IF3.3	0.05	0.20	70	30	20	0.75	200	90	30
	LIMO	0.05	0.20	70	30	20	0.75	200	90	30
MnO	IF	0.05	0.20	80	40	50	0.75	350	200	50
	IF3.1	0.05	0.20	80	40	50	0.75	350	200	50
	IF3.2	0.10	0.20	80	40	50	0.75	350	200	50
	IF3.3	0.05	0.20	80	50	50	0.75	350	200	50
	LIMO	0.05	0.20	80	40	50	0.75	350	200	50
Na_2O	IF	0.05	0.20	40	40	50	0.75	200	160	70
	IF3.1	0.05	0.20	40	40	50	0.75	200	160	60
	IF3.2	0.05	0.20	40	40	50	0.75	200	160	70
	IF3.3	0.05	0.20	40	40	50	0.75	200	160	70
	LIMO	0.05	0.20	40	40	50	0.75	200	160	70

Variable	Zone	Nugget	Structure 1 (Exponential)				Structure 2 (Spherical)			
			Sill	Major	Semi-major	Minor	Sill	Major	Semi-major	Minor
P_2O_5	IF	0.10	0.15	300	50	5	0.75	700	160	35
	IF3.1	0.10	0.15	300	50	5	0.75	700	160	35
	IF3.2	0.10	0.15	300	50	5	0.75	700	160	35
	IF3.3	0.10	0.15	300	50	5	0.75	700	160	35
	LIMO	0.10	0.15	300	50	5	0.75	700	160	35
SiO_2	IF	0.05	0.45	40	30	20	0.50	300	200	60
	IF3.1	0.05	0.45	20	30	20	0.50	300	200	60
	IF3.2	0.05	0.45	100	30	20	0.50	300	200	60
	IF3.3	0.05	0.45	40	30	20	0.50	300	200	60
	LIMO	0.10	0.40	200	170	60	0.50	200	250	60

Source: QIO, 2023

Notes:

(1) All ranges are in metres.

14.6 Block Model and Estimation Approach

The mineral resource block model is an unrotated, regularized model constructed using Leapfrog Edge, with a block model definition summarized in Table 14-8. Each block is assigned a lithology code, resource domain code and a density value (see Section 14.3). Grades for Al_2O_3, Cr_2O_3, K_2O, LOI, S, and TiO_2 are estimated into each block using inverse distance weighting to a power of three (ID^3) estimation. Ordinary kriging (OK) was used for the estimation of CaO, Fe, MgO, MnO, Na_2O, P_2O_5, SAT, and SiO_2.

Table 14-8: Block model definition

Direction	No. blocks	Origin	Size (m)
X	679.00	612010	10
Y	365.00	5853410	10
Z	67.00	858	14

Source: QIO, 2023

For all variables, estimation was performed using two passes with variable orientation. The estimation parameters used per variable per domain are shown in Table 14-9. Estimation sensitivities were undertaken by QIO to assess the impact of search ellipsoid ranges, maximum number of composites used per drillhole, and the minimum and maximum number of samples. SRK reviewed the outcome of these sensitivity cases and found that the parameters in Table 14-9 yielded reasonable and relatively insensitive estimated grades to slight changes in these parameters.

Table 14-9: Summary of estimation parameters

Variable	Estimation Method	Zone	Pass 1						Pass 2					
			Search Ranges (m)			No. of Samples		Max / DH	Search Ranges (m)			No. of Samples		Max / DH
			Max	Int	Min	Min	Max		Max	Int	Min	Min	Max	
Al_2O_3, Cr2O3, K_2O, LOI, TiO_2	ID^3	All zones	250	200	50	7	15	3	500	400	100	4	15	3
S	ID^3	All zones	250	200	50	7	25	3	500	400	100	4	25	3
Fe	OK	IF3.1	250	200	50	7	15	3	500	400	100	4	15	3
		IF3.2	250	200	50	7	15	3	500	400	100	4	15	3
		IF3.3	250	200	50	7	15	3	500	400	100	4	15	3
		IF	250	200	50	7	15	3	500	400	100	4	15	3
		LIMO	150	100	25	7	15	3	500	400	100	5	15	3
CaO	OK	IF3.1	250	200	50	7	15	3	500	400	100	4	15	3
		IF3.2	300	250	50	7	15	3	500	400	100	4	15	3
		IF3.3	250	200	50	7	15	3	500	400	100	4	15	3
		IF	250	200	50	7	15	3	500	400	100	4	15	3
		LIMO	250	200	50	7	15	3	500	400	100	4	15	3
MgO	OK	IF3.1	250	200	50	7	15	3	500	400	100	4	15	3
		IF3.2	250	200	50	7	15	3	500	400	100	5	15	3
		IF3.3	250	200	50	7	15	3	500	400	100	4	15	3
		IF	250	200	50	7	15	3	500	400	100	4	15	3
		LIMO	250	200	50	4	15	2	500	400	100	4	15	2
SiO_2, Na_2O, P_2O_5	OK	IF3.1	250	200	50	7	15	3	500	400	100	4	15	3
		IF3.2	250	200	50	7	15	3	500	400	100	4	15	3
		IF3.3	250	200	50	7	15	3	500	400	100	4	15	3
		IF	250	200	50	7	15	3	500	400	100	4	15	3
		LIMO	250	200	50	7	15	3	500	400	100	4	15	3

Variable	Estimation Method	Zone	Pass 1						Pass 2					
			Search Ranges (m)			No. of Samples		Max / DH	Search Ranges (m)			No. of Samples		Max / DH
			Max	Int	Min	Min	Max		Max	Int	Min	Min	Max	
Sat	OK	IF3.1	250	200	50	7	15	3	500	400	100	4	15	3
		IF3.2	250	200	50	7	15	3	500	400	100	5	15	3
		IF3.3	250	200	50	7	15	3	500	400	100	4	15	3
		IF	250	200	50	7	15	3	500	400	100	4	15	3
		LIMO	250	200	50	4	15	3	500	400	100	4	15	3
MnO	OK	IF3.1	250	200	50	7	15	3	500	400	100	4	15	3
		IF3.2	250	200	50	7	15	3	250	200	100	4	15	3
		IF3.3	250	200	50	7	15	3	500	400	100	4	15	3
		IF	250	200	50	7	15	3	500	400	100	4	15	3
		LIMO	250	200	50	7	15	3	500	400	100	4	15	3

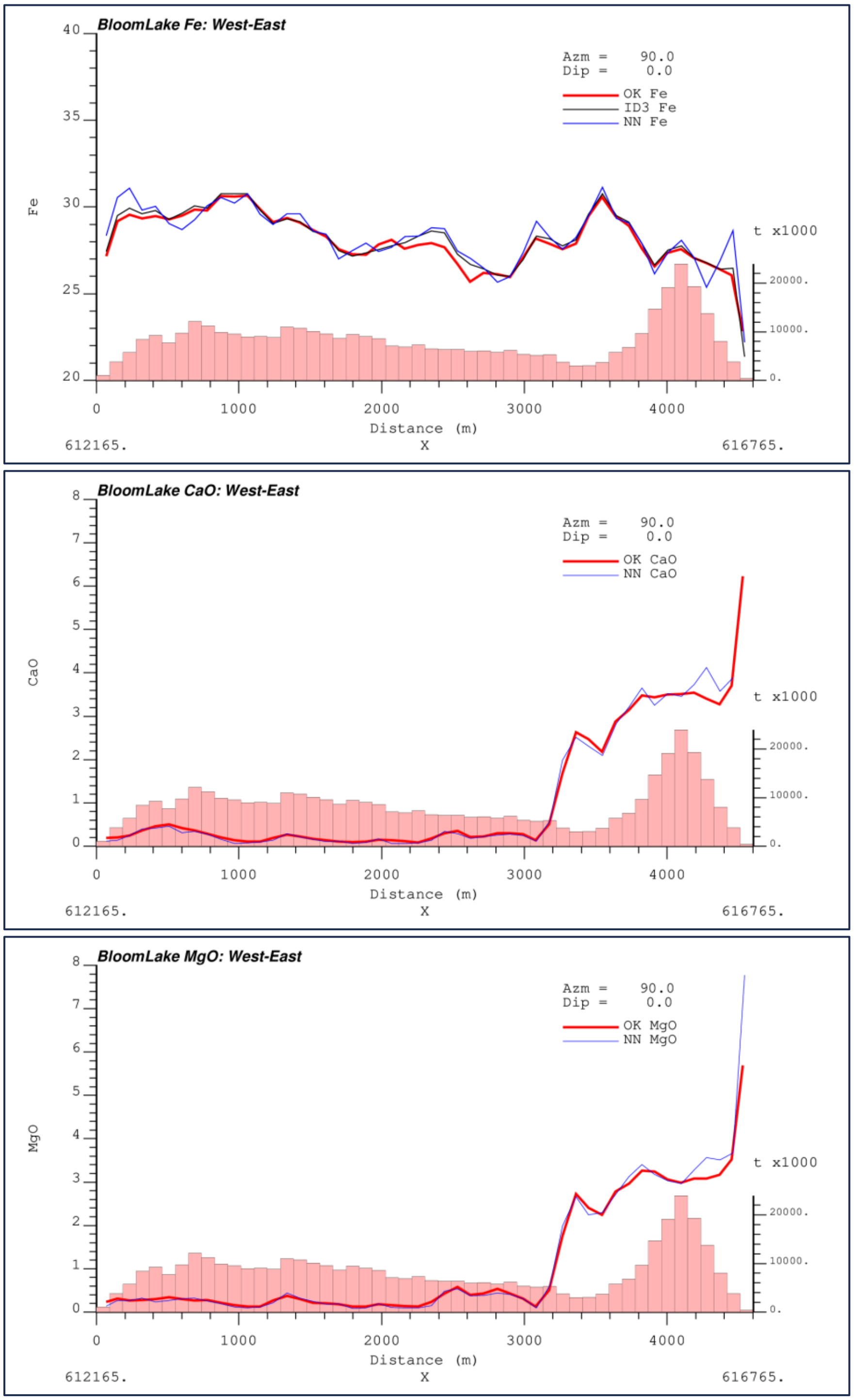
Source: QIO, 2023

14.7 Model Validation

QIO validated the block model using several methods, including visual review of block grades relative to composites, spatial distribution plots of block grades relative to composite grades (i.e., swath plots), and OK versus alternate estimation methods.

SRK independently generated swath plots for each variable and compared alternate estimates generated by QIO. These are illustrated for Fe, CaO, and MgO along the strike of the Bloom Lake deposit in Figure 14-6.

Table 14-10 shows the comparison of average grades between OK, ID^3, and nearest neighbour (NN) estimation for Fe, CaO, and MgO. An ID^3 estimate was generated only for Fe. The NN estimate is generated using 14 m composites consistent with the block height. For Fe, there is minimal difference in the estimated average grade. In CaO and MgO, higher percent differences are observed between the OK and NN estimates; however, these seemingly high percent differences are attributed to the magnitude of the grades and/or associated with smaller domains. It is the QP's opinion that these differences are not appreciable compared to the average grades or key operational thresholds for quality. Overall, the difference in average grades is considered satisfactory.



Source: SRK, 2023

Figure 14-6: Swath plot for Fe, CaO and MgO in east-west direction with alternate estimators

Table 14-10: Comparison of alternate estimates of Fe, CaO and MgO

Variable	Zone	Tonnage (Mt)	Proportion of Tonnage	Average Grade (%)			% Difference	
				OK	ID³	NN	OK/ID³	OK/NN
Fe	All	1,935.4	100%	28.2	28.3	28.3	0%	0%
	IF	519.9	27%	27.2	27.4	27.4	-1%	0%
	IF3.1	41.0	2%	22.0	22.2	21.9	-1%	0%
	IF3.2	557.7	29%	28.3	28.4	28.3	0%	0%
	IF3.3	790.4	41%	29.0	29.2	29.2	0%	-1%
	LIMO	26.5	1%	31.9	32.1	32.4	-1%	-1%
CaO	All	1,930.4	100%	1.3		1.3		-2%
	IF	516.7	27%	0.7		0.8		-6%
	IF3.1	41.0	2%	6.0		6.4		-7%
	IF3.2	555.9	29%	3.2		3.2		0%
	IF3.3	790.4	41%	0.1		0.1		7%
	LIMO	26.5	1%	0.3		0.2		71%
MgO	All	1,930.1	100%	1.2		1.2		-2%
	IF	516.7	27%	0.7		0.8		-10%
	IF3.1	41.0	2%	5.2		5.3		-3%
	IF3.2	555.6	29%	3.0		3.0		-1%
	IF3.3	790.4	41%	0.1		0.1		6%
	LIMO	26.5	1%	0.4		0.3		55%

Source: QIO, 2023

14.8 Mineral Resource Classification

Mineral Resources were classified considering the geological understanding of mineralization and structure on the property, the quality of the underlying drilling data, history of mining production and reconciliation, mineralization and grade continuity, and average distance to informing data. Final resource classification criteria are as follows:

- **Measured:** Blocks estimated within areas informed by an average drillhole spacing of 70 m. Virtually all Measured blocks are estimated within the first estimation pass and informed by composites from at least three drillholes.
- **Indicated:** Blocks estimated within areas informed by an average drillhole spacing of 110 m. Approximately 95% of Indicated blocks are estimated within the first estimation pass and informed by composites from at least three drillholes.
- **Inferred:** Blocks estimated within areas informed by an average drillhole spacing of 185 m. All Inferred blocks are informed by at least two drillholes, with almost 60% of blocks estimated within the first estimation pass.

Figure 14-7 shows a plan view of the classification and the relative distribution of the exploration drillholes supporting the classification.

The QP is satisfied that the classification at Bloom Lake is a reasonable reflection of the overall mineral resource risks associated with geologic understanding and confidence, data support, and grade continuity associated with the varying levels of resource categories assigned.

14.9 Mineral Resource Statement

CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) define a Mineral Resource as:

> *"[A] concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling."*

The "reasonable prospects for eventual economic extraction" (RPEEE) requirement generally implies that quantity and grade estimates meet certain economic thresholds and that mineral resources are reported at an appropriate cut-off grade that takes into account extraction scenarios and processing recovery. SRK considers that the Bloom Lake iron ore project is primarily amenable to open pit extraction. To assist with determining which portions of the iron ore deposit demonstrate RPEEE from an open pit and to assist with selecting reporting assumptions, QIO mining engineers developed a conceptual open pit shell using mining, processing, and G&A costs based on mine operational experience using Geovia Whittle Software, version 4.7.2. The pit optimization assumptions are summarized in Table 14-11 using Measured, Indicated, and Inferred category of resources.

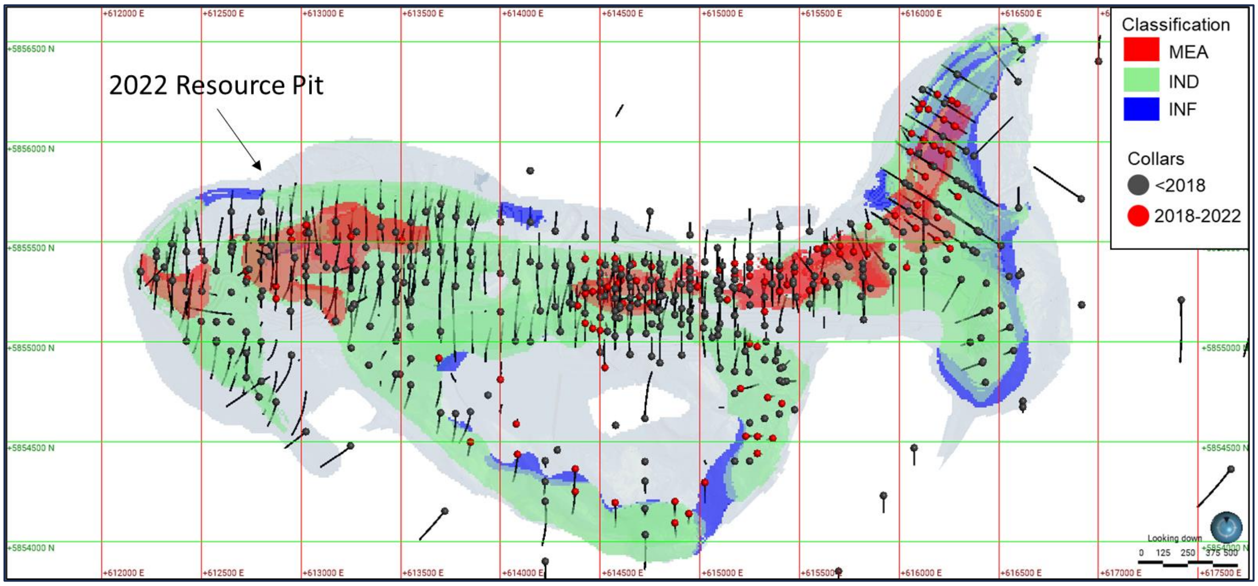
Table 14-11: Conceptual open pit optimization parameters

Parameters	Value	Unit
Mining Costs		
Mining Cost	3.80	CAD/dmt mined
Incremental Bench Cost	0.041	CAD/dmt /14 m
Processing & G&A Costs		
G&A Cost	2.96	CAD/dmt milled
Concentrator Cost	4.52	CAD/dmt milled
Tailings Cost	1.50	CAD/dmt milled
Total Processing Cost	8.98	CAD/dmt milled
Concentrate Costs		
Rail, Port and Ship Loading	22.25	CAD/dmt conc.
Corporate Costs	1.31	CAD/dmt conc.
Total Concentrate Costs	23.56	CAD/dmt conc.
Revenues		
CFR 65% Iron	110.24	USD/dmt
Concentrate Premium	2.04	USD/dmt
Ocean Freight Costs	24.48	USD/dmt
FOB Sept-Iles 66.2% Concentrate	87.80	USD/dmt
Exchange Rate	1.27	CAD/USD
FOB Sept-Iles 66.2% Concentrate	**111.66**	**CAD/dmt**
Iron Recovery	varies	%Fe * 0.84 + 57.9

Source: QIO, 2023

After review of optimization results, and through discussions with QIO, the QP considers that it is reasonable to report as open pit mineral resource, those classified blocks located within the conceptual pit shell above a cut-off grade of 15% Fe (see Figure 14-7).

An economic cut-off grade of 10% was found using Table 14-11 values. However, the historical cut-off grade of 15% is retained since the quantity of material in the 10%-15% Fe range is negligible. Use of a 15% Fe CoG aligns with current and historical production practices and it is the QP's opinion that this is appropriate for mineral resource disclosure.



Source: SRK, 2023

Figure 14-7: Plan view showing estimated blocks above 15% Fe relative to the conceptual pit coloured by resource classification

The QP is satisfied that the mineral resources were estimated following the widely accepted CIM Estimation of Mineral Resource and Mineral Reserve Best Practices Guidelines (November 2019). The mineral resources may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent mineral resource estimates. The mineral resources may also be affected by subsequent assessments of mining, environmental, processing, permitting, taxation, socio-economic, and other factors. The audited Mineral Resource Statement for the Bloom Lake Iron Ore Mine presented in Table 14-12 was reviewed by SRK, under the supervision of Erik Ronald, P.Geo. (PGO#3050, OGQ SA). Mr. Ronald is an independent qualified person as this term is defined in National Instrument 43-101.

The effective date of the Mineral Resource Statement is April 1, 2023.

Table 14-12: Audited Mineral Resource Statement, Bloom Lake Iron Ore Mine
SRK Consulting (Canada) Inc., April 1, 2023

Classification	Tonnage	Fe	CaO	Sat	MgO	Al_2O_3
	Mt	%	%	%	%	%
Measured	186.7	30.4	1.3	5.5	1.3	0.3
Indicated	1,065.5	28.4	1.3	6.1	1.2	0.5
Total M&I	**1,252.2**	**28.7**	**1.3**	**6.0**	**1.2**	**0.5**
Inferred	**246.3**	**26.6**	**1.4**	**6.4**	**1.2**	**0.5**

Notes on Mineral Resources:

1. Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures have been rounded to reflect the relative accuracy of the estimates. Reported at open pit resource cut-off grade of 15% iron. The resource shell is based on a long-term iron price of USD110.24/dmt for 65% Fe content, a premium of USD2.04/dmt for the 66.2% Fe concentrate and an exchange rate of 1.27 CAD/USD.

14.10 Grade Sensitivity Analysis

The mineral resources of the Bloom Lake Iron Ore Mine are fairly insensitive to the selection of the reporting cut-off grade, up to a cut-off grade of 25% Fe. To illustrate this sensitivity, block model quantities and grade estimates at various cut-off grades are presented in Table 14-13.

Table 14-13: Block model quantity within 2022 resource pit and grade estimates at various cut-off grades, Bloom Lake Iron Ore Mine

Class	Cut-off grade	Tonnage	Fe	Al_2O_3	Sat	MgO	CaO
	% Fe	Mt	%	%	%	%	%
Measured	5%	186.8	30.4	0.3	5.5	1.3	1.3
	10%	186.8	30.4	0.3	5.5	1.3	1.3
	15%	**186.7**	**30.4**	**0.3**	**5.5**	**1.3**	**1.3**
	20%	184.7	30.6	0.3	5.4	1.2	1.3
	25%	172.7	31.1	0.3	5.3	1.1	1.1
	30%	105.8	33.0	0.3	4.6	0.7	0.6
	35%	16.7	37.2	0.3	3.6	0.2	0.1
	40%	1.7	43.2	0.4	1.4	0.1	0.1
Indicated	5%	1,071.7	28.3	0.5	6.1	1.2	1.3
	10%	1,071.4	28.3	0.5	6.1	1.2	1.3
	15%	**1,065.5**	**28.4**	**0.5**	**6.1**	**1.2**	**1.3**
	20%	1,013.3	28.9	0.5	6.1	1.2	1.3
	25%	872.7	29.9	0.4	5.9	1.1	1.2
	30%	398.2	32.3	0.3	6.1	0.9	0.9
	35%	34.1	37.0	0.4	5.6	0.5	0.3
	40%	3.4	42.5	0.8	2.6	0.2	0.1
Measured + Indicated	5%	1,258.5	28.6	0.5	6.0	1.2	1.3
	10%	1,258.2	28.6	0.5	6.0	1.2	1.3
	15%	**1,252.2**	**28.7**	**0.5**	**6.0**	**1.2**	**1.3**
	20%	1,197.9	29.2	0.4	6.0	1.2	1.3
	25%	1,045.4	30.1	0.4	5.8	1.1	1.2
	30%	504.0	32.4	0.3	5.8	0.8	0.8
	35%	50.8	37.0	0.4	5.0	0.4	0.3
	40%	5.2	42.7	0.6	2.2	0.2	0.1
Inferred	5%	247.1	26.5	0.5	6.4	1.2	1.4
	10%	247.1	26.5	0.5	6.4	1.2	1.4
	15%	**246.3**	**26.6**	**0.5**	**6.4**	**1.2**	**1.4**
	20%	227.1	27.3	0.5	6.6	1.2	1.4
	25%	166.1	28.9	0.4	6.4	1.1	1.2
	30%	56.0	31.9	0.4	4.9	0.7	0.6
	35%	0.5	35.7	1.0	5.1	0.4	0.3
	40%	0.0	0.0	0.0	0.0	0.0	0.0

Source: SRK, 2023

Note: The reader is cautioned that the figures in Table 14-13 should not be misconstrued with a Mineral Resource Statement. The figures are only presented to show the sensitivity of the block model estimates to the selection of a cut-off grade. All figures have been rounded to reflect the relative accuracy of the estimates.

14.11 Reconciliation

14.11.1 Relative to the 2019 Mineral Resource Statement

Table 14-14 shows the comparison between the 2019 and 2023 Mineral Resource Statements for the Bloom Lake Mine.

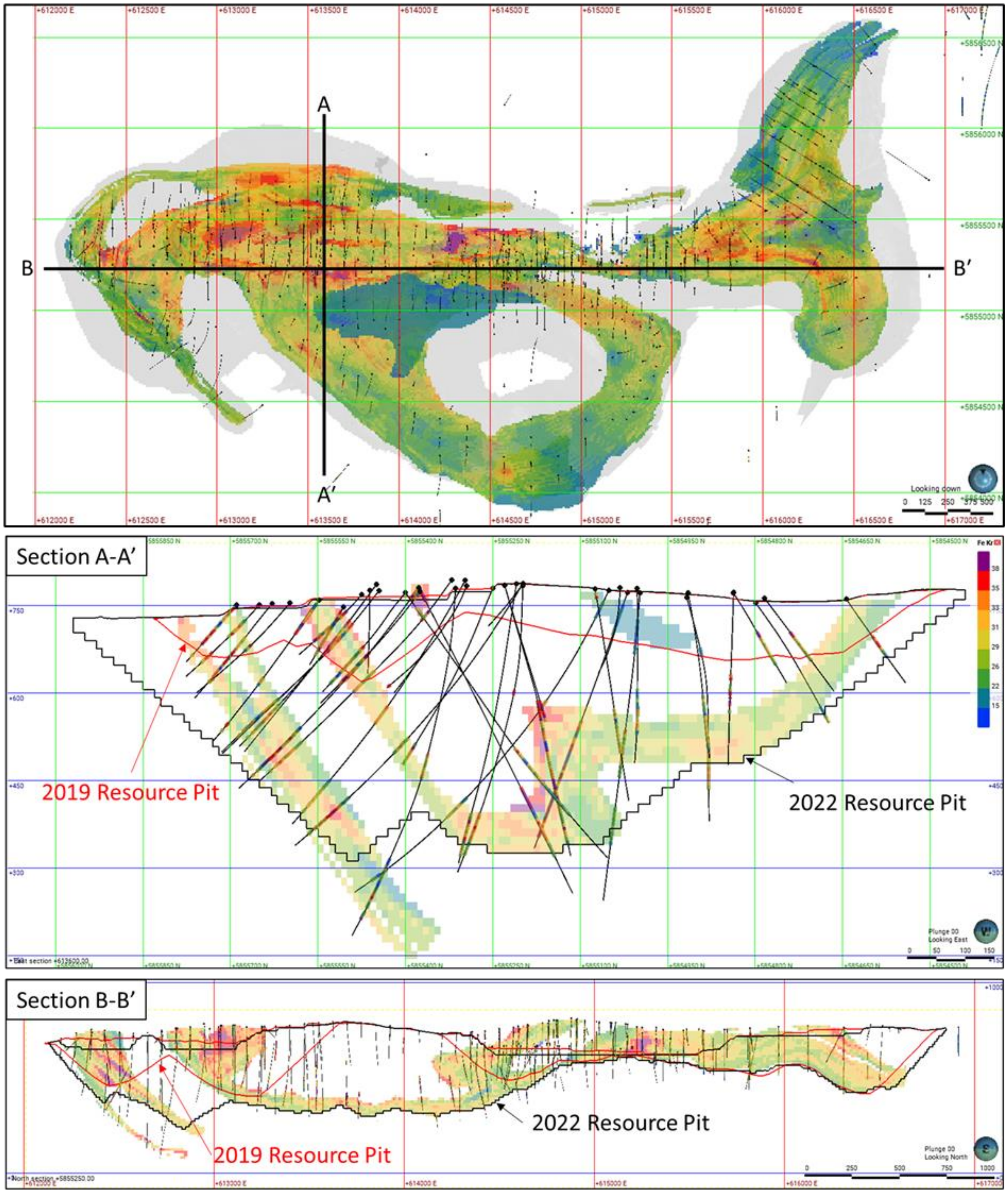
Table 14-14: Comparison between 2019 and 2023 Mineral Resource Statements

Year	Classification	Tonnage	Fe	CaO	Sat	MgO	Al_2O_3
		Mt	%	%	%	%	%
2019	Measured	379.1	30.2	1.4	4.4	1.4	0.3
	Indicated	514.4	28.7	2.5	7.7	2.3	0.4
	Total M&I	**893.5**	**29.3**	**2.1**	**6.3**	**1.9**	**0.4**
	Inferred	**53.5**	**26.2**	**2.8**	**8.0**	**2.4**	**0.4**
2023	Measured	186.7	30.4	1.3	5.5	1.3	0.3
	Indicated	1,065.5	28.4	1.3	6.1	1.2	0.5
	Total M&I	**1,252.2**	**28.7**	**1.3**	**6.0**	**1.2**	**0.5**
	Inferred	**246.3**	**26.6**	**1.4**	**6.4**	**1.2**	**0.5**
% Difference (2023/2019)	Measured	-51%	1%	-7%	25%	-7%	0%
	Indicated	107%	-1%	-48%	-21%	-48%	25%
	Total M&I	**40%**	**-2%**	**-38%**	**-5%**	**-37%**	**25%**
	Inferred	**360%**	**2%**	**-50%**	**-20%**	**-50%**	**25%**

Source: QIO, 2023

Since the 2019 mineral resource model, QIO has drilled an additional 106 core boreholes (18,465 m), representing an increase of 13%. The infill drilling on the Bloom Lake property has been successful in converting Inferred resources to the Indicated category. Further, this infill drilling has demonstrated continuity of iron mineralization, allowing for grade continuity to be established and estimated. The resource shell based on the updated model and the increased long-term iron price of USD110.24/dmt (CFR China 65%) was significantly larger compared to the 2019 pit (Figure 14-8), resulting in a considerable gain of Inferred resources.

Depletion of resources based on topographic differences between January 1, 2020 to forecasted May 1, 2023 is estimated to account for a reduction of 67 Mt.

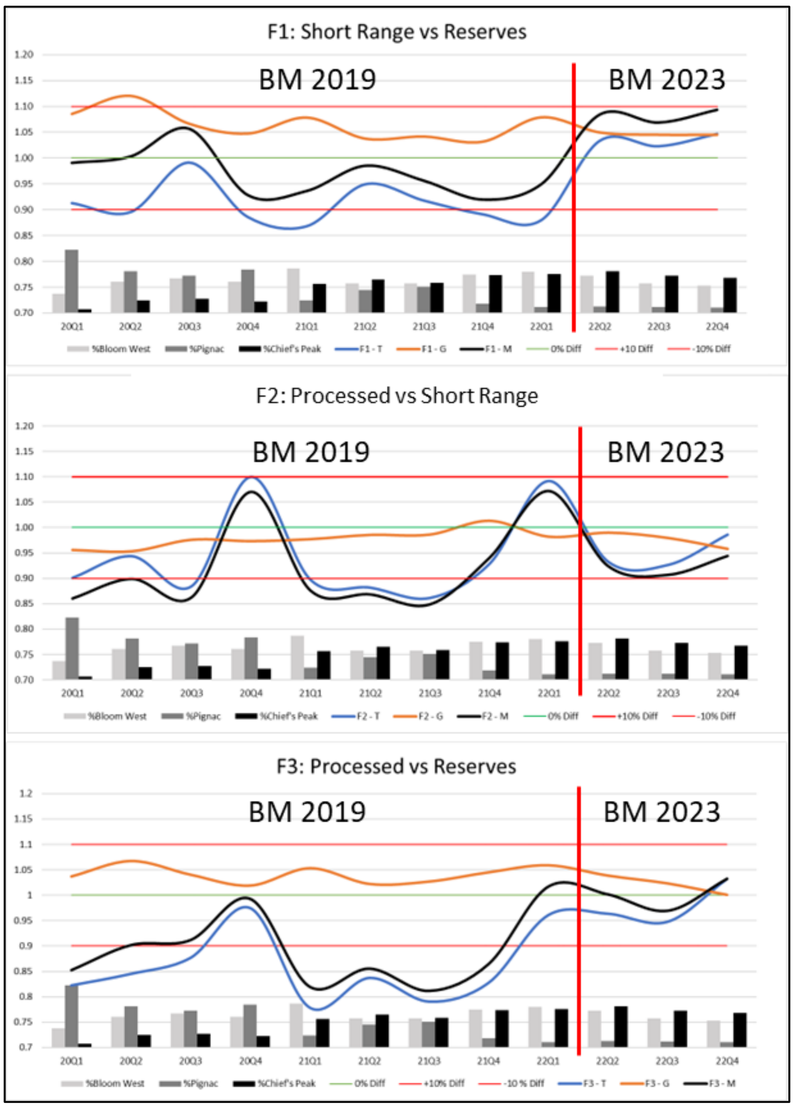


Source: SRK, 2023

Figure 14-8: Plan view of Fe distribution inside 2022 pit, and section views A-A' and B-B' comparing 2019 and 2022 resource pits

14.11.2 Production

The reconciliation graphs comparing the performance of the 2019 resource model and the 2023 mineral resource model. Figure 14-9 shows the comparison of long term to short term model (F1 factor), short term to plant (F2 factor), and the long term to the plant (F3 factor) in the reserve area (Measured + Indicated [M&I]). Recent reconciliation between the 2023 model to the last 3 years (12 quarters from 2020 to 2022) shows that the model overestimated tonnage by 4%, underestimated Fe grade by 5%, for virtually 1% more metal content received at the plant.



Source: QIO, 2023

Figure 14-9: Reconciliation

15. Mineral Reserve Estimates

Quebec Iron Ore (QIO) has updated the mineral reserve estimate for the Bloom Lake Mine to better align it with current costs, global iron ore prices, operational experience, and depletion after the successful launch of the Phase II expansion.

Started by Cliffs Natural Resources, this Phase II expansion was put on hold then care and maintenance during the shutdown in January 2015. It was later acquired as a part of the purchase by QIO in April 2016 and Phase II is now constructed and in production.

This reserve update is not due to a change in the scope of infrastructure, technology, or pit size. It is an update and refinement of the reserves and mine plan laid out in the 2019 Feasibility Study (Allaire et al., 2019), herein referred to as the 2019 FS.

15.1 Summary

The mineral reserve for the Bloom Lake mine is estimated at 716 Mt at an average grade of 28.6% Fe as summarized in Table 15-1. The mineral reserve estimate was prepared by QIO and the resource block model was generated by QIO and audited by SRK.

The mineral reserve estimate stated herein is consistent with the CIM definitions and is suitable for public reporting. As such, the mineral reserves are based on Measured and Indicated (M&I) Mineral Resources, and do not include any Inferred Mineral Resources. The Inferred Resources contained within the mine design are classified as waste.

Table 15-1: Mineral reserve estimate

Classification	Diluted Tonnage	Diluted Fe	CaO	Sat	MgO	Al_2O_3
	Mt	%	%	%	%	%
Proven	183.7	30.0	1.3	5.6	1.3	0.3
Probable	532.5	28.1	2.1	9.2	2.0	0.5
Total Proven & Probable	**716.2**	**28.6**	**1.9**	**8.3**	**1.8**	**0.4**
Waste (Includes Inferred)	*685.7*	-	-	-	-	-

Notes on mineral reserves:

1. The mineral reserves were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Standards for Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by CIM Council May 10, 2014.
2. The qualified person (QP) for the mineral reserve estimate, as defined by NI 43 101, is Olivier Hamel, P.Eng., from QIO. The effective date of the estimate is April 1, 2023.
3. Refer to Section 15.6.2 for all relevant comments.

15.2 Resource Block Model

The block model was prepared by QIO in October 2022 and named "BL_DDH_2022 10_24.csv". Its framework information is presented in Table 15-2. In addition to the modelled iron grade, other interpolated attributes include calcium oxide (CaO), Satmagan (SAT), Magnesium Oxide (MgO), and aluminum oxide (Al_2O_3), which are tracked in the schedule.

Table 15-2: Block model framework

Model Setting	Value
X Origin	612,010
Y Origin	5,853,410
Z Origin	-80
Block Size in X Direction	10
Block Size in Y Direction	10
Block Size in Z Direction	14
Number of Blocks in X Direction	679
Number of Blocks in Y Direction	365
Number of Blocks in Z Direction	67

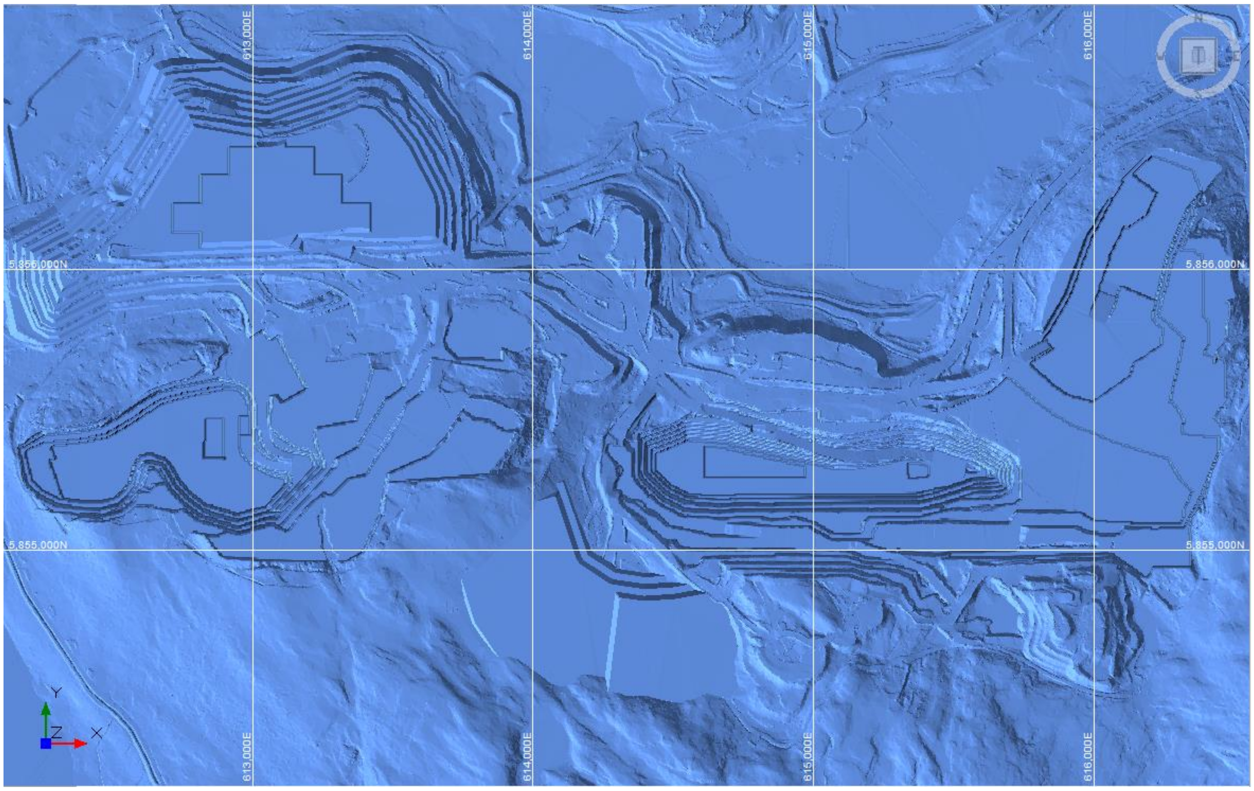
15.3 Starting Surface

The starting surface used for Reserves is the combination of three different data sets:

- The 2021 Lidar survey of the mine site as a base surface.
- The 2018 Lidar survey of the mine site to cover the South Dump area.
- The in-pit and on-dump forecast of mining progress as of April 1, 2023.

Together, they form the most accurate picture of the topography as of April 1, 2023 available at the time work on the reserves began.

As can be seen in Figure 15-1, the surface is generally Lidar-surveyed apart from active areas of the pits and dumps, which are projected to April 1, 2023.



	Starting Surface	Author: QIO Date: December 2022

Figure 15-1: Starting surface

15.4 Pit Optimization

Open pit optimization was conducted to determine the optimal economic shape to guide the pit design process. This task was undertaken using Geovia Whittle (software version 4.7.2). This widely adopted method works on a block model of the ore body, and progressively constructs lists of related blocks that should be mined. The method uses the net value of the blocks to define a pit outline that maximizes total economic value, subject to the required pit slopes defined as structure arcs in the software. This section describes all the parameters used to calculate block values and structure arcs.

Only Measured and Indicated Resource blocks were considered valuable for optimization purposes.

15.4.1 Pit Slope Geotechnical Assessment and Design Criteria

Golder Associates Ltd. (Golder) carried out a geotechnical review of the planned pit prepared by BBA in 2019. For this review, Golder used the feasibility level pit slope design prepared by Golder (2014b) as the basis for comparison. The conclusions of this 2014 technical report are the basis to the pit optimization and design process. They have been locally modified based on site experience and the 2019 review.

A total of 11 domains were defined according to changes in the rock mass, with separations roughly along the axes of the overall folding structures, by changes in the pit wall orientation, and by available structural data sources. These 11 domains have been subdivided into 20 sub-domains, due to increasing knowledge of the complexity of the rock mass.

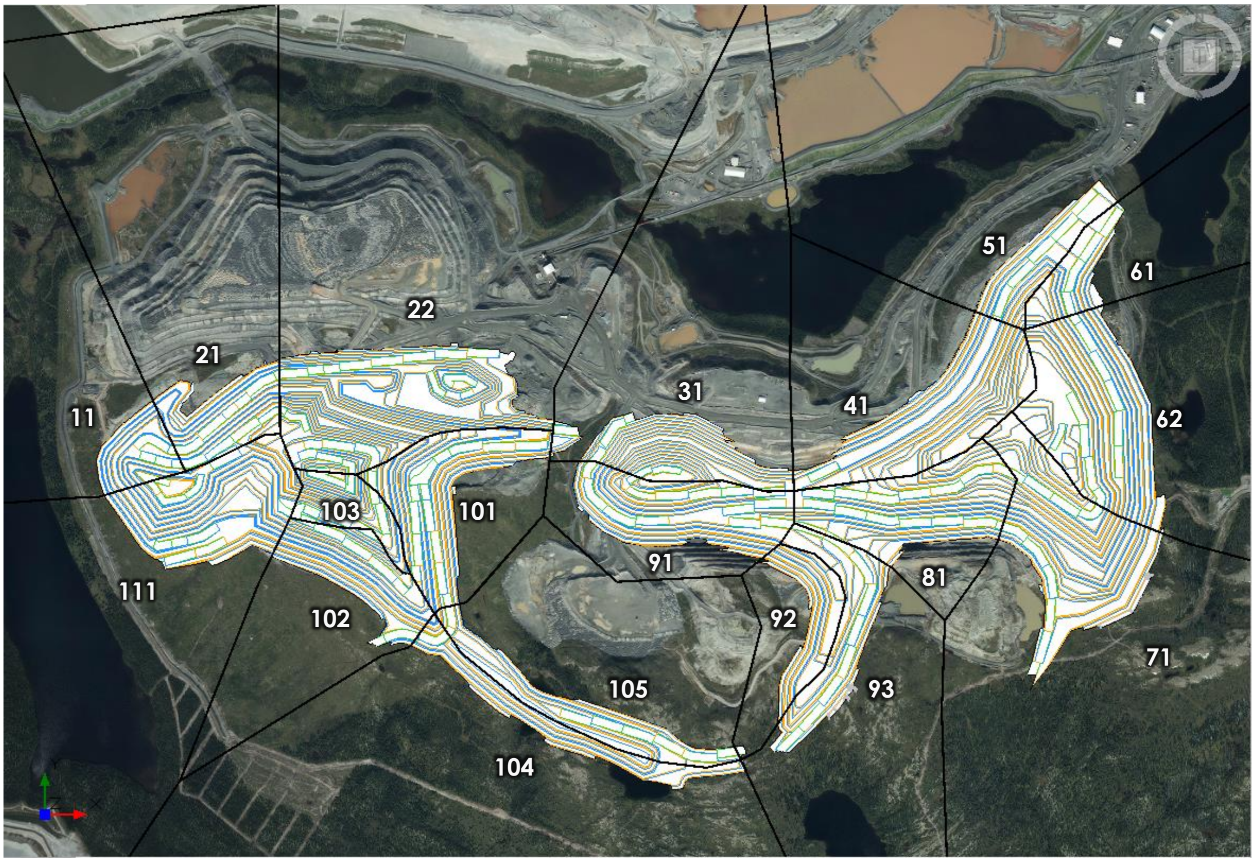
Groundwater levels generally follow the topography and are found within 11 m from the ground surface following testwork completed by Hydro-Ressources. It has been assessed that the open pit will be developed in a good rock mass where rock mass failure is not a concern. Rather, potential instability will involve structural controls, the most significant being foliation control on the bench face angle and potential control of flat sets on the bench crest backbreak angles. No major faults that would adversely affect the final pit walls were identified.

In overburden, a minimum design slope of 2H:1V with 8 m bench width at each 15 m height was recommended (Golder, 2014b).

The pit slopes used for design and pit optimization are presented in Table 15-3. Preliminary overall slope angles were used for optimizations and the design criteria were subsequently followed more closely for the pit design.

Table 15-3: Pit slope design sectors

Slope Domain (2019 FS)	Slope Zone Number	Material Type	Face Angle	Bench Height	Berm Width	IRA (crest-to-crest)	Geotech berm width	IRA (incl. Geotech Berm)	Number of Haul Roads	OSA (crest-to-crest)
			(°)	m	m	(°)	m	(°)	#	(°)
			Design Criteria					Optimization Only		
I	11	ROCK	75	28	14.0	52.5	20	50.6	0	**50.6**
II	21	ROCK	75	28	14.0	52.5	20	50.6	1	**44.8**
II	22	ROCK	70	14	8.4	46.1	20	43.1	1	**41.1**
III	31	ROCK	70	14	10.4	42.1	20	40.0	0	**40.0**
IV	41	ROCK	70	28	13.3	50.0	20	48.1	1	**44.6**
V	51	ROCK	70	28	13.3	50.0	20	48.1	1	**43.5**
VI	61	ROCK	75	28	14.0	52.5	20	50.6	1	**44.4**
VI	62	ROCK	75	28	14.0	52.5	20	50.6	1	**47.7**
VII	71	ROCK	70	28	13.3	50.0	20	48.1	1	**45.7**
VIII	81	ROCK	70	28	13.3	50.0	20	48.1	2	**41.6**
IX	91	ROCK	70	28	13.3	50.0	20	48.1	2	**41.3**
IX	92	ROCK	70	28	13.3	50.0	20	48.1	0	**48.1**
IX	93	ROCK	70	28	13.3	50.0	20	48.1	1	**40.0**
X	101	ROCK	70	28	13.3	50.0	20	48.1	1	**45.6**
X	102	ROCK	70	28	13.3	50.0	20	48.1	1	**43.1**
X	103	ROCK	70	14	8.4	46.1	20	43.1	0	**43.1**
X	104	ROCK	70	28	13.3	50.0	20	48.1	0	**48.1**
X	105	ROCK	70	28	13.3	50.0	20	48.1	0	**48.1**
XI	111	ROCK	70	28	15.0	48.0	20	46.6	0	**46.6**
C	1001	OB	26	8	15.0	14.3	15	14.3	0	**14.3**



	Design Slope Sectors	Author: QIO Date: December 2022

Figure 15-2: Design slope sectors

While the design criteria listed previously are used for long-term planning and reserves, designs are adjusted locally to specific conditions. The deposit is folded and varies locally, and the bench face angle can be adjusted locally from 60 to 80 degrees depending on the conditions.

15.4.2 Mining Dilution and Mineral Loss

For all blocks within the resource model, diluted grade and density are calculated by taking into account the grade, density and rock type of the surrounding blocks. Table 15-4 shows the loss and dilution by rock type criteria.

A mining dilution assessment was made on a block-by-block basis prior to applying a cut-off grade. A script was developed to assess if the block was ore, what rock type the neighbouring blocks are, and whether to dilute from the neighbouring blocks or lose mass to the neighbouring blocks. The amount that is either lost or gained (diluted) is then the block height x block width x skin thickness. For this study, the skin thickness was chosen to be 2.0 m based on recent ore reconciliation work (see Section 14.2). The dilution is specific to the geometry of the ore body and the number of contacts between ore and waste.

Table 15-4: Ore loss and dilution interactions

Waste Rock Types	Effect on Mineralized Blocks
Sub-grade Iron Formation	Dilutes
High Silicates Iron Formation	Dilutes
Quartzite	Dilutes
Mica-Schist	Causes ore loss
Amphibolite	Causes ore loss
Gneiss	Causes ore loss
Overburden	No effect

All dilution was considered at 0% Fe grade. Iron formation classified as "Inferred" or not classified did not cause dilution or losses in "Measured" or "Indicated" blocks. Cut-off grades were applied after dilution, see Section 15.4.4.

Inside the pit design, the average mining dilution is 1.73% at a grade of 0% Fe and the average ore loss is 1.91% at a grade of 29% Fe. This dilution is extremely asymmetric and affects narrow bands of ore much more than wide mineralization. It has been modelled after observations from operations.

15.4.3 Cost and Revenue Model

A series of optimized pit shells was generated by varying the base selling price using revenue factors ranging from 0.5 to 2.0.

A summary of the pit optimization parameters is presented in Table 15-5 for a milling rate of 41.9 Mtpy based on a reference iron ore price (Platt's 65% CFR China) of USD99.00/dmt concentrate. A price adjustment of USD1.83/dmt was applied as a premium for 66.2% iron concentrate and USD24.48/dmt ocean freight cost were subtracted. The final FOB revenue at the Port of Sept-Îles is USD76.34/dmt and converts to CAD97.09/dmt.

The iron ore price assumption is deemed in line with respect to long-term forecasts. The metallurgical recovery is estimated on a block-by-block basis using the following formula:

$$r\% = Fe\% \times 0.84 + 57.9$$

Other recovery predictions penalizing a high-silicate content have been developed and are still relevant. However, this simplified formula was preferred due to its longer history of use.

Unit reference mining costs are used for a “reference mining block” located near the pit crest or surface and are incremented with depth, which corresponds to the additional cycle time and resulting incremental hauling cost. The reference mining cost was estimated at $3.80/t with an incremental depth factor of $0.041/t per 14 m bench. All costs include sustaining capital.

The cost model used in the optimization is based on a fully costed internal LOM exercise done in 2021. Costs have been adjusted to fit into Whittle software inputs and cannot be exactly reconciled with cost of goods sold, economic cut-off grades or the all-in sustaining costs (AISC).

Table 15-5: Optimization cost and revenue model

Parameters	Base values	Unit
Mining Costs		
Mining Cost	3.80	$/dmt mined
Incremental Bench Cost	0.041	$/dmt /14m
Processing & G&A Costs		
G&A Cost	2.96	$/dmt milled
Concentrator Cost	4.52	$/dmt milled
Tailings Cost	1.50	$/dmt milled
Total Processing Cost	**8.98**	**$/dmt milled**
Concentrate Costs		
Rail, Port and Ship Loading	22.25	$/dmt concentrate
Corporate Costs	1.31	$/dmt concentrate
Total Concentrate Costs	**23.56**	**$/dmt concentrate**
Net Value & Payment		
CFR 65% Iron	99.00	USD/dmt
Concentrate Premium	1.83	USD/dmt
Ocean Freight Costs	24.48	USD/dmt
FOB Sept-Iles 66.2% Concentrate	76.34	USD/dmt
Exchange Rate	1.27	CAD/USD
FOB Sept-Iles 66.2% Concentrate	**97.09**	**$/dmt**
Iron Recovery	varies	%Fe x 0.84 + 57.9
Discount Rate	8.0	%

15.4.4 Cut-off Grades

The cut-off grade (CoG) of the Bloom Lake deposit has historically been chosen as 15% Fe. It is still used both in this Report and in operations. This is supported by the grade-tonnage curve of the deposit, as this point is well below the usual iron grade range (see Table 14-13)

The cost/revenue model allows to calculate a break-even cut-off grade as a confirmation that the geologic decision supports a profitable operation. The applicable calculation is detailed in the literature (Rendu, 2008; p. 20) and the result of 14.1% Fe supports the current practices.

15.4.5 Open Pit Optimization Results

A subset of the nested shell results is presented in Table 15-6 using only the Measured and Indicated (M&I) Resource. Concentrate values presented are using the recovery formula applied on a block-by-block basis. Revenue factors are applied to FOB Sept-Iles revenue ($97.09/dmt).

Pit Shell 16 is selected for guiding the pit designs, as is it close to the economic maximum and to the former pit designs. This selection allows for an 18-year mine life. This shell has a total tonnage of 1,357 Mt including 753 Mt of ore at an average diluted grade of 28.7% Fe. The average strip ratio is 0.80 while the marginal strip ratio is 1.81.

It should be noted that a significant pushback appears at Revenue Factor (RF) 0.925, however it is not pursued as the stripping required has a negative impact on NPV. Furthermore, the scope of such a pushback would require a new feasibility study as it would require major infrastructure changes.

Table 15-6: Open pit optimization results

Revenue Factor	Pit #	P65 (USD/t)	FOB[5] (CAD/t)	Total Rock (Mt)	Total Ore (Mt)	Grade %	Total Conc. (Mt)	Strip Ratio	Marginal Strip Ratio	Mine Life	% of Max NPV
0.700	9	77	68	484	364	29.8%	136	0.33	0.56	8.7	80%
0.800	13	84	78	926	589	29.0%	213	0.57	1.18	14.1	96%
0.825	14	86	80	1,049	641	28.9%	231	0.64	1.33	15.4	97%
0.850	15	88	83	1,178	690	28.8%	247	0.71	1.67	16.5	98%
0.875	16	90	85	1,357	753	28.7%	269	0.80	1.81	18.1	100%
0.900	17	92	87	1,520	806	28.6%	287	0.88	2.08	19.3	100%
0.925	18	93	90	2,276	1,030	28.6%	367	1.21	2.38	24.7	97%
0.950	19	95	92	2,368	1,058	28.6%	376	1.24	2.32	25.4	97%
1.000	21	99	97	2,550	1,108	28.5%	394	1.30	2.73	26.6	95%

Notes on pit optimization:

1. These results are not mineral reserves.
2. Optimization based on diluted block grades. CoG of 15% Fe applied after dilution and ore losses.
3. Green: Highest NPV pit.
4. Blue: selected pit for design.
5. 66.2% Iron Concentrate Price (Free on Board, Sept-îles).

The same results are also presented graphically in Figure 15-3.

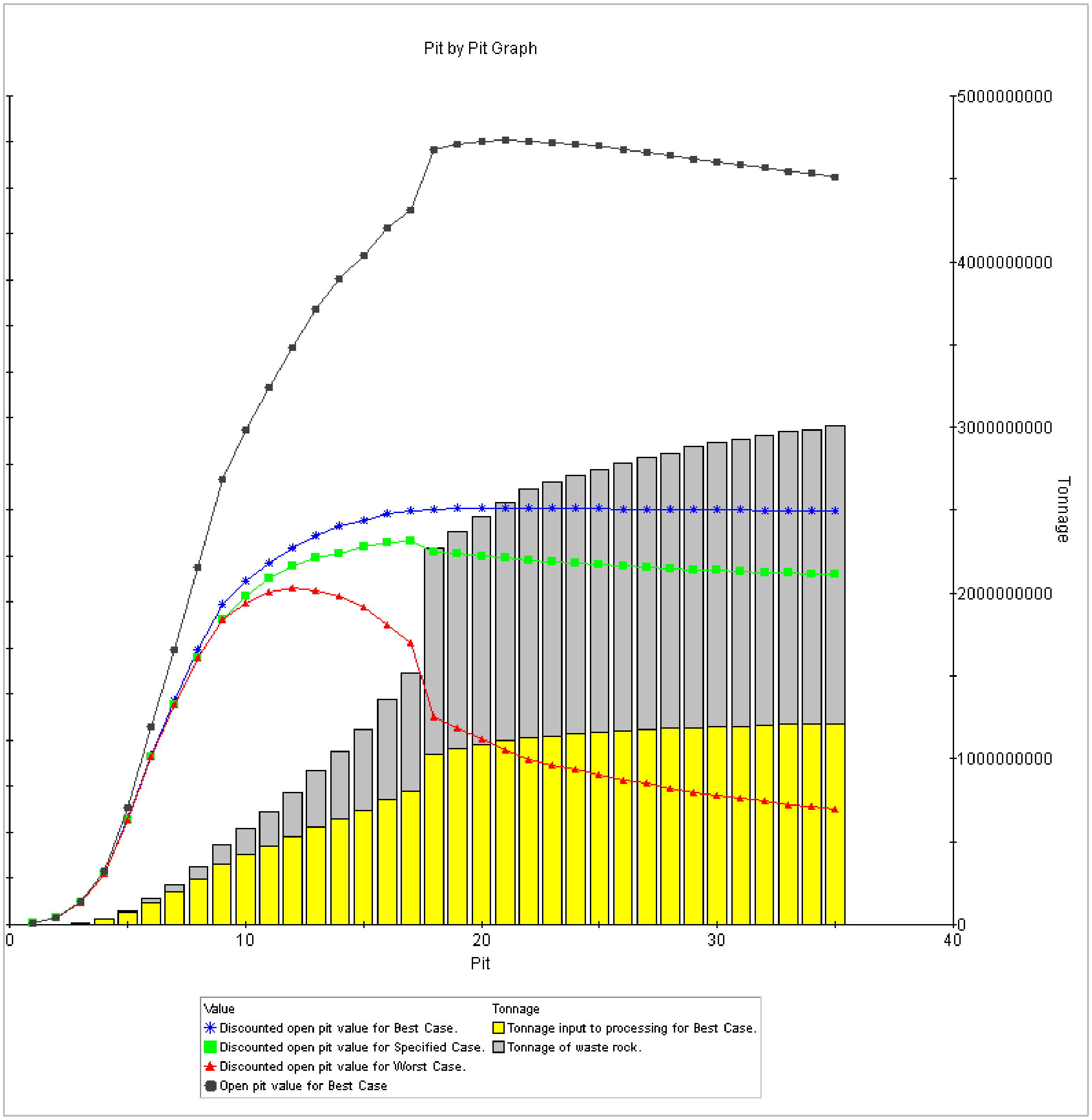


Figure 15-3: Classical Whittle pit by pit graph
(DCF Axis not displayed, as presenting an economic analysis is not required)

15.5 Pit Designs

15.5.1 Slope Design Criteria

Refer to Section 15.4.1.

15.5.2 Ramps, Switchbacks and Pushback Design Criteria

The design ramp widths were planned to be 35 m and 25 m respectively for double lane and single lane. These values have been increased to 37 m and 28 m due to operational preference. The gradient is 10% except in pit bottoms where it can reach 12%. Access to the catch berm is maintained on both sides.

Switchbacks of 180° must have a minimum gap of 10 m between ramp sections. Combined with the 5-metre-wide safety berm and the 4 m gap between the truck and the berm, this adds up to 28 m, which is the turning diameter for a CAT793 (240 t). Switchback depth is 65 m to account for a safety berm between lanes and required space for a tow truck.

In addition, roads are designed such that a truck driver has a minimum line of sight of 120 m. This limits steep turns around a pit wall.

The minimum width for a full pushback was chosen as 100 m, although efforts were made to keep them wider. A width of 50 m was tolerated in special circumstances such as the merging of mined-out areas with future stages.

Ore recovery at pit bottoms is considered optimistic due to the three single-lane 12% ramp sections allowed in design rules. Major pit bottoms are at least 30 m wide, which implies the use of smaller equipment on the last bench. Most pit bottoms, however, are wider than 30m since the lower boundary of the iron formation is reached.

Wall corners are allowed to reach 10 m in width, which is very aggressive even with small equipment. It is expected that not all corners will be achieved as designed, depending on the situation at time of mining.

Many smaller backhoes are used on site for scaling and dilution reduction (CAT 349, CAT 6015), which justifies the wall corner and pit bottom assumptions.

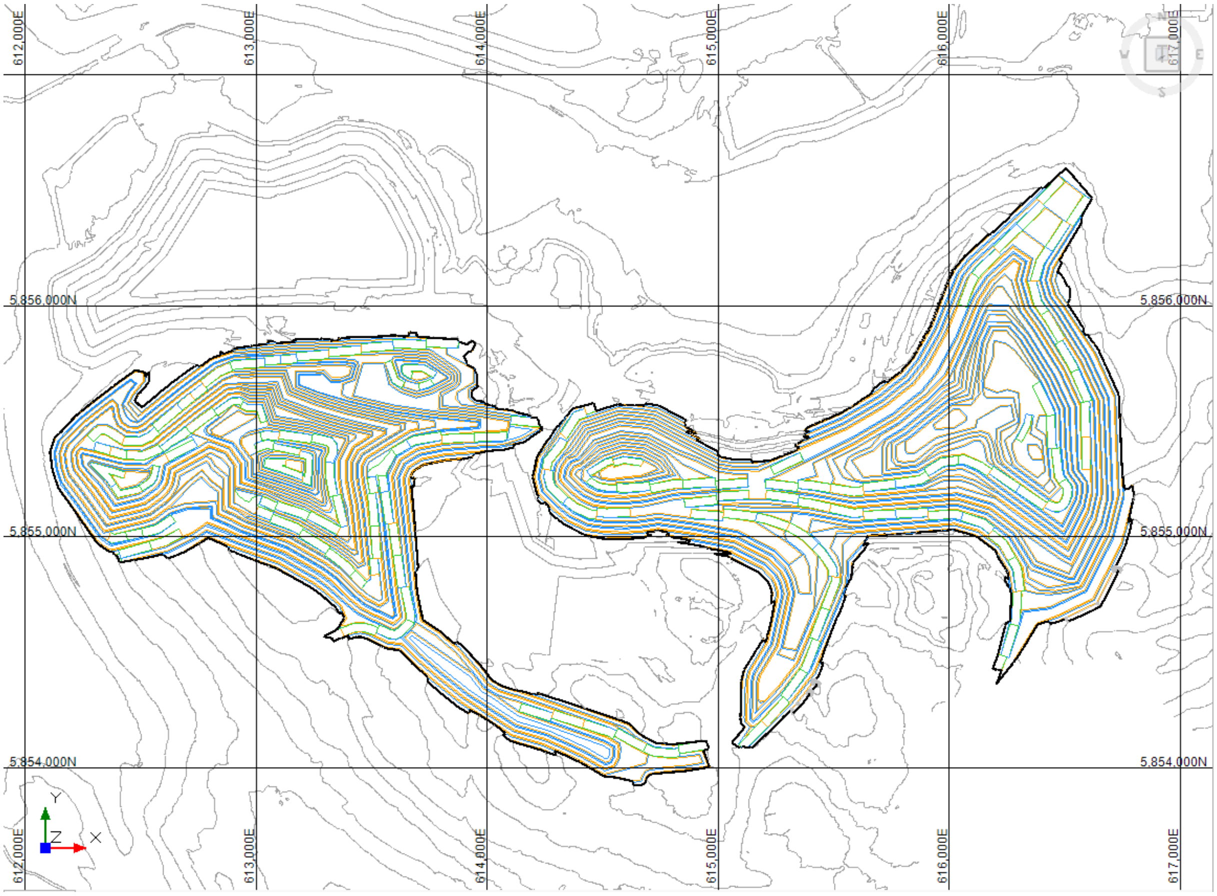
15.5.3 Open Pit Mine Design Results

The final pit design is presented in Figure 15-4. The final pit includes three areas: Bloom West, Pignac, and Chief's Peak. Pignac and Chief's Peak are merged into one large pit; however, they are referred to as separate entities for operations and historical reasons. The final mined area spans 4,600 m east-west and roughly 2,700 m north-south, although the true mined out area is roughly 4.5 km^2. Relative to sea level, pit bottom elevations are 410 m in Bloom West, 508 m in Pignac and 396 m in Chief's Peak. The final pit was designed considering the active stages, ramps and roads so that the transition happens without a negative impact on operations.

The Bloom West final pit design has five exits, two to the north and three to the southeast to provide access to the pushbacks and shorten distances to the crusher and waste dumps. Pignac and Chief's Peak have interconnected ramp networks, with five exits to ensure that both crushers are always available and that waste dumps are accessible without backtracking.

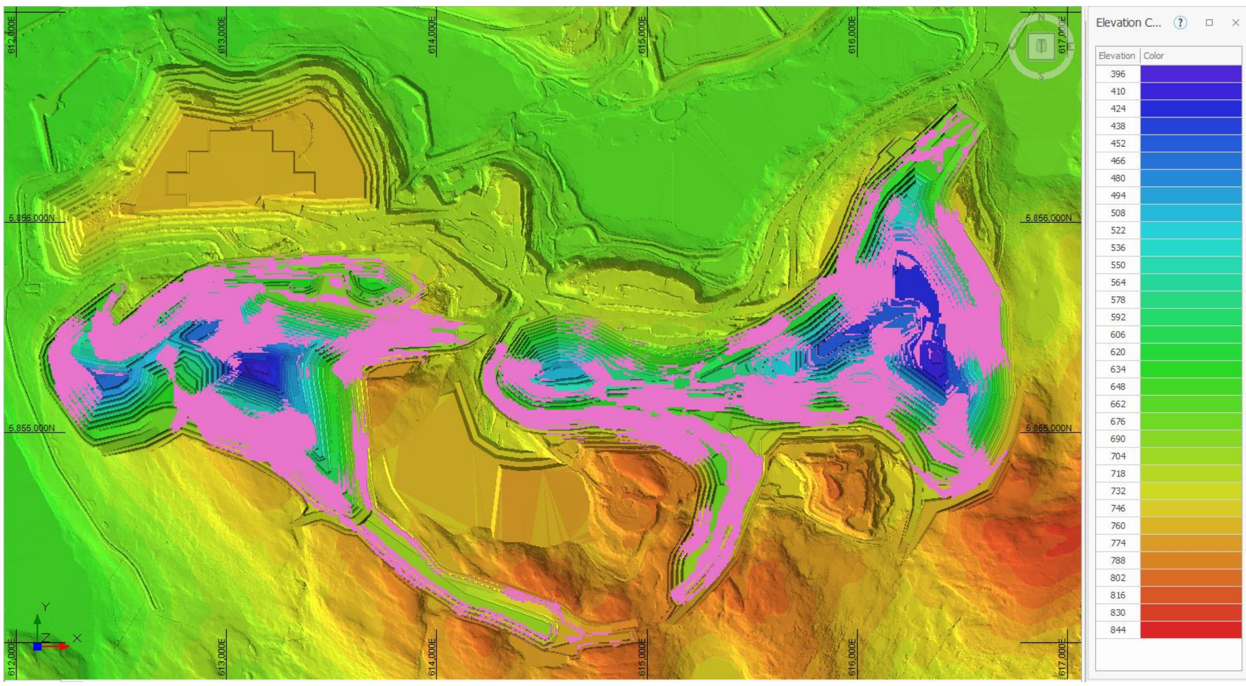
Each pit design generally follows the guiding economic pit shell as presented in Figure 15-6. Some exceptions do exist, such as ramp exits and shell pushbacks that did not meet the minimum width. The reserves contained and strip ratio in the pit design are less favorable than the pit shells for a variety of reasons:

- Infrastructure and lakes are limiting in some areas (no hard boundary in shell generation);
- Minimum pushback width;
- Irregular pit shape (especially in Bloom West);
- Limited amount of final walls are already under construction.



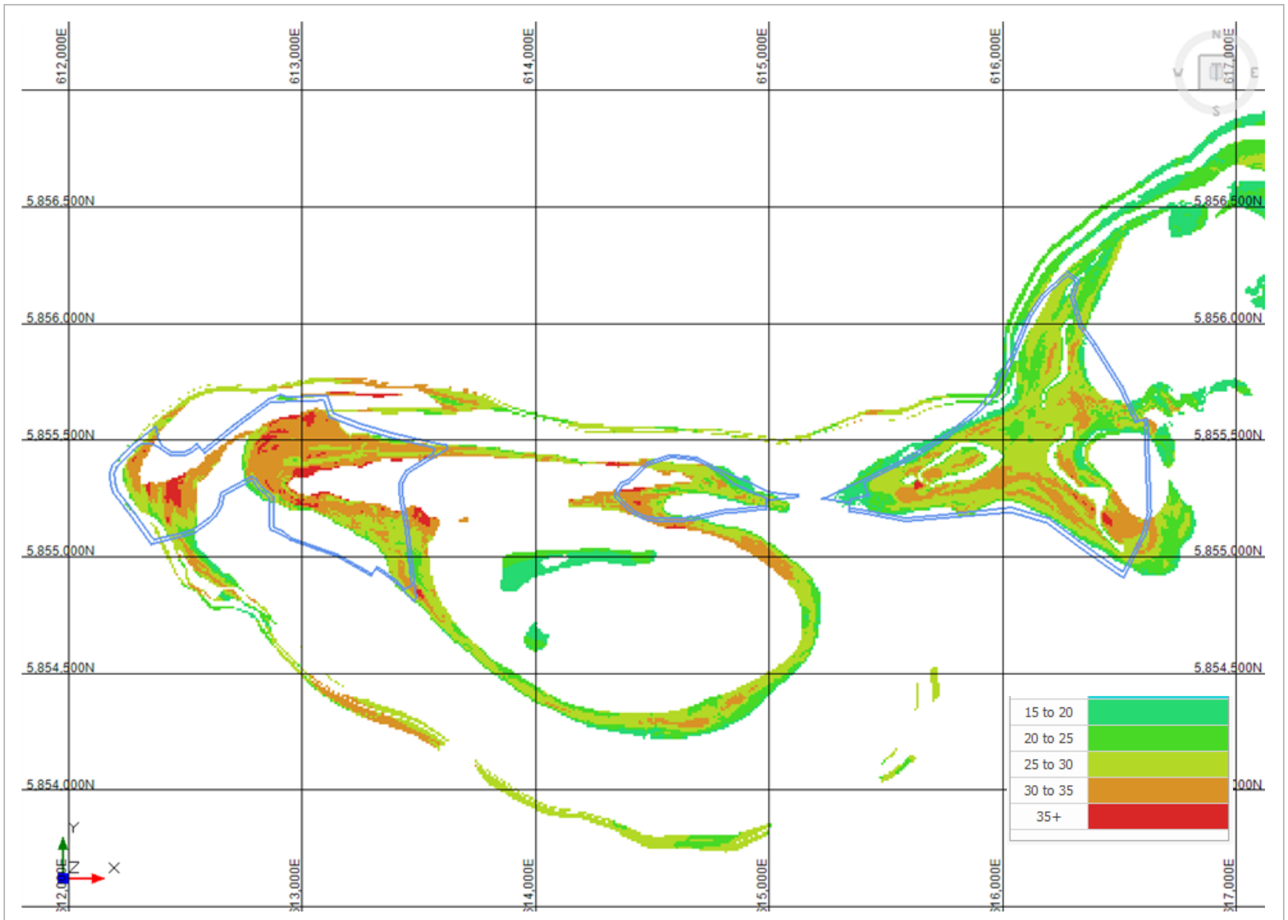
	Final Pit Design	Author: QIO Date: December 2022

Figure 15-4: Final pit design



	Final Pit Design and Elevation vs RF0.875 Shell	Author: QIO Date: December 2022

Figure 15-5: Final pit design and elevation vs RF0.875 shell



	Final Pit Design vs. Iron Grade at Level 592 (Diluted)	Author: QIO Date: December 2022

Figure 15-6: Final pit design vs. Iron grade

15.6 Mineral Reserve Statement

15.6.1 Mineral Reserve Definition

The "CIM Definition Standards for Mineral Resources and Reserves" published by the Canadian Institute of Mining, Metallurgy and Petroleum for the resource classification clarifies the following:

Probable Mineral Reserve:

A Probable Mineral Reserve is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proven Mineral Reserve.

Proven Mineral Reserve:

A Proven Mineral Reserve is the economically mineable part of a Measured Mineral Resource. A Proven Mineral Reserve implies a high degree of confidence in the Modifying Factors.

15.6.2 Mineral Reserve Estimate for the Bloom Lake Project

Mineral reserve and stripping estimates are based on the designs presented in Section 15.5 and a projected surface as of April 1, 2023.

Proven and Probable Mineral Reserves total 716 Mt at an average grade of 28.6% Fe. The total tonnage to be mined is estimated at 1,402 Mt for an average strip ratio of 0.96, which includes overburden.

Table 15-7: Mineral reserve estimate

Classification	Diluted Tonnage	Diluted Fe	CaO	Sat	MgO	Al_2O_3
	Mt	%	%	%	%	%
Proven	183.7	30.0	1.3	5.6	1.3	0.3
Probable	532.5	28.1	2.1	9.2	2.0	0.5
Total Proven & Probable	**716.2**	**28.6**	**1.9**	**8.3**	**1.8**	**0.4**
Waste (Includes Inferred)	*685.7*	-	-	-	-	-

Notes on mineral reserves:

1. The mineral reserves were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Standards for Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council on May 10, 2014.
2. The qualified person (QP) for the mineral reserve estimate, as defined by NI 43 101, is Olivier Hamel, P.Eng., from QIO. The effective date of the estimate is April 1, 2023.
3. In the ultimate pit design, all Measured Resources and associated dilution/ore loss were converted to Proven Mineral Reserves. All Indicated Resources and associated dilution/ore loss were converted into Probable Mineral Reserves.
4. Stockpiles are excluded from reserve calculations due to their small size (<1 Mt).
5. Bulk density of ore is variable but averages 3.39 t/m^3 (pre-dilution).
6. Remaining strip ratio is 0.96:1 (including overburden).
7. Mineral reserves are based on a mining surface projected to April 1, 2023. The last survey was done in Q3 2022.
8. Mineral reserves are estimated at a cut-off grade of 15% Fe (diluted).
9. Mineral reserves are estimated using a long-term iron ore reference price (Platt's 65%) of USD99/dmt and an exchange rate of 1.27 CAD/USD. A price adjustment to 66.2% of USD1.83/dmt was added.
10. Bulk density of ore is variable but averages 3.39 t/m^3 (pre-dilution).
11. Mining dilution was calculated using a 2-m contact skin.
12. The average mining dilution is 1.73% at a grade of 0% Fe. Dilution was applied block by block and shows a wide range of local variability.
13. The average ore loss is 1.91% at a grade of 29% Fe. Ore loss was applied block by block and shows a wide range of local variability.
14. Numbers may not add up due to rounding.
15. SAT stands for SATMAGAN, an industry standard device that measures the magnetic content by weight of a sample. This value is assumed to be the magnetite content by weight.
16. The author is not aware of any known environmental, permitting, legal, title-related, taxation, socio-political or marketing issues, or any other relevant issues not reported in the Technical Report, that could materially affect the mineral reserve estimate.

15.7 2019 FS Reserves Compared to this Report

The following waterfall chart (Figure 15-7) and explanations have been prepared to help the reader conceptualize the change in reserves since the last public technical report (Allaire et al., 2019).

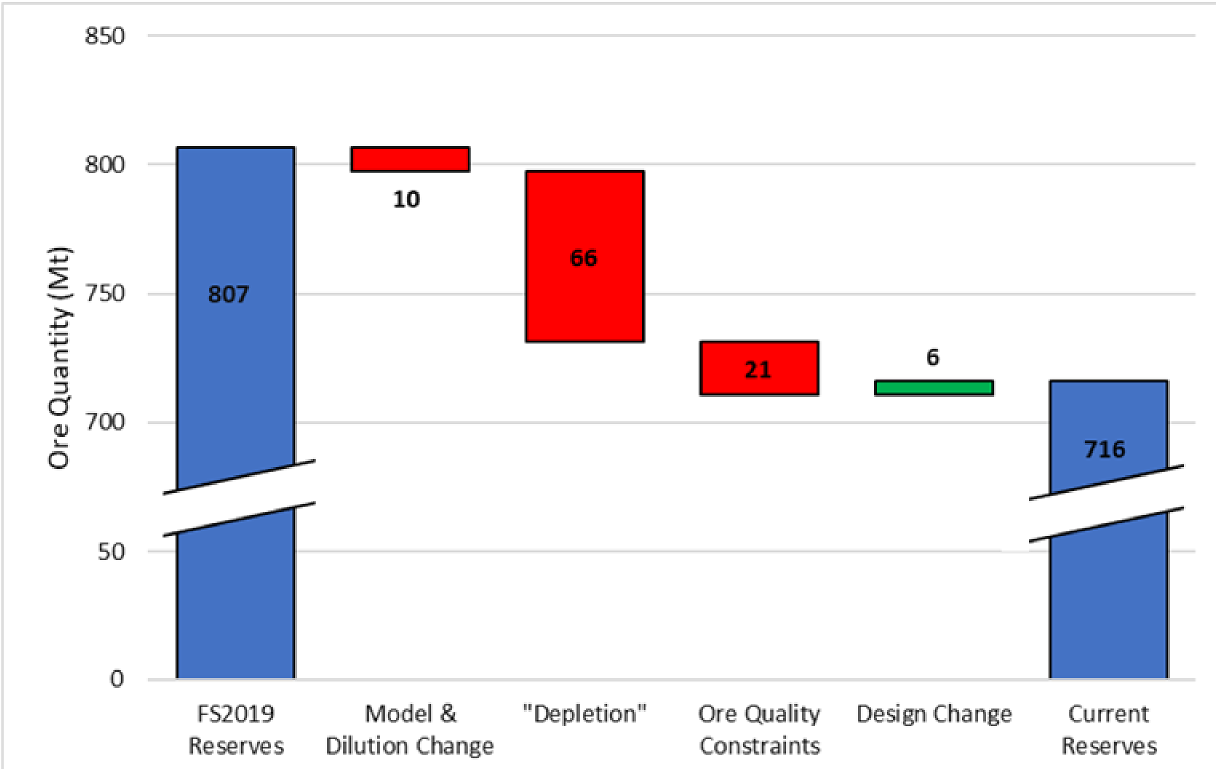


Figure 15-7: Simplified reserve change waterfall chart

To simplify the process, one must assume that each change is made in sequence and independent of each other.

1. Model & Dilution Change: Within the original 2019 FS pit design, difference in the diluted volume of ore in the 2019 FS block model and the 2023 block model presented in this Report.
2. "Depletion": Volume of ore contained between the 2019 FS topography and the 2023 topography presented in this Report, according to the 2023 block model. This is not a true depletion since both surfaces were estimated, not surveyed.
3. Ore Quality Constraints: Portion of the iron formation above the 15%Fe cut-off, but where geological indicators suggest most of the iron is not recoverable. This constraint was not used in the 2019 FS.
4. Design Change: Additional ore gained by adjusting the design to the adjusted deposit.

16. Mining Methods

The operation consists of a conventional surface mining method using an owner mining approach with electric hydraulic shovels, wheel loaders and trucks. The primary objective is to sustain the mill feed every year at a rate of 41.9 Mtpy within ore quality constraints.

Many technologies are being evaluated continuously to improve operations, such as electric trucks, mobile in pit crushers, trolley assist, and autonomous equipment. However, the purpose of this Report is to disclose reserves and a status-quo approach is used (i.e.: current practices are extrapolated in the future).

16.1 Mine Designs

16.1.1 Open Pit Stages

To avoid confusion between the Phase I and Phase II plant expansion, the term "**mining stage"** is preferred instead of the common "mining phase" to represent pushbacks.

Mining of the Bloom Lake project is now planned with 13 sub-stages in three pits. While attempts were made at naming and numbering the stages similarly to previous convention, no direct analogy can be made to previous designs or processing plants. There are three named pits in this Report:

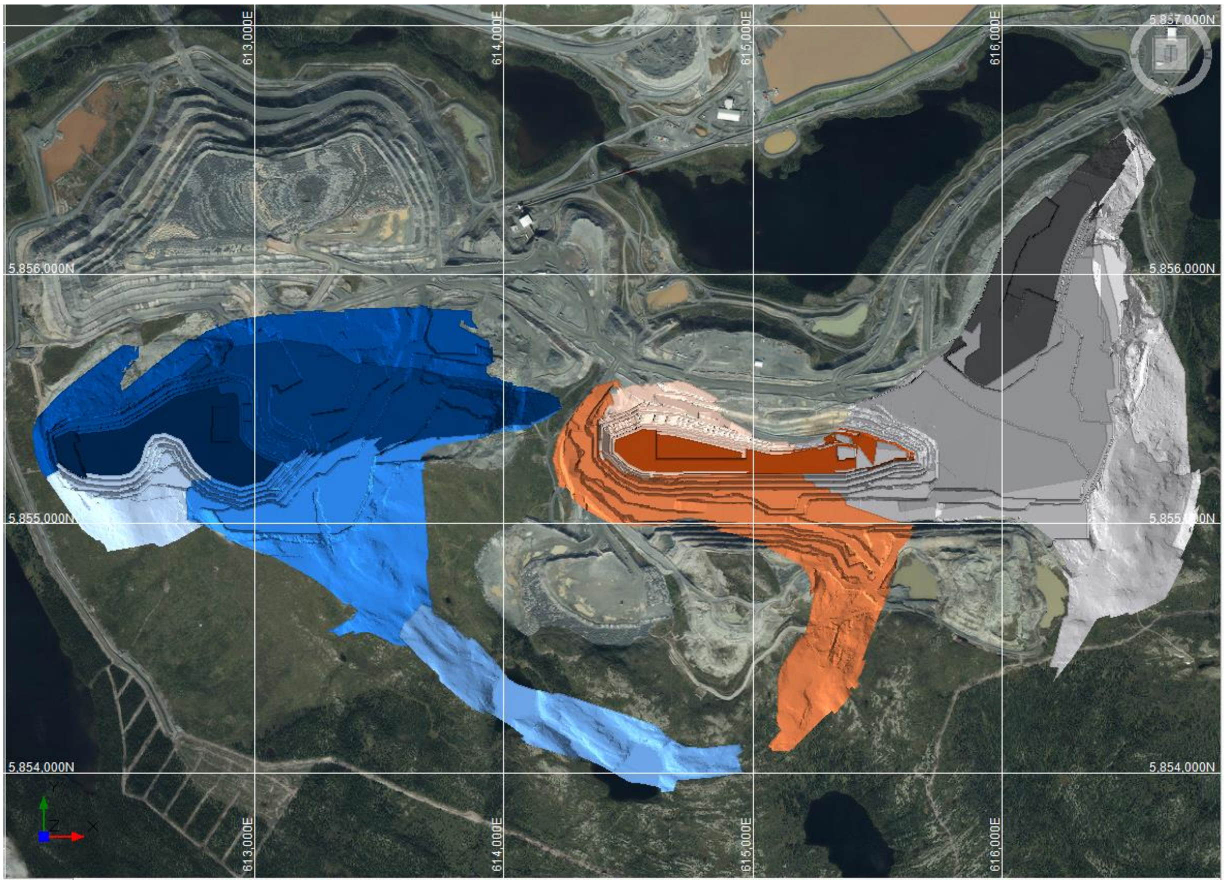
- Bloom West (BW) with six sub-stages;
- Bloom Pignac (BP) with three sub-stages;
- Bloom Chief's Peak (BC) with four sub-stages.

It should be noted that in the previous technical report (Allaire et al., 2019), "Chief's Peak" referred to what is now Pignac and Chief's Peak. The different ore qualities, strip ratios and mining priorities justified the naming split. While sub-stages and naming conventions have changed, the ultimate pit design has barely changed in scope.

Characteristics of each mining stage are summarized in Table 16-1and should be consulted in conjunction with Figure 16-1.

Table 16-1: Bloom Lake Mine – Summary by stage, by pit, and total

Mine	Pit	Stage	Total	Over burden	Waste	Strip Ratio	Ore	Diluted Fe	CaO	MgO	SAT
			(Mt)	(Mt)	(Mt)	w:o	(Mt)	(%)	(%)	(%)	(%)
By Stage											
Bloom Lake	West	1A	20	0	2	0.13	**18**	31.5	0.0	0.1	1.4
		1B	107	1	47	0.80	**59**	31.8	0.1	0.1	1.3
		2A	79	1	55	2.44	**23**	31.1	0.2	0.3	7.6
		2B	252	4	154	1.67	**94**	29.4	0.1	0.1	1.5
		2C	37	1	15	0.82	**20**	25.2	0.0	0.0	0.9
		2D	81	1	49	1.59	**31**	30.3	0.2	0.2	2.7
	Pignac	1	7	0	2	0.49	**5**	27.6	0.9	1.5	4.6
		2A	87	3	53	1.75	**32**	26.5	0.0	0.1	2.8
		2B	35	0	16	0.87	**19**	29.5	0.6	0.8	5.2
	Chief's Peak	1A	32	0	10	0.48	**21**	25.3	4.1	3.5	13.7
		1B	193	0	55	0.40	**138**	28.8	2.9	2.8	12.1
		2A	224	2	97	0.79	**125**	28.2	3.1	3.0	11.8
		2B	246	2	114	0.89	**130**	27.0	3.6	3.1	13.7
By Pit											
Bloom Lake	West		577	8	323	1.34	**246**	30.0	0.1	0.1	2.1
	Pignac		130	3	71	1.34	**55**	27.6	0.3	0.5	3.8
	Chief's Peak		694	4	276	0.68	**414**	27.9	3.2	3.0	12.6
Total											
Bloom Lake			**1,401**	**15**	**671**	**0.96**	**716**	**28.6**	**1.9**	**1.8**	**8.3**



	Bloom Lake Mine: All Stages	Author: QIO Date: December 2022

Figure 16-1: Plan view of all Bloom Lake stages

The West Pit appears large on the map but is shallow in some areas. It contains 41% of total tonnage and 34% of the ore, for a strip ratio of 1.34. The ore quality is the highest in the mine, and the iron mineralization is hematite.

The Pignac Pit contains 8% of the ore at a strip ratio of 1.34. The mineralization becomes more complex than the West Pit, but less so than Chief's Peak. It can be mined completely independently of Chief's Peak, even though both sections connect.

Chief's Peak contains 58% of the ore and has more complex iron mineralization (including magnetite and iron silicates), although the strip ratio is much lower than the other two pits (0.68).

The differences in pit geometry, strip ratio and ore properties justify the need for a blending strategy in processing (keep the feed properties in the preferred range) and in mining (avoid peaks in mining capacity). The ultimate pits contain 716 Mt of ore at an average grade of 28.6% Fe with an average strip ratio of 0.96. This mineral reserve is sufficient for an 18-year mine life.

16.1.2 Pit Design Slopes

The pit design slope profiles adhere to recommendations generated by Golder Associates Inc. (Golder) stemming from the performance and excavation of the Pignac Pit Stage 1A since the restart of operations. The inter-ramp angles (IRA) vary from 42 to 50 degrees depending on the regional RQD and bench height.

The pit slope profile has a geotechnical catch bench of 20 m in the sections where the wall would span a height of 112 m without any kind of decoupling (ramp/step-in). This geotechnical catch bench mitigates risks from overbank hazards on the pit wall. Overbank hazards result from muck spilling down the slope of the previous pit stage filling the catch benches. The design allows the catch bench to be accessed to allow debris removal.

Where possible, more conservative wall slopes (single bench, shallower) were designed in sub-stages where the wall is not final. However, 12 of the 13 sub-stages contain portions of the ultimate pit wall, which limits the impact of this conservative decision.

A summary of all design criteria and sectors is presented in Section 15.4.1.

16.1.3 Overburden and Waste Rock Storage

A total of 685 Mt of waste material is mined throughout the remaining life of mine (LOM). Fully permitted capacity from the effective date is approximately 80 Mt and is sufficient for the next 2 years of the mine life.

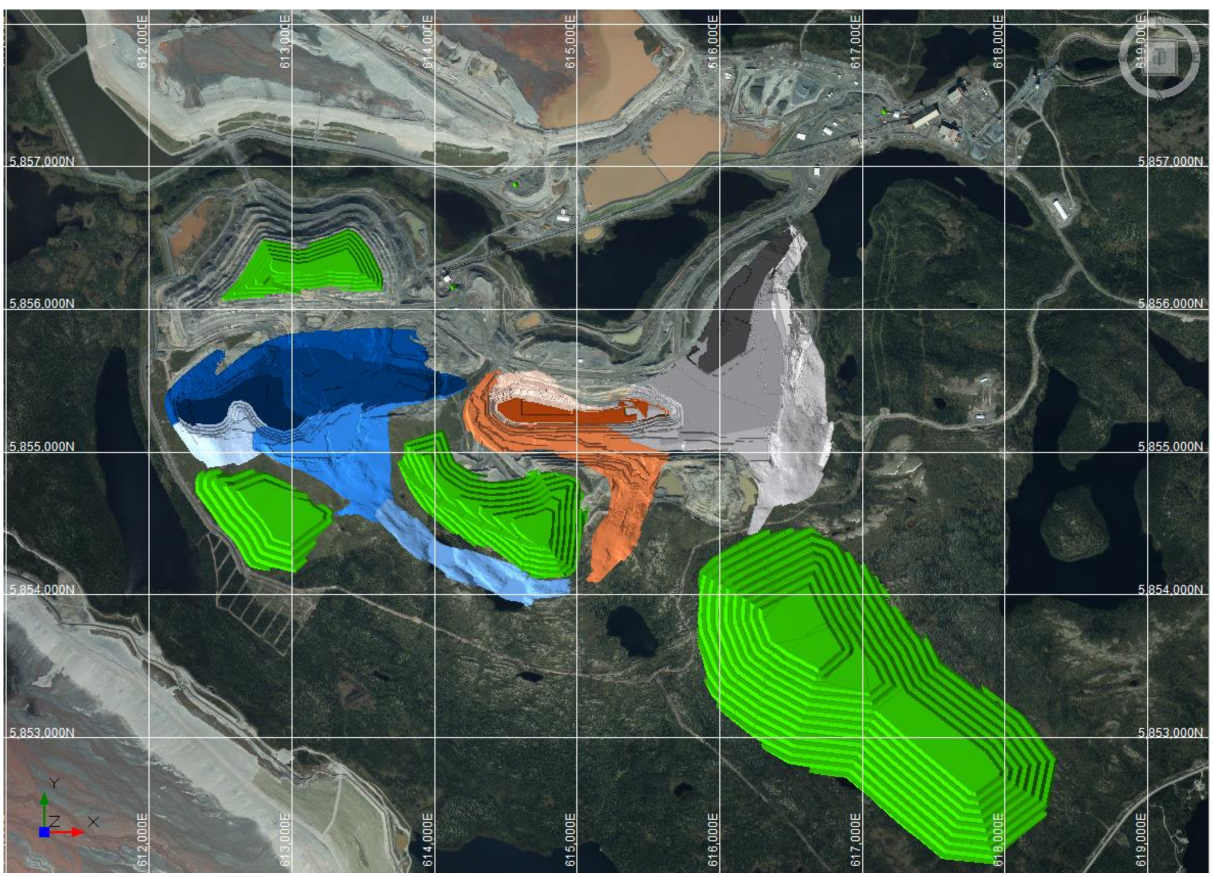
Full permitting of all remaining capacity (~658 Mt) is expected to be finalized and obtained in calendar year 2023. More information on the process is available in Chapter 20.

Four dumps are planned in the mine life. The overburden dump from before the 2018 mine restart still exists but is considered unusable until its stability is confirmed. The overburden will instead be co-located along with rock waste at each of the storage facilities.

All waste dump capacities are shown in Table 16-2.

Table 16-2: Dump summary

Waste storage facility	Remaining capacity (Mt)	Remaining capacity (Mm³)	Total disturbed surface area (ha)	% Filled at life-end
Mazaré	17.4	8.2	128	100%
Triangle	63.5	29.9	79	100%
Sud-Ouest	27.9	12.7	46	100%
Sud	629.8	303.8	334	90%
Overburden	*0*	*0*	*18*	*0%*
Total	**738.6**	**354.6**	**605**	**91%**



	Waste Dump Designs	Author: QIO Date: December 2022

Figure 16-2: Waste dump designs

The dump storage locations will be offset 20 m from the pit limit for safety reasons. As can be seen in Figure 16-2, this will require minor step-ins in the dump designs. The average density of the dumps is 2.08 t\m^3 based on a swell factor of 1.45 from in situ to dump.

During operations, an allowance for material requirements for the tailings management facility (TMF) construction will be placed on the containment dike. Those requirements have been detailed year-by-year and total 10.4 Mt.

Table 16-3: Waste dump design criteria

Waste storage facility	Bench height (m)	Avg. catch bench width (m)	Pile face angle (deg)	Overall slope angle (H:V)	Approximate height (m)
Mazaré	10	15.75	37	2.9:1	145
Triangle	14	23.75	37	3:1	140
Sud-Ouest	20	30.5	35	3:1	90
Sud	20	34	37	3:1	240

16.1.4 Ore Stockpiles

Two small operational stockpiles are maintained at each crusher (maximum of 500 kt) to handle unplanned work stoppages and to provide continuity of feed during white-out conditions. These stockpiles are not modelled explicitly in this Technical Report.

Unlike the previous technical report (Allaire et al., 2019), this mine plan does not rely on long-term stockpiles for ore blending.

16.2 Production Schedule

16.2.1 Production Schedule Optimization

The life of mine schedule was developed with the Deswik suite of software. Deswik.GO was used to stabilize the strip ratio, mining rate and mill feed over the LOM, and Deswik.Blend was used to optimize the haulage.

The optimization was based on the pit stage designs and related mineral reserves. The constraints are summarized in Table 16-4.

Table 16-4: LOM targets and constraints

LOM Targets and Constraints	Unit	LOM Target
Mining Constraints		
Total tonnage mined	Mtpy	90
Number of open stages	y	6
Bench Dropdown rate	Bench/y	6
Maximum Tonnage by stage	Mtpy	50
Processing Limits & Recoveries		
Mill feed tonnage	Mtpy	≤ 41.9
Annual crusher 1 feed	Mtpy	≤ 31
Annual crusher 2 feed	Mtpy	≤ 31
Preferred Contaminants Limits in Feed		
Ore Feed – (MgO + CaO)	%	≤ 6.0
Ore Feed – Satmagan	%	≤ 10.0

16.2.2 Mine Production Schedule

The mine production schedule is on a yearly basis. Pre-stripping is included in the mine plan and is done on a just-in-time basis. The initial mining equipment ramp-up outlined in the 2019 Feasibility Study is near-complete at the start of this production schedule.

The objectives of the LOM plan are to build upon and refine the plan outlined in the feasibility study (Allaire et al.,2019), mostly by changing the internal stages to allow a reduced maximum mining rate:

- Limit the mining rate to approximately 90 Mtpy;
- Minimum 20% of feed from Bloom West Pit on any given year;
- Ensure sufficient feed to the concentrator to maximize production;
- Limit the vertical drop down rate to six benches per stage per year;
- Limit the total mined tonnage from any particular stage;
- Minimize the number of truck hours required;
- Place contaminant level constraints on the mill feed;
- No long-term stockpiling.

As shown in Figure 16-3, the initial ex-pit mining rate is 75 Mtpy and stays stable for 3 years. The mining rate then gradually increases to reach 90 Mtpy in financial year (FY) 2030. The mining rate declines, starting in FY2038, as sufficient ore for the mill is accessible.

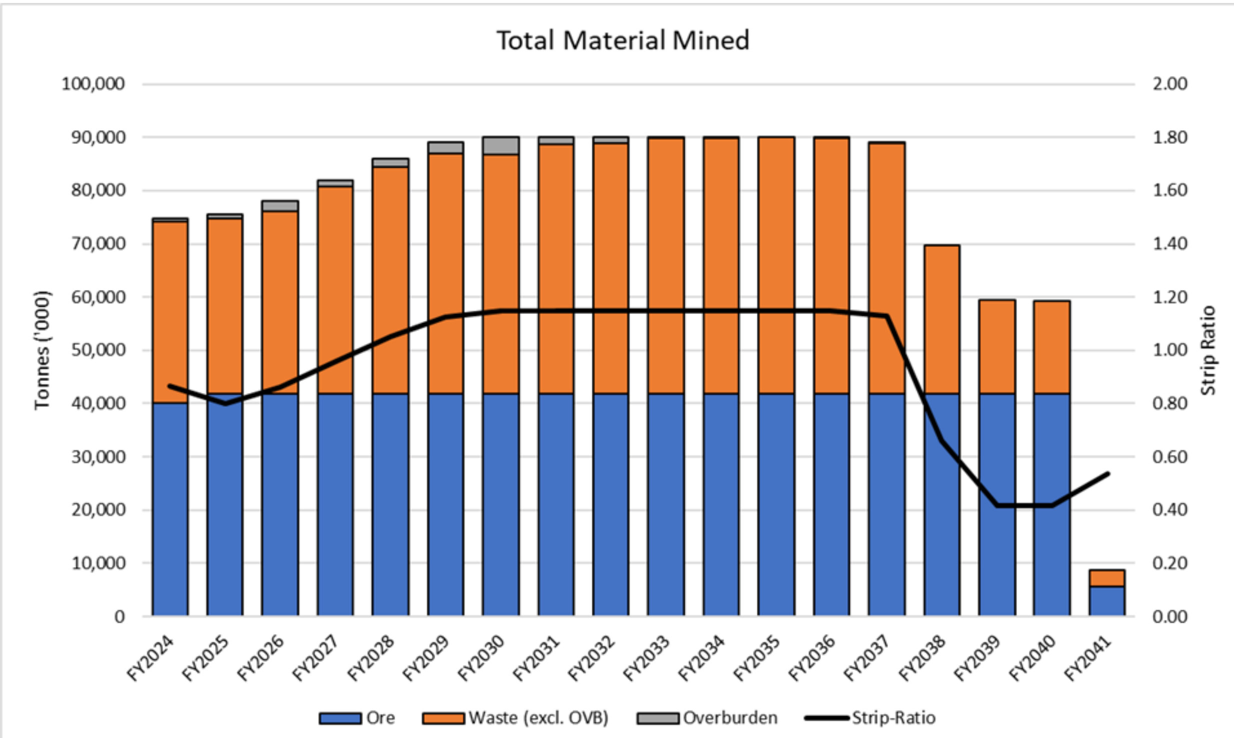


Figure 16-3: Material mined by financial year

Table 16-5 presents the material movement from the mine plan on an annual basis including mill feed properties. For mine planning, the Phase I and Phase II processing plants are considered as a single plant since they are fed from the same crushed ore stockpile (A-Frame).

The crushers, however, are separately modelled: 35% of the run of mine (ROM) ore going to Crusher 1 (original) and 65% to Crusher 2 (the "in-pit" crusher).

Table 16-5: Mine and mill production schedule

Year	Total mined	Waste mined	Ore Feed / Ore Mined							Recovery	Concentrate
			Crusher 1	Crusher 2	Total	Fe	CaO	MgO	SAT		
	Mt	Mt	Mt	Mt	Mt	%	%	%	%	%	Mt
FY2024	74.7	34.7	9.0	31.0	40.0	29.3	1.7	1.7	9.1	82.8	14.7
FY2025	75.4	33.5	21.8	20.1	41.9	28.7	2.0	2.0	10.0	82.2	14.9
FY2026	78.0	36.1	25.6	16.3	41.9	28.6	1.8	1.8	10.0	82.0	14.8
FY2027	82.0	40.1	21.0	20.9	41.9	29.0	1.3	1.3	8.2	82.6	15.2
FY2028	86.0	44.1	10.9	31.0	41.9	29.0	1.3	1.3	7.2	82.5	15.1
FY2029	89.0	47.1	10.9	31.0	41.9	28.9	2.7	2.4	8.8	82.2	15.0
FY2030	90.0	48.1	15.8	26.1	41.9	28.8	1.6	1.7	9.2	82.3	15.0
FY2031	90.0	48.1	18.0	23.9	41.9	28.9	1.5	1.6	7.9	82.4	15.1
FY2032	90.0	48.1	10.9	31.0	41.9	27.8	1.6	1.7	8.0	81.1	14.3
FY2033	90.0	48.1	10.9	31.0	41.9	28.0	2.4	2.3	7.2	81.2	14.4
FY2034	90.0	48.1	10.9	31.0	41.9	28.3	2.9	2.5	7.2	81.6	14.6
FY2035	90.0	48.1	13.7	28.2	41.9	27.4	2.9	2.4	7.8	80.4	14.0
FY2036	90.0	48.1	25.0	16.9	41.9	27.7	2.2	1.8	9.8	80.9	14.2
FY2037	89.2	47.3	10.9	31.0	41.9	29.1	1.1	1.0	7.2	82.8	15.3
FY2038	69.6	27.7	10.9	31.0	41.9	28.4	2.2	2.1	9.3	81.7	14.7
FY2039	59.4	17.5	10.9	31.0	41.9	28.3	2.4	2.1	8.8	81.6	14.6
FY2040	59.3	17.4	10.9	31.0	41.9	29.4	1.5	1.4	6.6	83.0	15.4
FY2041	8.6	3.0	0.0	5.6	5.6	31.7	0.1	0.1	1.5	85.4	2.3
Grand Total	1,401.3	685.3	248.1	467.9	716.0	28.6	1.9	1.8	8.3	82.0	253.6

The mill production schedule is presented in Table 16-5. As a conservative measure, the first year is at 95% capacity to account for ramp-up completion.

In full production years, the concentrate production averages 14.8 Mtpy. The concentrate, at 66.2% iron, is obtained with a combined Phase I and Phase II metallurgical recovery that averages 82.0% over the same period. The recovery equation detailed in Chapter 17 was applied by scheduling period. Since large efforts are made in short term planning to keep the mill feed properties stable, the use of annual average grades to calculate the recovery was considered appropriate.

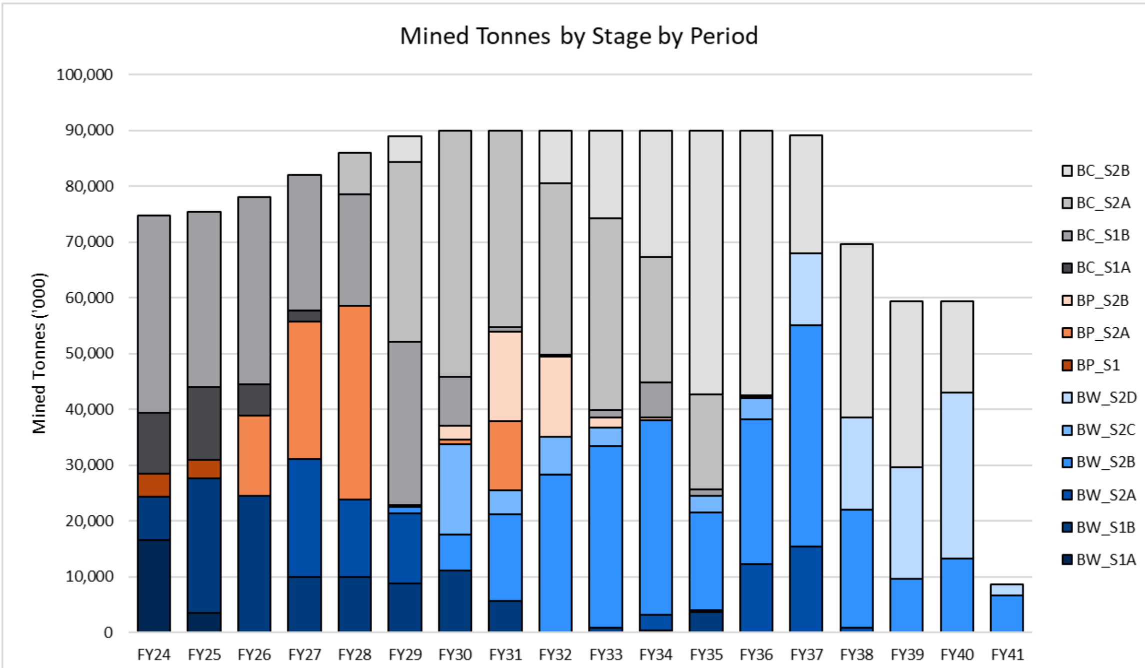


Figure 16-4: Mined tonnes by stage by period

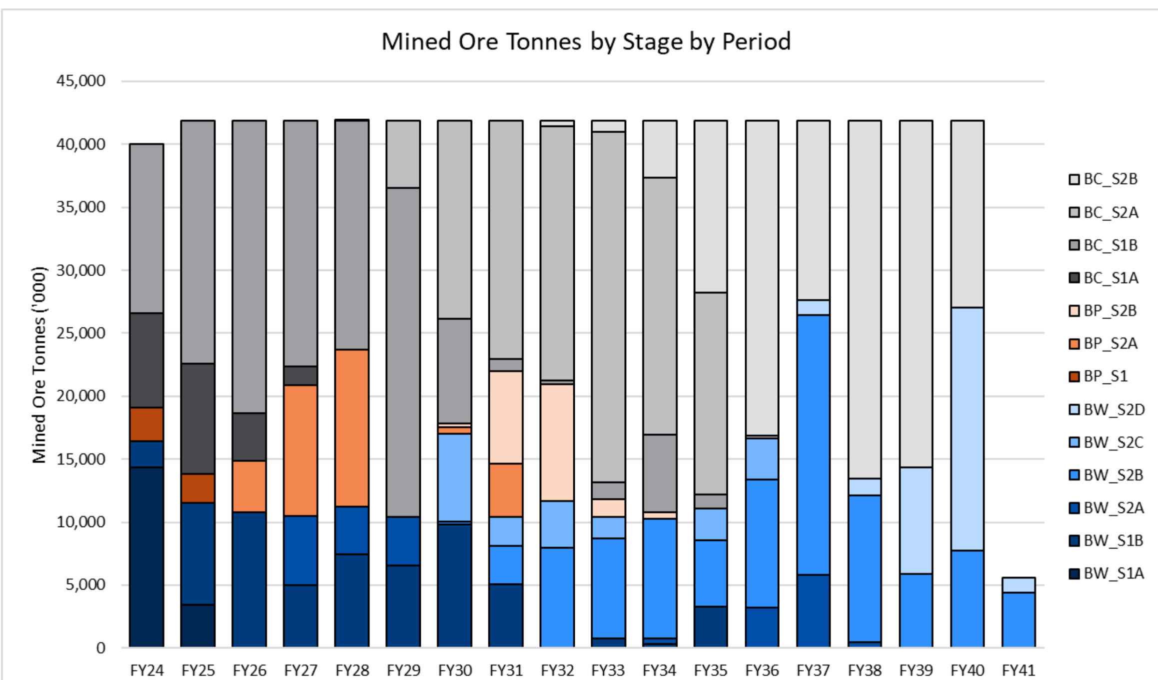
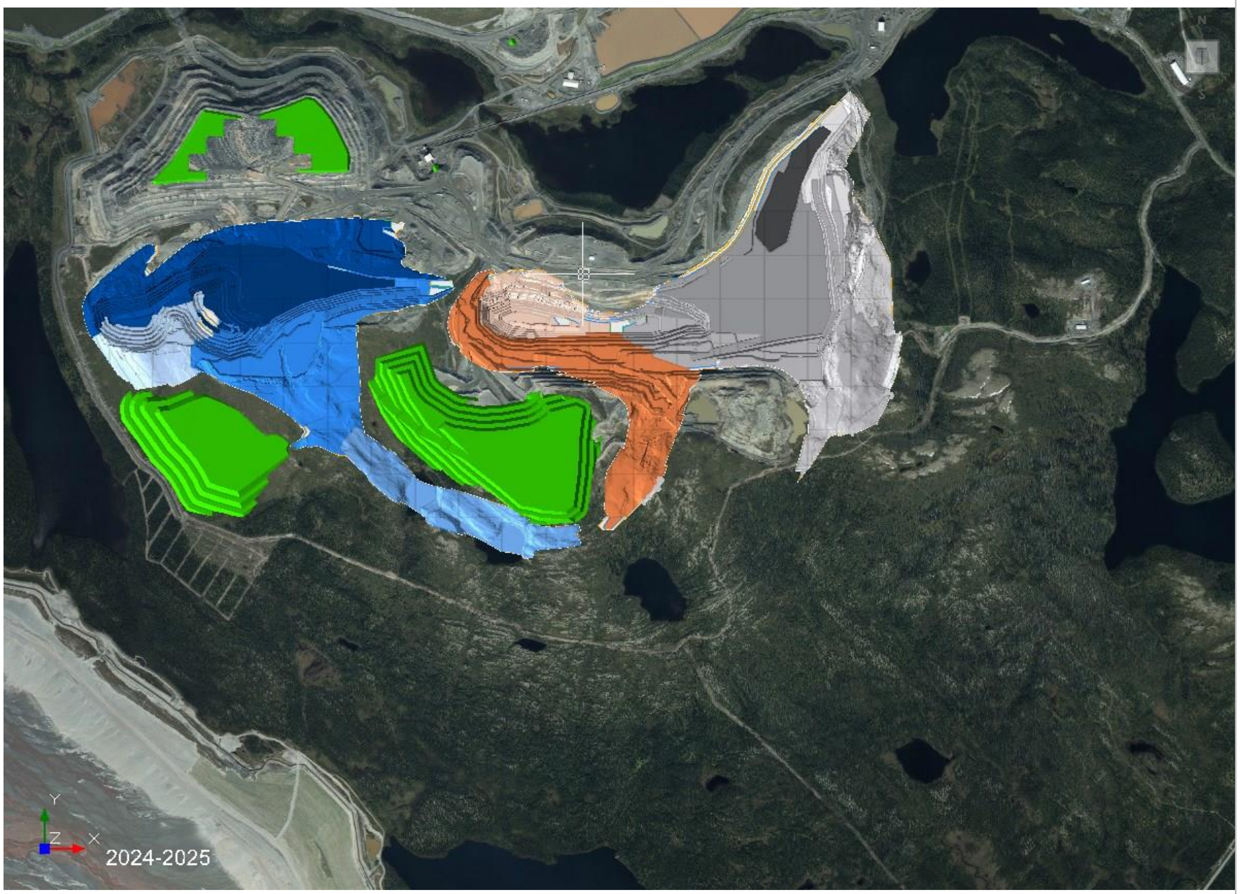
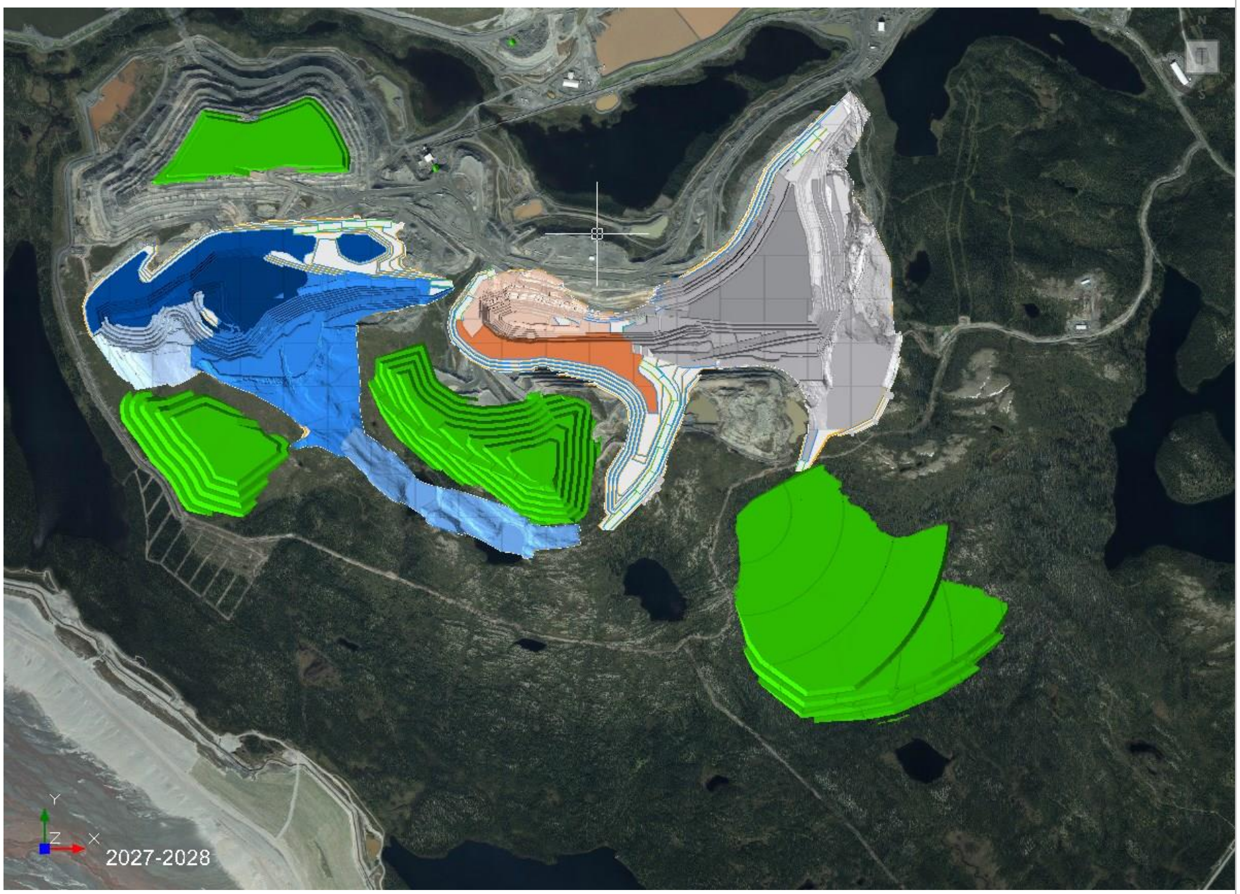


Figure 16-5: Mined ore tonnes by stage by period



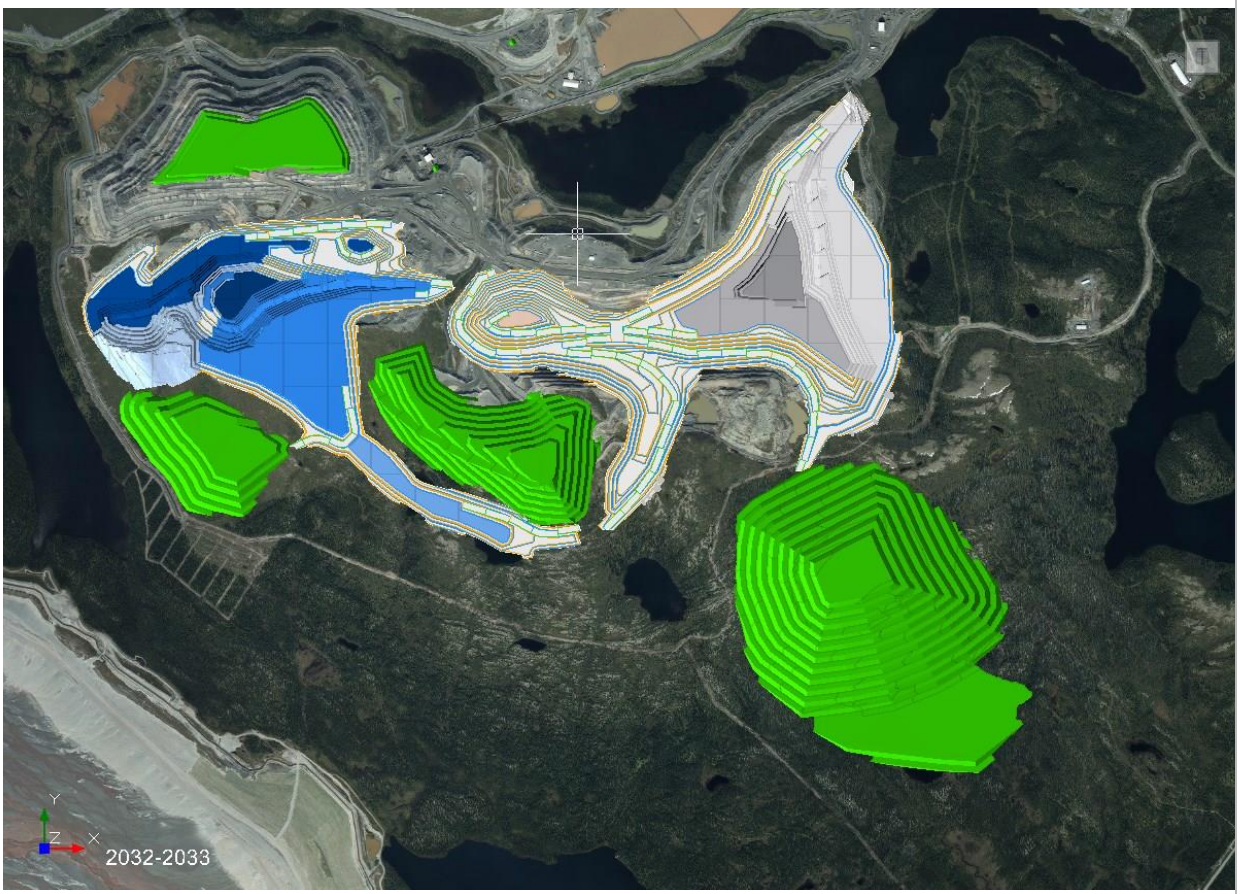
	Bloom Lake Mine: March 31, 2025 (Y2)	Author: QIO Date: December 2022

Figure 16-6: Mine status map March 31, 2025



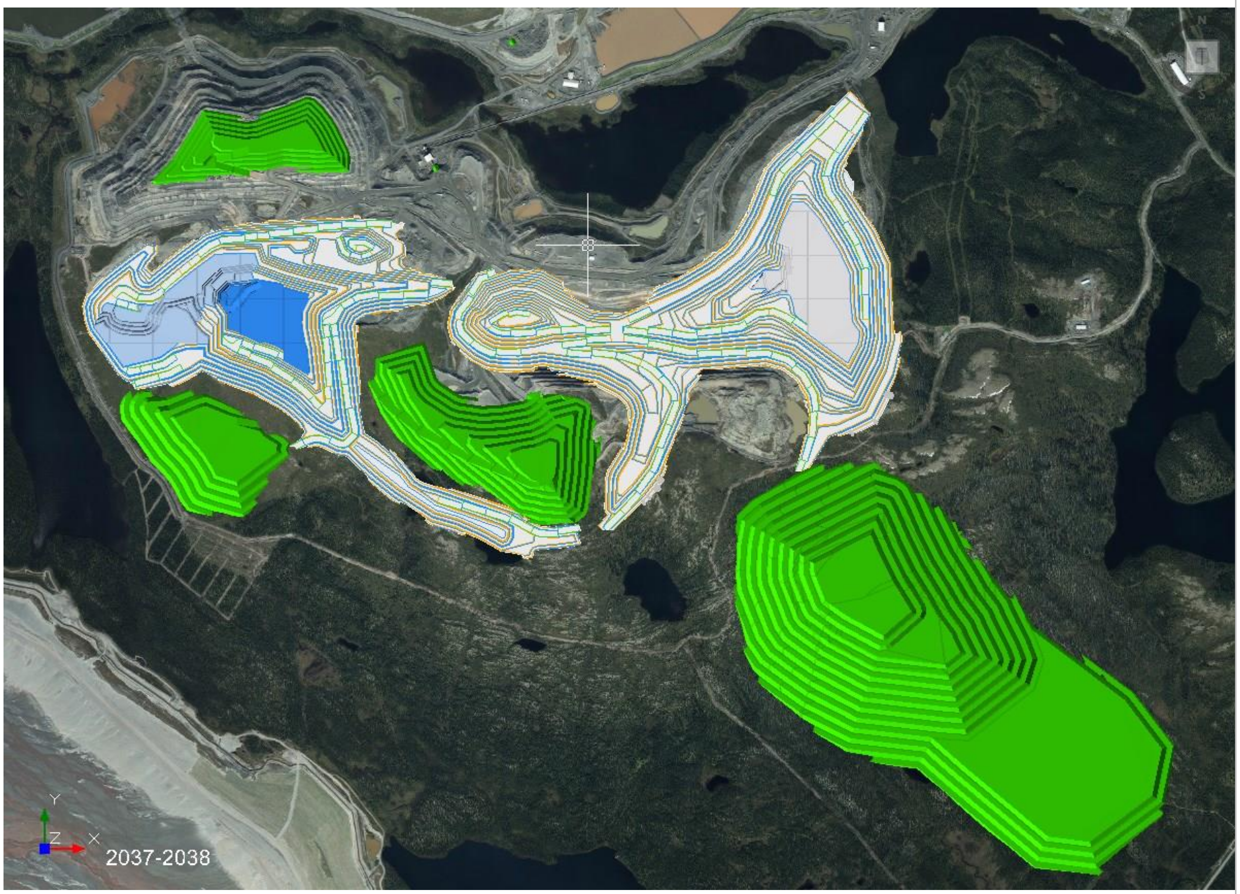
	Bloom Lake Mine: March 31, 2028 (Y5)	Author: QIO Date: December 2022

Figure 16-7: Mine status map March 31, 2028



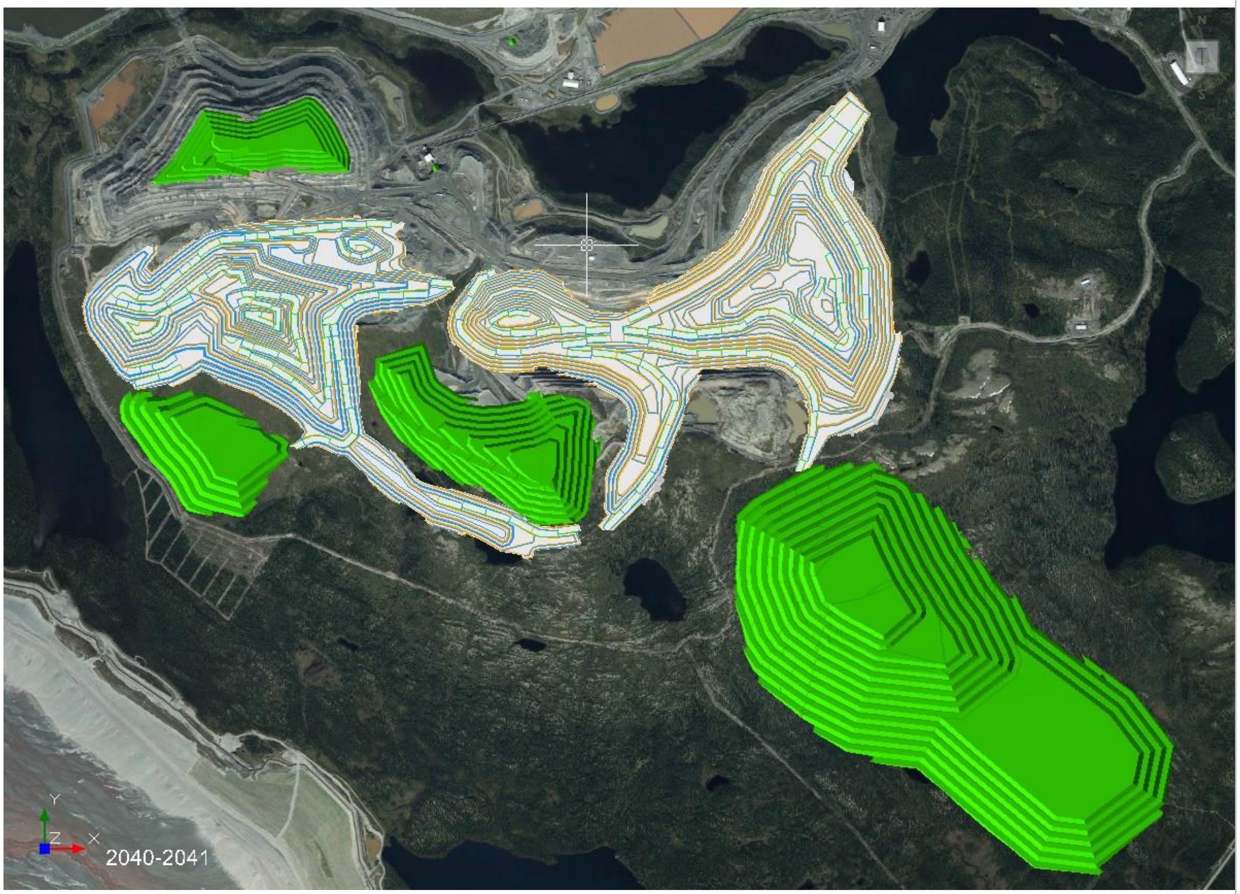
	Bloom Lake Mine: March 31, 2033 (Y10)	Author: QIO Date: December 2022

Figure 16-8: Mine status map March 31st, 2033



	Bloom Lake Mine: March 31, 2038 (Y15)	Author: QIO Date: December 2022

Figure 16-9: Mine status map March 31, 2038



	Bloom Lake Mine: March 31, 2041 (Y18)	Author: QIO Date: December 2022

Figure 16-10: Mine status map March 31, 2041

16.2.3 Waste Requirements for Civil Works

Waste material will be required for the construction of the TMF and various usages in the mine. The total remaining waste rock required is 10.4 Mt mainly for the TMF. Waste material for stemming and road construction is not included but will be sourced from the mined waste.

16.3 Mine Operations and Equipment

16.3.1 Mine Operations Approach

Mining is carried out using conventional open pit techniques with electric hydraulic shovels, wheel loaders and mining trucks in a bulk mining approach with 14 m benches. Bloom Lake is an owner-operator open pit mine with the outsourcing of certain support activities such as explosives manufacturing, blasthole loading, pre-split drilling and overburden removal.

16.3.2 Production Drilling and Blasting

Drill and blast specifications are established to effectively single pass drill and blast a 14 m bench. For this bench height, a 311-mm blasthole size was chosen with a variable burden and spacing and 1.5 m of subdrill. Because of the changing rock properties and size requirements between waste and ore, powder factors vary between 0.35-0.5 kg/t. Blastholes are initiated with electronic detonators and are double primed with 450 g boosters. The bulk emulsion product is a gas sensitized pumped emulsion blend specifically designed for use in wet blasting applications.

Several rock types are present in the pit including hematite, gneiss, schist, quartzite and amphibolite. The average rock properties based on testing shows a range in hardness between 52 MPa and 119 MPa (Table 16-6). More rock types exist for classification, but those are the main types.

Table 16-6: Rock properties

Rock properties		Hematite iron formation	Gneiss	Schist	Quartzite	Amphibolite
UCS	MPa	119	67	52	113	80
Young's modulus	GPa	43.95	20.15	11.25	n/a	29.84
Poisson's ratio	%	0.19	0.27	n/a	n/a	0.22
Specific gravity	t/m^3	3.41	2.74	2.77	2.68	3.04

The drilling parameters used in the study are based on data collected from the previous operation at Bloom Lake. While it varies by rock type, the average drill productivity for the production rigs is estimated at an average 14.5 m/h instantaneous with an overall penetration rate of 11.6 m/h. The average drilling productivity is estimated at 1,730 tph including the 5% re-drill factor. Drilling requirements are based on the planned rock type movements throughout the LOM. Iron formation, especially silicate zones, is the slowest to drill.

There are currently six blasthole rigs in production on site. Each drill has a drill bit size range of 244 mm to 406 mm with a single pass drill depth of 21.3 m with a 21.4 m tower configuration. There are two Bucyrus 49HR electric drive and four Caterpillar MD6640. Future drill additions will be required and are planned as the same class of drill.

Blasting activities are outsourced to an explosives provider who is responsible for supplying and delivering bulk explosives in the hole. The mine engineering department is responsible for designing blast patterns and relaying hole information to the drills via the wireless network.

A mobile manufacturing unit (MMU) was chosen. The emulsion truck is a mixing truck that takes bulk explosive components such as ammonium nitrate prill, emulsion matrix, gassing agents and diesel fuel to form a blasting product as it is distributed into the blast hole. Thus, the provider is not storing a large amount of bulk explosive on site, but ingredients in separate tanks that are not considered as explosives. For this reason, the explosives plant or depot can be located closer to mining operations.

Table 16-7: Drill & blast parameters

Parameter	IF	IFM	SIF	Gneiss	Quartzite	Amphibolite (Default)
Drill specifications						
Hole diameter (inch)	12.25	12.25	12.25	12.25	12.25	12.25
Hole diameter (mm)	311.2	311.2	311.2	311.2	311.2	311.2
Hole area (m²)	0.076	0.076	0.076	0.076	0.076	0.076
Bench height (m)	14.0	14.0	14.0	14.0	14.0	14.0
Subdrill (m)	1.5	1.5	1.5	1.5	1.5	1.5
Overdrill (m)	0.4	0.4	0.4	0.4	0.4	0.4
Stemming (m)	5.0	5.0	5.0	4.5	5.0	5.0
Loaded length (m)	10.9	10.9	10.9	11.4	10.9	10.9
Hole spacing (m)	6.7	6.7	6.7	6.8	7.9	6.5
Burden (m)	7.7	7.7	7.7	7.7	9.1	7.7
Re-drill (%)	5	5	5	5	5	5
Rock mass/hole (t)	2,329	2,315	2,281	1,914	2,648	2,111
Stemming/hole (t)	0.8	0.8	0.8	0.88	0.8	0.8
Explosives						
Density (kg/m³)	1,120	1,120	1,120	1,120	1,120	1,120
Kg/hole	928	928	928	971	928	928
Blasting specifications						
Powder factor (kg/t)	0.399	0.401	0.407	0.507	0.350	0.440

16.3.3 Ore Control

The ore control program consists of establishing dig limits for ore and waste in the field to guide loading unit operators. A high precision system combined with an arm geometry system allows shovels to target small dig blocks and perform selective mining. The system gives operators real-time view of dig blocks, ore boundaries, and other positioning information. Physical flagging is implemented when required in the field.

The ore control boundaries will be established by the technical services department based on grade control information obtained through blasthole sampling with post-blast boundaries adjusted. 50% to 100% of ore blasthole cuttings are analyzed depending on ore continuity.

A hydraulic excavator (CAT 6015B) is used to clean the ore/waste contact to reduce dilution and ore loss.

16.3.4 Pre-Split

Pre-split drill and blast is planned to maximize stable bench faces and to maximize inter-ramp angles along pit walls as prescribed by the geotechnical pit slope study. Pre-split is combined with trim shots in order to minimize damage to walls.

Blasting of the pre-split holes uses a special packaged pre-split explosive internally traced with detonating cord that ensures fast and complete detonation of the decoupled charge. Pre-split parameters vary by rock type and bench height, only the most generic pattern is shown in Table 16-8.

Table 16-8: Pre-split parameters (double bench)

Pre-split parameter	Unit	Value
Hole diameter	in	5.5
Diameter (D)	m	0.14
Spacing (S)	m	1.8
Bench height (H)	m	28
Pre-split hole length (L)	m	30.2
Face area	m^2	54.36
Explosives charge	kg	37.8
Charge factor	kg/m^2 face	0.695

Pre-split drilling is currently contracted out, and a price per metre was calculated based on their historical performance.

16.3.5 Loading

Most of the loading in the pit will be done by four electric drive hydraulic face shovels with 28 m^3 bucket, which are currently on site. The shovels (CAT 6060 or equivalent) are matched with a fleet of mining trucks with a capacity 240 tonnes (217 dmt effective payload). The hydraulic shovels will be complemented by five production front-end wheel loader (FEL). Two Komatsu WA-1200 and two LeTourneau 1850 are on site.

The blending strategy at the mine endeavors to provide a consistent feed to the mill, while the local geology varies significantly. Therefore, the loading strategy at the mine requires half the loading fleet in ore for most of the working hours. This has an impact on loading performance and explains the lower than optimal loading speeds used for planning. The loading productivity assumptions for both types of loading tools in are presented in Table 16-9. Overburden is loaded by contractors.

With operational data now available, planned equipment performance is now based on historical data rather than fleet matching calculations. Efforts are underway to maximize equipment performance before the next round of purchases, thereby potentially reducing the quantity required.

Table 16-9: Loading performance

Loading unit	Unit	CAT 6060 or Terex RH340	Komatsu WA1200 or LeTourneau L1850 or Komatsu WE1850
Performance	dmt/h	2,500	1,800
Mechanical Availability or Uptime	% (Available h / Calendar h)	70%	70%
Utilization	% (Operating h / Available h)	80%	80%
Max Yearly Production	Mdmt/year	12.3	8.8

16.3.6 Hauling

Haulage is performed with 240-tonne class trucks. The existing fleet of trucks consists of Caterpillar 793D or 793F. There are currently three 90-tonne CAT 777 trucks in use, mostly for non-production work, but they have been converted to 240-tonne equivalent for the sake of simplicity in haulage modelling (0.4:1 ratio). CAT 777 have been considered explicitly in the final fleet estimates (Section 16.4).

The truck fleet productivity was estimated using Deswik.LHS and double checked with current cycle times as well as the short-term production model. Integrating the model within the planning suite allows for cycle times to be generated for every cut to every destination, including an estimate of the waste storage facility geometry at the time of mining.

The input factors and outputs KPIs for the haulage simulations are presented in Table 16-10, Table 16-11, Table 16-12 and Table 16-13.

A speed limit of 50 km/h was applied globally, and 23 km/h downhill. Rolling resistances were also applied globally at 3%, which is likely conservative given the high-quality of road surfaces. The trucks were not de-rated to calibrate against current cycle times as they were similar enough. However, the fuel consumption was calibrated to actuals.

Table 16-10: Model parameters

Model input	Values
Rolling resistance (%)	3
Global speed limit (km/h)	50
Maximum downhill speed (km/h)	23
Effective payload (dmt)	217

Table 16-11: Cycle time components

Cycle time component	Duration (min)
Truck average spot time at loader	1.5
Truck average loading time	3.5
Truck average spot time at dump	0.5
Truck average dumping time	1.5

Table 16-12 present the unadjusted results of the haulage study, and Table 16-13 shows the results adjusted for mine planning. Unadjusted results do not include an allowance for rehandling and non-production (so that cycle times and travel velocity are not distorted for the reader).

Table 16-12: Unadjusted haulage results

Year	Distance (km)	Material hauled (Mt)	Cycles	Traveling time (raw h)	Travel time per cycle (min)	Average travel velocity (km/h)
FY24	1,974,451	74.7	344,220	79,255	13.8	24.9
FY25	1,782,765	75.4	347,587	70,957	12.2	25.1
FY26	2,246,977	78.0	359,452	83,923	14.0	26.8
FY27	2,235,579	82.0	377,885	90,864	14.4	24.6
FY28	2,744,951	86.0	396,313	108,084	16.4	25.4
FY29	2,406,170	89.0	410,143	100,099	14.6	24.0
FY30	2,506,327	90.0	414,747	105,218	15.2	23.8
FY31	2,782,098	90.0	414,747	124,758	18.0	22.3
FY32	3,070,604	90.0	414,747	134,736	19.5	22.8
FY33	3,405,035	90.0	414,746	149,052	21.6	22.8
FY34	3,614,656	90.0	414,746	143,410	20.7	25.2
FY35	3,394,984	90.0	414,747	142,633	20.6	23.8
FY36	3,847,714	90.0	414,747	170,448	24.7	22.6
FY37	4,176,371	89.2	410,887	171,464	25.0	24.4
FY38	3,609,557	69.6	320,937	149,141	27.9	24.2
FY39	2,932,643	59.4	273,652	131,692	28.9	22.3
FY40	2,922,573	59.3	273,477	135,627	29.8	21.5
FY41	474,566	8.6	39,814	22,836	34.4	20.8
Total	50,128,019	**1,401.3**	6,457,592	**2,115,429**	19.6	23.7

While the travel velocity decreases, it is not sufficient to explain the increase in travel time. The distance to waste storage areas lengthens with time in addition to the road being mostly flat (fast travel, but longer time).

The total adjusted operating hours required by period determines the number of trucks throughout the LOM. The truck fleet will reach a maximum of 34 units in FY2032 and remains at this level until FY2037. There is no significant decrease in truck requirements at the end of the mine life due to the cycle times constantly increasing. This result outlines that haulage strategy and dump locations still have room for improvement.

Table 16-13: Adjusted haulage results

Year	Material hauled (Mt)	Cycles	Operating hours (h)	Tonnes per operating hour	Fuel consumption (L/h)
FY24	79.8	367,905	122,077	615	158
FY25	80.7	371,719	114,180	665	154
FY26	82.0	377,981	126,228	611	159
FY27	86.9	400,366	136,691	598	161
FY28	90.8	418,392	156,088	547	167
FY29	93.5	430,658	148,962	590	164
FY30	93.4	430,456	151,621	580	165
FY31	95.3	439,099	174,933	512	174
FY32	95.5	440,184	196,287	458	169
FY33	96.4	444,448	206,343	440	180
FY34	96.4	444,234	206,681	439	170
FY35	96.6	445,138	206,299	441	174
FY36	96.4	444,018	206,427	439	205
FY37	95.4	439,622	206,768	434	202
FY38	75.2	346,639	191,596	369	192
FY39	64.4	296,989	168,206	360	194
FY40	64.4	296,805	172,193	352	196
FY41	9.4	43,098	28,199	312	229
Total	**1,492.5**	**6,877,752**	**2,919,779**	**481**	**178**

Adjustments include:

- Overburden hauled by contractor with smaller articulated trucks;
- +5% of tonnes mined as non-production (and the corresponding truck hours);
- +5% of tonnes fed as rehandle (and the corresponding truck hours);
- Deswik.LHS raw hours converted to operating hours (coherent with site standards).

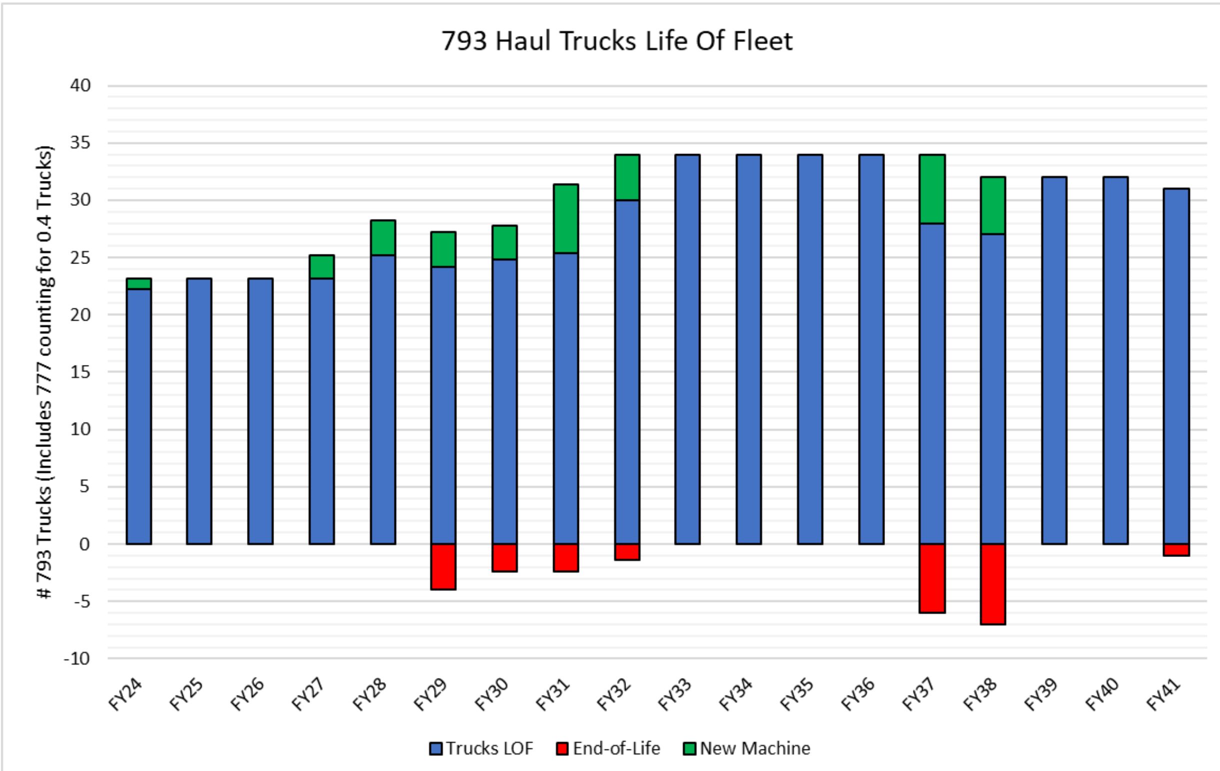


Figure 16-11: Truck requirements (top of bar is total active)

The equipment ramp-up associated with the Phase II plant startup is almost finished at the effective date of this Report. As can be seen in Figure 16-11, the number of trucks required will still require a significant ramp-up in 7 years. This ramp-up is delayed from its ~FY27 start date in the 2019 FS, mostly due to the addition of pit sub-stages.

16.3.7 Road and Dump Maintenance

Waste and ore storage areas are maintained by a fleet of four CAT D10 and one CAT D9 dozers. Also, two 814-hp wheel dozer are available on site. The wheel dozers are dedicated to the maintenance of the mine roads and the loading areas.

Mine roads are maintained by four 16 ft blade motor graders, eventually going up to six at maximum haulage capacity. A water/sand truck is used to spray roads to suppress dust, or spread road aggregate during winter months. Two small water trucks are also available (1 water truck and 1 sand truck through rental). They are used for areas inaccessible to the larger truck.

For snow removal activities in and around the open pit area, a 900-hp wheel loader and a fleet of three 100 t haul trucks are used. A 339-hp wheel loader with a high-volume bucket or a snow blade is used for tighter areas. All other snow removal on site is performed by a contractor.

16.3.8 Support Equipment

Depending on the field conditions, miscellaneous construction related work, such as water ditch construction, safety berms, access roads and general cleaning are done by 49 t, 70 t or 90 t excavators. The two 49 t excavators are primarily employed by the dewatering crew for pumps and pipes installation. One of them is also compatible with the rock hammer and manages oversized rocks when equipped. The 90 t excavator and the pair of 70 t excavators are primarily used for wall scaling, ditch construction and dewatering sumps digging. A larger 140 t excavator is used to clean up the contacts between ore and waste to minimize dilution and can be used instead of the 90 t excavator for increased efficiency as a secondary task.

For open pit service, there are two mechanic service trucks, three fuel trucks, one lube truck and two tow trucks, which are repurposed mining haul trucks.

Light towers are required to illuminate critical workplaces such as at the loading face, stockpile area, and waste dump points. In other locations, the pit electrical network is used for lighting.

Several other pieces of equipment support mining activities: three school buses for shift change, two cable reelers for cable moves and two 271 hp wheel loaders are used primarily for the stemming of blastholes.

16.3.9 Mine Maintenance

Mine equipment is done in-house and not through a Maintenance and Repair Contract (MARC). However, reliance on dealer and manufacturer support for major components is planned through component exchange programs.

Tire services such as tire pressure and wear monitoring, scheduled tire rotation, tire replacement and repairs are outsourced.

A Computerized Maintenance Management System (CMMS) is used to manage maintenance and repair operations. This system keeps up to date status, service history and maintenance needs of each machine.

16.3.10 Roster Schedules

While some of the workforce is sourced locally from neighbouring communities such as Fermont (QC), Labrador City (NL) or Wabush (NL), the rest of the workforce is hired on a fly-in fly-out basis. Apart from some administrative positions on a standard 8-hour shift 5 days on / 2 days off, the rest of the crews are working 12-hour shifts with a 14 on / 14 off rotating schedule. Four crews are required to operate on a continuous basis 24 hours per day 365 days per year.

16.3.11 Equipment Usage Model Assumptions

Equipment time usage is mostly based on operational data. The model attempts to follow the Global Mining Guidelines Group Model as closely as possible. Hours in this Report have been standardized to Operating Time (OT) to be comparable to the financial and operational key performance indicators (KPIs).

Any hourly equipment performance in this Technical Report is therefore on an operating time basis.

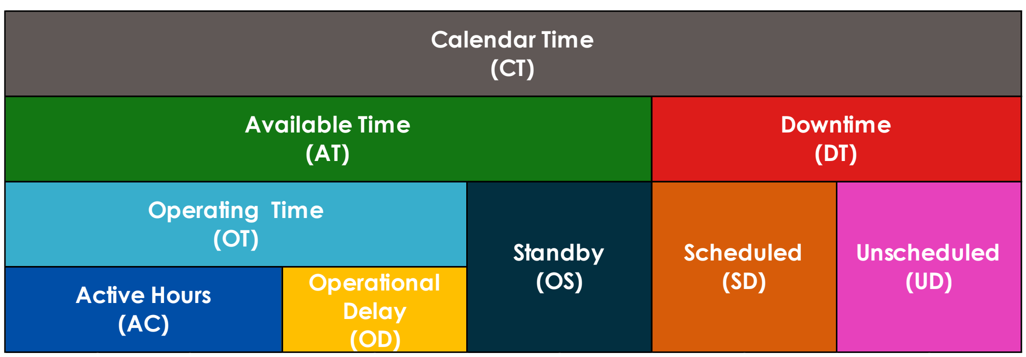


Figure 16-12: Equipment usage model

Table 16-14: Equipment usage assumptions

Equipment usage assumptions		Shovels	Loaders	Trucks	Drills	Dozers	Graders
Days in period	d	365	365	365	365	365	365
Mechanical availability	%	70	70	80	80	80	80
Operating utilization	%	80	80	85	90	90	85
Asset utilization	%	56	56	68	72	72	68
Yearly calendar time	h	8,760	8,760	8,760	8,760	8,760	8,760
Yearly downtime	h	2,628	2,628	1,752	1,752	1,752	1,752
Yearly standby time	h	1,226	1,226	1,051	971	971	1,051
Yearly operating time	h	4,906	4,906	5,957	6,307	6,307	5,957

Time standards used for the mine follow the Global Mining Guidelines (GMG) industry standard definitions as closely as possible and are described in Figure 16-1. All productivities mentioned in this chapter are based on an Operating Time basis.

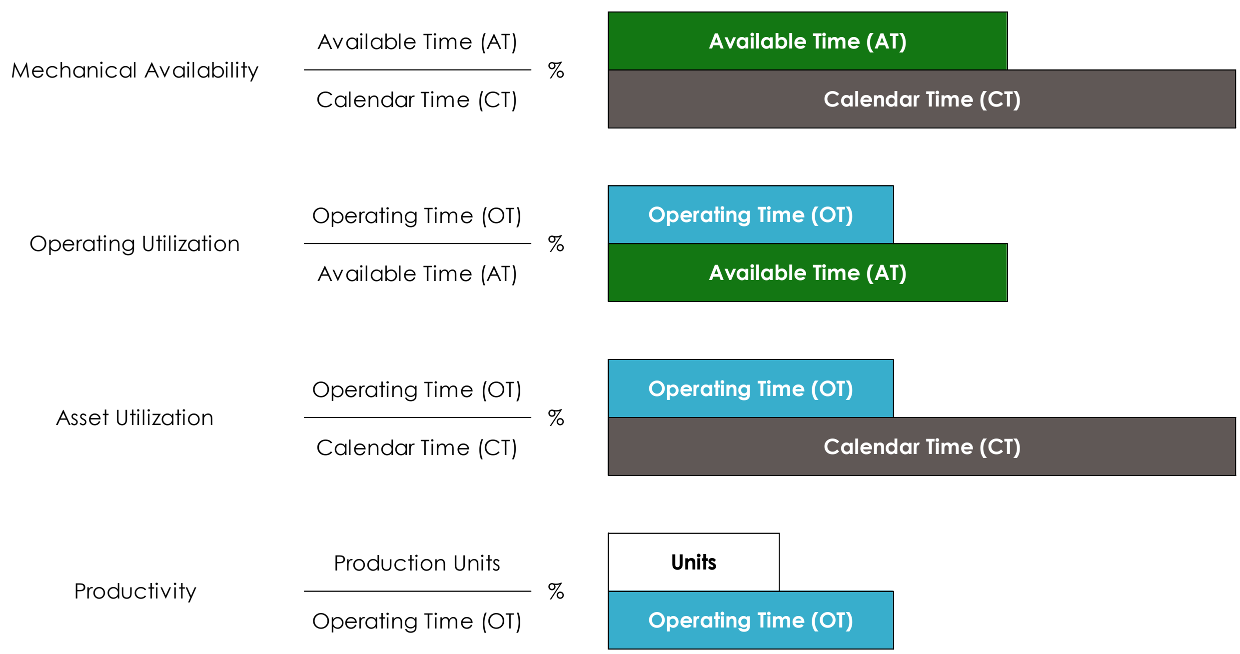


Figure 16-13: Time definitions

16.4 Mine Equipment Requirements

At the start date of this Technical Report, most of the required equipment will already be available in the mine. However, the addition of some equipment will be required for the first year. The required fleet was estimated with material movement requirements and haulage hours from the LOM plan. The equipment requirements are presented in Table 16-15.

Table 16-15: Mine equipment

Financial Year Ending in 20##	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Production Primary Fleet																		
Production Electric Shovel CAT 6060	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	1
Drill Rig CAT 6640	7	8	8	8	8	9	9	9	9	9	9	9	9	9	8	7	6	4
CAT 793F	22	22	22	24	27	26	27	31	34	34	34	34	34	34	32	32	32	31
Production Loader WA1200/WE1850	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	4	4	2
Support Primary Fleet																		
Grader (16M)	4	4	4	4	5	5	5	5	5	6	6	6	6	6	6	6	6	5
Wheel Dozer (854K)	2	2	2	2	2	2	2	3	3	3	3	3	3	4	4	3	3	3
Dozer (D9)	1	1	1															
Dozer (D10)	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	3
Auxiliary Fleet																		
Haul truck -777	3	3	3	3	3	3	2	1										
CAT6015B dilution excavator	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CAT 390F	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Excavator (med size)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Excavator (small size)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Wheel Loader CAT 992K	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wheel Loader CAT 988	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wheel Loader CAT 982	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Wheel Loader CAT 972	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Wheel Loader (WA600)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Reel loader WA500 + reel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Multi-Tool (IT62H)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Water Truck (T183) / Sand Spreader	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fuel/Lube Truck	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Service Truck	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Tow Truck (Cat 793/CAT785)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Various Other Trucks	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Pick-up Truck	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
"School" Bus	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Towerlight	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Genset RH340 and drill moves	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CAT D10 REMOTE (A-Frame)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CAT 390 REMOTE (A-Frame)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total																		
Primary Fleet	48	49	49	53	57	57	58	63	66	67	67	67	67	68	64	61	60	49
Auxiliary Fleet	187	187	187	187	187	187	186	185	184	184	184	184	184	184	184	184	184	184
Total mining equipment	**235**	**236**	**236**	**240**	**244**	**244**	**244**	**248**	**250**	**251**	**251**	**251**	**251**	**252**	**248**	**245**	**244**	**233**

16.5 Mine Personnel Requirements

Figure 16-14 presents the mine workforce requirements over the LOM. The total mine department workforce is estimated to 510 the first year of operation and should reach a peak of 594 individuals by FY2038.

The total mine staff is expected to be constant over the mine life with 112 people required.

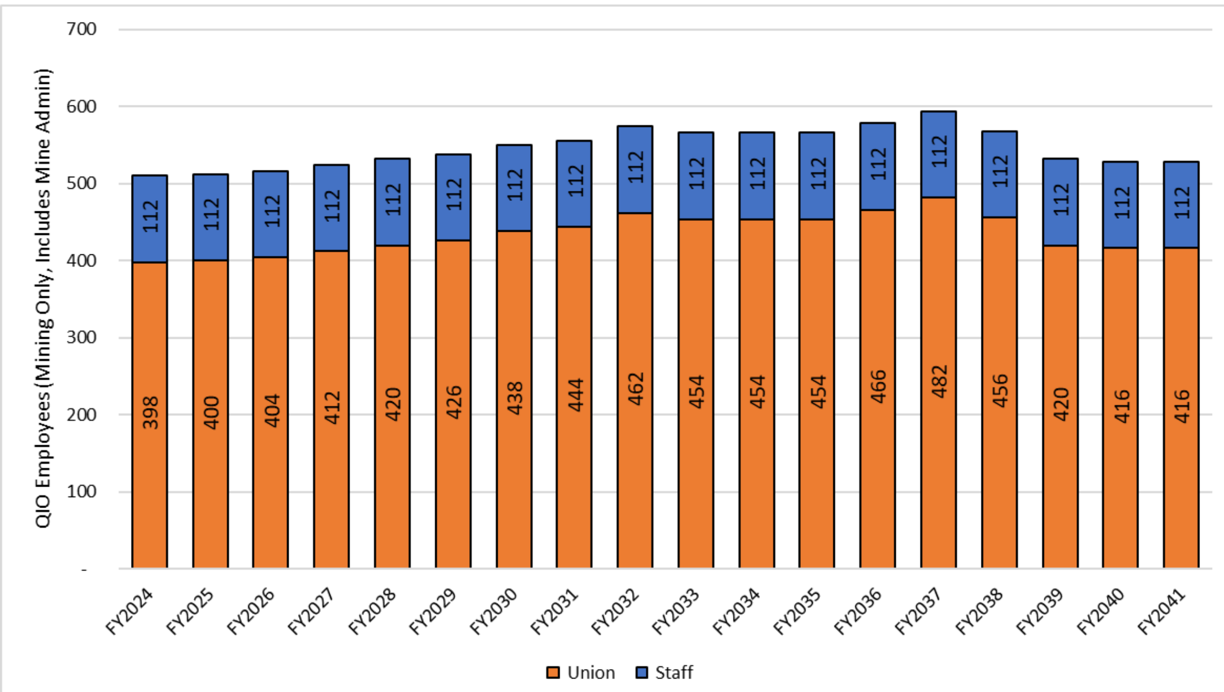


Figure 16-14: Mine workforce requirements

17. Recovery Methods

17.1 Introduction

Quebec Iron Ore (QIO) operates two concentrators at its Bloom Lake facilities. Phase I restarted in 2018 and Phase II, started in 2022. The combined design yearly production capacity is 15 Mtpy of concentrate from the ore mined from Pignac, West, and Chief's Peak pits.

The Phase I flowsheet developed for the start-up by QIO, was based on the initial Phase II (Cliffs) flowsheet, as well as testing and piloting results realized in partnership with Mineral Technologies. The Phase II flowsheet incorporated further improvements derived from experience with Phase I operation and testwork.

In the following sections, the design basis and criteria of the processing plants are presented together with the description of each of the processing sections.

17.2 Overall Process Design Basis and Design Criteria

Bloom Lake Phase I and Phase II were designed to process ore at a nominal rate of 2,500 tph and 2,650 tph respectively. With the new life of mine (LOM) design, the projected combined production is 14.78 Mtpy of concentrate at a 28.6% Fe feed grade and concentrate grade of 66.2% Fe with a Fe recovery of 82.0% and a weight recovery of 35.4%. The Phase I capacity is proven by production since 2018, and Phase II since 2022.

17.2.1 Process Design Criteria

Table 17-1 summarizes the general parameters on which the design of concentration plants has been based. Sizing of the selected equipment was based on these parameters as nominal values.

Table 17-1: Major design criteria

Parameter	Unit	Nominal Value Phase I and Phase II
Operating Schedule		
Annual Operating Time	day	365
Equipment Utilization - Concentrator	%	93.0
Annual Operating Time - Concentrator	h	8,147

Parameter	Unit	Nominal Value Phase I and Phase II
Mill Feed		
Mill Feed Annual Capacity	tpy	41,900,000
Mill Feed Rate - Average	tph	2,571
Mill Feed Rate - Design	tph	3,100
Mill Feed Iron Grade	%	28.59
Mill Feed MgO Grade	%	1.81
Mill Concentrate		
Mill Annual Concentrate Production - Nominal	wmtpy	15,252,854
Mill Annual Concentrate Production - Nominal	dmtpy	14,787,642
Mill Concentrate Iron Recovery	%	82.0
Mill Concentrate Iron Grade	%	66.2
Mill Concentrate Weight Recovery	%	35.4
Mill Concentrate Silica (SiO_2)	%	4.5

17.3 Process Flow Diagrams and Material Balance

The simplified process flow diagram (PFD) for Phase I is presented in Figure 17-1 and the simplified PFD for Phase II is presented in Figure 17-2.

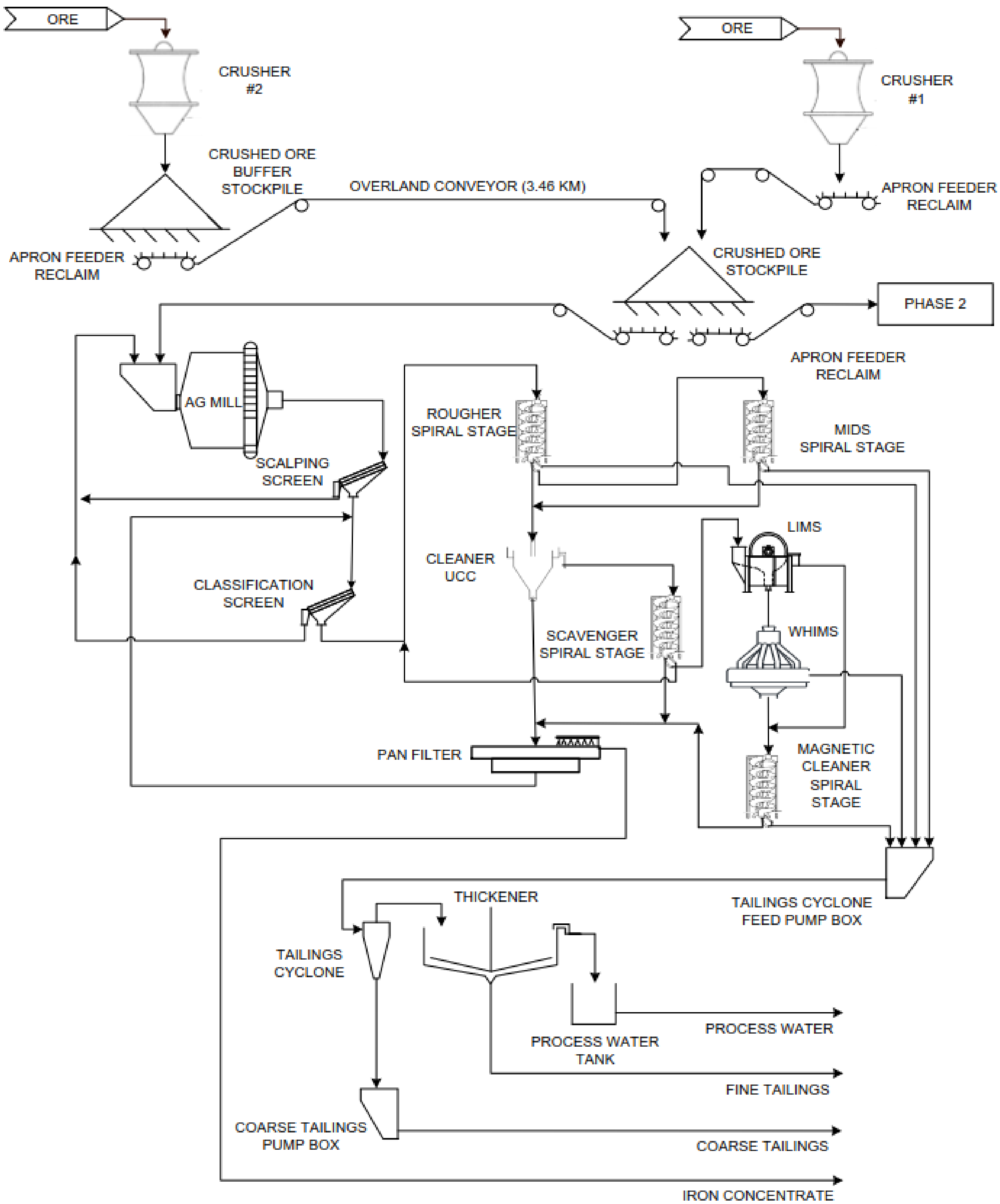


Figure 17-1: Simplified block flow diagram Phase I (QIO)

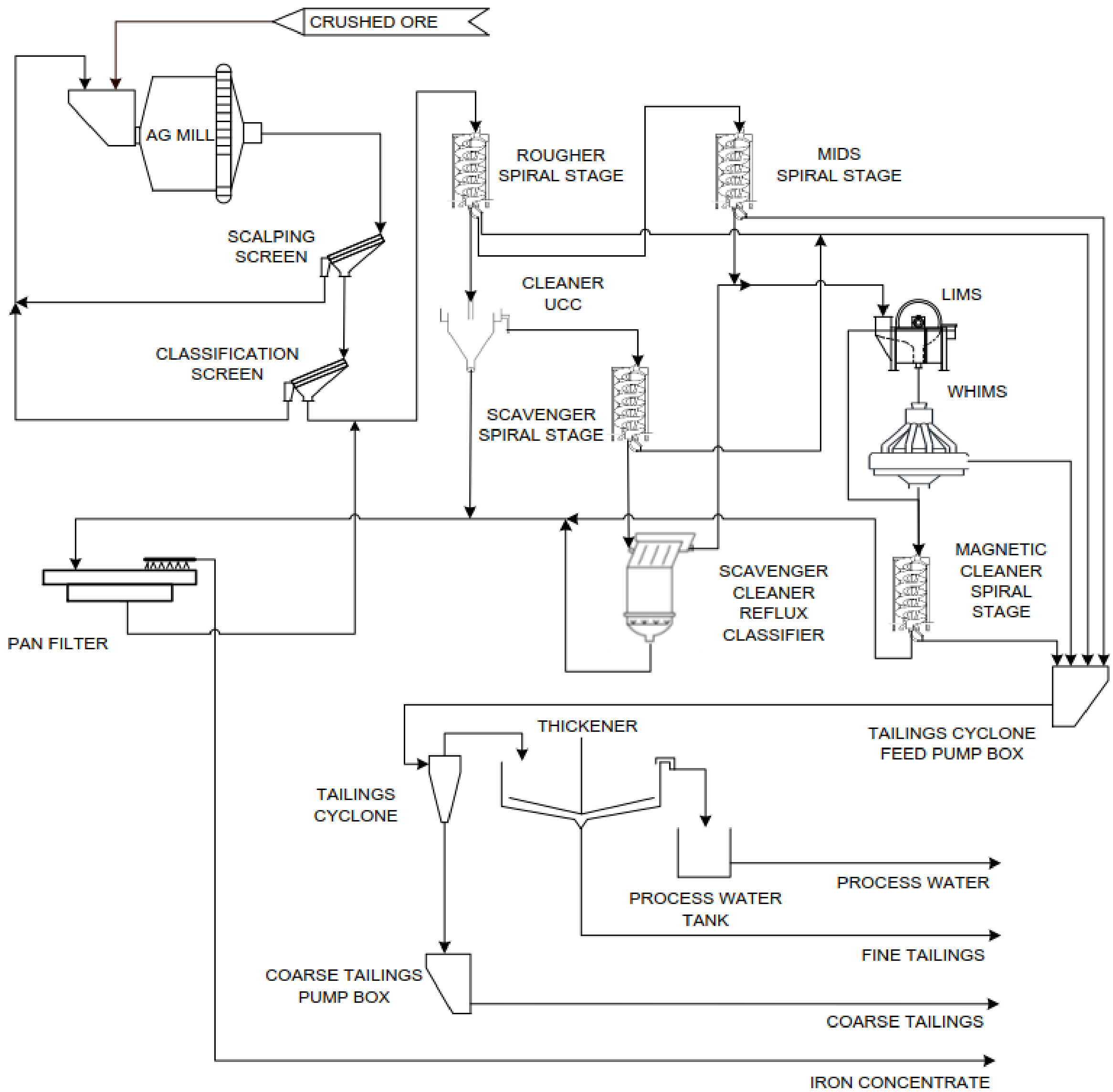


Figure 17-2: Simplified block flow diagram Phase II (QIO)

17.4 Crushing Circuit

A basic flowsheet of the crushing circuit is represented in Figure 17-3. The subsections below describe the crushing circuit flowsheet.

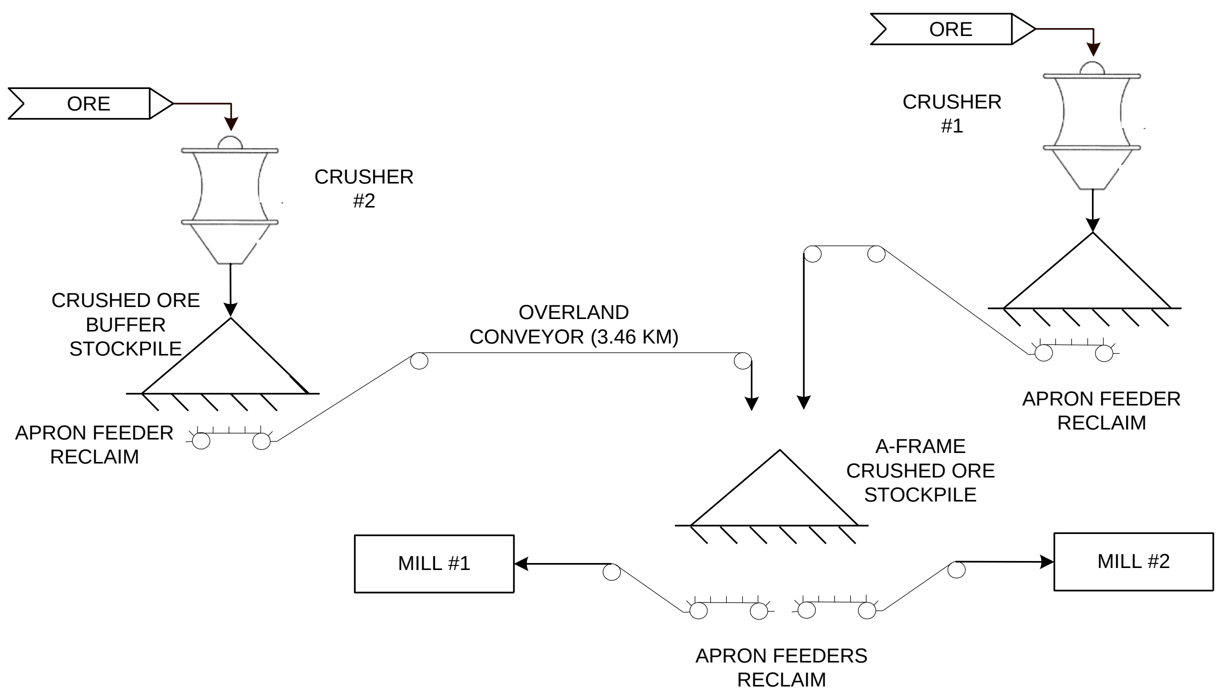


Figure 17-3: Simplified block flow diagram – Crushing circuit

17.4.1 Primary Crushers

Ore from the mine is delivered by 240-tonne trucks to Crusher 1 and Crusher 2, both equipped with two dump points. A hydraulic hammer (rock breaker) is installed adjacent to each crusher and is operated from the crusher operator's room.

Crushed ore from both crushers (<250 mm) falls on a surge conveyor that transports it to the crushed ore buffer stockpile, enclosed in a dome. Ore is withdrawn from the buffer stockpile by apron feeders to a sacrificial conveyor (Crusher 2) or onto crushed ore conveyors feeding either the Phase I or Phase II stockpiles (Crusher 1).

Ore from the sacrificial conveyor is then transferred on the overland conveyor which transports the crushed ore over a distance of 3.45 km before discharging onto the shuttle conveyor which discharges onto the crushed ore stockpiles.

17.4.2 A-Frame Crushed Ore Stockpile Building

There are five apron feeders installed to withdraw the crushed ore from the stockpiles to feed the concentrators, two feeding Phase I and three feeding Phase II. Each apron feeder is equipped with a dust collector to minimize dust emission. The mill feed tonnage is controlled by varying the apron feeder speed with a signal from the belt scale. Metal detectors are installed on the mill feed conveyors to stop the conveyor when metal pieces are detected in order to protect the conveyor and mill liners. The stockpile feeding system allows crushed ore from Crusher 1 and Crusher 2 to be placed over either of the phase apron feeders.

17.5 Grinding and Classification Circuit

Phase I and Phase II grinding circuits are very similar. Crushed ore from the stockpile is fed to an AG mill, one in each concentrator, by means of the mill feed conveyors. The mills are 10.97 m in diameter and 5.79 m long and are equipped with two 5,595 kW motors. Ground ore is discharged from the mill as a slurry to feed two scalping screens. The screens oversize (ore greater than 5 mm) is conveyed back to the mill and the undersize is pumped to the classification screens.

Phase I has eight 1.83 m wide by 3.05 m long static screens followed by four 4.27 m wide by 8.53 m long banana vibrating classification screens. Phase II has 20 static screens of 1.83 m wide by 3.05 m long followed by 20 horizontal vibrating classification screens of 2.13 m wide by 5.49 m long.

From the classification stage, the plants are divided into two production lines, named North and South. Classification screen oversize is conveyed back to the AG mill while static screens and classification screens undersize are collected and pumped to the gravity concentration circuit.

17.6 Separation Circuit

A basic flowsheet of the Phase I and Phase II separation circuits are represented in Figure 17-4 and Figure 17-5 respectively. The subsections below describe each processing step.

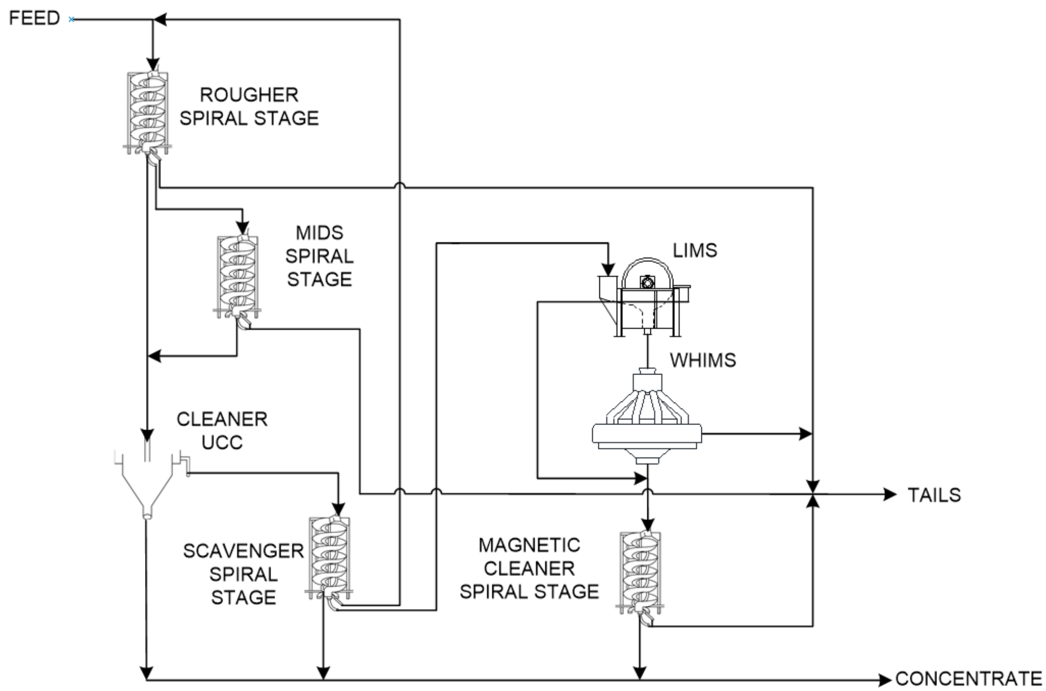


Figure 17-4: Simplified block flow diagram – Separation circuit – Phase I

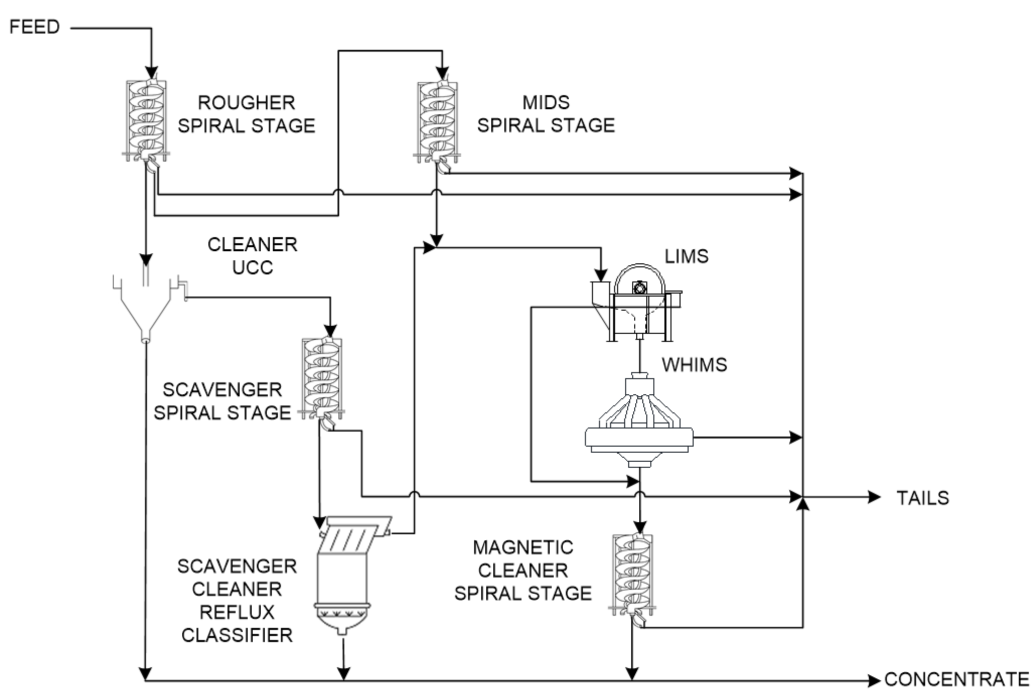


Figure 17-5: Simplified block flow diagram – Separation circuit – Phase II

17.6.1 Gravity Circuit

17.6.1.1 Rougher Stage

In each concentrator, the classification screen pumps feed four primary distributors that evenly distribute the feed to each of the 32 rougher spirals feed distributors. The rougher spirals feed distributors then redistribute the feed to each of the spiral starts of each rougher spirals bank. There are 40 spiral starts per bank in Phase I and 36 starts per bank in Phase II.

The rougher spiral concentrate feeds the cleaner up-current classifiers (UCCs). The middlings containing iron are fed to the mids spiral banks for further separation and the tails are partly fed to the rougher spirals dewatering cyclones, with the excess sent to the tailings thickening cyclone cluster pump boxes.

17.6.1.2 Mids Stage

The mids spiral banks are fed by the rougher spirals' middlings through the mids feed distributors. in both concentrators, there are 32 mids spiral banks installed, each having 12 starts. In Phase I, the mids spiral concentrate is sent the UCCs. In Phase II, the mids spiral concentrate feeds the magnetic circuit. Both middlings and tails are fed to the tailings cyclone cluster feed pump boxes for disposal.

17.6.1.3 Cleaner Stage

The cleaner UCCs receive the rougher spirals concentrate and, in Phase I, the mids spirals concentrate. Phase I has 32 UCCs, each fed by one rougher spirals bank and one mids spirals bank. Phase II has eight UCCs each receiving feed from four rougher banks. The cleaner UCC underflow is high-grade concentrate and is sent to the pan filters while overflow feeds the scavenger spirals.

17.6.1.4 Scavenger Stage

The UCC's overflow is sent to the scavenger spirals distributors to feed the individual scavenger spiral starts. In Phase I, there are 64 scavenger spiral banks, each having eight starts. In Phase II, there are 16 scavenger spiral banks, each having 36 starts. In Phase I, the tailings are recirculated to the classification screens pump boxes as dilution water. The middlings are fed to the magnetic separation circuit while the scavenger spiral concentrate is sent to the pan filters. In Phase II, the middlings and tailings are fed to the tailings cyclone cluster feed pump boxes for disposal while the scavenger spiral concentrate feeds the scavenger cleaner Reflux classifiers.

17.6.1.5 Scavenger Cleaner Stage

There is a scavenger cleaner stage in Phase II only. The concentrate coming from the scavenger spiral banks is pumped into four scavenger cleaner Reflux Classifiers. The underflow is high-grade concentrate and is sent to the pan filters. The overflow feeds the magnetic separation circuit.

17.6.1.6 Rougher Tails Dewatering Stage

The tails coming from the rougher stage is a high flow/low percent solids stream from which water can be recovered and reused in the process. In Phase I, 12 rougher banks individually gravity feed 12 cyclones. The cyclones' overflow is in turn gravity fed to the AG mill feed chute. In Phase II, the rougher tails are collected through a series of launders that gravity feed two rougher spiral tails dewatering cyclones clusters of seven cyclones each. The overflow is sent to the rougher spiral tails dewatering cyclone overflow pump box. The cyclone underflow is sent to the tailings cyclone cluster feed pump boxes for disposal. The recovered water is pumped to the mill feed chute and the scalping screen pump boxes for density control.

17.6.2 Magnetic Circuit

17.6.2.1 Low Intensity Magnetic Separators Stage

The low intensity magnetic separators (LIMS) stage is the first stage of the magnetic separation circuit. In Phase I, it is fed by the scavenger spirals middlings. In Phase II, It is fed by the mids spirals concentrate and the scavenger cleaner Reflux Classifiers overflow. There are two LIMS installed in each concentrator. The LIMS concentrate goes to the magnetic cleaner spiral banks and the LIMS tails are sent to the wet high intensity magnetic separators (WHIMS) for further separation.

17.6.2.2 Wet High Intensity Magnetic Separators Stage

There are six WHIMS installed in Phase I and four in Phase II. Non-magnetic tails report to the WHIMS tails discharge point of the machine and are directed to the tailings cyclone cluster feed pump boxes for disposal. The hematite reports to the concentrate discharge point of the machine and is directed to the magnetic (mag) cleaner spirals feed pump box from where it is pumped to the mags cleaner feed distributors.

17.6.2.3 Mags Cleaner Stage

The mags cleaner spirals banks are fed by the LIMS and WHIMS concentrates through the mags cleaner feed distributors. There are six mags cleaner spirals banks installed in Phase I, each having eight starts. There are two mags cleaner spirals banks installed in Phase II, each having 24 starts. The mags cleaner spiral concentrate is sent to the pan filters while the middlings and tails are fed to the tailings cyclone cluster feed pump boxes for disposal.

17.7 Concentrate Filtration Circuit

In Phase I, the concentrate from the cleaner UCCs, the scavenger spiral banks and the mags cleaner spiral banks is collected into the concentrate launders. From there, it goes onto four pan filters each fed by eight UCCs, 16 scavenger spiral banks and one or two mags cleaner spiral banks.

In Phase II, the concentrate from the cleaner UCCs, the scavenger cleaner Reflux Classifiers and the mags cleaner spiral banks is collected into the concentrate collector launders. From there, it goes into a four-way pan filter feed distributor that splits the feed into four horizontal pan filters.

In both concentrators, vacuum filtration is provided by five rotary-lobe type vacuum pumps (two in operation and three standbys) connected to a common header. Pressurized air is provided by two dedicated blowers (one in operation and one standby). Air goes counter flow to the slurry direction to unclog the pan filter cloths. Each filter is equipped with a steam hood for increased concentrate drying. Rotating screws discharge the concentrate from the filters onto the filter collector conveyor. In Phase I, the filtrate is pumped to the two scalping screen pump boxes and in Phase II, it is pumped to the two classification screen pump boxes.

Each concentrator has a belt cut sampler installed on the filter collector conveyor. It collects a primary concentrate sample, recovered on the secondary sampler conveyor where a secondary belt cut sampler collects a secondary smaller sample. Material not recovered by the secondary sampler is sent back to the concentrate collector conveyor.

17.8 Load-Out Circuit

A basic flowsheet of the load-out circuit is represented in Figure 17-6. The subsections below describe the load-out circuit flowsheet.

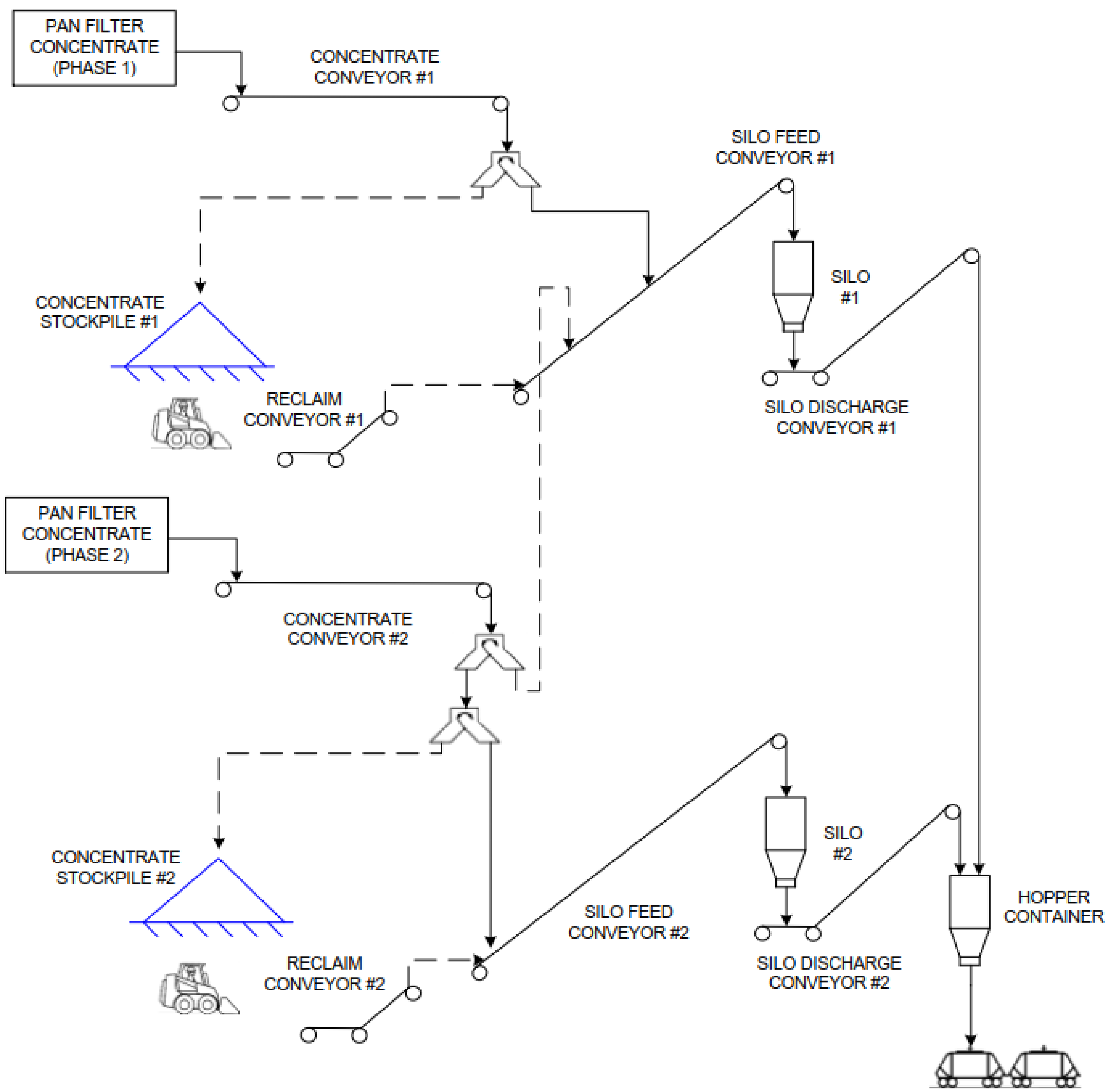


Figure 17-6: Simplified block flow diagram – Load-out circuit

The concentrate from each concentrator is transferred onto conveyors that lead to transfer towers. In the Phase I transfer tower, concentrate can be sent onto a conveyor feeding Silo 1 or onto a stacker conveyor that leads to the Phase I stockpile. In the Phase II transfer tower, the concentrate can be sent to conveyors leading to Silo 2, Silo 1 or the Phase II stockpile.

Material sent to the stockpiles can later be reclaimed by feeding it into the reclaim hoppers, which feed the conveyors that lead to the silos. The concentrate silos store the concentrate for later loading onto trains. Silo 1 has a capacity of 24,000 t and Silo 2 has a capacity of 30,000 t. When train loading begins, the four pan feeders located under each silo floor, reclaim the concentrate and transfer it onto the silo discharge conveyors that lead to the hopper and tilt chute for loading into railcars. Calcium chloride is added in the winter months to prevent the concentrate from sticking onto the railcar walls.

17.9 Tailings Circuit

17.9.1 Tailings Thickening Cyclones Stage

In both concentrators, the tailings cyclone cluster feed pump boxes receive the rougher spirals banks tails, the rougher tails dewatering cyclones' underflow, the mids spirals banks tails, the WHIMS tails, and the mags cleaner spirals banks tails. In Phase II, the scavenger spirals banks tails are also sent to the tailings cyclone cluster feed pump boxes. From there, the tailings thickening cyclone cluster feed pumps send the slurry to two tailings thickening cyclone clusters. Feed to the cyclone clusters is sampled by a primary pressure pipe sampler and a secondary cross-cut sampler. The tailings thickening cyclone clusters are each composed of six individual cyclones in Phase I and eight individual cyclones in Phase II, which produce a dense and coarse underflow reporting to the coarse tailings collection box and a fine and dilute overflow that reports to the tailings thickener.

17.9.2 Coarse Tailings Stage

In each concentrator, the tailings cyclone cluster underflow (coarse tailings) is gravity fed to a pump box. From here the tailings stream is pumped via a series of coarse tailings pumps to the booster station and, from there, to the coarse tailings storage facility.

17.9.3 Fine Tailings Stage

The tailings thickening cyclone cluster overflow is sent to the tailings thickener feed box where it is mixed with coagulant, then flows into the thickener feed well where it is mixed with flocculant. The rake mechanism drags the solids towards the centre where it discharges to a series of fine tailings pumps. From there, the material is pumped to the combined fine tailings tank, located in the booster station, where Phase I and Phase II fine tailings are mixed. In the booster station, the material is pumped through a series of fine tails pumps to the fine tailings storage facility.

The thickener overflow, consisting of water containing small quantities of very fine solids, is gravity fed into the process water tank to be reused throughout the concentrator.

The fine tailings from the thickener underflow and the coarse tailings from the cyclone underflow are disposed of separately in different settling basins.

17.10 Utilities

17.10.1 Compressed Air and Steam

Compressed air and steam required for Phase II equipment and services is supplied by the Phase I systems via a services pipe-rack connecting the two Phases.

17.10.2 Water Systems

The water distribution system maximizes water recovery and recirculation.

Rougher tails cyclone overflow and pan filters' filtrate is recirculated to the grinding circuit for density control.

The rest of the process water is recirculated from thickener overflow. The process water losses are compensated by reclaiming water from the tailings basin overflow. All the process water goes through the process water tank. In Phase I, the process water is distributed through a single circuit. In Phase II, the process water is distributed in the plant via two circuits: the low-pressure system that feeds the pump boxes and the mill, and a high-pressure system that feeds all the other equipment.

The gland seal water tank is fed by fresh water in Phase I and reclaim water in Phase II, through water filters. From the gland seal water tank, water is supplied to all the process pumps in the concentrators via three circuits: the low-pressure circuit servicing most of the pumps, the high-pressure circuit servicing the tailings second and third stage pumps and the booster circuit (Phase II only) servicing the process water pumps.

17.11 Operation Monitoring

Sampling for operation monitoring purposes is required to estimate the plant production and performance on an hourly basis and take actions on the process to reach the production and quality target.

The operation monitoring samples are mainly based on three automatic samplers located on the rougher spiral feed, final concentrate, and tailings cyclone feed.

These samplers produce a composite sample every two hours of operation, at which time they are analyzed and provide operators with concentrate quality and plant recovery to guide their actions on the process to ensure efficient production of concentrate respecting quality specifications.

Further investigation of the process performance can be achieved using the metallurgical sampling points.

18. Project Infrastructure

18.1 Mine Infrastructure

All mine infrastructure required for current mining operations are built and operational. Two items are to be constructed in the near-term to support future mining operations:

- Mine maintenance garage expansion (2023-2025);
- Additional 34.5-7.2 kV electrical substation (2025-2026).

18.2 Infrastructure Located on Site

Major infrastructure located on the Bloom Lake site are shown on Figure 18-1.

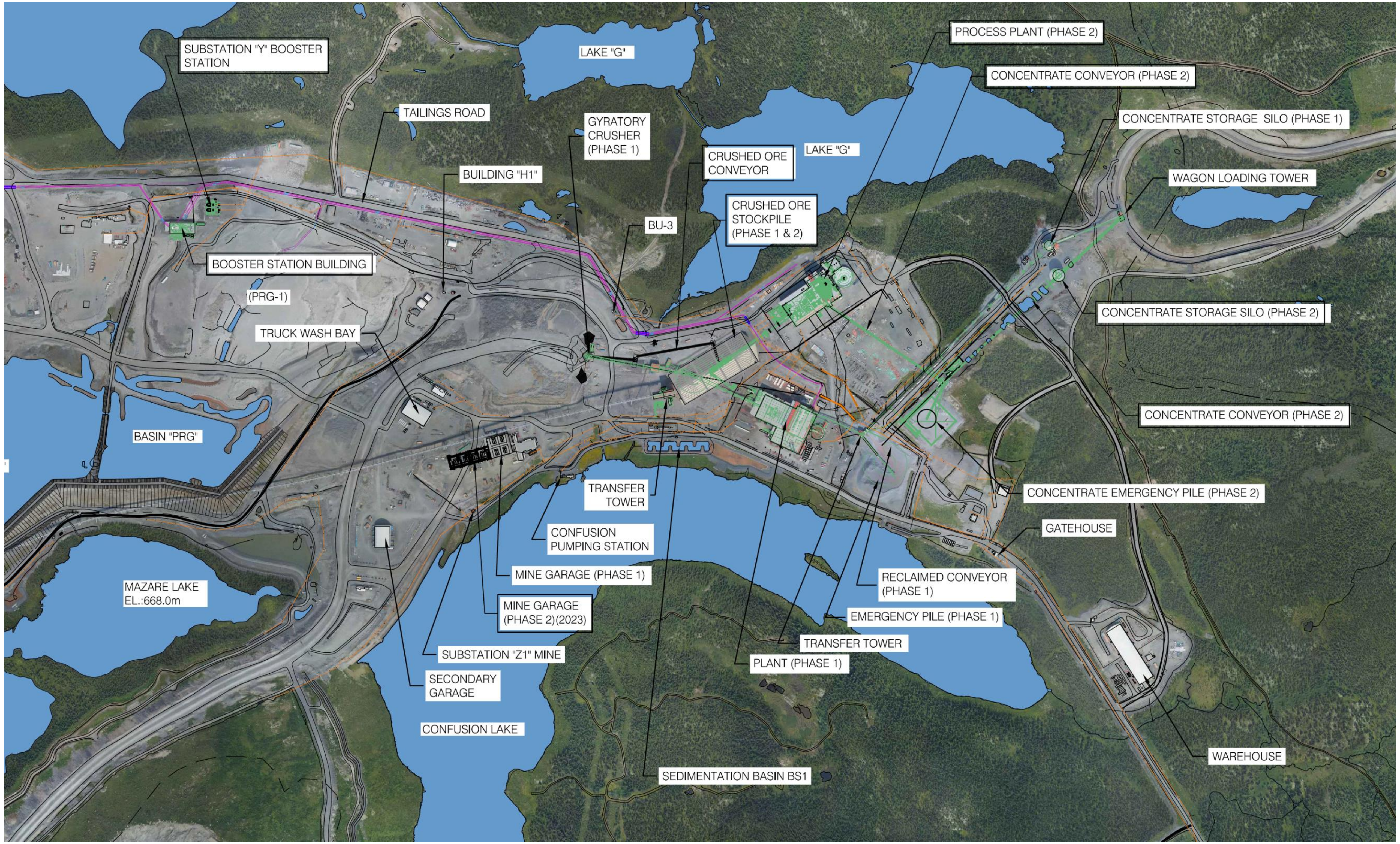


Figure 18-1: Major infrastructure on site

18.3 Operation Infrastructure

18.3.1 Train Loading Station

Concentrate produced in the Phase I plant is currently discharged to a series of conveyors and transported to a 24,000 t silo at the train load-out station. The train loading station fills one 240-railcar train (100 t capacity railcars). The Phase II expansion involved a second silo having a capacity of 30,000 t and linked to the existing load-out station. Phase II can feed both silos allowing greater operational flexibility, while Phase I can only feed silo 1.

A dedicated calcium chloride system is in place to store and dose the addition of a freeze protection solution on the bottom and top layer of each railcar.

18.3.2 Rail Infrastructure

The rail network consists of three separate segments to transport iron ore concentrate from the mine site to the port.

1. First segment of rail referred to as the Bloom Lake Railway (BLR) consists of a 32 km long segment that connects the mine site to the Quebec North Shore and Labrador (QNS&L) railway at the Wabush Mines facilities in Wabush, Labrador.
2. Second segment uses the QNS&L railway from Wabush to Arnaud junction in Sept-Îles, which has a mainline track of approximately 395 km.
3. Third segment is 36 km from Arnaud junction to Pointe-Noire (Sept-Îles), which is the property of SFP Pointe-Noire (SFPPN).

The current fleet is composed of 1,285 insulated ore cars dedicated to move Bloom Lake's concentrate, which includes a 5% spare fleet allowance. As of the effective date of this report, three locomotives are due to arrive in June 2023, which will complete the fleet and increase the hauling capacity of the network.

Besides maintenance, no changes to the rail infrastructure are planned. All railroad infrastructure construction detailed in the previous technical report is either complete or not required anymore.

18.3.3 Port Infrastructure

The concentrate is unloaded from railcars at Pointe Noire, which is owned by SFPPN and controlled by the Government of Québec, and can be either loaded directly onto a vessel or stockpiled to be reclaimed and loaded at a later time. The former Cliffs / Bloom Lake concentrate stockpiling and shipping system is comprised of a rotary car dumper, dump hopper, stockpiling and reclaiming conveyors, a stacker-reclaimer, and ship loaders. Storage capacity is currently 600,000 t of concentrate in the Bloom stockpile yard and 1,000,000 t of concentrate in the Wabush west section stockpile yard. As part of the expansion project, the infrastructure has been upgraded to accommodate an average yearly throughput of 16 million wmt of concentrate. To allow efficient and reliable operations, modifications have been performed to increase the stockpiling capacity, reduce the railcars unloading cycle and increase the stacking and reclaiming performance.

The current Bloom Lake concentrate production is loaded onto vessels using the Port of Sept-Îles' new multiuser terminal linked to the SFPPN terminal. The dock has a capacity of 50 Mtpy via two 10,000 tph travelling ship loaders. Dock 35 is mostly used by QIO to load capesize vessels and will remain the infrastructure commonly used for Phase II production. Smaller vessels can be loaded using Dock 36 while Dock 35 can accommodate bigger than capesize vessels, if required, granting flexibility to adapt to customer's needs. The current agreement between Champion Iron and the Port of Sept-Îles allows QIO to load 16 million wmtpy of concentrate using the current port infrastructure, including the new infrastructure for Phase II listed below.

The SFPPN new infrastructure to support Phase II operations is shown in the diagram in Figure 18-2. The summary of the SFPPN infrastructure modifications is as follows:

- Modification to Transfer Tower TT-02;
- Conveyor CV-4 mobile drive and chute;
- New Conveyor CV-5A capacity 5,000 tph to connect the Bloom Yard to Wabush Yard;
- New Transfer Tower TT-07;
- New bidirectional Conveyor CV-29B capacity 8,000 tph;
- New Stacker/Reclaimer 8,000 tph nominal capacity for each mode.

The existing exit from the rail dumper was renovated to extend the rail and conveying systems (CV-2 and CV-3) to allow the unloading, handling and storage of two train loads of 240 wagons per day.

The modifications will allow a minimal storage capacity of 1.5 Mt of concentrate (10% of the average yearly production) by combining Bloom Yard and Wabush Yard's storage capacity required for Phase II.

The new design will allow for ship loading activities to be performed at the same time as fresh concentrate from trains being stacked. This operational flexibility is achieved through the installation of a second stacker-reclaimer at the shipyard.

Figure 18-2: Shipyard

18.3.4 Electrical Substation and Site Power Distribution

Electrical power for Bloom Lake operation is supplied by Hydro-Québec from a T-tap off the 315 kV transmission line L3039 (Montagnais-Normand), which terminates in an existing 315-34.5 kV substation (Substation W) owned by QIO and feeding the existing concentrator plant and mine site. Two 34.5 kV distribution overhead lines also come from the HQ Normand substation to provide backup power supply to the QIO distribution system, in case of emergency.

Substation W is located along Provincial Route 389 and includes two 315-34.5 kV, 48/64/80 MVA oil-filled, power transformers. The power transformers are fed through outdoor-type 315 kV air-insulated disconnect switches and SF6-insulated live-front circuit breakers connected with overhead conductors and busbars in a single-bus configuration. The commercial power metering is done downstream from the incoming 315 kV breaker. A 34.5 kV gas-insulated switchgear (GIS) is used to feed the various 34.5 kV distribution lines.

From Substation W, two double-circuit 34.5 kV distribution lines run along Provincial Route 389 and main site access road to the concentrators. They are approximately 10 km long. An additional overhead 34.5 kV distribution line, approximately 5 km long, also derive from Substation W to feed the electrical installations in the mine area directly and independently from the plant area.

The 34.5 kV mine distribution network supplies three (and eventually a fourth) 34.5-7.2 kV, 7.5 MVA fixed mine substations strategically located on the perimeter of the mine pit to supply 7.2 kV power to the mining and pumping equipment in operation. The 7.2 kV network (pit lines and trailing cables) are designed in compliance with the Canadian Electrical Mining Code CSA M421-16.

The peak power demand of the entire installations should not exceed 90 MW, with an average power demand of approximately 70 MW, excluding the 22 MW electrical boiler that is used on non-firm power.

18.3.5 Non-Process Buildings

The existing 2,485 m^2 (35 m x 71 m) service building attached to the Phase I concentrator building provides the following services:

- Maintenance shops;
- Unloading and warehousing completely stocked with parts and supplies;
- Electrical/instrument repair shop;
- Boiler plant to provide steam to both plants for heating and filter cake drying. The boiler plant also hosts the boiler water treatment system;
- Offices for administration, purchasing, human resources, technical services (engineering and geology), training and plant operating personnel;
- Laboratory equipped for metallurgical testwork, wet and dry assaying;
- Lunchroom, men and women change rooms, sanitary and locker facilities;
- Communications room;
- Compressor room to provide service air and instrument air to both concentrators;
- Fresh water storage tank and water treatment facilities;
- Electrical room;
- Various utility domes used as warehouses or shops for contractors.

18.3.6 Shop and Warehouse

The service building warehouse floor area covers an area of 630 m^2 (21 m by 30 m) and is 9.5 m high. Trucks to be unloaded descend a ramp to bring the truck bed level with the loading dock and floor inside the warehouse. Another warehouse is located at the entrance of the mine site. The dome type building covers an area of 5,600 m^2. Half the building is insulated and heated. A fenced outdoor warehouse yard surrounds the dome building and has an area of 20,000 m^2 that is used to store bulk and large materials.

18.3.7 Utilities Area

The 820 m^2 utilities area includes the boiler room, freshwater storage tank and water treatment, blower and compressor rooms and the emergency MCC room. An emergency generator, feeding both plants, is located outside the service building.

Two 50 MBtu/h light fuel oil #2 water tube boilers, and one 22 MW electrode boiler supply high pressure steam to the concentrate filters and to the hot water heat exchangers for building heating.

Phase II plant services such as steam, compressed air and domestic water are delivered from the Phase I plant through a utility pipe rack. In each plant, two 14 MBtu/h glycol boilers are used to provide heating energy using light fuel oil #2.

18.3.8 Emergency & First Aid

The first-aid station is located next to the Phase I plant in the service building. The emergency vehicle station adjacent to the service building hosts an ambulance. One fire truck is located inside a dedicated dome in a central location relative to the firefighter's location across the site.

18.3.9 Offices, Change Rooms and Lunchroom

An office space of 1,379 m^2 for administration, human resources, accounting, purchasing, engineering, plant operating and maintenance personnel has been provided on the second floor of the service building. Washrooms and a fully equipped first aid room are also located on this floor.

Offices along the outer walls have windows. There is direct access from the offices to the concentrator operating floor. Men's change rooms, showers and toilets are located on the ground floor while women's change rooms, showers and toilets are on the first floor. A lunchroom is located on the first floor.

A dry house, lunch room and additional offices are located next to the second concentrator in order to minimize transportation time.

18.3.10 Laboratory

Phase I and Phase II laboratories are equipped for splitting, drying, crushing, grinding, screening and filtering of samples from both the mine and the concentrator. A dust collection system is installed in both preparation area.

The main laboratory is located on the ground floor of the Phase I concentrator and is equipped for sample preparation and analysis by wet methods, X-ray fluorescence (XRF), Satmagan determination, carbon and sulfur, LOI and specific gravity. Fume hoods are installed in the wet assay room, and a storage room with shelving is provided for samples and supplies.

Phase II sample preparation laboratory is in the Phase II concentrator building. Samples prepared in Phase II are transported to the main laboratory for analysis.

18.3.11 Heating, Ventilation and Air Conditioning

Systems are designed for outdoor temperatures of -40°C in winter and 17°C in summer, and inside temperatures of 19-21°C. Fresh air changes vary from one in the offices to ten in change rooms.

The shops, warehouse and concentrator are heated with hot water from the boiler plant by a central system for each sector, which includes a supply fan, return exhaust fan, heating coil, filter and air to air energy recovery system.

The office, laboratory and lunchroom are air conditioned by a variable volume central unit with a 700 kW steam heating coil and a 40-ton roof-mounted cooling unit. Heating of cold perimeter areas is supplemented by using electrical baseboard heaters.

A steam heater is installed near each garage door in the service building and concentrator to compensate for the heat loss through air infiltration in winter.

In the second plant, heating is provided by glycol heaters and some electric unit heaters. Ventilation is supplied by central and local systems, which includes supply fan, return exhaust fan, glycol heating coil and filter.

18.3.12 Water Distribution and Drainage Network

Hot and cold water is distributed to all sanitary facilities in the concentrator buildings.

Emergency showers and eye-washes are installed in the laboratory and at the chemical preparation area in the concentrators.

Water used for the wash bay operations is recirculated through settling basins with oil skimmers and reused until it allows for good washing operations. Oil and grease are recovered and disposed of off-site on a regular basis by an authorized contractor as it is the case for the non-recyclable oily waters.

Drainage from shop repair bays is collected in a gutter and pumped on a regular basis to be disposed of off-site by an authorized contractor.

18.3.13 Access and Site Roads

The sole access road to the Bloom Lake deposit is from Highway 389. A security station and a barrier gate are located at the end of the 5 km access road leading to the mine site. Other roads have been constructed from the concentrator to the mine, the crusher, along the route of the tailings line and to the freshwater collection point at Bloom Lake.

18.3.14 Fresh Water Supply

Fresh water is required for make-up to the boilers and for domestic consumption. Fresh water is supplied to the fresh water tank at the concentrator by gravity flow from Bloom Lake through a 1.5 km long, 152 mm diameter high-density polyethylene (HDPE) pipe.

18.3.15 Reclaim Water Supply

Reclaim water is pumped from the decanted water into basin RC-2. There are three 700 hp pumps mounted on separate barges. Each pump is capable to meet the demand of one concentrator; therefore, two pumps are used to provide water to both plants and one pump is on stand-by.

The pipelines are constructed of 610 mm diameter HDPE pipes (approximately 4.5 km long) and are buried. Each reclaim water pipeline terminates at a process water reservoir outside each concentrator.

Reclaim water is also supplied to the booster pumphouse 1 (BPH1) for gland seal and tailings lines flush water. Both pipelines from the barges can supply the pumphouse to provide the required water if rapid flush is needed.

18.3.16 Fire Protection

The fire protection system includes fire water pumps, a fire water distribution network, fire water hose stations and water sprinkler systems.

A water sprinkler system is installed over covered conveyor belts and over the lubrication and hydraulic systems in the process areas.

Fire water pumps are in a pumphouse and source water from the Confusion Lake. There are three pumps, two main pumps and one jockey pump to maintain the pressure in the fire water pipe network. One of the main pumps is driven by an electric motor and the other by a diesel engine, complete with controls for automatic starting.

Alarm signals are automatically transmitted to the security station in the service building.

18.3.17 Fuel Storage

Number 2 light fuel oil, heating oil and gasoline are delivered to the site by road tanker and then delivered to one of the 21 storage tanks (from 22,700 L to 50,000 L).

A 22,700 L gasoline storage tank and a fuel station for pick-up trucks and other vehicles are in the storage tank area of concentrator 1.

Fuel for heating is stored in 50,000 L tanks installed beside buildings.

18.3.18 Effluent Water Treatment

A water treatment plant (WTP) is in place and is designed to comply with all regulatory and permitting standards. The treatment plant can treat effluent water from various sources and handle contact water coming from any basins present on the site as well as any type of runoff waters collected and pumped into tailings facility basins. All recirculated water not required for the concentrator process can be discharged to the environment by the WTP at a capacity of 75,000 m^3/day, which is more than adequate to accommodate the needs on a yearly basis. A WTP upgrade is planned to manage extra water from the planned expansion of the tailings deposition area and the south dump.

18.4 Tailings and Surface Water Management

This infrastructure is currently in detailed engineering, some descriptions and figures may change.

18.4.1 Surface Water Management

18.4.1.1 General Concept

The site's surface water management infrastructure is used to collect the process and run-off waters generated throughout the site, to prevent any unauthorized discharges to the environment and ensure sufficient water supply to the mill. This water is contained in a system of retention basins that is eventually transferred to basins RC1 and RC2. The water is then either recirculated to the mineral processing plants or discharged into the environment after being treated in the water treatment plant. Figure 18-3 and Figure 18-4 present the global water management system with the final deposition areas as planned in operation.

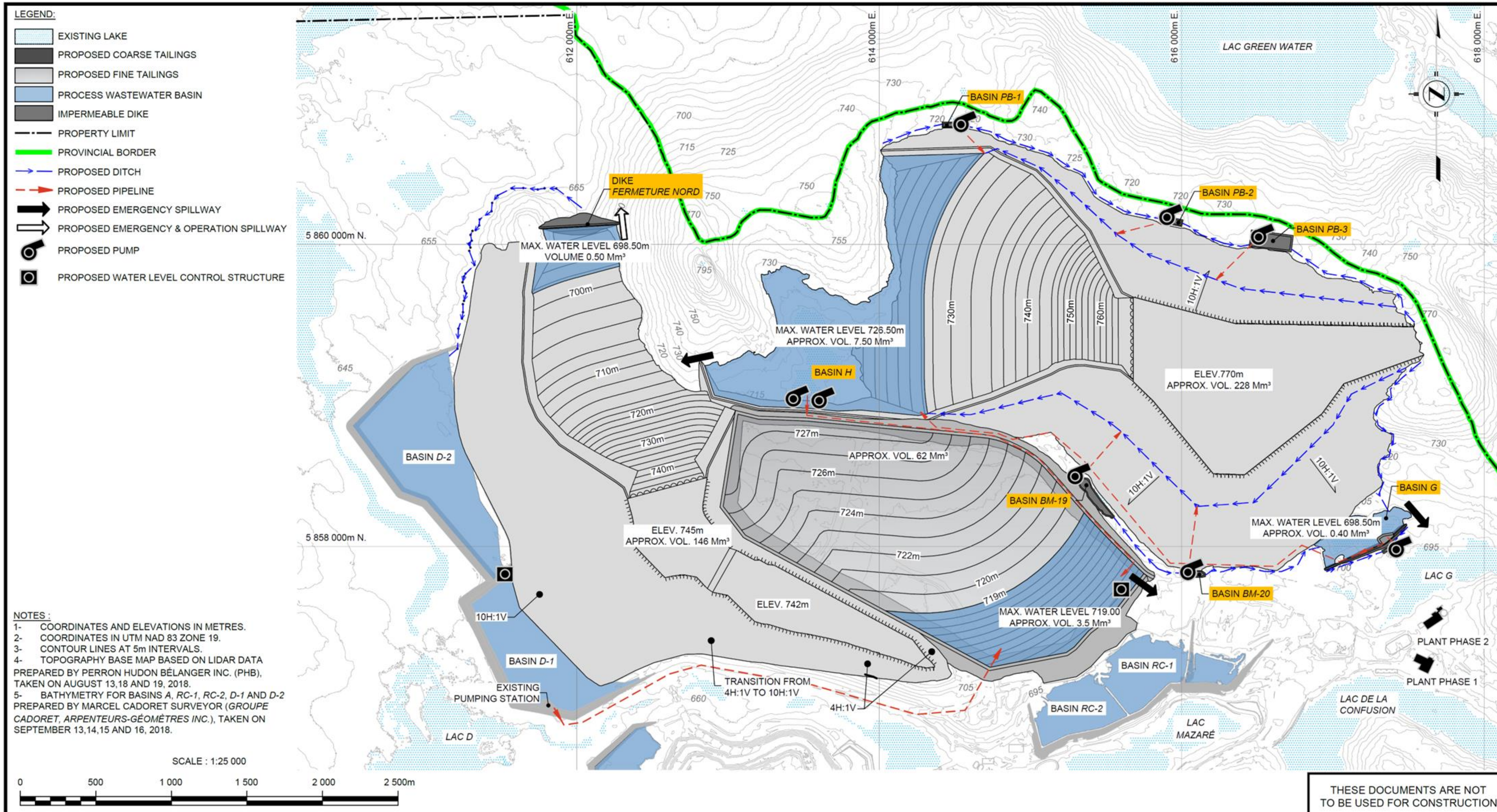


Figure 18-3: Water management infrastructure – Tailings storage facilities

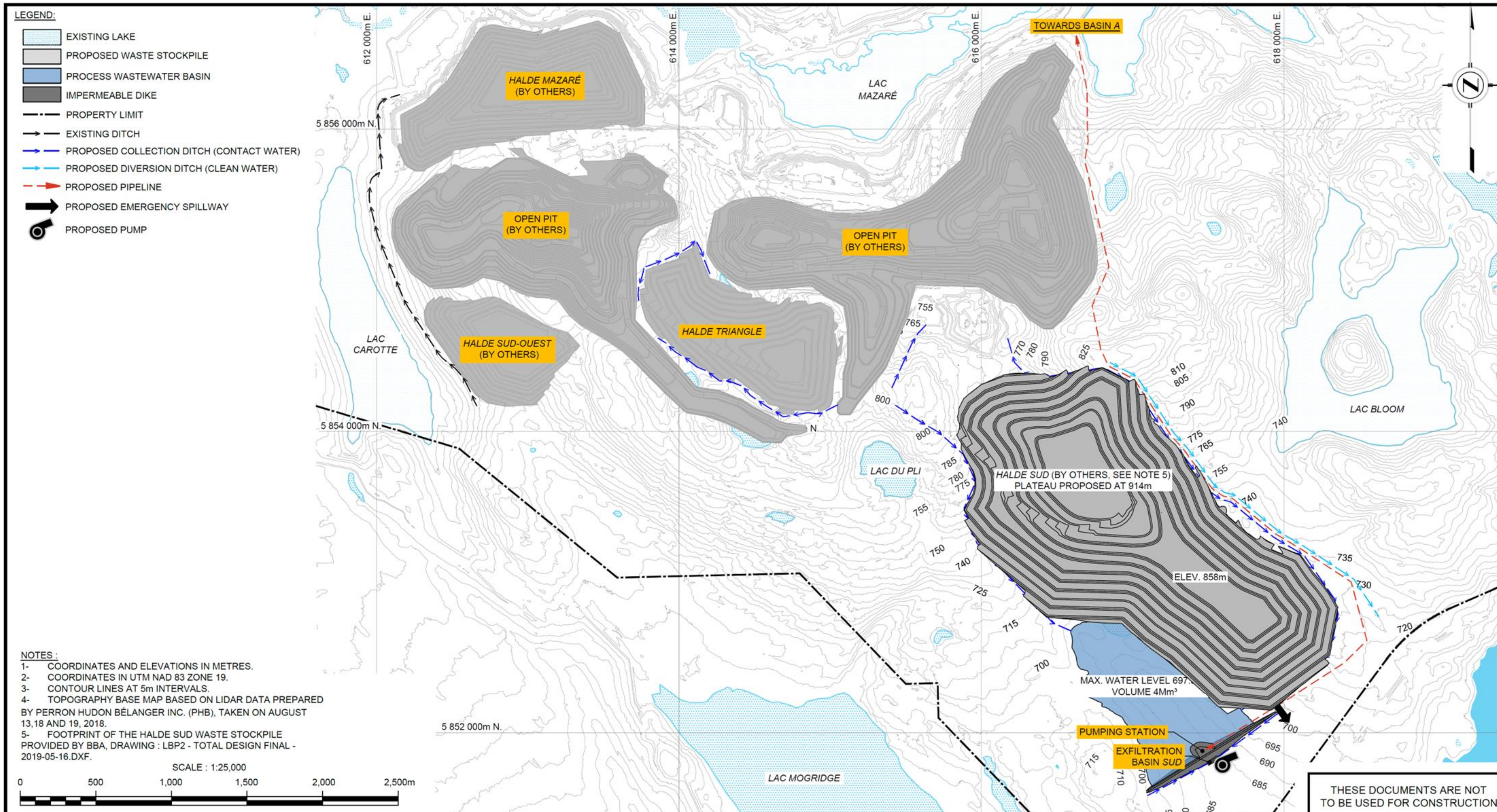


Figure 18-4: Water management infrastructure – Waste rock and overburden facilities

18.4.1.2 Design Criteria

The design criteria for surface water management comply with the various laws and regulations in Canada.

The Bloom Lake iron ore tailings are non-acid generating. As specified *in Directive 019 sur l'industrie minière* (MELCCFP [formerly MELCC], 2012), all water management structures associated with non-acid generating tailings and mining waste storage facilities must be designed to manage the project's flood event. Two types of water management structures are defined in Directive 019: water-retaining structures (dams or dikes with associated reservoirs) and structures without retention (ditches and small pumping basins). Each type is designed according to a specific project flood.

18.4.1.3 Existing Water Management Infrastructure

Ditches and Pumping Stations

The existing surface water management system that collects and conveys the contact and process water is currently operational and is considered appropriately designed for current and future conditions. Some minor upgrades will be implemented to improve the reliability and robustness of the system.

Water Treatment Plant

As the site's footprint increases with the expansion, the amount of contact water generated is expected to increase. This necessitates a progressive increase in the site's treatment capability. The existing water treatment plant (WTP) is currently able to treat at a rate of 75,000 m^3/day when the temperature is above 0°C. In order to manage the extra amount of water coming from the commissioning of the *Halde Sud* waste stockpile, the WTP will first be winterized to be able to treat year-round at the same rate. Once the Hydraulic Placement Area (*HPA)-Nord* tailings storage facility (TSF) is commissioned, the treatment rate will need to be increased to approximately 150,000 m^3/day. The existing building, which shelters the treatment plant, was built large enough to accommodate these upgrades.

HPA-Ouest and *Sud* TSFs

As the current *HPA-Ouest* and *Sud* TSFs will expand during operations, the water management system in this area will also need to be expanded. The construction of an operation ditch will be necessary to redirect the reclaim water from the west of *HPA-Ouest* towards the existing basin D2. By 2023, to contain the water at the limit of the TSF, the dike *Fermeture Nord* will be constructed. The foundation of the dike's core will be built on injected and treated bedrock. Due to the increases in water and coarse tailings levels, the dike will be raised in two phases with a centreline method.

A spillway, designed for both operational and emergency purposes, will be constructed at each phase to allow for controlled gravitational discharges, while protecting the dike from overtopping during extreme weather events. The spillway will lead to the existing ditch, which drains into basin D2. Basin D2 drains towards basin D1 via a control structure. Basin D1 is pumped to basin A, as is the current protocol.

Basin A

The existing water management system within basin A is both adequately designed and operational. Due to the deposition of fine tailings, existing dike A and its water transfer structure will require raises to increase the maximum water level and thus maintain a design flood storage capacity. The volume of fine tailings that will be produced with the expansion, however, will require a final crest elevation of dike A higher than originally designed. The initial design consisted of a centreline raise of the till core up to a final elevation of 715 m to 718 m with a width crest of 21 m. To meet this design, the dike will be raised using a centreline raise up to the maximum crest elevation as originally designed. To eventually exceed this limit, a subsequent downstream raise method with an inclined till core will be used until the final planned crest elevation of 722 m. This will ensure that the final crest width of 21 m is maintained. However, this is subject to change as QIO will always strive to find solutions to keep the height of basin A as low as possible.

18.4.1.4 Mine Sector Water Management

The current mine sector surface water management system collects dewatering water from the pit and surface water run-off from waste dumps and other surface infrastructure.

The system conveys water, through pumping stations and ditches, to basins C, D, Pignac, and Triangle who then transfer the water by pumping to basin A. No upgrade to the existing surface system is required as the full watershed of the mine sector is currently considered in the water management system. Variations of in pit groundwater infiltration and surface run-off reporting to the pit in time based on the pit evolution will be handled by the pit dewatering strategy so not to exceed the current conveying capacity of the mine side pumping stations.

18.4.1.5 New Water Management Infrastructure

HPA-*Nord* TSF

To contain the contact and process water generated on the new *HPA-Nord* TSF, a system of water management infrastructure will be built along the perimeter of the TSF. Ditches and pumping stations will be built in stages with the expanding footprint. Similarly, the storage and pumping capacity of the surface water management basins (basin H and basin G) will be increased in phases.

The impermeable dike G will be constructed with the commissioning of the *HPA-Nord* TSF to block the current eastward water flow direction of the watershed. The foundation of the dike's core will be set on the bedrock or on a layer of impervious till. During operations, basin G will collect run-off and exfiltration from the starting dike of *HPA-Nord*.

The permeable dike H will be constructed to contain the water from the western side of the TSF. This dike will allow managing the spring flood and the process water volumes while the TSF progresses to the west. Dike H will be built using trucked and compacted materials. However, its permeable design will require upstream and downstream coarse tailings beach deposited at different times.

The water management system of the *HPA-Nord* is considered isolated and independent from the existing system. This implies that all run-off and reclaim water generated within the limits of the TSF during the design flood event will be directed to and contained entirely within basin H. This process ensures that the existing infrastructure will not be affected by the newly developed facility during peak water periods, except for the water treatment plant, which will have to be doubled to reach 150 000 m^3/day at the opening of the TSF.

Following the spring melt event, water volumes collected in basin H can be gradually discharged towards existing basin A via a dual barge pumping system. Considering that basin H also serves as a sedimentation pond for the TSF, the pumping station is designed to operate year-round. The intakes of both barge systems will require specific positioning throughout the life of the TSF, as such they will be relocated as needed (generally towards the west). They will be anchored to the shore and a walkway will be used for access and maintenance.

The emergency spillway of basin H will be excavated in the bedrock on the west end of the TSF and constructed in two phases following the raising of the water level within the basin. The emergency spillway is planned to discharge its water through a conveyance ditch into dike *Fermeture Nord*'s operation and emergency spillway.

Waste Stockpile *Halde Sud*

The new waste stockpile, *Halde Sud*, will require the construction of surface water management infrastructure.

An impervious dike, dike Sud, will be erected to contain the water from the design flood. The foundation of the dike's core will be built on injected and treated bedrock. A vertical drain will also be constructed and connected to the drainage blanket on the downstream side of the core; this will improve the robustness of the stability.

Peripheral ditches will be constructed to redirect the contact water from the waste stockpile to basin *Sud* or to the existing basins *Pignac Ouest* and *Pignac Est*. To reduce the watershed, a clean water diversion ditch will also be constructed to the east.

Waste Rock Stockpile *Halde Triangle*

Halde Triangle is now operational. Surface water is collected via peripheral ditches to basin Triangle and then pumped to basin A.

18.4.1.6 Monitoring

As the site's water management system is dependent on numerous pumping stations, to ensure a robust and secure operation. All water management pumping stations are designed with automatic operating system capabilities and the most critical stations also have remote monitoring systems. This allows operators to follow basin operation parameters and react diligently to unplanned situations.

18.4.2 Tailings Management

18.4.2.1 Concept

Bloom Lake's tailings management strategy is developed around the hydraulic deposition of separated coarse and fine tailings streams. The coarse tailings account for approximately 85% of the total tailings feed, while fine tailings account for 15% of the total tailings feed. The coarse tailings are a sandy draining, non-liquefiable material while the fine tailings are a silty material, more susceptible to liquefaction. Figure 18-5 presents the layout of the TSFs at the end of mine.

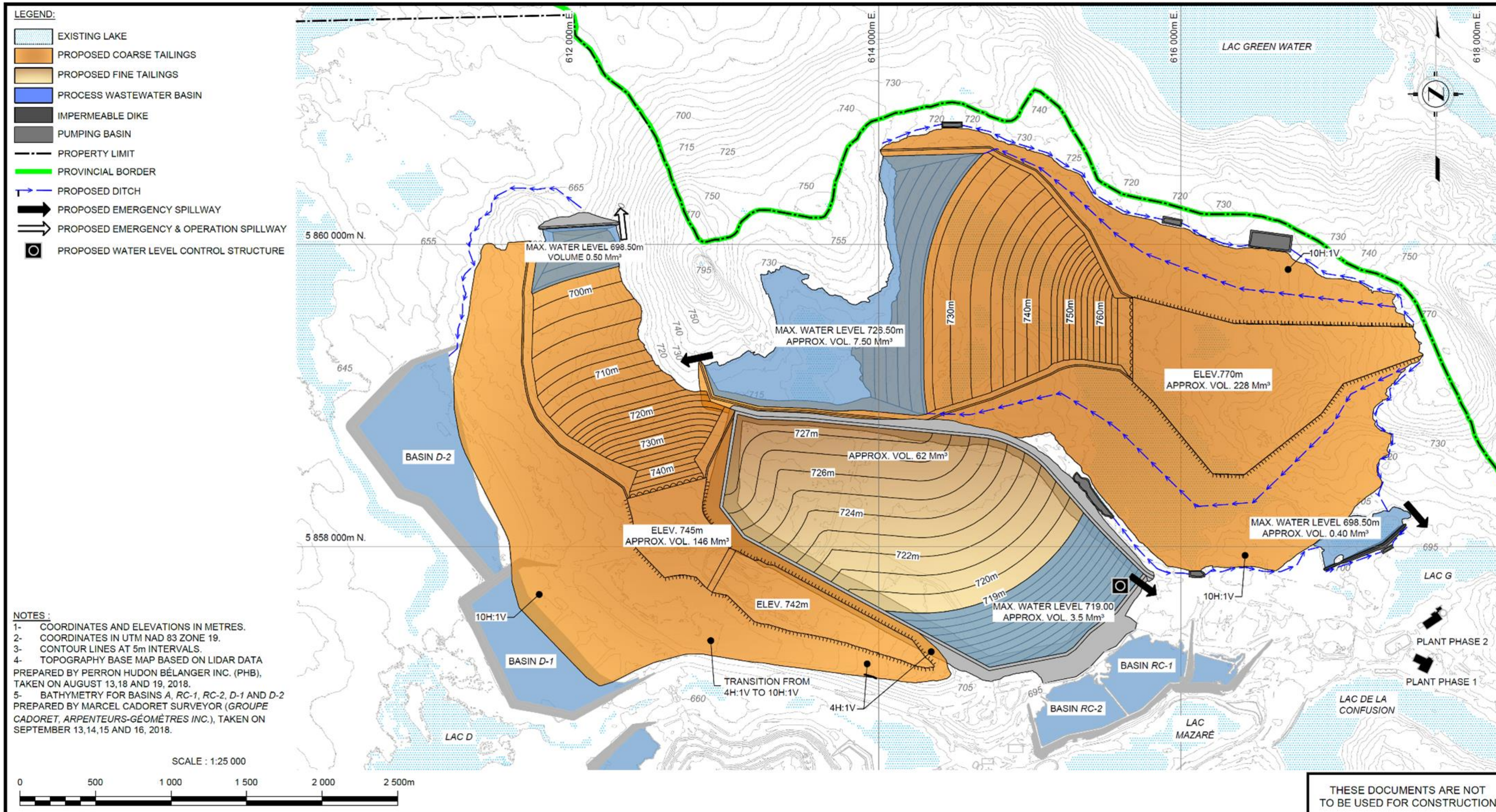


Figure 18-5: Tailings storage facilities – Year 2040

From April 1, 2023, Phases I and II mills are expected to produce 393 Mt of coarse tailings and 69 Mt of fine tailings over the 18 remaining years of operation. The coarse and fine tailings have an estimated in situ density of respectively 1.45 t/m^3 and 1.4 t/m^3.

The coarse portion of the feed is pumped to three tailings storage facilities (*HPA-Sud, HPA-Ouest,* and *HPA-Nord*), where pervious dikes are built to contain tailings and impervious dikes to retain water.

The coarse tailings management strategy is to fill the existing permitted area (*HPA-Sud* and *HPA-Ouest*) up to capacity, and then move operations to the new TSF *HPA-Nord*. This strategy allows deferring capital investments, delay environmental impacts, and decommission and restore portions of the existing TSF while operations are still ongoing.

The fine portion of the feed is pumped during the life of mine to the current containment area, basin A, confined by impervious dikes. This containment area also holds a fine particle sedimentation pond.

To achieve this deposition strategy, additional pumping capacity will be required for both fine and coarse tailings.

18.4.2.2 Design Criteria

The design of a TSF ensures a safe management of tailings and is based on conservative design assumptions. The containment structures are designed in accordance with industry standards (Canadian Dam Association, Mining Association of Canada, and Directive 019) and in compliance with current provincial regulations from the *Ministère des Ressources naturelles et des Forêts* (MRNF, 2017) entitled "Guidelines for preparing mine closure plans in Québec". The minimum factors of safety presented in Table 18-1 were respected for the design.

Table 18-1: Minimum factors of safety required

Loading Conditions	Minimum FS
Slope Stability (short-term)	≥1.3
Slope Stability if Stationary Conditions (long-term)	≥1.5
Pseudo-static Analysis	≥1.1

18.4.2.3 Storage Facilities

It has been determined that the coarse tailings are non-liquefiable and are safe to use for dike construction. Therefore, the design of the tailings storage facilities utilizes the availability of coarse tailings from the process plant.

Basin A

Fine tailings are pumped to the existing basin A's TSF throughout the LOM. To ensure the containment of the total amount of fine tailings, it is projected to raise the containment structures of dikes *Est, Ouest* and *Nord* to an elevation varying from 721 m to 730.5 m. The design of the dikes is primarily based on the retention of fine tailings. A membrane is added to the design to ensure the continuity of the impervious element throughout basin A, at an elevation of 719.5 m.

Dike *Est* is built using a centreline construction method for most of its operations, and transitioned to a downstream design towards the end of operations, to maintain a final crest width of 21 m. A freeboard of 1.5 m is respected in compliance with Directive 019. The dike is composed of coarse tailings with a membrane as the impervious barrier and a riprap on the upstream slope.

Dikes *Ouest* and *Nord* are built using a downstream construction method. A freeboard of 1.5 m is respected in compliance with Directive 019. The dike is composed of coarse tailings with an impervious barrier and a riprap on the upstream slope.

HPA-Ouest and *Sud* Coarse Tailings Areas

Coarse tailings are currently pumped to *HPA-Ouest* and *HPA-Sud* TSFs and will be until 2028. For the expansion, the current layout of the TSF is conserved with minor modifications. *HPA-Sud* starter dike is already built. For *HPA-Ouest*, most of the starter dike is already build. This pervious dike includes an internal drainage system (finger drains and blanket drains), a rock toe, and is made of trucked, compacted, and controlled coarse tailings.

Once the peripheral starter dikes are built, raising of the containment infrastructure will be done using the hydraulic deposition of coarse tailings combined with mechanical placement. The upstream raise of tailings containment dikes will be exclusively done with the coarse fraction, respecting a 10H:1V average slope.

HPA-Nord

Once *HPA-Ouest* and *HPA-Sud* TSFs are filled, a new TSF named *HPA-Nord* will be opened. Coarse tailings will be pumped to *HPA-Nord* from 2029 until the end of the mine life. As it is the case for the existing TSF, peripheric starter dikes need to be constructed prior to, and during, TSF operations. These starter dikes will be pervious and made of coarse tailings including a rock toe with a minimum height of 5 m. The rock toe will assure drainage and stability to the TSF.

Once the peripheral starter dikes are built, an upstream raise, using a coarse tailings deposition and mechanical placement following a 10H:1V average slope, will also be used.

18.4.2.4 Monitoring

To make sure the infrastructure is safe and operating within the design parameters, an array of instruments is to be installed. These instruments will be in specific areas to monitor different parameters related to stability and safety of the dikes. These instruments include:

- Vibrating wire piezometers;
- Inclinometers;
- Settlement plate;
- Seismograph.

Monitoring is already implemented in the existing infrastructure and additional instruments will be installed in both existing and new infrastructure. The instrumentation at Bloom Lake TSFs is currently connected to a telemetry system. This allows for real-time data to be consulted at anytime, anywhere. This system minimizes the dependency towards on-site personnel and, therefore, adds reliability and efficiency to the monitoring.

Annual site inspections and safety reports are also planned. This diligent process is vital to assess the stability and security of the TSF infrastructure throughout the life of mine.

18.5 Waste Stockpile *Halde Sud*

This infrastructure is currently under detailed engineering, some descriptions and figures may change.

18.5.1 Concept

The expansion of the Bloom Lake Mine requires the development of a new waste rock and overburden stockpile. The location was chosen following a study of numerous locations and configurations. The new stockpile is in a new watershed, south of the projected open pit. Figure 18-6 presents the waste stockpile *Halde Sud*.

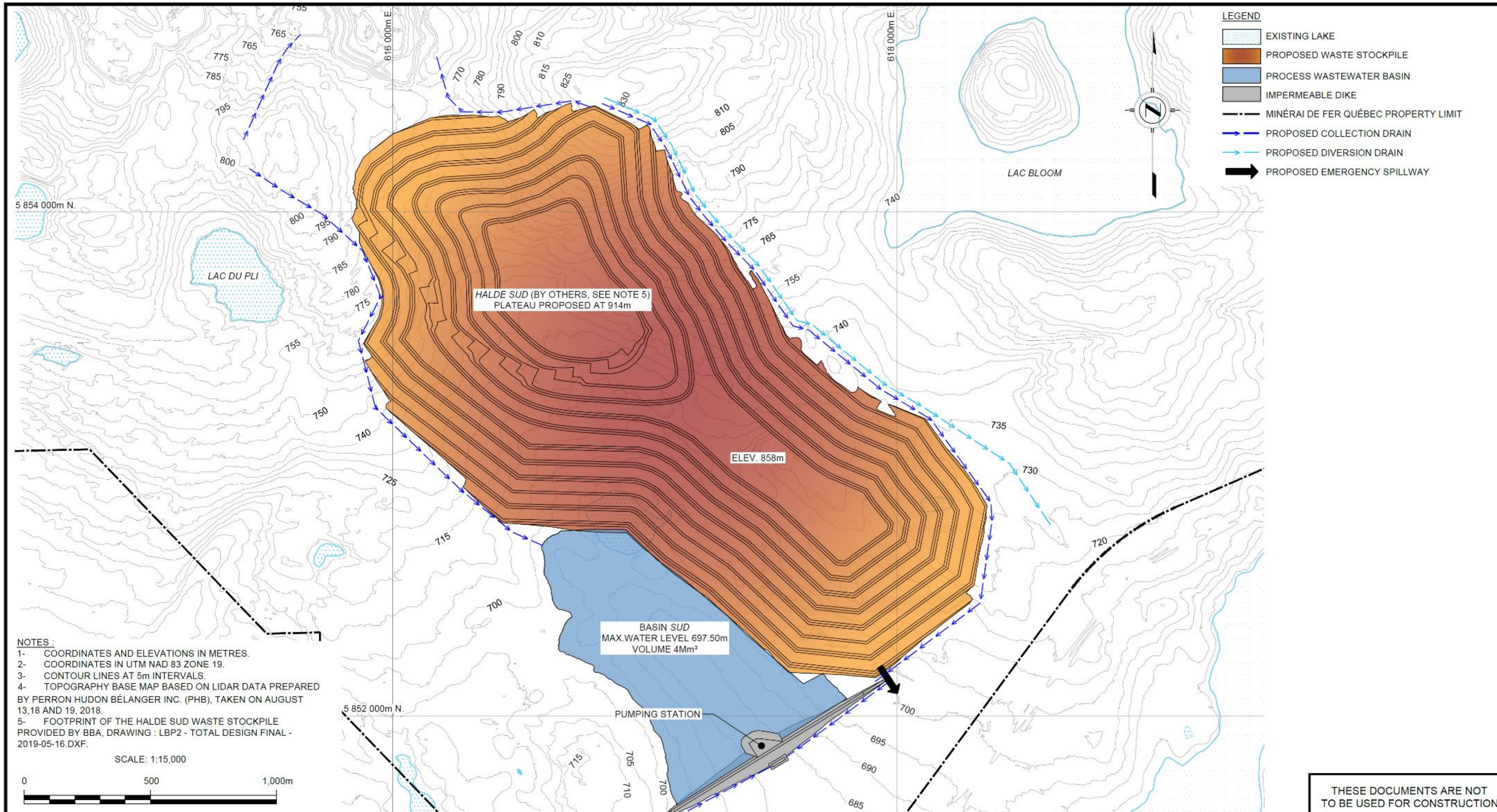


Figure 18-6: Waste stockpile *Halde Sud* – Maximum capacity

18.5.2 Design Criteria

The stockpile was designed to comply with the requirements of Appendix 1 in the MRNF (2017) and Directive 019 of the mining industry. The minimum factors of safety, summarized in Table 18-2, were respected for the design.

Table 18-2: Minimum factors of safety required

Loading Conditions	Minimum FS
Local Stability for each Bench (short-term and static)	≥ 1.0 to 1.1
Overall Stability, for Deep Slip Surfaces or in Foundation Soil (short-term)	≥ 1.3 to 1.5
Overall Stability, for Deep Slip Surfaces or in Foundation Soil (long-term)	≥ 1.5
Overall Stability, for Deep Slip Surfaces or in Foundation Soil (pseudo-static)	≥ 1.1 to 1.3

The factor of safety for each cross-section analyzed complies with the acceptance criteria mentioned above. To meet the minimum factor of safety, an overall slope of 3H:1V is required with local bench slopes of 2H:1V.

18.5.3 Design Results and Limitations

Detailed analysis, based on the staging strategy of the operation mine plan including waste rock and overburden placement, is currently being determined in the detailed engineering phase.

Analyses show that to ensure the stability of the dump on critical peripheral sections, stripping of organic material is required at the toe of the dump on a width varying between 60 m and 300 m depending on the location. The staging strategy during the development of the dump must take this constraint into consideration.

18.5.4 Monitoring

The stockpile monitoring program will be part of the detailed engineering and operation phases.

18.6 Sanitary Treatment and Waste Disposal

The sewage disposal system is designed to accommodate all sanitary services requirements at the site. The sewage treatment system includes collecting and pumping stations, a septic tank and a biological reactor treatment stage. The treated water meets the mandatory discharge parameters before it is released by gravity into a watercourse in a 100 mm diameter PVC pipe.

All material that can be recycled is sent to recycling sites. Solid waste materials that cannot be recycled will be sent to municipal dump located in various areas according to the service provider.

Used oil and lubricants and all other hazardous wastes are managed by a recognized waste disposal company in accordance with applicable regulations.

18.7 Accommodations

Lodging for construction workers and permanent workers is mostly accommodated within the town of Fermont. Accommodations are fully equipped with furniture, linen and wiring for communications and entertainment. A detailed list of buildings owned is provided in Section 5.3 of this Report.

Permanent workers are fed at the QIO cafeteria facility located in Fermont. The QIO cafeteria is a fully equipped industrial kitchen with walk-in freezers and fridges. It has a warehouse and delivery dock. The cafeteria has a seating capacity of 700 people. This new building completed in 2014, has a complete gym, work offices, as well as a playroom with pool tables, golf simulators and other recreational games and is currently used by QIO operations staff.

Temporary workers are fed at the cafeteria on site; food preparation is performed at the cafeteria facility in Fermont.

19. Market Studies and Contracts

19.1 Market Studies

All dollar amounts in this chapter are presented on a real basis as opposed to nominal.

19.1.1 Bloom Lake Base Case Price Estimate – CFR China Basis (QIO)

Iron ore is commonly sold on a Cost and Freight (CFR) or Free on Board (FOB) basis. Under a CFR sale, the product changes hands as it is unloaded at the arrival port and the pricing includes shipping costs. In recent years, there has been a strong trend to CFR sales, as this gives sellers control over shipping. An FOB sale is for iron ore delivered on board a vessel at the loading port, and the price is usually determined by netting back the cost of ocean freight (to China) from the CFR price.

Based on the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) guidance on commodity pricing adopted on November 28, 2015, various methods of estimating prices are accepted as industry standards, therefore a blend of these methods has been used to determine the long-term price for Bloom Lake concentrates.

The first method used was that of consensus prices obtained by collating the prices used by peers or provided by industry observers. This consensus of 17 well recognized global research firms was collected in Q2 of 2022 and generated a result of USD78.10/t for the P62 and USD98.9/t for the P65 for the LOM. This represents a gross realized price of USD100.73/t for the Bloom Lake concentrate after adjusting the P65 to the actual 66.2% Fe.

The second method used was based on the forecasts issued by the reputable analyst firm Wood Mackenzie. This firm was elected as a benchmark as it has historically gathered the largest amount of data to deliver market forecasts. Wood Mackenzie generally holds conservative assumptions. The long-term estimates for iron ore prices released in the Wood Mackenzie Q2 2022 market report are USD80/t for the P62 and USD99/t for the P65 for the LOM. This represents a gross realized price of USD100.83/t for the Bloom Lake concentrate after linearly adjusting the P65 index to 66.2% Fe.

The last method used was to measure the 3 and 5-year moving averages of iron ore prices. The results revealed by this method are shown in Table 19-1.

Table 19-1: Iron ore prices: 3 and 5-year moving averages

Year	62% Index CFR China	65% Index CFR China	Realized 66.2% CFR China
2018	69.46	90.38	92.05
2019	93.41	104.47	106.40
2020	108.87	122.01	124.26
2021	159.49	185.15	188.57
2022	120.16	138.70	141.26
3-year average	**129.51**	**148.62**	**151.36**
5-year average	**110.28**	**128.51**	**130.51**

The 3-year average would represent a gross realized price of USD151.36/t for the Bloom Lake concentrate after adjusting the P65 to the actual 66.2% Fe. The 5-year average would represent a gross realized price of USD130.51/t for the Bloom Lake concentrate after adjusting the P65 to the actual 66.2% Fe. These values do not account for the extreme volatility the market became subjected to under the Covid-19 pandemic from 2020 until 2022. For this reason, it is believed that the 3 and 5-year historical data cannot be used to accurately model the long-term forecast of Bloom Lake's iron ore concentrate.

In conclusion, it has been determined that a conservative P65 index value of USD99/t in line with the consensus and with Wood Mackenzie's calculations should be used in order to assess the long-term price of the future Bloom Lake concentrate. This value corresponds to a CFR selling price of USD100.83/t after a linear adjustment to an Fe grade of 66.2%.

19.1.2 Bloom Lake Base Case Price Estimate – FOB Sept-Îles Basis (QIO)

As the vast majority of Quebec Iron Ore's Bloom Lake concentrate customers are in Asia, the basis for the calculation of freight costs is the C3 Capesize Freight Index, as published daily by the Baltic Exchange. To be consistent with the long-term iron ore price assumptions, the Q2 2022 Wood Mackenzie report of market forecasts was also used as reference for this parameter. The research firm sets the long-term value of freight at USD19/wmt.

As the C3 index is representative of the Tubarão to Qingdao route and no index exists to reflect the exact freight from Sept-Iles to Qingdao, a premium of 25% was applied to account for the additional distance to Sept-Iles. The additional value is an estimate based on historical costs paid by Quebec Iron Ore and not based on future contracts. Considering the moisture adjustments, the ocean freight costs are estimated at USD24.48/dmt, finally yielding an FOB selling price of the Bloom Lake concentrate of USD76.34/dmt.

Refer to Table 15-5 for a tabular version of the economic assumptions.

19.2 Contracts

As Bloom Lake is an operating mine, all contracts necessary for development and operations are in place. The following are material to the business:

- Marketing agreements with renowned trading companies to support its iron ore sales globally on a long-term basis.
- Rail transportation from Wabush to Arnaud Junction contract with QNS&L.
- Rail transportation from Arnaud Junction to Pointe-Noire, as well as port handling and loading services with the *Société Ferroviaire et Portuaire de Pointe-Noire* and the Port of Sept-Iles Authority.
- Rail contract from Bloom Lake to Bolger Yard Junction in Wabush.

In addition, QIO has many contracts for usual mining supplies, including but not limited to: explosives supplies, parts supplies, aggregate crushing, air transport of employees, topography drilling, overburden removal, shutdown maintenance, tailings designs and construction, camp services, fuel delivery, etc. However, these contracts are not considered materially significant to the business.

All contracts are under terms and rates that are within the industry norms.

20. Environmental Studies, Permitting, and Social or Community Impact

20.1 Related Information

The following information was summarized in a NI 43-101 Feasibility Study Report prepared for Quebec Iron Ore (QIO) and issued August 2, 2019 (Allaire et al., 2019), and has been updated with more recent information developed since that time.

20.2 Required Permits and Status

Section 20.2.1 lists the main permits obtained and Section 20.2.2 identifies the authorizations required up to the mine closure.

20.2.1 Obtained Permits

20.2.1.1 Provincial Level

The construction of the Bloom Lake Iron Mine project was initiated in 2008 and operation was launched in March 2010. The project was subject to an EIA and review process under Section 31 of the Environment Quality Act (EQA), which led to the first decree (137-2008) issued by the Québec government in 2008. The increase in production to 16 Mtpy was approved by the *Ministère de l'Environnement et Lutte contre les changements climatiques* (MELCC) in a decree modification (849-2011) in August 2011. In addition, two subsequent decrees (608-2012 and 764-2012) modifying decree 137-2008 were issued in 2012 to expand the pit(s) and the Tailings Management Facilities (TMF).

The construction of a 315 kV-34.5 kV electrical power station to provide power has been authorized by decree in 2012, and built the same year. Certificates of authorization, in compliance with sections 22 and 32 of the EQA, were approved for the construction of various infrastructure facilities and the certificate of authorization for the mine exploitation, ore treatment, waste rock and tailings disposition were granted in March 2010. The former entity Consolidated Thompson Iron Mines Ltd. has also received operational permits for the mine, dust collection systems, railroad and the wastewater treatment systems. An Environmental Impact Assessment (EIA) for the tailings and waste management has been submitted to the MELCC in August 2019. Various exchanges of information between MELCC and QIO occurred until September 2021. The BAPE public hearing began in October 2020 and the report was issued in February 2021. Decree 166-2022 for the increase of tailings and waste rocks storage capacity was issued by the Government of Québec on February 16, 2022. The decree specifies nine conditions to be respected. Conditions apply to fish habitats, hydric habitats wetlands, air quality (use of low crystalline silica materials), greenhouse gas reduction, adaptation to climate change and monitoring.

Table 20-1: Main environmental permits obtained

Permit name and description	Agency	Date authorized
Certificate of authorization for the Bloom Lake Iron Ore Mine, 8.5 Mtpy, (Decree 137-2008)	Government of Québec	20/02/2008
Certificate of authorization for operation of Bloom Lake Iron Mine	MELCC (Québec)	02/03/2010
Certificate of authorization for the railway	MELCC (Québec)	20/04/2010
Certificate of authorization to operate six dust collectors	MELCC (Québec)	20/09/2010
Certificate of authorization for the construction and operation of two wastewater treatment systems related to the plant	MELCC (Québec)	24/01/2011
Certificate of authorization to modify Bloom Lake Mine operation, 16 Mtpy, (Decree 849-2011)	MELCC (Québec)	15/09/2011
Certificate of authorization to build new structures	MELCC (Québec)	15/09/2011
Decrees 608-2012 and 764-2012 modifying decree 137-2008, issued on February 20, 2008, to expand the pit(s) and the TMF	MELCC (Québec)	06/2012 & 07/2012
Certificate of authorization to install and build a boiler, water-glycol heater, conveyors and transfer tower, storage silo and a new water treatment plant	MELCC (Québec)	21/11/2012 18/06/2013
Certificate of authorization to operate with production increase	MELCC (Québec)	04/09/2013
Certificate of authorization to modify the tailings pond	MELCC (Québec)	26/02/2014
Certificate of authorization to create a new borrow pit	MELCC (Québec)	04/07/2014
Authorization of work or activity that results in serious harm to fish	DFO (Federal)	20/07/2016
Temporary storage of contaminated treated posts	MELCC (Québec)	25/01/2017
Modification of water management infrastructure at TMF and sedimentation pond	MELCC (Québec)	19/09/2017
Operation of *Halde Sud* waste rock dump	MELCC (Québec)	22/01/2018
Modification of Pignac spillway	MELCC (Québec)	23/05/2018
Burning of a summer camp	MELCC (Québec)	25/10/2018
Sanitary and potable waters at MAMU Complex	MELCC (Québec)	11/03/2021
Water withdrawal at MAMU Complex	MELCC (Québec)	19/07/2021
Construction of a new mining road	MELCC (Québec)	09/07/2021
Increase of iron concentrate storage area	MELCC (Québec)	14/07/2021
Modifications of pounds BM-05 and BU-05	MELCC (Québec)	05/11/2021
Corrective works on ditches F01, F17 and F18	MELCC (Québec)	21/06/2022
Increase of blasted ore storage area	MELCC (Québec)	24/08/2022
Increase of tailings and waste rock storage areas (decree 166-2022)	Government of Québec	16/02/2022

20.2.1.2 Federal Level

The current mine has already been authorized for operation under the federal environmental authority, including the Department of Fisheries and Oceans Canada (DFO), Transport Canada, Natural Resources Canada, and Environment and Climate Change Canada (ECCC).

20.2.2 Applicable Regulations and Permits to be Obtained

The following infrastructure will require authorizations at both provincial and federal levels:

- *HPA-Nord* TSF;
- *Halde Sud* waste rock stockpile;
- Increase in storage capacity of Triangle waste rock pile;
- *Halde Sud-Ouest* waste rock pile (within the boundary of a previous authorized pit);
- Increase in storage capacity for basin A;
- Two pit extensions south of the mine;
- Increase in the water treatment plant capacity.

20.2.2.1 Provincial Level

Environment Quality Act (EQA)

Following obtainment of decree 166-2022, QIO must obtain various ministerial authorizations from the *Ministère de l'Environnement de la Lutte contre les changements climatiques, de la Faune et des Parcs* (MELCCFP) (Ministry of Environment, Fight against Climate Change, Fauna and Parks) regional office as per section 22 of the Environment Quality Act.

The project is subject to a procedure, as it will require filling, or levelling, of work for any purpose whatsoever, within the 2-year flood line of a river or lake, over a cumulative distance equal to, or greater than, 500 m, or over a cumulative area equal to, or greater than 5,000 m^2, for a same river or lake.

An application for ministerial authorization for *Halde Sud* will be submitted to the MELCCFP. A compensation plan will be provided with the application. A request to amend decree 166-2022 will also be submitted to the MELCCFP regarding the condition relative to the register of materials used for construction and maintenance of hauling roads.

As of April 2023, applications for ministerial authorizations have been submitted to the MELCCFP for the following:

- Beneficiation of waste rocks;
- Modification of *Halde Triangle* Certificate of Authorization;
- Optimization of Phase II circuit;
- North closing dam.

Permits should be obtained in a timely manner for the various components of the project in order to be ready for construction by 2026:

- *Halde Triangle*;
- *Halde Sud-Ouest*;
- *Halde Sud* and Pit Extension;
- HPA-*Nord*, Basin A, Increased Water Treatment Plant capacity;

Following the obtainment of decree 166-2022, the detailed engineering of the project has begun. This step takes into account the environmental mitigation measures associated with the equipment and infrastructure, as presented in the EIA and subsequent exchanges, and incorporated by the government in the decree. It must also consider all applicable environmental standards included in other relevant provincial laws and regulations.

Fish habitat, and wetlands and hydric habitat compensation plans must be approved by the ministry during the authorization process under Section 22 of the EQA. Forest intervention permits will also be required for deforestation activities that will occur before construction of the infrastructure or deposition of tailings and waste rocks.

20.2.2.2 Federal Level

Canadian Impact Assessment Act

The Canadian Impact Assessment Act (S.C. 2019, c. 28, s. 1) (CIAA) and its regulations establish the legislative basis for federal environmental assessments in Canada. The CIAA (2019) applies to projects designated by the Physical Activities Regulations (SOR/2019-285). The Information and Management of Time Limits Regulations (SOR/2019-283) specifies information requested and time limits of the environmental examination procedure. The QIO Project is not subject to a federal environmental assessment under the CIAA (2019) and the Regulations Designating Physical Activities. According to the federal agency, the project was initiated with provincial authorities before the legislation was modified in 2013 and therefore is not subject to a federal EIA.

The Fisheries Act (Sch. I, P.I, It.6 and Sch. II, It. 5)

Metal and Diamond Mine Effluent Regulation (MDMER)

Under the Fisheries Act, the MDMER (SOR/2002-222) provides the framework for mining activities regarding the protection of fish habitats and resources through Environmental Effects Monitoring (EEM). It also sets thresholds that mining effluents must comply with, for the following parameters: suspended solids, pH, metals (arsenic, copper, lead, nickel, and zinc), cyanides, radium, un-ionized ammonia and toxicity. The project will not affect the monitoring at the effluent because the same discharge point (EFF-REC2) will be maintained.

Fish habitats (lakes, ponds and streams) are present within HPA-Nord TSF and the *Halde Sud* waste stockpile locations. Under Section 36(3) of the Fisheries Act, it is forbidden to deposit deleterious substances such as tailings and waste rock in water frequented by fish. However, the MDMER includes provisions (regulatory amendment) allowing the use of a natural water body frequented by fish for mine waste disposal.

Therefore, Quebec Iron Ore has submitted to ECCC in 2022 various documents to be authorized to dispose mining wastes in fish habitats through inclusion the Schedule 2 of the MDMER. An Alternatives Assessment report (WSP, 2022a) and a Fish Habitat Compensation Plan report (WSP, 2022b) were submitted.

ECCC has invited citizens to participate in public consultation sessions on the disposal of mine waste under the MDMER in Fermont on February 21, 2023 and in Sept-Îles on February 23, 2023. ECCC also intends to hold consultation sessions with First Nations. Written comments on the assessment of alternatives and fish habitat compensation plan was submitted to ECCC no later than April 3, 2023. A Government Cabinet and publication in the Canada Gazette is expected in the near-term.

According to the project development schedule, disposal of tailings in *HPA-Nord* TSF and waste rocks in *Halde Sud* stockpile will not be required before some years, thus allowing sufficient time for QIO to complete the federal permitting process.

The Migratory Birds Convention Act (Sch. I, P.I, It.7.1)

The Migratory Birds Convention Act, 1994, provides for the implementation in Canada of the 1916 Convention between the United Kingdom and the United States of America for the Protection of Migratory Birds in Canada and the United States.

To respect the convention, QIO will conduct deforestation operations outside the breeding season of migratory birds to respect the Migratory Birds Convention Act.

The Species at Risk Act (S.C. 2002, c. 29)

The Species at Risk Act (SARA) was created to prevent wildlife species from becoming extinct. The Act protects species at risk and their critical habitats. SARA also contains provisions to help manage species of special concern to prevent them from becoming endangered or extinct. The project will not affect species at risk based on all surveys conducted.

20.3 Environmental Studies and Issues

In 2006, Consolidated Thompson Iron Mines Ltd. (Consolidated Thompson) conducted an EIA study for the mine development project. Since then, several other studies were conducted due to project changes and these studies were intended to support the modification of the provincial authorization. The other studies conducted were required as per provincial and federal authorizations. The main studies used are summarized below:

- Environmental and social impact assessment (GENIVAR, 2006);
- The request for modification of the project, the mine expansion (GENIVAR, 2011a);
- Environmental and social impact assessment (WSP, 2014);
- Previous technical reports prepared for the former owners of the mine (Consolidated Thompson and BBA Inc., 2008; CIMA, 2010; SRK, 2011 and 2013; Allaire et al., 2019);
- Technical reports prepared for QIO (Ausenco, 2017);
- Assessment of alternatives for mine waste disposal in fish habitat for the new waste pile and the TSF for the amendment of Schedule 2 of the MDMER (WSP, 2022a).

QIO updated the EIA study, which was submitted to the MELCC in August 2019. QIO also provided complementary information from March 2020 to September 2021.

Most of the elements required for the project are already authorized, which minimizes the potential issues associated with environmental permitting. Therefore, issues presented below are mostly related to the new TSF (*HPA-Nord*) and *Halde Sud* waste stockpile that will be developed on un-impacted areas.

20.3.1 Physical Components

20.3.1.1 Surficial Deposit

Rock outcrops are mainly present at the top of the principal hills around the mine site. Till is the principal surficial deposit on bedrock but the thickness varies depending on the topography.

Sporadic permafrost can be found in the Fermont area, mainly in peat bogs and under islands of forest tundra on mountain summits (Allard and Seguin, 1987). The various surveys conducted revealed no evidence of permafrost. There are no specific issues regarding surficial deposits.

20.3.1.2 Rock Geochemistry

Various geochemical studies have been performed on waste rocks and tailings samples (Golder, 2014a, Golder 2021, Golder, 2022). According to these studies, waste rocks and tailings from Bloom Lake mine do not show Metal Leaching potential or Acid Rock Drainage potential based on Directive 019 criteria and the *Guide de caractérisation du minerai et des résidus miniers* criteria (MELCC, 2020). Therefore, no specific containment methods are required to store tailings and waste rocks.

20.3.1.3 Hydrology

Mining infrastructure has been present in the study area since 2010 and natural conditions have been modified since that period.

The waste rocks and tailings increased storage capacity project will increase the annual volume of contact water to the water treatment plant and release it to the effluent. All the contact water on the site will be collected and directed to the existing effluent (EFF-REC2).

The drainage of *Halde Sud* waste stockpile is naturally heading towards the *Rivière aux Pékans* watershed. However, as it is a protected area (aquatic reserve), the water collected into the basin will be pumped towards the existing system to avoid the creation of a new effluent and potential impacts in the aquatic reserve. Consequently, a flow reduction is apprehended downstream of *Halde Sud* water management system, but this will affect only 10.5% of the Mogridge Lake watershed, which will have limited impact on the lake.

20.3.1.4 Surface Water and Sediment Quality

Background surface water quality is not problematic for aquatic life. Nonetheless, pH tends to be lower than 6.5 and aluminum, barium, cadmium and copper concentrations are exceeding governmental criterions. However, these exceedances are associated to the natural background level in the region and not the mining operations. In certain areas, chromium and zinc sediments contents areas are exceeding criteria but are associated to the natural background level.

Effluent quality is regulated by requirements from Directive 019 and the MDMER. Section 20.6 in this Report presents a summary of the monitoring ongoing at the effluent. The waste rocks and tailings increased storage capacity project will not impact effluent quality significantly. The water treatment plant will be upgraded for the additional incoming flow.

20.3.1.5 Groundwater

Groundwater quality shows occasional exceedances of the criterion for barium, copper, manganese and zinc, which are related to the natural background level of the region and not the mining operations.

20.3.1.6 Air Quality

Currently, there are no National Air Pollution Surveillance Program stations near the study area that could provide data on the amount of particulate matter, NOx and ozone. In the Bloom Lake mine area, meteorological data show a strong convergence of winds from the northwest with a predominance of high velocity winds from the west and north-northwest. The town of Fermont, located 13 km southeast of the Bloom Lake Mine site, is partially downwind of the Bloom Lake Mine and the Mont-Wright Mine (ArcelorMittal).

Potential sources of dust include the TSF, the waste rock piles and the ore and concentrate stockpile areas. The mine has dust mitigation measures to prevent fine particle emissions like dust collectors at the facilities and conveyors. In addition, dust control (water spreading) is ongoing on the roads of the mine. In the TSF as well as the waste rock stockpiles, areas that become inactive are gradually re-vegetated to avoid wind erosion and dust dispersion. It is relevant to note that some waste rock piles and TSF dikes have already been re-vegetated on the site. An air modelling study was completed and allowed for documentation of particle dispersion associated with the waste rocks and tailings increased storage capacity project.

20.3.1.7 Noise

Noise level measurements have been carried out in 2018 close to the nearest residential properties. Noise from the mine site was inaudible at all receiving points. The noise modelling analysis of the waste rocks and tailings increased storage capacity project showed that the regulations in place will be respected.

20.3.2 Biological Components and Species at Risk

20.3.2.1 Terrestrial Wildlife

The surveys revealed a total of 66 bird species within the study area. Field surveys have identified the presence of two species at risk, the bald eagle and the rusty blackbird. None of those species will be affected by the waste rocks and tailings increased storage capacity project. The availability of similar undisturbed habitats in the area limits the impact of new TSFs and waste rock piles area.

Seven species of amphibians and reptiles are likely to be present in the study area. Of these, four species have been confirmed by surveys. The waste rocks and tailings increased storage capacity project will be limited.

Rock vole, eastern red bat, northern long-eared bat and little brown bat are mammals species at risk observed near the mine. However, the Bloom Lake mine will unlikely affect significantly those species. The Bloom Lake Mine is in an area where the range of woodland caribou (boreal) and migratory ecotype (tundra) caribou of the George River herd is overlapping. However, George River caribou are no longer frequenting the Fermont area. Woodland caribou can occupy the study area throughout the year but in very low densities. The future infrastructure will intentionally be concentrated near existing anthropic features (Bloom Lake mine, Mont-Wright mine), which will reduce the habitat disturbance for this species.

20.3.2.2 Vegetation and Wetlands

Black spruce is the most common forest species in the study area. Mineral or woody bogs occupy poorly drained depressions. The wetlands in the study area are primarily peatlands, riparian habitats and some shallow water areas. Peatlands are ubiquitous where the topography is flat. The waste rocks and tailings increased storage capacity project will affect approximately 75 ha of wetlands. The assessment of alternatives conducted showed that the selected locations are impacting less wetlands than other alternatives analyzed. According to the regulation, financial compensation for wetland losses is not in force in the project area because it is located outside of the area of application. However, as part of the permitting process, the provincial government will require that a compensation project be realized (wetland restoration or creation). Compensation projects will be produced.

20.3.2.3 Aquatic Fauna and Habitats

The main species found in lakes and streams in the area are: red sucker, black sucker, lake whitefish, lake chub, northern pike, burbot, brook trout, round whitefish, and pearl dace. Rivers and lakes that will be affected by the new infrastructure will be compensated. The *Halde Sud* Waste Stockpile location is one of the options analyzed where impacts on fish habitats were the lowest. On the other hand, the *HPA-Nord* TSF will be in a sector where there are several lakes. Approximately 155 ha of fish habitat will be impacted by the project. However, it was the best alternative based on environmental, socio-economic and technical indicators through the robust assessment of alternative study. Impacted fish habitats will be compensated through projects aiming at restoring or creating new fish habitats.

The fish habitat compensation plan development was initiated in June 2018 by a research of potential sites/projects. Many stakeholders were consulted and an extensive research on the field was carried out, where 131 sites were evaluated. Nearly one third of those were close to the Fermont community. The conceptual plan was developed from a subset of projects that were the most promising and that reflected the needs and concerns of local communities, especially First Nations. QIO involved First Nations and provincial authorities early in the process (meetings, consultations, and documentation revision) to produce a compensation plan that would fulfill their requirements. Furthermore, the Innu Nations of Matimekush Lake-John and of Uashat mak Mani-Utenam were involved and consulted during that process.

20.4 Social and Community

20.4.1 First Nations

QIO has entered into an Impact Benefit Agreement (IBA) with the Uashat mak Mani-Utenam First Nation, which includes provisions for benefits to the Matimekush - Lac John First Nation. The IBA provides for training, jobs and contract opportunities for the Innu communities, and specifies fair and equitable financial and socio-economic benefits.

As part of the IBA, working committees on specific topics (training and employment, and environment) were created with the First Nations to discuss and answer questions of concern to them. Committees ensure that QIO maintains an excellent relationship with the First Nations in the territory. As the mining operations develop at Bloom Lake, QIO plans to keep conducting the committees.

20.4.2 Information, Consultation and Collaboration

For the purpose of the project, QIO conducted an extended public consultation program with the community and the local stakeholders in 2018 and 2019. An information meeting on the project was organized with the First Nations Uashat mak Mani-Utenam and Matimekush – Lake-John in the winter of 2019.

20.4.3 Social Environment Monitoring Program

A Social Environment Monitoring Program is already implemented by QIO. This program aims to evaluate the effectiveness of the proposed measures to mitigate impacts on the social and human environment during mine operations. Monitoring results will, if necessary, adjust the program to better respond to identified impacts. The monitoring approach is essentially based on a committee formed with municipal and regional stakeholders.

20.5 Operation Monitoring Requirements

The EEM program is conducted in accordance with regulation requirements since 2010 at the Bloom Lake mine site. Groundwater and air quality monitoring programs are also ongoing on the site. No specific concerns were raised whatsoever. QIO also puts a high importance on the follow-ups with First Nations and the local community, as summarized in Section 20.4.

20.6 Water Management

Bloom Lake Mine has the authorization to pump fresh water from Bloom Lake for domestic use and for boiler make-up water. The process water used at the mill is recycled but Confusion Lake water can be used during system maintenance. It can also be used for the fire suppression system.

Contact water is collected at the TSF where it is decanted from tailings through successive basins. Runoff water in contact with waste rock at stockpile locations is also collected by a network of ditches and basins where it is pumped to be recycled at the mill. The excess quantity of water is sent to the water treatment plant before discharge at the effluent. The current water treatment unit has a capacity of 75,000 m^3/day. After the expansion, the capacity will be up to 150,000 m^3/day.

20.7 Hazardous Materials Management

Hazardous materials at Bloom Lake include used oil, used antifreeze, oil filters, oil canisters, hydraulic hoses, aerosols, absorbents, and soiled clothes. This material is collected in wheeled carts, barrels, or various containers identified and dated. Used oil tanks are also present on site in several locations. Hazardous material stored in carts, barrels, or tanks are disposed of by a specialized company on a regular basis.

Fuel oil tanks have integral holding sections to retain leakage and prevent contamination to the ground. Used oil and lubricants, and oil skimmed from ponds, are disposed of off-site by a contractor.

20.8 Mine Closure

According to Québec Mining Act (L.R.Q., c. M 13.1), QIO shall submit a revised closure plan to the Minister for approval every 5 years or whenever amendments to the plan are justified by changes in the mining activities. QIO must also provide a financial guarantee covering the closure plan cost to the provincial government in accordance with the Regulation Respecting Mineral Substances other than Petroleum, Natural Gas and Brine (Chapter M-13.1, r. 2).

It is expected that the restoration works will be carried out progressively. The most important closure activities are as follows:

- Sale of salvageable mobile equipment or disposal at authorized recycling/disposal facilities;
- Dismantling of buildings and infrastructure, except for those required for monitoring during the post-closure period. Salvageable materials and equipment will be sold or transported to a recycling/disposal facility. Waste from dismantling operations will be transported to authorized sites for disposal;
- On-site treatment of contaminated soil or off-site disposal in accordance with regulations;
- Levelling of the area of the site affected by mining and industrial activities and revegetation of the surface;
- Scarification and revegetation of access and mining roads (except for an access to the site to allow monitoring in the post-restoration period) as well as dismantlement of bridges;
- Securement of the open pit mines and of the accesses to critical mine facilities (tailings management area, waste rock stockpile) with waste rock / boulder berms. Hazard warning signs will be installed every 25 m around the mine pits and at blocked accesses;
- The pumping will stop and the open pit mines will be naturally flooded;
- Progressive pumping and treatment of the water from the accumulation and treatment basins. The dikes will be breached and vegetated. The sludge accumulated in the ponds will be excavated, transported, and put in place on the TSF. Finally, the surfaces of the empty basins will be vegetated;
- The TMF and the waste rock piles will be progressively vegetated as sections become ready for closure.

Several follow-up activities are planned once the mining is complete (post-operation) and once the closure work is completed (post-closure). Each of these two periods will span over five years. Monitoring is planned for the integrity and stability of the structures, for the agronomic performance of the re-vegetated areas and for the environmental quality of the effluent and groundwater. The water treatment plant will be maintained operational as required during the post-mining period.

The last version of the closure plan has been sent to the MERN at the beginning of September 2021. The MELCCFP (formerly MELCC) has provided favourable opinion on January 20, 2022. The MRNF (formerly MERN) has approved the closure plan on February 28, 2023 following responses to the MRNF questions provided by QIO in September 2022 and February 2023.

The financial guarantee has been estimated by the MRNF at $131,716,031. By the end of February 2023, $51,258,281 was already deposited in the financial guarantee. The provision of the financial guarantee will be as follows: $40,228,875 at the end of May 2023, $20,114,437 at the end of February 2024, and $20,114,437 at the end of February 2025, for a total of $80,749,750.

21. Capital and Operating Costs

21.1 Capital Cost Summary and Basis

The life of mine capital expenditures (CAPEX) were estimated by each department as part of the budgeting process (Figure 21-1). Phase II infrastructure is now built and reached commercial production in December 2022. Further to recent delivery of mining equipment, Bloom Lake is expected to reach its expanded nameplate capacity of 15 Mtpy by the end of calendar year 2023 (~FY2024). However, sustaining capital remains to be spent. All capital expenditures are described below and shown in Figure 21-1:

- Capitalized Stripping and Mining Activities: includes overburden removal, pre-split blasting and topography drilling, and mining costs for waste above a defined strip ratio.
- Mining Equipment: includes purchases of new equipment, replacement of old equipment, rebuilds and some maintenance parts and costs. It is individually defined for large equipment, with a base amount assumption for the smaller fleets (pick-ups, tower lights, etc.).
- Processing: includes all sustaining capital required to maintain the two concentrate plants running.
- Tailings, Water Management and Waste Dumps: mostly involves earthworks and infrastructure required to store waste rock, store tailings, and manage site water.
- Closure, Compensation and Various Improvement Projects: the head is mostly composed of Phase II finalization, mine maintenance infrastructure, environmental compensation projects and locomotives. The tail consists of forecasted costs of $131M to close the mine and the recovered estimated salvage value of $42M, for a net amount of $89M.

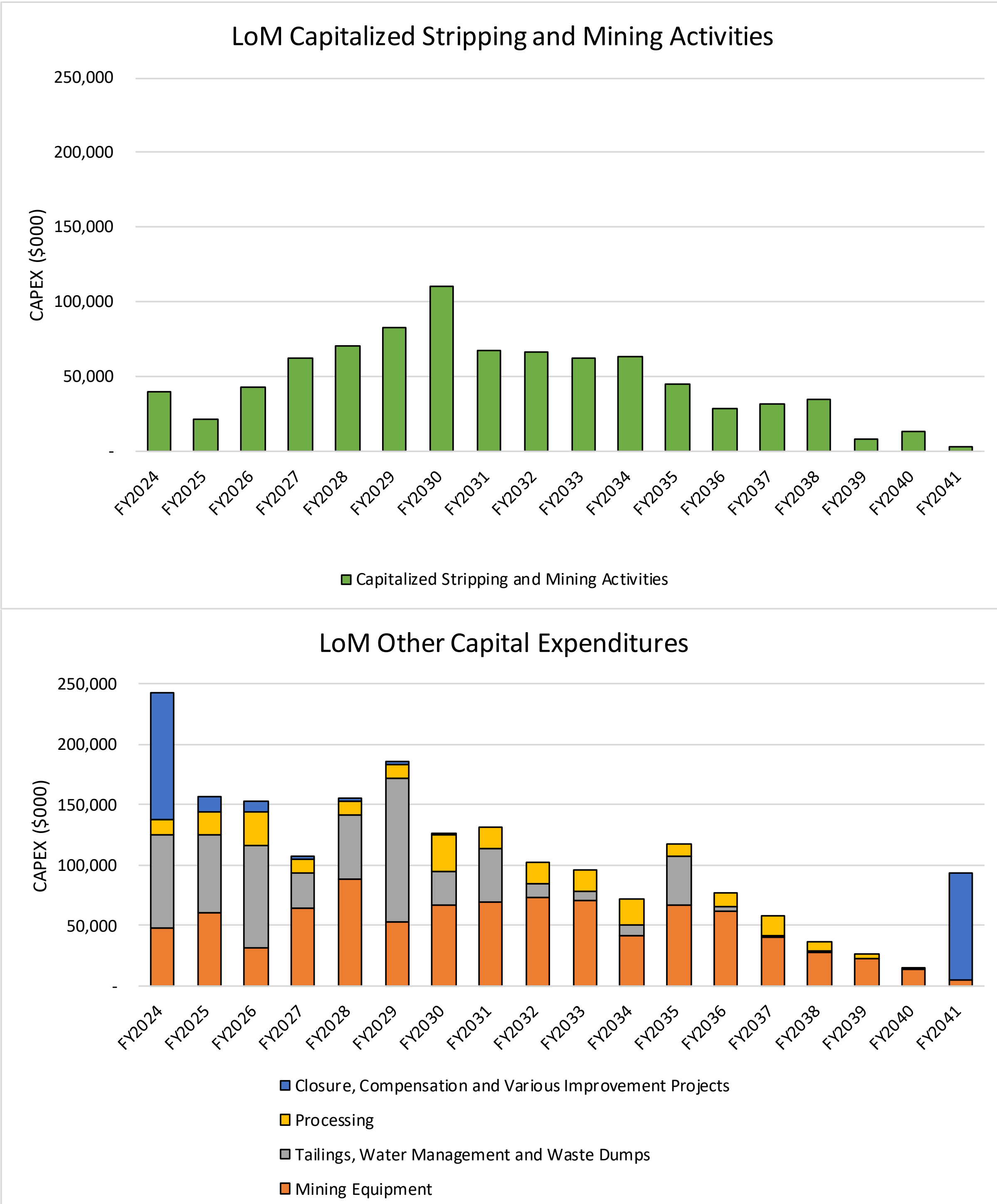


Figure 21-1: Capital expenditures required (CAD)

21.2 Operating Cost Summary and Basis

The LOM operating costs (OPEX) are determined based on current costs and contracts using a simplified budget cost model. As this study is based on a 100% FOB sales basis, the costs of shipping are deducted from the selling price rather than added to operating costs.

Costs presented in Table 21-1 are directly comparable to cash costs, as they include adjustments for capitalized stripping. They are presented as an undiscounted LOM average.

Table 21-1: LOM operating costs

Cost centre	Unit cost (CAD)	Reference unit
Mining	$3.30/t	dmt mined
Processing	$4.75/t	dmt processed
Tailings and Water Management	$0.83/t	dmt processed
G&A	$3.35/t	dmt processed
Rail & Port	$21.14/t	dmt concentrate
Total	**$64.58/t**	**dmt concentrate**

Generally, this cost basis aligns within reason with the Whittle model and actual performance. It should be noted that some differences will be observed due to the timing of the Whittle model, the evolution in cost budgeting as well as varying depths and strip ratios.

21.3 Exclusions

The following costs are excluded from both the CAPEX and OPEX presented above:

- Sustainability and Other Community Expenses (CSR);
- Corporate G&A;
- R&D & Exploration;
- Changes in Working Capital, Interest on Debt, and Taxes.

22. Economic Analysis

The Bloom Lake Mine is currently in production and this Technical Report does not include a material expansion of the current production. Therefore, economics are not presented.

However, QIO notes that an economic analysis was performed and that the reserve estimate in this Report is supported by positive cash flows.

23. Adjacent Properties

The Bloom Lake Mine is in an active iron ore mining district, as illustrated in Figure 23-1.

The Mont-Wright Mine (ArcelorMittal) is 1 km south of the Bloom Lake property. Further south, the Fire Lake Mine is also operated by ArcelorMittal Mines Canada. Both mines have a combined production of 26 Mt of concentrate per year.

Approximately 30 km northeast of the Bloom Lake mine is the Iron Ore Company of Canada (IOC) whose major shareholder is the international mining group Rio Tinto. IOC has recorded production rates for a combination of concentrate and pellets of 17.5 Mt in 2022. Ore is sent to a concentrator for upgrading to 65% iron. Upgrading takes three processes involving the spiral, magnetite and hematite plants. Most of the concentrate is pelletized with the remainder sold as concentrate.

Also located approximately 30 km northeast, near the town of Wabush, is the Scully Mine owned by Tacora Resources (Tacora). Tacora has recently reactivated operations at Scully Mine; the first train of concentrate from the concentrator arrived in Pointe Noire at the end of June 2019. Tacora uses the same multiuser ship loading terminal as Bloom Lake.

The DSO Mine (Tata Steel) is not adjacent, but it also uses the same multiuser terminal and rail as Bloom Lake.

Exploration properties owned by Quebec Iron Ore or by Champion Iron are listed in Chapter 4.

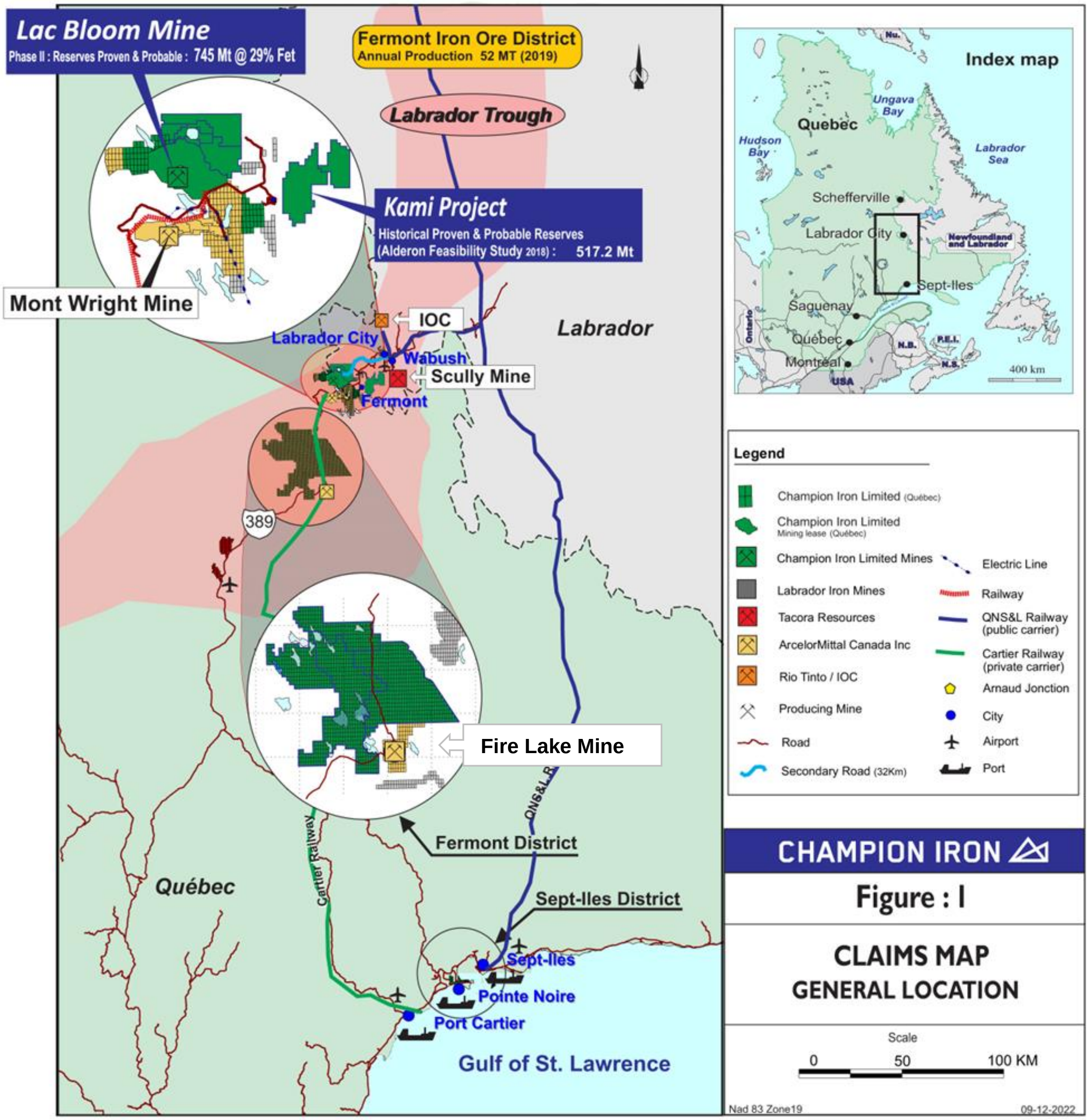


Figure 23-1: Adjacent properties

24. Other Relevant Data and Information

24.1 Flotation Plant

A feasibility study for a Direct Reduction Pellet Feed (DRPF) project was conducted, in partnership with BBA, to further remove silica from iron oxides while reducing energy consumption and improving iron recovery compared to traditional flowsheets. The mine plan, cost model and sales described are based on the current operations (66.2% Fe).

Such an improvement to the process, if constructed, would increase the overall profit margin of the mine relative to the current product and could change the quantity of resources and reserves.

However, both QIO's upper management and the QPs' are of the opinion that, currently, it is more reasonable to be conservative with the processing technology and the selling price assumptions. Therefore this feasibility study has not been considered in any way in this Report.

25. Interpretation and Conclusions

25.1 Overview

This Technical Report is not a feasibility study or based on a feasibility study. However, the level of analysis is sufficient to justify Proven and Probable Reserves because the mine is in operation.

25.2 Data Verification and Mineral Resources

- It is the QP's opinion that data verification procedures have yielded confidence in resource data and site procedures related to drilling, logging, and sampling. The QP undertook an audit on the reconciliation practices that yielded confidence in ore control procedures with minor areas for operational improvement.
- The geological model for Bloom Lake consists of a lithology model, grunerite model, sulphur model, and the iron formation (IF) estimation domain model. These geological models are considered satisfactory for use in mineral resource estimation.
- The geological interpretations for the Bloom Lake deposit were based on lithological logging, analyses from drill core, grade control data, geological maps, historical models, and ground magnetic surveys. The geology and controls on the mineralization is considered well understood.
- The mineralized iron formation units in the lithology model include iron formation, silica iron formation, and limonite. The iron formation model further differentiates the iron formation units into operational quality categories of low (< 0.6%,), moderate and elevated (>16%) CaO + MgO values.
- All 3D digital geological modelling was performed using Leapfrog Geo™ software. In the QP's opinion, the geological model is appropriate for the size, grade distribution, and geometry of the mineralized zones and is suitable for the resource estimation of the Bloom Lake mine.
- The QP is of the opinion that the database is appropriate for the purposes of the mineral resource estimation and that the sample density allows a reliable estimate to be made of the size, tonnage, and grade of the mineralization in accordance with the level of confidence established by the mineral resource classification categories as per CIM Standard Definitions.
- The mineral resource model is based on 6.0 m composite intervals within the iron formation. Grade capping was reviewed but deemed unnecessary and was not applied. Ordinary kriging (OK) was used for the estimation of CaO, Fe, MgO, MnO, Na_2O, P_2O_5, SAT and SiO_2. Grades for Al_2O_3, Cr_2O_3, K_2O, LOI, S and TiO_2 are estimated into the block model using inverse distance weighting to a power of three (ID3) estimation.

- Mineral resources were classified into Measured, Indicated, and Inferred Mineral Resources categories based on the geological understanding of mineralization and structure on the property, the quality of the underlying drilling data, history of mining production and reconciliation, mineralization and grade continuity, and drillhole spacing.
- It is the QP's opinion that the classification at Bloom Lake is a reasonable reflection of the overall mineral resource risks associated with geologic understanding and confidence, data support, and grade continuity associated with the varying levels of resource categories assigned.
- The mineral resources for the Bloom Lake project are reported at a cut-off grade of 15% Fe, within an optimized open pit shell using a long-term iron price of USD110.24/dmt for 65% Fe content, a premium of USD2.04/dmt for the 66.2% Fe concentrate and an exchange rate of 1.27 CAD = 1.00 USD.
- The Measured and Indicated Mineral Resources for the Bloom Lake project are estimated at 1,252.2 Mt with an average grade of 28.7% Fe and Inferred Mineral Resource at 246.3 Mt with an average grade of 26.6% Fe.
- The QP is satisfied that the mineral resources were estimated following CIM Estimation of Mineral Resource and Mineral Reserve Best Practices Guidelines (November 2019). The mineral resources may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent mineral resource estimates. The mineral resources may also be affected by subsequent assessments of mining, environmental, processing, permitting, taxation, socio-economic, and other factors.

25.3 Metallurgy and Processing

Extensive metallurgical testwork was historically performed on the Bloom Lake mine ore. Furthermore, the Bloom Lake concentrator Phase I, in its current configuration, has been in operation since 2018 and Phase II, since 2022. The operational data from that period suggests that although recoveries are on average lower than what the models predict, the likely causes are for the most part, independent of the feed ore and related to the plant operation, which is expected to improve as experience and knowledge is gained with different ore blends. High magnetite feed levels, on the other hand, could also be linked to lower recovery events.

The recovery models developed in the previous phases can be considered valid to be used with the new life of mine (LOM) considering that:

- The LOM feed grades ranges have remained the same since the Phase I study;
- Despite an increase of the average magnetite feed grade, historical testwork has shown that magnetite recoveries are similar to hematite recoveries in the separation circuit;

- The HLS database shows that the new LOM ore is not different from the past LOMs, thus validating historical testwork results application on the new LOM;
- The Phase II variability testwork was performed on samples that are representative of the new LOM;
- Recovery models developed for Phase I and Phase II match the filtered production data relatively well, especially within the 28% to 29% Fe feed grade range which is where the LOM average feed grade is.

Bloom Lake Phase I and Phase II were designed to process ore at a nominal rate of 2,500 tph and 2,650 tph, respectively. With the new LOM design, the projected combined production is 14.78 Mtpy of concentrate at a 28.6% Fe feed grade and concentrate grade of 66.2% Fe with a Fe recovery of 82.0% and a weight recovery of 35.4%.

25.4 Mineral Reserves

- The mine design and Mineral Reserve estimate have been completed to a level appropriate for feasibility studies. Definitions for Mineral Reserve categories used in this Report are consistent with the CIM definitions as adopted by NI 43-101.
- Open pit optimization was conducted using Geovia Whittle (software version 4.7.2) to determine the optimal economic shape of the open pit to guide the pit design process. Pit optimization is based on a reference iron ore price (FOB Sept-Iles 66.2% Concentrate) of USD76.34/dmt concentrate and an exchange rate of 1.27 CAD/USD, equivalent to a CAD97.09/dmt.
- The cut-off grade (CoG) of the Bloom Lake deposit has historically been chosen as 15% Fe. It is still used both in this Report and in operations. Current cost/revenue model allows to calculate a break-even cut-off grade and the result of 14.1% Fe supports the current practices.
- Pit Shell 16 is selected for guiding the pit designs, as is it close to the economic maximum and to the former pit designs. This selection allows for an 18-year mine life. This shell has a total tonnage of 1,357 Mt including 753 Mt of ore at an average diluted grade of 28.7% Fe. The average strip ratio is 0.80 while the marginal strip ratio is 1.81.
- The final pit includes three areas: Bloom West, Pignac, and Chief's Peak. Pignac and Chief's Peak are merged into one large pit; however, they are referred to as separate entities for operations and historical reasons.
- As of April 1, 2023, the Proven and Probable Mineral Reserves total 716 Mt at an average grade of 28.6% Fe. The total tonnage to be mined is estimated at 1,402 Mt for an average strip ratio of 0.96, which includes overburden.
- The open pit generates 685.7 Mt of overburden and waste rock.

25.5 Mining Methods

The operation consists of a conventional surface mining method using an owner mining approach with electric hydraulic shovels, wheel loaders and trucks with a target of sustaining the mill feed every year at a rate of 41.9 Mtpy.

- The project already owns four Caterpillar 6060 electric drive hydraulic front shovels. Five production FEL (either Komatsu WA1200-6 or LeTourneau L1850) will complement the hydraulic shovels.
- Mining of the Bloom Lake project is now planned with 13 sub-stages in three pits. The phases are divided as follows:
  - Bloom West (BW) with six sub-stages;
  - Bloom Pignac (BP) with three sub-stages;
  - Bloom Chief's Peak (BC) with four sub-stages.
- Fully permitted capacity from the effective date is approximately 80 Mt and is sufficient for the next 2 years of the mine life. Full permitting of all remaining capacity (~658 Mt) is expected to be finalized and obtained in calendar year 2023.
- Four dumps are planned in the mine life, Mazaré, Triangle, Sud-Ouest & Sud with a combined remaining capacity of 738.6 Mt.
- The life of mine schedule was developed with the Deswik.GO software and Deswik.Blend was used to optimize the haulage. The new LOM plan has an 18-year lifespan, scheduled to end in 2041.
- The initial ex-pit mining rate is 75 Mtpy and stays stable for 3 years. The mining rate then gradually increases to reach 90 Mtpy in financial year (FY) 2030. The mining rate declines, starting in FY2038, as sufficient ore for the mill is accessible.
- In full production years, the concentrate production averages 14.8 Mtpy. The concentrate, at 66.2% iron, is obtained with a combined Phase I and Phase II metallurgical recovery that averages 82.0% over the same period.

25.6 Environmental Studies

The mine has been authorized for operation under the federal environmental authorities and provincial governments (decrees, numerous certificates of authorizations and numerous ministerial authorizations).

New tailings storage facility and waste rock stockpile has been authorized by a provincial governmental decree. At the federal level, the process of amendment of Schedule 2 of the MDMER for disposal of mining wastes in fish habitats is ongoing. There are no issues with the deliverance of the authorizations in due time and therefore the project schedule should not be impacted. The mine conducts routine monitoring of water, wastewater and air as part of their decrees and authorizations.

The MRNF has approved the closure plan on February 28, 2023. The financial guarantee has been estimated by the MRNF at $131,716,031. By the end of February 2023, $51,258,281 was already deposited in the financial guarantee. The provision of the financial guarantee will be as follows: $40,228,875 at the end of May 2023, $20,114,437 at the end of February 2024, and $20,114,437 at the end of February 2025 for a total of $80,749,750.

25.7 Infrastructure

All mine infrastructure required for current mining operations are built and operational. Two items are to be constructed in the near-term to support future mining operations:

- Mine maintenance garage expansion (2023-2024);
- Additional 34.5-7.2 kV electrical substation (2025-2026).

25.8 Market Studies and Contracts

In line with the consensus and with Wood Mackenzie's calculations, a conservative value of USD99/t should be used in order to assess the long-term price of the future Bloom Lake concentrate. The ocean freight costs are estimated at USD24.48/dmt, finally yielding an FOB selling price of the Bloom Lake concentrate of USD76.34/dmt over the LOM.

As Bloom Lake is an operating mine, all contracts necessary for development and operations are in place. All contracts are under terms and rates that are within the industry norms.

25.9 Capital and Operating Costs

25.9.1 Capital Cost

Since the mine is in full production, all capital expenditures (CAPEX) are classified as sustaining capital spending. The estimated sustaining capital expenditures for the remaining LOM are displayed in Figure 25-1.

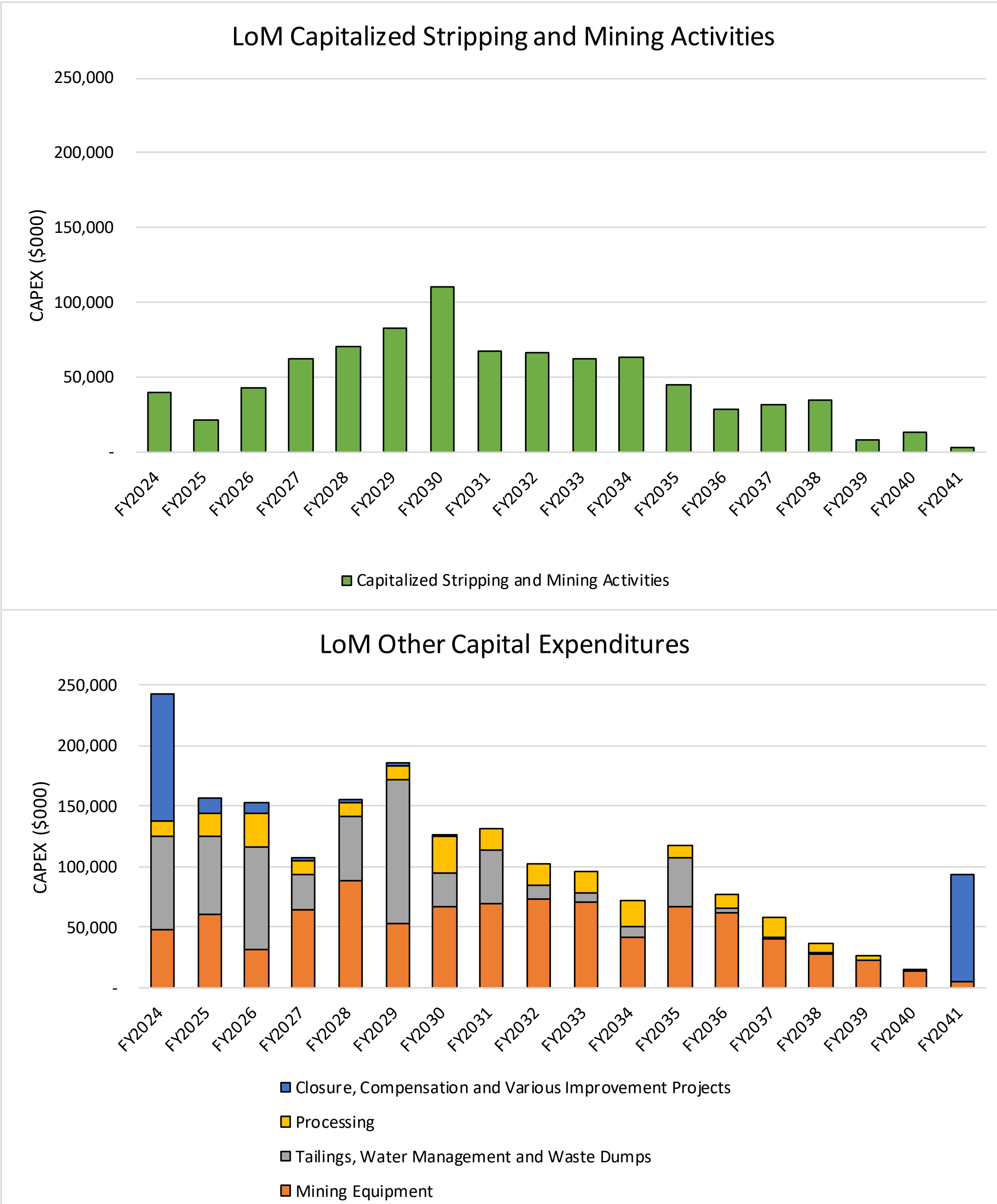


Figure 25-1: Capital expenditures required (CAD)

25.9.2 Operating Cost

The operating costs (OPEX) were determined using actual cost from the operating mine and current contracts using a simplified budget cost model. Costs displayed in Table 25-1 are comparable to cash costs, as they include adjustments for capitalized stripping.

Table 25-1: LOM operating costs

Cost centre	Unit cost (CAD)	Reference unit
Mining	$3.30/t	dmt mined
Processing	$4.75/t	dmt processed
Tailings and Water Management	$0.83/t	dmt processed
G&A	$3.35/t	dmt processed
Rail & Port	$21.14/t	dmt concentrate
Total	**$64.58/t**	**dmt concentrate**

25.10 Indicative Economic Results

The Bloom Lake mine is currently in production and this Technical Report does not include a material expansion of the current production. Therefore, economics are not presented.

26. Recommendations

26.1 Geology and Resources

- Infill drilling in shallow, within-pit regions of Bloom West and Chief's Peak is recommended for consideration of increasing confidence in zones of Inferred Mineral Resources.
- Review historical logging and assays to determine potential for mineralization continuity in Pignac area (to the south).
- Improve the QA/QC process to align with current good practices for iron ore evaluation, including increasing overall insertion rates of QC samples, obtaining certified blank materials (CRMs), and consistent use of CRMs appropriate for the deposit style and grade ranges observed at Bloom Lake.
- Improve the QA/QC process with additional focus on deleterious materials such as CaO, MgO, and S.
- Re-assay all available historical samples for S and update the database with analyses. Remove all high detection limit historical S data.
- A geometallurgical model should be further developed to provide material type prediction for mine and process planning including iron-bearing minerals (oxide, silicate, sulphide, and carbonate), iron oxide mineralogy and modal composition (magnetite, hematite, goethite, and limonite), and other potentially deleterious materials. This model should incorporate geological, lithological, mineralogical, and chemical data.

26.2 Metallurgical Testwork

Despite an increase of the average magnetite feed grade, historical testwork has shown that magnetite recoveries are similar to hematite recoveries in the separation circuit. This similarity is not observed on production data. Complete sampling campaigns should be performed under various feed conditions to fully understand the impact of magnetite on recovery and identify mitigation solutions. Depending on the sampling campaigns' results, the undertaking of a metallurgical testwork program could be recommended.

26.3 Processing Plant

Production data suggests that although recoveries are on average lower than what the models predict, causes are likely independent of the feed ore. An investigation into the causes of recovery losses resulting from plant operation methods and equipment performances should continue to be performed to optimize operation and implement mitigating actions.

26.4 Mineral Reserves

A feasibility study for a Direct Reduction Pellet Feed (DRPF) project was conducted, in partnership with BBA, to further remove silica from iron oxides while reducing energy consumption and improving iron recovery compared to traditional flowsheets. However, it has not been considered in any way in this Report. Once the design has reached a sufficient level of detail, its impact on the profitability of currently marginal ore should be assessed. Ultimate pit size, as cut-off grades and material routing, should be modified accordingly.

26.5 Waste and Water Management

Haulage cycle time studies have shown that truck requirements will be significant at the end of the mine life. Efforts should be undertaken to identify alternative waste dump areas.

26.6 Environment and Permitting

Authorizations will be required at provincial and federal levels for various project infrastructure. Permits are required by spring 2024 for *Halde Sud* and by spring-summer 2025 for *Halde Sud-Ouest*, *Halde Nord*, Basin A, and increase of the wastewater treatment plant capacity. Therefore, the permitting process should continue as a high-priority component.

26.7 Proposed Work Program

Table 26-1: Cost estimate for optimization studies

Activities	Estimated costs ($M)
▪ 1,000 metres of P1 resources conversion and derisking drilling and laboratory analysis of 700 samples by XRF, Fe_2+ by titration, Satmagan, C and S for LECO.	0.422
▪ Mineralogical analyses using automated systems such as MLA or Qemscan for grade control validation (total of 20).	0.080
▪ Mineralogical analyses using automated systems such as MLA or Qemscan of 25 low iron grade samples to better define the classification threshold into waste.	0.100
▪ Geometallurgical study combining automated mineralogy (MLA or Qemscan) and metallurgical testworks on a minimum of 10 composite samples representative of the lithologies defined in the Bloom Lake deposit with the objectives to improve the blending and the plant feed consistency.	0.150

27. References

Allard M. and M. K. Séguin, 1987. Le pergélisol au Québec nordique : bilan et perspectives. Géographie physique et Quaternaire, vol. 41, n° 1, p. 141-152.

Allaire, A., Leblanc, I., Richard, P.-L., Girard, M., and Rio Roberge, P., 2019. NI 43-101 Technical Report prepared for Quebec Iron Ore Inc. on behalf of Champion Iron Limited. Bloom Lake Mine Feasibility Study Phase 2, Fermont, Québec, Canada, effective as of June 20, 2019 and dated August 2, 2019. 442 pages.

Ausenco, 2017. NI 43-101 Technical Report on the Bloom Lake Mine Re-Start Feasibility Study, 101230-RPT-001, Version 1, March 17, 2017. Report prepared for Quebec Iron Ore on behalf of Champion Iron Limited.

BBA, 2008. Feasibility Study for 8 Mtpy Iron Concentrate, 2008-09.

Bekker, A., Krapež, B., Slack, G.F., Planavsky, N., Hofmann, A., Konhauser, K.O., Rouxel, O.J., 2011. Iron Formation: The Sedimentary Product of a Complex Interplay among Mantle, Tectonic, Oceanic, and Biospheric Processes, Economic Geology and the Bulletin of the Society of Economic Geologists, v. 105, p. 467–508.

Bokela, 2011. Performance Curve, 08-07-2011.

Champion Iron Limited, 2023. Champion iron reports record production for its FY2023 third quarter with Phase II reaching commercial production, and announces the positive findings of the direct reduction pellet feed project feasibility study. Press Release, June 26, 2023.

CIMA, 2010. Technical Report 43-101 on the feasibility study for the increase in production from 8 Mtpy to 10 Mtpy of concentrate for the Bloom Lake Project. Private report prepared for Consolidated Thompson Iron Mines Limited, June 22, 2010.

Consolidated Thompson and BBA, 2008. Technical Report by Consolidated Thompson Iron Mines Ltd. and BBA Inc. for the Bloom Lake Project, Labrador Trough, Québec, Technical Report 43-101 on the Feasibility Study for the Bloom Lake Project 8-million tonnes per year of Iron Concentrate, November 12, 2008.

Corem, 2019. Physical Separation Tests for the Development of Bloom Lake – Phase 2, Final Report No. T2472, May 23, 2019.

Cunningham, R.C. 1954. Geology Map, Quebec Cobalt and Exploration Bloom Lake Claims Group River Aux Pékans, New Québec, 1" to 400 feet.

Derrick, 2019. Derrick Screen Test Results with Bloom Lake AG Mill Discharge, January, 2019.

FLSmidth, 2011. Laboratory Testing Report for The Bloom Lake Iron Ore Mine Limited Partnership (Consolidated Thompson - Cliffs Natural). Sedimentation and Rheology Tests on Fine Tailings for Bloom Lake Phase 2 Concentrator Expansion Project, November 2011.

FLSmidth, 2019. Sedimentation and Rheology Testing Bloom Lake Phase 2 Project, March 2019.

GENIVAR, 2006. Projet de mine de fer du lac Bloom – Étude d'impact sur l'environnement. Rapport réalisé pour Consolidated Thompson Iron Mines Limited. 4 volumes, pagination multiple.

GENIVAR, 2011a. Projet minier du lac Bloom - Demande de modification de décret – Pit ouest. Rapport réalisé pour la Société en commandite de la Mine de fer du lac Bloom. 25 p. et annexes.

Golder, 2013. Caractérisation géochimique des stériles, du minerai, des résidus et du concentré de la mine de fer du lac Bloom. Rapport confidentiel présenté à Cliffs Natural Resources Inc. - SEC Mine de fer du lac Bloom. 18 p + annexes.

Golder, 2014a. Caractérisation géochimique des stériles et des résidus de la mine de fer du lac Bloom. Rapport confidentiel présenté à Cliffs Natural Resources. 15 p + annexes.

Golder, 2014b. Preliminary Geotechnical and Hydrogeological Assessments of the Current and Proposed Open Pit, Cliffs Natural Resources – Sec Mine de Fer du Lac Bloom. Report No, 001-13-1117-0032-4000-RevA.

Golder, 2021. Mémorandum technique – Caractérisation annuelle 2020 du minerai, résidus et concentré de la mine du Lac Bloom, Québec.

Golder, 2022. Caractérisation géochimique des stériles de la mine du Lac Bloom, Fermont, Québec.

Gross, G.A. 2009. Iron formation in Canada, genesis and geochemistry: Geological Survey of Canada, Open File 5987, 164 p.

GM 57129. Index of/documents/EXAMINE/GM57129 (gouv.qc.ca)

H. E. Neal &. Associates, 1976. Preliminary Evaluation, Québec Cobalt Property, March 1976.

MDDEP, 2012. Directive 019 sur l'industrie minière, Gouvernement du Québec, Ministère du Développement durable, le l'Environnement et des Parcs (now MELCCFP - Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs).

MELCC, 2020. Guide de caractérisation des résidus miniers et du minerai. 43 p. Ministère de l'Environnement, de la Lutte contre les changements climatiques (now MELCCFP - Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs).

MRNF, 2017. Ministère des Ressources naturelles et des Forêts, Guidelines for preparing mine closure plans in Québec - Ministère des Ressources naturelles et des Forêts (gouv.qc.ca). Publication No: M08-03a-1711, November 2017.

Mueller, R.F. 1960, Compositional characteristics and equilibrium relations in mineral assemblages of a metamorphosed iron formation. American Journal of Science, p. 449-497.

Rendu, J.M., 2008. An Introduction to Cut-Off Grade Estimation, SME, 106 p.

Rioux, N., 2009. Resource Estimate – Bloom Lake West Technical 43-101, Genivar Limited Partnership, 140 p.

Risto, R.W., Neal, H.E., Kociumbas, M.W., 1998. Report on the Bloom Lake Iron Deposit, 1998 Exploration Program for Québec Cartier Mining Company by Watts, Griffis and McOuat (WGM). Four Volumes.

Risto, R.W. et al., 2005. A Technical Review and Mineral Resource Estimate for the Bloom Lake Iron Deposit, Labrador Trough, Québec, for Québec Cartier Mining Company by Watts, Griffs and McOuat Ltd.

Soutex, 2011a. Essais Métallurgiques du gisement du Lac Bloom, Fosse Ouest, 2242 Rapport Final, version 1, 2011-04-21.

Soutex, 2012. Bloom Lake Expansion - Phase 2 Engineering Report, January 2012.

Soutex, 2013a. SGS Bench Scale Testwork Results, February 2013.

Soutex, 2013b. COREM Pilot Plant Testwork Results, February 2013.

Soutex, 2013c. Magnetite Plant Process Engineering Report for Feasibility Study, 2279 Engineering Report - Process, version 3, March 2013.

Soutex, 2019. Résultats de l'échantillonnage du circuit de séparation de la Phase 1, version 3, April 4, 2019.

SRK, 2011. NI 43-101 Technical Report. Bloom Lake Mine, Québec Province, Canada. Private Report prepared for Cliffs Natural Resources. Effective date: December 31, 2011.

SRK, 2013. Technical Report 43-101. Bloom Lake Mine, Québec Province, Canada. Report prepared for Cliffs Natural Resources, January 31, 2013.

Statistics Canada, 2021. Profile table, Census Profile, 2021 Census of Population - Fermont, Ville (V) [Census subdivision], Quebec (statcan.gc.ca).

WGM, 2005. Watts, Griffis, and McOuat Limited, A Technical Review and Mineral Resource Estimate for the Bloom Lake Iron Deposit Labrador Trough, Québec for Consolidated Thompson-Lundmark Gold Mines Limited, 05-2005.

WSP, 2014. Mine de fer du lac Bloom. Augmentation de la capacité de stockage des résidus et stériles miniers à la mine de fer du lac Bloom. Étude d'impact sur l'environnement. Rapport principal, réalisé pour Cliffs – SEC Mine de Fer du Lac Bloom. Pagination multiple + annexes.

WSP, 2022a. Évaluation es solutions de rechange pour l'entreposage des résidus miniers - Augmentation de la capacité de stockage des résidus et stériles à la mine de fer du Lac Bloom.

WSP, 2022b. Programme de compensation pour l'habitat du poisson en vertu du REMMMD. - Augmentation de la capacité de stockage des résidus et stériles à la mine de fer du Lac Bloom.