CHAMPION IRON MINES LIMITED

Preliminary Feasibility Study of the West and East Pit Deposits of the Fire Lake North Project

Fermont Area, Québec, Canada

NI 43-101 TECHNICAL REPORT

January 25th, 2013

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Patrice Live, Eng., **BBA Inc.**
Tracy Armstrong, P.Geo., **P&E Mining Consultants Inc.**
Antoine Yassa, P.Geo., **P&E Mining Consultants Inc.**
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BBA

IN COOPERATION WITH:

P&E MINING CONSULTANTS INC. Geologists and Mining Engineers

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ROCHE 50e

DATE AND SIGNATURE PAGE

This report is effective as of the 25th day of January 2013.

The date of issue of the report is the 22nd day of February 2013.

André Allaire, Eng., M.Eng., Ph.D. Vice-President, Mining and Metals Markets BBA INC.	February 22nd, 2013 Date
Patrice Live, Eng. Manager of Mining BBA INC.	February 22nd, 2013 Date
Tracy Armstrong, P.Geo. Independent Geological Consultant P&E Mining Consultants Inc.	February 22nd, 2013 Date
Antoine R. Yassa, P.Geo. Independent Geological Consultant P&E Mining Consultants Inc.	February 22nd, 2013 Date
Martial Major, Eng. Vice-President, Engineering and Major Projects Rail Cantech Inc.	February 22nd, 2013 Date

CERTIFICATE OF QUALIFIED PERSON

André Allaire, Eng.

To Accompany the Report entitled:

"NI 43-101 Technical Report Preliminary Feasibility Study of the West and East Pit Deposits of the Fire Lake North Project".

Effective Date: January 25th, 2013

Issue Date: February 22nd, 2013

I, André Allaire, Eng., M.Eng., Ph.D., do hereby certify that:

1) I am Director, Mining and Metals with BBA with an office at 630, Rene-Levesque West, Suite 1900, Montreal, Quebec, H3A 4V5;
2) I graduated from McGill University in Montréal with a B.Eng. in Metallurgy in 1982 and a Ph.D. in 1991;
3) I am a registered member of the Order of Engineers of Quebec (#38480);
4) I have worked as a process engineer continuously since my graduation from university;
5) I have read the definition of "qualified person" set out in the National Instrument 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 an independent qualified person for the purposes of NI 43-101;
6) I am responsible for Chapters 1, 2, 3, 13, 17, 18, 19, 20, 21, 22, 24, 25, 26 and 27 of this Technical Report;
7) I have had no prior involvement with the properties that are the subject of the Technical Report;
8) I have visited the site on September 22nd, 2010;
9) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this report;
10) Neither I, nor any affiliated entity of mine, is at present under an agreement, arrangement or understanding or expects to become an insider, associate, affiliated entity or employee of Champion Iron Mines Ltd., or any associated or affiliated entities;
11) Neither I, nor any affiliated entity of mine, own directly or indirectly, nor expect to receive, any interest in the properties or securities of Champion Iron Mines Ltd., or any associated or affiliated companies;

12) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three years from Champion Iron Mines Ltd., or any associated or affiliated companies;

13) I have read NI 43-101 and Form 43-101F1 and have prepared the technical report in compliance with NI 43-101 and Form 43-101F1; and have prepared the report in conformity with the generally accepted Canadian Mining Industry practices and, as of the date of the certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to ensure the technical report is not misleading.

This 22nd day of February 2013.

{ORIGINAL SIGNED AND SEALED}

André Allaire, Eng., M.Eng., Ph.D
Vice President, Mining and Metals Markets
BBA Inc.

CERTIFICATE OF QUALIFIED PERSON

Patrice Live, Eng.

To Accompany the Report entitled:

“NI 43-101 Technical Report Preliminary Feasibility Study of the West and East Pit Deposits of the Fire Lake North Project”.

Effective Date: January 25th, 2013

Issue Date: February 22nd, 2013

I, Patrice Live, Eng., do hereby certify that:

1) I am Manager of Mining with BBA with an office at 630, Rene-Levesque West, Suite 1900, Montreal, Quebec, H3A 4V5;
2) I graduated from Université Laval of Quebec, Canada with a B.Sc. in Mining in 1976;
3) I am a registered member of the Order of Engineers of Quebec (#38991);
4) I have worked as a mining engineer continuously since my graduation from university;
5) I have read the definition of “qualified person” set out in the National Instrument 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 an independent qualified person for the purposes of NI 43-101;
6) I am responsible for Chapters 15 and 16 of this Technical Report;
7) I have had no prior involvement with the properties that are the subject of the Technical Report;
8) I have visited the site on September 20th, 2010;
9) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this report;
10) Neither I, nor any affiliated entity of mine, is at present under an agreement, arrangement or understanding or expects to become an insider, associate, affiliated entity or employee of Champion Iron Mines Ltd., or any associated or affiliated entities;
11) Neither I, nor any affiliated entity of mine, own directly or indirectly, nor expect to receive, any interest in the properties or securities of Champion Iron Mines Ltd., or any associated or affiliated companies;

12) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three years from Champion Iron Mines Ltd., or any associated or affiliated companies;

13) I have read NI 43-101 and Form 43-101F1 and have prepared the technical report in compliance with NI 43-101 and Form 43-101F1; and have prepared the report in conformity with the generally accepted Canadian Mining Industry practices and, as of the date of the certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to ensure the technical report is not misleading.

This 22nd day of February 2013.

{ORIGINAL SIGNED AND SEALED}

Patrice Live, Eng.
Manager, Mining
BBA Inc.

CERTIFICATE OF QUALIFIED PERSON

TRACY J. ARMSTRONG, P.GEO.

I, Tracy J. Armstrong, P.Geo., residing at 2007 Chemin Georgeville, res. 22, Magog, QC J1X 0M8, do hereby certify that:

1. I am an independent geological consultant contracted by P&E Mining Consultants Inc.

2. This certificate applies to the technical report titled "Preliminary Feasibility Study of the West and East pit deposits of the Fire Lake North project", (the "Technical Report") with an effective date of January 25th, 2013.

3. I am a graduate of Queen's University at Kingston, Ontario with a B.Sc (HONS) in Geological Sciences (1982). I have worked as a geologist for a total of 27 years since obtaining my B.Sc. degree. I am a geological consultant currently licensed by the Order of Geologists of Québec (License No. 566), the Association of Professional Geoscientists of Ontario (License No. 1204) and the Association of Professional Engineers and Geoscientists of British Columbia (License 34027);

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;

   My relevant experience for the purpose of the Technical Report is:

• Underground production geologist, Agnico-Eagle Laronde Mine	1988-1993
• Exploration geologist, Laronde Mine	1993-1995
• Exploration coordinator, Placer Dome	1995-1997
• Senior Exploration Geologist, Barrick Exploration	1997-1998
• Exploration Manager, McWatters Mining	1998-2003
• Chief Geologist Sigma Mine	2003
• Consulting Geologist	2003-present.

4. I visited the Oil Can Property on January 17 and 18, 2012.

5. I am responsible for authoring Sections 4 through 11, 23, and co-authoring Section 12.

6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.

7. I have had prior involvement with the Fire Lake North Property as co-author on the 2009 and 2010 Technical Reports and Preliminary Economic Assessment.

8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.

9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective date: January 25th, 2013
Signing Date: February 22nd, 2013

{SIGNED AND SEALED}

Tracy J. Armstrong, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

ANTOINE R. YASSA, P.GEO.

I, Antoine R. Yassa, P.Geo. residing at 3602 Rang des Cavaliers Rouyn-Noranda, Qc. J0Z 1Y2, do hereby certify that:

1. I am an independent geological consultant contracted by P&E Mining Consultants Inc.

2. This certificate applies to the technical report titled "'Preliminary Feasibility Study of the West and East pit deposits of the Fire Lake North project", (the "Technical Report") with an effective date of January 25th, 2013 and a signing date of February 22nd, 2013.

3. I am a graduate of Ottawa University at Ottawa, Ontario with a B.Sc (HONS) in Geological Sciences (1977)I am a geological consultant currently licensed by the Order of Geologists of Québec (License No 224) and by the Association of Professional Geoscientist of Ontario (License No 1890);

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;
   My relevant experience for the purpose of the Technical Report is:
   - Minex Geologist (Val d'Or), 3D Modeling (Timmins), Placer Dome 1993-1995;
   - Database Manager, Senior Geologist, West Africa, PDX, 1996-1998;
   - Senior Geologist, Database Manager, McWatters Mine 1998-2000;
   - Database Manager, Gemcom modeling and Resources Evaluation (Kiena Mine) 2001-2003;
   - Database Manager and Resources Evaluation at Julietta Mine, Bema Gold Corp. 2003-2006;
   - Consulting Geologist 2006-present;

4. I visited the Bellechasse & Fire Lake area on September 30, 2009, the Fire Lake North property was visited from June 30 to July 1, 2011 and the most recent visit to the property was from September 4 to 6, 2012.

5. I am responsible for authoring Sections 14, and co-authoring Section 12.

6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.

7. I have had prior involvement with the Consolidated Fire Lake North Property as co-author on the 2009, 2010, 2011 and 2012 Technical Reports and Preliminary Economic Assessments on the Fire Lake North, Oil Can and Bellechasse Properties.

8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.

9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective date: January 25th, 2013
Signing Date: February 22nd, 2013

{SIGNED AND SEALED}

Antoine R. Yassa, P.Geo.
OGQ # 224
APGO # 1890

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CERTIFICATE OF QUALIFIED PERSON

Martial Major, Eng.

To Accompany the Report entitled:

"NI 43-101 Technical Report Preliminary Feasibility Study of the West and East Pit Deposits of the Fire Lake North Project".

Effective Date: January 25th, 2013

Issue Date: February 22nd, 2013

I, Martial Major, Eng., do hereby certify that:

1) I am Vice-president, Engineering and Major Projects with Rail Cantech Inc with an office at 650 Lionel-Boulet Blvd, Varennes, QC, J3X 1P7;
2) I graduated from McGill University in Montréal with a B.Sc. Eng. in Applied Sciences in 1988;
3) I am a registered member of the Order of Engineers of Quebec (#101343);
4) I have worked in different capacities in the civil engineering, heavy industry and manufacturing sectors since my graduation from university and since 2006 in the railway industry; I have participated in the construction of major railway, road, municipal and industrial works along with conducting different infrastructure studies related to the railway industry;
5) I have read the definition of "qualified person" set out in the National Instrument 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 an independent qualified person for the purposes of NI 43-101;
6) I am responsible for Sections 18.1.20 and 24.3 of this Technical Report and ''Rail Cantech – Feasibility Study, Project No. 3524 for the Railway : Capex and Opex'';
7) I have had no prior involvement with the properties that are the subject of the Technical Report;
8) I have visited the site and part of the projected railway alignment on various occasions by ground and helicopter between September and December, 2012;
9) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this report;

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10) Neither I, nor any affiliated entity of mine, is at present under an agreement, arrangement or understanding or expects to become an insider, associate, affiliated entity or employee of Champion Iron Mines Ltd., or any associated or affiliated entities;

11) Neither I, nor any affiliated entity of mine, own directly or indirectly, nor expect to receive, any interest in the properties or securities of Champion Iron Mines Ltd., or any associated or affiliated companies;

12) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three years from Champion Iron Mines Ltd., or any associated or affiliated companies;

13) I have read NI 43-101 and Form 43-101F1 and have prepared the technical report in compliance with NI 43-101 and Form 43-101F1; and have prepared the report in conformity with the generally accepted Canadian Mining Industry practices and, as of the date of the certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to ensure the technical report is not misleading.

This 20th day of February 2013.

{ORIGINAL SIGNED AND SEALED}

Martial Major, Eng.
Vice-president, Engineering and Major Projects
Rail Cantech Inc

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LIST OF ABBREVIATIONS

'	feet, minutes (Long. / Lat.)
"	inches, seconds (Long. / Lat.)
$	Canadian Dollar
$US	U.S. dollars
%	Percent
% Fe (sol)	Percentage of soluble iron
<	Less than
>	Greater than
°	Degrees of arc
°C	Degrees Celcius
µm	Micrometer (10^{-6} meter)
2D	Two-Dimensional
3D	Three dimensional
A	JK Drop Weight Test Impact parameter
A	Ampere
AACE	Association for the Advancement of Cost Engineering
ABA	Acid / Base Accounting
AFWR	Adjusted Formula Weight Recovery
AG	Autogenous Grinding
AI	Abrasion Index (Bond)
AIP	Agreement-In-Principle
Al_2O_3	Aluminum Oxide (Alumina)
ALS Chemex	ALS Laboratory Group
Amp	Ampere
ANFO	Ammonium Nitrate - Fuel Oil
AP	Acid Generation Potential
APSI	Administration portuaire de Sept-Îles (Sept-Îles Port Authority)
ArcelorMittal	ArcelorMittal Mines Canada
As	Arsenic
asl	Above Sea Level
AUD	Australian Dollar
b	JK Drop Weight Test Impact Parameter
Ba	Barium
BAPE	Bureau d'audiences publiques sur l'environnement
BCM	Bank Cubic Meter

Bellechasse	The group of claims formerly designated as the Bellechasse Property
Bellechasse Mining	Bellechasse Mining Corporation Ltd.
BFA	Bench Face Angle
BNE	Non-Exclusive Lease
Bt	Billion Tonnes
BWI	Ball Mill Work Index (Bond)
CA	Certificate of Authorization
$CaCO_3$	Calcium Carbonate (Limestone)
CAD	Canadian Dollar
Canadian Javelin	Canadian Javelin Ltd.
CaO	Calcium Oxide
CAPEX	Capital Expenditure
CDA	Castonguay, Dandenault & Associates
CEAA	Canadian Environmental Assessment Act
CEET	Comminution Economic Evaluation Tool
CFIA	Canadian Food Inspection Agency
CFLN	Consolidated Fire Lake North
Champion	Champion Iron Mines Limited (formerly Champion Minerals Inc.)
CHM	Champion Iron Mines Limited (formerly Champion Minerals Inc.)
Ci	Crusher Index
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
Cl	Chlorine
cm	Centimetre
CN	Canadian National Railway Company
Co	Cobalt
CO_3	Carbonate
COG	Cut-Off Grade
Consolidated Thompson	Consolidated Thompson Iron Mines Limited
Cr	Chromium
Cr_2O_3	Chromium (III) Oxide

CRÉ	Conférence régionale des Élu(e)s
CRM	Certified Reference Material
CSV	Comma-Separated Values
Cu	Copper
CWI	Crusher Work Index (Bond)
d_{50}	median particle size
deg	Degrees of Arc
DFO	Fisheries and Oceans Canada
Dist	Distribution
DS	Double Start
DWT	Drop-Weight Test
EBS	Environmental Baseline Study
EEMP	Environmental Effects Monitoring Program
EIA	Environmental Impact Assessment
Eng.	Professional Engineer
EPA	U.S. Environmental Protection Agency
EPCM	Engineering, Procurement and Construction Management
EQA	Environment Quality Act
ESIA	Environmental and Social Impact Assessment
EW	Early Work
F	Fluorine
F_{80}	80% passing size for comminution device feed
Fancamp	Fancamp Exploration Ltd.
Fe	Iron
Fe% (sol)	Percentage of soluble iron
Fe_2O_3	Iron (III) oxide, ferric oxide
Fe_T	Total iron
FIFO	Fly-In Fly-Out
FIOD	Fermont Iron Ore District
Fire Lake North	The group of claims formerly designated as the Fire Lake North Property
FLN	Fire Lake North
FLNE	Fire Lake North East pit
FLNW	Fire Lake North West pit
FOB	Freight On Board
FS	Feasibility Study
Ft	Foot / Feet
g	Gram
G&A	General and Administrative
Ga	Billion years
Gaspésie	Gaspésie Mining Company Ltd.
GPS	Global Positioning System
h	Hour
H_2SO_4	Sulphuric Acid
Ha	Hectare
H-E	Hydraulic-Electric
HLS	Heavy Liquid Separation
HNO_3	Nitric Acid
HP	Horsepower
HQ	Hydro-Québec
hr	Hour
HT	Harvey-Tuttle
HVAC	Heating, Ventilation, and Air Conditioning
ICP-OES	Inductively Coupled Plasma - Optical Emission Spectroscopy
IF	Iron formation
IRA	Inter-Ramp Angle
IRR	Internal Rate of Return
ISP	Internet Service Provider
ITUM	Takuaikan Uashat Mak Mani-Utenam Innu
JEF	Job Efficiency Factor
JK	JKTech Pty Ltd
JK DWT	JK Drop Weight Test
Journeaux	Journeaux Associates
JV	Joint Venture
K_2O	Potassium oxide
K_{80}	80% passing size
Kelly Desmond	Kelly Desmond Mining Corporation Limited
kg	Kilogram
kg/m^3	Kilograms per cubic meter
kg/t	Kilograms per metric tonne
km	Kilometer
km/h	Kilometers per Hour
km^2	Square kilometer
Knight-Piésold	Knight-Piésold Ltd.
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt-hours

kWh/t	Kilowatt-hours per metric tonne
L or l	Liter
l/h	Liters per hour
Lakefield	Lakefield Research of Canada Ltd.
lb	Pound
LG	Lerchs-Grossman
LIDAR	Light Detection and Ranging
LIF	Lower Iron Formation
LOI	Loss on Ignition
LOM	Life of Mine
Long.	Longitude
LRC	Limited Range Count
M	million
m	Meter
M. Eng.	Master of Engineering
m^2	Square meter
m^3	Cubic meter
mag	magnetite
Mbps	Megabits per second
MBR	Membrane biological reactor
MDDEFP	Ministère du Développement Durable, Environnement, Faune et Parcs
Mesh	Tyler Standard Screen Series Mesh Size
mg	milligram
mg/l	Milligrams per liter
MgO	Magnesium oxide
M_{ia}	SAG Mill Comminution Work Index
Midway	The group of claims formerly designated as the Midway Property
MIF	Middle Iron Formation
min	Minutes
Mineral Resource	"Mineral Resource" as defined in NI 43-101
Mining Act	The Quebec Mining Act
MLA	Mineral Liberation Analyser
mm	Millimeter
Mm^3	Million cubic metres
MMER	Metal Mining Effluent Regulations
Mn	Manganese
MnO	Manganese oxide
Mo	Molybdenum
MOU	Memorandum of Understanding

MRB	MRB & Associates
MRC	Regional County Municipalities (Municipalité Régionale de Comté)
MRN	Ministère des Ressources Naturelles
MRNFQ	Ministère des Ressources Naturelles et de la Faune (Quebec)
MS	Mass Spectrometry
Mt	Million tonnes (metric)
MTA	Mining Tax Act
MTO	Material Take-Off
Mtpy	Million tonnes per year
MVA	Million volt amperes
MW	Megawatt
N	North
Na_2O	Sodium oxide
NAG	Net Acid Generation
Nfld	Newfoundland and Labrador
NGO	Non-Governmental Organization
NI	National Instrument (43-101)
Ni	Nickel
NI 43-101	National Instrument 43-101 – *Standards of Disclosure for Mineral Projects*
NN	Nearest Neighbour
No.	Number
NO_2	Nitrite
NO_3	Nitrate
NOH	Net Productive Operating Hours
NP	Neutralization Potential
NPV	Net Present Value
NSR	Net Smelter Royalty or Net Smelter Return
ø	Diameter
O/F	Overflow
O/S	Oversize
OB	Percent of block below bedrock surface, or Overburden
OER	Objectifs environnementaux de rejet
OHL	Overhead Line
Oil Can	The group of claims formerly designated as the Oil Can Property
opex	Operating Expenditure
P&C	Paterson & Cooke

P&E	P&E Mining Consultants Inc.
P. Geo	Professional Geoscientist
P.Eng	Professional Engineer
P_2O_5	Phosphorus oxide
P_{80}	80% passing size for comminution device product
Pa	Pascal
PAC	Polyaluminium chlorhydrate
PAI	Punctual Abundance Index
Pb	Lead
PEA	Preliminary Economic Assessment
PFS	Preliminary Feasibility Study
pH	Negative of the base-10 logarithm of hydrogen ion activity
Ph.D.	Doctor of Philosophy
PLC	programmable logic controller
PMF	Probable Maximum Flood
POV	Pre-Operational Verification
ppm	Parts per Million (mg/L)
Q	Quarter
QA/QC	Quality assurance and quality control
QC	Quality control
QCM	Québec Cartier Mining Company
QNS&L	Quebec North Shore and Labrador Railroad
QP	Qualified Person
Rail Cantech	Rail Cantech, Inc
RBHD	Rotary Blast Hole Drill
Rec	Recovery
RF	Revenue Factor
Rio Tinto	Rio Tinto Group
Roche	Roche ltée, Groupe-conseil
ROM	Run-of-Mine
RWI	Rod Mill Work Index (Bond)
S	Sulphur
SAG	Semi-Autogenous Grinding
SARA	Species At Risk Act
Sat	Satmagan measurement
Sb	Antimony
SCC	Standards Council of Canada
sec	Seconds
SEDAR	System for Electronic Document Analysis and Retrieval

SG	Specific Gravity
SGS	SGS Canada Inc.
SGS Lakefield	SGS Minerals Services (SGS Canada Ltd)
Sheridan	Sheridan Platinum Group Ltd.
SiO_2	Silicon Dioxide (Silica)
SMC	SAG (Semi-Autogenous Grinding) Mill Comminution
Sn	Tin
SO_4	Sulphate
SPCSRP	Soil Protection and Contaminated Sites Rehabilitation Policy
SPI	SAG (Semi-Autogenous Grinding) Power Index
SPLP	Synthetic Precipitation Leaching Procedure
SR	Stripping Ratio
SW	Southwest
T or t	Tonnes (metric)
t/h	Tonne per hour
t/m^3	Tonnes per cubic meter
t_a	Abrasion Characteristic (JK DWT)
TCLP	Toxicity Characteristic Leaching Procedure
THUA	Thickener Hydraulic Unit Area
TiO_2	Titanium Dioxide
TMF	Tailings Management Facility
Tons	Short tons
TOPO	Percent of block below topographic surface
tpd	Metric tonnes per day
tph	Metric tonnes per hour
tpy	Metric tonnes per year
TSS	Total Suspended Solids
TUFUA	Thickener Underflow Unit Area
U/F	Underflow
UIF	Upper Iron Formation
URSTM	Unité de recherche et de service en technologie minérale
USD	United States Dollar
UTM	Universal Transverse Mercator
V	Vanadium
v/v	By volume
V_2O_5	Vanadium (V) Oxide (Vanadium Pentoxide)

Vale	Vale SA
VHF	Very High Frequency
W	West
w/w	By weight
WHIMS	Wet High-Intensity Magnetic Separation
WRA	Whole Rock Analysis

WREC	Concentrate weight yield rate
Wt	Weight
XRD	X-Ray Diffusion
XRF	X-Ray Fluorescence
Y	Year
ZEC	Zone d'exploitation contrôlée
Zn	Zinc

1. EXECUTIVE SUMMARY

1.1 Introduction

The Fire Lake North (FLN) Project is being developed by Champion Iron Mines Ltd. (formerly Champion Minerals Inc.). The Project is situated within the Labrador Trough, in northern Québec. The FLN project consists of two (2) specular hematite deposits referred to as the East deposit and West deposit. A total of 464.6 Mt of Mineral Reserves, as classified according to NI 43-101 guidelines, have been defined and will be processed over 20 years using conventional open pit mining and processing methods. The material collected from the open pit mines will be crushed, stockpiled, ground and treated by a gravimetric process in order to liberate and separate iron particles from the gangue material. The tailings generated will be pumped to a tailings management facility located near the concentrator, while the final hematite concentrate will be filtered and loaded into rail cars for delivery to the Port of Sept-Îles. The project includes a rail link from FLN to Pointe-Noire, rail garages and rolling stock. The Pointe-Noire site includes a stockyard and ship loading facilities where the concentrate will be stockpiled and loaded onto ships prior to final delivery to Champion's clients.

Over the life-of-mine (LOM), an average of 9.3 Mtpy of concentrate at 66% Fe will be produced.

1.2 Geology and Mineralization

The Project is situated in the Fermont Iron Ore District (FIOD). The FIOD lies within the Paleo-Proterozoic fold and thrust belt known as the Labrador Trough, which hosts extensive iron formations. Within the Southern Domain of the Labrador Trough, the Knob Lake Group comprises six (6) formations. The Sokoman Formation, also known as the Wabush Iron Formation, is the ore-bearing unit in the Knob Lake Group and is subdivided into Lower Iron Formation (LIF), Middle Iron Formation (MIF) and Upper Iron Formation (UIF) members.

The iron in the UIF, MIF and LIF is, for the most part, in its oxide form, mainly as specular hematite and specularite in its coarse-grained form and, to a lesser extent, as magnetite. Some of the iron content is bound within iron silicates, which are considered as deleterious elements with respect to the iron resource. The main gangue mineral in the iron deposits is quartz, which constitutes approximately 50% of the ore. The most significant structural factor, economically, is the common thickening of rock units; with the thickened, near-surface, synclinal hinges being the most favourable feature for open pit mining.

The deposits underlying the Project are Lake Superior-type iron formations. Iron formations are classified as chemical sedimentary rock containing greater than 15% iron, consisting of iron-rich beds usually interlayered on a centimetre scale with chert, quartz or carbonate. Ore is mainly composed of magnetite and hematite and commonly associated with mature sedimentary rocks. Extensive Lake Superior-type iron formations occur on all continents in areas of relatively stable sedimentary-tectonic systems.

The Knob Lake Group underlying the northern half of Fire Lake North (Don Lake area) consists of a moderately northeast-dipping, overturned, curvilinear synform trending northwest-southeast for approximately six (6) km. The synform is cored by LIF and MIF members of the Sokoman Formation. Airborne magnetic surveys show that the Sokoman Formation continues to the southeast. In the southern part of the Fire Lake North property, this structure gradually changes orientation toward the south-southeast. The southern half of Fire Lake North has distinct iron formation-hosting structures in the western, centre and eastern parts. Geophysical magnetic-response anomalies indicate that the western structure is continuous with the synclinal structure in the Don Lake area.

1.3 Exploration and Drilling

The Fermont project area has been the subject of regional mineral exploration assessment by numerous mineral exploration and mining companies from the middle of the last century to the present day.

In 2008, a 3855 line-km airborne magnetic and electromagnetic (VLF-EM) geophysical survey was performed over all properties held by Champion in the FIOD area. Following this reconnaissance program, 31 new claims (16.28 km^2) were added to Fire Lake North and the property was merged with the former Don Lake Property.

The 2009 exploration program was designed as a 4000 m drilling program to delineate the Fire Lake North (including Don Lake area) and Bellechasse iron formations and to quantify a near-surface mineral resource estimate.

The 2010 winter drill campaign at Fire Lake North was focused on the East Pit and West Pit areas. A total of 4130 m were drilled in 24 holes at a drill hole spacing of 400 m from late February to early April 2010.

Champion carried out a diamond drilling program at the Don Lake, East Pit, and West Pit areas of Fire Lake North from September 2010 to August 2011. Sixteen new holes were drilled at the Don Lake area for a total of 4805 m, 29 holes at the East Pit area for a total of 10 642 m, and 31 new holes for a total of 9448 m at the West Pit area. The total number of metres drilled in late 2010 and 2011 was 26 221 m in 84 holes.

Feasibility Definition Drilling commenced at Fire Lake North in mid-November 2011 and Champion completed Phase I in June 2012. Drilling was focused within the proposed West area designed pit limits and the East area starter pit, as outlined by the November 2011 PEA. More than 22 000 m of definition drilling was completed in both the East and West pit areas, with over 17 000 m of this being carried out in the West pit area.

Champion carried out a trenching program at Fire Lake North between July 31st and September 20th, 2012. A total of 29 trenches were completed and sampled, over a total strike length of 2.5 km.

1.4 Sample Preparation and Data Verification

All drill core logging and sample preparation were conducted by qualified Champion personnel, as required by NI 43-101 standards, at Champion's core logging facilities. For the drill program, logging was done at either the Wabush Industrial Park warehouse, or the Fire Lake North Camp or the Bellechasse Camp, both of which are located adjacent to Highway 389. The HQ/NQ/BQ-sized drill core was split in half, and one-half of the drill core was kept in the core tray for reference purposes. Samples were shipped to either the COREM laboratory in Québec City or to the ALS Minerals facility in either Sudbury, Ontario or Val-d'Or, Québec, for sample preparation.

Fire Lake North was last visited by Mr. Antoine Yassa, P.Geo., an independent QP, as defined by NI 43-101, from September 4th to September 6th, 2012. Nine (9) samples were collected from three (3) drill holes. The samples were documented, bagged, and sealed with packing tape and taken by Mr. Yassa to Purolator Courier where they were shipped to the offices of P&E in Brampton, Ontario. Independent testing by P&E confirmed the Fe_T assay results conducted by Champion.

1.5 Mineral Processing and Metallurgical Testwork

During the Preliminary Feasibility Study, a metallurgical test program was undertaken in order to evaluate ore treatment parameters and provide data for flowsheet development and preliminary equipment sizing. Testwork was performed on material from the West Pit and East Pit zones; material from the Don Lake zone was not used. The testwork included:

- Ore grindability assessment;
- Pilot Plant trials;
- Metallurgical performance and liberation size analysis by Heavy Liquids Separation;
- Settling and filtration tests;
- Environmental characterization.

Analysis of the ore grindability testwork results determined that a 16 MW, 11.6 m x 6.6 m (38 ft x 21.5 ft) AG mill would be required to achieve 23 Mtpy throughput when treating West Pit material. A supplementary 9.8 m x 5.0 m (32 ft x 16.5 ft) AG mill would also be required to maintain this throughput when treating East Pit material.

The pilot plant consisted of a conventional arrangement of the AG mill, followed by three (3) stages of spirals. The final production run achieved 83.2% iron recovery, with a 65.9% Fe_T concentrate grade.

Heavy Liquids Separation (HLS) was used to determine liberation size and metallurgical performance. Results are summarized in the table below.

Table 1-1: West Pit and East Pit HLS Results at 100% Passing 20, 24 and 28 Mesh

Grind Size (100% Passing)	Average Head Grade (% Fe_T)	Wt Recovery (%)	Fe Recovery (%)	Fe_T (%)	SiO_2 (%)
West Pit 20 mesh (38 samples, 1 repeat)					
20 mesh (850 µm)	34.2	44.4	84.6	66.0	5.1
East Pit 20-28 mesh (38 samples)					
20 mesh (850 µm)	32.8	41.4	81.7	64.7	6.8
24 mesh (700 µm)	32.8	40.7	80.6	65.4	6.1
28 mesh (600 µm)	32.8	39.0	78.4	66.1	5.1

Settling and filtration testwork indicated that the concentrate and tailings had similar filtration and thickening performance, respectively, to similar iron ore operations in the Fermont area.

Environmental characterization demonstrated the tailings to be non-acid generating.

1.6 Mineral Resources

P&E prepared a mineral resource estimate in accordance with NI 43-101, and assessed in conformity with generally accepted CIM “Estimation of Mineral Resource and Mineral Reserves Best Practices” guidelines. The effective date of this mineral resource estimate is July 23rd, 2012.

Based on the mineral resource model, the Total Mineral Resources for the Fire Lake North Deposits at a 15% Fe_T cut-off are estimated, as indicated below, in Table 1-2.

Table 1-2: Fire Lake North Resource Estimate at 15% Fe_T Cut-Off

Deposit	Measured		Indicated		Inferred	
	Million Tonnes	Grade Fe_T	Million Tonnes	Grade Fe_T	Million Tonnes	Grade Fe_T
East Area	3.0	34.2%	262.0	29.6%	192.4	28.7%
West Area	23.6	35.4%	404.9	32.6%	329.2	30.9%
Total	26.6	35.2%	666.9	31.4%	521.6	30.1%

1.7 Mineral Reserves

The final PFS rock-code block models for the Fire Lake North West and East deposits were provided by P&E Mining Consultants Inc. on October 4th, 2012 and September 10th, 2012, respectively. The models were provided as Comma Separated Value files (CSV) in a UTM NAD83 Zone 19 coordinate system.

The variables in the model include block coordinates, total iron grade (Fe_T), Density, Rock Type, Percent and Class. The density follows a regression curve for mineralized rock, and the waste rock densities are variable depending on different rock types, which are divided between mineralized and non-mineralized rock types. The class item is divided among Measured, Indicated and Inferred mineralized rock categories. Since this Study is a PFS, only Measured and Indicated rock categories will be considered for the economics of the project.

With that in mind, economic pit shell optimization uses the true pit optimizer Lerchs-Grossman 3-D (LG 3D) algorithm in MineSight. The LG 3-D algorithm is based on the graph theory and calculates the net value of each Measured or Indicated block in the model. The net value of each block is calculated using a series of cost and selling parameters including: concentrate selling price (FOB), mining, processing and other costs, and the Fe recovery for each block, pit slopes, and other constraints. The pit optimizer searches for the pit shell with the highest undiscounted cash flow. The chosen selling price used for the chosen pit optimizations (East and West) was $74.82/t concentrate.

The milling cut-off grade (COG) used for this Study to classify material as Mineral Resource or waste is 15% Fe_T. This COG is in line with similar iron ore projects in the region and their historical data.

A pit slope study was performed by Knight-Piésold to develop the engineered pit, using the optimized pit shell at 15% Fe_T COG. The pit slope study incorporated operational and design parameters such as ramp grades, surface constraints, bench angles and other ramp details. Once the operational pit was designed, a yearly mine plan was determined based on specific mining rates and production goals. The Mineral Reserves were determined from the detailed engineered pit design and the real-life mine plan.

Table 1-3: Champion Fire Lake North PFS Mineral Reserves

FLN Combined Reserves			
CoG 15% Fe_T			
	Tonnage	Grade	W.R
	Mt	Fe_T%	Wrec%
Proven	23.73	35.96	45.00
Probable	440.86	32.17	39.58
Total Reserve	464.59	32.37	39.86
OB	120.17		
Waste Rock	1107.55		
Inferred (considered waste)	45.80		
Total Stripping	1273.53		
Stripping Ratio (w/OB)	2.74		

1.8 Mining Methods

Mining operations are based on a 24-hour per day, seven (7) days per week and 360 days per year production schedule. The life of mine (LOM) is approximately 20 years and is based on the plant production capacity of 23 Mtpy for the West Pit, and 24.8 Mtpy for the East Pit. The East Pit production tonnage is contingent on the construction of a second AG mill. The mine plan takes into account a construction period and a pre-production period. The first and second years of the production schedule are planned on a semi-annual basis.

The period plans of the mine production schedule were developed using MineSight software Interactive Planner Module and optimized phases as guides.

The mining method selected for the Project is based on conventional drill, blast, load and haul. Annual mining equipment fleet requirements were developed based on equipment performance parameters and average hauling distances.

The primary equipment at the peak in the mine life consists of 40 x 222 t diesel haul trucks, 2 x 28 m^3 bucket rope shovels, 1 x 22 m^3 bucket hydraulic electric shovel in ore, 2 x 27 m^3 bucket hydraulic electric shovels in waste, a 15 m^3 bucket wheel loader and 5 x 12¼ inch rotary blast hole drills.

The mine operating and capital costs have been estimated by BBA and consist of equipment energy, equipment maintenance and replacements, blasting and drilling, personnel, and other costs. It is assumed that the mine equipment will be owned by Champion and the workforce will be directly employed by Champion, except for contracted blasting services.

Figure 1-1 presents the tonnes of overburden, waste, and ore mined, along with head grades and recoveries over the Life of Mine.

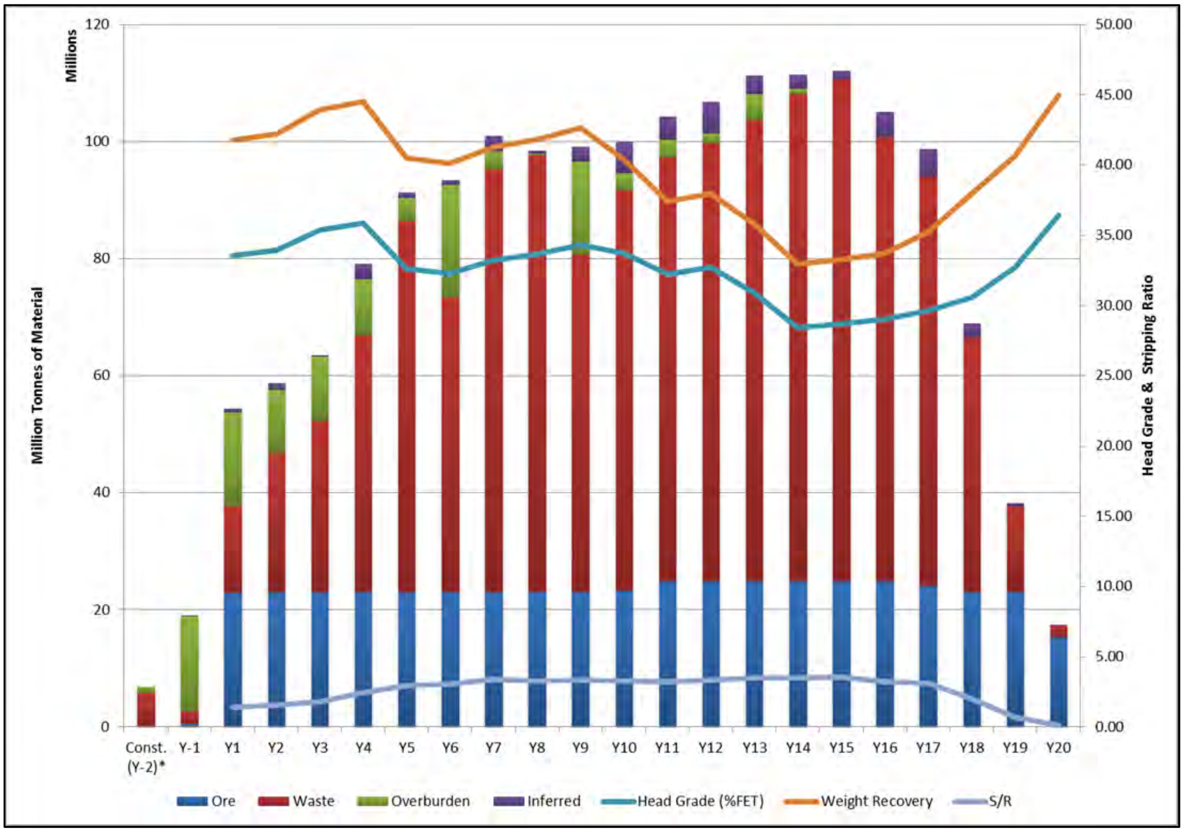


Figure 1-1: Tonnes of Ore, Waste and Overburden Mined, Head Grade, and Recoveries over LOM

1.9 Recovery Methods and Processing Plant Design

Metallurgical testwork results from the Preliminary Economic Assessment, as well as some results from pre-feasibility testwork, were used to develop process design criteria and a flowsheet, as well as perform preliminary equipment sizing. In developing the process design criteria, the use of a high grade ore and nominal grade ore was considered, and equipment was sized to meet the worst case scenario. General process design values and production rates are summarized in Table 1-4 and Table 1-5 below. Pre-feasibility testwork took place at the same time as the process design basis and plant design were being developed; as a result, certain parameters used in this section (for example, concentrate grade) are different from those used in other sections.

Table 1-4: General Process Design Basis Values

Criterion	Nominal Value	High Grade Value	Unit
Weight Recovery	37.8	44.7	%
Iron Recovery	82	82	%
Head Grade	30.0	35.4	% Fe
Concentrate Grade	65.0	65.0	% Fe
Plant Utilization	92	92	%

Table 1-5: Concentrate Production and Nominal and Design Production Rates

Material	Average Annual Throughput (Mtpy)	High Grade Annual Throughput (Mtpy)	Hourly Throughput (tph)		
			Average Nominal	High Grade Nominal	Design
Feed	23.0	23.0	2,854	2,854	3,282
Concentrate	8.7	10.3	1,080	1,274	1,466
Tailings	14.3	12.7	1,774	1,579	2,040

The process flowsheet and resulting plant design consists of the major processing areas:

- ROM ore from the open pit or stockpile is hauled to the crusher area where a gyratory crusher reduces the ore to -250 mm (10") in size;
- Crushed ore is conveyed by overland conveyors to the crushed ore stockpile;
- Crushed ore is reclaimed from the stockpile and fed to the AG mill, which is in closed circuit, with a two-stage screening circuit;
- Product from the AG grinding and screening circuit is fed to the three-stage spiral circuit for gravity concentration, producing tailings and a final gravity concentrate;
- The final gravity concentrate is filtered and conveyed to the concentrate load-out area;
- Tailings from the spirals are classified using cyclones. Fine tailings are dewatered in the fine tailings thickener, while coarse tailings are sent to the tailings pump box;
- Coarse and fine tailings are pumped to the Tailings Management Facility (TMF) together, using a single pipeline.

1.10 Project Infrastructure

The main features of the Fire Lake North site infrastructure are as follows:

- 10.3-km long rail loop, capable of holding two (2) entire trains;
- Secondary train maintenance shop;
- Connection to a new railway to be built between the FLN site and the Pointe-Noire terminal;
- An access road connecting the Property to the Trans-Québec Labrador Highway 389;
- The mine roads designed specifically for mine haul trucks and other mining equipment connecting the pit to the crusher, waste rock areas and to the mine services area;
- The mine services area consisting of the truck wash bay, mine garage, workshop, warehouse, employee facilities, diesel fuel tank farm and fueling station, etc.;
- The waste rock and overburden stockpiles;
- The primary crusher building;
- The overland conveyors and crushed ore stockpile;
- The ore processing plant (concentrator) and ancillary facilities;
- The concentrate load-out system, including concentrate conveyors;
- Parking areas for employees, light vehicles and heavy mining vehicles;
- The floating raw water pumphouse located on Lake Eva;
- The power transmission line and main electrical substation;
- The Tailings Management Facility and water reclamation and effluent treatment systems;
- The construction camp, designed to house 800 workers;
- The permanent camp, designed to house 400 workers.

The FLN property will be connected to the Pointe-Noire terminal in Sept-Îles by a new railway to be owned by Champion. The main line will extend for 311 km, and includes five (5) tunnel sections extending 14.7 km in total. Two (2) long-span bridges will also be built.

Champion will build a facility in Pointe-Noire, Québec, for receiving, unloading, stockpiling and reclaiming concentrate for ship loading. The Pointe-Noire facility includes the following infrastructure:

- The administration building.
- Rail access to Pointe-Noire, including a 1.6 km tunnel section (in addition to the five (5) tunnel sections previously mentioned).
- The 22.2 km long rail car discharge loop.
- The main train workshop.
- The concentrate storage yard.
- The stacker/reclaimer and interconnecting conveyor systems, leading to the Port of Sept-Îles ship loaders.

1.11 Market Studies and Contracts

Considering that commercial production for the Fire Lake North Project is scheduled to begin in 2016, BBA arrived at a medium-term (first five (5) years) and long-term (beyond five (5) years) price of $115/t and $110/t respectively, based on the Platts Index benchmark of 62% Fe iron ore concentrate landed at the port in China.

As of the effective date of this Report, no formal agreement or engagement has been signed or finalized by Champion with any potential client. Champion informed BBA that discussions with some of the world's largest bulk commodity traders are well advanced.

On July 18th, 2012, Champion announced that it has signed a long term agreement with the Sept-Îles Port Authority in relation to its planned 50 million tonne per year new multi-user port facilities. The Port Agreement has an initial term of 20 years, which is renewable for up to four (4) additional 5-year terms. This agreement guarantees Champion's ship-loading capacity at the Port of Sept-Îles for a minimum of 10 million tonnes of iron concentrate per year at preferential rates, using two (2) ship loaders, each with a capacity of 8000 tonnes per hour. The Port Agreement also provides an opportunity to expand Champion's reserved annual tonnage in the event of potential future expansions of iron concentrate production from Fire Lake North. Champion's buy-in payment is $25.58 million.

The railway, running from the mine site to Pointe-Noire, will be financed as follows:

- A railway contractor consortium would finance 60% (or $800.2M) of the railway capital cost over a 12-year term at an interest rate of 7%.
- A Canadian bank is interested in financing 25% (or $333.4M) of the railway capital cost for a 12-year term at an interest rate of 7.5%.
- The remaining 15% (or $200.0M) would be financed with internal capital raised by Champion as equity financing.

Champion is also participating in CN's Feasibility Study for a proposed new multi-user railway connecting mining projects in the Labrador Trough to the deep-water port facilities in Sept-Îles, Québec. Under the terms of the agreement with CN, Champion has committed to contribute $1 million to the feasibility study on the railway. The study is expected to be carried out over the next few months. (In February 2013, CN announced that it was suspending work on the Rail Feasibility Study).

Hydro-Québec will initially provide a connection from the existing 161 kV nearby line (161 kV line No. 1695) by mid-2013. This will supply power to the site for the construction period and for the operation of the first production line. A new 315 kV power line is expected to become available in 2018. As of the effective date of this Report, contract details are still being discussed with Hydro-Québec.

1.12 Environment

The overall Project is subject to environmental assessment provisions of the *Environment Quality Act* and the *Canadian Environmental Assessment Act*. The requirements for each of these processes are well understood. The Environmental Impact Assessment that is required pursuant to the *Acts* is in preparation. A schedule for the environmental assessment of the Project has been developed. Environmental studies have been conducted and reports either have been or are being prepared.

Permitting requirements are also well-defined and have been considered in the project plan.

A tailings management strategy has been defined and a feasibility level design for the Tailings Management Facility (TMF) has been developed. A siting study was undertaken and an appropriate area has been determined and located on the site plan, taking into account environmental considerations and constraints. Water in the polishing pond will be recycled to the mill, within the constraints of both water availability in the polishing pond, on the one hand, and concentrator water demand on the other. Water in excess of mill requirements will be released to the environment, meeting all regulatory requirements.

An overburden and waste rock stockpile feasibility level design has been developed, and locations are defined on the site plan. The identified areas do not contain any significant mineralization and make use of the natural topography. Discharges from the stockpiles will be routed to a series of sedimentation ponds to ensure adequate treatment and to meet required regulatory requirements prior to release to the environment.

A Rehabilitation and Closure Plan is being prepared for the Project. The Plan describes measures planned to restore the Property as close as reasonably possible to its former use or condition, or to an alternate use or condition that is considered appropriate and acceptable by the Department of Natural Resources (MRN). The Plan outlines measures to be taken for progressive rehabilitation, closure rehabilitation and post-closure monitoring and treatment.

1.13 Capital Costs

The Fire Lake North project scope covered in this Study is based on the construction of a greenfield facility having a nominal annual production capacity of 9.3 Mt of iron ore concentrate per year. The Capital Cost Estimate related to the mine, concentrator and FLN site infrastructure, as well as that of Pointe-Noire, was developed by BBA. The costs related to the construction and operation of a new railway linking the FLN site to Pointe-Noire were calculated by Rail Cantech. The closure plan was developed by

Journeaux, who also worked with BBA to design the tailings management facilities. The environmental compensation costs were provided by Roche. BBA consolidated cost information from all sources. A summary of the total capital costs for the Project is presented in Table 1-6.

Table 1-6: Total Capital Costs Summary

Cost Area		TOTAL Capital*
Fire Lake North & Pointe Noire	***Direct Costs***	
	Mining	$133.7M
	Concentrator and FLN Site Infrastructure	$1033.4M
	Pointe-Noire	$227.3M
	Indirect Costs	
	Owner's Cost	$53.2M
	EPCM	$106.5M
	Project Indirect Costs	$140.5M
	Contingency	$114.6M
	Sub-total	**$1394.4M**
Railway	***Direct Costs***	
	Railway*	$1005.8M
	Indirect Costs	
	Owner's Cost	$106.0M
	EPCM	$100.6M
	Contingency	$121.2M
	Other Capitalized Costs	
	Rolling Stock Leasing (Y-1)	$13.4M
	Sub-total	**$1347.0M**
GRAND TOTAL CAPEX		**$2741.4M**

* Total CAPEX excludes debt financing of the railway (i.e. railway at full capital cost of $1333.6M).

The total capital cost, including Indirect Costs and contingency, was estimated to be **$2741.4M**. The initial capital cost was estimated at **$1607.9M**, with an additional **$839.6M** in sustaining costs over the LOM. These costs are presented in Table 1-7.

Table 1-7: Pre-Production and Sustaining Captial

Cost Area		Pre-Production Capital*	Sustaining Capital**
Fire Lake North & Pointe Noire	***Direct Costs***		
	Mining	$133.7M	$438.8M
	Concentrator and FLN Site Infrastructure	$1033.4M	$290.5M
	Pointe-Noire	$227.3M	-
	Indirect Costs		
	Owner's Cost	$53.2M	-
	EPCM	$106.5M	-
	Project Indirect Costs	$140.5M	$43.6M
	Contingency	$114.6M	$66.8M
	Sub-total	**$1394.4M**	**$839.6M**
	Railway*	$200.0M	-
	Other Capitalized Costs		
	Rolling Stock Leasing	$13.4M	-
	Sub-total	**$213.4M**	**-**
GRAND TOTAL CAPEX		**$1607.9M**	**$839.6M**

*The total capital cost of the railway is $1333.6M. Champion will contribute $200M during pre-production while the remainings $1133.6M will be debt financed. The debt financed portion of the railway, including principle and interest payments, is presented in the Financial Analysis in Chapter 22, and is also presented in Table 1-8 as a LOM average operating cost.

Not included in the capital cost summary, but included in the financial analysis, are the following items:

- Principle and interest payments associated with the debt financing of the railway;
- Closure plan costs totalling $75.8M. The payments are made over the LOM on a schedule set by the provincial government;
- Payments to Hydro-Québec, totaling $217.5M, which are paid net of credits.

1.14 Operating Costs

The Operating Cost Estimate related to the mine, concentrator and FLN site infrastructure, as well as that of Pointe-Noire, was developed by BBA. The operating costs of a new railway linking the FLN site to Pointe-Noire were calculated by Rail Cantech.

The operating expenses calculated per tonne of concentrate produced are presented in Table 1-8. The Subtotal line shows the operating costs before rail financing, while the Grand Total line shows the operating costs once rail financing costs are taken into account.

Table 1-8: Operating Costs

Cost Area	Average LOM Cost (per tonne of concentrate)
Mining	\$18.89/t
Processing	\$4.38/t
Rail	\$4.80/t
Port	\$2.34/t
Environmental	\$0.13/t
G&A	\$4.05/t
SUBTOTAL	**\$34.58/t**
Rail - Principal Repayment	\$6.22/t
Rail – Interest Payment	\$3.25/t
GRAND TOTAL	**\$44.05/t**

The estimated operating costs, over the LOM, are \$34.58/t concentrate, or \$44.05/t concentrate including the debt financing of the railway.

1.15 Economic Analysis

The economic evaluation of the Fire Lake North Iron Ore Project was performed using a discounted cash flow model on both a pre-tax and after-tax basis. The evaluation uses the Capital and Operating Cost Estimates developed in this Study; these estimates assume an average production of 9.3 Mtpy of iron ore concentrate, at a grade of 66% Fe_T, over a life of mine (LOM) of 19.6 years.

The assumptions used in the Financial Analysis are as follows:

- LOM and operations are estimated to span over a period of approximately **19.6 years**;
- 100% equity financing for all project infrastructure except for the railway;
- Railway to be financed at 15% by equity financing, and 85%, by debt financing
- Rolling stock is assumed to be leased; therefore, costs for rolling stock are included in the operating costs, except for PP-1.
- The price of 66% Fe_T concentrate loaded in ship (FOB) at Port of Sept-Îles is **$115/t** for the first five (5) years of production and **$110/t** thereafter.
- Shipping costs from the Port of Sept-Îles to China assumed to be $20/t of concentrate.
- Commercial production startup is scheduled to begin, at full capacity, in late Q2-2016.
- All of the concentrate is sold in the same year of production.
- All cost and sales estimates are in constant Q4-2012 dollars (no escalation or inflation factor has been taken into account).
- The Financial Analysis includes $19.3M in working capital, which is required to meet expenses after startup of operations and before revenue becomes available. This is equivalent to approximately 30 days of Year 1 operating expenses.
- All project-related payments and disbursements incurred prior to the effective date of this Report are considered as sunk costs, and are not considered in this Financial Analysis.
- A payment schedule (net of applicable credits) for the Hydro-Québec 315 kV line construction was estimated based on preliminary discussions with Hydro-Québec.
- US Dollar is considered at par with Canadian Dollar.

This Financial Analysis was performed by BBA on a pre-tax basis. Champion Management provided the after-tax economic evaluation of the Project, which was prepared with the assistance of external tax consultants (Ernst & Young). Table 1-9 presents the results of the Financial Analysis with NPV calculated at various discounting rates. The Base Case NPV was assumed at a discount rate of 8%.

Table 1-9: Pre-Tax Financial Analysis Results

IRR = 30.9%	NPV (M$)	Payback (yrs)
Discount Rate		
0%	$9038M	2.8
5%	$4736M	3.1
8%	**$3295M**	**3.4**
10%	$2602M	3.6

As can be seen, the before-tax IRR was calculated to be 30.9%. For the base case discount rate, the NPV was calculated as $3295M, with a 3.4 year payback period.

The after-tax financial analysis results are given in Table 1-10.

Table 1-10: After-Tax Financial Analysis Results

IRR =25.3%	NPV (M$)	Payback (yrs)
Discount Rate		
0%	$5393M	2.9
5%	$2871M	3.3
8%	**$1954M**	**3.6**
10%	$1510M	3.8

Table 1-10 shows the after-tax IRR to be 25.3%. For the base case discount rate, the NPV was calculated as $1954M, with a 3.6 year payback period.

A sensitivity analysis was also performed to show the project sensitivity to a +/- 20% variation in initial capital cost, annual operating costs, and commodity selling price. This sensitivity analysis was done on the pre-tax Financial Analysis results, using the Base Case discount rate of 8%. Results of this analysis are shown in Table 1-11.

Table 1-11: Sensitivity Analysis Table (Before Tax)

Champion Fire Lake North Sensitivity Analysis (Pre-Tax)									
Sensitivity Factor	CAPEX			SELLING PRICE			OPEX		
	Initial Capital*	NPV at 8% Disc.	IRR	Yr 1-5/ Yr 6-20	NPV at 8% Disc.	IRR	Avg. LOM Opex	NPV at 8% Disc.	IRR
0.8	$1048.9M	$3 807M	44.6%	$92/$88	$1 435M	18.5%	$27.22	$3 857M	33.9%
0.9	$1321.7M	$3 551M	36.6%	$103.5/$99	$2 365M	24.8%	$31.19	$3 576M	32.4%
1.0	$1594.5M*	$3 295M	30.9%	$115/$110	$3 295M	30.9%	$34.66	$3 295M	30.9%
1.1	$1867.3M	$3 039M	26.6%	$126.5/$121	$4 224M	36.7%	$38.12	$3 014M	29.3%
1.2	$2140.1M	$2 783M	23.2%	$138/$132	$5 154M	42.2%	$41.59	$2 732M	27.6%

* Sensitivity for railway CAPEX is done on total capital cost (including financed portion) and sensitivity factor is applied to initial capital, i.e. financed amounts are kept constant at all sensitivity factors.

** This amount excludes the financed portion of railway capital cost amounting to $1133.6M. Total project initial capital cost estimate is $2728M, of which $1133.6M is financed (railway financing), excluding the $13.4M of rolling stock leasing in PP-1.

1.16 Project Schedule

A Project Execution Plan and a detailed Project Execution Schedule were developed as part of this Study. The key project milestones are indicated in Table 1-12 below. As can be seen, full production is expected to begin in May 2016.

Table 1-12: Key Project Milestones

Major Milestones	Date
Start Detailed Engineering	February 2013
CA Approval to Proceed	January 2014
Start Construction – FLN Site and Pointe-Noire	February 2014
First Concrete – FLN Site	April 2014
First Concrete – Pointe-Noire	May 2014
Permanent Camp Ready	August 2015
Rail Work Completed	October 2015
55 MW Available for Line 1 Startup	December 2015
Wet Commissioning Completed Pointe-Noire	March 2016
POV Completed Line 1	April 2016
Wet Commissioning Completed Line 1	May 2016

1.17 Risks

A number of potential project risks have been identified during the course of this PFS that can materially affect project execution and project economics. These risks are categorized as originating from the FLN site development, from Railway infrastructure development between the FLN and Pointe-Noire sites, or from Pointe-Noire Port facility development.

High-risk areas pertaining to the FLN site development are:

- Timely reception of environmental permits and EA approvals;
- Timely conclusion of MOU agreements with First Nations and other stakeholder agreements;
- Timely arrangement of Project financing.

High-risk areas pertaining to railway infrastructure development are:

- Completion of the geotechnical campaign for the railway (required to begin detailed engineering for the railway);
- Risk to construction schedule due to CN's suspension of their decision on whether or not to move forward with railway construction until Q4 2013.

High-risk areas pertaining to Pointe-Noire port development are:

- Potential conflicts between the several port stakeholders;
- Space constraints in proximity to the port infrastructures. (The final location of the Champion stockyard has not been established and discussions are still underway amongst the various Stakeholders);
- Establishment of a concentrate transportation management plan to ensure an efficient utilization of infrastructures.

All the identified risks will be carried through to the next phase of the Project and shall be updated based on the status of the Feasibility Study. The next step of the risk analysis process will be to hold a risk workshop to further identify potential issues and risks. The outcome of the workshop will be a risk register that will identify and quantify risk element and assess their severity as well as identify all possible opportunities. The risk register will help implement a risk management plan to monitor, reduce and avoid potential risks. Successful mitigation of the evaluated risk can result in a cost and schedule savings with a positive impact on the Project.

1.18 Conclusions and Recommendations

Mineral Resource Estimate

The mineral resources on the Fire Lake North property were estimated to be 26.6 Mt at 35.2% Fe_T (measured), 666.9Mt at 31.4% Fe_T (indicated) and 521.6 Mt at 30.1% Fe_T (inferred). P&E believes that the current block model resource estimate and its classification are to NI 43-101 and CIM standards and definitions and adequately represent the mineralization in the Fire Lake North deposits.

Mineral Reserves

The mining engineering work performed for this PFS was based on the 3-D block model provided by P&E. Pit optimization was performed applying the Lerchs-Grossman 3-D Algorithm on Measured and Indicated Resources and the pit shell having the optimal discounted NPV and strip ratio at a COG of 15% Fe_T was selected for the final Mineral Resource estimate. The final Mineral Reserve was estimated after applying engineering and operational design parameters. A total combined reserve of 464.6M metric tonnes grading was 32.4% Fe_T was estimated. Weight recovery to concentrate was estimated to be 39.9%. BBA is of the opinion that the reserve estimate derived in this PFS reasonably quantifies the economical ore mineralization of the Fire Lake North deposit.

Processing Plant Design and Metallurgical Testing

It is BBA's opinion that the metallurgical testwork conducted on the Fire Lake North material is of sufficient quantity and quality to support a feasibility-level study. Based on the testwork performed, a robust flowsheet and mass balance were developed for processing the Fire Lake North deposit ore, as well as estimates of iron and weight recovery to concentrate. The process flowsheet consists of three-stage gravity concentration using spirals, which is very similar to other iron ore processing plants in the area. Plant and process design were based on the limited information available at the time they were developed. However, they were validated as more testwork results became available.

BBA recommends that a review and updating of all process areas and equipment be performed for final design. Confirmatory testwork for final process design is also recommended.

Mining Engineering

The mine plan developed during the PFS provides a reasonable base for projected mining operations at this level of study. BBA recommends the following mining engineering work to be undertaken for final design:

- Collect hardness data and potentially integrate this information into the geological block model for use in mine planning.
- Further optimize mining phases and develop mine schedule in more detail (quarterly for first three years).

Drilling Campaign

BBA recommends that further drilling be carried out in the West Pit and East Pit zones. It is expected that this will add resources which will allow the pits to be expanded.

Feasibility Study – Two (2) Lines

BBA recommends that the Project proceed to a Feasibility Study (FS) that would investigate the use of two (2) production lines, rather than one (1), in order to further enhance the economics of the project after consideration of the capital required for the railway component.

PEA – Oil Can Property

BBA recommends that a Preliminary Economic Assessment (PEA) be carried out for the Oil Can property. The development of a third processing line for Oil Can, in addition to the two (2) FLN lines proposed in the upcoming Feasibility Study, would reinforce the justification for construction of Champion's railway over 310 km between the FLN loading station and the new multi-use wharf facilities at Pointe-Noire.

2. INTRODUCTION

2.1 Introduction

The Fire Lake North (FLN) Project is being developed by Champion Iron Mines Ltd. (formerly Champion Minerals Inc.). The Project is located within the Labrador trough in northern Québec in the Fermont area. The FLN project consists of two (2) specular hematite deposits referred to as the East deposit and West deposit. A total of 464.6 Mt of Mineral Reserves, as classified according to NI 43-101 guidelines, have been defined and will be processed over 20 years using conventional open pit mining and processing methods. The material collected from the open pit mines will be crushed, stockpiled, ground and treated by a gravimetric process in order to liberate and separate iron particles from the gangue material mainly composed of silica. The tailings generated will be pumped to a tailings pond facility located south-east of the concentrator while the final hematite concentrate will be filtered and loaded into rail cars for delivery to the Port of Sept-Îles, at Pointe-Noire. The project includes a rail link from FLN to Pointe-Noire, the rail garages, rolling stock and related facilities. The Pointe-Noire site includes a stockyard and ship loading facilities where the concentrate will be stockpiled and loaded onto ships prior to final delivery to Champion's clients.

Over the life-of-mine (LOM), an average of 9.3 Mtpy of concentrate at 66% Fe will be produced.

2.2 Scope of Study

Champion Iron Mines Inc. (Champion) commissioned BBA Inc. (BBA) to conduct a Preliminary Feasibility Study on the development of the FLN (the Project) in the Province of Québec, Canada. The Project comprises the Fire Lake North mine site and infrastructure and the port terminal facility at the Port of Sept-Îles in Pointe-Noire, Québec. Champion also retained the services of Rail Cantech to conduct a Feasibility Study for the development of a railway and ancillary infrastructure linking the FLN mine site to the Pointe-Noire port terminal facilities. The railway is also included in the scope of this Preliminary Feasibility Study.

The present Report, entitled 'Preliminary Feasibility Study of the West and East Pit Deposits of the Fire Lake North Project', incorporates the latest Mineral Resources and Mineral Reserve estimates for the project, as well as Mineral Resource estimates for other nearby deposits, and provides information on the development of the project site (including the mine, concentrator and tailings facilities), the Pointe-Noire site at the Port of Sept-Îles and the construction of a new railway linking the FLN site to Pointe-Noire. This Technical Report was prepared by Qualified Persons following the guidelines of the "Canadian Securities Administrators" National Instrument 43-101 (effective June 30th, 2011), and in conformity with the guidelines of the Canadian Mining, Metallurgy and Petroleum (CIM) Standard on Mineral Resources and Reserves.

This Report was prepared at the request of Jean-Luc Chouinard, Project Director, Champion Iron Mines Inc. Champion is a Canadian based publicly held company trading on the Toronto Stock Exchange (TSX) under the symbol of CHM with its corporate office situated at:

20 Adelaide Street East, Suite 301
Toronto, Ontario
Canada, M5C 2T6
Tel: +1 (416) 866-2200
Fax: +1 (416) 361-1333

The report uses the metric system and all dollar figures cited are Canadian Dollars, unless otherwise noted. The assumed exchange rate for the report was 1 CAD to 1 USD.

This Report is considered effective as of January 25th, 2013.

2.3 Site Visits

A site visit to the Fire Lake North property was made by André Allaire, Eng., M.Eng., Ph.D on September 22nd, 2010 and Patrice Live, Eng., on September 20th, 2010, representing BBA Inc. Additional visits by Mr. Antoine Yassa, P.Geo. of P&E were made on two separate occasions, the first from July 29th to 31st, 2011 and the second from September 4th to 6th, 2012. Mr. Allaire, Mr. Live and Mr. Yassa are Qualified Persons under the terms of NI 43-101.

2.4 Information Sources and Previous Technical Reports

This report is based, in part, on internal company technical reports, maps, published government reports, company letters and memoranda, and public information as listed in the “References”, Chapter 27, at the conclusion 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.

It should be noted that the authors have relied upon selected portions or excerpts from material contained in previous NI 43-101 compliant Technical Reports available on SEDAR (www.sedar.com). Other information used to complete the present Preliminary Feasibility Study includes, but is not limited, to the following reports and documents:

- Mineral Resource block model provided by P&E Mining Consultants Inc. (P&E);
- Metallurgical Testwork results from SGS Minerals Services (SGS) and COREM;
- Internal and commercially available databases and cost models;
- Canadian Milling Practice, Special Vol. 49, CIM;
- Various reports produced by other consultants such as Journeaux Assoc. (Journeaux), Paterson & Cooke, Knight Piésold Ltd., Roche Ltd. (Roche), Rail Cantech Inc. (Rail Cantech), concerning rail, environmental studies and permitting, site hydrology, hydrogeology and geotechnical as well as tailings management.

3. RELIANCE ON OTHER EXPERTS

BBA and P&E have not verified the legal titles to the Project areas (Fire Lake North and Pointe-Noire terminal) or any underlying agreement(s) that may exist concerning the licenses or other agreement(s) between third parties Champion has provided a description of ownership in Chapter 4 of this Report. BBA has therefore relied on Champion to have conducted the proper legal due diligence and to have disclosed all related material information.

The pre-tax Financial Analysis presented in this Report was performed by BBA. Champion mandated a firm specializing in taxation to undertake a tax analysis and to provide an after-tax cash flow to allow BBA to perform an after-tax financial analysis.

Previously and during the course of this Preliminary Feasibility Study, Champion has initiated discussions with financial institutions and other potential investors concerning debt financing for the construction of the railway. This is described in more detail in Chapter 19 of this Report. It was Champion's responsibility to provide BBA with a disbursement schedule based on the 'Letters of Interest', which Champion obtained during the course of the aforementioned discussions. BBA used the disbursement schedule, as provided by Champion, to develop the pre-tax Financial Analysis presented in Chapter 22 of this report. BBA has examined the aforementioned 'Letters of Interest', but has not conducted any further verification on these matters.

Any statements and opinions expressed in this document are given in good faith and in the belief that such statements and opinions are not false and misleading as of the effective date of this Report.

3.1 NI 43-101 Responsibilities and Reliance

BBA had the responsibility for assuring that this technical report meets the guidelines and standards stipulated. Information and certain sections of this Report however, were contributed by P&E, Rail Cantech and Roche.

The following Qualified Persons (QPs) have contributed to the writing of this Report and have provided QP certificates, which are included in this Report. The information contained in the certificates outlines the sections in this Report for which each QP is responsible.

- Tracy Armstrong, P.Geo. (P&E)
- Antoine Yassa, P.Geo., (P&E)
- Martial Major, Eng., (Rail Cantech)
- André Allaire, Eng., M. Eng., Ph.D., (BBA)
- Patrice Live, Eng., (BBA)

Additional information/writing for this PFS was provided by the following individual companies which, while having extensive experience in the mining and metals industry or in a supporting capacity in the industry, are not considered QPs under NI 43-101 guidelines for the purposes of this Report.

- Nicolas Skiadas, Eng., P. Eng., (Nfld), M.Eng. (Journeaux) – tailings dam construction, mine and site closure plan, overburden pit slopes;
- Yves Thomassin, Eng., M.Sc. (Roche) - environment;
- Simon Thibault, M.Sc. (Roche) – environment;
- Knight Piésold – pit slopes;
- André Lortie, (Ernst & Young) – after tax analysis;
- Yarek Koziura, P, Eng., (P&C) – tailings disposal study.

Table 3-1 shows the NI 43-101 chapters and the Qualified Person (QP) responsible for each of the chapters.

Table 3-1: Responsibilities and Qualified Persons for NI 43-101 Chapters

Chapter	Description	Responsible	Qualified Person(s)
1	Executive Summary	BBA Inc.	André Allaire
2	Introduction	BBA Inc.	André Allaire
3	Reliance on Other Experts	BBA Inc.	André Allaire
4	Property Description and Location	P&E	Tracy Armstrong
5	Accessibility, Climate, Local Resources, Infrastructure and Physiography	P&E	Tracy Armstrong
6	History	P&E	Tracy Armstrong
7	Geological Setting and Mineralization	P&E	Tracy Armstrong
8	Deposit Types	P&E	Tracy Armstrong
9	Exploration	P&E	Tracy Armstrong
10	Drilling	P&E	Tracy Armstrong
11	Sample Preparation	P&E	Tracy Armstrong
12	Data Verification	P&E	Tracy Armstrong, Antoine Yassa
13	Mineral Processing	BBA Inc.*	André Allaire
14	Mineral Resource Estimate	P&E	Antoine Yassa
15	Mineral Reserve Estimate	BBA Inc.	Patrice Live
16	Mining Methods	BBA Inc.	Patrice Live
17	Recovery Methods	BBA Inc.	André Allaire
18	Project Infrastructure	BBA Inc.**	André Allaire
19	Market Studies and Contracts	BBA Inc.	André Allaire
20	Environmental Studies, Permitting and Social or Community Impact	BBA***	André Allaire
21	Capital and Operating Costs	BBA Inc.	André Allaire
22	Economic Analysis	BBA Inc.	André Allaire
23	Adjacent Properties	P&E	Tracy Armstrong
24	Other Relevant Information	BBA Inc.	André Allaire
25	Interpretation and Conclusions	BBA Inc.	André Allaire
26	Recommendations	BBA Inc.	André Allaire
27	References	BBA Inc.	André Allaire

* All metallurgical testwork was conducted by SGS Lakefield and COREM, independent and accredited laboratories. BBA Inc. was responsible for integration and interpretation of the metallurgical testwork results presented in Chapter 13.

** The railway design presented in Chapter 18 was a result of a Feasibility Study conducted for Champion by Rail Cantech (led by Martial Major, Eng.). The results of the study are also referenced in Chapters 21 and 24.

*** All environmental data presented in Chapter 20 was prepared by Roche.

4. PROPERTY DESCRIPTION AND LOCATION

4.1 Location of Oil Can

Champion's Fermont Project area, comprising the Cluster 1, Cluster 2 and Cluster 3 Projects, is located in the Fermont Iron Ore District (FIOD) of northeastern Québec, approximately 40 km southwest of the town of Fermont and 250 km north of the Gulf of St. Lawrence's port town of Port-Cartier, and consists of 14 iron ore properties totalling 747.2 km^2. Figure 4-1 and Figure 4-2 below show approximate map locations of the FIOD and Clusters 1, 2 and 3.

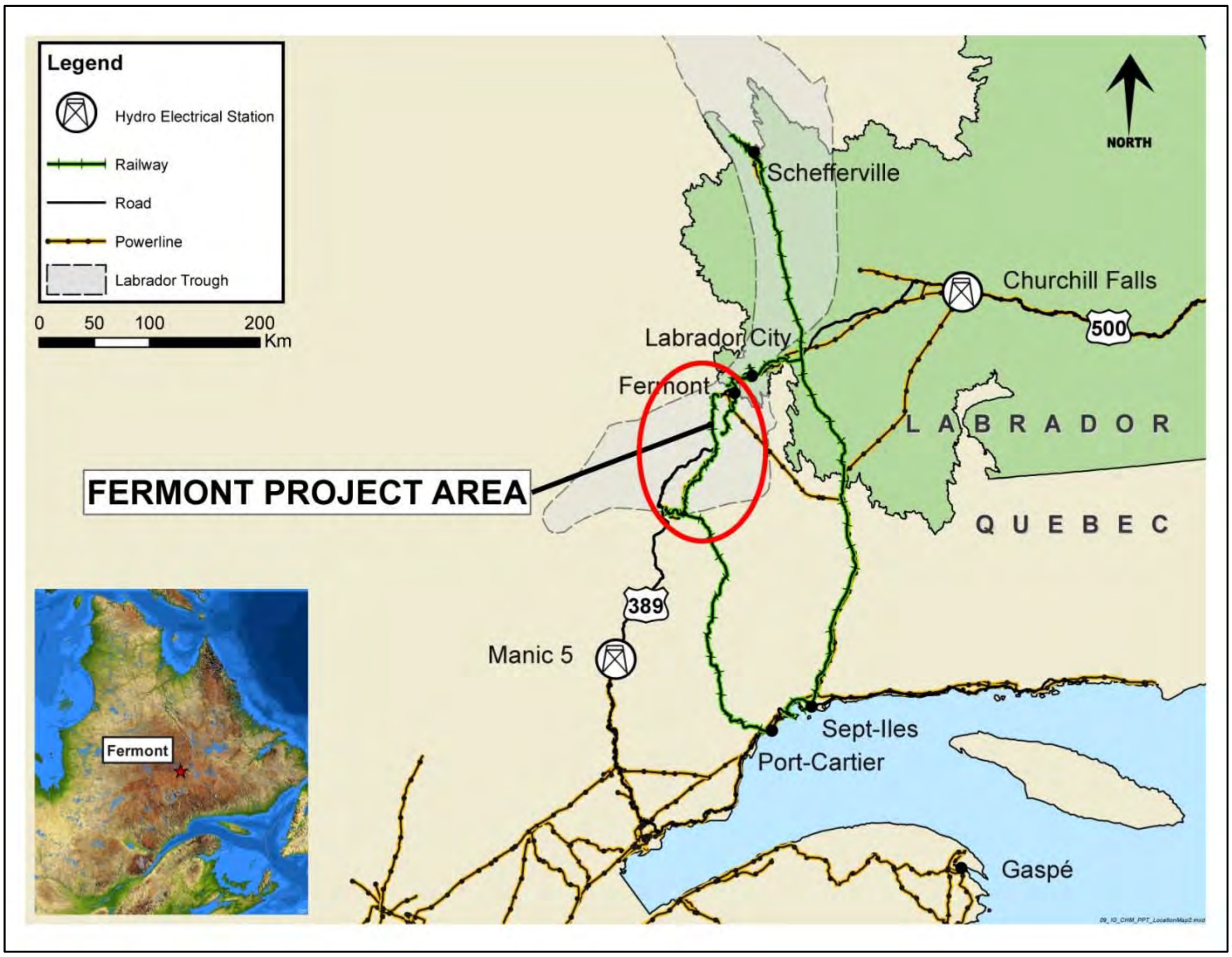


Figure 4-1: Location Map of the Fermont Project Area - Source: From MRB, (2012)

This report contains an updated Mineral Resource estimate for the Fire Lake North Deposit, and previously released Mineral Resource estimates for the Oil Can and Bellechasse Deposits, located within the boundaries of the CFLN Property (Figure 4-3).

The CFLN Property is centred at an approximate Latitude of 52°28'48"N and Longitude of 67°20’19”W.

The CFLN Property boundary has not been legally surveyed, but the perimeter generally follows the Range and Lot lines. The boundary of each claim block was defined using the Ministère des ressources naturelles et de la faune Québec (MRNFQ) website at http://www.mrnfp.gouv.qc.ca/mines/index.jsp, and the MRNFQ GESTIM claim management system.

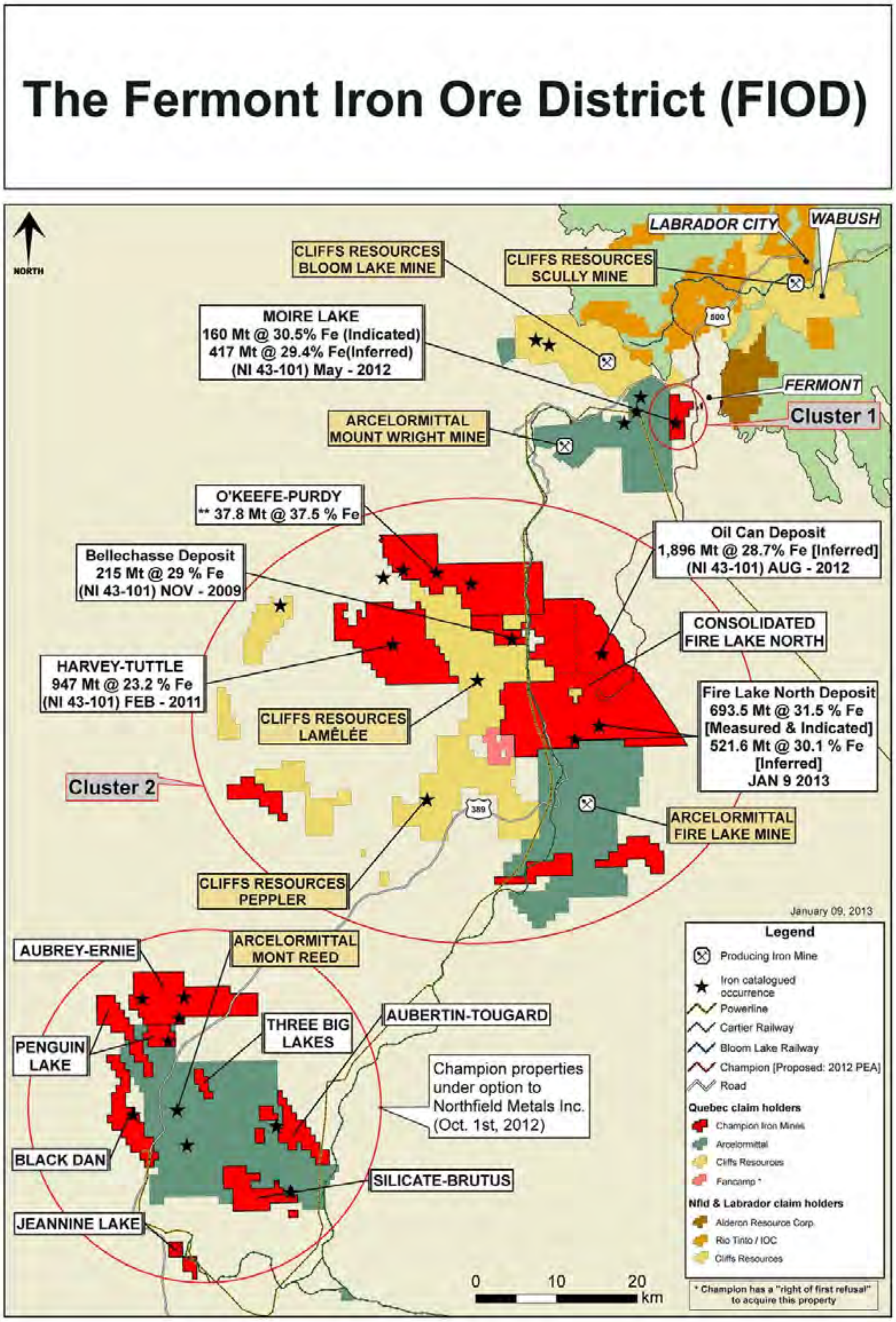


Figure 4-2: Location Map of Champion's Fermont Holdings; Cluster 1, Cluster 2 & Cluster 3 - Source: MRB (2013)

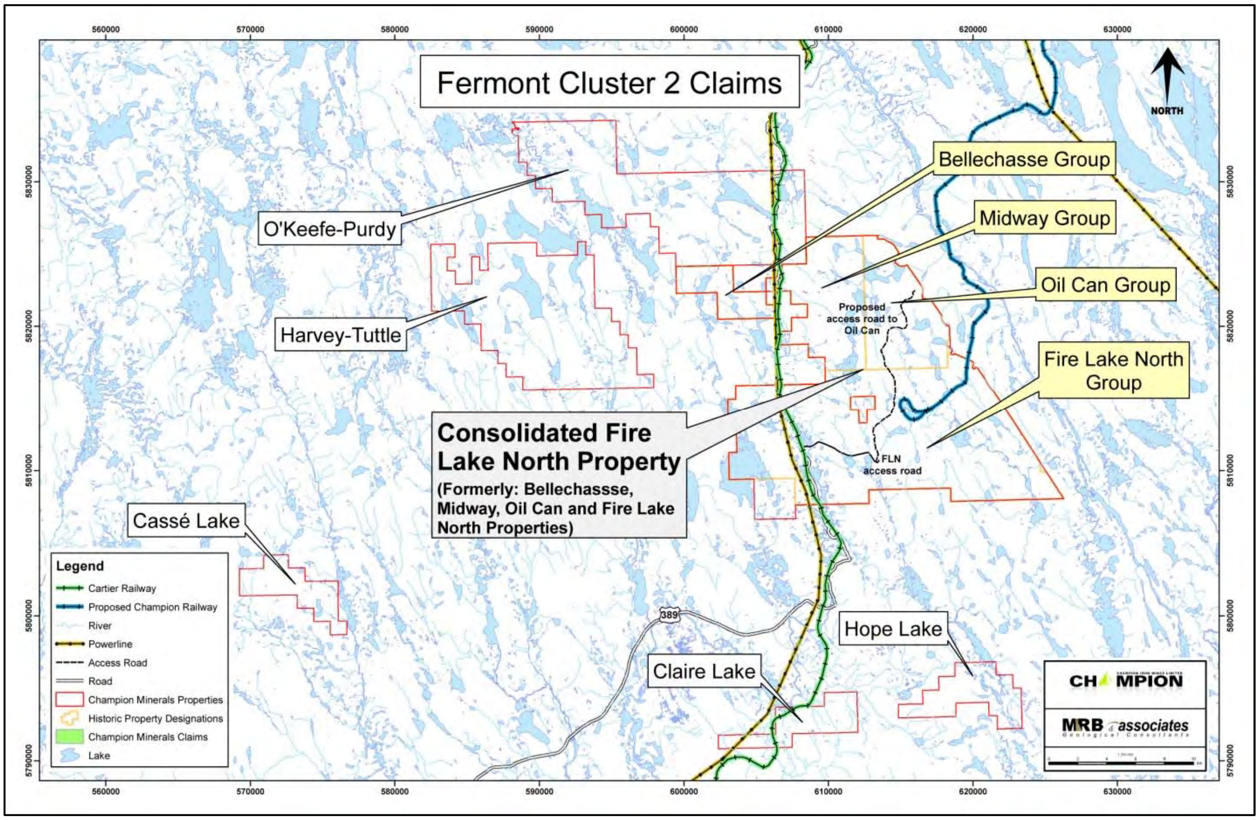


Figure 4-3: Location Map of Fermont Cluster 2 and the Consolidated Fire Lake North Property - Source: MRB (2012)

4.2 Fermont Iron Properties Agreement

On September 1st, 2009, Champion announced the execution of a definitive option and Joint Venture Agreement (the “JV Agreement” or “JV”) with Fancamp Exploration Ltd. (Fancamp) and The Sheridan Platinum Group Ltd. (Sheridan) in connection with 15 properties optioned pursuant to the Binding Option Agreement between Fancamp, Sheridan and Champion dated May 21st, 2008. Under the terms of the final Agreement, Champion earned an initial 65% interest in the properties at Champion’s option by spending $6 million in staged exploration and development work on the properties, making cash payments to Fancamp and Sheridan totalling $1 million, and issuing 2.5 million shares to Fancamp and Sheridan by June 2010. Fancamp and Sheridan were entitled to a 3% Net Smelter Returns (NSR) royalty on the potential iron production from the Fermont Properties, one third of which was available for purchase by Champion for $3 million.

Champion also signed an agreement with Sheridan, dated June 23rd, 2010, in order to acquire Sheridan's 17.5% interest in the JV to increase its ownership to 82.5%.

Under the terms of this agreement, Champion issued 4 000 000 shares to Sheridan and paid $2 000 000 in cash (the final installment of $500 000 being paid in January 2012), with both Fancamp and Sheridan retaining the 3% NSR royalty granted under the JV Agreement.

On May 18th, 2012, Champion announced the completion of the acquisition of Fancamp's remaining 17.5% interest in the Fermont Properties (refer to the Champion News Release, dated May 18th, 2012). The acquisition was paid for by Champion issuing 14 000 000 common shares and 7 000 000 non-transferable warrants to Fancamp. The shares and warrants of Champion are subject to a 4-month regulatory hold period and to a 6-year voluntary restriction on transfer, subject to the consent of Champion. As a result of the acquisition, Champion now owns a 100% interest in the Fermont Properties, and Champion and Fancamp terminated their JV Agreement relating to the Fermont Properties. Champion, however, continues to retain its right of first refusal over Fancamp's interest in the Lamêlée Property, and Fancamp continues to retain its 50% interest in the original 3% NSR royalty. Champion waived its right to buy back one-third of this royalty from Fancamp, in exchange for $2 million from Fancamp.

As at the date of this Report, the claims comprising the Fermont Projects are in good standing.

4.2.1 Fermont Cluster 2 Project and the CFLN Property

Champion's Fermont Project is located in the FIOD of northeastern Québec, approximately 40 km southwest of the town of Fermont and 250 km north of the Gulf of St. Lawrence's port town of Port-Cartier, and consists of 14 iron ore properties totalling 1448 claims (see Figure 4-2). The Project is divided into three (3) clusters, designated as Cluster 1, Cluster 2 and Cluster 3, which are geographically separated from one another. Within each cluster, the individual properties may or may not be contiguous. Cluster 2 comprises six (6) properties. The claim groups formerly designated as the Fire

Lake North, Oil Can, Bellechasse and Midway properties are now collectively termed the Consolidated Fire Lake North (CFLN) Property.

Fire Lake North was the subject of a 2009 NI 43-101 Technical Report entitled "Technical Report and Resource Estimate on the Bellechasse and Fire Lake North Properties, Fermont Project Area, Québec, Canada" with an effective date of November 10th, 2009 (Malloch et al., 2009, P&E) and a Preliminary Economic Assessment (PEA) and subsequent PEA update completed on Fire Lake North, entitled "Updated Resource Estimate and Preliminary Economic Assessment on the Fire Lake North Property, Fermont Project Area, Québec Canada", with an effective date of November 23rd, 2010, and "Update of the Preliminary Economic Assessment on the Fire Lake North Project, Fermont Area, Québec, Canada", with an effective date of November 21st, 2011 and amended on March 1st, 2012. These reports all predate the recent NI 43-101 Technical Report entitled, "Technical Report and Mineral Resource Estimate on the Oil Can Deposit of the Consolidated Fire Lake North Property, Fermont Area, Québec, Canada" (the "Technical Report") with an effective date of July 1st, 2012, in which Fire Lake North was a major focus.

4.2.2 Fire Lake North

Fire Lake North is centred approximately 35 km south-southwest of the town of Fermont, in Gueslis and Bergeron Townships, in the Regional Municipality (MRC) of Caniapiscau, northeastern Québec, at approximately 52°26'57"N Latitude and 67°19'22"W Longitude (UTM NAD83 Zone 19, 613750E and 5811250N) on the National Topographic System map sheet 3-B/06. Fire Lake North comprises 340 contiguous claims covering an area of 173.12 km^2 with all 340 claims held 100% by Champion (see Figure 4-4).

The 340 claims that make up Fire Lake North are in good standing as at the date of this report.

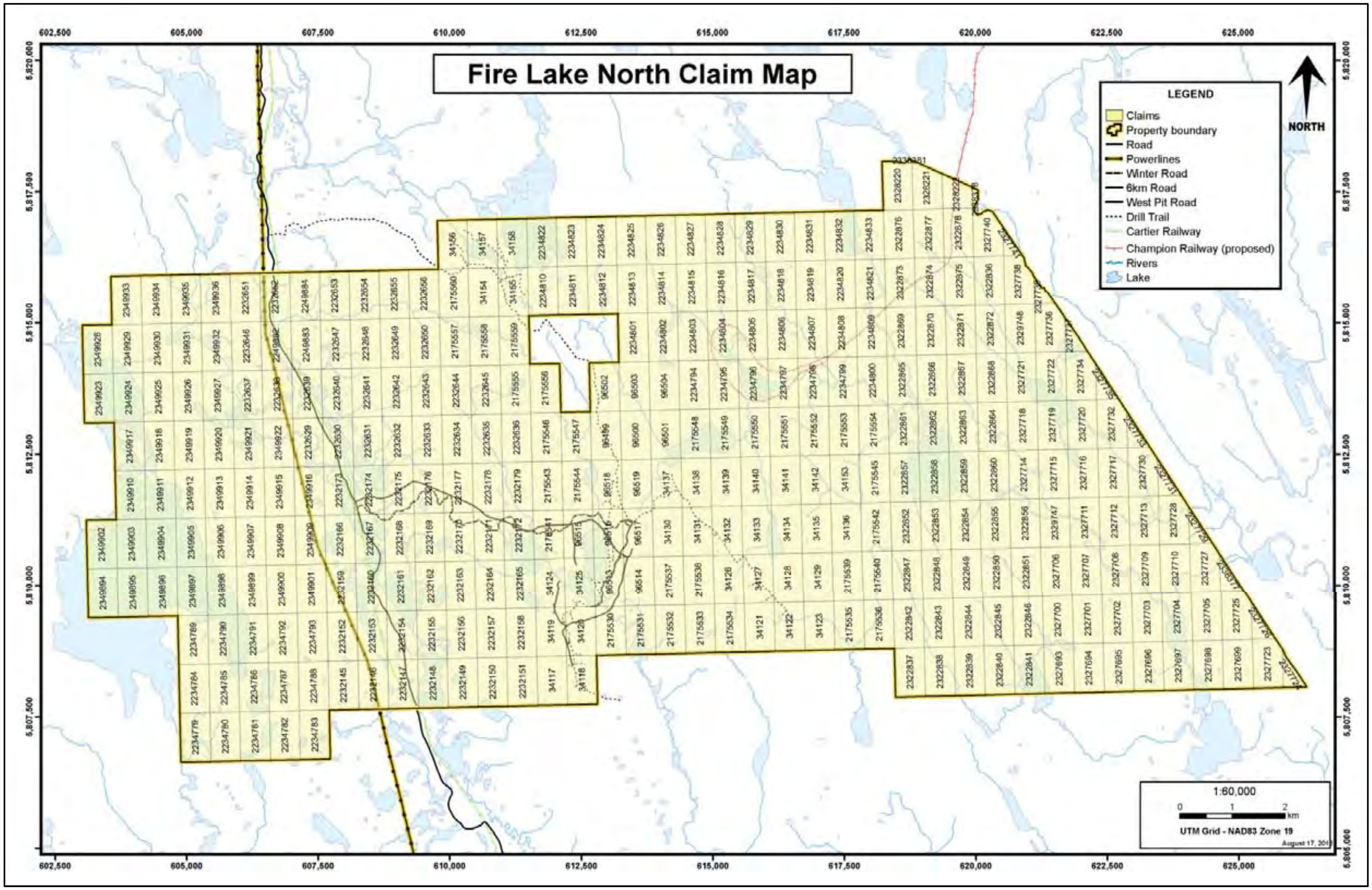


Figure 4-4: Fire Lake North Claim Map *(Source: MRB, (2012))*

4.2.3 Oil Can

Oil Can is centred approximately 30 km south-southwest of the town of Fermont in Gueslis Township, in the MRC of Caniapiscau, northeastern Québec, at approximately 52°31'32" N Latitude and 67°18'24" W Longitude (UTM NAD83 Zone 19, 615312E and 5820327N) on the National Topographic System map sheet 23-B/11. Oil Can comprises 86 contiguous claims covering an area of 39.65 km^2 with all 86 claims held 100% by Champion (see Figure 4-5).

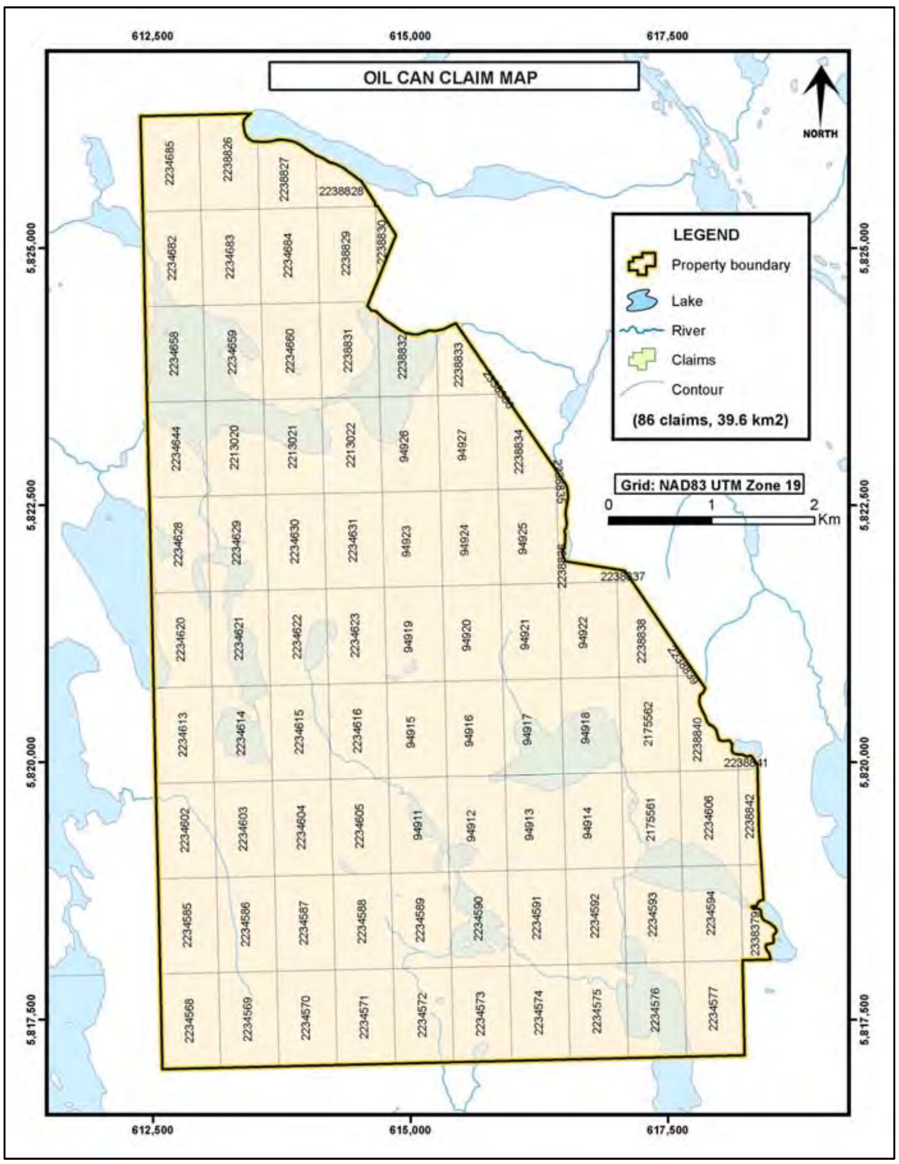


Figure 4-5: Oil Can Claim Map - *Source: MRB (2012)*

The 86 claims that make up Oil Can are in good standing as at the date of this report.

4.2.4 Bellechasse

Bellechasse is centred approximately 34 km southwest of the town of Fermont in Faber Township, in the MRC of Caniapiscau, northeastern Québec at approximately 52°32'31" N Latitude and 67°29'06" W Longitude (UTM NAD83 Zone 19, 604288E, 5821470N) on the National Topographic System map sheet 23B/11. Bellechasse comprises 27 contiguous claims covering an area of 14.15 km^2 with all 27 claims held 100% by Champion (Figure 4-6).

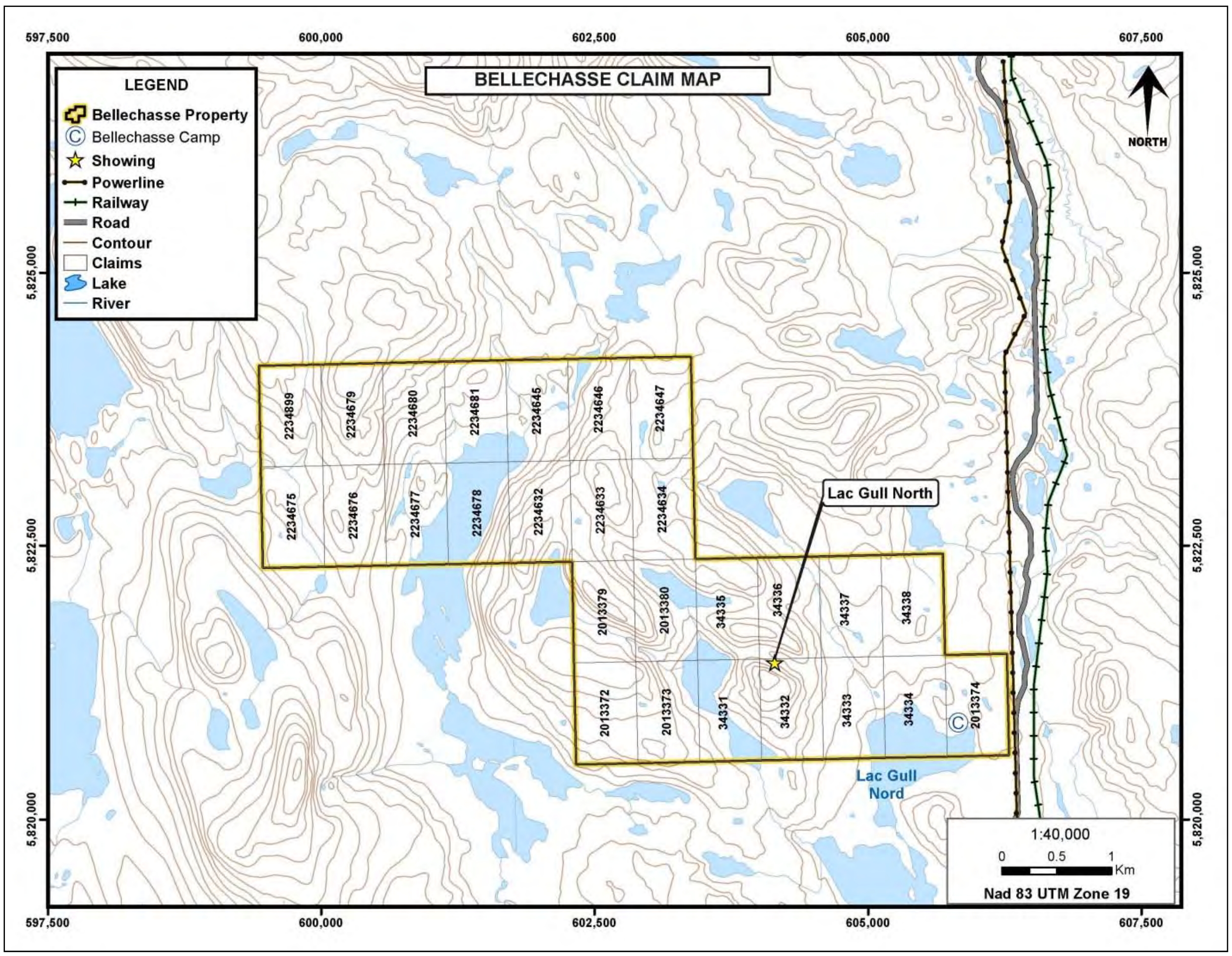


Figure 4-6: Bellechasse Claim Map- (*Source: Langton and Pacheco, (2012c)*

The 27 claims that make up Bellechasse are in good standing as at the date of this report.

4.2.5 Midway

Midway is centred approximately 30 km south-southwest of the town of Fermont, in Gueslis Township, in the MRC of Caniapiscau, northeastern Québec at approximately 52°32'04" N Latitude and 67°22'44" W Longitude (UTM NAD83 Zone 19, 609448E, 5822041N) on the National Topographic System map sheets 23-B/06 and 23-B/11. Midway comprises 84 contiguous claims covering an area of 44.03 km with all 84 claims held 100% by Champion (Figure 4-7).

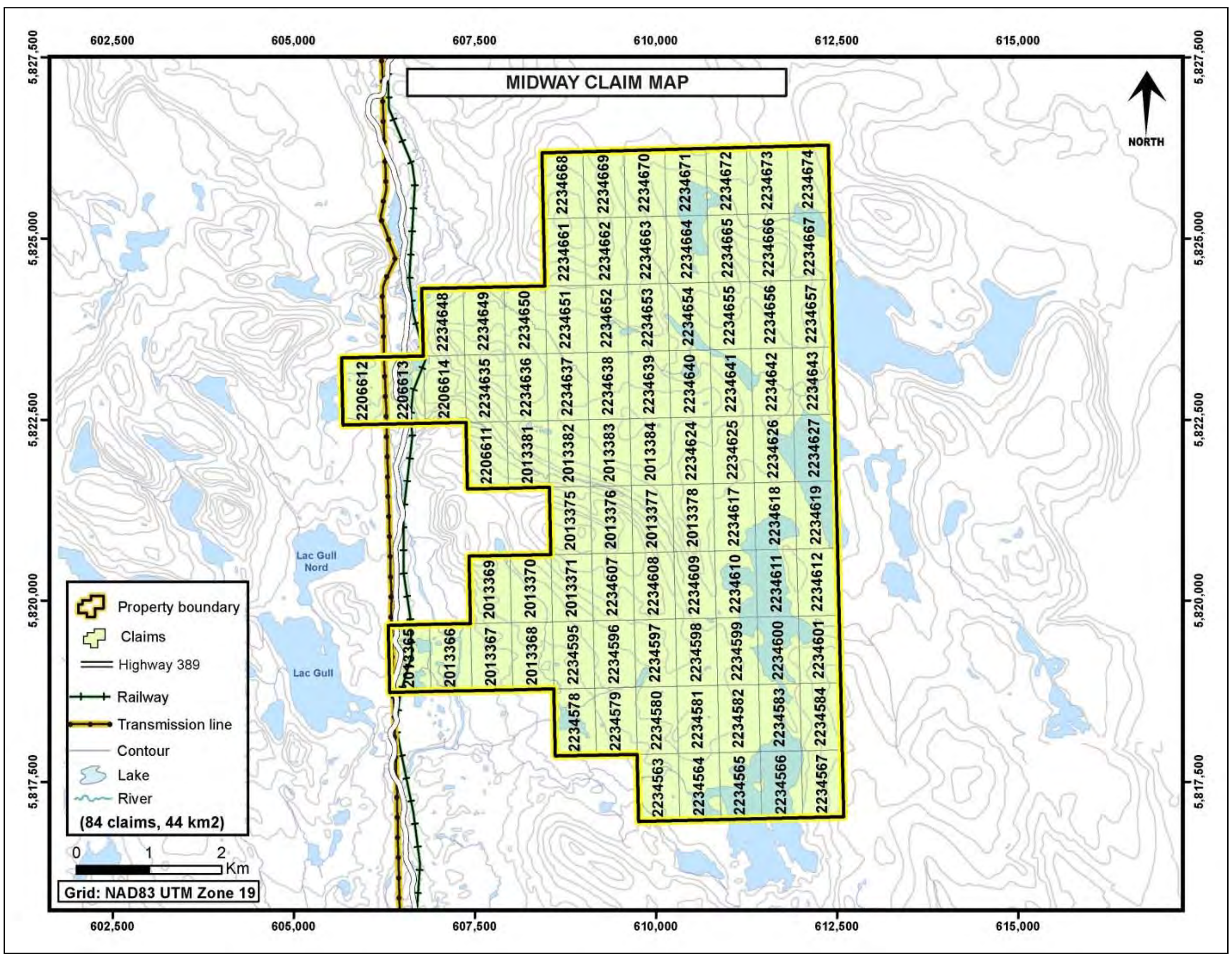


Figure 4-7: Midway Claim Map - *Source: Langton and Pacheco., (2012d)*

The 84 claims that make up Midway are in good standing as at the date of this report.

4.3 The Québec Mining Act and Claims

The Québec Mining Act (the "Mining Act") deals with the management of mineral resources and the granting of exploration rights for mineral substances during the exploration phase. It also deals with the granting of rights pertaining to the use of these substances during the mining phase. The Mining Act also establishes the rights and obligations of the holders of mining rights to ensure maximum development of Québec's mineral resources.

A "claim" is the only valid exploration right in Québec. A claim gives the holder an exclusive right to search for mineral substances in the public domain, with the exception of sand, gravel, clay, and other loose deposits on the land subjected to the claim. Since November 2000, exploration titles are obtained by map designation over predetermined parcels of land. This approach is quicker and simpler than the system in use prior to November 2000, making claims more difficult to dispute thereby better protecting the investment made on a claim.

The term of a claim is two (2) years from the day the claim is registered, and it can be renewed indefinitely providing the holder meets all the conditions set out in the Mining Act, including the obligation to invest a minimum annual amount in exploration work determined by regulation. The Mining Act provides that any amount disbursed to perform work in excess of the prescribed requirements may be applied to subsequent terms of the claim.

To satisfy government assessment requirements and thus maintain a claim in good standing, minimum exploration expenditures must be incurred and filed sixty (60) days prior to the anniversary date of such claim. The report of work is due prior to sixty (60) days before the anniversary date. In Québec, the amount of expenditures per claim varies according to the surface area of the claim, its location (either north or south of 52° latitude) and the number of terms since its issuance, which escalates according to the schedules below. Table 4-1 and Table 4-2 show the amount of assessment work to be carried out during each term of a claim.

Table 4-1: South of 52° Latitude

Term	Surface Area of Claim		
	< 25 ha	25 – 100 ha	> 100 ha
1 to 3	$500	$1200	$1800
4 to 6	$750	$1800	$2700
7 or more	$1000	$2500	$3600

Table 4-2: North of 52° Latitude

Term	Surface Area Of Claim		
	< 25 ha	25 – 45 ha	> 45 ha
1	$48	$120	$135
2	$160	$400	$450
3	$320	$800	$900
4	$480	$1200	$1350
5	$640	$1600	$1800
6	$750	$1800	$1800
7 or more	$1000	$2500	$2500

Assessment work credits from another claim may be applied to the claim to be renewed, providing the renewed claim lies within a radius of 4.5 km from the centre of the claim with the excess work credits. The claim holder may apply amounts spent on work carried out on a mining lease or concession towards the renewal of a claim, provided that the work was performed during the term of the claim and that the amount does not exceed one quarter of the required amount for renewal. If the required work was not performed or was insufficient to cover the renewal of the claim, then the claim holder may pay a sum equivalent to the minimum cost of the work that should have been performed.

The cost of renewal of a claim depends on the surface area of the claim, its location, and the date the application is received. If the application for renewal and fees is received prior to 60 days before the anniversary of a claim, the following renewal fees apply for claims 52°North latitude: less than 25 ha = $26; 25 to 45 ha = $96; 45 to 50 ha = $107; over 50 ha = $120. For claims 52°South latitude, the following renewal fees apply: less than 25 ha = $26; 25 to 100 ha = $52; over 100 ha = $78. These renewal fees double if the application is received within sixty (60) days or less of the anniversary date of the claim.

4.4 Surface Rights and Permits

Each claim provides access rights to a parcel of land on which exploration work may be performed. However, the claim holder cannot access land that has been granted, alienated or leased by the Province for non-mining purposes, or land that is the subject of an exclusive lease to mine surface mineral substances, without first having obtained the permission of the current holder of these rights.

The Mining Act states that a claim holder cannot erect or maintain a construction on lands in the public domain without obtaining, in advance, the permission of the MRNFQ, unless such construction is specifically allowed for by ministerial order. An application is not necessary for temporary shelters that are made of pliable material over rigid supports that can be dismantled and transported.

A new temporary exploration camp was constructed on the Fire Lake North mineral claims during the summer of 2011, and is currently occupied by Champion personnel. The camp is constructed of pliable material over rigid supports that can be dismantled and transported.

At the time of this Report, P&E was not aware of any back-in rights, payments or other agreements or encumbrances to which any of the properties within the CFLN Property could be subject, other than the 3% NSR royalty held by Sheridan and Fancamp, and Champion's right to buy back 0.5% from Sheridan.

4.5 Environmental Considerations

All phases of Champion's operations are subject to environmental regulation in the jurisdictions in which it operates. These regulations mandate, among other things, the maintenance of air and water quality standards and land reclamation. They also set forth limitations on the generation, transportation, storage and disposal of solid and hazardous waste. These regulations set forth a wide range of sanctions and penalties, both criminal and civil, for violations of the regulations.

To date, applicable environmental legislation has had no material financial or operational effects on Champion.

P&E has not investigated any environmental liabilities that may have arisen from previous work, and P&E is not aware of any present environmental related issues affecting the CFLN Property.

5. ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Accessibility

The western boundaries of both Fire Lake North and Midway are transected by the Trans-Québec-Labrador Road and Bellechasse, adjacent to and west of the Trans-Québec-Labrador Road (Highway 389 in Québec and Highway #500 in Labrador and Newfoundland), which runs in Québec from Baie-Comeau to Fermont, continuing into Labrador City and Wabush in Newfoundland and Labrador (Figure 5-1). The highway provides year-round access to the CFLN Property. The western boundary of Oil Can is located 6 km east of the Trans-Québec-Labrador Road.

The airport located at Wabush, Newfoundland and Labrador (NL) is the main airport servicing the region, and offers daily commercial flights to Montréal, Québec City and Sept-Îles in Québec, and Goose Bay and St. Johns in Newfoundland and Labrador via Air Canada and Provincial Airlines. Pascan Aviation Inc. recently commenced commercial flights between Wabush and Bathurst, New Brunswick, in addition to their existing multiple Québec destinations. Local air service is also available from the Wabush Water Aerodrome located adjacent to Wabush on Little Wabush Lake, with charter flights offered from June to October.

The Labrador City area is accessible by train utilizing Tshiuetin Rail Transportation Inc. railway. The railway line links Sept-Îles to Emeril Junction and Schefferville in Québec. There are two (2) trains per week for passengers and community freight. The Cartier Railway is a privately-owned railway company that operates 416 km of track connecting the ArcelorMittal Mont-Wright iron ore mine to the iron ore processing plant and port, located at Port-Cartier, on the northern shore of the Gulf of St. Lawrence. The Cartier Railway is used solely for ArcelorMittal's iron-ore and freight transportation. The Québec North Shore and Labrador Railway is another regional railway that transports iron ore through northeastern Québec and western Labrador; a distance of 414 km from Labrador City, Labrador to the Port of Sept-Îles, Québec.

Champion also recently announced the signing of an agreement with Canadian National Railway Company (CN) to participate in the feasibility study of a proposed new multi-user railway that aims to connect mining projects in the Labrador Trough to the deep water port of Sept-Îles in Québec. CN and its partner, La Caisse de dépôt et placement du Québec, together with several iron ore exploration and mining companies (including Champion) are contributing to the cost of the feasibility study, which will enable Champion to assess the railway as a long-term transportation option.

5.2 Climate

The Fermont area has a sub-arctic, continental taiga climate with very severe winters, typical of northern central Québec. Winter conditions last six (6) to seven (7) months, with heavy snow from December through April. The prevailing winds are from the west and average 14 km per hour, based on records at the Wabush Airport. Daily average temperatures exceed 0°C for only five (5) months a year. Daily mean temperatures for Fermont average -24.1°C and -22.6°C in January and February, respectively. Snowfall in November, December, and January generally exceeds 50 cm per month, and the wettest summer month is July with an average rainfall of 106.8 mm. Mean daily average temperatures in July and August are 12.4°C and 11.2°C respectively. Extended daylight enhances the summer workday period due to the relatively high latitude. The early and late winter conditions are acceptable for ground geophysical surveys and drilling operations.

5.3 Local Resources and Infrastructure

The town of Fermont has a population of approximately 4,000 and is the residential town for ArcelorMittal Mines Canada (ArcelorMittal", formerly Québec Cartier Mining Company (QCM)); whose employees work at the Mont-Wright iron operations. The town was originally built by QCM in the early 1970s. Fermont has schools, a 72-room hotel, municipal and recreational facilities plus a business and shopping complex. The height-of-land, which determines the border between Québec and Newfoundland and Labrador, is located 10 km east of Fermont.

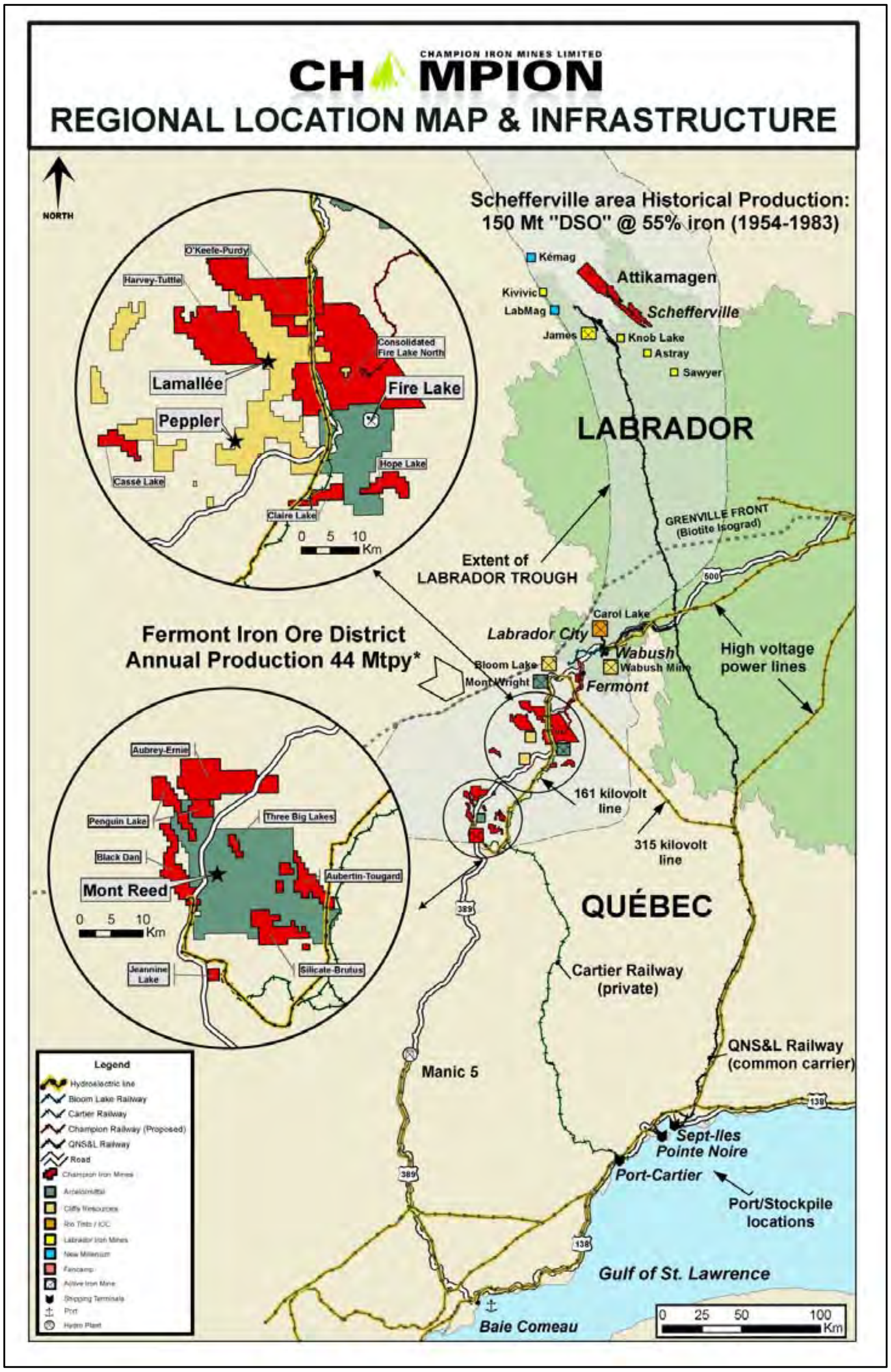


Figure 5-1: Location and Access Map of Fermont Project Area - Source: MRB (2012)

The twin communities of Labrador City (27 km northeast of Fermont), and Wabush (35 km northeast of Fermont) in Newfoundland and Labrador, have a total population of approximately 10 000. Labrador City and Wabush were also developed around iron-ore mining operations during the last half-century. The twin cities offer services that are complementary to those offered in Fermont, with a strong industrial base, medical and educational services, plus a variety of retail shops and grocery outlets.

The hydroelectric power supply in Labrador originates from Churchill Falls, Newfoundland and Labrador, which generates 5428 MW of power, 127 MW of which is provided to Labrador's western region for its current needs. The region has the lowest average cost for power in Newfoundland and Labrador; however, the local system is being burdened and a second transmission line to service Labrador West is a high priority for the region.

The Fermont-Labrador City-Wabush area, as a mining centre, is able to provide personnel, contractors, equipment and supplies for mining exploration and development.

5.4 Physiography

The sub-arctic terrain of Fire Lake North consists of a rolling glacial peneplain from 500 m to 900 m above sea level, with local relief in the order of 300 m. The area drains southward to the Gulf of St. Lawrence through the Nipissis and Manicouagan River systems. Glaciation has left a veneer of moraine boulder till and eskers that cover much of the local bedrock. These glacial deposits dominate the local topography and control most of the surface drainage. Lakes, swamps and grassy meadows fill bedrock and drift depressions. Most of the terrain is thinly forested with a typical mixture of fir and tamarack, with local stands of aspen and yellow birch. Ground cover is generally in the form of grasses, caribou moss, and shrubs; the latter typically comprising willow, arctic birch, alders and Labrador tea.

6. HISTORY

6.1 Regional Historical Exploration

The Fermont project area has been the subject of regional mineral exploration assessment by numerous mineral exploration and mining companies, from mid-century up to the present day. Since they predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals described therein as a Mineral Resource as defined in NI 43-101. There has been insufficient work to define a mineral resource, and it is uncertain whether further exploration will result in a mineral resource being delineated, other than those described in the mineral resource estimates filed by Champion on SEDAR at www.sedar.com.

Société d'exploration minière Mazarin Inc. evaluated a number of properties, including a couple that partially covered present-day Fire Lake North (Poisson 1989). Work included mapping, sampling and ground geophysics mainly targeting sulphides associated with the Knob Lake Group.

BHP Minerals Canada Inc. completed a regional heavy-mineral sampling program in northeastern Québec that included Fire Lake North (St-Pierre 1998). Sampling took place along lines spaced approximately 50 km apart, with sample sites at approximately 3 km separation with 1561 – 25 kg samples collected. Targeted commodities and deposits included diamonds, base metals associated with massive sulphide deposits, Broken Hill-type deposits, and gold occurrences associated with massive sulphides and shear zones.

Anglo American Exploration (Canada) Ltd. completed a 12 750 km^2 regional reconnaissance survey exploring for potential Broken Hill and Franklin / Sterling-type zinc deposits in the eastern part of the Gagnon Terrane, south of the town of Fermont (Zuran, 2003). Work included regional stream sediment, till and rock sampling at 40 sites in the Gagnon Terrane. The sampling program did not successfully discover the unique mineralogy associated with Franklin / Sterling deposits; however, the report concluded that the region had potential for Broken Hill-type deposits.

6.2 Fire Lake North

6.2.1 Historical Exploration

Iron formation was discovered at Fire Lake North in 1955 by QCM geologists during reconnaissance follow-up of an airborne magnetic survey. QCM staked claims in 1955 over known iron occurrences, and mapped the iron formation and general geology of the area southwest of Don Lake. Geologists estimated the iron content at around 30%, and noted the discrete hematite and quartz grains that readily separated on crushing (Ferreira 1957). QCM's property area was further extended with additional staking of claims in 1955 and 1956 that included claims covering the Half Mile Lake area of present-day Fire Lake North. Detailed geological and structural mapping of the Half Mile Lake area was completed in 1957 (Currie, 1957a). The entire area of the magnetic anomaly was mapped at a scale of 200 ft. to the inch (Currie, 1957b). The 1961 field season included detailed mapping and ground geophysics combined with limited exploration diamond-drilling. 17 AX core drill holes totalling approximately 1,300 m were drilled on Fire Lake North to evaluate aeromagnetic anomalies and obtain a preliminary economic evaluation of the deposit. The best intersection of the drill program was 82 m at 30.61% Fe in drill hole 21A-7 (Reeve, 1961).

Since they predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals described therein as a Mineral Resource, as defined in NI 43-101.

An electromagnetic and magnetic survey was flown in 2000 over certain QCM properties, which included parts of present-day Fire Lake North. Several strong magnetic anomalies on QCM's Fire Lake property were thought to indicate the presence of iron formations (St-Hilaire, 2000).

6.2.2 Recent Exploration by Champion

In 2008, GPR Geophysics International Inc. of Longueuil, Québec completed a 3855 line-km airborne magnetic and electromagnetic (VLF-EM) geophysical survey over all properties held by Champion in the FIOD area. Follow-up work included a helicopter-borne reconnaissance/orientation and prospecting program, completed during five (5) days in October 2008. The purpose of the program was to identify the iron formations, the structural geology, and to sample outcrops in the vicinity of the 2008-defined magnetic anomalies for comparison with type iron formations that host iron in the FIOD. All properties were evaluated from the air for physiographic elements (roads and trails, waterways, rail and power lines), and historical exploration work (line grids, trenches, and drill hole sites). For further information regarding the key observations from this work, refer to the Champion news release dated November 24th, 2008.

Champion staked additional claims in the FIOD following the reconnaissance program in October 2008. Fire Lake North had 31 new claims added (16.28 km^2) and was merged with the former Don Lake Property. The new combined property contains the two kilometric-scale quartz specularite ridges that were partially drill tested during 1956.

Prior to the commencement of Champion's 2009 drill program, a compilation of all previous exploration work was completed. Emphasis was put on historical drill hole information and down-hole assays. This information was entered into a database to plot cross-sections and plans using MapInfoTM and DiscoverTM GIS and Gemcom 3D software.

Fire Lake North and Bellechasse were selected by Champion as priority drill target areas, since their underlying airborne magnetic anomalies were located within a few kilometres of existing road and rail infrastructure.

The 2009 exploration program was designed as a 4000 m drilling program to delineate the Fire Lake North (including the Don Lake area) and Bellechasse iron formations, and to quantify a near-surface mineral resource estimate. The secondary goal was to determine the spatial and geological controls on the mineralization to guide future drill programs. Seven (7) holes totalling 1526.30 m were drilled on the Don and Half Lake (Demi Mille) areas of Fire Lake North.

The 2010 winter drill campaign at Fire Lake North was focused on the East Limb and West Limb target areas. A total of 4130 m were drilled by Lantech Drilling Services of

Dieppe, New Brunswick, in 24 holes at a drill hole spacing of 400 m, from late February to early April, 2010. A total of 503 core samples, totalling 1844.04 m of core, were collected from the mineralized sections and analyzed.

A geochemistry program of bedrock channel sampling, collected from 32 sites totalling 106 samples (85 samples + 21 QC samples) at Fire Lake North, was completed during October 2010 by MRB and Associates of Val-d'Or, Québec (MRB) and submitted to COREM Laboratories in Québec City, Québec. The average grade of the channel samples was 32.8% Fe, with a low of 12.4% to a high of 64.5% Fe_T.

MRB also completed a bulk sampling program, where 400-600 kg of specular hematite and magnetite mineralization was collected from each of 16 sites on Fire Lake North during October 2010.

Reconnaissance geological bedrock mapping was conducted intermittently by MRB geologists over a two (2) to four (4)-week period during the late summer and early fall of 2010, to verify the dip direction of the hematite-magnetite mineralization in outcrop.

A field visit was made in July 2010 by Bruce Mitton, P.Geo., Jeff Hussey, P.Geo., and Jean Lafleur, P.Geo., all contract employees of Champion, , to the northeast iron formation to evaluate magnetic anomalies that were outlined here by the 2008 airborne survey. Grab samples were taken for Total Iron (Fe_T) assays from the two (2) mineralized outcrops located 2 km northeast of the East Limb, where three (3) historic diamond drill holes (unable to be located by Champion personnel in the field) were completed by QCM (hole #21A-15, 21A-16, 21A-17).

An airborne gravity-magnetic-LIDAR survey was flown by Fugro Airborne Surveys over all the Champion-held FIOD properties from May 31 to July 14, 2011. The survey outlined strong magnetic signatures interpreted as iron formation, and was followed-up by several small local ground gravity surveys conducted during the late summer of 2011 by Abitibi Geophysics of Val- d'Or, Québec.

Champion carried out a diamond drilling program at the Don Lake, East (also referred to as East Pit) and West (also referred to as West Pit) areas of Fire Lake North, from September 2010 to August 2011. 16 new holes were drilled at the Don Lake area for a total of 4805 m, 29 holes at the East area for a total of 10 642 m, and 31 new holes for a total of 9448 m at the West area. The total number of metres drilled in late 2010 and 2011 was 26 221 m in 84 holes.

Feasibility Definition Drilling commenced at Fire Lake North in mid-November of 2011 and Champion completed Phase I in June of 2012. Drilling was focused within the proposed West area designed pit limits and the East area starter pit as outlined by the November 2011 PEA. More than 22 000 m of definition drilling was completed in both the East and West pit areas, with over 17 000 m of this being carried out in the West pit area.

Drilling of the West Pit area defined a tight, overturned synform, gently dipping towards the east at the south end of the deposit, and rotating along strike so as to dip gently towards the west at the north end, with the deposit remaining open down-dip for the majority of its 3500 m strike length. Specular hematite iron mineralization was delineated in the West pit area with approximate true widths varying from 100 m to greater than 200 m locally, extending beyond the limits of the PEA designed pit.

A total of 4900 m of definition drilling was completed in the East Pit area, between February 1st and late April 2012, further delineating the near-surface iron resources of Fire Lake North's planned starter pit. The geometry of the iron formation in the proposed pit area is a steep to gently southwest dipping, tightly-folded synform, which remained open down-dip to specular hematite mineralization for the majority of its 2400 m strike length.

The November 2011 to August 2012 Feasibility Definition drill program was completed by Nitasi Landdrill I.P. of Moncton, New Brunswick, Logan Drilling Limited of Stewiacke, Nova Scotia and Major Drilling Group International Inc. of Winnipeg, Manitoba. Eight (8) geomechanical drill holes, totalling 3894 m, were completed by the former two (2) drill contracts between November 16th, 2011 and June 25th, 2012.

A geological bulk sample site was prepared on the East Pit area during December 2011. Blasting and sample extraction were completed during February 2012. The approximate 60-75 tonne sample was transported to SGS Laboratory in Kirkland Lake, Ontario for analysis, and results have been discussed in Section 13.6.7 of this report.

6.3 Oil Can

6.3.1 Historical Exploration

Exploration in the region was reported as early as 1948 by United Dominion Mining Co. Ltd., with reconnaissance geological prospecting conducted throughout the Pekan River Basin and Mont-Wright area. A geological map of iron occurrences located at Oil Can Lake was produced in 1950 by QCM and updated in 1955.

In 1956, the Jones and Laughlin Steel Corp. carried out an air photography lineament study as well as reconnaissance mapping, covering 135 square miles from the eastern Labrador- Québec border to longitude 67°30’ in the west. In 1961, it was reported by P.J. Clarke that the iron content increases in the iron formations located south of Oil Can Lake.

There are four (4) drill holes reported to have been drilled at Oil Can in 1956 by QCM. The holes, with a maximum depth of 138.7 m, were inclined at 45° toward the west and designed to crosscut the iron formation (GM #05485-B). The report states that the core was split, and samples were sent for analysis, however, no assay results were reported. Since they predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals described therein as a Mineral Resource, as defined in NI 43-101.

Oil Can was inactive from 1957 until recently, even though exploration companies were aware of the iron formation underlying Oil Can. The remoteness of the area and the discovery of other nearby deposits made Oil Can a lower priority target that had essentially remained unexplored.

6.3.2 Recent Exploration by Champion

An airborne survey was carried out over the Fermont Properties for Champion, including Oil Can, in the summer of 2008 by GPR Geophysics International Inc. of Longueuil, Québec. The survey included magnetic, gamma-ray spectrometry and EM-VLF. Iron mineralization was well defined by the magnetic survey, with the magnetite-rich iron formations defined as magnetic high anomalies, and some of the hematite-rich iron formations and zones of secondary iron enrichment resulting from near-surface oxidation, defined by magnetic low anomalies.

The 2011 airborne magnetic-response surveys delineated four (4) zones of strong magnetic anomalies interpreted as iron formations on Oil Can, namely the North, Central, South and East zones (see Figure 7.7). These zones are discussed in Sections 7.6 and 7.10.2.

Champion's 2011 helicopter-supported diamond drill program was the first ground exploration or drilling undertaken on Oil Can since acquiring an interest in May of 2008. Magnetic inversion techniques were used to determine the geometry of the iron formation source, in order to design drillhole targets. Lantech Drilling Services Inc. of Dieppe, New Brunswick and Nitasi Landdrill LP, of Moncton, New Brunswick, were commissioned to carry out drilling to test several magnetic anomalies on Oil Can. Drilling commenced on August 5th, 2011 and was completed on December 9th, 2011.

A total of 19 diamond drill holes (either HQ- or NQ-diameter in size), from hole OC11-01 to OC11-19, were completed over a total length of 8435.77 m. Eighteen of the 19 holes intersected significant iron mineralization (hole OC11-18 did not reach its intended target and was abandoned after 180.0 m). The drill program tested 5.5 km of an approximate 6.5 km strike length of favourable magnetic responses on Oil Can. Seven (7) holes were completed at the North Zone, five (5) at the Central Zone, four (4) at the South Zone and three (3) at the East Zone.

6.4 Bellechasse

6.4.1 Historical Exploration

Since they predated NI 43-101, none of the following historical assessments led to a categorization of any of the metals or minerals, described therein, as a Mineral Resource.

Bellechasse Mining Corporation Ltd. (Bellechasse Mining) commissioned a regional aero magnetic survey in 1956 over the area that included Bellechasse. Anomalies identified by the survey were staked by Bellechasse Mining with follow-up dip-needle surveying, geological mapping and preliminary sampling completed during 1956. Stripping and trenching were attempted, but due to extensive overburden, a complete cross section could not be obtained, and sampling of the iron formation was made difficult. The iron formation was noted to be of a quartzite type with magnetite and hematite mineralization. The company also noted that the iron formation strikes northwesterly, with a 55° to 60° northeasterly dip, and lies within a southwestern limb of a fold structure, possibly a syncline (Porter, 1958). Bellechasse Mining undertook detailed local geological mapping and petrographic studies on their Ochre Lake Property (present day Bellechasse), and recommended a detailed magnetometer survey over the mineralization to fully delineate and assess the economic potential of the deposit (Porter, 1960). Mapping traced the outcrop exposure of the iron formation for approximately 800 m on Bellechasse, with an additional 820 m under glacial till. Upon review of Bellechasse in 1962, sampling of the mineralization and concentration testwork, in addition to the magnetometer survey, was recommended (Hogan, 1962).

Canadian Javelin Ltd. (Canadian Javelin) completed an airborne magnetic survey over an area, which included Bellechasse (Canadian Javelin 1959). The survey did not identify any new occurrences of iron, but it accurately located and delineated the iron formation in the survey area.

Jubilee Iron Corporation evaluated their properties in the FIOD; work included airborne and ground magnetic surveys, geological mapping and diamond drilling. Jubilee's North Lake property included part of present-day Bellechasse (Retty, 1960).

Kelly Desmond Mining Corporation Limited (Kelly Desmond) acquired the property by staking 32 claims in 1960. Its 1962 geophysical program included ground magnetic and gravimetric surveys over anomalies on their Gull Lake Property (includes present day Bellechasse) as a follow-up to their 1960 airborne geophysical survey (Christopher, 1962a). Diamond drilling was recommended on the anomalies identified by the geophysical surveys (Christopher, 1962b, Thoday, 1962). A limited drill program of 14 holes totalling approximately 1600 m (Bergmann 1963) was carried out during 1963-1965 on the southeastern part of the geophysical anomaly. All holes were collared and ended in the iron formation, and were sampled. Bergmann (1963) reported an average of 29.9% soluble iron over 313 m of sampled core for the first four (4) holes drilled. Drilling indicated the potential of a large tonnage of iron, with an average grade of approximately 30%, and the feasibility of an open pit operation.

Since they predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals, described therein, as a Mineral Resource.

Metallurgical testwork was undertaken by Lakefield Research of Canada Ltd (Lakefield). Drill logs from this drill program can be found on the MRNFQ E-Sigeom website (http://www.mrnfp.gouv.qc.ca/produits-services/mines.jsp) under the assessment reports GM 13631, GM 16583 and GM 17299.

Gaspésie Mining Company Ltd. (Gaspésie) acquired the 25 claims of Kelly Desmond's Gull Lake Property in 1971. The results of metallurgical testwork reported in Bergmann (1971) are discussed in Section 15.0 of this Report. Gaspésie drilled three (3) holes on Bellechasse in 1972, totalling approximately 450 m. Drill logs from this drill program can be found on the MRNFQE-Sigeom website (http://www.mrnfp.gouv.qc.ca/produits-services/mines.jsp) under the assessment reports GM 28088 and GM 31538.

The most recent historical work on Bellechasse was a government assessment report that evaluated the resources of dolomite between, and partially including, the present-day Bellechasse claims and Highway 389, through a sampling and mapping program (Caron, 2000).

6.4.2 Recent Exploration by Champion

During February and March of 2009, Champion contracted Forages La Virole of Rimouski, Québec to undertake drilling at Bellechasse and Fire Lake North. At Bellechasse, the 11 hole, 2618.3 m drill program tested a 3 km segment of the 4 km long airborne magnetic anomaly contained within the MIF, where previous work outlined an historic resource estimate. Champion's drilling was conducted at 400 m spacings with the highlights including three (3) mineralized intersections, each greater than 100 m wide, containing iron ranging from 21.9% to 29% Fe_T. These were reported in Champion's news release, dated April 30th, 2009.

Champion completed two (2) in-fill holes totalling 872 m during September 2011 at Bellechasse, to evaluate the iron potential within the southeastern fold hinge area. High-grade iron formation was intersected, thereby substantiating the interpretation generated from the 2009 drilling program.

6.5 Midway

6.5.1 Historical Exploration

Since they predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals, described therein, as a Mineral Resource.

Ministère des richesses naturelles, Québec, completed an airborne regional magnetic survey over a 500 km² area in 1959, including the East Lake Area iron formation, interpreted to be an anticline fold plunging northwest, lying on the east side of a north-plunging synform.

QCM took control of the Midway concessions in 1962.

6.5.2 Recent Exploration by Champion

An airborne survey was carried out over the Fermont Properties for Champion, including Midway, in the summer of 2008 by GPR Geophysics International Inc. of Longueuil, Québec, which included magnetic, gamma-ray spectrometry and EM-VLF. Iron mineralization was well defined by the magnetic survey, with magnetic highs outlining magnetite-rich iron formations and magnetic lows outlining hematite-rich iron formations and zones of secondary iron enrichment, resulting from near-surface oxidation.

The 2011 airborne magnetic-response surveys delineated a dominant, 3 km long, linear, east-southeast striking, central geophysical anomaly (see Figure 7.13). These zones are discussed in Sections 7.9 and 7.10.5.

Champion carried out the first ground-based exploration at Midway in 2011, carrying out a total of 1096.2 m of diamond-drilling over four (4) holes. The best result was intersected in drill hole MW11-02, and included a 136.0 m interval (89.0 m to 225.0 m) grading 29.0% Fe_T.

6.6 Historical Resource Estimates

The following resource estimates are historical in nature, and as such, are based on data and reports prepared by previous operators prior to the adoption of NI 43-101. These Mineral Resources have not been verified by P&E, and therefore, cannot be treated as “Mineral Resources”, as such term is defined in NI 43-101 and has not been verified by a QP. A QP has not done sufficient work to classify these historical estimates as current Mineral Resources or Mineral Reserves, as defined in NI 43-101. Champion is not treating these historical estimates as current Mineral Resources or mineral reserves. These historical resource estimates should not be relied upon. All these historical assessments have been superseded by the Mineral Resource Estimates, which are disclosed in this Report, except Midway, which has no current Mineral Resource Estimate.

6.6.1 Fire Lake North

QCM defined an historical mineral resource estimate from 14 diamond-drill holes in the southwestern part (Lake Pounce) of Fire Lake North, of 22.7 Mt (25 million tons) grading 32% Fe along the 6.5 km long north-trending Fire Lake magnetic anomaly (Reeve, 1961). Potential open pit resources at Half Mile Lake were estimated at 13.6 Mt (15 million tons) at 30% Fe and 4.5 Mt (5 million tons) at 31% Fe.

Since they predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals, described therein as a mineral resource, as defined in NI 43-101.

A Champion news release dated September 15, 2009 quoted historical mineral resource estimates on eight (8) of Champion's 17 Fermont Holdings, including Fire Lake North, totalling 694 Mt at 30.4% Fe.

Since they predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals, described therein as a Mineral Resource.

6.6.2 Oil Can

There have been no previous historical resource estimates on Oil Can.

6.6.3 Bellechasse

Bergmann (1963) initially estimated a potential tonnage of 58.1 Mt (64 million tons) averaging approximately 30% Fe at Bellechasse, based on the size of the geophysical anomaly of the iron formation. Gaspésie's review of Kelly Desmond's work on Bellechasse included a reported historical resource estimate of 62.6 Mt (69 million tons) of iron-bearing material grading 30.7% soluble iron available for open pit mining (Bergmann, 1971). It was noted that there is potential for additional resources in areas not yet drill-tested and below the depth of 120 m.

Since they predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals described therein as a Mineral Resource.

An historical resource estimate for Bellechasse of 91.4 Mt at 30% Fe was reported in the January 20th, 1966 issue of the Northern Miner (Avramtchev and LeBel-Drolet 1979).

Since they predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals described therein as a Mineral Resource.

6.6.4 Midway

There have been no previous resource estimates on Midway.

6.7 Recent Resource Estimates

6.7.1 Fire Lake North

In 2011, P&E prepared a mineral resource estimate in accordance with NI 43-101 and estimated in conformity with generally accepted CIM "Estimation of Mineral Resource and Mineral Reserves Best Practices" guidelines. The effective date of this mineral resource estimate is September 30th, 2011.

Data from 114 drill holes and 31 surface channels (from 2009 to 2011) were utilized in the Fire Lake North resource estimate and historical drill holes were not utilized.

Based on the mineral resource model, the Total Mineral Resources for the Fire Lake North Deposits at a 15% Fe_T cut-off are estimated, as indicated below, in Table 6-1

Table 6-1: Fire Lake North Resource Estimate at 15% FeT Cut-Off

Deposit	Measured		Indicated		Inferred	
	Million Tonnes	Grade FeT	Million Tonnes	Grade FeT	Million Tonnes	Grade FeT
East Area	2.1	33.9%	177.8	30.0%	209.5	29.0%
West Area	5.9	36.3%	161.7	32.3%	263.4	28.3%
Don Lake	0.4	21.4%	52.2	26.5%	188.3	25.3%
Totals	8.4	35.0%	391.7	30.5%	661.2	27.7%

An updated mineral resource estimate on Fire Lake North is detailed in Section 14.1 of this Report.

6.7.2 Oil Can

Section 14.2 details a previously released 2012 resource estimate for the Oil Can Deposit.

6.7.3 Bellechasse

Section 14.3 details a previously released 2009 resource estimate for the Bellechasse Deposit.

6.7.4 Midway

There have been no previous resource estimates on Midway.

7. GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The FIOD lies within a Paleo-Proterozoic fold and thrust belt known as the Labrador Trough, which hosts some of the most extensive iron formations in the world (Figure 7-1). The area is underlain chiefly by rocks that form the western, miogeosynclinal part of the Labrador Trough in the Churchill Province of the Canadian Shield. The Labrador Trough, also known as the New Québec Orogen and the Labrador-Québec Fold Belt, extends for more than 1000 km along the eastern margin of the Superior Craton, from Ungava Bay to the Manicouagan impact crater in Québec. The fold and thrust belt is about 100 km wide in its central part, and narrows considerably to the north and south. It marks the collision between the Archean Superior Province (circa 3.0 Ga to 2.5 Ga) and the Rae Province of the Hudsonian Orogeny (circa 1.82 Ga to 1.79 Ga). Rocks of the Rae Province were transported westward over the Archean Superior Province basement, creating a foreland fold and thrust belt marked by a series of imbricate thrusts (Figure 7-2). Based on stratigraphic juxtapositions, these thrust faults may have stratigraphic throws of several thousand metres.

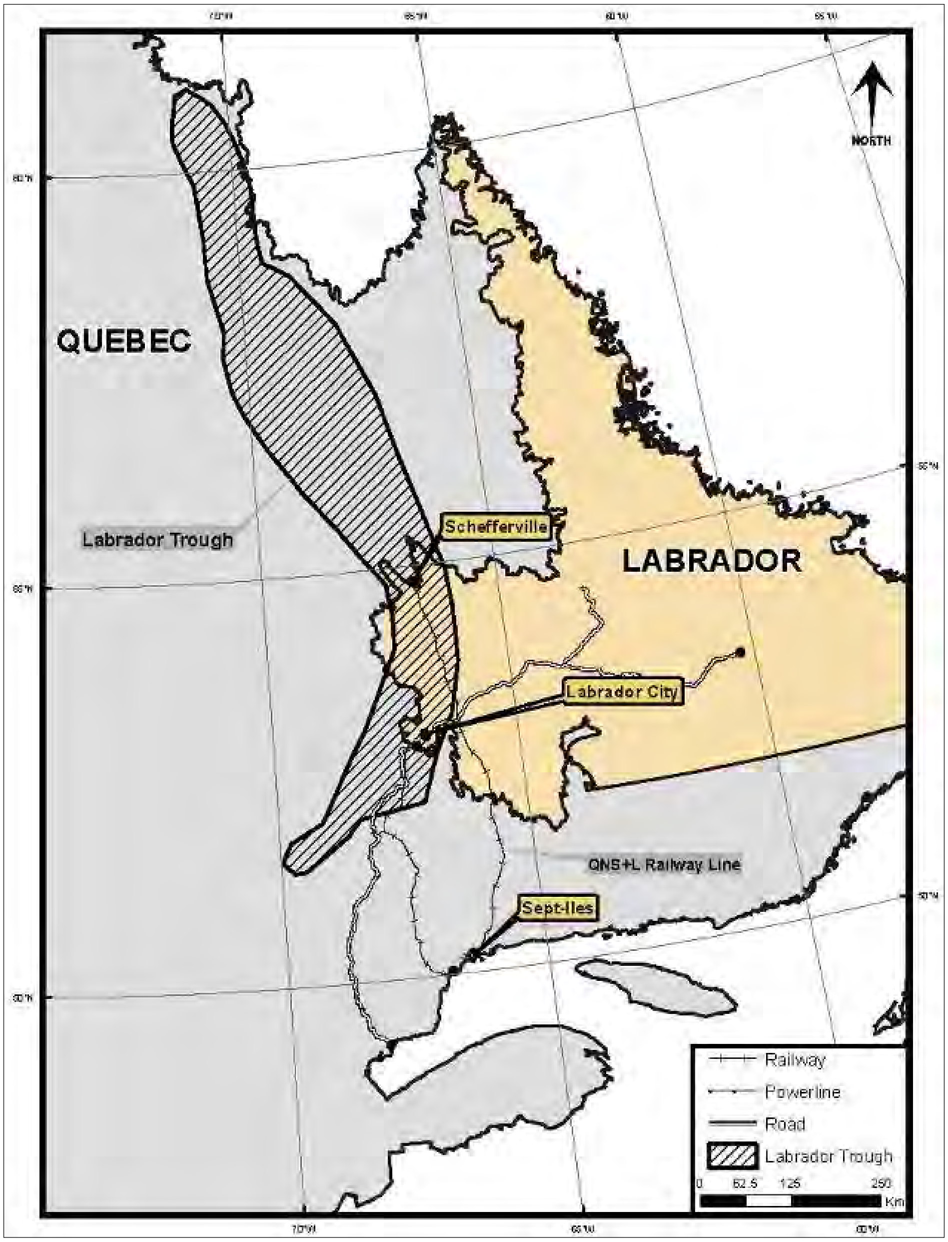


Figure 7-1: Location Map of Labrador Trough

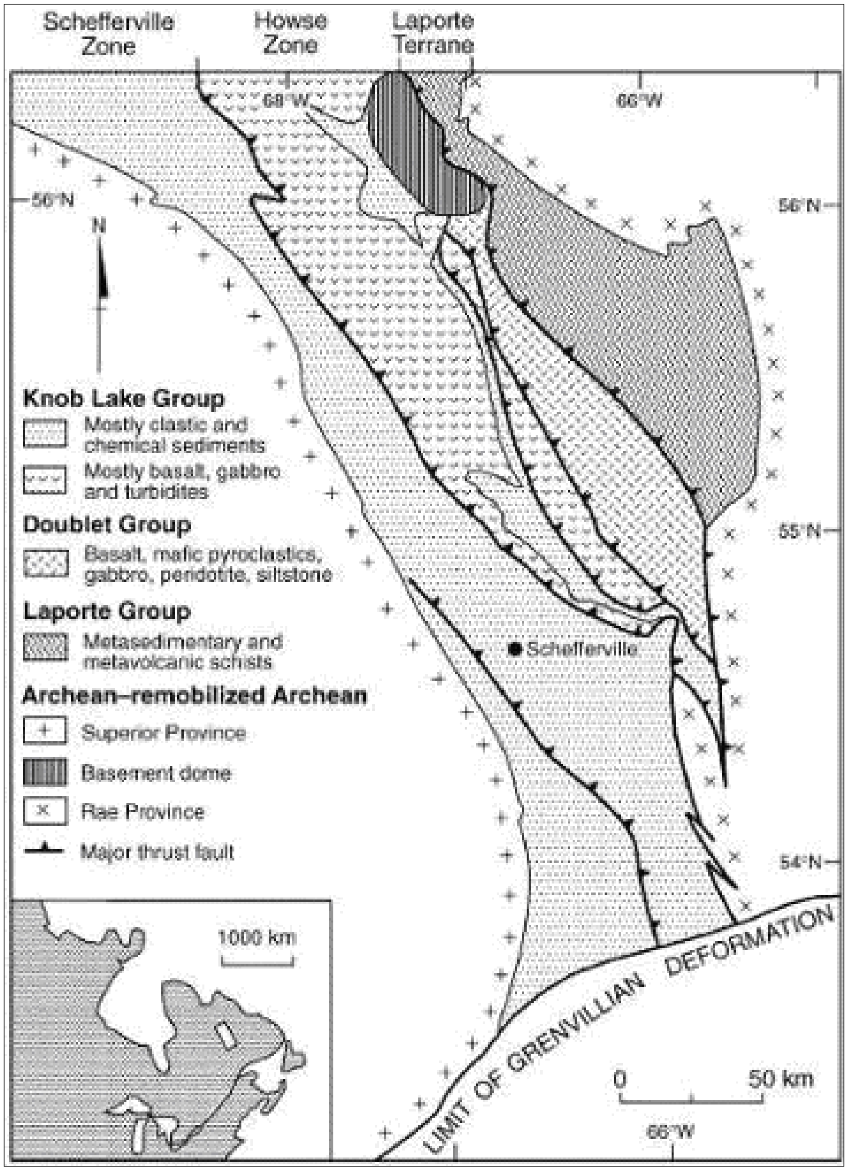


Figure 7-2: Litho-tectonic Subdivisions of the Central Labrador Trough
Source: From Williams and Schmidt (2004)

The Labrador Trough can be divided into three (3) geological domains. The Southern Domain is defined by the northern limit of the Grenville Orogenic Belt at approximately 53º24'00"N Latitude. The biotite metamorphic isograd, which represents the northernmost expression of the Grenville Orogenic Belt (along the Grenville Front), crosses the Labrador Trough trending northeast approximately 35 km northwest of Fermont (Figure 7-3), according to Fahrig (1967) and Klein (1978). The Southern Domain encompasses Labrador Trough rocks that were metamorphosed during the

Grenville Orogeny (circa 1.3 Ga to 1.0 Ga), which involved northward thrusting, northeast-southwest folding, abundant gabbro, anorthosite and pegmatite intrusions, and high-grade metamorphism.

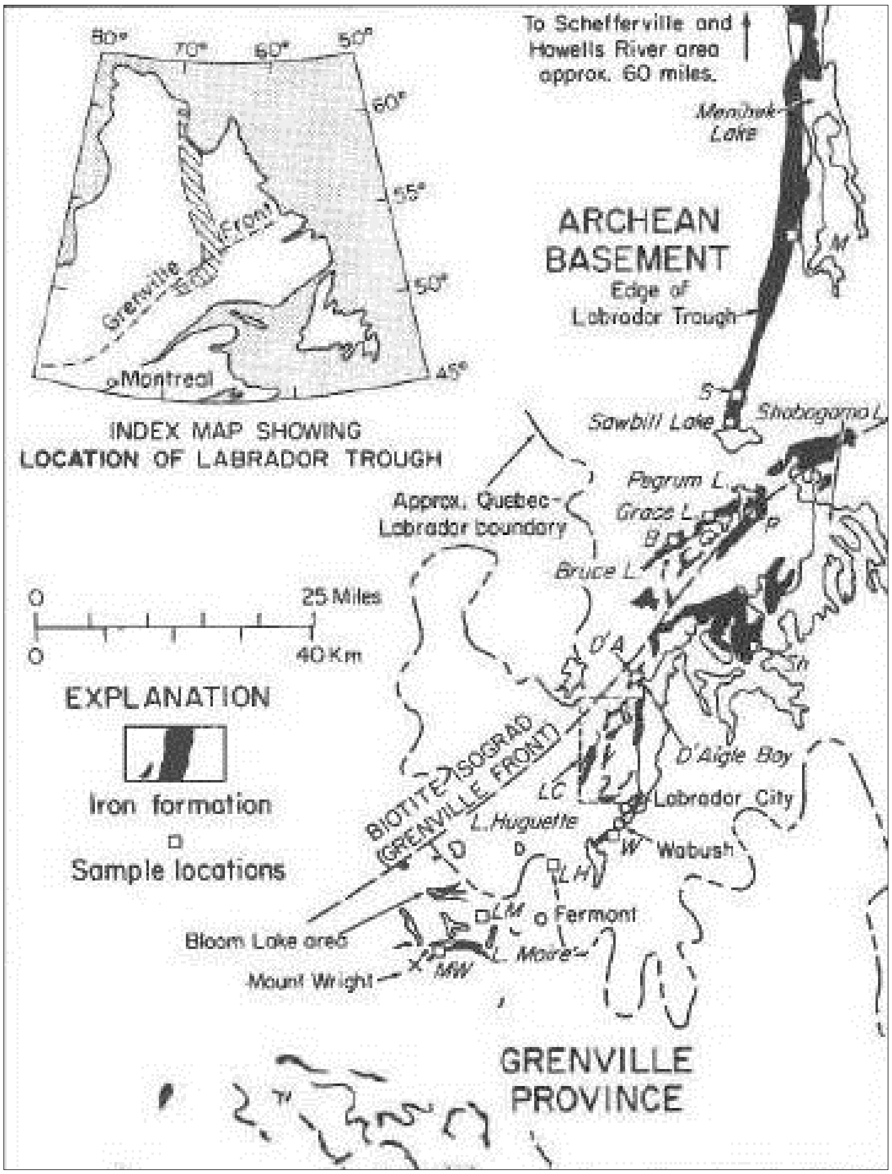


Figure 7-3: Simplified Regional Geology Map of the Southern Portion of the Labrador Trough Showing the Position of the Biotite Isograd and Iron Formations - Source: From P&E et al., (2012)

The metamorphism was responsible for the recrystallization of primary iron formations, producing coarse-grained sugary quartz, magnetite, and specular hematite schist (or meta-taconite). This coarser grained Southern Domain hosts the FIOD.

The Central Domain extends northward to approximately 58º30’00”N Latitude, along the west side of Ungava Bay. The Central Domain hosts regionally metamorphosed (greenschist metamorphic facies) iron formation deposits. The Central Domain consists of a sequence of Archaean, mainly sedimentary rocks, including iron formations, volcanic rocks and mafic intrusions, known as the Kaniapiskau Supergroup. The Kaniapiskau Supergroup is subdivided into the Knob Lake Group (western part of the Trough) and the Doublet Group, which is primarily volcanic, in the eastern part. The iron formation, meta-dolomite and quartzites in the Southern Domain are recognized as the metamorphosed equivalents of the Knob Lake Group.

The Northern Domain, north of the Leaf Bay area (58º30’00”N Latitude), comprises regionally metamorphosed rocks (lower amphibolite facies), much like those of the Southern Domain.

There is believed to be only one (1) iron formation assemblage throughout the region. This formation varies in thickness, and appears to have underlain the greater part of the original Labrador geosyncline. The economically important succession of quartzite-slate-iron formations and their metamorphosed equivalents, persist throughout the three (3) Domains.

7.2 Fermont Iron Ore District (FIOD) Geology

The FIOD, which includes iron formation in the Mont Reed-Fermont-Wabush area, is part of the Gagnon Terrane (Brown, et al. 1992) within the Grenville Province of Western Labrador (Figure 7-4). Archean granitic and granodioritic gneiss and migmatite of the Ashuanipi Metamorphic Complex form the basement to most of the FIOD. They comprise white to grey, coarse-grained hornblende-epidote-biotite granitic and tonalitic gneiss. Garnetiferous amphibolites are interlayered with the gneiss in the basement sequence.

Unconformably overlying the basement gneiss are the metamorphosed equivalents of the Lower Proterozoic Knob Lake Group, including crystalline limestone (siliceous dolomite), glassy quartzite, silicate-carbonate quartzite, magnetite-quartz iron formation, specularite-quartz iron formation, silicate-magnetite iron formation, garnet-biotite gneiss and garnet-mica schist. Quartzo-feldspathic and graphite-biotite gneiss overlies the iron formation sequence.

The Knob Lake Group is a continental margin metasedimentary sequence, consisting of pelitic schist, iron formation, quartzite, dolomitic marble, semi-pelitic gneiss and subordinate, local mafic volcanics. The Knob Lake Group was deformed and subjected to metamorphism ranging from greenschist to upper amphibolite facies within a northwest-verging ductile fold and thrust belt, during the Grenville Orogeny (Brown et al., 1992, van Gool et al., 2008). The sequence is best exposed in the region west of Wabush Lake, extending southeast into the province of Québec, and northeast beyond the north end of Shabogamo Lake. The equivalent rock successions of the Southern and Central domains are shown in the comparative list of Formations in Figure 7-5.

Intrusive rocks in the FIOD include pegmatites and aplite dykes, granodiorite plutons, amphibolites, gabbros and peridotite bodies.

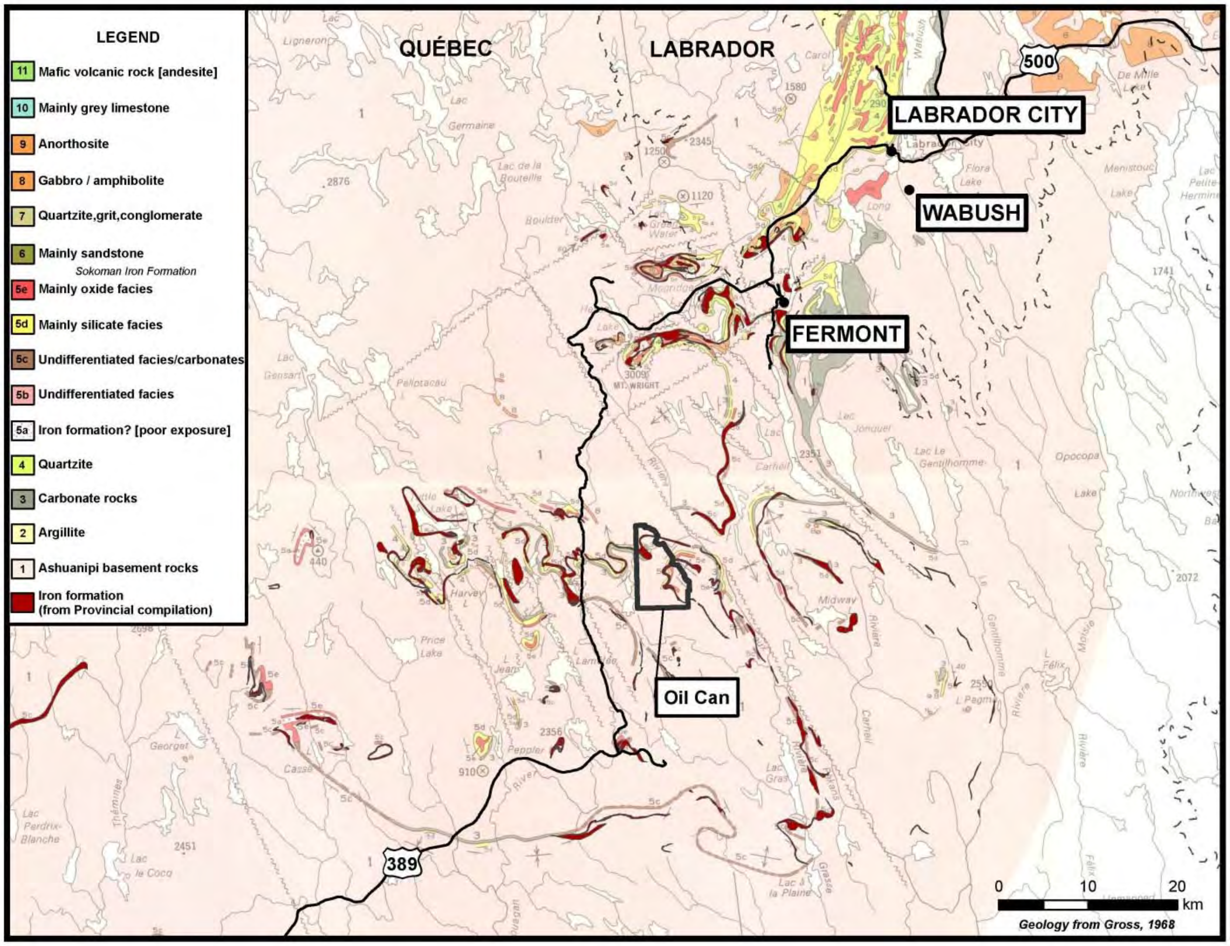


Figure 7-4: Regional Geology Map of the FIOD - ***Source: From Gross (1968)***

PROTEROZOIC
Helkian
Shabogamo Group
Gabbro Diabase

--------------------------- Intrusive Contact ---------------------------

	PROTEROZOIC **Aphebian** Kaniapiskau	
Churchill Province		Grenville Province
(Low-Grade Metamorphism) **Knob Lake Group**		**(High-Grade Metamorphism)**
Menihek Formation **Black shale, siltstone**		**Nault Formation** **Graphite, chloritic, and micaceous schist**
Sokoman Formation **Cherty iron formation**		**Wabush Formation** **Quartz magnetite-specularite-carbonate iron formation**
Wishart Formation **Quartzite, siltstone**		**Carol Formation** **Quartzite, quartz-muscovite-garnet schist**
Denault Formation **Dolomite, calcareous siltstone**		**Duley Formation** **Meta-dolomite and calcite marble**
Attikamagen Formation **Gray shale, siltstone**		**Katsao Formation** **Quartz-biotite-feldspar and gneiss**

--------------------------- Unconformity ---------------------------

ARCHEAN
Ashuanipi Complex
Granitic and granodioritic gneiss,
mafic intrusives

Note: The Duley, Carol and Wabush Formations are included in the Gagnon Group.

Figure 7-5: Equivalent Rock Successions in the Central and Southern Domains of the Labrador Trough - ***Source: From Gross (1968)***

7.3 Stratigraphy

The following sections are summarized from Fahrig (1967), Gross (1968), Dimroth (1970) and Muwais (1974) on the stratigraphy of the Knob Lake Group.

In the Southern Domain of the Labrador Trough, the Knob Lake Group is comprised of six (6) formations. The Attikamagen, Denault, Mackay River, Wishart, Sokoman and Menihek Formations occur along a northeast trending belt, and are briefly described below.

7.3.1 Knob Lake Group

Attikamagen Formation

The Attikamagen Formation is the oldest stratigraphic sedimentary sequence within the Knob Lake Group. The Attikamagen Formation, which can reach 300 m in thickness, unconformably overlies the Archean Ashuanipi Metamorphic Complex, and predominantly consists of brownish to creamy coloured, banded, medium to coarse-grained, quartz-feldspar-biotite-muscovite schist and lesser gneiss. Accessory minerals include chlorite, garnet, kyanite and calcite. The Attikamagen Formation appears to be best preserved in the deeper portions of the continental shelf, east of Wabush and Shabogamo Lakes, where the Formation thickness is greatest. In the extreme northwest, the Formation tapers and disappears, leaving upper units of the Knob Lake stratigraphy in contact with the Archean basement (Gross 1968).

Denault Formation

Conformably overlying the Attikamagen Formation is the Denault Formation. The Denault Formation consists of coarse-grained, banded, dolomitic and calcitic marble up to 75 m thick with minor tremolite, quartz, diopside and phlogopite as accessory minerals. In the Wabush Lake area, the Denault Formation has only been identified east and south of the Lake, and represents a transition between the shallow and deeper parts of the continental shelf. Stromatolites have been described to the south of Wabush Mine. Locally, the Formation can be sub-divided into three (3) sub-units consisting of the lower siliceous horizon, the middle low silica (< 5% SiO_2) horizon and the upper siliceous horizon. Low silica dolomite is mined and added to the iron pellets, and acts as a flux in the smelting process.

Mackay Formation

Overlying the Denault Formation is the Mackay River Formation. It consists of aqueous meta-tuffaceous sediments and conglomerate units. This sequence is not present in the Fermont area, and occurs mainly northeast of Shabogamo Lake, northeast of Labrador City.

Wishart Formation

The Wishart Formation conformably overlies the Denault Formation and locally, unconformably overlies the Attikamagen Formation. It consists of a 60 m to 90 m thick sequence of white, massive to foliated quartzite, which is typically resistant to weathering and erosion, forming prominent hills in the Wabush Lake Region. The Wishart Formation can be subdivided into the Lower, Middle and the Upper Members based on variation in composition and texture. The Lower Member consists of white to reddish brown, quartz-muscovite schist with varying percentages of garnet and kyanite.

The Middle Member is a coarsely crystalline orthoquartzite that is generally massive to banded. Accessory minerals include carbonate, amphibole (varying from tremolite and/or anthophyllite to grunerite and/or cummingtonite), garnet, mica (muscovite, sericite and biotite) and chlorite. Bands of iron-rich carbonates or their weathered products, limonite and goethite, may also occur.

The Upper Member exhibits a gradational contact with the overlying Sokoman Formation, and generally consists of bands of carbonate alternating with bands of quartzite. The presence of thin layers of muscovite and biotite schist (pelitic layers) is common. Accessory minerals include grunerite, garnet, kyanite and staurolite.

Parts of the Middle Member are locally mined for silica.

Sokoman Formation

The Sokoman Formation, also known as the Wabush Iron Formation, is the ore-bearing unit in the FIOD and is subdivided into Lower, Middle and Upper Members. The Sokoman Formation conformably overlies the Wishart Formation, but also locally shares its basal contact with the Denault, Mackay Lake, and Attikamagen Formations, and the Ashuanipi Metamorphic Complex.

The Lower Member (LIF) consists of up to a 50 m thick sequence of fine to coarse-grained, banded quartz carbonate, and/or quartz carbonate magnetite, and/or quartz carbonate (i.e., siderite, ankerite and ferro-dolomite) silicate (i.e., grunerite, cummingtonite, actinolite, garnet), and/or quartz carbonate silicate magnetite, and/or quartz magnetite specularite sequences. This member generally contains an oxide band up to 10 m thick in the upper portion.

The Middle Member (MIF), which forms the principal iron ore sequence, consists of a 45 m to 110 m thick sequence of quartz magnetite, and/or quartz specularite magnetite, and/or quartz specularite magnetite carbonate, and/or quartz specularite magnetite anthophyllite gneiss and schist sequence. Actinolite and grunerite-rich bands may be present in this member, although they are generally attributed to in-folding of the upper member. A vertical zonation is typically present with finer grained quartz magnetite dominated iron formation forming the basal section. Manganese content (rhodochrosite and pyrolucite) ranging from 0.4% to 1.0% Mn is associated with this sequence. Martite can also occur in weathered zones via supergene alteration of magnetite (Wabush Mines, Canning prospect and D'Aigle Bay area). The upper part of the MIF horizon is predominantly comprised of coarser grained quartz specular hematite iron formation.

The Upper Member (UIF) consists of a 45 m to 75 m thick sequence, similar in composition to the LIF, and can generally be differentiated through contact relationships with the overlying and underlying formations and the presence of increased grunerite or actinolite content. A magnetite rich zone may be present in the lower part of this Member.

Hydrous iron oxide (limonite and goethite) have been observed in all members of the Sokoman Formation. Limonite and/or goethite are present in weathered and fractured zones and are derived primarily from alteration of carbonate (Muwais 1974). Pyrolusite (a manganese oxide) may occur in a distinct zone at the base of the MIF but has also been observed in all members of the Sokoman Formation typically associated with surficial or supergene enrichment, extending to depth along and adjacent to structural discontinuities, such as fault and fracture zones.

Menihek Formation

The Menihek Formation consists of a 15 m to 75 m thick sequence of pelitic sediment. The Formation is commonly fine-grained, foliated and variably comprised of a quartz-feldspar-mica (biotite-muscovite)-graphite schist. Garnet, epidote, chlorite and carbonate are accessory minerals. This unit is well preserved in the southern region, and within broad synclinal regions in the north.

7.3.2 Shabogamo Intrusive Suite

The Shabogamo Intrusive Suite comprises the youngest Precambrian rocks in the Wabush Lake area. It consists of massive, medium to coarse-grained mafic intrusive (gabbro, olivine gabbro and amphibolite), non-magnetic, sill-like bodies with ophitic to sub-ophitic textures. These sills may be locally discordant, and have a tendency to be schistose near the contact with other rock formations. Most of the gabbro sills are composed of plagioclase, pyroxene, olivine and minor amounts of magnetite and ilmenite. The amphibolite equivalents are commonly composed of hornblende, biotite, garnet and chlorite. Pyrite, muscovite, and feldspar are accessory minerals.

7.4 Regional Structural Geology

Three stages of deformation are recognized in the Southern Domain. The first stage, associated with the New Québec Orogeny, produced linear belts that trend northwest in the Central Domain. The second stage, developed during the Grenville orogeny, reoriented the northwest trending linear belts to the east and northeast. Thrust faults associated with these two transpressional events are common, but sometimes very difficult to identify. Bedding planes are generally recognizable in the quartzite, dolomite and iron formation.

It is unclear whether the compositional banding in the schist and gneiss reflects original bedding. Asymmetrical, overturned and recumbent folds are common throughout the FIOD. The complex interference patterns evident on geological maps of the area indicate that a third phase of deformation has affected this domain.

As a result of folding and transposition, reversals, truncations, and repeats that thicken the iron formation are common. Late, brittle faults have redistributed the sequences only slightly compared with the influence of folding on the area.

7.5 Fire Lake North Geology

The geology in the northernmost part of Fire Lake North consists of a moderately northeast-dipping, overturned, curvilinear syncline that trends northwest-southeast. It is cored by the LIF and MIF members of the Sokoman Formation, and quartz-biotite-feldspar schist of the Menihek Formation (Figure 7-6). This six km long syncline parallels a ridge of high ground, southwest of Don Lake. Drilling during the 2009 campaign intersected parasitic folds to the main syncline, the amplitude and frequency of which are poorly defined at this time.

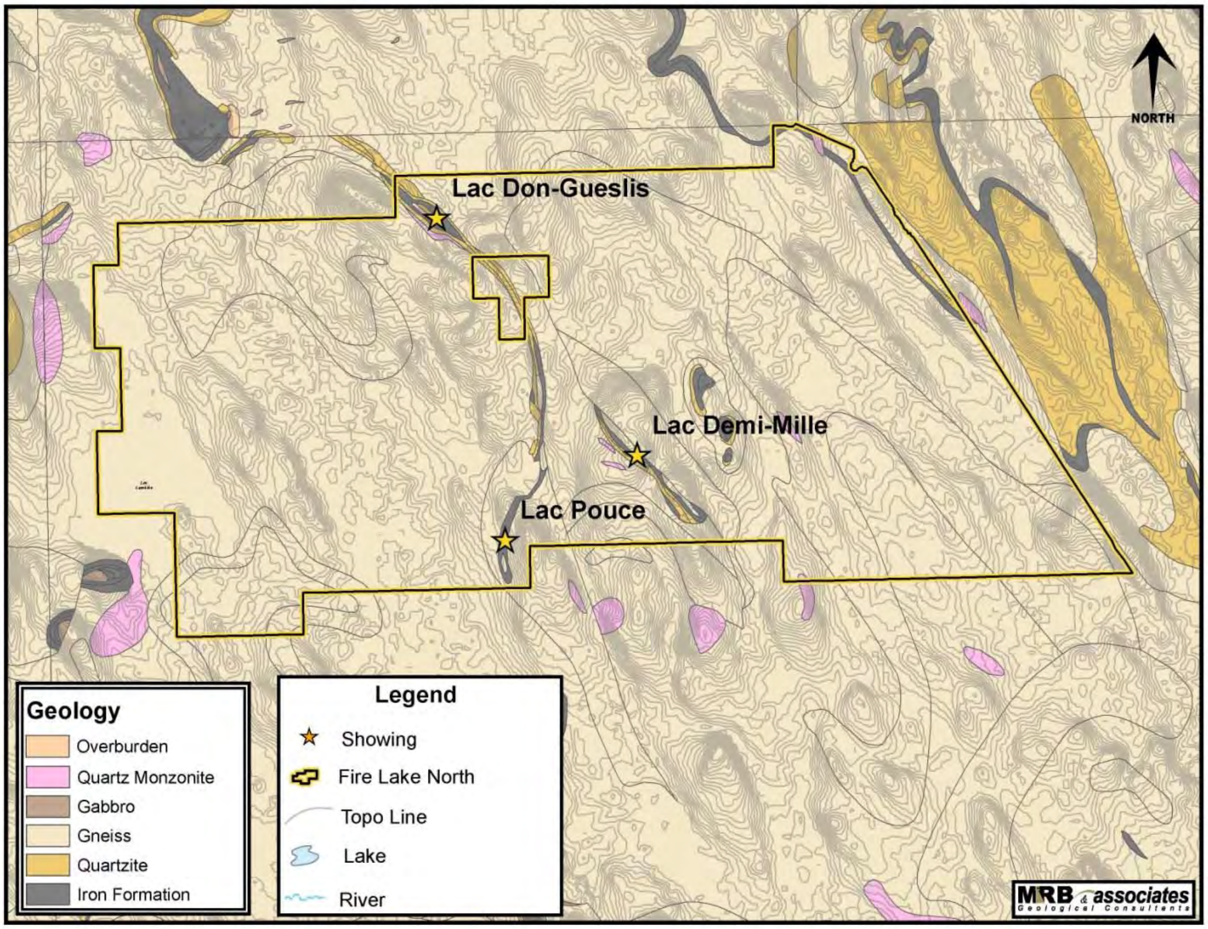


Figure 7-6: Fire Lake North Geology Map - ***Source: MRB (2012)***

A 2008 airborne magnetic survey completed by Champion indicates the Sokoman Formation is continuous across Fire Lake North (Figure 7-7). In the southwestern part of Fire Lake North, this structure gradually changes orientation toward the south and then to the south-southeast.

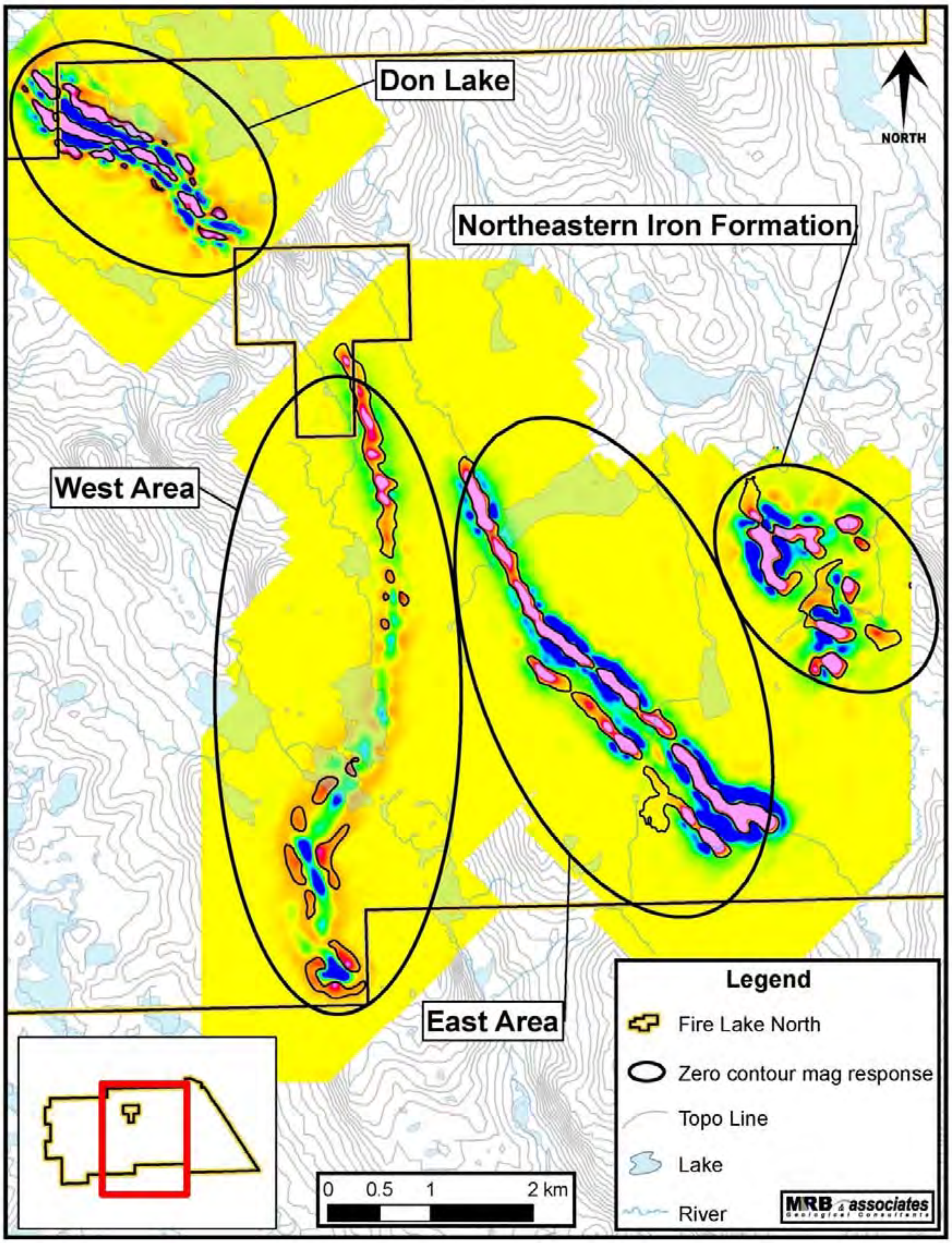


Figure 7-7: Magnetic Second Vertical Derivative Geophysical Map of Fire Lake North
Source: MRB (2012)

There are four (4) distinct iron formation structures in the central portion of Fire Lake North. Geophysical survey results show that the westernmost structure is continuous with the overturned syncline delineated in the northern part of Fire Lake North (see Figure 7-7). The folded mineralized Sokoman Formation closes near the southwestern boundary of Fire Lake North.

The East area iron formation structure is also a syncline cored by Sokoman Formation iron formation, according to QCM, who drilled the structure in 1961 (Reeve 1961). It trends northwest-southeast, but is re-oriented to north-south at its northern extension. It is interpreted on the MRNFQ geological compilation map to be truncated by faulting at each end. The geophysical signature of this structure is continuous over 6 km and appears to diverge away from the western syncline suggesting that the two structures have been juxtaposed (see Figure 7-6). Most likely, there is a thrust fault separating the two synclines.

7.6 Oil Can Geology

Basement gneissic rocks underlie the majority of Oil Can, with marble, quartzite and iron formation of the Denault, Wishart and Sokoman formations snaking through the northern and southeastern parts of the property. The convoluted surface distribution is the result of multiple phases of deformation that have resulted in open to tight, upright and overturned folds that refold early recumbent folds (Figure 7-8). Bedding dips and schistosity rarely guide stratigraphy, and many units disappear by attenuation rather than faulting. Intense metamorphism associated with the Grenville Orogeny has obliterated and masked most of the earlier structural discontinuities (thrusts and faults).

The most significant structural factor, economically, is the commonly occurring thickening of rock units with the thickened, near-surface, synclinal hinges regarded as the most favourable feature for open pit mining.

A 2011 Fugro gravity-magnetic survey outlined four (4) geophysical anomalies (the North, Central, South and East zones) that have been interpreted as 100 m to 300 m wide iron formations characteristically made up of a series of alternating magnetite- and hematite-rich horizons (Figure 7-9).

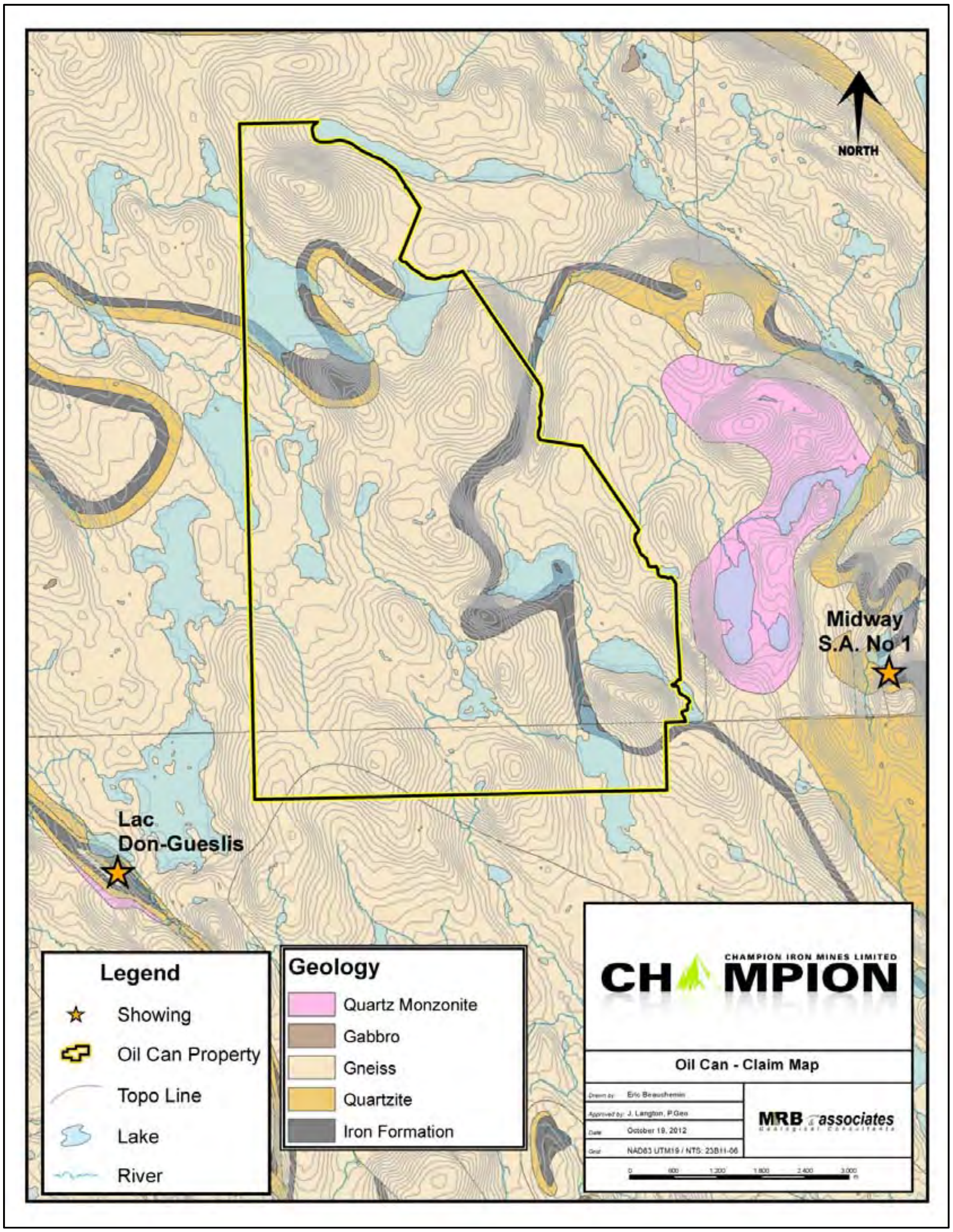


Figure 7-8: Oil Can Geology Map - Source: MRB (2012)

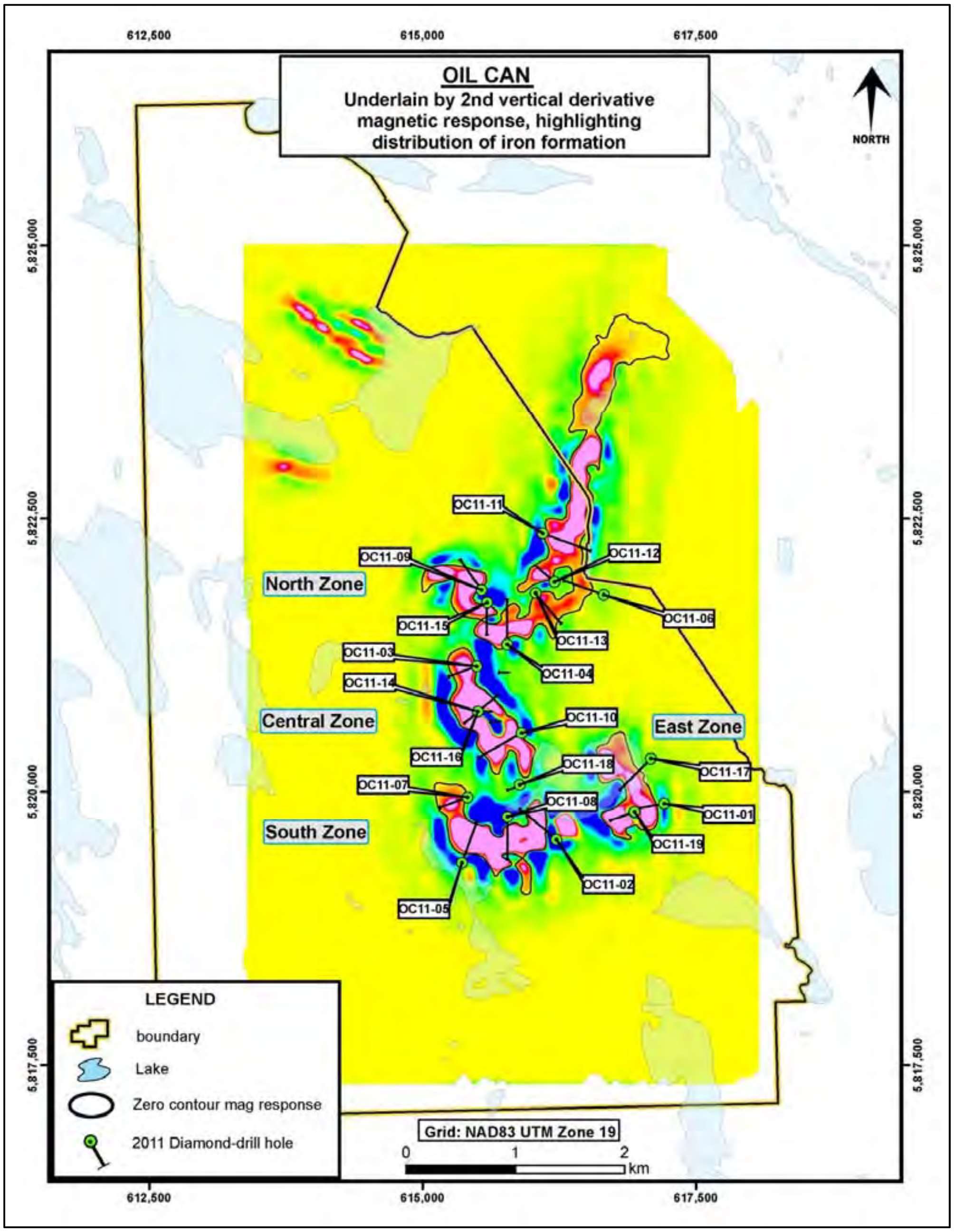


Figure 7-9: Magnetic Second Vertical Derivative Geophysical Map of Oil Can Showing 2011 Drillhole Locations - ***Source: MRB (2012)***

7.7 Bellechasse Geology

Bellechasse is underlain by the Sokoman Formation, and older, Knob Lake Group and Ashuanipi Basement Complex rocks. The surface and underground distribution is interpreted as a steeply north-northeast dipping, overturned, curvilinear, doubly-plunging synform, which is approximately 4 km in length, trending in a northwest-southeast direction, and cored by LIF, MIF and UIF members of the Sokoman Formation (Figure 7-10).

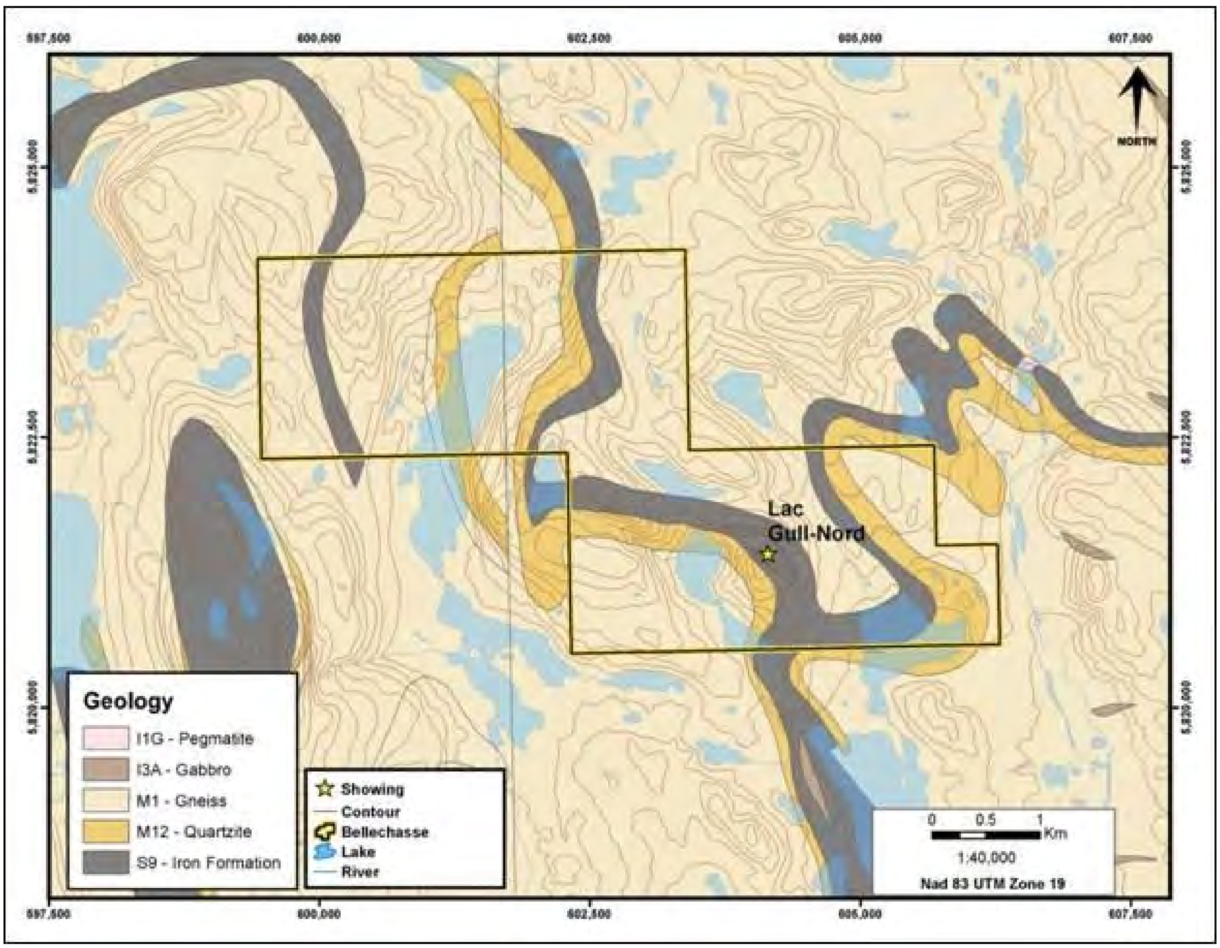


Figure 7-10: Bellechasse Geology Map - *Source: From Langton and Pacheco, (2012c)*

The southeastern end of this synform is tightly refolded into a hook shape near the northern part of North Gull Lake. Airborne magnetic survey data and recent drill results suggest that the plunge of the strongly magnetic iron formation near the east and west Bellechasse claim boundaries is towards the centre of the Bellechasse claim group, forming a synform of iron-rich mineralization (Figure 7-11).

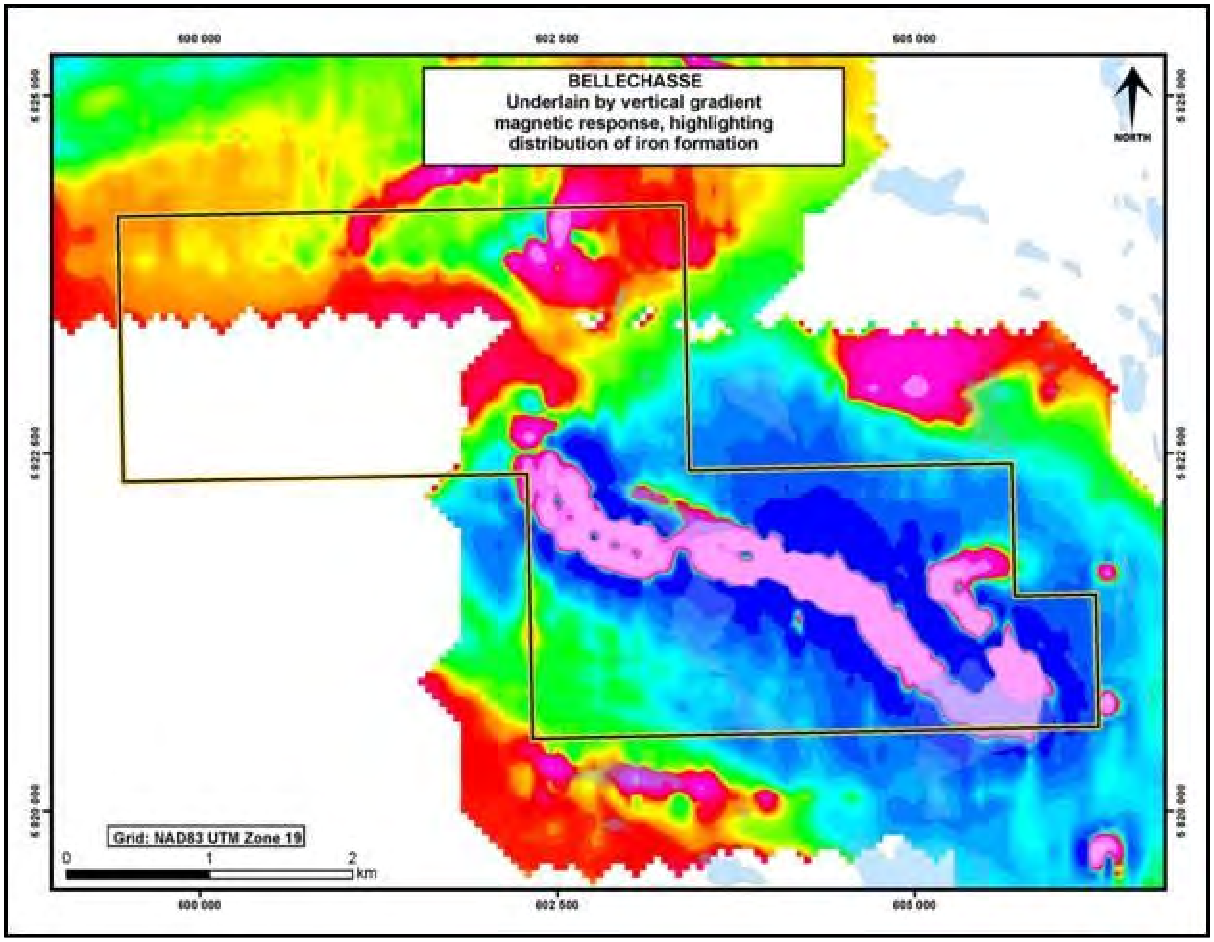


Figure 7-11: Magnetic Vertical Derivative Geophysical Map of Bellechasse
Source: From Langton and Pacheco, (2012c)

7.8 Midway Geology

Sedimentary rocks and iron formation of the Denault and Sokoman formations underly the north and central part of Midway, created by multiple phases of deformation that have resulted in open to tight, upright and overturned folds that refold early recumbent folds (Figure 7-12). Intense metamorphism associated with the Grenville Orogeny has obliterated and masked most of the earlier structural discontinuities (thrusts and faults).

A 2011 Fugro airborne magnetic-response survey outlined a dominant, central geophysical anomaly, interpreted to be coincident with Sokoman iron formation and characteristically made up of a series of alternating magnetite and hematite rich horizons capped by silicates and gneiss formations, and underlain by typical quartz, marble, quartz-silicate-carbonate rock and granitic gneiss (Figure 7-13).

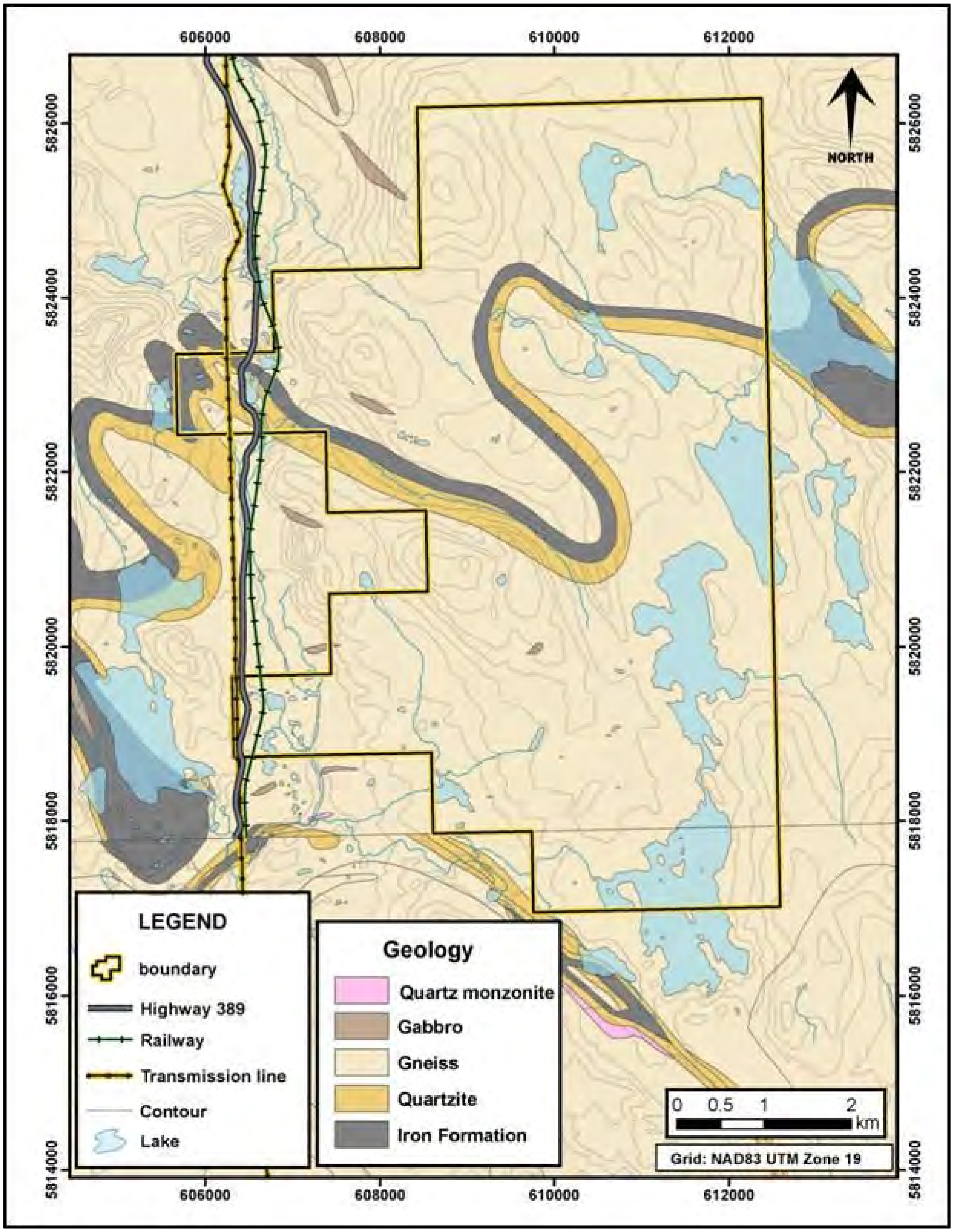


Figure 7-12: Geology Map of Midway - *Source: From Langton and Pacheco, (2012d)*

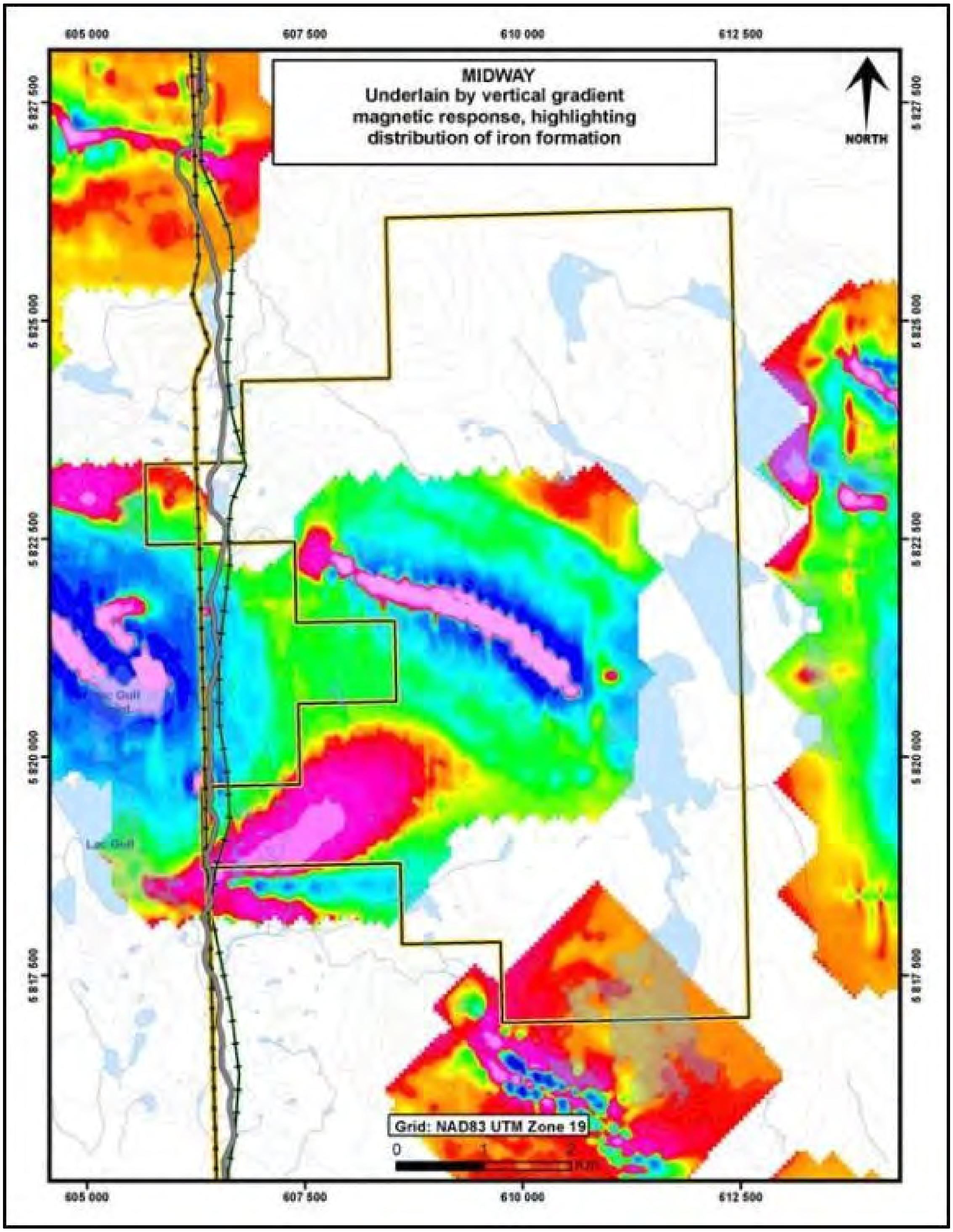


Figure 7-13: Magnetic Vertical Gradient Geophysical Map of Midway
Source: From Langton and Pacheco, (2012d)

7.9 Mineralization

7.9.1 FIOD Mineralization

Lake Superior-type iron formations form a major part of the succession of folded Proterozoic sedimentary and volcanic rocks that were deposited within an extensive basin, some interconnected, along the northeastern and southwestern craton margins of the Superior Province of the Canadian Shield. The Labrador-Québec fold belt, consisting of sedimentary and volcanic sequences and intrusions deposited in smaller interconnected sub-basins, is the largest continuous stratigraphic-tectonic unit that extends along the eastern margin of the Superior-Ungava craton.

The principal iron formation unit of the Labrador-Québec fold belt, the Sokoman Formation, extends for more than 1000 km and includes those iron formations in the FIOD that were subjected to deformation and regional metamorphism associated with the Grenville Orogeny (1.3 Ga to 1.0 Ga). The metamorphic grade ranges from greenschist facies near the Grenville Front to amphibolite-granulite facies farther south. As a result of deformation and metamorphism, the iron formation was structurally thickened in fold hinges and coarsely recrystallized to a quartz specular hematite with varying amounts of magnetite.

The Sokoman Formation occupies a stratigraphic position between shallow-water, high-energy sediments (Wishart) and deep-water, largely lower-energy sediments (Menihek). Stratigraphic relationships indicate that the Sokoman Formation is part of a transgressive sequence (Clark and Wares, 2006). The deposits consist of banded sedimentary units composed of bands of iron oxides within quartz (chert)-rich rock.

The principle iron deposits found in the FIOD can be grouped into two (2) types: quartz specular hematite and quartz specular hematite-magnetite.

The iron in the UIF, MIF and LIF is for the most part in its oxide form, mainly as specular hematite (Fe_2O_3) and specularite in its coarse-grained form and to a lesser extent, as magnetite (Fe_3O_4). Some of the iron is contained in iron silicates such as amphibole (grunerite, $Fe_7Si_8O_{22}(OH)_2$) and in carbonate such as ankerite ($Ca[Fe,Mg,Mn][CO_3]_2$).

The main gangue mineral in the iron formation deposits is quartz, which constitutes approximately 50% of the formation.

The Sokoman Formation is classified as a Lake Superior-type iron formation (Clark and Wares, 2006). This type is composed mainly of magnetite and hematite and is commonly associated with mature sedimentary rocks. Generally little metamorphosed and altered, the Sokoman can be termed ‘taconite’; however, in the Grenville Province where the FIOD is situated; the iron formation is more strongly metamorphosed and recrystallized.

The increased grain size of the FIOD formations makes mining and beneficiation easier; however, the additional episode(s) of folding has/have complicated the structural pattern in the FIOD.

Several models to explain the origin of the Sokoman Formation are presented in Clark and Wares (2006), and include an oxidizing shallow-marine paleo-environment for iron deposition (e.g., Dimroth, 1975); a volcanic-hydrothermal source (e.g., Gross 1996); and a sea rich in reduced iron that was used up during the accumulation of the sediments (e.g., Kirkham and Roscoe, 1993).

7.9.2 Fire Lake North Mineralization

During Champion’s 2008 reconnaissance mapping campaign, two (2) outcropping ridges of iron formation, located on Fire Lake North, were deemed prospective for immediate drilling. According to historical work, one of the two (2) ridges in the northern portion of Fire Lake North, the Don Lake area iron formation, has no known historical resource estimates, as it was not previously drill tested. This ridge hosts coarse-grained specular hematite mineralization at surface, very similar to the quartz-specularite ore from the FIOD. It is located within an airborne magnetic anomaly that is 2 km long and 500 m wide. The magnetic anomaly suggests the presence of magnetite rich iron formation that is interbedded with the moderately magnetic quartz-specularite iron formation sampled at surface. Both of these types of mineralization are common in the FIOD.

Magnetic signatures from the 2008 and 2011 airborne geophysical surveys revealed extensive and complexly folded iron formation horizons. The iron mineralization is linked to specular hematite (with magnetite) and quartz, commonly known as quartz-specularite iron formations, and are visually recognizable from the air, where exposed, by the dark steel grey colour of the quartz-specularite outcrops.

The West Limb target is interpreted to be a wide, canoe-shaped iron formation that is considered to be the Southern extension of the iron formation at Don Lake (Figure 7.8). The East Limb target is comprised of two (2) parallel north-south trending iron formations approximately 300 m apart that extend for several kilometres. The Northeast zone iron formation is essentially composed of specular hematite, magnetite and quartz, and is defined by a series of stacked and concentric magnetic linear anomalies over a 5 km combined strike length.

The mineralized zones consist of quartz-specular hematite (+/- magnetite and/or specularite) gneiss. The magnetite and specular hematite occurs as 0.5 mm to 2 mm disseminated subhedral to euhedral crystals in 1 cm to 10 cm wide semi-massive bands in amounts varying from 20% to 35%. The specularite occurs locally as euhedral crystals 2-5 mm. The majority of the specular hematite and minor magnetite occurs within the MIF of the Sokoman Formation.

7.9.3 Oil Can Mineralization

The iron mineralization contained within Champion's Fermont Holdings is hosted by the Wabush Formation (also known as the Sokoman Formation), which comprises a banded sedimentary unit predominantly composed of bands of iron oxides, magnetite and lesser hematite within quartz (chert)-rich rock, with variable amounts of silicate, carbonate and sulphide lithofacies (iron formation). The iron formation is metamorphosed into quartz and magnetite with the amounts of specular hematite varying. Categories of iron mineralization include quartz-specularite; specularite-hematite; magnetite-hematite, and; magnetite-rich.

Oil Can hosts mainly magnetite-hematite-rich iron formations, as indicated by four (4) strong magnetic anomalies that have been classified as four (4) separate zones; namely, the North, Central, South and East Zones. The North Zone is a 3.7 km long "J"-shaped magnetic anomaly (one (1) km of which extends outside the boundaries of Oil Can). The Central Zone is a 1.4 km long magnetic anomaly located in the central region of Oil Can. The South Zone is a 1.4 km long, crescent-shaped magnetic anomaly located south of the Central Zone. The East Zone is a 1.0 km long, crescent-shaped magnetic anomaly located east of the South Zone.

Historic drilling reportedly intersected banded, fine-to coarse-grained, magnetite iron formations at Oil Can, with one (1) hole intersecting an interval of 182.2 m of banded magnetite iron formation. Since this predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals described therein as a Mineral Resource, as defined in NI 43-101. The 2011 drilling undertaken by Champion included drilling of all four (4) zones with a total of 19 holes completed, which intersected predominantly banded and disseminated fine- to medium-grained quartz-silicate-magnetite iron formation with specularite and/or carbonate.

The Mineral Resources of Oil Can comprise a magnetite-rich iron formation and a mixed magnetite-silicate iron formation located within five (5) structurally-defined domains separated by faulting (the South, East, South Extension, Central and North zones).

Iron is present in its oxide form as magnetite (Fe_3O_4) and as specular hematite (Fe_2O_3) (also called specularite in its coarse-grained form). With the iron silicates, iron occurs in actinolite ($Ca_2(Mg, Fe)_5Si_8O_{22}(OH)_2$) and grunerite ($Fe_{2+7}(Si_8O_{22})(OH)_2$), as well as in carbonates such as ankerite ($Ca[Fe,Mg,Mn][CO_3]_2$).

In February of 2012, eight (8) core samples were submitted to Actlabs Geometallurgy-Mineral Liberation Analyser (MLA) Department of Ancaster, Ontario by Champion. Four (4) of the core samples were from Oil Can and the other four (4) from Moire Lake. The samples were evaluated for characterization of the morphology and chemistry of the minerals from the amphibole group in order to verify their non-asbestos character.

A combination of MLA (a quantitative mineralogical technology based on an FEI Quanta600F scanning electron microscope) and X-ray diffraction (XRD) were utilized to identify mineral assemblages (amphiboles and pyroxenes in particular), as well as morphological and chemical characteristics of amphibole group minerals.

Report findings were as follows:

- The following amphibole group minerals were found in the samples: actinolite, grunerite and mangano-cummingtonite;
- The morphology of the amphibole particles varies from platy to prismatic, acicular and needle-like. The particles with needle-like morphology are dominantly grunerite;
- No primary fibrous morphology of particles (which defines the asbestos character of minerals) was observed.

7.9.4 Bellechasse Mineralization

Bellechasse hosts a magnetite-rich iron formation. An interpretation of the Bellechasse iron mineralization and iron content using all historical data (as this predates NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals described therein as a Mineral Resource) and recent drill results indicate the mineralized zone consists of a curvilinear, re-folded, steeply northeast-dipping, overturned synform of Sokoman Formation trending southeast-northwest. The mineralized zone consists of quartz- magnetite (+- specularite) gneiss, which locally contains accessory actinolite. The magnetite and specularite occur as 0.5 mm to 2 mm disseminated subhedral to euhedral crystals, and as 1 cm to 10 cm wide semi-massive bands in amounts varying from 20% to 45%.

Although the majority of the magnetite occurs within the geological unit interpreted as the MIF of the Sokoman Formation, amounts up to 10% are present in the UIF and the LIF. These three (3) members of the Sokoman Formation contain varying amounts of accessory actinolite. There appears to be a reverse correlation between the amount of actinolite and the magnetite/specularite content.

7.9.5 Midway Mineralization

Midway hosts mainly magnetite-hematite-rich iron formations, in the form of a dominant, 3 km long, linear, east-southeast striking central geophysical anomaly interpreted from the 2011 Fugro airborne magnetic-response survey.

A 1959 ground survey noted silicate and carbonate type iron formations at the northwest end of the anomaly, but no other iron formation exposures over the anomaly and it was believed that the iron formation was buried by 15.2 m to 30.5 m of glacial material. Since this predated NI 43-101, none of these historical assessments led to a categorization of any of the metals or minerals described therein as a Mineral resource.

Mineralization at Midway, as delineated from the 2011 drilling undertaken by Champion (totalling four (4) holes) predominantly takes the form of banded and disseminated fine- to medium-grained quartz-silicate-magnetite iron formation with specularite and/or carbonate and/or minor biotite. Iron silicates are mainly present in the form of actinolite and grunerite.

8. DEPOSIT TYPES

The Properties' deposits are classified as Lake Superior-type. Such iron formations are the principal sources of iron throughout the world. Iron formation deposits in the FIOD include ArcelorMittal's Mont-Wright and Fire Lake Mines, Mont Reed iron deposits and Cliffs Natural Resources Bloom Lake Mine, (formerly owned by Consolidated Thompson Iron Mines Ltd.) and the Lamêlée Lake and Peppler Lake iron deposits.

8.1 Iron Formations

Iron formations are classified as chemical sedimentary rock containing greater than 15% iron consisting of iron-rich beds, usually interlayered on a centimetre scale with chert, quartz, or carbonate. Ore is mainly composed of magnetite and hematite, and commonly associated with mature sedimentary rocks.

Stratiform iron formations are distributed throughout the world in the major tectonic belts of the Precambrian shields, and in many Paleozoic and Mesozoic fold belts, as well as parts of the present day ocean floor. Gross (2009) noted that the enormous size of some of the Archean and Paleoproterozoic iron formations reflected the unique global tectonic features and depositional environments for iron formation that were distinctive of the time.

Although various models have been used to explain the deposition of iron formations in the past, current thinking (summarized in Cannon, 1992, Gross, 1996, Gross, 2009) supports the idea of iron formation deposition, resulting from the syngenetic precipitation of iron-rich minerals in a marine setting due to hydrothermal exhalative activity on the ocean floor. The iron is thought to have formed in stable tectonic-sedimentary environments where silica, iron, ferrous and non-ferrous metals were available in abundance, mainly from hydrothermal sources, and where conditions were favourable for their rapid deposition with minimal clastic sediment input.

Hydrothermal processes related to volcanism and major tectonic features are thought to be the principal source of iron and other metals. Deep fractures and crustal dislocations over hot spots and high thermal gradients penetrating the upper mantle enabled convective circulation, alteration and leaching of metals from the upper crust, including possible contributions by magmatic fluids. Iron formations are important hosts of enriched iron and manganese ore, gold deposits, and are also marker horizons for massive-sulphide deposits. Deposition of the iron was influenced by the pH and Eh of the ambient water, and biogenic anaerobic processes may have also played a role (Gross, 1996, Gross, 2009).

Post depositional events such as weathering, groundwater circulation and hydrothermal circulation can modify the deposits, and the mineralogy is usually recrystallized and coarsened by medium- to high-grade regional metamorphism. Protracted supergene alteration can be an important economic fact in upgrading the primary iron formation (Gross, 1996).

Iron formations can be subdivided into two (2) types, related to two (2) major types of tectonic environments: the Lake Superior-type on the continental shelf and marginal basins adjacent to deep-seated fault and fracture systems and subduction zones along craton borders; and the Algoma-type along volcanic arcs and rift systems and other major disruptions of the earth's crust (Figure 8-1). Development of Lake Superior-types was related to global tectonic systems that caused the breakup of cratons, shields or plates in the Paleoproterozoic. Rapitan-type have distinctive lithological features being associated with diamictite, and were deposited in grabens and fault scarp basins along rifted margins of continents or ancient cratons in sequences of Late Proterozoic and Early Paleozoic rocks.

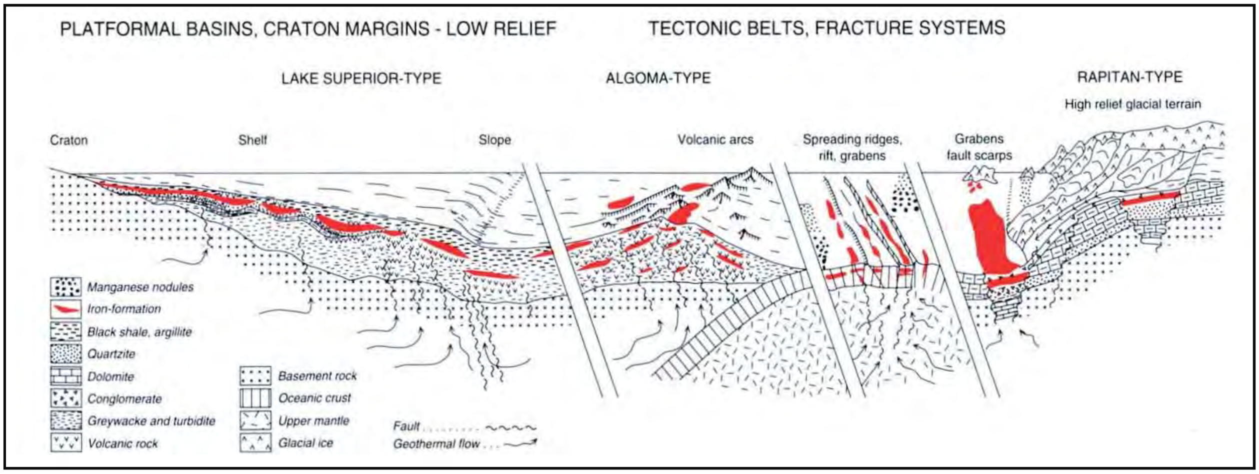


Figure 8-1: Tectonic Environment for the Deposition of Iron Formation - ***Source: Gross (1996)***

8.1.1 Lake Superior-Type Iron Formations

Extensive Lake Superior-type iron formations occur on all continents, in parts of relatively stable sedimentary-tectonic systems developed along the margins of cratons or epicontinental platforms. Most of the thicker iron formations were deposited in shallow basins on continental shelves and platforms in neritic environments, interbedded with mature sedimentary deposits (Gross, 2009).

The following are definitive characteristics of ore deposits of the Lake Superior-type iron formations (Gross, 1996):

- Iron content is 30% or greater;
- Discrete units of oxide lithofacies iron formation are clearly segregated from silicate, carbonate or sulphide facies and other barren rock;
- Iron is uniformly distributed in discrete grains or grain-clusters of hematite, magnetite and goethite in a cherty or granular quartz matrix;
- Iron formations, repeated by folding and faulting, provide thick sections amenable to mining, and;
- Metamorphic enlargement of grain size has improved the quality of the ore for concentration and processing.

Iron formation deposition coincided with volcanism in linear tectonic belts along the continental margins. Most of the sedimentary-tectonic belts in which they were deposited were characterized by extensive volcanic activity that coincided with deepening of the linear basins or trough in the offshore areas, and by extrusion and intrusion of mafic and ultramafic rocks throughout the shelf and marginal rift belts near the close, or after the main periods of iron formation deposition (Gross, 2009).

9. EXPLORATION

9.1 Fire Lake North Exploration

Champion carried out a recent trenching program at Fire Lake North, commencing on July 31st, 2012, and ending on September 20th, 2012. A total of 29 trenches were completed and sampled, over a total strike length of 2.5 km (Figure 9-1 and Table 9-1). A total of 508 samples that were obtained from the trenches, along with 149 QA/QC samples, have been sent for XRF analysis at ALS Chemex Laboratory in Sudbury, Ontario.

The geological data from the trenching program have not been incorporated into the modeling solids or surfaces used for the Fire Lake North Resource Estimate, as the trenching program was completed after the July 23rd, 2012 cut-off date for the database used to calculate the latest Fire Lake Mineral Resource Estimate.

No other recent exploration activities have been completed at Fire Lake North, and all previous exploration has been discussed in Section 6.2.2 of this report. Continued Feasibility Definition Drilling from June 2012 to the present time is discussed in Section 10.2.

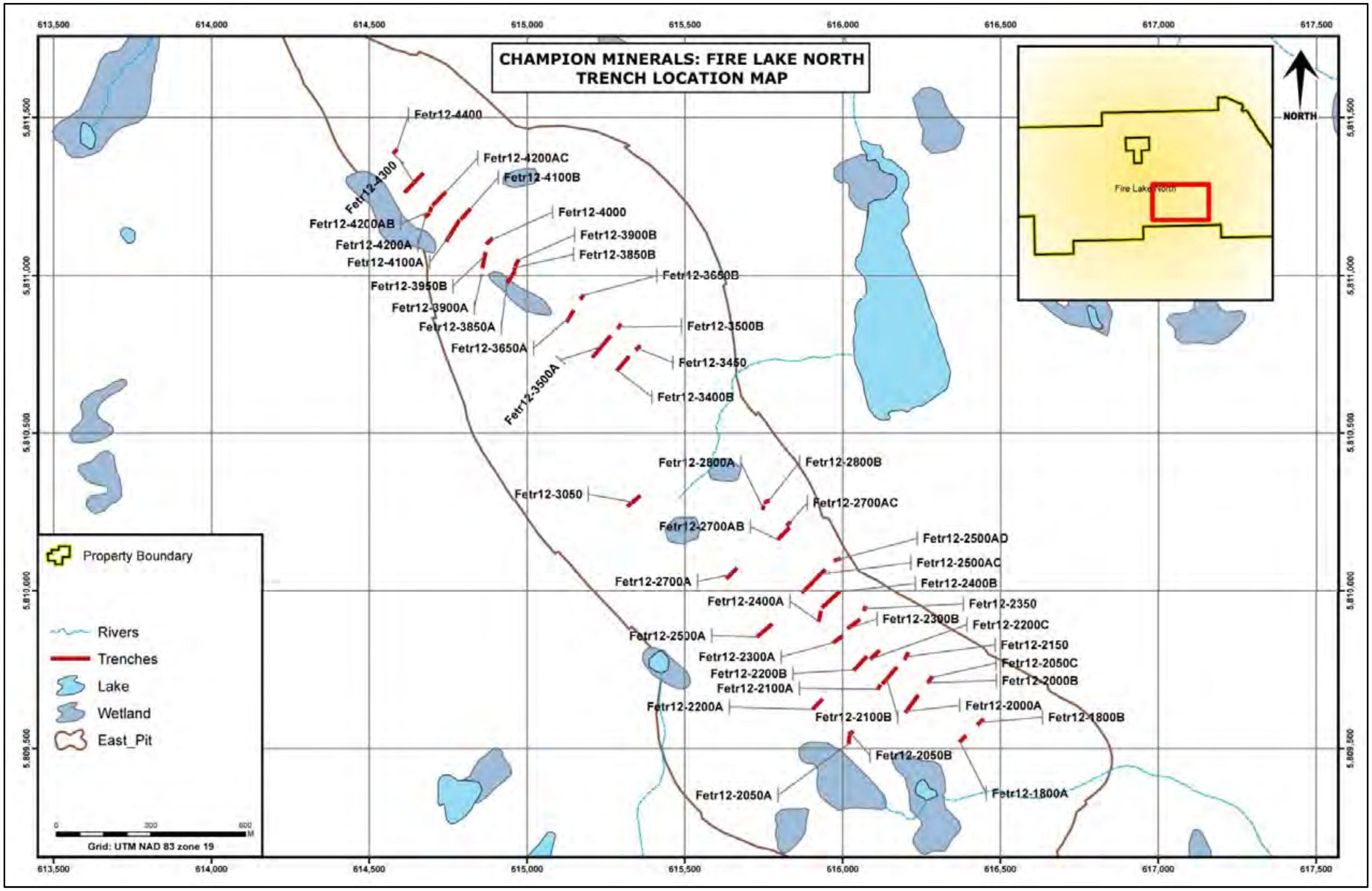


Figure 9-1: 2012 Trenching Program at Fire Lake North

Table 9-1: Summary of Fire Lake North Trench Program: July-Sept 2012

Trench No.	Samples	No. of Samples
FEtr12-1800A	954829	1
	954831-954834	4
	954836-954837	2
FEtr12-1800B	954838-954839	2
	954841-954844	4
	954846-954847	2
FEtr12-2000A	950987-950989	2
	950991-950994	4
	950996-950999	4
	954801-954804	4
	954806-954809	4
	954811-954812	2
FEtr12-2000B	954813-954815	3
	954817-954818	2
FEtr12-2050A	954864-954866	3
	954868-954869	2
	954871-954872	2
FEtr12-2050B	954873-954874	2
	954876-954879	4
FEtr12-2050C	954819	1
	954821-954825	5
	954827-954828	2
FEtr12-2100A	955493-955494	2
	955496-955499	4
FEtr12-2100B	950951-950954	4
	950956-950959	4
	950961-950964	4
	950966-950969	4
	950971-950974	4
FEtr12-2150	950976-950979	4
	950981-950984	4
	950986	1

Trench No.	Samples	No. of Samples
FEtr12-2200A	954848-954849	2
	954851-954854	4
	954856-954859	4
	954861-954862	2
FEtr12-2200B	955461-955464	4
	955466-955469	4
	955471-955474	4
	955476-955478	3
FEtr12-2200C	955479	1
	955481-955484	4
	955486-955488	3
	955490-955492	3
FEtr12-2300A	955424-955425	2
	955427-955429	3
	955431-955434	4
	955436	1
FEtr12-2300B	955437-955445	9
	955447-955449	3
	955452-955454	3
FEtr12-2350	955456-955459	4
FEtr12-2400A	955389-955390	2
	955392-955394	3
	955396-955399	4
	955450	1
FEtr12-2400B	955401-955404	4
	955406-955409	4
	955411-955416	6
	955418-955419	2
	955421-955423	3
FEtr12-2500A	955368-955369	3
	955371-955374	4
	955376-955379	4
	955381-955384	4
	955386-955388	3

Trench No.	Samples	No. of Samples
FEtr12-2500B	955356-955359	4
	955361-955364	4
	955366-955367	2
FEtr12-2500C	955333-955334	2
	955336-955339	4
	955341-955344	4
	955346-955349	4
	955351-955354	4
FEtr12-2500D	955327-955329	3
	955331-955332	2
FEtr12-2700A	955312-955319	8
	955321-955324	4
	955326	1
FEtr12-2700B	955287-955294	8
	955296-955304	9
FEtr12-2700C	955306-955309	4
	955311	1
FEtr12-2800A	955275	1
	955277-955279	3
FEtr12-2800B	955281-955284	4
	955286	1
FEtr12-3050	955257-955259	3
	955261-955269	9
	955271-955274	4
FEtr12-3400B	954863	1
	955009	1
	955011-955014	4
	955016-955019	4
	955021	1
	955023-955024	2
	955026-955029	4
	955031	1

Trench No.	Samples	No. of Samples
FEtr12-3450	955001-955004	4
	955006-955008	3
FEtr12-3500A	955038-955040	3
	955042-955044	3
	955046-955049	4
	955051-955054	4
	955056-955059	4
	955061-955063	3
FEtr12-3500B	955032-955034	3
	955036-955037	2
FEtr12-3650A	955072-955074	3
	955076-955079	4
	955081-955084	4
	955086	1
FEtr12-3650B	955064	1
	955066-955069	4
	955071	1
FEtr12-3850A	955241-955244	4
	955246-955249	4
	955251-955254	4
	955256	1
FEtr12-3850B	955237	1
	955239-955240	2
FEtr12-3900A	955210	1
FEtr12-3900B	955229-955230	2
	955232-955234	3
	955236	1
FEtr12-3950A	955211	1
	955213-955214	2
	955216	1
FEtr12-3950B	955217-955219	3
	955221-955224	4
	955226-955228	3
FEtr12-4000	955087-955088	2
	955090-955094	5
	955096	1

Trench No.	Samples	No. of Samples
FEtr12-4100A	955112-955113	2
	955115-955119	5
	955121-955124	4
	955126-955129	4
	955131-955134	4
	955136	1
	955138-955141	4
FEtr12-4100B	955097-955099	3
	955101-955103	3
	955105-955109	5
	955111	1
FEtr12-4200A	955169-955170	2
	955172-955174	3
	955176-955177	2
FEtr12-4200B	955162-955165	4
	955167-955168	2
FEtr12-4200C	955142-955144	3
	955146-955149	4
	955151-955154	4
	955156-955159	4
	955161	1
FEtr12-4300	955178-955179	2
	955181-955183	3
	955185-955189	5
	955191-955194	4
	955196-955199	4
	955201-955203	3
FEtr12-4400	955204	1
	955206-955209	4
	TOTAL	**508**

9.2 Oil Can Exploration

There have been no recent exploration activities conducted on Oil Can by Champion. All previous exploration activities at Oil Can were discussed in Section 6.3.2 of this report.

9.3 Bellchasse Exploration

There have been no recent exploration activities carried out at Bellechasse by Champion. All previous exploration activities at Bellechasse were discussed in Section 6.4.2 of this report.

9.4 Midway Exploration

There have been no recent exploration activities carried out at Midway by Champion. All previous exploration activities at Midway were discussed in Section 6.5.2 of this report.

10. DRILLING

10.1 2012 Fire Lake North Drilling Program

Champion continued its Phase I Feasibility Definition Drilling program at Fire Lake North, which commenced in mid-November of 2011 and was previously reported up to June of 2012 with hole FW12-51. Additional drilling has focused within the proposed West area designed pit limits as outlined by the November 2011 PEA.

A total length of 5921 m was drilled over 15 holes, commencing with hole FW12-51B on June 4th, 2012 and concluding with hole FW12-62B on August 21st, 2012.

The drill hole coordinates of the completion of Phase I of definition drilling are listed in Table 10-1, and the surface locations are shown in Figure 10-1.

Table 10-1: Drill Hole Coordinates for the 2012 Fire Lake North Drill Program

Hole #	Easting	Northing	Final Length (m)	Azimuth º (True North)	Dip º	Zone
FW12-51B	612458.9	5810606.1	422.0	95	-45	West
FW12-52	613059.5	5811029.8	309.0	270	-45	West
FW12-56	612393.6	5810310.3	452.0	120	-55	West
FW12-57	612522.4	5809206.0	435.0	270	-58	West
FW12-54	612756.5	5808422.8	518.4	270	-85	West
FW12-53	611756.0	5809838.0	678.0	100	-75	West
FW12-55	612459.0	5809548.0	529.0	280	-75	West
FW12-55A	612459.0	5809548.0	693.3	280	-75	West
FW12-59	612753.0	5810698.0	30.0	90	-70	West
FW12-59B	612753.0	5810698.0	206.0	90	-86	West
FW12-58	612007.1	5810538.0	720.0	100	-65	West
FW12-60	612790.3	5810590.0	260.0	90	-86	West
FW12-61	612766.0	5810496.0	255.0	90	-86	West
FW12-62	612702.8	5810401.1	150.0	100	-86	West
FW12-62B	612708.6	5810400.0	263.0	100	-85	West
		Total Length (m)	**5920.7**			

Similar to the trenching program, not all geological data from the June-August 2012 drilling program have been incorporated into the modeling of solids, surfaces or the block model used for the Fire Lake Resource Estimate. Some drill holes and most assay results were not completed before the July 23rd, 2012 cut-off date for the database used to calculate the latest Fire Lake Mineral Resource Estimate. The lithology data from holes FW12-51B to 59B inclusive were used to assist in solids and surface modeling; however, assay results for grade estimation were only available for holes FW12-52, FW12-55 and FW12-56. Assay results from the remaining holes were not available for inclusion in the Fire Lake Mineral Resource Estimate.

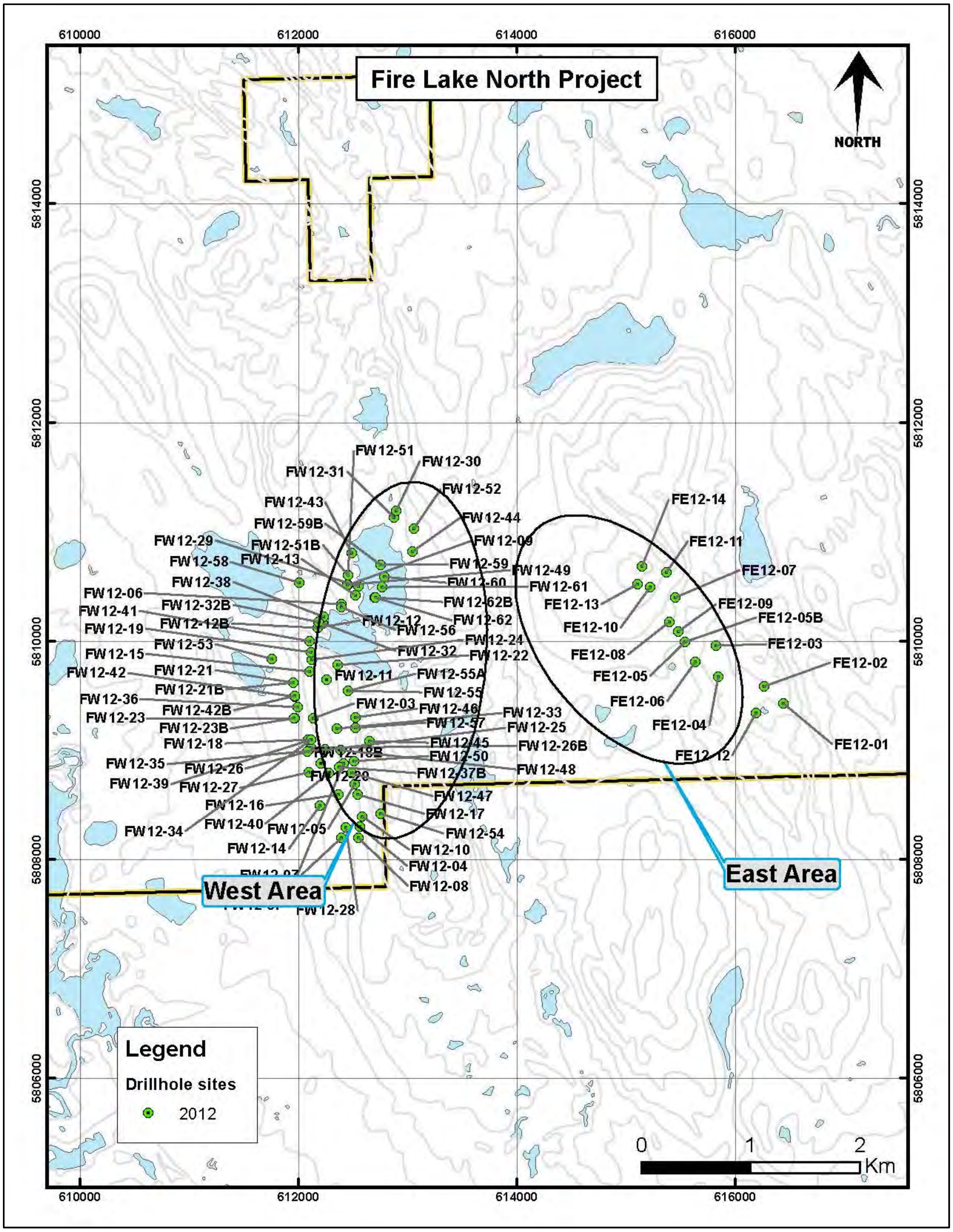


Figure 10-1: 2012 Drill Holes at Fire Lake North ***Source: MRB (2012)***

10.2 2011 Oil Can Drilling Program

There has been no recent drilling carried out at Oil Can by Champion. All previous drilling at Oil Can was discussed in Section 6.3.2 of this report.

10.3 Bellechasse Drilling

There has been no recent drilling carried out at Bellechasse by Champion. All previous drilling at Bellechasse was discussed in Section 6.4.2 of this report.

10.4 MIDWAY Drilling

There has been no recent drilling carried out at Midway by Champion. All previous drilling at Midway was discussed in Section 6.5.2 of this report.

10.5 Sampling Method and Approach

Core handling at the drill for all Champion drill programs was controlled by the drill contractor, and all drill core was placed into wooden core boxes from the drill core tube. Depth markers were placed every 3 m after emptying the wire line drill core tube. Once full, the boxes were secured for shipment to the core shed. Core boxes were sometimes opened at the drill rig, at the request of Champion's geologist, to "quick log" the hole in order to determine if the hole should be ended.

The core was then brought to the base camp, where a team of junior and senior geologists, project geologists, and sampling technicians executed the drill campaign, logistics, supervision, logging and sampling of all drill cores.

Sample lengths were typically four (4) meters, however the range of sample lengths may have occasionally varied based on the geology. Any drill core that contained visual Fe mineralization was sampled, and a sample was also taken adjacent to the iron formation, both above and below the mineralized section.

Samples were outlined by Champion's geologists logging the core and split by sampling technicians using a hydraulic rock splitter at the camp. Samples were tagged with a unique tag number, bagged and placed into large nylon bags, ready for transportation to Wabush.

11. SAMPLE PREPARATION, ANALYSES AND SECURITY

11.1 Sample Preparation and Assaying

All drill core logging and sample preparation was conducted by qualified Champion personnel, as required by NI 43-101 standards, at Champion's core logging facilities. For the drill program, logging was done at either the Wabush Industrial Park warehouse, the Fire Lake North Camp or the Bellechasse Camp, both of which are located adjacent to Highway 389.

The HQ/NQ/BQ-sized drill core was split in half, and one-half of the drill core was kept in the core tray for reference purposes, while the other half core was individually bagged, tagged, sealed and packed in large nylon bags or plastic pails, which were securely closed. Samples were delivered by Champion personnel to the trucking firm, Hodge Brothers Transport, (a division of Transport Thibodeau) in Wabush, NL, and then shipped to either the COREM laboratory in Québec City, or to the ALS Minerals facility in either Sudbury, Ontario or Val-d'Or, Québec for sample preparation. The ALS pulverized pulp samples were sent from Sudbury or Val-d'Or to their analytical laboratory in Vancouver, BC for analysis.

COREM is a private research consortium that provides competitive laboratory services to its members through research programs and the transfer of technology.

The COREM pyrometallurgical characterization laboratory in Québec City has been certified ISO 9001: 2000 and the analytical laboratory is certified ISO 17025: 2005.

ALS Minerals is an internationally recognized minerals testing laboratory operating in 16 countries and has an ISO 9001:2000 certification. Several of its laboratories have also been accredited to ISO 17025 standards for specific laboratory procedures by the Standards Council of Canada (SCC).

Split core samples were analyzed for a suite of whole rock elements including: SiO_2, TiO_2, Al_2O_3, Fe_2O_3, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5 and loss on ignition (LOI) plus Fe_T. Analysis was done on lithium metaborate fused, or borate fused, pressed pellets by X-ray Fluorescence (XRF) following sample crushing and pulverization. Select core samples were also analyzed for Satmagan and Specific Gravity testing.

12. DATA VERIFICATION

The following section reports on the data verification for Fire Lake North, Oil Can and Bellechasse and not Midway, for which there have been no previous resource estimates.

12.1 Site Visits and Independent Sampling

12.1.1 Fire Lake North

Fire Lake North was last visited by Mr. Antoine Yassa, P.Geo., an independent QP, as defined by NI 43-101, from September 4 to 6, 2012. Nine (9) samples were collected from three (3) drill holes. The samples were documented, bagged, and sealed with packing tape, and taken by Mr. Yassa to Purolator Courier, where they were shipped to the offices of P&E in Brampton, Ontario. From there, the samples were sent by courier to AGAT Laboratories in Mississauga, Ontario for analysis. Total iron was analyzed using sodium peroxide fusion-ICP-OES.

AGAT Laboratories employs a quality assurance system to ensure the precision, accuracy and reliability of all results. The best practices have been documented and are, where appropriate, consistent with:

- The International Organization for Standardization's ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories" and the ISO 9000 series of Quality Management standards;
- All principles of Total Quality Management (TQM);
- All applicable safety, environmental and legal regulations and guidelines;
- Methodologies published by the ASTM, NIOSH, EPA and other reputable organizations;
- The best practices of other industry leaders.

At no time, prior to the time of sampling, were any employees or other associates of Champion advised as to the location or identification of any of the samples to be collected.

A comparison of the P&E independent sample verification results versus the original assay results for iron can be seen in Figure 12-1.

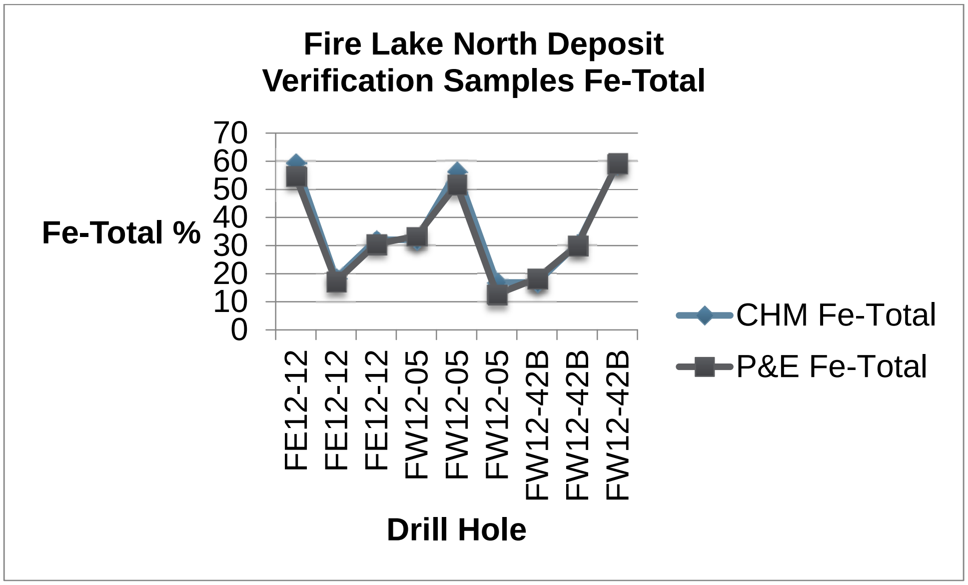


Figure 12-1: P&E Site Visit Verification Samples for Fire Lake North - September 2012

12.1.2 Oil Can

Oil Can was visited by Ms. Tracy Armstrong, P.Geo., an independent QP, as defined by NI 43-101, from January 17 to 18, 2012. Five (5) samples were collected from five (5) diamond drill holes. The samples were documented, bagged, and sealed with packing tape and taken by Ms. Armstrong to Air Canada Cargo at the Wabush International Airport, whereby they were shipped directly to AGAT Laboratories in Mississauga, Ontario for analysis. Total iron was analyzed using sodium peroxide fusion-ICP-OES.

AGAT Laboratories employs a quality assurance system to ensure the precision, accuracy and reliability of all results. The best practices have been documented and are, where appropriate, consistent with:

- The International Organization for Standardization's ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories" and the ISO 9000 series of Quality Management standards;

- All principles of Total Quality Management (TQM);
- All applicable safety, environmental and legal regulations and guidelines;
- Methodologies published by the ASTM, NIOSH, EPA and other reputable organizations;
- The best practices of other industry leaders.

At no time, prior to the time of sampling, were any employees or other associates of Champion advised as to the location or identification of any of the samples to be collected.

A comparison of the P&E independent sample verification results versus the original assay results for iron can be seen in Figure 12-2.

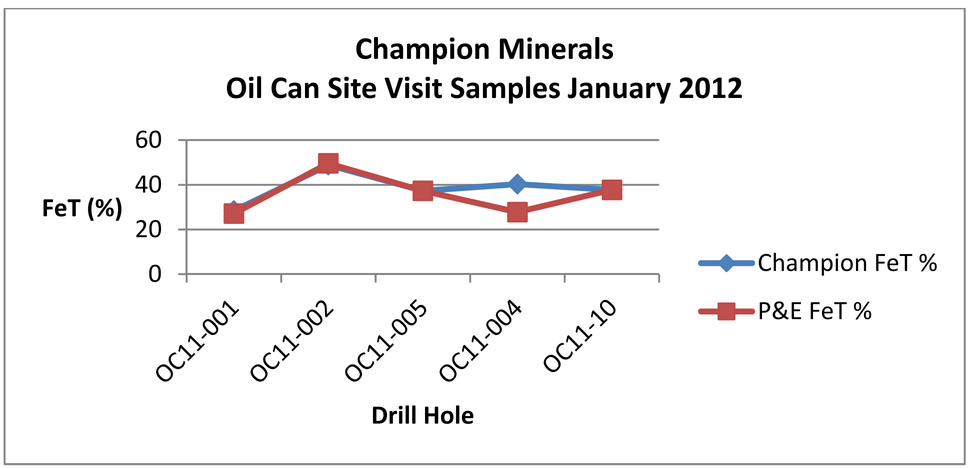


Figure 12-2: P&E Site Visit Verification Samples for Oil Can

12.1.3 Bellechasse

Bellechasse and Fire Lake North were visited by Mr. Yassa between September 30 and October 1st, 2009. Twelve samples were collected from two (2) drill holes; one (1) hole drilled at Bellechasse, and the other hole drilled at Fire Lake North. The samples were documented, bagged, and sealed with packing tape, and taken by Mr. Yassa to Purolator Courier where they were shipped to the offices of P&E in Brampton, Ontario. From there, the samples were sent by courier to SGS Mineral Services in Lakefield, Ontario for analysis. Total Fe was analyzed using lithium metaborate fusion-XRF.

SGS Minerals has 1350 offices and labs throughout the world. Many of the exploration sample processing services at SGS are ISO 17025 accredited by the Standards Council of Canada. Quality Assurance procedures include standard operating procedures for all aspects of the processing, and also include protocols for training and monitoring of staff. ONLINE LIMS is used for detailed worksheets, batch and sample tracking, including weights and labeling for all the products from each sample.

At no time, prior to the time of sampling, were any employees or other associates of Champion advised as to the location or identification of any of the samples to be collected.

A comparison of the P&E independent sample verification results versus the original assay results for Fe can be seen in Figure 12-3.

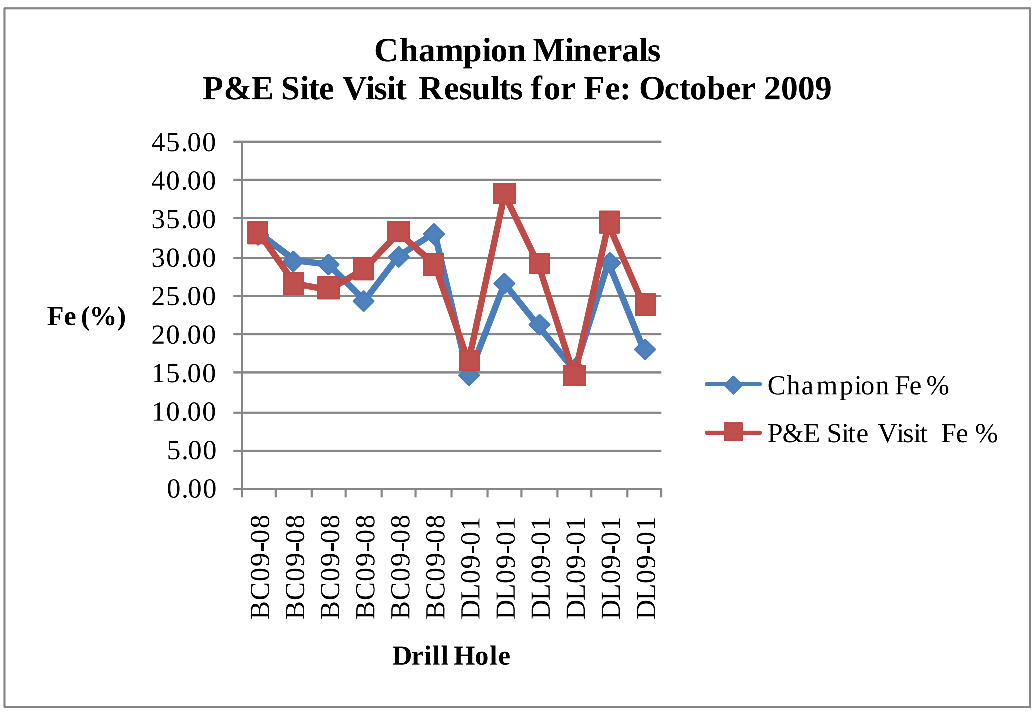


Figure 12-3: Bellechasse and Fire Lake North 2009 Site Visit Results

12.2 Quality Assurance and Quality Control (QA/QC)

12.2.1 Fire Lake North and Bellechasse QA/QC

The QA/QC program evolved from 2009, where certified reference materials (CRM or standards) and blanks were inserted approximately 1 in every 40 samples, to an insertion rate of 1 in 25 samples in 2010 and onward. In addition, field duplicates consisting of ¼ core were collected every 25 samples, and coarse reject and pulp duplicates were prepared at the lab from every twenty-fifth sample.

The reference materials used from 2009 through the 2012 programs were certified for total Fe. For the 2009 Bellechasse and Fire Lake North drill programs, the reference material was purchased from BAM (Federal Institute for Materials Research and Testing) in Berlin, Germany. What was believed to be differential settling of the contents of the German reference materials caused it to under report (underestimate) the total Fe, and as such, the reference materials were changed for the 2010 and 2011 drill programs. For subsequent drill programs, the reference materials were purchased from Ore Research and Pty (OREAS) in Australia, and from CANMET in Ottawa, Canada. In mid-2012, one of the standards was no longer available and a replacement was sourced from Geostats Pty in Australia.

The two (2) OREAS standards were developed by Ore Research and Exploration Pty. Ltd., Australia, and were purchased through a Canadian supplier. Both are composite standards produced from a range of oxidized materials, including Blackwood greywacke (central Victoria), Bulong laterite (Yilgarn, Western Australia), Iron Monarch hematite ore (Whyalla, South Australia) Hilton North gossan and Mount Oxide ferruginous mudstone (Mount Isa region, Queensland). The dominant constituent was obtained from the flank of a mineralised shear zone within Ordovician flysch sediments in the Blackwood area of central Victoria. The sedimentary succession hosting the shear zone consists predominantly of medium-grained greywackes, together with subordinate interbedded siltstone and slate. Hydrothermal alteration in the vicinity of the mineralisation is indicated by the development of phyllite. The shear zone is manifested by foliated sericitic and chloritic fault gouge and goethitic quartz veins.

The SCH-1 CRM was purchased from CANMET in Ottawa. The material for reference ore SCH-1 was donated to the C.C.R.M.P. by the Iron Ore Company of Canada in 1973. The ore is from the area of Schefferville, Québec, and is composed of hematite, with a mixture of unidentified hydrous oxides of iron, minor magnetite and trace pyrolusite. The gangue consists mainly of quartz, with minor amounts of feldspar and traces of biotite, chlorite and amphibole.

The GBAP-8 reference material, which was used beginning in April 2012, was purchased from Geostats Pty and was sourced from pulp bauxite.

Performance of Certified Reference Materials 2009

For the 2009 Bellechasse and Fire Lake North drill programs, the reference material under- reported the total Fe content, and as such, the total Fe content of the samples was also under- reported. Because both resource estimates in 2009 were in the Inferred category only, the under-reporting was of no great concern; however, it necessitated a change to different reference materials for subsequent drill programs.

Performance of Certified Reference Materials 2010 – 2011

The Fire Lake North 2010 and 2011 drill programs used the two (2) OREAS standards, and one (1) CANMET standard.

All standard results for the three (3) reference materials were graphed and compared to the warning limits of +/- 2 standard deviations from the mean of the between lab round robin characterization, and the tolerance limits of +/- 3 standard deviations from the mean.

The reference materials for the 2010 and 2011 drilling remained within the warning limits, however, a slight low bias was indicated, with most of the values falling below the mean, yet remaining within – 2 standard deviations.

Performance Certified Reference Materials 2012

The 2012 drill program used the two (2) OREAS standards and one (1) CANMET standard until April, when one of the OREAS standards was no longer available and was replaced by the Geostats standard.

All standard results for the four (4) reference materials were graphed and compared to the warning limits of +/-2 standard deviations from the mean of the between lab round robin characterization and the tolerance limits of +/-3 standard deviations from the mean.

The SCH-1 had 45 data points. A low bias was demonstrated for this standard, however the standard was characterized by CANMET, using a very precise volumetric titration method, and the standards were analyzed during this drill program using fusion-XRF. A difference would not be unexpected.

There were 27 data points for OREAS 43P. The data passed the warning limits; however they were clustered around the -2 standard deviation line, showing a low bias.

OREAS 44P had 48 data points. This standard demonstrated a low bias as well, with all but one (1) of the data points falling below the mean, and six (6) points below -3 standard deviations from the mean. The data generally showed good precision with little scatter.

The new standard purchased from Geostats did not fare as well, with most of the 23 data points falling on or slightly below -3 standard deviations from the mean.

P&E considers that the standards demonstrate reasonable accuracy, however they seem to indicate that the lab may be under-reporting the iron very slightly. There is no impact to any of the resource estimates.

Performance of Blanks

The blank material for all drill programs was obtained from barren marble drilled in the Bellechasse area. A blank sample was inserted into the sample stream, where practical, initially from every fortieth sample in 2009 to every twenty-fifth sample in 2010, 2011 and 2012. The mean of the blanks analyzed during the 2012 drill programs was less than 0.5%, demonstrating that contamination was not an issue.

Performance of Duplicates

There were no duplicates produced for the 2009 drill programs. Three (3) types of duplicates were produced; field (1/4 core), coarse reject and pulp for the 2010, 2011 and 2012 drill programs.

All three (3) duplicate types were scatter graphed, and were found to have excellent precision at all levels. There was essentially no difference between the precision at the field level and the precision at the pulp level.

The authors consider the data to be of good quality, and satisfactory for use in a resource estimate.

12.2.2 Oil Can QA/QC

Certified reference materials (CRM) and blanks were inserted approximately every 25 samples for Quality Assurance and Quality Control. In addition, field duplicates consisting of ¼ core were collected every 25 samples, and coarse reject duplicates and pulp duplicates were prepared at the lab from every twenty-fifth sample.

There were three (3) different CRMs used for the Oil Can drill program; OREAS 43P, OREAS 44P and SCH-1.

The two (2) OREAS standards were developed by Ore Research and Exploration Pty. Ltd., Australia, and were purchased through a Canadian Supplier. Both are composite standards produced from a range of oxidized materials, including Blackwood greywacke (central Victoria), Bulong laterite (Yilgarn, Western Australia), Iron Monarch hematite ore (Whyalla, South Australia) Hilton North gossan and Mount Oxide ferruginous mudstone

(Mount Isa region, Queensland). The dominant constituent was obtained from the flank of a mineralised shear zone within Ordovician flysch sediments in the Blackwood area of central Victoria. The sedimentary succession hosting the shear zone consists predominantly of medium-grained greywackes, together with subordinate interbedded siltstone and slate. Hydrothermal alteration in the vicinity of the mineralisation is indicated by the development of phyllite. The shear zone is manifested by foliated sericitic and chloritic fault gouge and goethitic quartz veins.

The SCH-1 CRM was purchased from CANMET in Ottawa. The material for reference ore SCH-1 was donated to the C.C.R.M.P. by the Iron Ore Company of Canada in 1973. The ore is from the Schefferville, Québec area, and is composed of hematite, with a mixture of unidentified hydrous oxides of iron, minor magnetite and trace pyrolusite. The gangue consists mainly of quartz, with minor amounts of feldspar, and traces of biotite, chlorite and amphibole.

Performance of Certified Reference Materials

There were 28 data points for OREAS 43P. The data passed the warning limits; however, they were clustered around the -2 standard deviation line, showing a low bias. OREAS 44P had 25 data points. This standard demonstrated a low bias as well, with 100% of the data falling below the mean, most often between -2 and -3 standard deviations.

The SCH-1 had 25 data points. A low bias was demonstrated for this standard as well, however, the standard was characterized by CANMET using a very precise volumetric titration method, and the standards were analyzed during this drill program using fusion-XRF. A difference would not be unexpected.

P&E considers that the standards demonstrate reasonable accuracy, however, they seem to indicate that the lab is slightly under-reporting the iron. There is no impact to the resource.

Performance of Blanks

The blank material was obtained from barren marble drilled in the Bellechasse area. A blank sample was inserted every twenty-fifth sample, where practical, into the stream of core samples. There were 80 blank samples analyzed. The average of the blanks was 0.32% Fe_T, with a standard deviation of 0.03.

Performance of Duplicates

Three (3) types of duplicates were produced; field (1/4 core), coarse reject and pulp. 81 field pairs, 81 coarse reject pairs, and 80 pulp duplicate pairs were analyzed.

All three (3) duplicate types were scatter graphed, and were found to have excellent precision at all levels. There was essentially no difference between the precision at the field level and the precision at the pulp level.

The authors consider the data to be of good quality, and satisfactory for use in a resource estimate.

13. MINERAL PROCESSING

13.1 Introduction

This chapter reviews both the historical testwork completed as part of the original Preliminary Economic Assessment (PEA) (November 3, 2010) and PEA Update (January 5, 2012), as well as that completed for the present Preliminary Feasibility Study. The initial testwork focused on liberation size determination and demonstration (proof of concept) of the production of a saleable concentrate. The testwork for the Prelimilary Feasibility Study expanded on the liberation size determination work, but also addressed grindability variability of the deposits (West Pit and East Pit), filtration of the concentrate and the settling behaviour, rheology, and environmental characterization of the tailings.

Also included in this chapter is a summary of findings related to the characterization of the minus 150 mesh (106 µm) fraction of the tailings, which still contain an appreciable amount of hematite that might be recoverable through alternative means. The characterization of these fines, as well as a discussion on possible recovery approaches, is also presented.

The principal outcomes were:

- The West Pit material had similar grindability characteristics to other iron ore projects in the area. Most East Pit samples were harder than the West Pit samples.
- In gravity testing, the West Pit material produced acceptable concentrate grade (>65% Fe_T) and 84.6% iron recovery when ground to 100% passing 20 mesh. The East Pit material required further grinding to 100% passing 28 mesh to consistently produce a concentrate grade above 65% Fe_T. An iron recovery of 78.4% was achieved in East Pit gravity testing.
- Using a 16 MW (21 450 HP), 11.6 m (38 ft) diameter autogenous (AG) mill, it will be possible to treat the nominal design tonnage of 2 854 tph when processing the West Pit material (using the 65th percentile of hardness).
- The East Pit material throughput, using a 16 MW, 11.6 m (38 ft) diameter AG mill, is estimated to be 2080 tph at the 65th hardness percentile. This is due to the

increased hardness and finer grinding requirement of East Pit material relative to West Pit material. Additional grinding capacity must be installed when treating East Pit material to maintain the nominal design tonnage of 2854 tph.

- The mill size and grinding energy required was calculated by three (3) different methods. All of these gave results within 20% of the mean; these results were also confirmed by the Pilot Plant trials done with the East Pit bulk sample. The mills were designed to provide the nominal throughput of 2854 tph at the 65th percentile of ore hardness, using 85% of installed power.
- Using conventional gravity separation, concentrate grades of greater than 65% Fe_T were obtained. The combined Al_2O_3 + SiO_2 level was less than 7.0%, with a SiO_2:Al_2O_3 ratio of approximately 10:1. The concentrate had low levels of other impurities.
- The tailings were found to have good thickening and settling properties, and are classified as non-acid generating following test results.
- Tests done at a second testing laboratory confirmed the gravity recovery results obtained at SGS.

13.2 Overview of Pre-Feasibility Testwork

Metallurgical testing for the Preliminary Feasibility Study was initiated in early 2012, following the issue of the PEA Update on Fire Lake North. A series of tests was planned for three (3) areas of the Project: West Pit, East Pit and Don Lake. The tests were designed to better characterize the grindability and liberation characteristics of the mineralization. At the time of the PEA Update, Don Lake was viewed as a mineral resource that would be exploited considerably later in the mine plan. As a result, testing for this zone was minimized in the interest of better characterizing the West Pit and East Pit zones.

Several testing activities were performed, including the following:

- Bench scale grindability characterization;
- Pilot plant;

- Liberation size determination;
- Settling and rheology;
- Environmental characterization;
- Fine hematite recovery.

Bench Scale Grindability Characterization

Several bench scale grindability tests were performed on a variety of samples taken from the West Pit and East Pit zones. To assess grindability variability, SAG Power Index (SPI) testing was performed; 73 SPI tests were performed on the West Pit zone and 78 on the East Pit zones, while another thirty (30) were performed on Don Lake material. Other work performed to confirm the SPI results included JK Drop Weight and SAG Mill Comminution (SMC) testing.

Pilot Plant

A bulk sample was collected from a surface-accessible portion of the mineralization in the East Pit zone. This was used in a pilot plant in which several optimization and production runs were completed over the course of a two-week period. A total of 55 tonnes of the material was processed and two (2) production runs were completed.

Liberation Size Determination

In gravity testwork for the PEA Update, it was noted that 100% of samples produced a concentrate with >65% Fe_T when ground to 100% passing 28 mesh (600 µm). In the interest of reducing power consumption and achieving higher throughputs, a test plan was designed with the objective of confirming whether or not this grinding requirement could be relaxed. Heavy liquid separation (HLS) testing was performed on composite samples ground to 100% passing 20, 24, and 28 mesh. Confirmatory Wilfley table testwork was performed using material ground to 100% passing 20 mesh.

Settling, Filtration and Rheology

Settling, filtration and rheology testing was completed on the products of both the pilot plant and Wilfley table testing.

Environmental Characterization

Environmental testing was completed on the tailings and concentrate products of the pilot plant and the Wilfley table testing.

Fine Hematite Recovery

Preliminary, scoping-level tests were performed to determine the feasibility of recovering fine hematite from the spirals tailings stream. Favourable results were achieved using Derrick screens to remove large silica particles, followed by wet high-intensity magnetic separation (WHIMS).

13.3 Historical Testwork - PEA (2010)

COREM performed the original testwork on iron liberation and recovery for the first Preliminary Economic Assessment (PEA) for the Fire Lake North Project, published in 2010. Initial tests were performed with a Wilfley table; however, due to the variability of the results, subsequent tests were run using Heavy Liquids Separation (HLS).

In the HLS testing, six (6) core samples taken from both the West Pit and East Pit zones were ground to 20 mesh (850 µm) and screened at 150 mesh (106 µm). The oversize was submitted to the HLS testwork. The undersize from this screening was rejected, as particles below this size are largely unrecoverable in a conventional gravity circuit.

The test results showed that an iron recovery greater than 80% could be obtained at concentrate grades between 57.7 and 67.5% Fe_T. However, two (2) of the six (6) samples tested had concentrate iron grades below 65% and four (4) samples had silica levels above 10% SiO_2 in the concentrate.

13.4 Marketing Sample

A bulk sample of approximately 10 t was collected from the East Pit zone in 2011 and sent to SGS. Of this, approximately four (4) tonnes were used in a small-scale pilot plant, while approximately 500 kg was used for bench-scale testing. The bench-scale testwork comprised a JK Drop-Weight Test (DWT), a SAG Power Index (SPI) test, a

Bond low-energy impact test and a Bond rod mill grindability test. For the pilot plant work, the material was ground in a rod mill and passed through two stages of Wilfley tables (with the tailings of the second table recycled to the feed of the first). The pilot plant produced approximately one tonne of concentrate with a grade of 65.3% Fe_T.

13.5 Historical Testwork - PEA Update (2011)

Further testwork was done in 2011 as part of the PEA update. This included head assay, validation of previous HLS testwork results and further HLS testwork to determine the optimum grind size. Samples were taken from both the West Pit and East Pit zones.

13.5.1 Head Assay

Complete head assays were done on all 23 samples used for this phase of testwork. The head assays for the HLS samples ranged from 23.5% to 49.6% Fe_T, with an average grade of 35.7% Fe_T. Concentrations of deleterious elements and oxides, such as MgO, CaO, Na_2O, K_2O, TiO_2, P_2O_5, MnO, and S, were found to be low.

13.5.2 Heavy Liquid Separation Testing

A gravity recovery campaign was undertaken in January 2011 at COREM. All samples were ground to 100% passing 20 mesh (850 µm). The results for the East Pit and West Pit samples are presented in Table 13-1 (Three (3) samples from the Don Lake zone were also tested, but their results are not included in the table). Note that the minus 150 mesh (106 µm) fraction is considered to be unrecoverable in conventional gravity circuit; therefore the minus 150 mesh fraction was screened out and added to the tails.

Of the eight (8) samples, four (4) failed to meet typical product specifications for iron and silica. This was an indication of an incomplete liberation of the iron from the silica and it was assumed that these samples had a higher percentage of fine grained specular hematite, when compared to the samples that had been tested previously.

Table 13-1: Initial Series of Heavy Liquid Separation Testwork (20 mesh) – PEA Update

Composite Sample		Head	+150 mesh (+106 µm) Sink				+150 mesh (+106 µm) Float			-150 mesh (-106 µm)	
Zone	Name	Fe_T (%)	Weight (%)	Grade (% Fe_T)	Fe_T Dist. (%)	SiO_2 (%)	Weight (%)	Grade (% Fe_T)	Fe_T Dist. (%)	Weight (%)	Fe_T Dist. (%)
East Pit	FL09-01-1	30.4	29.5	59.9	56.3	14.0	31.1	4.8	4.9	39.4	39.0
East Pit	FL09-02-1	25.4	19.3	67.6	49.5	4.2	37.7	2.0	3.0	42.9	47.6
East Pit	FL10-06-1	31.3	43.8	62.1	86.5	10.2	47.0	3.5	5.3	9.2	8.2
East Pit	FL10-06-3	31.9	45.8	57.7	82.1	17.7	44.3	5.8	8.1	9.8	9.9
West Pit	FL10-21-1	23.5	32.7	60.2	81.7	13.4	56.3	3.1	7.4	11.0	11.1
West Pit	FL10-21-3	35.0	47.5	67.5	88.8	4.0	44.6	3.0	3.8	7.9	7.4
West Pit	FL10-24-2	34.3	44.0	67.0	88.6	4.3	49.5	3.1	4.5	6.5	6.8
West Pit	FL10-24-3	42.6	58.4	66.6	88.7	3.4	34.2	5.0	4.0	7.4	7.4

13.5.3 Liberation Size Determination

Additional HLS tests were performed on the samples at SGS to determine whether finer grind sizes would improve concentrate grade and recovery. Samples FL10-06-1 and FL10-06-3 were tested at 100% passing 20 (850 µm), 24 (710 µm), 28 (600 µm) and 35 mesh (425 µm). Samples FL10-06-2 and FL10-24-3 were also tested at 28 mesh to determine the effect of a finer grind on the samples containing the relatively coarse specular hematite.

The results for the additional HLS tests are shown in Table 13-2.

The tests at 28 and 35 mesh both yielded positive results with all iron grades above 65% and silica levels at 5% or below. The average silica content in the concentrate of the four (4) samples tested at 28 mesh was 2.8%. There therefore appeared to be a significant benefit to grinding the samples from 20 to 28 mesh. Given these results, an expanded testing program was put in place for the Pre-Feasibility Study to confirm the liberation size requirement based upon a much larger number of samples.

Table 13-2: Heavy Liquid Separation Results at Various Mesh Sizes – PEA Update

Composite Sample		Grind Size (mesh, P_{100})	Head	Heavy Liquid Separation Test Results									
				+150 mesh (+106µm) Sink				+150 mesh (+106µm) Float			-150 mesh (-106µm)		
Zone	Name		Fe_T (%)	Weight (%)	Grade (% Fe_T)	Fe_T Dist. (%)	SiO_2 (%)	Weight (%)	Grade (% Fe_T)	Fe_T Dist. (%)	Weight (%)	Grade (% Fe_T)	Fe_T Dist. (%)
East	FL10-06-1	20	27.7	46.0	59.4	98.6	5.2	42.9	2.3	3.6	11.1	23.9	9.6
		24	31.0	43.0	64.3	89.1	6.5	49.1	2.2	3.5	8.0	26.5	6.8
		28	31.0	42.9	66.6	92.1	3.3	45.6	2.3	3.4	11.5	28.7	10.6
		35	31.0	36.7	67.0	79.4	3.3	43.9	1.3	1.8	19.4	31.0	19.4
East	FL10-06-2	28	48.3	63.4	67.8	89.0	1.3	26.8	2.6	1.4	9.8	48.5	9.8
East	FL10-06-3	20	31.6	40.5	61.5	78.9	8.8	41.5	2.8	3.7	18.0	27.9	15.9
		24	31.6	44.7	63.9	90.4	9.6	45.9	3.0	4.4	9.4	31.0	9.3
		28	31.6	38.3	67.9	82.3	5.2	45.6	3.1	4.5	16.1	30.0	15.3
		35	32.2	40.4	67.5	84.8	4.2	45.6	1.8	2.5	24.0	29.9	22.3
West	FL10-21-3	28	35.8	43.0	68.7	82.6	1.3	42.7	1.6	1.9	14.0	33.0	12.9

13.5.4 SPI® Grindability Study

Initial SAG Power Index (SPI) testwork was undertaken at SGS in summer 2011 to determine the hardness and grindability of the Fire Lake North deposit. CEET Crusher Indices (CEET Ci) are also derived from the SPI data. SPI testwork was also performed for the Pre-Feasibility Study on a much larger sample set than for the PEA Update. Therefore, the SPI results for the PEA Update were not considered in the PFS and are not presented here.

13.6 Testwork for the Preliminary Feasibility Study (2012)

In January 2012, an expanded mineralurgical testing program was initiated at SGS (Lakefield, Ontario) as part of the activities related to the Pre-Feasibility Study. The testing comprised both bench scale and pilot plant testing.

The objectives of the testwork were as follows:

1. Assess the grindability (hardness) of the deposits, including its variability, from a larger sampling of material to better estimate the autogenous grinding (AG) mill throughput;
2. Confirm the PEA Update throughput of 23 Mtpy;
3. Assess liberation size requirements and mill circuit performance of a larger sampling of material from the Fire Lake North deposits, using both heavy liquid separation and Wilfley table testing;
4. Characterize the filtration behaviour of the resulting concentrate;
5. Characterize the settling behaviour and rheology of the tailings;
6. Confirm assumptions made on the environmental performance of the tailings.

In the course of the Pre-Feasibility Study mineralogical program, confirmatory HLS tests and repeat assays were completed at COREM in July 2012 for quality control.

13.6.1 Bench Scale Grindability

Bench scale grindability tests of various types were performed on samples taken from both the West Pit and East Pit zones. These are summarized in the following sections.

With this data, various analytical techniques were applied to model and size the AG mill and primary crusher. The analytical techniques and data required are given in Table 13-3 below.

Table 13-3: Data Required for Various Grinding Circuit Throughput Analysis Techniques

Analytical Technique	Data Required
Morrell calculation (AG sizing)	SMC test results
JK SimMet simulation software (comminution performance)	JK DWT and SMC test results Pilot Plant model used as calibration.
CEET simulation software (AG sizing and performance)	SPI test results; crusher Index
Bond's equation (crusher and AG sizing and performance)	CWi, RWi and BWi results
Benchmarking	Plant data from existing operations

13.6.2 SAG Power Index, SPI® Test

The SAG Power Index (SPI®) gives the time in minutes required to grind 2 kg of mineral sample from 80% passing 12.5 mm (½") to 80% passing 10 mesh (1.7 mm). The CEET Crusher Index (CEET Ci) is also measured during the SPI® feed preparation procedure.

The SPI® test was performed on 73 West Pit samples and 78 East Pit samples. The results are presented in Table 13-4 as follows.

Table 13-4: West and East Pit SPI Results

Description	West Pit	East Pit
Number of tests	73	78
Average (minutes)	20.7	27.7
Minimum (min)	3.3	2.7
Median (min)	14.7	22.4
75th Percentile (min)	27.8	37.4
Maximum (min)	72.5	86.0

Comparison with other SPI data in the CEET database (Figure 13-1) suggests that the hardness of the FLN West Pit material is slightly harder than other iron ore mines in the region. The East Pit material, on the other hand, is considerably harder.

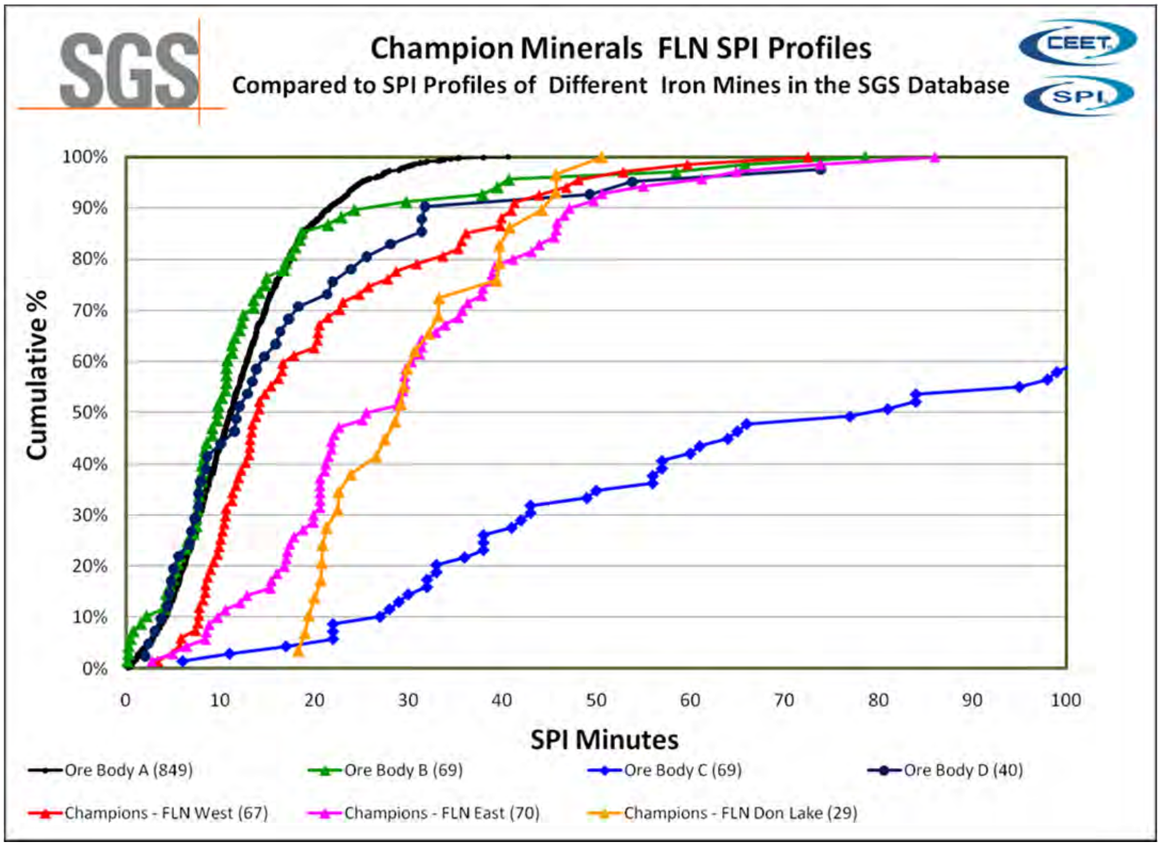


Figure 13-1: East and West Pit SPI Data Compared to Other Iron Ore Mine SPI Data Source: SGS, 2012

Given the higher level of hardness of the East Pit samples and its impact on throughput, the SPI values for the East Pit were plotted against the location from which the samples were taken. This was done to see whether any trends in hardness might be found, with the hope of identifying a sizable zone of softer material that could be expected to behave in a manner that was comparable to the West Pit.

The plot is presented in Figure 13-2.

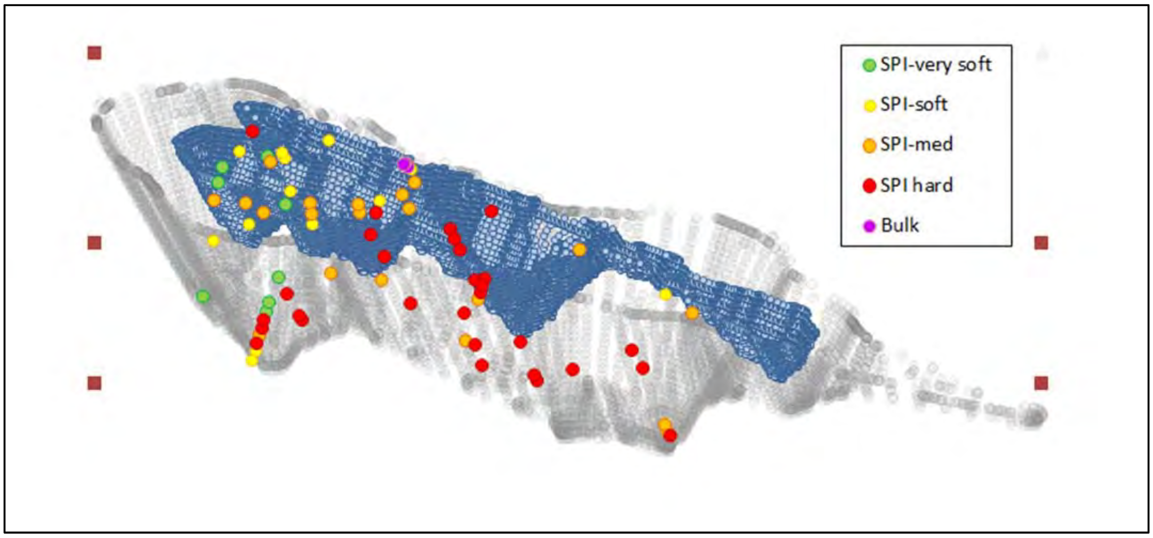


Figure 13-2: Positioning of SPI Values in the East Pit Starter and Ultimate Shells

The plot suggests that the soft and very soft samples are clustered in the south end of the Pit (left-hand side in the figure), while the harder samples are found further towards the north end of the Pit. The bulk sample for the pilot plant was taken nearer to the south end, in proximity to the soft cluster. Grindability testing of the pilot plant sample indicated that it was among the softest material to be recovered from either the West or East Pit zones (Figure 13-3). Microscopy also showed that the pilot plant sample was coarse-grained compared to the rest of the East Pit material. Figure 13-3 shows that the pilot plant sample hardness, in fact, is in approximately the bottom ten (10) per cent of East Pit SPI values. This corresponds to approximately the bottom 35% of West Pit SPI values. Actual plant operation will therefore see harder material than the pilot plant, with greater milling energy requirements.

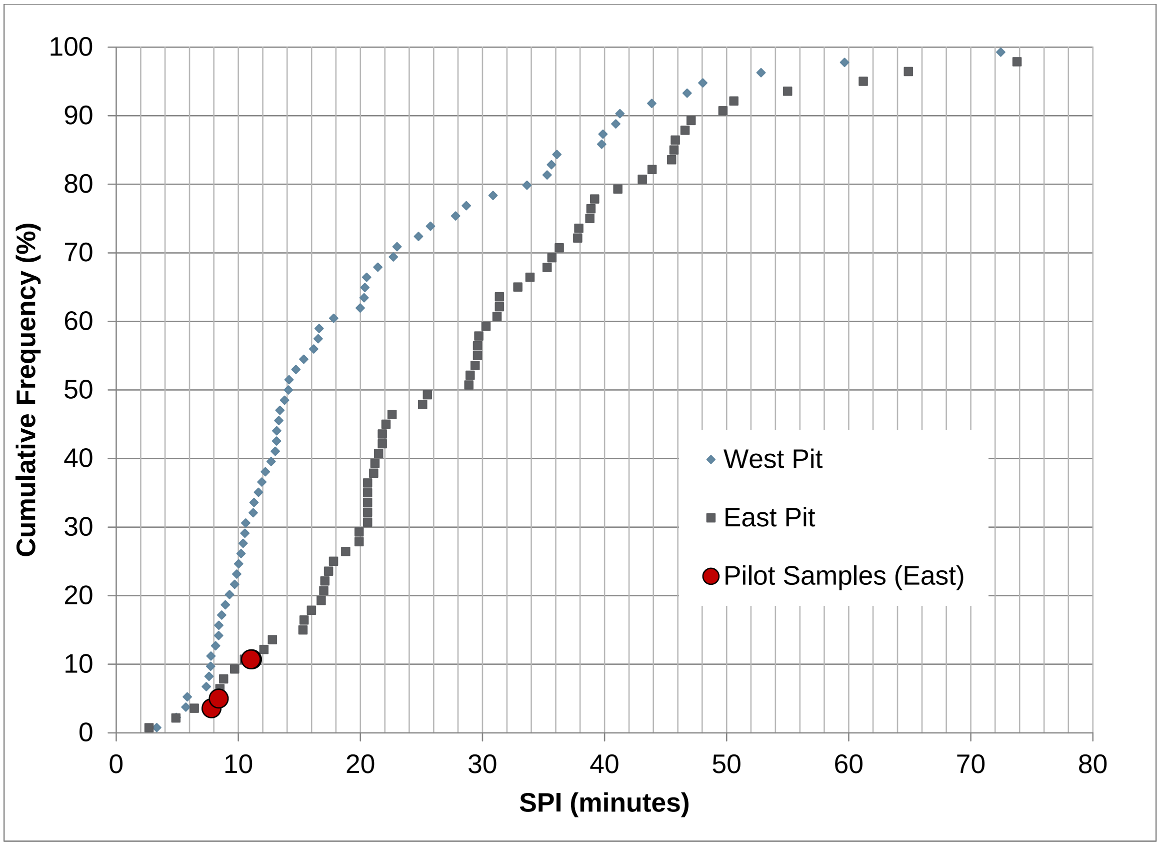


Figure 13-3: SPI Values of Pilot Plant Samples Compared to Overall SPI Distributions of West and East Pit Ore

13.6.3 JK Drop Weight Tests

The JK Drop Weight Test (DWT) measures the particle size distribution produced when pieces of ore are impacted by a weight imparting a range of energies. These results are analyzed to produce two (2) impact parameters: A and b. The product A x b provides an indication of hardness: in general, the higher the A x b product, the softer the material. The A and b impact parameters can be used in the JKSimMet grinding simulation software.

As part of the procedure, the abrasion characteristic of the sample (t_a) is also measured using a tumbling test. The abrasion characteristic for the JK Drop Weight test does not reflect the potential for the material to produce equipment wear, but rather the extent to which different particles abrade against each other.

Two (2) JK Drop Weight tests were performed on material taken from the bulk sample recovered at surface in the East Pit zone. Two (2) more tests were performed on PQ core samples taken from the West Pit zone. A fifth test was carried out on a sample that had been recovered a year prior and used to generate a one-tonne concentrate sample for marketing purposes. The results are presented in Table 13-5.

Table 13-5: JK Drop Weight Test (DWT) Results

Zone	Sample Name	A	b	A x b	t_a	Density (g/cm^3)
East Pit	Pilot Feed S-3	85.5	1.98	169	0.92	3.33
West Pit	PQ 1 Fine Grained	91.7	1.07	98.1	0.64	3.27
West Pit	PQ 2 Coarse Grained	91.6	3.18	291	2.62	3.74
East Pit	Marketing Sample	86.1	2.03	175	0.44	3.37

The results show that the East Pit pilot plant feed sample was relatively soft, in line with the results of the SPI testwork. Also of note is the large difference in A x b product and abrasion characteristic t_a between the fine grained and coarse grained sample. The fine grained sample requires more grinding energy than the coarse grained sample. The coarse grained sample has a higher abrasion characteristic than the fine grained sample.

13.6.4 SAG Mill Comminution (SMC®) Tests

The SMC® test is an abbreviated drop-weight test (DWT) that can be performed on small pieces of rock or drill cores. The test generates A and b parameters, as in the drop-weight tests, as well as the work index for coarse grinding in a tumbling mill, M_{ia}. The A and b parameters can be used in JKSimMet simulation software; the work index M_{ia} is used in the Morrell power equation.

The NQ quarter core used for the SPI® was also used to perform the SMC® tests. Other SMC® tests were performed using the bulk sample for the pilot plant as well as the PQ core taken from the West Pit zone.

Results are presented in Table 13-6 below.

Table 13-6: West and East Pit SMC Results

	West Pit		East Pit (PP Pre-Feed)	
Description	A x b	M_{ia} (kWh/t)	A x b	M_{ia} (kWh/t)
Number of Tests	32		1	
Average	183	5.8	212	4.9
Minimum	42	2.1	-	-
Median	163	5.0	-	-
75th Percentile	240	7.2	-	-
Maximum	450	14.7	-	-

The East Pit pilot plant material gave an A x b product of 212, while the JK DWT obtained an A x b product of 169. However, only one SMC test was performed on East Pit material.

The West Pit material gave a wide range of A x b values, between 163 and 450. This seems to confirm the discrepancy, found in the JK drop weight test results, between the A x b product of fine grained material (A x b = 98.1) and coarse grained material (A x b = 291).

13.6.5 Bond (Allis-Chalmers) Tests

The Bond tests include the Low-Energy Impact test (giving the Crusher Work Index, or CWI); the Rod Mill Work Index (RWI) test; the Ball Mill Work Index (BWI) test; and the Abrasion Index (AI) test. The CWI, RWI, and BWI are used with the Bond Formula to determine the energy requirements of crushers, rod mills, and ball mills, respectively. The energy requirement of an AG mill can be modelled by treating the AG as a crusher, rod mill, and ball mill in series.

Samples for the Bond tests were taken from the same sources as for the DWT and SMC tests.

The results are presented in Table 13-7.

Table 13-7: Bond CWI, RWI and BWI Test Results

Zone	Sample Name	CWI (kWh/t)	RWI	BWI	AI
East Pit	Pilot Pre Feed	-	4.9	-	-
East Pit	Pilot Feed S-3	9.8	5.1	15.9	0.257
East Pit	Marketing Sample	11.1	6.7	-	-
West Pit	Fine Grain	13.1	-	-	0.364
West Pit	Coarse Grain	12.2	-	-	0.255

13.6.6 Mill Throughput Analysis

The throughput of the AG mill was estimated with CEET (using SPI data), JK SimMet (using DWT data), and the Morell method (using SMC data). The West and East Pits were considered separately in this analysis as they have different hardness profiles (Figure 13-1). Furthermore, the West Pit had considerably more data than the East Pit allowing for analysis by CEET, JK SimMet and the Morell Method. The East Pit had only CEET available as an analysis tool. The Bond work indices were used only to confirm the mill throughput obtained by other methods, as the Bond Work Index was determined for only one sample.

Each of the analysis methods determined the specific energy requirement for grinding the material in an AG mill. The specific energy was then used along with the throughput to determine the power draw of the AG mill. The power draw in turn was used to determine the required AG mill size and installed power, using power curves from suppliers. The mill was sized such that it would be able to treat the nominal plant throughput of 2854 tph for the 65th percentile of ore hardness using 85% of installed power.

The analysis revealed that for the West Pit a 11.6 m by 6.6 m (38 ft by 21.5 ft) mill with 16 MW (21 450 HP) installed power would be required to achieve a throughput of 2854 tph (23 Mtpy at 92% availability) at the 65th percentile of hardness. AG mill throughput will decrease when treating material above the 65th percentile of hardness; however, calculations showed that these shortfalls would be overcome during periods when softer material is being processed and the mill can be operated at an increased feed rate. A safety factor of 15% is added to all equipment downstream of the AG mill to enable temporary operation at 15% higher throughput.

The results from this analysis are shown in Figure 13-4.

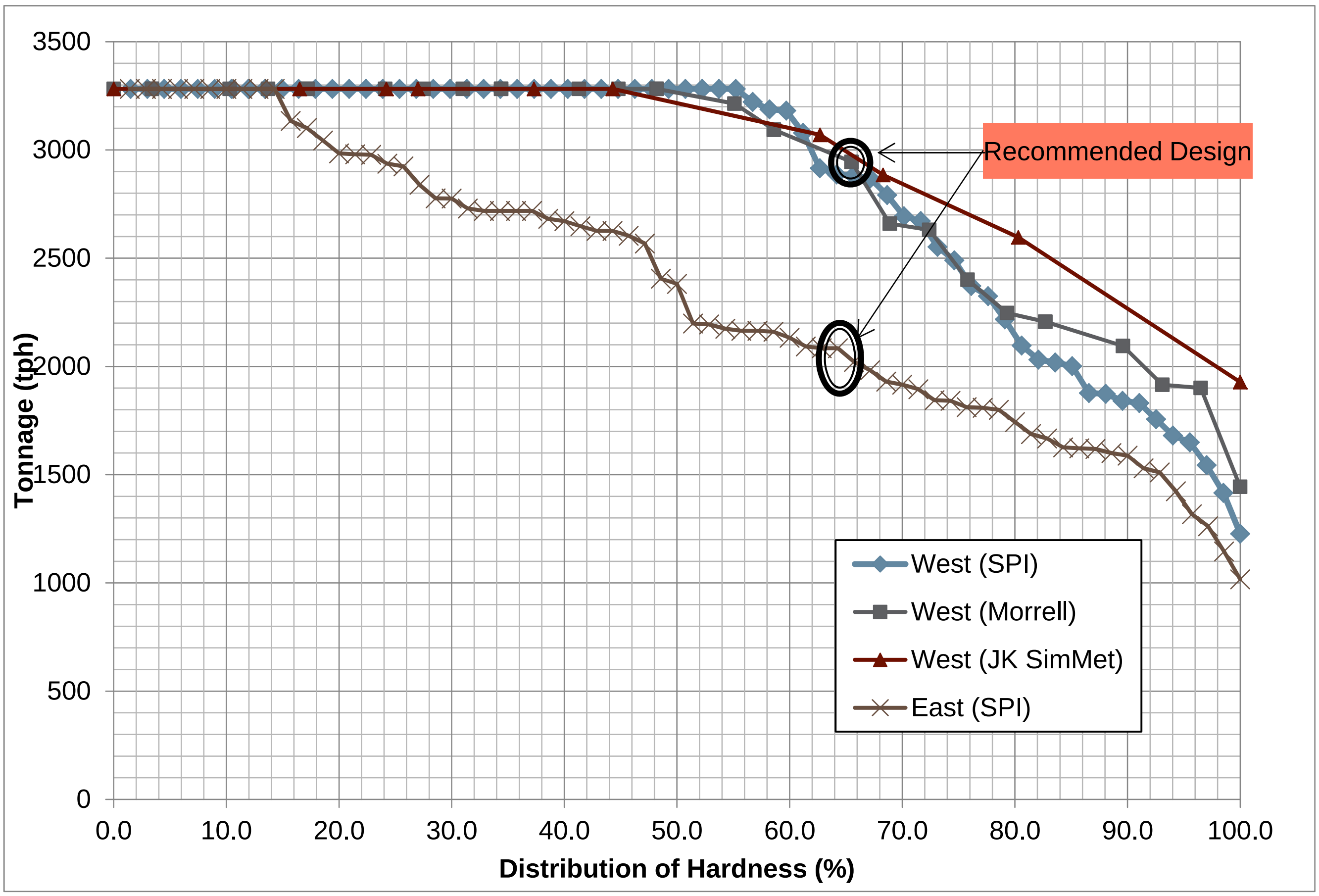


Figure 13-4: Throughput Analysis for West and East Pits

It can be seen from the graph that the SPI, Morrell and JK SimMet methods yielded similar results. This gives a high degree of confidence in the results.

The simulations conducted for processing of material from the East Pit showed that the nominal throughput attainable from the mill would drop to 2080 tph at grind sizes of

28 mesh. The decrease is caused by the increased hardness of the East Pit material and the finer grind size required to achieve the target iron grade of 65-66% Fe with low impurity levels. Therefore, when mining of the East Pit begins, a second AG mill will be required to maintain the 2854 tph throughput obtained with the West Pit. The second AG mill is estimated to have a 9.8 m (32 ft) diameter and a 5.0 m (16.5 ft) length.

13.6.7 Pilot Plant

A bulk sample was taken for testing from surface-accessible mineralization in the East Pit zone. Approximately 55 t of this sample were used for pilot plant testing. As mentioned in Section 13.5.2, SPI testing has established that the bulk sample was in the bottom 10 percent of ore hardness in the East Pit deposit, and in the bottom 35 percent of hardness in the West Pit deposit. Moreover, the material was found to be coarse-grained compared to the average East Pit material. The pilot plant results are therefore considered to be somewhat more indicative of the performance of West Pit material than that of East Pit material. A full report of the pilot plant can be found in the SGS report for project 13360-005 (August 31, 2012).

The pilot plant objectives were as follows:

- Evaluate the AG mill grinding performance;
- Confirm the beneficiation flowsheet performance;
- Provide process data for plant design;
- Produce final products for vendor testing.

The pilot plant circuit was comprised of the AG mill, primary and secondary screening, followed by three (3) stages of gravity spirals (rougher, cleaner, and recleaner) for final recovery of concentrate to a belt filter. The AG mill for the Fire Lake North pilot plant was a nominal 1.8 m x 0.6 m (6’ x 2’) Nordberg mill. The mill discharge was carried through two (2) grates with 12.5 mm slots and transferred to a Sweco circular (vibrating) screen with a 6 mesh (3.36 mm) opening. The oversize from this screen was fed back to the AG mill, while the undersize was fed to a Derrick screen that was initially fitted with a 28 mesh (600 µm) cloth; this was later changed to 20 mesh (850 µm) because the circulating load was considered too high. The undersize from this screen was fed to the rougher spiral.

The AG mill feed rate was manually adjusted to maintain a steady mill load level. When the feed rate, power draw and circulating loads had stabilized, the circuit was considered to be at steady-state. The feed rate, mill speed, mill loading and power draw were monitored. Pulp density and flow rate readings were also recorded to control the circuit and assess stability.

The beneficiation circuit consisted of three (3) stages of spirals. The rougher spiral models used were Reichert MK VII (runs C-1 and S-1 to S-4) and Humphreys HC1870G (runs S-5 to S-7). The cleaner spiral model was a Reichert MK VI (all runs), while the recleaner spiral model was a Reichert WW2B (all runs).

The tailings from the rougher spiral were collected in drums. The rougher concentrate was pumped to the cleaner spiral and its concentrate was pumped to the re-cleaner stage. The re-cleaner concentrate consisted of the final concentrate. For all runs except run S-7, the cleaner and re-cleaner tailings were combined and pumped back to the rougher spiral feed. For run S-7, the cleaner and re-cleaner tailings were pumped to the Derrick feed in order to reduce the amount of fresh water added to the rougher spiral feed.

A schematic flow diagram of the pilot plant (runs C-1 and S-1 to S-6) is presented in Figure 13-5.

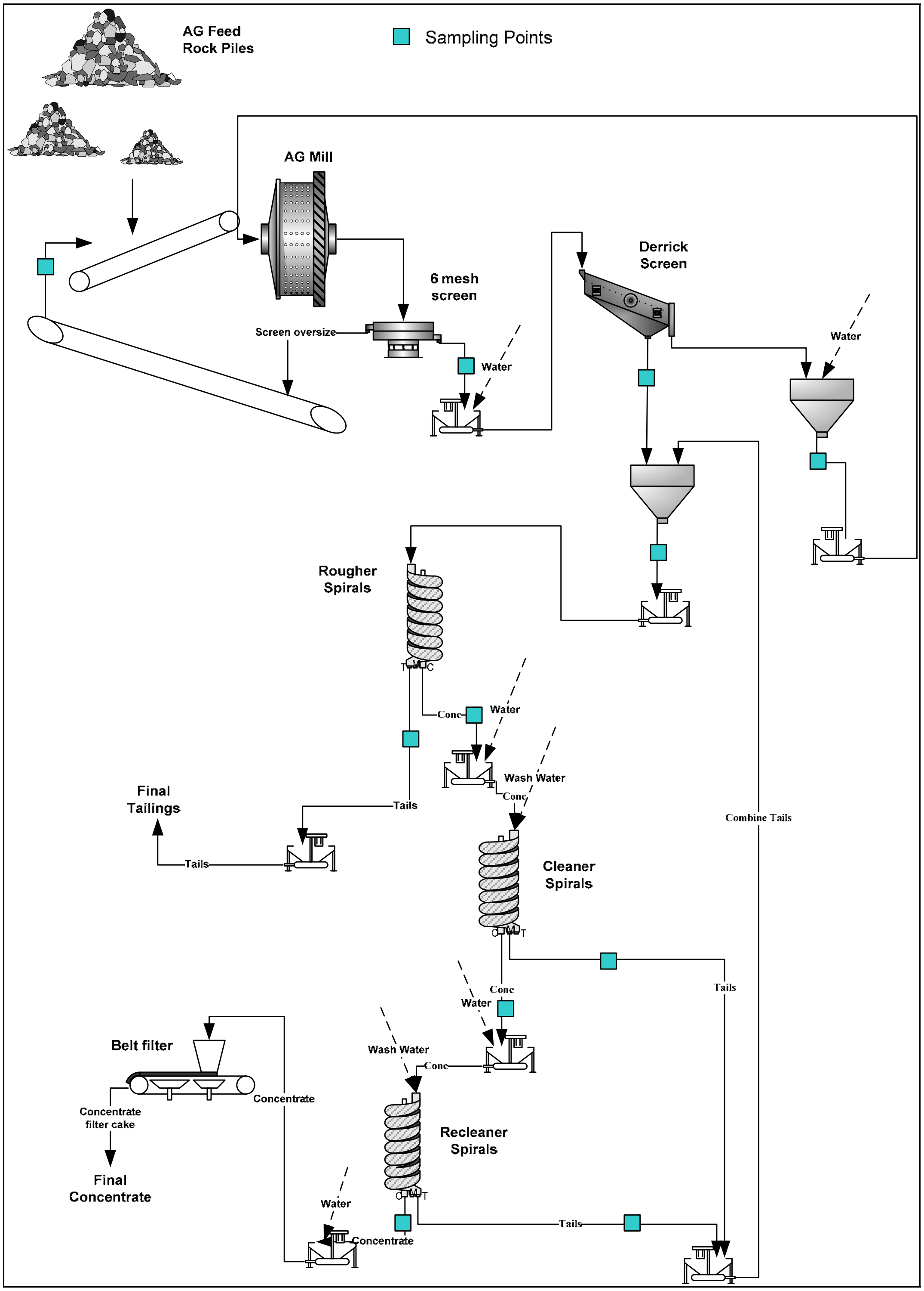


Figure 13-5: Schematic Pilot Plant Flowsheet (runs C-1 and S-1 to S-6)
Source: SGS Report 13360-005 (August 31, 2012).

The pilot plant was run over the course of a two week period, during which a sequence of trials, lasting up to 7 hours each, were run. One (1) commissioning run, one (1) start-up, four (4) optimization and two (2) production runs were completed. A total of 55 t of the material was processed. Table 13-8 summarizes the seven runs.

Table 13-8: Summary of Trial Runs for FLN Pilot Plant

Test Run	Purpose	Fresh Feed	Secondary Screen		Feed	Final Concentrate		Rougher Tails	Recovery	
		kg/h (dry)	µm	Mesh	$\%Fe_T$	$\%Fe_T$	$\%SiO_2$	$\%Fe_T$	%Wt	$\%Fe_T$
C-1	Commissioning	-	600	28						
S-1	Start-up	1242	600	28	33.9	64.1	8.1	8.4	45.8	86.6
S-2	Mill Optimization	1110	600	28	33.2	67.2	3.9	9.6	40.9	82.8
S-3	Mill Optimization	1423	600	28	33.3	67.6	3.1	10.6	39.8	80.9
S-4	Mill Optimization	1444	600	28	34.3	67.8	2.5	11.6	40.3	79.8
S-5	Production	1174	600	28	33.0	66.3	4.3	11.4	39.4	79.1
S-6	Mill Optimization	2043	850	20	34.2	62.5	9.8	9.8	46.4	84.7
S-7	Production	1455	850	20	33.3	65.9	5.7	9.6	42.1	83.2
	Average 28 mesh (600 µm)				33.6	66.7	4.3	10.4	41.2	81.8
	Average 20 mesh (825 µm)				33.8	63.9	8.1	9.7	44.6	84.1

Five of the runs were able to achieve a concentrate grade greater than 65% Fe_T, with runs S-1 and S-6 as the exceptions. All of the runs except S-1 and S-6 also produced a final concentrate with an SiO_2 level under 6%. Iron recoveries above 79% were obtained in all runs.

Runs S-5 and S-7 were optimized production runs and are considered to be the most representative runs. Trial S-5 was run using a 28 mesh (600 µm) opening, while a 20 mesh (850 µm) was used for Trial S-7. There were some marked differences between the two, namely the difference in the resulting recirculating load, the energy consumption and the iron recovery. Table 13-9 presents a comparison of data derived from these two (2) runs.

Table 13-9: Comparison of Pilot Plant Trial Runs S-5 and S-7

Parameter	Trial Run S-5	Trial Run S-7
Grate Size	12.5 mm	12.5 mm
Mill Speed	74% of critical speed	41% of critical speed
Aperture – Primary Screen	3365 µm	3365 µm
Aperture – Secondary Screen	28 mesh (600 µm)	20 mesh (850 µm)
Throughput	1.17 tph (dry)	1.46 tph (dry)
Weight Recovery	39.4%	42.1%
Rougher Feed K_{80}	335 µm	509 µm
AG Circulating Load	303%	14%
Specific Power Consumption	5.3 kWh / t	3.3 kWh / t
Iron Recovery	79.1%	83.2%

Of note is the high recirculating load in run S-5. In part, this is indicative of a screen size opening that is too small for the natural grain size of the feed material. However, the main cause of the high recirculating load is considered to be the screen media. Screening at 28 mesh (600 µm) was done using metal media; screening at 20 mesh (850 µm) was done using polyurethane media, which performs better than metal in this application. Referring back to Table 13-10 and Table 13-11, several shifts in performance can be noted after the change, namely:

- Iron grade in the tailings decreased from 11.4% to 9.6% Fe_T;
- Iron recovery increased from 79.1% to 83.2%;
- Specific power consumption dropped from 5.3 kWh/t to 3.3 kWh/t;
- Secondary screen undersize (i.e., rougher feed) 80% passing size increased from 335 to 509 µm;
- Throughput of new feed material increased from 1.17 tph to 1.46 tph;
- Concentrate grade dropped from 66.3% to 65.9% Fe_T;
- Silica levels increased from 4.4% to 5.7% SiO_2.

The runs at 28 mesh show increased losses of finely ground hematite due to the added grinding. This was compounded by a reduction in throughput and additional materials handling associated with the high recirculating load.

13.6.8 Grindability Calibration Against Pilot Plant

Data from the four test methods described above (SPI, DWT, SMC, and Bond tests), were employed to determine the AG mill specific power draw at the pinion. The methods were calibrated against the results from the pilot plant. The results are presented in Table 13-10, along with measured AG power draw figures from the pilot plant trials.

Table 13-10: Validation of Models Versus Pilot Plant Data

	Pilot Plant		JK SimMet		CEET		Morrell		Bond Equation	
F_{80} (µm)	94 500		94 725		179 000		94 500		94 500	
Screen Opening (µm)	600	850	600	850	600	850	600	850	600	850
P_{80} (µm)	353	522	365	493	353	522	353	522	353	522
Mill Loading (% v/v)	29	32	23	32	25	25	-	-	-	-
Critical Speed (%)	75	75	75	75	75	75	-	-	-	-
AG Mill Power Draw (kWh/t)	5.2	3.7	5.6	4.8	4.1	3.5	5.3	3.8	5.4	4.0

It can be seen that the different methods yielded similar results to the pilot plant for AG mill power draw. Therefore, it was concluded that these methods were suitable for determining the throughput and required size of the AG mill.

13.6.9 Liberation Size Determination

Liberation size determination was continued as part of the Pre-Feasibility Study test program. Previous testwork confirmed that many samples produced a marketable concentrate (> 65% Fe_T) when ground to 100% passing 20 mesh (850 µm), while all of the samples tested did so at 100% passing 28 mesh (600 µm). Based on these results, it was assumed in the PEA Update that the material would be ground to 100% passing 28 mesh. However, the split between fine and coarse specularite in the deposits was unknown at the time of the PEA Update, with only a limited number of samples tested. The final grind size was therefore revisited for the PFS. In order to determine more fully the response of the material to different grind sizes, subsequent gravity testwork (described in the following sections) was performed on samples ground to 20, 24, and 28 mesh. Ten (10) samples were also ground to 14 mesh to evaluate performance at that size.

13.6.10 Composite Head Grades

Composite samples encompassing a wide range of head grades were chosen. Summaries of the composite sample grades are presented in Table 13-11 below.

Table 13-11: West and East Pit Head Assays

	Fe_T %	Mag. Fe %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Na_2O %	K_2O %	TiO_2 %	P_2O5 %	MnO %	Cr_2O_3 %	V_2O_5 %	S %
West Pit														
Average	33.95	0.39	49.69	1.07	0.11	0.07	0.03	0.30	0.09	0.03	<0.01	0.03	<0.01	<0.01
Maximum	55.05	3.47	81.00	7.50	0.80	0.38	0.12	2.52	0.31	0.29	-	0.07	-	-
Minimum	12.31	0.07	20.30	0.15	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	-	-
East Pit														
Average	32.76	4.17	51.34	0.84	0.29	0.39	0.07	0.21	0.09	0.05	<0.01	0.04	<0.01	<0.01
Maximum	54.84	15.77	71.30	3.37	1.52	1.95	0.31	1.01	0.84	0.10	-	0.07	-	-
Minimum	19.86	0.43	16.10	0.10	0.04	0.03	0.01	0.01	0.01	0.02	-	0.02	-	-

Overall, the samples averaged 33.4% iron. The average grade of the West Pit samples was 34.0% iron, while the average grade of the East Pit samples was 32.8% iron. Of interest is the fact that the average head grade for the West Pit samples is higher than that of the East Pit samples. However, the range of grades in the East Pit samples (19.9 to 54.8% Fe_T) was tighter than that of the West Pit samples (12.3 to 55.0% Fe_T). Another significant difference between the two zones is that the East Pit has a higher average magnetite content than the West Pit (4.2% magnetite in the East Pit zone versus 0.4% magnetite in the West Pit zone). The expected average grade of the deposits is 33.64% and 30.28% Fe_T for the West and East Pit zones, respectively. Note that the average grade of the deposits is slightly lower than the head grades of the samples used in testwork.

13.6.11 Heavy Liquid Separation

HLS testing for the Pre-Feasibility Study was performed on 38 West Pit samples (of which one was tested twice) and 38 East Pit samples. Samples were ground to three (3) different 100% passing sizes: 20, 24 and 28 mesh. Following grinding, the samples were wet screened at 150 mesh (106 µm) and the undersize added to the tailings; this simulated in-plant spiral performance, in which the recovery of minus 150 mesh (-106 µm) particles is poor. The undersize fractions were filtered, dried, weighed and submitted for whole rock analysis (WRA) and Satmagan measurement. The oversize was riffled and a 200 g sample submitted to HLS at 2.95 g/cm^3. The heavy (sink) fraction and light (float) fraction were also dried, weighed, pulverized and submitted for assays (WRA and Satmagan) in the same manner as previous testing.

The results of the HLS testing are summarized in Table 13-12.

Table 13-12: West Pit and East Pit HLS Results at 100% Passing 20, 24 and 28 Mesh

Grind Size (100% Passing)	Average Head Grade (% Fe_T)	Wt Recovery (%)	Fe Recovery (%)	Concentrate	
				Fe_T (%)	SiO2 (%)
West Pit 14 mesh (10 samples)					
14 mesh (1200 µm)	41.1			62.7	
West Pit 20-28 mesh (38 samples, 1 repeat)					
20 mesh (850 µm)	34.2	44.4	84.6	66.0	5.1
24 mesh (700 µm)	34.2	43.2	83.4	66.6	4.3
28 mesh (600 µm)	34.2	42.1	81.9	67.1	3.6
East Pit 20-28 mesh (38 samples)					
20 mesh (850 µm)	32.8	41.4	81.7	64.7	6.8
24 mesh (700 µm)	32.8	40.7	80.6	65.4	6.1
28 mesh (600 µm)	32.8	39.0	78.4	66.1	5.1

Table 13-12 shows that the West Pit material performed best at a 20 mesh grind size. A concentrate grade above 65% Fe_T was obtained, with an iron recovery of 84.6% and a silica grade of 5.1%. These results confirm that a 20 mesh grind size is optimal for West Pit material.

Ten West Pit samples were also submitted to HLS testing at a 14 mesh (1200 µm) grind size, to evaluate whether it would be possible to make a concentrate at a coarser grind size than 20 mesh. Concentrate grades ranging between 58.3 and 66.7% Fe_T were obtained. Only one of the ten samples produced a concentrate with greater than

65% Fe_T. It was therefore concluded that the hematite was not sufficiently liberated at 14 mesh and that the material could not in fact be ground coarser than 20 mesh.

The East Pit material required finer grinding than the West Pit material to produce a concentrate grade of 65% Fe_T, with acceptable SiO_2 levels at approximately 5%. In addition, its iron recovery was lower than that of the West Pit material at each grind size. Based upon this new information, 100% passing 28 mesh was retained as the design grind size for the East Pit.

HLS results for selected samples from the East Pit zone were plotted against the position from which each sample was taken (Figure 13-6). There does not appear to be any indication that the Pit can be classified into areas of good/poor expected recoveries.

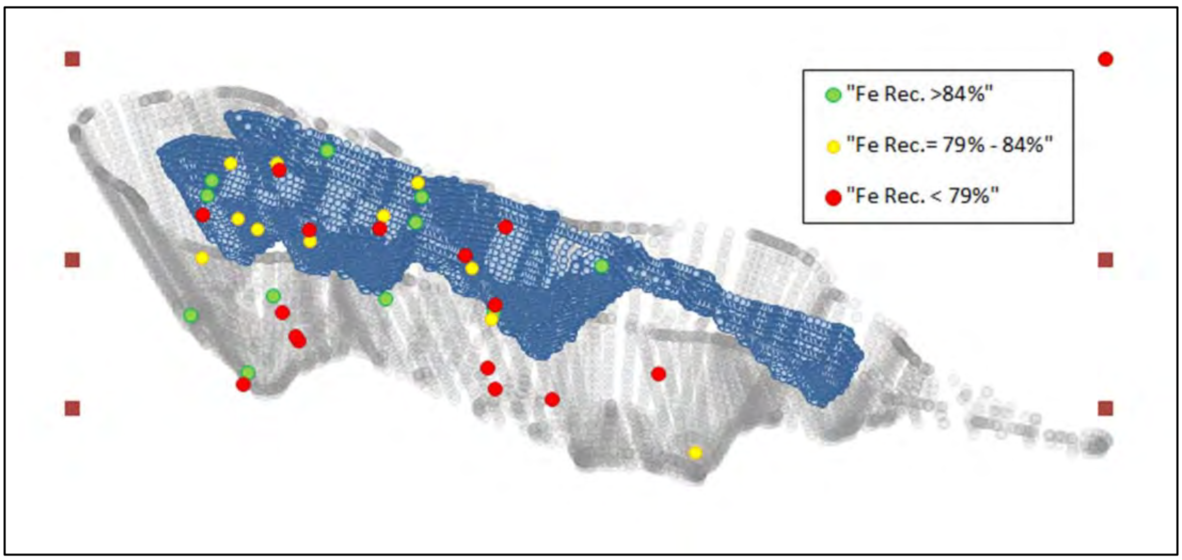


Figure 13-6: Positioning of HLS Recoveries in the East Pit

13.6.12 Grade-Recovery Curves

The HLS testwork found an excellent relationship between weight recovery to concentrate and sample head grade. This relationship is shown for the West Pit and East Pit samples in Figure 13-7 and Figure 13-8, below. The trend lines in the figures show the recovery performance of the material at the 20 mesh grind size for the West Pit and the 28 mesh grind size for the East Pit. The results suggest that head grade will be a reliable indicator of weight recovery. Since the results fall on a line passing through the origin, it was determined that the iron recovery is independent of head grade.

The Block Model recovery equations are also plotted in Figure 13-7 and Figure 13-8. These equations are used in the mine block model to predict mill recoveries. They are calculated for the West Pit and East Pit as follows:

- Weight Recovery (West Pit) = (Head grade, $\%Fe_T$)(82%)/(Concentrate grade, $\%Fe_T$);
- Weight Recovery (East Pit) = (Head grade, $\%Fe_T$)(76.5%)/(Concentrate grade, $\%Fe_T$).

A concentrate grade of 66% was used in calculating the Block Model recovery curves. The Block Model recovery equations return slightly lower recoveries than those obtained by HLS testing. This was deliberately done to err on the conservative side for the production estimates. The HLS recovery curve for the West Pit gives a weight recovery of 84.6% at a concentrate grade of 66.0% Fe_T. In the Block Model recovery curve for the West Pit, the weight recovery is decreased to 82.0%. The HLS recovery curve for the East Pit gives a weight recovery of 78.5% at a concentrate grade of 66.0% Fe_T. In the Block Model recovery curve for the East Pit, the weight recovery is decreased to 76.5%.

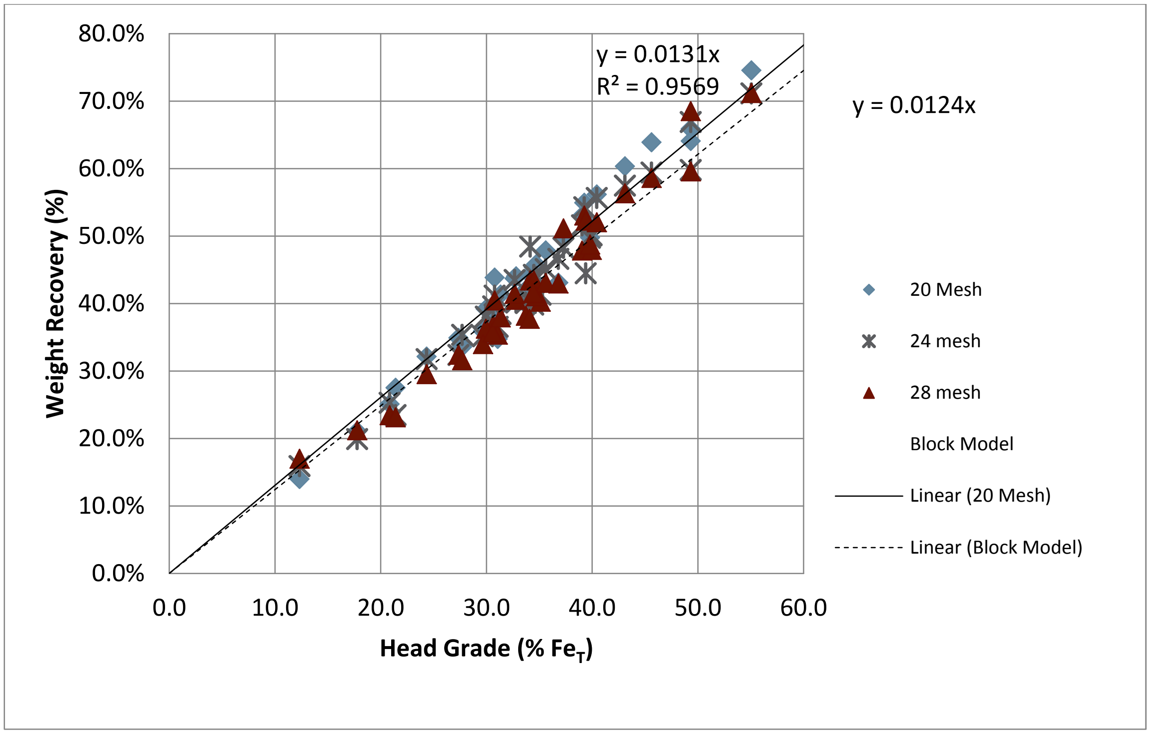


Figure 13-7: West Pit Head Grade vs. Weight Recovery

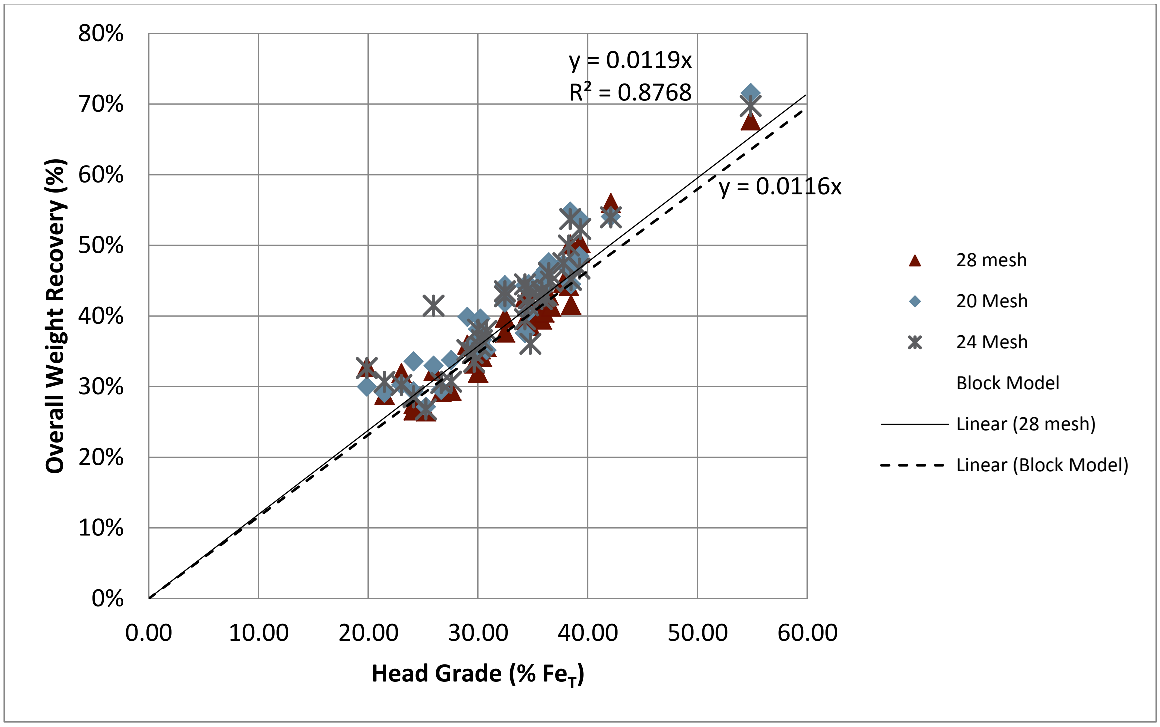


Figure 13-8: East Pit Head Grade vs. Weight Recovery

The expected combined SiO_2 and Al_2O_3 levels in the concentrate is below 7.0%, provided the material is adequately ground. An SiO_2 + Al_2O_3 level of less than 7.0% is a common industry benchmark. The HLS testwork was analyzed to determine the concentrate grade at which this criterion would be met. The concentrate alumina level and silica level were averaged over each unit increase in concentrate grade (from 63.0% to 64.0%, from 64.0% to 65.0%, and so on) and plotted. The results are given in Figure 13-9, Figure 13-10 and Figure 13-11 below.

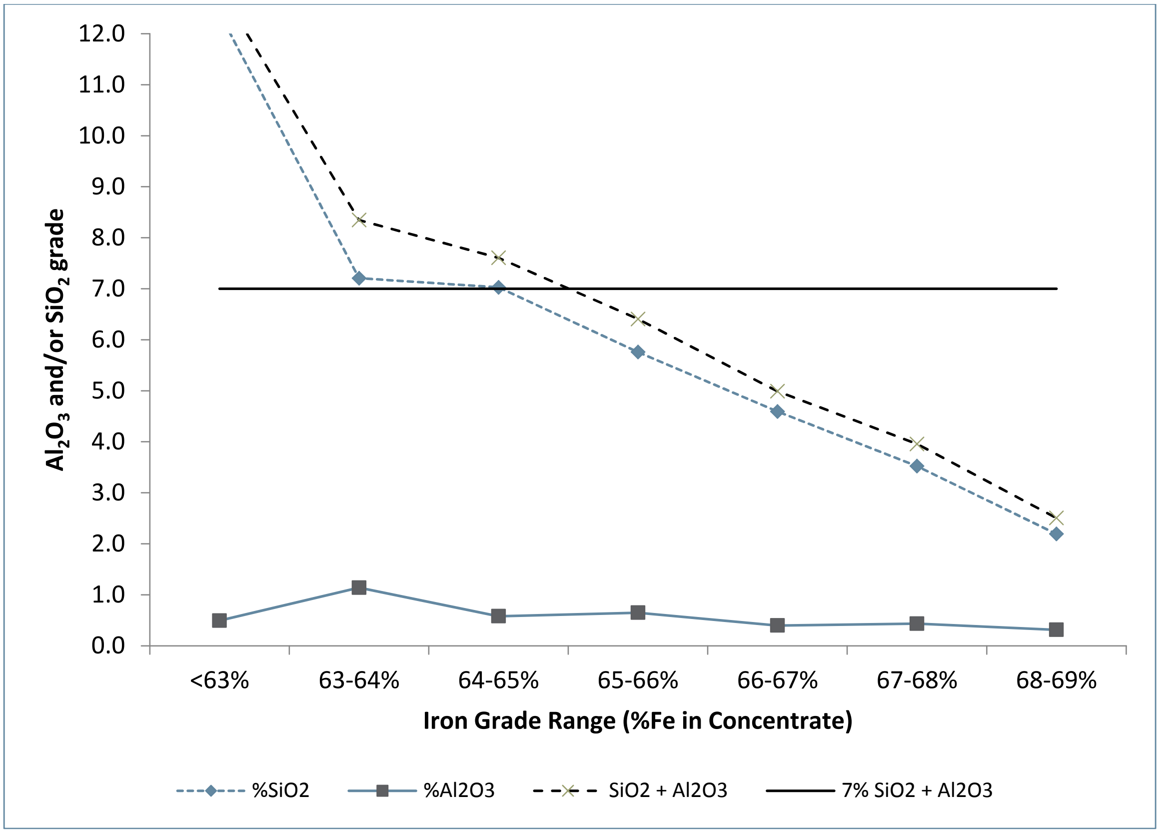


Figure 13-9: West Pit SiO_2+Al_2O_3 Levels vs. Fe Concentrate Grade (100% Passing 20 Mesh)

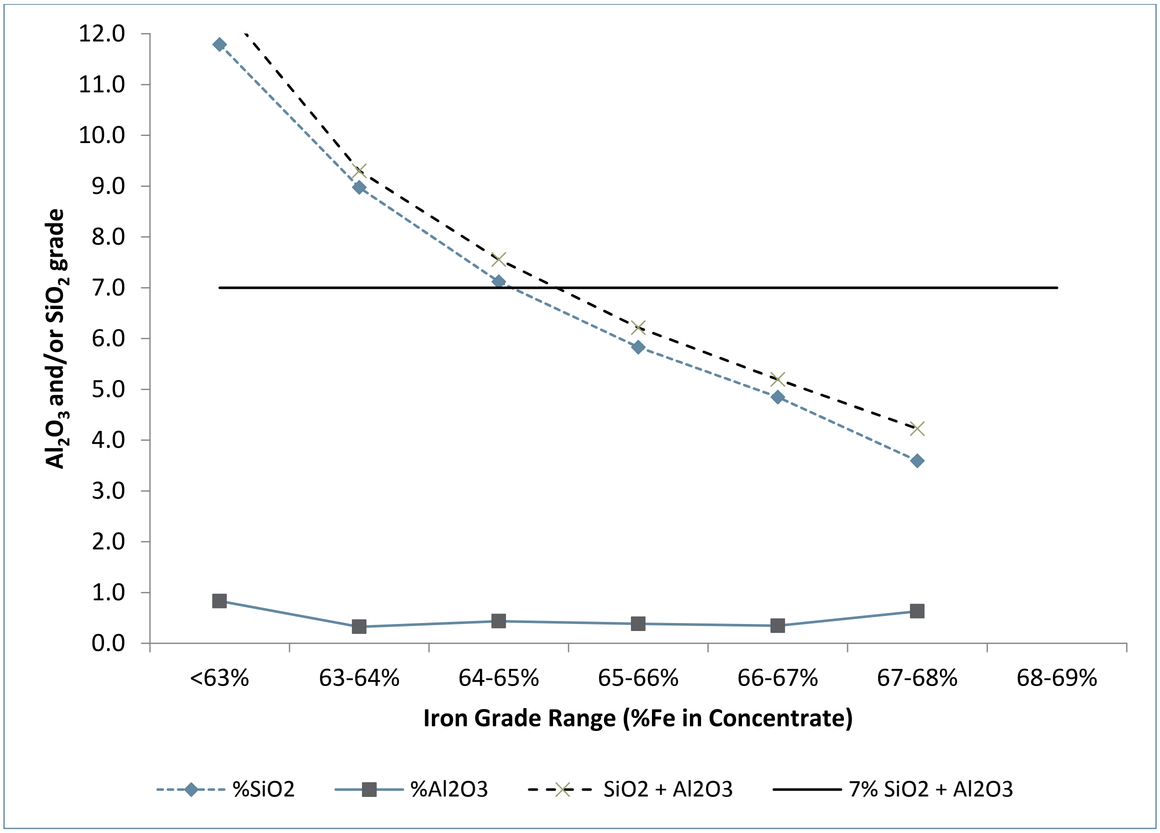


Figure 13-10: East Pit SiO_2+Al_2O_3 Levels vs. Fe Concentrate Grade (100% Passing 20 Mesh)

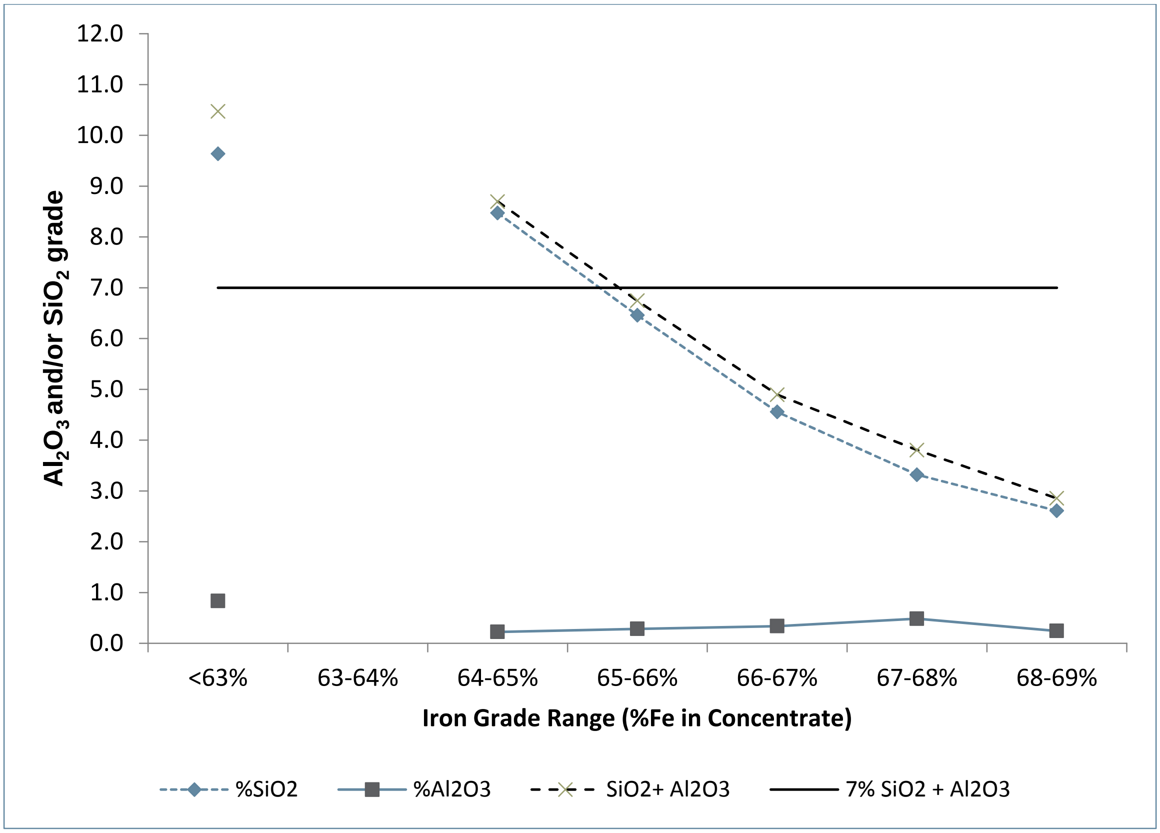


Figure 13-11: East Pit SiO_2+Al_2O_3 Levels vs. Fe Concentrate Grade(100% passing 28 Mesh)

For the East Pit, the condition of less than 7.0% SiO_2+Al_2O_3 is met at grades higher than 65.0% Fe_T at a grind of 28 mesh. For the East Pit, the condition is also met at a concentrate grade of 65.0% at 20 mesh. The same applies at a grind size of 28 mesh for the East Pit. (While the East Pit material has acceptable Al_2O_3 + SiO_2 levels at a 20 mesh grind, it must be ground to 100% passing 28 mesh to achieve the target concentrate grade of 65% Fe_T on a consistent basis. This difficulty is not illustrated by these figures.)

13.6.13 Wilfley Table Testing

Following the heavy liquid separation testwork, Wilfley table testwork was performed on six (6) composite samples from the West Pit and five (5) composite samples from the East Pit. The samples were selected to represent progressively higher iron head grades. In this case, locked-cycle testing was not performed. The Wilfley table was used as a means to generate sufficient sample material for follow-up settling, rheology, environmental and filtration testing, as well as to confirm the HLS results previously obtained.

For the Wilfley Table tests, each sample was stage-crushed to 100% minus 20 mesh (850 µm) and fed to the table for roughing. The concentrate and middlings streams were combined and fed to the table again for cleaning. Exceptionally, the cleaner concentrate for West Pit sample 4 was fed to the table for recleaning, as the cleaner concentrate grade was below 65% Fe_T. East Pit sample 5 was also submitted to recleaning, however, the products from the cleaner were subsequently used as the recleaner gave only marginal improvement in grade. At both stages, samples were taken of the product streams for assay. The results are given in Table 13-13 below.

Table 13-13: Wilfley Table Testwork Results

Sample	Head (% Fe_T)	K_{80} (µm)	Concentrate Grade (%)				Recovery (%)		
			Fe_T	SiO_2	TiO_2	Sat	Wt	Fe_T	Sat
West 1	28.6	485	68.3	2.2	0.22	0.6	31.1	75.1	32.4
West 2	31.1	529	68.5	2.4	0.09	1.2	34.8	75.7	59.9
West 3	33.8	524	65.0	6.4	0.10	0.3	41.8	83.7	47.7
West 4	35.7	546	65.9	5.5	0.08	0.2	41.1	77.5	37.8
West 5	34.3	463	65.1	5.7	0.16	1.0	42.7	80.4	65.3
West 6	39.0	572	67.6	3.4	0.03	0.2	50.5	87.7	48.0
West Average	**33.8**	**520**	**66.7**	**4.3**	**0.11**	**0.6**	**40.3**	**80.0**	**48.5**
East 1	28.0	459	66.8	4.1	0.16	2.1	28.3	67.2	49.3
East 2	29.2	497	65.1	6.8	0.18	11.4	37.6	80.7	80.3
East 3	34.5	456	68.1	1.8	0.10	6.2	33.3	68.8	66.0
East 4	38.2	439	69.7	1.1	0.06	15.9	32.6	61.2	60.5
East 5	37.7	492	66.6	5.2	0.04	4.0	45.2	80.0	70.6
East Average	**33.5**	**469**	**67.3**	**3.8**	**0.11**	**7.9**	**35.4**	**71.6**	**65.3**
Overall Average	**33.7**	**498**	**67.0**	**4.1**	**0.11**	**3.6**	**38.3**	**76.5**	**55.5**

As compared to the heavy liquid separation results at 100% passing 20 mesh (850 µm), the Wilfley table gave lower recoveries at 80.0% and 71.6% for the West Pit and East Pit, respectively (against 84.6 and 81.7% in the HLS results). However, as locked cycle testing was not performed, recycle streams that would increase recovery in plant practice were not taken into account. Therefore, the recoveries obtained in the Wilfley table tests cannot meaningfully be used to predict mill performance. In BBA's experience, HLS results are more dependable for performance prediction than Wilfley table results. Good concentrate grades were achieved, with all tests producing concentrate grades of 65% Fe_T or above.

13.6.14 COREM Confirmatory Testing

To confirm the heavy liquids separation results obtained at SGS, ten samples from the West Pit zone and ten samples from the East Pit zone were sent to COREM for quality control testing. Each sample was stage-crushed to 100% passing 20 mesh (850 µm) and then submitted to HLS. The results are shown in Table 13-14. The results for one of the East Pit samples were found to be in error and were discarded.

Table 13-14: Confirmatory HLS Testing Results (100% passing 20 mesh)

	Head Grade (%)	Concentrate Assay (%)				Recovery (%)	
Sample ID	Fe_T	Fe_T	SiO_2	Al_2O_3	TiO_2	Weight	Fe_T
1-West	55.0	68.7	1.0	0.6	0.1	68.7	85.6
5-West	23.0	64.7	5.1	1.1	0.7	27.9	81.0
8-West	38.1	66.7	4.4	0.3	0.1	48.8	85.3
10-West	38.9	68.1	2.3	0.7	0.1	49.7	87.3
12-West	41.6	67.7	3.0	0.6	0.2	52.6	85.8
16-West	53.8	68.3	1.4	0.7	0.4	67.2	85.5
24-West	44.9	67.9	2.3	0.4	0.1	56.7	86.7
26-West	51.2	67.3	2.5	0.5	0.1	63.6	84.5
31-West	35.9	65.2	6.5	0.3	0.1	43.4	79.2
37-West	33.3	66.2	5.0	0.5	0.1	41.1	81.8
West - average	**41.6**	**67.1**	**3.3**	**0.5**	**0.2**	**52.0**	**84.3**
4-East	35.6	64.8	6.3	0.6	0.3	46.6	84.9
7-East	33.6	65.0	7.4	0.3	0.1	41.0	80.0
10-East	35.9	64.0	7.9	0.5	0.2	45.9	82.7
13-East	26.8	67.3	3.9	0.4	0.1	32.3	81.0
16-East	28.0	66.1	5.5	0.3	0.1	34.5	82.5
22-East	31.5	67.2	4.0	0.3	0.1	39.1	85.1
25-East	35.6	67.2	4.2	0.2	0.1	44.9	84.7
28-East	39.1	66.0	5.8	0.2	0.0	50.0	84.0
31-East	24.3	60.5	11.0	0.8	1.9	29.5	74.5
East - average	**32.3**	**65.4**	**6.2**	**0.4**	**0.3**	**40.4**	**82.2**
Overall average	**37.2**	**66.3**	**4.7**	**0.5**	**0.3**	**46.5**	**83.3**

The average HLS results for the West Pit and East Pit and overall averages are similar to the SGS HLS results for minus 20 mesh material in terms of concentrate grade and iron recovery. For comparison, the SGS HLS results gave an average 84.6% Fe_T recovery at a 66.0% Fe_T grade for the West Pit material, and an average 81.7% Fe_T recovery with a 64.7% Fe_T grade for the East Pit material. As with previous tests, lower recoveries were obtained with East Pit as compared to the West Pit samples.

The COREM and SGS HLS results are compared in Figure 13-12 and Figure 13-13, below.

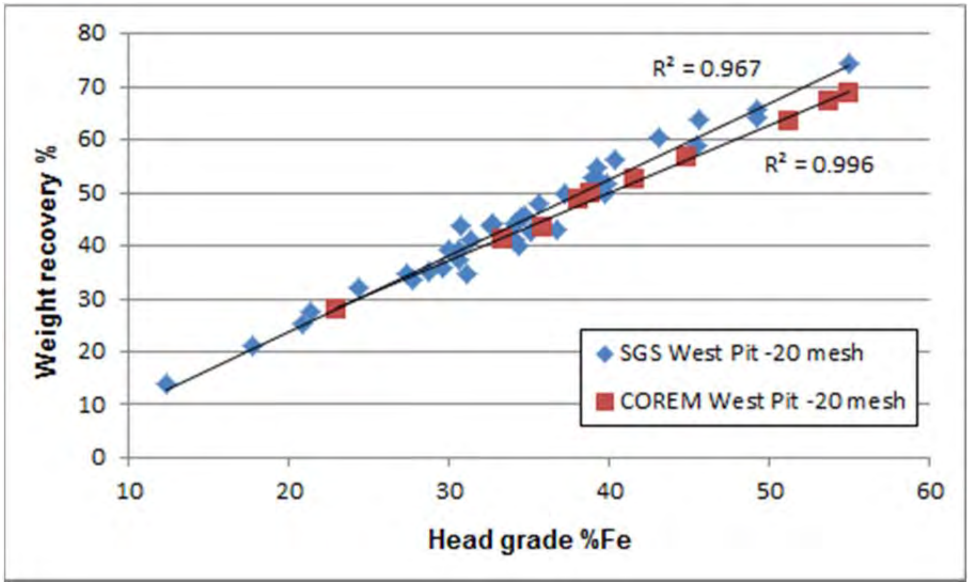


Figure 13-12: Comparison of HLS Weight Recovery Curves for West Pit Material at 100% passing 20 mesh

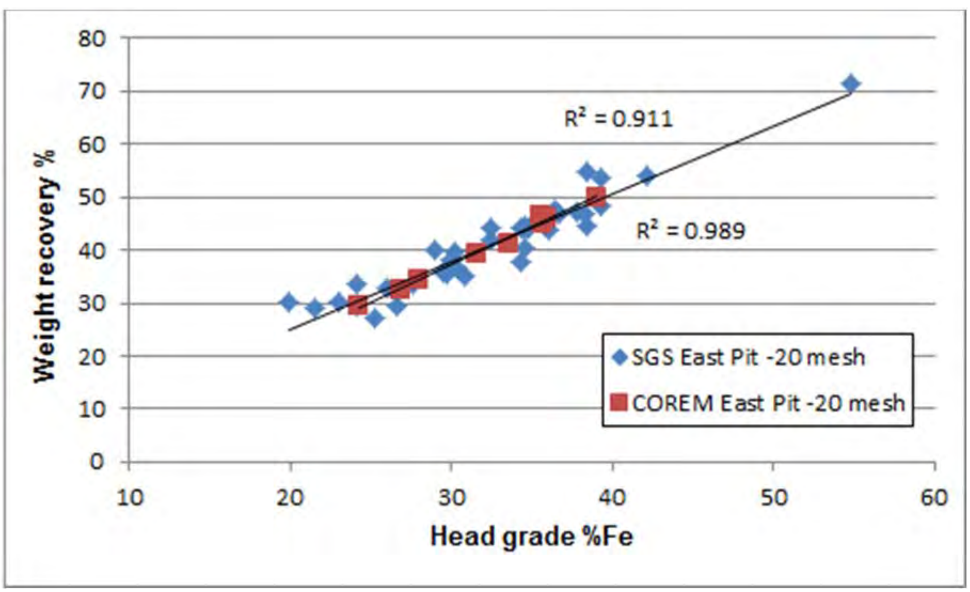


Figure 13-13: Comparison of HLS Weight Recovery Curves for East Pit material at 100% passing 20 mesh

As can be seen, the results obtained at COREM were in good agreement with those obtained at SGS.

13.6.15 Mill Recovery Assumptions

The heavy liquid separation results were used to establish estimated recoveries and concentrate grades for production. From BBA's experience, the recovery estimate obtained from HLS should be lowered by a few percentage points to produce an adjusted recovery for a reasonable estimate of actual plant performance. The adjusted recovery reflects the less efficient performance obtained in a production plant as compared to the laboratory. HLS results and adjusted recoveries, which were subsequently used for the purpose of design, are shown in Table 13-15. For comparison purposes, the pilot plant performance and recoveries used in Pit modelling are also given.

A concentrate grade of 66% was chosen for design purposes.

Table 13-15: Laboratory and Design Recovery and Grades

Source	Fe_T % Recovery	%Fe_T Concentrate Grade	%SiO_2 Grade	Adjusted Recovery %
West Pit -20 mesh HLS	84.6	66.0	5.1	82.6
East Pit -28 mesh HLS	78.4	66.1	5.1	76.4
Pilot Plant (East Pit) - 20 mesh*	84.0	64.2	7.7	
West Pit - Design	82.0	66.0		
East Pit - Design	76.5	66.0		

*Pilot plant results are the average of Runs S-6 and S-7

13.6.16 Concentrate Assays and Particle Size Distribution

The final concentrate particle size distribution (PSD) is taken from the PSDs measured during the Pilot Plant trials. Runs S-5 and S-7 were considered to be the most representative of a full-scale operation, and an average was taken of these two runs. The average K80 (80% passing size) was found to be 424 µm. Less than 0.8% of the concentrate was smaller than 1 µm, and 0.3% of the concentrate was larger than 1000 µm. Results are shown in Table 13-16 for Runs S-5 and S-7, and for all runs in Figure 13-14

Table 13-16: Final Concentrate Particle Size Distribution for Pilot Plant Runs S-5 & S-7

Size	Percent Passing		
Microns	Run S-5	Run S-7	Average
1180	100.0	100.0	100.0
850	100.0	98.9	99.5
600	100.0	90.0	95.0
425	90.5	76.0	83.3
300	64.0	56.4	60.2
212	42.1	38.1	40.1
150	25.0	22.4	23.7
106	12.8	11.7	12.3
75	5.2	4.8	5.0
53	1.7	1.8	1.8
38	0.6	0.9	0.8
K80 (µm)	375	472	424
		Percent above 1000 µm	0.3
		Percent below 1 µm	< 0.8

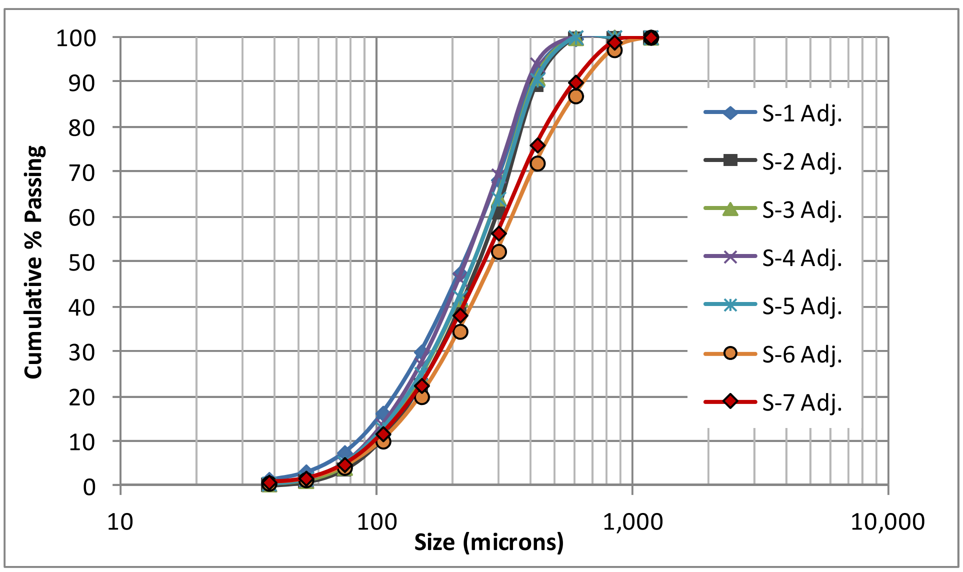


Figure 13-14: Particle Size Distributions for Pilot Plant Final Concentrate (Taken from SGS Report 13360-006 – Pilot Plant Report)

Assays of the concentrates produced at SGS by Heavy Liquid Separation are presented in Table 13-17 (for West Pit samples) and Table 13-18 (for East Pit samples).

Table 13-17: Concentrate Assay, Heavy Liquid Separation Tests, West Pit (SGS)

	(-20 mesh/+150 mesh)
Fe_T %	65.98
Fe_3O_4 %	0.89
Magnetic Fe %	0.64
SiO_2 %	5.07
Al_2O_3 %	0.52
Fe_2O_3 %	93.43
MgO %	0.07
CaO %	0.12
Na_2O %	0.03
K_2O %	0.06
TiO_2 %	0.18
P_2O_5 %	0.05
MnO %	0.02
Cr_2O_3 %	0.02
V_2O_5 %	0.01
LOI	0.32
Total	101.40

Note: Values do not add exactly to value in “Total” row due to averaging.

Table 13-18: Concentrate Assay, Heavy Liquid Separation Tests, East Pit (SGS)

	-20 mesh/+150 mesh	-24 mesh/+150 mesh	-28 mesh/+150 mesh
Fe_T %	64.73	65.36	66.06
Fe_3O_4 %	11.29	11.65	11.23
Magnetic Fe %	8.17	8.43	8.13
SiO_2 %	6.77	6.07	5.09
Al_2O_3 %	0.47	0.44	0.43
Fe_2O_3 %	80.87	81.40	82.82
MgO %	0.20	0.18	0.18
CaO %	0.28	0.27	0.28
Na_2O %	0.03	0.03	0.04
K_2O %	0.05	0.06	0.05
TiO_2 %	0.17	0.17	0.17
P_2O_5 %	0.04	0.04	0.04
MnO %	0.03	0.03	0.03
Cr_2O_3 %	0.02	0.02	0.02
V_2O_5 %	0.01	0.02	0.01
LOI	-0.16	-0.20	-0.18
Total	100.47	100.48	100.51

Note: Values do not add exactly to value in "Total" row due to averaging.

Two (2) samples of concentrate produced during the testwork were analyzed for base metals and halogens. The results are presented in Table 13-9.

Table 13-19: Base Metals and Halogens Analysis of Two Concentrate Samples

Sample	Co	Cr	Cu	Mo	Ni	Pb	Sb	Sn	V	Zn	As	Cl	F	S
	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	g/t	%	%
West Pit Sample 1 B2-5	< 8	142	< 0.5	< 5	< 20	< 20	< 10	< 20	27	< 40	< 30	70	0.01	< 0.01
West Pit Sample 26 B2-5	< 8	144	1.6	< 5	< 20	< 20	< 10	< 20	18	< 40	< 30	< 50	0.013	< 0.01

The results provide further confirmation of low levels of impurities.

13.7 Settling, Filtration and Rheology

Iron concentrate generated from the pilot plant bulk sample and from the Wilfley table tests described in Section 13.6.9 were submitted for vacuum filtration testing and their associated rougher tailings were submitted for settling and rheology testing.

13.7.1 Vacuum Filtration

Standard vacuum filter testing was carried out on five concentrate samples. Four (4) of these were products of Wilfley table testwork. Streams from different Wilfley table tests were combined to generate sufficient sample for testing. Sample S5 was produced by the pilot plant. The results are given in Table 13-20 below.

Table 13-20: Vacuum Filtration Performance of Samples

Sample	K_{80} (µm)	Solids capacity (kg/m^{2}h)	Residual Moisture (%)	Feed solids (%)
West Pit 27-30% Wifley Cleaner Concentrate	577	7393	3.7	60
West Pit 30-32% Wilfley Cleaner Concentrate	520	5358	3.1	60
East Pit 2 Wilfley Cleaner Concentrate	497	5975	7.0	60
East Pit 5 Wilfley Recleaner Concentrate	426	8927	2.7	60
S5 Concentrate (Pilot Plant)	533	32 229	5.0	48

Vendors will be consulted at the detailed engineering stage to finalize equipment selection and determine the steam requirement for drying the concentrate to 3% moisture in the winter period. The testwork has shown that a horizontal pan filter, similar in design to the ones already in use in the Fermont area, is suitable for the Fire Lake North project.

13.7.2 Static Settling Tests

Two-stage static settling tests were performed for three (3) samples taken from the Wilfley table tails. All of these were screened to remove the +150 µm fraction. As with the vacuum filtration samples, streams from different Wilfley table tests were combined to provide enough sample for testing. In the first stage of testing, the feed solids density was optimized; in the second stage the flocculant dosage was optimized. Magnafloc 333 was used for all tests. Results are presented in Table 13-21 below.

Table 13-21: Two-Stage Static Settling Test Results on Three Samples

Sample	K_{80} (µm)	Flocculant Dosage (g/t)	Feed %solids	Underflow %solids	TUFUA (m^2/t/d)	THUA (m^2/t/d)	TSS (mg/l)
West Pit 27-34% Wilfley Tails	87	15	6	66	0.050	0.016	~10
West Pit 34-40% Wilfley Tails	87	20	6	62	0.04	0.01	<10
East Pit Rougher Wilfley Tails	90	7	8	65	0.036	0.012	<10

TUFUA = Thickener Underflow Unit Area
THUA = Thickener Hydraulic Unit Area
TSS = Total Suspended Solids Measured After One Hour

SGS commented that the samples appeared to settle well in the presence of Magnafloc 333 flocculant. The overflow for all samples was slightly cloudy; however, in all cases the overflow TSS was well below 200 mg/l, the level at which the solids content becomes problematic.

For the purposes of Preliminary Feasibility Study design, the addition of both flocculant and coagulant to the fine tailings thickener was assumed. This is a common practice in operating iron ore mines in the Fermont-Labrador City area.

13.7.3 Rheology Testing

The rheology testwork used a concentric rotational viscometer – to determine viscosity and critical solids density (CSD) – and a vane viscometer, which is used for shear and yield strength measurements. The tests were performed on the underflow from the static settling tests.

The slurry was found to be too fast-settling to be amenable to concentric rotation viscometry, and therefore no CSD measurements could be made. However, it was possible to measure the yield stress of the slurry using the vane viscometer. The results are summarized in Table 13-22 as follows:

Table 13-22: Yield Stress Measurements on Settling Test Underflow Products

Sample	K_{80} (µm)	Solids Density (%)	Yield stress or Max Shear Stress (Pa)
West Pit 27-34% Wilfley Tails	87	79	403
West Pit 34-40% Wilfley Tails	87	78	224
East Pit Rougher Wilfley Tails	90	75	279

The yield stress figures attained were noted to be quite high. A yield stress of 30 Pa is often used as a maximum yield stress in many equipment specifications. Specialized rakes and pumping equipment may therefore be required. It should however be noted that the solids densities at which the yield stress was measured are higher than those set as operating parameters for design; this was done to prevent settling during the test. The thickener underflow is set to 60% solids for design purposes; the slurry being pumped to the tailings pond is expected to have a 50% solids density.

Detailed equipment needs will be determined in cooperation with vendors in subsequent stages of the Project.

13.8 Environmental Characterization

Tailings and concentrate samples were collected from the pilot plant and the Wilfley table testwork. This material was used for environmental characterization. This included the following work:

- Trace metal analysis by ICP-OES/MS (Inductively Coupled Plasma - Optical Emission Spectroscopy/Mass Spectrometry);
- Acid/Base Accounting (ABA) Testing;
- Net Acid Generation Testing;
- Toxicity Characteristic Leaching Procedure (TCLP) (EPA Method 1311);
- Synthetic PreciPitation Leaching Procedure (SPLP) (EPA Method 1312);
- The Distilled Water Leach Extraction (Quebec CTEU-9);
- Liquid Effluent Analysis.

Tests were performed on the following samples:

- Pilot Plant S-7 Rougher Tails Decant;
- Pilot Plant S-7 Concentrate;
- West Pit #2 Wilfley Rougher Tails 30-32% Fe_T;
- East Pit #1 Wilfley Rougher Tails 27-30% Fe_T;
- East Pit #5 Wilfley Rougher Tails 38-40% Fe_T.

A full description of the testwork and results is given in Section 20.

13.8.1 ICP-OES / MS Trace Metal Analysis

Samples were submitted to elemental digestion and analyzed for 34 different metals using inductively coupled plasma-optical emission spectroscopy/mass spectroscopy (ICP-OES/MS). This was intended to identify elements occurring in environmentally significant concentrations. Digestion and analysis was performed on material from pilot plant Run S-7 concentrate and tails, one (1) sample of Wilfley table tails from West Pit zone material, and two (2) samples of Wilfley table tails from East Pit zone material.

13.8.2 Acid / Base Accounting (ABA) Testing

The modified acid base accounting (ABA) test was used to determine the susceptibility of the concentrate and tailings to produce acid drainage.

In the ABA test, the total sulphur, sulphide sulphur, and sulphate present in the sample are quantified. This gives the acid generation potential (AP) related to the oxidation of sulphide sulphur. The AP is expressed in terms of tonnes of limestone ($CaCO_3$) required to counteract the acidity in 1000 t of material.

The sample is subsequently reacted with acid to determine the content of neutralizing minerals present. This gives the neutralization potential (NP). The NP is expressed in terms of limestone ($CaCO_3$) equivalent present. The acid generation potential and neutralization potential are finally combined to produce the net neutralization potential. The ABA test was performed on material from pilot plant Run S-7 (concentrate and tails), one (1) sample of Wilfley table tails from West Pit zone material and two (2) samples of Wilfley table tails from East Pit zone material. Test results are presented in Table 13-23.

Table 13-23: Acid/Base Accounting (ABA) Testwork Results

Parameter	Unit	Pilot Plant S-7 Rougher Tails Decant	Pilot Plant S-7 Concentrate	West Pit #2 Wilfley Rougher Tails 30-32% Fe_T	East Pit #1 Wilfley Rougher Tails 27-30% Fe_T	East Pit #5 Wilfley Rougher Tails 38-40% Fe_T
S	%	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acid Leachable SO_4-S	%	<0.01	<0.01	<0.01	< 0.01	< 0.01
Sulphide	%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
CO_3	%	0.116	0.017	0.049	0.117	0.105
Paste pH	units	8.70	8.78	8.89	9.13	8.84
NP	t $CaCO_3$ /1000 t	5.8	3.8	3.6	5.3	4.1
AP	t $CaCO_3$ /1000 t	0.31	0.31	0.31	0.31	0.31
Net NP	t $CaCO_3$ /1000 t	5.49	3.49	3.29	4.99	3.79
NP/AP	ratio	18.7	12.3	11.6	17.1	13.2

Table 13-23 shows that all samples tested had a positive neutralization potential and had much more neutralizing material than acid-generating material (as given by the NP/AP ratio). This is to be expected from the very low sulphur and sulphide levels detected and the presence of carbonates. Based on these data the tailings and concentrate are considered to be non-acid generating.

13.8.3 Net Acid Generation Testing

In the net acid generation (NAG) test, a sample is reacted with concentrated hydrogen peroxide for 24 hours to force complete oxidation of the sulphur and sulphide in the sample. The acid generated reacts completely with the neutralizing minerals present in the sample. The quantity of acid generated is subsequently determined by measuring the final pH and by neutralizing the sample to a pH of 4.5 or 7.0.

The NAG tests were performed on samples from pilot plant Run S-7 concentrate and tailings streams, one (1) sample of Wilfley table tailings from West Pit zone material, and two (2) samples of Wilfley table tails from East Pit zone material. Test results are given in Table 13-24.

Table 13-24: Net Acid Generation (NAG) Test Results

Parameter	Unit	Pilot Plant S-7 Rougher Tails Decant	Pilot Plant S-7 Concentrate	West Pit #2 Wilfley Rougher Tails 30-32% Fe_T	East Pit #1 Wilfley Rougher Tails 27-30% Fe_T	East Pit #5 Wilfley Rougher Tails 38-40% Fe_T
Final pH	units	7.66	6.91	6.94	7.46	7.30
NAG (neutralized to pH 4.5)	kg H_2SO_4/tonne	0	0	0	0	0
NAG (neutralized to pH 7.0)	kg H_2SO_4/tonne	0	0.5	0.4	0	0

The results show no net acid generation for three (3) of the samples, and a modest net acid generation for the pilot plant concentrate and the West Pit number 2 Wilfley rougher tails. The final pH for these two (2) samples, however, was around 6.9. Critical

NAG pH values predicting acid generation potential in the field are typically in the range of 3 to 4.5. These results therefore confirm the conclusion of the ABA testwork, indicating that the material is non- acid generating.

13.8.4 Toxicity Characteristic Leaching Procedure (TCLP) (EPA Method 1311)

The Toxicity Characteristic Leaching Procedure (TCLP) US EPA Method 1311 leachate test was completed to determine the mobility of the contained metals in the solids. The TCLP uses a mixture of acetic acid and sodium hydroxide as its lixiviant. The leachate is analyzed for pH and concentrations of 40 species in solution.

For this Study, tests were performed on samples from pilot plant Run S-7 concentrate and tailings streams, one (1) sample of Wilfley table tailings from West Pit zone material, and two (2) samples of Wilfley table tails from East Pit zone material. The leachate concentrations measured were compared with the leachate concentration limits prescribed by the Government of Québec's Directive 19. No exceedance of the Directive 19 limits was found. Full results are given in Section 20.

13.8.5 Synthetic PreciPitation Leaching Procedure (SPLP) (EPA Method 1312)

The Synthetic PreciPitation Leachate Procedure (SPLP; US EPA Method 1312) was completed to determine the leachability of contaminants from the tested sample solids under acid conditions such as those created by acid rock drainage or acid rain. The SPLP is based on a H_2SO_4 / HNO_3 mixture as its lixiviant. The leachate is analyzed for pH and concentrations of 40 species in solution.

SPLP tests were performed on samples from pilot plant Run S-7 concentrate and tailings streams, one (1) sample of Wilfley table tailings from West Pit zone material, and two (2) samples of Wilfley table tails from East Pit zone material

13.8.6 Distilled Water Leach Extraction (Quebec CTEU-9)

The Distilled Water Leach Extraction was conducted as per the Quebec CTEU-9 methodology. This leach test provides an indication of sample contaminants that are readily available to ground and surface water. The resulting solution from the leach test was measured for pH, alkalinity, electrical conductivity, SO_4, Cl, NO_3, NO_2, and trace metals. The leach was performed on samples from pilot plant Run S-7 concentrate and tailings streams, one (1) sample of Wilfley table tailings from West Pit zone material, and two (2) samples of Wilfley table tails from East Pit zone material

All parameters were found to be within the limits set by Directive 19, except the iron concentration in the Pilot Plant S-7 Rougher Tails. This was determined to be 3.89 mg/l as against the Directive 19 concentration of 3.00 mg/l. The West Pit Number 2 Wilfley Rougher Tails also produced a leachate close to this limit, at 2.77 mg/l iron.

13.8.7 Liquid Effluent Analysis

Liquid effluent analysis was conducted on a sample decanted off of the fresh tailings from the pilot plant. The decanted solution was placed into appropriate bottles, preserved and analyzed for a number of environmental parameters. Samples from pilot plant Run S-7 tailings stream, one (1) sample of Wilfley table tailings from West Pit zone material, and two (2) samples of Wilfley table tails from East Pit zone material. The pilot plant concentrate was not analyzed.

Analysis showed that all parameters were within the limits set by Directive 19. However, the West Pit Number 2 Wilfley Rougher Tails gave a TSS close to the Directive 19 limit, at 13 mg/l (as against the limit of 15 mg/l).

13.8.8 Discussion on Environmental Testing Results

Analysis of the TCLP leachate from both the tailings samples and the concentrate samples showed that Québec Directive No. 019-controlled parameters were well within the limits specified. It should be noted that since the TCLP is a very aggressive extraction procedure, the limits applicable to this test procedure are much higher than those used for the decant solution or SPLP and CTEU-9 extractions.

Analysis of the SPLP leachate from all samples likewise showed that all controlled parameters are within the limits set by Québec Directive No 19.

Analysis of the CTEU-9 leachate showed an iron (Fe_T) concentration greater than the Directive No. 019 limit in one (1) sample (pilot plant tails) and a concentration close to the limit in one (1) other sample. All other Directive No. 019 controlled parameters were within the limits designated for the procedures of this test for all samples tested.

Liquid Effluent Analysis for all samples showed all controlled parameters to be within the limits set by Québec Directive No 19.

13.9 Fine Iron Recovery

In a spirals circuit, a significant portion of the feed material finer than approximately 150 mesh (-106 µm) will report to the tailings. This means that some portion of the hematite is unrecovered using only spirals. In an effort to further boost iron recovery, BBA investigated a few approaches to recover fine hematite from the tailings stream. These include:

- Screening using a Derrick screen (StackSizer®);
- Screening, followed by gravity separation;
- Screening, followed by wet high-intensity magnetic separation (WHIMS).

An initial recovery trial was performed using a Wilfley table to determine the ability to recover fine hematite by gravity. After poor results in this trial, a combination of screening and WHIMS was selected for scoping testwork for proof of concept. The testwork indicated that approximately 39% of the total iron in the tailings could be recovered into a concentrate with a grade of more than 65% Fe_T. This implies that a fines recovery circuit would increase the weight and iron recoveries of the spirals plant in operation, without affecting the concentrate grade. Given these positive results, it is recommended to continue investigating the feasibility of WHIMS fine hematite recovery.

The general concept of the testwork was to reject larger silica particles, leaving an iron-enriched undersize fraction. In initial testwork, the pilot plant rougher tailings were screened at 180 µm (some material was screened at 150 µm instead). The undersize was submitted to Wilfley table testing, consisting of a roughing and a cleaning step. While the Wilfley cleaning was able to produce a 65.3% Fe_T concentrate grade, iron recoveries were poor at 9.8%.

Subsequently, recovery by Wet High-Intensity Magnetic Separation (WHIMS) was tested. As the goal was to provide a proof of concept, only one (1) series of tests was performed.

Hematite is paramagnetic and will respond to a magnetic field of sufficient strength. In WHIMS, material is passed through a high-intensity magnetic field generated by electrical coils. The paramagnetic material is trapped in the field while the nonmagnetic material is washed out. The paramagnetic material is recovered after it has been moved away from the magnetic field. A variation of the conventional WHIMS device is given by the Vertical Ring and Pulsating High Gradient Magnetic Separator (also referred to as SLon), which uses pulsation and more effective washing to reduce the likelihood of blockages of the magnetic media.

In this round of testing, a sample of the rougher tailings was sent to Derrick Screens to evaluate the performance of the StackSizer. The sample was screened at 150 µm and the oversize rejected.

A size-by-size assay of the rougher tailings was then performed, revealing that the 75-150 µm fraction of the tailings was also poor in iron. This is shown in Table 13-25. Data on hematite liberation by size fraction was not available; however it was clear that rejecting the +75 µm fraction by screening would reject a large portion of the silica and produce an iron-enriched undersize.

Table 13-25: Size-By-Size Analysis of Pilot Plant Rougher Tailings

Size Class (µm)	Rougher Tailings		
	% Mass	$\%Fe_T$	$\%Dist\ Fe_T$
600	6.1	9.8	6.8
420-600	7.6	7.8	6.7
300-420	17.5	5.5	10.9
210-300	23.1	4.4	11.5
150-210	17.9	4.4	8.9
105-150	11.7	8.3	10.9
74-105	6.4	18.3	13.3
53-74	3.6	34.0	13.8
37-53	2	43.2	9.8
Pan	4.1	16.0	7.4
Totals	100	8.8	100.0

The undersize fraction was screened at 75 µm at SGS, with the oversize fraction again rejected. The two (2) screening steps rejected approximately 86% of the feed weight, recovering 48% of the iron into 14% of the feed weight. This increased the iron grade from 8.5% Fe_T in the screen feed to 26% Fe_T in the -75 µm fraction.

The -75 µm screen undersize was subjected to a series of passes through a WHIMS device at SGS. The first pass was performed at 25 A (19 700 Gauss); subsequent passes were done at lower field strengths. In each pass, the concentrate grade increased.

The results of the WHIMS test on the -75 µm fraction are presented in Table 13-26. The table shows the concentrate undergoing successive cleaning steps as lower and lower field strengths are applied. A concentrate grade above 65% Fe_T was obtained after the second pass, at 20 A (17 710 Gauss).

Table 13-26: WHIMS Performance on Screened Pilot Plant Rougher Tails (-75 µm)

Stream	Cumulative Assays		Cumulative Distributions		
	SiO_2 %	Fe_T %	Weight %	SiO_2 %	Fe_T %
5 Amp Mag	1.66	68.3	24.4	0.66	66.1
10 Amp Mag	2.17	67.6	26.7	0.95	71.7
15 Amp Mag	2.72	67	28.5	1.26	75.7
20 Amp Mag	3.78	65.9	31.5	1.94	82.4
25 Amp Mag	6.71	63.6	34.6	3.78	87.2
Calc. Head	61.4	25.2	100	100	100

A preliminary materials balance for a fine iron recovery circuit was developed based on the testwork results, and is presented in Figure 13-15. The balance combines the results of several separate tests and it was not possible to perform a materials balance reconciliation with them; therefore the materials balance does not completely close. The figure is intended to be indicative only.

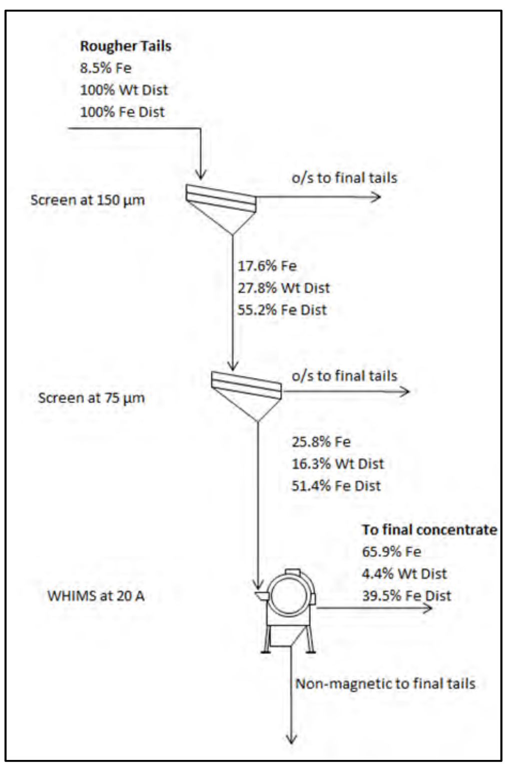


Figure 13-15: Material Balance of Fine Iron Recovery Testwork

(Note: balance may not close as the data was taken from multiple sources)

In the circuit tested, globally 39% of the iron is concentrated into 4.4% of the weight. The concentrate produced would have a grade of 65.9% Fe_T; therefore in plant operation, the WHIMS concentrate could be shipped with no further upgrading required. The results suggest that the addition of a fine iron recovery circuit to treat the rougher spirals tailings could potentially increase overall iron recovery by several percentage points with no loss in grade.

Further investigation to determine the feasibility of this pathway for plant operation is recommended.

14. MINERAL RESOURCE ESTIMATES

14.1 P&E 2012 Mineral Resource Estimate Update Fire Lake North

14.1.1 Introduction

The Fire Lake North updated mineral resource estimate consists of the West and East Area block Models. The mineral resource estimate presented herein is reported in accordance with the Canadian Securities Administrators' National Instrument 43-101, and has been deemed to be in conformity with generally accepted CIM "Estimation of Mineral Resource and Mineral Reserves Best Practices" guidelines. Reported mineral resources are not mineral reserves, and do not have demonstrated economic viability. There is no guarantee that all or any part of the mineral resource will be converted into a mineral reserve. The quantity and grade of the reported Inferred resources may not be realized.

The resource estimate of the Fire Lake North was performed by Yungang Wu, P.Geo. and Eugene Puritch, P.Eng., under the supervison of Antoine Yassa, P.Geo and Tracy Armstrong, P.Geo. of P&E Mining Consultants Inc. ("P&E"), Brampton, Ontario. The effective date of this mineral resource estimate is July 23rd, 2012.

Alex S. Horvath, P.Eng., Executive VP Exploration of Champion Iron Mines Limited ("Champion") and Bruce Mitton, P.Geo., VP Exploration of Champion, developed the 3D geological wireframe models for the Fire Lake North Property using GEMS. The wireframes were reviewed, confirmed and accepted by P&E. A draft copy of this report was reviewed by Champion for factual errors.

14.1.2 Reliance On Other Experts

Champion provided P&E with the Excel drill hole database and 3D geological wireframes for the Fire Lake North Property. P&E has relied on the data and information supplied by Champion, and no additional validation of the data was completed by P&E with respect to the origin, validity or accuracy of the data used for the mineral resource estimate contained in this report, except for the Fe_T% assays, which were validated by P&E against original laboratory certificates of analysis from ALS Canada Ltd. of North Vancouver, BC.

14.1.3 Data Validation

The GEMS project contained the East and West area drill hole databases, digital topographic surfaces, and bedrock and property boundary lines. In addition to the GEMS project database, a digital surface geology plan and a series of processed airborne magnetic contour maps, including total magnetic field, 1st vertical derivative, 2nd vertical derivative and tilt derivative were provided.

Prior to commencing any work on the Fire Lake North Property, the GEMS project drill hole database was validated by Champion, using the GEMS system database validation routines to check for the most common and critical data errors. Champion reconciled all identified errors with MRB, and the original data source and all reported errors were accordingly corrected by Champion.

P&E imported and re-validated all collar, geology and sampling data into an Access format GEMS database. P&E typically validates a mineral resource database by checking for duplicate entries, interval, length or distance values less than or equal to zero, out-of-sequence intervals, intervals or distances greater than the reported drill hole length, inappropriate collar locations, and missing interval and coordinate fields. No significant errors were noted in the drill hole database. P&E additionally and independently validated all Fe_T% assay results from original assay laboratory digital files. P&E believes that the supplied databases are suitable for mineral resource estimation.

14.1.4 Fire Lake North Geological Model

The Fire Lake North 3D geological model was developed by Champion using a combination of diamond drill hole geology, 2nd vertical derivative airborne magnetic contours, airborne magnetic inversion results, and surface topography to develop a 3D representation of the host iron formation (“IF”) units.

The drill hole collar co-ordinates and elevations in the database were combined, by Champion, with area topography taken from the 1:50 000 National Topographic Database, and used to generate a digital topographic surface of the Fire Lake North Property.

A bedrock/overburden interface surface was created from the casing depths of the 171 drill holes.

The second vertical derivative airborne magnetic contour results were found by Champion to correlate reasonably well with the IF surface expression, especially along strike. The thickness of the IF indicated by the zero magnetic contour, however, often exceeds the actual thickness indicated by the projected drill hole intersections.

The zero value contour line of the 2nd vertical derivative magnetics was digitized by Champion to produce an initial interpretation of the IF at surface. A series of cross-sections were generated across all drill holes, and polylines of the interpreted IF were digitized on each section from surface to depths in excess of 500 m below surface. The resulting cross-sectional interpretation polylines were further constrained within the limits of continuous down-the-hole Fe_T assay mineralization of 15% or higher. The surface magnetic contours were then scaled and adjusted to respect the cross-section IF polylines at surface, as interpreted from the drill hole results. Successive polylines were connected and 3D wireframes of the interpreted IF domains were generated.

The property boundary was used to clip any portion of the IF domains that occurred outside the limits of the property, in order to ensure that mineral resources would be correctly reported.

P&E reviewed the IF domain solids by checking the assays against the intercepts of drill holes and the solids. A minor adjustment was made on the IF solid of West area. P&E agrees that the IF wireframes are acceptable for resource estimation.

The total volume of all geologically interpreted IF domains below bedrock surface at the Fire Lake North Property is in the order of 401 Mm^3 (258 Mm^3 for the West area and 153 Mm^3 for the East area), which represents a maximum possible volume for mineral resource estimation of the modelled domains. The IF wireframes are displayed in Appendix-I of P&E's report.

Waste rock wireframes of Altered Granitic Gneiss, Marble, Quartz Mica Schist, Gabbro and Lean IF were also provided by Champion.

14.1.5 Rock Types and Rock Codes

All solids were assigned rock codes respectively for purposes of the resource estimate. The rock codes applied for the modeling are presented in Table 14-1.

Table 14-1: Rock Code Description for the West and East Area

Area	Rock Types	Type Codes	Rock Codes	Ore/Waste
West and East	Air	AIR	0	Air
	Overburden	CAS	1	Waste
	Granitic Gneiss	KAT	30	Waste
	Marble	DUL	40	Waste
	Qtz Mica Schist	QMS	50	Waste
	Gabbro	HBG	60	Waste
	Lean IF	LIF	90	Waste
West	IF	IF	100	Ore
East	IF Main	IF	100	Ore
	IF East	IFEast	104	Ore

To constrain the assays used for resource estimates, the folded IF domains for both West and East area were divided into three (3) sub-domains. The sub-domains are listed in Table 14-2.

Table 14-2: Sub-Domain Rock Codes of Fire Lake North

Area	Domain	Sub-Domain	Rock Code
East	IF Main	IF Main Hinge (IFHinge)	101
		IF Main ELimb (IFEL)	102
		IF Main WLimb (IFWL)	103
West	IF	IF Hinge (IFHinge)	101
		IF ELimb (IFEL)	102
		IF WLimb (IFWL)	103

14.1.6 Assay Statistics

The West area of Fire Lake North drill hole database contains a total of 114 drill holes and 3 679 assay samples, of which 93 drill holes intercepted IF domain and three (3) holes had no assays available during the course of this study. The East area consists of 57 drill holes and 17 Channels, for a total of 2 391 assays. Drill plans are demonstrated in Appendix II of P&E's report.

The drill hole database contains complete records for location, survey, assay and major lithology. All samples were analyzed for FeO, SiO_2, Al_2O_3, CaO and MgO.

Summary statistics for the Constrained Fe_T% raw assays and composites were tabulated in Table 14-3. The histogram for the Fire Lake North constrained Fe_T% assay and composite population is displayed in Appendix III of P&E's report.

Table 14-3: Summary Statistics for Constrained FeT% Raw Assays and Composites

	West Area		East Area	
	Raw Assays	Composites	Raw Assays	Composites
Number of Values	2 528	2 457	1 299	1 248
Minimum	1.09	1.25	0.71	1.23
Maximum	68.90	67.81	65.80	64.52
Mean	33.18	33.20	29.20	29.44
Median	33.40	33.22	30.40	30.09
Variance	154.71	132.59	121.09	98.18
Standard Deviation	12.44	11.51	11.00	9.91
Coefficient of Variation	0.37	0.35	0.38	0.34

14.1.7 Composites

Approximately 70% of the assaying within the West IF wireframe and 60% of constrained samples in East area were composited at four (4) metre intervals. Sample length distribution is presented in Figure 14-1and Figure 14-2. In order to regularize the sampling for grade interpolation, assay compositing to four (4) metre lengths was carried out down hole within the drill hole intercepts of the wireframes. The compositing process started at the first point of intersection between the drill hole and the domain, and halted upon exit from the domain wireframe. Any composites that were less than 0.40 metres in length were discarded, so as not to introduce any short sample bias in the interpolation process. The wireframes that represented the interpreted mineralization domains were also used to back-tag a rock code field into the drill hole workspace. Each assay and composite record was assigned a domain rock code value based on the domain wireframe that the interval midpoint fell within. The composite data were then exported to Gemcom extraction point files for grade capping, variogram study and grade estimation.

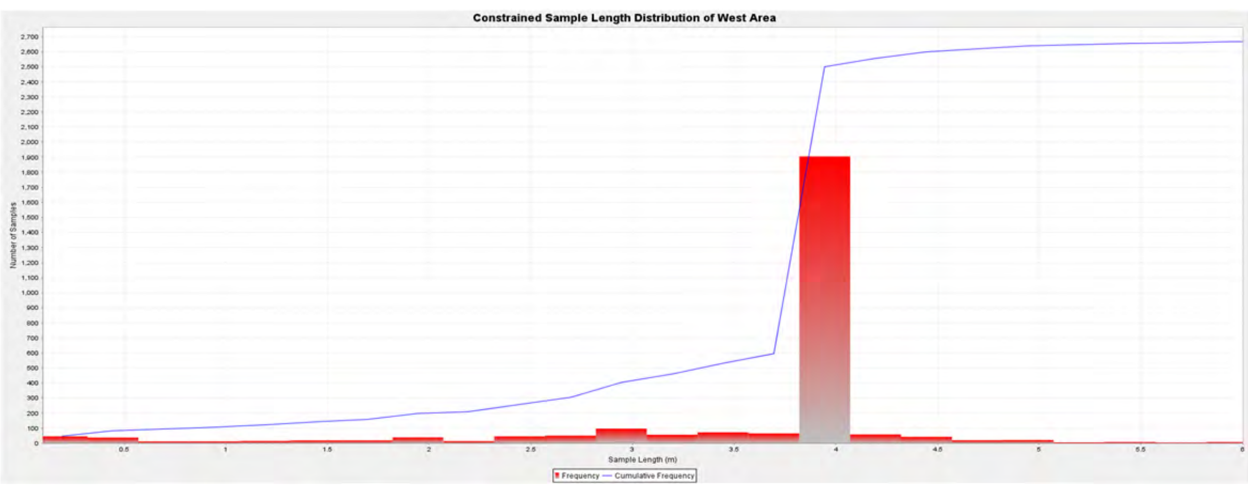


Figure 14-1: West Area Constrained Sample Length Distribution

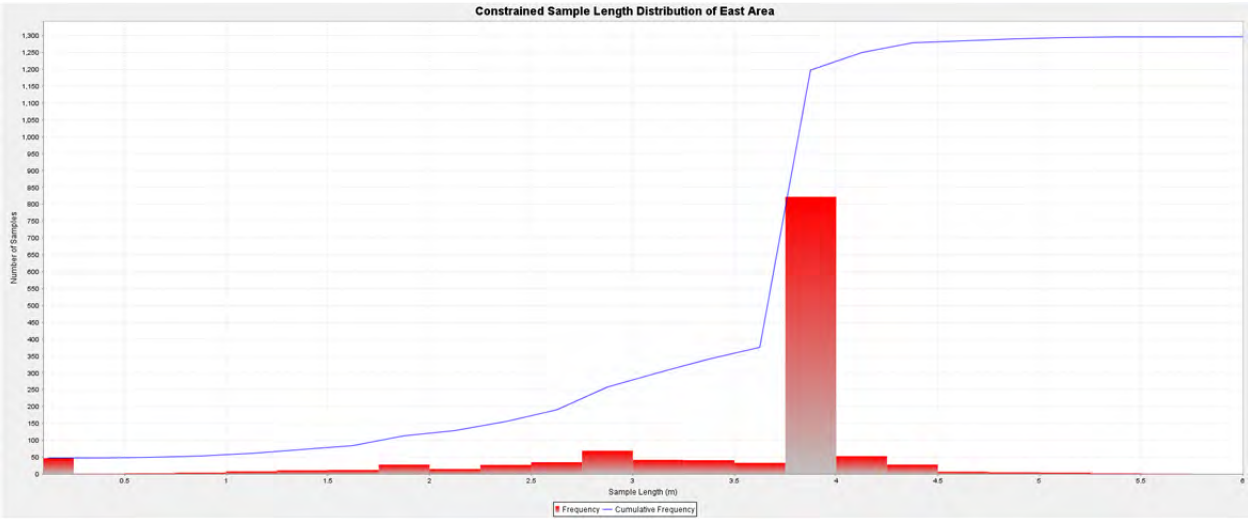


Figure 14-2: East Area Constrained Sample Length Distribution

14.1.8 Grade Capping

As shown in Table 14-3, the coefficient of variation of the distributions of Fe_T composites contained within the resource wireframes are low. The composite histograms (Appendix III in P&E's report) indicate that no outliers appear and it was deemed unnecessary to cap Fe_T% composites.

14.1.9 Bulk Density

The bulk density of waste rock for inclusion in the density model is listed in Table 14-4.

The bulk density of IF was the subject of a bulk density vs Fe_T% regression analysis based on 402 samples, as shown in Figure 14-3, from which a polynomial equation "Density=0.00033*(Fe_T%)^2+ 0.01114*Fe_T% + 2.66145" was derived to code the density model blocks.

Table 14-4: Bulk Density used for Resource Estimate

Rock Types	Number of Samples	Modeled Bulk Density (t/m^3)
Air	N/A	0.00
Overburden	N/A	1.90
(Altered) Granitic Gneiss	31	2.70
Marble	17	2.90
Qtz Mica Schist	9	2.70
Gabbro	17	3.00
Lean IF	70	2.70
IF	402	*

* IF density was interpolated for each mineralization block

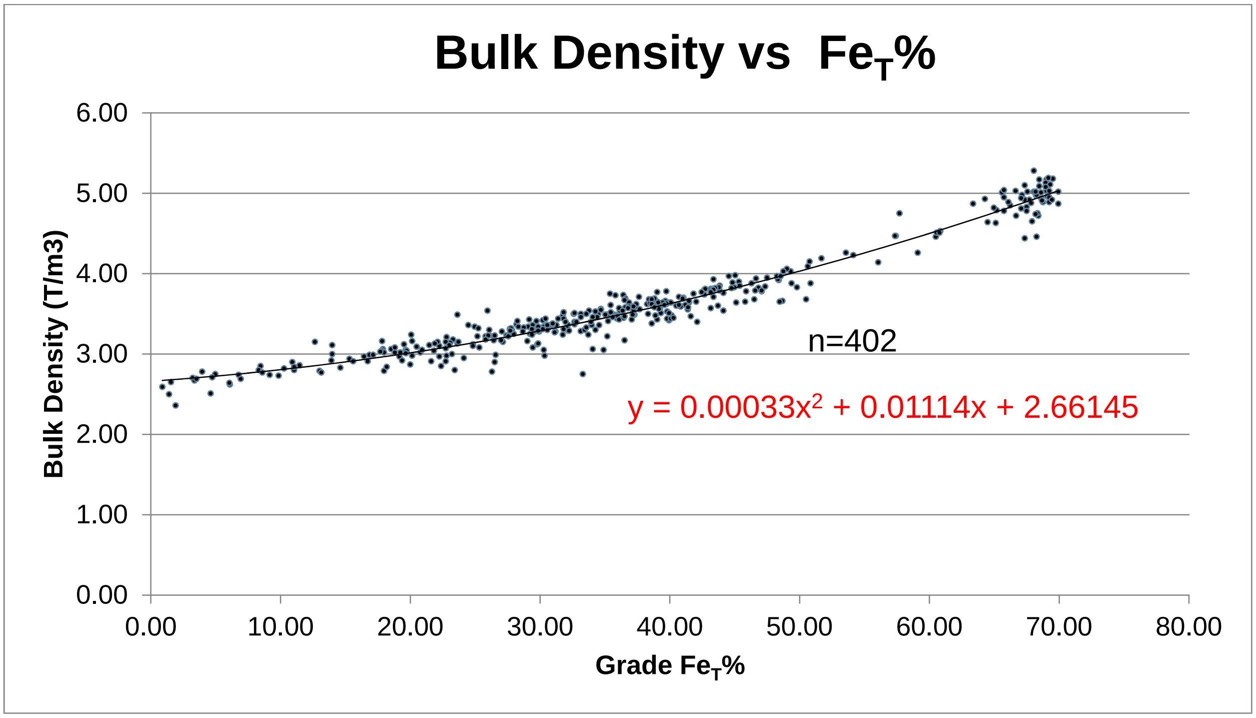


Figure 14-3: Bulk Density Regression Analysis

14.1.10 Semi-Variography

A variography study was undertaken as a guide to grade interpolation search strategy. Variography was attempted on the constrained composites of the West area and East area respectively. Reasonable directional variograms were attained along strike and down dip. The selected variograms are exhibited in Appendix-IV of P&E's report.

14.1.11 Block Modeling

The West area and East Area resource block models were constructed individually using Gemcom modeling software. Block model parameters are summarized in Table 14-5.

Table 14-5: Fire Lake North Block Model Definitions

Deposit	Parameter	Columns (X)	Rows (Y)	Levels (Z)
West Area	Model Origin	611 000.000	5 807 700.000	712
	Block Size (m)	10	20	12
	No. of Blocks	250	220	87
	Distance (m)	2500	4400	1044
	Rotation	0°		
	Blocks Total	4 785 000		
East Area	Model Origin	616 224.645	5 808 023.951	760
	Block Size (m)	10	20	12
	No. of Blocks	220	250	64
	Distance (m)	2200	5000	768
	Rotation	45°		
	Blocks Total	3 520 000		

For mineral resource estimation, several individual block model attributes were used to store data and facilitate mineral resource estimation. They were Rock Type, Bulk Density, Percent, Grade models and Class.

Rock Type Block Model

All blocks in the rock type model were initialized to a waste rock code of 30, corresponding to Granitic Gneiss. IF domains were used to select all blocks within the wireframes that contained, by volume 1% or greater, iron mineralization. All waste rock solids were then utilized to update the non-mineralized blocks at minimum 1% by volume. The bedrock topographic surface was subsequently used to assign rock code 1, corresponding to overburden, to all blocks 50% or greater above the bedrock surface. Similarly, the topographic surface was used to reset all blocks that were 50% or greater above the surface topography to the default rock code 0, corresponding to air.

IF blocks were then updated with sub-domains and assigned their appropriate individual rock codes, as indicated in Table 14-2.

Bulk Density Model

The bulk density model of all non-mineralization blocks were initialized by selecting the rock type with the value presented in Table 14-4. The bulk density model of Iron Formation was interpolated using the same method as grade interpolation discussed below and utilizing linear regression values.

Percent Block Model

A percent block model was set up to accurately represent the volume and tonnage that was contained by each block within the constraining IF domains. As a result, domain boundaries were properly represented by the percent model's capacity to measure infinitely variable block inclusion percentages within a specific domain.

Grade Interpolation

Inverse Distance Squared ($1/d^2$) grade interpolation was utilized based on the Fe_T% composites which were extracted from drill hole profiles into point profiles. The first grade interpolation pass was executed for the Measured classification, the second pass for Indicated and the third for the Inferred resource category. Grade blocks were interpolated using the following parameters in Table 14-6.

Table 14-6: Grade Model Interpolation Parameters

Category	Dip Range (m)	Strike Range (m)	Across Dip Range (m)	Max # per Hole	Min # Samples	Max # Samples
Measured	75	75	75	3	7	20
Indicated	150	150	150	3	4	20
Inferred	300	300	300	3	1	20

Due to the IF being folded with variable dip directions and angles, a spherical ellipsoidal search was incorporated to code the Fe_T% grade blocks. In order to facilitate more precise grade estimation along the various dips of the deposits, the IF domains in Table 14-1 were interpolated separately by using sub-domains, where local grade interpolations by the search ellipse could be established to best fit the interpreted geology. The resulting grade blocks are presented on the selected block model cross-sections and plans in Appendix-V of P&E's report.

14.1.12 Resource Classification

Based on the semi-variogram performance and density of the point data, the Measured, Indicated and Inferred resource categories were justified for both West and East areas. The ranges of the search ellipse employed for grade interpolation are illustrated in Table 14-6. Classification block cross-sections and plans are attached in Appendix VI of P&E's report.

14.1.13 Fire Lake North Mineral Resource Estimate

The resource estimate was derived from applying a Fe_T% cut-off grade to the block model and reporting the resulting tonnes and grade for blocks within the modeled Iron Formation. The following calculation demonstrates the rationale supporting the cut-off grade for the constrained mineralization.

Fe_T% Cut-Off Grade Calculation for Open Pit CDN$

Fe_T Value	US$1.77/dmtu $US/$CDN
Exchange Rate	$1.00
Process Recovery	82% Iron
Process Cost	$1.71/tonne milled
Transportation	$6.66/tonne
General & Administration	$1.66/tonne milled

Therefore, the Fe_T% cut-off grade for the open pit resource estimate is calculated as follows:

Operating costs per ore tonne = ($1.71+ $6.66+$1.66) = $10.03/tonne
[($10.03)/[($1.77 x 82% Recovery)] **= <u>6.9%</u>**

Mineral Resource Estimate

The sensitivity of the Mineral Resource estimate to the Fe_T% cut-off grade is presented in Table 14-7.

Table 14-7: Fire Lake North Mineral Resource Estimate & Sensitivity to 15% Fe_T Cut-Off(1)(2)(3)(4)

		West Area		East Area	
Category	**Cut-Off (Fe_T%)**	**Tonnes (Mt)**	**Fe_T %**	**Tonnes (Mt)**	**Fe_T %**
Measured	25+	21.5	36.76	3.0	34.45
	20+	23.0	35.89	3.0	34.21
	15+	23.6	35.38	3.0	34.18
	10+	23.7	35.33	3.0	34.18
Indicated	25+	344.6	34.52	224.2	30.84
	20+	387.0	33.23	253.9	29.95
	15+	404.9	32.57	262.0	29.57
	10+	407.6	32.44	264.3	29.43
Inferred	25+	271.6	32.75	153.2	30.65
	20+	319.8	31.27	179.9	29.47
	15+	329.2	30.90	192.4	28.70
	10+	334.2	30.64	201.9	27.94

1. Mineral resources that are not mineral reserves do not have demonstrated economic viability. The estimate of mineral resources can be materially affected by environmental, permitting, legal title, taxation, socio-political, marketing, or other relevant issues.
2. The quantity and grade of reported Inferred resources in this estimation are uncertain in nature and there has been insufficient exploration to define these Inferred resources as an Indicated or Measured mineral resource and it is uncertain if further exploration will result in upgrading them to an Indicated or Measured mineral resource category.
3. The mineral resources in this report were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council.
4. Values in the table may differ due to rounding.

Pit Optimization Parameters

In order for the constrained open pit mineralization in the Fire Lake North resource model to be considered potentially economic by open pit methods, a first pass Whittle 4X pit optimization was carried out to create a pit shell for in-pit resource reporting purposes (See Appendix VII of P&E's report) utilizing the criteria below:

Waste mining cost per rock tonne	\$1.84
Ore mining cost per rock tonne	\$1.84
Overburden mining cost rock per tonne	\$1.84
Process cost per ore tonne	\$1.71
Transportation cost per ore tonne	\$6.66
General & Administration cost per ore tonne	\$1.66
Process production rate (ore tonnes per year)	18 million
Pit slopes (overall wall angle)	49 degrees
Mineralized & Waste Rock Bulk Density	2.7t/m^3
Overburden Bulk Density	1.9t/m^3

Mineral Resource Estimate

The resulting In-Pit resource estimate for the Fire Lake North project is summarized in Table 14-8.

Table 14-8: Fire Lake North In Pit Mineral Resource Estimate at 15% Fe_T Cut-Off

Deposit	Category	Tonnes (M)	Fe_T%
West Area	Measured	23.5	35.37
	Indicated	403.6	32.58
	Inferred	301.0	31.20
East Area	Measured	3.0	34.19
	Indicated	261.2	29.56
	Inferred	178.7	29.01
Total	Measured	26.5	35.23
	Indicated	664.8	31.39
	Inferred	479.8	30.38

The sensitivity of the in-pit Mineral Resource estimate to the Fe_T% cut-off grade is presented in Table 14-9

Table 14-9: Fire Lake North In Pit Resource Fe_T% Cut-Off Sensitivity

		East Area		West Area	
Category	**Cut-Off (Fe_T%)**	**Tonnes (M)**	**Fe_T%**	**Tonnes (M)**	**Fe_T%**
Measured	**25**	2.9	34.46	21.4	36.75
	20	3.0	34.23	22.8	35.88
	15	**3.0**	**34.19**	**23.5**	**35.37**
	10	3.0	34.19	23.6	35.31
Indicated	**25**	223.5	30.83	343.7	34.52
	20	253.1	29.93	385.7	33.24
	15	**261.2**	**29.56**	**403.6**	**32.58**
	10	263.5	29.42	406.3	32.45
Inferred	**25**	145.3	30.70	247.1	33.16
	20	170.5	29.52	292.7	31.57
	15	**178.7**	**29.01**	**301.1**	**31.20**
	10	180.1	28.88	301.6	31.17

14.1.14 Model Validation

The block models were validated using a number of industry standard methods, including visual and statistical methods.

- Visually examined composite and block grades on plans and sections on-screen, and review of estimation parameters including:
  - → Number of composites used for estimation;
  - → Number of holes used for estimation;
  - → Distance to the nearest composite;
  - → Number of passes used to estimate grade.

- As a test of the reasonableness of the resource estimate, the average interpolated grades for the block models were compared to the assays and composites within the constrained solids. As shown in Table 14-10, the average grades of all the Fe_T blocks are somewhat lower than the composites in the constraining domains. It is probably due to the localized clustering of some higher grade assays, which were smoothed by the compositing block modeling grade interpolation process. In this case, P&E believes the block model grade will be more spatially representative.

Table 14-10: Comparison of Average Grade of the Assay and Composites with Average Grades of the Block Model

Deposit	Data Type	Fe_T%
West Area	Assay	33.1
	Composites	33.2
	Block Model	31.1
East Area	Assay	29.2
	Composites	29.4
	Block Model	28.2

A volumetric comparison was performed with the block model volume versus the geometric calculated volume of the domain solids. The difference is detailed in Table 14-11. Approximately 9% and 6% IF domain volume of the West and the East area respectively were not estimated due to the drillhole spacing being greater than 300 m.

Table 14-11: Volume Comparison of Block Model and Geometric Solid

West Area	Rock Type Model Volume (m^3)	257 644 563
	Geometric Domain Volume (m^3)	257 697 186
	Difference	0.02%
East Area	Rock Type Model Volume (m^3)	152 803 584
	Geometric Domain Volume (m^3)	152 913 799
	Difference	0.07%

The economic sensitivity of the mineral resource was evaluated by constraining the Mineral Resource within an optimized pit shell demonstrated in Appendix VII of P&E's report. At a cut-off grade of 15% Fe_T, within the pit shell, there is a reduction of approximately 4% and 3% to global tonnage of the West and East areas respectively.

14.2 P&E 2012 Initial Mineral Resource Estimate Oil Can

14.2.1 Introduction

Alex S. Horvath, P.Eng., Executive VP Exploration of Champion, developed the 3D geological wireframe models for Oil Can from a GEMS v6.2 project database supplied by MRB. Review and confirmation of the Oil Can 3D geological wireframes and development of the resource estimate block model was performed by Yungang Wu, P.Geo. and Eugene Puritch, P.Eng. of P&E, under the supervision of Antoine Yassa, P.Geo., OGQ, also of P&E, who is an independent QP in terms of NI 43-101.

The effective date of this mineral resource estimate is July 1st, 2012.

The mineral resource estimate presented herein is reported in accordance with the Canadian Securities Administrators' National Instrument 43-101, and has been deemed to be in conformity with generally accepted CIM "Estimation of Mineral Resource and Mineral Reserves Best Practices" guidelines. Reported mineral resources are not mineral reserves, and do not have demonstrated economic viability. There is no guarantee that all or any part of the mineral resource will be converted into a mineral reserve. The quantity and grade of the reported Inferred resources may not be realized.

14.2.2 Reliance on Other Experts

Champion provided P&E with the GEMS project database and 3D geological wireframes for the Oil Can project. P&E has relied on the data and information supplied by Champion, and no additional validation of the data was completed by P&E with respect to the origin, validity or accuracy of the data used for the mineral resource estimate contained in this report, other than the Fe_T% and Fe_{Sat}% assays, which were validated by P&E against original laboratory certificates of analysis from ALS Canada Ltd. of

Vancouver, British Columbia, and Activation Laboratories Ltd. of Ancaster, Ontario, respectively.

14.2.3 Data Validation

The GEMS project contained the drill hole database, digital topographic and bedrock-surface data, claim group boundary coordinates, digital surface-geology plan, and a series of processed airborne magnetic contour maps, including total magnetic field, first vertical derivative, second vertical derivative and tilt derivative interpretations.

Prior to commencing the resource calculations for the Oil Can Deposit, the GEMS project drill hole database was validated by Champion using the GEMS system database validation routines, which check for the most common and critical data errors. Champion reconciled all identified errors with MRB and the original data source, and all reported errors were accordingly corrected by Champion.

P&E imported and validated all collar, geology and sampling data into an Access format GEMS database. P&E typically validates a mineral resource database by checking for duplicate entries, interval, length or distance values less than or equal to zero; out-of-sequence intervals; intervals or distances greater than the reported drill hole length; inappropriate collar locations; missing intervals and coordinate fields. No significant errors were noted in the drill hole database. P&E also independently validated all assay results from original assay laboratory digital files obtained directly from the assay laboratories. P&E believes that the supplied databases are suitable for mineral resource estimation.

14.2.4 Oil Can Geological Model

The Oil Can 3D geological model of the host IF units was developed by Champion using a combination of diamond drill hole geology, second vertical derivative airborne magnetic contours, airborne magnetic inversion results, and surface topography.

The drill hole collar co-ordinates and elevations for the nineteen (19) 2011-series drill holes incorporated in the database were rectified by Champion with digital elevation data from the 1:50 000 National Topographic Database to generate an enhanced digital topographic surface of Oil Can.

A bedrock/overburden interface surface was created using the casing depths from the 19 drill holes.

Previous work by Champion has shown that the "zero-contour" of second vertical derivative airborne magnetic-response survey correlates well with the IF contact at surface. The thickness of the IF, indicated by the zero magnetic contour, however, often exceeds the actual thickness indicated by the projected drill hole intersections.

The zero value contour line of the second vertical derivative magnetics was used by Champion to interpret the surface distribution of the IF. A series of cross-sections were generated for all drill holes, and polylines of the interpreted IF were digitized on each section from surface to depths below 500 m. The resulting cross-sectional interpretation polylines were further constrained using down-hole Fe_T assay results of 15% Fe_T or higher. The surface magnetic contours were then scaled and adjusted with respect to the cross-section IF polylines at surface, as interpreted from the drill hole results. Successive polylines were connected and 3D wireframes of the interpreted IF domains were generated.

The claim group boundary was used to clip any portion of the IF domains that occurred outside the limits of the claim group, in order to ensure that no mineral resources would be reported outside the limits of the claim group.

The topography and bedrock surfaces have been regenerated by Champion, since P&E recognized that the initial surfaces provided to P&E were lower than the drill hole casing (40 m in some locations).

The total volume of all geologically interpreted IF domains below bedrock surface at Oil Can is in the order of 838 million cubic metres, and represents a maximum possible volume for mineral resource estimation of the modelled domains.

14.2.5 Oil Can Rock Types, Rock Codes and Bulk Densities

The bulk density for inclusion in the block model was derived from 160 mineralized core samples. An additional 60 wall rock samples were also collected and their specific gravity values determined. The bulk densities were the subject of a bulk density vs. Fe_T% regression analysis (Figure 14-4) from which a polynomial equation (red text in Figure 14-4) was derived to code the density model blocks. As no drill holes intersected the “Southext” Domain, its density was averaged from the South and East domains. The rock codes, with the average of the derived bulk densities used for resource estimation, are listed by domain in Table 14-12.

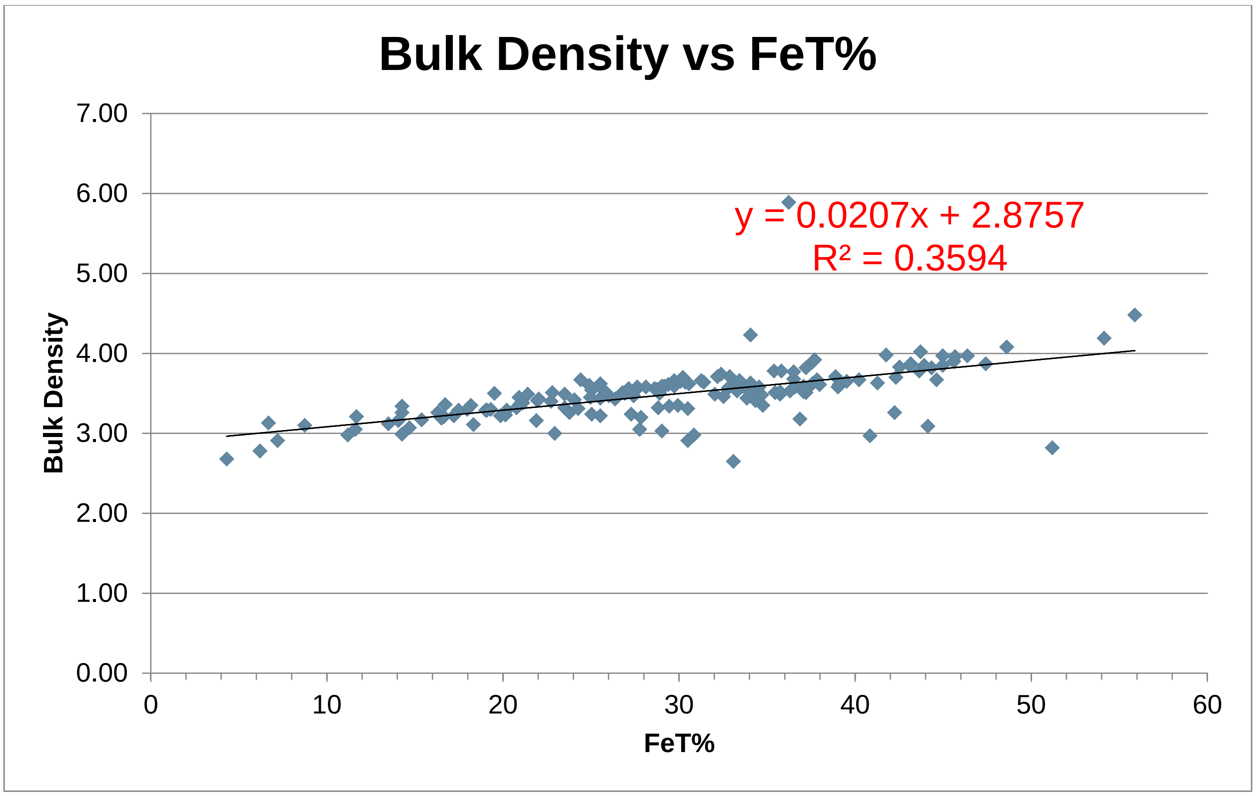


Figure 14-4: Bulk Density Regression Analysis

Table 14-12: Rock Codes and Bulk Density Values for Oil Can

Rock Type	Rock Code	Bulk Density T/M^3
Air	0	0
Overburden	1	1.8
Waste Rock	99	2.9
IF-All-South	101	3.51
IF-All-Southext	102	3.49
IF-All-East	103	3.44
IF-All-Central	104	3.42
IF-All-North	105	3.41

Each domain and rock type consists of oxide and silicate mineralization. Due to the iron formation folding, each domain was divided into several sub-domains (Table 14-13) along the axes of the folds.

Table 14-13: Sub-Domain Rock Codes of Oil Can

Domain	Sub-Domain	Rock Code
South-Oxide	IF-Ox-Smain	111
	IF-Ox-SUpper	112
	IF-Ox-SLower	113
East-Oxide	IF-Ox-East	120
Southext-Oxide	IF-Ox-Southext	130
Central-Oxide	IF-Ox-Ceast	141
	IF-Ox-CWest	142
North-Oxide	IF-Ox-NNorth	151
	IF-Ox-NMiddle	152
	IF-Ox-NSUpper	153
	IF-Ox-NSLower	154
South-Silicate	IF-Si-SUpper	211
	IF-Si-SMiddle	212
	IF-Si-Slower	213
East-Silicate	IF-Si-East Upper	221
	IF-Si-East Lower	222
Southext-Silicate	IF-Si-SX Upper	231
	IF-Si-SX Lower	232
Central-Silicate	IF-Si-CUpper East	241
	IF-Si-CUpper West	242
	IF-Si-CLower East	243
	IF-Si-CLower West	244
North-Silicate	IF-Si-NNorthUpper	251
	IF-Si-NNorthLower	252
	IF-Si-NMiddleUpper	253
	IF-Si-NMiddleMain	254
	IF-Si-NMiddleCentral	255
	IF-Si-NMiddleLower	256
	IF-Si-NSMiddleUpper	257
	IF-Si-NSMiddleLower	258
	IF-Si-NSLower	259

14.2.6 Oil Can Assay Statistics

The Oil Can drill hole database contains a total of 19 drill holes and 1600 assay results. Figure 14-5 presents the drill hole distribution over the Oil Can Deposit.

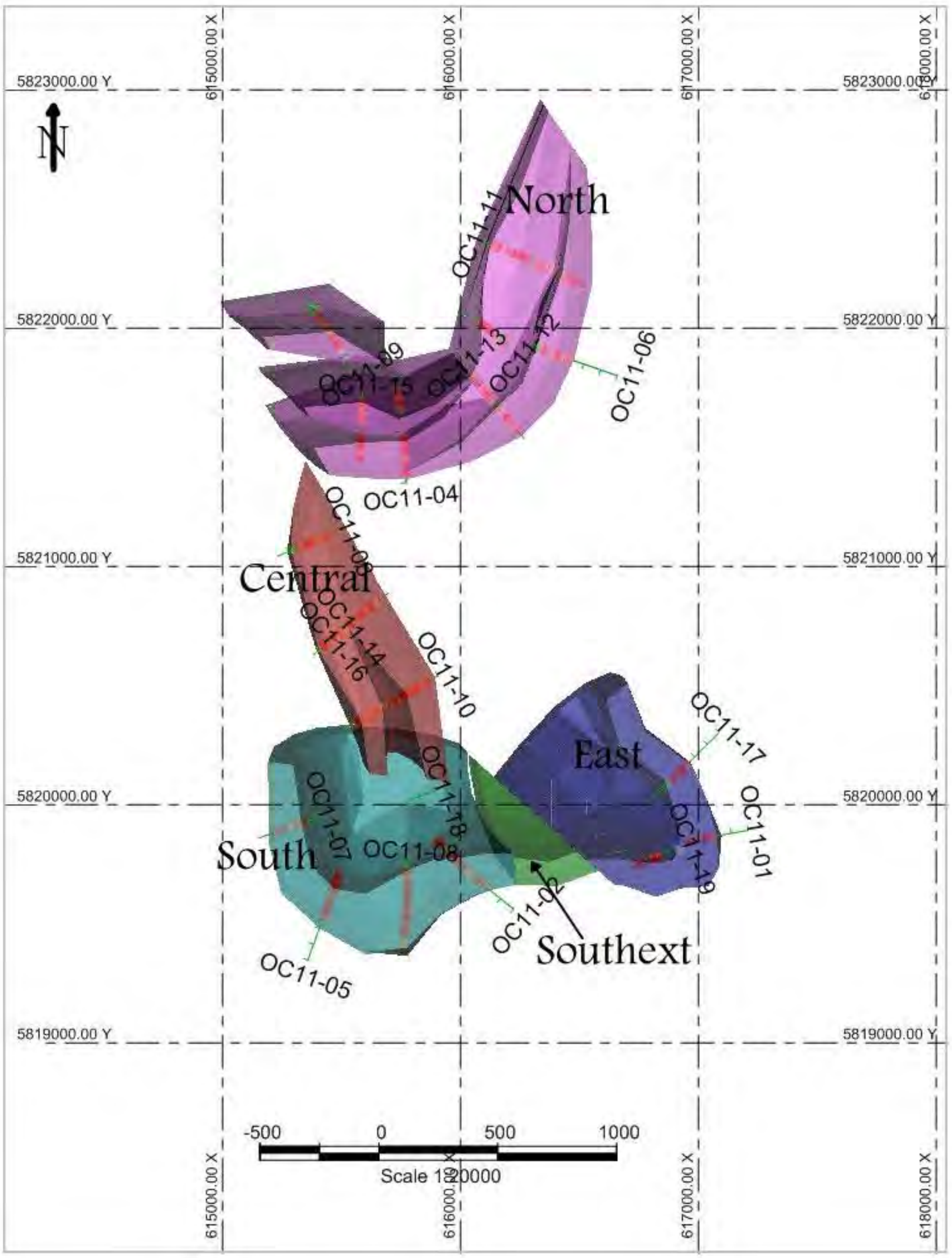


Figure 14-5: Drill Hole Plan of the Oil Can IF

Geological logs of the 19 drill holes contain complete records for location, survey and geology. All samples were analyzed for Fe Total (Fe_T) and a Whole Rock suite of elements including CaO and MgO; and 1466 samples were analyzed for FeMag as well.

Summary statistics were calculated for the Fe_T% raw assay values and composites. Figure 14-6 displays the histogram for the Oil Can Fe_T% assay sample population, whereas Figure 14-7 shows the Fe_T% composite population. The summary statistics are shown in Table 14-14.

Table 14-14: Summary Statistics for Oil Can Fe_T% Raw Assays and Composites

	Raw Assays	Composites
Number of Values	1600	1504
Minimum	0.82	0.82
Maximum	55.60	53.53
Mean	27.29	28.26
Median	27.85	28.40
Standard Deviation	9.44	8.14
Coefficient of Variation	0.35	0.29

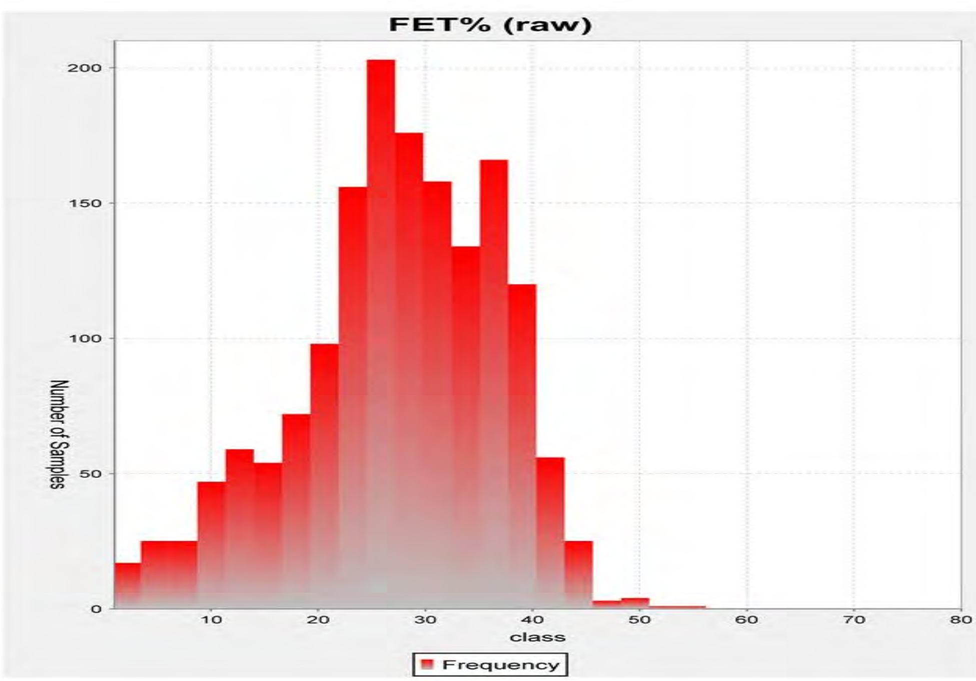


Figure 14-6: Histogram for Oil Can Fe_T % Raw Assays

14.2.7 Oil Can Composites

Drill hole sample lengths were composited to 4.0 m equal interval lengths within the limits of the defined mineralization domains. The compositing process started at the first point of intersection between the drill hole and the domain intersected, and halted upon exit from the domain wireframe. The wireframes that represented the interpreted mineralization domains were also used to back-tag a rock code field into the drill hole workspace. Each assay and composite record was assigned a domain rock code value, based on the domain wireframe that the interval midpoint fell within. The composite data were then exported to Gemcom extraction files for grade estimation. Figure 14-7displays the histogram calculated for the 4.0 m Fe_T% composite samples within all defined domains.

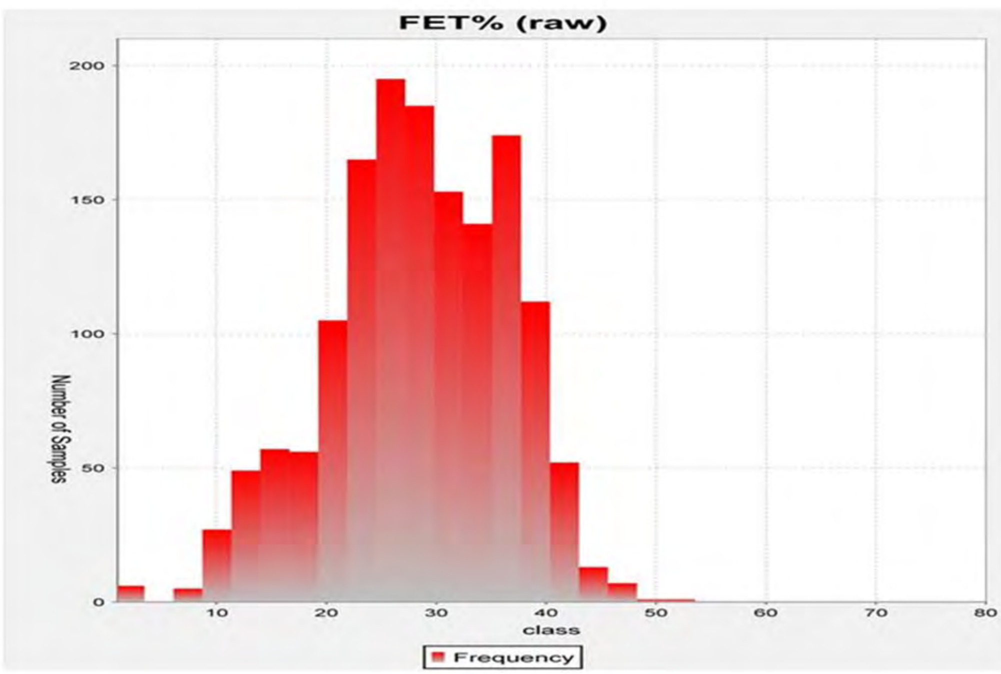


Figure 14-7: Histogram for Oil Can Fe_T% Composites

14.2.8 Oil Can Variography

Due to the wide spacing of some drill holes (from 170 m to 400 m), and the fact that each domain was only intersected by three (3) to seven (7) holes, the estimate herein does not include a reasonable variogram model.

14.2.9 Oil Can Grade Capping

Within the constrained domains, grade-capping was investigated on the composite values to ensure that the possible influence of erratic high values did not bias the database. An extraction file was created for the constrained Fe_T% data. From this extraction file, a histogram was generated (Figure 14-7). It was deemed unnecessary to cap FeT% composites.

14.2.10 Oil Can Model Grade Estimation Parameters

A GEMS block model was developed by P&E (see Table 14-15).

Table 14-15: Oil Can Block Model Definitions

Oil Can	Origin	Blocks	Block Size
X	614 500 E	162	20
Y	5 818 500 N	250	20
Z	800 m	80	12
Rotation	0		

As only 18 drill holes intersected the iron formation, an acceptable variogram was not generated for the estimate. The ranges of the ellipse axes used for the resource estimate (Table 14-16) were based on neighbouring similar iron deposits, of similar mineralogic and metallogenic character, for which P&E has calculated resource estimates.

Table 14-16: Oil Can Search Ellipse Definitions for Fe_T%

Category	Inferred
Major Semi-axis	300 m
Intermediate Semi-axis	300 m
Minor Semi-axis	300 m

As the drill hole data at Oil Can is not evenly distributed in three dimensions (i.e., there are more samples in the down-hole direction than along strike and down-dip), additional parameters were established in order to de-cluster the data and obtain a representative number of samples within the search ellipse used for grade estimation. These parameters included a minimum and maximum number of samples for estimation, and a maximum number of samples per drill hole. The values applied for grade estimation are tabulated in Table 14-17 .

Table 14-17: Oil Can Grade Estimation Parameters

Sample Limits	Inferred
Minimum Samples	1
Maximum Samples	20
Max Samples/Drill Hole	3

14.2.11 Oil Can Block Modeling

Individual block model attributes (i.e., Rock Type, Bulk Density, Percent, Domain and Grade models) were used to facilitate mineral resource estimation.

Rock Type Block Model

All blocks in the rock type block model were initially assigned a waste rock code of 99 (barren sediment).

Five (5) “IF-All” domains were used to select all blocks within the rock block model that contained, by volume, 1% or greater IF. These blocks were then updated with IF-Ox and IF-Si sub-domains, and assigned their appropriate individual rock codes (Table 14-2).

The bedrock topographic surface was then used to assign rock code 1 (overburden), to all blocks 50% or greater above the bedrock surface. Similarly, the surface topography was used to reset all blocks that were 50% or greater above the surface topography to the default rock code 0 (air).

Bulk Density

The bulk densities utilized for the resource estimate were as follows:

Overburden	1.8 t/m^3
Waste Rock (Sediments)	2.9 t/m^3
Iron Formation	Interpolated in the same parameters as grade interpolation

Percent Block Model

A percent block model was set up to accurately represent the volume and tonnage that was contained by each block within the constraining IF domains. As a result, domain boundaries were properly represented by the percent model's capacity to measure infinitely variable inclusion percentages within a specific domain.

Domain Block Model

Due to the highly variable local strike of the IF, a spherical ellipsoidal search was incorporated to code the Fe_T% grade blocks. In order to determine more precise grade estimation along the various trends of the deposit, the five (5) "IF-All" domains were interpolated separately, using sub-domains where local grade interpolations by the search ellipse could be established to best fit the interpreted geology.

Figure 14-8 displays a 3D view of the zone-coded IF blocks. The search ellipse orientations defined by the domains are listed in Table 14-16.

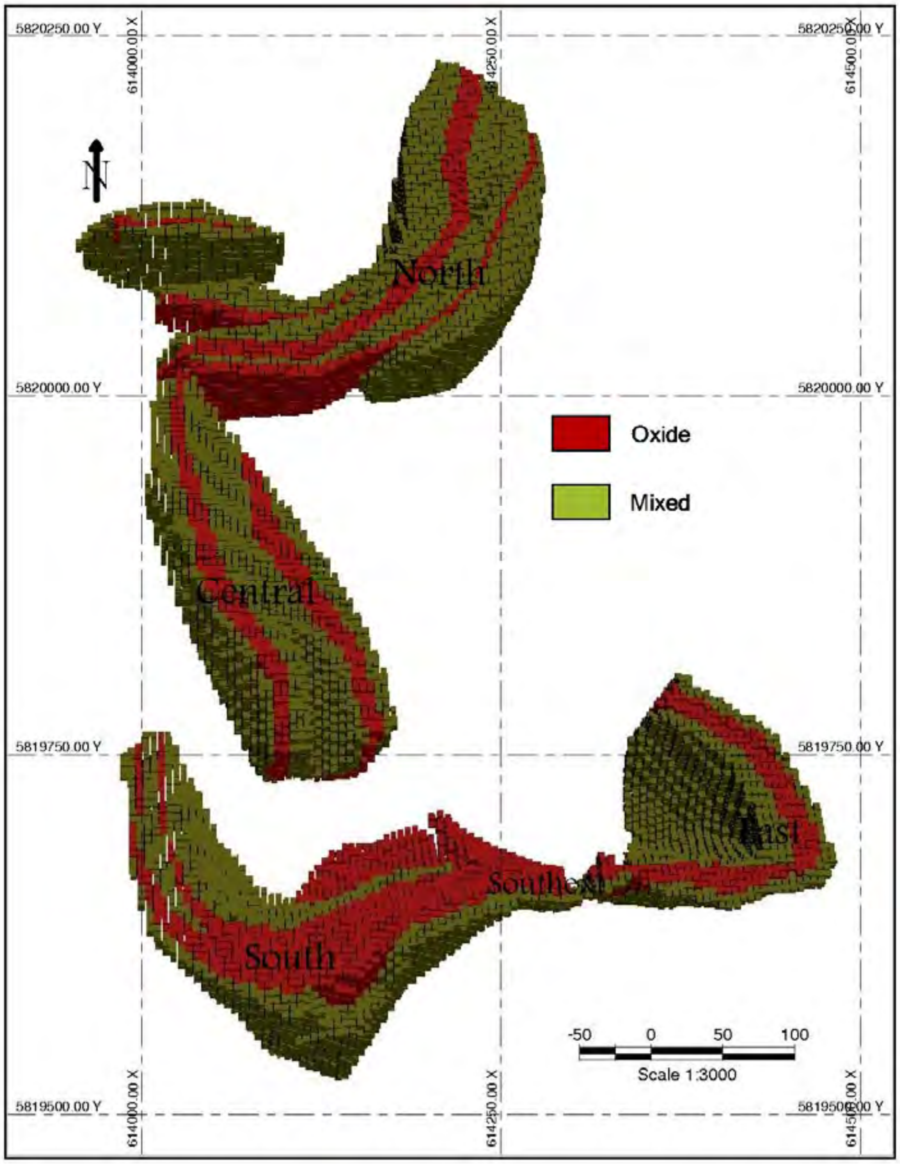


Figure 14-8: 3D View of Oil Can IF Zone Blocks

Grade Block Models

Fe_T%, CaO, MgO and FeMag grade block models were populated from a series of estimation profiles for each of the domains using the search and estimation parameters as described.

14.2.12 Oil Can Grade Estimation

Grade estimation was completed by using inverse distance squared linear estimation of composite samples within a search ellipse that was set to 300 m for Inferred of the maximum ranges. In addition, the minimum number of samples required to estimate the grade was set at three (3) per hole. Approximately 29% of the Oil Can IF units were not estimated due to the spacing of drill holes being greater than 300 m. The grade of the Southext domain was interpolated using drill holes that intersected the domain South and East, as no drill holes intersected the Southext domain.

14.2.13 Oil Can Mineral Resource Estimate

Due to the wide spacing of drill holes (from 170 m to 400 m), and the fact that each domain was intersected by only three (3) to seven (7) holes, the mineral resources of Oil Can are classified in the Inferred category by this estimate. Based on the mineral resource model, the Total In-Pit Mineral Resources for the Oil Can Deposit at a 15% Fe_T cut-off are estimated, as tabulated below in Table 14-18.

Table 14-18: Oil Can In Pit Resource Estimate ([1-4])

	Inferred Resources				
Zone	Tonnes (M)	Fe_T %	CaO%	MgO%	FeMag%
Oxide @ 15% Fe_T Cut-Off	967	33.21	3.58	3.42	20.42
Mix @ 15% Fe_T Cut-Off	912	24.10	6.48	5.89	6.37
Total @ 15% Fe_T Cut-Off	**1879**	**28.79**	**4.99**	**4.62**	**13.60**

(1) *Mineral Resource estimates were calculated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions.*

(2) *Mineral resources, which are not mineral reserves, do not have demonstrated economic viability. The mineral resource estimate may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.*

(3) *The quantity and grade of estimated Inferred Resource reported herein are uncertain, and there has been insufficient exploration to categorize them as an Indicated or Measured Resource. It is uncertain if further exploration will result in reclassification of Inferred Mineral Resources to the Indicated or Measured Mineral Resource categories.*

(4) *The Mineral Resource estimate was constrained to the Oil Can claim group boundary; however, the waste portion of the pit optimization was allowed to run onto the neighbouring group of claims. See* Table 14-9 *for a Mineral Resource estimate and pit optimization completely constrained on Oil Can.*

The sensitivity of global mineral resource estimate at 15% cut-off is presented below in Table 14-19.

Table 14-19: Oil Can Global Sensitivity of Inferred Resource

Zone	Cut-Off Grade	Tonnes	Grade
	FeT%	(M)	FeT%
Total Oxide	20%+	969	33.2
	15%+	972	33.2
	10%+	1355	23.8
Total Mixed	20%+	788	25.1
	15%+	924	24.1
	10%+	1027	23.0
Total All	15%+	1896	28.7

The sensitivity of the in pit mineral resource estimate to the cut-off grade is presented in Table 14-20.

Table 14-20: Oil Can In Pit Resource High Grade Domains Fe_T% Cut-Off Sensitivity

Zone	Cut-Off Grade	Tonnes	Grade
	FeT%	(M)	FeT%
Total Oxide	20%+	964	33.3
Total Oxide	15%+	967	33.2
Total Oxide	10%+	967	33.2
Total Mixed	20%+	781	25.1
Total Mixed	15%+	912	24.1
Total Mixed	10%+	978	23.4

14.2.14 Oil Can Model Validation

P&E confirmed the volumetric calculations and grade estimate for Oil Can using two (2) tests to validate the mineral resource model, as based on the methodology selected for mineral resource estimation:

- the economic sensitivity of the mineral resource was evaluated by constraining the Inferred Mineral Resource within an optimized pit shell;

- a comparison of estimated block grades at a 0.01% Fe_T cut-off were compared to Fe_T% averages for constrained raw assays and composites presented in Table 14-21.

Table 14-21: Comparison of Block Grades to Raw Assays and Composites

Data Type	FeT%
Raw Assays	27.29
Composites	28.26
Blocks	28.16

P&E examined the economic sensitivity of the mineral resource model by generating an optimized pit shell (Figure 14-9) around the Oil Can resource area, based on the cost parameters listed in Table 14-22. At a cut-off grade of 15% Fe_T, within the pit shell, there is a reduction of approximately 0.5% to the total reported Oil Can global tonnage.

Table 14-22: Pit Shell Optimization Parameters

Parameter	Value
Fe_T Value	$1.77/dmtu
Mining (Ore & Waste)	$1.90/tonne
Processing	$2.30/tonne
Transport & Port Cost	$4.85/tonne
G&A	$0.82/tonne
Process Recovery	60%
Pit Slopes	49^o
US$/CDN$ Exchange Rate	1:1

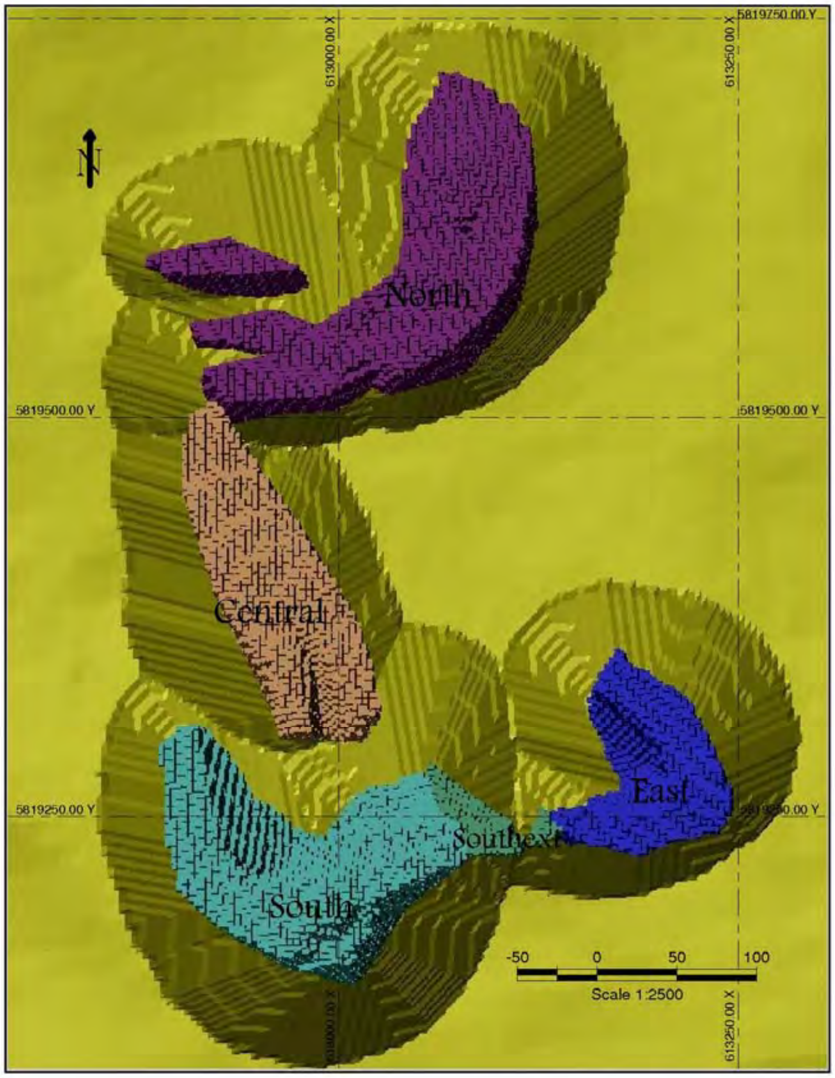


Figure 14-9: Oil Can Optimized Pit Shell

14.3 Bellechasse 2009 Mineral Resource Estimate

14.3.1 Bellechasse Geological Model

The Bellechasse geological model was developed by Champion using a combination of geology derived from diamond drill holes, second vertical derivative airborne magnetic contours, airborne magnetic inversion results, and surface topography to develop a 3D representation of the host iron formation (IF) units.

Drill hole collar co-ordinates and elevations for 17 historical and 11 recent drill holes in the database were combined with area topography taken from the 1:50 000 National Topographic Database, and used by Champion to generate a digital topographic surface of Bellechasse.

The overburden intersections in the 28 drill holes indicated a median depth from surface to bedrock of approximately 10.5 m. Bellechasse's surface topography was copied to a depth of 8.0 m below surface, and the surface re-generated with the drill hole bedrock intersection points to create a bedrock surface topography.

The second vertical derivative airborne magnetic contour results were found by Champion to correlate reasonably well with the IF surface expression, especially along strike. The thickness of the IF indicated by the zero magnetic contour, however, often exceeds the actual thickness indicated by the projected drill hole intersections. Magnetic inversion results indicate near vertical tabular slab-like bodies of varying thickness for the interpreted IF, extending to depths in excess of 250 m.

The zero value contour line of the vertical derivative magnetics was digitized by Champion to produce an initial interpretation of the IF at surface. A series of cross-sections were generated across all drill holes and polygons of the interpreted IF were digitized on each section from surface to depths in excess of 250 m below surface. The resulting cross-sectional polygons were further constrained within the limits of continuous down-the-hole Fe assay mineralization of 15% or higher. The surface magnetic contour was then scaled and adjusted to respect the cross-section IF polygons at surface, as interpreted from the drill hole results. Successive polygons were connected and a wireframe of the interpreted IF domain was generated.

14.3.2 Bellechasse Rock Types, Rock Codes and Specific Gravity

The rock codes with specific gravities used for block modelling and resource estimation purposes are listed in Table 14-23.

Table 14-23: Champion Rock Codes and SG Values for Bellechasse

Rock Type	Rock Code	Sg (T/M3)
Air	0	0
Overburden	1	1.8
Iron Formation (IF)	10	3.3
Sediments (Waste)	20	2.8

P&E collected a total of 12 check samples from Bellechasse and Fire Lake North. Specific gravity values for the independent check samples ranged from 2.9 t/m^3 to 3.8 t/m^3, with an average specific gravity value of 3.3 t/m^3. P&E recommends that specific gravity measurements be taken for all Fe assays.

14.3.3 Bellechasse Assay Statistics

The Bellechasse drill hole database contains a total of 28 drill holes, of which 17 are historical and 11 were completed by Champion in 2009.

The historical drill hole data entered in the database were extracted by MRB from MRNFQ assessment file records. Geological logs of the 17 drill holes (DDH-1 through DDH-16 inclusive, including DDH-12A) contain complete records of the location, survey and geology recorded for the drill holes. Only six (6) of the historical drill hole logs (DDH-8, DDH-9, DDH-10, DDH-11, DDH-12A, and DDH-13) provide sampling and assay results for Fe %(sol). Three (3) of the 11 historical drill holes, with no assay results, were either abandoned in overburden (DDH-1 and DDH-12) or were drilled outside the IF (DDH-6). The remaining eight (8) drill holes (DDH-2, DDH-3, DDH-4, DDH-5, DDH-7, DDH-14, DDH-15 and DDH-16) do not include sampling and assaying results.

Two (2) of the 2009 series drill holes were not sampled (BC09-04 and BC09-05), as both were drilled outside the mineralized IF.

Summary statistics were generated for the Fe % (sol) assay values stored in the drill hole database. Figure 14-10 displays the calculated statistics as well as a histogram and cumulative frequency plots for the Bellechasse assay sample population.

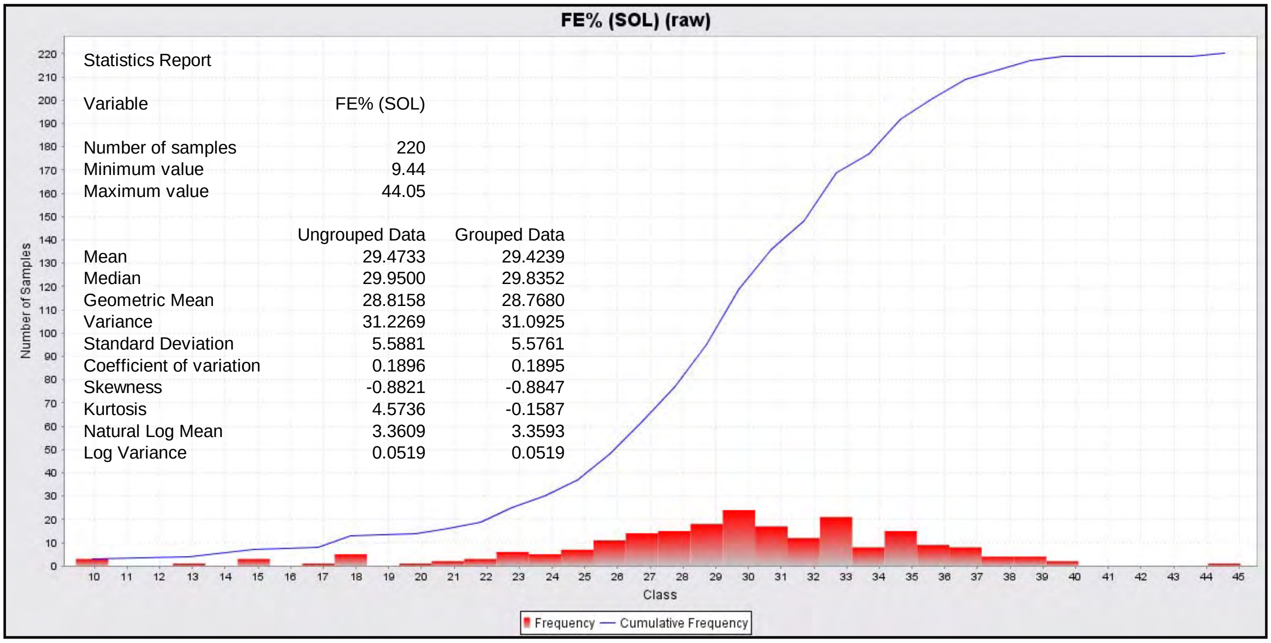


Figure 14-10: Histogram and Summary Statistics for Bellechasse Fe % (sol) Assays

The distribution of the Fe % data appears to follow a normal distribution Figure 14-11 displays a normal probability plot for the entire Fe %(sol) assay data population.

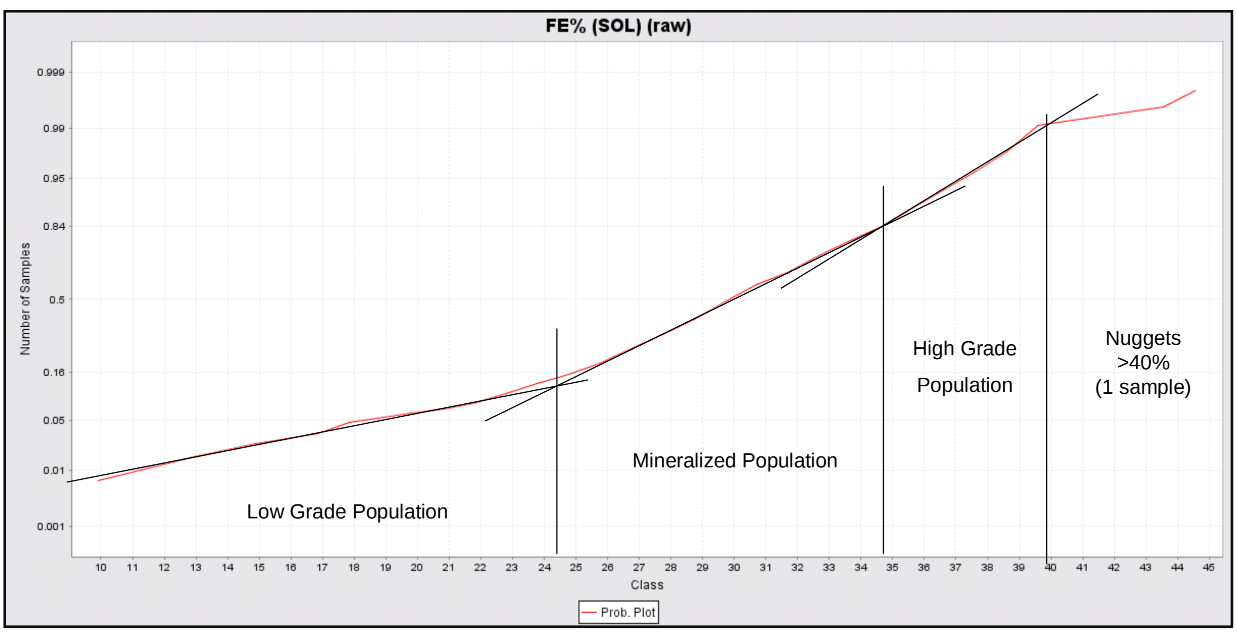


Figure 14-11: Normal Probability Plot for Bellechasse Fe % (sol) Assays

Examination of the probability plot suggests that one (1) assay sample grading 44.05% Fe is a high grade outlier. This value was capped to 40% Fe for compositing and resource estimation. The probability plot also indicates the presence of mixed sample populations within the database.

The historical and 2009 series drill hole data were also examined to determine if any bias occurs in the historical data. A total of 220 assays are present in the database, of which 46 (20.9%) are from historical drill holes, while the remaining 174 (79.1%) are from the 2009 series drill holes. The historical drill holes contain grades ranging from 18.10% to 44.05% Fe, with an average grade of 31.1% Fe being slightly higher than the median of 30.8% Fe. The recent 2009 drill hole results contain grades ranging from 9.44% to 39.7% Fe with an average grade of 29.0% being slightly below the median of 29.5% Fe. Both the historical and 2009 drill hole assay sample populations show similar normal distributions. The slightly higher mean grade of the historical data can be largely attributed to the one (1) high grade sample grading 44.05% Fe, and to the lowest grade samples in the population grading less than 18% Fe.

Summary statistics derived from the historical drill hole assay results indicate similar results to the recent assays, and suggests that the data are representative and suitable for mineral resource estimation. As previously indicated, one (1) value of 44.05% Fe in the historical database was cut to a maximum value of 40% Fe prior to compositing and resource estimation.

P&E agrees with the results presented by Champion with regard to the comparison of historical and current data populations for Bellechasse, but recommends that analysis of the sample distributions also be completed using conventional parametric tests and QQ plots, as well as twinning of historical drill holes.

Summary statistics were also calculated on the sample interval lengths for the 220 sample assays recorded in the database. Results indicate a range of sample lengths from 2.0 m to 51.8 m, with a mean of 6.2 m greatly exceeding the median of

4.5 m. The greatest number of samples (> 50%) are 4.0 m in length, predominantly from the 2009 drill hole campaign.

Due to the highly variable sample lengths and the possible bias introduced in grade estimation using variable length samples, drill hole sample assays were composited to 4.0 m length-weighted intervals within the limits of the IF domain. P&E agrees with the compositing interval and methodology, selected by Champion, for mineral resource estimation.

14.3.4 Bellechasse Assay Composites

Drill holes containing assay results were composited to 4.0 m length-weighted intervals within the limits of the constructed IF domain. A background value of 0.0% Fe was assigned to explicit missing intervals with no assay value. As noted earlier, a single assay in the database grading 44.05% Fe was cut to the maximum indicated value of 40% Fe prior to compositing. The constrained composite points were extracted to a point file, and all composite points were retained for mineral resource estimation.

Figure 14-12 displays the summary statistics calculated for the 4.0 m Fe % composite points within the IF domain. The results of the 4.0 m composites indicate that the sample population has increased to 369 points for estimation compared to only 220 assays. The 4.0 m composites show a slightly lower average grade of 27.2% Fe compared to the assays and a slightly higher median of 29.9% Fe compared to the assays. The 4.0 m composites also display a normal distribution. The normal probability plot shown in Figure 14-13 suggests the presence of mixed sample populations in the database.

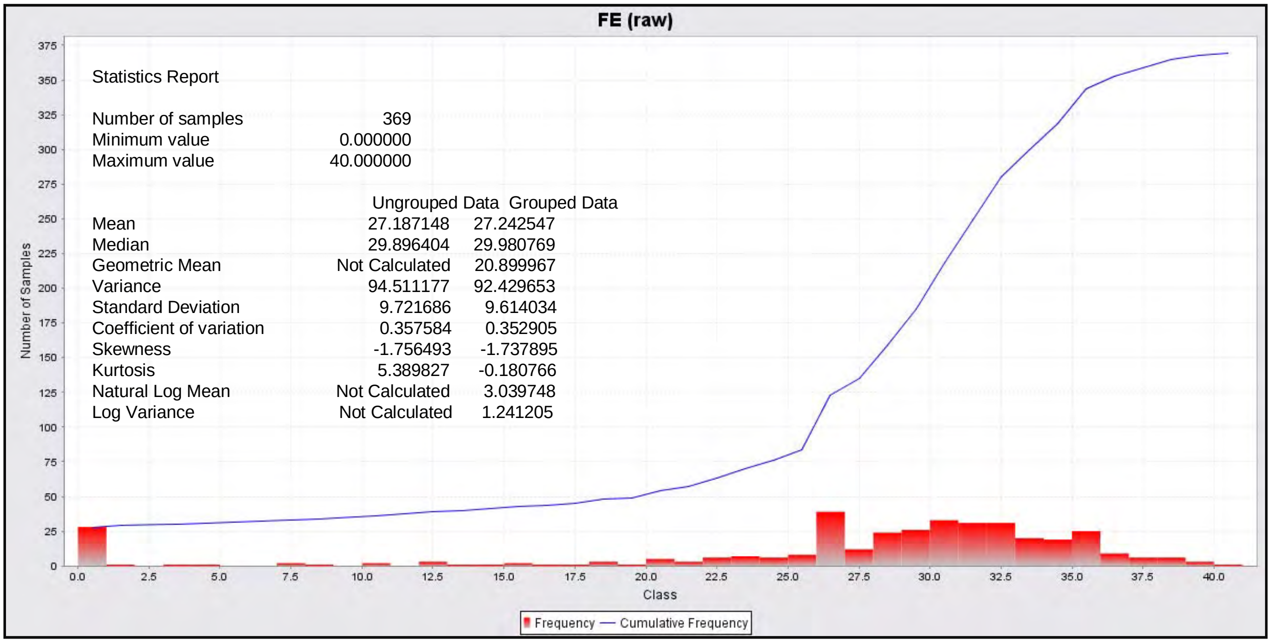


Figure 14-12: Bellechasse Summary Statistics for 4.0 m Composites > 0% Fe (sol)

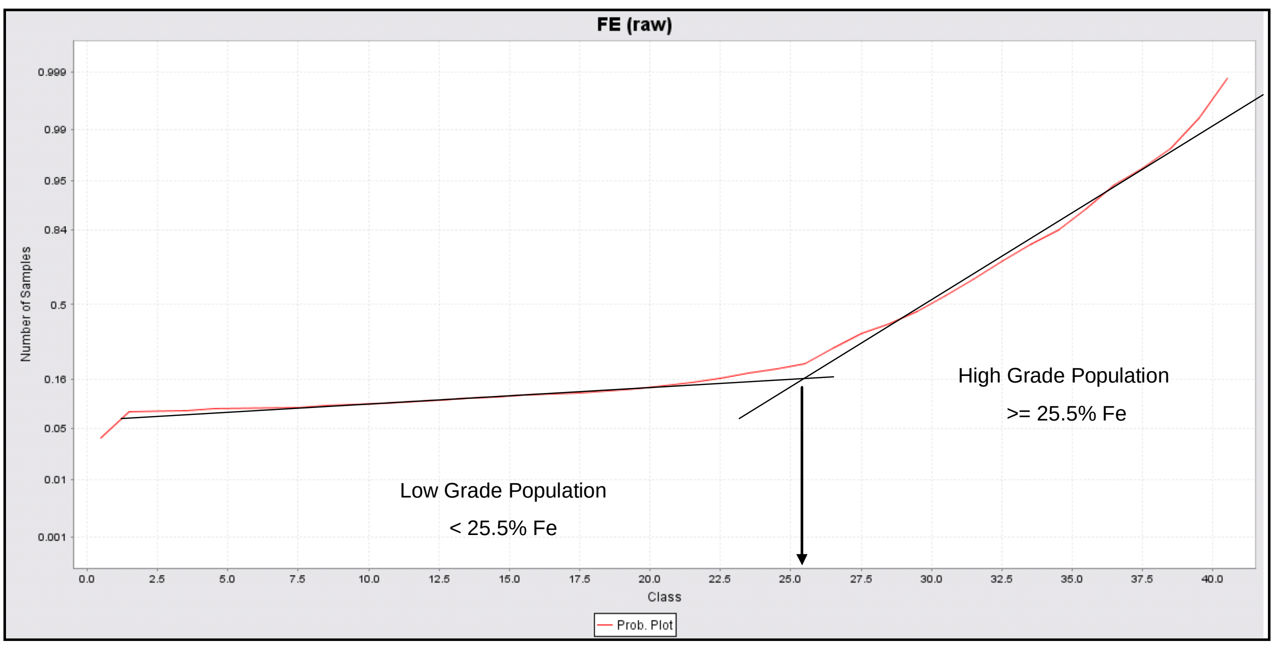


Figure 14-13: Normal Probability Plot for Bellechasse 4.0 m Composites > 0% Fe (sol)

14.3.5 Bellechasse Variography

A down hole experimental semi-variogram was modelled to provide an indication of the range of down-hole continuity of mineralization at Bellechasse, as well as the background nugget effect for samples taken at the same point. Figure 14-14 and Figure 14-15 display the results of the experimental semi variograms for the Fe % assays and 4.0 m capped assay composites, respectively.

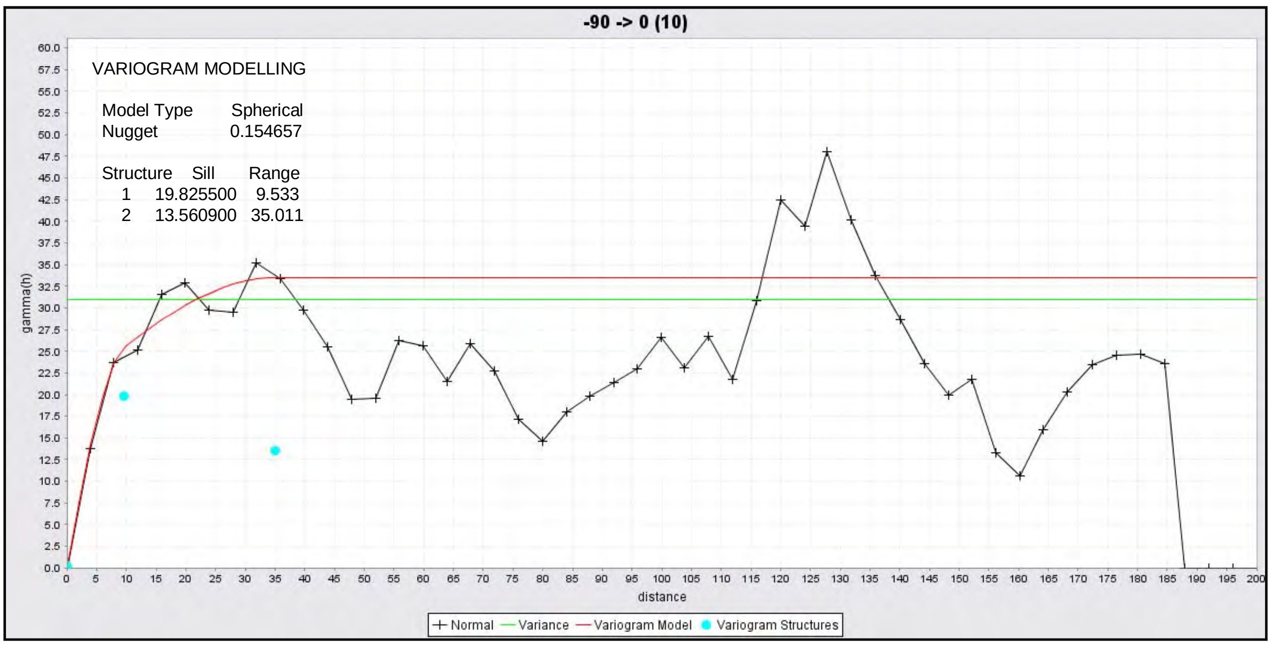


Figure 14-14: Linear (Down Hole) Experimental Semi-Variogram for Bellechasse Fe % (sol) Assays

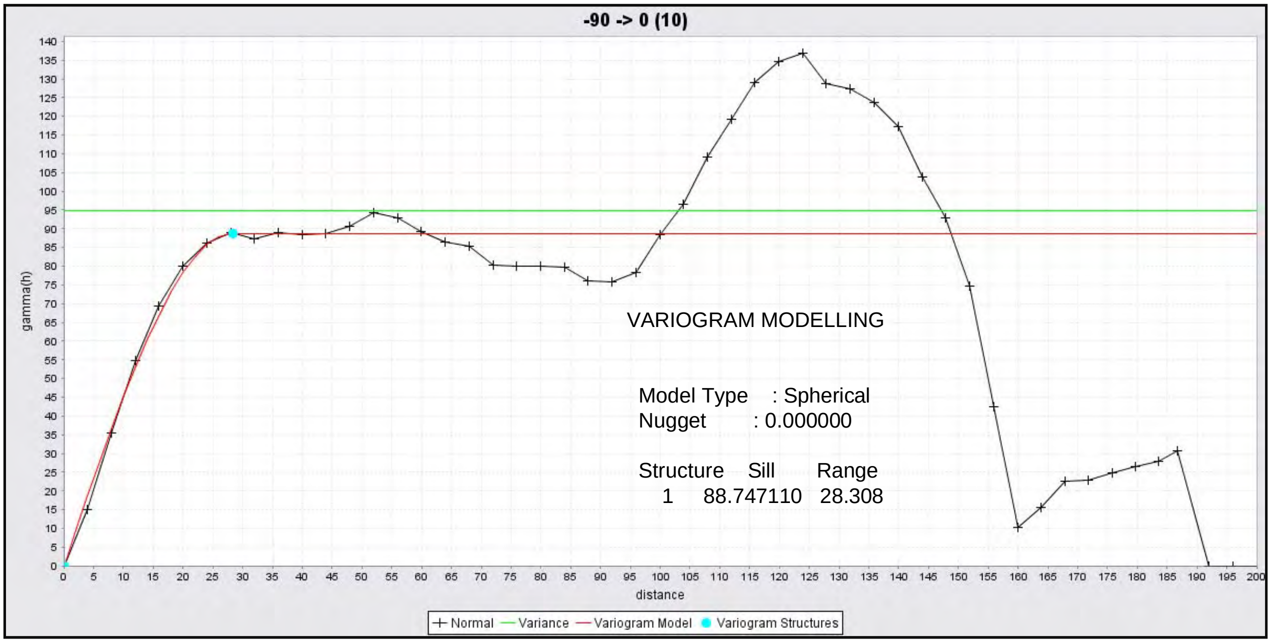


Figure 14-15: Linear (Down Hole) Experimental Semi-Variogram for Bellechasse 4.0 m Fe% (sol) Composites

Because the drill holes are oriented to intersect the IF units perpendicular to the strike and dip of the modelled domains, the ranges from the down hole variography are considered to be a reasonable approximation of the maximum range of continuity for the minor axis of the search ellipse used for grade estimation.

Isotropic semi-variograms were modelled to provide a general measure of continuity of the grade within the modelled IF domains. Figure 14-16 displays the results for the experimental semi-variogram calculated from the 4.0 m Fe % composite values.

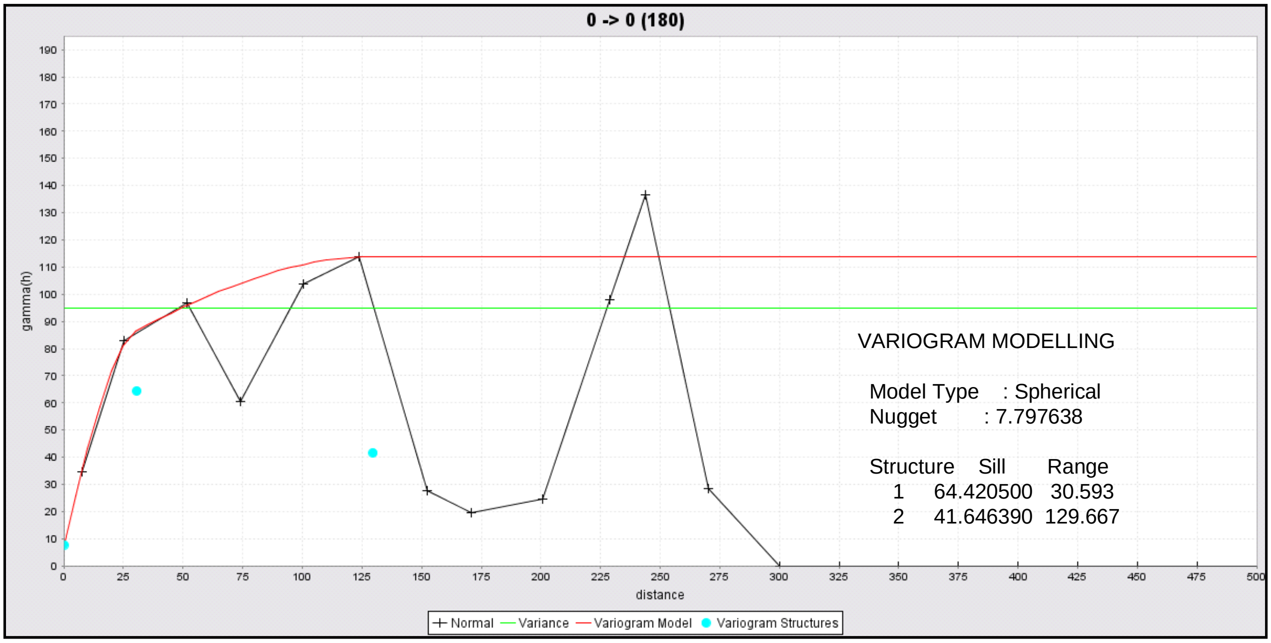


Figure 14-16: Isotropic Experimental Semi-Variogram for Bellechasse 4.0 m Fe % (sol) Composites

The isotropic experimental semi-variogram was modelled by Champion as a nested structure with two (2) ranges at approximately 30 m and 130 m. The shorter 30 m range is similar to the range of the down hole experimental semi-variogram, and likely results from the cross width sampling down hole.

Champion generated a series of 36 directional specific semi-variograms for the 4.0 m Fe % composites in 10° increments across a horizontal plane. Each of the 36 semi-variograms was evaluated to select the direction of maximum indicated continuity. Figure 14-17 displays the experimental semi-variogram generated along azimuth 135°, which coincides with the general strike of the IF in the area with the most significant and closest spaced drilling. The experimental semi-variogram displays a range of 200 m as a reasonable approximation of the orientation and range of the major axis of a search and estimation ellipse for grade estimation.

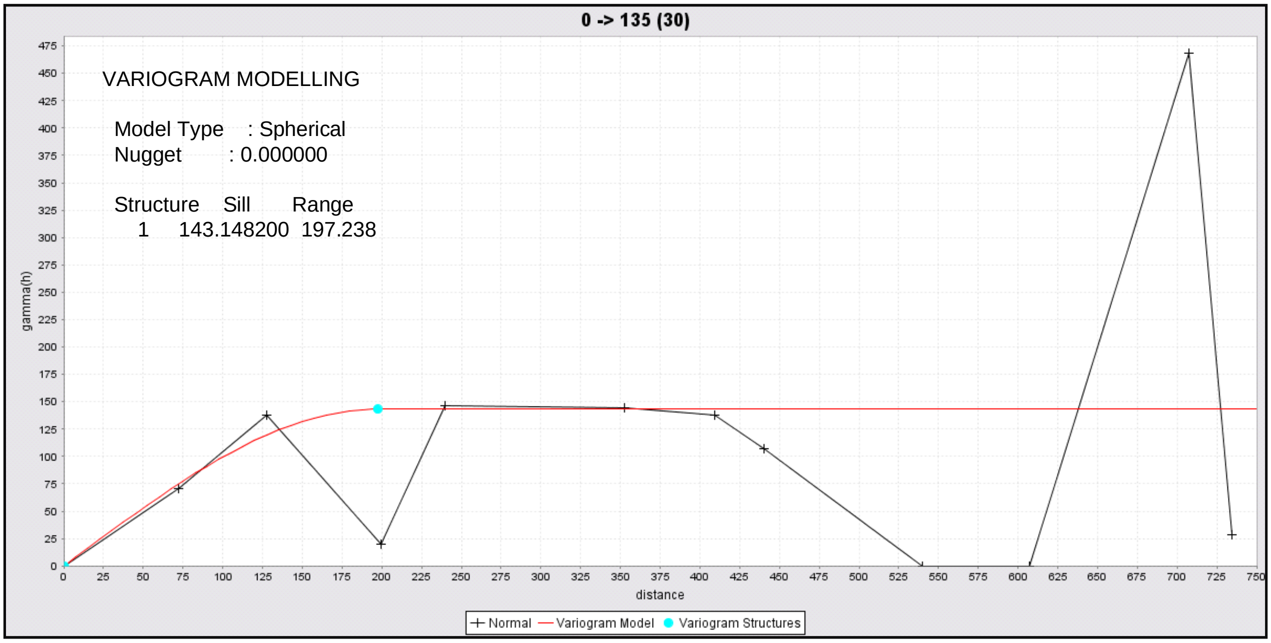


Figure 14-17: Directional Semi-Variogram (Azimuth 135°) For Bellechasse 4.0 m Fe% (sol) Composite Values

P&E notes that Champion was unable to model the directional specific experimental semi-variograms relative to the variance of the data, and recommends that the variography be reviewed when additional sample assay data is available.

14.3.6 Bellechasse Block Model and Grade Estimation Parameters

The initial GEMS block model was redefined by Champion following recommendations by P&E using block cell dimensions, orientations and extents, as detailed in Table 14-24. P&E notes that the block dimensions selected by Champion are too small for the drilling spacing for any further upgrading beyond Inferred Resources, and recommends that this parameter be reviewed when additional sample assay data are available.

Table 14-24: Bellechasse Block Model Definition

	Origin	Blocks	Block Size
X	601,750E	230	20
Y	5,821,900N	185	10
Z	800 m	35	10
Rotation	335°		

Results from the variography were used to define search ellipses for grade estimation by providing orientations and ranges for the three (3) principal axes of the ellipse. Ranges for each of the ellipse axes used for estimation, as identified from the variography, are defined in Table 14-25. Since no variography could be modelled along the semi-major or down-dip oriented axes of the ellipse, the range indicated from the global isotropic semi-variogram was used for the semi-major axis.

Because drill hole data at Bellechasse are generally clustered with most samples occurring in the down hole direction, and fewer along strike and down-dip, additional parameters were established in order to de-cluster the data, and obtain a representative number of samples within the search ellipse used for grade estimation. These parameters included a minimum and maximum number of samples for estimation, a maximum number of samples per drill hole, and an octant subdivided search ellipse with a maximum number of samples per octant. The values used are tabulated with all other parameters utilized for grade estimation in Table 14-26.

Table 14-25: Bellechasse Search Ellipse Definitions

	First Pass	Second Pass	Third Pass
Axis Range	100%	200%	NA
Major Semi-axis	200 m	600 m[1]	1000 m
Intermediate Semi-axis	130 m	260 m[2]	325 m
Minor Semi-axis	30 m	60 m[3]	240 m
1 Domain-1 700 m; Domain-3 800 m 2 Domain-1 325 m; Domain-5 520 m 3 Domain-4 150 m; Domain-5 520 m			

Table 14-26:Bellechasse Grade Estimation Parameters

	First Pass	Second Pass	Third Pass
Minimum Samples	2	1	1
Maximum Samples	12	12	12
Max Samples / Drill Hole	4	4	4
Max Samples / Octant	8	8	8
Minimum Octants	1	1	1

P&E recommends that Champion review the sensitivity of the mineral resource estimate to changes in the estimation parameters when additional sample assay data are available.

14.3.7 Bellechasse Block Modeling

For mineral resource estimation, several individual block model folders were used by Champion to store data and facilitate grade and mineral resource estimation.

Rock Type Block Model

All blocks in the rock type block model were initially assigned a rock code of 20, corresponding to barren sediments. The bedrock topographic surface was then used to assign rock code 1, corresponding to overburden, to all blocks 50% or greater above the bedrock surface. Similarly, the surface topography was used to reset all blocks that were 50% or greater above the surface topography to the default rock code 0, corresponding to air.

The IF domain was used to select all blocks within the rock block model that contain 1% or greater IF by volume. These blocks were assigned the IF rock code 10. The claim group boundary polygon was used to select any IF blocks with any portion of the block outside the claim group limits, and these blocks were reset to rock code 20, corresponding to barren sediments, to ensure no resources were estimated outside the claim group limits.

Percent Block Model

A percent block model was set up to accurately represent the volume and tonnage that was contained by each block within the constraining IF domain. As a result, domain boundaries were properly represented by the percent model’s capacity to measure infinitely variable inclusion percentages within a specific domain.

Domain Block Model

In order to facilitate more precise estimation along the trend of the deposit and in the fold hinges, the Bellechasse claim group was subdivided by Champion into a series of domains where specific orientations for the search ellipses could be established for each domain with regards to the geology. A total of five (5) =domains were established and stored in the domain block model as integer values specific to each domain within the IF.

Figure 14-18 displays a 3D rendered top-view image of the domain coded IF blocks. The search ellipse orientations defined for each domain are listed in Table 14-27.

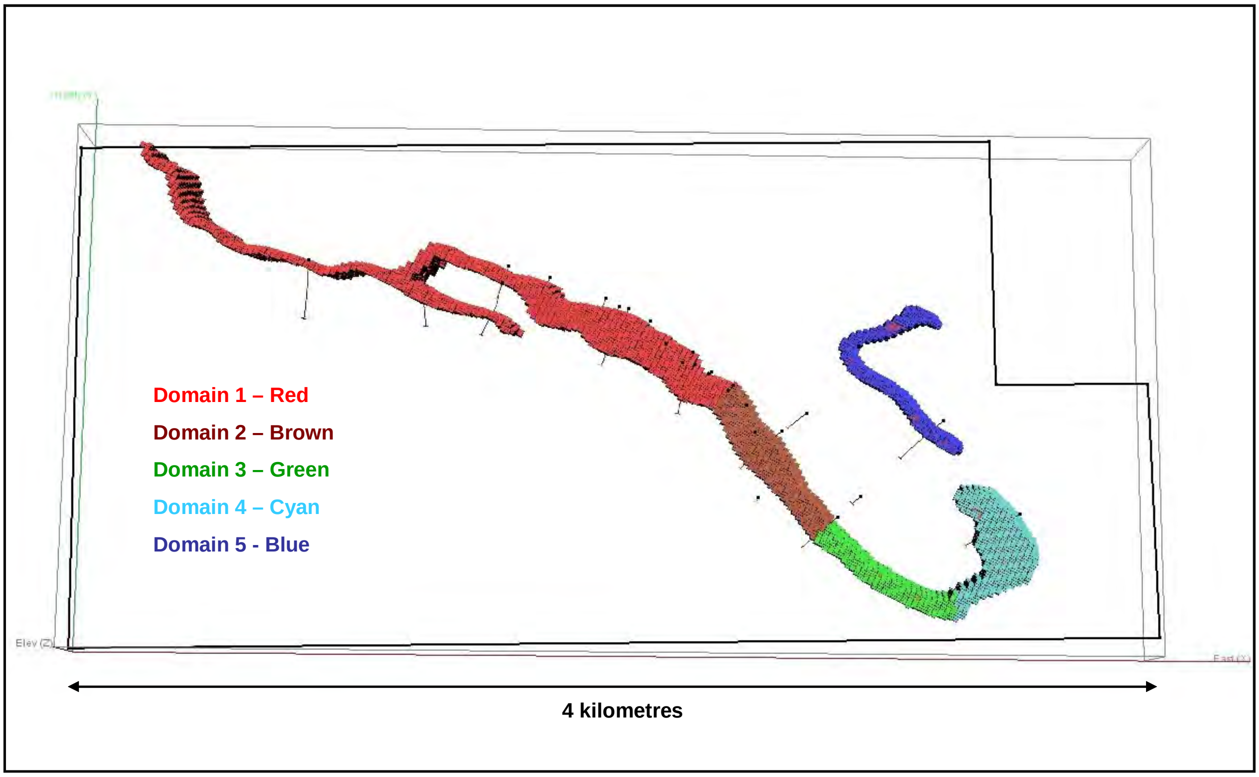


Figure 14-18: 3D Rendered Top View (Facing North) of the Bellechasse Estimation Domains

Table 14-27:Bellechasse Search-Ellipse Orientations

Domain	Axis	Trend	Plunge	Rotation1
Domain-1	Major	115	0	0
	Intermediate	25	-70	-70
	Minor	205	-20	0
Domain-2	Major	140	0	-25
	Intermediate	50	-70	-70
	Minor	230	-20	0
Domain-3	Major	120	0	-5
	Intermediate	30	-70	-70
	Minor	210	-20	0
Domain-4	Major	5	0	110
	Intermediate	95	-80	80
	Minor	275	-10	0
Domain-5	Major	235	0	-20
	Intermediate	45	-70	-70
	Minor	225	-20	0
1 ZXZ RLR rotation relative to the block model rotation				

Fe% Grade Block Model

An Fe % grade block model was populated from a series of estimation profiles for each of the five (5) domains based on the search and estimation parameters, as described.

Additional Block Models

In addition to the block models described above, additional block models were established to store intermediate results obtained during the grade estimation process. A block model was established to store the number of samples that were used to calculate the grade of each block. Another similar model was established to store the distance to the nearest composite point that was used to calculate the grade of each block, and a block model was established to store integer values for blocks that were estimated during each of the estimation passes completed to generate the final grade block model.

14.3.8 Bellechasse Estimation

Grade estimation was completed using inverse distance squared linear estimation of composite samples within a sub-divided octant search ellipse. Two (2) estimation passes were used to populate the grade model with the exception of Domain-1, where three (3) estimation passes were completed.

For the first estimation pass, the search ellipses were set to 100% of the maximum ranges defined by the experimental semi-variograms. In addition, the minimum number of samples required to estimate the grade was set at two (2). A total of 26,322 (57.1%) blocks within the defined IF domains were assigned grade estimates during the first pass.

For the second estimation pass, the search ellipses were expanded to 300% of the maximum ranges defined by the experimental semi-variograms along strike, and 200% of the maximum ranges defined by the experimental semi-variograms down and across the dip of the IF, with the exceptions noted in the tables. The minimum number of samples required for grade estimation was set at one (1). Blocks not estimated during the first pass were estimated during the second pass. A total of 17,712 (38.4%) additional IF blocks were assigned estimates during the second pass and a total of

44 034 (95.5%) IF blocks were assigned grade estimates by the two (2) estimation passes.

An investigation of the model results indicated that the remaining 2 094 (4.5%) unestimated blocks within the IF domains occurred at the northwest end of the deposit in Domain-1. The range of the x-axis for the Domain-1 search ellipse was therefore extended to 1000 m, to enable estimation of the relatively small percentage of remaining blocks during a third pass.

14.3.9 Bellechasse Mineral Resource Estimate

Based on the mineral resource model, the total Inferred Mineral Resource for the Bellechasse Deposit, at a 15% Fe cut-off, is estimated to be 215.1 Mt grading 28.7% Fe (sol).

The sensitivity of the Inferred Mineral Resource Estimate to the incremental cut-off grade is presented in Table 14-28

Table 14-28: Bellechasse Cut-Off Grade Sensitivity

Cut-Off Grade	Tonnes (x 1000)	Grade (Fe% (sol))
10%	219 697	28.4
15%	215 127	28.7
20%	201 718	29.5
25%	172 821	30.6

14.3.10 Bellechasse Validation

P&E confirmed the volumetric calculations and estimate, as reported by Champion, and used three (3) tests to validate the mineral resource model, as based on the methodology selected by Champion for mineral resource estimation:

- The economic sensitivity of the mineral resource was evaluated by constraining the Inferred Mineral Resource within a conceptual floating-cone pit shell;

- The precision of the model estimation parameters were evaluated by generating a Nearest Neighbor (NN) model, using the same estimation parameters used by Champion for the mineral resource model; and
- The conditional bias of the mineral resource model was evaluated by comparing the grades estimated to the average grades of composites within all blocks intersected by drill holes.

P&E examined the economic sensitivity of the mineral resource model by generating an optimized floating-cone pit shell around the Inferred Resources, based on the cost parameters listed in Table 14-29. At a cut-off grade of 15% Fe, a total of 177.2 Mt at a grade of 29.2% Fe are contained within the pit shell, a reduction of approximately 18% in total tonnage.

Table 14-29: Conceptual Pit Shell Financial Parameters

Parameter	Value
Fe Value	$1.00/unit
Mining	$1.76/tonne
Processing	$1.67/tonne
Transport	$4.75/tonne
G&A	$0.75/tonne
Recovery	85%

As a test of the validity of the mineral resource model parameters, P&E estimated a NN model using the same estimation parameters, used by Champion, for the mineral resource model. A comparison between the mineral estimate and the NN estimate at a nominal zero grade cut-off confirms the precision of the block model parameters used (Figure 14-19).

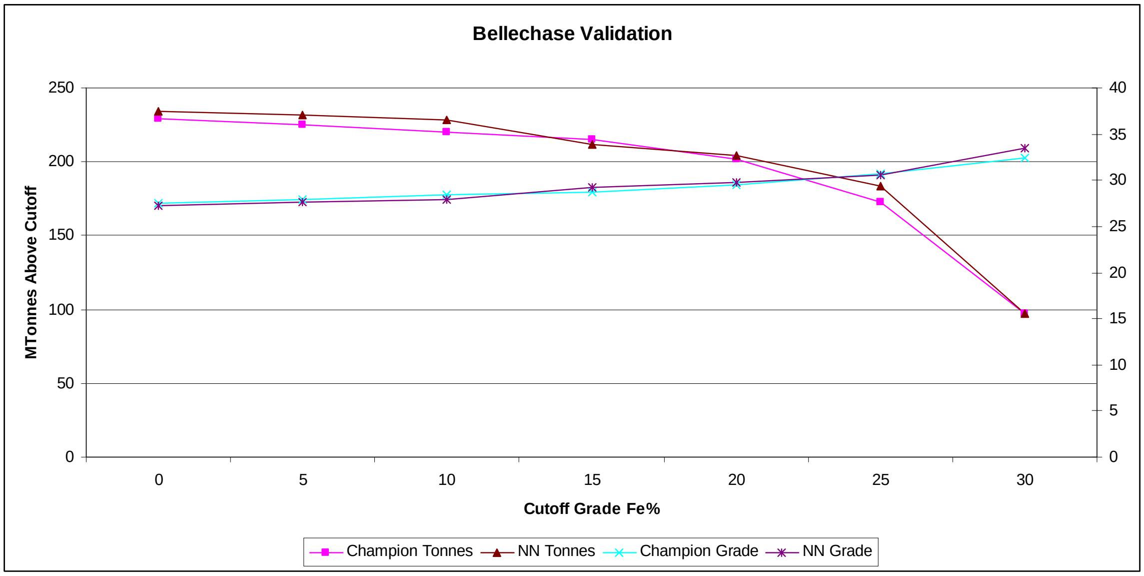


Figure 14-19: Bellechasse Nearest Neighbour Validation Test

A comparison of the average grade of the composites contained within blocks intersected by drill holes to the grade of the blocks estimated in the mineral resource indicates that for those blocks, the mineral resource estimate displays minimal conditional bias (Figure 14-20).

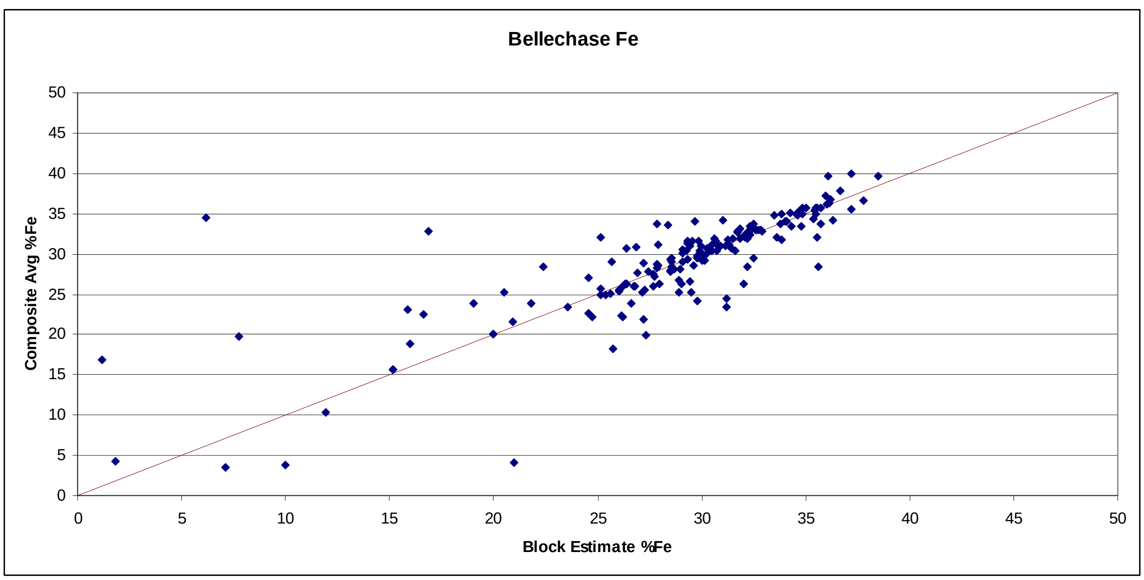


Figure 14-20: Bellechasse Conditional Bias Test

15. MINERAL RESERVE ESTIMATE

15.1 Resource Block Model

The Preliminary Feasibility Study (PFS) block models for the Fire Lake North West pit and East pit deposits were prepared by P&E Mining Consultants Inc. (P&E). The Fire Lake North West pit (FLNW) domain model and Fire Lake North East pit (FLNE) rock code model were provided to BBA on August 29, 2012 and September 10, 2012 respectively as Comma Separated Value files (CSV). The updated rock code model for FLNW was provided October 4, 2012.

The variables present in the model are shown in Table 15-1. The model includes subdivisions of rock types, mineralized and non-mineralized rock types, as well as the densities and density regression curves. All of the mineralized rock types are classified as Measured, Indicated or Inferred Resources (“Class” item). Only the Measured and Indicated Resources have been converted to Reserves for the purpose of this Study, in accordance with NI 43-101 regulations for a Preliminary Feasibility Study.

Those blocks, which are classified as one of the aforementioned resource categories, have a Total Iron Percent Grade (“Fe_T” item), which will be used as one of the economic determinants for block value, and a percent (“Percent” item).

The block models were imported into MineSight 3-D software, with no modification to the information given. The only differences in the Fire Lake North West pit (FLNW) model and the Fire Lake North East pit (FLNE) model are the origin coordinates and the rotation applied, which are described in further detail in Section 15.1.1.

Following BBA’s validation of the block model after import, additional model variables were created and defined by BBA and are listed below:

- TOPO: percent of block below topographic surface;
- OB: percent of block below bedrock surface;
- WREC: Concentrate weight yield rate.

Table 15-1: Fire Lake North West Pit Block Model Items

	Model Item Description
Item	West Pit Model: (west block model.csv), East Pit Model: (FLN east entire BM.csv)
Level	Bench Number in "z" direction
Col	Bench Number in "x" direction
Row	Bench Number in "y" direction
X	Easting Coordinate
Y	Northing Coordinate
Z	Elevation Coordinate
Rock Type	Ore Types: 101= IF Hinge, 102= IF ELimb, 103= IF WLimb, *104= IF East (ONLY in East Model)* Non-Ore Types: 0= Air, 1= Overburden (Waste), 30= Granitic Gneiss (Waste), 40= Marble (Waste), 50= Qtz Mica Schist (Waste), 60= Gabbro (Waste), 90= Lean IF (Waste)
Density (By Rock Type)	Ore Types: 101-104 Follow regression curve (See Chapter 14) Non-Ore Types: 1=1.9 t/m^3, 30= 2.70 t/m^3, 40= 2.90 t/m^3, 50= 2.70 t/m^3, 60= 3.00 t/m^3, 90=2.70 t/m^3
Percent	% of partial blocks lying within lithological wireframes
Fe_T	Total Iron (Fe) Percent Grade Item
Class	1= Measured, 2=Indicated, 3=Inferred

15.1.1 Model Coordinate System

The FLNW and FLNE models were both provided in the UTM NAD83, Zone 19, coordinates. The West pit model was provided with origin of x=611 000 m, y=5 807 700 m, z=730 m. There is no applied rotation for the West model.

The East model was provided with origin of x=616 224.665 m, y=5 808 023.951 m, z=760 m. The East model was provided with an applied rotation of 45° (refer to Chapter 14). BBA unrotated the model and used a Local Mine Grid with origin x=0 m, y=0 m when importing it into MineSight (3-D Mining Software).

The block size in both models is 10 m (x-coordinate) x 20 m (y-coordinate) x 12 m (z-coordinate). Figure 15-1 and Figure 15-2 show 3D representations of both models on sample benches, showing the division of rock types. Only Measured and Indicated blocks are shown. As well, Figure 15-3 demonstrates a close-up of the block size present in either model.

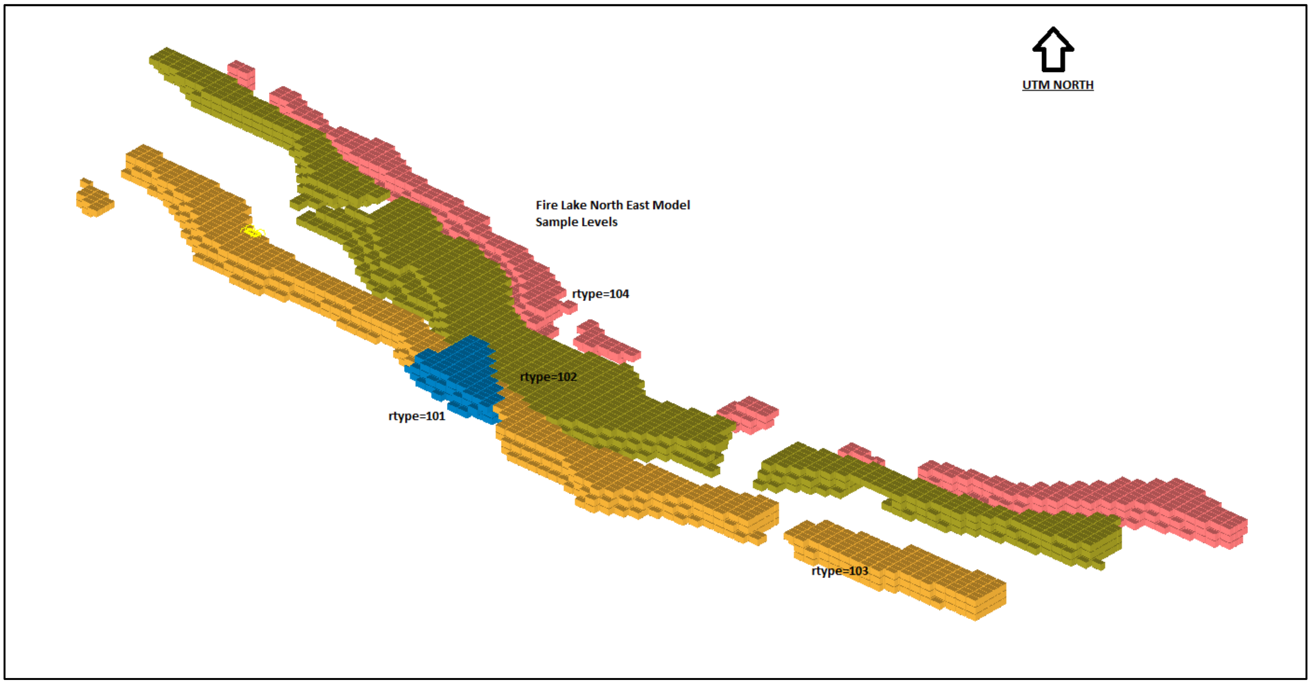


Figure 15-1: Fire Lake North East Pit Sample Model Blocks

Figure 15-2: Fire Lake North West Pit Sample Model Blocks

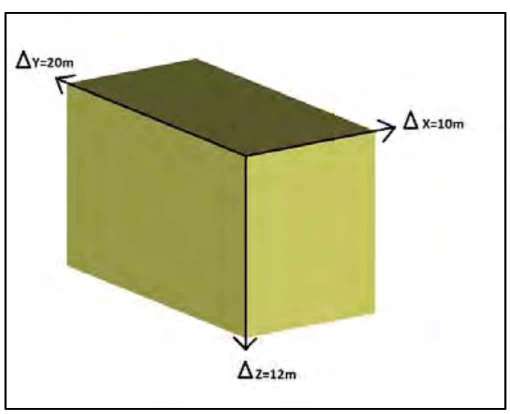


Figure 15-3: Sample Model Block Size

15.1.2 Model Densities

Density for any of the mineralized rock types was coded into the provided model and follows the regression curve shown in Section 14.1.9. The mineralized block density in the FLNW model ranges from 1.90-4.80 t/m^3. The mineralized block density in the FLNE model ranges from 1.90-4.55 t/m^3.

The in-situ overburden density for both the FLNW model and FLNE model is 1.90 t/m^3. This density was confirmed by P&E and by Champion. The waste rock densities follow those in Table 15-2 and were also specified by P&E.

Table 15-2: Variety of Waste Rock Densities

Rock Types	Rock Codes	Ore/Waste	Density (t/m^3)
Granitic Gneiss	30	Waste	2.70
Marble	40	Waste	2.90
Qtz Mica Schist	50	Waste	2.70
Gabbro	60	Waste	3.00
Lean IF	90	Waste	2.70

15.1.3 Model Recoveries

The Fe_T mill recoveries were determined by a team of Mineral Processing experts (BBA), from mineral processing testwork and analysis. The results of such tests can be found in Chapter 13 of the report on Mineral Processing.

A Fe_T mill recovery of 82% was calculated for Fire Lake's North West pit, and a 76.5% Fe_T recovery for the Fire Lake North East pit. These two (2) Fe_T recoveries, along with a specified grade of iron in concentrate of 65%, derived from testwork as well, were used for the determination of the weight recovery for each block within the block model. The weight recovery equation is represented by:

$$Weight\ Recovery\ (WREC) = \frac{FeT\ (variable) x\ Fe\ Recovery\ (82\%\ West\ or\ 76.5\%\ East)}{Concentrate\ Fe\ Grade\ (65\%)}$$

The weight recovery was only calculated for the blocks classified as either Measured or Indicated Resource for the purpose of this Preliminary Feasibility Study. By the CIM Standards NI 43-101 definitions, a Mineral Reserve is the economically mineable part of a Measured or Indicated Mineral Resource demonstrated by at least a PFS. Therefore, no weight recoveries were calculated for the blocks within the model that were classified as Inferred Resources.

15.1.4 Model Surfaces

Along with the block models provided to BBA by P&E, two (2) important surface files were provided along with each model. They were provided in UTM coordinates, which are the same as the block models, ready for import as DXF files. The two (2) files are:

- Topography Surface (Topo.dxf);
- Bedrock Surface (Bedrock.dxf).

The two (2) files provided cover the area of the FLNW pit model and the FLNE pit model. These surfaces allow BBA to code the additional variables: TOPO and OB described in Section 15.1. Both items allow coding in a percent value to each block within the overburden zone or in the bedrock zone.

The two (2) surfaces provide additional understanding for the overburden thicknesses in the Fire Lake North West pit region and in the Fire Lake North East pit region. The overburden thicknesses vary the most over the FLNW pit region, with thicknesses reaching 60 m on the westernmost side of the forecasted pit. The FLNE pit region, on the other hand, shows that overburden thicknesses greater than 20 m are rare.

Figure 15-4 and Figure 15-5 show the variation of overburden thicknesses (“isopach maps”) in the FLNW and FLNE pit regions, respectively. The images show that, although in the East pit area, it is rare to see thicknesses greater than 5 m; the thicknesses are at least 10 m in the West pit area. Also displayed in the figures are the final engineered pit design outlines, which are shown on the isopach maps and are described later on in this Chapter.

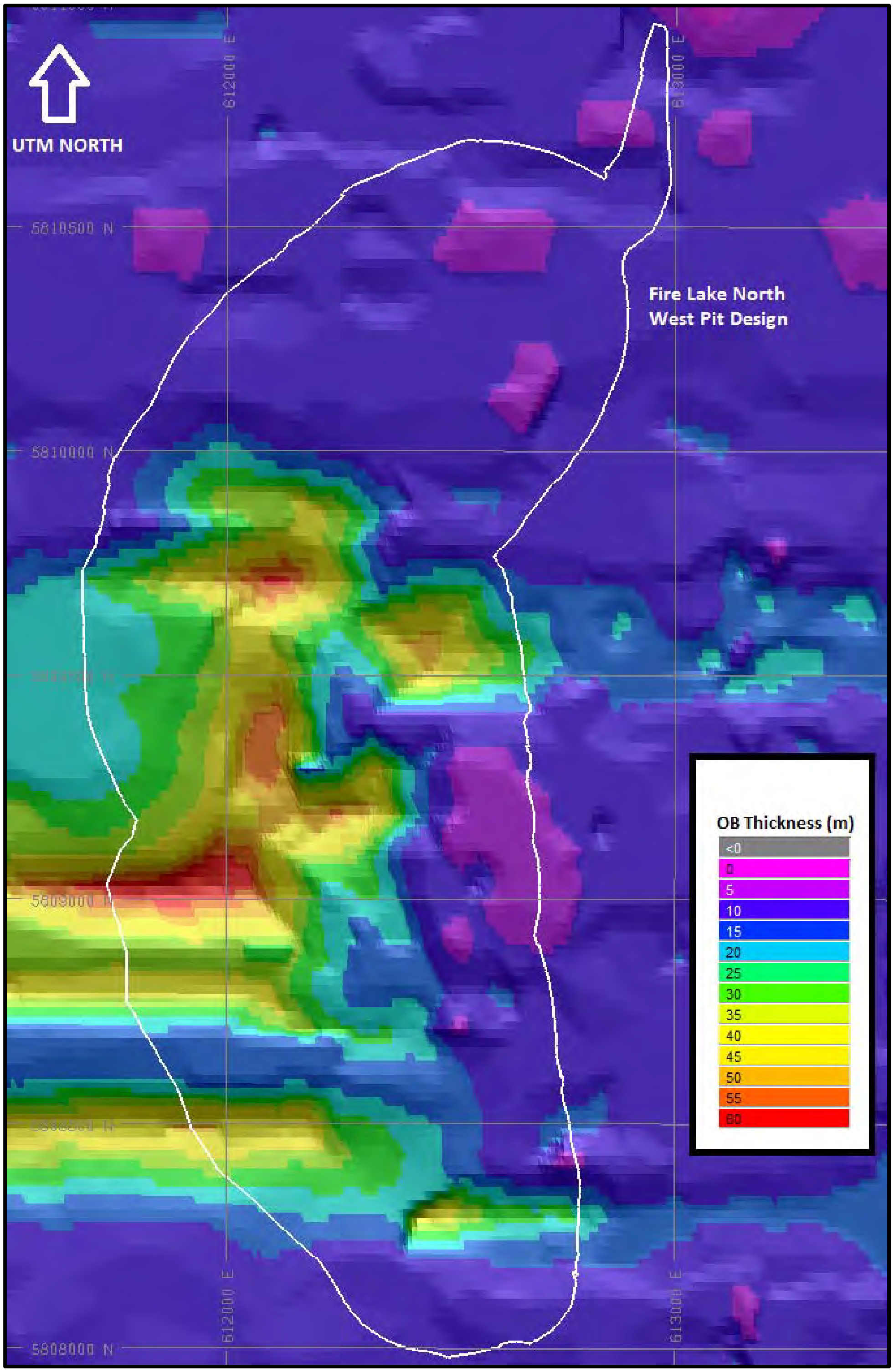


Figure 15-4: Fire Lake North West Pit Overburden (OB) Thicknesses

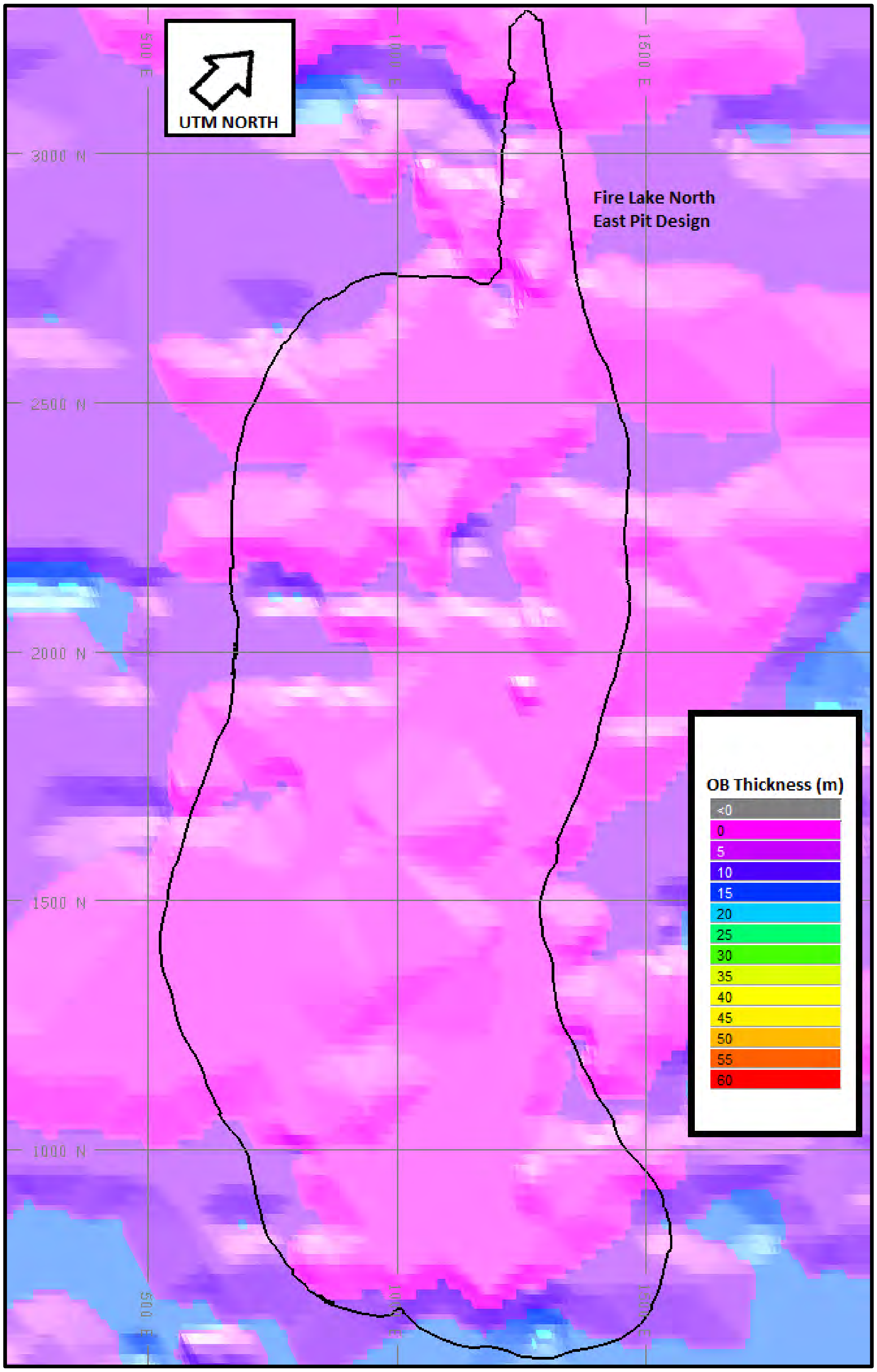


Figure 15-5: Fire Lake North East Pit Overburden (OB) Thicknesses

15.2 Pit Optimization

For the Fire Lake North PFS, pit optimizations were carried out using the Lerchs Grossman 3D (LG 3D) algorithm in MineSight. This optimizer is based on the graph theory and calculates the net value of each block in the model, i.e., revenues minus costs. The pit optimizer searches for the optimum economic pit shell that delineates the maximum volume of extraction. This is done by evaluating the revenues less costs that consist of mining costs and processing costs. Other parameters that contribute to the optimum economic pit shell include processing recoveries (determined from testwork), weight recovery values and the geotechnical parameters (slopes) recommended by Knight Piésold Consulting.

15.2.1 Pit Optimization Parameters

Table 15-3 and Table 15-4 summarize the pit optimization parameters used in this PFS for the Fire Lake North West pit and the Fire Lake North East pit, respectively. The costs were based on the Preliminary Economic Assessment and on the best available information from benchmarking of similar projects in the region.

At various project milestones, cost information, as well as other parameters, were reviewed and were incorporated into new pit optimization simulations, when necessary, during the process of pit designs.

The mining cost for the ore and waste material, at the start of the mine life, was estimated at $1.84/tonne mined. An incremental bench cost of $0.02/tonne mined/bench was used starting at bench 5 of the economic pit shell to consider increased haulage distances. Other costs, such as rail transportation and port fees, as well as G&A, were confirmed by the Client.

The iron sale price is described later on in this section.

Table 15-3: Fire Lake North West Pit Optimization Parameters

FIRE LAKE NORTH – PFS PIT OPTIMIZATION PARAMETERS			
Parameters		**Unit**	**Values**
Operating Costs			
	Mining Cost Ore, Waste	($/tonne mined)	1.84
	Mining Cost Overburden	($/tonne mined)	1.84
	Unit Mining Cost Increase per Bench	$/tonne/bench	0.02
	Processing Cost	($/tonne concentrate)	4.52
	(Assuming Wrec=37.8%)	($/t milled)*	1.71
Indirect Costs			
	Transport Rail + Port Cost	($/tonne concentrate)	17.32
	(Assuming Wrec=37.8%)	($/t milled)*	6.55
	G&A Cost	($/tonne concentrate)	4.40
	(Assuming Wrec=37.8%)	($/t milled)*	1.66
Sales Revenue			
	Iron Sale Price	(FOB) $/tonne of con at 65%	Vary by revenue factor (Base case= $115/t)
	Exchange Rate	(CDN $ / US $)	1.00
	Average Iron Mill Recovery (Rec.)	Percent	82
	Weight Recovery	Wrec=Fe_T x 82%/65%	
Pit Characteristics			
	Pit Slope Angle	Degrees	Variable by pit sector

Table 15-4: Fire Lake North East Pit Optimization Parameters

FIRE LAKE NORTH – PFS PIT OPTIMIZATION PARAMETERS			
Parameters		**Unit**	**Values**
Operating Costs			
	Mining Cost Ore, Waste	($/tonne mined)	1.84
	Mining Cost Overburden	($/tonne mined)	1.84
	Unit Mining Cost Increase per Bench	$/tonne / bench	0.02
	Processing Cost	($/tonne concentrate)	6.66
	(Assuming Wrec=35.3%)	($/t milled)*	2.35
Indirect Costs			
	Transport Rail + Port Cost	($/tonne concentrate)	17.32
	(Assuming Wrec=35.3%)	($/t milled)*	6.11
	G&A Cost	($/tonne concentrate)	4.40
	(Assuming Wrec=35.3%)	($/t milled)*	1.55
Sales Revenue			
	Iron Sale Price	(FOB) $/tonne of con at 65%	Vary by revenue factor (Base case= $115/t)
	Exchange Rate	(CDN $ / US $)	1.00
	Average Iron Mill Recovery (Rec.)	Percent	76.5
	Weight Recovery	Wrec=Fe_T x 76.5%/65%	
Pit Characteristics			
	Pit Slope Angle	Degrees	Variable by pit sector

The LG 3D economic pit shell was run using complex slopes extracted from those recommended by Knight Piésold Consulting. Preliminary slope recommendations were provided on September 21, 2012 and final pit slopes were confirmed in January 2013. In practice, shallower slopes than those recommended for final design specifications are used for the Lerchs Grossman pit optimization simulation. Operational design factors such as haulage ramps, geotechnical and safety berms and safe benching arrangements are added during the engineered pit design phase. The overall slopes set for the Lerchs Grossman pit optimization for the Fire Lake North West pit are dependent on the slope sectors shown in Figure 15-6, and are as follows:

- North: 49°;
- North West: 44°;

- Fold Axis West, Central West: 40°;
- Southwest: 38°;
- South: 42°;
- Southeast: 47°;
- Fold Axis East, Central East: 43°;
- North East: 37°.

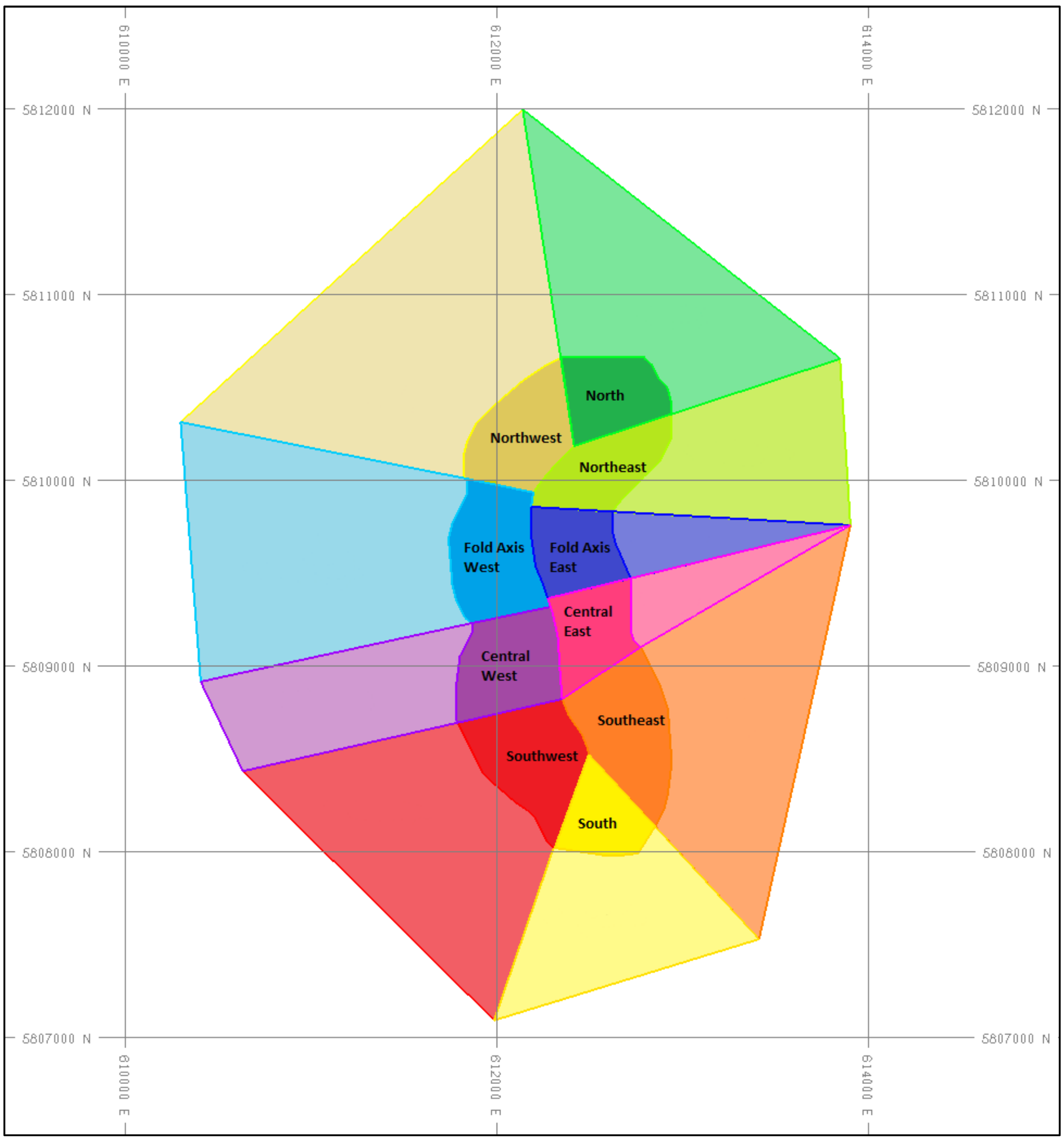


Figure 15-6: Fire Lake North West Pit Slope Sectors

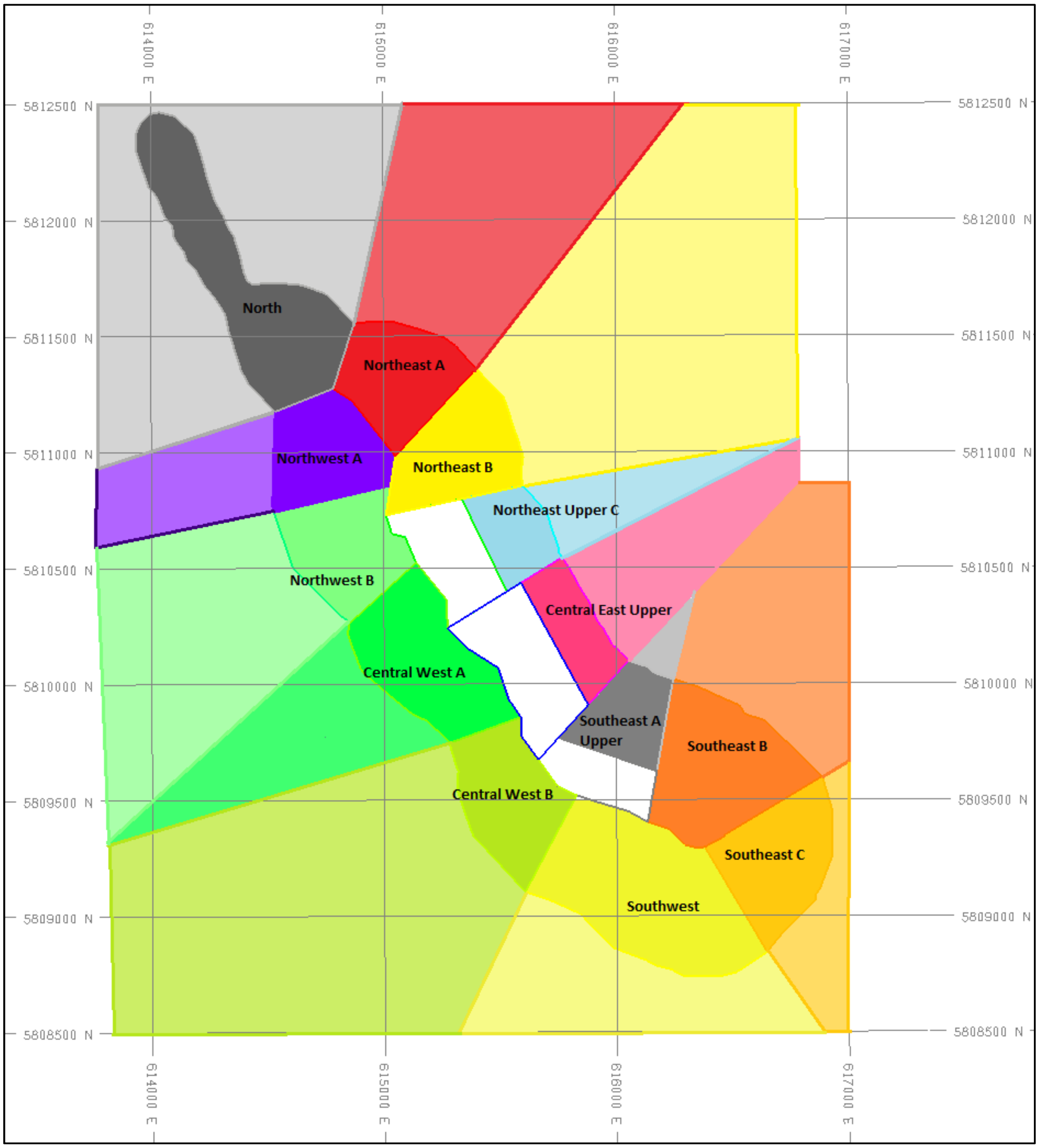


Figure 15-7: Fire Lake North East Pit Slope Sectors

The slope sectors for the Fire Lake East pit are shown in Figure 15-7. For the purpose of the Lerchs Grossman pit optimizations, BBA has used shallower slopes than the recommended inter-ramp angles (IRA), as in the case of the West pit. The slopes used for the pit optimization for the East pit are as follows:

- North, North East A, North West A, Central West A, Southeast A Upper, Southeast C: 49°;
- North East B, North West B, North East C Upper, Central West B, Southwest: 44°;
- Central East Upper: 42°;
- Southeast B: 46°.

All pit optimization was carried out within Champion property limit claims.

The approach taken for the pit optimization exercise was to run LG 3D pit optimizations using iron concentrate selling prices ranging from revenue factors (R.F) from 0.35-1.00, 0.35 being the lowest value to generate the first pit shell. Based on the pit shell sensitivity analysis, the final optimized pits for both Fire Lake North West and East for this PFS are based on a RF of 0.65, as well as a selling price of $74.82/t of concentrate.

These pits were chosen with the consideration to maintain the lowest possible stripping ratio and to obtain approximately 20 years life of mine (LOM).

15.2.2 Cut-Off Grade Calculation

The break-even milling cut-off grade is used to classify the material within the pits as ore or waste. Based on an iron concentrate selling price of $74.82/tonne for the selected pit shells for both the West and the East pits, the break-even COGs were calculated at 10.5% Fe_T and 11.4% Fe_T, respectively.

For the purpose of this PFS, a COG of 15% Fe_T was used and is in line with similar operations in the area and was selected by the Client.

15.2.3 Pit Optimization Results

The results of the optimizations for the Fire Lake North West and East pit, based on the parameters previously described in this section, are compiled in Table 15-5 and Table 15-6, respectively. The total combined in-pit resources, at a COG of 15% Fe_T, amounts to 519.35 Mt at a Fe_T grade of 32.17%, and the average weight recovery is 42.31%. They are represented in Table 15-7.

Table 15-5: Fire Lake North West In-Pit Resources

FLN West In-Pit Resources			
CoG 15% Fe_T			
	Tonnage	Grade	W.R
	Mt	Fe_T%	Wrec%
Measured	20.92	36.17	45.63
Indicated	290.66	33.35	42.07
Total Resource (M+I)	311.58	33.54	42.31
Overburden	96.21		
Waste Rock	674.33		
Inferred (considered as waste)	29.37		
Total Stripping	799.91		
Stripping Ratio (w/total stripping/M+I)	2.57		

Table 15-6: Fire Lake North East In-Pit Resources

FLN East In-Pit Resources			
CoG 15% Fe_T			
	Tonnage	Grade	W.R
	Mt	Fe_T%	Wrec%
Measured	3.02	34.18	40.23
Indicated	204.76	30.05	35.36
Total Resource (M+I)	207.78	30.11	35.43
Overburden	21.41		
Waste Rock	598.07		
Inferred (considered as waste)	18.67		
Total Stripping	638.15		
Stripping Ratio (w/M+I)	3.07		

Table 15-7: Fire Lake North Total PFS In-Pit Resource

FLN Total In-Pit Resource			
CoG 15% Fe_T			
	Tonnage	Grade	W.R
	Mt	Fe_T%	Wrec%
Measured	23.94	35.92	44.95
Indicated	495.42	31.98	39.30
Total Resource (M+I)	519.35	32.17	39.56
OB	117.61		
Waste Rock	1272.40		
Inferred (considered as waste)	48.04		
Total Stripping	1 438.06		
Stripping Ratio (w/M+I)	2.77		

15.3 Engineered Pit Design

The detailed engineered pit designs were carried out using the LG 3D pit shells as a guide. Operational features that are required for a mine are added during the engineering pit design process and include a haulage ramp, safety berms, bench face angles, inter-ramp angles, bench height, and minimum operational widths. Once these operational design factors are incorporated into the engineered pit design, they will have an overall effect on the economically mineable material in the pit. This will ultimately determine the Proven and Probable Mineral Reserve for the open pit mines.

15.3.1 Pit Design Parameters

Knight Piésold provided the final pit slope and geotechnical recommendations by sector for the PFS for Champion. Additionally, the in-pit overburden configuration was provided by Journeaux Assoc. The slope sectors are the same as the ones shown in Figure 15-6 and Figure 15-7 earlier on in this section. The Inter-Ramp Angles, Bench Face Angles and Berm Widths used for the design of each sector of the Fire Lake North West and East pits are shown in Table 15-8 and Table 15-9.

Table 15-8: Knight Piésold Recommendations (FLNW pit)

Slope Sector	BFA (°)	IRA (°)	Berm (m)
North	70	52	10
North East	60	43	12
Fold Axis East	70	49	12
Central East	70	49	12
Southeast	*70*	*52*	*10*
South	70	47	14
Southwest	60	45	10
Central West	60	45	10
Fold Axis West	60	45	10
North West	65	49	10

Table 15-9: Knight Piésold Recommendations (FLNE pit)

Slope Sector	BFA (°)	IRA (°)	Berm (m)
North, North East A, North West A, Central West A, Southeast A Upper, Southeast C	70	52	10
North East B, North West B, North East C Upper, Central West B, Southwest	70	47	14
Central East Upper	60	45	10
Southeast B	65	49	10

Knight Piésold Consulting provided a more aggressive scenario of slopes in the southeast sector of the West pit in order to optimize the recovery of the resources located inside Champion's claim limit. Although these slopes are the steepest configuration considered for the West pit's Southeast sector, they assume no stability concerns and require that additional geotechnical drilling and analysis be performed in this area for the next stage of study, in order to ensure that the recommended slopes can be achieved with consideration to an accepted and safe design practice.

The overburden slopes for both pits follow the following configuration:

- BFA: 30°;
- IRA: 25°;
- Bench height: 10 m;
- Constant berm at interface of bedrock and OB:
  - Where OB thickness ≥ 20 m, a 20 m berm at bedrock contact should be applied;
  - Where OB thickness < 20 m, a 10 m berm at bedrock contact should be applied.

This overburden configuration assumes that the material will be dewatered. Journeaux Assoc. has contributed to recommendations of the measures and costs to ensure that the material is dewatered.

The block models for this Study were provided with 12 m block heights. This enables BBA to design benches to coincide with the block heights. In their final recommendations, Knight Piésold has specified a double-benching arrangement for the final wall of both pits.

The in-pit haulage ramp measures 34 m in width to accommodate for double-lane traffic for the selected truck fleet (described in detail in Chapter 16). The final benches of the pit bottom have a 20 m haulage ramp. The maximum ramp gradient or slope used in the design is 10%.

15.3.2 Engineered Pit Design Results

The Fire Lake West pit is characterized by a long stretch of ramp on the West side of the pit, which connects to two (2) smaller bottom pit sectors at an elevation of z=376 m. A slot following the ore zone allows for the ramp to exit the pit at the north end, while keeping the total stripping amounts in that region to a minimum. Figure 15-8 shows the limits of the Fire Lake North West pit on surface within the claim boundary. The West pit has an average life of mine (LOM) of approximately 12.6 years at a mining rate of 23 Mt of ore per year.

The Fire Lake East pit is smaller. However, it has a similar long ramp splitting into two (2) bases at an elevation of z=448 m. The average life of mine (LOM) of the East pit is about 7.1 years assuming a mining rate of 24.8 Mt of ore per year.

Figure 15-8 shows both pits in a 2D plan view, whereas Figure 15-9 and Figure 15-10 show the pits in 3D view.

Figure 15-11 through Figure 15-18 show section views, Northings and Eastings, for both the Fire Lake North West pit and the Fire Lake North East pit.

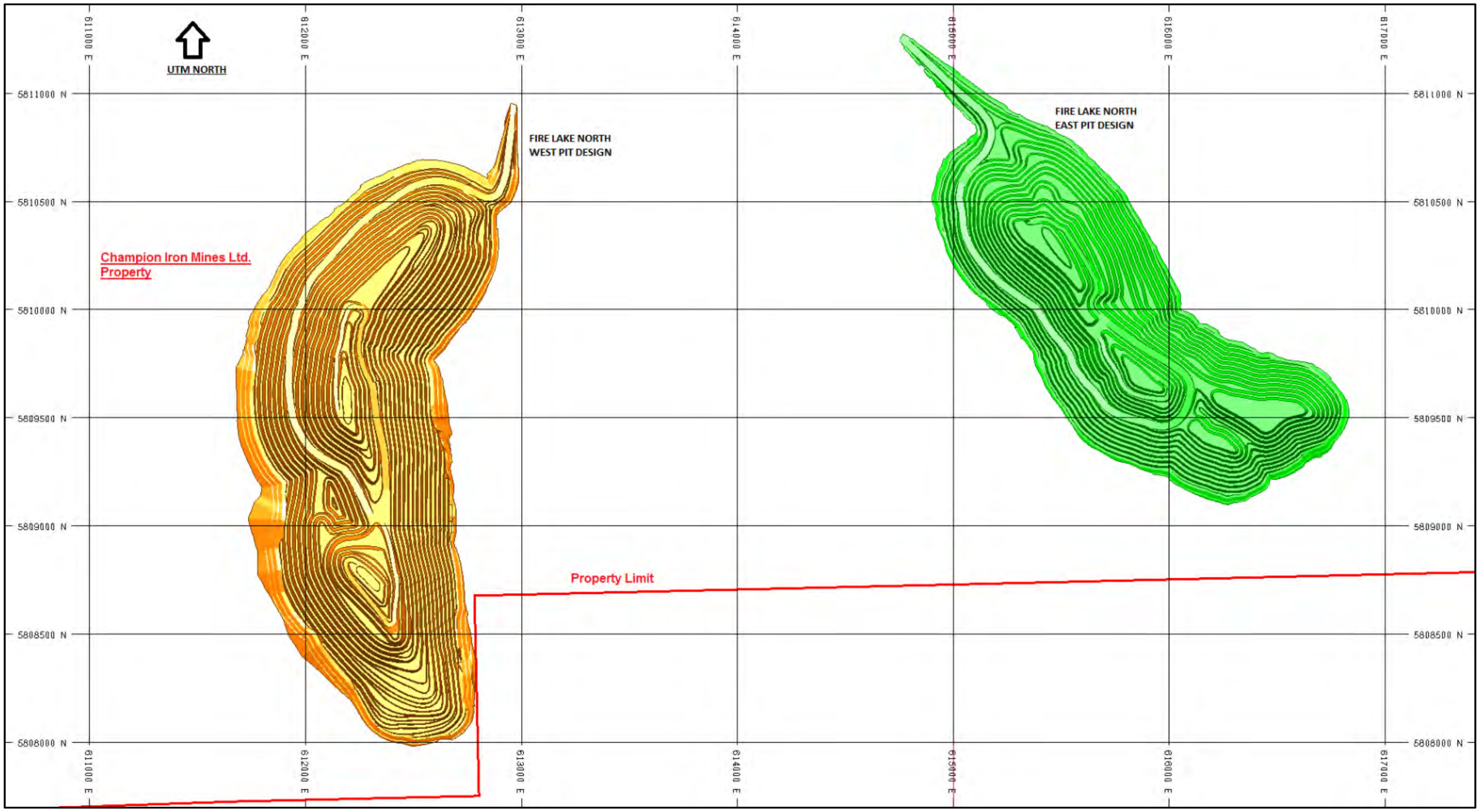


Figure 15-8: Fire Lake North Pit Engineered Pit Designs – 2D View

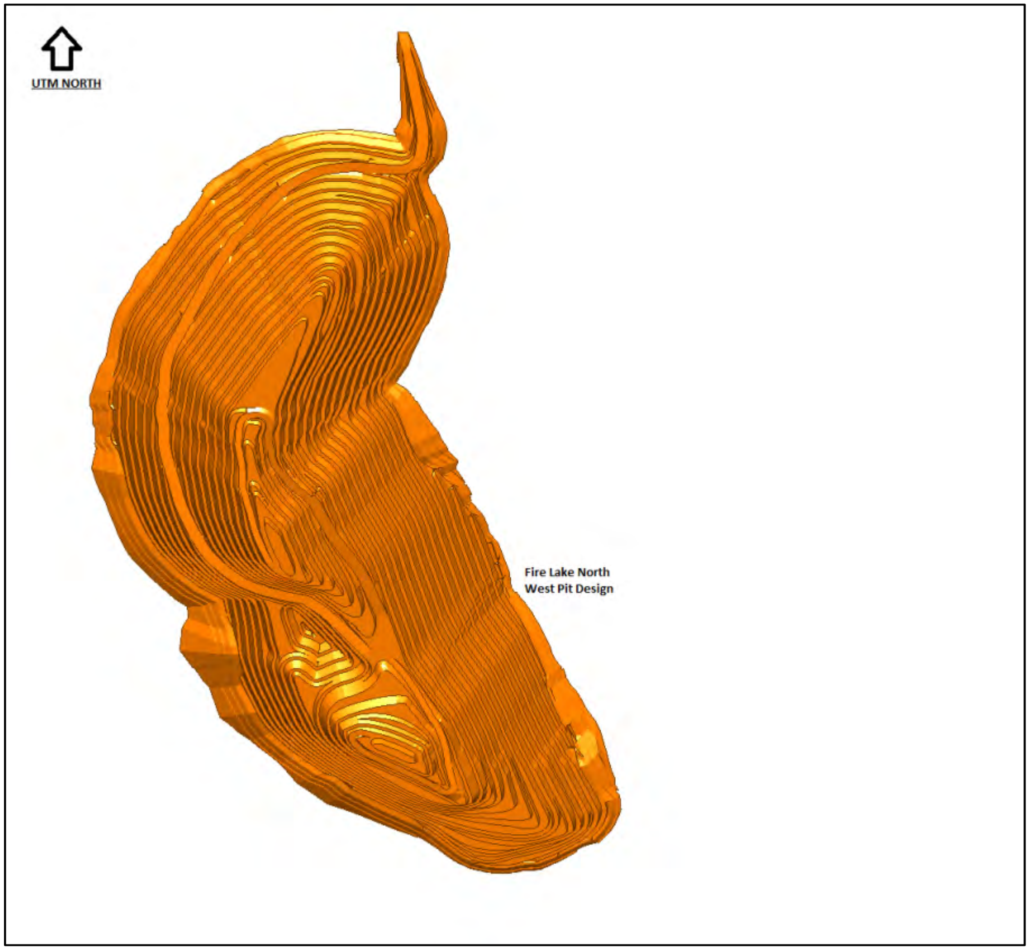


Figure 15-9: Fire Lake North West Engineered Pit Design – 3D View

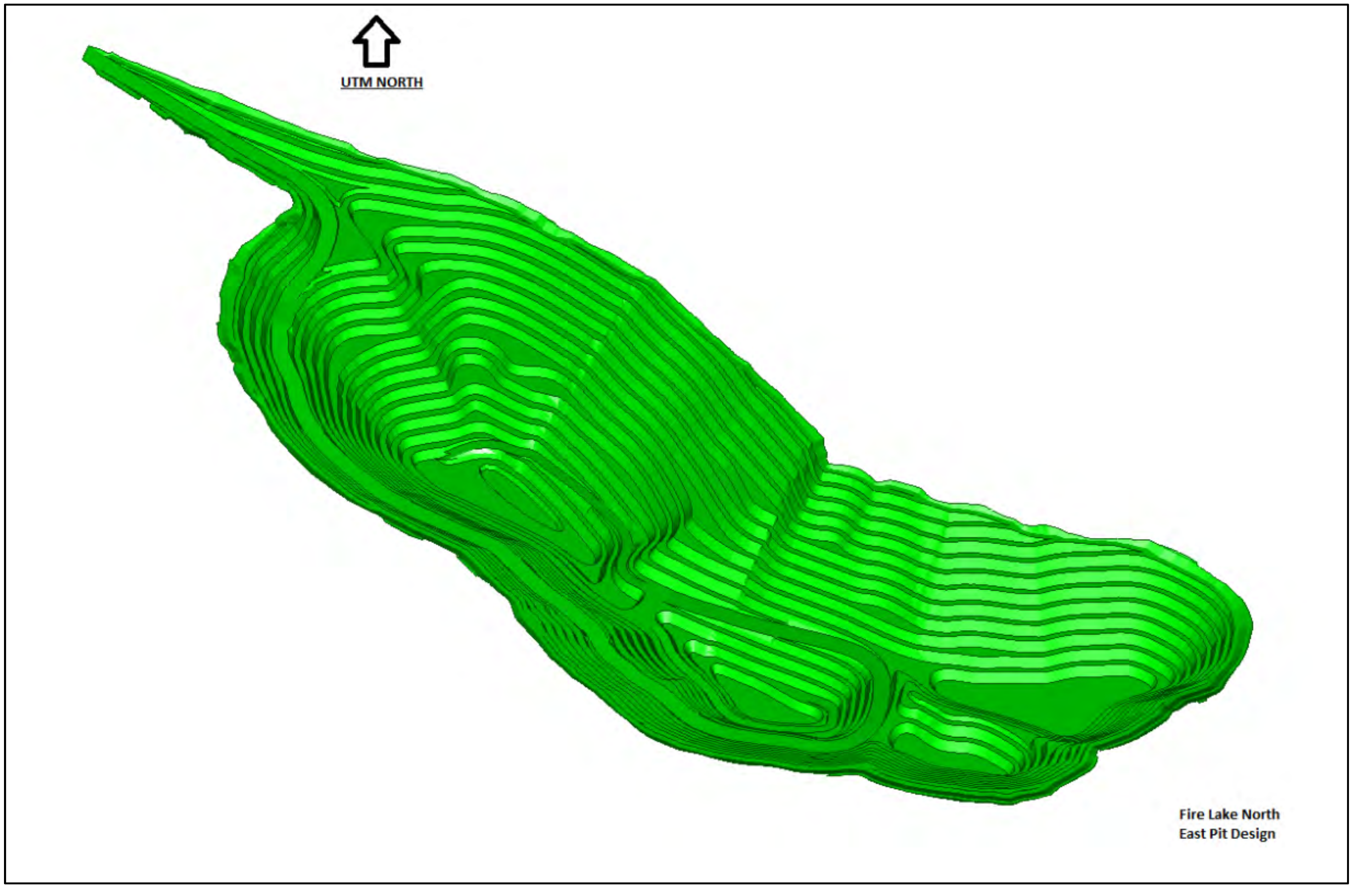


Figure 15-10: Fire Lake North East Engineered Pit Design – 3D View

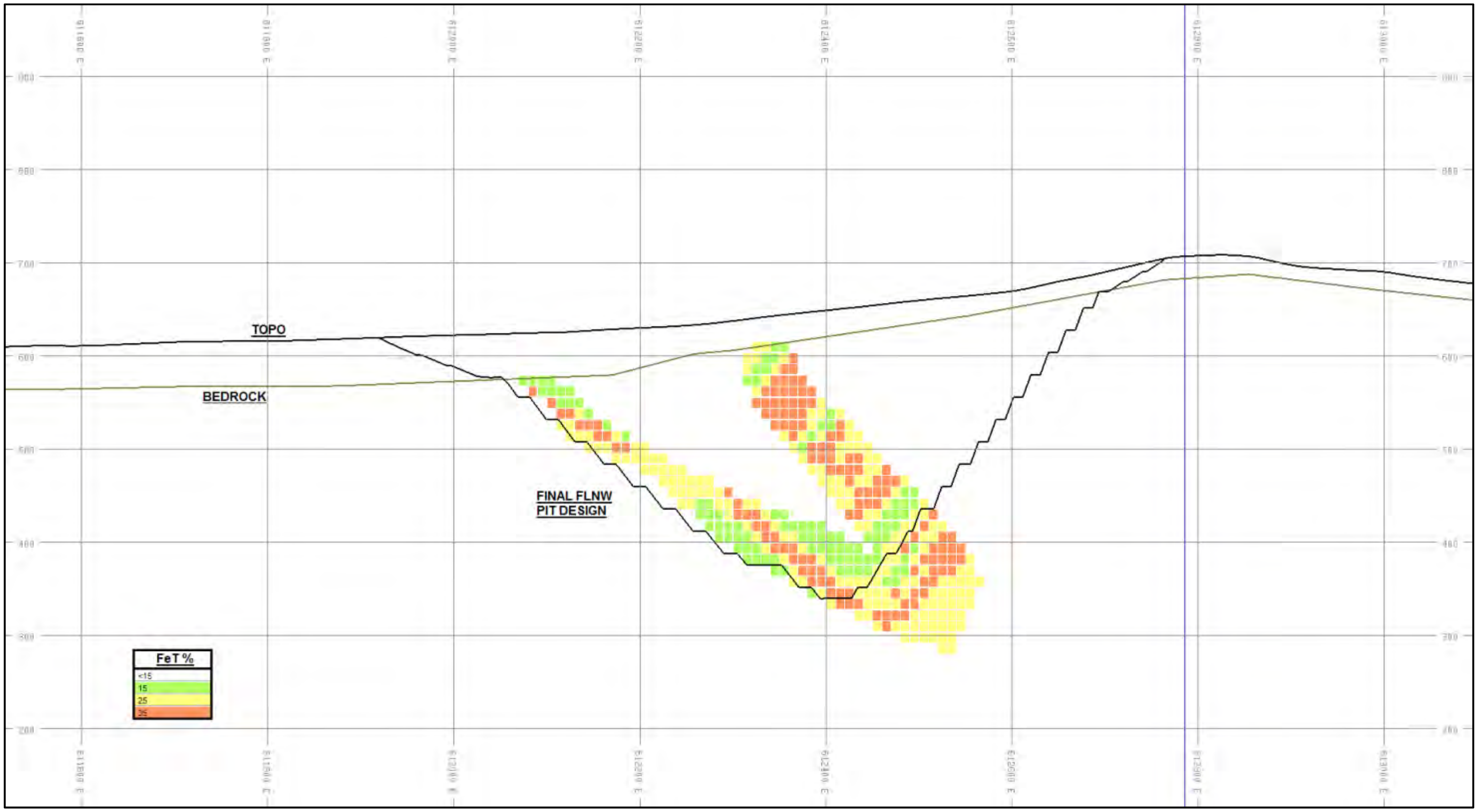


Figure 15-11: FLNW Pit Section View N 5 808 500 m

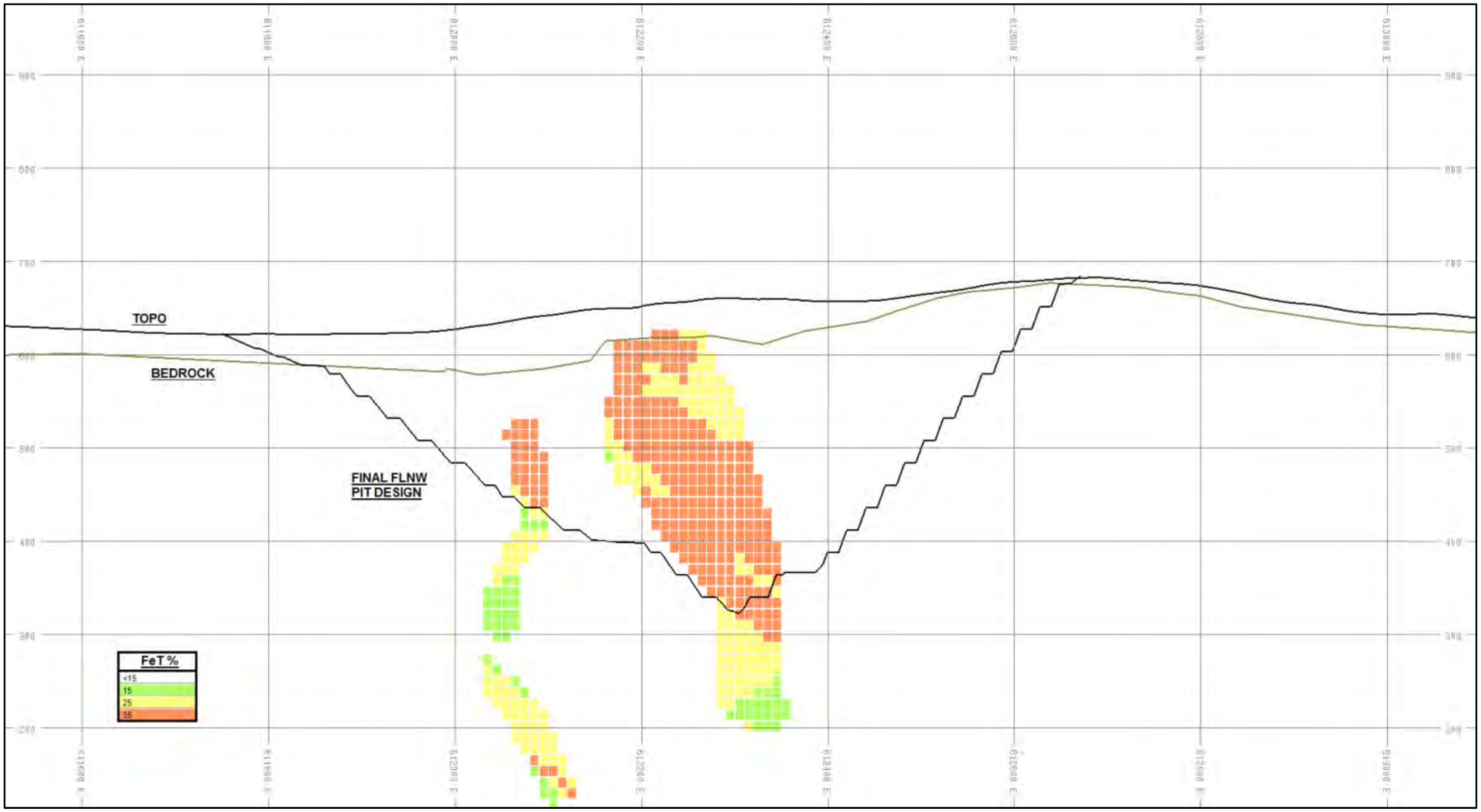


Figure 15-12: FLNW Pit Section View N 5 809 250 m

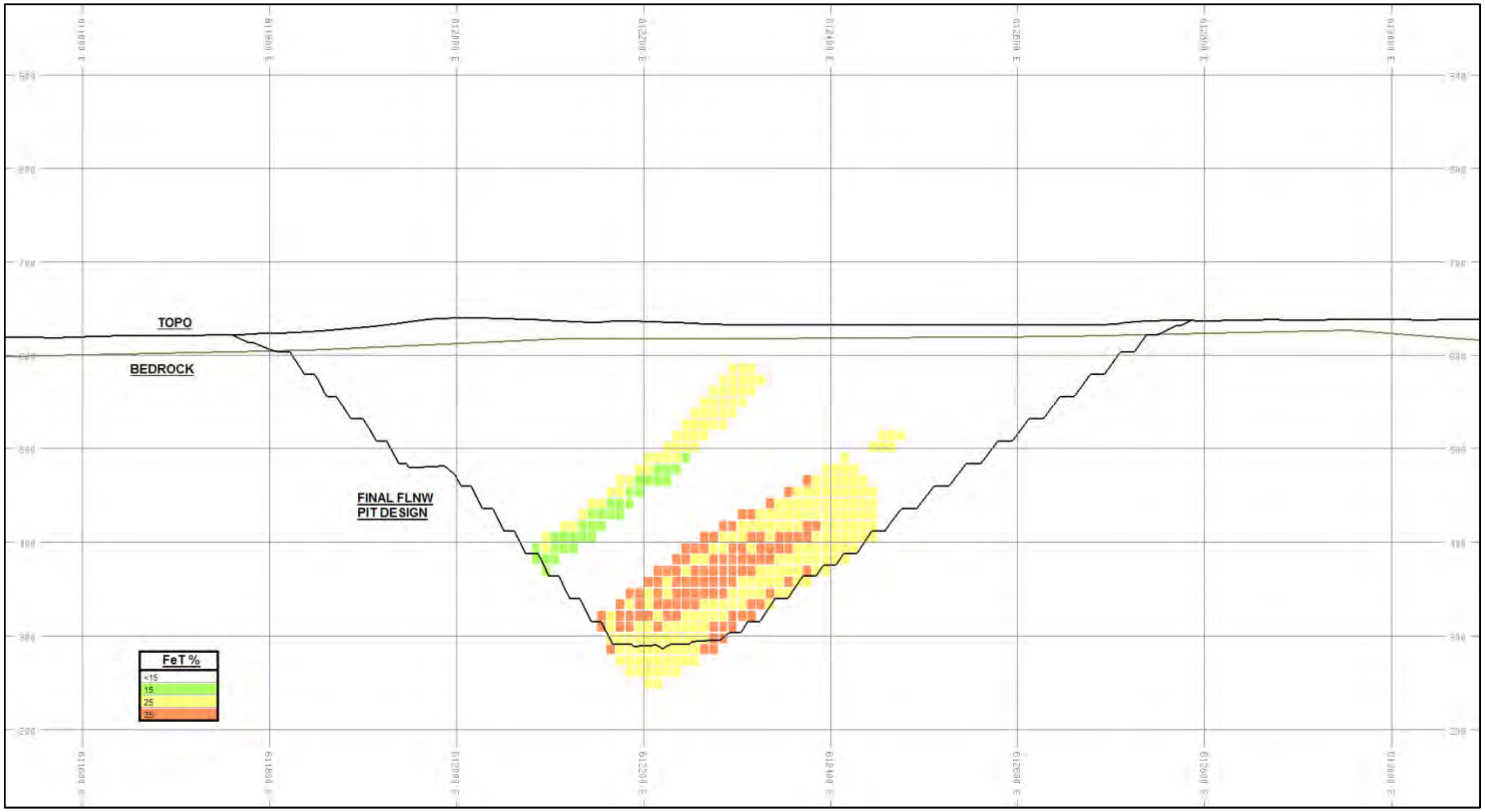


Figure 15-13: FLNW Pit Section View N 5 810 000 m

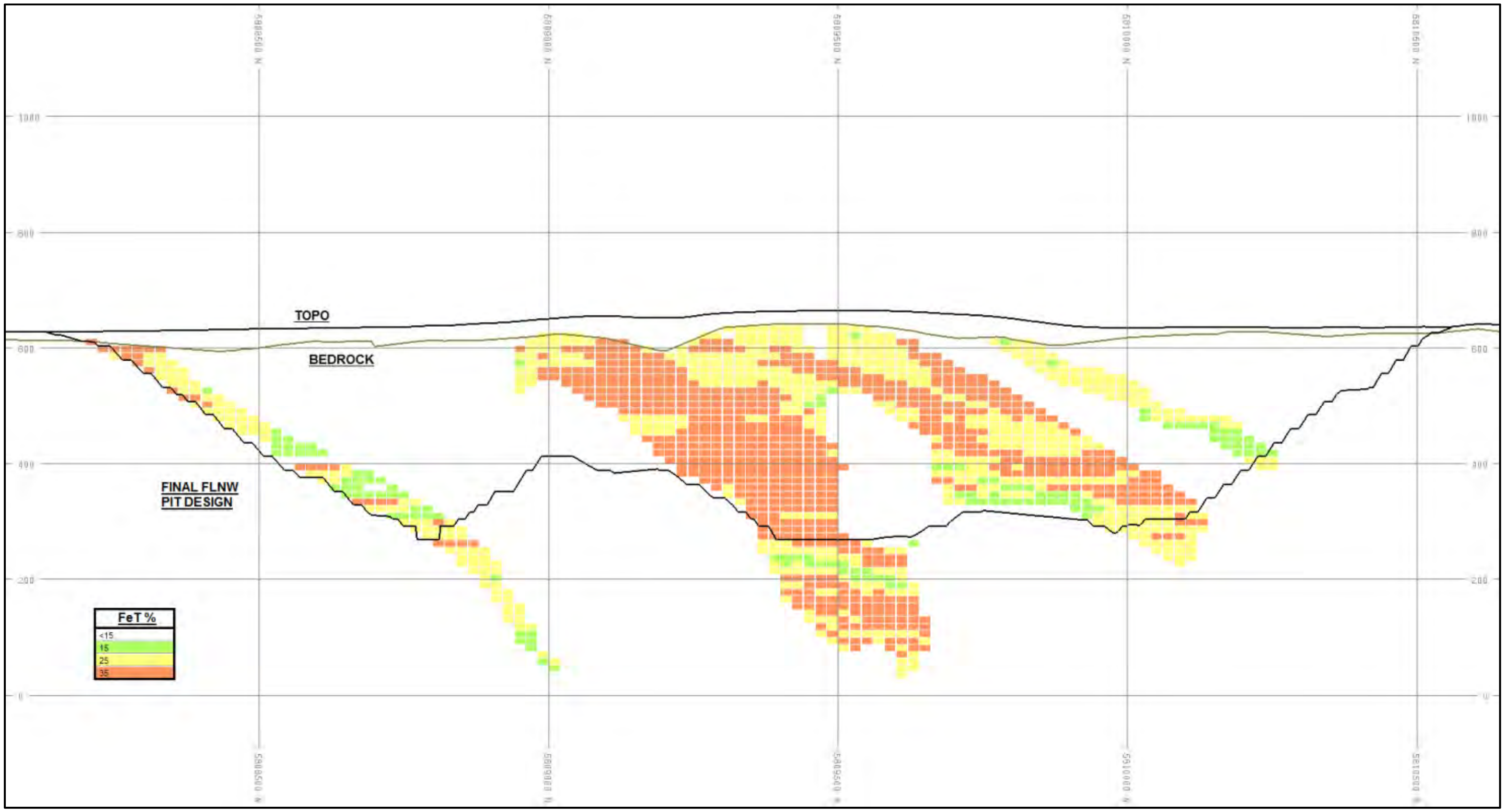


Figure 15-14: FLNW Pit Section View E 612 250 m

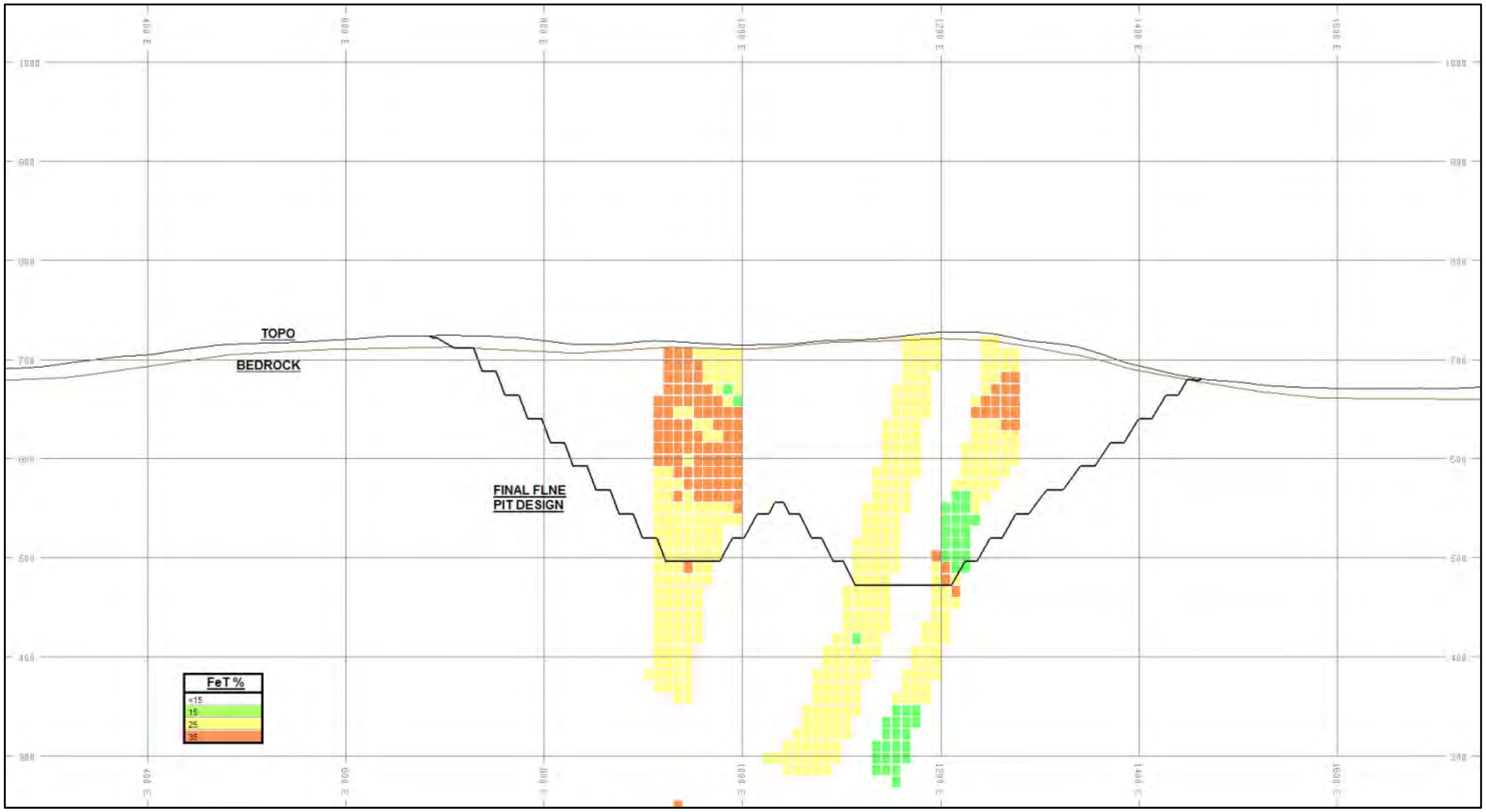


Figure 15-15: FLNE Pit Section View N 1000 m

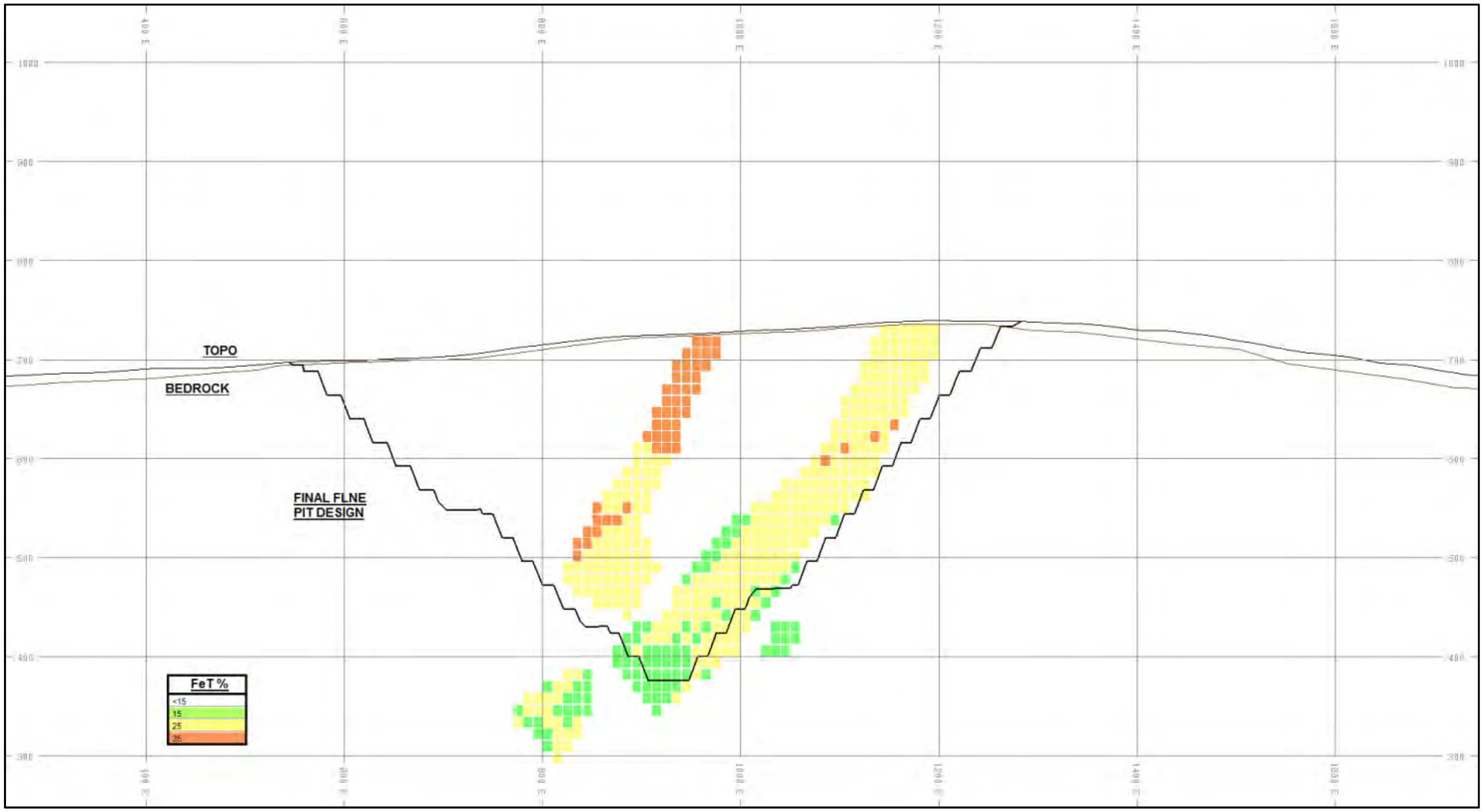


Figure 15-16: FLNE Pit Section View N 1500 m

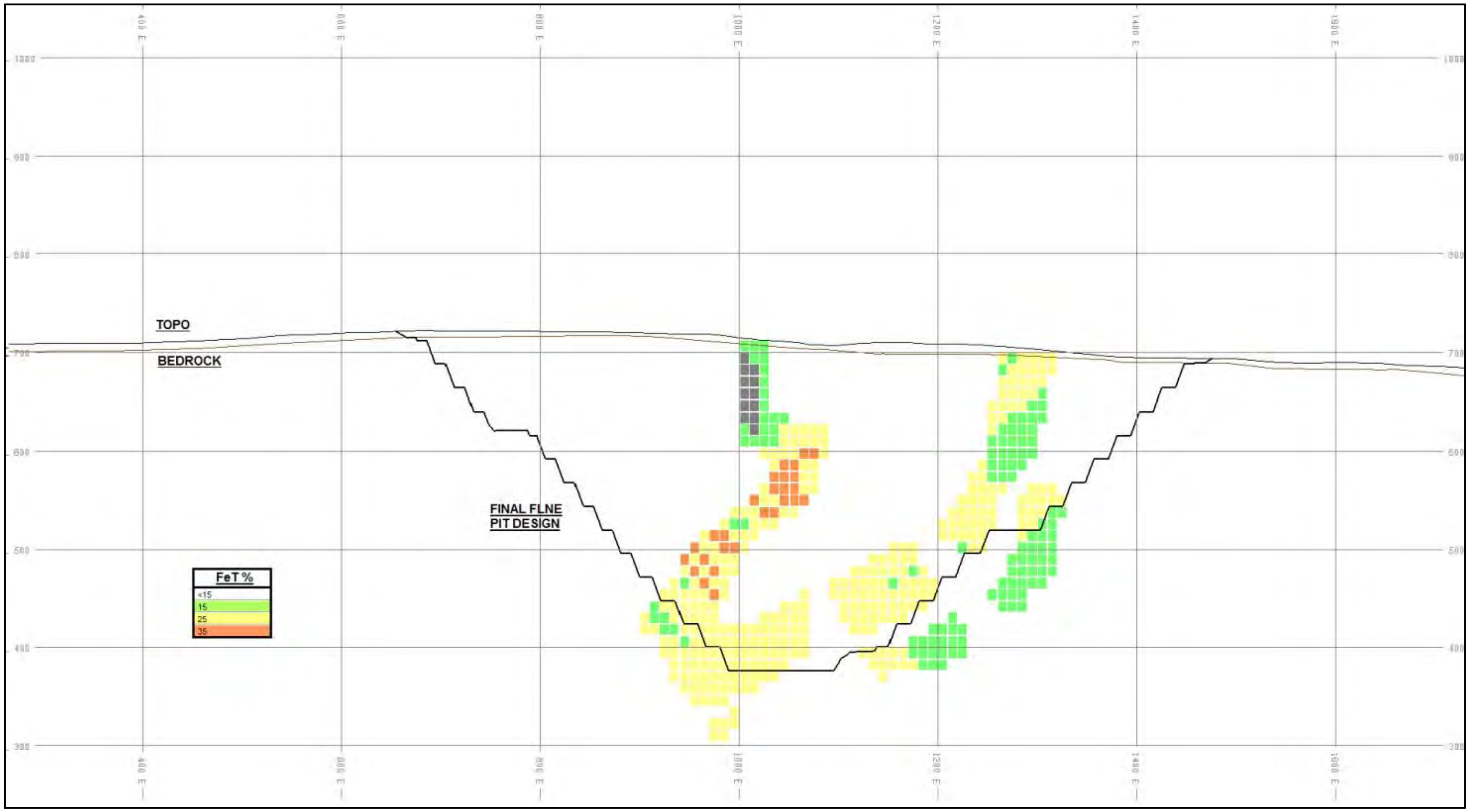


Figure 15-17: FLNE Pit Section View N 2260 m

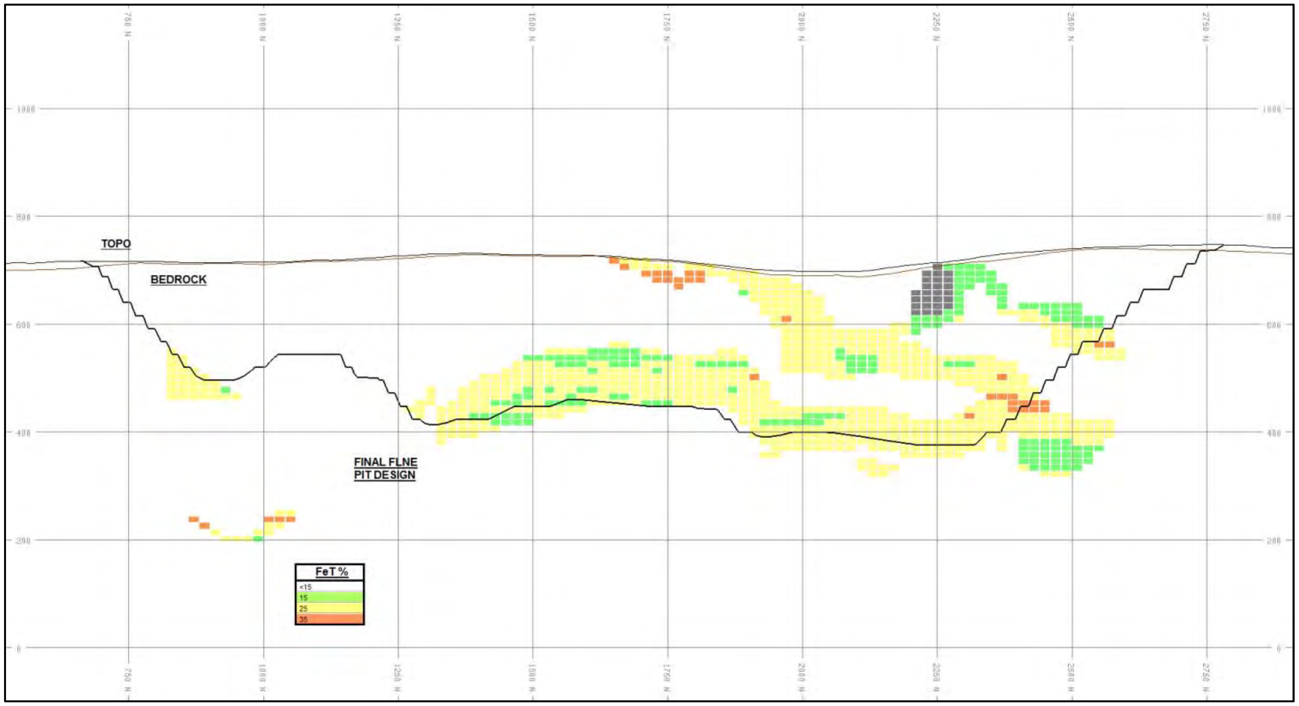


Figure 15-18: FLNE Pit Section View E 1000 m

15.4 Mineral Reserve Estimate

The Mineral Reserves are based on the engineered pit design and on aforementioned parameters. According to CIM guidelines for a PFS, only material classified as Proven and Probable shall be considered as reserves. The reserves were calculated at a set cut-off grade of 15% Fe_T, with 0% dilution and no ore loss. Table 15-10 presents the reserves for the Fire Lake North West pit. The total reserves in this pit amount to 288.81 Mt, an at average grade of 33.64% Fe_T, and 42.43% WREC (Weight Recovery). The total stripping for this pit is estimated at 747.57 Mt including 29.92 Mt of Inferred resources, resulting in a stripping ratio of 2.59.

Table 15-10: Fire Lake North West Pit Reserves

FLN West Reserves			
CoG 15% Fe_T			
	Tonnage	Grade	W.R
	Mt	Fe_T%	Wrec%
Proven	20.71	36.22	45.69
Probable	268.10	33.44	42.18
Total Reserves	288.81	33.64	42.43
Overburden	100.81		
Waste Rock	616.84		
Inferred (considered waste)	29.92		
Total Stripping	747.57		
Stripping Ratio (w/Reserves)	2.59		

Table 15-11 shows the results for the Fire Lake North East pit. The total reserves in this pit amount to 175.78 Mt at an average grade of 30.28% Fe_T and 35.64% WREC (Weight Recovery). The total stripping is 525.96 Mt, which includes overburden and inferred material (15.88 Mt), and amounts to a stripping ratio of 2.99.

Table 15-11: Fire Lake North East Pit Reserves

FLN East Reserves			
CoG 15% Fe_T			
	Tonnage	**Grade**	**W.R**
	Mt	**Fe_T%**	**Wrec%**
Proven	3.02	34.19	40.23
Probable	172.76	30.21	35.56
Total Reserves	175.78	30.28	35.64
Overburden	19.36		
Waste Rock	490.72		
Inferred (considered waste)	15.88		
Total Stripping	525.96		
Stripping Ratio (w/Reserves)	2.99		

Table 15-12 provides the final overall reserves for the PFS for Champion's Fire Lake North Project. The reserves incorporate both the Fire Lake North West and East pits. The total reserves for this Study come to 464.59 Mt at an average grade of 32.37% Fe_T and a WREC of 39.86%. The total required stripping for both the FLN West and East pits combined is 1.27 Bt, which includes 1.1 Bt of waste rock, 120.2 Mt of overburden and 45.80 Mt of Inferred resource. The average life of mine (LOM) of the Project is approximately 20 years with an overall stripping ratio of 2.74.

Table 15-12: Champion Fire Lake North PFS Mineral Reserves

FLN Combined Reserves			
CoG 15% Fe_T			
	Tonnage	**Grade**	**W.R**
	Mt	**Fe_T%**	**Wrec%**
Proven	23.73	35.96	45.00
Probable	440.86	32.17	39.58
Total Reserves	464.59	32.37	39.86
Overburden	120.17		
Waste Rock	1107.55		
Inferred (considered waste)	45.80		
Total Stripping	1273.53		
Stripping Ratio (w/Reserves)	2.74		

16. MINING METHOD

16.1 Mine Production Schedule and Methodology

The overall objective of the mine scheduling and planning process is to maximize Project NPV while attaining processing plant objectives and targets. Generally, this is done by delaying overburden and removal activities (costs) for as long as possible. This objective is taken into consideration during all phases of mine design and planning. BBA used a multiple step approach in the development of the final mine plan to reach this goal.

Due to the consideration of two (2) pits within the FLN property for this Study, additional work was completed to attempt to optimize the timing of the transition between the FLNW and FLNE pit, and to reduce excessive fluctuations in mine output, truck fleet size and personnel. This was reasonably achieved in this Study, but further optimization should be performed in the next Study phase. The West pit was selected to be the first production pit due to better grade and production considerations.

The mine plan was developed to provide a constant throughput of 23 Mtpy of ROM to the concentrator when mining in the West pit, and 24.8 Mtpy when mining in the East Pit. During transitional years, the concentrator feed tonnage was adjusted to account for the start-up of a second AG mill and is adjusted according to the feed split between the two (2) pits. The preproduction mine plan was also adjusted to suit a timely availability of construction materials for the site infrastructure and tailings dam.

The mine planning process involved the simulation of a series of pit optimizations within the selected final optimized pit at incremental concentrate selling prices to create progressive pit shells or expansions. From these pit shells, multiple starter and transition pit phases were designed as a guiding tool during the detailed planning process. Mine planning was manually undertaken using the MineSight's Interactive Planner Module while using the various pit phases and shells as guides. This mine plan was then further refined to smooth out equipment fleet and optimize capital expenditures.

16.1.1 Optimized Mine Phases

Incremental pit shells were obtained as a function of the selling price (costs were kept constant) in order to visualize the spatial sensitivity of the deposit to changes in project economics. Pit shells developed with the lower selling prices generally prioritize high profitability material (high grade, low stripping). As such, these pits can be used to create a starting pit and a pit development sequence that will maximize the Project NPV, as the phases are inherently designed to delay the increasing costs associated with additional mining of waste material. These shells will form the basis for the various pushbacks that will be mined sequentially over the mine life. These intermediate optimizations use the same mining cost and slope parameters as the primary pit optimization used to define the ultimate economic pit. The phase shells are selected to meet a minimum pushback width of approximately 100 m.

The selected pit shells were subsequently used as a basis to develop the designed phases stated in previous paragraphs, using the same design criteria as the final pit designs. In particular, two (2) starter pits were created for the West pit in order to delay, as much as possible, the start of mining within the footprint of Lac Hippocampe.

16.1.2 Mine Production Schedule

16.1.2.1 Pre-production and Construction

Site construction is scheduled to occur during Year -2 and Year -1 of the project schedule and is to begin using waste material from the East pit. A site for the quarry will be designated in the East pit to provide approximately two (2) million in-situ cubic meters of rock for infrastructure and tailings dam construction. Construction material is to be hauled using a fleet of 40 t articulated trucks during Year -2, after which the primary mining fleet will be responsible for the movement of an additional 5 000 in-situ cubic meters of construction rock. Pre-stripping of the West pit is scheduled to begin in Year -1. Further pre-stripping of the East pit will occur in Year 9 to prepare this pit for mining in the second half of Year 10.

16.1.2.2 Production

Ore production will first occur from the FLNW deposit following its pre-stripping period in Year -1. Ore will be supplied to the concentrator at a rate of 23 Mt per annum. In an effort to maximize the time available for the drainage of both Lac Hippocampe and the surrounding overburden, mining will first occur in a small starter pit located at the south end of the deposit. In the second half of Year 1, mining will transition to a larger, central, starter pit that will infringe on Lac Hippocampe beginning in Year 2. The West pit will be mined continuously until the second half of Year 10 when the ore production will shift to the East Pit. The East pit will provide ore at a rate of 24.8 Mt per annum until its depletion in the second half of Year 17.

Additional stripping at the West pit is planned for both the beginning and end of the East pit life to progressively enable an access to the ore within the final West pit pushback. In particular, stripping in the West pit will occur during Year 11, Year 12 and Year 16. Any ore that is mined during these years is planned to be processed separately from the East pit ore. This mining strategy has been employed to minimize the stripping ratios in the first half of the mine life, and to help balance the truck fleet requirements during the transition to the East pit.

The total tonnes moved will reach a maximum of 112 Mt in Year 15 with a maximum stripping ratio of 3.52. A graph outlining the tonnage of material moved, mill feed grade and weight recovery for the combined mine plan is shown in Figure 16-1. The detailed mine plan for both pits can be found in Table 16-1: Yearly Mine Plan Divided for Fire Lake West and East Pits, and a combined mine plan can be found in Table 16-2. Drawings reproducing the pit shape at the end of each period of the production schedule are included, and can be found in Figure 16-2 to Figure 16-31.

Table 16-1: Yearly Mine Plan Divided for Fire Lake West and East Pits

		Fire Lake North West Pit								Fire Lake North East Pit								Grand Total	% Source	
		ROM			OB	Waste Rock	Inferred		West Total	ROM			OB	Waste Rock	Inferred		East Total			
Pit	Period	Mt	Fe_T%	WREC%	Mt	Mt	Mt	Fe_T%	Mt	Mt	Fe_T%	WREC%	Mt	Mt	Mt	Fe_T%	Mt	Mt	%West	%East
East	Const. (Y-2)*	0.00			0.00	0.00	0.00		0.00				1.03	5.81			6.83	6.83	0.00	1.00
E/W	Y-1_H1*	0.37	35.19	43.73	5.74	0.25	0.02	33.03	6.38				0.26	1.45			1.71	8.08	1.00	0.00
West Pit	Y-1_H2	0.08	31.29	38.88	10.27	0.46	0.04	31.31	10.86								0.00	10.86	1.00	0.00
	Y1_H1	11.30	33.30	41.38	5.86	5.45	0.02	32.16	22.63								0.00	22.63	1.00	0.00
	Y1_H2	11.50	33.84	42.05	10.21	9.39	0.62	32.38	31.72								0.00	31.72	1.00	0.00
	Y2_H1	11.50	34.15	42.44	8.14	8.77	0.49	33.51	28.90								0.00	28.90	1.00	0.00
	Y2_H2	11.50	33.74	41.93	2.61	15.05	0.63	32.15	29.79								0.00	29.79	1.00	0.00
	Y3	23.00	35.34	43.92	11.09	29.17	0.17	31.82	63.43								0.00	63.43	1.00	0.00
	Y4	23.00	35.85	44.55	9.45	43.93	2.63	31.45	79.02								0.00	79.02	1.00	0.00
	Y5	23.00	32.59	40.49	3.94	63.39	0.86	32.73	91.19								0.00	91.19	1.00	0.00
	Y6	23.00	32.26	40.08	19.12	50.41	0.86	32.16	93.40								0.00	93.40	1.00	0.00
	Y7	23.00	33.22	41.28	3.13	72.16	2.60	44.49	100.88								0.00	100.88	1.00	0.00
	Y8	23.00	33.65	41.82	0.36	74.56	0.50	38.33	98.42								0.00	98.42	1.00	0.00
East/West Pit	Y9	23.00	34.32	42.64	9.87	45.89	2.55	27.68	81.31				6.01	11.76	0.00	0.00	17.76	99.08	0.83	0.17
	Y10	9.90	36.15	44.93	1.01	38.33	4.17	26.23	53.41	13.38	31.94	37.02	1.90	29.99	1.27	28.42	46.54	99.95	0.52	0.48
	Y11	0.54	35.08	43.59	0.00	24.40	2.73	26.04	27.67	24.26	32.16	37.27	3.06	48.00	1.27	28.42	76.60	104.27	0.28	0.72
	Y12	0.64	34.97	43.45	0.00	9.83	2.80	26.51	13.27	24.16	32.65	37.84	1.56	65.15	2.56	27.97	93.43	106.71	0.16	0.84
East Pit	Y13	0.00	0.00	0.00	0.00	3.75	0.00	0.00	3.75	24.80	30.92	35.83	4.56	75.01	3.09	29.92	107.47	111.22	0.00	1.00
	Y14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.80	28.40	32.92	0.98	83.28	2.29	28.35	111.34	111.34	0.00	1.00
	Y15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.80	28.70	33.27	0.00	85.77	1.52	27.36	112.09	112.09	0.00	1.00
East/West	Y16	0.67	33.96	42.21	0.00	15.03	1.32	27.56	17.03	24.13	28.87	33.47	0.00	60.89	3.03	30.51	88.05	105.07	0.16	0.84
	Y17	8.50	30.87	38.36	0.00	46.43	3.88	30.21	58.81	15.46	28.91	33.51	0.00	23.62	0.84	28.61	39.91	98.72	0.61	0.39
West Pit	Y18	23.00	30.55	37.96	0.00	43.49	2.43	28.76	68.92	0.00							0.00	68.92	1.00	0.00
	Y19	23.00	32.73	40.68	0.00	14.71	0.48	25.69	38.19	0.00							0.00	38.19	1.00	0.00
	Y20	15.29	36.44	44.97	0.00	1.98	0.14	30.60	17.41	0.00							0.00	17.41	1.00	0.00
	Grand Total	288.81	33.64	41.79	100.81	616.84	29.92	30.17	1036.38	175.78	30.28	35.10	19.36	490.72	15.88	28.94	701.74	1738.12		

Table 16-2: Combined Yearly Mine Plan

		Combined Yearly Mine Plan											SR	Fe Con
		Ore Milled			Ore Mined			OB	Waste Rock	Inferred		Grand Total		
Pit	Period	Mt	Fe_T%	WREC%	Mt	Fe_T%	WREC%	Mt	Mt	Mt	Fe_T%	Mt		Mt
East	Const. (Y-2)*	0.00			0.00			1.03	5.81	0.00		6.83		
West Pit	Y-1	0.00			0.45	34.48	42.85	16.27	2.16	0.06	31.82	18.94		
	Y1	23.00	33.57	41.74	22.80	33.57	41.72	16.07	14.84	0.64	32.38	54.35	1.38	9.60
	Y2	23.00	33.95	42.19	23.00	33.95	42.19	10.75	23.82	1.12	32.75	58.69	1.55	9.70
	Y3	23.00	35.34	43.92	23.00	35.34	43.92	11.09	29.17	0.17	31.82	63.43	1.76	10.10
	Y4	23.00	35.85	44.55	23.00	35.85	44.55	9.45	43.93	2.63	31.45	79.02	2.44	10.25
	Y5	23.00	32.59	40.49	23.00	32.59	40.49	3.94	63.39	0.86	32.73	91.19	2.96	9.31
	Y6	23.00	32.26	40.08	23.00	32.26	40.08	19.12	50.41	0.86	32.16	93.40	3.06	9.22
	Y7	23.00	33.22	41.28	23.00	33.22	41.28	3.13	72.16	2.60	44.49	100.88	3.39	9.49
	Y8	23.00	33.65	41.82	23.00	33.65	41.82	0.36	74.56	0.50	38.33	98.42	3.28	9.62
East/West Pit	Y9	23.00	34.32	42.64	23.00	34.32	42.64	15.88	57.65	2.55	27.68	99.08	3.31	9.81
	Y10	23.28	33.73	40.39	23.28	33.73	40.39	2.91	68.31	5.44	26.74	99.95	3.29	9.40
	Y11	24.80	32.22	37.41	24.80	32.22	37.41	3.06	72.40	4.00	26.80	104.27	3.20	9.28
	Y12	24.80	32.71	37.98	24.80	32.71	37.98	1.56	74.98	5.37	27.21	106.71	3.30	9.42
East Pit	Y13	24.80	30.92	35.83	24.80	30.92	35.83	4.56	78.76	3.09	29.92	111.22	3.48	8.89
	Y14	24.80	28.40	32.92	24.80	28.40	32.92	0.98	83.28	2.29	28.35	111.34	3.49	8.16
	Y15	24.80	28.70	33.27	24.80	28.70	33.27	0.00	85.77	1.52	27.36	112.09	3.52	8.25
East/West	Y16	24.80	29.01	33.70	24.80	29.01	33.70	0.00	75.92	4.35	29.61	105.07	3.24	8.36
	Y17	23.96	29.60	35.23	23.96	29.60	35.23	0.00	70.05	4.71	29.92	98.72	3.12	8.44
West Pit	Y18	23.00	30.55	37.96	23.00	30.55	37.96	0.00	43.49	2.43	28.76	68.92	2.00	8.73
	Y19	23.00	32.73	40.68	23.00	32.73	40.68	0.00	14.71	0.48	25.69	38.19	0.66	9.36
	Y20	15.54	36.44	44.97	15.29	36.44	44.97	0.00	1.98	0.14	30.60	17.41	0.14	6.99
	Grand Total	464.59	32.37	39.26	464.59	32.37	39.26	120.17	1107.55	45.80	29.74	1738.12	2.74	182.38

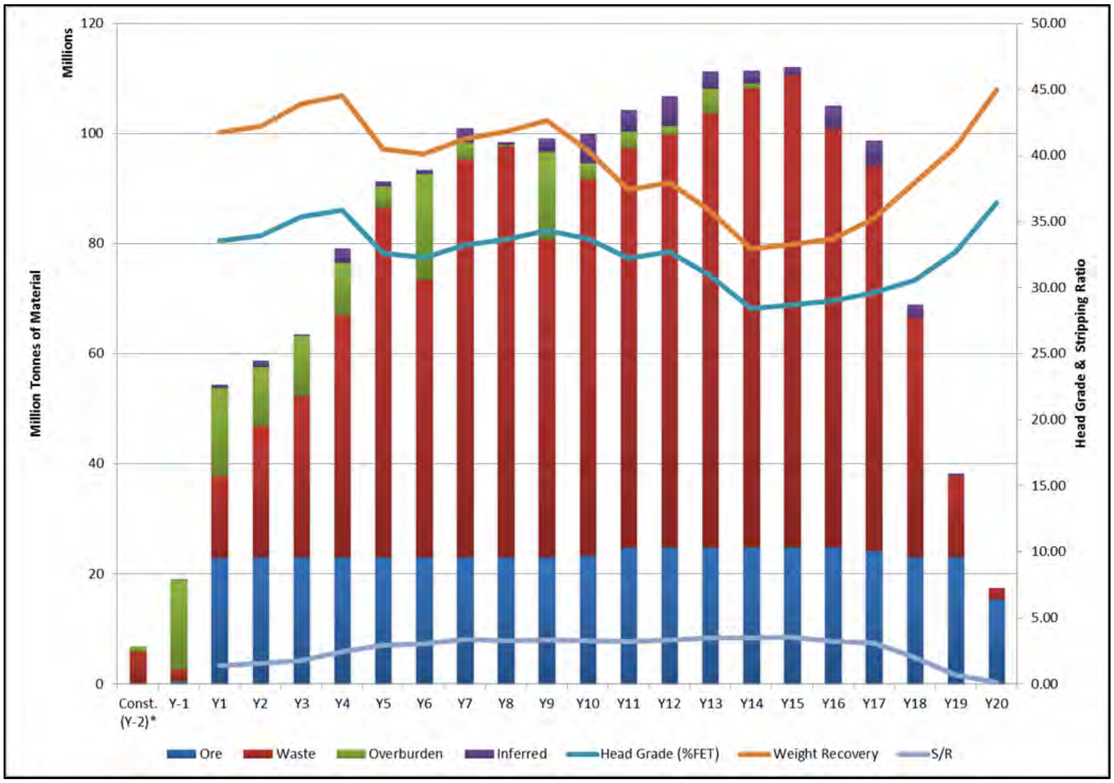


Figure 16-1: Combined Yearly Mine Plan

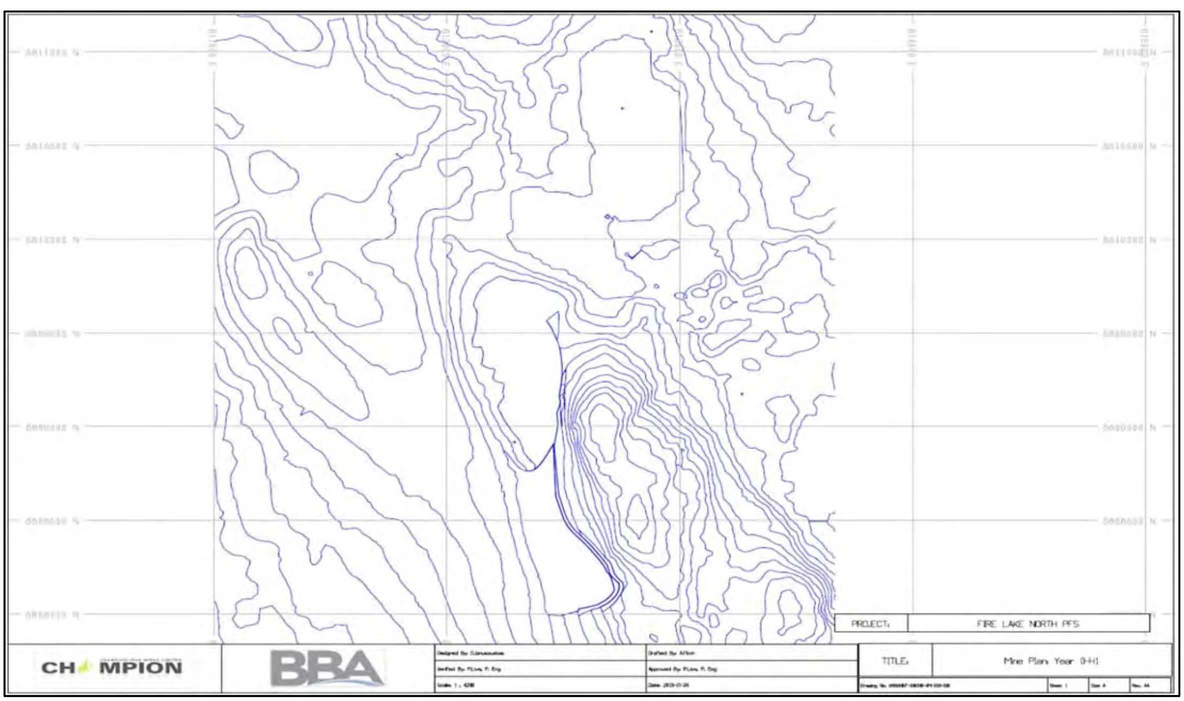


Figure 16-2: Mine Plan -1 (First Half) (FLNW)

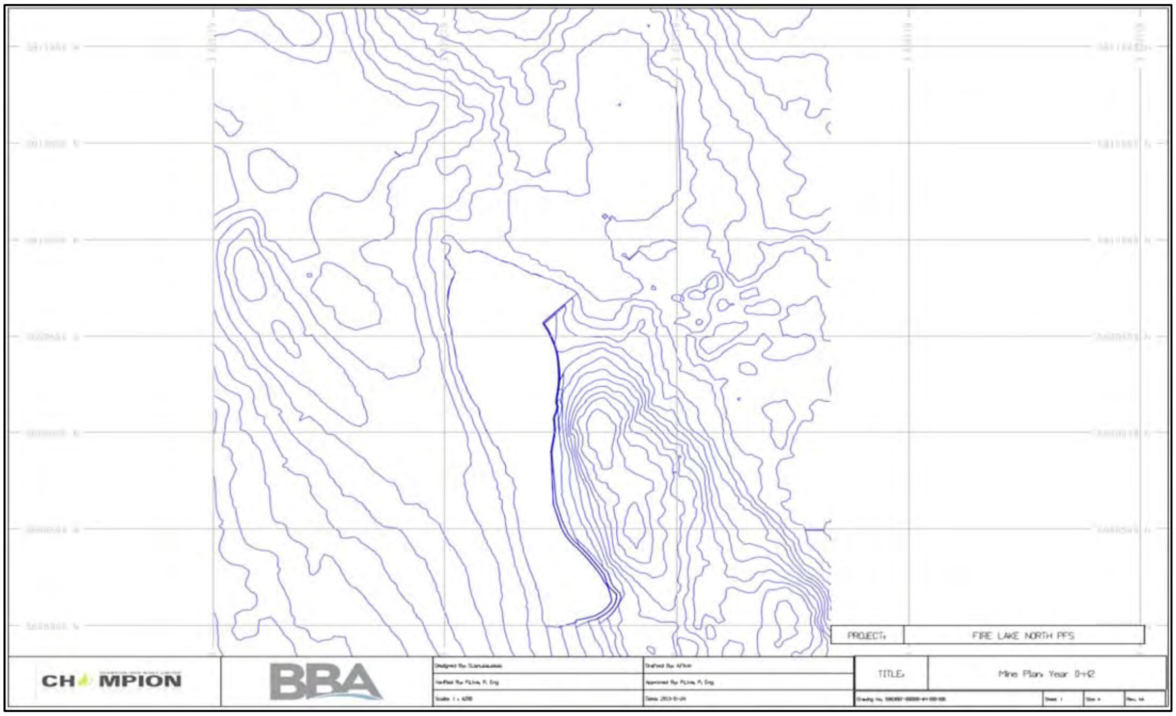


Figure 16-3: Mine Plan Year -1 (Second Half) (FLNW)

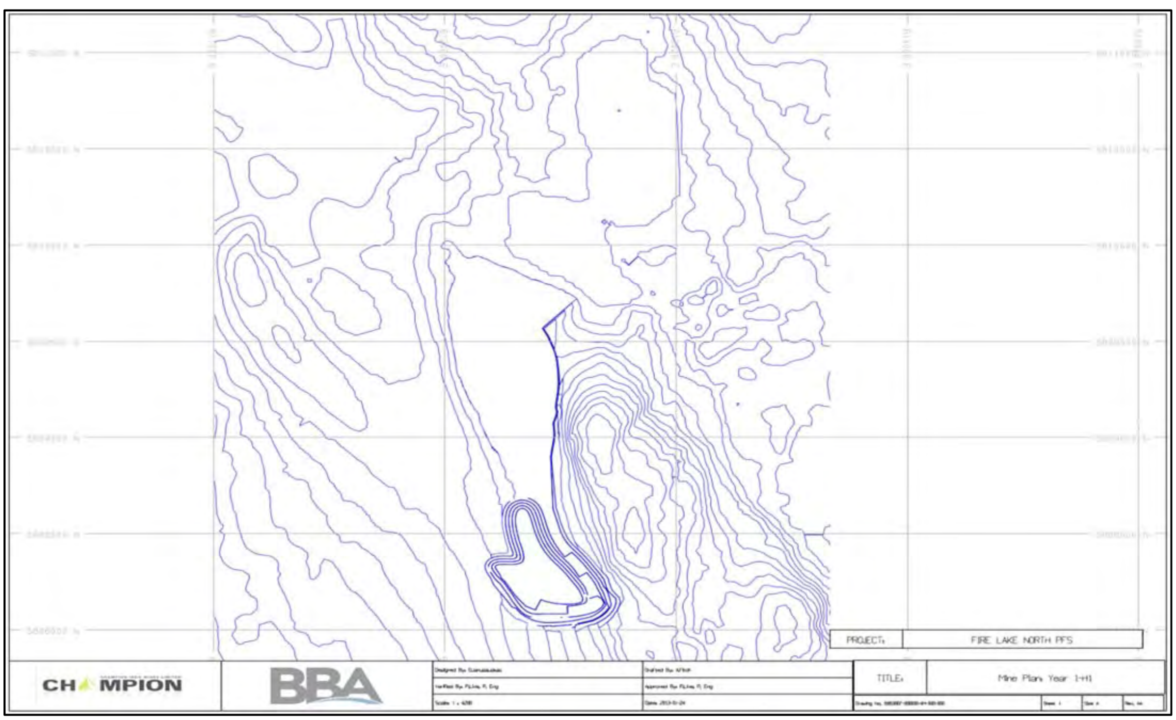


Figure 16-4: Mine Plan Year 1 (First Half) (FLNW)

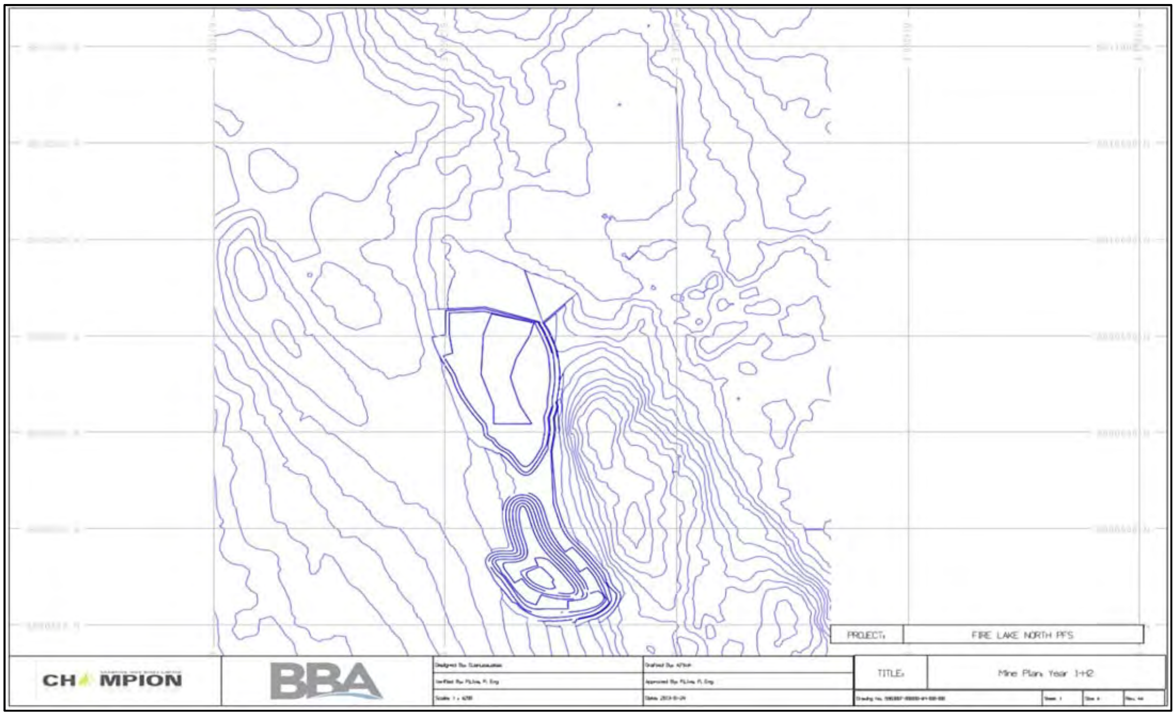


Figure 16-5: Mine Plan Year 1 (Second Half) (FLNW)

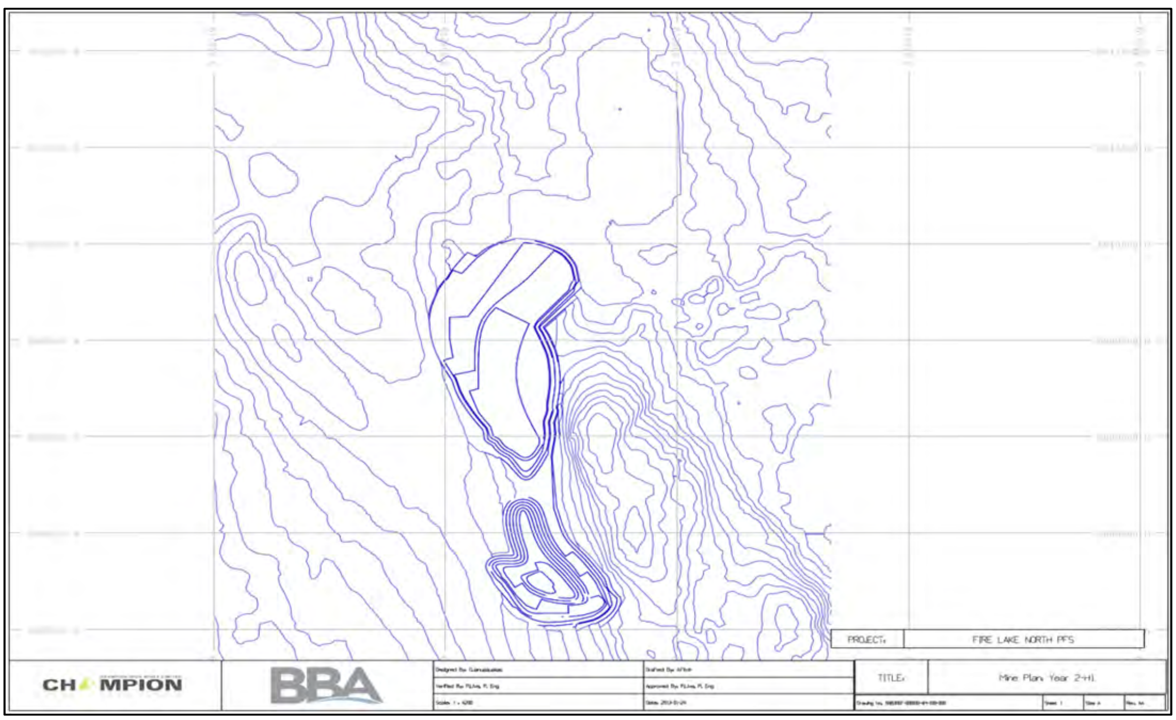


Figure 16-6: Mine Plan Year 2 (First Half) (FLNW)

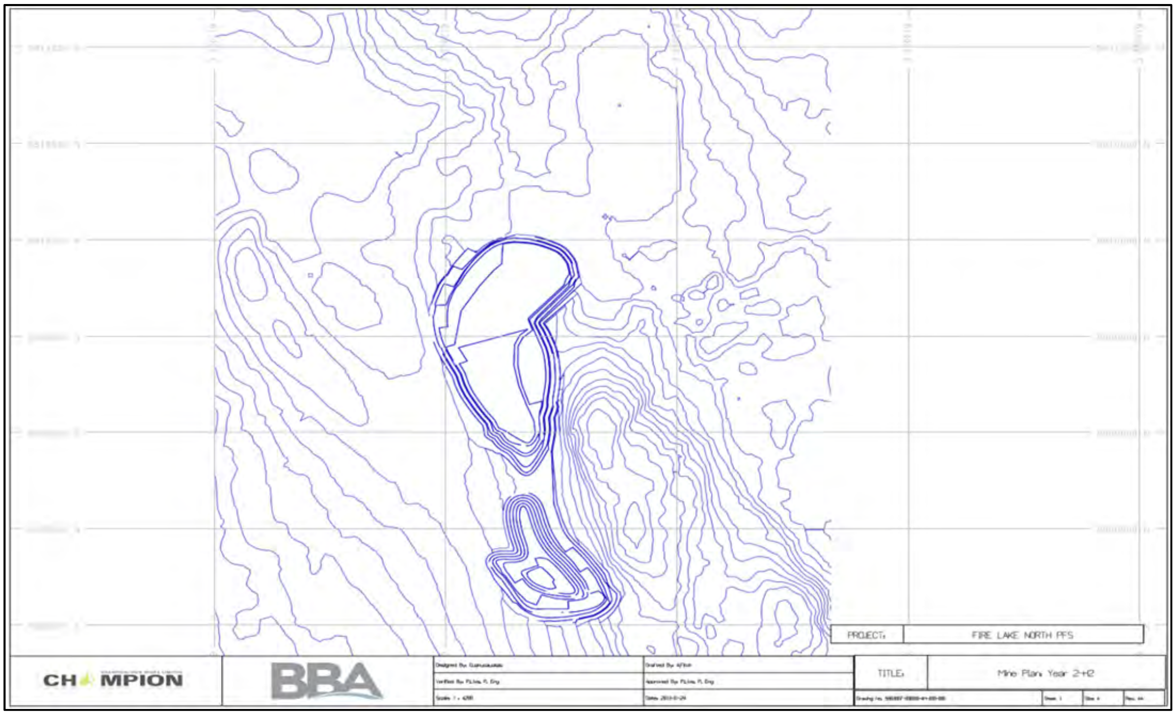


Figure 16-7: Mine Plan Year 2 (Second Half) (FLNW)

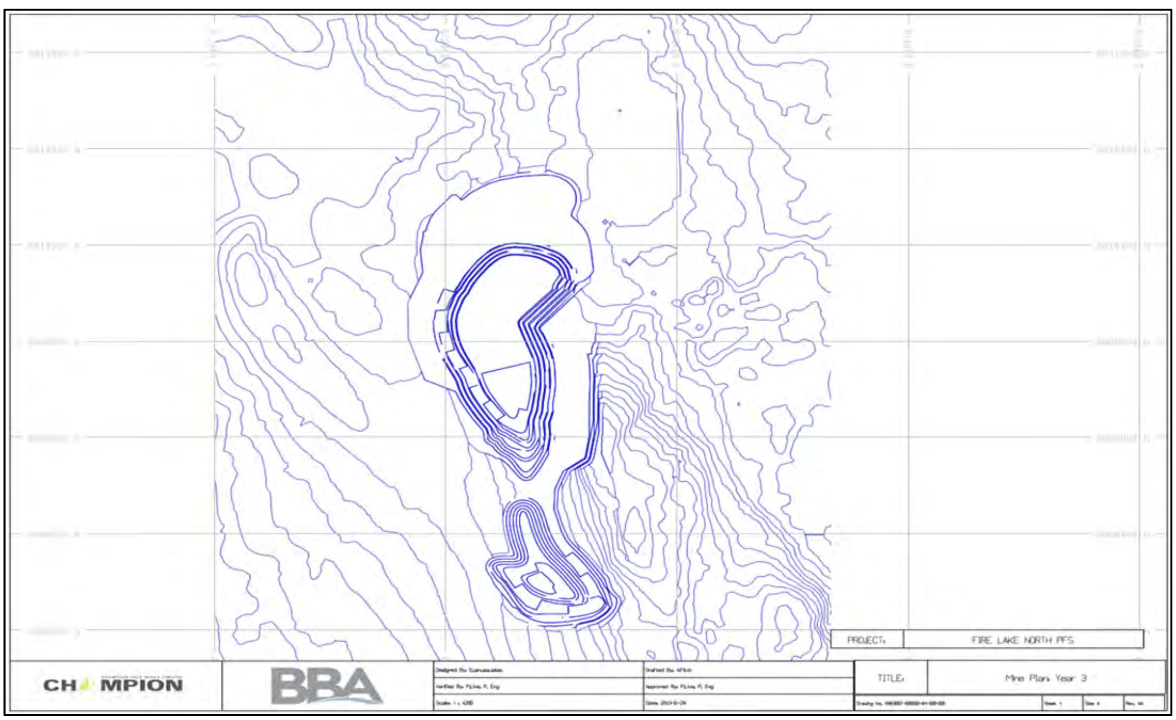


Figure 16-8: Mine Plan Year 3 (FLNW)

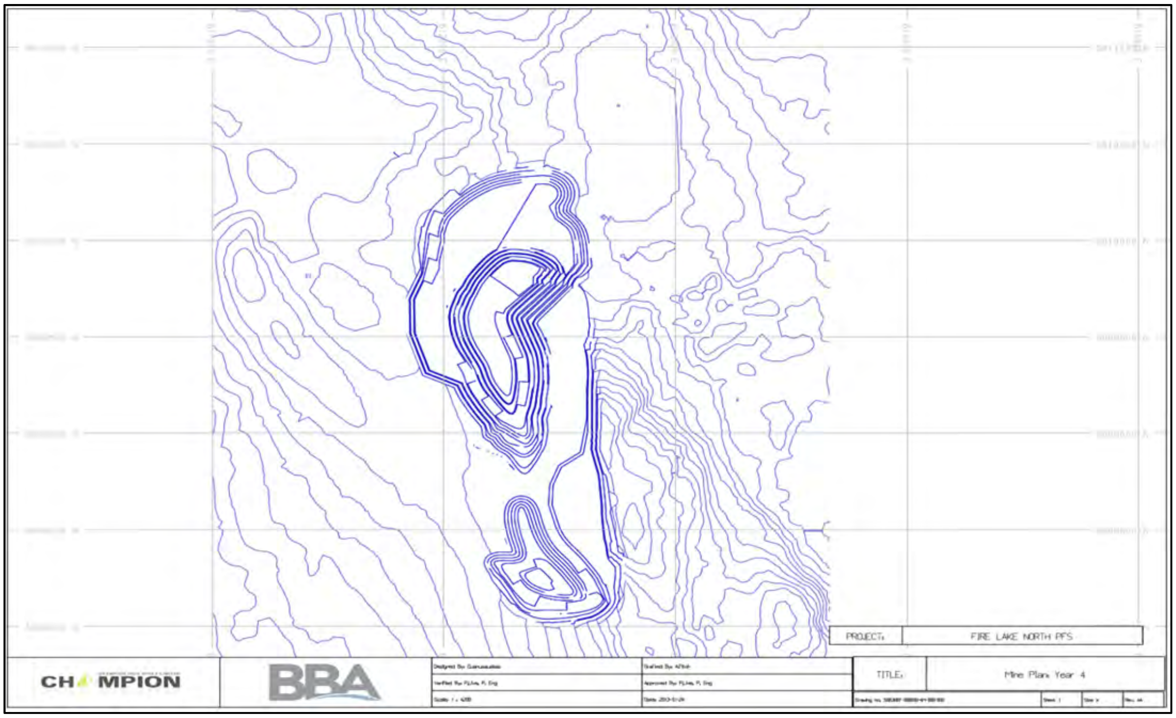


Figure 16-9: Mine Plan Year 4 (FLNW)

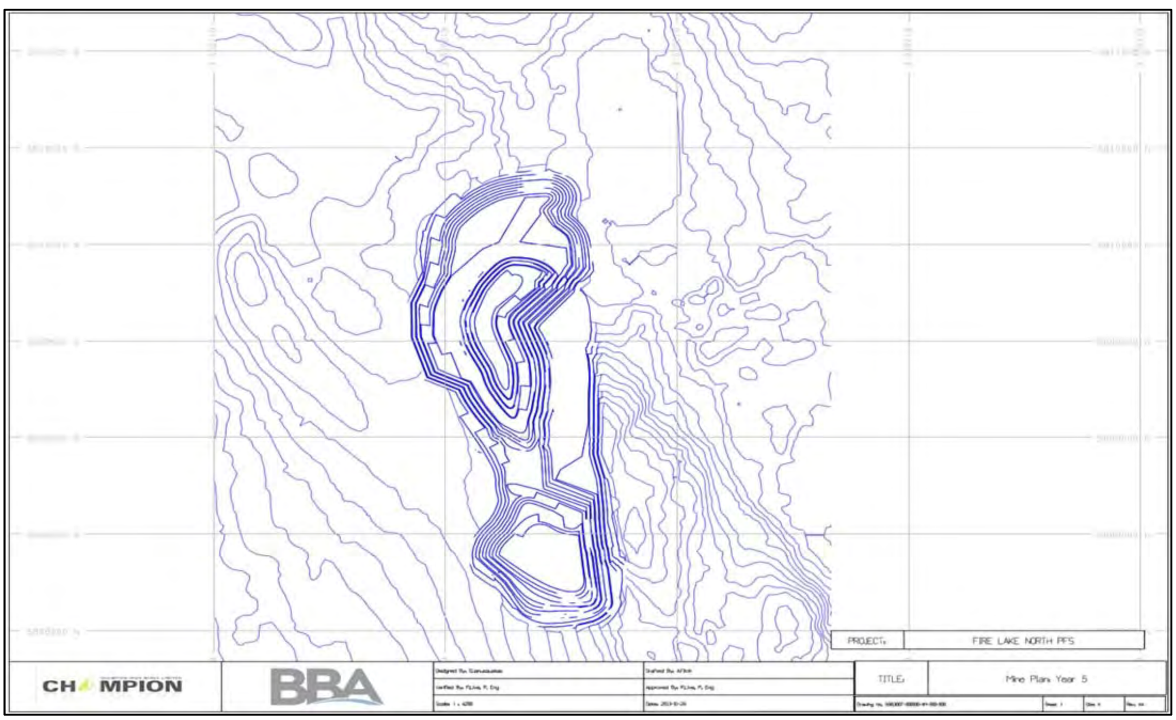


Figure 16-10: Mine Plan Year 5 (FLNW)

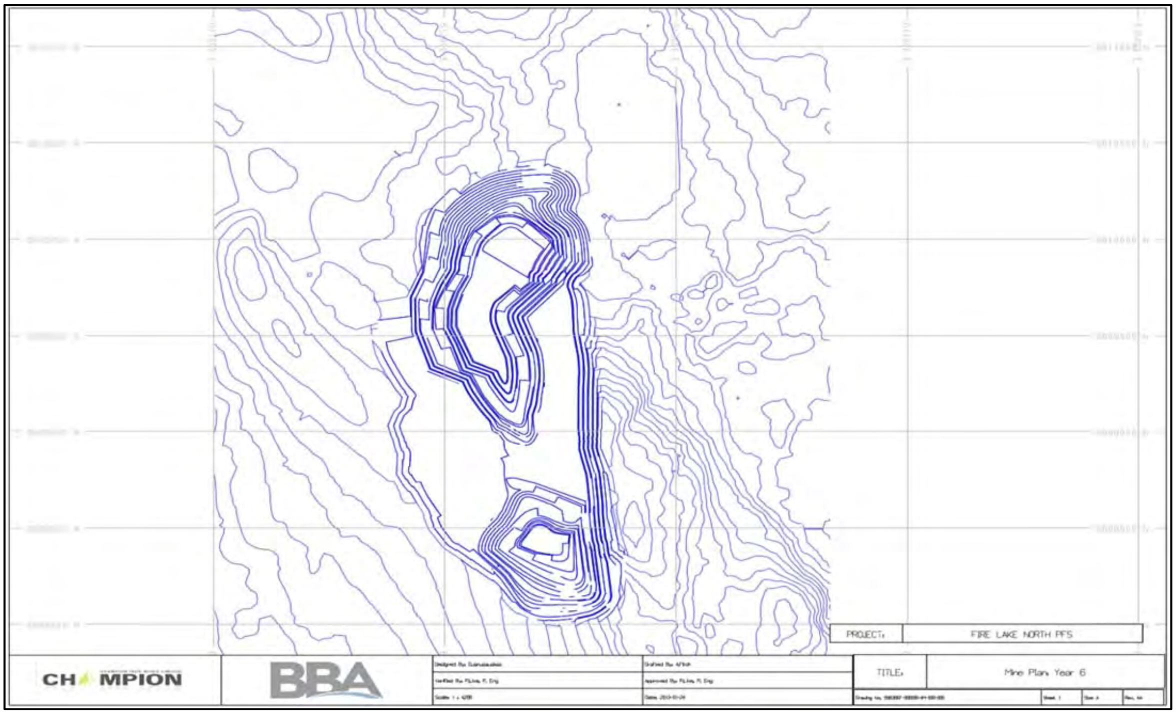


Figure 16-11: Mine Plan Year 6 (FLNW)

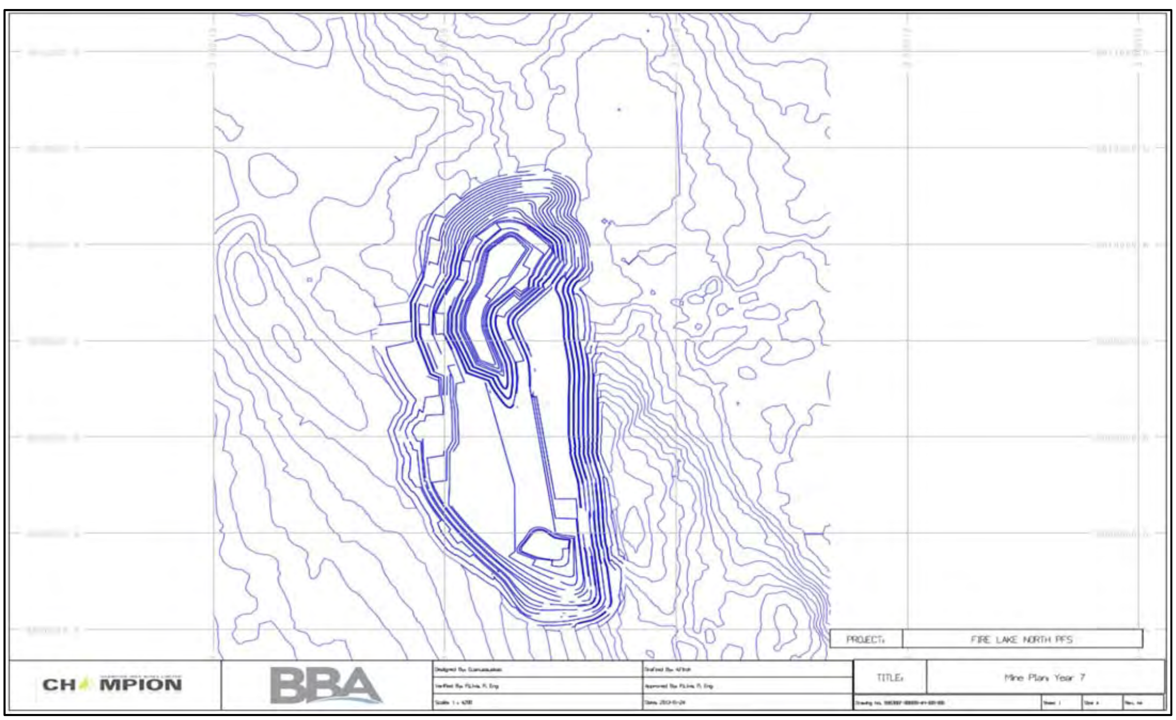


Figure 16-12: Mine Plan Year 7 (FLNW)

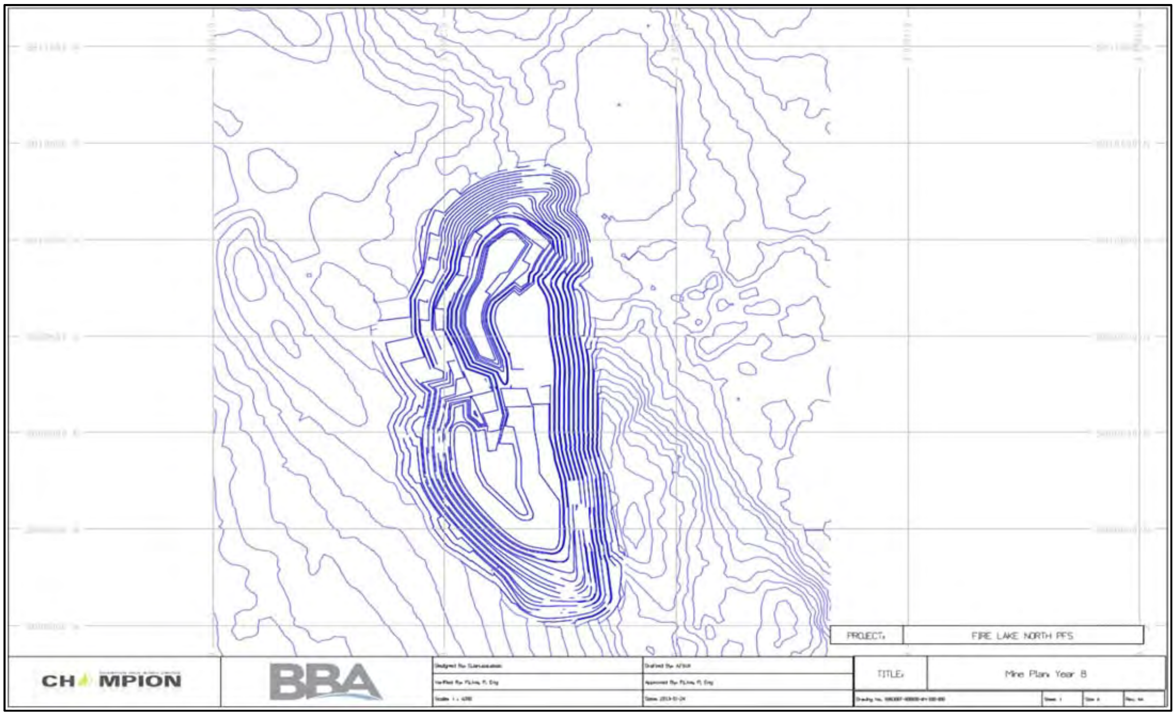


Figure 16-13: Mine Plan Year 8 (FLNW)

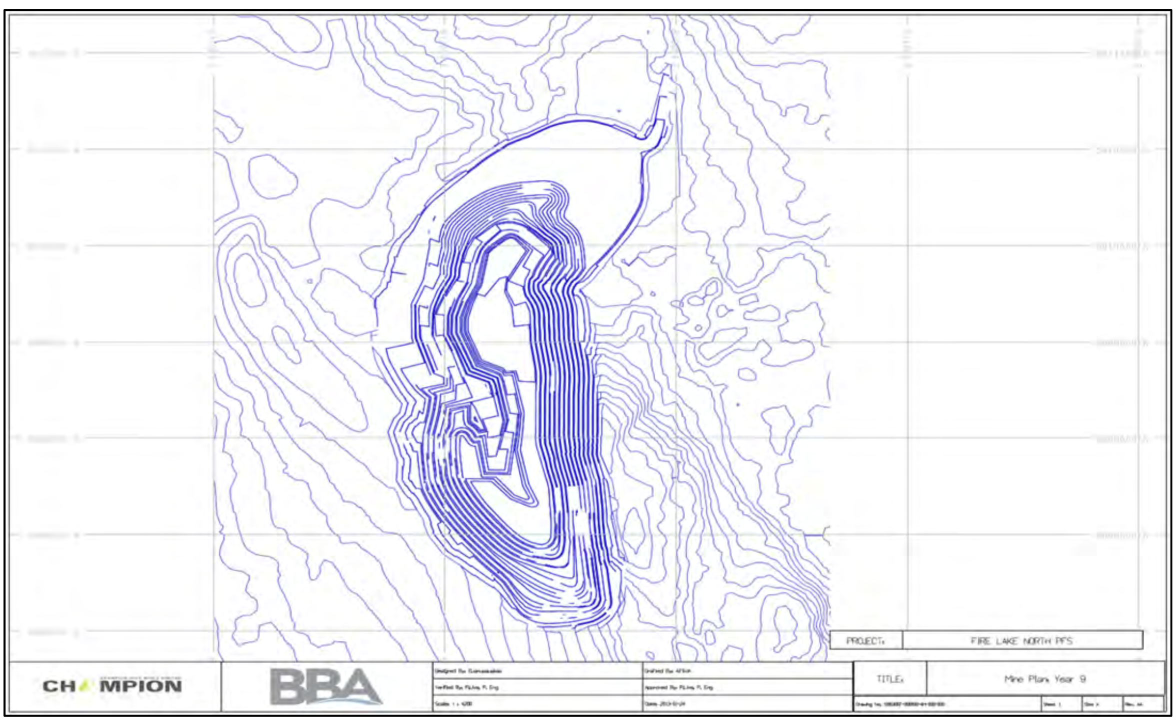


Figure 16-14: Mine Plan Year 9 (FLNW)

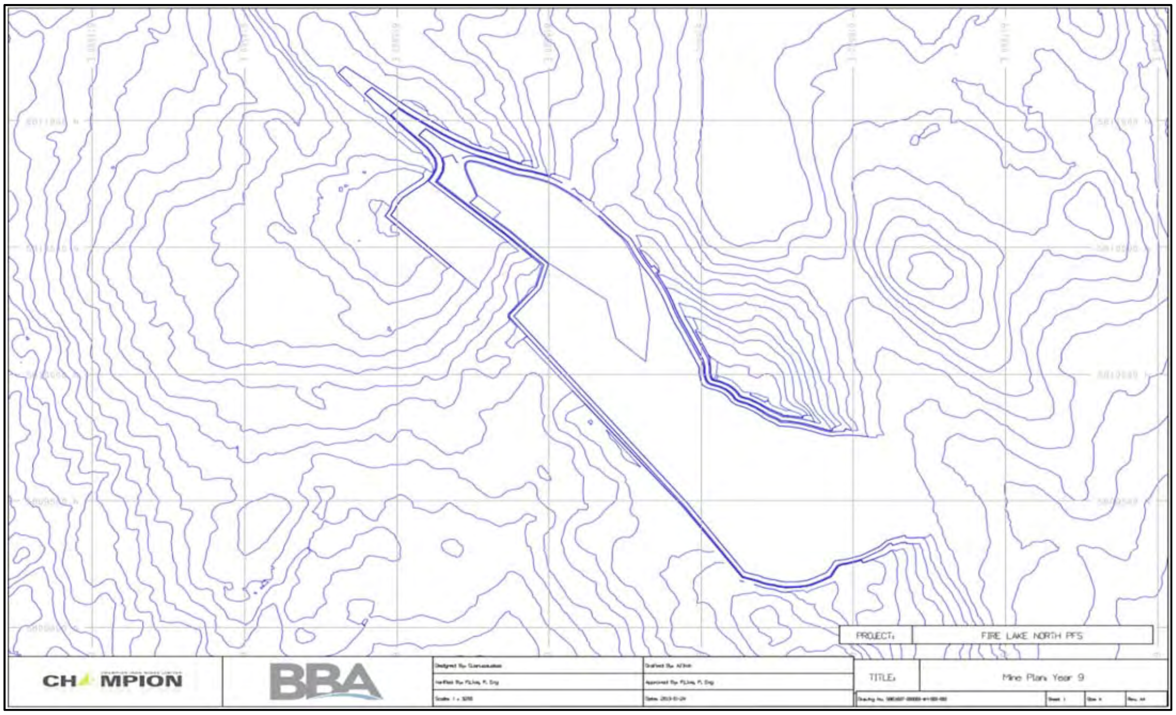


Figure 16-15: Mine Plan Year 9 (FLNE)

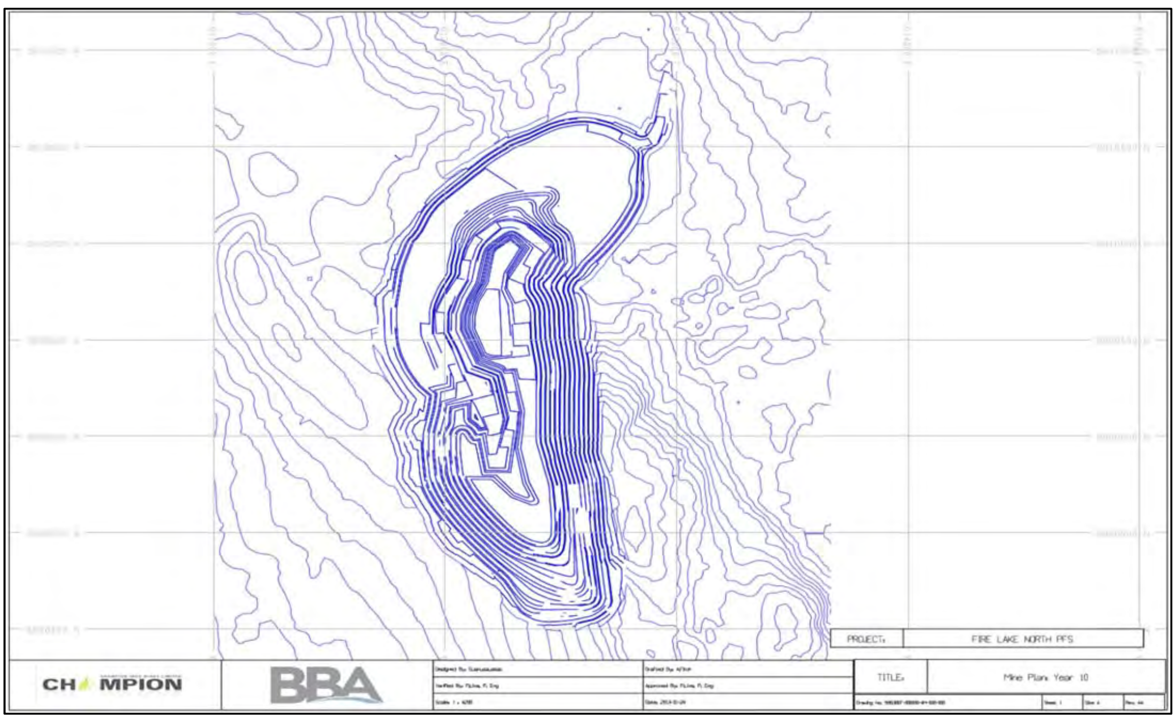


Figure 16-16: Mine Plan Year 10 (FLNW)

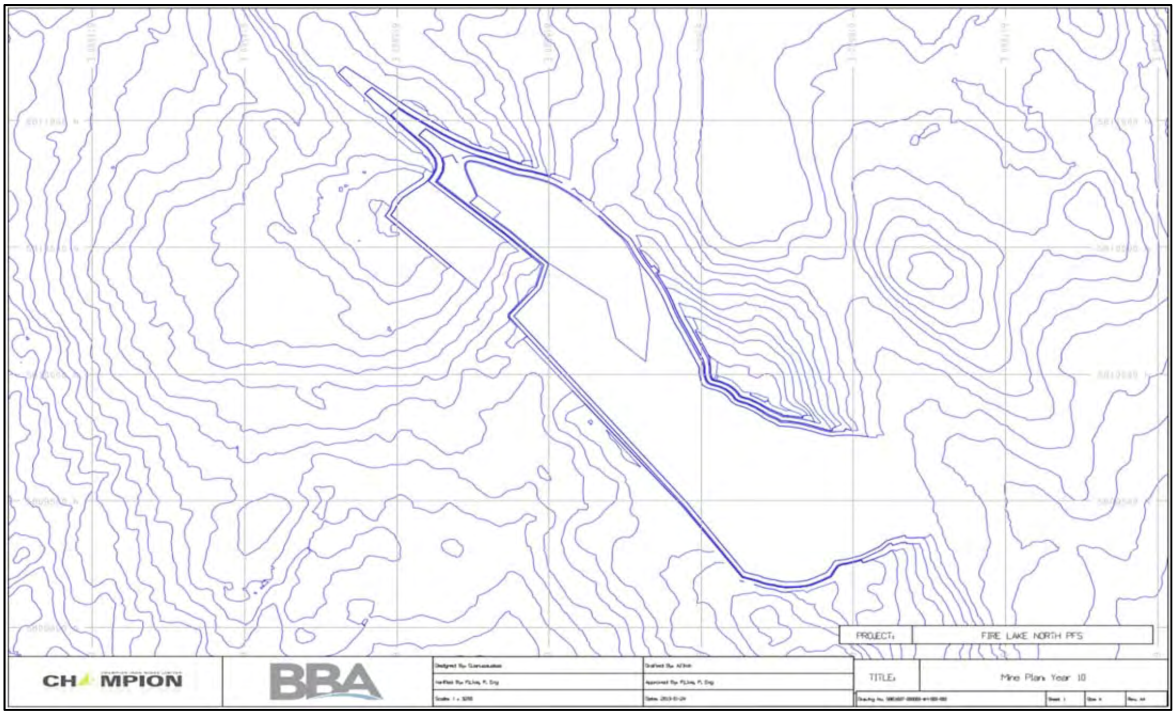


Figure 16-17: Mine Plan Year 10 (FLNE)

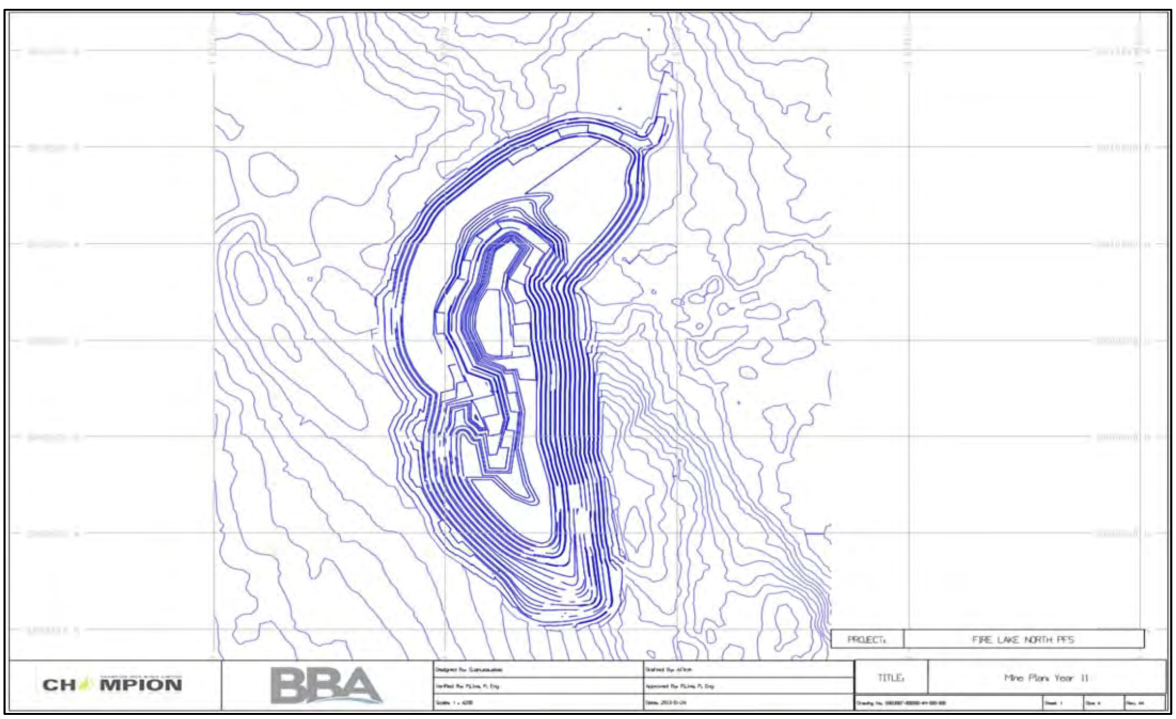


Figure 16-18: Mine Plan Year 11 (FLNW)

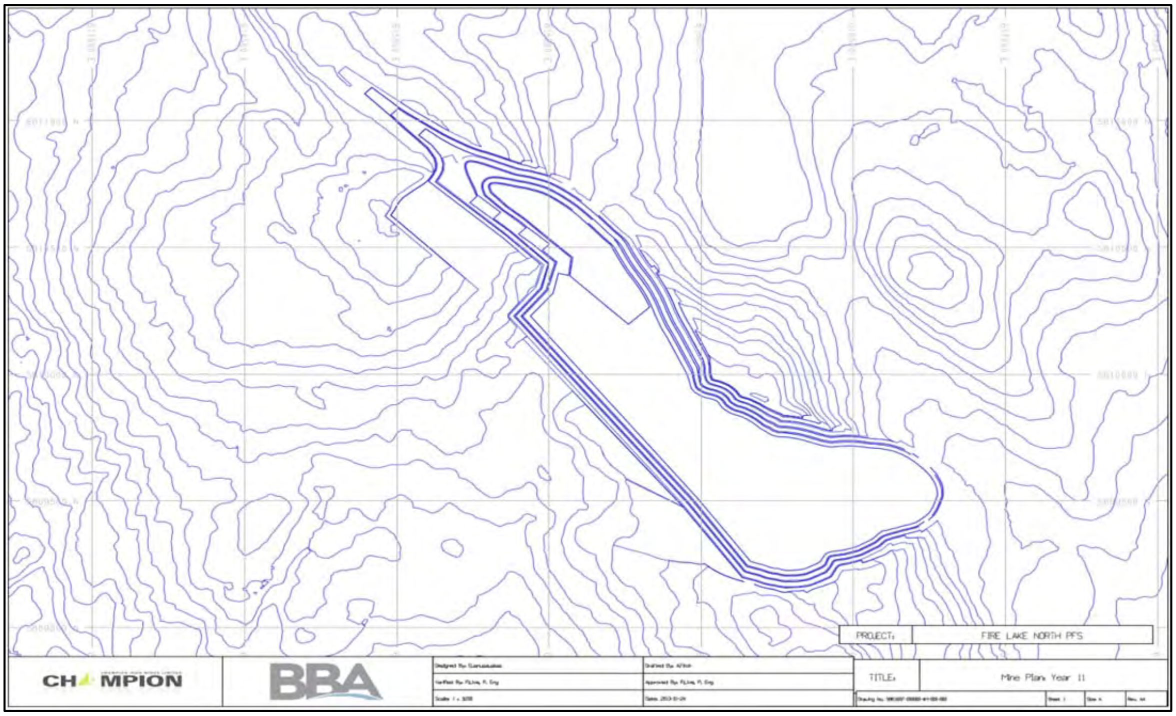


Figure 16-19: Mine Plan Year 11 (FLNE)

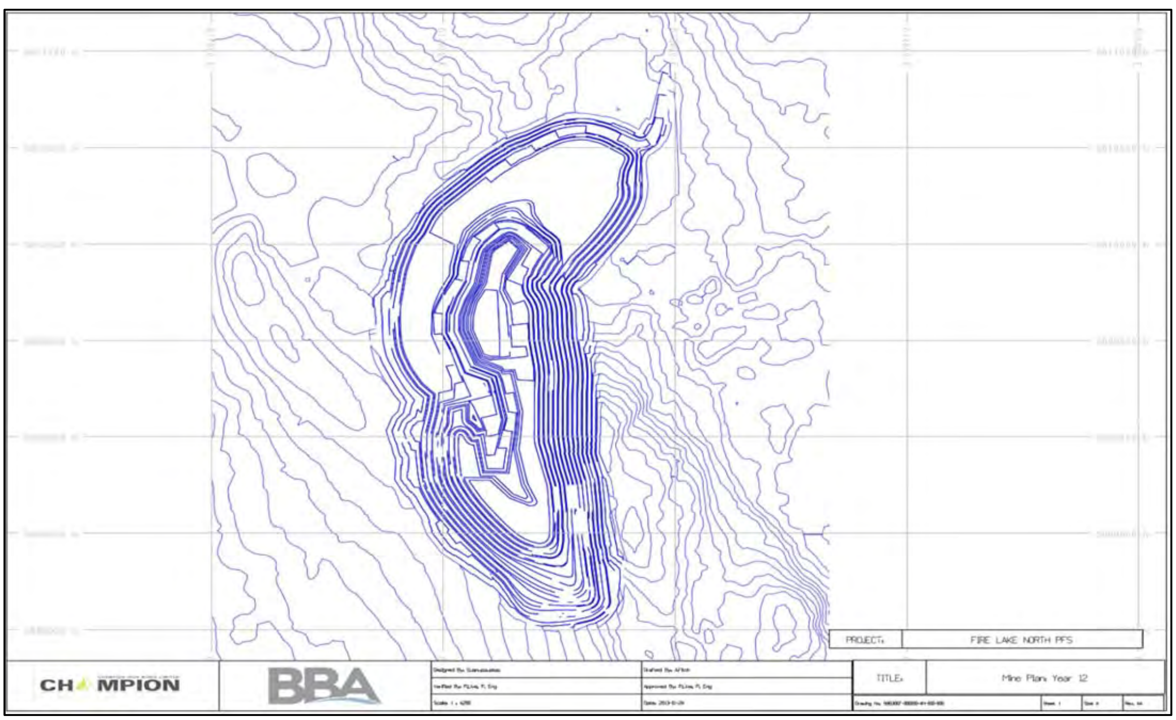


Figure 16-20: Mine Plan Year 12 (FLNW)

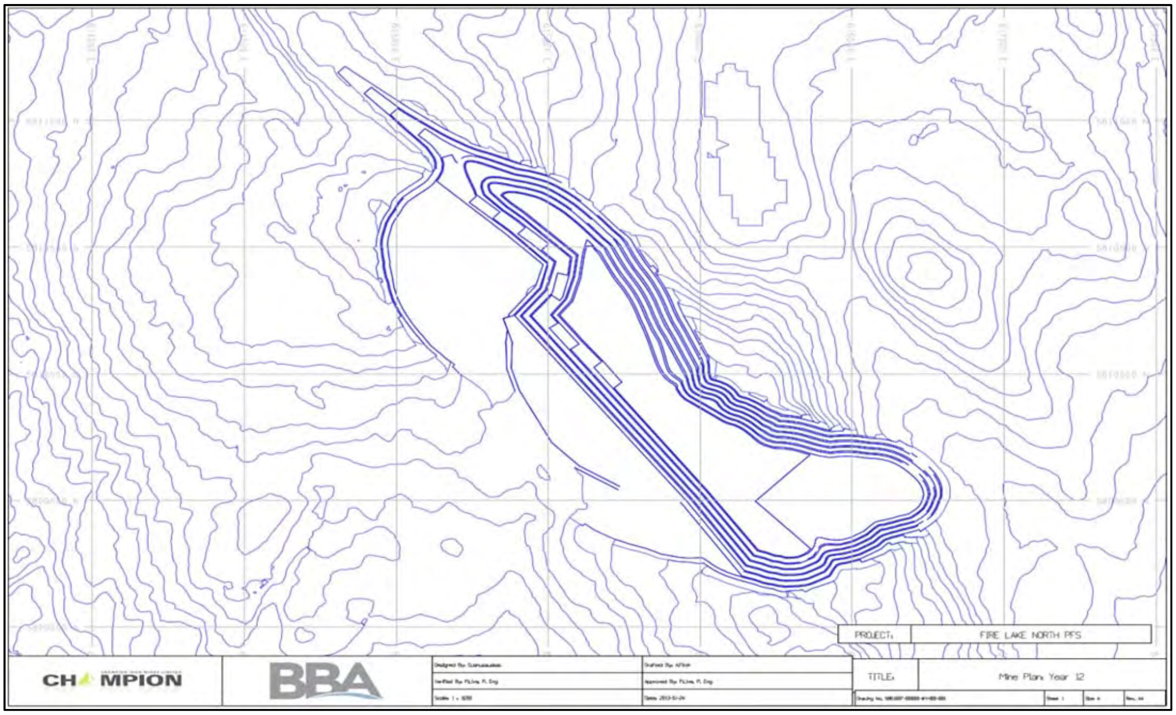


Figure 16-21: Mine Plan Year 12 (FLNE)

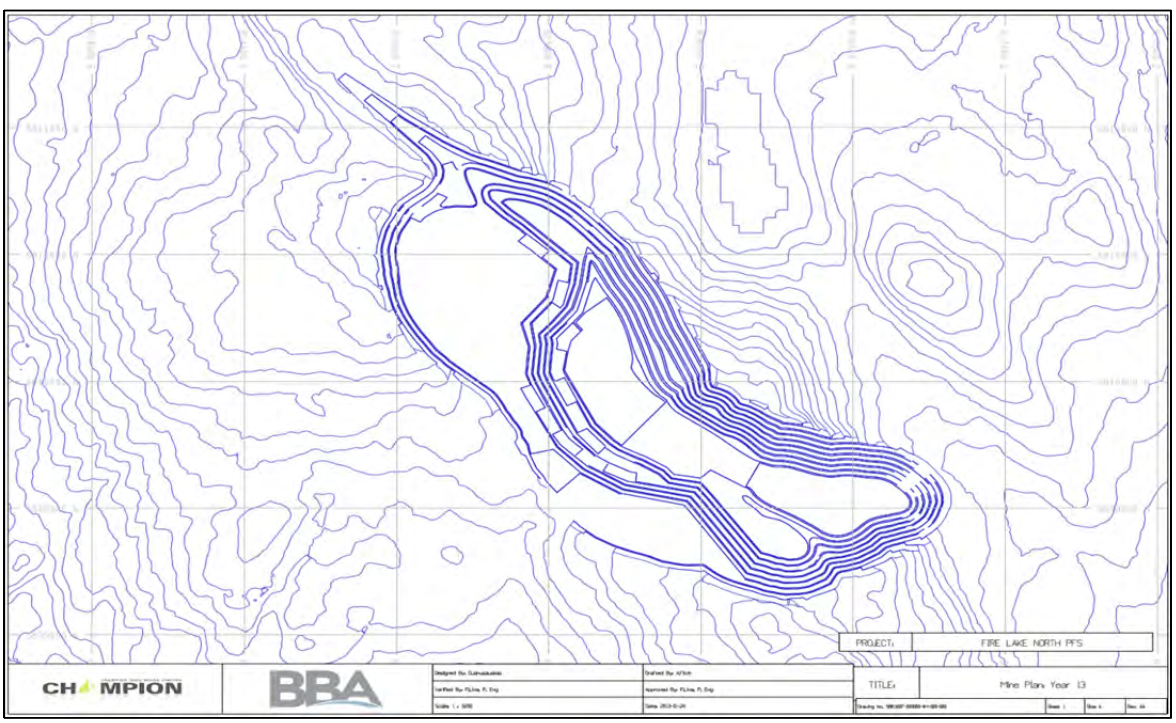


Figure 16-22: Mine Plan Year 13 (FLNE)

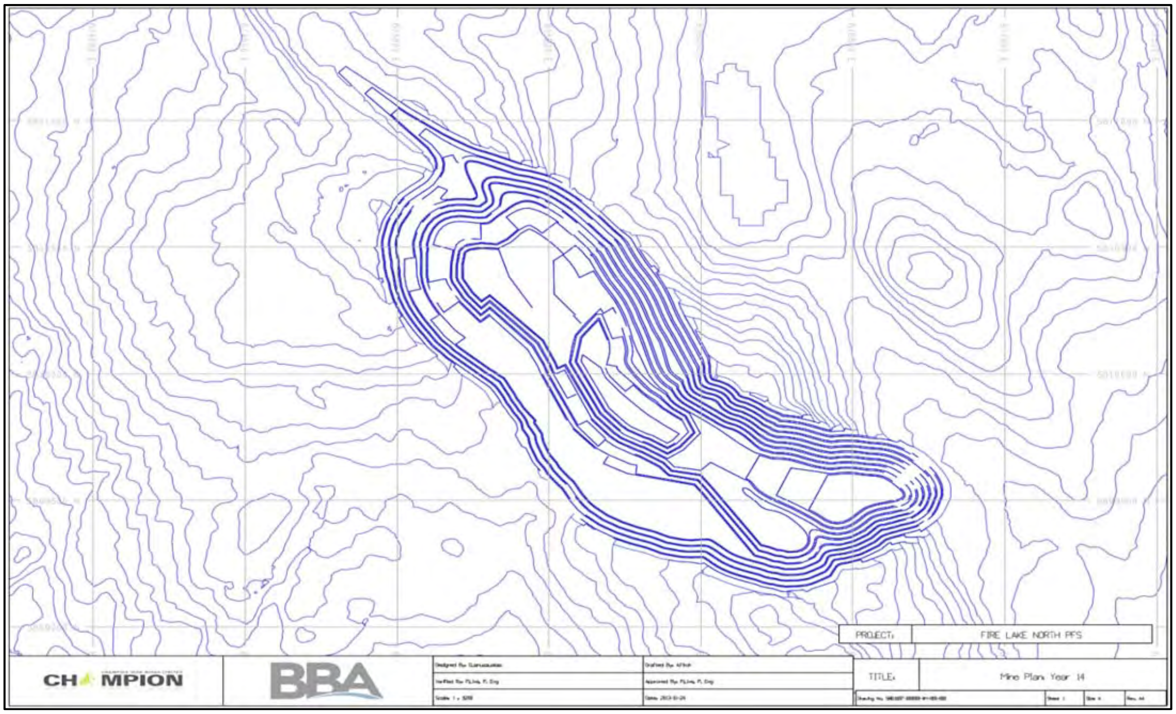


Figure 16-23: Mine Plan Year 14 (FLNE)

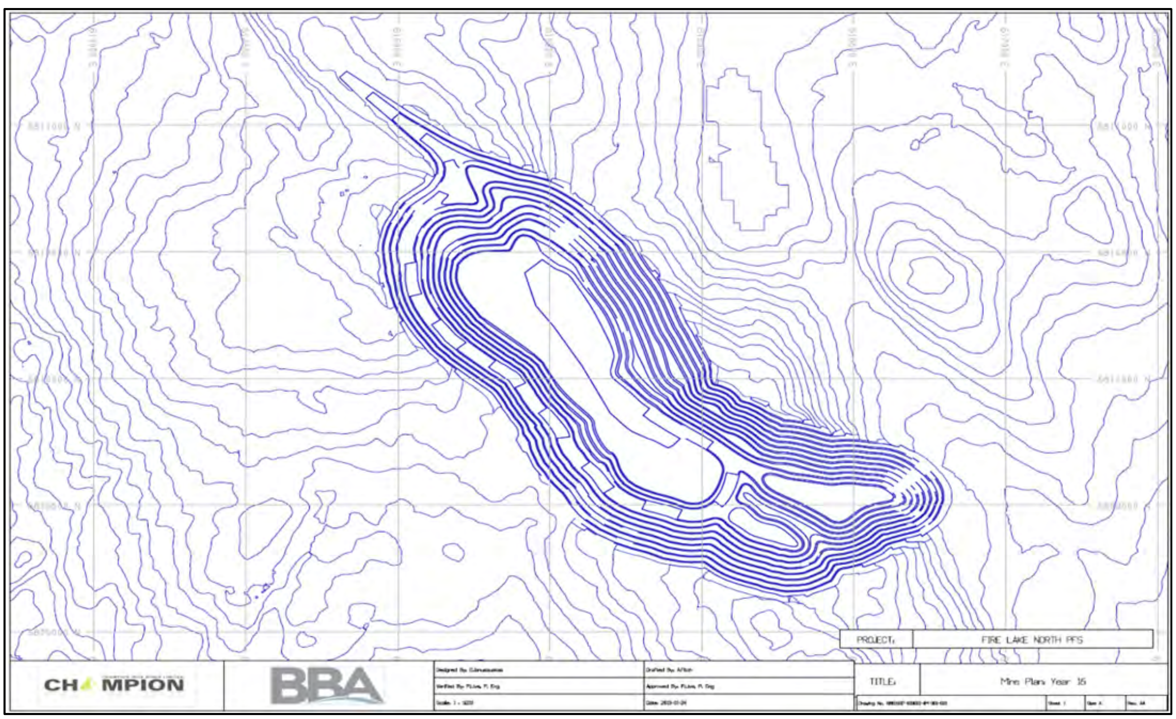


Figure 16-24: Mine Plan Year 15 (FLNE)

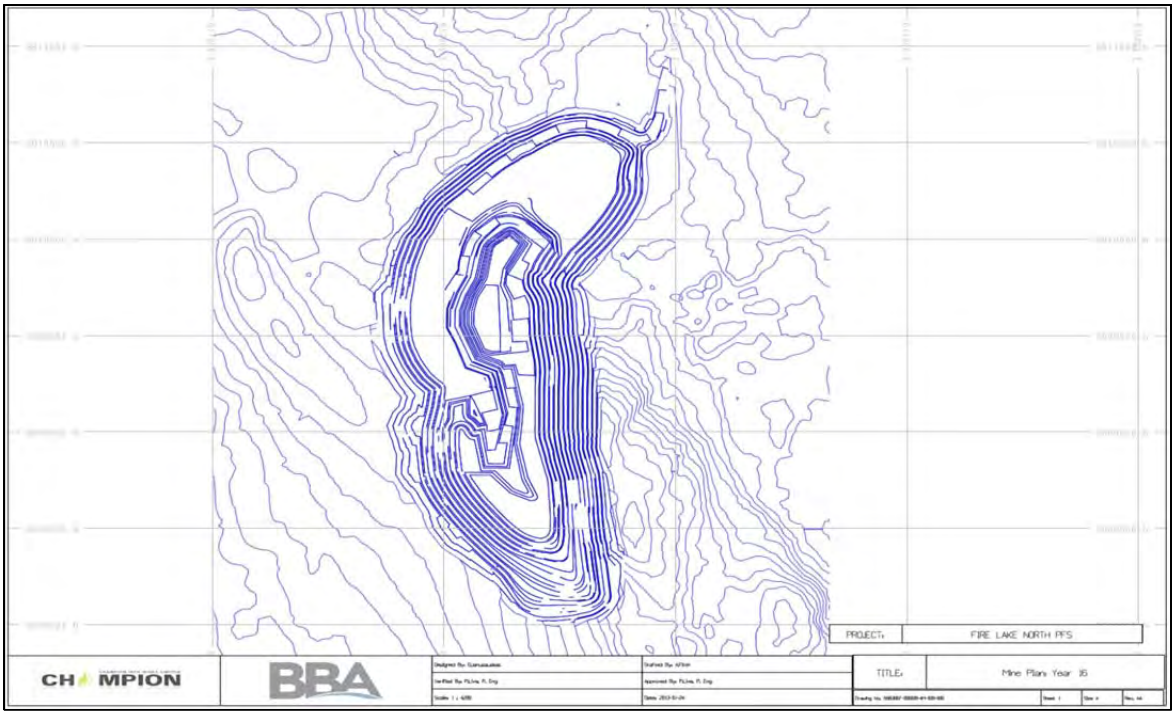


Figure 16-25: Mine Plan Year 16 (FLNW)

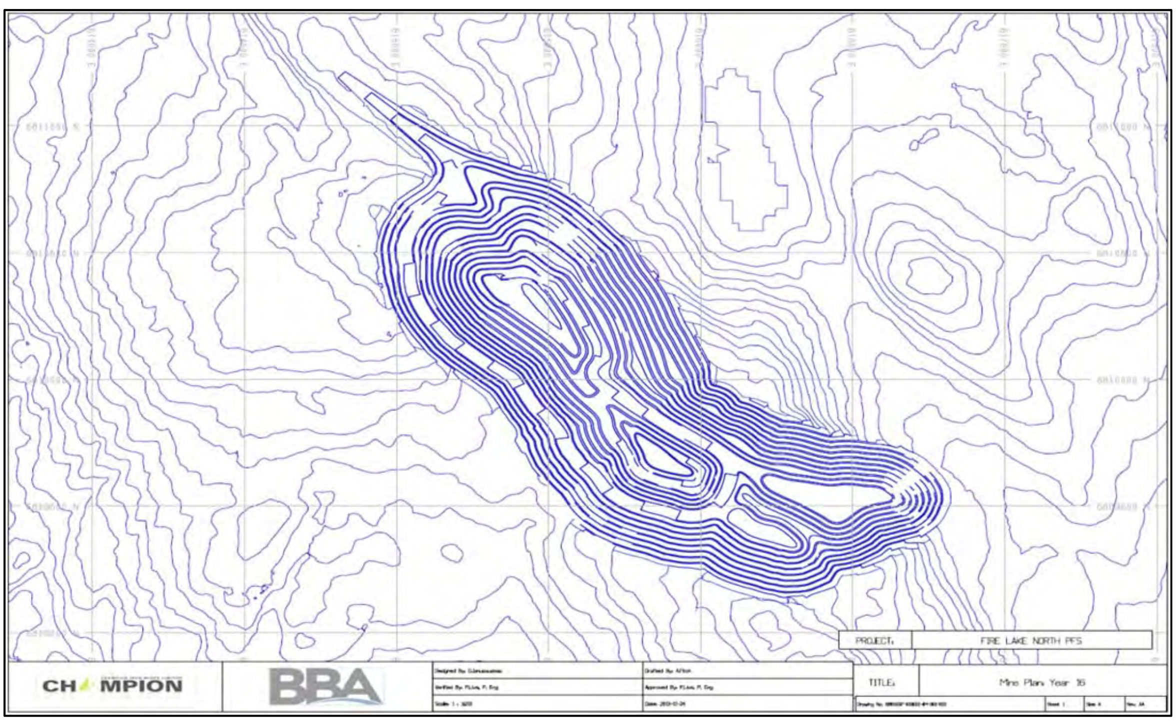


Figure 16-26: Mine Plan Year 16 (FLNE)

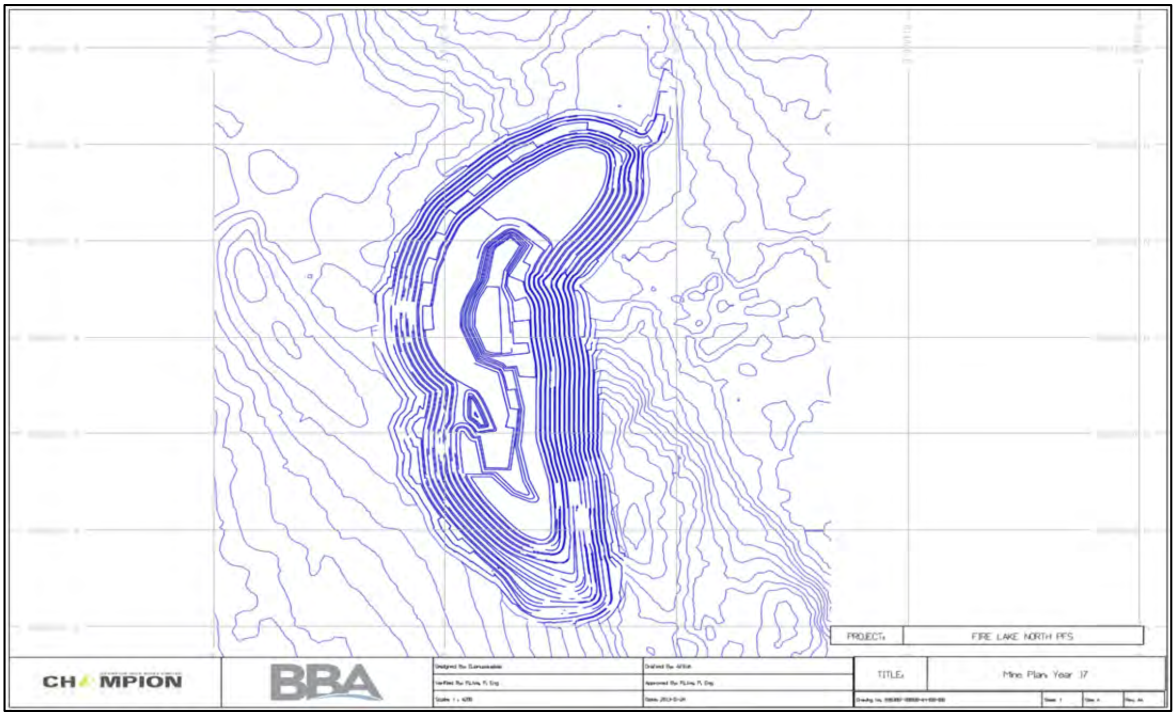


Figure 16-27: Mine Plan Year 17 (FLNW)

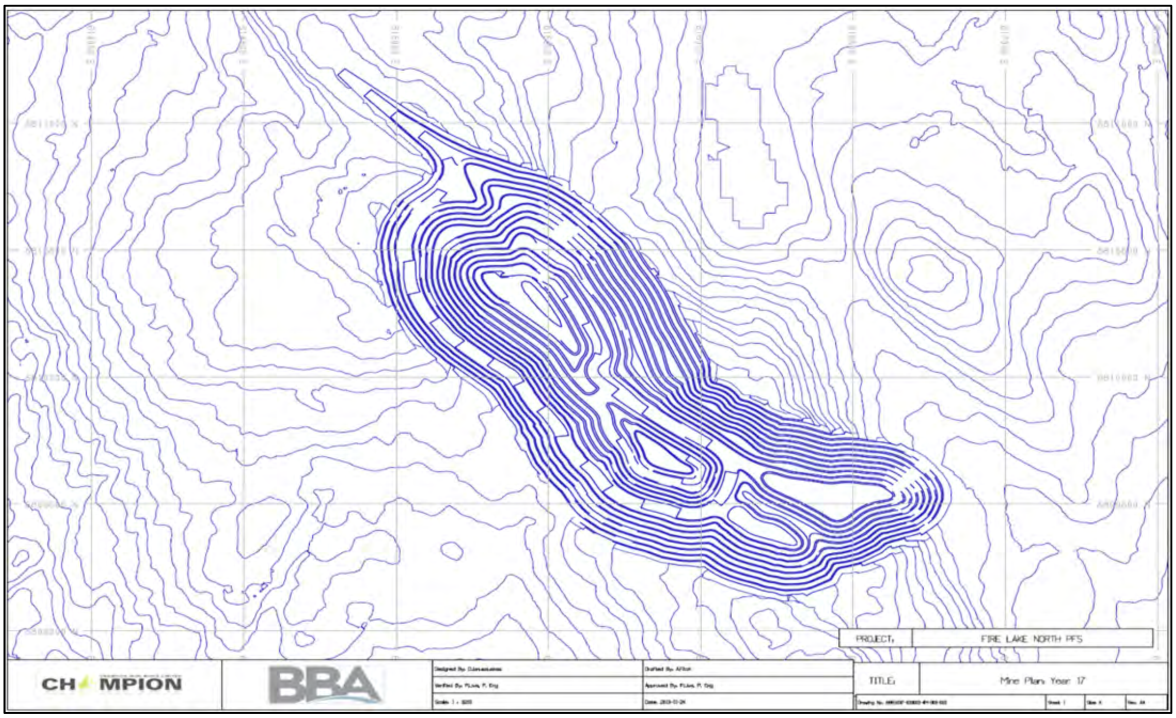


Figure 16-28: Mine Plan Year 17 (FLNE)

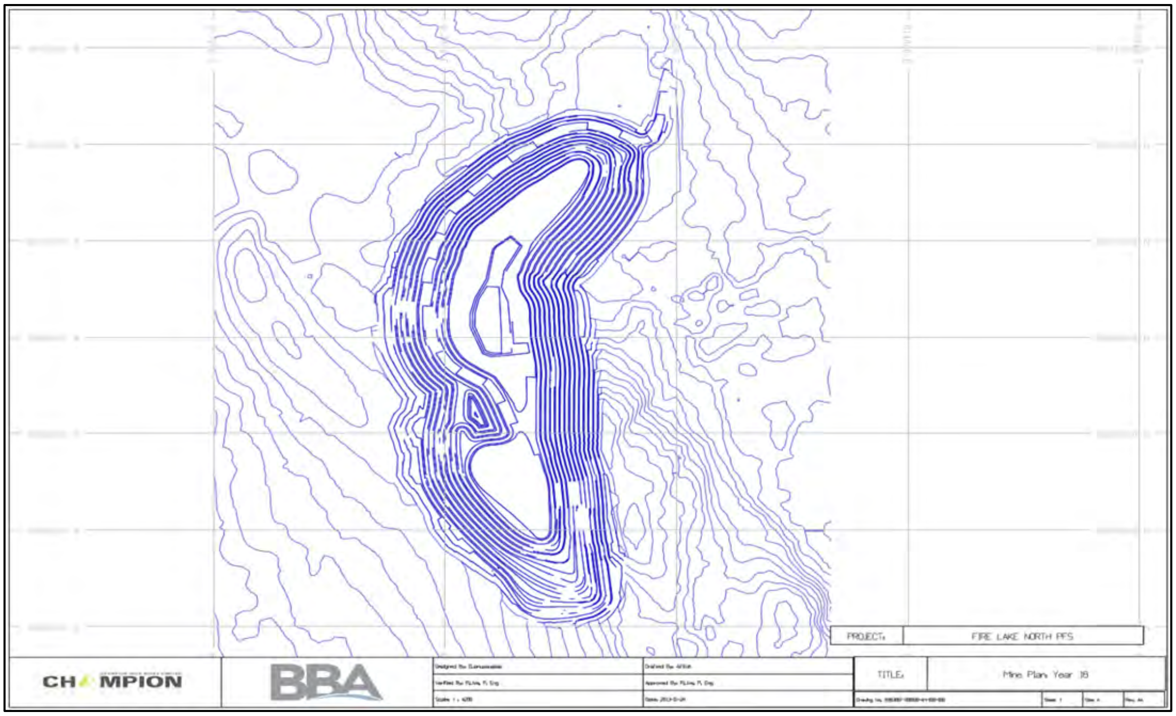


Figure 16-29: Mine Plan Year 18 (FLNW)

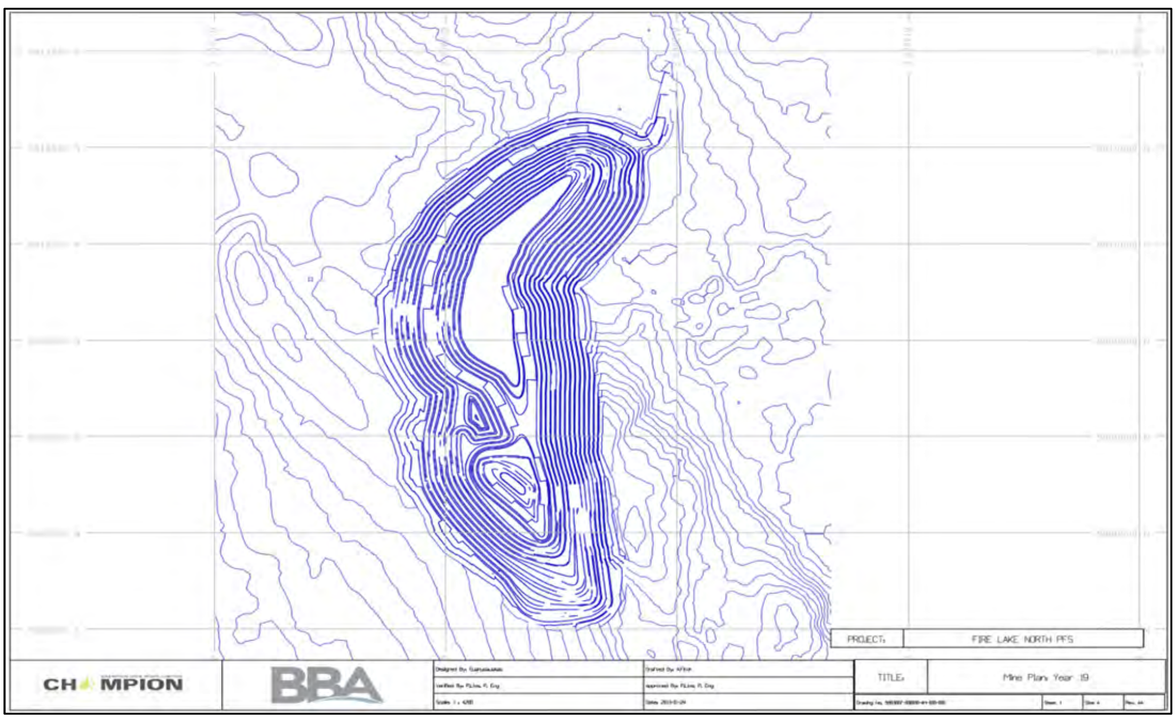


Figure 16-30: Mine Plan Year 19 (FLNW)

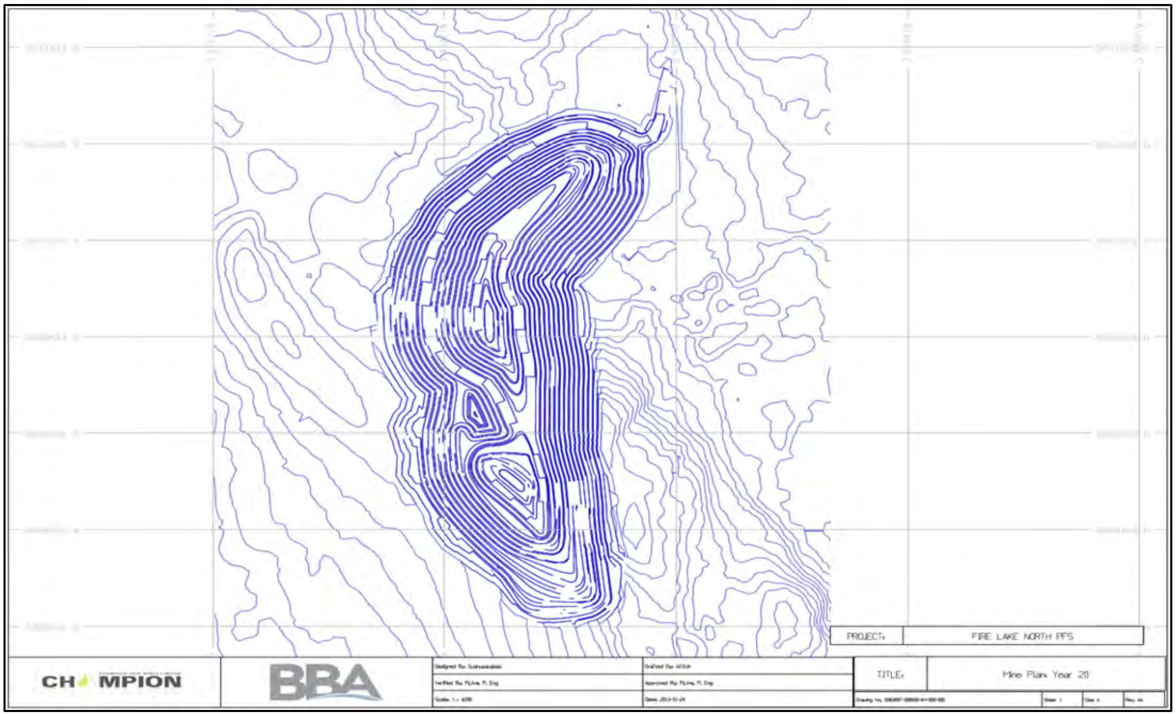


Figure 16-31: Mine Plan Year 20 (FLNW)

16.2 Waste Rock Pile Design

There are three (3) waste rock piles and one (1) overburden pile that were designed for the Fire Lake North PFS. The waste rock piles and overburden pile satisfy the required tonnages originating from the two (2) open pits, including the swell of the material. Refer to Figure 16-32.

The parameters for the design of the waste rock and overburden piles were supplied by Journeaux Assoc., and are shown in Table 16-3.

Table 16-3: Waste Rock Pile and Overburden Pile Design Criteria

Overburden Disposal Area Design Criteria	Value	Unit
Bench Face Angle	16	deg
Overall Angle (from horizontal)	14.6	deg
Bench Height	30	m
Ramp Width	34-38	m
Ramp Grade	10	%
Swell Factor	30	%

Waste Rock Disposal Area Criteria	Value	Unit
Bench Face Angle	34	deg
Overall Angle (from horizontal)	27	deg
Bench Height	30	m
Ramp Width	34-38	m
Ramp Grade	10	%
Swell Factor	30	%

The waste rock piles have been designed with phase sequencing in order to allow for shorter hauls during the earlier years of operation. The maximum elevations of the waste rock piles can be found in Table 16-4.

There is also available room for capacity increase in the piles to consider the next phase of design.

The West waste rock pile will be completed first, due to its proximity to the West pit. This will provide shorter hauls at the beginning and middle of the mine life. Subsequently, the central pile will be filled. It lies in between the two pits. The East pile will be used mostly when the East pit is in production. It is located northeast of the East pit exit. (refer to Figure 16-32)

Table 16-4: Waste Rock and Overburden Design Summary

WEST Waste Rock Disposal Area	Value	Unit
Top Elevation	723	m (asl)
Maximum Height	150	m

CENTRAL Waste Rock Disposal Area	Value	Unit
Top Elevation	770	m (asl)
Maximum Height	135	m

EAST Waste Rock Disposal Area	Value	Unit
Top Elevation	702	m (asl)
Maximum Height	90	m

Overburden Disposal Area	Value	Unit
Top Elevation	702	m (asl)
Maximum Height	112	m

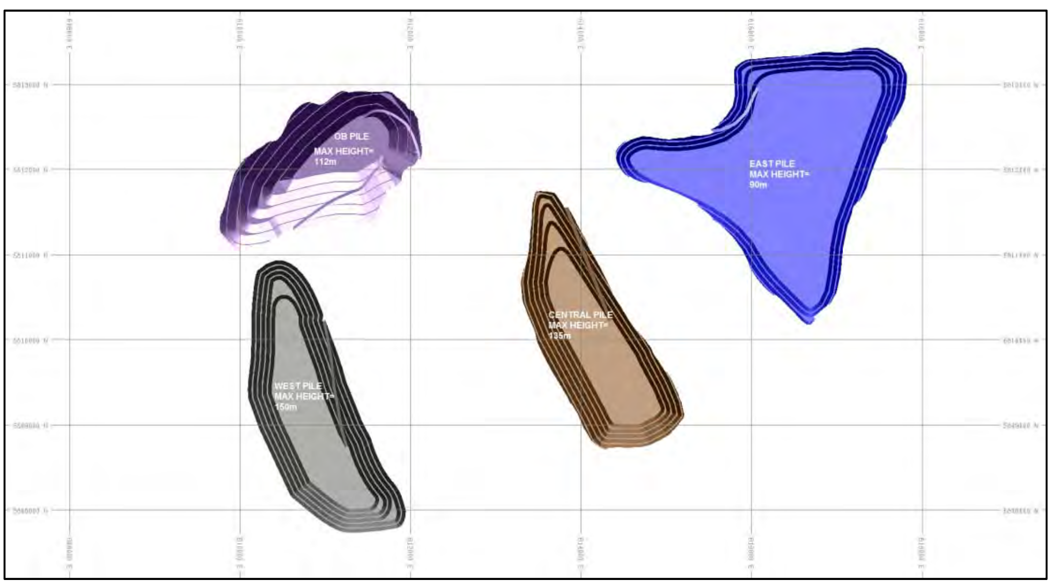


Figure 16-32: Waste Rock Pile Layout

16.3 Mine Equipment and Operations

Mining operations are based on a 24 hour per day production schedule, seven (7) days per week and 360 days per year. Considering there are two (2) operating shifts per day, this yields to 720 productive shifts per year. The assumption is that there will be five (5) lost operating days on average per year due to bad weather conditions. Mine operations will be divided among the following groups: pit operations, mine maintenance, engineering and geology.

16.3.1 Operating Time Assumptions

The operating shift parameters are presented in Table 16-5. A breakdown of scheduled delays, which include shift changes, inspections and fueling, and breaks is presented. The shift parameters are calculated separately for workers of most primary equipment, as well as for the drills. The difference in the two (2) calculations is due to the Job Efficiency Factor (JEF), which is lower for the drills in order to take into account the additional time required for displacing the drill between different drill holes and extra spot time needed.

Table 16-6 shows how the Net Productive Operating Hours (NOH) per shift are calculated after removing the scheduled and unscheduled delays. Unscheduled delays are those outside of human control that cannot be forecasted. They were determined based on similar operations in the region and on BBA’s experience. The Net Productive Operating Hours (NOH) for the workers and major equipment are 8.96 hours/shift, and 8.06 hours/shift for the drill.

Table 16-5: Operating Shift Parameters

Shift Parameters	
Shifts/Day	2
Worker and Equipment Shift Operating Time	
Shift Changes (min)	15
Inspections and Fueling (min)	15
Coffee Breaks (min)	15
Lunch Breaks (min)	30
Job Efficiency Factor (JEF) (%)	83%
Drill Operating Time	
Shift Changes (min)	15
Inspections and Fueling (min)	15
Coffee Breaks (min)	15
Lunch Breaks (min)	30
Job Efficiency Factor (JEF) (%)	75%

Table 16-6: Equipment Operating Time

Operating Time Calculation	
Worker and Equipment Operating Time	
Scheduled Time (min)	720
Scheduled Delays (min)	75
Scheduled Operating Time (min)	645
Unscheduled Delays (min)	108
Total Delays (min)	183
Net Operating Time (min)	538
Net Operating Hours (hr)	8.96
Drill Operating Time	
Scheduled Time (min)	720
Scheduled Delays (min)	75
Scheduled Operating Time (min)	645
Unscheduled Delays (min)	161
Total Delays (min)	236
Net Operating Time (min)	484
Net Operating Hours (hr)	8.06

16.3.2 Equipment Availability and Utilization

Mechanical availability and utilization factors were assigned for each piece of major equipment over the life of the mine (LOM), namely the haul trucks, rope shovels, hydraulic electric shovels (in ore and waste) and drills. The mechanical availability considers the percentage of hours that the equipment is not available for operation due to planned maintenance or unplanned events such as mechanical breakdowns. Utilization refers to the use of each piece of equipment during the hours that the equipment is available. Thus, the utilization factor considers the time that a piece of equipment is operative and productive.

Table 16-7 shows the availability and utilization factors over the life of the mine. The variability of the percentages is based on supplier input, previous studies, and on BBA's internal database.

Table 16-7: Major Mine Equipment Availability and Utilization

	Years									
Haul Trucks	**Y -2**	**Y -1**	**Y 1**	**Y 2**	**Y 3**	**Y 4**	**Y 5**	**Y 6**	**Y 7-19**	**Y 20**
Haul Truck Availability	88%	88%	87%	87%	87%	87%	87%	87%	87%	87%
Haul Truck Utilization	90%	90%	95%	95%	95%	95%	95%	95%	95%	95%
Rope Shovels										
Shovel Availability	92%	92%	92%	91%	90%	90%	89%	89%	85-88%	88%
Shovel Utilization	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
H-E* Shovels										
Ore Shovel Availability	91%	91%	89%	88%	88%	86%	85%	85%	83-91%	85%
Ore Shovel Utilization	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Waste Shovel Availability	91%	91%	91%	90%	88%	88%	88%	86%	83-88%	83%
Waste Shovel Utilization	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Drills										
Drill Availability	90%	90%	90%	90%	90%	89%	89%	89%	85-89%	85%
Drill Utilization	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%

*H-E: Hydraulic Electric

16.3.3 Loading Parameters

The primary mining fleet for the Champion's FLN project PFS consists of 222 t diesel haul trucks, 28 m^3 bucket rope shovels, 22 m^3 bucket hydraulic electric shovels in ore, 27 m^3 bucket hydraulic electric shovels in waste, and a 15 m^3 bucket wheel loader. It is assumed that the primary fleet is used at 100%. Any unproductive time is taken into account in the mechanical availability, utilization and operating time calculations. Although the loader is not typically categorized as being used at 100%, it is acting, in this scenario, as a constant support for the shovel when peak shovel demand periods occur. The loader is also used for .5 support in stockpile equipment for construction and reclamation.

The 222 t rigid trucks were chosen primarily to allow for the aggressive ramp design of the Fire Lake North West and East pits. In addition, the trucks, rope and hydraulic-electric shovels have a good pass-match (4-6). It has been assumed that truck liners will be used during operations to improve on rated truck payloads. The fleet trend is shown in Section 16.3.6.

The 28 m^3 bucket rope shovel was chosen in order to act as a primary waste removal shovel and to allow more flexibility during periods in the schedule when peaks of stripping occurs. The rope shovel is used to alleviate moving large waste rock quantities from the other shovels, so that they may focus on ore movement and blending. The rope shovel is brought into the schedule in the second half of the first year.

The electric shovels were chosen to provide flexibility for the ore operations and for blending. In addition, since the hydraulic shovels are electric, there is also an advantage due to Québec's low-cost electricity.

Different bucket sizes were selected in ore and waste to take into consideration the maximum loose densities of each material. Since the ore and waste densities present are variable, the average loose density of each one was used when considering the bucket sizes. The use of the shovels is optimized by assuring that a shovel with any bucket size can, when required, handle ore, waste and overburden material. This is done in order to represent real-life mining operation where the shovel may be moved around within the same day.

The complete loading parameters are listed in Table 16-8, and are divided among loading unit type (rope shovel, hydraulic electric shovel and wheel loader).The rope shovel achieves 3.5 passes while loading in ore, 4 passes when in waste and 5.5 passes when loading in overburden. The hydraulic electric shovel assigned to the ore achieves 4.5 passes during loading, where the hydraulic electric shovel assigned to waste achieves approximately 5 passes when loading in waste rock and about 7 passes while loading in overburden.

Table 16-8: Loading Parameters

Loading			Shovels			
			Rope	H-E (Ore)	H-E (Waste)	Loaders
Haul Truck	Truck	Truck Capacity (m^3)	147.00	147.00	147.00	147.00
		Truck Rated Payload (t)	221.60	221.60	221.60	221.60
		Truck Spot Time (sec)	60	60	60	60
		Truck Dump Time (sec)	38	38	38	38
	Ore	Fill Factor	85%	85%	73%	85%
		Tonnes/Bucket	62.6	49.2	51.5	33.5
		Passes/Truck	3.50	4.50	4.30	6.50
		Loading Time (min)	2.00	2.33	2.33	4.67
		Load & Spot Time (min)	3.00	3.33	3.33	5.67
		Load, Spot, Dump Time (min)	3.63	3.97	3.97	6.30
		Truck Loads/Shift	179.2	161.3	161.3	94.9
		Tonnes per Trip	219.1	221.4	221.4	218.0
		Shift Production (t)	39 263	35 697	35 707	20 680
	Waste	Fill Factor	92%	95%	88%	87%
		Tonnes/Bucket	56.1	45.5	51.7	28.4
		Passes/Truck	4.00	4.80	4.50	8.00
		Loading Time (min)	2.00	2.33	2.33	5.33
		Load & Spot Time (min)	3.00	3.33	3.33	6.33
		Load, Spot, Dump Time (min)	3.63	3.97	3.97	6.97
		Truck Loads/Shift	179.2	161.3	161.3	84.9
		Tonnes per Trip	224.3	218.4	232.8	227.3
		Shift Production (t)	40 189	35 215	37 532	19 288
	Ovb	Fill Factor (Manual Input)	95%	95%	95%	93%
		Tonnes/Bucket	42.1	33.1	40.6	22.1
		Passes/Truck	5.50	6.70	5.50	10.00
		Loading Time (min)	3.00	3.27	2.80	6.67
		Load & Spot Time (min)	4.00	4.27	3.80	7.67
		Load, Spot, Dump Time (min)	4.63	4.90	4.43	8.30
		Truck Loads/Shift	134.4	126.0	141.4	70.1
		Tonnes per Trip	231.6	221.7	223.4	220.9
		Shift Production (t)	31 127	27 931	31 595	15 485

*H-E: Hydraulic Electric

16.3.4 Hauling Parameters

The haulage parameters contributing to the determination of the truck fleet involve: haulage road profiles, sequenced dumping, haulage speeds and fuel consumptions, and load/spot/dump times incorporated in the final cycle times. The road haulage profiles are segmented into in-pit distances and distances exterior to the pit. The distances are further divided into the following:

- In-pit flat haul;
- In-pit ramp;
- On surface outside of the pit;
- On-stockpile/waste rock pile/crusher pad flat;
- On stockpile/waste rock pile/crusher pad ramp.

Centroid distances are taken for the in-pit flat haul profiles in the MineSight software for each year and by material type. Weighted averages are calculated each year for the in-pit flat and in-pit ramp distances. The distances outside the pit are accumulated in the same way.

There will be four (4) waste rock piles on site. Three (3) of these are allocated to waste rock, and one (1) is allocated to overburden. The piles closest to the pit being developed are the ones that are filled to capacity first, in order to optimize lower cycle times for waste rock.

Table 16-9 shows the trucks' haulage speed and fuel consumption for the different types of haul. The haulage travel speed and fuel consumption were based on vendor rimpull charts and on BBA's equipment database.

Table 16-9: Truck Speed and Fuel Consumption (Loaded and Empty)

		Loaded					
		Acceleration 100 m	**Flat (0%) Top**	**Flat (0%) In-Pit**	**Slope Up (10%)**	**Slope Down (-10%)**	**Deceleration 100 m**
Haul Truck	Speed (km/h)	20	35	35	11.9	20	20
	Fuel consumption (l/hr)	393.2	150	200	375	26.9	26.9

		Empty					
		Acceleration 100 m	**Flat (0%) Topo**	**Flat (0%) In-Pit**	**Slope Up (10%)**	**Slope Down (-10%)**	**Deceleration 100 m**
Haul Truck	Speed (km/h)	25	45	45	28.5	30	25
	Fuel consumption (l/hr)	117.8	117.8	117.8	300	26.9	26.9

The calculated cycle times, which are based on the road haulage profiles, haul truck speed and load/spot dump times for each piece of equipment moving a certain type of material, are shown in Figure 16-33.

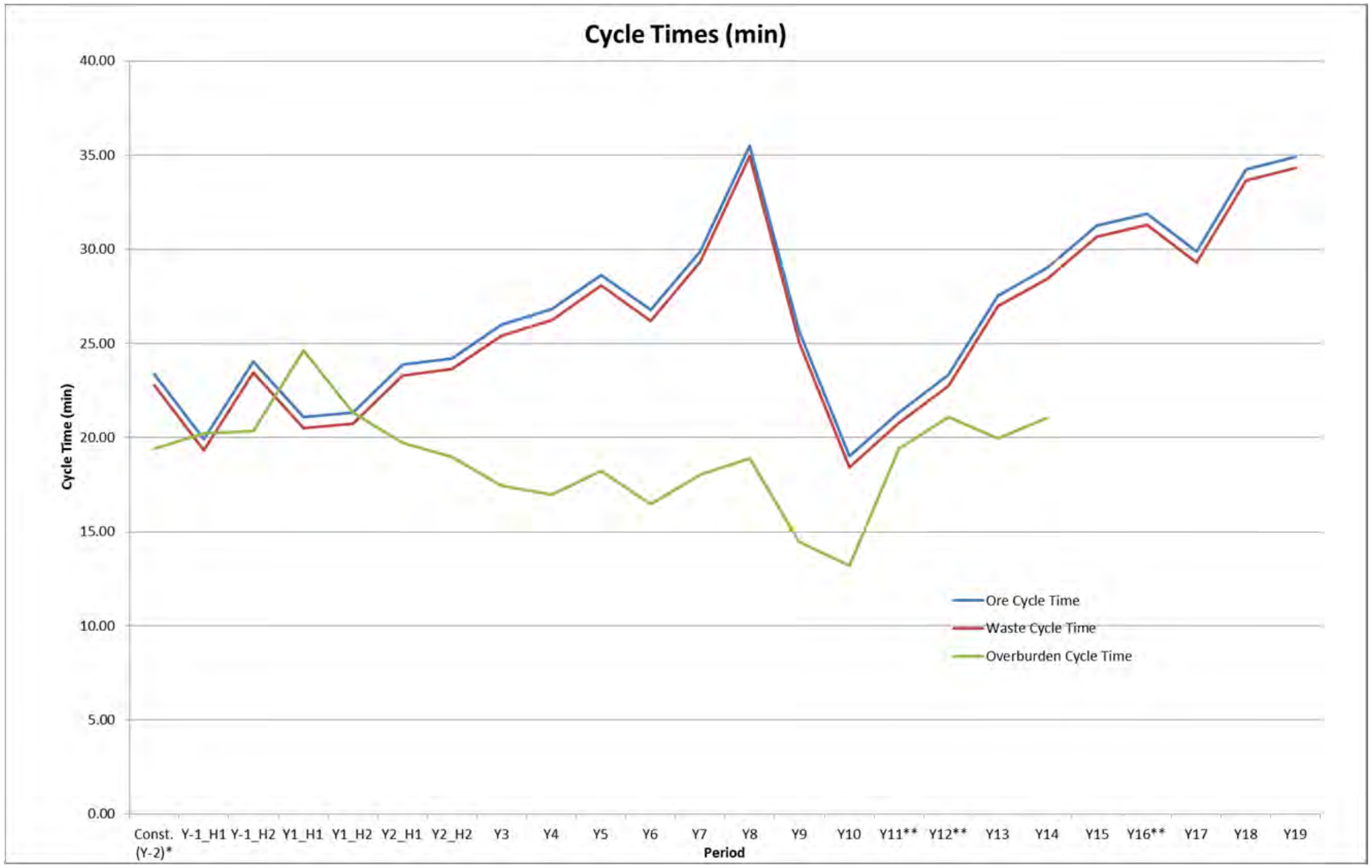


Figure 16-33: Cycle Time by Material Type

16.3.5 Drilling and Blasting

Drilling specifications for the Fire Lake North project were selected in order to satisfy the required specification of the material to be blasted and to reduce the overall costs of drilling and blasting. A 311 mm (12.25") rotary configuration was selected for production drilling. Detailed drill and blast parameters and calculations can be found in Table 16-10 below.

Table 16-10: Drill and Blast Specifications

Parameter	Ore	Waste
Drill Specifications		
Hole Diameter (mm)	311.2	311.2
Hole Area (m^2)	0.0760	0.0760
Bench Height (m)	12	12
Sub-Drill (m)	1.5	1.5
Stemming (m)	4.0	4.0
Loaded Length (m)	9.5	9.5
Hole Spacing (m)	7.5	9.0
Burden (m)	7.5	9.0
Penetration Rate (m/hr)	28.0	28.0
Re-drill (%)	10%	10%
Rock Mass/Hole (t)	2308.5	2308.5
Bulk Emulsion		
Usage (by volume)	100%	100%
Density (kg/m^3)	1200	1200
Kg/Hole	867	867
Blasting Specifications		
Powder Factor (kg/tonne)	0.375	0.315
Average Explosive Density (kg/m^3)	1200	1200

Considering a bench height of 12 m, a 7.5 m x 7.5 m drilling pattern in ore, and a 9 m x 9 m drilling pattern in waste material was selected in order to achieve the required blasted material output. From Table 16-10, the tonnes of material that are covered by a drill during a shift, with 8.06 net productive operating hours per shift and a penetration rate of 28 m per hour and redrill of 10% can be estimated. Given that no information was available to characterize the penetration rate, one was selected from BBA's database of similar projects located nearby. Additional engineering work should be completed to better characterize the penetration rates that can be achieved, considering the in-situ rock qualities.

Blast holes will be drilled to a total depth of 13.5 m, including a 1.5 m of sub-drilling. A stemming length of 4.0 m in ore and waste was selected to maximize the effectiveness of the explosive column. In addition to the primary drill fleet, two (2) air track drills will be used for pioneer drilling, boulder blasting and other similar small jobs. In the first year of production, two (2) rotary blasthole drills will be required. A maximum of five (5) production drills are needed during the mine life in order to sustain production to the appropriate level.

High precision GPS and fleet management systems will be installed on each drill unit to enable precise and rapid hole setup and tracking of production. The drill tracking system will allow for the generation of a database of previously drilled holes, to reduce the possibility of drilling into existing hole bottoms (sub-drilling).

The present Study assumes that all explosives will be produced on-site by an emulsion plant operated and managed under contract with an explosives provider. The provider will be responsible for a complete down-the-hole service. Blast tie-in and detonation will be performed and managed by the Champion's blast crew. The mine's technical services department will remain responsible for the blast pattern design and follow-up.

BBA has recommended that a high energy bulk emulsion explosive with electronic detonators be employed for application in both wet and dry conditions, with an in-hole explosive density of 1.20 g/cc. Emulsion has several environmental, logistical and operational advantages over ANFO or ANFO/Emulsion blend products, in addition to higher explosive energy. Using a 100% emulsion product, average powder factors of 0.38 kg/t in ore and 0.32 kg/t in waste can be obtained. Additional loading details can be found in Table 16-10.

Production blasting will utilize a system of electronic detonators that will allow for more precise and consistent blast results. The electronic detonator system can also allow for better control of ground vibrations, which should help to minimize some of the geotechnical risks associated with blasting. Electronic blasting systems have numerous additional benefits:

- Precise timing of each detonator;
- Reduced ground vibrations;
- No possibility of accidental detonation;
- Elimination of cut-off hole risks (results in misfire and safety risks);
- Improved fragmentation.

The recommended blasting accessories per hole can be found in detail in Table 16-11. All holes were assumed to be double-primed (detonators and primers per hole) to minimize the likelihood of misfired holes and the safety risks associated with them.

Table 16-11: Blasting Accessories

Blasting Accessories		
Accessory	**Quantity per Hole**	
	Ore	**Waste**
I-kon RX 20 m	2	2
Pentex D454	1	1
Harness Wire	1	1
Pentex D908	1	1

16.3.6 Mining Equipment Fleet

The primary equipment fleet was selected based on optimized fleet selection and fleet size utilization, reliability of equipment, supplier quote and benchmarking of similar operations in the region. The maximum quantity of primary equipment required at any one point of the life of mine (LOM) is as follows:

- 40 x 222 t diesel haul truck;
- 2 x 28 m^3 bucket rope shovel;

- 1 x 22 m^3 bucket electric-hydraulic shovel (ore);
- 2 x 27 m^3 bucket electric-hydraulic shovel (waste);
- 5 x 12¼ inch rotary blast hole drills (RBHD)

Figure 16-34 shows the truck fleet required over the life of mine (LOM). The peak of haul trucks is reached in Year 13 and lasts until Year 17.

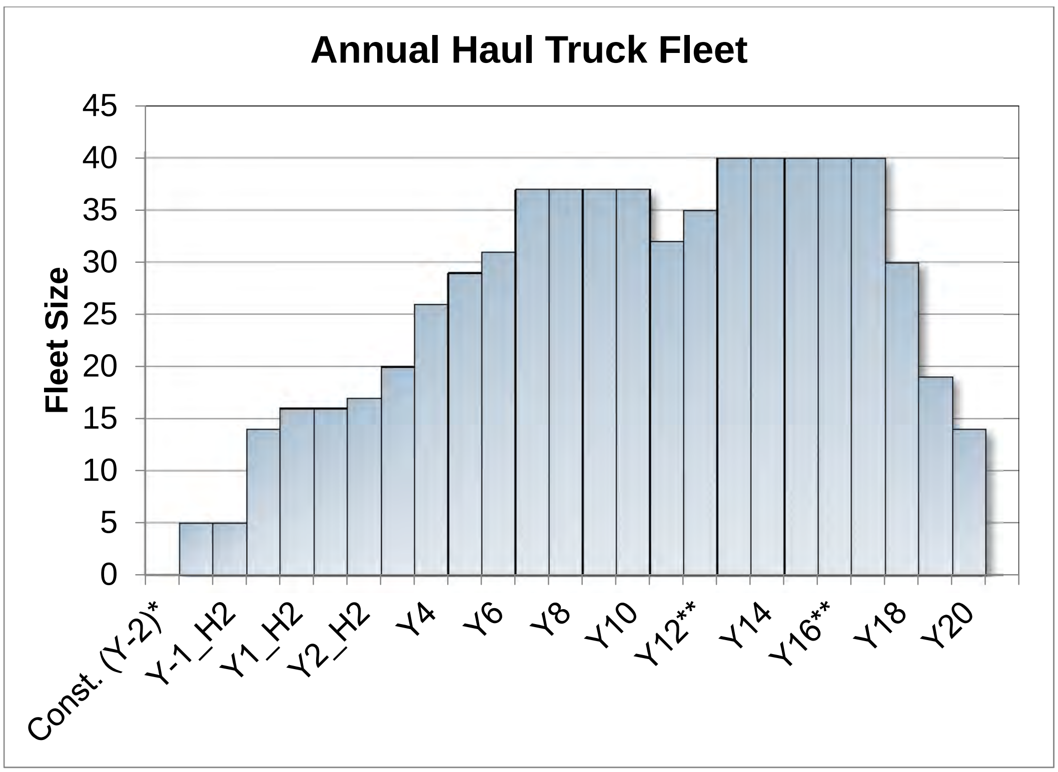


Figure 16-34: Haul Truck Fleet over LOM

Over the life of the operation, replacement of mining equipment is required. The net operating hours were used as the hours/shift for the equipment replacement calculations and for the equipment operating costs estimation. The timing of the equipment replacements is based on the anticipated useful life of each piece of equipment. Table 16-12 indicates the life expectancy for each type of primary equipment.

Table 16-12: Life of Major Mine Equipment

Major Mine Equipment NOH (LOM)	
Equipment	Machine Life (hrs)
222 t Haul Truck	90 000
Rope Shovel	120 000
Hydraulic Electric Shovel	80 000
12¼" RBHD	80 000

The complete equipment list for each year is shown in Table 16-13, and comprises the primary fleet previously described in the text, as well as the support and auxiliary fleet. The support and auxiliary equipment fleets were determined based on BBA's internal equipment database and on BBA and client expertise. The yearly quantities which are shown do not include amounts related to replacements.

Table 16-13: Equipment List over LOM

	Const. (Y-2)	Y-1_H1	Y-1_H2	Y1_H1	Y1_H2	Y2_H1	Y2_H2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20
Major Fleet																									
222 t Diesel Haul Truck	0	5	5	14	16	16	17	20	26	29	31	37	37	37	37	37	37	40	40	40	40	40	30	19	14
28 m^3 Bucket Rope Shovel	0	0	0	0	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	0
22 m^3 Bucket Electric Hydraulic Shovel (ore)	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27 m^3 Bucket Electric Hydraulic Shovel (waste)	0	0	0	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1
12¼ inch RBHD Drill	0	0	0	2	2	2	2	3	3	4	4	4	4	4	4	5	5	5	5	5	5	5	3	2	2
Support Fleet																									
Wheel Loader (15 m^3)	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Grader (16' blade, 4.88 mm blade)	1	1	1	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
Rubber Tire Dozer (627 HP, 468 kW)	0	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Track Dozer (580 HP, 433 kW)	1	2	2	4	4	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	4
Auxiliary Fleet																									
Sand/Water Truck (91 t)	0	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Water Tank Body (for 91 t)	0	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Sand Spreader Body (for 91 t)	0	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Fuel/Lube Truck (40 t)	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Wheel Loader (7 m^3)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Air Track Drill (200 HP 80 to 100 mm)	0	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Stemming Loader (3.2 m^3)	0	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
CAT 777F with Towing Gooseneck and 120 t Lowbed	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Backhoe Loader (Caterpillar 430F)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Excavator (Komatsu PC490 with Hammer)	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
All-Terrain Mobile Crane (100 t)	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Boom Truck	0	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Service Truck 22000 GWV, 250 HP, 186 kW	0	1	1	2	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2
Mobile Lube/Oil Change Truck	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Welding Truck	0	1	1	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2
Tire Changer Truck-mounted	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pick-up Truck (Ford F250) Crew Cab	6	9	9	12	12	12	12	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	12
Mini Bus (12-seater Ford E series)	0	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2
Skid Steer (CAT 252B3)	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Telehandler (CAT TL943)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lighting Tower 4-post of 1000 W. / Diesel Generator	4	4	4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	4
Dewatering Pump (186 kW electric)	1	2	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Mobile Pump (93 kW)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total Major and Support Fleet	**2**	**11**	**11**	**26**	**29**	**29**	**30**	**35**	**45**	**49**	**51**	**58**	**58**	**58**	**58**	**59**	**59**	**62**	**62**	**62**	**62**	**62**	**49**	**36**	**27**
Auxiliary Equipment	20	36	36	58	58	60	60	68	68	68	68	69	69	69	69	69	69	69	69	69	69	69	69	69	45
Total Mining Equipment	**22**	**47**	**47**	**84**	**87**	**89**	**90**	**103**	**113**	**117**	**119**	**127**	**127**	**127**	**127**	**128**	**128**	**131**	**131**	**131**	**131**	**131**	**118**	**105**	**72**

16.4 Mine Manpower Requirements

The manpower calculations were based on continuous operations of 24 hours per day, 7 days per week and 360 days per year. The operations will consist of four (4) mining crews, working two (2) 12-hour shifts per day and altering rotations of 14 days on-site and 14 days off-site.

The estimation of manpower requirements as calculated by BBA are shown in Table 16-14 and in Table 16-15. Both the salaried and hourly personnel requirements are listed on an annual basis and were based on similar operations in the region, and validated with the Client's managerial experience. The hourly operations and maintenance personnel were estimated from operational fleet requirements, forecasted shifts, and number of crews working at the mine site.

The highest headcount for the salaried staff amounts to 52 in Year 2, while that of the hourly staff amounts to 373 in Year 15.

Table 16-14: Mine Salaried Personnel List

Operations	Const. (Y-2)	Y-1_H1	Y-1_H2	Y1_H1	Y1_H2	Y2_H1	Y2_H2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20
Mine Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mine Assistant Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mine Shift Foreman		2	2	4	4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Drill & Blast Foreman		0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dispatcher		0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Trainer		1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Production / Mine Clerk		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Secretary		0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Salaried Open Pit Operations Total	**2**	**6**	**6**	**16**	**16**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Maintenance																									
Maintenance Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maintenance Assistant Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maintenance Planner		1	1	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1
Mechanical/Industrial Engineer		0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mine Maintenance Foreman		1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Mechanical Foreman		1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Electrical Foreman		0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Maintenance Trainer		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Clerk		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Salaried Mine Maintenance Total	**2**	**7**	**7**	**13**	**13**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**5**
Technical Services																									
Superintendent Technical Services	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Assistant Superintendent Technical Services	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Senior Mine Planning Engineer (Long Term)		0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Planning Engineer (Short Term)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pit Engineer		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Geotechnical Engineer		0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Blasting Engineer		0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mining Engineering Technician	1	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Salaried Mine Engineering Total	**4**	**6**	**6**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**	**11**
Senior Geologist	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Geologist (Long Term)		0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Geologist		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Grade Control Geologist		0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Geology Technician		1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Salaried Geology Total	**1**	**3**	**3**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Total Salaried Staff	**9**	**22**	**22**	**47**	**47**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**43**

Table 16-15: Mine Hourly Personnel

Operations	Const. (Y-2)	Y-1_H1	Y-1_H2	Y1_H1	Y1_H2	Y2_H1	Y2_H2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20
Shovel Operators		4	6	10	10	10	10	10	12	16	16	16	16	16	16	16	16	16	16	16	16	16	12	8	6
Loader Operators	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Haul Truck Operators		14	18	48	54	54	56	64	88	98	104	120	128	124	120	108	120	128	132	136	136	136	100	64	45
Drill Operators		2	2	6	8	8	8	8	10	12	12	14	14	14	14	14	16	16	16	16	16	16	10	8	6
Dozer Operators	3	9	9	14	14	14	14	14	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	17
Grader Operators	2	2	2	4	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	4
Water Truck Operators/ Snow Plow/ Sanding	0	3	3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	4
Other Auxiliary Equipment	4	8	8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	8
Janitors	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2
Blasters	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Hourly Open Pit Operations Total	**17**	**52**	**58**	**112**	**120**	**120**	**122**	**132**	**169**	**185**	**191**	**209**	**217**	**213**	**209**	**197**	**211**	**219**	**223**	**227**	**227**	**227**	**181**	**139**	**100**
Field Maintenance																									
Field Gen Mechanics		4	6	8	10	10	10	12	14	16	16	18	18	18	18	20	20	20	20	20	20	20	14	10	8
Field Welder		2	4	6	6	6	6	6	8	8	8	8	8	8	8	8	8	10	10	10	10	10	8	6	6
Field Electrician		2	4	6	6	6	6	6	8	8	8	8	8	10	10	10	10	10	10	10	10	10	8	6	6
Shovel Mechanics		4	6	8	10	10	10	12	14	16	16	18	18	18	18	20	20	20	20	20	20	20	16	10	8
Shop Maintenance																									
Shop Electricians	2	4	4	6	8	8	8	8	12	14	14	14	14	14	14	14	14	16	16	16	16	16	14	10	10
Shop Mechanics	2	8	8	14	16	16	16	16	24	26	26	30	30	30	30	30	30	30	30	30	30	30	26	20	16
Mechanic Helpers	2	2	2	6	6	6	6	6	6	8	10	10	10	10	10	10	10	10	10	10	10	10	10	8	8
Welder-Machinists	0	2	2	6	6	6	6	6	6	8	8	8	10	10	10	10	10	10	10	10	10	10	8	8	8
Lube/Service Trucks	2	4	4	6	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Electronics Technicians	0	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Tool Crib Attendants	0	2	2	2	2	2	4	4	4	6	6	8	8	8	8	8	8	8	8	8	8	8	6	6	4
Hourly Mine Maintenance Total	**8**	**36**	**44**	**70**	**78**	**80**	**84**	**88**	**108**	**122**	**124**	**134**	**136**	**138**	**138**	**142**	**142**	**146**	**146**	**146**	**146**	**146**	**122**	**96**	**86**
Hourly Personnel Total	**25**	**88**	**102**	**182**	**198**	**200**	**206**	**220**	**277**	**307**	**315**	**343**	**353**	**351**	**347**	**339**	**353**	**365**	**369**	**373**	**373**	**373**	**303**	**235**	**186**
Ratio Maintenance / Operations Hourly Employees	**0.47**	**0.69**	**0.76**	**0.63**	**0.65**	**0.67**	**0.69**	**0.67**	**0.64**	**0.66**	**0.65**	**0.64**	**0.63**	**0.65**	**0.66**	**0.72**	**0.67**	**0.67**	**0.65**	**0.64**	**0.64**	**0.64**	**0.67**	**0.69**	**0.86**
Average Ratio Maint. / Operations Hourly Employees	**0.66**																								

17. RECOVERY METHODS

17.1 Process Overview

A conventional gravity circuit flowsheet will be used to produce concentrate from the Fire Lake North deposits. Run-of-mine (ROM) material will be transported by the mine trucks before being dumped into a gyratory crusher at one of two (2) dump points. The crushed ROM material will discharge into a surge pocket then onto an apron feeder, before being sent to a stockpile by a conveyor belt. The crushed ROM from the stockpile will be collected by three (3) apron feeders located in a reclaim tunnel and sent to the concentrator via a mill feed conveyor belt. The crushed ROM material will be combined with the oversize material from the AG mill screens and the coarse middlings from the cleaner spirals and fed to the AG mill.

The undersize from the classification screens will feed the 3-stage gravity spirals circuit. The rougher spirals will yield two (2) products: a concentrate and a tailings stream. The concentrate stream will feed the cleaner spiral circuit while the tailings will be pumped to the tailings circuit.

The cleaner spirals will produce three (3) products: coarse middlings, fine middlings, and concentrate. The coarse middlings will be recycled to the AG mill. The cleaner fine middlings will be combined with the recleaner fine middlings and the filtrate and pumped to the dewatering cyclones. The concentrate will be going to the recleaner spirals (feed).

The recleaner spirals will produce three (3) products: coarse middlings, fine middlings, and concentrate. The recleaner concentrate will be the final concentrate. The concentrate will be filtered using pan filters and dried using steam during the winter months to prevent freezing during transportation. The recleaner fine middlings will be combined with the cleaner fine middlings and the filtrate and pumped to dewatering cyclones. The recleaner coarse middlings will be recycled to the rougher spiral feed.

The cleaner fine middlings, recleaner fine middlings and filtrate will be combined and pumped to the dewatering cyclones. The cyclone underflow will be combined with the

AG mill classification screen undersize product and the recleaner coarse middlings and then pumped to the rougher spirals feed. A fraction of the cyclone overflow, mainly comprised of water with a small amount of fine middlings, will be recycled to the AG mill as needed. Cyclone overflow in excess of this will be sent to the fine tailings thickener.

The rougher spiral tailings will feed a classification/dewatering cyclone cluster. The cyclone underflow, consisting of coarse tailings, will flow directly to the tailings pump box. The cyclone overflow, consisting of fine tailings, will be dewatered in the fine tailings thickener. The thickener overflow will be recycled to the process water tank. The thickener underflow will be combined with the rougher tailings cyclone underflow in the tailings pump box and pumped to the tailings pond via a pipeline. In this way, fine and coarse tailings will be pumped to the tailings pond in a single pipeline.

17.2 Process Design

17.2.1 General Process Flows

Recovery of iron ore concentrate will be by a 3-stage gravity spirals circuit, typical of iron ore operations in the Labrador Trough. The block flow diagram in Figure 17-1 illustrates the overall movement of material and water in the Fire Lake North concentrator.

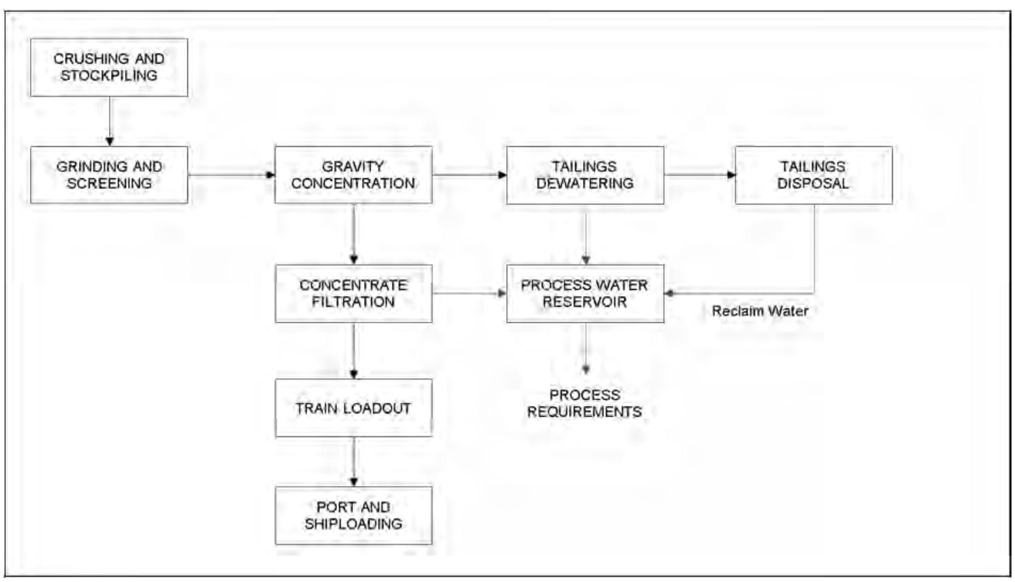


Figure 17-1: Simplified Process Block Flow Diagram

An overall mass balance was developed based on the selected flowsheet and process design criteria. Iron recovery and other Process Design Criteria were based on testwork, as well as benchmarking to similar operations. Equipment sizing is based on a combination of the following:

- Testwork results;
- Handbook references,
- BBA's experience on other projects (reference projects);
- Vendor information.

A general flowsheet and processing plant description of the various areas are provided. This information serves as input information for the development of the capital and operating cost estimates presented later in this Report.

17.3 General Process Design Basis

It is important to note that process design and equipment sizing took place approximately simultaneously with the mineral processing testwork. The testwork results therefore were not available to be used for process design or equipment selection, and parameters such as recovery and ore hardness were estimated based on BBA's experience and the limited testwork available from previous phases of the project. As a result, the process design parameters given here are somewhat different from the testwork results given in Chapter 13. In the next phase of the project, the equipment selection and process design parameters will be reviewed, compared to the mineral processing testwork results, and adjusted as necessary.

The overall design basis for this project was determined on the basis of 23 Mtpy of feed material to the mill. The average iron head grade was estimated for the first 20 years of mining the West Pit and East Pit zones. Weight recovery and iron recovery were assumed from similar operations in the region and took into consideration an assumed grinding particle size distribution and a liberation size determined by testwork. The concentrator utilization factor of 92% was based on modern plant design and performance. The throughput is based on achievable feed rates for a single autogenous (AG) mill at the given feed material hardness and required grind size.

The average annual production of iron concentrate over the first 20 years of operation is 8.7 Mtpy. However, during the first five (5) years of operation, it is anticipated that higher-grade ore will be mined. The process design and production throughputs are presented in Table 17-1 and Table 17-2.

Table 17-1: General Process Design Basis Values

Criterion	Nominal Value	High Grade Value
Weight Recovery (%)	37.8	44.7
Iron Recovery (%)	82	82
Head Grade (% Fe_T)	30.0	35.4
Concentrate Grade (% Fe_T)	65.0	65.0
Plant Utilization (%)	92	92

Table 17-2: Concentrate Production and Nominal and Design Production Rates

	Average Annual Throughput (Mtpy)	High Grade Annual Throughput (Mtpy)	Hourly Throughput (tph)		
			Average Nominal	High Grade Nominal	Design
Feed	23.0	23.0	2854	2854	3282
Concentrate	8.7	10.3	1080	1274	1466
Tailings	14.3	12.7	1774	1579	2040

Table 17-2 shows that the concentrator was designed for average concentrate production of 8.7 Mtpy over the first 20 years, generating 14.3 Mtpy tailings. It was also assumed that during initial years of production (high-grade), a maximum of 10.3 Mtpy concentrate will be produced, with 12.7 Mtpy tailings. Generally, equipment was sized for the larger of the two (2) cases: concentrate handling equipment was sized to handle the high-grade scenario, while tailings handling equipment was sized for the average scenario. For design purposes, a variation of 15% from nominal tonnages was considered.

Process Design Criteria

A table outlining general design criteria for major process equipment is presented in this section. This information was used to develop the capital and operating cost estimates for the scope of this Study.

The process design criteria that were used for the base case are shown in Table 17-3. As mentioned above, the design parameters are different from the testwork results described in Chapter 13.

The plant availability given in Table 17-3 is 92%, which is relatively high compared to other iron ore plants. It is considered that this availability factor is appropriate for Champion due to the presence of several additional pieces of equipment to be added to the concentrator, over and above the minimum necessary. These include:

- One additional pan filter, as a backup;
- Oversized classification screens;
- Division of the equipment downstream of the scalping screens into two (2) circuits that can be operated independently of each other. This will allow the plant to run at half capacity during maintenance.

Table 17-3: General Process Design Criteria

Criterion	Value	Units
General:		
Plant Availability	92	%
Hourly Tonnage	2854	tph
Daily Tonnage	63016	tpd
Annual Tonnage	23	Mtpy
Iron Grade (Average)	30	% Fe_T
Iron Grade (High)	35	% Fe_T
Liberation Size	850	µm
Concentrate Production:		
Iron Recovery	82	%
Product Grade	65	% Fe_T
Maximum Concentrate Production (Year 3)	10300000	tpy
Average Concentrate Production	8700000	tpy
Crushing and Stockpiling:		
Utilization	65	%
Crusher P_{80}	180	mm
Hourly Throughput (Actual)	4039	tph
Grinding and Screening:		
AG Mill Energy Requirement	4.8	kWh/t
Scalping Screen Aperture	6	mm
Classification Screen Aperture	850	µm
Gravity Concentration:		
Method Selected	Spiral Concentrators	
Rougher Spirals Capacity	4.5	t / start
Cleaner/Recleaner Spirals Capacity	2.5	t / start
Recleaner Spirals Capacity	2.3	t / start
Feed Percent Solids	40	%
Concentrate Filtration:		
Product Moisture (winter - steam dried)	3	%
Product Moisture (summer)	5	%
Tailings Handling		
Percent Solids to Pond	50	%

The following process design considerations were used in equipment selection and sizing. These are based on testwork results available at the time of the completion of the process design and estimates using BBA's experience.

- The run-of-mine (ROM) material will contain an average of 30.0% Fe_T over the first 20 years of operation based on the mine plan (Chapter 16). The material will be upgraded to produce a concentrate containing 65% Fe_T and 5% SiO_2 (max) with an assumed iron recovery of 82.0% (West Pit) and 76.5% (East Pit);
- ROM material will be crushed using a single 1525 mm x 2260 mm (60” x 89”) gyratory crusher. Crushed material will be stored in a conventional stockpile with a 12-hour live capacity of approximately 34 250 t and reclaimed by apron feeders onto the AG mill feed conveyor;
- Grinding will be done with one 11.6 m x 6.6 m (38’ x 21.5’) AG mill driven by a dual pinion induction motor drive train with a total installed power of 16 000 kW (21 450 HP). This is anticipated to treat the nominal throughput rate of ore at the 65th percentile of hardness using 85% of installed power;
- The nominal throughput rate of the AG mill is 2854 tph of material. The design of the mill has taken into account fluctuations of 10% in rock hardness and 15% in throughput;
- Mill discharge will be screened using a 2-stage screening circuit. Oversize from the primary scalping screens and the secondary multi-slope (“banana”) screens will be recirculated to the AG mill;
- The flow sheet for the production line will be based on a 3-stage spiral gravity concentrating circuit;
- Final concentrate will be dewatered on a pan filter. The filter will be fitted with a steam hood, allowing it to achieve a final concentrate moisture content of 3%;
- Concentrate will be directed to the train load-out area by a conveyor;
- Dewatered tailings will be directed to the tailings pumping system for final disposal;
- Design capacity for the concentrator will be based on a 365 days per year operation with an overall plant utilization of 92%;
- There is no redundancy in the various conveying systems in the plant.

17.4 Process Flowsheet and Mass and Water Balance

A conventional gravity circuit flowsheet was developed based on the testwork presented in Chapter 13. The circuit consists of primary crushing, primary autogenous (AG) mill grinding, 3-stage spiral gravity separation and concentrate dewatering by pan filters. The final concentrate will be dewatered during the winter months with the use of steam. The tailings will be dewatered and stored in a tailings pond. Reclaim water from the tailings pond will be recycled to the concentrator.

A schematic flowsheet is presented in Figure 17-2.

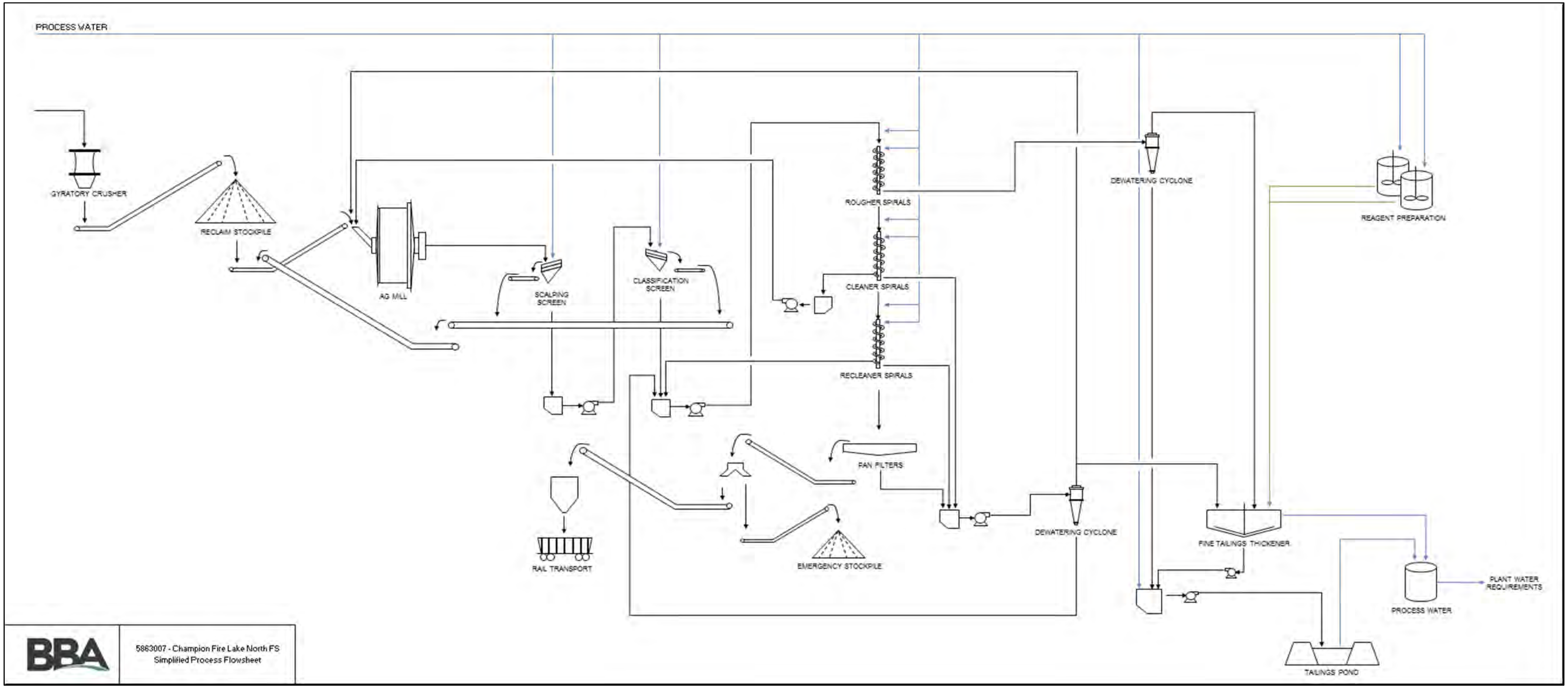


Figure 17-2: General Fire Lake North Process Flowsheet

A simplified mass balance was calculated for the process shown in Figure 17-2. This mass balance is based on similar operations and testwork data. The throughput was determined based on the AG mill size and its associated power draw. The iron recovery and concentrate grade were assumed based on similar operations. Flow rates from the mass balance for the average and high-grade cases are presented in Table 17-4.

Table 17-4: Simplified Solids Flow Rates and Iron Concentration

Streams	Throughput		Grade		tph (Design)
	TPH (average)	TPH (High-grade)	% Fe_T (average)	$\%Fe_T$ (High grade)	
Main Streams					
Feed	2854	2854	30.0%	35.4%	3282
Concentrate	1080	1274	65.0%	65.0%	1466
Tailings	1774	1579	8.7%	11.5%	2040
Internal Streams					
Rougher Concentrate	1500	1770	55.4%	55.4%	2036
Cleaner Concentrate	1200	1416	61.6%	61.6%	1629
Recleaner Concentrate	1080	1274	65.0%	65.0%	1466
Cleaner Coarse Middlings	200	236	37.4%	37.4%	271
Recleaner Coarse Middlings	65	77	34.0%	34.0%	89
Cleaner Fine Middlings	100	118	16.6%	16.6%	136
Recleaner Fine Middlings	55	65	27.0%	27.0%	74
Coarse Tailings	1147	1041	1.4%	1.9%	1319
Fine Tailings	626	539	22.0%	30.2%	720

As mentioned above, for each of the process streams, the higher of the two (2) throughputs (average or high-grade case) was used for design. A design factor of 15% was then applied to the selected throughput to obtain the design throughput.

An overall water balance for the process plant was established based on the design criteria presented in Figure 17-3.

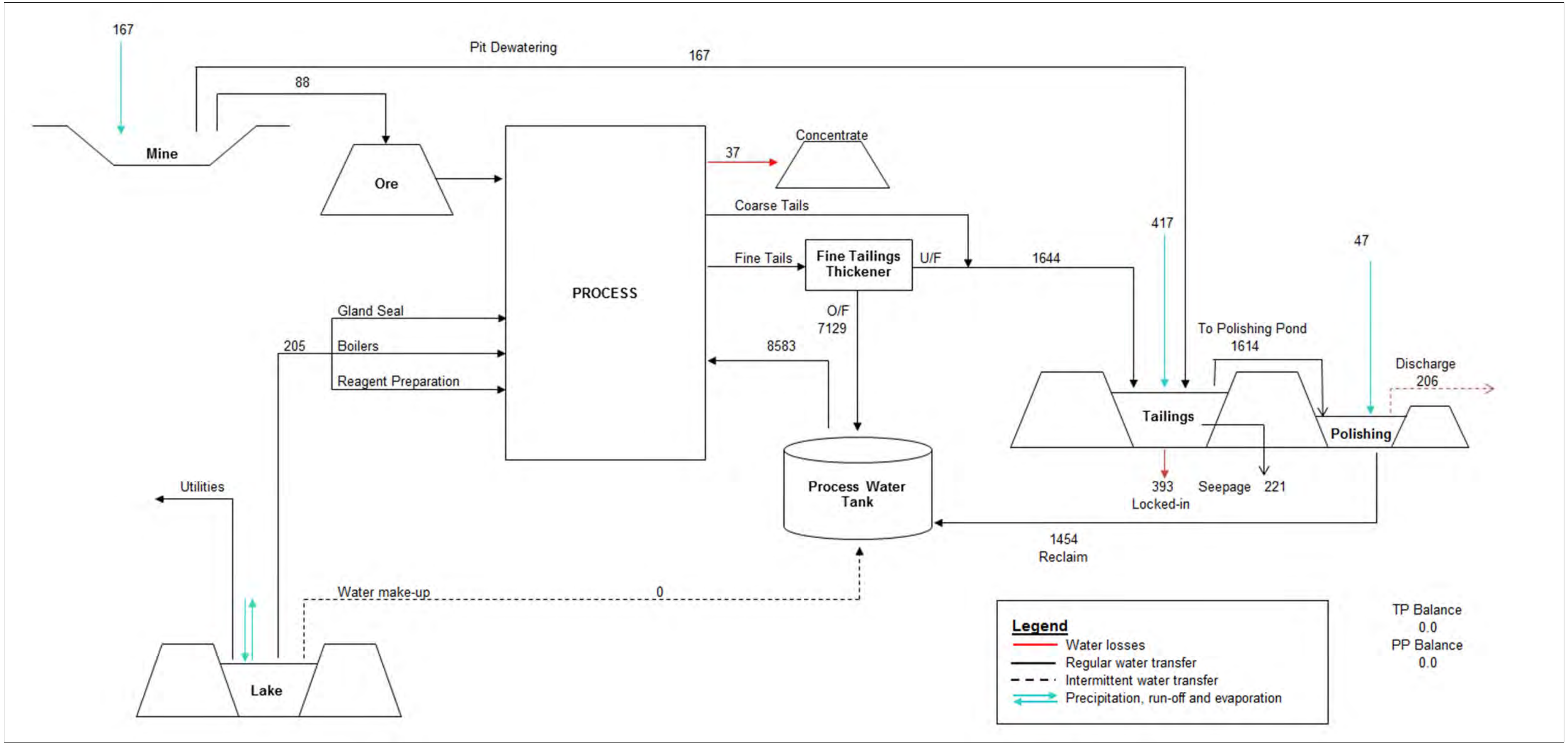


Figure 17-3: General Process Plant Water Balance

The water balance shows that there will be sufficient water from precipitation and run-off into the tailings pond and pits, as well as from the tailings slurry, to meet process water requirements without needing fresh water makeup. Moisture content of the run-of-mine material was assumed to be 3%.

17.5 Ore Crushing, Conveying and Storage

Run-of-mine (ROM) material will be delivered in trucks to either of the two (2) dump points at the 1525 mm x 2260 mm (60" x 89") gyratory crusher. A hydraulic rock breaker, operated from the crusher operator's room, will be installed adjacent to the crusher to manipulate lumps in the feed pocket and to break lumps too large to enter the crusher. An overhead crane will be located over the dump pocket and will be used during installation of the crusher and for handling the crusher main shaft and concaves during maintenance periods. An auxiliary hoist will be installed over the hoist well in the crusher building to handle parts for the crusher drive, the discharge apron feeder, crushed ROM conveyor and other ancillary equipment. The crusher building will be enclosed and provided with a baghouse. Floor wash-down water and drainage will be collected in a sump which will periodically be collected by a tank truck and removed from site.

ROM material crushed to -250 mm (10") in size will be collected in a surge pocket with a two-truck capacity of 640 t below the crusher. From the surge pocket, the crushed ROM will be fed by a 2134 mm (84") wide apron feeder with a design capacity of 4500 tph onto the 1829 mm (72") wide fixed-speed crushed rock belt conveyor fitted with a belt scale, belt magnet and metal detector. The conveyor, with walkways on both sides, will be enclosed in an unheated gallery and will discharge onto the crushed ore stockpile. The stockpile will not be covered. The 34 250 t live capacity of the stockpile will be sufficient for approximately 12 hours of operation. This will allow the crusher to be taken out of service for normal maintenance while maintaining the feed to the mill. The total pile capacity will be 85 600 t, sufficient to maintain an uninterrupted feed to the grinding circuit for up to 30 hours. This will allow major repairs to be undertaken on the crusher.

Crushed ore will be withdrawn from the stockpile by three (3) variable speed, 1372 mm (54”) wide apron feeders located inside a heated reclaim tunnel. The apron feeders are sized such that during maintenance, two (2) feeders can provide the full mill-feed capacity of 2854 tph. The apron feeders will feed the crushed material onto the 1829 mm (60”) wide mill feed conveyor at a maximum rate of 3425 dry tph and an average rate of 2854 dry tph. The mill feed tonnage will be controlled electronically by varying the feeder speed with a control signal from the belt weigh scale.

One (1) baghouse per apron feeder will be installed in the reclaim tunnel. Wash-down and drainage water from the tunnel, together with the water pumped from the floor sump at the crusher building, will be collected periodically by tank truck and transported from the site.

The mill feed conveyor and walkways on both sides will be enclosed for protection from wind and snow.

17.6 Grinding and Screening

Crushed ore from the stockpile along with oversize material removed from the primary screening will feed the AG mill via the mill feed conveyor. The AG mill will be a 11.6 m x 6.6 m (38’ x 21.5’) mill driven by two (2) dual-pinion, 8.0 MW (10 700 HP) drives for a total installed power of 16 MW (21 450 HP).

The ground material from the AG mill will be discharged onto two (2) 4267 mm x 8534 mm (14’ x 28’) primary scalping screens with 6 mm openings. The oversized fraction from the primary screens will be discharged onto the scalping screen O/S belt conveyor. The undersize material from each screen will discharge into a single pump box. The pump box will feed two (2) separate pumps, each capable of supplying half of the total plant feed. The division of the stream into two (2) parts makes it possible to operate the plant at half capacity during maintenance. All equipment which is downstream of the scalping screen undersize pumpbox (with the exception of the tailings thickener and tailings pumps) has been divided into two (2) circuits to allow for operation at half capacity.

The scalping screen undersize fraction is pumped to an adjacent building and fed to six (6) 4267 mm x 8534 mm (14’ x 28’) multi-slope (“banana”) secondary screens with 850 micron openings (20 mesh). The secondary screens are housed in an adjacent building to minimize the impact of the equipment vibrations within the main concentrator building; vibrations can be amplified when operating at a screen opening size below 1.5 mm. One primary screen pump box feeds three (3) secondary screens. The oversize from the secondary screens is collected onto a belt conveyor along with the scalping screen oversize material. The undersize fraction of the classification screens is collected into two (2) pump boxes, with each pump box collecting material from three (3) secondary screens. This material is then pumped to the gravity spirals circuit.

The combined scalping and classification screen oversize material are directed back into the AG mill.

The mill feed and recirculation system consists of five (5) separate conveyors. The conveyors and the information regarding the material they carry are presented in Table 17-5.

Table 17-5: Mill Feed and Recycle Conveyors

Conveyor Name	Feed From	Discharge To	Horizontal Length (m)	Emergency Discharge
Stockpile reclaim conveyor	Stockpile reclaim	Fresh feed and mill recycle conveyor	280	No
Fresh feed and mill recycle conveyor	Stockpile reclaim, scalping screen O/S, classification screen O/S	AG mill feed conveyor	90	No
AG mill feed conveyor	Fresh feed and mill recycle conveyor	AG mill feed chute	26	No
Scalping screen O/S conveyor	Scalping screen O/S	Classification screen O/S conveyor	88	Yes, 30 t pebble pile
Classification screen O/S conveyor	Scalping screen O/S, classification screen O/S	Fresh feed and mill recycle conveyor	51	Yes, 30 t pile

17.7 Primary Grinding Mill Sizing

Grinding characterization work was carried out during the Preliminary Feasibility Study in order to confirm the autogenous mill selection. As discussed in Section 13.5, additional SPI testing, JK drop weight tests and SMC tests were conducted on both East and West Pit samples. These test results were analyzed using CEET, JKSimmet simulation software and Morell calculations. The CEET simulation performed for the PFS concluded that a 11.6 m x 6.6 m (38 ft by 21.5 ft) AG mill with 16 MW installed power would be required, a larger mill than was assumed in the PEA work.

Moreover, testwork found that the East Pit material was harder and required a finer grind size than the West Pit material. It was concluded that when processing the East Pit material or starting Year 10 after Year 9 in the LOM, a second AG mill would be needed to maintain approximately 9.0 Mtpy concentrate production target. This and other ramifications of East Pit material is discussed further below.

17.8 Gravity Spirals Circuit

The gravity concentrating circuit layout is based on a conventional, gravity fed, 3-stage spiral circuit. The undersize from the classification screens will be pumped to four (4) primary distributors. The primary distributors feed an additional eight (8) secondary distributors. The secondary distributors will feed 32 banks of 14 double-start *rougher* spirals (896 total starts). The rougher spirals will produce two (2) products, a concentrate stream and a tailings stream. The concentrate will be collected by a series of launders and directed to the distributors feeding the cleaner spirals. Dilution water will be added in the launders to control the solids density at the cleaner spiral feed at 40% solids (w/w). The tailings from the rougher spiral will be discharged to two (2) separate pump boxes, each feeding a separate pump. The tailings collected in both pump boxes will be pumped to two (2) dewatering cyclone clusters. The tailings system is described in Section 17.10.

The 32 banks of 14 double-start *cleaner* spirals (896 total starts) will be fed by distributors. Dilution water will be added to the recleaner spiral feed to control the feed percent solids to 40% (w/w). The cleaner spirals will produce three (3) products: concentrate, coarse middlings and fine middlings. The concentrate will be fed directly to the recleaner spirals located immediately below the cleaner spirals. The coarse middling stream will be collected by a network of launders into a pump box from which it will be pumped back to the AG mill. The fine middlings stream will be collected by a network of launders and sent by gravity to two (2) fine middlings pump boxes. From there it will be sent to the fine middlings cyclone cluster.

The 32 banks of 14 double-start *recleaner* spirals (896 total starts) will be fed directly by the cleaner spiral concentrate stream. The recleaners produce three (3) products: concentrate, coarse middlings, and fine middlings. The final concentrate is collected by a network of launders and directed to distributors which feed five (5) 8.5 m diameter (28’) horizontal pan filters, four (4) operating and one (1) on stand-by. The pan filter distribution system was designed such that each distributor can feed one of two (2) filters; this allows maintenance to be done on a pan filter without impeding the plant production. Each pan filter is provided with a scroll discharge and a steam hood.

The coarse middling stream from the recleaner spirals is collected to a pumpbox by a network of launders and is then pumped to the classification screen undersize pump box. The fine middling stream is collected and is directed by gravity to the fine middling pump boxes along with the cleaner fine middlings stream. The fine middling streams will have less than 10% solids by weight.

The fine middlings that are collected will be pumped to dewatering cyclone clusters, each consisting of four (4) 800 mm cyclones. This design is used to limit the quantity of excess water returning to the head of the spiral circuit to better control the circuit water balance. A portion of the cyclone overflow is used as make-up water and is directed to the AG Mill for control of pulp density (percent solids), while the remaining portion is gravity fed to the fine tailings thickener. The cyclone underflow is directed back to the classification screen undersize pump box; from there, it is recycled to the rougher spiral feed.

17.9 Concentrate Conveying and Loadout

The concentrate discharged from the pan filters is collected onto a common 914 mm wide (36’’) belt conveyor inside the plant and is transferred to the 32 600 t capacity load-out silo by two (2) 914 mm (36”) wide belt conveyors operating in series. If the load-out silo is full, concentrate can be diverted onto the emergency stockpile conveyor and sent to an outdoor stockpile. Concentrate will be reclaimed later on by a loader and will be dumped into a hopper onto a 914 mm (36”) wide reclaim conveyor and returned onto the load-out conveyor feeding the silo.

17.10 Tailings Dewatering and Handling

Rougher tailings from each half of the spiral line are collected in rubber-lined steel launders and flow by gravity to a pump box. A variable speed pump on each pump box feeds a cluster of five (5) 800 mm dewatering cyclones. The thickened cyclone underflow streams flow by gravity to the tailings pump box. The overflow from the rougher spiral tailings cyclones, along with a portion of the fine middling cyclone overflow, will be pumped to a 55 m diameter high-rate thickener. Flocculant and coagulant will be added at dosages of 20 g/t and 10 g/t respectively to the thickener feed stream to promote settling and to maintain process water clarity.

The clarified thickener overflow stream will flow by gravity to a process water reservoir and will constitute the main source of process water for plant operation. In order to minimize the size and cost of the process water tank, the thickener will be constructed with an additional 1 m of height that will be used to accumulate process water. This additional height will accommodate 2375 m^3 of process water.

In winter, both the tailings thickener underflow (comprising the fine tailings) and rougher spiral dewatering cyclone underflow (comprising the coarse tailings) will be pumped to the tailings pond in one of two (2) parallel lines, while the second line will be on stand-by. Both lines will be equipped with four (4) pumps (three (3) operating and one (1) on stand-by.

Water from the tailings pond will be transferred to the polishing pond using a siphon. The siphon flow will be regulated so that the polishing pond releases an approximately constant flow of water to the environment. In this way, a residence time of at least 60 days will be maintained in the polishing pond. Fluctuations in water flows to the tailings pond will be buffered by the storage capacity of the tailings pond.

17.11 General Concentrator Plant Services

This section describes the various services and site infrastructure that will be required for the operation of the Fire Lake North concentrator. In the present mandate, BBA has not specifically quantified the various services and infrastructure costs. Instead, costs were estimated based on BBA’s reference projects.

17.11.1 Compressed Air

Compressed air requirements have been assumed to be similar to BBA's reference projects and capital costs for the compressed air distribution network were estimated accordingly.

17.11.2 Fresh Water

The fresh water requirements of the concentrator include: high and low pressure gland seal water, flocculent and coagulent preparation, steam and general utilities. The water balance indicates that no fresh water will be required for the process (as process water make-up).

Fresh water will be obtained from pit dewatering (wells) and any additional water will come from local lakes. It is anticipated that water drained from the development of the West Pit area can be used as fresh water. An allowance for a pumping system and pipeline from the West Pit area to the concentrator has been made.

Total fresh water requirement for the process was estimated to be approximately 205 m^3/h.

17.11.3 Process Water

Most of the process water for the plant will be taken from the tailings thickener overflow, representing an anticipated flow of approximately 7130 m^3/h. Additional amounts of water will come from the tailings pond. Water from the tailings pond will be transferred to a polishing pond. Overflow water from the polishing pond, estimated to be 1454 m^3/h, will be returned to the process as reclaim water. It is anticipated that additional water collected from precipitation and natural runoff will be sufficient to make-up for losses due to water locked in tailings and to residual moisture in the concentrate.

17.11.4 Fire Protection

A reservoir with two (2) pumps, one (1) electric and one (1) diesel-powered, will be used for fire protection. The pumps will draw water from the bottom of the reservoir, which will be a dedicated fire reserve consisting of one (1) million cubic metres of water. This water will be distributed by an independent piping system. Fire hydrants will be located at strategic points on site, allowing for easy access in the event of an emergency.

17.11.5 Steam

Steam is used for the process of drying the concentrate as well as the heating of buildings during the winter months. Based on BBA's internal database, the steam requirements for drying the concentrate averaged 12 kg (26 lbs) of steam per tonne of concentrate during winter months (November to April). A maximum steam consumption of 20 kg (45 lbs) per tonne is assumed during the months of December and January. The amount and cost of heating oil required for the generation of steam was determined based on diesel oil usage and considering an efficiency factor of 0.8, such that 1 litre of diesel produces 13.2 kg of steam,.

17.12 Major Process Equipment List

A major process equipment list is presented in Table 17-6.

Table 17-6: Process Plant Major Equipment List

Qty.	Name	Size	Unit Capacity
CRUSHER AREA			
1	Gyratory Crusher	1524 mm x 2261 mm (60" x 89")	4000 tph
1	Stockpile Feed Belt Conveyor	1828 mm (72") x 300 m	4850 tph
CRUSHED ROM STORAGE			
1	Stockpile	-	34 250 t / 85 600 t
1	Stockpile Reclaim Conveyor	1524 mm (60") x 280 m	3300 tph
GRINDING AND SCREENING AREA			
1	AG Mill	10.97 m x 6.55 m (38' x 21.5')	2850 tph
2	Scalping Screens	4.27 m x 8.53 m (14' x 28')	2000 tph
6	Classification Screens	4.27 m x 8.53 m (14' x 28')	600 tph
GRAVITY CONCENTRATION			
32	Rougher Spiral Banks 14 DS	-	4.5 t / start
32	Cleaner Spiral Banks 14 DS	-	2.5 t / start
32	Recleaner Spiral Banks 14 DS	-	2.3 t / start
4	Pan Filters	8.5 m (28') Dia.	350 tph
TAILINGS HANDLING			
2	Fine Middlings Cyclone Clusters	800 mm (4 units per cluster)	3000 m^3/h
2	Rougher Spiral Tails Cyclone Clusters	800 mm (5 units per cluster)	3000 m^3/h
1	Fine Tailings Thickener	55 m dia.	7.2 m^3/m^2/h
1	Tailings Pipeline (Operational)	610 mm x 6000 m (24" x 19685')	3000 m^3/h
1	Tailings Pipeline (Standby)	610 mm x 6000 m (24" x 19685')	3000 m^3/h
LOAD-OUT SILO			
1	Silo Reclaim Conveyor	1829 mm (72") x 259 m	6000 tph
1	Load-Out Silo	25.5 m dia. X 37 m height	32 600 t

The major process equipment list from Table 17-6 provides only a general overview of the plant equipment and does not include any secondary or ancillary equipment. This list also does not include the slurry or water pumps needed.

17.13 Process Changes for East Pit

In the proposed mine plan, the West Pit will be mined during Years 1-9 of the Project. The East Pit will be mined afterwards. Testwork has shown that the East Pit material is harder than the West Pit material and requires a smaller liberation size. These factors increase the amount of grinding that must be performed per tonne of ore. In addition, the concentrate weight recovery from the East Pit material is lower than that of the West Pit material (see Chapter 13). Therefore, in order to maintain the approximately 9.0 Mtpy concentrate production target, 24.8 Mtpy of ore must be milled rather than 23.0 Mtpy for the West Pit. To provide the additional grinding power needed, a second AG mill will be added to the concentrator starting in Year 10. The second mill will have dimensions of 9.7 m diameter by 5.0 m length (32 ft diameter by 16.5 ft length), with a total installed power of 8 MW.

The general process design values and stream throughputs are given in Table 17-7 and Table 17-8.

Table 17-7: General Process Design Basis, East Pit (Compared to Nominal)

Criterion	Nominal Value	East Pit Value
Weight Recovery (%)	37.8	35.6
Iron Recovery (%)	82.0	76.5
Head Grade (% Fe_T)	30.0	30.3
Concentrate Grade (% Fe_T)	65.0	65.0
Plant Utilization (%)	92	92

Table 17-8: Simplified Solids Flow Rates & Iron Concentration, East Pit (Compared to Base Case)

Streams	Throughput, East Pit		% Fe_T, East Pit	tph (design) East Pit	tph (design) Base Case
	tph	Annual			
Product Streams					
Feed	3077	24.8	30.3%	3539	3282
Concentrate	1097	8.8	65.0%	1261	1466
Tailings	1981	16.0	11.1%	2278	2040
Internal Streams					
Rougher Concentrate	1523	12.3	55.4%	1752	2036
Cleaner Concentrate	1218	9.8	61.6%	1401	1629
Recleaner Concentrate	1097	8.8	65.0%	1261	1466
Cleaner Coarse Middlings	203	1.6	37.4%	234	271
Recleaner Coarse Middlings	66	0.5	34.0%	76	89
Cleaner Fine Middlings	102	0.8	16.6%	117	136
Recleaner Fine Middlings	56	0.4	27.0%	64	74
Coarse Tailings	1282	10.3	1.8%	1475	1319
Fine Tailings	698	5.6	28.0%	803	720

In order to determine whether the concentrator would be able to handle the increased throughput proposed for the East Pit, a mass balance was generated using the East Pit process design values. The throughputs in this scenario were compared against the streams for the base case described in Sections 17.5 and 17.6. The throughputs in the East Pit treatment scenario were found to be within the design limits of the base case scenario, with the exception of the cyclones. Additional cyclones would be required when commencing the East Pit exploitation.

18. PROJECT INFRASTRUCTURE

This section describes the major infrastructures required to support the Project, both the Fire Lake North (FLN) mine and processing site, as well as the Pointe-Noire terminal facility site. Descriptions of the concentrate rail transportation system and Port infrastructures are also provided.

18.1 General FLN Site Plan Description

The general FLN site plan presented in Figure 18-1 and Figure 18-2 was developed as part of this Report. This section describes the infrastructures and support facilities that are required for the construction and operation of the mine and processing plant. The following was taken into consideration in order to develop the site plan:

- Trans-Québec Labrador Highway 389 provides year-round access to the FLN site;
- Hydro-Québec (HQ) 161 kV transmission line number 1695 extends along Highway 389 and will be able to support a 55 MW power demand;
- The 161-34.5 kV FLN temporary substation will be built along Highway 389 and connected to the HQ 161 kV transmission line;
- 161 and 34.5 kV power transmission lines will support the construction and operation of the FLN site;
- Internet communication service can be made available at the railway station “Poste Queen” located just off Highway 389;
- Main site access road to reach the mine and processing plant will be located at kilometre 494 along Highway 389;
- The main site access road will extend 7 km from Highway 389 to reach the processing plant site;
- The construction camp will be located at the junction between Highway 389 and the main access road;
- FLN site telecommunication tower will be installed along the main site access road;
- Explosive plant and storage area will be connected to the main site access road;
- The permanent camp for operations will be located 1.5 km north from the processing facilities and accessible from the main site road;

- Stockpiles for waste rock and overburden are as shown in Figure 18-1;
- The open pit footprints for the West and East pit deposits are as shown in Figure 18-1. As a result, haul roads will run from the pits to waste rock overburden stockpiles and crusher building location;
- The tailings management facility (TMF) will be located southeast of the processing plant area. Tailings will be pumped from the concentrator to the deposition points in accordance with the TMF development plan;
- The general plant sites for the processing and infrastructure buildings are located as indicated in Figure 18-2;
- The process plant will be located to the north of Demi-Mille Lake;
- The FLN 315 kV main substation is positioned to the south of the concentrator building;
- The proposed 315 kV transmission line will be built and connected to the main substation by Hydro-Québec;
- The concentrate load-out facilities will connect the concentrator to the rail transportation system;
- The mine service area will be located to the east of the concentrator building and will consist of a mine garage, truck wash bay and tire shop, fuel storage depot and railroad repair shop;
- The mine service area will be accessible for the mine haul trucks using mine roads and for light vehicles using the main site access road from the concentrator building;
- The site service utility distribution equipment for process water, domestic water, waste water and fire protection water is located on a common pad to the east of the concentrator building;
- Raw water will be pumped from Eva Lake using a floating pump house station;
- Trenches and sedimentation ponds will be built around the FLN site for water management and effluent control.

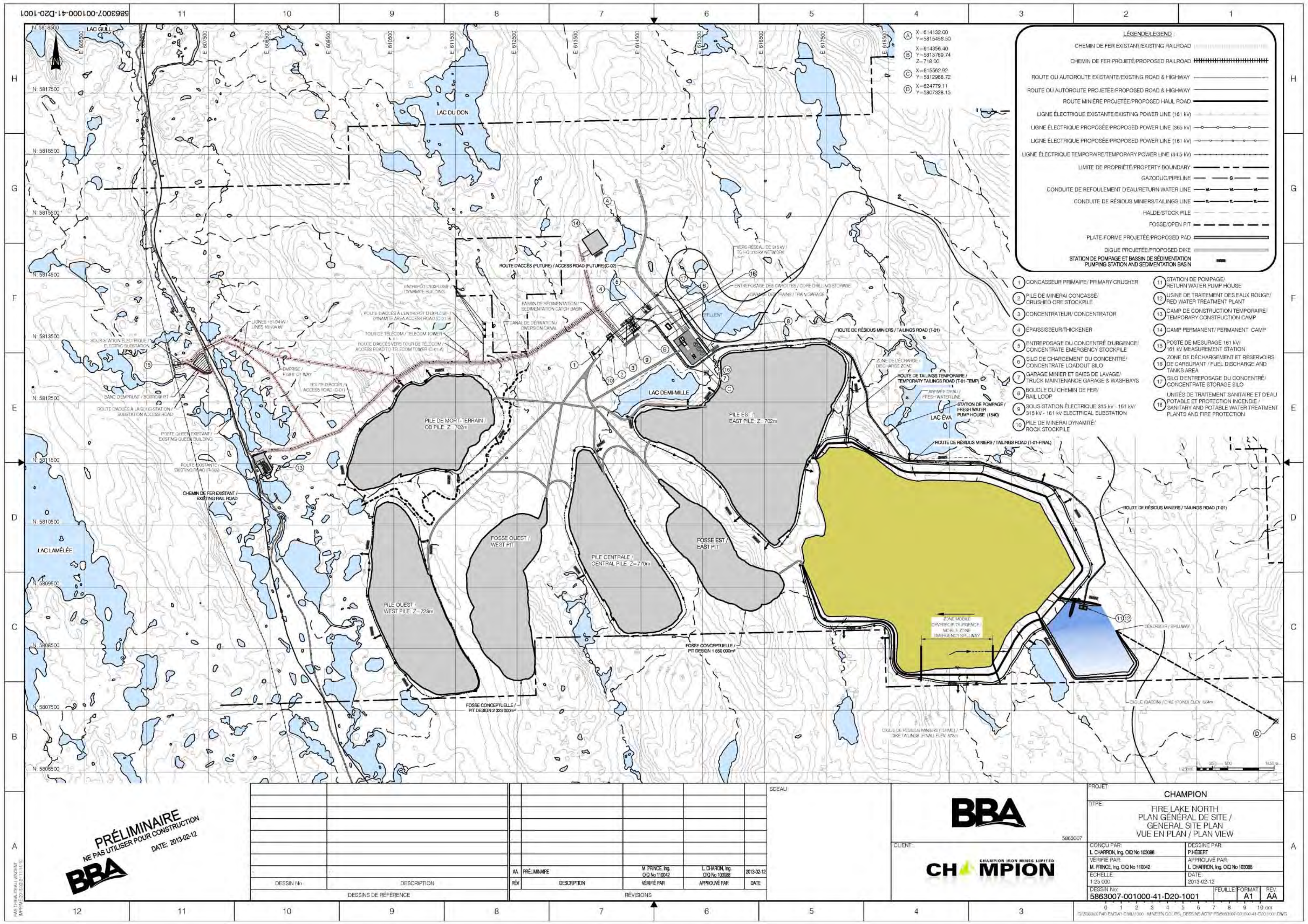


Figure 18-1: FLN Site Plan

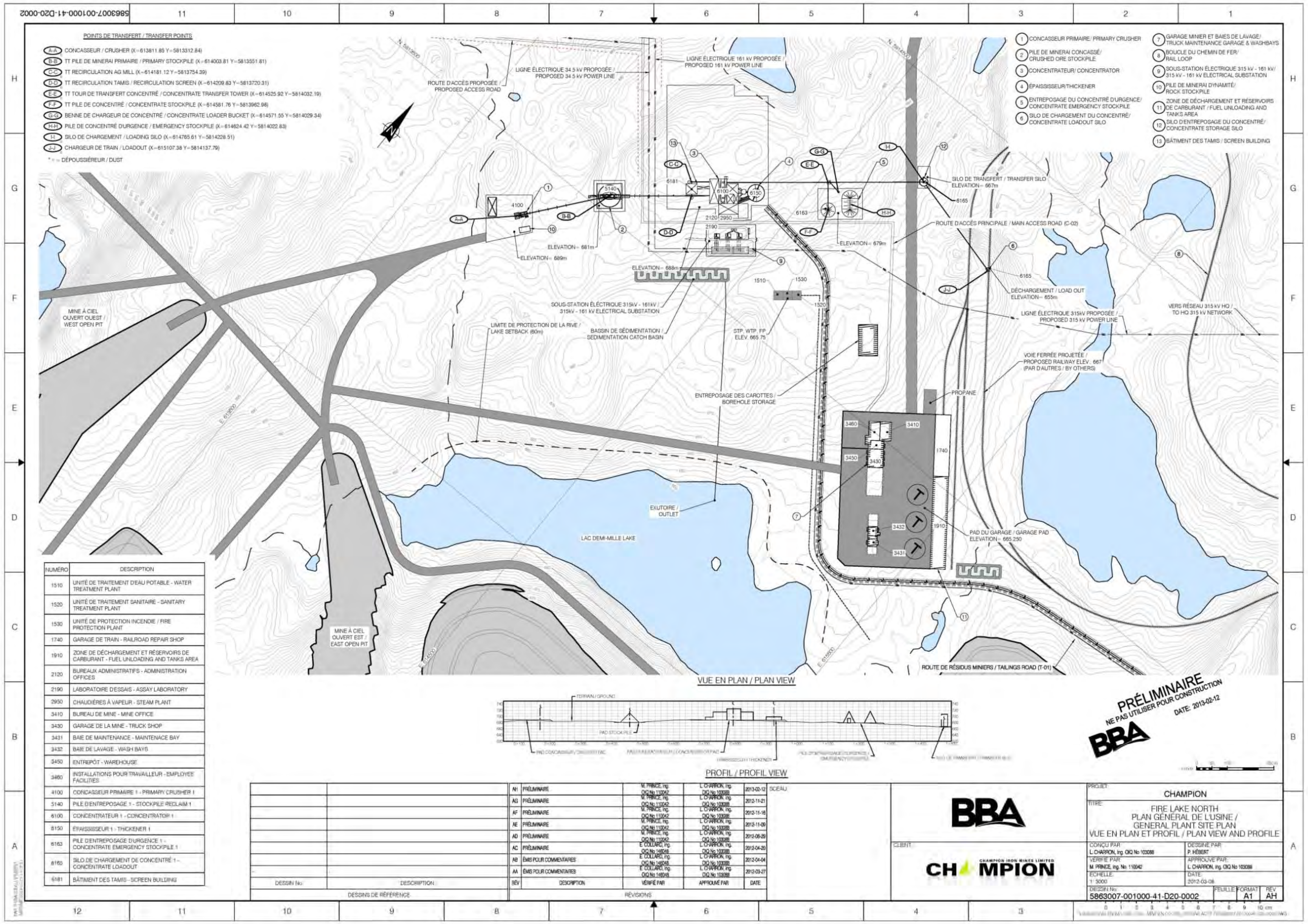


Figure 18-2: FLN Plant Site

18.1.1 Access to FLN Site

The FLN site is serviced by the Trans-Québec Labrador Highway 389 that runs south-north from the port town of Baie-Comeau to the Fermont and Labrador City area. The existing highway provides year-round access and can support both the construction and operation phases of the Project. Highway 389 is undergoing a major 5-year upgrade program conducted by the Québec Ministry of Transportation. The access road to the FLN site will be located at kilometre 494 along Highway 389.

18.1.2 Site Preparation

Site preparation will consist of tree cutting and clearing, excavation of organic material and overburden, rock excavation and stockpiling and construction of site roads, building foundations, ditching and sedimentation ponds.

Removal of organic material will only be accomplished where required and the material will be stockpiled to eventually revegetate the mine site. It is intended to recycle the maximum amount of material available from the FLN site for construction such as overburden and waste rock from the open pits, providing that these materials are deemed competent and inert. The potential sources of backfill for construction materials are cut and fill from the construction site preparation, overburden and waste rock from the open pits, mainly the East pit. Moreover, the intent is to minimize the use of gravel pits for construction and maximize the use competent and inert waste rock from the pit stripping operations.

- Cut and fill will be used to minimize the amount of material from borrow pit;
- Competent and inert overburden material for road construction;
- Competent and inert waste rock excavated from pits will be used as a source for common backfill;
- Competent and inert waste rock from the pits that is qualified and certified by a laboratory in accordance with construction engineering standards will be used as a source for structural backfill;
- Gravel pits will provide sand and gravel for mass and qualified backfill when required.

The construction of roads for light vehicles will use the maximum amount of cut and fill material available and overburden, where possible. The primary source of material used to construct the mine haul roads will be waste rock from the pits, as common fill and the same material will be crushed for its top layer. Overburden can be used as an alternative source of material for mine haul road construction, where possible. Building and equipment foundations will be constructed from qualified material. Moreover, mine waste rock will be used as the source of common backfill around buildings and infrastructures to reach finished platform elevations.

An extensive geotechnical investigation program was initiated in 2012 and will be completed prior to detailed engineering in order to design the optimum foundations for the mine site and associated infrastructures, while considering the existing soil conditions. An initial geotechnical investigation program was also completed for the AG mill foundations. The remaining geotechnical investigation program must be completed prior to confirming the foundation requirements of the tailings disposal area, waste rock piles, process plant, crushing building, infrastructure buildings and circulation areas.

Sedimentation ponds will be built at various locations around the FLN site for water management and sedimentation control. Ditches and trenching will capture the surface water and redirect the flow to strategic low points where control basins will be constructed to protect the nearby water streams from sedimentation accumulation. In some cases, watershed diverters will be used to divert small streams and rivers, which would normally circulate through the pits or stockpiles, by sending them to different water channels so as not to affect the natural flow of water.

18.1.3 FLN Site Road Work

The construction of a 7 km main access road extending eastward from Highway 389 is required to reach the mine and concentrator site. A guard house will be located at the entrance point of the main access road. The main site road network will also provide access to the explosive plant, telecommunications tower and permanent camp locations. The plant site road network will allow for light vehicle circulation between the concentrator, crusher, mine service building, and tailings area. The layout of the light vehicle road network will not cross mining haul roads for safety reasons. This road network will be used for personnel and material transportation between the different infrastructure locations.

18.1.4 FLN Mine Roads

Mine roads will be designed specifically for mine haul trucks and other mining equipment and built using waste rock material that is available onsite. The haul roads will connect the open pits to the crusher building, waste rock areas and to the mine maintenance buildings. Mine roads will be designed based upon parameters such as grade, maximum curves, intersections and switchbacks. The main objective of the road design is to provide for a safe and efficient cycle time at standard operating speeds. The general width of the haul roads will be sufficient for 320 t haul trucks.

18.1.5 FLN Electrical Supply and Distribution

The electrical supply and distribution will be achieved in successive phases to provide the initial construction power requirements up to the mining operation. These requirements are as follows:

- Construction of a temporary 161/149 kV-34 kV metering substation by Champion;
- The FLN site will be connected to an existing 161 kV Hydro-Québec overhead line (“OHL”), line number 1695, which extends along Highway 389 from the Hart-Jaune power station to the Normand substation (Mount Wright);
- This substation would support a 12 MW power demand during the construction period and will allow to support the 55 MW power demand at 149/161 kV for the first two years for production line 1 at the concentrator;
- Meanwhile, Hydro-Québec will build a 315 kV class transmission line from the Montagnais substation to permanently support the FLN site power demand;
- Champion will build a permanent expandable 315-161/149/34 kV substation at the concentrator site;
- A 34.5 kV transmission line will be built by Champion that will extend from the 161/149 kV metering substation to the FLN site. The 34.5 kV transmission line will serve as the power distribution grid for the construction phase, will feed the

construction camp as well as future plant operations and mine activities. The total length of the line will be 12.5 km; 4 km from the 161/149-34.5 kV substation to the construction camp; 7 km to reach the concentrator site and a further 1.5 km section to reach the permanent camp.

- A temporary 161 kV transmission line will be built by Champion extending from the 161/149 kV metering substation to the 315-161/149/34 kV substation at the concentrator site. The total length of the line is 7.5 km from the 161/149 kV metering substation to the 315-161/149 kV main electrical substation at the concentrator site. This 161 kV transmission line will serve as the power source for first two years of operation at 10 Mta;
- Hydro-Québec's 315 kV transmission line will permanently support the Project once the transmission line is completed and connected to the 315-161/149 kV main electrical substation at the concentrator site;
- Power from the low voltage terminal of the main 315-161/149/34 kV substation will be distributed at 34.5 kV to the mine site, process plant facilities, site infrastructures and permanent camp. Transformers and switchboards will be located at each area to feed lower voltage to buildings and equipment. The mining operations will require 34.5-7.2 kV portable substations to provide power to the mine equipment. The substations will be placed near the pit to minimize the length of the 7.2 kV trailing cables and to protect them from damage while in use. The mine distribution network at 34.5 kV will be built progressively, according to the pit development and requirements.

18.1.6 Primary Crusher Building

The primary crusher building will be located midway between the West and East pits and about 1 km from the final pit shell boundary. Provisions will be made to stockpile run of mine materiel ("ROM") in designated areas in proximity to the crusher building in the event of equipment downtime or scheduled maintenance at the crusher. This building will be composed of a multi-level concrete foundation and the top section will constructed of non-insulated steel siding and roofing over the dump pocket. Dust control equipment will be provided for the transfer points located inside the building. The crushed ore will be conveyed from a tunnel below the crusher building to the stockpile located 300 m away.

18.1.7 Crushed Ore Stockpile

The crushed ore stockpile design will provide a live capacity of about 34 250 t, which equates to about 12 hours of mill operation. No enclosure or dome will be provided for the crushed ore stockpile. Apron feeders, located underneath the stockpile, will reclaim the crushed ore and deposit it onto the mill feed conveyor and the ore will then be conveyed over a distance of about 320 m to the AG mill. Walkways and access roads will run along the mill feed conveyor to allow for appropriate inspection and maintenance.

18.1.8 Process Plant Building

The main process plant building, located to the north of Demi-Mille Lake, will house the grinding circuit, gravity concentration circuit, concentrate filtration processing equipment, tailings pumps, steam plant, process plant administration offices and laboratory. The process plant area will also include the tailings thickener and the screening circuit that is housed in a separate building in proximity to the concentrator building. In locating the process plant, the critical consideration was to ensure that the AG mill foundations will be located on competent rock. Furthermore, considerations were given to minimize the conveyor distances, tailings pumping lines and backfill material. The process building will be a structural steel building with insulated industrial steel siding with a waterproof 2-ply modified bitumen membrane roof. Light vehicle circulation will be planned for access around the buildings.

18.1.9 Concentrate Load-Out Facilities

The load-out facilities will include a concentrate load-out conveyor, emergency stockpile, transfer silo and a load-out silo. The concentrate will be conveyed over a distance of 650 m from the concentrator to a load-out transfer silo of 32 600 t. The feed to the silo can be diverted to an outside concentrate emergency stockpile of 120 000 t capacity, in the event of a disruption downstream or train unavailability. In such case, the concentrate will be reclaimed from the emergency stockpile and returned to the load-out silo feed conveyor using a shovel and a loader combination. Concentrate from the load-out silo will be conveyed to the train loading surge bin, which will be designed to discharge directly into the railroad cars and reach the target loading weight. Track scales will be used to weigh each wagon individually before and after loading.

18.1.10 Tailings Management Facility

A detailed description of the tailings management system can be found in Chapter 20 of this Report, as well as Note L-12-1516-7 (January 2013) prepared by Journeaux Associates for this project.

The tailings management facility consists of a tailings pond and a polishing pond, which are located near the southeast corner of the property. This site has favourable topography as parts of it form valleys that can easily be dammed.

As the tailings are considered to be non-acid generating, it will not be necessary to build impermeable dikes for the tailings pond. Thus, the peripheral tailings pond dike (i.e., that part of the dike not contiguous with the polishing pond) will be semi-permeable and constructed of unselected run-of-mine waste rock. A blanket of glacial till will be placed on the upstream side of the dyke. This till blanket will reduce the permeability of the dike, decrease water seepage and improve the site water balance. The tailings pond-to-polishing pond median dike will be a permeable dike constructed of selected run-of-mine waste rock; a geotextile layer will be placed on the upstream side to trap fines. The polishing pond dike will be an impermeable dike constructed of selected run-of-mine waste rock, with an impermeable till core. In addition to these dikes, two (2) smaller dikes will be built inside the tailings pond area to dam a small valley to be used in the first year of operation.

Tailings are expected to be pumped as 50% solids slurry to the tailings pond. The coarse and fine tailings will be pumped together in one pipeline. A second tailings pipeline will be installed and used as a back-up.

The slurry will be discharged at a point such that it will first flow into the small dammed-off valley located inside the tailings pond area. The coarse tailings will settle at the bottom during the time that the slurry remains in the valley, leaving only the fine tailings in the slurry. These will flow towards the downstream side of the tailings pond, where the fines will eventually settle.

Supernatant will be transferred from the tailings pond to the polishing pond using a siphon. The siphon flow will be regulated to maintain an approximately constant flow. A residence time of approximately sixty (60) days will be maintained in the polishing pond. Clear water will be pumped back to the concentrator, using a floating barge pump house and will be used as process water. Excess water that is not required for the process will be released into the environment.

18.1.11 Mine Service Area

The installations of the mine service area will consist of:

- A mine garage maintenance facility that will house the maintenance shop, workshop and warehouse;
- Administration offices and mine employee change room;
- Mine truck wash bay and tire change shop;
- Diesel fuel tank farm and propane storage;
- Core storage area;
- Railroad repair shop.

The mine garage building will be designed as a permanent structure. The maintenance shop will initially consist of four (4) repair bays and two (2) auxiliary vehicle repair bays, sized in accordance with the mine truck and mining equipment dimensions. The mine garage will be designed with an expandable maintenance shop structure, whereby it will be possible to increase the number of repair bays to service a larger fleet of mobile equipment. A mechanical room, hydraulic room and mechanical workshop are included within the mine maintenance building. The warehouse will be adjacent to mine garage building and will be sized according to its storage requirements.

The administration offices will be an extension of the mine garage building. The office space will sufficient to include the following personnel:

- Site general administration;
- Human Resources;
- Environmental;
- Health and Safety;
- Information Technology;
- Mine Operations;
- Mine Maintenance;
- Technical Services;
- Infrastructure Personnel;
- Shop and Warehouse Personnel.

The mine employee change room will include lockers and showers. Each mine employee will be assigned two (2) distinct lockers. The shower facilities will be sufficient to handle one mine employee shift and will consider an expansion plan. All the personnel required for process operations will be located at the concentrator.

The mobile equipment wash bay will be located close to the mine maintenance building. The wash system will be equipped with a manually-operated washing system able to clean one (1) vehicle at a time. The wash system will operate in closed circuit to minimize the water consumption. The solids accumulated in the wash system settling basin will be periodically removed from the pit, dewatered and samples will be sent to a laboratory for testing. The solids can either be sent to the tailings pond for disposal or hauled off-site to a licensed treatment facility depending on the hydrocarbon concentration. The tire change shop will be adjacent to the wash bay. The tire change shop will be dimensioned to allow the removal and replacement of the tires on only one side of the mobile vehicle while it is enclosed fully within the building. The layout of the wash facility and tire change shop will be expandable to service a larger fleet of mobile equipment.

18.1.12 Fuel Storage Facility

Diesel fuel for mine equipment and fuel for operating the boilers will be transported by truck from Baie-Comeau to the FLN storage facility. Initially, six (6) above ground steel nursing tanks of 50 000 liters each will form a fuel depot of 300 000 liters. Over the life of the mine, tanks can be added to increase the storage capacity of the fuel depot. The tanks will supply the mine truck refueling station of the mine service area.

Independent storage tanks for the boilers will be located in proximity to the steam plant. Fuel will be transferred from the storage facility to the localized storage tanks by a tanker truck.

18.1.13 Construction Camp

The temporary construction camp will be located at the junction between Highway 389 and the main site access road. The camp facilities will be units that are assembled on-site from prefabricated wood frame modules. The construction camp will be designed to house 800 workers while incorporating an expandable configuration to reach 1200 workers. The camp will provide individual bedrooms with common shared bathrooms and include all necessary services to accommodate the labour force such as:

- Camp administration and reception offices;
- Cafeteria and concession shop;
- Recreational complex and workout gym;
- Baggage storage area;

- Dormitory complexes;
- Emergency service vehicle shelter.

18.1.14 Construction Facilities

The construction facilities, namely the construction engineering offices, the mine engineering offices, medical center and laydown area will be located near the mine and process plant facilities.

18.1.15 Permanent Camp

A permanent camp for the operation of the FLN site is planned for the project. The permanent camp will be located approximately 1.5 km north of the concentrator area. All complexes will be assembled on-site from prefabricated wood frame modules. The permanent camp will be designed with individual rooms equipped with private bathrooms to accommodate 400 employees and could be expanded to house 600 employees.

18.1.16 Raw Water Sources

Mine and process plant requirements are as follows:

- Raw water at the plant site will be required for the following applications:
  - Process water for the concentrator;
  - Mine garage water supply and wash bay make-up water;
  - Fire protection.
- Process water will be supplied from the tailings overflow and pumped back to the concentrator from the reclaim water pumping station;
- Additional sources of raw water required for the FLN site will be supplied from Eva Lake using a floating pump house;
- The pump house will supply raw water to a large exterior tank located near the concentrator site;
- It is anticipated that the future mine pit dewatering wells can be used as a potential source of raw water;
- Raw water will be required to produce potable water for the FLN site infrastructures. Filtration and disinfection equipment will be provided in order to obtain water for

human consumption in accordance with the drinking water regulations established by the MDDEFP. The possibility of using localized wells to supply drinking water for the site infrastructures will be examined in order to reduce the filtration and disinfection requirements.

Construction Camp and Permanent Camp requirements are as follows:

- Fresh water required at the construction camp and for the permanent camp sites will be supplied by local artesian wells;
- The well pumping stations will supply fresh water that will be used for the following applications:
  - Potable water;
  - Fire protection.

18.1.17 Site Utilities

Utilities requirements are as follows:

- Slurry and reclaim water pipelines will be run above ground using appropriate piping material;
- The raw water pipeline will be approximately 5.5 km, extending from the barge pumping station on Eva Lake to the exterior water tank. The pipeline will be installed above ground and composed of heated and insulated ductile iron pipe;
- Underground pipelines will distribute the process water, potable water and fire protection water to the crusher building, stockpile area, concentrator building, mine garage and load out facility, as required;
- The underground piping utilities required to service each building will include:
  - Trenching and piping distribution for process water, potable water and fire water;
  - Indicating isolation valves and fire hydrants;
  - Service connections to all required buildings;
  - Manholes and sewage pumping stations.

- Waste or sewage water will be collected at each building and pumped to a membrane biological reactor ("MBR") for treatment. The treated effluent will exit the system and will be sent to a receiving water bed. Accumulated biological sludge from the treatment process will be collected and removed with the use of a certified transportation service for off-site disposal;
- Potable water and fire protection distribution piping networks for the construction and permanent camp will be installed above ground via insulated pipes equipped with heating cables or located within heated enclosures. Both camp sites will be equipped with packaged MBR sewage treatment systems.

18.1.18 Site Access Security

The FLN site access and parking for visitors will be controlled by a guard house and a security gate at the entrance of the Project site access road. The security guards will supervise the circulation of personnel and merchandise entering the site and ensure that all vehicles have the appropriate authorization and are equipped with the appropriate safety material. The guard house will be equipped with a remote fire panel and be the main point of communication in case of emergencies. This guard house will be a constructed modular unit equipped with communication equipment, safety cameras and basic services such as bottled potable water, toilet and fridge.

18.1.19 FLN Communications Infrastructure

A main telecommunication tower will be installed at the FLN site to provide all communication services on the property. The communication architecture will be based on an all-IP approach using a variety of wireless technologies such as Wi-MAX, Wi-Fi and point-to-point radios that allow for easy service drops to fixed and mobile users. A VHF mobile radio system will be supplied for the construction and operation phases and will provide coverage at the process facility and mine site. A permanent optic fiber link will be extended throughout the FLN site using the 34.5 kV transmission line, as it becomes available. A provision was made to include a cellular base station for the FLN site to provide a greater flexibility.

The Internet communication service will be made available by an Internet Service Provider (ISP) at the railway station “Poste Queen”, just off Highway 389, which is located on Champion property. An optic fiber link will be installed from “Poste Queen” to the FNL main communication tower. The Internet communication service will have a bandwidth of 50 Mbps for download and upload. If required, the ISP will be able to increase the bandwidth to 100 Mbps without any modifications to the infrastructure and equipment. A radio communication link will initially be used to provide communications at the construction camp, and will eventually be used as a back-up communication link.

18.1.20 Rail Transportation System

Rail Cantech was mandated by Champion, in September 2011, to perform a feasibility study of a rail transportation system to determine the preferred routing option between the FLN site and Sept-Îles. The study demonstrated that the preferred solution for the rail transportation line would be a Champion owned and operated direct link between FLN and Pointe-Noire (Sept-Îles). Following these findings, Rail Cantech was awarded a mandate to perform a feasibility study to define and optimize the routing of the new railway line between FLN and Pointe-Noire, and to prepare budget estimates for the railway implementation and operations for an annual concentrate production tonnage of 20 Mtpy and revised for 10 Mtpy. The rail transportation network schematic between the FLN terminal and the Pointe-Noire terminal is shown in Figure 18-3.

The rail transportation network proposed between the FLN project and the Pointe-Noire stockyard at Sept-Îles will totalize 360.8 km of new railway with 310.7 km of single main track, and 50.1 km categorized as other tracks. The proposed corridor for the 310.7 km of main tracks is situated in the Sept-Îles/Fermont axis, along the east side of the Saint-Marguerite River. It will include five (5) sections of tunnel, representing a total of 14.68 km of tunneled rail line, all located within 85 km of Pointe-Noire. A total of two (2) long span bridges and eight (8) medium span bridges will be required for road and wetland crossings over the railway corridor. The other tracks will consist of a 10.3 km car loading loop yard at the mine terminal, 17.6 km of sidings required along the main track and finally, 22.2 km for the port terminal car discharge loop yard, for a total of 50.1 km.

An additional tunnel section of 1.59 km is required as part of the Pointe-Noire car discharge loop at Sept-Îles.

The car loading loop connected to the main track at the FLN site is described as follows:

- Car loading loop capable of holding two (2) entire trains, one (1) empty train before the loading point and one (1) loaded train after;
- Bad order tracks (B.O. Track) for railroad car removal and replacement;
- A service track parallel to the loading track that can be used to yard two (2) trains, one (1) for merchandise and the other for fuel ;
- One (1) track leading to a secondary maintenance shop to park vehicles and maintenance equipment, and perform minor emergency repairs on rolling stock. The main workshop building will be located at the Pointe-Noire terminal.

The transits required along the mainline are as follows:

- Five (5) sections of tunnel required for the main track;
- Four (4) sidings of 3.37 km each will be required along the 310.7 km main track to allow for encounters between the 240-car trains and for temporary accommodation;
- Three (3) refuge sidings of 1.37 km will be required for construction and operational maintenance (engineering) needs;
- Three (3) rest buildings at each refuge siding to accommodate ten (10) workers will be required.

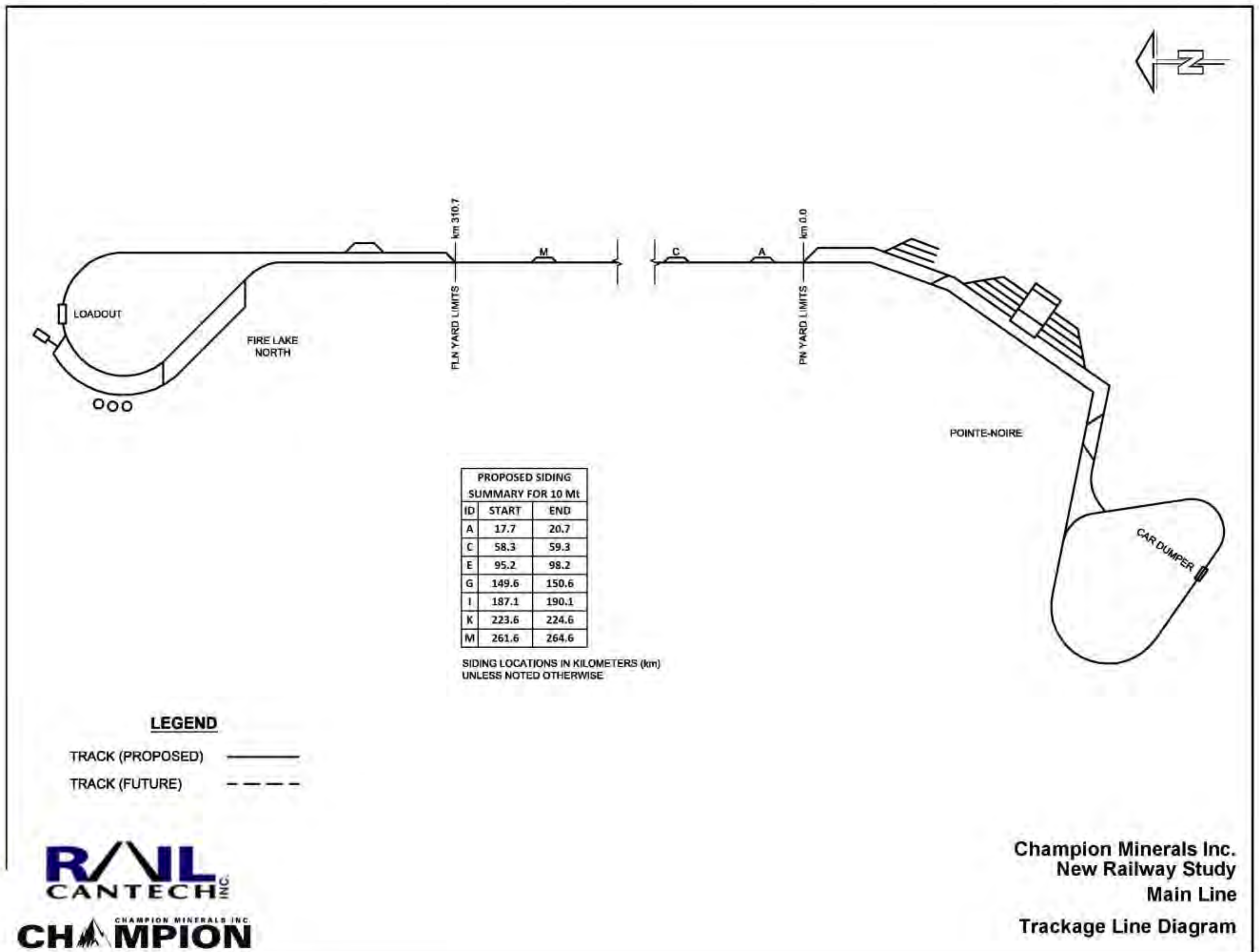
The Pointe-Noire train discharge loop connected to the main track is described as follows:

- Pointe-Noire discharge loop tunnel section of 1.59 km;
- Loaded car positioning lane and empty car lane of 4.2 km. Inspection and refueling sidings will be included after the dumper equipment;
- Transit and maintenance tracks to direct the railroad cars to the workshop building;

- Main workshop building for maintenance of rolling stock, locomotives and maintenance equipment. This workshop will be equipped with the tools and materials normally required to service and repair all locomotives and railroad cars;
- The administration office building for management and operations personnel will be adjacent to the workshop building;
- Multiple tracks for the operations and service will be included for locomotive storage, merchandise railroad cars, fuel railroad cars and service equipment;
- Parking area to store spare railroad cars;
- Parallel service lanes for ease of circulation and to allow for an efficient circulation of the trains will be included.

The configuration of the track will allow for 240 railroad cars, capable of transporting 25 200 t of concentrate each, which are propelled by three (3) locomotives. A total of 396 trains are required each year to meet the annual production rate of 10 Mt, which equates to 1.13 trains per day. Therefore, the operational plan requires that one (1) train depart from the FLN site every 21.2 hours. The cycle-time for a train is estimated at 30 hours, based on planned daily maintenance work, unplanned interruptions due to operational breakdowns, temporary slow orders and terminal operations for loading and unloading of cars. Regional climatic conditions such as extreme temperatures, storms, snowfall and precipitation were accounted for when establishing the cycle time of the convoys. Service interruption at the FLN loading point and at the Pointe-Noire discharge point will affect the fluidity of the train movements on the mainline. Moreover, the capacity of the multi-user ship loader facility at the port of Sept-Îles will have an impact on the cycle-time of the trains.

The fleet size required for a production rate of 10 Mtpy will depend on the train configuration and the power distribution requirements. Each convoy will consist of 240 railroad cars and three (3) locomotives for a total requirement of 480 railroad cars and six (6) locomotives overall. A reserve will be required for the rolling stock that consists of 24 spare railroad cars and one (1) spare locomotive (equipment for rail line maintenance and repair are not included in these figures). A total of 97 employees will be required to continuously operate and maintain the rail transportation system.



PROPOSED SIDING SUMMARY FOR 10 Mt		
ID	START	END
A	17.7	20.7
C	58.3	59.3
E	95.2	98.2
G	149.6	150.6
I	187.1	190.1
K	223.6	224.6
M	261.6	264.6

Figure 18-3: Rail Transportation Network interconnecting FLN and Pointe-Noire

18.1.21 Pointe-Noire Stockyard Infrastructure

The Pointe-Noire terminal general site plan presented in Figure 18-4 was developed as part of this Report. The Champion terminal facility will be situated in the Baie des Sept-Îles, south-east of the Port of Sept-Îles' new multi-user wharf. This section describes the infrastructure that is required for the concentrate stockpiling and loading at the Pointe-Noire terminal facility location. The stockyard infrastructure will consist of a railroad car unloading system, concentrate storage yard, concentrate stacking/reclaiming equipment, and a conveyor system that will transport the concentrate to the Port of Sept-Îles multi-user ship loader. The following describes the terminal facility and stockyard infrastructure equipment:

- A rotary single railroad car dumper and an automatic train positioner designed to achieve a nominal feed rate of 6000 t/h;
- Car dumper discharge conveyor to feed the stacker-reclaimer transfer house;
- A mobile rail-type rotary bucket stacker-reclaimer and a reversible yard conveyor assembly with retractable tripper car for stacking material in stockpiles or reclaiming from them. The nominal reclaiming capacity required for this equipment is 8000 t/h;
- A conveyor will be required to send the concentrate to the 800 t transfer silo equipped with samplers and emergency discharge points;
- The concentrate will be conveyed to the multi-user ship loader facility;
- Building enclosures, as well as dust collection equipment, will be provided at all conveyor chute location transfer points;
- All conveyor electrical motors, drives, belt tensioners, pulleys and other equipment will be located within the drive house enclosures;
- Conveyors will be enclosed.

The stockyard configuration will be designed so that the stacker/reclaimer is centered between two (2) piles of concentrate. Each pile will be capable of holding 1 000 000 t, as shown in this proposed configuration, for a total of 2 000 000 t of concentrate. It remains possible to expand the stockyard volume by implementing a second set of stockpiles and stacker-reclaimer assemblies adjacent to the initial piles. These will still be located within the railroad car loop track and would then represent a total volume of 4 000 000 t of concentrate.

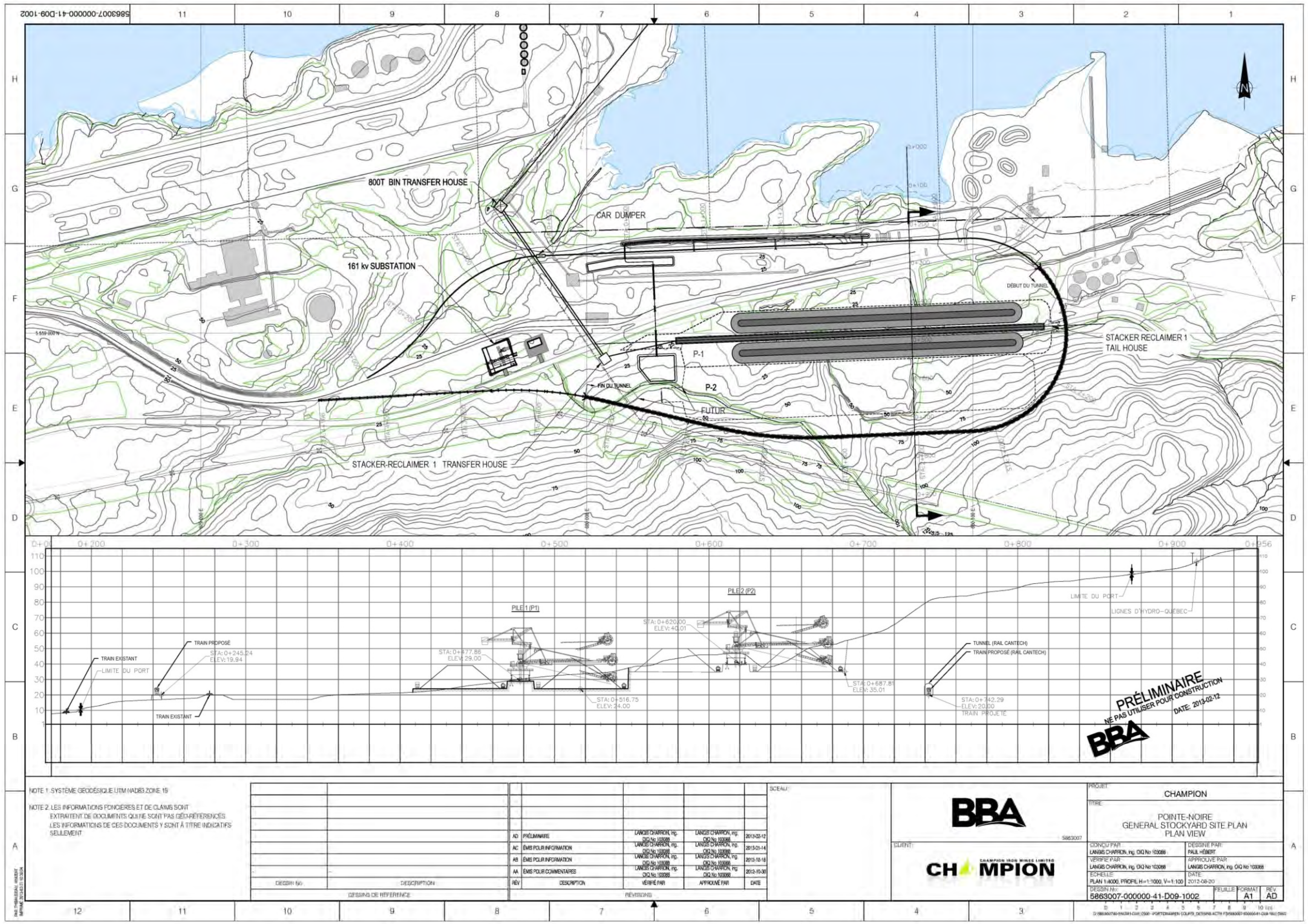


Figure 18-4: Pointe-Noire Terminal Site Plan

18.1.22 Port Infrastructure

The Port Authority of Sept-Îles is currently building a new multi-user ship loading facility (Wharf No. 35) at the Port of Sept-Îles (Pointe-Noire) as shown in Figure 18-5. The Port Authority of Sept-Îles required binding commitment payments (buy-in payments) from the potential end-users to provide a portion of the necessary funds. The facility will be built, owned and operated by the Port Authority of Sept-Îles, and the end-users of the facility will pay operation fees based on the volume of concentrate that will be shipped (port fees). Champion will receive a discount of the shipping fees until the buy-in payment has been reimbursed.

The ship loading equipment will consist of two (2) linear traveling and rotating-type ship loaders, rail track-mounted, each capable of transferring 8000 t/h. The users of the ship loader facility will be required to deliver the concentrate to a transfer point, transfer tower T02, already defined by the Port of Sept-Îles. The multi-user facility will operate under a first-come, first-served basis, and will allow for the loading of two (2) ships simultaneously at a transfer rate of 8000 t/h each, or a single ship at a transfer rate of 16 000 t/h. The Port infrastructures are expected to be completed and operational by March 31, 2014. The yearly loading capacity of this new facility will initially be 50 Mt and could later on be expanded to 100 Mt per year depending on the requirements of the end-users. Figure 18-6 shows the Port of Sept-Îles' ship loading facility location and the Pointe-Noire terminal facility.

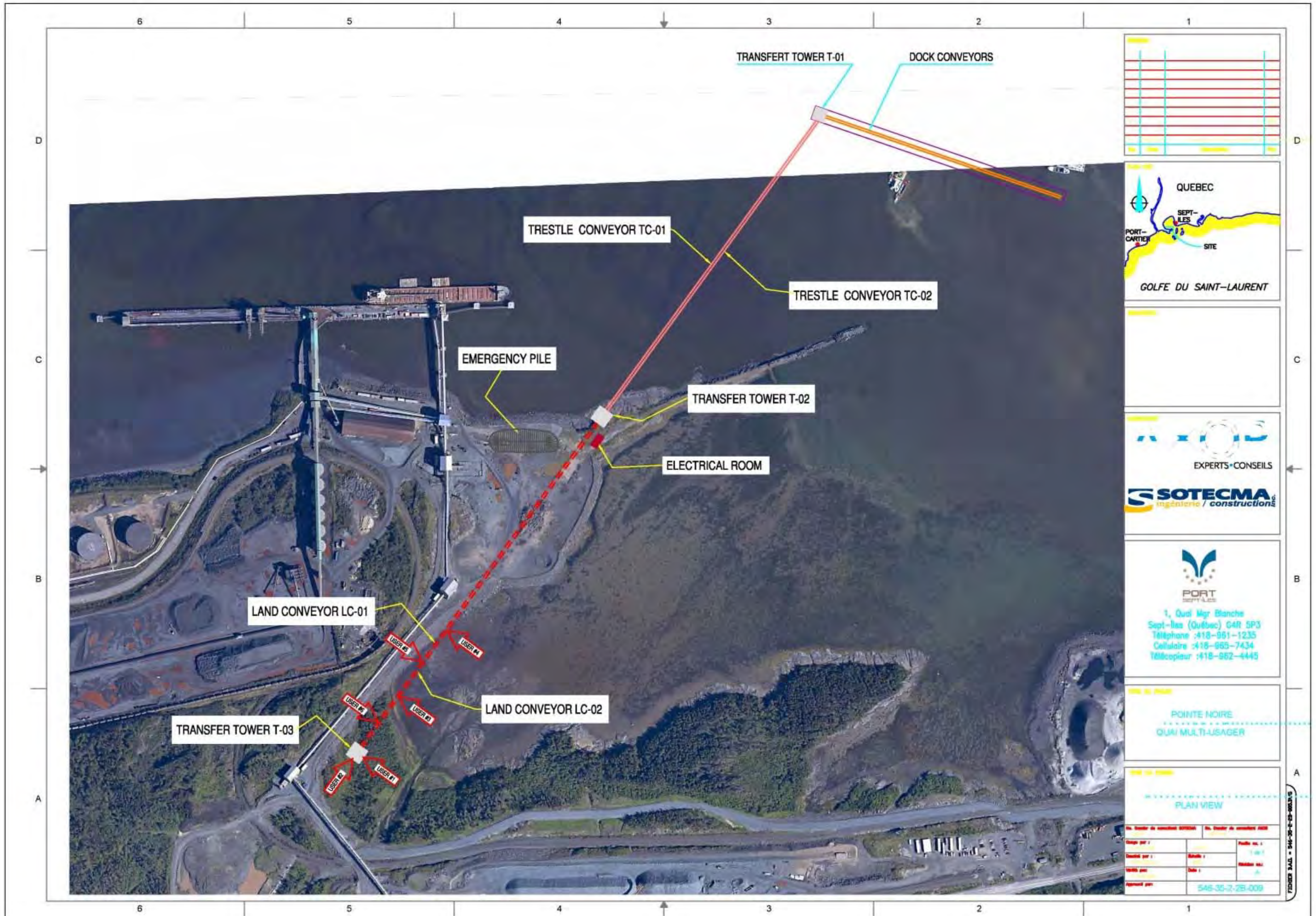


Figure 18-5: Port of Sept-Îles Multi-User Ship Loading Facility

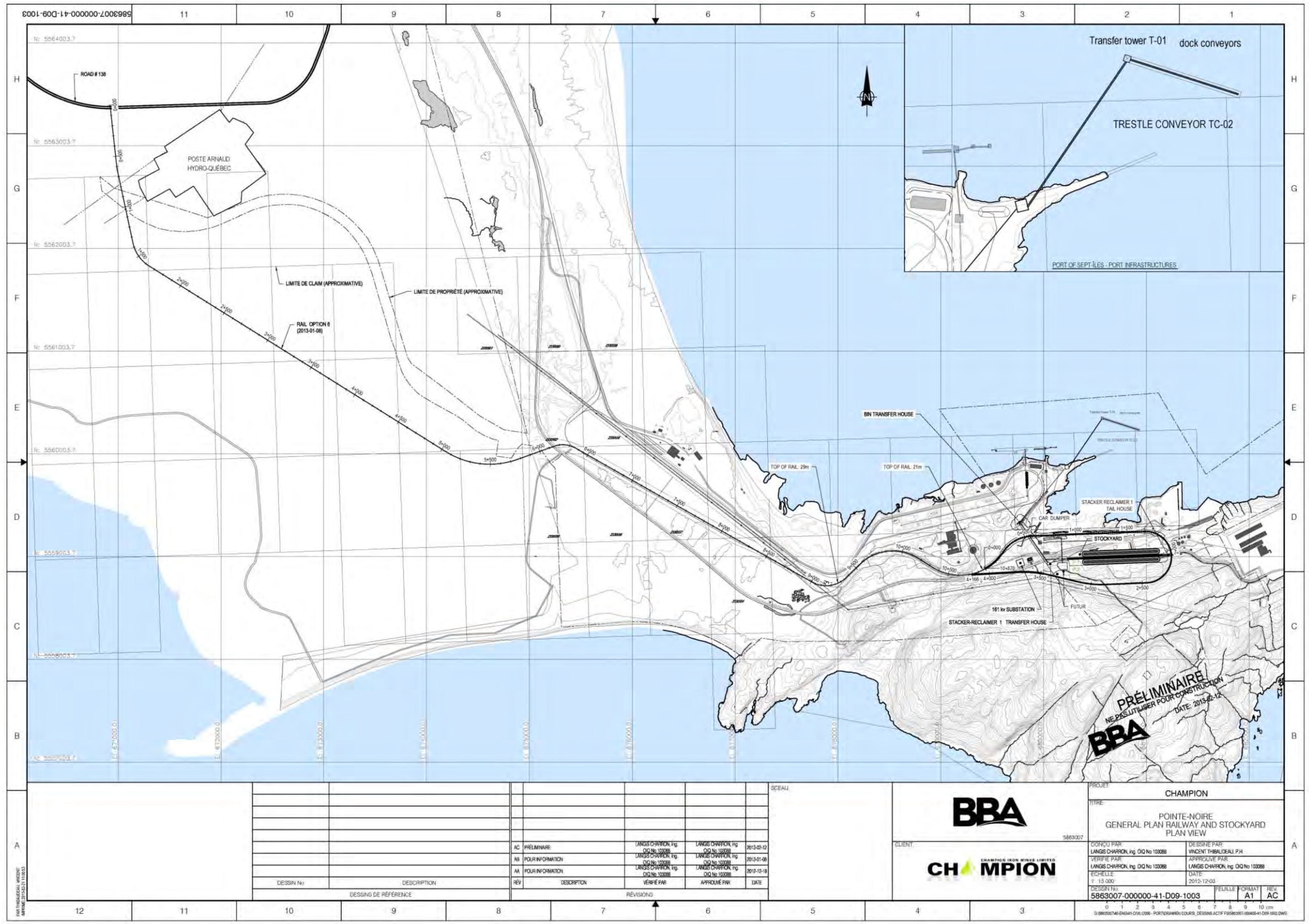


Figure 18-6: Multi-User Ship Loading Facility and Pointe-Noire Terminal

19. MARKET STUDIES AND CONTRACTS

19.1 Market Study and Long Term Pricing

For this Preliminary Feasibility Study, Champion has not undertaken any formal market study. The medium and long-term iron ore price forecast for use in the Project Financial Analysis was performed by BBA, based on various public and private market studies by reputable analysts and iron ore producers, opinions of industry experts, as well as other sources. The Financial Analysis for this Project is presented in Chapter 22 of this Report. Considering that commercial production for the Fire Lake North Project is scheduled to begin in 2016, BBA arrived at a medium (first five years) and long-term (beyond 5 years) price of $115/t and $110/t respectively, based on the Platts Index benchmark of 62% Fe iron ore concentrate landed at port in China. To arrive at these prices, BBA considered the following:

- Global crude steel demand is expected to continue to grow moderately, driven mainly by demand in China. Major iron ore producers are basing their production and expansion plans to be in line with this forecasted growth in demand. Having recently put several expansion projects on hold, the major producers are awaiting evidence of sustained and increasing commodity price projections prior to resuming their expansion plans. Major producers such as Rio Tinto, Vale and BHP expressed their views on supply and demand projections in recent presentations posted on their public websites. Crude steel production in China is forecasted to continue to grow to over 900 Mtpy by 2020 and peak at about 1000 Mtpy in 2030 (forecast by Rio Tinto). In their price forecasting, BBA has relied heavily on the forecasts of these producers.
- There is an implied iron ore "floor price" where lower tier iron ore producers in China become unprofitable and curtail production when this price level is broken. It is generally agreed among market analysts that this price is between $110/t and $120/t. In recent history, when this floor price was breached, prices rebounded and stabilized. In forecasting long-term pricing, supply and demand come in balance and large price variations in the form of slides and spikes are generally short lived, and need to be discounted. The effects of this floor price, and how it acts as a moderating factor to longer term pricing, are expressed by Rio Tinto and Fortescue

in an article in 'The Australian' by Matt Chambers, dated August 30th, 2012. In their price forecasting, BBA has considered the effects of this floor price as an important element in driving long-term pricing.

Analyst opinions and market study forecasts are generally very subjective and are quite variable. A minority of analysts are forecasting long-term pricing in line with the aforementioned floor price. The majority of analysts were forecasting late 2012 prices below $100/t. In order to take into consideration the opinions of analysts forecasting lower iron ore prices, BBA has performed a sensitivity analysis as part of its Project Financial Analysis in order to assess how robust the Project is at lower commodity prices.

After determining the forecasted benchmark Platts Index price for 62% Fe iron ore concentrate, an adjustment in the form of a premium is considered for iron ore concentrates grading above 62% Fe. Premiums for higher Fe content have traditionally been in the order of $4 to $5 per 1% Fe content above 62%. At times of price volatility, premiums can run considerably higher. For this Study, BBA has considered a premium of $5 for each 1% Fe increment above the Platts Index benchmark of 62% Fe. BBA considers this to be a reasonable forecast.

19.2 Off-Take and Agreements

Champion informed BBA that discussions with some of the world's largest bulk commodity traders are well advanced. The objective is to reach an off-take agreement covering 100% of the Fire Lake North concentrate. The concentrate pricing structure will be based on a commodity price index such as the Platts Iron Ore Index. As of the effective date of this Report, no formal agreement or engagement has been signed or finalized by Champion with any potential client.

19.3 Agreement with Port of Sept-Îles

On July 18th, 2012, Champion announced that it has signed a long term agreement with the Sept-Îles Port Authority in relation to its planned new 50 million tonne per year multi-user port facilities. The Port Agreement has an initial term of 20 years that is renewable for up to four (4) additional 5-year terms. The Sept-Îles Port Authority has committed to completion of its planned port facilities by March 31st, 2014, which is approximately 18 months prior to the planned production start-up date for Champion's wholly-owned Fire Lake North Project. This agreement guarantees Champion ship-loading capacity at the Port of Sept-Iles for a minimum of 10 million tonnes of iron concentrate per year at preferential rates, using two (2) ship loaders, each with a capacity of 8000 tonnes per hour. The Port Agreement also provides an opportunity to expand Champion's reserved annual tonnage in the event of potential future expansions of iron concentrate production from Fire Lake North.

In order to finance the estimated $220 million cost of the new facility, the Sept-Îles Port Authority required Champion and other potential end-users to fund 50% of the construction cost through a "buy-in payment". Champion's buy-in payment is $25.58 million payable in installments, where the initial installment was payable on signing and the final payment will be payable on July 1st, 2013. The buy-in payment will constitute an advance on Champion's future shipping, wharfage and equipment fees. This advance will be recovered by Champion via a reduced tariff on each tonne of concentrate that will be loaded by the new facility until the buy-in payment is recovered.

The Port Agreement also includes a sliding-scale fee schedule for shipping, wharfage and equipment fees payable on Champion's iron concentrate shipped through the port facilities, and a monthly "take or pay" fee based on 50% of the reserved tonnage commencing from the date of completion of the port facilities. The amount of “take or pay” that will be paid by Champion prior to its production start-up will be recovered similarly to the buy-in payment.

Independent of the aforementioned Port Agreement, Champion has indicated to BBA that they have signed an agreement with the Sept-Îles Port Authority to secure land for the installation of their port facility infrastructure. This agreement is confidential in nature and BBA has access to the document. Although the Port Authority has engaged to provide this land, a final location has not been defined as part of this agreement.

19.4 Railway Transportation Negotiation Status

As the base case for the present Preliminary Feasibility Study, Champion has assumed and developed an independent solution for transporting their concentrate from the Fire Lake North mine site to the Port of Sept-Îles port terminal facility in Pointe Noire, Québec. A feasibility-level study was conducted by Rail Cantech and was completed in July 2012. Considering this approach, Champion is not considering, at this point in time, undertaking any discussions with other rail transporters in the region.

In order to finance the substantial capital cost associated with the construction of a stand-alone railway from the mine site to Pointe Noire, Champion has had confidential discussions with potential lenders who have shown an interest in participating in the financing of such an endeavor. As such, Champion has obtained letters of interest from a bank and from railway contractors outlining the preliminary terms for debt financing as follows:

- A railway contractor consortium would finance 60% (or $800.2M) of the railway capital cost over a 12-year term at an interest rate of 7%.
- A Canadian bank is interested in financing 25% (or $333.4M) of the railway capital cost for a 12-year term at an interest rate of 7.5%.
- The remaining 15% (or $200.0M) would be financed with internal capital raised by Champion as equity financing.

In parallel to having developed an independent solution for rail transportation of its concentrate to the Port of Sept-Îles, Champion announced on August 29th, 2012 the signing of an agreement with Canadian National Railway Company (CNR), for Champion's participation in CN's Feasibility Study for a proposed new multi-user railway, that would connect mining projects in the Labrador Trough to the deep water port facilities in Sept-Îles, Québec. CN's partner in this proposed venture is "La Caisse de Dépôt et Placement du Québec", which, together with a group of iron ore exploration and mining companies, including Champion, are contributing to the cost of the Feasibility Study. Should this option materialize, Champion would avoid incurring capital and financing costs for building a substantial part of the railway (base case of this present Study). In exchange, Champion would pay a fee to CN for rail transportation from FLN to Pointe Noire, at terms that will be defined following CN's feasibility study.

CN is expeditiously coordinating its environmental study application to the Canadian Environmental Assessment Agency for required permitting, which will allow the feasibility study to commence with appropriate consultation with First Nations, local communities and other stakeholders.

Under the terms of the agreement with CN, Champion has committed to contribute $1 million to the feasibility study on the railway that is anticipated to be carried out over the next months. (In February 2013, CN announced that it was suspending work on the Rail Feasibility Study).

19.5 Electric Power Supply Status

In September 2012, Hydro-Québec provided Champion with the results of its planning study for the electrical connection of the Fire Lake North project site to the provincial grid. Following this initial step, and after further discussions, Champion received a contract proposal in mid-December from Hydro-Québec for the detailed engineering phase related to the construction of a new 315 kV power line, which will originate from the Montagnais substation located approximately 135 km from the mine site. As part of this agreement, Hydro-Québec will initially provide a connection to the existing line (161 kV line No. 1695) by mid-2013 to supply power to the site for the construction period, and for the operation of the first production line until such time that the new 315 kV power line becomes available (2018). As of the effective date of this Report, contract details are still being discussed with Hydro-Québec.

An application to obtain the most favorable power rate reserved for industrial clients was made by Champion to the regulating authorities in November 2012. This process is expected to be complete by mid-February 2013.

20. ENVIRONMENTAL STUDIES, LEGAL FRAMEWORK, AND RELATIONS WITH STAKEHOLDERS

20.1 Environmental Baseline Studies

All the work described in this section was conducted by Roche Ltd, Consulting Group, and its subcontractors.

20.1.1 Fire Lake North Property

In 2011, an environmental baseline study (EBS) was conducted on the Fire Lake North property in order to list all the wildlife and to characterize the fish habitats, terrestrial habitats, and wetlands in the area. Elements of the human environment characterizing the study area were also described in the EBS. The following sections summarize the methodology used for each component that was studied in 2011.

20.1.1.1 Physical Environment

The physical environment of the Fire Lake North property was described based on information collected from various sources:

- Field surveys;
- Aerial photographs and/or satellite images, maps, and geomatic tools;
- Information provided by various governmental agencies, as well as project proponents active in the territory (MRC, other mine or hydropower projects, etc.);
- Studies from the scientific and technical literature

Soil, groundwater, surface water, as well as lake and river sediment analyses were performed in order to assess the physical environment before the beginning of mining operations. This preliminary characterization mainly establishes the characteristics and the natural variability of the environment in anticipation of site restoration objectives. Sample analyses were conducted by Maxxam Analytics, an independent laboratory in Québec City, and following standard quality control program (*QA/QC*).

Topography, Hydrology and Geology

The area under study is characterized by a hilly terrain with elevation variations ranging from 50 to 100 metres. The altitude ranges from 580 metres a.s.l. at the level of the Little Manicouagan River and up to 760 metres a.s.l. southwest of Don Lake. The valleys are generally occupied by small watercourses and locally by peaty environments. More than 20 lakes of various sizes are scattered throughout the study area and about 30 permanent, however small watercourses run along the territory. The study area is occupied by two sub-watersheds, namely that of the Pékans River and the Little Manicouagan River. The surface is covered by glacial deposits and numerous rock outcrops. Basal till of varying thicknesses covers the area, while valley bottoms are mainly occupied by glaciofluvial deposits of sand and gravel.

Soil Quality

Soil samples were collected at 10 stations on the Fire Lake North property in the area of Don Lake and next to the future open pits. Samples were collected in holes dug with a shovel and kept in containers provided by Maxxam Analytics laboratories. The parameters analysed included the grain size, metals and metalloids, volatile organic compounds, hydrocarbons and phenolic compounds. All samples showed concentrations below the detection limit for volatile organic compounds, polycyclic aromatic hydrocarbons, phenolic compounds, and petroleum hydrocarbons. In all cases, the detection limits were equal or under the background levels corresponding to Criteria A. Total cyanide, available cyanide and total sulphur values were also below Criteria A for all samples analysed.

Groundwater Quality

In order to determine the main characteristics of groundwater, 10 samples were collected and analysed. In order to account for any event during which groundwater would mix with surface waters, results were compared with water quality criteria from the Soil Protection and Contaminated Sites Rehabilitation Policy of the *Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs du Québec* (MDDEFP). The results obtained were also compared with the criteria found in the *Regulation Respecting the Quality of Drinking Water* (c. Q-2 r. 40).

The groundwater samples were collected from 10 recent exploration diamond drill holes in good condition. For dissolved metals and metalloids, no samples showed values equal or above the criteria found in the *Regulation Respecting the Quality of Drinking Water*.

Surface Water Quality

According to the results observed at the 17 sampling stations distributed throughout the study area, the surface waters in the territory show the following general characteristics:

- an average dissolved oxygen concentration;
- a generally neutral pH ranging from 5.64 to 7.09;
- a low total hardness;
- a very low turbidity and suspended solid concentration;
- a relatively uniform conductivity and a dissolved solid concentration ranging between 17 and 41 mg/l;
- a low nitrogen concentration, more often below the detection limit (total Kjeldahl nitrogen, ammonia nitrogen, nitrites and nitrates);
- a sulphur concentration close to or below the detection limit;
- low and relatively uniform concentrations in minerals;
- a low dissolved organic carbon concentration;
- no petroleum hydrocarbon contamination was detected;
- exceedances of water quality criteria were observed for some samples for pH, aluminum and iron only.

Sediment Quality

The general characteristics of the sediments in the study are as follows:

- a significant concentration of organic matter;
- a grain size mainly in the sand category;
- an acidic pH ranging from 5.47 to 6.21;
- high values of iron, magnesium and manganese that vary greatly from one site to another.

It is important to note that in the highly mineralized areas similar to the Fire Lake North property, exceedances of guidelines and criteria are often observed.

20.1.1.2 Biological Environment

Vegetation

In order to provide a general description of the plant communities present in the study area, a characterization of the various stands covering the territory was initially done by photo-interpretation of aerial images and was then validated by field surveys at targeted locations.

The study area covering the Fire Lake North property is located in the boreal zone, in the eastern spruce-moss sub-domain, slightly south of the spruce-lichen domain. Black spruce stands may be divided into two predominant forest types in the study area, namely the spruce-hypnaceous and heath moss stand (27%) and the spruce-lichen stand (50%). To a lesser extent, other forest types like the balsam fir stand (1.8%) and the white birch stand (0.1%) are also present in the study area. Some 8% of the territory is occupied by open dry barrens mainly composed of lichen. Many wetlands occupy the valley bottoms, edges of watercourses and lowlands. In the majority of cases, these are poor to intermediate minerotrophic peaty environments and most often bordered by spruce-moss stands. These peat lands occupy small surface areas, but are numerous on the territory, particularly along watercourses and lakes. The plant community is uniform and poorly diversified. This type of environment represents 3.2% of the territory. During the plant field survey, no plant species classified as threatened or vulnerable, or likely to be designated so, was identified.

Terrestrial Wildlife

The relative abundance of terrestrial wildlife, as well as their preferred habitats, were determined based on hunting and trapping statistics published on the MRN Internet site, as well as additional data provided by this government department for the study area. In addition, a winter survey for the small and large wildlife (with the exception of the black bear) was conducted in February 2011.

Large wildlife is represented by forest-dwelling caribou, moose and black bears. The forest-dwelling caribou ecotype is considered threatened in Canada under the *Species at Risk Act* (SARA) and vulnerable in Québec under the *Act respecting Threatened or Vulnerable Species* (c. E-12.01). According to the available literature and large wildlife survey results, the area covering the Fire Lake North property has good potential for moose and the forest-dwelling caribou. During the 2011 survey, no caribou were observed around the Champion Iron Mines Exploration Camp. The Fire Lake North property area shows a gently rolling topography that is unfavorable to the caribou in winter. However, it is possible that the surroundings of the mine property are used by caribou during other periods of the year as their needs vary through time.

Generally speaking, it is estimated that the moose density in the study area is the lowest catergory in Québec. This scarcity is due to the low productivity of the spruce-lichen stand, which is the dominant habitat type in the area and this is usually not considered a quality habitat for this species. Little information is available on the abundance of black bears in the area. The hunting level per 10 km² is among the lowest in Québec and the bears are seldom hunted. No observation was reported by users of the exploration camp or the various survey teams.

Small wildlife is of particular interest for the local communities that trap a good number of species belonging to this group. The Fire Lake North property is home to an interesting diversity of small wildlife. According to the literature review and the small wildlife survey results, the most abundant species in the area include the grey wolf, the Canada lynx, the snowshoe hare, and Tetraonidae species. Other species present in lesser abundance include the red fox, the ermine (or the least weasel), the Canadian beaver, and the American porcupine. No mink, muskrats or fishers were observed during the survey and no small wildlife species with a particular status were observed within the study area.

Fisheries and Fish Habitats

Experimental fisheries were conducted to determine the presence or absence of fish populations in watercourses and lakes that will potentially be affected by the future mining operations. More than 20 watercourses and five (5) lakes were sampled in the study area. Fish habitat characterization was done in parallel with the fisheries.

Overall, six (6) species of fish were caught including brook trout, northern pike, burbot, white sucker, lake trout, and lake chub; the brook trout being the most abundant species. According to the fisheries conducted and the prevailing conditions in the study area, it appears that nearly all watercourses and streams are fish habitats with the exceptin of the sections of watercourse at the head of the watersheds and where the topography and/or the presence of insurmountable obstacles (beaver dams, riffles, etc.) make the upstream movement of fish impossible.

The mercury concentration in the fish flesh was also analysed. Slightly over 15% of the specimens analysed showed a mercury concentration above the Canadian Food Inspection Agency (CFIA) criterion, yet the mean concentration is below this criterion.

20.1.1.3 Human Environment

The human environment components in the EBS were described based on information searches from various sources. The elements of the human environment that were described include the following:

- The socioeconomic environment of the town of Fermont;
- The socioeconomic environment of the Uashat Mak Mani-Utenam (ITUM) Innu community;
- Land use by the Innu;
- Land use by the non-aboriginal;
- Land-use planning;
- Recreational activities;
- Transport and energy-related infrastructure;
- Archeological potential of the territory.

20.1.1.4 Studies Conducted in 2012

At the end of 2011, Champion Iron Mines Ltd extended its mining property to the east to allow for development of a tailings management facility. Studies were conducted on this additional territory in 2012, while some complementary surveys were conducted on the property as it was known in 2011. All the data collected during the 2011 EBS and the additional data collected in 2012 were used to produce an environmental and social impact assessment (ESIA).

With the exception of the study on the physical and biological environments, the analyses conducted in 2011 were redone in 2012, except for the large wildlife survey that already covered the territory that included the extension east of the Fire Lake North property in 2011. Moreover, in 2012, the bird survey was conducted to cover the entire property, as it had not been done in 2011.

As part of the human environment study, Castonguay, Dandenault & Assoc. (CDA) was mandated in 2012 to describe land use by native communities. This study was not only done for the Fire Lake North property, but also for the territory where the proposed railway will be located and for the concentrate storage area in Sept-Îles (see Section 20.1.2). Interviews were also conducted with resort vacationers present on the territory (Caniapiscau MRC), as well as with non-aboriginal trappers present in the study area (near Sept-Îles).

No field survey for reptiles, amphibians and micro mammals was conducted in 2012 as part of the ESIA. However, an analysis, looking at the potential presence of species belonging to these groups using their known distribution range, was conducted.

The results obtained in 2012 on the physical environment (soil, sediment, groundwater and surface water quality) show no significant variation compared to those of 2011. In terms of the biological environment (wildlife species and plant communities), the results obtained for the east extension of the property are similar to those obtained in 2011 for the other parts of the territory. The experimental fisheries allowed for the identification of three (3) additional fish species compared to 2011: the lake whitefish, the pearl dace and the mottled sculpin. A bird survey was also conducted in 2012. In fact, 2011 study only included the bird species potentially present, such as described in the literature. A list of 95 bird species belonging to 29 different families had been generated for the study area.

The forest bird survey of 2012 was conducted in June using the limited range count (LRC), the punctual abundance index (PAI), and transect count techniques. In total, 45 forest bird species were located in 2012 in the study area. The observations allowed for the classification of 19 species as breeding species with a high degree of certainty. Most of these are terrestrial birds, followed by aquatic birds and raptors. The surveys conducted in the study area allowed for the identification of the presence of three (3) special status species: the olive-sided flycatcher, the common nighthawk and the rusty blackbird.

Waterfowl surveys were conducted by helicopter in May 2012. Nine (9) waterfowl species were observed in total during the spring of 2012, among which, the American black duck and the Canada goose were the most dominant ones. Other than waterfowl species, one (1) aquatic bird species was observed; the common loon.

20.1.2 Proposed Railway and Concentrate Storage Area in Pointe-Noire(Sept-Îles)

The Fire Lake North mining project includes the construction of a railway connecting the mining property to the port facilities in Sept-Îles for the concentrate transportation. The development of a concentrate storage area is also planned near the Port of Sept-Îles at Pointe-Noire. The studies conducted in 2012 consisted of a characterization of the physical, biological and human environments in the areas through which the railway will cross, and where the planned development of a storage facility is located. The methods used are similar to those used for the characterization of the mining property area previously described.

No field survey for reptiles, amphibians and micro mammals was conducted in 2012 along the proposed railway corridor and at the proposed concentrate storage area. However, an analysis, looking at the potential presence of species belonging to these groups using their known distribution range, was conducted.

All the work described in this section was conducted by Roche Ltd, Consulting Group, and its subcontractors.

20.1.2.1 Physical Environment

The physical environment of the territory through which the railway will cross, and where the concentrate storage area will be located, was described based on information collected from various sources:

- Field surveys;
- Aerial photographs and/or satellite images, maps, and geomatic tools;
- Information provided by different governmental agencies, as well as by other project proponents present on the territory (regional county municipalities, other mine or hydropower projects, etc.).
- Studies in the scientific and technical literature;

Surface water and sediment analyses were conducted in order to determine the quality of the physical environment before construction of the railway begins. A total of 12 water and sediment sampling stations were positioned at different locations along the proposed railway corridor. Sample analyses were conducted by Maxxam Analytics laboratories, an independent laboratory in Québec City, and following a standard quality control program (*QA/QC*).

20.1.2.2 Biological Environment

Vegetation

In order to provide a general description of the plant communities present along the proposed railway corridor and at the proposed concentrate storage area, a characterization of the various stands covering the territory was firstly done by photo-interpretation of aerial images and was then validated by field surveys at selected locations. The southern portion of the territory relating to the railway project and where the concentrate storage area is located belongs to the spruce-moss domain. A few balsam fir-white birch stands can also be found, but mainly close to Sept-Îles. The northern portion of the railway corridor that includes the future mine site also belongs to this domain, but is without the balsam fir stands and with a growing abundance of spruce-lichen stands to the north. As previously mentioned, the spruce-lichen stand is the main forest stand observed on the Fire Lake North property. Wetlands, however, are found in relatively low abundance along the railway, which is of no surprise from a geotechnical point of view.

Fisheries and Fish Habitat

Aquatic wildlife studies were conducted in August 2012 aiming at characterizing the fish habitats and identifying the species present in the watercourses crossing the proposed railway corridor. Of the 628 watercourses identified, 174 are permanent, 210 are intermittent and 244 are only drainage channels. All of the stream crossings were visited during the summer of 2012. Fisheries were conducted in a total of 40 watercourses and five (5) lakes in order to identify the species present in them and to determine their relative abundance.

During this 2012 survey, 459 fish belonging to 11 different species were caught in the lakes and watercourses sampled. Among the 11 fish species identified in the study area, four (4) are of sport fishing interest, such as the northern pike, the burbot, the brook trout and the lake trout.

Terrestrial Wildlife

During the winter of 2012 a survey was conducted by helicopter over the railway corridor and a minimum of 102 moose were observed in 95 recent track networks. Along the railway corridor, moose track network groupings were found all over, but more particularly near the Sainte-Marguerite-3 reservoir at the level of Gaillarbois Lake and Great Germain Lake. Groups of caribou and wolves also visited these areas. As for the mine site, the winter density observed along the railway corridor is lower than what is observed throughout hunting Zone 19.

In total, 51 forest-dwelling caribou track networks were observed during the survey of the proposed railway. Of these, 20 were old tracks and 31 were more recent ones. Overall, 466 forest-dwelling caribou were counted, a species that is considered threatened in Canada and vulnerable in Québec. The track networks were particularly concentrated in two (2) corridors located in the area of Great Germain Lake; one (1) at Alexandre Lake and another one (1) at the latitude of the Little Manicouagan Lake. However, other areas that are visited by the forest-dwelling caribou were also found. The winter density observed is higher compared to other density values known in the region. It is noteworthy to mention, however, that in the area of the Sainte-Marguerite-3 reservoir, the low proportion of fawns, their poor physical condition, as well as their observed travelling mode suggest that, this group may already be significantly distressed by ongoing resort activities in the area.

Avifauna

The forest bird survey was conducted in June 2012 using the limited range count (LRC), the punctual abundance index (PAI), and transect count techniques. In total, 71 bird species were identified in the study area. The observations allowed for the classification of 34 species as breeding species with a high degree of certainty. Terrestrial birds represent the vast majority of these species, followed by aquatic birds and raptors. The surveys conducted in the study area allowed to identify the presence of four (4) endangered species: the olive-sided flycatcher, the common nighthawk, the Canada warbler and the rusty blackbird.

Waterfowl surveys were conducted by helicopter in May 2012. In total, 13 Anatidae species were observed, of which only three (3) represented half of the breeding population: the common goldeneye, the American black duck and the Canada goose. The total density of pair-equivalents was slightly higher in the southern portion of the proposed railway corridor, which is the ecological region of the *Cuvette du réservoir Manicouagan,* and where the common goldeneye, the American black duck and the ring-necked duck were the predominant species.

In the area of the *Plateau Sainte-Marguerite*, the species showing the greatest quantity of pair-equivalents included the Canada goose, the American black duck and the red-breasted merganser. Within this region, the large coastal peatlands of the Pointe-Noire area to the south and the head lakes were particularly rich in Anatidae species. The common loon is another aquatic bird species, visible from the air, which was identified in 2012. It was almost three (3) times more abundant (in pair-equivalents) in the area of the *Plateau Sainte-Marguerite* than in the area of the *Cuvette du réservoir Manicouagan*.

20.1.2.3 Human Environment

As previously mentioned, the CDA firm was mandated in 2012 to describe the current land use by native communities within the Fire Lake North property, the territory through which the proposed railway will cross, and where the concentrate storage area will be located in Sept-Îles. Interviews were also conducted with resort vacationers present in the territory (ZEC Matimek, RCM of Caniapiscau and Sept-Rivières). Meetings were also held with non-aboriginal trappers present in the study area.

The following elements of the human environment covered by the environmental studies are:

- The socioeconomic environment of the town of Fermont and Sept-Îles;
- The socioeconomic environment of the Uashat Mak Mani-Utenam (ITUM) Innu community;
- Land use by the Innu;
- Land use by the non-aboriginal;
- Land-use planning;
- Recreational activities;
- Transport and energy-related infrastructure;
- Archeological potential of the territory.

20.1.3 Ore and Waste Rock and Tailings Environmental Characterization

20.1.3.1 Ore and Waste Rock - Static Tests

Two (2) waste rock samples and two (2) ore samples from the East Pit, West Pit and Don Lake Pit areas were characterized in 2011 (12 samples). One (1) composite waste rock sample from each deposit was also characterized in 2012 at the *Unité de recherche et de service en technologie minérale* (URSTM).

The static tests carried out included the Metals Leaching tests (TCLP-USEPA1311, SPLP-USEPA1312 and Environment Canada CTEU-9) as well as the Acid Generation Potential (Modified Acid Base Accounting). Elemental content by partial acid digestion (aqua regia) was also carried out on all samples.

The results were compared to the criteria for the classification of mining waste, which is presented in the MDDEFP Directive 019 for the mining industry. Mining waste, which includes waste rock and tailings, can be any of the following categories: leachable or acid generating (low risk), or radioactive or cyanide containing (high risk).

All of the samples that were collected had a sulphur content that was lower than 0.3 %, and were therefore not considered acid generating.
Waste material that has an elemental content lower than Criteria A of the Soil Protection and Contaminated Sites Rehabilitation Policy (SPCSRP) is considered to be low risk. For any given chemical element, if the leachate generated from the Toxicity Characteristic Leaching Protocol (TCLP) tests show a concentration that is higher than the criteria for protection of the groundwater and an elemental content higher than Criteria A of the SPCSRP, the sample is considered leachable.

Table 20-1 presents a summary of all the results obtained from the static leaching tests and element content determination carried out on waste rock samples. SPLP and CTEU-9 leaching test results are presented even if they are not considered in the Directive 019 mining waste classification framework. The results obtained from the 2011 and the 2012 characterizations are somewhat different for both the metal content and the concentration in the leachates.

Based upon the 2011 characterization results, waste rock from the East Pit area would be classified as low risk due to their low elemental content, the Don Lake area waste rock would be considered leachable for barium and manganese, and the West Pit area waste rock would be leachable for barium. Based upon the 2012 characterization results, waste rock from the East Pit area would also be classified as low risk. However, the Don Lake area waste rock would be considered leachable for nickel and the West Pit area waste rock would be considered leachable for nickel, copper and manganese.

Table 20-1: Parameters Showing Content Higher than SPCSRP's Criteria A and Leachate Concentration Higher than Groundwater Protection Criteria for Waste Rock Samples

	East Pit	West Pit	Don Lake
2011 Characterization			
TCLP	None	Ba (one (1) sample)	Ba, Mn (one (1) sample)
SPLP	None	None	None
CTEU-9	None	None	None
2012 Characterization			
TCLP	Cu, Mn	Cu, Mn	Mn
SPLP	None	Cu	None
CTEU-9	Cu	Cu	None

20.1.3.2 Waste Rock - Kinetic Tests

Following the 2011 static test results, kinetic tests were carried out at the URSTM on composite waste rock samples from the three (3) deposits in order to characterize their leaching potential. Kinetic testing is considered to be more representative than static leach testing, in terms of both probable leaching behaviour and leachate concentrations generated from waste material that will be exposed to the natural conditions at site, due to the following:

- The nature of the contact between the filtration water and waste rock that simulates the infiltration of water through a waste rock pile more closely, as opposed to an agitated mixing of rock and water in a short-term leach test;
- The lower solution-to-solid ratio used in the kinetic tests is a better representation of the climate conditions at site, and;
- The long-term (20 week) nature of the testing that allows for the evaluation of transient chemical processes, such as the sulphide oxidation and other weathering reactions.

Results obtained during the kinetic tests for parameters showing content higher than the SPCSRP's criteria A and leachates concentration higher than groundwater protection criteria for the static tests (Ba, Cu, Mn and Ni) are shown in Table 20-2.

Table 20-2: Barium, Copper, Manganese & Nickel Concentrations in Leachate from the Kinetic Tests

	Barium (mg/L)	Copper (mg/l)	Manganese (mg/l)	Nickel (mg/l)
Groundwater protection criteria	0.12	0.0018	0.60	0.073
East Pit	0.001 – 0.059	<0.03*	<0.002* – 0.020	<0.0005* – 0.004
West Pit	<0.001* – 0.068	<0.0005* – 0.0006	<0.02* – 0.028	<0.004*
Don Lake	0.005 - 0.087	<0.0005* – 0.0008	<0.002* – 0.035	<0.0005* – 0.009

* Indicates analytical limit of detection

Results obtained during the kinetic tests clearly showed that waste rock from the three (3) deposits will not leach any metals. On this basis, no special groundwater protection measures (e.g. collection and treatment of water in order to control dissolved metals or suspended solids) will be required at the Fire Lake North property.

20.1.3.3 Tailings and Concentrate

Additional testing was performed as part of an overall mineral processing testing program completed in 2012 at the SGS Laboratories (Lakefield, ON). Representative samples of tailings and iron concentrate were subjected to trace metal analysis using Inductively Coupled Plasma Optical Emission Spectroscopy / Mass Spectrometry, and the corresponding liquid fractions (decant solutions) were also characterized extensively. Acid Rock Drainage static tests and Metal Leaching static tests (TCLP-USEPA1311, SPLP-USEPA1312 and Environment Canada CTEU-9) were carried out.

As for waste rock, tailings that have an elemental content lower than Criteria A of SPCSRP are considered to be low risk. For any given chemical element, if the leachate generated from the TCLP test shows a concentration that is higher than the criteria for the protection of groundwater, and an elemental content higher than criteria A of the SPCSRP, the sample is considered leachable.

Two (2) of the three (3) solid samples of tailings showed element contents lower than Criteria A and are therefore *de facto* considered non leachable. One sample (East Pit 127 - 30 % Wilfley Table) showed contents higher than Criteria A for chromium, molybdenum and nickel (Table 20-3). Results from the leaching test showed that the leachate from TCLP, SPLP and CTEU-9 tests are largely below their corresponding groundwater protection criteria and therefore the third sample is not considered leachable. Results obtained showed also that the tailings carry no real potential to generate acid rock drainage (ARD).

Table 20-3: Results from Static Testing Performed on East Pit 127 – 30 % Wilfley Table Sample

	Criteria A (mg/kg)	Content (mg/kg)	Groundwater Protection Criteria (mg/l)	TCLP Leachate (mg/l)	SPLP Leachate (mg/l)	CTEU-9 Leachate (mg/l)
Chromium	85	180	0.85	0.0075	<0.005	0.0024
Molybdenum	2	14	29	0.00017	0.001	0.002
Nickel	50	84	0.073	0.008	0.001	0.0009

The liquid fraction of the tailings has also been characterized on these three (3) samples. One of the samples showed a high suspended solids concentration (13 mg/l) and therefore the results are useless for a comparison of the dissolved metals concentrations with the groundwater protection criteria. Table 20-4 presents the main results for the other two samples.

Table 20-4: Main Characteristics of the Liquid Portion of the Tailings

	Groundwater Protection Criteria (mg/l)	Tailings East Pit 538 – 40 % Wilfley Table	Tailings East Pit 127 – 30 % Wilfley Table
pH	6.0 – 9.5	8.04	8.04
Suspended solids	-	3	<2
Hardness	-	97.5	93.1
Barium	0.12	0.0375	0.0284
Chromium	0.85	<0.005	<0.005
Copper	0.0018	0.008	<0.005
Manganese	0.60	0.0215	0.0182
Molybdenum	29	0.001	0.002
Nickel	0.073	0.003	0.002

The liquid portion of the tailings was slightly alkaline (pH ± 8.0) and hardness is significant (± 95 mg/l). The hardness reduces the aquatic toxicity of many metals. The samples showed concentrations of metals lower than the groundwater protection criteria for all parameters with the exception of copper in one (1) sample.

However, considering the result obtained for the other sample, and the dilution caused by the precipitation, no special groundwater protection measures (e.g. geo-membrane) will be required at the tailings impoundment area and no waste water treatment will be necessary to control any dissolved metals. A sedimentation pond will be sufficient to control the water effluent quality.

20.2 Jurisdictions and Applicable Laws and Regulations

The legal framework for the construction and operation of the projected facilities is a combination of provincial, national, and municipal policies, regulations and guidelines. The design and the environmental management of the project facilities and activities must be done in accordance with this legal framework.

20.2.1 Québec Procedure Relating to the Environmental Assessment of the Project

20.2.1.1 Overview

Section 31.1 of the *Environment Quality Act* (EQA) states that *"No person may undertake any construction, work, activity or operation, or carry out work according to a plan or program, in the cases provided for by regulation of the Government without following the environmental impact assessment and review procedure and obtaining an authorization certificate from the Government."*

Moreover, Section 2 of the *Regulation Respecting Environmental Impact Assessment and Review* provides the list of projects subject to the environmental impact assessment and review procedure, namely:

"(b) any program or project involving the dredging, digging, filling, levelling off or backfilling, for any purpose whatsoever, of a watercourse referred to in Schedule A or of a lake, within the 2-year flood line, over a distance of 300 m or more or an area of 5000 m^2 or more, and any program or project involving the dredging, digging, filling, levelling off or backfilling, for any purpose whatsoever, cumulatively equalling or exceeding the above limits for the same watercourse referred to in Schedule A or the same lake, except work on a river that drains a watershed of less than 25 km^2…;

(n.8) the construction of an ore processing plant for metalliferous ore or asbestos ore, where the processing capacity of the plant is 7000 metric tons or more per day, or any other ore , where the processing capacity of the plant is 500 metric tons or more per day;

(p) the opening and operation of a metals mine or an asbestos mine that has a production capacity of 7000 metric tons or more per day, or any other mine that has a production capacity of 500 metric tons or more per day."

Thus, the Fire Lake North project is subject to the provincial environmental impact assessment and review procedure.

Section 31.2 of the EQA states that: "Every person wishing to undertake the realization of any of the projects contemplated in section 31.1 must file a written notice with the Minister describing the general nature of his project; the Minister, in turn, shall indicate to the proponent of the project the nature, the scope and the extent of the environmental impact assessment statement that he must prepare."

A project notice was tabled on April 4th, 2012 to the Department of Sustainable Development, Environment, Wildlife and Parks (MDDEFP). A month later, following the study of the project notice, a Directive defining the required scope and content of the environmental impact assessment of the project was sent by the MDDEFP to Champion Iron Mines Ltd.

According to the *Regulation respecting Environmental Impact Assessment and Review*, and following the filing of the project notice, the MDDEFP sets 15 months as the maximum delay during which the Minister must submit the application record to the Government for approval. It is, however, noted that the period of 15 months does not include the time taken by the ''proponent'' to draft the EIA report or to answer any request for additional information, nor the time taken by the Government (Cabinet) to make its decision. It is worthwhile to note that the MDDEFP intends to reduce this time period to 12 months. Figure 20-1 shows the steps involved in this procedure.

20.2.1.2 General Contents of an Environmental Impact Assessment Statement

Section 3 of the *Regulation Respecting Environmental Impact Assessment and Review* defines the contents of an environmental impact assessment statement:

a) *A description of the project mentioning, in particular, the desired objectives, the site [...], the project timetable, any subsequent operation and maintenance activities, the amounts and characteristics of types of borrowed materials required, power sources, methods of management of waste or residue other than road construction residue, transportation activities inherent in the construction and subsequent operation of the project, any connection with land use planning and development plans, urban zoning plans or agricultural zoning and reserved areas within the meaning of the act to preserve agricultural land [...];*

b) *A qualitative and quantitative inventory of the aspects of the environment which could be affected by the project, such as fauna, flora, human communities, the cultural, archaeological and historical heritage of the area, agricultural resources and the use made of resources of the area;*

c) *A list and evaluation of positive, negative and residual impacts of the project on the environment, including indirect, cumulative, latent and irreversible effects [...];*

d) *A description of the different options to the project, in particular regarding its location, the means and methods of carrying out and developing the project, and all other variables in the project as well as reasons justifying the option chosen;*

e) *A list and description of measures to be taken to prevent, reduce or attenuate the deterioration of the environment, including [...] In particular, any equipment used or installed to reduce the emission, deposit, issuance or discharge of contaminants into the environment, any control of operations and monitoring, emergency measures in case of accident, and reclamation of the area affected.".*

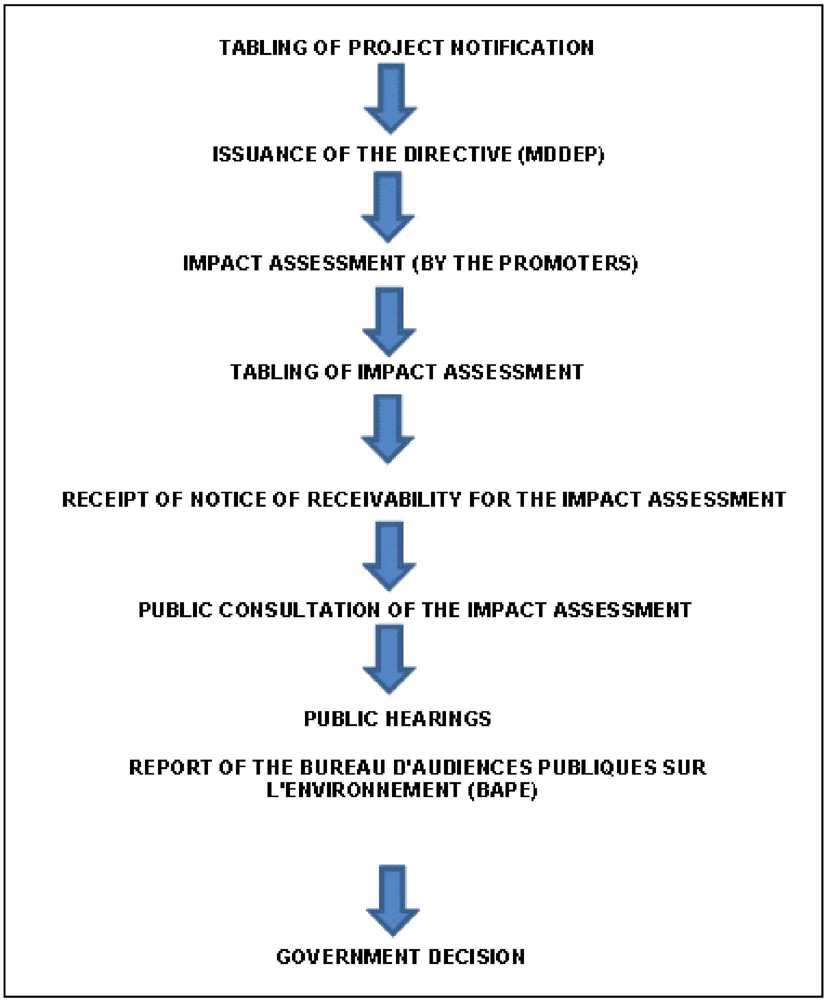


Figure 20-1: Steps of the Environmental Impact Assessment Procedure (Source: MDDEFP's website)

20.2.1.3 Summary of the Environmental Impact Assessment Statement

Section 4 of the *Regulation respecting Environmental Impact Assessment and Review* indicates that an environmental impact assessment statement, prepared pursuant to Section 31.1 of the Environment Quality Act, must be accompanied by a non-technical summary of the main elements and conclusions of the studies, documents or research. The summary is published separately.

20.2.1.4 Evaluation of the Environmental Impact Assessment (EIA)

A well-defined project is essential to producing an EIA report that accounts for the project to be carried out, and which could be considered acceptable by the authorities early on in the procedure. Upon receipt of the EIA report, the MDDEFP will determine its admissibility. This evaluation involves several consultations with government departments and agencies. The proponent should generally expect to receive questions and comments to be addressed before the EIA report can be determined to be admissible. Following the filing of the response to this first set of questions, a second set of questions may be issued. To avoid delays associated with this procedure, it is essential to produce an environmental impact assessment that covers, as specifically as possible, every aspect raised in the Directive issued by the MDDEFP.

20.2.1.5 Public Consultations

Section 31.3 of the EQA states that *"After receiving the environmental impact assessment statement, the Minister shall make it public and indicate to the proponent of the project to initiate the stage of public information and consultation provided for by regulation of the Government."*

Once the impact study is found to be admissible, the Minister will then direct the *Bureau d'audiences publiques sur l'environnement* (BAPE) to prepare the project for public consultation. This consultation process extends for 45 days (Section 11 of the *Regulation respecting Environmental Impact Assessment and Review*).

20.2.1.6 Public Hearings

Section 31.3 of the EQA also states that *"Any person, group or a municipality may, within the time prescribed by regulation of the Government, apply to the Minister for the holding of a public hearing in connection with such a project. Unless he considers such application to be frivolous, the Minister shall direct the Bureau to hold a public hearing and report its findings and its analysis thereof to him."*

Public hearings are governed by the Rules of Procedure relating to the Conduct of Public Hearings (Q 2, r. 45).

Following the public hearings, the BAPE commission files its report with the MDDEFP. The commission is required to complete its mandate and file its report within four (4) months. The Minister then has sixty (60) days to publicly release the BAPE report.

20.2.1.7 Government Decision

On the basis of the BAPE report and of the MDDEFP's evaluation of the EIA, the Minister analyzes the project and makes a recommendation to the Government. As specified in section 31.5 of the EQA, the Government will render its decision by a Decree: it authorizes the project, with or without changes and conditions, or rejects it. The maximum period between the publication of the BAPE report and the Government's decision is not specified in both the EQA nor in its regulations.

20.2.2 Federal Procedure

The new *Canadian Environmental Assessment Act* (CEAA 2012) was introduced on July 6th, 2012. Consequently, projects are now examined according to the requirements of this new law. Thus, under the CEAA 2012, an environmental assessment focuses on potential adverse environmental effects that are within federal jurisdiction, including:

- Fish and fish habitat;
- Other aquatic species;
- Migratory birds;
- Federal lands;
- Impacts that will or could potentially cross provincial or international boundaries;
- Impacts on Aboriginal peoples, such as land use and traditional resources;
- Impacts that are directly linked or necessarily incidental to any federal decisions about a project.

An environmental assessment will consider a comprehensive set of factors that include cumulative effects, mitigation measures and comments received from the public.

Regulations Designating Physical Activities determine the specific activities which constitutes the designated projects that may require an environmental assessment by the Canadian Environmental Assessment Agency (hereinafter the Agency), or by the Canadian Nuclear Safety Commission or the National Energy Board. The schedule specifies the designated projects that may require an environmental assessment under the responsibility of the Agency (Sections 1 to 31), the Canadian Nuclear Safety Commission (Sections 32 and 33), or the National Energy Board (Sections 34 to 39). With regards to the Fire Lake North project, it has been determined that the following designated activities are to be considered:

"8. The construction, operation, decommissioning and abandonment of a facility for the extraction of 200 000 m^3/y, or more of groundwater, or an expansion of such a facility that would result in an increase in production capacity of more than 35%.

15. The construction, operation, decommissioning and abandonment of a metal mine, other than a gold mine, with an ore production capacity of 3000 t/d or more."

Note that the Minister of the Environment may appoint a project not covered by the Regulations, if it considers that it is possible that this project may cause adverse environmental effects in areas of federal jurisdiction, or if public concerns about such environmental effects are to be expected.

According to CEAA (2012), proponents of designated projects are required to submit a description of the designated project to the Agency, to inform on whether or not an environmental assessment of the designated project is required. The project description must include the prescribed information as set out in the *Prescribed Information for the Description of a Designated Project Regulations*, including information about the possible adverse environmental effects which will be generated by the project.

Champion Iron Mines tabled its Description of a Designated Project on September 28th, 2012.

After accepting the project description, the Agency posts a notice on the Canadian Environmental Assessment Registry Internet site (hereafter, "the Registry") to inform whether or not an environmental assessment must be conducted. A summary description of the project is also displayed, along with a notice that the public has 20 days to submit comments on the project.

Within 45 days after the posting of the project description in the registry, the Agency must decide whether a federal environmental assessment is required or not. The Agency must consider the following elements while making a decision:

- The description of the designated project provided by the proponent;
- The possibility that the designated project may cause adverse environmental effects;
- Any comments received from the public during the 20 days after posting the project description summary on the registry;
- The results of any relevant regional studies.

Considering the above information and recent experience with the CEAA 2012, it is concluded that the Fire Lake North project is a designated project and that it will have to go through the Canadian environmental assessment process.

After having determined that an environmental assessment is required, the Agency posts the Notice of Commencement of the environmental assessment on the Internet site of the Registry and prepares a preliminary version of the guidelines relative to this assessment. These guidelines are then posted on the Registry's website allowing the public to comment on the proposed studies and methods, as well as on the information that will be required for the environmental impact assessment.

The Agency takes into account the general public's comments, including the observations made by the Aboriginal groups and by the federal ministries, before providing the final version of the environmental impact assessment guidelines to the proponent.
The proponent then has to submit an environmental impact assessment to the Agency identifying the environmental effects of the project, and proposed measures to mitigate these effects, while accounting for the Agency's guidelines.

Following submission of the environmental impact assessment to the Agency, the latter will ensure its relevancy and accuracy. The Agency may require that the proponent provide further clarifications or additional information to better understand the potential environmental effects and the proposed mitigation and preventive measures.

The Agency will then prepare a preliminary version of the environmental assessment report, which will include the Agency's conclusions on the potential environmental effects of the project, the proposed mitigation measures, the significance of the residual adverse environmental effects of the project, and the requirements of the monitoring program. The Agency will then invite the public to comment on this preliminary report before finalizing and submitting it to the Minister of the Environment.

If the Minister decides that the project is not likely to cause any significant adverse environmental effect, or that the latter are considered justifiable by the Governor in Council, then the conditions relative to the mitigation measures and the monitoring program to be respected by the proponent, as part of its project, are set out in the assessment decision statement issued by the Minister.

An environmental assessment to be conducted by the Agency must be completed within 365 days. This timeframe begins when the environmental assessment's Notice of Commencement is released on the website of the registry and ends when the Minister of the Environment issues its decision as to whether or not the designated project is likely to cause significant adverse environmental effects.

The Minister may extend the deadline for a maximum of three (3) months in order to allow for a partnership with another authority or because of circumstances particular to the project. The Federal Cabinet has the authority to extend this deadline for more than three (3) months

20.2.3 Canada-Québec Agreement on Environmental Assessment Cooperation (2010)

The federal and provincial governments reached an agreement in 2004, aiming for a simultaneous analysis of impact assessments submitted to both governmental levels in order to minimize the time required for obtaining the environmental authorizations. The Agreement which expired in 2009 was renewed in 2010.

The Agreement applies to projects located in Québec and conducted on provincial and federal lands that are subject to an assessment under the *Canadian Environmental Assessment Act* and the Québec *Environment Quality Act*. However, it does not apply to projects governed by the James Bay and Northern Québec Agreement.

The Agreement has as an objective to ensure that a single environmental assessment is conducted for projects that must comply with the federal and provincial requirements for environmental assessments. The Parties agreed to respect the environmental assessment timetables stipulated in the provincial and federal legislations. Each jurisdiction has a single point of contact, and they are responsible for ensuring that the requirements of each Party participating in the cooperative environmental assessment are respected. The Agreement does not delegate any federal powers to the province, or vice versa. Each government maintains authority in the areas under its jurisdiction, and remains responsible for the environmental assessment decisions required by its legislation.

As it is specified on the Agency's website, this Agreement:

- *constitutes an administrative framework within which the Parties will collaborate to exercise their respective powers and duties with respect to environmental* *assessment, as set out in the Canadian Environmental Assessment Act and in Division IV.1 of the Québec Environment Quality Act;*

- *must be interpreted in accordance with the Canadian Environmental Assessment Act and the Québec Environment Quality Act, as well as any other legal requirements, including, but not limited to the legislative requirements;*
- *does not establish new powers or duties, nor does it alter the powers and duties established by the Canadian Environmental Assessment Act and the Québec Environment Quality Act, and is not legally binding on the Parties;*
- *does not affect in any way the independence and autonomy of any commission of the Bureau d'audiences publiques sur l'environnement or joint review panel, which may participate in the process of a cooperative environmental assessment.*

20.2.4 Environmental Permitting

Even if the project undergoes an environmental impact assessment and is authorized by the Government, pursuant to Section 31.5 of the Act, it would still be subject to Section 22 of the *Environment Quality Act* (EQA), and must, therefore, obtain a certificate of authorization, as stated in Section 6 of the *Regulation Respecting the Administration of the Environment Quality Act* (c. Q-2, r. 3).

"6. Notwithstanding sections 1 to 3 of this Regulation, any project arising from a project authorized by the Government pursuant to Section 31.5 of the Act is subject to the application of Section 22 of the Act."

In addition to the mitigation measures set out as part of the environmental and social impact assessment, the final project design must comply with all applicable standards relating to the proposed infrastructure and equipment.

The issuance of the certificate of authorization, however, should only be a formality, as the certificate issued pursuant to Section 31.5 of the EQA binds the Minister as to where he exercises the powers provided in Section 22, and as specified in Section 31.7 of the Act.

"31.7. Every decision rendered under Section 31.5 or 31.6 is binding on the Minister, where he subsequently exercises the powers provided in section 22, 32, 55, 70.11 or in Division IV.2."

In addition to the Certificate of Authorization required under Section 22 of the EQA, the proponent must obtain the permits, authorizations, approvals, certificates and leases required from the appropriate authorities. These are described in the upcoming sections.

The authorization application and permitting process is expected to take one (1) full year. Applications may be filed concurrently with the construction work and should not, therefore, impact on the project schedule.

20.2.4.1 Certificates of Authorization

In order to carry out with the Fire Lake North project, one (1) or more Certificates of Authorization (CA) will be required from the MDDEFP under Section 22 of the EQA. A form to which are attached the documents and information set out in sections 7 and 8 of the *Regulation respecting the Application of the Environment Quality Act* is included with CA applicaton. For mining activities, CA applications must also comply with the Directive 019 requirements.

Moreover, because the Fire Lake North Project will involve discharges into the aquatic environment, it will be necessary to complete the effluent discharge objectives application form (*Demande d'objectifs environnementaux de rejet (OER) pour les industries*), and attach it to the CA application. The CA application forms and all required documents must be sent to the MDDEFP's Côte-Nord regional branch. The time required to analyze an application for a Certificate of Authorization directly depends on the complexity of the project. Under the *Declaration of Services to the Public*, the Department is committed to providing an official response within 75 days following the receipt of the application for a Certificate of Authorization or approval.

The number of CA applications to prepare will depend on the timeline of the project activities and its associated work items. By dividing the project into predefined items, it will enable a step-by-step implementation process.

Under the *Ministerial Order concerning the fees payable under the Environment Quality Act*, fees are payable by the company seeking an authorization under the Act. The fees which are indicated in the Ministerial Order are approximately $1000 to $5000 for each request for an authorization under sections 22, 31, 32, 48 and 70.8 of the Act.

Authorization for Water Supply Intakes and Devices for the Treatment of Drinking Water and Disposal of Wastewater

An authorization under Section 32 of the EQA is needed to build drinking water and wastewater treatment facilities. Two (2) forms must be completed and signed by the project engineer, and the required documents must be attached to them. The two (2) forms are the application for an authorization to build a water or wastewater facility (*Demande d'autorisation pour réaliser un projet d'aqueduc et d'égouts*) and the submission of applications for an authorization for domestic wastewater treatment systems (*Présentation des demandes d'autorisation pour les systèmes de traitement des eaux usées d'origine domestique*). The required documents are administrative documents and a technical document to be signed by the project engineer. The application for an authorization must be submitted to the MDDEFP regional branch.

Authorization to Install an Apparatus or Equipment to Prevent, Reduce or Cause the Cessation of the Contaminants Release into the Atmosphere

Under Section 48 of the EQA, an application for an authorization must be submitted for the installation of an apparatus or equipment which will prevent, reduce or cause the cessation of the release of contaminants into the atmosphere. The application for the authorization of an industrial project (*Demande d'autorisation pour un projet industriel*) must be completed and submitted to the MDDEFP regional branch. The documents to be attached to this application are listed in the form.

20.2.4.2 Approval

Approval for the Location of the Process Concentration Plant and Mine Tailings Management Facility

Under Section 240 of the *Mining Act*, *"Any person who intends to operate a mill for the preparation of mineral substances, a concentration plant, a refinery or a smelter shall, before commencing its operations, have the site approved by the Minister or, where the project is subject to the environmental impact assessment and review procedure* *provided for in Division IV.1 of Chapter I of the Environment Quality Act, by the Government*." Section 241 of the same Act also states, *"Every person responsible for the management of a concentration plant, refinery or smelter shall, before commencing activities, have the site intended as a storage yard for tailings approved by the Minister. The same applies to every holder of a mining right, owner of mineral substances or operator who intends to establish a mine tailings site."* Consequently, a request for approval must be submitted to the Department of Natural Resources (MRN) before the activities begin at the Fire Lake North Mine project. This request must include the information and documents as set out in Sections 124 and 125 of the *Regulation respecting Mineral Substances other than Petroleum, Natural Gas and Brine.*

20.2.4.3 Attestation

Depollution Attestation

In accordance with the *Order in Council 515-2002* issued on May 1st 2002, the Fire Lake North Mine project requires a depollution attestation from the MDDEFP. This certificate, which is renewable every five (5) years, identifies the environmental conditions that must be met by the industrial facilities when carrying out its activities. The certificate compiles all of the environmental requirements relating to the operation of an industrial facility. The depollution attestation differs from the certificate of authorization issued under Section 22 of the EQA. The latter is a statutory document which is issued prior to the implementation of a project or activity, whereas the former applies strictly to the operation of an industrial facility. The steps included in the depollution attestation process are described below.

- Order in Council
  - The process for the issuance of a depollution attestation was implemented through the adoption, by the Québec Government of an order in council that subjects certain categories of industrial facilities to Subdivision 1 of Division IV.2 of Chapter 1 of the EQA. This Subdivision of the Act establishes the legal framework for the depollution attestation.
- Application for a Depollution Attestation

  - The operator of an industrial facility that is subject to an order in council must apply to the Ministry for a depollution attestation within a month of the start-up date. This application must be made using the form provided by the Ministry that identifies all of the required information.
- First Draft of Depollution Attestation
  - The Ministry will prepare and submit a first draft of the depollution attestation to the industrial facility. The facility management has then 30 days to provide comments, as stipulated by the regulation.
- Public Consultations
  - As stipulated by the regulation, the Ministry must publish a notice for public consultation in a daily or weekly newspaper within 90 days of the mailing date of the first draft of the depollution attestation. The Ministry must also make the request and project attestation accessible for public consultation. These consultations must take place over a period of at least 45 days. The facility management is also informed that the project attestation is being submitted to public consultation.

Second Draft of Depollution Attestation

Following the public consultations, the Ministry will review the comments that were received, and prepare a second draft of the depollution attestation. The second draft is submitted to the industrial facility management, which has 30 days to provide comments.

Issuing of Depollution Attestation

The Ministry will review the final comments provided by the industrial facility management, and will prepare the final version of the depollution attestation, which will be issued to the industrial facility management for a period of five (5) years.

The facility management, for its part, will be responsible for requesting a renewal of its depollution attestation at least six (6) months before it expires. The original certificate will remain in effect until a new certificate is issued.

20.2.4.4 Permits

Forest Management Permit for Mining Activities

Under Section 20 of the *Forest Act*, holders of mining rights can obtain forest management permits relating to mining activities in order to exercise their rights under the *Mining Act*. The permit holder is allowed to cut timber on the land covered by its mining rights for the construction of buildings or any other operations necessary for its mining activities, in compliance with the *Forest Act* and its regulations. The applicant must have already obtained the right to operate the site for mining purposes, a right which is granted by the Mines Division of the MRN. Prior to proceeding with its timber cutting operations, the holders of mining rights must submit a written request to the MRN forest management unit in order to obtain a permit for its mining operations. The request can be for the clearing of a site for mining activities, the exploratory boring of a gravel bed, or the clearing of a gravel or sand pit.

It is important to note that the holder of a forest management permit for mining activities must scale all timber harvested in public land according to the standards prescribed by Government regulation and, as specified in Section 26 of the *Forest Act*. The holder is responsible for paying the prescribed duty as stipulated in Section 6 of the Regulation respecting Forest Royalties.

High-Risk Petroleum Equipment Operating Permit

Under Section 120 of the *Safety Code*, *"The owner of a petroleum equipment installation that includes at least one component that is high-risk petroleum equipment must obtain a permit for the use of all the high-risk petroleum equipment situated at the same address, until the equipment is removed from its respective place of use"*.

A "High-risk" petroleum equipment as defined in Section 8.01 of the *Construction Code* is having one of the following characteristics:

- For underground storage systems:
  - Capacity of 500 or more litres, used to store gasoline or diesel;

  - Capacity of 4000 or more litres, used to store heating oil and heavy fuel oil, except for equipment used for heating a residential single-family dwelling;
- For aboveground storage systems:
  - Capacity of 2500 or more litres, used to store gasoline;
  - Capacity of 10 000 or more litres, used to store diesel;
  - Capacity of 10 000 or more litres, used to store heating oil and heavy fuel oil, except for equipment used for heating a residential single-family dwelling;
  - Storage tanks used to store gasoline, diesel, heating oil and heavy fuel oil for profit, regardless of their capacity.

The form entitled “Application for a Permit for the Use of a High-Risk Petroleum Equipment” must be completed and submitted to the *Régie du bâtiment*. This application must include all of the information and documents identified in Section 121 of the *Safety Code*. A permit is valid for 24 months. The issuing and renewal of a high-risk petroleum equipment permit are subject to compliance and performance monitoring under the provisions of the *Construction Code* and the *Safety Code*.

Explosives Permit

Under the *Act respecting Explosives*, no person shall possess, store, sell or transport any explosive unless he is holding a permit for such purpose. Depending on the intended usage, several permits are required for the possession of explosives for industrial or commercial purposes. Division II of the *Regulation under the Act respecting Explosives* describes the different types of permits that are required. A general explosives permit entitles the holder to have explosives in his possession. Solely the holder of a general permit can obtain a magazine, sale or transport permit. A magazine permit entitles the holder of a general permit to purchase and store explosives in a container or a building that complies with the regulations. A transport permit entitles the holder of a general permit to transport explosives.

In order to obtain these permits, the forms entitled “Application for a General Explosives Permit” and “Application for a Sale, Magazine or Transport Permit”, which are available from the *Sûreté du Québec*, must be completed and submitted with the required fees to the Sûreté du Québec. Permits are valid for a period of five (5) years.

20.2.4.5 Leases

Mining Lease

Under Section 100 of the *Mining Act*, *"no person may mine mineral substances, except surface mineral substances, petroleum, natural gas and brine, unless he has previously obtained a mining lease from the Minister […]"*. In order to obtain a mining lease, a claim holder must establish the existence of the presence of an economic deposit. Applications must be submitted to the Registrar's Office or to the regional office. The initial term of a mining lease is 20 years. The lease can then be renewed every 10 years for the duration of the mining operation. The procedure for obtaining a mining lease is described in the MRN's online publication "Mining Leases and Concessions".

Non-Exclusive Lease for the Mining of Surface Mineral Substances

According to Section 109 of the *Mining Act*, *"a lessee or a grantee may use, for their mining activities, sand and gravel that is part of the domain of the State except where the land that is subject to the lease is already subject to an exclusive lease to mine surface mineral substances in favour of a third person".* The mining of sand and gravel located outside of mining leases requires a non-exclusive lease for the mining of surface mineral substances, under Section 140 of the *Mining Act*. The applicant must make a request for a non-exclusive lease by completing the form "Application for Non-Exclusive Lease (BNE) for Mining Surface Mineral Substances" and providing the documents identified in Section 3 of the form.

Lease for the Occupation of the Domain of the State

Under Section 239 of the *Mining Act*, *"the holder of mining rights or the owner of mineral substances may, in accordance with the Act respecting the lands in the domain of the State (Chapter T-8.1), obtain that public lands be transferred or leased to him to establish a storage site for tailings, or a site for mills, shops or facilities necessary for mining activities"*. Several components of the Fire Lake North project might be located outside of the lands covered by the mining lease. Since the project is located on public lands, the land in question will need to be leased under Section 47 of the *Act respecting the Lands in the Domain of the State*.

20.2.4.6 Federal Permitting

Authorization to Alter Fish Habitat

Section 35 of the *Fisheries Act* specifies that:

"(1) No person shall carry on any work, undertaking or activity that results in the harmful alteration or disruption, or the destruction of fish habitat.

(2) A person may carry on a work, undertaking or activity without contravening subsection (1) if:

> *(*a*) the work, undertaking or activity is a prescribed work, undertaking or activity, or is carried on in or around prescribed Canadian fisheries waters, and the work, undertaking or activity is carried on in accordance with the prescribed conditions;*
>
> *(*b*) the carrying on of the work, undertaking or activity is authorized by the Minister and the work, undertaking or activity is carried on in accordance with the conditions established by the Minister;*
>
> *(*c*) the carrying on of the work, undertaking or activity is authorized by a prescribed person or entity and the work, undertaking or activity is carried on in accordance with the prescribed conditions;*
>
> *(*d*) the harmful alteration or disruption, or the destruction, of fish habitat is produced as a result of doing anything that is authorized, otherwise permitted or required under this Act; or*
>
> *(*e*) the work, undertaking or activity is carried on in accordance with the regulations.*

When a project includes a known risk of affecting fish and fish habitat, the project must be submitted to Fisheries and Oceans Canada (DFO) for its review. The general process that must be followed is described on the DFO website. The Proponent's Guide to Information Requirements for Review under the Fish Habitat Protection Provisions of the *Fisheries Act* identifies the information requirements for a detailed review by DFO. In order for a project to be reviewed, the proponent must have previously completed the form "Request for Review under the Fish Habitat Protection Provisions of the *Fisheries Act*". This request must be submitted to the local Fish Habitat Management Office.

There are three (3) possible outcomes following a DFO review:

- Mitigation measures (included in the project design or proposed by DFO are sufficient to avoid or mitigate the negative impacts to fish and fish habitat – DFO issues a "*Letter of Advice*";
- The residual damage to the fish habitat cannot be avoided, but is considered to be acceptable – an authorization for a harmful alteration, disruption or destruction of fish habitat (HADD) and a compensation for fish habitat loss are required;
- The project will have unacceptable impacts on fish and fish habitats – the project cannot proceed as designed.

The Ministry will issue in most cases an authorization if the compensation plan results in no net loss of fish habitats. The Fire Lake North project is expected to require an authorization for HADD and a compensation for the loss of habitats.

Champion Iron Mines Ltd will have to establish an Environmental Effects Monitoring Program (EEMP). This is a requirement for regulated mines in accordance with the *Metal Mining Effluent Regulations* (MMER) under the authority of the *Fisheries Act*. The objective of EEMP is to evaluate the effects of mine effluents on fish, fish habitats and the use of fishery resources by humans. Directive 019 sets at the provincial level, the criteria that mine effluents must comply with at the end-of-pipe. TheEEMP examines the effectiveness of the environmental protection measures directly in the aquatic ecosystems, i.e. downstream of the final discharge point. EEMP consists of biological monitoring and effluent and water quality monitoring:

- Effects on fish are assessed through a comparison of adult fish exposed to effluent with unexposed fish;
- Effects on fish habitats are assessed through a comparison of benthic invertebrate communities from areas which are exposed and unexposed to an effluent;
- Effects on the use of fishery resources are assessed by comparing the designated contaminants (i.e. mercury for metal mines) in fish tissue against health guidelines for fish consumption.

Moreover, the effluent quality is monitored through sub-lethal toxicity testing. For metal mines, an effluent characterization and water quality monitoring studies are also required.

The requirement of an EEMP is to be reviewed as more information is collected, and when a better assessment of the impact of effluents on the aquatic environment is available, along with

Licence for Explosives Factories and Magazines

Under Section 7(1) a) of the *Explosives Act*, a licence issued by the Minister of Natural Resources Canada is required for the operation of explosive plants and magazines in Canada.

It is reported that there will probably be no explosive plant on site. Also, according to Section 2 of the same Act, the term “magazine” excludes:

“a place where an explosive is kept or stored exclusively for use at or in a mine or quarry in a province in which provision is made by the law of that province for efficient inspection and control of explosives”.

In Québec, the *Act respecting explosives* provides for the issuing of permits, and the inspection and the control of activities associated with explosives (see Section 1.4.4 Explosives permit).

Thus, no licence for explosives should be required from Natural Resources Canada Ministry. If modifications were to be implemented to the Project so that it would require the operation of an explosive plant or magazine, such license would be necessary. However, obtaining it would not have any impact on the permitting schedule after consideration of the recent modifications applied to the CEAA 2012.

Appendix 2 of the Metal Mining Effluent Regulations

Considering the very abundance of lakes, rivers and creeks within the Project area, it will be very difficult to avoid any fish habitat while locating the tailings and waste rock management facilities.

The use of a natural waterbody considered as a fish habitat to store mine residues requires a modification to the *Metal Mining Effluent Regulations* (MMER), which was adopted in compliance with Sections 34(2), 36(5) and 38(9) of the *Fisheries Act* in order to control mine effluent discharge and implementation of tailings and waste rock management facilities in fish-bearing waterbodies.

The Environmental and Social Impact Assessment (ESIA) will have to account for the following:

- Evaluation of alternatives for tailings and waste rock management;
- Public comments and stakeholders which may be impacted by the proposed management plan;
- Consultation on the proposed Fish Habitat Compensation Plan; and
- Consultation with First Nations.

The final decision to add a waterbody to Appendix 2 of MMER is made by the Treasury Board of Canada.

20.2.5 Rehabilitation and Mine Closure Plan

The *Mining Act* (RSQ, c. M-13.1), and its regulations, is another important aspect of the provincial legislation relating to the management of mining activities in the Province of Québec. *"The object of this Act is to promote prospecting, mineral exploration, development and operation of underground reservoirs, taking into account other possible uses of the land in the territory"* (s.17).

Section 232.1 of the *Mining Act* states that *"land rehabilitation and restoration work must be carried out, in accordance with the plan approved by the Minister. The obligation shall subsist until the work is completed or until a certificate is issued by the Minister under Section 232.10."*

The land rehabilitation and restoration work to be conducted must be planned and previously approved by the Department of Natural Resources (MRN). Indeed, according to Section 232.2 of the Act, *"Every person to whom Section 232.1 applies must submit a* *rehabilitation and restoration plan to the Minister for approval before commencing mining activities."*

Hence, a rehabilitation plan will have to be prepared (as part of the project and approved by the MRN). The rehabilitation and restoration plan should be elaborated in accordance with the provincial *Guidelines for Preparing a Mining Site Rehabilitation Plan and General Mining Site Rehabilitation Requirements* (1997) which provides to the the proponents the rehabilitation requirements. The feasibility study of a project will have to account for the costs of all works needed for the rehabilitation of a mining site.

Impact of Bill 14 amending the Mining Act

On May 12th, 2011, the Minister of Natural Resources presented, at the National Assembly, Bill No. 14 amending the *Mining Act.* The Bill was still under Parliament Commission study by the end of October 2012. Bill 14 *"An Act respecting the development of mineral resources in keeping with the principles of sustainable development"* will see an increase of the financial guarantee from 70% to 100% of the projected costs for the work required under the rehabilitation and restoration plan. According to this Bill, the guarantee must be paid in three (3) annual instalments. The first instalment corresponds to 50% of the total amount of the guarantee, and must be paid within 90 days following the receipt of the plan approval. The second and third instalments each represent 25% of the guarantee.

20.2.5.1 General Principles

The main objective of mine site rehabilitation is to restore the site to a satisfactory condition by:

- Eliminating unacceptable health hazards and ensuring the public safety;
- Limiting the production and circulation of substances that could damage the receiving environment and trying to eliminate long-term maintenance and monitoring;
- Restoring the site to a condition which is visually acceptable to the community;

- Reclaiming the areas where the infrastructures are located (excluding the accumulation areas) for future use.

Specific objectives are to:

- Restore degraded environmental resources and land uses;
- Protect important ecosystems and habitats of rare and endangered flora and fauna, which favors the re-establishment of biodiversity;
- Prevent or minimize future environmental damage;
- Enhance the quality of specific environmental resources;
- Improve the capacity of eligible organizations to protect, restore and enhance the environment; and
- Undertake resource recovery and waste avoidance projects and prevent and/or reduce pollution.

The general guidelines of a rehabilitation plan include:

- Favoring progressive restoration to allow for rapid re-establishment of biodiversity;
- Implementing a monitoring and surveillance program;
- Maximizing recovery of previous land uses;
- Establishing new land uses;
- Promoting habitat rehabilitation using operational environmental criteria;
- Ensuring sustainability of restoration efforts.

The mine site rehabilitation plan focuses on land reclamation, reclamation of tailings area and water basins, and on surface drainage to prevent erosion. The successful completion of a rehabilitation plan will ensure that the project will result in a minimum of disturbance. Site inspections will be carried out before the property is returned to the Government.

The rehabilitation concept for the current project is described below, and complies with the requirements described in the *Guidelines for Preparing a Mining Site Rehabilitation Plan and General Mining Site Rehabilitation Requirements* and the current legislation.

20.2.5.2 Mining Site Rehabilitation Plan Concept

The rehabilitation and restoration plan concept is summarized as follows:

- Tailings Accumulation Cells and Waste Rock Piles
  - Exposed surfaces of the accumulation areas (tailings accumulation cells, waste rock and overburden piles) will be covered with a layer of top soil/overburden and re-vegetated when feasible.
- Haul Roads
  - Surface will be scarified and re-vegetated.
- Industrial Complex and Buildings
  - No building will be left in place. Whenever possible, buildings will be sold with the equipment they contain, completely or partially. During dismantling works, beneficiation/recycling of construction material will be maximized. Remaining waste will be disposed of in an appropriate site.
- All equipment and machinery will be disposed of or recycled off-site.
- Explosives magazine, if any, and related facilities will be dismantled.
- The drinking water supply and domestic wastewater treatment facilities will be dismantled.
- Infrastructure relating to electricity supply and distribution will be dismantled with the exception of Hydro-Québec requirements.

All underground services (power lines, pipelines, water and sewer pipes, etc.) shall remain in place since they are unlikely to cause any environmental damage. Openings and access to such pipelines, however, shall be sealed.

Open Pit

The surface exploitation of mineral substance is common in Québec. Many open pits that are created to extract mineral substance or ore are therefore found throughout the province. Unlike quarries that are essentially developed on rock outcrops, ore deposits can be located below the surface, which means pits could be filled with groundwater. In many open pit mines, water could rise to the overburden contact without the dewatering wells.

Once the mining activities cease, the pit will gradually fill up to its equilibrium level with rainfall and groundwater. The overburden slope around the pit will have already been established for a safe operation of the mine. No special work in this regard will be required upon cessation of mining activities.

A two-meter high embankment will be built along with an equivalent crest line using waste rock to permanently close off the pit access roads. A two meter wide and one metre deep ditch will be excavated in front of the embankment.

Environmental Aspects

- **Drainage**
  - Whenever possible, the surface water drainage pattern will be re-established to a condition similar to the original hydrological system.
- ***Topsoil Management***
  - During the site construction period and overburden stripping over the ore body, overburden and topsoil will be stored separately and used for re-vegetation purposes. Slopes of the overburden storage area and flat surfaces will ultimately be seeded and re-vegetated.
- ***Waste Management***
  - Waste material from demolition activities will be:
    - Decontaminated when required;
    - Recycled when cost-effective;
    - Buried in an appropriate site.
  - All non-contaminated waste will be sent to an appropriate site.

- ***Hazardous Materials***
  - Facilities containing petroleum products, chemicals, solid waste, hazardous waste, and/or contaminated soil or materials will be dismantled and managed according to regulatory requirements.
  - All hazardous waste will be managed according to existing laws and regulations, and will be transported off site.

Characterization Study

The Land Protection and Rehabilitation Regulation, which came into force on March 27th, 2003, contains several provisions concerning land protection in the new Section IV.2.1 of the *Environmental Quality Act*. The term “land” also includes groundwater and surface waters. The Regulation sets limit values for a range of contaminants and specifies the categories of targeted commercial or industrial activities. The mining industry is one of the categories subject to the Regulation.

For the mining industry, this generally entails an undertaking of a site characterization study within six (6) months following the termination of the mine operations. In cases where the contamination were to exceed the criteria set for in the Regulation , a rehabilitation plan, which would specify the environmental protection measures to be undertaken, must be submitted to the MDDEFP for its approval.

Waste rock and mine tailings are not soils and are not covered by this Regulation. The characterization study will address the areas that are likely to have been contaminated by human activities, specifically the handling of petroleum products.

20.2.5.3 Monitoring Program and Post-Closure Monitoring

According to *Directive 019 for the mining industry*, a Monitoring Program will have to be implemented during the mine operation to account for all of the requirements specified in that Directive, especially with regards to noise levels, vibrations, surface and ground waters.

Physical Stability

The physical stability of the tailings dams and of the waste rock piles will need to be assessed, and signs of erosion will be noted. This monitoring will be conducted on an annual basis for a minimum of five (5) years following mine closure.

Environmental Monitoring

Monitoring of the water quality (surface and groundwater) will continue for five (5) years after the completion of the restoration work.

Agronomic Monitoring

The agronomic monitoring program is designed to assess the effectiveness of the re-vegetation which will be done as part of mining rehabilitation efforts.

To document the success of the re-vegetation efforts over the waste dumps areas, agronomic monitoring will be undertaken, following the establishment of a vegetative cover on the areas subject to the progressive restoration program. This monitoring will be conducted annually for three (3) years following the revegetation efforts. Reseeding will be carried out, as required, in areas where re-vegetation is found unsatisfactory.

20.3 Relations with Stakeholders

20.3.1 Innu First Nation

The Project is located on the traditional territory of the Innu Nation. The Innu traditional territory is the Boreal Forest, which, roughly, in Québec, covers all of the administrative regions of the Saguenay – Lac-Saint-Jean and North Shore (*Côte-Nord*), and overlaps part of Northern Québec (*Nord-du-Québec*) and the National Capital (*Capitale-Nationale*) regions. The Innu mainly live within nine (9) communities, located primarily along the Saint-Lawrence River coastline, with the exception of the Mashteuiatsh (*Lac-Saint-Jean*) and Matimekush-Lac John (Schefferville in Northern Québec, near the Labrador border communities).

A people of hunters and gatherers, the Innu, formerly known as the Montagnais, were nomads who have been forced to settle. The Innu used to spend most of the year deep in the interior of Québec-Labrador where, until recently, they lived as nomadic hunters only visiting the coastal trading posts for brief periods of time.

The Fire Lake North project is located on the territory of the Saguenay Beaver Reserve, Sept-Îles division.

On their traditional territory (named "Nitassinan"), the Innu are claiming Uashaunnuat Indian title or an aboriginal and treaty rights to the land and all its natural resources. Important negotiations involving both the federal and provincial governments are currently underway with some of the Innu communities of Québec. It followed the of an Agreement-In-Principle (AIP), which was agreed upon on March 31st, 2004. The Innu of Pessamit (west of Baie-Comeau), Uashat mak Mani-Utenam (Sept-Îles) and Matimekush-Lac John (near Schefferville) are currently not part of any agreement, as they intend to settle their own land claims directly with both levels of government. The communities of Uashat mak Mani-Utenam (ITUM) and Matimekush-Lac-John are part of the Ashuanipi Corporation, which is representing them in the comprehensive territorial negotiations since 2006.

Furthermore, , Ekuanitshit, Matimekush-Lac John, Pessamit, Uashat mak Mani-Utenam and Unamen Shipu founded the *Alliance stratégique Innue* (Innu Strategic Alliance) in 2008, which represents an Innu population of approximately 12,000, or about 70% of the total members of the Innu Nation living in Québec. The mandate of this alliance is to enable the parties to defend their rights, common interests, and to conduct joint initiatives to achieve political, economic and judicial results in a cooperative manner.

Several attempts to consult with both local and regional stakeholders were made since early 2011 to gather as much data and knowledge as possible on the local and regional biophysical and social environment. Nonetheless, few of those attempts were successful. Nonetheless, it should be noted that this situation is not directly related to the

Champion Iron Mines project, but to a more general political context in which the Innu Nation is trying to gain additional power and acknowledgement.

Despite this, Champion Iron Mines entered into an exclusive Memorandum of Understanding (MOU) in April 2012 with the Takuaikan Uashat Mak Mani-Utenam Innu (ITUM) First Nations relating to the potential development of a new multi-user railway. The intent of ITUM and Champion at this stage is that the interests and long-term vision of ITUM will be integrated into the project planning, as the parties desire to create a sustainable development project that will enable the economic development of the region and support mutual environmental and social responsibility objectives. The participation of ITUM in this railway project is conditional upon, among other things, the negotiation of a definitive agreement between Champion and ITUM.

Champion Iron Mines are still consulting directly with the local Innu First Nations, and will continue to do everything in its power to establish sustainable relationships with all local and regional stakeholders.

20.3.2 Non-Aboriginal Communities and Governmental Authorities

Since 2011, Champion Iron Mines' representatives have established sustainable relationships with several local and regional stakeholders, including with representa tives of the cities of Fermont and Sept-Îles, the MRC of Caniapiscau and *des Sept-Rivières and*, the *Conférence régionale des Élu(e)s* (CRÉ). Roche Ltd, Consulting Group was also mandated to meet with several local and regional NGOs – including, among others, the Regional Environmental Board, the ZIP Committee, the Sept-Îles Environmental Protection Corporation, and the Watershed Conservation agencies of Duplessis and Manicouagan, to inform them about the Project and to address their concerns.

Moreover, Champion Iron Mines mandated Roche to meet, on its behalf, with local non-aboriginal tallymen - mostly located in the southern part of the proposed railway corridor - as well as with resort vacationers located close to the future project facilities, including the mine site and the proposed railway. Moreover, Roche met with other non-aboriginal land users, such as the regional Snowmobile and Quad Association and the ZEK Matimek (local hunter and fishermen association). All stakeholders were informed about the Project, and their concerns were noted for inclusion in the upcoming Environmental and Social Impact Assessment.

Finally, Champion Iron Mines representatives have taken part in in many meetings with Québec's Department of Natural Resources (MRN) and MDDEFP to discuss mutual interests, and to ensure that all involved parties could be satisfied. The MRN is also working towards the same objective, and has been cooperating fully with Champion Iron Mines to facilitate the development of the Fire Lake North project.

21. CAPITAL AND OPERATING COSTS

The Fire Lake North project scope covered in this Study is based on the construction of a greenfield facility producing 9.3 Mt of concentrate per year. The Capital and Operating Cost Estimates related to the mine, concentrator and FLN site infrastructure, as well as that of Pointe Noire, were developed by BBA. The costs related to the construction and operation of a new railway linking the FLN site to Pointe-Noire were calculated by Rail Cantech. The closure plan was developed by Journeaux, who also worked with BBA to design the tailings management facilities. The environmental compensation costs were provided by Roche. BBA consolidated cost information from all sources. A summary of the total capital costs of $2741.4M for the Project is presented in Table 21-1.

Table 21-1: Total Capital Costs Summary

Cost Area		TOTAL Capital*
Fire Lake North & Pointe Noire	***Direct Costs***	
	Mining	$133.7M
	Concentrator and FLN Site Infrastructure	$1033.4M
	Pointe Noire	$227.3M
	Indirect Costs	
	Owner's Cost	$53.2M
	EPCM	$106.5M
	Project Indirect Costs	$140.5M
	Contingency	$114.6M
	Sub-total	**$1394.4M**
Railway	***Direct Costs***	
	Railway*	$1005.8M
	Indirect Costs	
	Owner's Cost	$106.0M
	EPCM	$100.6M
	Contingency	$121.2M
	Other Capitalized Costs	
	Rolling Stock Leasing	$13.4M
	Sub-total	**$1347.0M**
GRAND TOTAL CAPEX		**$2741.4M**

* Total CAPEX excludes debt financing of the railway (i.e. railway at full capital cost of $1333.6M).

The pre-production costs and sustaining capital for the project are presented in Table 21-2. The initial capital costs for the mine, FLN site and port facilities were estimated to be $1394.4M and the sustaining capital is $839.6M. The railway component brings the total pre-production cost to $1607.9M

Table 21-2: Pre-Production and Sustaining Capital Summary

Cost Area		Pre-Production Capital*	Sustaining Capital**
Fire Lake North & Pointe Noire	***Direct Costs***		
	Mining	$133.7M	$438.8M
	Concentrator and FLN Site Infrastructure	$1033.4M	$290.5M
	Pointe Noire	$227.3M	-
	Indirect Costs		
	Owner's Cost	$53.2M	-
	EPCM	$106.5M	-
	Project Indirect Costs	$140.5M	$43.6M
	Contingency	$114.6M	$66.8M
	Sub-total	**$1394.4M**	**$839.6M**
Railway	Railway*	$200.0M	-
	Rolling Stock Leasing	$13.4M	-
	Sub-total	**$213.4M**	-
TOTAL		**$1607.9M**	**$839.6M**

*The total Capital cost of the railway is $1333.6M. Champion will contribute $200M during pre-production, while the remaining $1133.6M will be debt financed. The debt financed portion of the railway, including principle and interest payments, is presented in the Financial Analysis in Chapter 22, and is also presented in Table 21-3 as a LOM average operating costs.

Not included in the capital cost summary, but included in the financial analysis, are the following items:

- Principle and interest payment associated with the debt financing of the railway;
- Closure plan costs totalling $75.8M. The payments are made over the LOM on a schedule set by the provincial government;
- Payments to Hydro-Québec totaling $217.5M, which are paid net of credits.

The operating expenses calculated per tonne of concentrate produced are presented in Table 21-3. Detailed descriptions for the cost area calculations are presented in the following sections:

Table 21-3: Operating Costs

Cost Area	Average LOM Cost (per tonne of concentrate)
Mining	$18.89/t
Processing	$4.38/t
Rail	$4.80/t
Port	$2.34/t
Environmental	$0.13/t
G&A	$4.05/t
TOTAL Direct Operating Costs	**$34.58/t**
Railway Debt financing – principle	$6.22/t
Railway Debt financing – interest	$3.25/t
TOTAL Operating Cost	**$44.05/t**

The estimated direct operating costs, over the LOM, are $34.58/t concentrate. The debt financing of the railway adds another $9.47/t concentrate, bringing the total to $44.05/t concentrate.

Royalties and working capital are not included in the Operating Cost Estimate presented in Table 21-3 and are treated separately in the Financial Analysis presented in Chapter 22 of this Report.

21.1 Basis of Estimate

Mining costs for the project have been established by the BBA mining group from the mine plan developed in this study. Mining equipment budget costs were obtained from vendor quotes and the BBA database. The processing plant costs were developed by a professional estimator using a mechanical equipment list based on the process flow sheet and from the material take off (MTO). Site infrastructure costs were also developed by a BBA estimator. The port infrastructure was produced by BBA on the basis of an equipment list, the site layout and MTO. The environment costs were prepared by Roche. The tailings management facility concept and MTO were developed by Journeaux and priced by BBA. The railway infrastructure, rolling stock and ancillary buildings costs were developed by Rail Cantech.

21.1.1 Type and Class of Cost Estimate

BBA's Cost Estimate Classification System maps the phases and stages of asset cost estimating, and aids in achieving the following:

- A common basis of the concepts involved with classifying project cost estimates, regardless of the type of facility, process or industry that the estimates relate to;
- Fully defines and correlates the major characteristics used in classifying cost estimates, so that companies may unambiguously determine how their practices compare to the guidelines;
- Allows for the measurement of a degree of project definition and degree of engineering completion as the primary characteristic to categorize estimate classes; and
- Reflects generally accepted practices in the cost estimation profession.

The Capital Cost Estimate pertaining to this Preliminary Feasibility Study is meant to form the basis for an overall project budget authorization and funding, and as such, forms the "Control Estimate" against which, subsequent phases of the Project will be compared to and monitored. It meets AACE Class 3. The accuracy of the Capital Cost Estimate and the Operating Cost Estimate developed in this Study is qualified as -10%/+15%. Generally, engineering is developed to an approximate accuracy of 10%, while the level of project definition is 35%.

The following elements were developed for the cost estimation:

- Project scope description;
- Plant location and preliminary site plan;
- Plant production / facility capacity and description;
- Preliminary building sizing;

- Preliminary mine plan and mine fleet requirements;
- Process flow diagrams, preliminary mass balance and power requirements;
- Preliminary process and mechanical equipment list;
- Initial scope statement for major infrastructure (rail and port)
- Preliminary site geotechnical survey.

21.1.2 Date, Currency and Exchange Rate

This cost estimate is calculated and presented in Q4-2012, Canadian Dollars (CAD). Table 21-4 and Table 21-5 show the currency exchange factor used for the Study and the distribution of foreign currency project Direct Costs based on selected equipment Vendor proposals received.

Table 21-4: Foreign Exchange Rates

Country/Zone	Currency	CAD Equivalent
Australia	AUD	1.0334 CAD
United States	USD	1.0000 CAD

Table 21-5: Direct Cost Currency Distribution

Currency	Direct Cost	CAD Equivalent
Australia	$15.1M AUD	$15.7M CAD
United States	$74.3M USD	$74.3M CAD

No allowance has been made for the rate of exchange variation between the time the estimate is issued and the actual order. It is assumed that foreign exchange variations will be borne by Champion and assessed as part of their financial model.

21.1.3 Labour Rates and Labour Productivity Factors

For the purpose of defining the “work week”, the work is done in two (2) separate administrative regions, the costs and the needs of manpower is different in each zone.

The “work week” in the North (FLN) is based on ten (10) hours per day, over seven (7) days per week, for a total of 70 hours per week. The work is expected to be executed with rotations of three (3) weeks of work and one (1) week of rest.

The "work week" in the South (Pointe Noire) is based on ten (10) hours per day, over five (5) days per week, for a total of 50 hours per week. The work is expected to be executed on a continuous basis, and the impact of job rotations is not incorporated in the productivity factors.

There is no allowance for a second working team (night shift). The present estimate is structured and based on the philosophy that contracts will be awarded to reputable contractors on a lump-sum basis.

Table 21-6 and Table 21-7 present union wage rates for major construction trades as well as factored construction equipment rates, thus resulting in an all-in blended rate for the various trades for the two (2) separate administrative regions; North (Fire Lake North) and South (Pointe-Noire).

Table 21-6: Capital Cost Estimate North (FLN) Labour Rates

Crew Type	Labour Rate			Equipment Costs	Total
	Direct	Indirect	Sub-Total		
Site Works - Civil	$73.20	$49.20	$122.40	$54.90	**$177.30**
Concrete Works	$74.00	$52.60	$126.60	$11.30	**$137.90**
Structural Works	$79.50	$55.90	$135.40	$34.70	**$170.10**
Architectural Finishes	$74.20	$52.70	$126.90	$7.30	**$134.20**
Mechanical / Process	$78.00	$55.90	$133.90	$21.50	**$155.40**
Mechanical / Building	$74.80	$54.70	$129.50	$18.60	**$148.10**
Piping	$73.80	$54.30	$128.10	$19.20	**$147.30**
Piping Insulation	$71.30	$48.80	$120.10	$7.40	**$127.50**
Electrical	$79.50	$56.50	$136.00	$4.80	**$140.80**
Automation / Telecom.	$78.30	$56.10	$134.40	$1.70	**$136.10**

In Table 21-6, the crew rates are composed of direct and indirect labour rates, plus the required construction equipment per trade to accomplish their tasks. The direct costs are calculated on an assumption of 70 hours per week, considering 50 hours at the regular rate and the remaining 20 hours applying an overtime multiplier of 2 to the regular rate.

Table 21-7: Capital Cost Estimate South (Pointe Noire) Labour Rates

Crew Type	Labour Rate			Equipment Costs	Total
	Direct	Indirect	Sub-Total		
Site Works - Civil	$66.10	$33.40	$99.50	$52.30	$**151.80**
Concrete Works	$66.80	$36.70	$103.50	$10.80	$**114.30**
Structural Works	$72.00	$42.30	$114.30	$33.20	$**147.50**
Architectural Finishes	$67.10	$39.80	$106.90	$6.90	$**113.80**
Mechanical / Process	$70.20	$45.40	$115.60	$20.50	$**136.10**
Mechanical / Building	$67.40	$44.70	$112.10	$17.70	$**129.80**
Piping	$66.50	$44.40	$110.90	$18.30	$**129.20**
Piping Insulation	$64.30	$39.20	$103.50	$7.00	$**110.50**
Electrical	$71.60	$45.80	$117.40	$4.60	$**122.00**
Automation / Telecom.	$70.50	$45.50	$116.00	$1.60	$**117.60**

In Table 21-7, the crew rates are composed of direct and indirect labour rates, plus the required construction equipment per trade to accomplish their tasks. The direct costs are calculated on an assumption of 50 hours per week, considering 40 hours at the regular rate, 2 hours applying an overtime multiplier of 1.5 and the remaining 8 hours applying an overtime multiplier of 2 to the regular rate.

These rates include a mix of skilled, semi-skilled and unskilled labour for each trade, as well as the fringe benefits on top of gross wages. Direct supervision by the foremen and surveyors is built into the direct costs.

The indirect cost component consists of allowances for small tools, consumables, supervision by the general foreman, management team, on-site contractors at temporary construction facilities, mobilization / demobilization, contractors' overhead and profit. Also included are the costs related to the transportation of the employees from their residence to the construction site.

The construction equipment rates are based on those proposed by "La Direction Générale des Acquisitions du Centre de Services Partagés du Québec", detailed in the April 1st, 2011 edition. The cost used for fuel (diesel) in this estimate is $1/litre, assuming there is a tax rebate. In brief, the crew rates are developed for each discipline (by speciality), and are established based on the assumption that all hourly workers are unionized.

21.1.4 Productivity

Project construction performance is an important concern of project owners, constructors, and cost management professionals. Project cost and schedule performance depend largely on the quality of project planning, work area readiness, preparation and the resulting productivity of the work process made possible in project execution. Labour productivity is often the greatest risk factor and source of cost and schedule uncertainty to owners and contractors alike.

The two (2) most important measures of labour productivity are:

- The efficacy of labour used in the construction process; and
- Their relative efficiency in doing what is required at a given time and place.

Important factors affecting productivity on a construction site include, but are not limited to, the following:

Site location	Weather conditions
Extended overtime	Work over scattered areas
Access to work area	Worker accommodations
Height – Scaffolding	Work complexity
Availability of skilled workers	Supervision
Labour turnover	Project schedule pressure
Health and Safety considerations	Fast-track requirements

Table 21-8 and Table 21-9 present the labour productivity factors applied in the capital cost estimate for the two (2) separate administrative regions; North (Fire Lake North) and South (Pointe Noire):

Table 21-8: North's (FLN) Productivity Factors Used in the Capital Cost Estimate

Activity	Productivity Factor
Site Works - Civil	1.331
Concrete Works	1.409
Structural Works	1.524
Architectural Finishes	1.456
Mechanical / Equipment	1.587
Piping	1.637
Electrical	1.606
Automation / Telecom.	1.593
Average	**1.518**

Table 21-9: South's (Pointe Noire) Productivity Factors Used in the Capital Cost Estimate

Activity	Productivity Factor
Site Works - Civil	1.244
Concrete Works	1.322
Structural Works	1.438
Architectural Finishes	1.369
Mechanical / Equipment	1.500
Piping	1.550
Electrical	1.519
Automation / Telecom.	1.507
Average	**1.431**

21.1.5 Direct Costs

This capital cost estimate is based on the construction of a greenfield facility with an open pit mine and process plant facility having an initial nominal treatment capacity of 23 Mtpy ROM.

The design of the crusher area, the crushed ore stockpile area and the concentrator area has largely been based on BBA's experience gained from recent projects of a similar nature using proven technology and equipment. The site plan and General Arrangement drawings developed in this Study have been used to estimate quantities and generate Material Take-Offs (MTOs) for all commodities. Equipment costs have been estimated using budgetary proposals obtained from vendors for most process equipment. Labour rates have been estimated, as previously described in this Chapter. Related infrastructure has been estimated by BBA based on the site plan developed.

The following methodology was used to estimate the direct costs of the project:

- The East pit surface clearing and advanced stripping quantity of 2.5 M bank cubic meter (BCM) excavated during the pre-production period is included in the initial CAPEX;
- The West pit surface clearing and pre-stripping quantity of 16.7 M tonnes excavated during the pre-production period is included in the initial CAPEX;
- Backfill materials will be sourced from excavation materials, pit overburden and waste rock, gravel pits, esker or other sources located within a radius of 10 km of the construction site in order of priority;
- The capital cost of the Environmental management was developed by Groupe Conseil Roche.
- The capital cost of the tailings management facility was priced by BBA according to the rates and productivity evaluated and described in Chapter 22, based on quantities developed by Journeaux. It includes clearing and site preparation, geotextile, quarry materials and sill for the tailings and polishing ponds. Quarry material is assumed to be extracted from the East Pit area.
- The capital cost of the railway was developed by Rail Cantech for the route selected to connect Fire Lake North to the Pointe-Noire, as described in Chapter 18.
- Site Works – Earthwork quantities were estimated from drawings, LIDAR, topographical data and geotechnical information.
- Concrete – Preliminary design sketches were used to develop the concrete and embedded steel quantities. The concentrator location has been positioned based on geotechnical information obtained during the course of this Study.
- Architectural – Siding and roofing quantities were estimated from General Arrangement drawings.

- Mechanical and Process Equipment – A detailed equipment list was developed with equipment sizes, capacities, motor power, etc.
- Mechanical Bulk Quantities – A platework list was developed with sizing, weights and surface areas including lining requirements.
- Fire Protection and HVAC – MTOs were taken from layout and elevation drawings. An HVAC equipment list was developed.
- Piping – MTOs were taken from a project of similar size and adjusted according to the requirements of this Study. Lining requirements were also categorized. Lengths for each line have been determined from layouts.
- Electrical Equipment – An equipment list was developed with capacities and sizing from the single line diagrams developed in this Study.
- Electrical Bulk Quantities – MTOs were derived from cable schedules and runs, including cable trays routing layouts.
- Site electrical includes the main electrical substation, all infrastructure to connect to the local power grid, and distribution from the main substation to the various electrical rooms located throughout the site facilities. The cost of major electrical components identified on the single-line diagram was obtained from budgetary quotations requested during this study.
- Automation – A detailed instrumentation list was developed from the process flow diagrams developed in this Study.
- The pricing and unit costs used in this estimate were based on a combination of budgetary quotes and/or data obtained from similar projects.
- Concrete – Unit rates, including formwork and rebar, were estimated from similar projects overseen by BBA.
- Steelworks – Material priced from the current steel market value benchmarked with current projects. Labour costs are estimated from BBA's historical data.
- Architectural – Pricing based on BBA's references on recent data from similar projects.
- Plant Equipment – For process and mechanical equipment packages, equipment data sheets and summary specifications were prepared, and budget pricing was obtained from vendors. For packages with low monetary value, pricing was obtained from BBA's recent project data, when available.

- Piping – Material pricing for carbon steel and rubber-lined piping was based on BBA's references on recent data from similar projects.
- Electrical & Instrumentation Bulks – Pricing of bulks were based on BBA's references on recent data from similar projects.
- Electrical Equipment – For all major electrical equipment and components, datasheets were prepared and budget pricing obtained from vendors. For electrical equipment of lower value, BBA's historical data was used.

21.1.6 Indirect Costs

Indirect Costs was estimated jointly by BBA and Champion Minerals, as described below:

- The Owner's cost was estimated at 6% of the total direct costs and early works was based on BBA's reference data for projects of similar size and construction schedule. This cost covers the Owner's team's salaries and expenses, permitting, authorization certificates, insurance, geotechnical and survey costs, laboratory testwork, etc.

- Costs related to the construction of temporary facilities required during the project construction period include costs incurred for building and maintaining temporary facilities and accesses, which will no longer be required once construction is completed. These costs include the following, and are a combination of budgetary quotes obtained from vendors and/or data from BBA's database from similar projects:
    - A temporary construction camp complex for 800 workers;
    - Construction management complex complete with meeting rooms and offices to accommodate a staff of 50;
    - On-site distribution of temporary construction power;
    - Access roads to the temporary construction facilities;
    - Telecommunication tower and related equipment.

- Costs related to the operation of the aforementioned temporary construction facilities are included in Indirect Costs. An itemized list with budget allowances was developed by BBA;
- EPCM Services Costs were developed based on BBA's reference data for projects of similar magnitude and construction schedule;
- Cost of sub-consultants and other third parties were estimated based on projects of similar size;
- Costs for mobile equipment and vehicles used during construction were estimated based on projects of similar size;
- Cost of freight has been estimated at 5% of the cost of equipment applied in the absence of a quote. Cost of freight for special equipment was obtained from vendors and included herein;
- Costs of construction and commissioning spare parts were estimated as a proportion of equipment purchase costs at 4 % of the equipment value;
- Vendor representation during construction is estimated based on projects of similar magnitude.
- Indirect costs for the railroad portion and the environment were developed for the purpose of this study as an all-in factor by Rail Cantech and Roche, respectively

21.1.7 Contingency

The contingency for the project was determined on the basis of 10% of the total direct and indirect costs. The contingency provides an allowance to the Capital Cost Estimate for undeveloped details within the scope of work covered by the estimate. Contingency is not intended to take into account items such as labour disruptions, weather-related impediments, changes in the scope of the Project from what is defined in the Study, nor any price escalation or currency fluctuations.

21.2 Capital Costs

The detailed project capital cost estimate is presented in Table 21-10. The table includes the initial and sustaining capital required over the life of the mining operation, the FLN site, Pointe Noire, rehabilitation and closure costs, payments to Hydro-Québec and the railway financing strategy. These costs are used as the basis for the Financial Analysis of the Project.

The initial capital cost to develop the Project to an average annual production capacity of 9.3 Mtpy is estimated to be **$1394.4M**, not including **$213.4M** relating to the railway component.

Table 21-10: Life of Mine Capital Costs ($M)

YEAR	PP-2	PP-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
Mining																							
Pre-Stripping	4.8	40.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45.1
Mine Development	25.3	7.9	7.8	7.6	5.4	4.4	0.7	5.3	0.7	1.9	8.0	0.6	4.7	1.9	7.1	2.6	5.3	0.8	-	-	-	-	97.9
Mining Fleet (incl. replacement)	7.4	48.0	105.8	4.4	20.2	59.0	18.8	8.3	35.9	6.7	12.9	12.5	7.5	14.7	29.0	16.6	16.6	4.7	-	-	-	0.4	429.5
TOTAL MINING	**37.5**	**96.3**	**113.6**	**12.0**	**25.7**	**63.4**	**19.4**	**13.6**	**36.5**	**8.6**	**20.9**	**13.1**	**12.2**	**16.6**	**36.2**	**19.2**	**22.0**	**5.5**	**-**	**-**	**-**	**0.4**	**572.5**
Fire Lake North Site																							
Direct Costs																							
General Site Infrastructure	-	41.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41.7
Administration and Services	-	83.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	83.3
Mine Area Infrastructure	-	67.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67.0
Primary Crushing Area	-	45.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45.9
Crushed Ore Conveying and Stockpile	-	22.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22.8
Concentrator	-	342.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	442.0
Tailings Pond (TMF Dams and Water Management)	-	84.9	22.5	13.6	22.9	10.4	12.2	15.9	1535	6.9	4.6	4.9	4.9	5.1	5.1	6.3	5.4	5.4	6.5	5.4	5.4	5.4	269.3
Environmental Compensation	0.1	-	-	-	-	1.2	0.6	0.6	0.6	0.6	0.6	0.6	0.3	0.3	0.3	0.3	-	-	-	-	-	-	6.1
Indirect Costs																							
Owner's Costs	-	43.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43.7
Project Indirect Costs	-	208.1	3.4	2.0	3.4	1.7	1.9	2.5	2.4	7.1	8.3	2.3	0.8	0.8	0.8	1.0	0.8	0.8	1.0	0.8	0.8	0.8	251.6
Contingency	-	93.9	5.2	3.1	5.3	2.7	2.9	3.8	3.7	10.9	12.7	3.6	1.2	1.2	1.2	1.5	1.2	1.2	1.5	1.2	1.2	1.2	160.7
Total Concentrator and Site CAPEX	**0.1**	**1,033.3**	**31.0**	**18.8**	**31.7**	**16.0**	**17.7**	**22.7**	**22.2**	**65.6**	**76.2**	**21.3**	**7.1**	**7.5**	**7.5**	**9.1**	**7.5**	**7.5**	**9.0**	**7.5**	**7.5**	**7.5**	**1434.2**
Pointe Noire Site																							
Direct Costs																							
General	-	10.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.9
Car Dumper	-	33.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33.1
Stockpile	-	75.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75.4
Overland Conveyor	-	23.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23.9
Electrical	-	12.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.5
Other Miscellaneous	-	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.4
Indirect Costs																							
Owner's Costs	-	9.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.5
Project Indirect Costs	-	38.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38.9
Contingency	-	20.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20.7
Total Pointe Noire CAPEX	**-**	**227.3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**227.3**
TOTAL CAPEX	**37.6**	**1356.8**	**144.7**	**30.8**	**57.3**	**79.4**	**37.1**	**36.3**	**58.7**	**74.2**	**97.1**	**34.5**	**19.4**	**24.1**	**43.6**	**28.3**	**29.4**	**13.0**	**9.0**	**7.5**	**7.5**	**7.9**	**2234.1**
Rehabilitation and Closure Costs																							
Estimated Costs	-	-	-	-	-	0.4	1.1	1.8	2.6	3.3	4.1	4.8	5.6	6.3	7.0	7.8	-	-	-	-	-	31.1	75.8
TOTAL REHABILITATION AND CLOSURE	**-**	**-**	**-**	**-**	**-**	**0.4**	**1.1**	**1.8**	**2.6**	**3.3**	**4.1**	**4.8**	**5.6**	**6.3**	**7.0**	**7.8**	**-**	**-**	**-**	**-**	**-**	**31.1**	**75.8**
Hydro-Québec 315 kV Line Payments																							
Estimated Costs (net of credit)	-	-	20.0	20.0	80.0	97.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	217.5
TOTAL HYDRO-QUÉBEC	**-**	**-**	**20.0**	**20.0**	**80.0**	**97.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**217.5**
Other Capitalized Pre-Production Costs																							
Other Capitalized Pre-Production Costs (rolling stock leasing)	-	13.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.4
TOTAL OTHER CAPITALIZED PRE-PRODUCTION COSTS	**-**	**13.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**13.4**
Railway Financing Strategy																							
Internal Capital (Total Rail Cost $1 333 607 000)	-	200.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200.0
Bank Financing (25% or $333 401 750)	-	-	43.1	43.1	43.1	43.1	43.1	43.1	43.1	43.1	43.1	43.1	43.1	43.1	-	-	-	-	-	-	-	-	517.2
Railway Contractor Financing (60% or $800 164 200)	-	-	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	100.7	-	-	-	-	-	-	-	-	1209.0
TOTAL RAILWAY	**-**	**200.0**	**143.8**	**143.8**	**143.8**	**143.8**	**143.8**	**143.8**	**143.8**	**143.8**	**143.8**	**143.8**	**143.8**	**143.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1926.2**

21.2.1 Mining Capital Costs

Of the total capital costs, **$133.7M** is incurred as initial capital during the pre-production period. These costs were estimated by BBA, assuming that all operations are carried out by Champion Iron Mines' personnel (with the exception of Y-2). Mine pre-stripping, mine preparation and mine equipment fleet costs comprise the initial capital for the mine. All construction activities in Year -2 will be completed using a rented fleet of 40 t articulated trucks and other required equipment. Additional capital and operating cost allowances for auxiliary mine equipment and supervisory personnel salaries have also been included in the initial capital costs beginning in Year -2. Starting in Year -1, all material movement is planned to occur using the owner's fleet. All mining equipment is planned for purchase, therefore no leasing costs have been computed in the mine operating costs.

Sustaining capital costs consists of all mine equipment purchases and replacements that occur after the pre-production period. Fleet replacement has been estimated by BBA, based on the useful life of equipment, on vendor's recommendations, as well as local experience. Of the total capital costs, **$438.8M** is incurred as sustaining capital in all years following pre-production. Mine preparation makes up $64.7M of the sustaining cost over the life of mine (LOM), whereas mine equipment purchases and replacements make up $374.1M of the total sustaining capital.

21.2.2 Concentrator and Site Capital Costs

The concentrator and FLN site infrastructure initial capital costs are estimated to be **$1033.4M**. The direct costs consist of all disbursements related to the construction of the mine, concentrator and site infrastructure facilities required to begin operation, including initial environmental compensation costs and tailings management facility construction.

Over the course of the LOM, sustaining capital, estimated to be **$400.8M**, is required for activities related to assuring the continuity of operations and compliance with regulations. The sustaining capital related to the concentrator and site infrastructure includes:

- Phased construction of TMF dams based on the tailings management strategy developed by Journeaux and BBA;
- Environmental compensation for wetlands and fish habitats;
- Addition of a second AG mill and other related equipment for processing of East Pit material;
- On-going project indirect costs and contingency funds.

21.2.3 Port Capital Costs

The Capital Cost Estimate for the Pointe Noire Terminal facility was estimated by BBA to be **$227.3M**. This includes all Direct and Indirect Costs of this project component as well as a 10% contingency.

21.2.4 Rail Capital Costs

A feasibility study prepared by Rail Cantech concluded that the total capital cost for the construction of a new rail line connecting the FLN site to Pointe Noire is **$1333.6M**. The financing strategy adopted by Champion for the purpose of this PFS for the construction of the rail consists of internal capital (15%) and debt financing by banks (25%) as well as by railway contractors (60%). The payment schedule is as follows:

- Internal capital – single payment of $200.0M in PP-1;
- Bank financing – annual payments of $43.1M (production years 1 to12);
- Railway contractor financing – annual payments of $100.7M (production years 1 to 12).

The debt financed portion of the railway costs was included in the operating costs.
An additional **$13.4M** of initial capital is required for capitalized pre-production costs related to the leasing of rolling stock.

21.2.5 Rehabilitation and Closure Costs

Rehabilitation and closure costs of **$75.8M** were estimated by Journeaux Assoc. These payments are distributed over the LOM as dictated by the provincial government, and are considered net of salvage value.

21.2.6 Hydro-Québec

A total of **$217.5M** in payments to Hydro-Québec was estimated for the construction of a 315 kV line. These costs are paid net of credit (Years 1 to 4).

21.3 Operating Costs

The detailed operating cost estimate for the Project on an annual basis is presented in Table 21-11. Mining costs vary from year to year based on the mine plan. The mining pre-stripping costs are capitalized, and are therefore excluded from operating costs. The average operating cost over the life of the operation has been estimated at **$34.58** per tonne of concentrate produced (dry basis). This cost represents the cost of concentrate loaded into a shipping vessel at the Pointe Noire Terminal (i.e. FOB Port of Sept-Îles). This cost excludes any royalties and working capital, which are treated separately in the Financial Analysis presented in Chapter 22.

The operating costs calculated in Years -1 and -2 for both mining and rail transportation rolling stock were capitalized.

Table 21-11: Life of Mine Operating Costs ($M)

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
Mining																					
Equipment OPEX	23.9	32.3	39.9	45.8	57.4	62.9	64.0	72.6	73.2	68.0	67.3	74.5	72.3	71.8	75.4	78.7	81.3	60.2	40.3	17.8	1179.6
Equipment Fuel & Electricity	17.7	19.5	23.1	30.6	35.5	37.2	44.0	48.2	47.1	44.6	37.0	43.8	49.5	52.2	54.1	54.4	56.0	41.6	29.6	14.1	779.9
Blasting	16.1	19.2	20.6	26.3	32.2	27.9	35.6	35.7	30.8	35.4	35.8	37.1	37.6	38.8	39.4	37.0	34.9	25.0	14.9	7.4	587.5
Labour	29.3	31.6	33.7	40.8	44.5	45.4	48.9	50.1	49.9	49.4	48.5	50.2	51.7	52.2	52.7	52.7	52.7	43.9	35.4	19.0	882.3
Services & Misc.	0.4	0.4	2.4	0.8	1.1	1.4	0.4	1.4	0.8	0.4	0.4	1.5	0.6	0.9	0.4	0.4	0.4	0.4	0.4	0.3	15.3
TOTAL MINING ($M Annual)	**87.3**	**103.0**	**119.6**	**144.3**	**170.6**	**174.8**	**192.9**	**208.1**	**201.8**	**197.8**	**189.0**	**207.1**	**211.7**	**215.9**	**221.9**	**223.2**	**225.3**	**171.2**	**120.6**	**8.5**	**3444.6**
Total Mining ($/t concentrate)	***9.10***	***10.61***	***11.85***	***14.09***	***18.32***	***18.96***	***20.31***	***21.64***	***20.57***	***21.03***	***20.37***	***21.98***	***23.82***	***26.45***	***26.90***	***26.71***	***26.69***	***19.60***	***12.89***	***8.37***	***18.89***
Concentrator																					
Labour	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9.2	6.2	181.2
Maintenance & Consumables	6.2	7.0	8.2	8.6	8.2	8.6	8.2	8.6	8.2	10.6	10.6	11.2	10.74	11.2	10.74	11.2	10.1	8.6	8.2	6.7	181.5
Reagents	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.7	0.7	0.4	14.9
Fuel & Electricity	20.5	20.6	20.8	20.9	20.4	20.3	20.5	20.6	20.7	22.0	23.1	23.1	22.9	22.6	22.6	22.7	21.7	20.1	20.4	14.2	420.7
TOTAL CONCENTRATOR ($M Annual)	**36.6**	**37.4**	**38.8**	**39.4**	**38.4**	**38.9**	**38.5**	**39.1**	**38.7**	**42.6**	**43.8**	**44.4**	**43.7**	**44.0**	**43.4**	**44.0**	**41.9**	**38.7**	**38.5**	**27.5**	**798.3**
Total Concentrator ($/t concentrate)	***3.81***	***3.86***	***3.84***	***3.84***	***4.13***	***4.22***	***4.06***	***4.06***	***3.94***	***4.53***	***4.72***	***4.72***	***4.92***	***5.38***	***5.26***	***5.27***	***4.97***	***4.43***	***4.11***	***3.94***	***4.38***
General & Administration																					
Corporate Office Personnel	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	4.2	121.3
On-site Personnel	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.4	99.2
Site Maintenance	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	2.9	83.8
Fuel	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	0.9	25.6
Electricity	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	1.7	49.1
FIFO Travel	4.3	4.5	4.6	5.3	5.7	5.8	6.1	6.2	6.2	6.1	6.0	6.2	6.3	6.4	6.4	6.4	6.4	5.6	4.8	3.7	113.2
Permanent Camp	5.3	5.5	5.7	6.3	6.8	6.9	7.0	7.1	7.1	7.0	6.9	7.1	7.3	7.3	7.4	7.4	7.4	6.7	5.7	4.6	132.6
Corporate Allowance	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	3.9	113.3
TOTAL G&A ($M Annual)	**34.7**	**35.0**	**35.4**	**36.7**	**37.4**	**37.6**	**38.1**	**38.3**	**38.3**	**38.2**	**38.0**	**38.3**	**38.6**	**38.7**	**38.8**	**38.8**	**38.8**	**37.3**	**35.6**	**25.2**	**738.1**
Total G&A ($/t concentrate)	***3.61***	***3.61***	***3.50***	***3.58***	***4.02***	***4.08***	***4.01***	***3.99***	***3.90***	***4.06***	***4.09***	***4.07***	***4.35***	***4.75***	***4.71***	***4.65***	***4.60***	***4.28***	***3.80***	***3.61***	***4.05***
Environment																					
Labour	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.6	16.1
Environmental Monitoring	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	2.4
Allowance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	4.9
TOTAL ENVIRONMENT	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**1.2**	**23.4**
Total Environment ($/t concentrate)	***0.12***	***0.12***	***0.12***	***0.12***	***0.13***	***0.13***	***0.13***	***0.12***	***0.12***	***0.13***	***0.13***	***0.13***	***0.13***	***0.15***	***0.14***	***0.14***	***0.14***	***0.14***	***0.13***	***0.11***	***0.13***
Rail Transportation																					
Operations Labour	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.3	37.4
Locomotive Maintenance	2.1	2.2	2.2	2.3	2.1	2.0	2.1	2.1	2.2	2.1	2.1	2.1	2.0	1.8	1.8	1.9	1.9	1.9	2.1	1.6	40.5
Car Maintenance	4.1	4.1	4.3	4.4	4.0	3.9	4.1	4.1	4.2	4.0	4.0	4.0	3.8	3.5	3.5	3.6	3.6	3.7	4.0	3.0	78.0
Track Maintenance	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	8.9	259.7
Fuel	12.1	12.3	12.8	13.0	11.8	11.7	12.0	12.2	12.4	11.9	11.7	11.9	11.2	10.3	10.4	10.5	10.7	11.0	11.8	8.9	230.7
Allowance	5.8	5.8	6.2	6.1	5.6	5.5	5.7	5.8	5.9	5.6	5.6	5.7	5.3	4.9	5.0	5.0	5.1	5.2	5.6	4.2	109.4
Railcar Leasing (504 cars)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	-	-	-	-	-	-	-	-	-	-	-	64.6
Maintenance Equipment (Rolling stock)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	-	-	-	-	-	-	-	-	-	-	-	20.1
Locomotive Leasing (7 locomotives)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	-	-	-	-	-	-	-	-	-	-	-	35.9
TOTAL RAIL ($M Annual)	**52.6**	**52.9**	**53.9**	**54.3**	**51.9**	**51.7**	**52.4**	**52.7**	**53.2**	**38.7**	**38.4**	**38.8**	**37.4**	**35.6**	**35.8**	**36.1**	**36.3**	**37.1**	**38.6**	**27.9**	**876.3**
Total Rail ($/t concentrate)	***5.48***	***5.45***	***5.34***	***5.30***	***5.57***	***5.61***	***5.52***	***5.48***	***5.42***	***4.11***	***4.14***	***4.12***	***4.21***	***4.36***	***4.35***	***4.32***	***4.30***	***4.24***	***4.13***	***3.99***	***4.80***
Port and Pointe Noire Terminal Facilites																					
Site Maintenance	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.8	24.2
Equipment Maintenance	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.4	39.7
Pilot Launches & Tugs	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	2.4	70.8
Berthage	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.3	37.8
Labour	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.1	33.2
Power	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	1.6	45.1
Insurance	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.4	39.4
Shiploading Equipment Maintenance	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	9.0
Other Services	5.8	5.8	5.9	5.9	5.7	5.7	5.7	5.8	5.8	5.7	5.7	5.7	5.4	7.5	7.6	7.6	7.7	7.8	8.1	6.9	127.6
TOTAL PORT ($M Annual)	**20.9**	**21.0**	**21.1**	**21.1**	**20.9**	**20.9**	**20.9**	**21.0**	**21.0**	**20.9**	**20.9**	**20.9**	**20.6**	**22.7**	**22.8**	**22.8**	**22.8**	**23.0**	**23.3**	**17.3**	**426.7**
Total Port ($/t concentrate)	***2.18***	***2.16***	***2.09***	***2.06***	***2.24***	***2.26***	***2.20***	***2.18***	***2.14***	***2.22***	***2.25***	***2.22***	***2.32***	***2.78***	***2.76***	***2.73***	***2.71***	***2.63***	***2.49***	***2.48***	***2.34***
TOTAL ANNUAL COST ($M Annual)	**233.3**	**250.4**	**270.0**	**296.9**	**320.5**	**325.1**	**344.0**	**360.4**	**354.1**	**339.4**	**331.2**	**350.7**	**353.2**	**358.1**	**364.0**	**366.2**	**366.4**	**308.4**	**257.7**	**157.3**	**6307.3**
TOTAL OPEX ($/t concentrate)	***24.30***	***25.81***	***26.73***	***28.98***	***34.41***	***35.26***	***36.23***	***37.47***	***36.10***	***36.09***	***35.70***	***37.23***	***39.75***	***43.87***	***44.12***	***43.81***	***43.41***	***35.32***	***27.55***	***22.50***	***34.58***

21.3.1 Mine Operating Costs

Mine operating costs were calculated on a bi-annual basis for the pre-production period and for the first two (2) years of production and on an annual basis thereafter. However, these costs are represented annually in the Financial Analysis. The life of mine average mining costs are estimated at $2.01 per tonne mined. Mining operating costs averaged over the life of the operation have been estimated at **$18.89** per tonne of dry concentrate produced. The major mining operating cost elements are as follows:

21.3.2 Equipment Operating Costs

These costs consist mainly of two (2) equipment categories:

- Equipment maintenance costs;
- Equipment Energy (Fuel and Electricity) Costs.

The basis for the estimate of the equipment maintenance is composed of vendor information, benchmarking of similar operations and BBA's internal project database. Maintenance costs include the cost of repairs, spare parts and consumables, which are compiled on a maintenance cost per hour of operation basis for each equipment type. It should be noted that equipment maintenance costs exclude the cost of maintenance personnel, fuel and electricity, which are accounted for separately.

The equipment energy costs are calculated on a yearly basis for each type of equipment. For pieces of equipment that use diesel, such as the haul trucks, rope shovels, wheel loaders, dozers and other mine equipment, annual fuel consumptions are calculated based on hours of utilization. The unit fuel cost used is $1.00 per liter based on information available in BBA's database of similarly located projects.

The electrically-run pieces of equipment, such as the hydraulic electric shovels, drills and dewatering pumps operate from a power loop that supplies the open pit mine. The electricity cost is $0.045 per kWh, with a power factor of 75%.

21.3.3 Blasting

Blasting costs for ore and waste rock have been estimated based on parameters and powder factors presented in Chapter 16 of this Report. Blasting unit costs were estimated at $0.38 per tonne of ore and $0.33 per tonne of waste rock, based on an emulsion unit cost of $89.00 per 100 kg. Contractor labour costs for mixing, delivering explosives to the blast holes and loading explosives into the blast holes is covered under a separate contract. The accessories costs are included in the average estimated cost and are summarized in Table 21-12.

Table 21-12: Blasting Accessories Costs

Blasting Accessories	
Accessory	**Cost / Unit**
I-kon RX 20m ($/hole)	$41.55
Pentex D454	$11.04
Harness Wire ($/hole)	$1.46
Pentex D908	$6.24

21.3.4 Labour

Labour requirements have been estimated on a bi-annual basis for the pre-production period and the first two (2) years of production and on an annual basis thereafter to support the mine plan developed for this Study. Mine salaried and hourly personnel positions and headcounts are presented in Chapter 16 of this Report. Table 21-13 and Table 21-14 present the mine salaried and hourly personnel annual wages and salary, including fringe benefits for the various positions and functions. Base salaries for salaried personnel were provided to BBA by Champion Iron Mines, and are comparable to other operations in the region. Fringe benefits were estimated as being 40% of the base salary.

Table 21-13: Mine Salaried Staff

Mine Salaried Staff	Salary*
Operations	
Mine Superintendent	$224 000
Mine Assistant Superintendent	$169 082
Mine Shift Foreman	$139 500
Drill & Blast Foreman	$139 500
Dispatcher	$120 000
Trainer	$120 000
Production / Mine Clerk	$82 500
Secretary	$75 000
Maintenance	
Maintenance Superintendent	$224 000
Maintenance Assistant Superintendent	$169 082
Maintenance Planner	$105 000
Mechanical/Industrial Engineer	$124 000
Mine Maintenance Foreman	$145 035
Mechanical Foreman	$139 500
Electrical Foreman	$139 500
Maintenance Trainer	$120 000
Clerk	$82 500
Technical Services	
Superintendent of Technical Services	$200 000
Assistant Superintendent of Technical Services	$169 082
Senior Mine Planning Engineer (Long Term)	$139 500
Planning Engineer (Short Term)	$124 000
Pit Engineer	$131 750
Geotechnical Engineer	$124 000
Blasting Engineer	$124 000
Mining Engineering Technician	$105 000
Senior Geologist	$139 500
Geologist (Long Term)	$139 500
Geologist	$124 000
Grade Control Geologist	$124 000
Geology Technician	$105 000

*Note: Salaries include benefits of 40% and bonuses ranging from 10-20% where applicable.

Table 21-14: Hourly Personnel Salaries

Mine Hourly Staff	Salary*
Operations	
Shovel Operator	$127 293
Loader Operator	$127 293
Haul Truck Operator	$119 805
Drill Operator	$121 686
Dozer Operator	$119 805
Grader Operator	$119 805
Water Truck Operator/ Snow Plow/ Sanding	$119 805
Other Auxiliary Equipment	$98 526
Janitor	$95 322
Blaster	$117 925
Field Maintenance	
Field Gen. Mechanic	$136 697
Field Welder	$136 697
Field Electrician	$136 697
Shovel Mechanic	$136 697
Shop Maintenance	
Shop Electrician	$132 900
Shop Mechanic	$134 816
Mechanic Helper	$98 526
Welder-Machinist	$132 900
Lube/Service Truck	$98 526
Electronics Technician	$132 900
Tool Crib Attendant	$98 526
Janitor	$95 322

*Note: Salaries include 40% benefits and bonuses ranging from 10-20% where applicable.

21.3.5 Process Operating Costs

The process operating costs are shown as an average over the life of the mine. The LOM processing cost was calculated to be **$4.38** per tonne of concentrate produced. A cost breakdown by sector is presented in Table 21-15.

Table 21-15: Process Operating Costs

Cost Area	LOM Cost per Tonne Concentrate ($/t)
Labour	$0.99/t
Maintenance & Spares	$1.00/t
Flocculant and coagulant	$0.08/t
Electricity	$1.47/t
Fuel	$0.84/t
TOTAL	**$4.38/t**

The costs included in the processing expenses include manpower requirements, mechanical equipment maintenance and spares, flocculant and coagulant, electricity and fuel consumption. The main process consumables for the concentrator include the mill and crusher liners as well as the screen and pan filter components. The prices of the consumables were taken from vendor's quotes, while the replacement frequencies were determined based on information available from similar operations and based on the vendors' operational experience. Maintenance costs were factored at 4% of the total mechanical equipment cost, and include mobile equipment required for material manipulation within the tailings impoundment facility. An electricity cost of $0.045/kWh (based on Hydro-Québec's tariff-L) was used for the site and power consumption. Discussions between Champion, Hydro-Québec and the MRN are on-going; however, a tentative agreement for the supply of electrical power at the reduced rate is in place. Diesel fuel requirements were calculated for steam production needed for concentrate drying in the winter months, concentrator and crusher heating, as well as for the heating of the quantity of required ventilation for a minimum of four (4) air changes per hour, as specified by health and safety regulations. A price of $1.00/litre was used for all diesel fuel consumption and the related cost was calculated using an efficiency factor of 80%.

A personnel list was compiled and reviewed with Champion. Salaries were provided by Champion and included 40% fringe benefits and bonuses ranging from 10-20% of base wages for salaried personnel. The total concentrator workforce includes 77 employees (19 staff and 58 hourly) and includes requirements for rotations. A detailed list of employees and their salaries is presented in Table 21-16. An allowance for contractors was also included in the operating costs for crusher and grinding mill liner changes.

Table 21-16: Concentrator Personnel List and Salaries

Salaried Personnel	No. of Employees	Salary* ($)
Mill Superintendent	1	$224 000
Assistant Superintendent	1	$169 081
Shift Foreman	4	$139 500
Trainer	2	$120 000
Chief Metallurgist	1	$181 706
Plant Metallurgist	1	$141 418
Laboratory Supervisor	1	$139 500
Chief Chemist	1	$163 797
Mechanical Foreman	1	$139 500
Electrical Foreman	1	$139 500
Maintenance Planner (Mech.)	1	$105 000
Maintenance Planner (Elec.)	1	$105 000
Maintenance Supervisor	1	$139 500
Maintenance Supervisor	1	$139 500
Tailings Manager	1	$139 500
Hourly Personnel		
Crushing Operator	4	$127 293
Grinding Operator	4	$114 198
Spiral Operator	4	$114 198
Boiler Room Operator	4	$117 925
Filtration Operator	4	$117 925
Loadout Area Operator	4	$117 925
General Labour	4	$98 526
Tailings Pond Operator	4	$105 143
Concentrator Sampler/Sample Prep.	4	$105 143
Laboratory Analyst/Technician	4	$97 500
Technician	4	$97 500
Mechanic	3	$136 697
Pipefitter	3	$136 697
Welder	2	$136 697
Electrician	2	$136 697
Instrumentation Technician	2	$136 697
Maintenance General Labour	2	$98 526
TOTAL	**77**	**$9 415 513**

*Note: The salaries presented include benefits of 40% and bonuses ranging from 10-20% where applicable. The total is calculated for all employees, whereas the line totals are presented per employee.

21.3.6 General & Administrative Costs

The general and administrative (G&A) costs were calculated while taking into consideration the corporate head office expenses, site administrative and service staff costs, the permanent camp operation and FIFO costs, site and infrastructure maintenance costs, administrative, management and health and safety expenses, laboratory expenses, as well as the site electrical power and fuel consumption costs. The average LOM general and administrative costs were calculated to be **$4.05** per tonne of concentrate.

Table 21-17 shows a breakdown of the G&A costs.

Table 21-17: General and Administrative Costs

Cost Area	LOM Cost per Tonne Concentrate ($/t)
Labour (Corporate)	$0.67/t
Labour (On-site)	$0.54/t
Site Maintenance and Administrative Costs	$0.46/t
Site Utilities (fuel and electricity)	$0.41/t
FIFO and Permanent Camp	$1.35/t
Corporate Allowance	$0.62/t
TOTAL	**$4.05/t**

The personnel and salaries for the corporate head office, as well as the on-site staff, were provided by Champion, along with the head office expenses. Additional corporate office allowances were included to account for insurance, external consultants, legal fees, mining fees, audits and recruiting. Table 21-18 shows a detailed G&A personnel list including the site Human Resources team, services and environmental personnel.

Table 21-18: General and Administrative Personnel

Site Management	No. of Employees	Salary*
General Site Manager	1	$370 000
Human Resources		
Superintendent - Human Resources	1	$200 000
Assistant Superintendent - Human Resources	1	$169 081
HR Coordinator	1	$159 672
HR Advisor	1	$142 393
HR Technician	1	$97 500
HR Clerk	1	$98 697
Health & Safety Coordinator	1	$159 672
Health & Safety Agent	2	$97 500
Health & Safety Technician	1	$98 697
Nurse	2	$126 348
Training Coordinator	1	$159 672
Trainer	1	$97 500
Training Clerk	1	$98 697
Asset Protection Supervisor	1	$159 672
Security Guards	4	$95 322
Services		
Superintendent - Services	1	$200 000
Assistant Superintendent - Services	1	$169 081
Rail Supervisor	1	$139 500
Logistics Coordinator (Transport)	1	$139 500
General Manager - Camp	1	$163 797
Camp Supervisor	1	$139 500
Kitchen Supervisor	1	$139 500
IT Coordinator	1	$139 500
IT Technician	4	$109 082
Warehouse Supervisor	1	$139 500
Warehouse Clerk	2	$98 697
Mobile Equipment Operator	2	$98 526
TOTAL	**38**	**$5 040 887**

* Note: The salaries presented include benefits of 40% and bonuses ranging from 10-20% where applicable. The total is calculated for all employees, whereas the line totals are presented per employee.

Additional staff, consisting of executive management and support staff, is located at the corporate head office. The salary for these 26 employees totals $6 507 250, which includes benefits, bonuses and stock options.

The site maintenance and administrative costs also include infrastructure and road maintenance, laboratory, health and safety expenses, as well as information technology (IT) and telecommunication costs.

The fly-in fly-out and permanent camp costs were calculated based on a 14-day work schedule. The travel costs include both chartered flights and buses to bring employees to the site, while the permanent camp includes all food, lodging and security costs.

The utilities include the electrical power required for water treatment (including fresh, fire, potable and sewage water), as well as allowances for the operation of the mine garage, truck shop and permanent camp.

21.3.7 Environmental Operating Costs

A LOM cost of **$0.13** per tonne of concentrate was calculated for environmental operating costs. The expenses take into consideration a staff of six (6) persons assembled by Champion (see Table 21-19) and operating expenses that include water and biological monitoring, geotechnical investigation of the tailings dams and reporting. These costs were provided by Roche. An additional allowance was allotted for miscellaneous expenses related to environmental monitoring.

Table 21-19: Environment Personnel and Salaries

Environment Personnel	No. of Employees	Salary
Superintendent – Environment	1	$200 000
Assistant Superintendent – Environment	1	$169 081
Water Treatment Technician	4	$112 500
TOTAL	**6**	**$819 081**

* Note: The salaries presented include benefits of 40% and bonuses ranging from 10-20% where applicable. The total is calculated for all employees, whereas the line totals are presented per employee.

21.3.8 Rail Operating Costs

The rail operating costs were calculated by Rail Cantech Inc. as part of the Feasibility Study that was completed in August 2012, which studied concentrate transportation from the Fire Lake North site to Pointe Noire. The expenses include fixed costs for the operating team and track maintenance, and variable costs for fuel, locomotive and railcar maintenance, as well as an allowance for miscellaneous costs (insurance, etc.). Although the study was based on the transportation of 20 Mt of concentrate per year, the costs were factored in for actual projected production rates averaging 9.3 Mtpy. The factored-in costs were subsequently validated by Rail Cantech. The LOM average cost for rail transportation was calculated at $4.14/t. Additional expenses related to rolling stock leasing and maintenance equipment bring the total railway operating cost to a life of mine average of **$4.80/t**.

21.3.9 Port Operating Costs

A cost of **$2.34** per tonne of concentrate was calculated for the operation of Champion's stockyard at Pointe Noire, including insurance, equipment and site maintenance, labour, electrical power consumption, berthage fees as well as costs associated with pilot launches and tugs. Also included are operating costs paid to the Port of Sept-Iles for maintenance of the ship loading equipment as well as fees per tonne of concentrate shipped, which were previously negotiated between Champion and the Port.

22. ECONOMIC ANALYSIS

The economic evaluation of the Champion Fire Lake North Iron Ore Project was performed using a discounted cash flow model on both a pre-tax and after tax basis. The Capital and Operating Cost Estimates presented in Chapter 21 of this Report were based on the mining, processing, transportation and ship loading plan developed in this Study to produce and handle an average of 9.3 Mt (19.6 years) of concentrate annually over the life-of-mine (LOM) at a grade of 66% Fe_T. The Financial Analysis for this Study was performed based on 100% equity financing for all the project infrastructure, with the exception of the railway component, which was assumed to be built, owned and operated by Champion based on the total estimated Capital Cost of $1333.6 M, which would be financed by 15% equity financing and 85% debt financing, according to terms described later in this chapter. Further details are described in Chapter 19 of this Report. The pre-tax Financial Analysis was performed by BBA based on the following financial metrics:

The Internal Rate of Return (IRR).

The Net Present Value (NPV) was calculated for discounting rates between 0% and 10%, resulting from the net cash flow generated by the Project. The Project Base Case NPV was calculated based on a discounting rate of 8%.

The Project Payback Period.

Furthermore, a sensitivity analysis was also performed for the pre-tax Base Case to assess the impact of a +/-20% variation of the Project's initial capital disbursement (capital disbursed before Year 1 of production), annual operating costs and the price of iron ore concentrate.

The Financial Analysis was performed with the following assumptions and basis:

- The Project Execution Schedule developed in this Study;
- The Financial Analysis was performed for the entire LOM for the Mineral Reserve estimated in this Study. Operations are estimated to span over a period of approximately 20 years;

- The price of concentrate loaded on board of ships (FOB) at Port of Sept-Îles used in this Financial Analysis is **$115/t** for the first five (5) years of production and **$110/t** thereafter. This commodity price was derived from a forecasted medium and long-term Platts Index price, as discussed in Chapter 19 of this Report and adjusted to account for the following factors:
  - A premium was applied as described in Chapter 19 of this Report to account for the Fire Lake North concentrate grade of 66.0% Fe_T;
  - Shipping costs from the Port of Sept-Îles to the Chinese port are assumed to be in the order of $20/t of dry concentrate, as estimated by BBA, based on limited publicly available data.
- Commercial production start-up is scheduled to begin in late Q2-2016 at full capacity. All of the concentrate is sold in the same year of production;
- All cost and sales estimates are in constant Q4-2012 dollars (no escalation or inflation factor has been taken into account);
- The Financial Analysis take into consideration $19.3 M in working capital, which is required to meet expenses after the operations startup and before the revenue becomes available. This is equivalent to approximately 30 days of Year 1 operating expenses;
- All project related costs and disbursements incurred prior to the effective date of this Report are considered as sunk costs, and are not considered in this Financial Analysis;
- A 2.5% royalty is payable based on gross sales revenue less off-site operating costs (costs related to rail transportation, port terminal and ship loading costs);
- The railway component capital cost, estimated by Rail Cantech to be in the order of $1333.6 M, is assumed to be, in part, financed by debt. The payment schedule for the principal and interest was provided by Champion based on their discussions with potential lenders. This amount does not include the capital cost of rolling equipment, which is assumed to be leased and is included within the operating costs, except for pre-production Year 1 or PP-1 ($13.4 M);
- A payment schedule (net of applicable credits) for the Hydro-Québec 315 kV line construction was estimated based on preliminary discussions with Hydro-Québec;
- The US dollar is considered to be at par with the Canadian dollar.

This Financial Analysis was performed by BBA on a pre-tax basis. Champion Management, assisted by their external tax consultants, provided the after-tax economic evaluation of the Project. Table 22-1 presents the undiscounted cash flow projection for the Project. BBA assumed that the initial capital cost disbursement (excluding the railway component, which is treated separately) is distributed 40%-50%-10% in Years PP-2, PP-1 and Year 1, respectively.

Table 22-1: Fire Lake North Project Table of Undiscounted Cash Flow

Champion Fire Lake North Project - Undiscounted Cash Flow (M$ CAD) All $ in $CAD(1$ CAD = 1$ US)																							
Year	**PP-2**	**PP-1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**TOTAL**
Concentrate Production (Mt)			**9.60**	**9.70**	**10.10**	**10.25**	**9.31**	**9.22**	**9.49**	**9.62**	**9.81**	**9.40**	**9.28**	**9.42**	**8.89**	**8.16**	**8.25**	**8.36**	**8.44**	**8.73**	**9.36**	**6.99**	**182.4**
Concentrate Selling Price ($/t)			**$115.00**	**$115.00**	**$115.00**	**$115.00**	**$115.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$110.00**	**$111.34**
Gross Revenue from Sales (M$)			**$1104.1**	**$1115.8**	**$1161.6**	**$1178.3**	**$1071.1**	**$1014.1**	**$1044.4**	**$1058.0**	**$1078.9**	**$1034.4**	**$1020.5**	**$1036.2**	**$977.5**	**$898.0**	**$907.5**	**$919.5**	**$928.4**	**$960.5**	**$1029.2**	**$769.0**	**$20 306.9**
OPERATING EXPENSES																							
Mining			$87.3	$103.0	$119.6	$144.3	$170.6	$174.8	$192.9	$208.1	$201.8	$197.8	$189.0	$207.1	$211.7	$215.9	$221.9	$223.2	$225.3	$171.2	$120.6	$58.5	**$3444.6**
Concentrator			$36.6	$37.4	$38.8	$39.4	$38.4	$38.9	$38.5	$39.1	$38.7	$42.6	$43.8	$44.4	$43.7	$44.0	$43.4	$44.0	$41.9	$38.7	$38.5	$27.5	**$798.3**
General and Administration			$34.7	$35.0	$35.4	$36.7	$37.4	$37.6	$38.1	$38.3	$38.3	$38.2	$38.0	$38.3	$38.6	$38.7	$38.8	$38.8	$38.8	$37.3	$35.6	$25.2	**$738.1**
Environment			$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$1.19	$0.80	**$23.4**
Rail Transportation			$52.6	$52.9	$53.9	$54.3	$51.9	$51.7	$52.4	$52.7	$53.2	$38.7	$38.4	$38.8	$37.4	$35.6	$35.8	$36.1	$36.3	$37.1	$38.6	$27.9	**$876.3**
Port and Pointe-Noire Terminal Facilities			$20.9	$21.0	$21.1	$21.1	$20.9	$20.9	$20.9	$21.0	$21.0	$20.9	$20.9	$20.9	$20.6	$22.7	$22.8	$22.8	$22.8	$23.0	$23.3	$17.3	**$426.7**
TOTAL OPERATING EXPENSES			**$233.3**	**$250.4**	**$270.0**	**$296.9**	**$320.5**	**$325.1**	**$344.0**	**$360.4**	**$354.1**	**$339.4**	**$331.2**	**$350.7**	**$353.2**	**$358.1**	**$364.0**	**$366.2**	**$366.4**	**$308.4**	**$257.7**	**$157.3**	**$6307**
Royalties			$25.8	$26.0	$27.2	$27.6	$25.0	$23.5	$24.3	$24.6	$25.1	$24.4	$24.0	$24.4	$23.0	$21.0	$21.2	$21.5	$21.7	$22.5	$24.2	$18.1	**$475.1**
CAPITAL COSTS																							
Mining (Including Pre-Stripping)	$37.5	$96.3	$113.6	$12.0	$25.7	$63.4	$19.4	$13.6	$36.5	$8.6	$20.9	$13.1	$12.2	$16.6	$36.2	$19.2	$22.0	$5.5	$0.0	$0.0	$0.0	$0.4	**$572.5**
Concentrator and Fire Lake North Site Infrastructure	$0.1	$1033.3	$31.0	$18.8	$31.7	$16.0	$17.7	$22.7	$22.2	$65.6	$76.2	$21.3	$7.1	$7.5	$7.5	$9.1	$7.5	$7.5	$9.0	$7.5	$7.5	$7.5	**$1434.2**
Pointe-Noire Terminal Facility		$227.3	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	**$227.3**
TOTAL CAPITAL COSTS	**$37.6**	**$1356.8**	**$144.7**	**$30.8**	**$57.3**	**$79.4**	**$37.1**	**$36.3**	**$58.7**	**$74.2**	**$97.1**	**$34.5**	**$19.4**	**$24.1**	**$43.6**	**$28.3**	**$29.4**	**$13.0**	**$9.0**	**$7.5**	**$7.5**	**$7.9**	**$2234**
Closure Costs		$0.0	$0.0	$0.0	$0.0	$0.4	$1.1	$1.8	$2.6	$3.3	$4.1	$4.8	$5.6	$6.3	$7.0	$7.8	$0.0	$0.0	$0.0	$0.0	$0.0	$31.1	**$75.8**
Hydro Québec 315 kV Line Payments		$0.0	$20.0	$20.0	$80.0	$97.5	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	**$217.5**
Other Capitalized Pre-Production Costs		$13.4																					**$13.4**
RAILWAY FINANCING																							
Total Rail Cost from Cantech is $1333 607 000 (Internal Capital)		$200.0																					**$200.0**
Bank Financing (25% or $333 401 750)			$43.1	$43.1	$43.1	$43.1	$43.1	$43.1	$43.1	$43.1	$43.1	$43.1	$43.1	$43.1									**$517.2**
Railway Contractor Financing (60% or $800 164 200)			$100.7	$100.7	$100.7	$100.7	$100.7	$100.7	$100.7	$100.7	$100.7	$100.7	$100.7	$100.7									**$1209.0**
TOTAL RAILWAY		**$200.0**	**$143.8**	**$143.8**	**$143.8**	**$143.8**	**$143.8**	**$143.8**	**$143.8**	**$143.8**	**$143.8**	**$143.8**	**$143.8**	**$143.8**									**$1926.2**
CASH FLOW (UNDISCOUNTED)																							
Total Operating Expenses + Royalties (M$)	$		$259.1	$276.5	$297.1	$324.5	$345.4	$348.6	$368.2	$385.0	$379.2	$363.7	$355.2	$375.1	$76.2	$379.1	$385.2	$387.7	$388.1	$330.9	$281.9	$175.4	$6782.4
Capex Disbursement Estimate incl. Rehab (M$)	$580.3	$891.9	$444.2	$194.6	$281.2	$321.1	$182.1	$182.0	$205.2	$221.4	$245.0	$183.1	$168.7	$174.2	$50.6	$36.1	$29.4	$13.0	$9.0	$7.5	$7.5	$39.0	$4467.0
Working Capital			$19.3																				$19.3
Annual Cash Flow ('000$)	**-$580.3**	**-$891.9**	**$381.5**	**$644.7**	**$583.3**	**$532.7**	**$543.6**	**$483.5**	**$471.0**	**$451.7**	**$454.7**	**$487.5**	**$496.5**	**$486.9**	**$550.7**	**$482.8**	**$492.9**	**$518.8**	**$531.3**	**$622.1**	**$739.8**	**$554.6**	**$9038.2**
Cumulative Cash Flow ('000$)	**-$580.3**	**-$1472.2**	**-$1090.7**	**-$446.0**	**$137.2**	**$670.0**	**$1213.5**	**$1697.0**	**$2168.0**	**$2619.6**	**$3074.3**	**$3561.9**	**$4058.4**	**$4545.3**	**$5096.0**	**$5578.8**	**$6071.7**	**$6590.5**	**$7121.8**	**$7743.9**	**$8483.6**	**$9038.2**	

A discount rate is applied to the cash flow to derive the NPV of each discount rate. The payback period is calculated for each discount rate. The NPV calculation was done at 0%, 5%, 8% and 10%. The Base Case NPV was assumed to be at a discount rate of 8% following discussions with Champion. Table 22-2 presents the results of the pre-tax Financial Analysis for the Project, based on the assumptions and cash flow projections previously presented.

Table 22-2: Pre-Tax Financial Analysis Results

IRR = 30.9%	NPV (M$)	Payback (Yrs)
Discount Rate		
0%	$9038M	2.8
5%	$4736M	3.1
8%	**$3295M**	**3.4**
10%	$2602M	3.6

As can be seen, the Project is forecasted to provide a before-tax IRR of 30.9%. At the Base Case discount rate of 8%, NPV is $3295 M and the Payback period is 3.4 years after the start of production.

22.1 Taxation

Federal Income Taxes

Income tax is payable to the Federal Government of Canada pursuant to the Income Tax Act (Canada). The statutory federal income tax rate is 15% of taxable income.

In computing taxable income from a business for Canadian income tax purposes, a taxpayer is permitted to deduct various amounts with respect to expenditures made in the course of the business.

Expenditures incurred for depreciable property, including buildings, structures and machinery and equipment used in mining operations, will be added to either Class 41(a) or 41(b), depending on whether or not the mine is in production. The taxpayer will be entitled to claim a discretionary “capital cost allowance” deduction from income up to a maximum of 100% or 25% of the pool, depending on whether the asset is included in Class 41(a) or 41(b).

Expenditures incurred to find and assess the quality of the mineral resources and expenses incurred to bring the mine into production are included in the taxpayer's "Cumulative Canadian Exploration Expense Pool". The taxpayer is entitled to claim a deduction of up to 100% of the year-end pool balance in computing his net income for tax purposes.

The cost of acquiring an interest in a mining property in Canada and costs of expanding a mine that has come into commercial production are included in the taxpayer's "Cumulative Canadian Development Expense Pool". The taxpayer can claim up to a maximum of 30% of the year-end pool balance in computing his net income for tax purposes in a year.

Any mining taxes paid in the year are deductible in computing a taxpayer's net income for tax purposes for that year.

Provincial Income Taxes

Income tax is also payable to Revenue Québec under the *Québec Taxation Act*. The statutory provincial income tax rate in Québec is 11.9% of taxable income. Taxable income for Québec income tax purposes is computed in a similar manner as it is for federal income tax purposes, and any mining taxes paid in the year are deductible in computing a taxpayer's net income for tax purposes for that year.

Mining Taxes

The *Mining Tax Act* (**MTA**) imposes the following tax on operators of mines in Québec.

For purposes of the MTA, "annual profit" is determined by subtracting from gross revenue the operating expenses and allowances directly related to the mine, including exploration and development expenses. Exploration expenses incurred to determine the existence of a mineral substance in Québec, or to determine its extent or quality, are deductible at a rate of 100%, up to a maximum of 10% of annual profit if the operator is in production. To the extent that the mine is located in the mid-North or the North of Québec, this deduction is increased to 125%. Additionally, operators can claim a deduction of up to 100% for expenses incurred to bring a new mine into production before commercial production commences; expenses incurred once the mine is in commercial production are deductible at a rate of 30%.

Operators can also claim allowances for depreciation and processing. The depreciation allowance permits operators to depreciate assets at a rate of 30% per annum. The processing allowance permits the taxpayer to deduct 7% of the cost of processing assets located in Québec, up to a maximum of 55% of annual profit before the processing allowance and the northern mine allowance.

An additional allowance of $2M is available to mining corporations for mines located in the mid-North of Québec (between 50° 30' N and 55°N latitude); the allowance is increased to $5M for those located in the North (above 55°N latitude).

The MTA specifically disallows the deduction for the cost of acquiring a mineral property and financing costs and royalties paid or payable in the computation of “annual profit”. Actual reclamation costs are deductible when incurred.

An operator can claim a refundable tax credit for losses incurred in mining operations, equal to 16% of the lesser of:

- Adjusted annual loss;
- The total of (i) pre-production mineral deposit evaluation and mine development expenses deducted for the year and (ii) 50% of exploration expenses incurred.

The refundable tax credit is not taxable for Federal and Québec income tax and Québec mining tax purposes.

The after-tax project financial performance is presented in Table 22-3 and is based on a number of assumptions, including the following:

- The Project is held 100% by a corporate entity and the after-tax analysis does not attempt to reflect any future changes in corporate structure or property ownership;
- The Project will be financed partially through debt financing (i.e., the Railroad Financing Strategy). The interest related thereto is not deductible for mining tax purposes, and has therefore been added back into the computation of Québec's mining taxes payable;
- The provincial allocation of taxable income will be 100% to Québec;
- The royalties, representing 2.5% of sales, less off-site costs, are treated as royalties subject to deduction for provincial mining tax purposes;
- The first year of production is 2016;
- Rehabilitation and closure costs will be incurred in Production Year 20;
- Actual taxes payable will be affected by corporate activities and current and future tax benefits have not been considered;
- All project-related payments, disbursements and irrevocable letters of credit incurred prior to the effective date of the analysis, and the tax attributes related thereto, are not considered in the tax analysis. Disbursements projected for after the effective date of this Report, but before the start of construction, are considered to take place in pre-production Year 2 (PP-2). However, it is expected that certain disbursements will be incurred prior to this year;
- Owner's costs are assumed to be allocated as follows:
  - 50% allocation to Owner's team salaries and expenses
  - 25% for various compensations
  - 25% sundry items (e.g., permits, insurance).
- No foreign exchange fluctuations have been considered.

Table 22-3: After Tax Financial Analysis Results

IRR = 25.3%	NPV (M$)	Payback (yrs)
Discount Rate		
0%	$5393M	2.9
5%	$2871M	3.3
8%	**$1954M**	**3.6**
10%	$1510M	3.8

As can be seen, on an after tax basis, the Project is forecasted to provide an IRR of 25.3%. At the Base Case discount rate of 8%, the NPV is $1954M and the payback period is 3.8 years after the start of production.

22.2 Sensitivity Analysis

The sensitivity of NPV and IRR was done for the pre-tax Base Case discounted at 8% on parameters that are deemed to have the biggest impact on project financial performance. Results are presented in Table 22-4, as well as in Figure 22-1 and Figure 22-2.

- Estimated initial capital costs +/-20;
- Assumed commodity selling price +/-20%;
- Estimated operating costs +/-20%.

It should be noted that the sensitivity analysis on capital costs was performed only on the initial capital (sustaining capital was kept constant at Base Case values). For the railway, the sensitivity factors were applied to the full capital cost of the railway, and only the initial capital (i.e. the portion of the capital cost that is financed with internal capital) was varied with each sensitivity factor. It was assumed that the debt-financed portion and principal and interest payments remained the same as in the Base Case.

The sensitivity analysis demonstrates that NPV is most sensitive to variations of the selling price of iron concentrate. Capital and operating cost variations have a similar impact on NPV. On the other hand, IRR is least sensitive to operating costs, followed by capital costs and selling price.

Table 22-4: Sensitivity Analysis Table (Before Tax)

Champion Fire Lake North Sensitivity Analysis (Pre-Tax)									
Sensitivity Factor	CAPEX			SELLING PRICE			OPEX		
	Initial Capital*	NPV at 8% Disc.	IRR	Yr 1-5/ Yr 6-20	NPV at 8% Disc.	IRR	Avg. LOM Opex	NPV at 8% Disc.	IRR
0.8	$1048.9M	$3807M	44.6%	$92/$88	$1435M	18.5%	$27.22	$3857M	33.9%
0.9	$1321.7M	$3551M	36.6%	$103.5/$99	$2365M	24.8%	$31.19	$3576M	32.4%
1.0	$1594.5M**	$3295M	30.9%	$115/$110	$3295M	30.9%	$34.66	$3295M	30.9%
1.1	$1867.3M	$3039M	26.6%	$126.5/$121	$4224M	36.7%	$38.12	$3014M	29.3%
1.2	$2140.1M	$2783M	23.2%	$138/$132	$5154M	42.2%	$41.59	$2732M	27.6%

* Sensitivity for railway CAPEX is done on total capital cost (including financed portion) and sensitivity factor is applied to initial capital, i.e., financed amounts are kept constant at all sensitivity factors.

** This amount excludes the financed portion of railway capital cost amounting to $1133.6M. Total project initial capital estimate is $2728M, of which $1133.6M is financed (railway financing). This estimate excludes costs associated with the leasing of rolling stock.

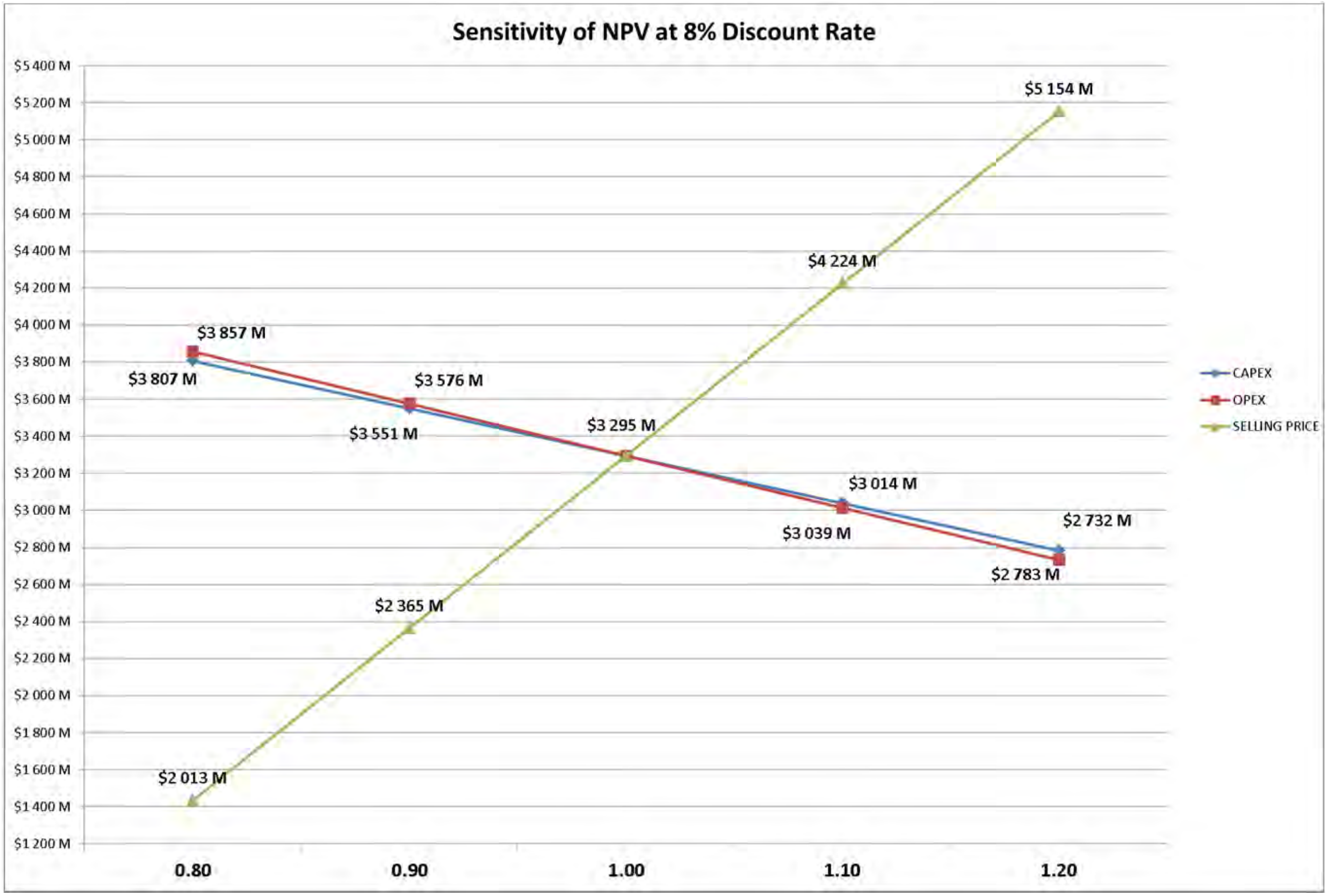


Figure 22-1: Sensitivity Analysis Graph for NPV

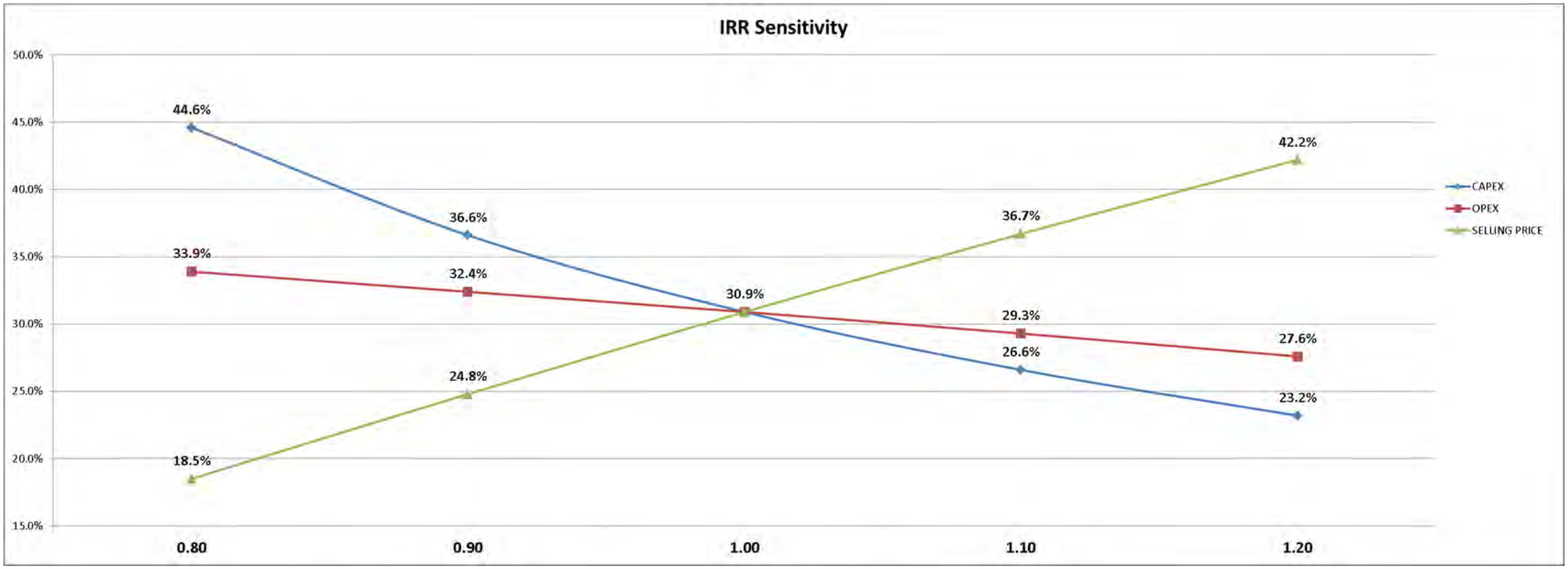


Figure 22-2: Sensitivity Analysis Graph for IRR

22.3 Risk Analysis and Management

Risk management is a continuous and iterative process that is performed to identify, assess and prioritize risks to ultimately minimize the potential threats or to realize opportunities, which can impact a Project. As part of the Preliminary Feasibility Study, a risk identification process was initiated to examine the various project elements to identify and document any associated potential risk.

Therefore, the purpose of this section is to identify the potential risks and opportunities that may impact of the capital expenditure, project schedule and operation costs relating to the following domains of interest:

- Aboriginal;
- Commercial;
- Environmental;
- Stakeholders;
- Governmental and Political;
- Mining;
- Strategic;
- Technical.

The identification process resulted in establishing major risks and opportunities for the Champion Project, railway construction and Sept-îles Port facility infrastructure. The mitigation of these risks will be implemented in the next phase of the Project.

The items that represent high-risks for the overall general status of the Project are those that have a direct impact on the construction schedule such as are the timely reception of environmental permits, EA approvals and MOU agreements with First Nations. Moreover, other risks that could potentially affect the Project schedule are the timely reception of the Project financing and agreement delays with various stakeholders.

Specific risks have been identified surrounding the railway construction between the FLN and Pointe-Noire sites. The most prominent one is the completion of the geotechnical campaign for the railway. The geotechnical study is along the critical path of the Project since it is required in order to start the detailed engineering of the railway. CN announced suspension of its feasibility study for the railway in February 2013. CN will make a final decision in June 2013 pertaining to the resumption or abandonment of the project. This uncertainty risks delays in the schedule.

The risks that are specific to the Pointe-Noire stockyard are the interaction between multiple stakeholders, the space constraints in proximity to the Port infrastructures and the development of an efficient Multi-User ship-loading facility. The interaction and input between the stakeholders can result in potential conflict of interests and schedule delays. The final location of the Champion stockyard on the Pointe-Noire site has not been established and discussions are still underway amongst the various stakeholders. Construction of the Multi-User ship-loading facility is underway at the Port of Sept-Îles and the concentrate transportation management plan remains to be established to ensure an efficient utilization of infrastructures.

All the identified risks will be carried through to the next phase of the Project and shall be updated based on the status of the Feasibility Study. The next step of the risk analysis process will be to hold a risk workshop to further identify potential issues and risks. The outcome of the workshop will be a risk register that will identify and quantify risk element and assess their severity as well as identify all possible opportunities. The risk register will help implement a risk mitigation plan to monitor, reduce and avoid potential risks. Successful mitigation of the evaluated risk can result in a cost and schedule savings with a positive impact on the Project.

23. ADJACENT PROPERTIES

Champion's CFLN Property is located immediately adjacent to and north of ArcelorMittal's property, that includes the Fire Lake Mine.

The open pit mine at Fire Lake, located 55 km south of the Mont-Wright Mining Complex, is an additional deposit now worked because of the high demand for iron ore products. The mine operates solely between May and October, when the ground thaws.

The Fire Lake mine site has neither a crusher nor a concentrator, though the extraction sequence is the same as at Mont-Wright. All crude ore from Fire Lake is transported to Mont-Wright by the privately-owned Cartier Railway line.

P&E has been unable to verify the information on ArcelorMittal's Fire Lake property, and the reader is cautioned that the above information is not necessarily indicative of the mineralization on Champion's CFLN Property. P&E is not aware of any exploration work by any other operator currently being carried out on lands surrounding the CFLN Property.

24. OTHER RELEVANT DATA AND INFORMATION

24.1 Project Implementation and Execution Plan

This section of the Report provides a summary and general description of the Project Execution Plan upon which the project schedule and the Capital Cost Estimate were developed.

The major project milestones for FLN, Pointe-Noire and for the railway are listed in Table 24-1, Table 24-2 and Table 24-3, respectively.

Table 24-1: Key Project Milestones Fire Lake North

Major Milestones	Date
Start Early Work Engineering	Oct-12
Construction Camp order awarded	Feb-13
Start Construction Camp construction	May-13
Start construction of temporary substation	Jul-13
Construction Camp ready for 300 workers	Oct-13
Temporary substation completed	Nov-13
Construction Camp fully operational	Jun-14
Start Permanent Camp construction	Mar-14
Permanent Camp operational	Aug-15
Start Process Plant Detail Engineering	Mar-13
CA Available	Feb-14
First concrete	Apr-14
Building enclosures complete	Dec-14
161kV / 55MW available for startup	Dec-15
Pre-Operational Verifications completed	Apr-16
Wet Commissioning completed	May-16

Table 24-2: Key Project Milestones Pointe-Noire

Major Milestones	Date
Start construction	Feb-14
First concrete	May-14
Mechanical completion	Jan-16
Dry Commissioning completed	Apr-16

Table 24-3: Key Project Milestones Railway

Major Milestones	Date
Geotechnical evaluation completed	Jun-13
Start railroad engineering	Jun-13
Start railroad construction	Feb-13
Railroad construction completed	Apr-16
Wet commissioning completed	Jun-16

The Project Execution Schedule developed in this Study and described herein covers the period from the start of the detailed engineering phase to the end of commissioning of the three (3) sub-projects: Mine & Process plant at Fire Lake North, the railroad between the FLN site and Pointe-Noire and the stockpile and export facilities in Pointe-Noire.

Fire Lake North's Early Work covers the engineering, procurement and construction activities to build a temporary substation, a construction camp, and power lines linking the temporary substation with the construction camp and the construction site. To support the construction schedule, the following EPCM activities need to be executed:

- EPCM services contractor was selected for the Early Work (EW) in October 2012. An Interim Engineering Services Agreement has been entered into with the contractor and full EW EPCM Agreement is currently under negotiation.
- The construction permits for Early Work should be available by April 2013. No site work is anticipated prior to this date.

- EW Construction is based on a 14 month construction schedule and is set to start in April 2013 (conditional on the necessary permits being issued). The construction camp will progressively be made available. The first 300 rooms will be ready in October 2013, and the number of rooms will increase to 800 in June 2014. A fly camp powered by diesel generators will be erected and operated by the construction camp contractor to lodge personnel until the first construction camp rooms are operational.

Activities for the Fire Lake North Mine, concentrator, and Tailings Management Facility include the following:

- Advanced stripping of the East pit;
- Pre-stripping of the West pit;
- Installation of construction management facilities and site access control gates;
- Water management including watershed control ditches and sedimentation ponds;
- Construction of the crusher, stockpile and concentrator;
- Construction of the tailings management facilities;
- Construction of the permanent camp.

To support the construction schedule, the following activities need to be executed:

- EPCM services contractor for the Fire Lake North mine and concentrator will be confirmed in March 2013;
- Early award of purchase orders for critical equipment (e.g. the AG Mill) is mandatory to obtain firm concrete and steel price bids for construction of the concentrator building;
- The full EA approval will be completed to obtain construction permits for a February 2014 construction start. No site work outside of defined Early Work is anticipated prior to this date;
- The permanent camp will be built in time to house the construction workers residing at Fire Lake North over and above the capacity of the temporary construction camp.

The graph below shows the total planned bed availability for the construction and permanent camps, compared to the staffing ramp-up. The staffing ramp-up would include construction management and labour, along with the owner's team..

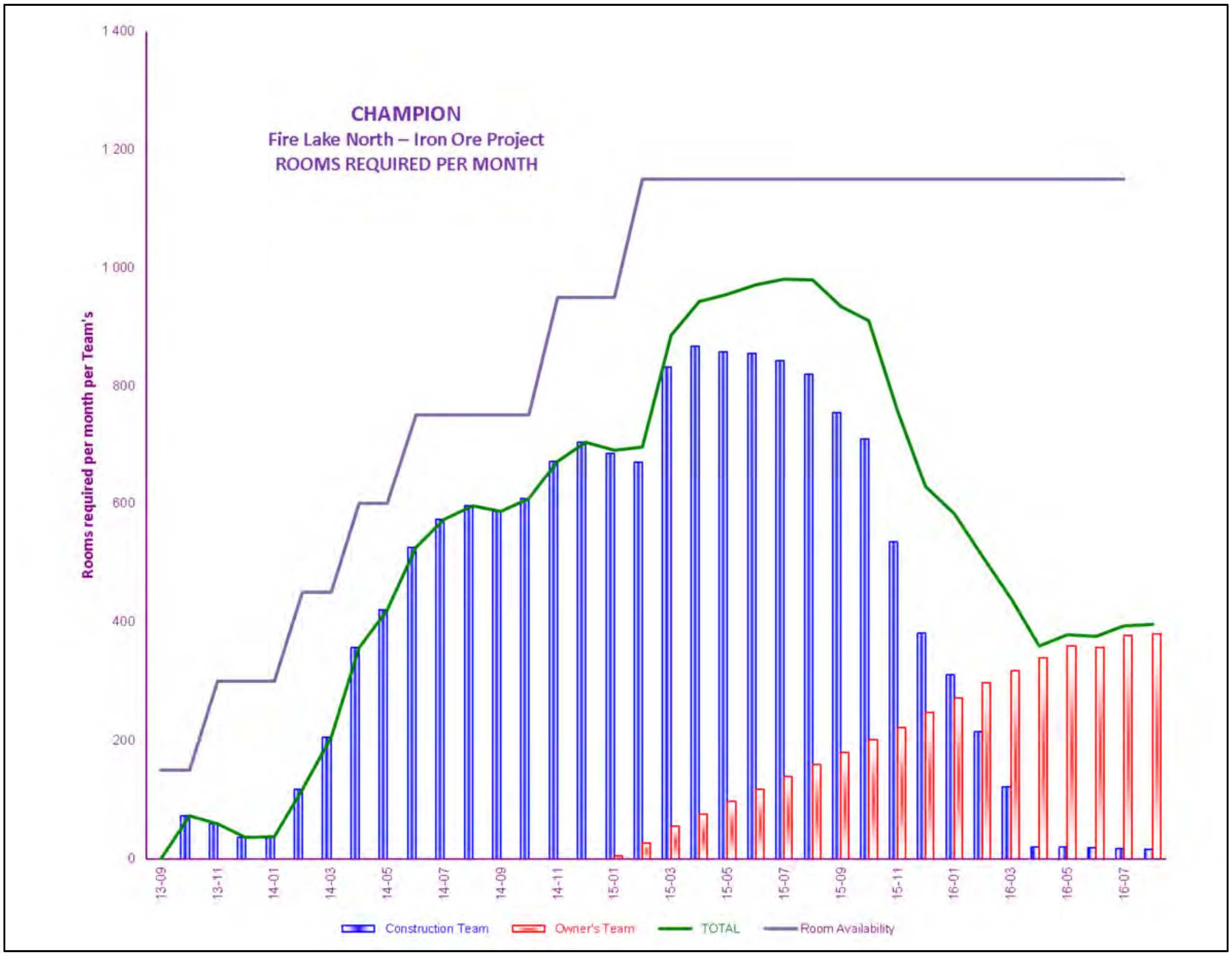


Figure 24-1: Rooms Required for Construction Camp and Permanent Camp

Construction will start with site clearing and bulk earth works, including construction roads. The crusher, stockpile area and concentrator pads are scheduled to be completed in the second quarter of 2014. In parallel, water management ditches and sedimentation ponds will be built in a sequence that will allow drainage of the West Pit overburden, allowing the mining operation crews to begin pre-stripping. Pre-stripping will be ongoing until start of operations.

Aggregates will be sourced mainly from advanced stripping of the East Pit, where a contractor will install a crushing and screening plant.

The foundation work is scheduled to begin in April 2014. Structural steel and pre-fabricated wall panels will be erected to close the back end of the concentrator by the end of 2014.

The construction of the tailings dam and polishing pond is scheduled to begin in the second half of 2014.

The Mechanical and Electrical trades will be executed in 2015. Hydro-Québec is expected to provide sufficient power to execute the pre-operational verifications (POV) and commissioning work by December 2015.

This will lead to a full turnover of the constructed facilities to Champion Iron Mines by May 2016.

Railroad construction will begin in parallel to the work at Fire Lake North,, following the approval of the environmental assessment. Construction will begin with clearing the right of way for the railroad in February 2014. Four different crews will each build a segment of the railroad. One segment will start in Pointe-Noire going north, another will start at the Fire Lake North site going south, and the remaining segments will join the first two. Specific crews will also be assigned to each tunnel section. The railroad and its ancillary facilities are expected to be completed and commissioned in April and June of 2016, respectively.

For Pointe-Noire, the purchasing, design, fabrication (45 weeks) and on-site assembly (30 weeks) of the Stacker/Reclaimer is on the critical path of the Project Schedule. In order to achieve the set objectives, engineering must start immediately following the award of the EPCM mandate. The project's objective is to award the Stacker/Reclaimer purchase order in late November 2013, which will allow assembly/construction at Pointe-Noire to begin in the spring of 2015.

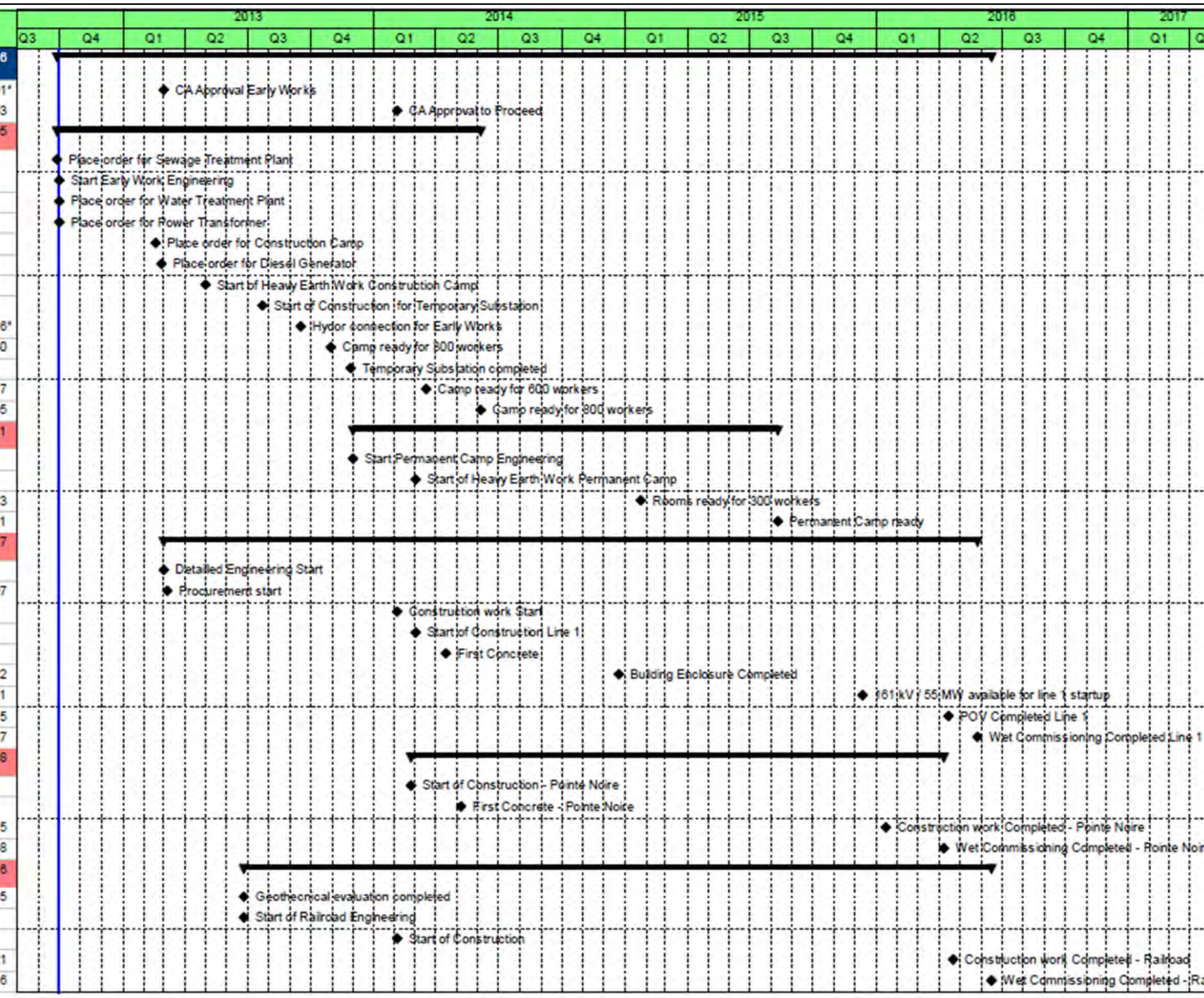
Construction at Pointe-Noire is planned to start in February 2014 with the wood cutting and site preparation activities (drainage, access roads and heavy civil).

Rail surfacing and installation at Pointe-Noire is scheduled to start in June 2014 and carry on through spring 2015, when the assembly of the Stacker/Reclaimer is scheduled to start.

Mechanical completion at Pointe-Noire is scheduled for January 2016. Commissioning activities are expected to carry on until handover to the client in April 2016.

A summary of the project schedule is presented in Figure 24-2.

Activity ID	Activity Name	Original Duration	Start	Finish
5863007 - Fire Lake North Project - 0 - Summary		941	2012-09-28 A	2016-06-16
A6580	CA Approval Early Works	0		2013-03-01*
A6550	CA Approval to Proceed	0		2014-02-03
Early Work Project Milestones		413	2012-09-28 A	2014-06-05
A6710	Place order for Sewage Treatment Plant	0	2012-09-28 A	
A6660	Start Early Work Engineering	0	2012-10-01	
A6720	Place order for Water Treatment Plant	0	2012-10-01	
A6700	Place order for Power Transformer	0	2012-10-01	
A6670	Place order for Construction Camp	0	2013-02-18	
A6680	Place order for Diesel Generator	0	2013-02-26	
A6690	Start of Heavy Earth Work Construction Camp	0	2013-05-02	
A6730	Start of Construction for Temporary Substation	0	2013-07-23	
A6630	Hydor connection for Early Works	0		2013-09-16*
A6750	Camp ready for 300 workers	0		2013-10-30
A6740	Temporary Substation completed	0	2013-11-28	
A6760	Camp ready for 600 workers	0		2014-03-17
A6770	Camp ready for 800 workers	0		2014-06-05
Permanent Camp's Project Milestones		429	2013-12-02	2015-08-11
A4680	Start Permanent Camp Engineering	0	2013-12-02	
A5080	Start of Heavy Earth Work Permanent Camp	0	2014-03-03	
A5130	Rooms ready for 300 workers	0		2015-01-23
A4980	Permanent Camp ready	0		2015-08-11
Fire Lake North Project Milestones		827	2013-03-01	2016-05-27
A6530	Detailed Engineering Start	0	2013-03-01	
A6520	Procurement start	0		2013-03-07
A6540	Construction work Start	0	2014-02-04	
A6560	Start of Construction Line 1	0	2014-03-03	
A6570	First Concrete	0	2014-04-16	
A6590	Building Enclosure Completed	0		2014-12-22
A6610	161 kV / 55 MW available for line 1 startup	0		2015-12-11
A6620	POV Completed Line 1	0		2016-04-15
A6640	Wet Commissioning Completed Line 1	0		2016-05-27
Pointe Noire Project Milestones		550	2014-02-24	2016-04-08
A1190	Start of Construction - Pointe Noire	0	2014-02-24	
A6340	First Concrete - Pointe Noire	0	2014-05-07	
A1100	Construction work Completed - Pointe Noire	0		2016-01-15
A6220	Wet Commissioning Completed - Pointe Noire	0		2016-04-08
RailRoad Project Milestones		761	2013-06-25	2016-06-16
A1200	Geothecnical evaluation completed	0		2013-06-25
A6800	Start of Railroad Engineering	0	2013-06-26	
A6810	Start of Construction	0	2014-02-03	
A6820	Construction work Completed - Railroad	0		2016-04-21
A6840	Wet Commissioning Completed - Railroad	0		2016-06-16



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

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Printed on: 2013-02-01

Date	Revision	Checked	Approved
2012-07-25	AA	NB	LC
2012-11-12	AB	NB	LC
2013-01-08	AC	NB	LC
2013-02-01	AD	PG	LC

Figure 24-2: FLN Project Schedule Summary

24.2 Site Surveys

During the course of the PFS, certain discrepancies related to site topography were noted between the existing survey data (geological models) and the survey data from the geotechnical program (LIDAR measurements).

A comparison of the survey and LIDAR data, completed by BBA for both the East and West pits, is presented in Table 24-4. Overall, 3060 data points were analyzed over the West Pit area, and 1644 points were analyzed over the East Pit area.

Table 24-4: Differences in Topography Observed Between Survey and LIDAR Data

West Pit			East Pit		
Difference (Δm)	No. of data points	Percentage (%)	Difference (Δm)	No. of data points	Percentage (%)
0 – 0.3	1068	34.9%	0 – 0.3	643	39.1%
0.3 – 0.6	972	31.8%	0.3 – 0.6	531	32.3%
0.6 – 0.9	376	12.3%	0.6 – 0.9	236	14.4%
> 0.9	644	20.9%	> 0.9	234	14.2%

While discrepancies were identified in the data collected by the two methods, 66.7% and 71.4% of the points, for the West and East pits, respectively, were within 0.6 m of each other. It is recommended that the matter be further investigated during the next phase of the project to align the measurements collected by the two methods and improve the precision of these data.

Also required in the next stages of the project are:

- A legal survey for the mining lease and the exact location of the property boundary;
- A seismic survey (or equivalent) over the future pit areas to determine the bedrock togophraphy with a greater degree of precision.

24.3 Railway Study

In August 2011, the process of selecting an option for concentrate shipment by rail began with a pre-feasibility study investigating two routes over public tracks. The two access options investigated were:

- Option 1: Bloom Lake. Shipment via the Bloom Lake Railway, north of Fire Lake North (FLN), would require the construction of a 62 km segment of new track.The route to Sept-Îles would then total 532 km;
- Option 2: May Junction. Shipment via the Québec North Shore & Labrador (QNS&L) at May station, heading south-east from FLN, would require the construction of a 177 km segment of new track.The route to Sept-Îles would then total 385 km.

The analysis by Rail Cantech revealed the pros and cons of these two options. The Bloom Lake option would have smaller capital expenditures, logistical advantages related to geographical positioning, and high operating expenditures. The May Junction option would have lower transportation fees, and this option would give CHM a greater share of the track route property.

Additional alternatives were then analyzed, including a direct link between FLN and Sept-Îles (the Ste-Marguerite option). Because of the advantages of this direct link, particularly the lower operating expenditures and the guaranteed quality of service through CHM ownership, it was selected for a feasibility study with a view to optimizing the parameters.

The definition of the route for the Ste-Marguerite option was developed through several variations that integrated more specific input (helicopter reconnaissance and Lidar surveys), as well as final changes concerning the Pointe-Noire terminal, which was moved closer to the bay. The final choice of routing of the Ste-Marguerite option, the 4.3.D route, totals 310.7 km of main track and 50.1 km of additional track, for a total of 360.8 km of new track to build.

The Ste-Marguerite option consists of a category-3 track for freight trains with maximum speeds of 64 km/h. The route is characterized by a gentle natural gradient (from 655 m to 20 m above sea level) for loaded cars travelling to the port, a reduced number of watercourse crossings, and five (5) tunnels totaling 14.68 km, primarily located between Highway 138, at Sept-Îles, and the SM-3 dam on the Ste-Marguerite river. One additional tunnel will be required at the Pointe-Noire site.

The ore is shipped by distributed power trains of 240 cars with an effective total capacity of 25.2 kt per train. 396 transportation cycles are required annually to ship 10 Mtpy. The 50.1 km of other track required to operate the railway network is comprised of a loading loop at FLN, sidings adjacent to the main track, as well as an unloading loop for access to the dumper at the Pointe-Noire port. These other tracks, providing access to the port, are made up of transit, maintenance, storage and inspection tracks. Ninety-seven (97) employees will be required to carry out rail operations; those activities will, in part, take place at a main maintenance shop at Pointe-Noire and at a secondary shop at FLN.

It will be possible to significantly increase the capacity of the railwaythrough adjustments requiring relatively small investments. For example, additions (to rolling stock and to the other tracks) of close to 5% ($60M) of the total initial investment will make it possible to double the network's capacity to 20 Mtpy. A capacity of 60 Mtpy or more could be achieved through more significant investments. This will allow faster repayment of the investment expenditures for this project component .

The investment and operating expenses for the Ste-Marguerite option are $1333.6M and $4.02/t, respectively, at 10 Mtpy. In addition to the railway construction costs ($1333.6M), the capital investment of $1427.7M presented in Table 24-5 includes the purchase of rolling stock ($78.4M) and maintenance vehicles and equipment ($15.7M) which were assumed to be leased and are taken into account in the operating costs (except for the capitalized portion of $13.4M in PP-1). (For further details on the financial analysis, refer to Chapter 22).

The following table summarizes the main elements of the Bloom Lake and Ste-Marguerite options, with a few variations in the routes and volumes of concentrate to be shipped.

Table 24-5: Summary of Railway Options Studied

Step	Option	New segment	Length km	Route km	Volume Mtpy	Capex[7] $	Opex $/t
Pre-feasibility	1. Bloom Lake	1.1 1.1 1.2[1] 1.2[1]	51[4] 51 62[5] 62	521 521 532 532	7 14 7 14	346.6M 383.8M 366.6M 403.8M	15.00 13.50 15.00 13.50
Feasibility	4. Ste-Marguerite	4.3.D[2] 4.3.D[3]	310.7[6] 310.7[6]	310.7 310.7	20 10	1,463.8M 1,427.7M	3.46 - 3.81[8] 4.02 – 4.42[8]

1 Bypasses the property of Lake Moiré
2 Loading loop at Pointe-Noire (South West side sector)
3 Unloading loop moved to the Sept-Îles bay
4 Segment 1.1 has 51 km of main track; it requires 18 km of other tracks (on segment 1.1) and 14 km of other track on the public tracks for a total of 83 km of new track
5 Segment 1.2 has 62 km of main track; it requires 15 km of other track (on segment 1.2) and 17 km of other track on the public tracks for a total of 94 km of new track
6 Segment 4.3.D has 310.7 km of main track and requires 50.1 km of other track, for a total of 360.8 km of new track
7 Capex including infrastructure and rolling stock investment expenditures
8 Varying Opex to take into account operations performed internally or by an outside operator, respectively

24.4 Fine Iron Recovery

Additional iron recovery of (-75 µm) hematite from the rougher spirals tails by screening followed by Wet High-Intensity Magnetic Separation (WHIMS) was demonstrated as a concept in previous testwork (refer to Section 13.9). This testwork suggested that a fine hematite product can be recovered from the tailings as a high grade (66% Fe_T) concentrate. However, the tests performed to date were conducted under highly controlled conditions, and further work is necessary to develop a fine iron recovery flowsheet leading to the production of a saleable product.

The recovery of fine iron could potentially increase concentrate production by several percentage points, representing significant additional revenue. The circuit operating costs and capital costs for both the additional mechanical equipment and infrastructure would also need to be evaluated.

24.5 Tailings Disposal Strategy

During the course of the PFS, three (3) tailings disposal strategies were considered. Some key parameters of tailings disposal and water management considered for the study included:

- Water recycling within the concentrator and reclaim from tailings disposal area;
- Tailings deposition angles;
- TMF areas remediation and exposed footprint;
- Segregation and filling of void space within tailings (overall volume);
- Costs associated with dyke construction.

During the course of the PFS, three (3) tailings disposal strategies were considered.

Option 1

The “Base Case” consists of a conventional strategy in which all tailings generated from the process are pumped to the tailings management facility (TMF) via pipeline using centrifugal pumps. The tailings, in the form of a 50% (w/w) solids slurry, are distributed in the tailings area by spigotting. Due to the large quantities of water being manipulated, the TMF in Option 1 has a large footprint of approximately 1100 ha, a large polishing pond of 130 ha, and requires significant dyke construction for both the tailings pond dykes and those of the polishing pond. While Option 1 presents the greatest amount of water manipulation and dyke construction materials, it is an effective and proven method of tailings disposal, widely used in the mining industry.

Option 2

In order to reduce the TMF footprint and the amount of water being transported to and from the concentrator, an alternative to a conventional tailings deposition strategy was developed. In Option 2, the fine and coarse tailings are treated separately in the concentrator. A paste product, 65-70% (w/w) solids, is generated from the fine tailings using a deep cone thickener. The tailings are delivered to the TMF via pipeline using either centrifugal or positive displacement pumps. The choice of pump type is largely dependent upon the shear stress profile of the material. The coarse tailings are dewatered using screens, prior to being transported to the TMF for separate handling (dry-stacking). The overall result is that less water is transported to the TMF. The TMF will therefore have a smaller overall footprint, smaller dykes and a smaller polishing pond.

In order to evaluate Option 2, the technical feasibility of the proposed fines treatment was sub-contracted to Paterson & Cooke (P&C). A sample of tailings produced at the SGS pilot plant (see Section 13.6.7) was sent for testing at P&C. Testwork results indicated that thickening the fines slurry to solids densities of 68-70% (w/w) was feasible. However, the material did not exhibit properties typical of a paste product. The presence of bleed water, segregation of the thickened slurry and the lack of yield stress were indications that the deposition of the fine tailings in the form of paste would not be possible. Furthermore, due to the segregation, dilution of the slurry to 60% (w/w) was required to render the underflow pumpable. The final report issued by P&C was based on a conventional tailings disposal strategy for the fines, consisting of thickening to a maximum density of 60% (w/w) and centrifugal pumping to the tailings pond. The coarse solids are dewatered using screens, prior to being conveyed to the TMF and dry-stacked. While an estimate of capital equipment costs for the dewatering of the coarse fraction was prepared, screening testwork and all aspects of the transportation of the solids to the TMF via conveyor was outside the scope of P&C's study.

Option 3

A preliminary concept for a third tailings disposal strategy was developed as an alternative to Option 2. Option 3 consists of dry-stacking both the fine and coarse tailings fractions. While the treatment of the coarse solids would remain identical to that presented in Option 2 (dewatering using screens), the fines would be filtered to a solids density of approximately 85% (w/w), and the products would be combined on a common conveyor leading to the TMF. A preliminary equipment list for the dry-stacking option consisted of dewatering screens (for the coarse solids), drum filters and auxiliary equipment including filtrate receivers and vacuum pumps (for the fine solids), and a network of conveyors for transportation of the dewatered tailings within the plant and to the TMF. An initial layout of the equipment in the concentrator was also prepared.

While an initial concept was developed, no fines filtration testwork or coarse screening tests were performed to validate the assumptions presented in Option 3. The capital and operating costs (including for dyke construction) were not evaluated. In theory, dry-stacking of the coarse and fine tailings would minimize the dyke construction requirements and would limit the size of the polishing pond.

Due to the elimination of the paste option for the fine tailings in Option 2, and a lack of complete information for the development of Option 3, a conventional tailings disposal strategy, as presented in Option 1, was retained for the PFS. Further investigation of a dry-stacking tailings management strategy (such as that of Option 3) is recommended in the next phase of the project.

25. INTERPRETATION AND CONCLUSION

This Preliminary Feasibility Study (PFS) is based on the proposed mining and processing of the Fire Lake North deposit for the estimated Mineral Reserve as of January 25th, 2013, which is the effective date of this Report. NI 43-101 Guidelines require that relevant results and interpretations be discussed as well as risks and uncertainties that could reasonably be expected to affect reliability or confidence in the exploration information, Mineral Resource and Mineral Reserve estimates or projected economic outcomes.

25.1 Geology and Mineral Resources

The deposits underlying the Project are Lake Superior-type iron formations. These formations are classified as chemical sedimentary rock containing greater than 15% iron, consisting of iron-rich beds usually interlayered on a centimetre scale with chert, quartz or carbonate. Ore is mainly composed of hematite and magnetite commonly associated with mature sedimentary rocks.

The Knob Lake Group underlying the northern half of Fire Lake North (Don Lake area) consists of a moderately northeast-dipping, overturned, curvilinear synform trending northwest-southeast for approximately six (6) km. The synform is cored by the Lower Iron Formation (LIF) and Middle Iron Formation (MIF) members of the Sokoman Formation. Airborne magnetic surveys show that the Sokoman Formation continues to the southeast. In the southern part of the Fire Lake North property, this structure gradually changes orientation toward the south-southeast. The southern half of Fire Lake North has distinct iron formation-hosting structures in the western, centre and eastern parts. Geophysical magnetic-response anomalies indicate that the western structure is continuous with the synclinal structure in the Don Lake area.

P&E have prepared a mineral resource estimate in accordance with NI 43-101. Resources were assessed in conformity with generally accepted CIM “Estimation of Mineral Resource and Mineral Reserves Best Practices” guidelines. The effective date of this mineral resource estimate was July 23rd, 2012.

P&E Mining Consultants Inc. estimated the Total Mineral Resources for the Fire Lake North Deposits using a 15% Fe_T cut-off grade. Their results are given in Table 25-1.

Table 25-1: Fire Lake North Resource Estimate at 15% Fe_T Cut-Off

Deposit	Measured		Indicated		Inferred	
	Million Tonnes	Grade Fe_T	Million Tonnes	Grade Fe_T	Million Tonnes	Grade Fe_T
East Area	3.0	34.2%	262.0	29.6%	192.4	28.7%
West Area	23.6	35.4%	404.9	32.6%	329.2	30.9%
Total	26.6	35.2%	666.9	31.4%	521.6	30.1%

25.2 Mineral Reserves

The final Pre-Feasibility Study (PFS) rock-code block models for the Fire Lake North West and East deposits were provided by P&E Mining Consultants Inc. on October 4th, 2012 and September 10th, 2012, respectively. The models were provided as Comma Separated Value files (CSV) in a UTM NAD83 Zone 19 coordinate system.

The variables in the model include block coordinates, total iron grade (Fe_T), Density, Rock Type, Percent and Class. The density follows a regression curve for mineralized rock, and the waste rock densities are variable depending on different rock types, which are divided between mineralized and non-mineralized rock types. The class item is divided among Measured, Indicated and Inferred mineralized rock categories. Since this Study is a PFS, only Measured and Indicated rock categories were considered for the economics of the project.

With that in mind, economic pit shell optimization uses the true pit optimizer Lerchs-Grossman 3-D (LG 3D) algorithm in MineSight. The LG 3-D algorithm is based on the graph theory and calculates the net value of each Measured or Indicated block in the model. The net value of each block is calculated using a series of cost and selling parameters, including: concentrate selling price (FOB), mining, processing and other costs, and the Fe recovery for each block, pit slopes, and other constraints. The pit optimizer searches for the pit shell with the highest undiscounted cash flow. The chosen selling price used for the chosen pit optimizations (East and West) was $74.82/t concentrate.

The milling cut-off grade (COG) used for this Study to classify material as Mineral Resource or waste is 15% Fe_T. This COG is in line with similar iron ore projects in the region and their historical data.

A pit slope study was performed by Knight-Piésold to develop the engineered pit, using the optimized pit shell at 15% Fe_T COG. The pit slope study incorporated operational and design parameters such as ramp grades, surface constraints, bench angles and other ramp details. Once the operational pit was designed, a yearly mine plan was determined based on specific mining rates and production goals. The Mineral Reserves were determined from the detailed engineered pit design and the real-life mine plan. Mineral reserves are presented in Table 25-2.

Table 25-2: Champion Fire Lake North PFS Mineral Reserves

FLN Combined Reserves			
CoG 15% Fe_T			
	Tonnage	Grade	W.R
	Mt	Fe_T%	Wrec%
Proven	23.73	35.96	45.00
Probable	440.86	32.17	39.58
Total Reserve	464.59	32.37	39.86
OB	120.17		
Waste Rock	1107.55		
Inferred (considered waste)	45.80		
Total Stripping	1273.53		
Stripping Ratio (w/OB)	2.74		

25.3 Metallurgy and Ore Processing

During the Preliminary Feasibility Study, a metallurgical test program was undertaken in order to evaluate ore treatment parameters and provide data for flowsheet development and preliminary equipment sizing. Testwork was performed on material from the West Pit and East Pit zones; material from the Don Lake zone was not used. The testwork included:

- Ore grindability assessment;
- Pilot Plant trials;
- Metallurgical performance and liberation size analysis by Heavy Liquids Separation;
- Settling and filtration tests;
- Environmental characterization.

Analysis of the ore grindability testwork results determined that a 16 MW, 11.6 m x 6.6 m (38 ft x 21.5 ft) AG mill would be required to achieve a 23 Mtpy throughput when treating the West Pit material. A supplementary 9.8 m x 5.0 m (32 ft x 16.5 ft) AG mill would also be required to maintain this throughput when treating the East Pit material.

The pilot plant consisted of a conventional arrangement of the AG mill, followed by three (3) stages of spirals. The final production run achieved 83.2% iron recovery, with a 65.9% Fe_T concentrate grade.

Heavy Liquids Separation (HLS) was used to determine liberation size and metallurgical performance. Results are summarized in Table 25-3 as follows.

Table 25-3: West Pit and East Pit HLS Results at 100% Passing 20, 24 and 28 Mesh

Grind Size (100% Passing)	Average Head Grade (% Fe_T)	Wt Recovery (%)	Fe Recovery (%)	Fe_T (%)	SiO_2 (%)
West Pit 20 mesh (38 samples, 1 repeat)					
20 mesh (850 µm)	34.2	44.4	84.6	66.0	5.1
East Pit 20-28 mesh (38 samples)					
20 mesh (850 µm)	32.8	41.4	81.7	64.7	6.8
24 mesh (700 µm)	32.8	40.7	80.6	65.4	6.1
28 mesh (600 µm)	32.8	39.0	78.4	66.1	5.1

HLS and pilot plant testwork results indicated that a conventional three-stage spirals arrangement, similar to other operations in the Fermont area, could be used to recover the iron. A magnetic separation circuit is not necessary considering the very low magnetite content.

Settling and filtration testwork indicated that the concentrate and tailings had similar filtration and thickening performance, respectively, to other iron ore operations in the Fermont area.

Environmental characterization demonstrated the tailings to be non-acid generating.

It is BBA's opinion that the testwork conducted on the Fire Lake North material is of sufficient quantity and quality to support a feasibility-level study.

25.4 Environmental Permitting

The overall Project is subject to environmental assessment provisions of the *Environment Quality Act* and the *Canadian Environmental Assessment Act*. The Environmental Impact Assessment that is required pursuant to the *Acts* is in preparation. A schedule for the environmental assessment of the Project has been developed. Environmental studies have been conducted and reports either have been or are being prepared. Permitting requirements are also well-defined and have been considered in the project plan.

A tailings management strategy has been defined and a feasibility level design for the Tailings Management Facility (TMF) has been developed.

A Rehabilitation and Closure Plan has been prepared for the Project. The Plan describes measures planned to restore the Property as close as reasonably possible to its former use or condition, or to an alternate use or condition that is considered appropriate and acceptable by the Department of Natural Resources (MRN). The Plan outlines measures to be taken for progressive rehabilitation, closure rehabilitation and post-closure monitoring and treatment

25.5 Financial Analysis

The pre-tax and after-tax financial analyses, performed using estimated project capital and operating costs, are presented in Table 25-4 and Table 25-5.

Table 25-4: Pre-Tax Financial Analysis Results

IRR = 30.9% Discount Rate	NPV (M$)	Payback (yrs)
0%	$9038M	2.8
5%	$4736M	3.1
8%	**$3295M**	**3.4**
10%	$2602M	3.6

Table 25-5: After-Tax Financial Analysis Results

IRR = 25.3% Discount Rate	NPV (M$)	Payback (yrs)
0%	5393	2.9
5%	2871	3.3
8%	**1954**	**3.6**
10%	1510	3.8

The financial analysis shows that the project is economically viable and robust.

25.6 Risk Analysis

A number of potential project risks have been identified during the course of this PFS that can materially affect project execution and project economics. These risks are categorized as originating from the FLN site development, from Railway infrastructure development between the FLN and Pointe-Noire sites, or from the Pointe-Noire Port facility development.

High-risk areas pertaining to the FLN site development are:

- Timely reception of environmental permits and EA approvals;
- Timely conclusion of MOU agreements with First Nations and other stakeholder agreements;
- Timely arrangement of Project financing;
- Timely completion of the railway component.

High-risk areas pertaining to railway infrastructure development are:

- Completion of the geotechnical campaign for the railway (required to begin detailed engineering for the railway);
- Risk to construction schedule due to CN's suspension of their decision on whether or not to move forward with railway construction.

High-risk areas pertaining to Pointe-Noire port development are:

- Potential conflicts between the several port stakeholders;
- Space constraints in proximity to the Port infrastructures. (The final location of the Champion stockyard has not been established and discussions are still underway amongst the various Stakeholders);
- Establishment of a concentrate transportation management plan to ensure an efficient utilization of infrastructures.

All the identified risks will be carried through to the next phase of the Project and shall be updated based on the status of the Feasibility Study. The next step of the risk analysis process will be to hold a risk workshop to further identify potential issues and risks. The outcome of the workshop will be a risk register that will identify and quantify risk element and assess their severity as well as identify all possible opportunities. The risk register will help implement a risk management plan to monitor, reduce and avoid potential risks. Successful mitigation of the evaluated risk can result in a cost and schedule savings with a positive impact on the Project.

25.7 Conclusion

Based on the information available and the degree of development of the Project as of the effective date of this Report, BBA is of the opinion that the Project is technically and financially sufficiently robust to warrant proceeding to the next phase of project development.

26. RECOMMENDATIONS

26.1 Project Advancement - Feasibility Study

The Economic Assessment of the project has demonstrated a strong Internal Rate of Return (IRR) of 30.9% and robust economics with a NPV of $3295M (at a discount rate of 8%). BBA therefore recommends that the Project proceed to a Feasibility Study (FS) that would investigate the use of two (2) production lines, rather than one (1) as to further enhance the economics of the project after consideration to the capital required for the railway component.

It is estimated that a total of $14.9M will be required to advance the project to Feasibility Level. A summary of the necessary activities and their costs is presented in Table 26-1.

Table 26-1: Costs Required to Advance Project to FS Level

Activity	Total Cost
Exploration	
Surveying	$0.60M
Seismic testing	$0.95M
Geological definition drilling – East Pit	$2.00M
Geological definition drilling – West Pit	$5.00M
Sub-total Exploration	**$8.55M**
Feasibility Study – Line 2	
Testwork	$0.95M
Feasibility Study - BBA	$1.20M
Geotechnical Work & Reports (FLN & PN)	$2.30M
Hydrogeological Work & Reports	$0.20M
Environmental study update	$0.50M
Condemnation drilling	$0.40M
Geotechnical (facilities)	$0.40M
Geotechnical (tailings pond)	$0.40M
Sub-total Exploration	**$6.35M**
TOTAL FS STUDY	**$14.90M**

The critical activities to complete the FS include drilling, revision of the mine plan and testwork.

Drilling

BBA recommends that further drilling be carried out in both the East and West Pit zones in order to increase mineral reserves capable of supporting two processing lines. The new drilling data collected should be incorporated into a new block model.

Mining

The mine plan developed during the PFS provides a reasonable base for projected mining operations at this level of study. BBA recommends the following mining engineering work be undertaken for final design:

- Update of the mineral reserves once the new block model is updated with additional drilling results;
- Better define the bedrock topography to more accurately estimate the overburden tonnage and improve the engineered pit design;
- Optimize the scheduling of East and West Pit exploitation to maximize iron concentrate production in the plant, while minimizing mining costs;
- Collect hardness data and potentially integrate this information into the geological block model for use in mine planning;
- Further optimize mining phases and develop mine schedule in more detail (quarterly for first three years);
- Improve geotechnical work with the objective of obtaining optimized pit slopes per sector in both the rock and overburden.

Mineral Processing

A laboratory testwork program for the FS is proposed in order to optimize the plant design, including:

- Comprehensive grinding testwork program to define the hardness variability in both the East and West Pit zones and a review of the mill sizing and energy requirement recommendations;
- Mineralogical examination of the new drill core samples with respect to the hematite grain size. Analyses will be performed to determine whether the grain size of

samples can be correlated with their hardness and metallurgical performance. A relaxation of final grind size required to meet final concentrate grade targets would reduce grinding energy requirements and could limit iron losses due to fines generation;

- Confirm the suitability of the East Pit ore for a size classification at 20 mesh;
- Cost benefit analysis of grind size vs. concentrate grade to optimize project economics;
- Vendor testing to confirm equipment selection and sizing.

Integration of Data into the Mine Block Model

The expanding volume of data produced by the next phase of testwork will require an improved system of management. In line with other companies in the Fermont Iron Ore District (FIOD), it is suggested that Champion Iron Mines incorporate grindability, mineralogical, and metallurgical-performance data into its block model to facilitate data evaluation. This will permit better visualization of the hardness distribution across the deposit and will be a helpful reference tool in any follow-up analysis on mill throughput. It will also serve as a powerful tool for operational decision-making, allowing the ore to be blended on the basis of grade, hardness, and expected performance, rather than simply grade.

Correlation of the hardness data to the grain size of the sample should also be a goal of the next phase of study, which may then result in a simplified ‘field’ classification system. The overall goal should be to reduce risk by better understanding the grain size distribution within the deposit, confirm the correlation with hardness, and use this information to build better predictive models for expected throughput and concentrate production.

It is expected that an integration of hardness, mineralogical, and metallurgical data into the block model will bring substantially more value to the Project than any efforts to run a second pilot plant. A second pilot plant would use a new bulk sample that may or may not be any more representative of the overall ore body than what had been used previously.

Risk Analysis

A summary of risks for the project was presented in Section 22.3. BBA recommends that a formal risk review and mitigation program be developed in the next stage of the project.

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