Lamêlée Iron Ore Ltd.

NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project

Lamêlée

4131 | M03339A

December 19th 2014

M03339A CIMA+

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Lamêlée Iron Ore Ltd.

Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project

4131 | M03339A

Qualified Persons:

David Bédard, AMEC

Michel Bilodeau, Independent consultant

Yves Buro, Met-Chem

Jeffrey Cassoff, Met-Chem

Mathieu Girard, Soutex

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December 19th, 2014

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CERTIFICATE OF AUTHOR

To Accompany the Report entitled:

"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada" dated December 19th, 2014 with effective date of November 25th, 2014.

I, David Bédard, Eng, MA.Sc., do hereby certify that:

1) I am the Team Lead Mining Design – Geotecnical presently with Amec Foster Wheeler with an office situated at 1425 Trans-Canada Hwy, Suite 400, Dorval, Qc, H9P 2W9. For the current project, I was a project manager for the tailings component of the report;

2) I am a graduate from Sherbrooke University with a Bachelor's in Civil Engineering obtained in 2003 and a Master degree in applied science (geotechnical);

3) I am a member in good standing of the Ordre des Ingénieurs du Québec (no. 136664);

4) I have worked as a engineer continuously since Master graduation from university in 2005. I am an engineer specialised in the geotechnical and tailings impoundment area fields and has been involved in numerous hydrology projects. I have participated in mining projects including tailings impoundment dikes and dams. I have also participated in the preparation of management manuals for tailings impoundment areas, in mine closure plans and in prefeasibility studies for the development of a new mine site. Over the years, I have implemented field work management infrastructures and developed a control system for some sites. Actually, my function in AMEC is Team Lead – Mining design Geotechnical. I directly supervise more than 20 engineers and technicians;

5) 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 by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;

6) I have participated in the preparation of the report entitled **"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) Study Report for the Lamêlée Project, Québec, Canada"** dated December 19th, under AMEC Foster Wheeler consultation company as Project Manager for the tailings component an water management. I have participated, and I am responsible for sections 21.2.4 (Summary of

Capital Cost Estimate/ Tailings Facilities Management), 21.6.4 (Operating Cost Estimate/ Tailings Operation Costs) and 26.3.8 (recommendation/Metallurgy/Tailings);

7) I have not visited the site;

8) I have not had prior involvement with Lamêlée Iron Ore Ltd. and its Lamêlée Project and property that is the subject of the Technical Report;

9) I state that, as the date of the certificate, to the best of my qualified 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;

10) I am independent of the issuer as defined in section 1.5 of NI 43-101;

11) I have read National Instrument 43-101 and Form 43-101F1, and the section 21.2.4 (Summary of Capital Cost Estimate/ Tailings Facilities Management), 21.6.4 (Operating Cost Estimate/ Tailings Operation Costs) and 26.3.8 (recommendation/Metallurgy/Tailings) of the Technical Report has been prepared in compliance with that instrument and form;

This 19th day of December, 2014.

Original signed and sealed

(Signed) "David Bédard"

____

David Bédard, Eng, MA.Sc.
Team Lead Mining Design – Geotechnical
AMEC Foster Wheeler

Michel L. Bilodeau, Eng., MSc (App), PhD
Independent Consultant
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CERTIFICATE OF AUTHOR

To Accompany the Report entitled:

"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada" dated December 19th, 2014, with effective date of November 25th, 2014.

I, Michel L. Bilodeau, Eng., do hereby certify that:

1) I am a retired (June 2009) Associate Professor from the Department of Mining and Materials Engineering of McGill University, 3450 University St., Montréal, QC, Canada H3A 2A7, and have continued teaching on a contract basis the mineral economics course of the mining engineering program at McGill in the Winter terms of 2010, 2011 and 2012;

2) I am a graduate of École Polytechnique de Montréal with a B.Eng. in Geological Engineering (1970), and of McGill University with a M.Sc. (App.) in mineral exploration (1972) and a Ph.D. in mineral economics (1978);

3) I am a member in good standing of the "Ordre des ingénieurs du Québec" (23799);

4) While employed at McGill (1975-2009), I have taught continuously in the areas of engineering economy, mineral economics and mining project feasibility studies in the mining engineering program dispensed by the University, and have carried out in the capacity of independent consultant several assignments related to the economic/financial analysis of mining projects;

5) 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 by NI 43-101) and past relevant work experience in the mineral industry that includes teaching for more than 30 years and consulting activities over the past 25 years,, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;

6) I have participated in the preparation of the report entitled **"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada"** dated December 19th, 2014, as an Economic/Financial Analyst Consultant, and I am responsible for Section 22 and parts of sections 1and 25;

7) I have not visited the site;

8) I have not had prior involvement with Lamêlée Iron Ore Ltd. and its Lamêlée Project and property that is the subject of the Technical Report except for the present Technical Report;

9) I state that, as of the date of this certificate, to the best of my qualified 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;

10) I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report;

11) I am independent of the issuer as defined in section 1.5 of NI 43-101;

12) I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form;

This 19th day of December, 2014.

Original signed and sealed

(Signed) “Michel Bilodeau”

____

Michel L. Bilodeau, Eng., MSc (App), PhD
Economic/Financial Analyst
Consultant for CIMA+

Yves A. Buro, Eng.
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Email: yburo@met-chem.com

CERTIFICATE OF AUTHOR

To Accompany the Report entitled:

"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada" dated December 19th, 2014 with effective date of November 25th, 2014.

I, Yves A. Buro, Eng, do hereby certify that:

1) I am a Senior Geologist presently with Met-Chem Canada Inc. (Met-Chem) with an office situated at Suite 300, 555 René-Lévesque Blvd. West, Montréal, Canada;
2) I am a graduate of University of Geneva, Switzerland, with the equivalent of a B.Sc. and a M.Sc. in Geology obtained in 1976;
3) I am a member in good standing of the Ordre des Ingénieurs du Québec (Reg. 42279);
4) I have worked as a geologist continuously since graduation from University in 1976. I have gained direct experience on iron deposits similar to the Lamêlée Project, as exploration geologist in the U.S.A., Africa, India, South America;
5) 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 by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;
6) I have participated in the preparation of the report entitled **"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) Study Report for the Lamêlée Project, Québec, Canada"** dated December 19th, 2014, under Met-Chem consultation company as geologist. I have participated, and I am responsible for sections 4, 6, 7, 8, 9, 10, 11 and part of sections 1, 12, 25, 26;
7) I have not visited the site;
8) I have not had prior involvement with Lamêlée Iron Ore Ltd. and its Lamêlée Project and property that is the subject of the Technical Report;
9) I state that, as the date of the certificate, to the best of my qualified 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;

10) I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report;

11) I am independent of the issuer as defined in section 1.5 of NI 43-101;

12) I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form;

This 19th day of December, 2014.

Original signed and sealed

(Signed) "Yves A. Buro"

___

Yves A. Buro, Eng.
Senior Geological Engineer
Met-Chem Canada Inc.

Jeffrey Cassoff, Eng.
Met-Chem Canada Inc.
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CERTIFICATE OF AUTHOR

To Accompany the Report entitled:

"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada" dated December 19th, 2014 with effective date of November 25th, 2014.

I, Jeffrey Cassoff, Eng, do hereby certify that:

1) I am the Lead Mining Engineer presently with Met-Chem Canada Inc. with an office situated at Suite 300, 555 René-Lévesque Blvd West, Montréal, Canada;

2) I am a graduate of McGill University in Montréal with a Bachelor's degree in Mining Engineering obtained in 1999;

3) I am a member in good standing of the Ordre des Ingénieurs du Québec (Reg. 5002252);

4) I have worked as a mining engineer continuously since graduation from university in 1999;

5) 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 by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;

6) I have participated in the preparation of the report entitled **"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada"** dated December 19th, 2014, under Met-Chem consulting company as Lead Mining Engineer. I have participated, and I am responsible for sections 15 and 16 and part of sections 1, 21, 25 and 26;

7) I have visited the site on October 8th, 2014;

8) I have not had prior involvement with Lamêlée Iron Ore Ltd. and its Lamêlée Project and property that is the subject of the Technical Report;

9) I state that, as the date of the certificate, to the best of my qualified 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;

10) I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report;

11) I am independent of the issuer as defined in section 1.5 of NI 43-101;

12) I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form;

This 19th day of December, 2014.

Original signed and sealed

(Signed) "Jeffrey Cassoff"

____

Jeffrey Cassoff, Eng.
Lead Mining Engineer
Met-Chem Canada Inc.

Mathieu Girard, Eng.
Soutex Inc.
357 Jackson
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CERTIFICATE OF AUTHOR

To accompany the Report entitled:

"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada" dated December 19th, 2014 with effective date of November 25th, 2014.

I, Mathieu Girard, Eng., do hereby certify that:

1) I am a professional Engineer, employed as a Senior Metallurgist by Soutex with an office situated at 357 Jackson, Québec City, Province of Québec, Canada;
2) I received a Bachelor's Degree in Material and Metallurgy Engineering from Université Laval in 2000, and a Master's Degree in Metallurgical Engineering from Université Laval in 2004;
3) I am a member in good standing of the Ordre des Ingénieurs du Québec (no. 129366);
4) I have over ten (10) years of experience in mineral processing operation support, optimization and design. I first worked for Algosys (now Triple Point) then joined Soutex in 2005 as a Metallurgist;
5) I have read the definition of "qualified person" set out in the National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;
6) I participated in the preparation of the report entitled **"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada"** dated December 19th, 2014, as a Senior Metallurgist for the consultation company Soutex. I have participated in, and I am responsible for sections 13 and 17, as well as the process related paragraphs of sections 1, 25 and 26;
7) I have not visited the site;
8) I have not had prior involvement with Lamêlée Iron Ore Ltd. nor its Lamêlée Project and property that is the subject of the Technical Report;
9) I state that, as of the date of this certificate, to the best of my qualified knowledge, information and belief, the Technical Report contains all the scientific and technical information that is required to be disclosed in order to produce a Technical Report that is both clear and accurate;

10) I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report;

11) I am independent of the issuer as defined in section 1.5 of NI 43-101;

12) I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with the instrument and form detailed in these documents.

This 19th day of December, 2014.

Original signed and sealed

(Signed) "Mathieu Girard"

Mathieu Girard, Eng., M. Sc.
Senior Metallurgist
Soutex Inc.

Schadrac Ibrango, P.Geo. PhD.
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CERTIFICATE OF AUTHOR

To Accompany the Report entitled:

"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada" dated December 19th, 2014 with effective date of November 25th, 2014.

I, Schadrac Ibrango, P.Geo. PhD. do hereby certify that:

1) I am a Senior Geologist with Met-Chem Canada Inc. ("Met-Chem") with an office situated at Suite 300, 555 Boul. René-Lévesque West, Montréal, Canada;
2) I am a graduate of University of Ouagadougou (Burkina-Faso) with a Master Degree in Geology obtained in 1998 and a Ph.D. in Engineering of Darmstadt Unversity of Technology (Germany) obtained in 2005;
3) I am a member in good standing of the Ordre des Géologues du Québec (#1102) and of the Professional Engineers and Geoscientists Newfoundland and Labrador (#07633);
4) I have practiced my profession continuously since 1998. I have gained direct experience on iron projects similar to Lamêlée Project, as geologist in Canada
5) 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 by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;
6) I have participated in the preparation of the report entitled **"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) Report for the Lamêlée Project, Québec, Canada"** dated December 19th, 2014, under Met-Chem as Senior Geologist. I have participated, and I am responsible for section 14 and part of section 12, 25 and 26;
7) I have visited the site on October 8th and October 9th, 2014;
8) I have not had prior involvement with Lamêlée Iron Ore Ltd. and its Lamêlée Project and property that is the subject of the Technical Report;
9) I state that, as the date of the certificate, to the best of my qualified 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;

10) I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report;

11) I am independent of the issuer as defined in section 1.5 of NI 43-101;

12) I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form;

This 19th day of December, 2014.

Original signed and sealed

(Signed) "Schadrac Ibrango"

____

Schadrac Ibrango, P.Geo., Ph.D.
Senior Geologist
Met-Chem Inc.

Jean-Sébastien Houle, Eng.
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CERTIFICATE OF QUALIFIED PERSON

To accompany the report entitled:

"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada" dated December 19th, 2014 with effective date of November 25th, 2014.

I, Jean-Sébastien Houle, Eng, do hereby certify that:

1) I am the project manager presently with WSP Canada Inc. with an office located at 171A, Léger Street, Sherbrooke, Québec, Canada;
2) I am a graduate from Université Laval, Québec, Canada, with a Coop Bachelor's degree in Mining and Mineral Processing Engineering obtained in 2000;
3) I am a member in good standing of the Ordre des Ingénieurs du Québec (no. 129263);
4) I have worked as a engineer continuously since graduation from university in 2000;
5) 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 by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;
6) I have participated in the preparation of the report entitled **"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada"** dated December 19th, 2014, as engineer in mining environment. I have participated, and I am responsible for section 20 and part of section 1, 3, 21, 25, 26;
7) I have visited the site on October 8th, 2014;
8) I have not had prior involvement with Lamêlée Iron Ore Ltd. and its Lamêlée Project and property that is the subject of the Technical Report;
9) I state that, as the date of the certificate, to the best of my qualified 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;
10) I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report;
11) I am independent of the issuer as defined in section 1.5 of NI 43-101;
12) I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form;

This 19th day of December, 2014.

Original signed and sealed

(Signed) "Jean-Sébastien Houle"

Jean-Sébastien Houle, Eng.
Project Manager, Geomechanics and Mining Environment
WSP Canada Inc.

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CERTIFICATE OF AUTHOR

To Accompany the Report entitled:

"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada" dated December 19th, 2014 with effective date of November 25th, 2014.

I, Jean-Sébastien Tremblay, Eng, do hereby certify that:

1) I am the project manager presently with CIMA+ with an office situated at Suite 900, 740 Notre-Dame Street, Montréal, Canada;
2) I am a graduate from École Polytechnique de Montréal with a Bachelor's in Mining Engineering obtained in 2000;
3) I am a member in good standing of the Ordre des Ingénieurs du Québec (no. 126856);
4) I have worked as a engineer continuously since graduation from university in 2000;
5) 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 by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101;
6) I have participated in the preparation of the report entitled **"NI 43-101 Technical Report on the Preliminary Economic Assessment (PEA) for the Lamêlée Project, Québec, Canada"** dated December 19th, 2014, under CIMA+ consultation company as Project Manager. I have participated, and I am responsible for sections 2, 3, 5, 18, 19, 23, 24, 27 and part of section 1, 21, 25, 26;
7) I have visited the site on October 8th, 2014;
8) I have not had prior involvement with Lamêlée Iron Ore Ltd. and its Lamêlée Project and property that is the subject of the Technical Report;
9) I state that, as the date of the certificate, to the best of my qualified 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;

10) I have no personal knowledge, as of the date of this certificate, of any material fact or material change which is not reflected in this Technical Report;

11) I am independent of the issuer as defined in section 1.5 of NI 43-101;

12) I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form;

This 19th day of December, 2014.

Original signed and sealed

(Signed) “Jean-Sébastien Tremblay”

____

Jean-Sébastien Tremblay, Eng.
Project Manager
CIMA+

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1 Summary

1.1 Introduction

CIMA+ was retained by Lamêlée Iron Ore Ltd. ("Lamêlée Iron Ore") to prepare a Technical Report for a Preliminary Economic Assessment (PEA) (the ''PEA'') for the Lamêlée Project (the ''Project''), located in Québec. Met-Chem was assigned to prepare the mineral resource estimate, as well as to produce the mine plan and the in-pit resource estimate. Soutex was to provide their expertise for the metallurgical testing, the tailing plan was developed by AMEC and the elaboration of the process and the environmental considerations and permitting was to be carried out by WSP Canada Inc. (''WSP'').

The financial analysis for the Project was developed by Michel Bilodeau and the product selling price was developed using a market studies provided by Lamêlée Iron Ore.

Site visits by CIMA+, WSP and Met-Chem were carried out in October 2014.

1.2 Property Description and Ownership

The Lac Lamêlée South Iron Property is located in northeastern Québec near the provincial boundary with Labrador, approximately 50 km southwest of the city of Fermont and 500 km north of the city of Baie-Comeau. The Property is situated approximately 10 km to the NW of ArcelorMittal's Fire Lake iron mine and 10 km W-SW of the Fire Lake North project of Champion Iron Mines Ltd. ("Champion") see Figures 4.1 and 4.3. The Lac Lamêlée South Property is comprised of 29 claims each of an area of approximately 52.5 ha, for a total of 1,524 hectares. All the claims were active and in good standing at the time of writing this report.

All claims were acquired as "map-designated claims" ("CDC") and registered under the name of Lamêlée Minerais de Fer Ltée, (also known as Lamêlée Iron Ore Ltd. ("LIO"), and formerly known as Gimus Resources Inc.) as the 100% holder. Fancamp Exploration Ltd. of Burnaby, B.C., is registered as the main shareholder of the company.

On September 16, 2013 Fancamp Exploration Ltd. ("Fancamp"), Champion and Gimus Resources Inc. ("Gimus") signed an agreement aimed at developing Fancamp's Lac Lamêlée South Iron Project. The transaction constitutes a reverse takeover of Gimus by Fancamp. Gimus will assume an existing 1.5% NSR Royalty on the Project, which is payable to the Sheridan Platinum Group Ltd. ("SPG") as the original owner of the Property with Fancamp.

1.3 History

The first recorded exploration work on the Property was conducted by Québec Cartier Mining (QCM) from 1950 to 1955, to follow up on known magnetic anomalies.

Fancamp Exploration Ltd. carried out claim staking and exploration drilling, sampling and geophysical surveys between 2004 and 2012. In May 2013 P.J. Lafleur Geo-Conseil Inc. issued a NI 43-101 Technical Report for Fancamp and prepared a resource estimate. This resource estimate was based on the results of the 57 holes drilled in 2011 and 2012 at different spacing along sections 100 m apart. Since the resource was based on limited drilling in the structurally complex and highly metamorphosed deposit, P.J. Lafleur considered a classification of all the mineral resource in the Inferred category.

1.4 Geology and Mineralization

The Lamêlée Property is located in the western margin of the Proterozoic sedimentary and volcanic rocks forming the Labrador Trough, also known as the Labrador-Quebec Fold Belt. The Labrador Trough contains world-class iron deposits hosted in the Sokoman formation that occurs as sub-basins throughout the fold belt.

The Labrador Trough extends in Quebec and Labrador for more than 1,100 km, from Ungava Bay to Lake Pletipi in Quebec, near the Manicouagan impact crater. The Trough is about 100 km wide in its central part and narrows considerably to the north and the south. It extends in an N-NW direction in the north and turns into a SW orientation, immediately south of, and parallel to, the Grenville Front.

The rocks in the Labrador Trough were deposited in a continental-rift environment. They are subdivided into a lower sedimentary sequence known as the Knob Lake Group occurring in the western part and an upper mafic volcanic-dominated succession known as the Doublet Group in the eastern part. These rocks are collectively referred to as the Kaniapiskau Supergroup (Frarey and Duffell, 1964; Wardle, 1979).

The Labrador Trough is divided into three geological/metamorphic domains:

a) Southern Domain

The Southern Domain, also referred to as the Gagnon Terrane, is located to the south of the northern limit of the Grenville Orogenic Belt defined as the biotite metamorphic isograd. The rocks in the Southern Domain were metamorphosed during the Grenville Orogeny, which also involved thrusting, folding and emplacement of abundant intrusive rocks. The high-grade metamorphism is responsible for the recrystallization of the primary iron formation, producing coarse-grained quartz, magnetite and specular hematite in a rock called meta-taconite, thus improving the quality of the mineralization with respect to beneficiation. Rocks in the Southern Domain are recognized as the metamorphosed equivalent of the Central Domain's Knob Lake Group (Table 7.1). The iron-bearing unit in this area is known as the Wabush Iron Formation, but it is the equivalent of the Sokoman Formation to the north. The Lamêlée Property is located in the Southern Domain.

b) Central Domain

The Central Domain, or Knob Lake Range, extends northward to the Leaf Bay area (58° 30' N latitude) along the west side of Ungava Bay. The Central Domain consists of a sequence of Archean rocks dominated by sediments, but also includes iron formations, volcanic rocks and mafic intrusions (Kaniapiskau Supergroup). Metamorphism grade is to the greenschist facies.

c) The Northern Domain

The Northern Domain, north of the Leaf Bay area, is comprised of rocks like those of the Southern Domain but metamorphosed to the amphibolite facies.

The Fermont-Wabush area is underlain by the Gagnon Terrane within the Grenville Province. The Archean gneiss or migmatite of the Ashuanipi Complex, interlayered with garnetiferous amphibolite, forms the basement of most of the area. The metamorphosed equivalent of the Lower Proterozoic Knob Lake Group unconformably overlies the basement gneiss. The Knob Lake Group consists of a continental margin metasedimentary sequence made up of pelitic schists, iron formation, quartzite, dolomitic marble, gneiss and, locally, mafic volcanic rocks. The Knob Lake Group was deformed and underwent metamorphism ranging from greenschist to upper amphibolite facies during the Grenville Orogeny.

The knowledge of the Property geology essentially derives from the results from diamond drilling in 2011 and 2012 considering the scarcity of outcrops. The property geology is illustrated in the regional geology map from the Quebec Ministry of Natural Resources (Figure 7.1).

Two main facies of the Wabush Formation that hosts the iron mineralization have been described on the Property:

- The “Iron Oxide Unit”, consisting primarily of quartz, magnetite and/or hematite (specularite) in varying proportions. The Iron Oxide member has been broken down into three sub-units: Magnetite Iron formation (MIF), Hematite (specularite) Iron formation (HIF) and the Magnetite–hematite Iron formation (MHIF/HMIF). The three sub-units differ in their ratios of magnetite to hematite but are geochemically and texturally similar. The units are described as well-banded, fine to medium grained rock with cm- to mm-scale beds of magnetite and/or hematite (typically specularite) alternating with quartz beds that usually contain disseminated magnetite and/or hematite. Locally, the bedding becomes diffused and the rock turns into a quartzite with disseminated magnetite.
- The “Iron Oxide - Silicate Unit” made up of Quartz-Pyroxene-Magnetite (QPyrxM). This unit is characterized by a significant proportion, up to about 50%, of pyroxene-rich bands alternating with bands of quartz, bands of massive magnetite and/or hematite or of disseminated magnetite and/or hematite. The QPyrxM varies considerably in its iron oxide content but the average ranges from about 15 to 25% magnetite, with occasional hematite. The contacts between the two facies are often gradational.

1.5 Mineral Processing and Metallurgical Testing

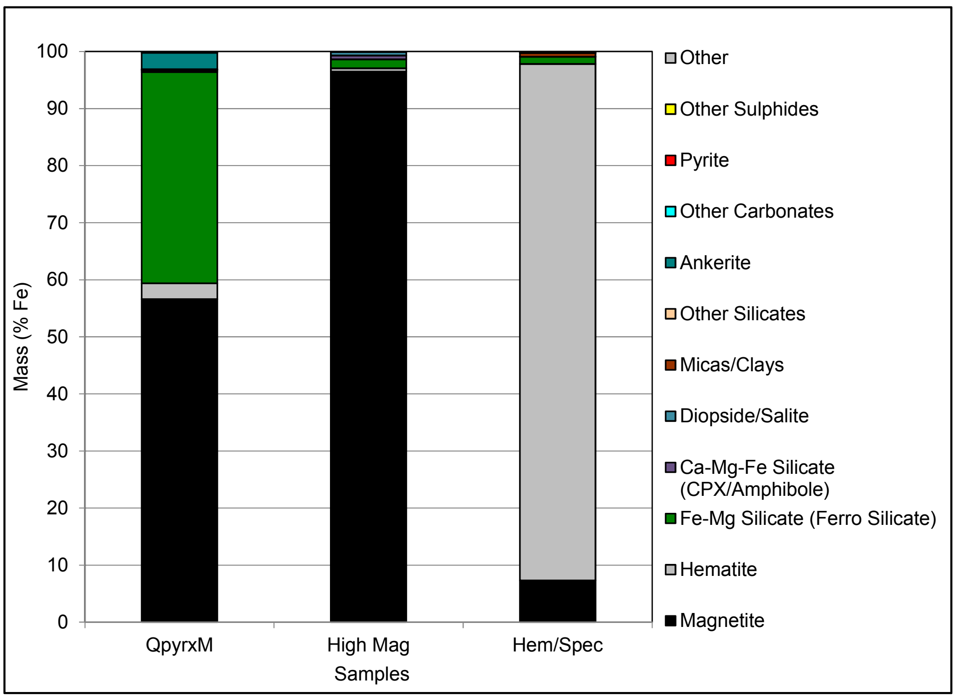
Three (3) specimens from the three (3) principal units (MIF, MHIF and QPyrxM) of the deposit that offer economic potential were used for the PEA metallurgical testwork program (Table 1.1). The iron grades of the specimens are significantly higher than the average grade of the deposit.

Table 1.1 – Satmagan Analysis, Specific Gravity and Calculated Elements

Sample	Analysis						
	SG -	Fe (%)	Mag (%)	Fe Mag (%)	Mn (%)	P (%)	Fe Mag/Fe (%)
High Mag	3.67	36.37	50.18	36.33	1.10	0.02	99.89
Hem/Spec	3.66	37.31	5.78	4.19	0.06	0.02	11.22
QPyrxM	3.60	32.35	23.51	17.02	0.67	0.02	52.62

Qualitative and quantitative mineralogical characterization tests were performed on the specimens. The characterization indicated that Fe-oxides represent 50.7 % of the High Mag sample (50.4 % magnetite, 0.3 % hematite), about 55.7 % of the Hem/Spec sample (51.5 % hematite, 4.2 % magnetite) and 29.2 % of the QPyrxM sample (27.8 % magnetite, 1.4 % hematite). The QPyrxM sample contains a significant amount of iron silicates. Contaminants are quartz, Fe-Mg silicate, Ca-Mg-Fe silicate, micas/clays (silicate). ankerite (carbonate), calcite (carbonate) and diopside/salite (silicate). Figure 1.1 presents the Fe deportment in the specimens.

Figure 1.1 – Fe Deportment - All Specimens



The QEMSCAN indicates that the liberation sizes for Fe-oxide particles is around 600 µm for the High Mag, between 1700 to 850 µm for the Hem / Spec, and between 600 µm to 300 µm for the QPyrxM.

Several comminution tests were conducted on the composite specimens and the test results obtained are summarized in Table 1.2.

Table 1.2 – Grindability Test Results Summary

Sample	JK Parameters Drop Weight Test				JK Parameters SMC Test				Crushing work index (kWh/t)	Rod Mill Work index (kWh/t)	Ball Mill Work index 106 um (kWh/t)	Ball Mill Work index 75 um (kWh/t)	Aj (g)
	A	B	Axb	ta	A	B	Axb	ta					
High Mag	87.3	8.2	712.4	3.43	90.3	9.1	824.4	6.31	4.5	-	17.8	20.6	0.058
Hem/Spec	92.8	10.0	928.0	4.49	-	-	-	-	-	-	22.0	24.8	0.056
QPyrxM	-	-	-	-	77.3	0.8	61.8	0.45	-	10.4	14.8	17.1	0.465

The drop weight test results indicate that, in terms of impact and abrasion breakage, the High Mag and Hem/Spec samples are considered a very soft ore type, while the QPyrxM can be considered as a medium ore type.

Heavy Liquid Separation (HLS) tests were performed on each sample. The objective was to evaluate whether the ore was amenable to gravity concentration. The High Mag sample showed a gravity separation potential to produce a concentrate at 4.5 % SiO_2 at a grinding size close to 600 µm. The Hem/Spec sample showed a gravity separation potential to produce a concentrate at 4.5 % SiO_2 at a grinding size of 1700 µm. The QPyrxM sample did not show a potential for gravity separation. Fe-Mg silicate recovery is important and produces a concentrate with a high SiO_2 grade.

Davis Tube Tests were performed on High Mag and QPyrxM samples. The objective was to evaluate whether the ore was amenable to magnetic concentration. The High Mag sample showed interesting magnetic separation potential to produce a concentrate at 4.5 % SiO_2 at a grinding size of between 150 µm and 75 µm. The QPyrxM sample showed interesting magnetic separation potential to produce a concentrate at 4.5 % SiO_2 at a grinding size of around 150 µm. Low iron recovery should be expected considering only 50 % of the Fe is in a magnetite form.

Preliminary Wilfley Table Tests were performed at SGS. The Wilfley Table test is used as a first assessment of the industrial gravity separation potential of an ore. Tests were performed at -1.7 mm and at -600 µm. The tests results are not coherent with the mineralogical analyses and the HLS results obtained on the High Mag and Hem/Spec samples. The suspected causes of these results are the non-optimal Wilfley Table operating parameters and circuit configuration.

A weight recovery model was developed based on the HLS tests, on assumed fine particles recovery and on industrial process performance. The model assumes the production of a concentrate at an average of 4.5 % SiO_2 and 64.3 % Fe. The model developed is the following:

Weight Recovery = 1.4952 x Fe Feed Grade – 8.1543

Based on this model, an iron feed grade of 29.7 % will allow a weight recovery of 36.3 %.

1.6 Mineral Resource Estimate

The mineral resource estimate was carried out by Met-Chem. No recent drill holes were added on the property since 2012 and the Mineral Resources update was undertaken after the geological model was refined using the additional information provided by the recent characterisation work and an effort to discriminate the type of iron, namely the iron oxides (MIF, HIF and MHIF) and the iron silicates (QPyrxM). The geological modelling was completed after the last validation process was finalized and the updated database was imported into MineSight® v. 9.00. The geological model developed is based on four (4) envelopes. One envelop referred to as Magnetite Iron Formation (MIF), one envelop referred to as Hematite Iron Formation (HIF), one envelop referred to as Quartz-Pyroxene-Magnetite (QPyrxM) and finally a mixed envelope referred as Magnetite Hematite Iron Formation (MHIF).

Due to the folded nature of the mineralization, its mixed nature, the irregular and sparse drilling pattern and the insufficiency of data, Met-Chem feels that a variography analysis at this stage will not deliver relevant and unbiased results. No variograms were generated for the purpose of the current Mineral Resource estimation.

Met-Chem chose, at this preliminary stage of the project development, to use an average density of 3.35 to convert the volumes of all mineralized envelopes into tonnes. That value represents the average density of samples that have a total iron in the range of 28.5% which is the iron average for the entire mineralization.

Met-Chem believes that more density measurements and exercises to domain different density/T Fe% populations are required to better understand and model the density.

The average distance between two holes as computed by Met-Chem is 127 m for the entire deposit. For the X and Y directions Met-Chem elected to consider a block size of 30 m × 30 m which roughly corresponds to one third (1/3) of the drill spacing. A height of 15 m was considered in the Z direction to align with the projected type of mining equipment.

The Mineral Resource was interpolated using the Inverse Distance Squared ("IDW2") method.

Mineral Resource classification is based on certainty of geology and grades and in most cases is related to the drilling density. Areas that are more densely drilled are usually better known and understood than areas with sparser drilling which could be considered to have a lower confidence level. However, in some rare cases, even a tight drill pattern may not allow for certainty on grades and geological continuity. This is particularly true in the case of deposits that show high variability on grades and high nugget effect. Met-Chem's QP found it appropriate to classify all tonnes estimated within the MIF, HIF and MHIF mineralized envelopes and limited by Lac Lamêlée as Inferred Mineral Resources. The QPyrxM which has a substantial tonnage and potential of 175 Mt (excluding volumes under Lac Lamêlée) was not considered as Mineral Resource since at this stage there has been no characterisation work that has attested an economic potential for its magnetite disseminations that are associated with iron silicates.

Under CIM definitions, Mineral Resources should have a reasonable prospect of economic extraction. Met-Chem chose to exclude the portion of the mineralization that lies below Lac Lamêlée from the Mineral Resource estimate since the complete dewatering of Lac Lamêlée, the construction of dykes to cut-off portions of the lake or underground mining of this mineralized material would most likely not be an economic option for the Project. The Mineral Resource Estimate for the Lac Lamêlée iron deposit contains 354.1 Mt of Inferred Mineral Resources at an average Total Fe grade of 29.49%, using a cut-off grade of 15% T Fe.

Table 1.3 – Mineral Resource Estimate

Category	Resources (Mt)	T Fe (%)
Inferred	354.1	29.49

Mineral resources cannot be considered Mineral Reserves until they have demonstrated economic viability. Environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues may materially affect the estimate of mineral resources. The quantity and grade of reported Inferred Mineral Resources in this estimate are uncertain in nature and there has been insufficient exploration to define these Inferred Mineral Resources as Indicated or Measured Mineral Resources and it is uncertain if further exploration will result in upgrading them to the Indicated or Measured Mineral Resource categories.

1.7 Mineral Reserve Estimate

Since this report is a Preliminary Economic Assessment (PEA) report, no Mineral Reserves are estimated. The Mineral Resources have to be classified as In-pit Mineral Resources.

1.8 Mining Methods

The mining method selected for the Project is a conventional open pit, drill and blast, truck and shovel operation with 15 meter high benches. Topsoil and overburden will be stripped and stockpiled for future reclamation use. The mineralization and waste rock will then be drilled, blasted and loaded into rigid frame haul trucks with hydraulic shovels. The mineralized material will be hauled to the primary crusher and the waste rock will be hauled to the waste rock piles. The mine will operate 365 days per year, 24 hours per day.

A pit optimization analysis was carried out using preliminary mining and processing costs and operating parameters, which determined that the open pit design should be based on the pit with a revenue factor of 0.65. Since this study is at a PEA level, NI 43-101 guidelines allow Inferred Mineral Resources to be used in the optimization and mine plan.

The pit design for the PEA was done using an offset of 50 m from Lac Lamêlée, an inter-ramp angle of 52° for the final pit wall configuration and a ramp width of 31 m. The design resulted in two (2) open pits that combined contain 272 Mt of Inferred Mineral Resources at a Total Fe grade of 29.7% (Weight Recovery of 36.3%), which account for mining dilution and losses. In order to access these Resources, 45 Mt of overburden and 591 Mt of waste rock must be mined. The total waste quantity of 636 Mt results in a stripping ratio of 2.3 to 1. The larger of the open pits will reach a depth of 500 m below surface.

A mine plan was developed for the 20-year life of the open pit mine which produces 5 Mt per year of iron concentrate. The mine plan was used to determine the fleet of mining equipment which was estimated to be include 22 haul trucks (227 tonne), 3 electric drive hydraulic shovels (26.5 m3 bucket), 3 production drills as well as a fleet of support and service equipment. The peak workforce for the mine reaches 218 employees.

1.9 Recovery Methods

Table 1.4 presents a global mass balance of the concentrator.

Table 1.4 - Global Mass Balance

Description	Production		Fe Grade	Recovery	
				Weight	Fe
	t/h	t/y	%	%	%
Feed	1 711	13 791 909	29.7	100.0	100.0
Concentrate	620	5 000 000	64.3	36.3	78.4
Tailings	1 091	8 791 909	10.0	63.7	21.6

Ore from the mine is delivered by trucks to the gyratory crusher. Crushed ore falls on a surge conveyor which transports it to the crushed ore stockpile

Ore is withdrawn from the crushed ore stockpile to feed an Autogenous Grinding mill (AG mill). Ground ore is discharged on scalping screens: the screen oversize is returned to the mill and the screen undersize is pumped into distributors which equally distribute the slurry onto the classification screens. The screens oversize is returned to the mill for further grinding, while the undersize consists of the grinding circuit product and is sent for upgrading to the gravity separation circuit.

The first stage of gravity separation is performed by rougher spirals that remove the coarse silica. The rougher spirals concentrate is sent to the cleaning hydrosizers that will efficiently remove medium and fine silica. The cleaning hydrosizers produce a high grade concentrate at their underflows. The hydrosizer overflow is processed by the scavenger spirals.

The main concentrate launder combines the two (2) concentrates produced by the plant to produce a constant final concentrate and feed to the pan filters.

The tails of both the rougher and the scavenger spirals are final tails. Final tailings feed a cluster of classification cyclones. The tailings cyclone underflows consist in the coarse tailings. The tailings cyclone overflow feeds a thickener along with the filtrate tank overflow. The thickener overflow flows by gravity to the process water tank and it constitutes the main source of process water for the plant operation. The thickener underflow is the fine tailings.

During the summer, the fine tailings from the thickener underflow and the coarse tailings from the cyclone underflow are disposed of separately in the same settling basin. The coarse tailings are then used for dam building.

During the winter, the fine is mixed to the coarse tailings through a by-pass on the fine tailings line to the coarse tailings pump box. The tailings are then pumped and disposed of together.

Process water is almost a closed loop circuit. The main source of process water is the thickener overflow. The process water losses are compensated by reclaiming water from the tailings basin overflow. All the process water goes through the process water tank.

1.10 Project Infrastructures

The Project has four main areas namely the open pit mine, the crusher and the concentrator area, the train loading and rail way area (about 3.0 km to the southeast) and the concentrate storage and ship loading area (about 400 km south of the train loading area). Section 18, including the figures, show the planned development.

The mine site haulage roads include haul roads to the crusher, to the waste and overburden dumps and they will be 31 m wide to accommodate the mine haul trucks. The main access road to the site from the existing road 389 and all other roads on the concentrator site and to the camp will be 10 m wide; Because only service vehicles travel those roads. The mineralized material coming from the pit will be crushed in a gyratory crusher to be constructed close to the concentrator. In addition to the gyratory crusher with the two dump “stations”, a “takeaway” conveyor to feed a crushed stockpile will be installed. The concentrate produced in the concentrator will be transported via three (3) conveyors and two (2) transfer towers to the train load-out station at the new proposed railway loop to the existing railroad track.

A modular building will be installed close to the concentrator. This building will include 12 modules of 3.6m x 18m. The administration building sections will house the offices for the project managers and other supervisory personnel as well as the concentrator supervisors, secretary, accounting, human resources, safety and first aid personnel. A section of this building will be reserved for the mine related operations. The workshop for mining equipment maintenance will be a light structure building unit. Both ends of the structure will have a large door for the 227 tonne trucks. This workshop will be used for all maintenance jobs on all equipment. Three fuel storage tanks and a filling station will be installed. The explosive preparation and storage facilities will be constructed west of the concentrator, at least 1 km away from the road to the mine. The main power station will be constructed near the concentrator. An accommodation camp will be installed to house the mine, the concentrator, the service and maintenance as well as the administrative personnel.

The fourth area where new infrastructures will be built will be near Port Cartier. Close to the end of the existing railroad track a new railway loop will be installed to a concentrate storage area (2 x 400 000 tonnes stockpiles). The infrastructures required for this site will include the electric power station connected to the existing 161 kV Hydro-Québec power line, the train unloading station and the office building combined with a warehouse and maintenance facility. The concentrate will be reclaimed from the stockpiles and transported to the dock and ship loading system via five conveyors and five transfer towers.

1.11 Market Studies and Pricing

In order to arrive at a acceptable projection of the possible market price of future iron ore concentrate sales, several market study projections were considered. From these projections, the selling price of the concentrate was estimated with the “Midrange Value” of all the forecasts. The projected price for the iron concentrate has been estimated at US$97.50/tonne / CFR China.

1.12 Environment Studies, Permitting and Social or Community Impact

The Project will be subject to Environmental Impact Assessment (EIA) in accordance with provincial and federal requirements. Following release from the provincial and federal EIA processes, the project will require a number of approvals, permits and authorizations prior to initiation and throughout all stages in the life of the project. In addition, the proponent will be required to comply with any other terms and conditions associated with the EIA release issued by the provincial and federal regulators. Additional details are provided in Section 20.

Lamêlée Iron Ore Ltd. Already contracted WSP in 2014 to initiate an Environmental Baseline Study for the Project which will eventually be completed in 2015.

1.13 Capital and Operating Costs

The capital cost of the project is the cost for the initial development of the project. When additional capital expenditures are planned for future capital replacements they would be charged as sustaining capital expenditures. Table 1.5 shows the summary of the estimated capital cost.

Table 1.5 – Summary of Capital Cost Estimate

Description		
WBS No	**Direct Cost**	**Total ($'000)**
0-0-00	General	59 881
1-0-00	Mining	34 575
2-0-00	Crusher, Conveyor and Concentrator	220 399
3-0-00	Tailings Facility Management	110 891
4-0-00	Infrastructures	38 049
5-0-00	Railroad and Yard	22 766
6-0-00	Port and Terminal	129 957
	Total Direct Cost	**616 518**
	Project Indirect Costs	**Total ($'000)**
9-1-00	Owner's Costs	12 500
9-2-00	EPCM Services	64 335
9-3-00	Construction Field Indirects	26 623
9-9-10	Contingencies	75 134
9-9-20	Escalation (excluded)	0
9-9-30	Risk (excluded)	0
	Total Indirect Cost	**178 592**
	Other Costs	**Total ($'000)**
	Mine Pre-Production	21 561
	Total Project Cost	**816 671**

The summary of the unit operating costs per tonne of ore and per tonne of concentrate of an average year of operations, are shown in Table 1.6.

Table 1.6 – Summary of an Average Year of Operations per Area

	Annual Cost	Unit Cost	
Area	**$'000**	**$/tonne Mineralization**	**$/tonne Conc.**
Mining	108 046	7.95	21.92
Concentrating	32 464	2.39	6.59
Tailings	8 131	0.60	1.65
General and Administration	34 714	2.55	7.04
Rail Transportation	56 379	4.15	11.43
Port Handling	30 454	2.24	6.18
TOTAL	**270 188**	**19.88**	**54.81**

The capital expenditures during the life of the mine (the Sustaining Capital) are required to maintain or upgrade the existing asset and to continue the operation at the same level of production. They are charged as an operating cost and are shown in Tables 21.11 to 21. 14.

Mine closure costs for the Project are estimated at approximately $65.18 million spread over three years and must be secured in a trust fund at the beginning of mining operations. It is assumed that trust fund payments are made in the last pre-production year and in the first two years of operation in the proportions of 50/25/25 %, respectively.

1.14 Economic Analysis

A preliminary economic analysis has been carried out for the Project using a cash flow model. The model is constructed using annual cash flows in constant third quarter 2014 Canadian dollars and is based on an iron concentrate production of 5 million tonnes per year. As a general rule, the financial assessment of projects of this nature is carried out on a “100% equity” basis, i.e. the debt and equity sources of capital funds are ignored. No provision is made for the effects of inflation.

For this analysis, the following price has been assumed:

- Iron concentrate, 64.3% Fe US$ 97.50/t, CFR China

Assuming transportation costs of US$ 18.00 per tonne from Port Cartier to the China market, the realised price of the product at Port Cartier is:

- Iron concentrate, 64.3% Fe US$ 79.50/t, (CAD$ 88.33) FOB Port Cartier

The summary of the financial results is shown in Table 1.7.

Table 1 7 - Summary of Financial Results

Description	Units	
Total Revenue FOB Port Cartier (LOM)	$ M	8,708.2
Total Operating Costs including Royalty (LOM)	$ M	5,403.7
Total Pre-production Capital Costs including Royalty Buy-back	$ M	819.7
Total Sustaining Capital Costs (LOM)	$ M	116.7
Initial Working Capital	$ M	16.9
Mine Closure Costs	$ M	65.2
Salvage Value	$ M	39.8
BEFORE TAX		
Total Cash Flow	$ M	2,342.6
Payback Period	years	5.8
NPV @ 8%	$ M	529.9
NPV @ 6%	$ M	796.2
NPV @ 10%	$ M	330.8
IRR	%	15.4
AFTER TAX		
Total Tax Payments (LOM)	$ M	873.6
Total Cash Flow	$ M	1,469.1
Payback Period	years	6.4
NPV @ 8%	$ M	243.8
NPV @ 6%	$ M	425.9
NPV @ 10%	$ M	106.9
IRR	%	12.1

Both the project's net present value and internal rate of return are more sensitive to changes in operating costs than to changes in capital costs. As expected however, the project's financial performance is most sensitive to changes in selling price. See Section 22.2 for a description of the key economic, operating and technical assumptions used in preparing the economic analysis.

Important Caution Regarding the Economic Analysis

The economic analysis contained in this report is preliminary in nature. It incorporates inferred mineral resources that are considered too geologically speculative to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. It should not be considered a prefeasibility or feasibility study. There can be no certainty that the estimates contained in this report will be realized. In addition, mineral resources that are not mineral reserves do not have demonstrated economic viability.

The results of the economic analysis are forward-looking information that is subject to a number of known and unknown risks, uncertainties and other factors that may cause actual results to differ materially from those presented here.

1.15 Recommendations

The following studies should be carried out early in the next project phase:

1.15.1 Geology

In view of the information available at the time of the preparation of the resource estimate, Met-Chem provides the following recommendations. The new drilling program completed in the winter of 2014 fullfilled some of these and the opportunity exists to follow the other recommendations using the results from the drilling program.

- Complete additional drill holes in order to improve the reliability of the geological model and raise parts of the resources into higher resource categories;
- Perform additional in situ density measurements on core samples, using the weight in air and in water technique;
- Add Satmagan and Davis Tube tests and Heavy-Liquids separation using samples from the 2011 drilling program;
- Re-sample and analyze some of the drill holes from the 2011 program that had been sporadically sampled, using a continuous sampling approach of the mineralized intervals;
- Update the resources estimate once all the results from the analytical and testing laboratory are available;

- Update the resource estimate and the confidence level in the various parameters that can be calculated from the results of the 2014 drilling program before proceeding with any further economic study as part of the next phase of development of the Project.

1.15.2 Mining

- Met-Chem recommends a complete geotechnical pit slope analysis as well as hydrogeology studies when the Project advances. These studies should evaluate the appropriate pit wall configuration as well as the effect of Lac Lamêlée on the open pit (wall stability and water inflows);
- The hydrogeological study should provide an estimate of the quantity of water that is expected to be encountered during the mining operation;

1.15.3 Metallurgy

Soutex recommended the following testwork on representative samples for the next phase:

- Additional mineralogy and liberation analysis;
- Bulk material angle of repose, transportation and handling tests;
- Various test work for grinding, screening and beneficiation;
- Test work on concentrate and on tailings.

1.15.4 Infrastructures

- Initiate discussion with electric power company (Hydro-Québec) to confirm the power availability;
- Initiate discussions with local carrier for a railroad access agreement.

2 Introduction

2.1 Scope of Study

This Technical Report presents the results of the Preliminary Economic Assessment (PEA) for the development of the Lamêlée Project. The Project is entirely located in Québec, approximately 80 km (by road) south of Fermont, Québec. In May 2014, Lamêlée Iron Ore Ltd. mandated CIMA+ to prepare the PEA Study. The services of Met-Chem were retained to produce the mineral resource estimate, the mine plan and the in-pit resource estimate. Soutex was to provide their expertise for the metallurgical testing and the elaboration of the process. AMEC developed a conceptual design for the tailings pond. The environmental considerations and permitting was to be carried out by WSP. The preliminary economic analysis was to be prepared by Mr. Michel L. Bilodeau.

This Technical Report titled "Preliminary Economic Assessment (PEA for the Lamêlée Project" was prepared by CIMA+ with contributions by Met-Chem, Soutex, AMEC and WSP. The report follows the guidelines of the "Canadian Securities Administrators" National Instrument 43-101 (effective June 30, 2011), and is in conformity with the guidelines of the Canadian Mining, Metallurgy and Petroleum (CIM) Standard on Mineral Resources and Reserves. Table 2.1 shows the responsibilities for each section of the report.

Table 2.1 – Responsibilities of Report Sections

Report Section	Responsible	Comment
Section 1 - Summary	JST	And other
Section 2 - Introduction	JST	
Section 3 - Reliance on Other Experts	JST	
Section 4 - Property Description and Location	YB	
Section 5 - Accessibility, Climate, Local Resources, Infrastructure and Physiography	JST	
Section 6 - History	YB	
Section 7 - Geological Setting and Mineralization	YB	
Section 8 - Deposit Type	YB	
Section 9 - Exploration	YB	
Section 10 - Drilling	YB	
Section 11 - Sample Preparation, Analyses and Security	YB	
Section 12 - Data Verification	YB & SI	
Section 13 - Mineral Processing and Metallurgical Testing	MG	
Section 14 - Mineral Resource Estimate	SI	
Section 15 - Mineral Reserve Estimate	JC	
Section 16 - Mining Methods	JC	
Section 17 - Recovery Methods	MG	
Section 18 - Project Infrastructure	JST	
Section 19 - Market Study and Contracts	JST	
Section 20 - Environmental and Social Impact	JSH	
Section 21 - Capital and Operating Cost	JST	And other
Section 22 - Economic Analysis	MB	
Section 23 - Adjacent Properties	JST	
Section 24 - Other Relevant Data and Information	JST	
Section 25 - Interpretation and Conclusions	JST	And other
Section 26 - Recommendations	JST	And other
Section 27 - References	JST	

DB - David Bédard, AMEC
MB - Michel Bilodeau, Independent consultant
YB - Yves Buro, Met-Chem
JC - Jeffrey Cassoff, Met-Chem
MG - Mathieu Girard, Soutex
JSH - Jean-Sébastien Houle, WSP Canada inc.
SI - Schadrac Ibrango, Met-chem
JST - Jean-Sébastien Tremblay, JST

2.2 Sources of Information

Information contained in this report is based on:

- "NI 43-101 Technical Report to present the Mineral Resources of the Lac Lamêlée South Project of Fancamp Exploration Ltd." Prepared by PJL Conseil dated May, 2013;
- Information provided by personnel of Lamêlée Iron Ore Ltd.

2.3 Abbreviations in the report

The Table 2.2 listed the abbreviation used in the report:

Table 2.2 – Report Abbreviations

Abbreviations	Description
%	Percent Sign
°	Degree
°C	Celsius Degree
$	Canadian dollar
$/h	Canadian dollar per hour
µm	Micrometres
CFR	Cost and Freight (and port of destination)
cm	Centimeter
EA	Environmental assessment
FOB	Free on board
ft	Feet
g/cm^3	Gram per cubic centimeter
ha	Hectare
IRR	Internal Rate of Return
kg/t	Kilogram per metric tonne
km	Kilometer
km^2	Square kilometer
km/h	Kilometer per hour
PEB	Pre Enginerred building
kW	Kilowatt
LOM	Life of Mine
m	Meter
m3	Cubic meter
mm	Millimeters
Mt	Million metric tonne
Mtpy	Million tonne per year
M$	Million Canadian dollar
M$/y	Million Canadian dollar per year
NPV	Net Present Value
ROM	Run of mine
t	Metric tonne
t/m_3	Metric tonne per cubic meter

CIMA+ M03339A

2.4 Site Visit

The following qualified persons for this report personally inspected the Lamêlée Iron Property on October 8th, 2014:

- Jeffrey Cassoff, MetChem;
- Jean-Sébastien Houle, WSP; and
- Jean-Sébastien Tremblay, CIMA+.

Schadrac Ibrango, P.Geo.,Ph.D., Met-Chem as visit the site on October 8th and 9th, 2014;

Each qualified persons considers the site visit current, per Section 6.2 of NI 43-101CP, on the basis that the material work completed on the Property was reviewed during the site visit and all practices and procedures documented were adhered to.

3 Reliance on Other Experts

CIMA+ prepared this report using documents as noted in Section 27.0 “References”. 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 at the date of this report.

Met-Chem was responsible for the resource estimate and the mine design, Soutex for the process definition, AMEC for the tailing concept, WSP for the environmental study and M. L. Bilodeau for the economic analysis.

This report includes technical information, which required subsequent calculations to derive subtotals, totals and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, the QPs do not consider them to be material.

For the purpose of this technical report, CIMA+ has relied mainly on information provided by Lamêlée Iron Ore Ltd. for the section entitled Market Studies and Contracts.

The Authors of this Report are not qualified to comment on issues related to legal agreements. The Authors have relied upon the representations and documentations supplied by the Company management. The Authors have reviewed the mining titles, their status, the legal agreement and technical data supplied by Lamêlée Iron Ore Ltd. and any public sources of relevant technical information.

All are specialists in their respective fields and CIMA+ has no reason to doubt their conclusions and recommendations. The responsibility for the various components of the Summary, Interpretation and Conclusions and Recommendations remains with each qualified persons for their specific area of the scope.

The QPs who prepared this report relied on information provided by experts who are not QPs. The QPs believes that it is reasonable to rely on these experts, based on the assumption that the experts have the necessary education, professional designations, and relevant experience on matters relevant to the technical report.

QP Jean-Sébastien Houle, Eng. has relied upon and disclaims information provided by Mr. Martin Larose, B.Sc., senior biologist and assistant vice-president for environmental studies at WSP. Mr. Larose cumulates 20 years in the environmental area. As Project Director or Project Manager, Martin has taken part in numerous impact studies and environmental assessments studies. He has also conducted several fish habitat development and restoration projects as well as many environmental surveys and monitoring studies. Mr. Larose is very knowledgeable with provincial and federal environmental impact assessment procedures. He was Project Director for the environmental and social impact study on many mining projects in the North-Shore region for ArcelorMittal Mine Canada, Cliffs Natural Resources, Century Iron Ore, Consolidated Thompson (now Cliffs Natural Resources). Martin Larose has provided the environmental baseline data, the permitting process required for the Project based on the information provided by Lamêlée Iron Ore Ltd. and other available data. The information he provided has been used in Section 20 of this report.

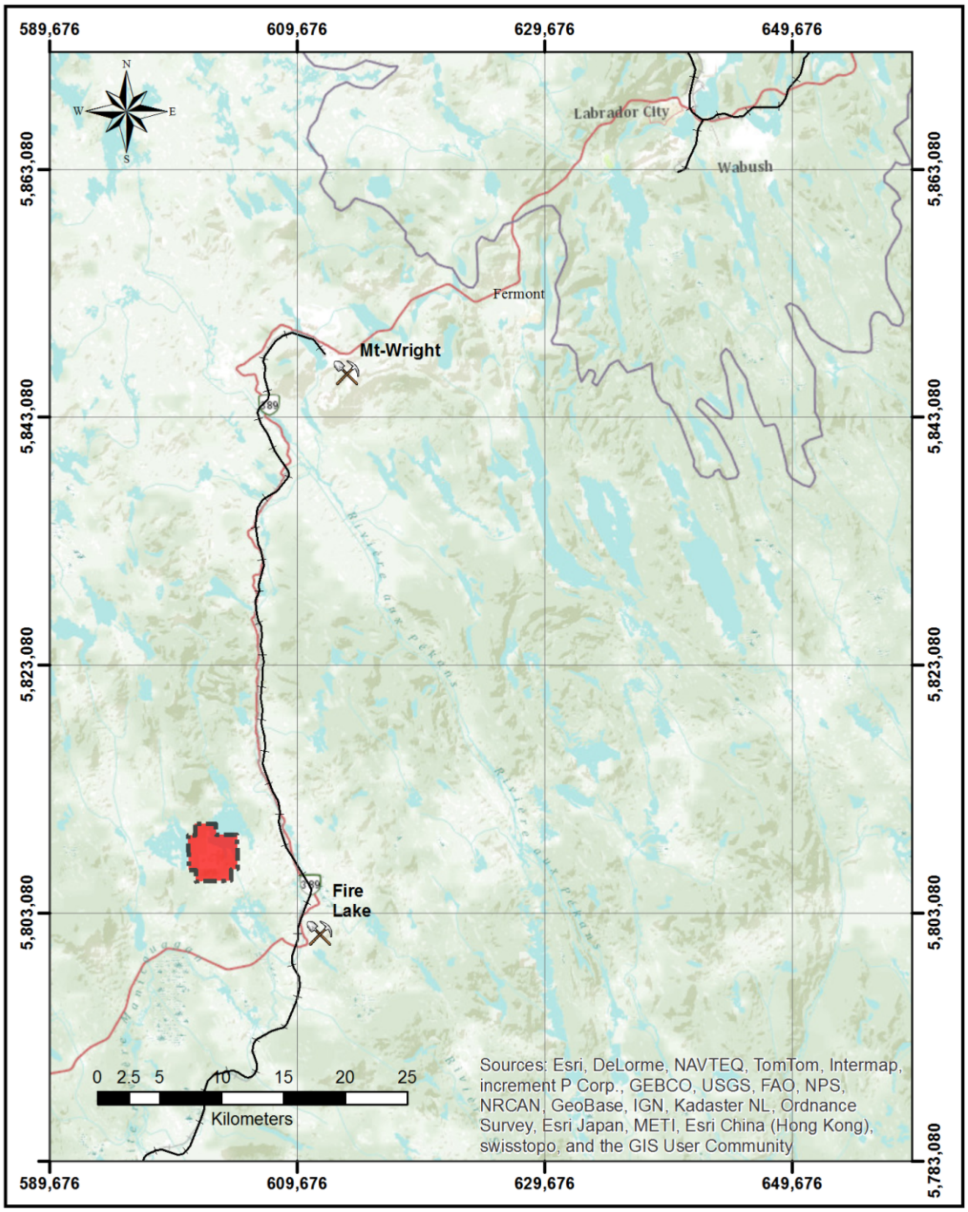
QP M. L.Bilodeau Eng. as relied upon Marc Robert, CPA for the fiscal aspects of the economic analysis.

4 Property Description and Location

4.1 Location

The Lac Lamêlée South Iron Property is located in northeastern Québec near the provincial boundary with Labrador, approximately 50 km southwest of the city of Fermont and 500 km north of the city of Baie-Comeau (Figure 4.1).

Figure 4 1 – Regional Location Map



The Property area is centered at 52°24’50’’ N latitude and 67°29’15’’ W longitude in National Topographic System (NTS) on map reference 23B/05 and 23B/06. The block of claims has an irregular shape that fits in a square with N-S and E-W limits. The Property straddles the east side of NTS sheet 23B/05 and the west side of NTS sheet 23B/06 and the northeastern sector is underlain by Lac Lamêlée.

The Property is situated approximately 10 km to the NW of ArcelorMittal’s Fire Lake iron mine and 10 km W-SW of the Fire Lake North project of Champion Iron Mines Ltd. (“Champion”)

4.2 Property Description

The Lac Lamêlée South Property is comprised of 29 claims each of an area of approximately 52.5 ha, for a total of 1,524 hectares (Figure 4.2 and Table 4.1). The claims on the Property have a rectangular shape of about 566 m by 927 m.

All the claims were acquired as “map-designated claims” (“CDC”) and registered under the name of Lamêlée Minerais de Fer Ltée (GESTIM Client’s number 93458), also known as Lamêlée Iron Ore Ltd. (“LIO”) as the 100% holder. LIO, formerly known as Gimus Resources Inc., is a company registered in the Province of Quebec in September 2008, with offices in Montreal, Quebec. Fancamp Exploration Ltd. of Burnaby, B.C., is registered as the main shareholder of the company.

The Property has not been legally surveyed but the location of map-staked claims is officially defined on the basis of Universal Transverse Mercator (UTM) coordinates.

The information on the claims in Quebec is accessible through the Register of Real and Immovable Mining Rights via the GESTIM geomatics application of the Quebec Ministry of Natural Resources and Wildlife (“MNR”). On August 27, 2014, Met-Chem accessed the GESTIM system and noted the registration dates for the Property extending from the earliest on September 1, 2004 to the most recent acquisition on March 29, 2010. Expiry dates of the claims range from March 28, 2016 to September 1, 2016. The registered excess assessment work amounted to close to $3.9 million, while the future required work to renew the claims stands at about $41,000. The excess assessment work is concentrated in the central sector of the Property but, as stipulated by the Mining Act, can be applied to any of the adjacent claims since they are within a 4.5 km radius (Section 4.3). All the claims were active and in good standing at the time of writing this report. A listing of the claims and details such as expiry dates, required fees and assessment work are provided in Table 4.1 No encumbrance is registered for any of the claims.

Figure 4.2 – Claim Map

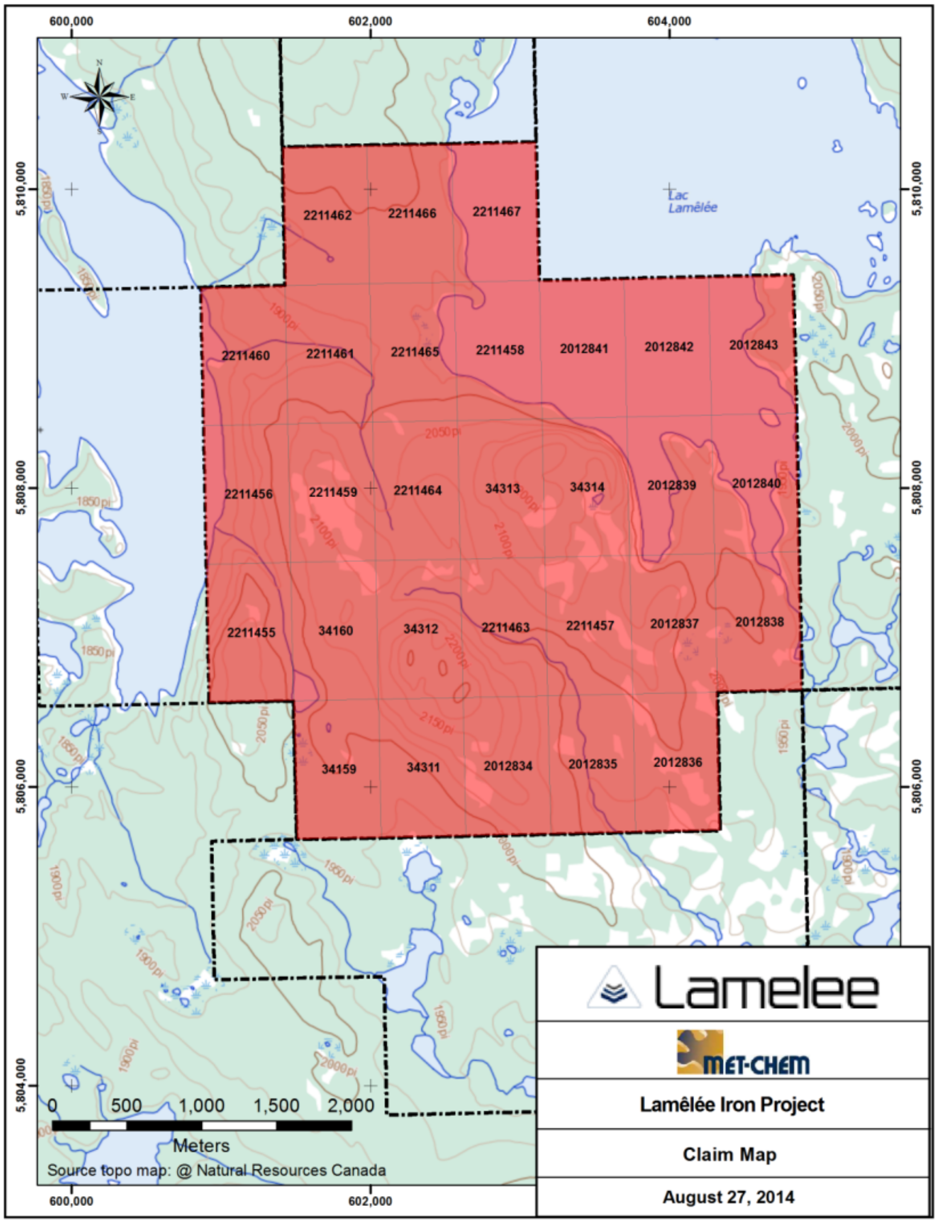


Table 4.1 – Summary of Claims Covering the Lac Lamêlée South Property

Map Sheet (SNRC)	Claim Number	Area (ha)	Issuance Date	Expiry Date	Excess Work ($)	Required Assessment ($)	Required Renewal Fees ($)
23B05	34159	52.57	01-09-2004	31-08-2016	0.00	1800	127
23B05	34160	52.56	01-09-2004	31-08-2016	414,203	1800	127
23B06	34311	52.57	02-09-2004	01-09-2016	0.00	1800	127
23B06	34312	52.56	02-09-2004	01-09-2016	508,309	1800	127
23B06	34313	52.55	02-09-2004	01-09-2016	1,411,913	1800	127
23B06	34314	52.55	02-09-2004	01-09-2016	1,252,013	1800	127
23B06	2012834	52.57	25-05-2006	24-05-2016	0.00	1800	127
23B06	2012835	52.57	25-05-2006	24-05-2016	0.00	1800	127
23B06	2012836	52.57	25-05-2006	24-05-2016	0.00	1800	127
23B06	2012837	52.56	25-05-2006	24-05-2016	0.00	1800	127
23B06	2012838	52.56	25-05-2006	24-05-2016	0.00	1800	127
23B06	2012839	52.55	25-05-2006	24-05-2016	0.00	1800	127
23B06	2012840	52.55	25-05-2006	24-05-2016	0.00	1800	127
23B06	2012841	52.54	25-05-2006	24-05-2016	0.00	1800	127
23B06	2012842	52.54	25-05-2006	24-05-2016	0.00	1800	127
23B06	2012843	52.54	25-05-2006	24-05-2016	0.00	1800	127
23B05	2211455	52.56	29-03-2010	28-03-2016	0.00	900	127
23B05	2211456	52.55	29-03-2010	28-03-2016	0.00	900	127
23B06	2211457	52.56	29-03-2010	28-03-2016	0.00	900	127
23B06	2211458	52.54	29-03-2010	28-03-2016	0.00	900	127
23B05	2211459	52.55	29-03-2010	28-03-2016	0.00	900	127
23B05	2211460	52.54	29-03-2010	28-03-2016	0.00	900	127
23B05	2211461	52.54	29-03-2010	28-03-2016	0.00	900	127
23B05	2211462	52.53	29-03-2010	28-03-2016	0.00	900	127
23B06	2211463	52.56	29-03-2010	28-03-2016	0.00	900	127
23B06	2211464	52.55	29-03-2010	28-03-2016	273,276	900	127
23B06	2211465	52.54	29-03-2010	28-03-2016	0.00	900	127
23B06	2211466	52.53	29-03-2010	28-03-2016	0.00	900	127
23B06	2211467	52.53	29-03-2010	28-03-2016	0.00	900	127
Total	**29**	**1 523.99**			**3,859,713**	**40,500**	**3,683**

4.3 Mineral Tenure in Quebec

The claims give the owner exclusive rights to explore for any mineral substances in the public domain, with a few exceptions. The claims have a validity of two years and can be renewed indefinitely for two-year periods, provided the renewal fees are paid and the required exploration work, subject to certain conditions, is completed.

All the claims are situated to the north of the 52° latitude, which means that a different scale applies for the amounts to pay as registration and renewal fees, as well as for the required value of assessment work per claim. In the case of the Property, the fees are higher than what applies to properties to the south of 52° N, but the amount of assessment work requirement is lower.

Excess work on one claim may be applied to the renewal of other contiguous claims held by the same owner within a radius of 4.5 km from the centre of the claim from which the credits will be used.

Access to the claims is granted to carry out exploration work. However, the claim holder cannot enter land granted for non-mining purposes or land leased for mining surface mineral substances without permission from the current holder of these rights.

A claim holder cannot erect or maintain a construction on lands in the public domain without obtaining the permission of the MNR, unless such a construction is specifically allowed for by ministerial order or consists of temporary shelters that can be easily dismantled and transported.

The information in this section is only a summary description of the mining rights and the reader seeking full and official descriptions on titles or rights and obligations of the claim holders should refer to the website of the Department of Natural Resources of Quebec.

4.4 Underlying Agreements and Royalties

On September 16, 2013 Fancamp Exploration Ltd. ("Fancamp"), Champion and Gimus Resources Inc. ("Gimus") signed an agreement aimed at developing Fancamp's Lac Lamêlée South Iron Project.

Under the agreement:

- Fancamp will transfer its 100% interest in the Project in consideration for the issuance by Gimus of 43,000,000 common shares at a deemed price of $0.10 per share;
- Fancamp will retain a 1.5% Net Sales Royalty, of which 0.5% may be bought back for $1,500,000.
- Champion will waive the exercise of its right of first refusal with respect to the transfer of the Project in consideration for the issuance:
  - by Gimus of 2,000,000 common shares to Champion at a deemed price of $0.10 per share;
  - by Fancamp of 4,000,000 common shares of its capital stock at a deemed price of $0.05 per share;

The transaction constitutes a reverse takeover of Gimus by Fancamp within the meaning of the policies of the TSX-V and was approved by the stock exchange in December 2013.

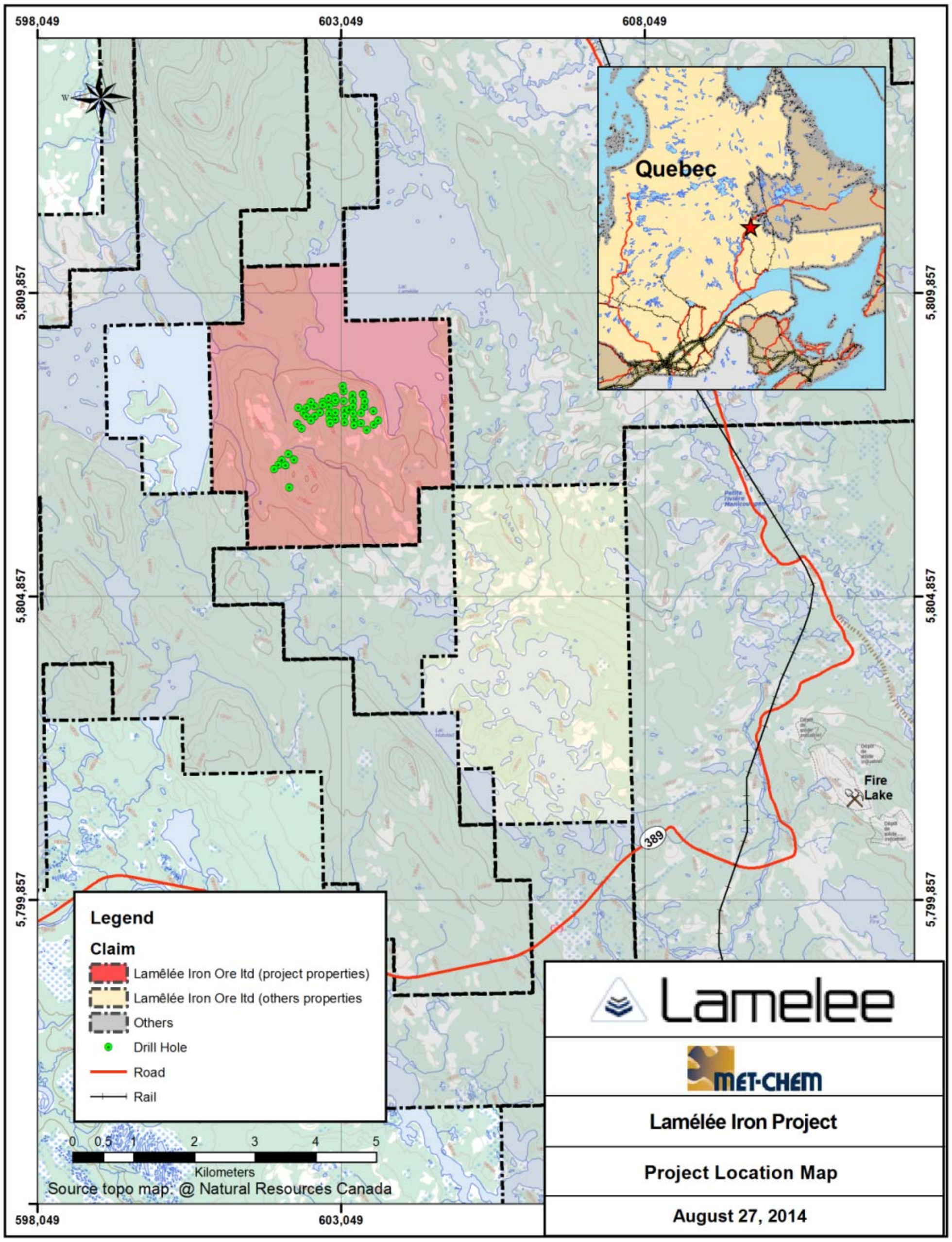
Gimus will assume an existing 1.5% NSR Royalty on the Project, which is payable to the Sheridan Platinum Group Ltd. ("SPG") as the original owner of the Property with Fancamp, of which 0.5% may be bought back for $1,500,000.

The purchase of the Project by Gimus will be subject to specific restrictions and to a number of conditions, which may be waived by Gimus or Fancamp.

In connection with closing of the Transaction, the Company changed its name from "Gimus Resources Inc." to "Lamêlée Iron Ore Ltd. / Lamêlée Minerais de Fer ltée" (Press Release of December 20, 2013). Gimus also completed a non-brokered private placement of 12,500,000 units for aggregate gross proceeds of $1,250,000.

The 30 additional claims staked by Fancamp on Novembre 13, 2013, to the SW of the Property were also included in the transaction (Figure 4.3).

Figure 4.3 – Project Location Map



The information provided in this section of the report only constitutes an unofficial summary of the transactions related to the Lamêlée Project. Met-Chem has not verified the validity and details of the transactions between the different parties. The reader is invited to refer to the concerned companies' websites and press releases for official and complete information, and more particularly to the description of the transaction in Gimus' information circular dated November 19, 2013

The portion of the contemplated transaction between Gimus and Fancamp is an arm's length transaction, whereas, based on the fact that Champion is an insider of Fancamp, the portion of the transaction between Champion and Fancamp involves non-arm's length parties and constitutes a "related party transaction".

Met-Chem relied on various sources to describe the transactions leading to the acquisition of the claims by LIO, but has not researched the legal aspects of the various transactions. The reader is referred to documents issued by LIO for complete and official information.

4.5 Environmental Liabilities

All phases of development on the Property will be subject to some environmental regulations related to various concerns, such as maintenance of air and water quality standards, land reclamation, waste disposal. Permits for the drilling programs of 2011 and 2012 on the Property were issued and it is not expected that permitting for new exploration activities will be problematic.

However, Met-Chem has not investigated any environmental liabilities that may arise from previous work. Met-Chem is not aware of any environmental liabilities to which the Property may be subjected.

4.6 Permits that must be acquired

To the extent known to Met-Chem, it can be expected that the permit to conduct the proposed work for the property, which consist of a drill program, will be granted, since drilling was already completed on the Property in 2011 and 2012.

4.7 Other significant factors and Risks

Met-Chem is not aware of any any risks that may affect access, title, or the right or ability to perform work on the property. Met-Chem has not verified the validity of titles or rights on the property except for the information for the claims available on Gestim.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Accessibility

The Lamêlée Property is located 560 km. north of Baie-Comeau and 80 km (by road) south of the town of Fermont, all connected by the provincial road 389. The property is some 270 km. in straight line north of Port-Cartier. The property is accessible by road 389 and the ArcelorMittal railroad is also passing beside the property. The city of Wabush, located at 35 km. of Fermont, is served by an airport with daily flights to Sept-Îles and Montréal.

5.2 Climate

Environment Canada's climate station at the Wabush airport provides comprehensive year round monitoring and with a record period that is sufficient for characterizing long-term climate conditions in the project area. The station is located close to the project site (70 km. in a straight line). Therefore, the Wabush Airport Environment Canada's climate station was used to characterize the climate conditions at the project site and the average year data are summarized in Table 5.1.

Table 5.1 – Average Annual Climatic Data (1981-2010)

Month	Temperature (⁰C)	Rainfall (mm)	Snowfall (cm)	Precipitation (mm)	Snow Depth (cm)
January	-22.2	0.6	63.8	49.2	80.6
February	-20.6	1.6	50.9	40.3	86.4
March	-13.3	2.6	65.9	54.1	77.7
April	-4.3	12.1	44.3	48.8	26.1
May	4.0	40.4	14.4	53.5	0.0
June	10.3	80.6	2.1	82.7	0.0
July	13.8	113.9	0.0	113.9	0.0
August	12.5	103.4	0.1	103.5	0.0
September	7.6	92.3	4.4	96.5	0.1
October	0.5	42	39	75.7	5.2
November	-8.2	10.9	77.5	70.9	30
December	-17.5	2.5	66.2	50.4	56.4

Average wind speed and direction is presented in Table 5.2. The average annual wind speed is about 14 km/h and the most frequent wind direction, on an annual basis, is from the west.

Table 5.2 – Wabush Area - Average Wind speed and direction (1981-2010)

Month	Speed (km/hr)	Most Frequent Direction	Maximum Hourly Speed (km/hr)	Maximum Gust Speed (km/hr)	Direction of Maximum Gust	Days with Winds ≥ 52 km/hr	Days with Winds ≥ 63 km/hr
January	13.8	O	72	111	S	0.3	0.1
February	13.8	O	65	130	O	0.1	0
March	14.9	O	59	89	NE	0.3	0
April	14.9	N	60	87	O	0.2	0.1
May	13.8	N	61	78	O	0.1	0
June	14.3	S	64	87	O	0.3	0.1
July	12.7	O	56	113	O	0	0
August	12.8	O	51	130	O	0.1	0
September	14.4	O	63	94	O	0.3	0.1
October	15.2	O	65	102	O	0.4	0.1
November	14.7	O	80	104	O	0.2	0.1
December	13.2	O	65	89	NO	0.1	0

5.3 Local Resources and Infrastructures

Fermont is accessible by a provincial road 389, at 560 km. north of Baie-Comeau. A private railroad, owned by ArcelorMittal links Port-Cartier to the Mont-Wright mine (located 17 km. west of Fermont). The area is served by the Québec Hydro electrical power grid.

Starting in 1954, the Quebec North Shore & Labrador Railway ("QNS&L") was established by IOC to haul iron ore from the Schefferville area mines to Sept-Îles, a distance of 468 km. In 1962 IOC started the operation of the Carol Lake mine near the town of Wabush.

Five railway companies operate in the region;

- Tshiuetin Rail Transportation Inc. ("TSH") which runs passengers and freight service from Schefferville to Ross Bay Junction (200 km. south of Schefferville);
- QNS&L hauls iron concentrates and iron pellets from the Labrador City/Wabush area via Ross Bay Junction to Sept-Îles;
- Bloom Lake Railway hauls iron ore from the Bloom Lake ("Cliffs") mine to Wabush;
- Arnault Railways hauls iron ore for Wabush Mines ("Wabush") and Cliffs mine between Arnault Junction and Pointe Noire; and
- ArcelorMittal's private railway hauls iron concentrates from the Fermont area to Port-Cartier.

The latter railway is not connected to TSH, QNS&L, Bloom Lake or Arnault railways.

The Wabush airport has a 1,830 metre paved runway and navigational aids for passenger jet aircraft. Air service is provided with several flights per day by service to Montreal, Sept-îles, Baie-Comeau and Churchill Falls.

5.4 Physiography

The Lamêlée Property is located within a relatively rugged physiography with rolling hills and valleys reflecting the structure of the underlying bedrock. Elevation in the Project Area can vary from 590 m on the shores of Hobdad Lake up to 671 m at the high point in the pit area.

5.5 Local Resources

It is assumed that the majority of the workforce would potentially come from the province of Québec and a part of employees will also be recruited from the communities close to the project site.

6 History

6.1 Prior Ownership

The claims were originally staked by Fancamp Exploration Ltd and wholly-owned by SPG and Fancamp. They were subsequently transferred to Gimus Resources Inc. via a Mining Rights Tranfer dated June 9, 2014. In 2013 Gimus changed its name to Lamêlée Iron Ore Ltd, also known as Lamêlée Minerai de Fer Ltée.

6.2 Historical Exploration and Development

The first recorded exploration work on the Property was conducted by Québec Cartier Mining (QCM) in 1950 to follow up on known magnetic anomalies.

A summary of the main exploration-development activities conducted on the Lamêlée South Property is provided in Table 6.1.

Additional details on the historical work on the Property can be found in the “NI 43-101 Technical Report to Present the Mineral Resources of the Lac Lamêlée South Project of Fancamp Exploration Ltd.”, presented to Fancamp Exploration Ltd, Burnaby, B.C., by P.J. Lafleur Geo-Conseil Inc. (PJLGC), Ste-Thérèse, QC, and dated May 2013.

Table 6.1 – Summary of Exploration Work on the Lamêlée South Property

<table>
<tr><th>Year</th><th>Company</th><th>Activity</th></tr>
<tr><td>1950-1955</td><td>Québec Cartier Mining (QCM)</td><td>-Prospecting
-Topographic survey
-Dip needle survey</td></tr>
<tr><td>1954</td><td>Oliver Iron Mining (US Steel) & QCM</td><td>-Prospecting, geological mapping
-Ground magnetic survey</td></tr>
<tr><td>1958</td><td>QCM</td><td>-Prospecting, geological mapping
-Ground magnetic survey</td></tr>
<tr><td>1988</td><td>Falconbridge</td><td>-Reconnaissance (Base & Precious metals)
-Airborne EM survey</td></tr>
<tr><td>2000</td><td>Quebec Cartier Mining</td><td>-Airborne Magnetic-EM survey</td></tr>
<tr><td>2004</td><td rowspan="9">Fancamp Exploration Ltd.</td><td>Claim Staking</td></tr>
<tr><td>2006</td><td>-Claim Staking
-Heliborne Magnetic and radiometric survey</td></tr>
<tr><td>2009</td><td>-Reconnaissance, sampling</td></tr>
<tr><td>2010</td><td>-Claim Staking</td></tr>
<tr><td>2011</td><td>-Airborne Magnetic-Gravity survey
-Diamond drilling: 17 holes for a total of 5,613 m</td></tr>
<tr><td>2012</td><td>-Diamond drilling: 40 holes for a total of 12,60 m
-Ground magnetometer survey
-Trenching (6 for mapping purposes)
-Trenching (2) for bulk sampling (9 tonnes)
-50 samples analyzed at ALS sent to Actlabs for Davis - Tube tests and analyses
-NI 43-101 Report on the mineral resources of the South iron deposit, P.J. Lafleur Géo-Conseil Inc.</td></tr>
<tr><td>2013</td><td>-Petrographic work (Mike Flanagan) on 53 thin sections</td></tr>
<tr><td>2014</td><td>-Transfer of the claims to Gimus (Lamêlée Iron Ore Ltd.)</td></tr>
</table>

6.3 Historical Mineral Resources Estimate

In 2012, Pierre-Jean Lafleur, P.Eng., of PJLGC, and Senior Business Analyst with 3DS Geovia (Gemcom), was retained by Fancamp to carry out a mineral resource estimate of the Lamêlée South deposit. P. J. Lafleur issued a technical report dated May 2013 to support Fancamp's first public disclosure of Mineral Resources on the Property. P.J. Lafleur is a QP for the purposes of NI 43-101. This resource estimate was based on the results of the 57 holes drilled in 2011 and 2012 at different spacing along sections 100 m apart.

A cut-off grade of 22% Fe_2O_3 was used in the reported mineral resource. The grade of T Fe was interpolated in five domains to take into account the different orientations of the iron units. The deposit is folded and disrupted into three blocks by major faults described as the Mountain Pond, the 91-92 and the Tanguay Zones.

Density determination was completed in 2011 on 120 samples from three different rock types. The density was calculated as a function of T Fe content and modeled as a variable within the volume of the deposit during the resource estimation.

P.J. Lafleur used Gems and Whittle software applications from 3DS Geovia (Gemcom) and the Ordinary Kriging method to interpolate grades within the deposit. The mineral resource estimate was constrained within two conceptual pit shells drawn with general economic factors based on the nearby Fire Lake NI 43-101 study published in November 2011. However, no mining dilution or mining recovery factors were included by P. J. Lafleur in this preliminary study.

The mineral resource for the Lamêlée deposit was defined according to NI 43-101 and CIM standards. However, since the resource is based on limited drilling in the structurally complex and highly metamorphosed deposit, P.J. Lafleur considered that a classification of all the mineral resource in the Inferred category was warranted.

The resource was estimated by P. J. Lafleur at a cut-off of 22% Fe_2O_3, as presented in Table 6.2.

Table 6.2 – In-Pit Mineral Resources of Lac Lamêlée South at a Cut-Off of 22% Fe_2O_3.

Tonnes (Mt)	Grade	
	Fe_2O_3 (%)	Fe (%)
520.0	39.5	27.6

Met-Chem has not verified the methodology and parameters of the resources by P.J. Lafleur. Although the resources are NI 43-101 compliant, they are mentioned in this report for their historical interest only but should not be relied upon.

A qualified person has not done sufficient work to classify the historical estimate as current mineral resources or mineral reserves. In addition, the issuer is not treating the historical estimate as current mineral resources or mineral reserves.

Although no additional drilling had been performed on the Property since the 2013 estimate, Met-Chem performed an updated resource estimate, as requested by LIO. The new resource estimate by Met-Chem supersedes all previous estimates and is discussed in the present report in Section 14.

6.4 Historical Drilling

Historical drilling on the Property consisted of 17 holes for a total of 5,613.50 m completed in 2011 and 40 holes for a total of 12,606.62 m drilled in 2012 (Table 6.3). These holes were used in the mineral resource estimate by P. J. Lafleur and also form the basis of the present resource estimate by Met-Chem.

Table 6.3 – Summary of Drilling by Fancamp

Year	2011		2012	
Zone	**Number of Holes**	**Meterage (*)**	**Number of Holes**	**Meterage(*)**
Mountain Pond	12	4,387	24	8,507
91-92	1	150	13	3,178
Tanguay	4	1,077	3	921
TOTAL	**17**	**5,614**	**40**	**12,607**

(*) Total may not add up, due to rounding.

7 Geological Setting and Mineralization

7.1 Regional Geology

The Lamêlée Property is located in the western margin of the Proterozoic sedimentary and volcanic rocks forming the Labrador Trough, also known as the Labrador-Quebec Fold Belt. The Labrador Trough contains world-class iron deposits hosted in the Sokoman formation that occurs as sub-basins throughout the fold belt.

The Labrador Trough extends in Quebec and Labrador for more than 1,100 km, from Ungava Bay to Lake Pletipi in Quebec, near the Manicouagan impact crater. The Trough is about 100 km wide in its central part and narrows considerably to the north and the south. It extends in an N-NW direction in the north and turns into a SW orientation, immediately south of, and parallel to, the Grenville Front.

The Trough results from the collision between the Archean basement gneisses of the Superior Province and those of the Rae Province during the Hudsonian orogeny (1.82 to 1.77 Ga). Rocks of the Rae Province were transported westward over the basement of the Superior Province, creating a foreland fold and thrust belt marked by a series of imbricate thrusts and map-scale folds (Hoffman, 1989, 1990b; Wardle et al., 1990b, 2002). Based on stratigraphic juxtapositions, these thrust faults may have throws of several thousand meters

Deformation related to the Grenville orogeny (1.16 – 1.13 Ga) (Emslie and Hunt, 1989) has been superimposed over the southwestern part of the Labrador Trough, in the Gagnon Terrane, in the Grenville tectonic belt (Gross, 2009). This deformation raised the degree of metamorphism up to the amphibolite and, in some areas, to the granulite facies. The resulting structural style reflects interference between several generations of folds, like the commonly found dome and basin structures.

The rocks in the Labrador Trough were deposited in a continental rift environment. They are subdivided into a lower sedimentary sequence known as the Knob Lake Group occurring in the western part and an upper mafic volcanic-dominated succession known as the Doublet Group in the eastern part. These rocks are collectively referred to as the Kaniapiskau Supergroup (Frarey and Duffell, 1964; Wardle, 1979).

The Labrador Trough is divided into three geological/metamorphic domains:

a) Southern Domain

The Southern Domain, also referred to as the Gagnon Terrane, is located to the south of the northern limit of the Grenville Orogenic Belt defined as the biotite metamorphic isograd. The limit lies about 35 km to the NW of Fermont. The rocks in the Southern Domain were metamorphosed during the Grenville Orogeny, which also involved thrusting, folding and emplacement of abundant intrusive rocks. The high-grade metamorphism is responsible for the recrystallization of the primary iron formation, producing coarse-grained quartz, magnetite and specular hematite in a rock called meta-taconite, thus improving the quality of the mineralization with respect to beneficiation.

Rocks in the Southern Domain are recognized as the metamorphosed equivalent of the Central Domain's Knob Lake Group (Table 7.1). The iron-bearing unit in this area is known as the Wabush Iron Formation, but it is the equivalent of the Sokoman Formation to the north. The Lamêlée Property is located in the Southern Domain.

b) Central Domain

The Central Domain, or Knob Lake Range, extends northward to the Leaf Bay area (58° 30' N latitude) along the west side of Ungava Bay. The Cental Domain consists of a sequence of Archaean rocks dominated by sediments, but also includes iron formations, volcanic rocks and mafic intrusions (Kaniapiskau Supergroup). Metamorphism grade is to the greenschist facies.

c) The Northern Domain

The Northern Domain, north of the Leaf Bay area, is comprised of rocks like those of the Southern Domain but metamorphosed to the amphibolite facies.

Table 7.1 – Equivalent Rock Successions in the Central and Southern Domains of the Labrador Trough (Source: Gross, 1968)

MESOPROTEROZOIC **Helkian Shabogamo Group** (Gabbro, amphibolite, gneiss) **---------------------------Intrusive Contact ---------------------------**			
PROTEROZOIC **Aphebian** Kaniapiskau			
Churchill Province		**Grenville Province**	
Central and Northern domain (Low-Grade Metamorphism)			*Southern domain (High-Grade Metamorphism)*
Menihek Formation Black shale, siltstone			**Nault Formation** Graphite, chloritic and micaceous schist
Sokoman Formation *Cherty iron formation*			**Wabush Formation** Quartz magnetite-Hematite-specularite-carbonate / *Iron formation*
Wishart Formation Quartzite, siltstone		*GAGNON TERRANE*	**Carol Formation** Quartzite, quartz-muscovitegarnet-kyanite schist
Denault Formation Dolomite, calcareous siltstone			**Duley Formation** Dolomite, Calcite ± Quartz with minor calc-silicate phases
Attikamagen Formation Gray shale, siltstone			**Katsao Formation** Quartz-biotite-feldspar and gneiss
---------------------------unconformity Contact --------------------------- **Archean** **Ashuanipi Archean Complex** (Mafic, intermediate and felsic migmatitic ortho and paragneiss)			

7.2 Local Geology (Fermont-Wabush area)

The Fermont-Wabush area is underlain by the Gagnon Terrane within the Grenville Province. The Archean gneiss or migmatite of the Ashuanipi Complex, interlayered with garnetiferous amphibolite, forms the basement of most of the area.

The metamorphosed equivalent of the Lower Proterozoic Knob Lake Group unconformably overlies the basement gneiss. The Knob Lake Group consists of a continental margin metasedimentary sequence made up of pelitic schists, iron formation, quartzite, dolomitic marble, gneiss and, locally, mafic volcanic rocks. The Knob Lake Group was deformed and underwent metamorphism ranging from greenschist to upper amphibolite facies during the Grenville Orogeny.

Intrusive rocks in the area consist of dykes and plutons of felsic to ultramafic composition.

Three stages of deformation are recognized in the Southern Domain:

- The New Quebec Orogeny (Hudsonian) that formed the linear, N-NW oriented belt visible in the Northern and Central Domain; and
- Two phases of the Grenville Orogeny that re-oriented the N-NW trending belt into a SW direction.

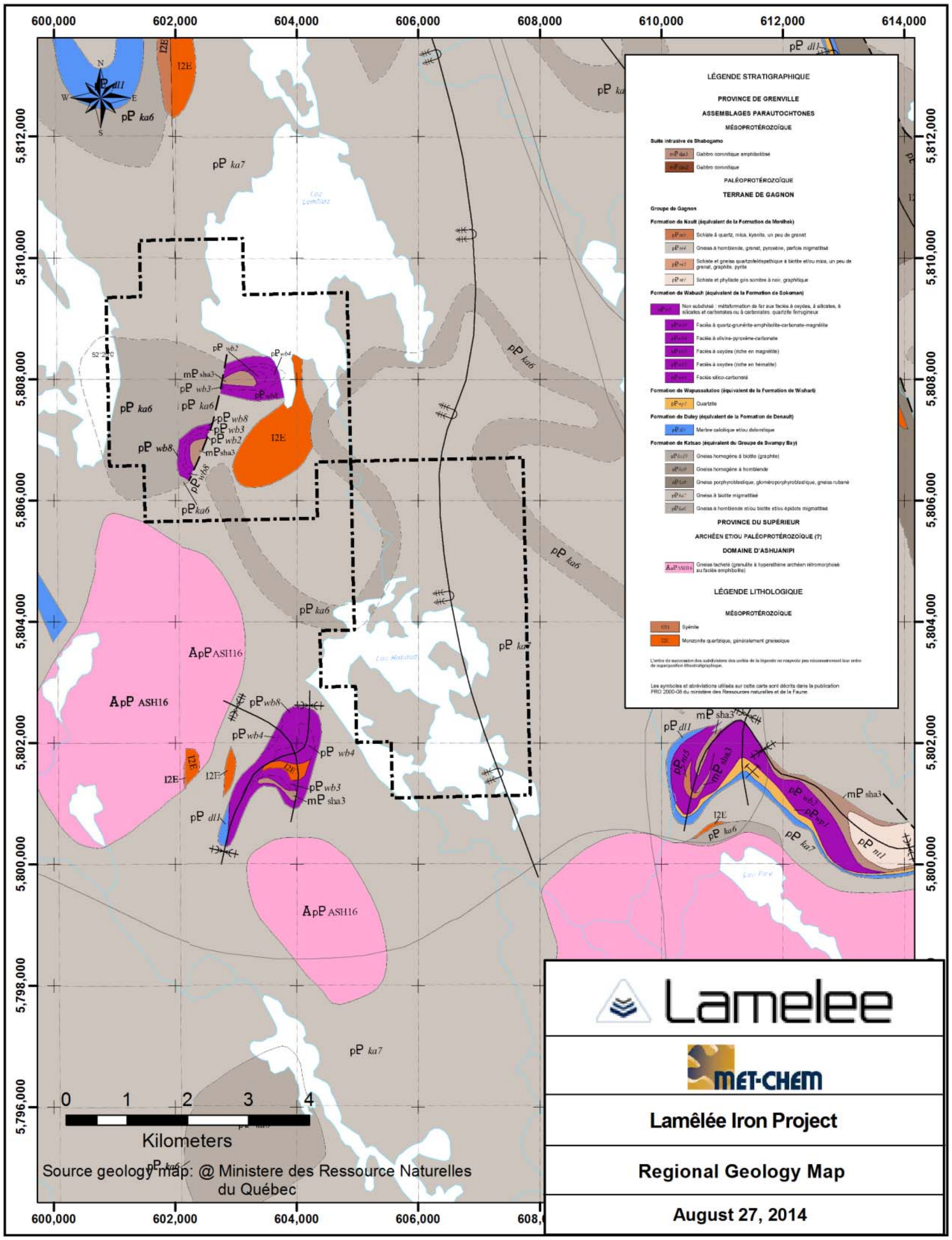
7.3 Property Geology

The information in this section is partly drawn from the Technical Report by P. J. Lafleur (2013) who had extracted data from internal geological reports by Mike Flanagan, Fancamp (2012, 2013).

7.3.1 Geology

The knowledge of the Property geology essentially derives from the results from diamond drilling in 2011 and 2012 considering the scarcity of outcrops. The property geology is illustrated in the regional geology map from the Quebec Ministry of Natural Resources (Figure 7.1). Complementary information was gained principally by compiling geoscientific and regional airborne survey data, mapping and sampling the outcrops and conducting ground magnetometer surveys.

Figure 7.1 – Regional Geology Map Showing the Property Geology.



7.3.2 Lithostratigraphy

The following units have been recognized on the Property, from the bottom to the top of the stratigraphic sequence:

Katsao (Attikamagen) Formation:

The oldest rocks on the property consist of the Katsao formation and correspond to quartzo-feldspathic gneiss with variable amphibole and biotite content.

Carol (Wishart) and Duley (Denault) Formations:

These two stratigraphic units, combined as a single unit within the Property, are dominated by quartzite and/or marble and dolomitic marble.

Low-silica dolomite is mined elsewhere to be used as flux in the smelting of iron pellets.

Wabush (Sokoman) Formation :

Two main facies of the Wabush Formation that hosts for the iron mineralization have been described on the Property:

- The "Iron Oxide Unit", consisting primarily of quartz, magnetite and/or hematite (specularite) in varying proportions; and
- The "Iron Oxide - Silicate Unit" made up of Quartz-Pyroxene-Magnetite (QPyrxM). This unit is characterized by a significant proportion, up to about 50%, of pyroxene-rich bands alternating with bands of quartz, bands of massive magnetite and/or hematite or of disseminated magnetite and/or hematite.

Nault (Menihek) Formation:

The Nault Formation, the youngest of the Group, is represented by a dark gneiss and/or amphibolite, containing variable proportions of quartz, feldspath, pyroxene/amphibole, biotite, muscovite and garnet. This formation includes occasional intervals of magnetite iron formation.

A significant volume of tonalitic gneiss occurs within the Nault formation in the Property area between the 91-92 and the Mountain Pond Zones. The gneiss is described as a well-foliated rock with substantial amounts of muscovite, biotite and rare garnet.

In the same area, dykes and quartz veins are relatively common within the Nault formation.

Ultramafic Intrusive Suite ("Popcorn rock") :

This unit was observed on surface and in drill holes as intercalations in the Wabush Formation (BIF and QPyrxM units). The rock is composed of orthopyroxene set in a green matrix and has a distinct porphyroblastic or glomeroporphyritic texture. Field observations suggest that the ultramafic suite represents folded sills injected into the Gagnon terrane.

7.3.3 Structure

The most prominent structural element of the Property is a large-scale, tight to isoclinal, re-folded syncline recognized by different authors in the field and by regional airborne magnetometer surveys. Detailed mapping by Fancamp geologists defined the curvilinear geometry of the axial plane of the fold that extends in a general NE-SW direction over about 2.5 km. A ground magnetic survey was also completed by Fancamp to assist in mapping and in laying out the drill holes of 2011 and 2012.

This structure is host to the iron mineralization on the Property and has been divided from northeast to southwest into three distinct zones:

a) Mountain Pond Zone: the syncline has a steep W-NW plunge, with a curved axial plane striking E to SE and dipping steeply to the S-SW. The closure of the periclinal (doubly-plunging) fold occurs on the east of the Zone, along the shore of Lac Lamêlée;

b) 91-92 Zone: the strike of the axial plane is rotated to the NE and the dip becomes steep to the NW; and

c) Tanguay Zone: while keeping the same NE strike, the dip changes to 65-70° NW. This zone is separated from the 91-92 by a regional sinistral fault.

The rocks on the Property have recorded the first stage of deformation, expressed by a penetrative schistosity, parallel to the primary bedding. This may be associated with the Hudsonian orogeny that generated the N-NW trending linear belt. The second deformation event developed during the Grenville orogeny and reoriented the belt into the SW direction. A third deformation phase recognized on the Property was responsible for the open fold that overprinted the axial plane of the large-scale syncline.

7.3.4 Metamorphism

The Property area was subjected to high-grade metamorphism corresponding to the limit of upper amphibolite-granulite facies resulting from the Grenville Orogeny.

During metamorphism, the iron formation was recrystallized into a meta-taconite that contains coarse-grained specular hematite, granular magnetite and friable quartz. The grade of this type of iron formation is generally higher than in the un-metamorphosed taconite.

7.3.5 Mineralization

The iron mineralization on the Property is hosted in the Wabush Formation, within two major facies:

a) Iron Oxide Facies

The Iron Oxide member has been broken down into the following sub-units:

- Magnetite Iron formation (MIF)
- Hematite (specularite) Iron formation (HIF)
- Magnetite–hematite Iron formation (MHIF/HMIF)

The three sub-units differ in their ratios of magnetite to hematite but are geochemically and texturally similar. The units are described as well-banded, fine to medium grained rock with cm- to mm-scale beds of magnetite and/or hematite (typically specularite) alternating with quartz beds that usually contain disseminated magnetite and/or hematite. Locally, the bedding becomes diffused and the rock turns into a quartzite with disseminated magnetite.

b) Quartz-Pyroxene-Magnetite Facies (QPyrxM)

The QPyrxM unit is characterized by a significant proportion, up to about 50%, of pyroxene-rich bands alternating with bands of quartz and bands of massive or disseminated magnetite and/or hematite. The QPyrxM varies considerably in its iron oxide content but the average ranges from about 15 to 25% magnetite, with occasional hematite. The contacts between the two facies are often gradational.

In addition to these two facies, a Carbonate Iron Formation (CIF) unit was observed on the Property. The CIF is locally encountered within the QPyrxM. It is similar in appearance to the QPyrxM but contains light yellow-grey bands of iron-magnesium carbonate intercalated between the pyroxene-rich bands. This unit commonly occurs toward the base of the stratigraphy and may contain magnetite.

On the Property, the Wabush Formation is further subdivided into a Lower and an Upper Iron Oxide - Silicate member locally separated by an ultramafic rock (UMF), informally referred to as “Popcorn Rock” (M. Flanagan, 2013) that may contain a few percent of magnetite. Field observations suggest that the ultramafic suite was injected as sills.

Hematite mineralization predominates in the fold hinge zone in the southeastern portion of the Mountain Pond Zone, which is reflected by a lower magnetic susceptibility observed in the ground magnetic survey data.

PJLGC stated that the ratio of iron in oxides relative to iron in the pyroxene within the QPyrxM unit has been reliably determined with magnetic susceptibility tests and Davis tube tests. Considering the limited amount of measurements and the limitations of non-continuous magnetic susceptibility readings on the core, it is Met-Chem’s opinion that this statement is not valid. In addition, there appears to be a considerable degree of lateral facies change between the major iron-bearing units.

The distribution of magnetite and hematite within the deposit is discussed in Section 14 of the present report.

The iron mineralization is hosted in a re-folded, plunging syncline located near the centre of the Property and extends over about 2.5 km in a general NE direction. The magnetic data strongly suggest that the eastern limit of the iron formation extends some distance from shore into Lac Lamêlée.

8 Deposit Types

The Lac Lamêlée iron deposit consists of magnetite Banded Iron Formation ("BIF") of the Lake Superior type.

The BIFs can be generalized and classified in two main types, the Lake Superior and Algoma BIFs, on the basis of tectonic systems and depositional environments (Gross, 1965, 1983, 1986). Oxide, silicate and carbonate lithological facies are common to both BIF types.

BIFs are sedimentary rocks composed of alternating mm- to cm-scale beds of quartz (chert or jasper) and iron oxides (predominantly magnetite and hematite). Variable amounts of gangue minerals, mostly silicates, carbonates and sulphides may be present.

The Lake Superior-type BIF formed in passive margins settings, in near-shore continental shelves and platform basins. They are associated with typical shelf-type sedimentary rocks with minimal volcanic input (James, 1954, Gross, 1965). Most Lake Superior-type banded iron formations formed during the Paleoproterozoic (2.5 - 1.8 Ga). The Superior-type BIFs show a greater lateral continuity than the deposits of the Algoma type. The Superior type represents a vastly more abundant source of iron than the Algoma type and is a major part of the iron mined in the Great Lakes region of the United States. Banded iron formations have greater than 15% iron content and host many gold deposits (Gross, 1996).

The salient characteristics of the Lake Superior-type iron deposit model described by Eckstrand (1984) are presented in Table 8.1.

The BIFs in the Labrador Trough were variably affected by metamorphism and alteration. On these bases, the BIFs are further divided into three types. The taconite lithofacies, represented by hard, unoxidized BIF, is little affected by metamorphism or alteration.

Strongly metamorphosed taconites are known as meta-taconite, as those found in the iron deposits in the Grenville part of the Labrador Trough, in the vicinity of Fermont and Wabush. The BIFs on the Lamêlée Property are meta-taconite. Post-depositional events such as weathering, groundwater circulation and hydrothermal circulation can modify the mineralogy of the iron formation. Silica and carbonate are leached, leaving a higher residual iron content in a soft, friable rock loosely referred to as "Direct Shipping Ore"

(DSO) in the mining terminology. It is stressed that this term is widely used but has no connotation with the CIM resources/reserves definition.

The exploration model used to design the exploration activities and the drilling at Lac Lamêlée is principally based on the interpretation of the drill data indicating the presence of tightly folded, fault-disrupted, Superior-type iron formation.

Table 8.1 – Characteristics of Lake Superior Type Iron Formation

DEPOSIT MODEL FOR LAKE SUPERIOR-TYPE IRON FORMATION AFTER ECKSTRAND (1984)

Commodities	Fe (Mn)
Examples: Canadian - Foreign	Knob Lake, Wabush Lake and Mount Wright areas, Que. and Lab. - Mesabi Range, Minnesota; Marquette Range, Michigan; Minas Gerais area, Brazil.
Importance	Canada: the major source of iron. World: the major source of iron.
Typical Grade, Tonnage	Up to billions of tonnes, at grades ranging from 15 to 45% Fe, averaging 30% Fe.
Geological Setting	Continental shelves and slopes possibly contemporaneous with offshore volcanic ridges. Principal development in middle Precambrian shelf sequences marginal to Archean cratons.
Host Rocks or Mineralized Rocks	Iron formations consist mainly of iron- and silica-rich beds; common varieties are taconite, itabirite, banded hematite quartzite, and jaspilite; composed of oxide, silicate and carbonate facies and may also include sulphide facies. Commonly intercalated with other shelf sediments: black
Associated Rocks	Bedded chert and chert breccia, dolomite, stromatolitic dolomite and chert, black shale, argillite, siltstone, quartzite, conglomerate, red beds, tuff, lava, volcaniclastic rocks; metamorphic equivalents.
Form of Deposit, Distribution of Ore Minerals	Mineable deposits are sedimentary beds with cumulative thickness typically from 30 to 150 m and strike length of several kilometres. In many deposits, repetition of beds caused by isoclinal folding or thrust faulting has produced widths that are economically mineable. Ore mineral distribution is largely determined by primary sedimentary deposition. Granular and oolitic textures common.
Minerals: Principal Ore Minerals - *Associated* Minerals	Magnetite, hematite, goethite, pyrolusite, manganite, hollandite. - Finely laminated chert, quartz, Fe-silicates, Fe-carbonates and Fe-sulphides; primary or metamorphic derivatives
Age, Host Rocks	Precambrian, predominantly early Proterozoic (2.4 to 1.9 Ga).
Age, Ore	Syngenetic, same age as host rocks. In Canada, major deformation during Hudsonian, and in places, Grenvillian orogenies produced mineable thicknesses of iron formation.
Genetic Model	A preferred model invokes chemical, colloidal and possibly biochemical precipitates of iron and silica in euxinic to oxidizing environments, derived from hydrothermal effusive sources related to fracture systems and offshore volcanic activity. Deposition may be distal from effusive centres and hot spring activity. Other models derive silica and iron from deeply weathered land masses, or by leaching from euxinic sediments. Sedimentary reworking of beds is common. The greater development of Lake Superior-type iron formation in early Proterozoic time has been considered by some to be related to increased atmospheric oxygen content, resulting from biological evolution.
Ore Controls, Guides to Exploration	1. Distribution of iron formation is reasonably well known from aeromagnetic surveys. 2. Oxide facies is the most important, economically, of the iron formation facies. 3. Thick primary sections of iron formation are desirable. 4. Repetition of favourable beds by folding or faulting may be an essential factor in generating widths that are mineable (30 to 150 m). . 5. Metamorphism increases grain size, improves metallurgical recovery. 6. Metamorphic mineral assemblages reflect the mineralogy of primary sedimentary facies. 7. Basin analysis and sedimentation modelling indicate controls for facies development, and help define location and distribution of different iron formation facies.
Author	G.A. Gross

9 Exploration

In the summer of 2014, following Met-Chem's recommendation, LIO completed a series of tests on selected pulps and rejects retrieved from the 2012 samples archived at the ALS laboratory in Val-d'Or (Table 9.1).

The proposed Satmagan and Davis tube tests were performed in an attempt to calculate a regression curve between the Satamagan results and the Davis tube tests data resulting from the 2012 drill program. The samples submitted to Heavy Liquid Separation were expected to provide some insight into the proportions of magnetite-hematite in the Lac Lamêlée deposit.

Table 9.1 – Laboratory Tests on Selected Samples (2014)

Tests	Quantity	Origin of the Samples
Satmagan	3,133	2012 drill program
Davis Tube Tests : Weight Recovery & Concentrates Analysis	266	Selected from the batch of 3,133 tested by Davis Tube
Heavy Liquid Separation (d=3.9) on 6-m Composites	294	6-m Composite Samples
Heavy Liquid Separation (d=3.3) on 6-m Composites	23	Selected from the batch of 294 tested at d=3.9

The results from these tests are discussed under Section 14 of the present report.

10 Drilling

10.1 Introduction

Drilling on the Property was completed in two phases, along two grids established across the three Zones on the Property. The Tanguay grid covers the Tanguay and the 91-92 Zones and consists of a series of NW cut lines spaced 100 metres apart. The Mountain Pond grid covers the Mountain Pond zone and consists of N-S lines generally 100-150 m apart.

10.2 2011 Drilling

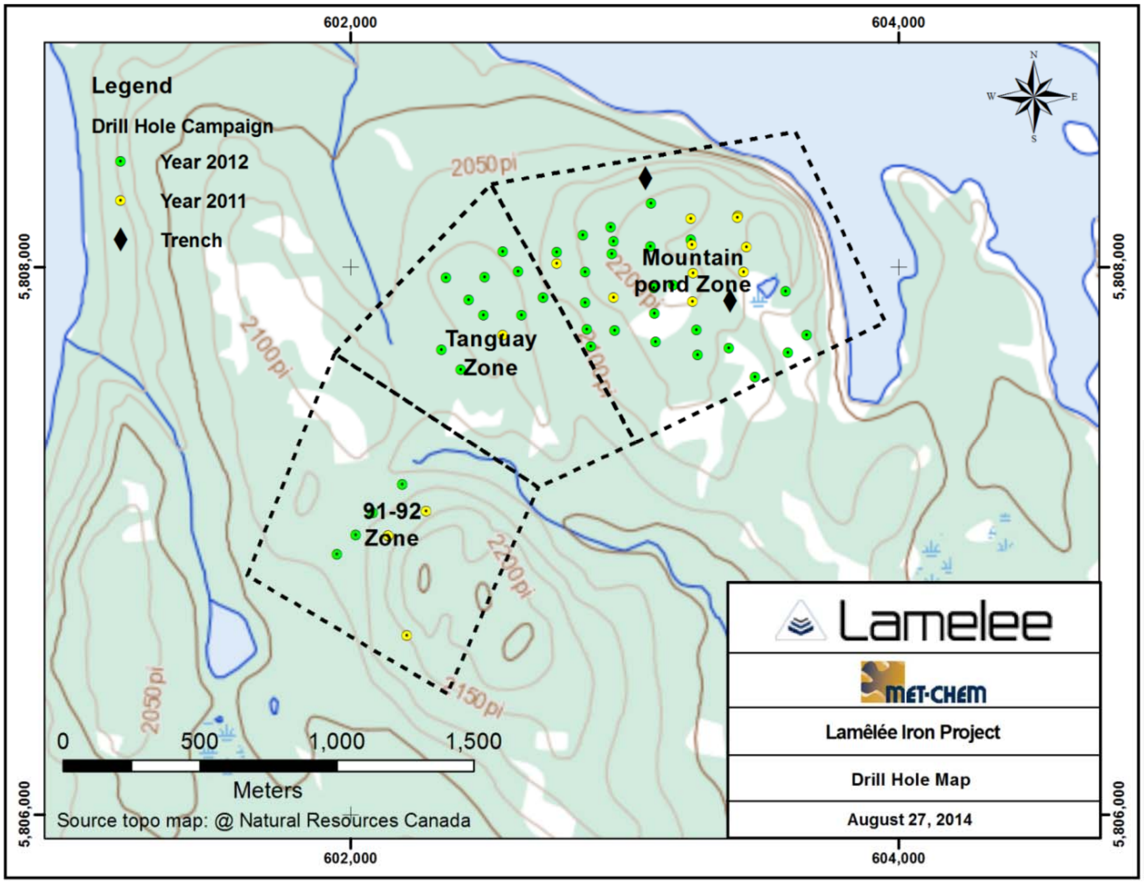
Fancamp conducted the first drilling campaign on the Lac Lamêlée South property between August and October 2011. Seventeen holes for a total of 5,613 meters of core were drilled during this program (Table 10.1; Figure 10.1).

Table 10.1 – Summary of Drilling by Fancamp (2011 and 2012)

Year	2011		2012	
Zone	Number of Holes	Meterage (*)	Number of Holes	Meterage(*)
Mountain Pond	12	4,387	24	8,507
91-92	1	150	13	3,178
Tanguay	4	1,077	3	921
TOTAL	**17**	**5,614**	**40**	**12,607**

(*) Total may not add up, due to rounding.

Figure 10.1 – Location Map Showing the Grids, Diamond Drill Hole Collars and Trenches



"Forages La Virole", Rimouski, Quebec, was contracted to drill the holes with one rig equipped to recover NQ size core. Deviation in all but two holes was determined using the Deviflex borehole survey tool that is unaffected by magnetism.

The 2011 drilling campaign confirmed the presence of large iron oxide-bearing units that occur across the three Zones on the Property. The iron mineralization extends laterally over a distance of approximately 2.5 km and was drilled to a maximum depth of about 350 m below surface.

This campaign also confirmed the geometry of the deposit as a tight, re-folded syncline broken into three fault blocks: the Mountain Pond Zone to the northeast, the centrally located "91-92" Zone, and the Tanguay Zone in the southwest.

10.3 2012 Drilling

The 2012 diamond drilling program completed between July and September 2012 consisted of 40 holes for a total of 12,607 m (Table 10.1; Figure 10.1). The additional information gained by the 2012 drilling, complemented with ground geophysical survey data improved the understanding of the deposit and partly tested the mineralization to a maximum depth of 575 m below surface.

Petrological studies, detailed re-interpretation of the geophysical data by Dubé and Desaulniers Geoscience provided additional information that facilitated the construction of the 3D geological model.

10.4 Magnetic Susceptibility Tests

Magnetic susceptibility measurements were conducted on the entire core from drill holes LS-2011-08 to -17 using the MPP-EM2S probe manufactured by Instrumentation GDD in Québec City.

The results from the measurements were incorporated into the drill logs. As expected, the readings for magnetite quartzite iron formation (MIF) yielded a much stronger magnetic signal than the hematite quartzite iron formation (HIF). The Quartz–pyroxene–magnetite unit (QPyrxM) showed highly variable magnetic susceptibility.

11 Sample Preparation, Analysis and Security

11.1 Core Logging

Core logging and sampling during the 2011 and 2012 programs were performed at the Fancamp's camp facility. Geology was described using 13 lithological units and several sub-lithologies. Other recorded parameters include core recovery, structural elements, magnetic susceptibility, rock quality designation (RQD) and a visual estimate of the percentage of magnetite and hematite. The recorded information was entered by the geologist into dedicated logging software, GeoticLog and GeoticGraph, and the data were subsequently exported to GEMCOM software.

Overall, core recovery was reported as being close to 100% in most cases and the RQD to be higher than 95%.

11.2 Core Sampling

Part of the core from the 2011 drill program was sampled continuously within the mineralized intervals using systematic 2-m samples. The length of the samples was adjusted where necessary to respect lithological contacts.

In portions of six of the sixteen 2011 holes, mineralization was sporadically sampled. In these cases, a 1-m sample was taken leaving gaps of 2, 5 or 8 meters of un-sampled mineralization. Partial sampling was used to speed up the process due to logistical difficulties near the end of the drilling program. Details on the sampling procedures are provided in P.J. Lafleur's technical report (2013).

Met-Chem believes that this way of sampling is not standard practice and that there is no assurance that the "skeleton samples" provide assay results representative of the complete sampled intervals.

The core from the 2012 program was systematically sampled along 2-m intervals that were adjusted where necessary to respect lithological contacts.

The samples were split using a hydraulic splitter. One half of the sample was returned to the core box, while the other half was packaged in sealed polyethylene bags to be shipped to the analytical laboratory.

11.3 Shipping, Chain of Custody

The core samples collected in 2011 were submitted to Activation Laboratories Ltd. (Actlabs) in Ancaster, Ontario, whereas the 2012 samples were submitted to ALS Minerals Laboratory (ALS) in Val-D'Or, Quebec.

The samples were transported from camp to a warehouse in Wabush. The sample bags were placed in rice bags, secured with a cable tie, stacked on pallets and shrink-wrapped for shipping.

The 2011 samples were shipped by truck to Actlabs in Ancaster, Ontario, while the 2012 samples were shipped by truck to the ALS in Val-D'Or, Quebec.

The Chain of Custody was preserved from the drill site to the Fancamp's warehouse in Wabush.

Met-Chem cannot comment on the security of the samples while being shipped to the laboratories but can see no reason to believe the samples were tampered with.

11.4 Sample preparation, analysis and security

The split core samples from 2011 and 2012 were prepared and analyzed at ALS and Actlabs, respectively. After crushing and pulverizing, the samples were analyzed by lithium metaborate X-ray Fluorescence ("XRF") on fused pellets for a suite of oxides, and some elements, including: Fe_2O_3, SiO_2, TiO_2, Al_2O_3, Fe_2O_3, MnO, P_2O_5, V_2O, MgO, CaO, Na_2O, K_2O and Loss on Ignition ("LOI"). An XRF package of 15 oxides and elements was selected by Fancamp for the 2011 samples (Actlabs), whereas 24 oxides and elements were part of the XRF package used in 2012 (ALS).

Satmagan and Davis Tube tests were also performed in 2011 and 2012, as presented in Table 11.1.

Table 11.1 – Laboratory Tests on Samples from the 2011 and 2012 Samples

Test	2011 Drill Program	2012 Drill Program
Satmagan	4	-
Davis Tube Weight Recovery	122	50
XRF on Davis Tube Product	117	45
XRF on Davis Tube Tails	119	46

A suite of 50 samples analyzed at ALS were sent to Actlabs for Davis Tube tests and analyses of both the concentrates and tails.

11.5 QA/QC Protocol - Fancamp

Density determination was performed on 120 samples in 2011 and on 50 samples in 2012. The samples represented the three units containing potentially significant quantities of iron oxide minerals: HIF, MIF and QPyrxM. No details are provided in PJLGC's technical report on the methodology used, which would indicate whether the measurements reflect the "in-situ' density or the specific gravity determined by pycnometer.

Details on the density parameters used in PJLGC's and Met-Chem's resource models are provided in PJLGC's technical report and under Section 14 of the present report, respectively.

11.6 QA/QC Protocol - Fancamp

Fancamp used Blanks, quarter core Duplicates and Reference Material to monitor the laboratory performance (Table 11.2).

Table 11.2 – Fancamp's QC Samples

QC Sample Type	2011 Program	2012 Program
Blank	9 (quartzite)	94 (50 carbonate, 42 quartzite, 2 unidentified)
Duplicate	43	94
Reference Material (Magpie Fe Ti)	10	65

One sample of reference material was inserted within the samples from the mineralized zones in each drill hole not exceeding 250 m in length. Holes longer than 250 m contained a second reference sample. In addition, one blank and one duplicate were included in the sample stream every 80 m.

Two types of blanks where used by Fancamp, as well as the "Magpie Reference Material" with a grade of 62.1% Fe_2O_3 and 11% TiO_2., which is a much higher grade than the average, or the cut-off, T Fe grade of the Lac Lamêlée deposit.

Forty samples of a range of mineralized samples analyzed at the main laboratory were quartered and sent to a second laboratory for monitoring the performance of the main laboratory. No information on these samples was made available to Met-Chem.

PJLGS examined the analytical results and found that eleven (10%) of the blanks were outside of the mean plus or minus one standard deviation, yet they contained very low iron values (average 0.6% Fe_2O_3% and a maximum of 2.7%). Thirteen standards (17%) were outside of the mean plus or minus one standard deviation but the coefficient of variation of Fe_2O_3 is very low (0.44%).

In 2011 and 2012, Fancamp introduced 137 quartered core duplicate samples ranging from 6.7% to 60.1% Fe_2O_3 in the sample stream. PJLGS found that, generally, the duplicate assays reproduced very well, with the same average grade for all the original and duplicate samples at 39.0% Fe_2O_3.

The few results from the QC samples that are outside of the selected fail/pass threshold were considered by PJLGS not to be critical, and were regarded as normal in any QA/QC program.

In view of the results, PJLCG concluded that there are no critical flaws in the data generated by the 2011 and 2012 exploration drilling and sampling programs conducted by Fancamp. The authors considered the data to be of good quality and satisfactory for use in a resource estimate.

11.7 QA/QC Protocol – Laboratories

Both ALS and Actlabs are fully accredited, internationally recognized testing laboratories using internal QA/QC procedures and operating under a Laboratory Information Management System (LIMS). Both ALS and Actlabs have built world-wide reputation and are certified to ISO 9001:2008 standards or accredited to ISO 17025:2005 in all of their locations. Internal QA/QC protocol includes insertion of blanks, standards and various duplicate samples, as well as periodical internal and external instrument calibration. The two laboratories participate in approved proficiency testing and round robin programs.

12 Data Verification

12.1 Verifications by P.J. Lafleur Geo-Conseil Inc. (PJLGC)

Mr. M.A. Ben Ayad, P.Geo., of PJLCG, visited the site on August 21-24, 2012. The visit took place with Mr. Mike Flanagan, P.Geo., Senior Exploration Geologist of Glenmere Geological Services, who carried out all the exploration work on behalf of Fancamp Exploration Ltd.

Mr. M.A. Ben Ayad, PJLCG, visited all the outcrops available at that time, including stripped and blasted areas. The different mapped lithologies and the general geological structure of the property were confirmed and a chronology of different deformation phases was established. Some core was examined and the logging and sampling procedures were reviewed. The core was found to be in very good condition and the core boxes are well labelled and stored. PJLGC found that logging and sampling had been carried out in a professional manner.

Fourteen mineralized core samples were selected to serve as QP check samples. In view of the results, PJLCG estimated the check assays reproduced well the original sample results.

Approximately 30 % of the assay data from the samples were audited by PJLGCI for accuracy against assay certificates. No major input errors were detected in the data.

12.2 Verifications by Met-Chem

12.2.1 Introduction

In compliance with NI 43-101's requirements when referring to a previously filed technical report, Met-Chem did a certain amount of background work and validation of the results from Fancamp's QA/QC system.

12.2.2 PJLGC's QP Check Samples

Met-Chem found a difference between the respective pairs of original and QP check samples by PJLGC ranging from 1.22 to -2.28 % T Fe, with one pair showing a difference of 9.43% T Fe. No standards, blanks or duplicates were inserted into the sequence of check samples. No statistically valid conclusion can be drawn from the limited amount of samples.

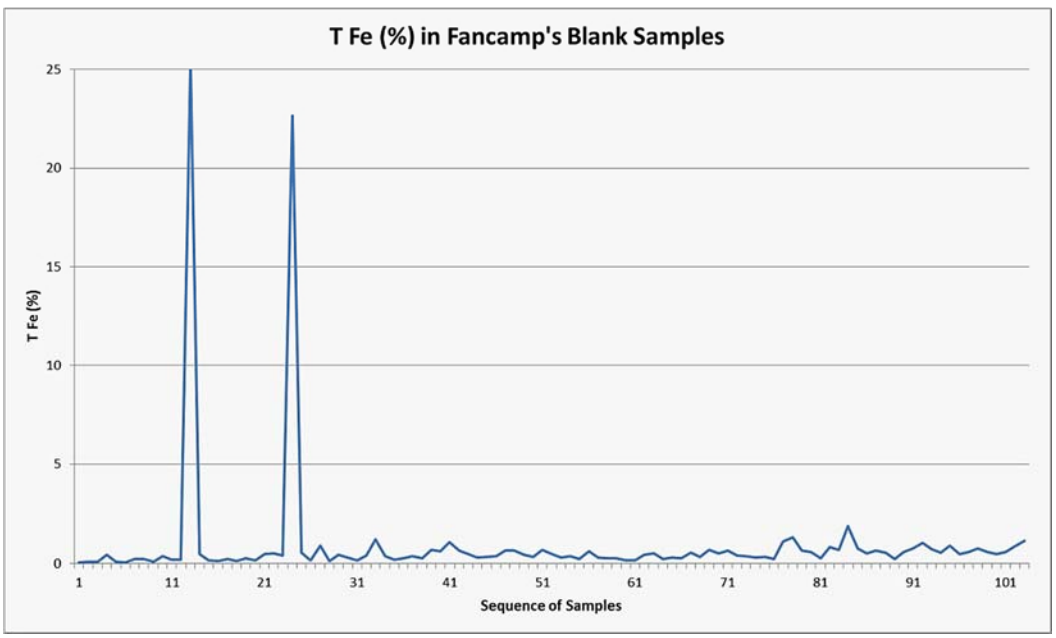
In its evaluation of the quality of the results delivered by the laboratories, PJLGC considered the 2011 and 2012 QC samples as one population. Considering the fact that the drilling programs were completed in different years and that two different laboratories were used, Met-Chem reviewed the results of the 2011 and 2012 program separately.

12.2.3 Fancamp QC Samples

a) Blanks

Nine blanks were inserted into the sample streams in 2011 with Tot Fe values ranging from 0.063% to 0.448% T Fe. Two out of the 94 blanks inserted in the sample stream during the 2012 drilling program yielded values of 22.65 and 25.24 % T Fe, which may be attributed to sample mix-ups. The T Fe values yielded by the blanks range from 0.11 to 1.89 % with an average of 0.50% (Figure 12.1).

Figure 12.1 – Line Diagram of Fancamp's Blank Samples from the 2012 Drilling Program.



These analytical results suggest the blanks were not certified blanks but the results are acceptable, except for the sample mix-ups. A subtle increase in the iron values with time can be discerned.

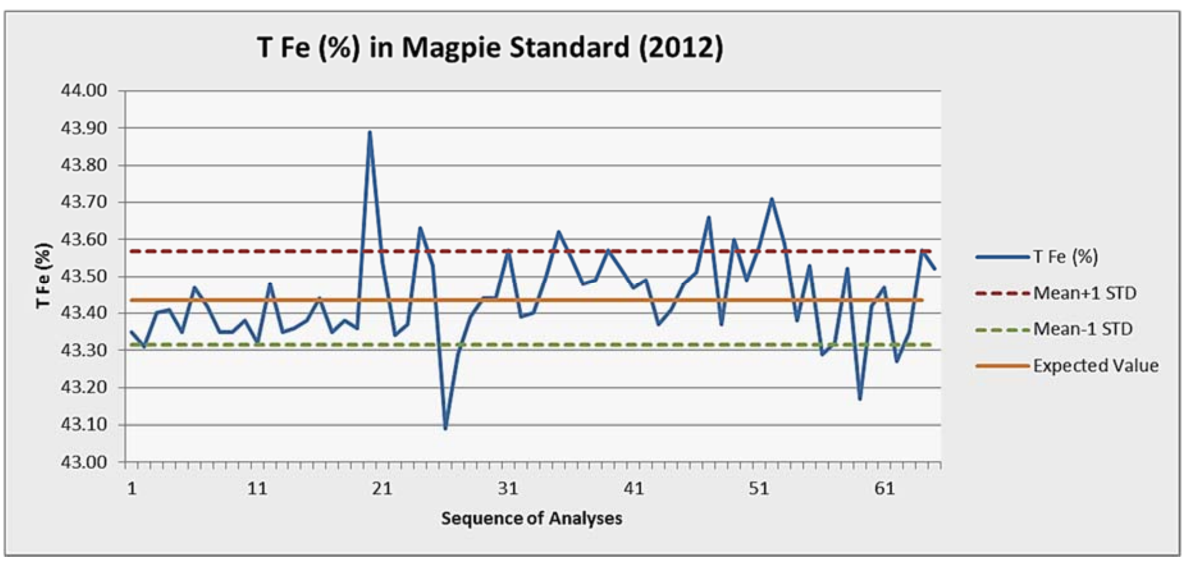
b) Standards

The "Magpie Standard" was used by Fancamp to serve as Standard Reference Material. Actually, this appears to be an in-house "Standard" prepared by Magpie Mines Inc. from core sludges produced by drill programs (Amended Technical Report and Resource Estimate on the Magpie #2 Iron-Titanium Deposit of the Magpie Property, Quebec, Canada for Magpie Mines Inc. by P&E Mining Consultants Inc., Brampton, Ontario; Amended Date: June 6, 2012).

Met-Chem used the mean plus or minus one standard deviation as a fail/pass threshold for the reference material used by Fancamp. Out of ten T Fe analyses of the reference material used in 2011, seven fall outside of the mean plus or minus one standard deviation (Figure 12.2). Although the performance of the laboratory indicated by the reference material appears not to be acceptable, no statistically valid conclusion can be derived from such a low number of analyses.

The results for T Fe showed that fourteen of the 65 samples of reference material inserted in 2012 exceed the mean plus one standard deviation, which represents 21.5% of the samples. The nineteen first analyses show a significantly lower variability than the rest of the 65 analyses of the reference material (Figure 12.2).

Figure 12.2 – Line Diagram of Fancamp's Duplicate Samples from the 2011 and 2012 Drilling Programs.



The fact that the material used as reference is not certified somewhat restricts the scope of conclusions that can be drawn from the results. In addition, the T Fe grade of the reference material should have been close to the average, or the cut-off, grade of the deposit.

In spite of these limitations, the analytical results from the Magpie reference material suggest that the performance of the ALS laboratory in 2012 may not have been outstanding, and the performance of Actlabs in the analyses of the 2011 drilling program seemed to be lower.

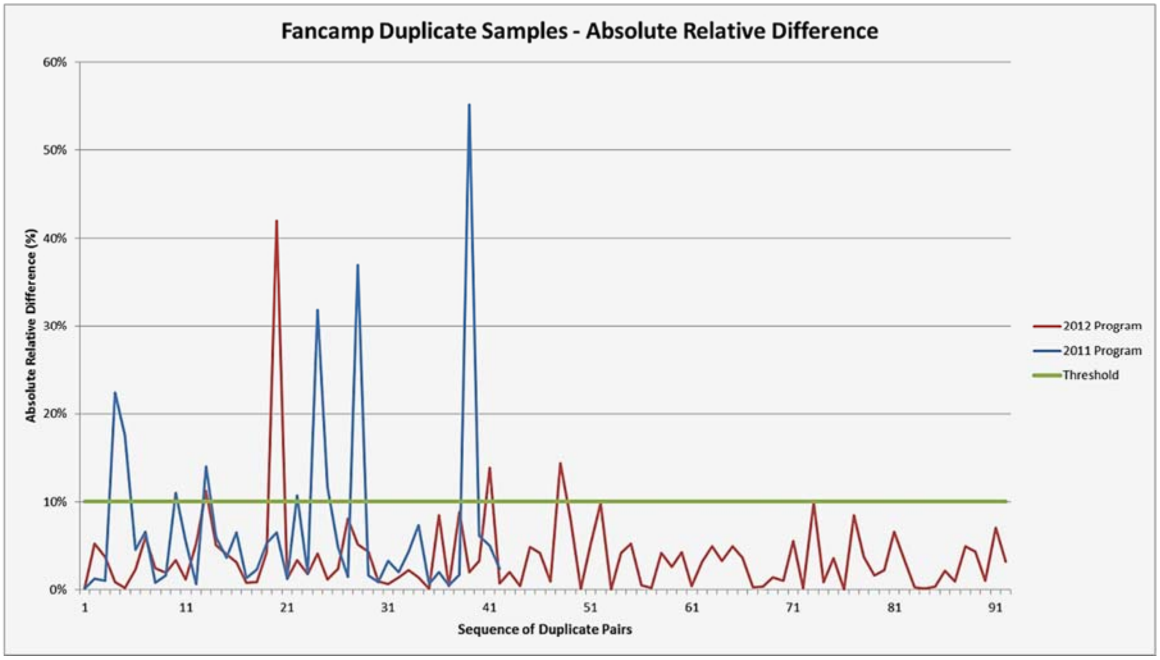
c) Duplicate Samples

2011 Drill Program

A total of 43 duplicate samples were sent to the laboratory in 2011, but 42 analytical results were found in the database. In the verification of the QA/QC program, Met-Chem used the Absolute Relative Difference (absolute difference between the two analyses of the consecutive pairs divided by the mean for the corresponding pairs) as the variable to determine the fail/pass threshold for the each of the Original-Duplicate pairs of analyses.

The analytical data show that nine pairs, representing 21.4% of the pairs, exceed the 10% threshold (Figure 12.3). These results show a relatively high variance between the pairs, as 90% of the pairs should have an absolute relative difference of less than 10%. The average T Fe for the 42 original and duplicate samples is calculated as 27.01% and 27.24%, respectively. The repeatability of the duplicate samples is not outstanding. The small volume of the samples, consisting of core halves, may partly contribute to the observed variability.

Figure 12.3 – Line Diagram of Fancamp's Duplicate Samples from the 2011 and 2012 Drilling Programs.



<u>2012 Drill Program</u>

A total of 94 duplicate samples were used in 2012. Two probable sample mix-ups were found (Duplicate 0.24% T Fe vs. Original 22.17% and Duplicate 0.23% T Fe vs. Original 15.21%). After eliminating these two pairs, 4 pairs exceed the 10% threshold, which is equivalent to 4.34% of the samples and is considered as acceptable.

The average T Fe for the 92 original and duplicate samples is calculated as 27.39% and 27.31%, respectively, which is acceptable as it is less than a 5% difference. The variability between the pairs of original and duplicate samples from the 2012 drill program is lower than the same parameter calculated for the 2011 sample.

12.2.4 Verification by Met-Chem

12.2.4.1 Site Visit

Schadrac Ibrango, P.Geo. PhD., Met-Chem's Senior Geologist, visited the Lac Lamêlée Project from October 08 to 09, 2014 in order to complete a personal inspection of the property for a QP visit, as required by the NI 43-101 Standards of Disclosure for Mineral Projects. The visit occurred while an infill drilling program was ongoing. However the results of this infill drilling campaign were not available for the current Mineral Resource estimate. The following points summarize the activities that occur at the time of the site visit, the verifications done by Met-Chem's senior geologist acting as an independent QP and the resulting main recommendations to be considered for future development work on the property.

a) Activities

At the time of the site visit an infill drilling campaign was undertaken by LIO in order to densify drilling and reach an average drill spacing of 100 m by 100 m with the objective to upgrade the Mineral Resource into Indicated and/or Measured Mineral Resource in the next stage of the development of the Lamêlée Project. Met-Chem discussed with Kateri Marchand, P.Geo, LIO's site responsible, and Claude Britt, P.Geo acting as geology advisor for LIO. The infill drilling campaign was planned by Claude Britt who presented briefly its main objectives. Drilling activities consisted on 2 NQ diamond drills operating 24 hours. Kateri Marchand also presented briefly the preliminary iron intercepts returned by completed holes on a 2D sections basis. The infill drilling campaign was started after the current Mineral Resource of the Lamêlée Project was completed and consequently does not have an impact on the geological model on which the Resource estimate is based.

A trip was then taken to the field to examine an outcrop and check the position of old drill collars. One of the operating drill rig was also visited. Seven holes collars and one outcrop were checked with a hand-held GPS and were well within the accuracy of the instrument when compared against their coordinates entered into LIO drillhole database. The core from selected holes was reviewed by the QP and compared against the original drill logs in Pdf format.

Recommendations that were brought up by Met-Chem QP to help refining the geological model for a subsequent update of the Lamêlée Project Mineral Resource are indicated below.

b) Main recommendations

- Perform on site core density measurements on selected samples. No density measurements, based on the weight on air and in water, were undertaken on the site at the time of the visit;
- Extend Satmagan, Davis Tube and Heavy Liquid Tests to samples of the 2011 drilling campaign which was not accounted in the characterisation work performed in the spring-summer 2014;

- Complete sampling and analyses of some holes of the 2011's drilling campaign that were partially sampled due to logistic/strategic reasons.

12.2.4.2 Independent Check Sampling

Met-Chem selected 40 samples covering a fair distribution of iron content to be re-analysed and to serve as independent check samples. Five (5) QC samples consisting of one (1) blank, two (2) standards and two (2) duplicates were inserted in the raw check samples. The coarse rejects were used rather than using pulps or re-splitting half core. Met-Chem does not consider a quarter core as a good duplicate sample, especially if the half core is split rather than sawn.

The analytical results for T_Fe% and T_SiO2% for Met-Chem's independent check samples against the original results are presented in Table 12.1 while Table 12.2 and Table 12.3 present SGS's assaying results for both standards against the reference values.

Table 12.1 – Met-Chem's Independent Check Samples – Analytical Results for T Fe% and T SiO2%

DDH	Sample ID	From (m)	To (m)	T_Fe Original (%)	T_Fe Duplicate (%)	T_SiO_2 Original (%)	T_SiO_2 Duplicate (%)
LS-12-08	P162418	70.00	72.00	15.02	15.04	28.7	28.4
LS-12-08	P162437	101.00	103.00	37.37	37.98	43.9	43.3
LS-12-08	P162443	111.00	113.00	24.75	25.11	48.5	48.3
LS-12-08	P162452	129.00	131.00	29.17	29.38	48.2	48.3
LS-12-08	P162467	157.00	159.00	30.24	30.64	45.6	44.7
LS-12-08	P162469	161.00	163.00	30.22	30.15	39.9	39.5
LS-12-08	P162486	193.00	195.00	24.86	24.97	34	33.5
LS-12-11	N156509	34.00	36.00	37.69	37.42	44.5	45
LS-12-11	N156533	84.00	87.00	44.71	44.97	32.5	32.8
LS-12-11	N156534	87.00	89.00	37.99	38.68	42.3	41.9
LS-12-11	N156559	135.00	137.00	30.14	30.01	55.1	55.5
LS-12-11	N156561	137.00	139.00	37.43	37.91	43	42.4
LS-12-11	N156562	139.00	141.00	30.57	30.99	51.6	50.6
LS-12-11	N156574	163.00	165.00	24.33	24.9	42.3	43.3

LS-12-13	N156603	86.00	88.00	30.85	30.99	42.2	41.1
LS-12-13	N156608	96.00	98.00	30.92	30.99	39.3	39.6
LS-12-13	N156633	144.00	146.00	30.73	29.94	50.7	51.7
LS-12-13	N156634	146.00	148.00	37.55	37.35	37.8	38.3
LS-12-13	N156635	148.00	150.00	30.27	30.78	42.2	41.5
LS-12-13	N156641	158.00	160.00	24.14	24.27	48.2	48.1
LS-12-13	N156646	168.00	170.00	24.47	24.62	50.1	50.6
LS-12-13	N156664	202.00	204.00	29.28	29.52	54.8	54.7
LS-12-13	N156665	204.00	206.00	30.99	31.89	50.2	49.2
LS-12-13	**N156678**	**230.00**	**232.00**	**29.55**	**32.03**	**53.1**	**50.5**
LS-12-13	**N156681**	**234.00**	**236.00**	**24.07**	**26.16**	**59.8**	**56.7**
LS-12-15	N156694	41.00	43.00	30.27	30.78	55.1	53.5
LS-12-15	N156696	45.00	47.00	30.49	31.41	53.4	51.1
LS-12-15	N156697	47.00	49.00	29.72	30.92	54	51.6
LS-12-15	N156699	51.00	53.00	29.38	29.45	55	54.7
LS-12-15	N156703	60.00	63.00	24.5	26.02	61.4	58.6
LS-12-15	**N156717**	**96.00**	**98.00**	**30.56**	**27.21**	**53.1**	**57.9**
LS-12-15	N156718	98.00	100.00	37.1	37.07	43.5	43.5
LS-12-15	N156754	318.00	321.00	24.33	25.67	64	62.9
LS-12-28	P163469	212.00	214.70	24.62	24.76	57.5	56.8
LS-12-28	P163470	214.70	217.00	14.62	13.5	39.8	38.9
LS-12-28	P163476	227.00	229.00	31	30.92	46.9	47.3
LS-12-28	P163493	257.00	258.40	31.1	32.17	46.6	45.6
LS-12-28	P163514	296.00	298.00	42.24	43.16	36.1	35.7
LS-12-28	P163523	312.00	314.60	37.54	37.42	39	39.3
LS-12-28	P163539	346.00	347.60	30.62	30.36	45.1	45.4

The results did not show any significant bias between both datasets and there is high correlation relative to the original samples. However one notes a substantial T Fe% and T SiO2% variability for some samples (N156717, N156681, N156678). The basic statistical parameters for head total iron and silica and the ranges of differences between the original and duplicate analyses for the individual pairs are listed in Table 12.2.

Table 12.2: Met-Chem's Check Samples – Basic Statistics on Head Analyses of Original and Duplicate Samples

Parameters	T_Fe% - Check Samples	T_Fe% - Original Samples	SiO_2% - Check Samples	SiO_2% - Original Samples
n=	40	40	40	40
Average	30.44	30.14	46.56	46.98
Standard Deviation	0.99	0.98	1.23	1.27
Correlation	0.98		0.97	
Range of difference in the Pairs	–3.38 to +2.48		–3.1 to +4.8	

Figure 12.4: Met-Chem's Check Samples – T Fe% Analyses of Original and Duplicate Samples

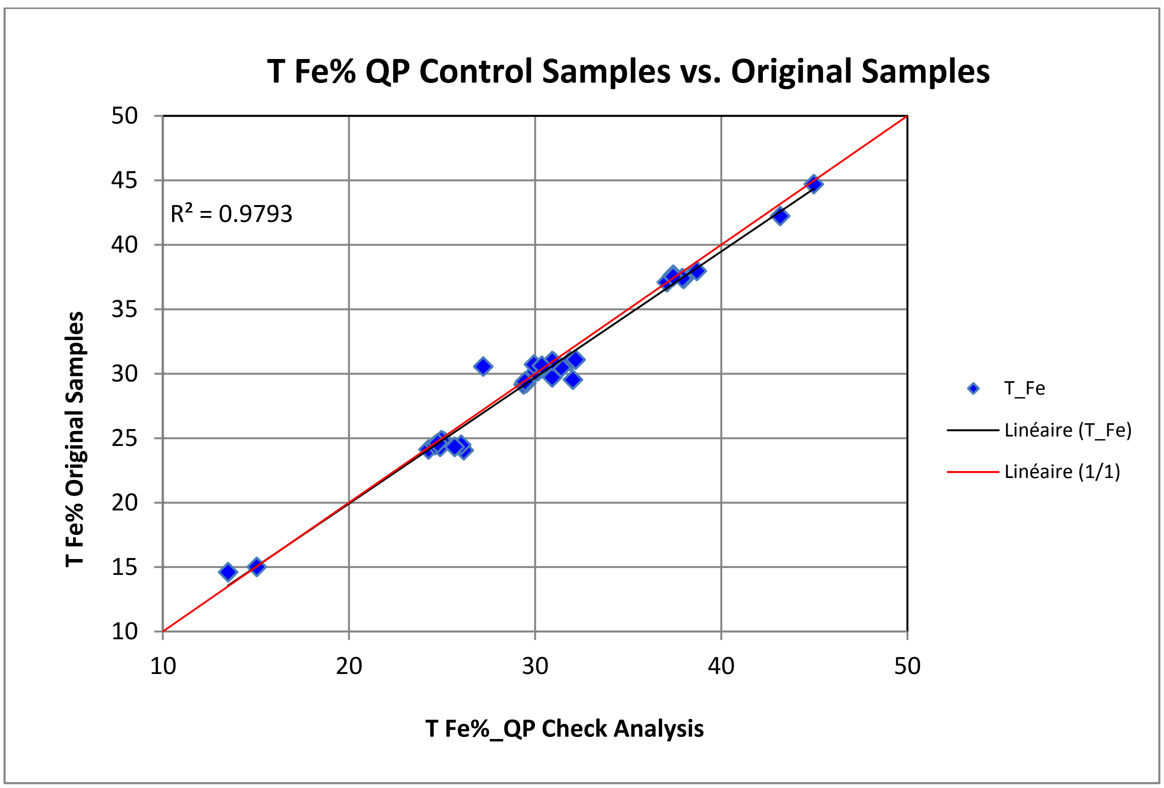


Figure 12.5: Met-Chem's Check Samples – T SiO2% Analyses of Original and Duplicate Samples

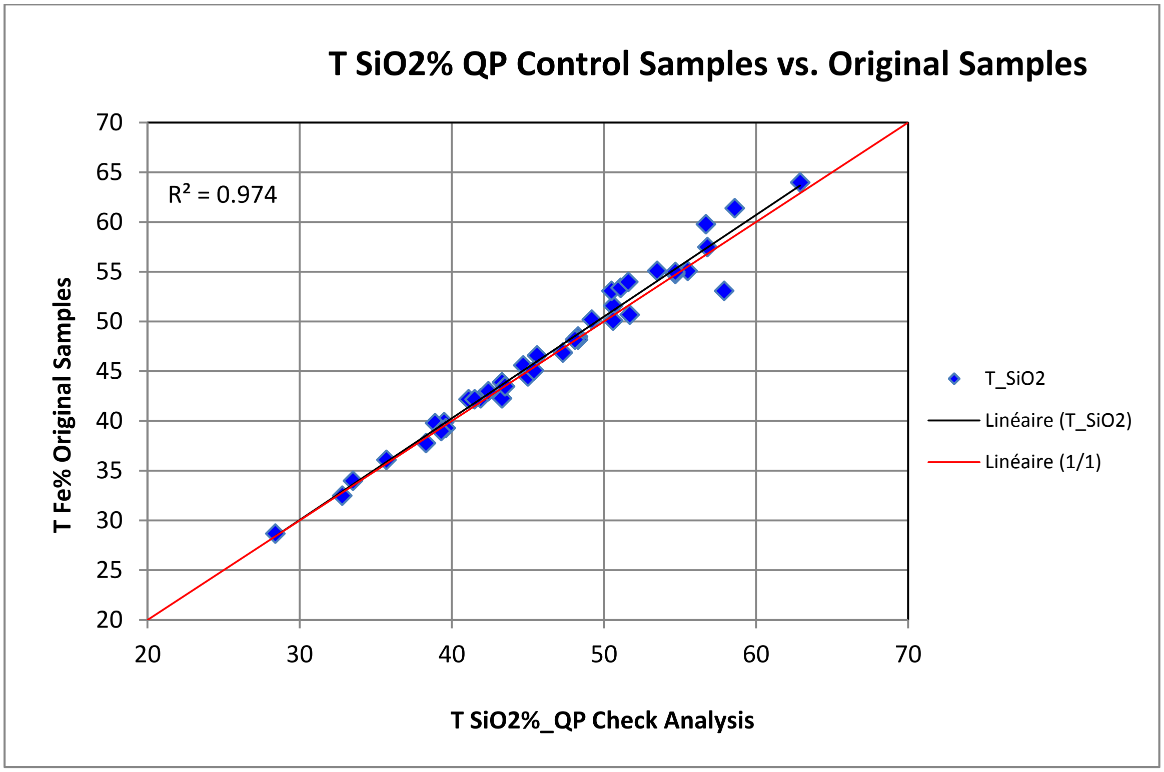


Table 12.3: Met-Chem's Check Samples – Basic Statistics on Head Analyses of Original and Duplicate Samples

	Element	Expect Value	Estimated Uncertainty	SGS Analysis
Certified Reference Material GIOP-102	Fe (%)	25.6	0.09	25.45
	Al_2O_3 (%)	2.05	0.05	2.05
	SiO_2 (%)	53.35	0.26	53.2
	P (%)	0.076	0.001	0.078
	TiO_2 (%)	0.08	0.01	0.08
	LOI (%)	-0.19	0.06	0.06
	Fe (%)	25.6	0.09	25.45

Table 12.4: Met-Chem's Check Samples – Basic Statistics on Head Analyses of Original and Duplicate Samples

	Element	Expect Value	Estimated Uncertainty	SGS Analysis
Certified Reference Material GIOP-103	Fe (%)	27.19	0.07	27.07
	Al_2O_3 (%)	0.72	0.02	0.7
	SiO_2 (%)	55.26	0.5	55.3
	P (%)	0.047	0.001	0.048
	TiO_2 (%)	0.03	0.000	0.02
	LOI (%)	-0.71	0.04	-0.48
	Fe (%)	27.19	0.07	27.07

13 Mineral Processing and Metallurgical Testing

13.1 Metallurgical Testwork Program (2014)

In October 2013, Lamêlée Iron Ore Ltd. requested Soutex Inc. to design and supervise metallurgical testwork in regards to the Preliminary Economic Assessment (PEA) of the Lamêlée Project. A metallurgical testwork plan suitable for a PEA level was developed.

The primary objectives of the metallurgical testwork were:

- To assess the mineral present and their liberation sizes through mineral characterization;
- To determine the ore hardness and grindability properties;
- To assess the potential of gravity separation and magnetic separation through preliminary concentration testwork to produce a concentrate with 4.5 % SiO_2.

The laboratory testwork was carried out by SGS. A complete analysis of the results was produced by Soutex.

13.1.1 Sample Description and Preparation

Three (3) material types from the three (3) principal units of the deposit that offer economic potential have been provided by the client:

1. High Magnetite Sample (High Mag): Sample of the Magnetite Iron Formation (MIF);
2. Hematite/Specularite + minor Magnetite (Hem/Spec): Sample of the Magnetite-Hematite Iron Formation (MHIF);
3. Quartzite – Pyroxene – Magnetite Unit (QPyrxM) : Sample of the Quartzite-Pyroxene-Magnetite Formation (QPyrxM).

The three (3) samples were obtained during the exploration activities conducted in 2012. The samples consist of rocks from blasting (MIF and MHIF) or half- NQ (QPyrxM) cores from diamond drill holes (DDH). The sample location and harvesting was handled by Explo-Logik.

The sample selection was done based on what was known from the drill cores at the time (2012). Each of the samples was considered to be representative of the magnetite iron formation across the deposit (blast #1) and the hematite iron formation (blast #2).

The blasted areas were 3 m x 3 m x 1.5 m. The areas were randomly sub-sampled with shovels, with the exception of rocks larger than 20 cm x 20 cm that were excluded to fit in the 5 gallon buckets.

The material was stored in a secured container at Chicoutimi and five (5) 5 gallon pails representative of each type of material were selected randomly to be sent to the SGS Lakefield facility for metallurgical testing.

As the sub-sampling method was not systematic, uniform and impartial, the blast rock samples should be considered as specimens rather than samples and should not be considered as representative of the blasted ore. Table 13.1 presents the information regarding the samples description.

Table 13.1 – Metallurgical Sample Description

Sample	Lithology	Zone	Material	Location	From (m)	To (m)	Total Weight (kg)
High Mag	Magnetite - Quartzite iron formation (MIF)	Pond Zone	Blast Rocks	Area #1	-	-	214
Hem/Spec	Magnetite – Hematite – Quartzite iron formation (MHIF)	Pond Zone	Blast Rocks	Area #2	-	-	201
QPyrxM	Quartzite – Pyroxene – Magnetite Unit (QPyrxM)	Pond Zone	DDH Half – NQ Core	LS-12-09	165.3	263.45	177
				LS-12-08	105.2	133.4	

For each of the blast rock composite samples (High Mag and Hem/Spec sample), the whole sample was dried and homogenized. The samples were then crushed and the material was split into the appropriate size to fulfill the comminution testing requirements. A representative portion was removed and stage-crushed to minus 1.7 mm and split to be submitted for head analyses, mineralogy and metallurgical testing.

The third sample (QPyrxM) consists of a half-core sample from diamond drill holes (DDH). The whole sample was dried and homogenized. The sample was then crushed and the material was split into the appropriate size to fulfill the comminution testing requirements. A representative portion was removed and stage-crushed to minus 1.7 mm and split to be submitted for head analyses, mineralogy and metallurgical testing.

13.1.2 Chemical Analysis

Table 13.2, Table 13.3 and Table 13.4 present the sample head analyses and specific gravity (SG). The magnetite grade was measured by Satmagan. All analyses were realized twice on each sample and the averages of these analyses are presented in the following tables.

The average iron grades of the specimens are significantly higher than the average grade of the deposit.

Table 13.2 –Head Sample - XRF Analyses

Sample	Analysis												
	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	TiO_2 (%)	P_2O_5 (%)	MnO (%)	Cr_2O_3 (%)	V_2O_5 (%)	LOI (%)
High Mag	42.65	0.08	52.0	2.33	2.33	0.04	<0.01	<0.0	0.04	1.42	<0.01	<0.01	-0.93
Hem/Spec	44.00	1.05	53.4	0.47	0.13	0.07	0.07	0.58	0.06	0.08	0.03	<0.01	0.53
QPyrxM	38.45	0.13	46.3	5.62	4.94	0.01	0.02	0.02	0.04	0.86	<0.01	<0.01	4.30

Table 13.3 – Head Sample - ICP and LECO Analyses

Sample	Analysis						
	Cu (%)	As (%)	C(t) (%)	S (%)	Pb (%)	Zn (%)	Sn (%)
High Mag	0.003	<0.001	0.09	<0.01	0.000	0.000	-
Hem/Spec	0.003	<0.001	0.09	<0.01	0.000	0.000	-
QPyrxM	0.003	<0.001	1.32	<0.01	<0.002	0.001	<0.05

Table 13.4 – Satmagan Analysis, Specific Gravity and Calculated Elements

Sample	Analysis						
	SG -	Fe (%)	Mag (%)	Fe Mag (%)	Mn (%)	P (%)	Fe Mag/Fe (%)
High Mag	3.67	36.37	50.18	36.33	1.10	0.02	99.89
Hem/Spec	3.66	37.31	5.78	4.19	0.06	0.02	11.22
QPyrxM	3.60	32.35	23.51	17.02	0.67	0.02	52.62

13.1.3 Mineralogical Analysis

In order to define the liberation size, mineralogical characterization tests were performed.

Qualitative mineralogy was initially performed to obtain a preliminary estimation of the liberation size for hematite and magnetite and also to select the grind sizes for the quantitative mineralogical characterization. Qualitative mineralogy consists of basic optical microscopy on two (2) polished sections per sample. Qualitative mineralogy was performed on the sample stage-crushed to 1.7 mm.

Then, the three (3) samples were characterized by Quantitative Evaluation of Minerals by Scanning Electron Microscopy (QEMSCAN).

Crushed samples to minus 1.7 mm were screened and the mineralogical work was conducted on individual size fractions. The value for the combined sample is calculated from the size fraction results. Table 13.5 presents the size fractions analysed for each sample. For the QPyrxM sample, the fractions -600/+425 µm and -425/+300 µm were combined in a -600/+300 µm fraction because of a lack of material in that size class.

Table 13.5 – Size Fractions Used in QEMSCAN Analysis

Size Fraction	Sample		
	High Mag	Hem / Spec	QPyrxM
+1180 µm	X	X	X
-1180/+850 µm	X	X	X
-850/+600 µm	X	X	X
-600/+425 µm	X	X	-
-425/+300 µm	X	X	-
-600/+300 µm	-	-	X
-300/+150 µm	X	X	X
-150/+75 µm	X	X	X
-75 µm	X	X	X

Table 13.6 presents the percentage of area used in the QEMSCAN to qualify the mineral liberation.

Table 13.6 – Liberation Class of Mineral

Liberation Class	Area Percent of Mineral (%)
Free	≥ 95
Lib	≥ 80 but < 95
Midds	≥ 50 but < 80
Sub Midds	≥ 20 but < 50
Locked	< 20

For the analysis of the liberation degree, the following convention will be used for the analysis of the size fractions and combined liberation degree:

- Well Liberated:
  - >= 80 % of "Free" particles & >= 90 % of "Free" + "Lib" particles;
  - It is assumed that well liberated size fractions or combined sample will lead to the production of a concentrate at 4.5 % SiO_2 or less.
- Liberated:
  - >= 80 % of "Free" + "Lib" particles;
  - It is assumed that liberated size fractions or combined sample could lead to the production of a concentrate at 4.5 % SiO_2 or slightly higher, depending on the nature of the process and the type of particles associated. A certain amount of liberated particles can be tolerated.

- Unliberated:
  - < 80 % of "Free" + "Lib" particles;
  - These size fractions or combined sample will not lead to the production of a concentrate. These should be avoided.

The qualitative mineralogical analysis showed that:

- The High Mag sample is composed primarily of magnetite;
- The Hem/Spec sample is indeed mostly hematite and specular hematite. Some magnetite is present. Specular hematite is abundant in that sample;
- The QPyrxM sample shows liberated magnetite and hematite;
- As a substantial portion of coarse liberated iron oxide was observed on the microscope, no additional grinding was performed on the samples before the quantitative mineralogical characterization and the metallurgical testwork.

Figure 13.1 presents the modals analysis of the three (3) samples characterized by Quantitative Evaluation of Minerals by Scanning Electron Microscopy (QEMSCAN).

The modals analysis of the High Mag sample indicates that Fe-oxides represent 50.7 % of the combined sample (50.4 % magnetite, 0.3 % hematite). Major contaminants are quartz and Ca-Mg-Fe silicate, and the minor contaminant is Fe-Mg silicate.

In the case of the Hem/Spec sample, Fe-oxides represent about 55.7 % of the sample (51.5 % hematite, 4.2 % magnetite). The major contaminant is quartz, and minor contaminants are Fe-Mg silicate and micas/clays (silicate). For the QPyrxM sample, Fe-oxides represent 29.2 % of the sample (27.8 % magnetite, 1.4 % hematite). Major contaminants are Fe-Mg silicate (43.5 %) and quartz (12.8 %), while minor contaminants are ankerite (carbonate), calcite (carbonate), Ca-Mg-Fe silicate and diopside/salite (silicate).

Figure 13.1 – Modal Analysis - All Samples

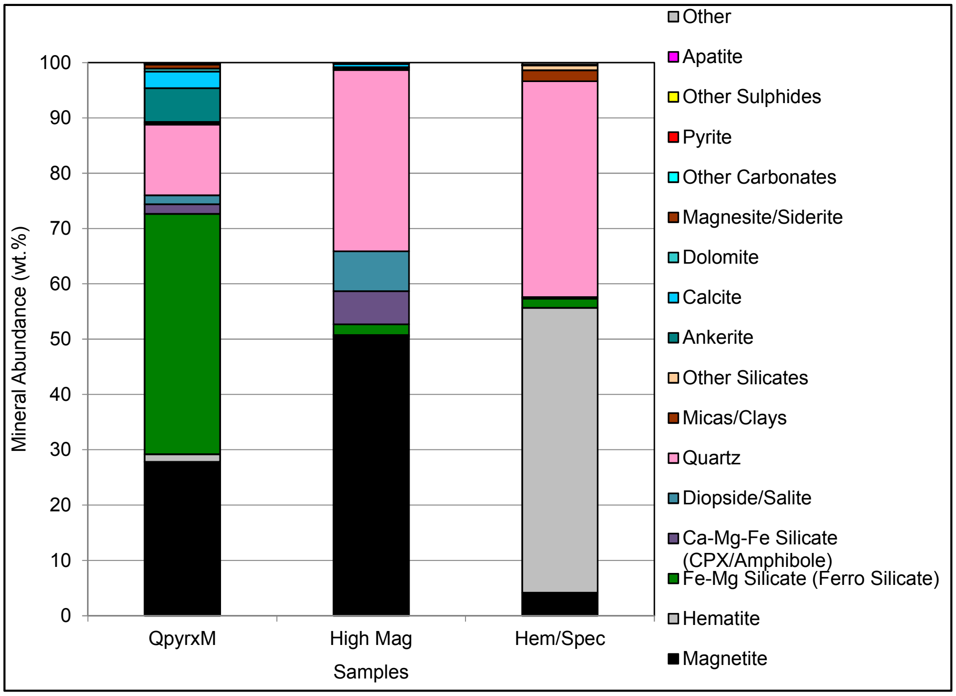


Figure 13.2 presents the iron deportment of the three (3) samples.

The iron deportment in the High Mag sample indicates that Fe is mostly in a Magnetite form (96.5 %), while the rest is mainly in a Fe-Mg silicate (1.6 %), Ca-Mg-Fe silicate (0.7 %), Diopside/Salite (0.6 %, silicate) and hematite form (0.6 %).

In the case of the Hem/Spec sample, Fe is mostly in an oxide form (90.5 % hematite, 7.3 % magnetite), while the rest is mainly under Fe-Mg silicate (1.2 %) and micas/clays form (0.7 %). The proportion of Fe under the magnetite form is more important in the -150 µm particles.

For the QPyrxM sample, Fe is mostly under the oxide form (56.6 % magnetite, 2.8 % hematite), while the rest is mainly under Fe-Mg silicate (37.0 %) with a small amount under ankerite (2.9 %).

Figure 13.2 – Fe Deportment - All Samples

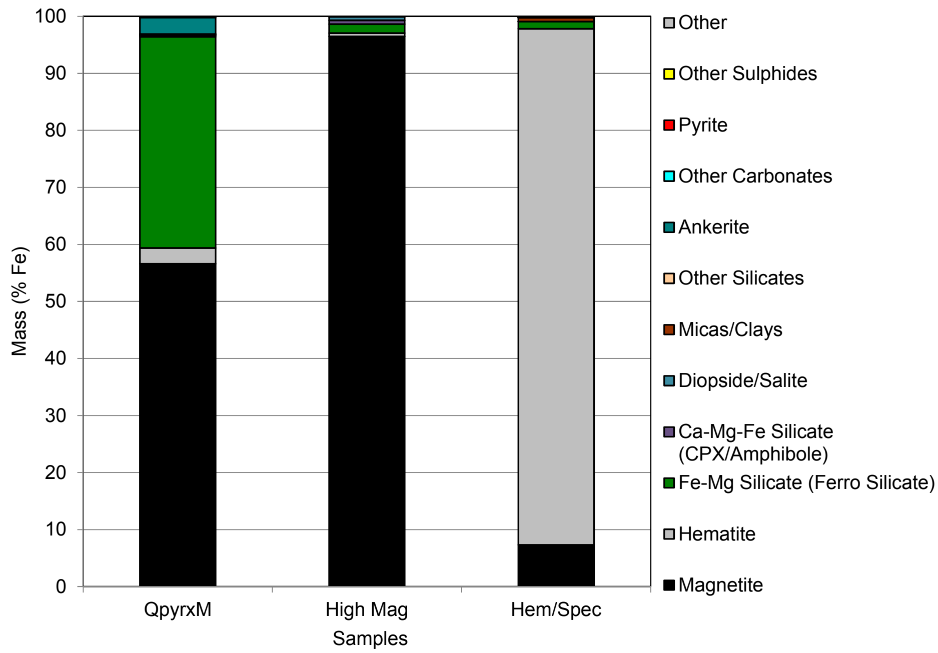


Figure 13.3 presents the Fe-oxides liberation and association in the High Mag sample. The combined sample can be considered as liberated.

The size classes below 425 µm are well liberated. The -600 µm +425 µm size class is liberated, showing a sum of “Free” + “Lib” particles of 84.1 %, which could be handled depending on the amount of particles generated in this class and the separation process used. Coarser size classes are unliberated. The liberation of Fe-oxides coarser than 600 µm drops drastically.

The unliberated Fe-Oxide particles (not “Free” or “Lib”) are mainly binary particles associated with silicates.

Figure 13.3 – Fe-Oxides Liberation and Association - High Mag Sample

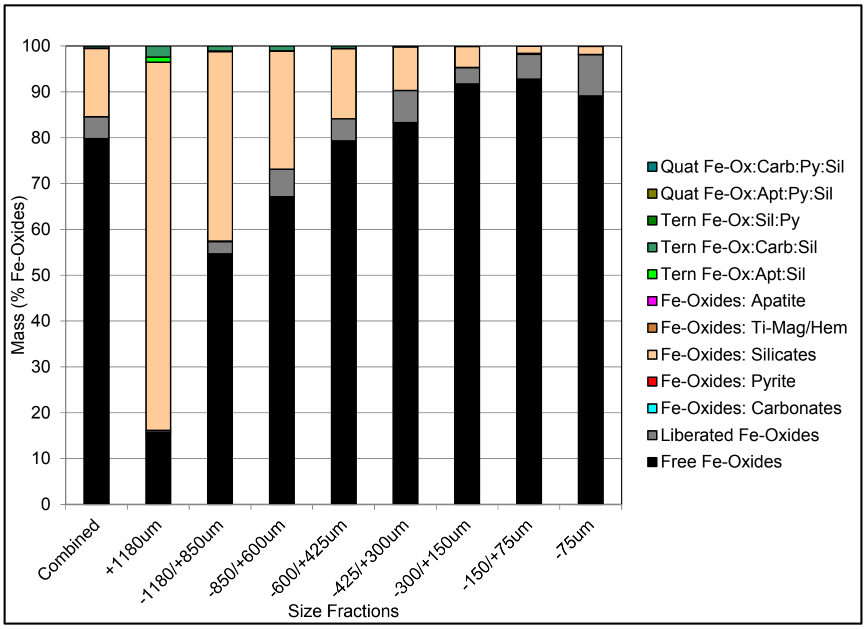


Figure 13.4 presents the Fe-oxides liberation and association in the Hem/Spec sample. The combined sample shows that the Hem/Spec sample is well liberated at -1700 µm.

The size classes below 600 µm are well liberated. Size classes coarser than 600 µm present a lower liberation level, but can still be considered as liberated.

Unliberated particles are mainly binary particles with silicates or with Ti-Mag/Hem particles.

Figure 13.4 – Fe-Oxides Liberation and Association - Hem/Spec Sample

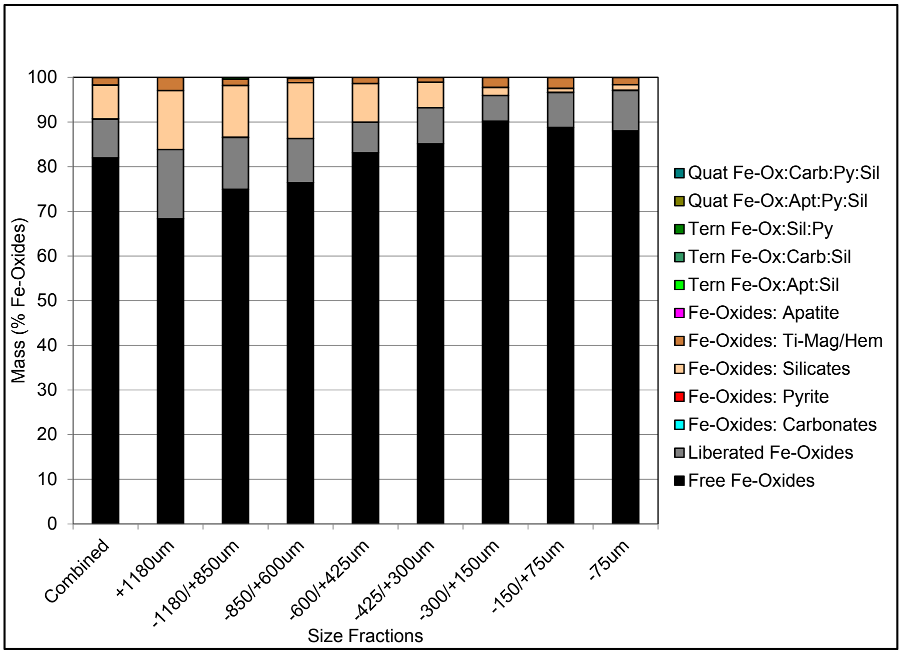
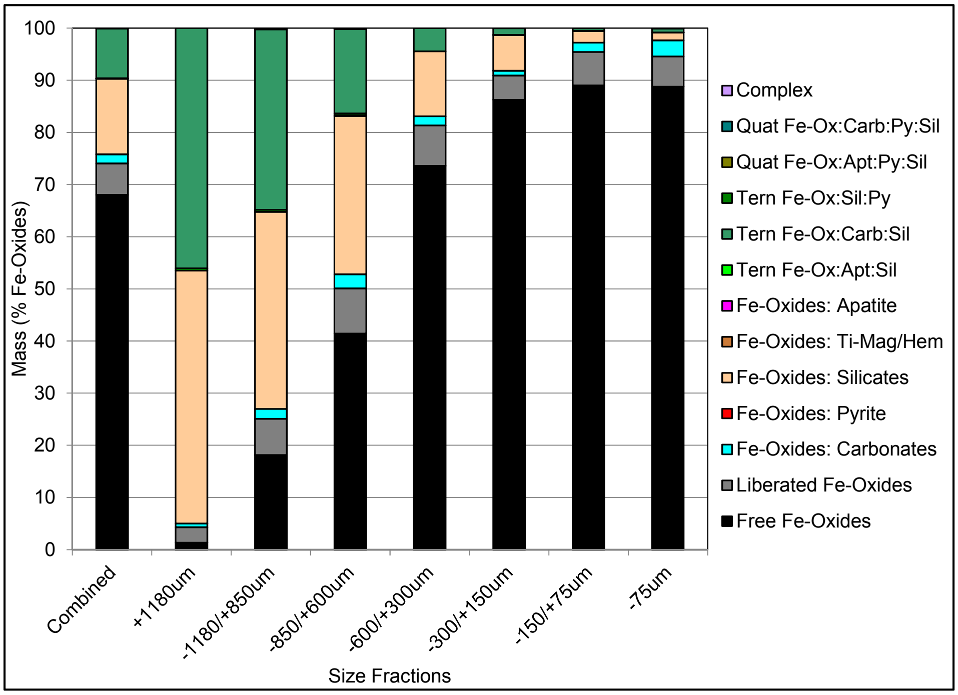


Figure 13.5 presents the Fe-oxides liberation and association in the QPyrxM sample. The combined sample is unliberated.

The size classes finer than 300 µm are well liberated. The liberation drops drastically for coarser sizes, with only the -600 µm, +300 µm fraction qualifying as liberated. Unliberated Fe-oxide particles are binary and ternary particles associated with silicates and/or carbonates.

Figure 13.5 – Fe-Oxides Liberation and Association - QPyrxM Sample



The mass distribution of major mineral present in each sample is presented in Table 13.7. All minerals that have less than 1 % of the mass for all samples are not presented in the table.

Table 13.7 – Comparison of Mass Distribution

Major Minerals	Mass Distribution (%)		
	High Mag	Hem/Spec	QPyrxM
Fe-Oxides	50.7	52.3	29.2
Magnetite	50.4	4.2	27.8
Hematite	0.3	51.5	1.4
Goethite	0.0	0.0	0.0
Ti-Magnetite / Hematite	0.0	3.4	0.0
Fe-Mg Silicate (Ferro Silicate)	2.0	1.7	43.5
Ca-Mg-Fe Silicate (CPX/Amphibole)	6.0	0.2	1.7
Diopside / Salite	7.2	0.1	1.6
Quartz	32.8	39.0	12.8
Micas / Clays	0.2	2.0	0.3
Ankerite	0.0	0.0	6.1
Calcite	0.6	0.0	3.0

The following general observations can be made in analyzing these results:

- The High Mag sample contains almost all of its iron under the magnetite form;
- The Hem/Spec sample contains most of its iron under the hematite form;
- The QPyrxM sample contains mainly magnetite and a little bit of hematite, but a significant amount of iron in silicates;
- The QEMSCAN indicates that the liberation sizes for Fe-oxide particles are in the following ranges:
  - High Mag: ±600 µm;
  - Hem / Spec: 1700 to 850 µm;
  - QPyrxM: 600 µm to 300 µm.

13.1.4 Grindability Testwork

Several comminution tests were conducted on the composite samples including:

- JK Drop Weight Test;
- SAG Mill Comminution Test (SMC);
- Bond Low Energy Impact Test (Crushing Work Index Test (CWI));
- Bond Rod Mill Index Test (RWI);
- Bond Ball Mill Index Test (BWI);
- Bond Abrasion Testing (Ai).

The grindability test results obtained are summarized in Table 13.8.

Table 13.8 – Grindability Test Results Summary

Sample	JK Parameters Drop Weight Test				JK Parameters SMC Test				Crushing Work Index (kWh/t)	Rod Mill Work Index (kwh/t)	Ball Mill Work Index 106 µm (kWh/t)	Ball Mill Work Index 75 µm (kWh/t)	Ai (g)
	A	B	Axb	ta	A	B	Axb	ta					
High Mag	87.3	8.2	712.4	3.43	90.3	9.1	824.4	6.31	4.5	-	17.8	20.6	0.058
Hem/Spec	92.8	10.0	928.0	4.49	-	-	-	-	-	-	22.0	24.8	0.056
QPyrx M	-	-	-	-	77.3	0.8	61.8	0.45	-	10.4	14.8	17.1	0.465

The drop weight test results indicate that, in terms of impact breakage, the High Mag and Hem/Spec samples are considered a very soft ore type, while the QPyrxM can be considered as a medium ore type. In terms of abrasion breakage, the High Mag and Hem/Spec samples are classified as a very soft ore type. These results indicated that this material is among the softer material of the JKTech database. Since coarse and hard rocks were systematically not included in the specimens, these results are not surprising.

The Bond Ball Mill Work Index (BWI) testing was performed to achieve two (2) different particle sizes, 106 µm and 75 µm, and indicates that the samples are above the 80th, the 95th and the 50th percentiles for the hardness in the SGS database for the High Mag, Hem/Spec and QPyrxM respectively. The BWI at 75 µm is ~2-3 kWh/t higher than at 106 µm in all cases. It's important to note that the feed size distributions for the High Mag and Hem/Spec samples for the test were finer than usual, due to the extreme softness of the ore, which broke into fines during the standard stage-crushing preparation. The test F80 was around 800 µm while the standard ball mill preparation usually requires an F80 of around 2400 µm.

The Abrasion Index (Ai) testing indicates that the material is below the 15th percentile for the abrasivity in the SGS database for the High Mag and Hem/Spec samples, while the QPyrxM is above the 72th percentile for the abrasivity in the SGS database.

13.1.5 Heavy Liquid Separation Test (HLS)

Heavy Liquid Separation (HLS) tests were performed on each sample pre-crushed at -1.7 mm and for five (5) particle size fractions. The fraction -75 µm was not performed in HLS because it does not react well to this process (long settling time and inefficient separation). The objective was to evaluate whether the ore was amenable to gravity concentration. The dense media used for the tests had a 2.96 and 3.3 density. The sink and the float were submitted for assays.

The results for the HLS tests on the High Mag sample at a specific gravity of 2.96 and 3.3 are summarized in Table 13.9 and Table 13.10.

Table 13.9 – HLS Tests Summary – High Mag Sample (Media Density of 2.96)

Size (µm)	Head Sample				Sink Fraction						
	Weight (%)	Assay			Assay			Recovery			
		Fe (%)	Mag (%)	SiO_2 (%)	Fe (%)	Mag (%)	SiO_2 (%)	Weight (%)	Fe (%)	Mag (%)	SiO_2 (%)
-1700, +1180	9.2	24.1	30.7	53.5	28.1	36.1	45.4	79.3	92.6	93.2	67.2
-1180, +850	5.7	28.7	37.0	48.7	35.0	45.3	37.8	76.8	93.5	94.1	59.6
-850, +600	8.3	33.1	43.9	45.3	42.5	56.5	30.4	73.6	94.4	94.7	49.4
-600, +300	29.1	35.2	47.8	46.9	54.5	74.3	17.9	60.8	94.2	94.4	23.2
-300, +75	43.1	42.0	57.8	37.2	61.9	85.2	8.9	66.3	97.7	97.7	15.8
-75	4.6	42.7	57.2	30.1	-	-	-	-	-	-	-

Table 13.10 – HLS Tests Summary – High Mag Sample (Media Density of 3.3)

Size (µm)	Head Sample				Sink Fraction						
	Weight (%)	Assay			Assay			Recovery			
		Fe (%)	Mag (%)	SiO_2 (%)	Fe (%)	Mag (%)	SiO_2 (%)	Weight (%)	Fe (%)	Mag (%)	SiO_2 (%)
-1700, +1180	9.2	24.1	30.7	53.5	32.8	42.4	37.1	53.5	72.9	73.9	37.1
-1180, +850	5.7	28.7	37.0	48.7	43.4	56.9	26.7	52.0	78.6	80.1	28.5
-850, +600	8.3	33.1	43.9	45.3	53.3	71.7	17.0	52.1	83.9	85.2	19.6
-600, +300	29.1	35.2	47.8	46.9	64.1	88.0	6.7	48.9	89.0	90.0	7.0
-300, +75	43.1	42.0	57.8	37.2	68.4	94.7	2.4	58.9	95.9	96.5	3.9
-75	4.6	42.7	57.2	30.1	-	-	-	-	-	-	-

The results for the HLS tests on the Hem/Spec sample at a SG of 2.96 and 3.3 are summarized in Table 13.11 and Table 13.12.

Table 13.11 – HLS Tests Summary – Hem/Spec Sample (Media Density of 2.96)

Size (µm)	Head Sample				Sink Fraction						
	Weight (%)	Assay			Assay			Recovery			
		Fe (%)	Mag (%)	SiO_2 (%)	Fe (%)	Mag (%)	SiO_2 (%)	Weight (%)	Fe (%)	Mag (%)	SiO_2 (%)
-1700, +1180	7.8	50.7	7.6	24.1	62.5	9.1	8.7	78.3	96.5	93.3	28.1
-1180, +850	8.2	47.8	6.4	29.1	62.3	7.9	8.9	73.3	95.5	91.3	22.4
-850, +600	14.0	40.1	4.9	41.0	61.2	6.9	11.1	60.8	92.8	85.7	16.5
-600, +300	42.5	31.1	4.1	53.6	62.7	6.8	9.0	45.1	91.0	75.7	7.6
-300, +75	25.1	39.9	8.1	40.2	67.0	12.9	2.1	57.9	97.2	92.1	3.0
-75	2.3	35.5	11.2	37.6	-	-	-	-	-	-	-

Table 13.12 – HLS Tests Summary – Hem/Spec Sample (Media Density of 3.3)

Size (µm)	Head Sample				Sink Fraction						
	Weight (%)	Assay			Assay			Recovery			
		Fe (%)	Mag (%)	SiO_2 (%)	Fe (%)	Mag (%)	SiO_2 (%)	Weigh t (%)	Fe (%)	Mag (%)	SiO_2 (%)
-1700, +1180	7.8	50.7	7.6	24.1	65.7	9.4	4.4	72.7	94.2	89.9	13.2
-1180, +850	8.2	47.8	6.4	29.1	66.0	8.3	3.8	67.3	92.9	87.5	8.8
-850, +600	14.0	40.1	4.9	41.0	66.5	7.3	3.8	53.9	89.4	80.3	5.0
-600, +300	42.5	31.1	4.1	53.6	67.2	7.0	2.8	40.8	88.3	70.9	2.1
-300, +75	25.1	39.9	8.1	40.2	68.3	13.1	0.8	56.4	96.6	91.1	1.1
-75	2.3	35.5	11.2	37.6	-	-	-	-	-	-	-

The results for the HLS tests on the QPyrxM sample at a SG of 3.3 and 2.96 are summarized in Table 13.13 and Tabel 13.14.

Table 13.13 – HLS Tests Summary – QPyrxM Sample (Media Density of 2.96)

Size (µm)	Head Sample				Sink Fraction						
	Weight (%)	Assay			Assay			Recovery			
		Fe (%)	Mag (%)	SiO_2 (%)	Fe (%)	Mag (%)	SiO_2 (%)	Weight (%)	Fe (%)	Mag (%)	SiO_2 (%)
-1700, +1180	15.3	30.5	16.9	43.4	32.5	18.0	39.7	91.2	97.2	97.1	83.6
-1180, +850	9.0	30.7	17.2	42.5	33.4	18.7	38.0	89.2	96.9	96.8	79.8
-850, +600	8.8	31.8	19.8	40.8	35.3	22.0	35.4	87.2	96.8	97.1	75.6
-600, +300	16.6	35.2	28.5	37.7	41.7	34.1	28.9	81.9	97.1	97.9	62.8
-300, +75	33.0	34.1	27.7	38.4	44.3	36.5	25.8	75.1	97.5	98.8	50.5
-75	17.3	30.6	21.8	31.7	-	-	-	-	-	-	-

Table 13.14 – HLS Tests Summary – QPyrxM Sample (Media Density of 3.3)

Size (µm)	Head Sample				Sink Fraction						
	Weight (%)	Assay			Assay			Recovery			
		Fe (%)	Mag (%)	SiO_2 (%)	Fe (%)	Mag (%)	SiO_2 (%)	Weight (%)	Fe (%)	Mag (%)	SiO_2 (%)
-1700, +1180	15.3	30.5	16.9	43.4	34.8	18.9	37.0	77.7	88.6	87.1	66.4
-1180, +850	9.0	30.7	17.2	42.5	35.8	20.0	36.1	76.2	88.8	88.7	64.7
-850, +600	8.8	31.8	19.8	40.8	38.2	24.2	34.4	75.0	90.1	91.8	63.3
-600, +300	16.6	35.2	28.5	37.7	45.6	38.3	28.2	71.2	92.3	95.7	53.2
-300, +75	33.0	34.1	27.7	38.4	48.3	40.9	26.4	66.5	94.3	98.2	45.8
-75	17.3	30.6	21.8	31.7	-	-	-	-	-	-	-

Figure 13.6, Figure 13.7 and Figure 13.8 present the iron, silica and manganese grades at the sink fraction by size classes for the HLS tests at a density of 3.3. It can be observed that the Hem/Spec sample provides acceptable grades for all size classes, while the High Mag sample would require additional grinding to provide an interesting concentrate. The QPyrxM sample contains too much iron silicate, with a density above 3.3, to produce an acceptable sink fraction. Heavy liquid tests at a higher density, such as 3.9, would be required to produce such a concentrate. However, achieving a separation at 3.9 in a conventional gravity circuit is a challenge. The concentration of manganese in the High Mag sink fraction is around 1.5 %.

Figure 13.6 – Fe Grade in Sink Fraction - HLS (Media Density of 3.3)

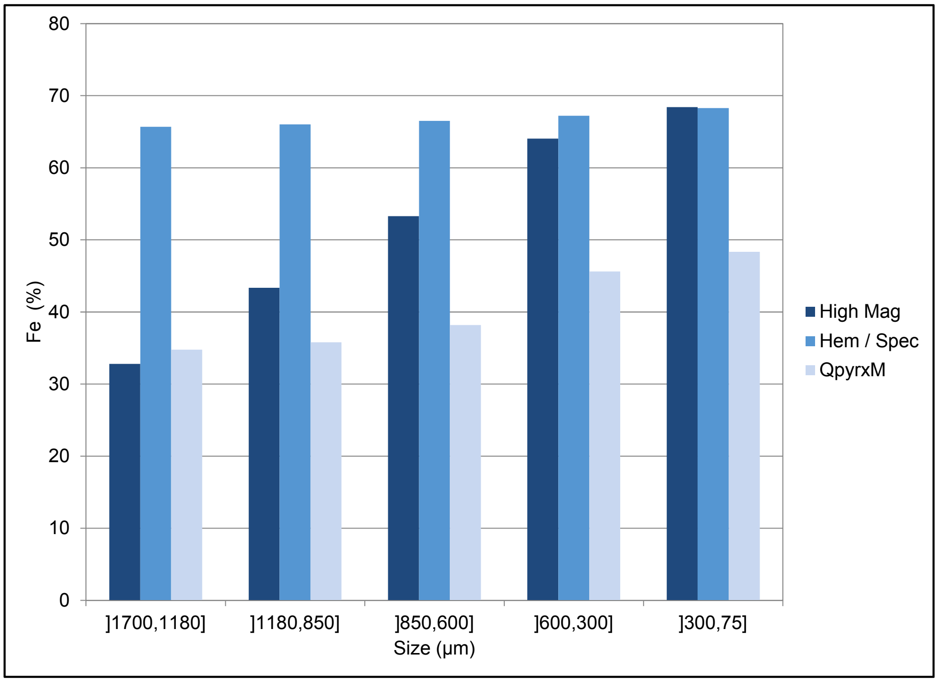


Figure 13.7 – SiO_2 Grade in Sink Fraction - HLS (Media Density of 3.3)

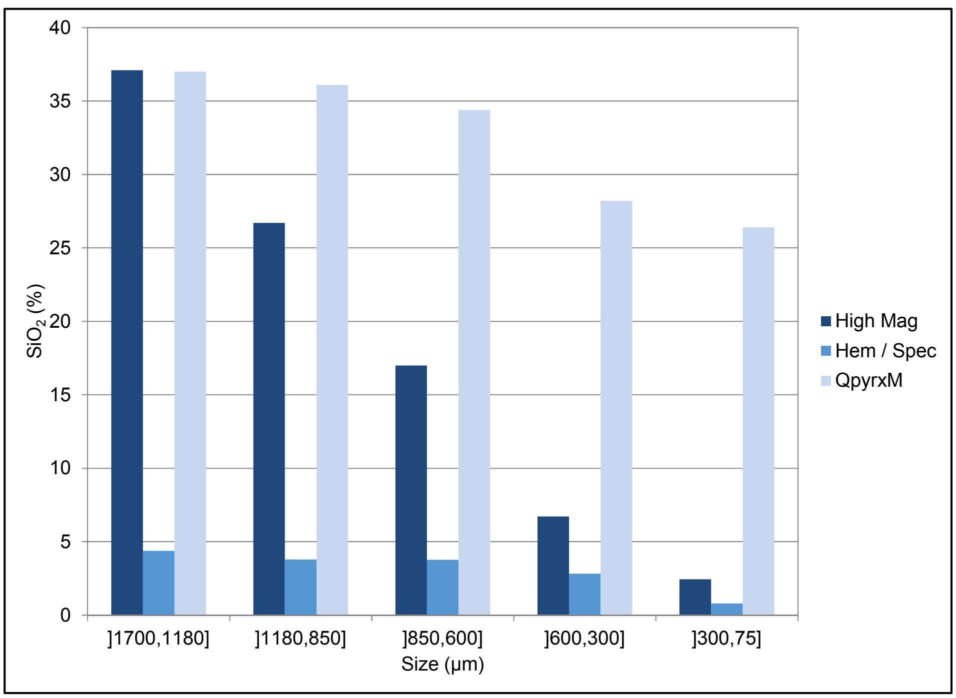


Figure 13.8 – Mn Grade in Sink Fraction - HLS (Media Density of 3.3)

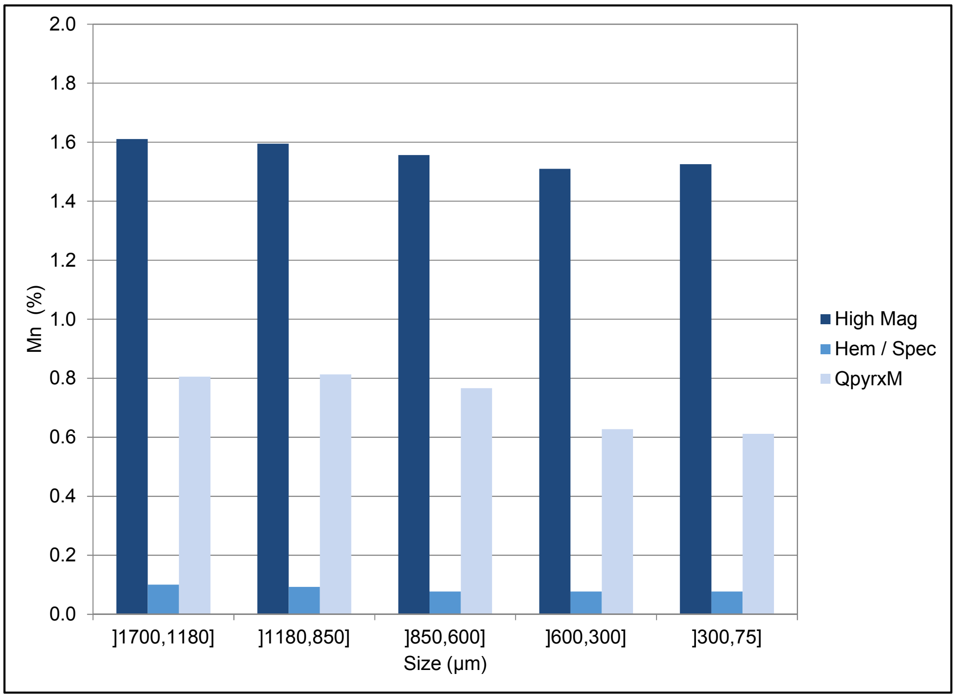
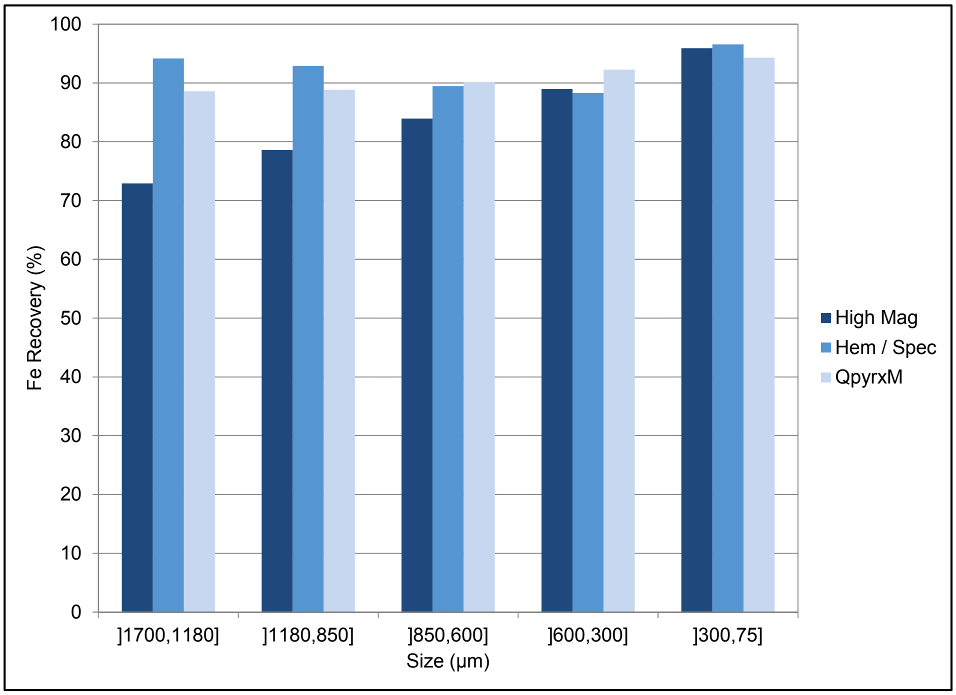


Figure 13.9 presents the iron recovery at the sink fraction by size classes for the HLS tests at a density of 3.3. It can be observed that the Hem/Spec and QPyrxM samples provide an interesting iron recovery for all size classes. However, since the QPyrxM silica grade is very high, this high recovery is the result of a lack of separation.

The High Mag sample presents a significant variation through size classes related to a lack of iron oxides liberation for the coarser sizes. Additional grinding would increase the recovery.

Figure 13.9 – Fe Recovery in Sink Fraction - HLS (Media Density of 3.3)



The following conclusions can be made in analyzing the heavy liquid separation results:

- HLS tests at a density of 2.96 do not allow the production of a concentrate at 4.5 % SiO_2;
- The High Mag sample showed interesting gravity separation potential at a density of 3.3:
  - ➢ It is estimated that a grinding size close to 600 µm would be required to reach a concentrate of 4.5 % SiO_2, which is coherent with the QEMSCAN results;
  - ➢ High iron recovery could be expected at this grind size considering the HLS Fe recovery is close to 90 %;
  - ➢ The Mn grade in the sink fraction is around 1.5 %. The mineralogical analysis showed that an important part of this manganese was closely integrated in the magnetite.
- The Hem/Spec sample showed interesting gravity separation potential at a density of 3.3:
  - ➢ It is estimated that a grinding size of 1700 µm would be sufficient to reach a concentrate of 4.5 % SiO_2, which is coherent with the QEMSCAN results;
  - ➢ High iron recovery could be expected at this grind size considering the HLS Fe recovery is above 90 %.
- The QPyrxM sample did not provide any interesting results with HLS. Fe-Mg silicate recovery is important and produces a sink fraction with a high SiO_2 grade.

13.1.6 Davis Tube Test (DTT)

Davis Tube Tests were performed on High Mag and QPyrxM samples pre-crushed at -1.7 mm and for five (5) particle size fractions. The Hem/Spec sample was not tested because of the low magnetite content. The fraction -1700, +1180 µm was not submitted to DTT because it is too coarse for the equipment. The objective was to evaluate whether the ore was amenable to magnetic concentration.

This test permits an almost perfect magnetite recovery to be simulated. The concentrate produced is free of gangue not associated with magnetite as the oscillating process and the wash water addition efficiently clean the concentrate. However, as the magnetic field is strong and the magnetite recovery is high, a significant amount of gangue material unliberated from the magnetite will be recovered.

The concentrate and tailings were submitted for assays.

The DTT results for the High Mag samples are summarized in Table 13.15, while Table 13.16 summarized the QPyrxM results.

Table 13.15 – Davis Tube Test Summary - High Mag Sample

Size (µm)	Head Sample				Concentrate						
	Weight (%)	Assay			Assay			Recovery			
		Fe (%)	Mag (%)	SiO_2 (%)	Fe (%)	Mag (%)	SiO_2 (%)	Weight (%)	Fe (%)	Mag (%)	SiO_2 (%)
-1700,	10.0	24.2	40.8	52.6	-	-	-	-	-	-	-
-1180, +850	6.2	28.7	36.8	48.1	32.5	42.0	44.0	86.8	98.2	99.1	79.3
-850, +600	8.8	33.2	44.6	44.8	38.6	52.4	39.1	84.5	98.3	99.2	73.8
-600, +300	28.4	36.2	47.5	45.0	44.8	59.1	34.5	79.5	98.5	99.0	61.0
-300, +75	41.8	42.1	55.4	36.8	58.3	77.3	16.1	71.1	98.5	99.1	31.1
-75	4.8	43.5	58.9	29.2	69.5	96.7	1.1	60.6	96.8	99.4	2.3

Table 13.16 – Davis Tube Test Summary – QPyrxM Sample

Size (µm)	Head Sample				DT-Concentrate						
	Weight (%)	Assay			Assay			Recovery			
		Fe (%)	Mag (%)	SiO_2 (%)	Fe (%)	Mag (%)	SiO_2 (%)	Weight (%)	Fe (%)	Mag (%)	SiO_2 (%)
-1700, +1180	16.4	30.3	22.8	43.4	-	-	-	-	-	-	-
-1180, +850	9.7	30.5	17.4	42.5	34.3	26.3	37.8	64.0	72.0	96.8	56.5
-850, +600	9.1	32.1	20.9	40.8	37.7	32.5	34.8	63.2	74.2	98.1	54.7
-600, +300	16.4	34.4	26.6	37.7	48.3	52.9	25.6	49.2	69.2	97.9	33.0
-300, +75	32.0	34.8	28.1	38.4	64.6	82.4	8.3	33.5	62.2	98.0	7.4
-75	16.4	30.9	21.2	31.7	70.5	89.3	1.4	23.1	52.8	97.5	1.0

Figure 13.10, Figure 13.11 and Figure 13.12 present the iron, silica and manganese grades at the concentrate by size classes for the DT tests. It can be observed that both samples present a similar evolution of the iron and silica grade along with the size fraction, but the QPyrxM sample produces a better concentrate. The concentration of manganese is around 1.2 % in the High Mag concentrate fraction.

Considering the QEMSCAN analysis, it can be observed that the fraction of silicate associated with oxide is more important for the High Mag samples. Furthermore, the iron oxides associated with the silicate in the High Mag samples are magnetite, while only half of them can be assumed magnetite for the QPyrxM sample. This leads to a higher unliberated silicate associated with magnetite for the High Mag sample.

Figure 13.10 – Fe Grade in Concentrate Fraction - DTT

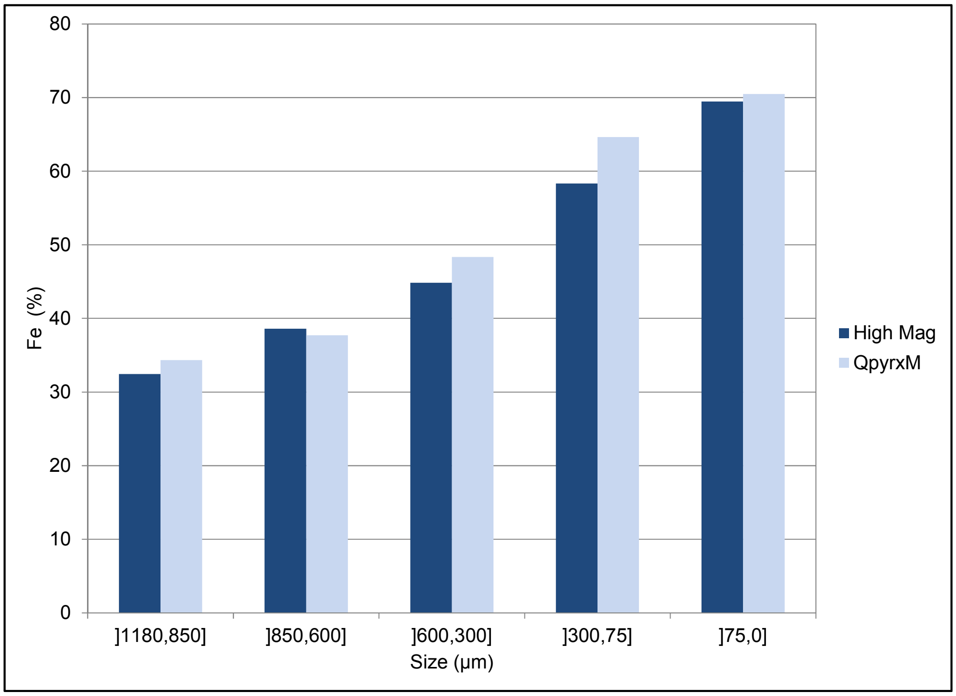


Figure 13.11 – SiO_2 Grade in Concentrate Fraction – DTT

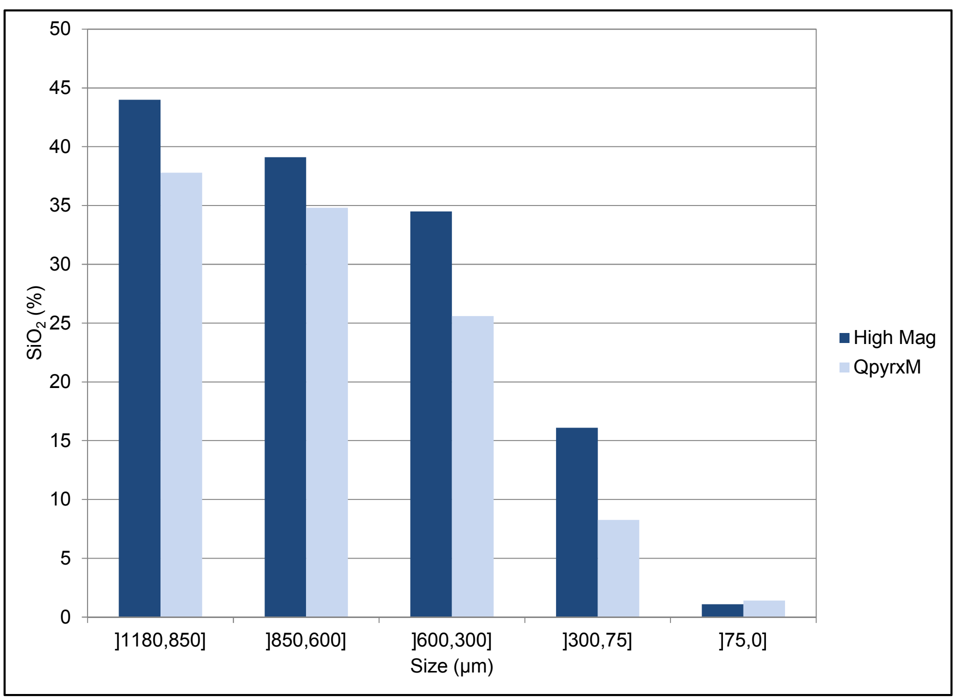


Figure 13.12 – Mn Grade in Concentrate Fraction – DTT

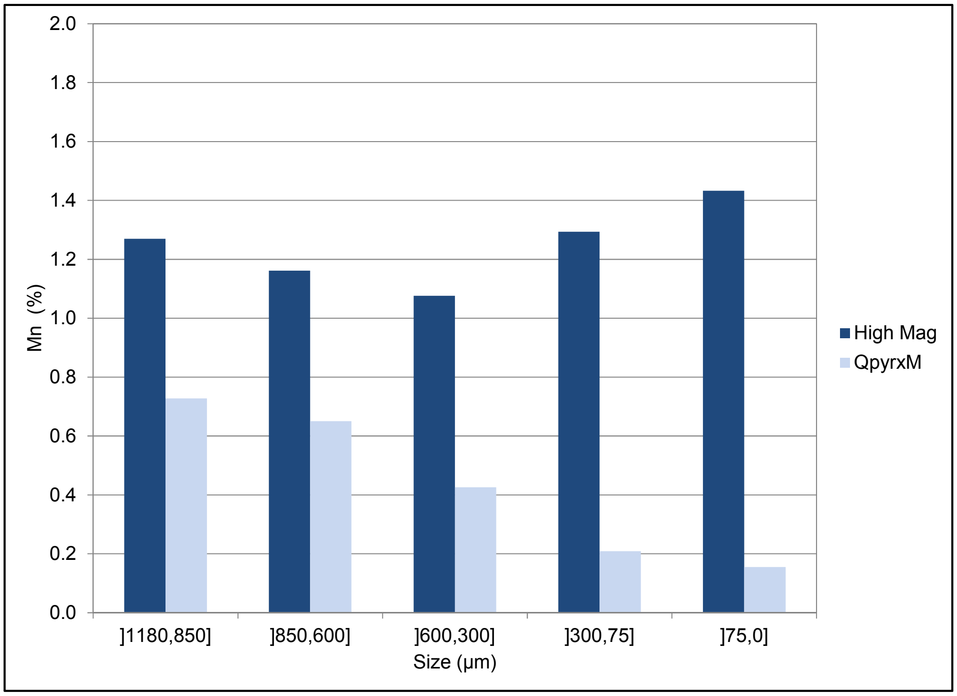


Figure 13.13 and Figure 13.14 present the iron and magnetite recovery at the concentrate by size classes for the DT tests. As the High Mag sample contains only magnetite, the iron and the magnetite recoveries are high and similar. Lower iron recoveries are observed with the QPyrxM sample which has around 50 % of the iron in a magnetite form. However, it can be assumed that significant non magnetite iron is recovered considering the individual size class recovery values.

The magnetite recoveries for both samples are very high, but higher for the High Mag sample. This is explained by the higher magnetite content and the higher liberation of the iron oxides of the High Mag sample.

Figure 13.13 – Fe Recovery in Concentrate Fraction - DTT

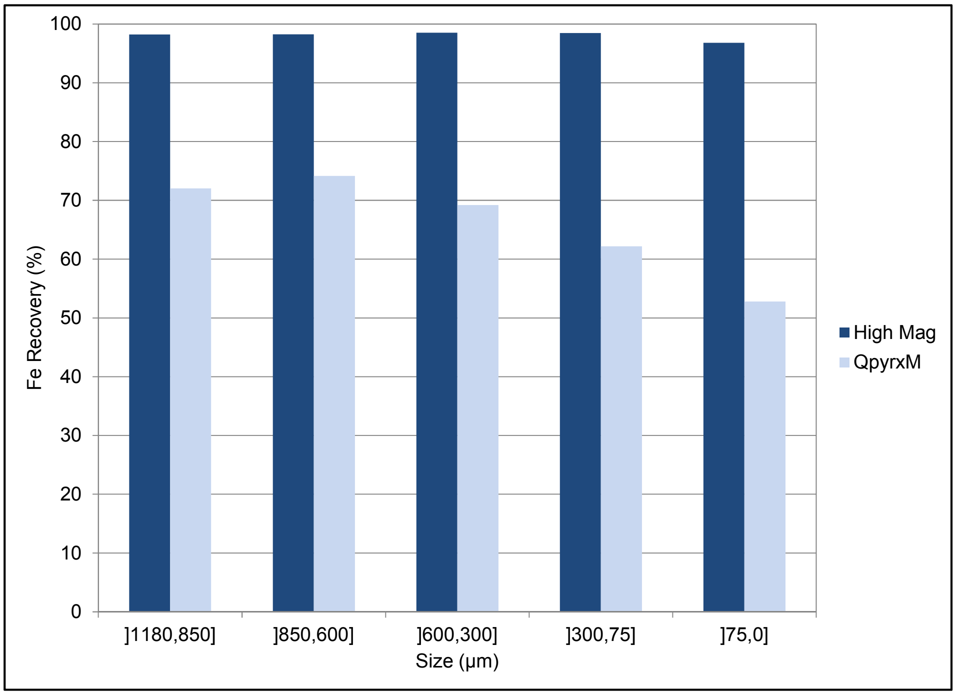
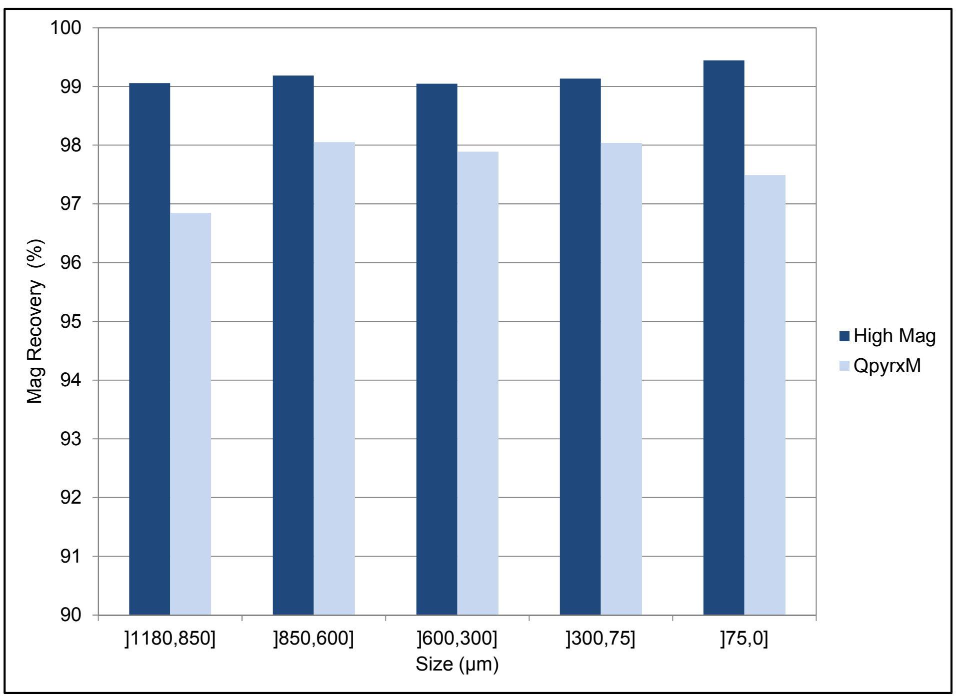


Figure 13.14 – Magnetite Recovery in Concentrate Fraction – DTT



The following conclusions can be made in analyzing the Davis Tube test results:

- The High Mag sample showed interesting magnetic separation potential:
  - It is estimated that a grinding size of between 150 µm and 75 µm would be required to reach a concentrate of 4.5 % SiO_2, which is finer than expected from the QEMSCAN results;
  - The Mn grade is around 1.2 % in the sink fraction. The mineralogical analysis showed that an important part of this manganese was closely integrated in the magnetite;
  - High iron recovery could be expected at this grind size considering the DTT Fe recovery of above 95 %.
- The QPyrxM sample showed interesting magnetic separation potential:
  - It is estimated that a grinding size of around 150 µm would be required to reach a concentrate of 4.5 % SiO_2, which is finer than expected from the QEMSCAN results;
  - Low iron recovery should be expected considering only 50 % of the Fe is in a magnetite form.

13.1.7 Wilfley Table Tests

Preliminary Wilfley Table Tests were performed at SGS. The Wilfley Table test is used as a first assessment of the industrial gravity separation potential of an ore. Tests were performed at -1.7 mm (Table 13.17) and at -600 µm (Table 13.18).

Table 13.17 – Wilfley Table Test Summary – 1.7 mm

Sample Name	Concentrate 1 or closer to 4.5% SiO_2									Conc. At 4.5% SiO_2		
	Grade						Recovery			Grade	Recovery	
	Fe (%)	SiO_2 (%)	Fe Mag (%)	MgO (%)	CaO (%)	MnO (%)	Weight (%)	Fe (%)	Fe Mag (%)	Fe (%)	Weight (%)	Fe (%)
QpyrxM	62.2	10.3	51.7	2.04	0.61	0.39	10.1	16.3	22.5	-	-	-
High Mag	67.8	3.1	65.5	0.48	0.44	1.90	22.3	40.6	41.1	67.0	25.0	44.0
Hem/Spec	66.8	2.7	6.7	0.06	0.08	0.08	22.1	39.1	34.8	66.0	28.0	50.0

Table 13.18 – Wilfley Table Test Summary – 600 µm

Sample Name	Concentrate 1 or closer to 4.5% SiO_2									Conc. At 4.5% SiO_2		
	Grade						Recovery			Grad	Recovery	
	Fe (%)	SiO_2 (%)	Fe Mag (%)	MgO (%)	CaO (%)	MnO (%)	Weight (%)	Fe (%)	Fe Mag (%)	Fe (%)	Weight (%)	Fe (%)
QpyrxM	65.4	6.3	56.4	1.28	0.45	0.33	3.3	6.4	10.6	-	-	-
High Mag	67.3	3.4	66.1	0.57	0.58	1.94	19.9	36.7	37.8	66.0	25.0	44.0
Hem/Spec	65.3	4.8	6.8	0.09	0.13	0.11	31.4	54.6	49.8	66.0	30.0	54.0

These tests were not originally planned, but they were initiated as the budget and the material allowed it. The tests generated a concentrate at a final grade for both the Hem/Spec and the High Mag samples. The iron recoveries obtained at -1.7 mm were very low and tests at -600 µm were performed to improve the preliminary results. However, the test at -600 µm did not show significant improvement in regards to the iron recovery. These results are not coherent with the mineralogical analyses and the HLS results obtained on the High Mag and Hem/Spec samples. The suspected causes of these results are the non-optimal Wilfley Table operating parameters and circuit configuration. Additional analyses and testwork are required in the next phase to determine the cause of these results.

13.2 Heavy Liquid Separation Test (2014)

Three hundred samples were selected by geology (Met-Chem) to perform Heavy Liquid Separation Tests at a density of 3.9. The samples were ground to -600 µm, and then screened to remove -75 µm particles; the HLS were performed on the +75 µm. From the three hundred samples selected, four (4) were not found and the HLS were conducted on the 296 samples. The complete testwork results are presented in the SGS report.

The objective of the test was to assess the concentrate recovery and quality for the geological model development. A liquid with a density of 3.9 was selected in order to avoid the recovery of silicates having a density above 3.3. Figure 13.15 presents the weight recovery at the sink fraction as a function of the +75 µm feed iron grade.

Figure 13.15 – Weight Recovery in Sink Fraction – HLS at a SG of 3.9

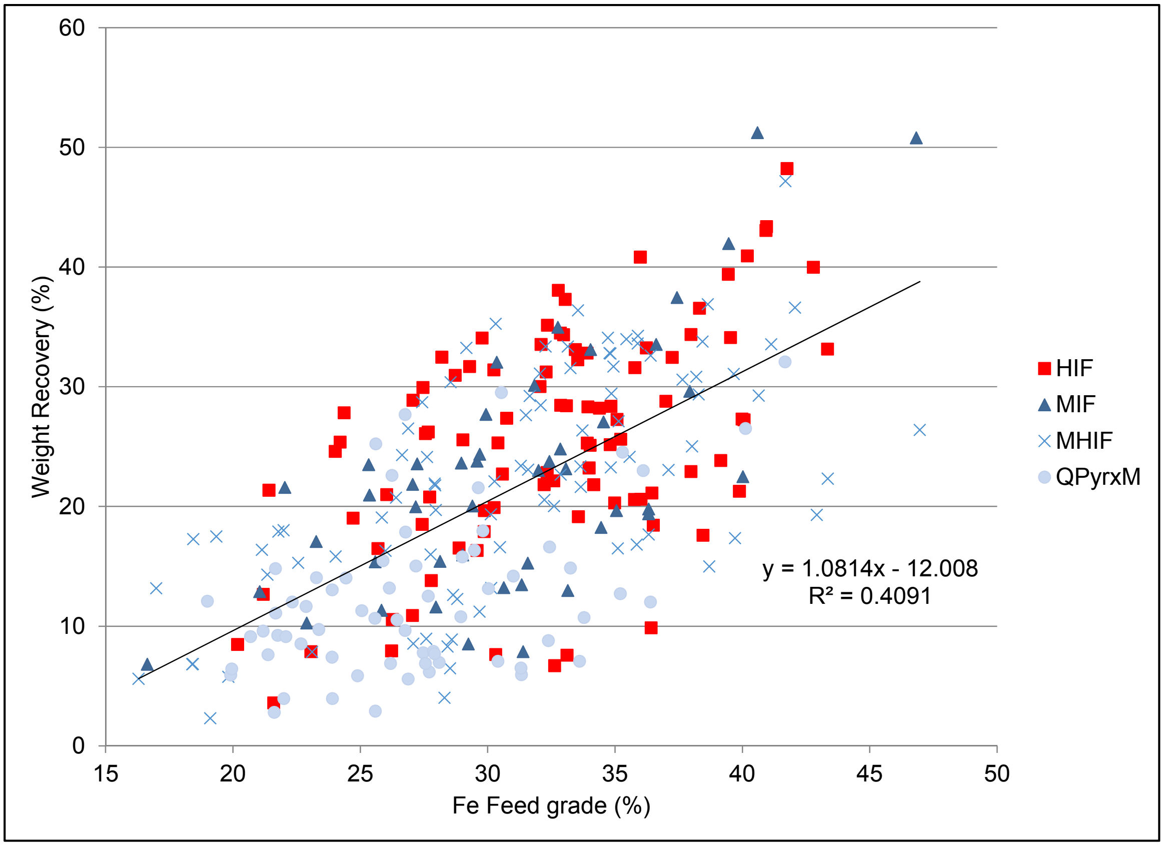
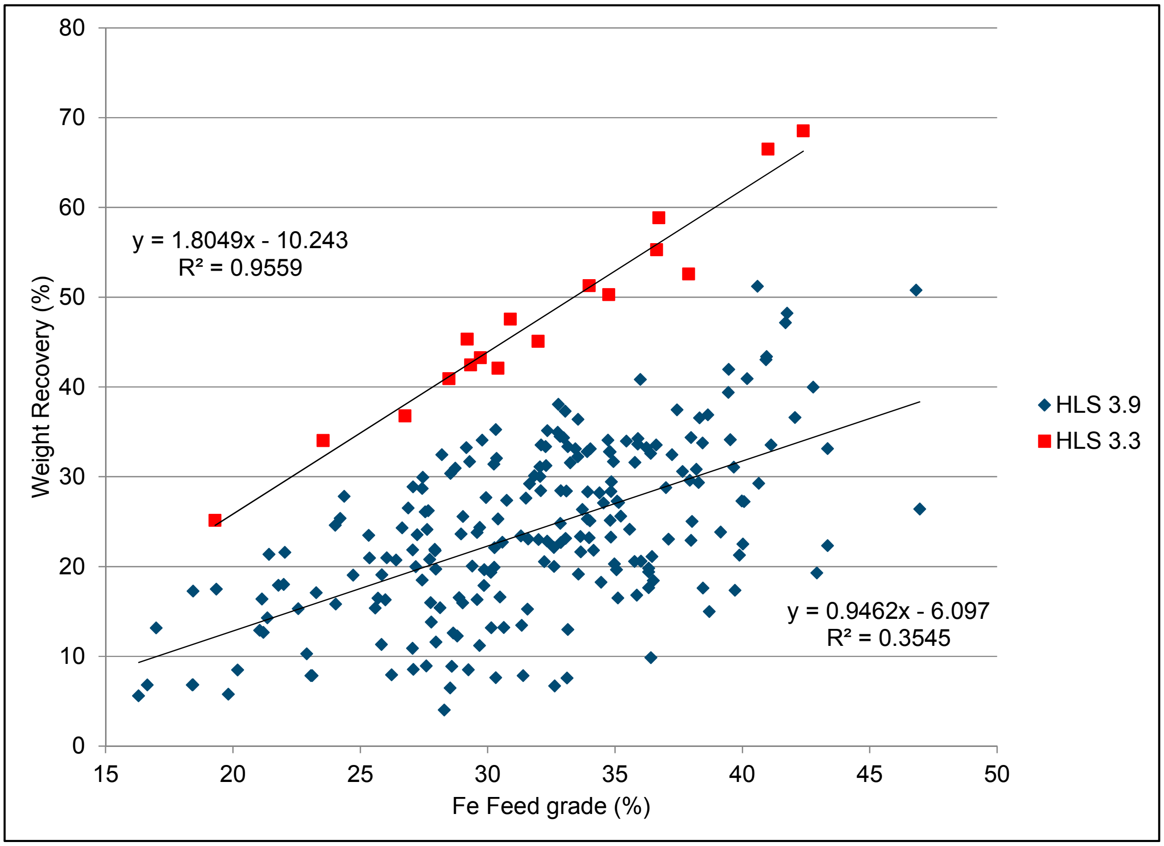


Figure 13.16 shows a low coefficient of determination (R-square) of the linear trend line, thus providing a poor model of the weight recovery based on the head grade. Furthermore, the relation provides a very low iron recovery, which is not consistent with the HLS performed at a density of 3.3.

From the 294 samples, 23 samples were selected by Soutex for HLS tests at a density of 3.3. The samples were selected in order to represent the proportion of each lithology, the range of Fe head grade and the range of weight recoveries observed in the 296 samples. The objective of the test was to validate the concentrate recovery obtained with the liquid at a density of 3.9. Figure 13.16 presents the results of the weight recovery at the sink fraction as a function of the +75 µm feed iron grade for the HLS at a density of 3.3 and 3.9 for the HIF, MIF and MHIF lithology. The QPyrxM lithology is not presented as it is currently considered as waste.

Figure 13.16 – Weight Recovery in Sink Fraction – HLS at a SG of 3.9 & 3.3



The HLS performed at a density of 3.3 allow the development of a linear trend with a high coefficient of determination, and lead to significantly higher weight recoveries than the HLS at a SG of 3.9. Table 13.19 presents a comparison between the head and sink grades of the 23 samples tested at 3.3 and 3.9. This table shows that a significant increase in the SiO_2 grade is observed for the HLS performed at a SG of 3.3.

Table 13.19 – HLS Test Summary – HLS at a SG of 3.3 vs. 3.9

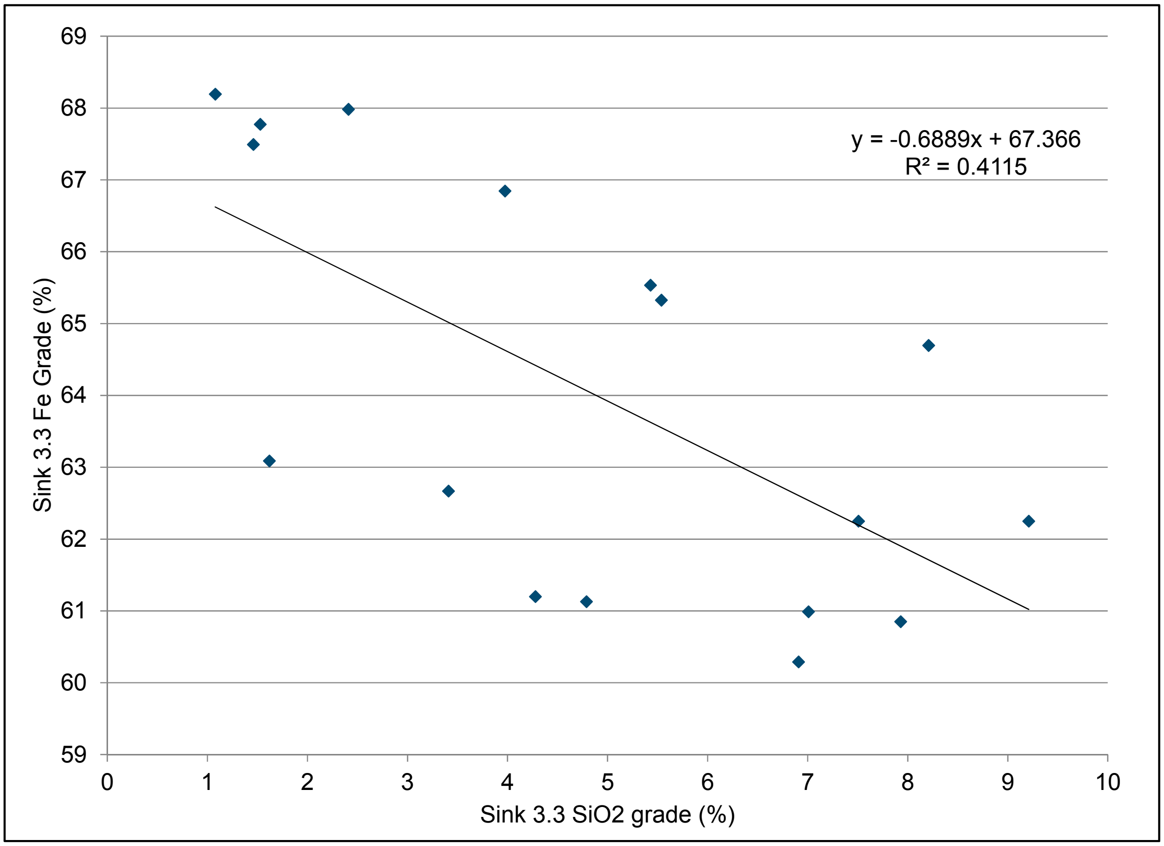
Grade	HLS 3.9 (%)	HLS 3.3 (%)
HIF		
Fe Head Grade	30.6	30.2
Fe +75 µm Head Grade	31.4	28.3
Fe sink Grade	64.7	62.5
SiO_2 Sink Grade	5.0	6.0
MIF		
Fe Head Grade	31.6	30.5
Fe +75 µm Head Grade	32.2	29.6
Fe sink Grade	65.4	59.1
SiO_2 Sink Grade	3.5	8.0
MHIF		
Fe Head Grade	31.3	30.9
Fe +75 µm Head Grade	31.3	30.6
Fe sink Grade	65.3	62.0
SiO_2 Sink Grade	4.5	7.2
QPyrxM		
Fe Head Grade	28.0	27.8
Fe +75 µm Head Grade	28.1	28.6
Fe sink Grade	60.6	48.9
SiO_2 Sink Grade	11.2	23.8

13.3 Fe vs. SiO_2 Grade Model Development

The HLS performed with a liquid at a SG of 3.3 were used to develop the relation between the Fe and SiO_2 grades in the concentrate. The results of the HLS at a SG of 3.3 were preferred to the one at 3.9 since they are more representative of a conventional full scale gravity circuit concentrate.

The model developed and used in the PEA is based on the High Mag and Hem Spec samples of the metallurgical testwork, and on selected HLS performed at a SG of 3.3 for the geology. The QPyrxM ore type was not included since it did not respond well to HLS and can be isolated from the other iron formation. It is not currently considered as ore. Figure 13.17 presents the data used for the model development as well as the resulting model.

Figure 13.17 – Fe vs. SiO_2 Grade in the Concentrate – PEA Model



It can be observed from Figure 13.18 that the coefficient of determination of the PEA model is low. This is mainly related to the high dispersion of the data. An analysis of the data showed two (2) distinctive trends related to different levels of contaminants other than SiO_2.

The contaminant distribution in the concentrate from the HLS at a SG of 3.9 was compared to the contaminant distribution in the HLS at a SG of 3.3. This showed that the sample selection for the HLS at a SG of 3.3 contains significantly more samples with a high level of contaminant than the HLS at a SG of 3.9. Considering the HLS at a SG of 3.9 were selected to be representative of the deposit, an adjustment to the PEA model could be carried out in order to account for this high contaminant over-representation of the model. The improved model suggests that a higher Fe grade (>65 %) would be produced for a constant SiO_2 level. A reduction in the weight recovery would however be related to the increase of the iron grade. Additional metallurgical testwork will be used to validate the possible model improvement in order to use it in the next phase.

13.4 Concentrate Specifications

The estimation of the iron concentrate specifications is based on:

- The Fe vs. SiO_2 model presented in section 13.3. It is assumed that the SiO_2 target for the concentrate is 4.5%. This produces a concentrate with 64.3% Fe;
- The typical values for the contaminants are based on the Heavy Liquid Separation (HLS) tests on the Magnetite-Hematite Iron Formation, at the following densities:
  - SG of 3.3 for Al_2O_3, CaO and MgO (7 samples):
    - The data from the HLS test at a SG of 3.3 was used because the value obtained was slightly higher at an SG of 3.3 than 3.9.
  - SG of 3.9 for all other contaminants (90 samples):
    - The data from the HLS test at a SG of 3.9 was used because the values at 3.3 and 3.9 are substantially the same and there are a lot more tests at 3.9, which increases the accuracy of the values.

Table 13.20 presents the projected iron concentrate assays.

Table 13.20 – Preliminary Iron Concentrate Specifications

Element or Mineral	Formula	Typical Value (%)
Iron	Fe	64.3
Silica	SiO_2	4.5
Aluminium Oxide	Al_2O_3	0.38
Calcium Oxide	CaO	0.65
Magnesium Oxide	MgO	1.16
Sodium Oxide	Na_2O	0.02
Potassium Oxide	K_2O	0.01
Titanium Oxide	TiO_2	0.51
Phosphorus	P	<0.01
Manganese	Mn	0.61
Chromium	Cr	<0.01
Vanadium	V	<0.01
Loss of Ignition (LOI)	–	-1.14
Sizing: -150 µm	–	30.0

13.5 Weight Recovery Model

The weight recovery model is based on 17 Heavy Liquid Separation (HLS) tests performed at a density of 3.3 on the -600 microns to +75 microns size range. The recovery of magnetite through a magnetic process is not considered in the model.

From the 23 samples available from the geology testwork, five (5) samples identified as QPyrxM and three (3) samples (HIF, MIF or MHIF) producing a concentrate with more than 13 % SiO_2 were not considered. The three (3) samples with more than 13 % SiO_2 were rejected for the following reasons:

- The SiO_2 grade distribution in the sink fraction for the 228 HLS results at a SG of 3.9 on the MIF, MHIF and HIF presents 1.8 % results above 13 % SiO_2, while the proportion represented by the three (3) samples at 3.3 is 16.7 %;
- A product at 13 % SiO_2 is not considered as a concentrate and it should not be integrated in the Fe vs SiO_2 concentrate grade relation.

To these 15 samples, the HLS results for the two (2) samples (HIM and MIF) previously selected for the PEA metallurgical testwork were added.

A correlation between the iron feed grade of the sample tested and the weight recovery obtained by HLS (sink fraction) was first developed (Figure 13.18). This correlation was then corrected to consider the following aspects:

- The production of a concentrate at an average of 4.5 % SiO_2;
- The HLS represents the perfect separation at a density of 3.3. A process will be less efficient;
- The -75 µm particles were not included in the HLS. Their recovery was added in the model. A conservative recovery based on a similar operation was used for the fine particles.

<u>The model developed is the following:</u>

- ➢ Weight Recovery = 1.4952 x Fe Feed Grade – 8.1543

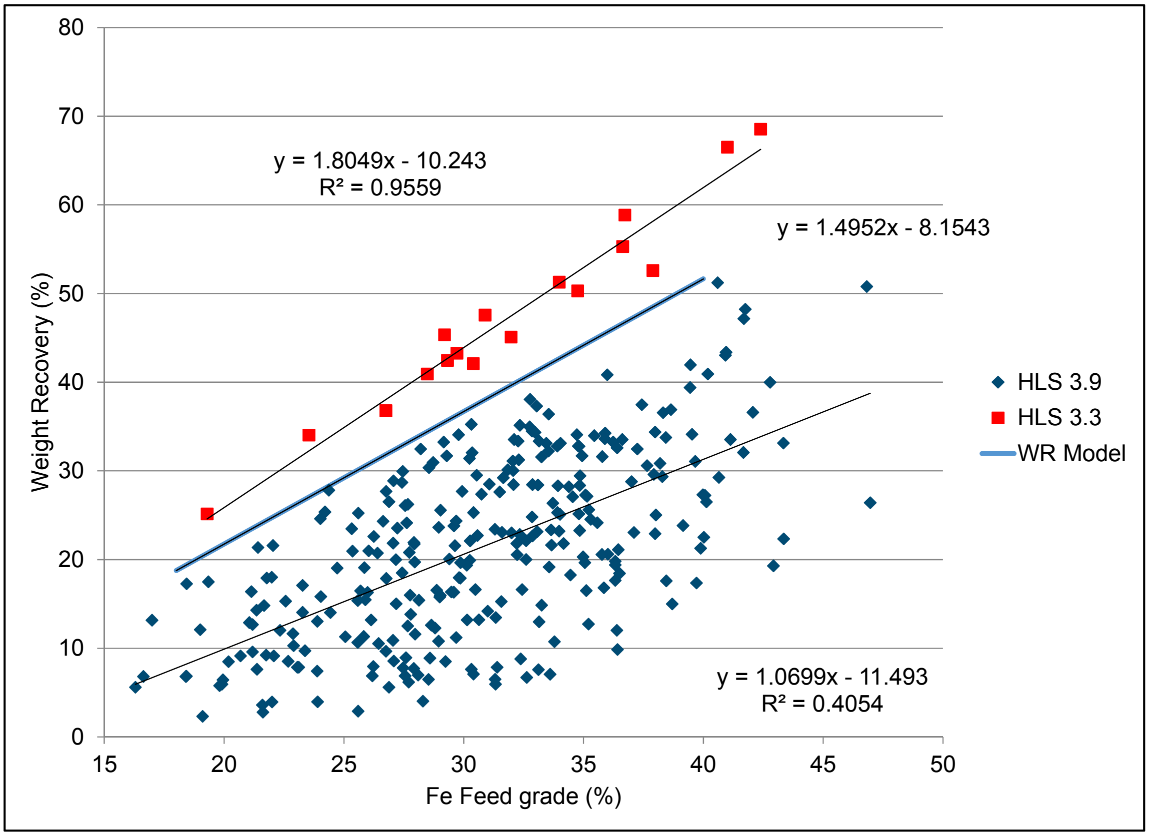
<u>This model assumes:</u>

- ➢ Only the HIM, MIF and the MHIF lithologies are processed (no QPyrxM);
- ➢ The production of a concentrate at 4.5 % SiO_2 and 64.3 % Fe.

Based on this model, an iron feed grade of 29.7 % will allow a weight recovery of 36.3 %.

Figure 13.18 presents the model, along with the HLS results at a density of 3.3 and 3.9.

Figure 13.18 – Weight Recovery Model



14 Mineral Resource Estimate

14.1 Summary

Met-Chem was retained by LIO to carry out a mineral resource update of the Lac Lamelée iron deposit. The previous Mineral Resources estimate, which was the first one on the project, was performed in May 2013 by P.J. Lafleur Geo-Conseil Inc. and was based on the results of two drilling campaigns in 2011 and 2012, consisting of 57 holes for a total of 18,221 m and 2 trenches. The 2011 drilling campaign consisted of 17 NQ drill holes for a total length drilled of 5,614 m while the 2012 drilling campaign consisted of 40 drill holes with a total length drilled of 12,607 m.

The 2013 Mineral Resource interpolation was performed using only the total iron (T Fe %) within a single geological envelope since there was not enough characterisation work performed on the magnetite content (Davis Tube test and/or Satmagan test) or the hematite content (Heavy Liquid Separation). Furthermore, statistical analyses of pair data between T Fe% and Davis Tube Weight Recovery (DTWR) or between T Fe% and the Magnetic Susceptibility (MAGSUS) have demonstrated poor relationships between these different elements. Following Met-Chem's recommendations, additional characterization work consisting of Heavy Liquid Separation tests (HLS), Satmagan tests and Davis Tube tests were undertaken in the spring and summer of 2014 in order to help provide a better understanding of the relationships and proportions between the different types of iron (magnetite, hematite, silicates iron, etc.) that are present on the property and refine the geological model. No recent drill holes were added on the property since 2012 and the current Mineral Resources update was undertaken after the geological model was refined using the additional information provided by the recent characterisation work and an effort to discriminate the type of iron, namely the iron oxides (MIF, HIF and MHIF) and the iron silicates (QPyrxM).

The first step that was carried out in the Mineral Resources estimation process was to model the mineralization by generating geological sections using the sectional interpretation. With this method geological polygons were first digitized and snapped to lithological contacts in 2D sections and then joined together, from section to section, to provide the resulted 3D envelopes. A 3D block modelling approach was used to discretize the project domain into blocks of an equivalent size of 30 m by 30 m by 15 m respectively in the X, Y and Z directions. The Mineral Resource was interpolated using the Inverse Distance Squared ("IDW2") method. In this method each block is interpolated using the weight of composites as a function of their positions and distances to the center of that block. A downhole compositing approach by bench was used to provide a regularised support prior to the resources interpolation. The Table 14.1 presents a summary of the Global Mineral Inventory that was generated from the block model.

Table 14.1 – Summary of the Global Mineral Inventory (Cut-Off of 15% Fe)

Category	Tonnage (Mt)	Tot Fe (%)
Global	451.7	28.85

Since under the CIM definitions, Mineral Resources should have a reasonable prospect of economic extraction, Met-Chem chose to exclude the portion of the mineralization that lies below Lac Lamêlée from the Mineral Resources estimate since the complete dewatering of Lac Lamêlée, the construction of dykes to cut-off portions of the lake or underground mining of this mineralized material would most likely render the project non-economic.

The Mineral Resources estimate was performed by Schadrac Ibrango, P.Geo, PhD a Qualified Person (QP) or under his direct supervision. All Mineral Resources were classified as Inferred by the QP. The resource classification follows the guidelines adopted by the CIM through the NI 43-101 standards and guidelines. The criteria used by Met-Chem for classifying the estimated resources are based on certainty of continuity of geology and grades. The CIM standards for resource classification are provided in Section 14.2. A summary of the Mineral Resource is provided in Table 14.2.

Table 14.2 – Summary of the Mineral Resources (Cut-Off of 15% Fe)

Category	Tonnage (Mt)	Fe (%)
Inferred	354.1	29.49

14.2 Definitions

According to the final version of the CIM Standards/NI 43-101 which became effective on February 1, 2001 and was revised on May 10, 2014

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

An **Inferred Mineral Resource** is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

An **Indicated Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.

A **Measured Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve.

14.3 Mineral Resource Estimate Estimation Procedures

The estimation of the Lac Lamêlée South Mineral Resources includes the following procedures:

- Validation of the drill hole database received from LIO;
- Importation of the database into MineSight® v. 9.00;
- Basic descriptive statistics to assess statistical parameters of the different quality elements;
- Geological modelling on vertical 2D sections;
- Generation of 3D mineralized envelopes (MIF, HIF, MHIF and QPyrxM);
- Statistical analysis of the sampling length and decision on the compositing parameters;
- Generation of a 3D block model;
- Setup of all parameters required for the resources interpolation;
- Interpolation of the total iron content (T Fe%) of all blocks constrained within each mineralized 3D solid;
- Validation of the results of the interpolation;
- Quantification of Global Mineral Inventory corresponding to the cumulative of all blocks that were interpolated within MIF, HIF and MHIF;
- Quantification of the Mineral Resources that correspond to part of global mineral inventory which is constrained within a shell limited by Lac Lamêlée;
- Classification of the Mineral Resource according to CIM/NI 43-101 standards; and
- Statement of the Mineral Resources.

14.4 Drill Hole Database and Data Verification

14.4.1 Drill Hole Database

The drill hole database used was supplied both in Excel and Access format by LIO. Additional information that was requested by Met-Chem was then sent by P.J. Lafleur Geo-Conseil Inc. The entire database consisted of 57 drill hole records and two (2) trenches. A total of 17 holes were drilled during the first drilling campaign in 2011, while 40 drill holes and two (2) trenches were realized during the second drilling campaign in 2012. Both drilling campaigns consisted of NQ diamond drilling with a nominal diameter of 47.6 mm. A compilation of the drilled length, sampled length, length in iron formation and iron silicates by drilling campaign is provided in Table 14.3. It may be noted that 53% of the total drilled length was sampled and 56% of the sampled length consists of iron formation while 32% consisted of iron silicates (QPyrxM). The remaining difference (12%) mostly refers to 395 samples, for a total length of 540 m, taken within an ultramafic lithology. There was no explanation why such lithology was sampled while minerals of interest on the project are iron oxides. The sampling for Quality Assurance and Quality Control (QA/QC), which is discussed in more details in Section 12, is represented by approximately 2% of blank material, 2% of duplicate samples and 1% of standards.

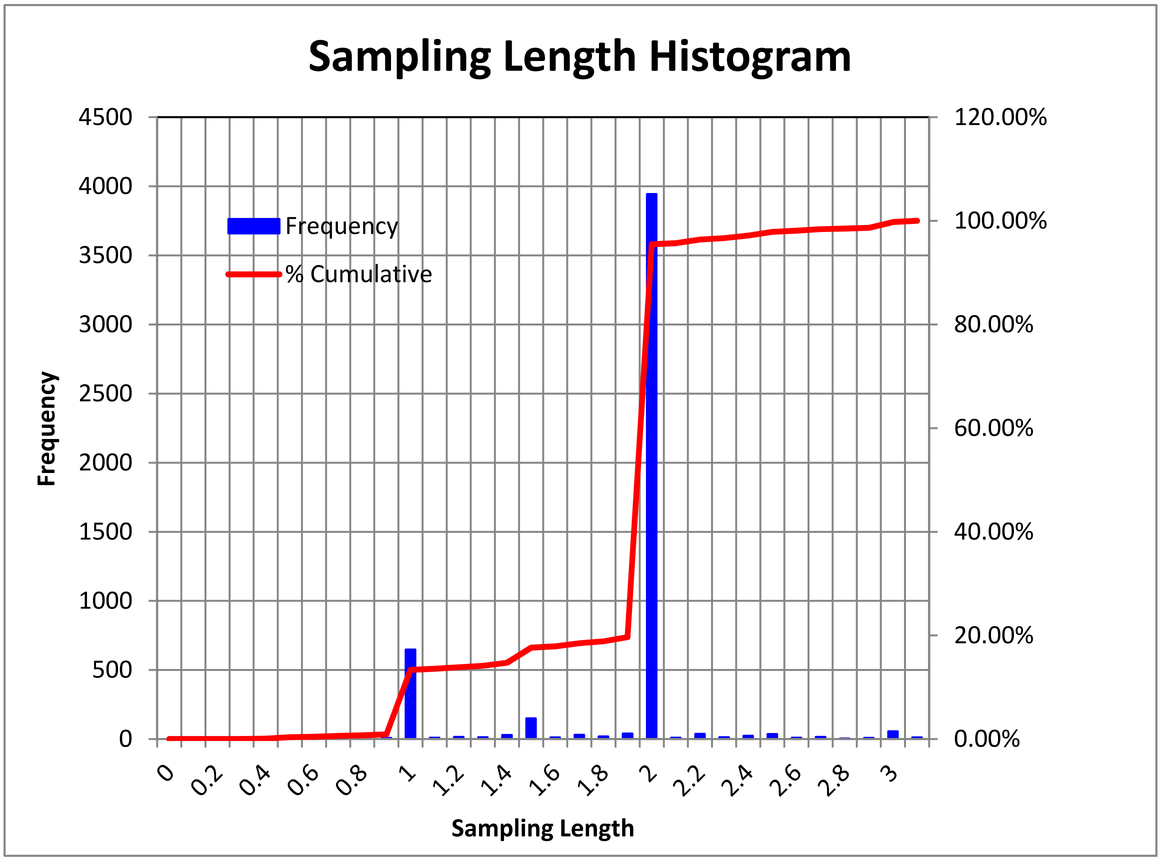
Table 14.3 – Summary of the content of the Drill hole database

Period	2011	2012	2012	Total
Count	17	40	2	59
Type	DDH	DDH	Trenches	—
Size	NQ	NQ	—	—
Samples	1 521	3 630	53	5 204
Drilled Length (m)	5 614	12 607	84	18 305
Sampled Length (m)	2 446	7 186	54	9 686
Sampled Length in IF (m)	1 590	3 798	30	5 418
Sampled Length in QpyrxM (m)	375	2 655	24	3 054
QC, Blanks	9	94	0	103
QC, Duplicates	43	94	0	137
QC, Standards	10	65	0	75

One can also observe an unusual sampling length for an iron project during all exploration work performed on the property. The average sampling length was 1.6 m, 2.0 m and 1.0 m respectively for the drilling campaigns of 2011, 2012 and the trenching in 2012. The average sampling length for all exploration activities combined was 1.9 m. Figure 14.1 presents a histogram of the sampling length which has a statistical mode of 2.0 m. Using 2.0 m as a nominal sampling length needlessly adds to the assaying budget since the geological description shows large intervals having the same lithology. Since such a length is unusual for an iron project Met-Chem elected to consider 6 m as the compositing length in order to uniform all samples to an equal support length prior to the Mineral Resources estimation.

It was also noted that some drill core from the 2011 drilling program was not continuously sampled even for the same lithological iron formations. For example in hole LS-2011-16 one (1) meter samples were taken six to sixteen meters apart in iron mineralized intervals. The previous resource estimate report mentions partial sampling as having been used to speed up sampling due to logistical problems near the end of the 2011 drilling program. It was also reported that it was deemed more important in the initial exploration program to sparsely sample the entire core which is contradictory to being selective in continuously sampling the same mineralized intervals in all drill holes. The plan was to later sample the unsampled core but this task still remains in the list of priorities. This non continuous sampling methodology applied to five (5) drill holes of the 2011 drilling program that are LS-2011-12, LS-2011-16, LS-2011-17 (complete hole) and partially to LS-2011-10 and LS-2011-11.

Figure 14.1 – Sampling Length Histogram



There was no effect on the final composites for the partial sampled holes (LS-2011-10 and LS-2011-11) file since the compositing made at a fixed length of 6 m has respected the lithological contacts and all composites less than 3 m were discarded prior the resources interpolation. The holes that have been completely sampled non continuously (LS-2011-12, 16 and 17) were not taken into account for the mineral resources interpolation since the resulted composites would have a diluted nature.

14.4.2 Data Verification

The following validation steps were performed to verify the soundness of the drill hole database:

- Checking for location and elevation discrepancies and unusual values;
- Checking minimum and maximum values for each quality element to ensure that all values are ranging within tolerable limits;
- Checking for inconsistency in the lithological units and for overlaps in the lithology and assay intervals;
- Checking for gaps in the lithological code intervals;
- Checking for repeated intervals/samples.

This first validation step was performed before importing the data into MineSight®. A further validation process was completed when importing the data into Torque, a SQL based database manager linked with MineSight®. Another step that was completed was to compare the assay results in the database with the assay results as displayed in the original laboratory certificates. Discrepancies that were found were corrected in the final drill hole database.

14.4.3 Additional Assaying Work completed in the Spring-Summer of 2014

Following a review of the exploration work completed on the property in 2011 and 2012, Met-Chem recommended additional characterization work that would help to better understand the nature of the different mineralization and improve the geological modelling. The first recommendation consisted in submitting pulps and rejects of the previous drilling campaigns to HLS tests, DTWR characterisation and Satmagan tests. These tests were necessary since the only extensive assaying realized in 2011 and 2012 consisted in the XRF analyses that provide the total iron with no possibility to discriminate the parts that related to magnetite, hematite, iron silicates and iron carbonates. Only 4 Satmagan tests were performed in 2011 and 172 DT tests were performed in 2011 and 2012. The pair data combining the DT results and the T Fe% did not show significant relationships between both quality elements making the use of a regression function to calculate the Weight Recovery of non-assayed samples unsuccessful. Furthermore, most of the samples from 2011 that were submitted to DT testing originated from a down-dip hole (LS-2011-11). A down-dip hole is referred to as hole that is drilled parallel to the dip of the mineralization. The results of such samples do not reflect the reality of the mineralization.

Table 14.4 summarized the assaying work previously completed.

Table 14.4 – Assaying work completed in 2011 and 2012

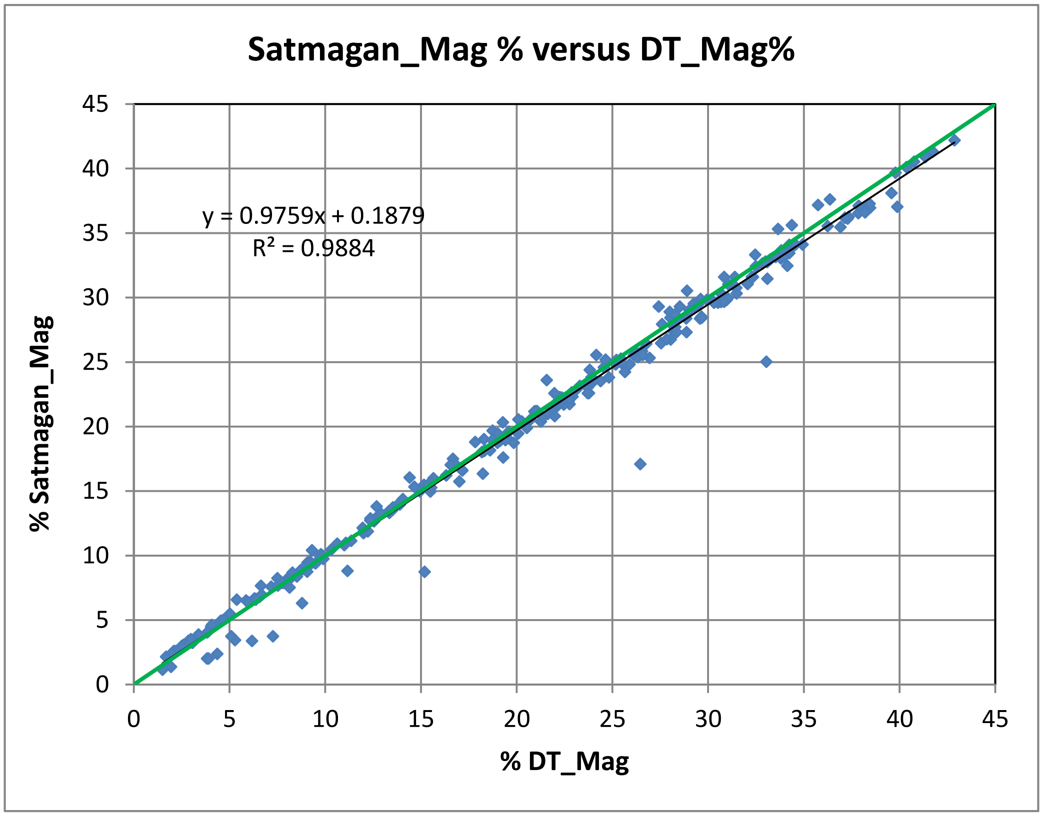
Description 1	Description 2	2011-Drilling	2012-Drilling	2012-Trenches	Total
Count	—	17	40	2	59
XRF on Head (Total)	—	1 521	3 630	53	5 204
Satmagan Tests	—	4	—	—	4
SusMag Reading	—	1 107	3 687	—	4 794
HLS tests	—	—	—	—	0
Davis Tube Tests	Weight Recovery	122	50	—	172
	XRF on Product	117	45	—	162
	XRF on Tails	119	46		165

Table 14.5 – Assaying work completed in 2014

All Samples assayed originated from the 2012 Drilling Campaign			
Description 1	**Description 2**	**Nature**	**Count**
Satmagan Tests	—	Samples	3 133
HLS tests at 3.3	—	Nominal 6 m composites	23
HLS tests at 3.9	—	Nominal 6 m composites	294
Davis Tube Tests	Weight Recovery	Samples	266
	XRF on Product	Samples	266
	XRF on Tails	—	—

Table 14.5 summarizes the additional assaying work completed in the Spring-Summer of 2014. All samples submitted for assaying during that period originate from pulps and rejects of the 2012 drilling campaign. A total of 3,133 Satmagan tests were realized to determine the magnetite proportion of selected samples belonging to different lithological units (iron oxides and iron silicates). A total of 266 samples from the 3,133 samples were also submitted for DT testing in order to allow for a comparison between the magnetite content determined with the Satmagan method and the magnetite content determined in the mean of DT approach. The results show a strong relationship between both determination methodologies with a correlation coefficient of 0.99.

Figure 14.2 – Correlation between magnetite iron from DT and Satmagan



However, one notes a slight bias with DT_Mag% which appears slightly higher (about +2%) than Satmagan_Mag%. This may be caused by slight calibration errors of the Satmagan instrumentation.

An additional request was to perform HLS tests on 300 selected composites in order to better understand the iron recovery. The objective was to combine this method with the Satmagan results in order to be able to distinguish part of the sink that is related to hematite versus the part that may be related to magnetite. A total of 6 of the 300 composites selected for HLS assaying were not found, therefore the results refer to 294 composites. Following discussions between Soutex, which is responsible for the metallurgical part of the PEA, Met-Chem, LIO and recommendations of SGS (Laboratory responsible for the tests) it was recommended to perform the HLS tests using a density of 3.9. Such a density would have allowed iron oxides (HIF, MIF, MHIF) to sink but not the iron silicates (QpyrxM) and iron carbonates. Unfortunately the results of these 294 composites using a density of 3.9 have showed poor Heavy Liquid Weight Recovery (HLWR) in comparison with the results of the 3 bulk samples that were submitted for metallurgical testing in 2014. Furthermore the relationship between the iron feed grade of the HLWR of these 294 composites was weak. It was decided to resubmit 23 composites from the initial batch to HLS tests using a density of

3.3. The results obtained had improved, which allowed Soutex to develop a WR model that is discussed in more details in the section of this report that relates to metallurgy (Section 13). Since the 294 HLS results using a density of 3.9 were not useful for the development of the resource model Met-Chem elected to simply interpolate the total iron. It was decided to not interpolate the Mag Fe% (from Satmagan results) since that variable is missing for part of the drill hole database and there is no good relationship between T Fe% and Mag Fe% to justify the use of a regression function to fill the gaps.

The present content of the resource drill hole database, with exclusion of the results of the HSL performed on composite samples, is presented in Table 14.6. Descriptive statistics of the different quality elements in the Drill Hole database are presented in Table 14.7.

Table 14.6 – Content of the Resource Drill Hole Database

File	Fields
Collar	DDH, East, North, Elev., Azimut, Dip, Zone, Start date, Description
Surveys	DDH, Depth, Type, Azimut, Dip
LITHO1	DDH, From, To, GCODE, Geol
LITHO2	DDH, From, To, GCODE2, Summary
Assays	DDH, Sample ID, From, To, T_Fe, % mag Fe, % Ratio Mag, T_SiO_2, T_MgO, T_TiO_2, T_MnO, T_CaO, T_Al_2O_3, T_Na_2O, T_K_2O, T_LOI, DTWR%, C_Fe_2O_3, C_SiO_2, C_MgO, C_TiO_2, C_MnO, C_CaO, C_Al_2O_3, C_Na_2O, C_K_2O, C_LOI, R_Fe_2O_3, R_SiO_2, R_MgO, R_TiO_2, R_MnO, R_CaO, R_Al_2O_3, R_Na_2O, R_LOI, R_K_2O
SUSMAG	DDH, From, To, Value

NOTE: "T_" = Total, "C_" = Concentrate, "R_" = Reject (Tails). "% Ratio Mag" = Ratio Magnetite Iron (Satmagan) and Total Iron.

Table 14.7 – Descriptive Statistics of Quality Elements in the Entire Database

	Weighted Av.	Arithmetic Av.	Median	Mode	St. Dev.	COV	Minimum	Maximum	Samples
T Fe%	27.39	27.06	27.89	28.45	8.47	0.31	0.66	57.12	5201
% mag Fe	15.05	15.17	13.39	1.01	10.56	0.70	0.24	53.36	3133
% Ratio Mag	49.92	50.30	46.20	89.94	31.55	0.63	0.63	154.46	3133
T SiO_2%	46.42	46.12	45.40	45.30	12.44	0.27	4.47	97.80	5201
T MgO%	4.56	5.01	3.25	0.01	5.87	1.17	0.01	31.04	5201
T TiO_2%	0.70	0.79	0.02	0.01	1.84	2.33	0.01	16.44	5201
T MnO%	0.80	0.79	0.65	0.02	0.83	1.05	0.00	17.50	5201
T CaO%	3.94	3.99	3.24	0.02	3.86	0.97	0.00	28.60	5201
T Al_2O_3%	0.88	0.96	0.13	0.01	2.12	2.22	0.01	21.77	5201
T Na_2O%	0.06	0.07	0.02	0.01	0.29	4.39	0.01	10.45	5201
T K_2O%	0.10	0.10	0.01	0.00	0.38	3.91	0.00	6.30	5201
T LOI%	2.93	3.01	1.54	0.14	4.40	1.46	-4.28	42.38	5201
DTWR%	22.95	22.58	18.91	10.50	15.52	0.69	0.04	60.09	432
C Fe_2O_3%	100.11	99.89	100.99	100.99	2.94	0.03	71.50	104.00	430
C SiO_2%	1.40	1.50	1.13	0.48	1.38	0.92	0.03	9.00	430
C MgO%	0.19	0.22	0.15	0.01	0.27	1.20	0.01	2.04	430
C TiO_2%	0.07	0.07	0.01	0.01	0.15	2.35	0.01	1.92	312
C MnO%	0.64	0.61	0.22	0.07	1.01	1.65	0.01	9.14	430
C CaO%	0.15	0.17	0.11	0.02	0.19	1.16	0.01	1.17	430
C Al_2O_3%	0.18	0.21	0.13	0.01	0.26	1.20	0.01	1.47	430
C Na_2O%	0.02	0.02	0.01	0.01	0.04	1.79	0.01	0.47	430
C K_2O%	0.01	0.01	0.01	0.01	0.00	0.82	0.01	0.05	312
C LOI%	-2.93	-2.95	-3.09	-3.06	1.70	-0.58	-5.31	24.80	312
R Fe_2O_3%	22.79	23.59	27.60	31.71	12.92	0.55	2.91	48.34	165
R SiO_2%	61.21	59.48	57.65	52.43	16.54	0.28	8.28	88.19	165
R MgO%	4.52	4.96	4.66	0.05	3.96	0.80	0.02	24.10	165
R TiO_2%	0.29	0.29	0.01	0.01	0.85	2.97	0.01	4.99	46
R MnO%	1.00	1.00	0.87	0.79	0.95	0.95	0.03	7.79	165
R CaO%	4.59	4.68	4.38	0.04	4.21	0.90	0.02	22.41	165
R Al_2O_3%	0.44	0.50	0.08	0.01	1.40	2.82	0.01	9.52	165
R Na_2O%	0.06	0.06	0.01	0.01	0.25	4.46	0.01	3.03	165
R K_2O%	0.04	0.04	0.01	0.01	0.10	2.80	0.01	0.65	46
R LOI%	6.74	6.75	5.51	—	5.08	0.75	0.51	28.87	46

14.5 Geological Modelling Procedures

The geological modelling was completed once the updated database was imported into MineSight® v. 9.00 and the last validation process finalized. The overlay of the assay results and the lithology raw data allows each sample to be assigned by a lithological code which is related to the geological description as was done during the core logging. New entries in the drill hole database, in comparison with those used in the 2013 resource modelling, are related to the results of the 3,133 Satmagan tests and the 266 Davis Tube tests. The results of the 294 HLS tests were not imported in the DB as they were not successful. The results of the 23 composites submitted to HLS using a density of 3.3 were used by Soutex to develop a WR model. However that model was not used in the Mineral Resources interpolation due to the limited number of pair data involved.

The geological model developed is based on four (4) envelopes. One envelop referred to as Magnetite Iron Formation (MIF), one envelop referred to as Hematite Iron Formation (HIF), one envelop referred to as Quartz-Pyroxene-Magnetite (QPyrxM) and finally a mixed envelope referred as Magnetite Hematite Iron Formation (MHIF).

For the iron oxides, it was initially tried to exclusively define envelopes that are either magnetite or hematite rich. However this exercise was not successful due to a high variability in both oxide types both on sections and from section to section. This makes it impossible to delineate large and continuous envelopes for MIF and HIF. The alternative was to develop a large envelope of mixed magnetite and hematite iron formations for the part of the mineralization that is not QPyrxM. The methodology used to develop the 3D envelopes is based on the traditional sectional interpretation on 2D prior to joining all sections together to the deliver the resulting solids.

A topographic surface was provided by LIO and was used for the purpose of the resources modelling. This topographic surface was generated with the use of satellite and photo interpretation. Met-Chem also generated a triangulated surface using the bottom of the overburden. This surface was then intersected with the topographic surface and used to guide the creation of the final solids representing the iron formation in order to ensure that the mineral resources stay below that surface.

The Figure 14.3 shows a 3D perspective view of the geological interpretation on sections while Figure 14.4 and Figure 14.5 show a typical vertical cross-section.

Figure 14.3 – 3D View of Vertical Cross-Sections

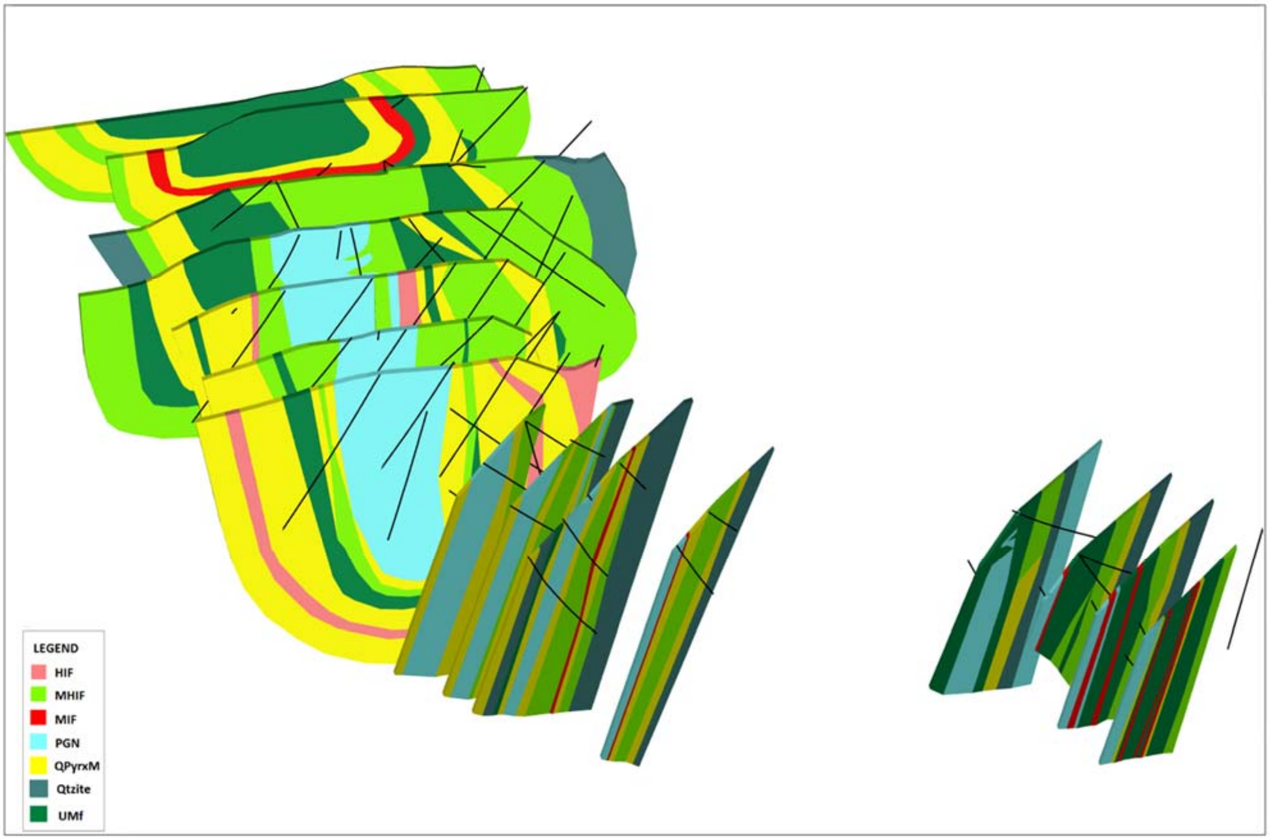


Figure 14.4 – Typical Vertical Cross-Section (Section N450)

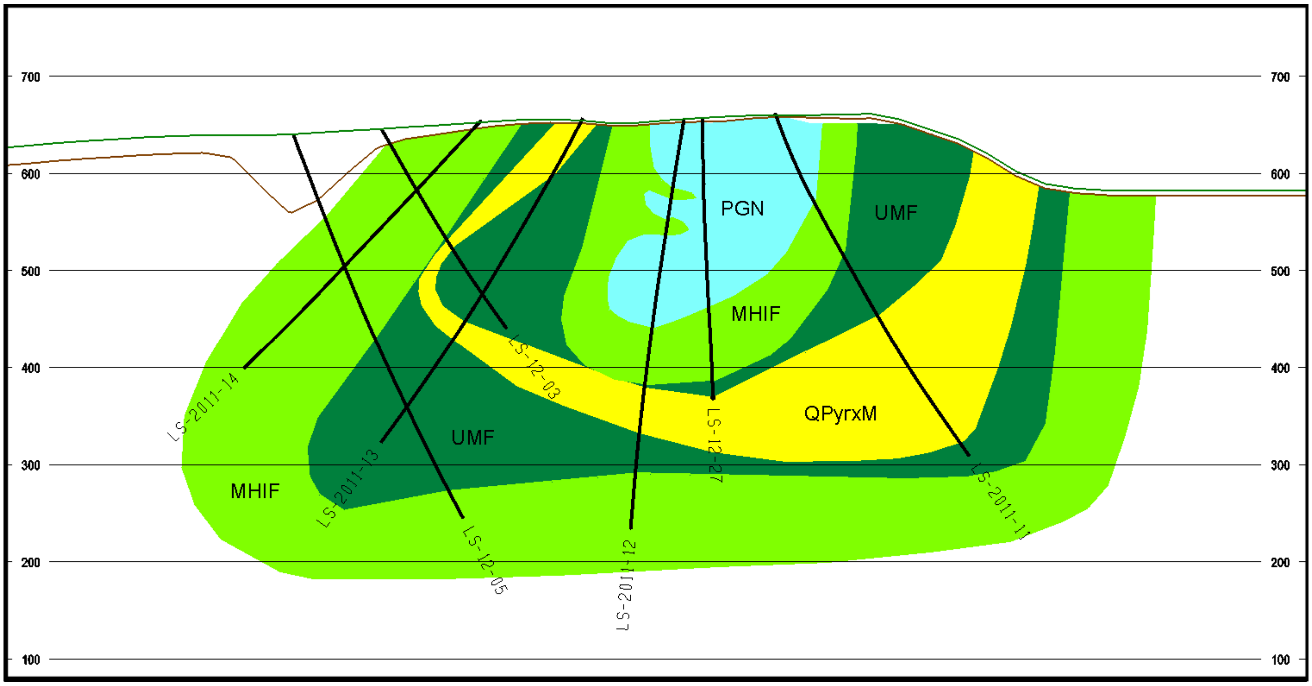
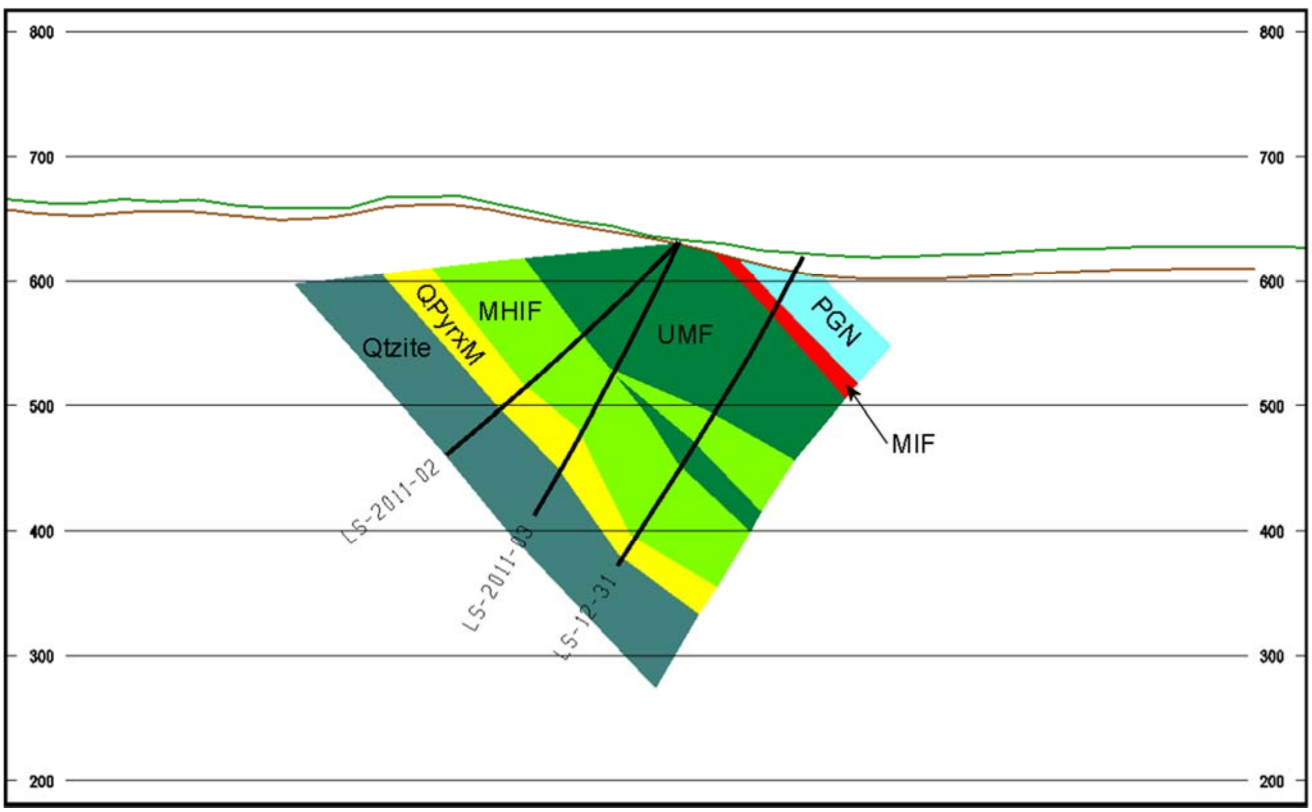


Figure 14.5 – Typical Vertical Cross-Section (Section N1020)



14.6 Statistical Analysis and Compositing

The geological solids were used to constrain the assays falling in each mineralized envelope. Basic statistics were calculated on the resulting raw data in order to provide a better visualisation of the statistics related to each quality element. Tables 14.8 to 14.11 provide the statistics that were generated for each mineralized envelope.

Table 14.8 – Descriptive Statistics of Assays within MIF

	Arith. Av.	Median	Mode	St. Dev.	COV	Minimum	Maximum	Samples
T_Fe	30.17	30.81	36.97	7.89	0.26	4.29	44.59	127
% Mag Fe	21.39	22.59	10.82	8.56	0.40	3.25	34.46	75
% Ratio Mag	71.37	77.86	29.86	21.59	0.30	11.10	95.21	75
T_Al_2O_3	0.79	0.17	0.08	1.25	1.59	0.00	6.64	127
T_CaO	5.53	5.02	4.57	4.04	0.73	0.48	27.80	127
T_K_2O	0.13	0.02	0.01	0.23	1.86	0.00	1.12	127
T_LOI	2.67	1.25	0.02	4.20	1.58	-1.38	24.38	127
T_MgO	4.99	3.68	2.73	4.08	0.82	0.44	23.20	127
T_MnO	1.30	1.07	1.36	1.17	0.90	0.02	9.15	127
T_Na_2O	0.13	0.04	0.02	0.19	1.53	0.00	0.95	127
T_SiO_2	40.09	39.26	51.40	10.33	0.26	10.65	89.60	127
T_TiO_2	0.80	0.03	0.01	1.56	1.96	0.00	7.03	127
C_Al_2O_3	0.17	0.12	0.06	0.15	0.86	0.03	0.59	13
C_CaO	0.25	0.22	0.09	0.18	0.72	0.08	0.75	13
C_Fe_2O_3	100.32	100.99	100.99	1.29	0.01	97.01	101.99	13
C_LOI	-2.94	-3.02	-3.06	0.19	-0.06	-3.16	-2.55	13
C_MgO	0.21	0.19	0.13	0.11	0.53	0.10	0.52	13
C_MnO	1.08	0.84	0.65	0.74	0.68	0.23	2.53	13
C_Na_2O	0.01	0.01	0.00	0.01	1.10	0.00	0.03	13
C_SiO_2	0.96	0.84	—	0.43	0.44	0.45	1.96	13
C_TiO_2	0.08	0.01	0.00	0.14	1.74	0.00	0.43	13
DTWR	36.95	40.04	—	11.40	0.31	4.34	47.59	13

Table 14.9 – Descriptive Statistics of Assays within HIF

	Arith. Av.	Median	Mode	St. Dev.	COV	Minimum	Maximum	Samples
T_Fe	28.73	29.09	23.60	7.00	0.24	6.34	44.94	130
% Mag Fe	7.57	4.98	1.01	7.81	1.03	0.43	33.97	122
% Ratio Mag	25.48	16.96	17.05	25.87	1.01	1.55	92.97	122
T_Al_2O_3	1.51	0.16	0.00	3.30	2.19	0.00	14.90	130
T_CaO	2.42	1.13	0.02	2.96	1.22	0.01	14.75	130
T_K_2O	0.13	0.01	0.00	0.29	2.35	0.00	1.34	130
T_LOI	1.36	0.79	0.18	2.34	1.73	-0.71	16.49	130
T_MgO	2.22	1.58	0.00	2.27	1.02	0.00	10.20	130
T_MnO	0.40	0.16	0.01	1.01	2.51	0.00	7.95	130
T_Na_2O	0.14	0.01	0.01	0.50	3.60	0.00	2.71	130
T_SiO_2	49.49	50.40	55.20	9.90	0.20	9.06	82.30	130
T_TiO_2	0.92	0.04	0.00	1.62	1.77	0.00	6.75	130

Table 14.10 – Descriptive Statistics of Assays within MHIF

	Arith. Av.	Median	Mode	St. Dev.	COV	Minimum	Maximum	Samples
T_Fe	29.22	29.97	28.45	8.10	0.28	2.70	57.12	2704
% Mag Fe	15.95	14.55	1.01	11.22	0.70	0.24	53.36	1703
% Ratio Mag	51.37	49.03	90.50	33.60	0.65	0.63	154.46	1703
T_Al_2O_3	0.69	0.09	0.00	1.95	2.80	0.00	17.55	2704
T_CaO	2.81	2.13	0.02	3.22	1.15	0.00	21.81	2704
T_K_2O	0.09	0.01	0.00	0.37	4.06	0.00	5.46	2704
T_LOI	1.69	0.85	0.05	3.12	1.85	-3.95	32.08	2704
T_MgO	2.54	1.74	0.00	3.18	1.25	0.00	28.10	2704
T_MnO	0.73	0.57	0.01	0.97	1.34	0.00	17.50	2704
T_Na_2O	0.05	0.02	0.01	0.17	3.55	0.00	3.86	2704
T_SiO_2	48.68	47.20	37.60	12.42	0.26	4.47	89.27	2704
T_TiO_2	0.46	0.01	0.00	1.54	3.36	0.00	16.44	2704
C_Al_2O_3	0.16	0.12	0.07	0.16	1.00	0.00	1.01	280
C_CaO	0.11	0.09	0.02	0.10	0.93	0.00	0.72	280
C_Fe_2O_3	100.06	100.99	100.99	2.74	0.03	71.50	104.00	280
C_K_2O	0.00	0.00	0.00	0.01	3.74	0.00	0.05	206
C_LOI	-2.88	-3.08	-3.07	2.09	-0.73	-5.31	24.80	206
C_MgO	0.15	0.13	0.00	0.11	0.75	0.00	0.56	280
C_MnO	0.79	0.32	0.05	1.22	1.55	0.01	9.14	280
C_Na_2O	0.02	0.01	0.00	0.04	1.51	0.00	0.24	280
C_SiO_2	1.36	1.13	0.48	1.12	0.82	0.15	8.20	280
C_TiO_2	0.06	0.00	0.00	0.17	2.98	0.00	1.92	206
DTWR	22.96	18.30	48.74	16.76	0.73	0.04	60.09	283
R_Al_2O_3	0.34	0.08	0.00	1.29	3.75	0.00	9.52	87
R_CaO	3.46	2.22	0.04	4.20	1.22	0.02	22.41	87
R_Fe_2O_3	20.73	15.92	—	14.96	0.72	2.91	48.34	87
R_K_2O	0.02	0.00	0.00	0.06	2.37	0.00	0.18	11
R_LOI	9.42	6.48	—	7.94	0.84	3.36	28.87	11
R_MgO	2.87	2.52	0.05	2.89	1.01	0.02	14.48	87
R_MnO	0.97	0.63	0.05	1.24	1.28	0.03	7.79	87
R_Na_2O	0.09	0.02	0.00	0.34	3.73	0.00	3.03	87
R_SiO_2	67.11	67.46	52.43	14.34	0.21	13.22	88.19	87
R_TiO_2	0.40	0.02	0.01	0.75	1.90	0.01	2.42	11

Table 14.11 – Descriptive Statistics of Assays within QPyrxM

	Arith. Av.	Median	Mode	St. Dev.	COV	Minimum	Maximum	Samples
T_Fe	25.79	26.50	25.63	7.43	0.29	2.49	52.47	1539
% Mag Fe	14.78	12.82	13.61	9.37	0.63	0.51	48.68	1097
% Ratio Mag	51.07	45.72	92.35	27.38	0.54	2.53	98.79	1097
T_Al_2O_3	0.56	0.10	0.00	1.25	2.23	0.00	15.95	1539
T_CaO	5.61	4.91	5.67	3.93	0.70	0.03	24.50	1539
T_K_2O	0.05	0.01	0.00	0.15	2.76	0.00	2.60	1539
T_LOI	4.46	3.15	1.75	4.83	1.08	-4.28	33.24	1539
T_MgO	5.71	5.30	6.44	3.65	0.64	0.00	29.40	1539
T_MnO	1.01	0.93	0.89	0.57	0.57	0.02	5.32	1539
T_Na_2O	0.04	0.02	0.01	0.15	3.74	0.00	2.59	1539
T_SiO_2	44.90	45.30	48.40	10.86	0.24	7.87	89.71	1539
T_TiO_2	0.46	0.02	0.00	1.30	2.80	0.00	9.98	1539
C_Al_2O_3	0.33	0.19	0.00	0.39	1.16	0.00	1.47	120
C_CaO	0.30	0.19	0.08	0.28	0.95	0.00	1.17	120
C_Fe_2O_3	99.12	100.95	101.99	3.50	0.04	89.80	103.50	120
C_K_2O	0.00	0.00	0.00	0.00	4.51	0.00	0.02	76
C_LOI	-3.09	-3.13	-3.09	0.22	-0.07	-3.50	-2.10	76
C_MgO	0.40	0.23	0.00	0.43	1.06	0.00	2.04	120
C_MnO	0.23	0.14	0.09	0.26	1.13	0.03	1.56	120
C_Na_2O	0.02	0.00	0.00	0.06	3.17	0.00	0.47	120
C_SiO_2	2.00	1.34	0.17	1.93	0.97	0.03	9.00	120
C_TiO_2	0.08	0.04	0.00	0.12	1.53	0.00	0.60	76
DTWR	19.97	15.90	20.80	12.52	0.63	1.60	58.79	119
R_Al_2O_3	0.66	0.10	0.00	1.51	2.27	0.00	8.92	78
R_CaO	6.05	5.95	7.39	3.80	0.63	0.24	22.28	78
R_Fe_2O_3	26.78	29.61	31.71	9.28	0.35	3.96	40.79	78
R_K_2O	0.04	0.00	0.00	0.11	3.18	0.00	0.65	35
R_LOI	5.91	5.23	—	3.54	0.60	0.51	15.94	35
R_MgO	7.29	6.56	4.53	3.69	0.51	1.81	24.10	78
R_MnO	1.03	0.98	1.05	0.45	0.43	0.31	3.13	78
R_Na_2O	0.01	0.00	0.00	0.09	6.56	0.00	0.78	78
R_SiO_2	50.97	52.09	—	14.63	0.29	8.28	80.28	78
R_TiO_2	0.25	0.01	0.01	0.89	3.51	0.01	4.99	35

It shows the mixed nature of the mineralization with most assays falling in the domain of MHIF. Where it was successful to discriminate hematite rich iron formation one notes a small proportion of magnetite (7.6%) with an average ratio of magnetite on total iron estimated at 25.5%. The examination of the geological logs of some holes where intersections were described as MIF also shows the presence of hematite in small to considerable proportions. The mixed nature of MHIF can also be attested by a ratio of magnetite to total iron estimated at 51%. A large proportion of the 49% remaining non magnetite iron may be assigned to hematite since MHIF does contain considerable iron silicates or iron carbonates. Based on the statistics of the 1,097 samples it may also be noted that up to 51% of the total iron in QPyrxM is magnetite. However, the majority of the magnetite in this unit is described as fine dissemination of magnetite within a quartz rich matrix. This means that a fine grinding size must be reached in order to liberate the magnetite. The remaining iron proportion in this unit originated mostly of pale olive green iron pyroxene and accessory of carbonate iron formation.

The sampling length histogram is presented and discussed in section 14.4.1. It shows that most of the sampling during the 2011 and 2012 drilling campaigns was made at a nominal length of 2 m. Such a sampling length is unusual for iron formations where the geological sequences have lengths of about ten meters. Traditionally the statistical mode of the sampling length is selected to uniform all samples to the same support. In the present case, Met-Chem elected to make the compositing at a nominal length of 6 m which is the typical nominal sampling length used in iron deposits. Due to the unequal number of samples assayed for the different quality elements, both on the head and product, the compositing was only made for the T Fe since only this quality element was interpolated in the current resource estimation. All composites with a length of less than 3 m were discarded after compositing to preserve a good representativeness. Table 14.12 summarizes the statistics obtained after compositing. It may be noted that the assay statistics described above are generally well preserved after compositing. The total iron histograms of composites for the different mineralizations are presented in Figures 14.6 to 14.9.

Table 14.12 – Descriptive Statistics of 6 m Composites

Description	MHIF	HIF	MIF	QPyrxM
	T_Fe%	T_Fe%	T_Fe%	T_Fe%
Arith. Average	29.50	27.94	30.97	25.97
Median	30.06	27.60	31.69	26.91
Mode	33.23	—	36.32	23.84
St. Deviation	7.00	5.74	6.06	6.62
COV	0.24	0.21	0.20	43.81
Minimum	4.96	10.98	15.80	2.49
Maximum	44.00	38.63	39.99	44.66
Samples	843	42	39	432

Figure 14.6 – Composites T Fe% Histogram for MIF

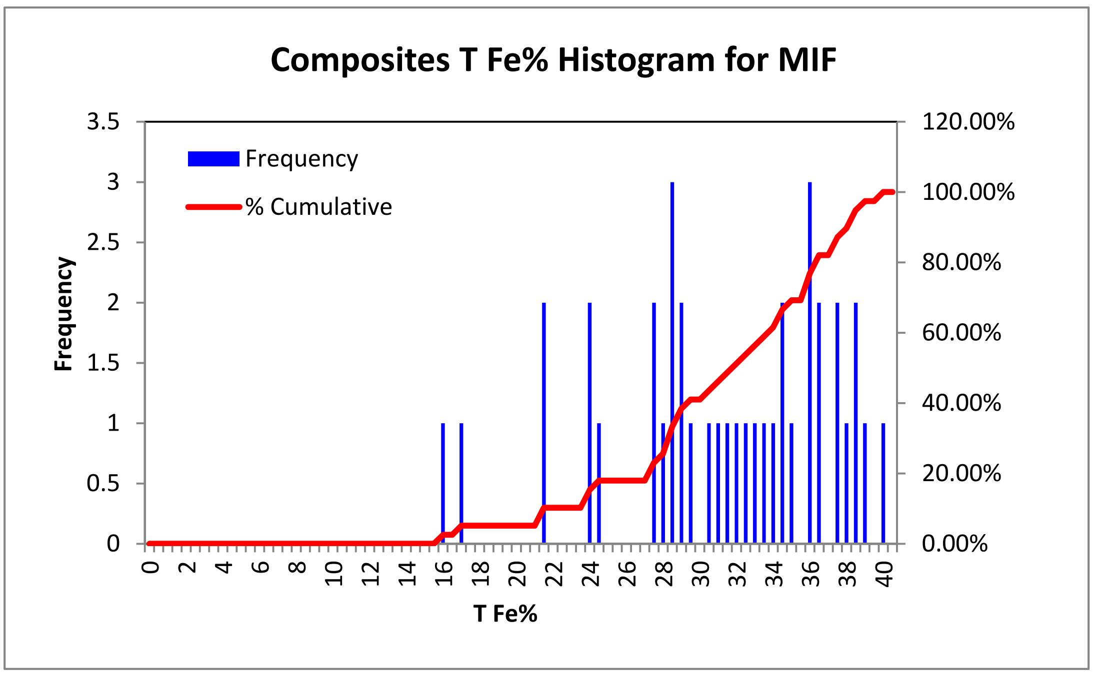


Figure 14.7 – Composites T Fe% Histogram for HIF

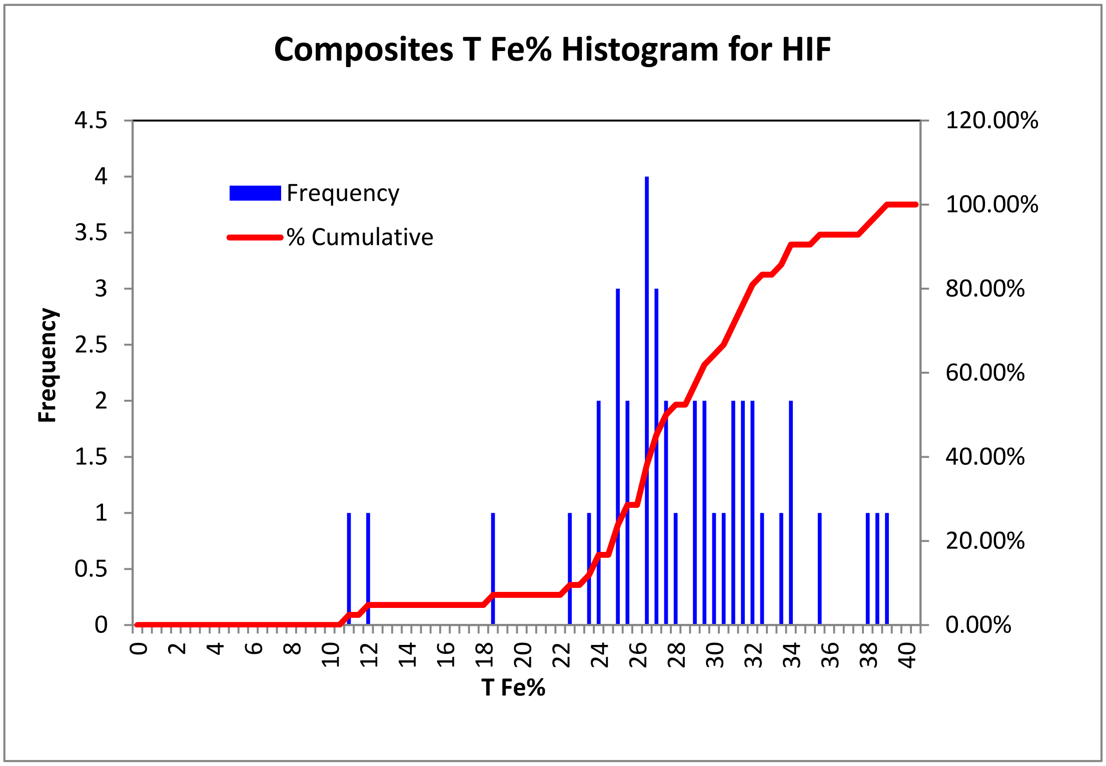


Figure 14.8 – Composites T Fe% Histogram for MHIF

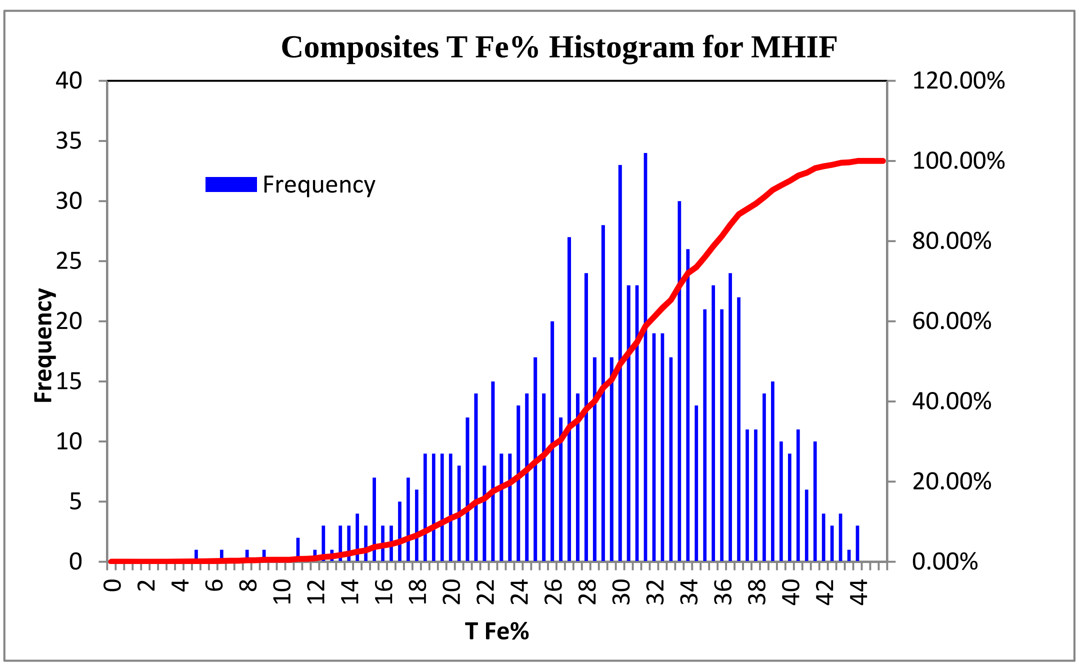


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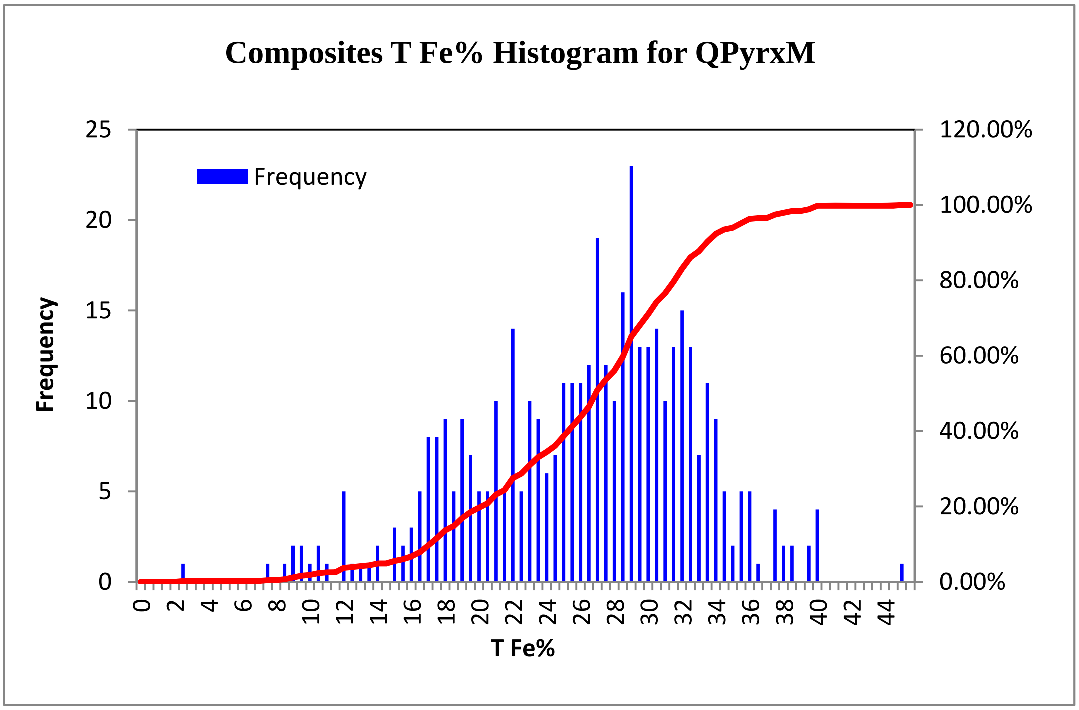
Figure 14.9 – Composites T Fe% Histogram for QPyrxM



14.7 Variogram Modelling

No variograms were generated for the purpose of the current Mineral Resource estimation. The last variograms generated on the project were performed in the previous resource estimation where only a single mineralized envelope was considered and no distinction was made between the different iron formations. The range found for the second structure at that time was in the order of 100 m which in fact is of the same order of magnitude as the drill spacing on the better drilled sections. Due to the folded nature of the mineralization, its mixed nature, the irregular and sparse drilling pattern and the insufficiency of data, Met-Chem feels that a variography analysis at this stage will not deliver relevant and unbiased results.

14.8 Density/Specific Gravity

During the previous Mineral Resource estimate, an attempt was made to develop a density model which is a regression function between the total iron of all mineralization (MIF, HIF and QPyrxM) and the density. That model was based on density measurements of 120 samples. However, no indication was provided on the method used (pycnometer or weight in air and in water) to determine the density. Furthermore all samples (iron oxides and iron silicates) were mixed together to develop the regression model. The pair's data plotted on a scatterplot show a relative high dispersion with the possibility to distinguish three different populations. The correlation coefficient obtained was also not high enough in Met-Chem's opinion to provide a high confidence level and to justify the use of that regression model to convert volumes into tonnages in the current mineral resource. Met-Chem believes that more density measurements and exercises to domain different density/T Fe% populations are required to better understand and model the density. This explains why Met-Chem chose, at this preliminary stage of the project development, to use an average density of 3.35 to convert the volumes of all mineralized envelopes into tonnes. That value represents the average density of samples that have a total iron in the range of 28.5% which is the iron average for the entire mineralization. Met-Chem recommends more density tests to be performed and to be better investigate this issue in next stage of the project development.

14.9 Block Model Setup/Parameters

A block model was created using the MineSight® software package to generate a grid of regular blocks to estimate tonnes and grades. A unique block model was created for all mineralized zones which include the Tanguay Zone, the 91-92 Zone and the Mountain Pond Zone. The previous estimate considered a block size of 10 m × 10 m × 10 m respectively in the X, Y and Z directions. It is Met-Chem's opinion that such a block size appears too small comparatively to the drill spacing. An industry standard is to consider block size in the range of one half (½) to one fourth (¼) of the average drill spacing. Block size is a particularly sensitive parameter for estimates that are based on geostatistical methods such as Kriging (Ordinary Kriging, Simple Kriging, Indicators Kriging, etc.). In this case the Kriging Variance of a selected block, which is interpreted as an indicator of a confidence level of the estimate, is intimately related to the distance of the center of that block to the composites used for its interpolation. The smaller the blocks the higher the Kriging Variance will be. Furthermore, even for estimates that are not based on geostasticial approaches such as Inverse Distance Method ("**IDW**"), a too small block size would lead to estimates that do not reflect the drilling density and the reality of the mineralization.

The average distance between two holes as computed by Met-Chem is 127 m for the entire deposit. For the X and Y directions Met-Chem elected to consider a block size of 30 m × 30 m which roughly corresponds to one third (1/3) of the drill spacing. A height of 15 m was considered in the Z direction to align with the projected type of mining equipment.

The parameters of the block model are presented in Table 14.13.

Table 14.13 – Lac Lamêlée – Blocks Model Parameters

Direction	Minimum (UTM)	Maximum (UTM)	Bock Size	Number of Blocks	Model Origin (UTM)
Easting (X)	601,000	605,710	30	157	601,000
Northing (Y)	5,805,500	5,810,510	30	167	5,805,500
Elevation (Z)	-100	1010	15	74	1010
Rotation	N/A	N/A	N/A	N/A	N/A

14.10 Mineral Resources Interpolation

The Mineral Resources of the Lac Lamêlée iron deposit were estimated using an Inverse Distance Squared (“**IDW2**”) Method. In its basis formulation IDW belongs to the non geostatistical estimation approaches. In such estimation, composites selected to interpolate a given block are weighted in function of their distance to the center of the block. IDW1 (IDW at a power of 1) and IWD3 (IDW at a power of 3) were run to validate the principal interpolation that was conducted using IDW2.

Three (3) successive interpolation passes were used in the estimation. In the first pass the search ellipse was set equal to 100 m × 100 m × 30 m. The maximum and minimum numbers of composites were respectively set to 15 and 9, while the maximum number of composites allows for a single hole was fixed equal to 3. The combination of these constraints has as consequence that at least three different holes are required to allow a block to be interpolated during that pass.

In the second pass the search ellipse was relaxed to 150 m × 150 m × 45 m. The maximum and minimum numbers of composites were respectively set to 15 and 6, while the maximum number of composites allows for a single hole was kept same. At least two different holes are required to allow a block to be interpolated during that pass.

During the third pass the search ellipse was extremely relaxed to 500 m × 500 m × 300 m to allow the interpolation of all un-interpolated blocks that are situated within the different geological envelopes (MIF, HIF, MHIF and QPyrxM). The maximum number of composites to interpolate a block and the maximum number of composites allows for a single hole were kept the same while the minimum number of composites required was reduced to 3. At least one (1) hole is required to allow a block to be interpolated during that pass. The interpolation parameters are summarized in Table 14.14.

Table 14.14 – Interpolation Parameters

Items	Description		
Grade Interpolation Method	IDW2		
Methods for Validation	IDW1 and IDW3		
Composites	By fixed length of 6 m and with respect of geological domain, discarding composites < 3 m		
High Values Capping	N/A		
Search Method 1	N/A		
Ellipse Orientation	N/A		
Interpolation Pass	**Pass 1**	**Pass 2**	**Pass 3**
Min. Number of Composites/Block	9	6	3
Max. Number of Composites/Block	15	15	15
Max. Number of Composites/Hole	3	3	3
Ellipse Size on the Major Axis (Strike)	100 m	150 m	500 m
Ellipse Size on the Semi-Major Axis (Acrros Strike)	100 m	150 m	500 m
Ellipse Size on the Minor Axis (Downhole)	30 m	45 m	300 m

14.11 Mineral Resources Validation

Estimated blocks were compared with composites and raw assay grades, on section, plan and 3D basis, as a first step in the Mineral Resources validation. The correlation was generally good and better where blocks were interpolated using the first and second passes. A further validation process consisted in generating basic descriptive statistics of blocks that are compared to the statistics of composites and assays used as inputs. The descriptive statistics generated are presented in Table 14.15. The comparison shows a generally good correspondence between the interpolated blocks, that represent the output of the resource model, and the composites that represent the input into the resource model. However some minor discrepancies, illustrated by a slight smoothing in the resource model, are noted. This is mainly caused by a large extrapolation that was introduced in the third interpolation pass where the search ellipse was much more relaxed to allow all blocks constrained within each mineralized envelop to be coded. The extreme relaxing of the search ellipse in that pass was necessary due to the folded nature of the mineralization with un-equal drill spacing. Some limbs of the mineralization were more interpretative with no drilling intercept in the near vicinity. Even structural domaining, which is the traditional solution for mineralization with folded patterns, would have not been helpful. The Mineral Resources model should be refined once more drilling is performed to provide a tighter drilling density and allow for a relevant variography analysis.

Table 14.15 – T Fe% Comparison for Assays, Composites and Blocks

		T FE% - MHIF	T FE% - HIF	T FE% - MIF	T FE% - QPyrxM *
ASSAYS	Average	29.22	28.70	30.17	25.79
	St. Dev.	8.10	7.00	7.89	7.43
	COV	0.28	0.24	0.26	0.29
	Min.	2.70	6.34	4.29	2.49
	Max	57.12	44.94	44.59	52.47
	Samples	2 704	130	127	1 539
COMPOSITES	Average	29.5	27.94	30.97	25.97
	St. Dev.	7.00	5.74	6.06	6.62
	COV	0.24	0.21	0.20	0.25
	Min.	4.96	10.98	15.8	2.49
	Max	44.00	38.63	39.99	44.66
	Samples	843	42	39	432
BLOCKS	Average	28.87	27.07	31.23	24.76
	St. Dev.	4.81	3.35	4.09	3.71
	COV	0.17	0.12	0.13	0.15
	Min.	15.16	20.45	17.1	11.41
	Max	42.3	34.25	38.09	38.19
	Samples	9 295	438	255	8 671

* Note: The tonnage of QPyrxM was not included in the Mineral Resource

Figure 14.10 and Figure 14.11 show typical vertical cross-sections with blocks and grades. The limits of the resource pit shell used to determine the mineralized zones that can be potentially mined without affecting the lake is drawn on Figure 14.10.

Figure 14.10 – Typical Vertical Cross-Section (Section N450)

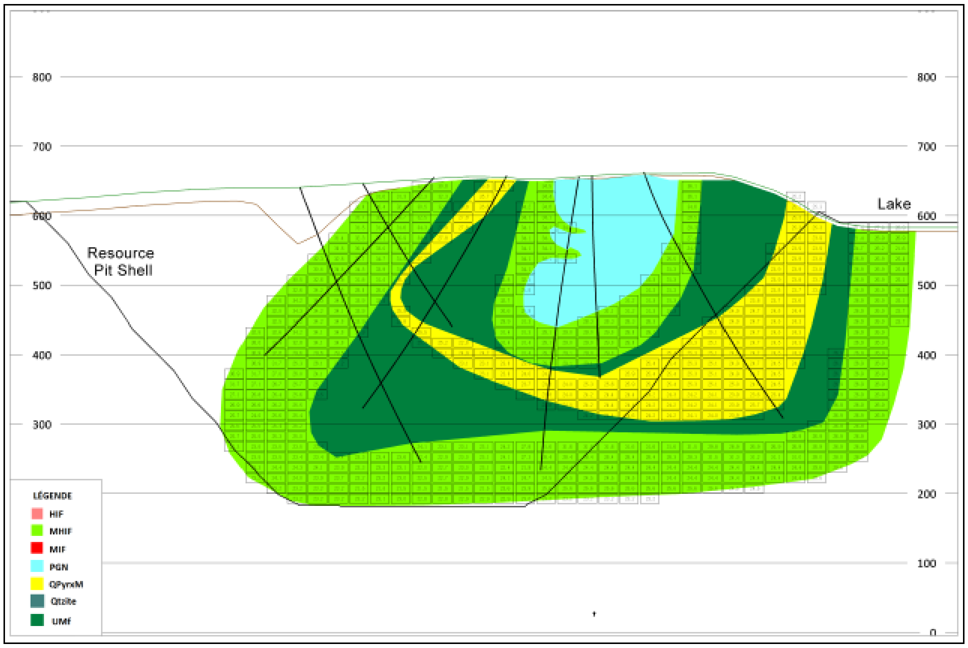
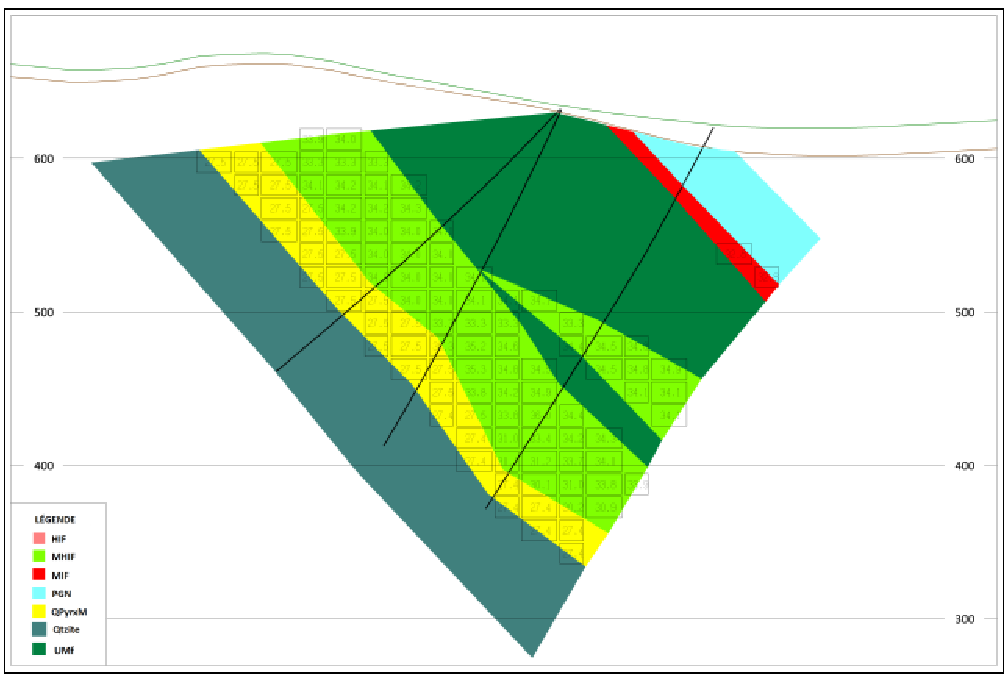


Figure 14.11 – Typical Vertical Cross-Section (Section N1020)



14.12 Resource Classification

Mineral Resource classification is based on certainty of geology and grades and in most cases is related to the drilling density. Areas that are more densely drilled are usually better known and understood than areas with sparser drilling which could be considered to have a lower confidence level. However, in some rare cases, even a tight drill pattern may not allow for certainty on grades and geological continuity. This is particularly true in the case of deposits that show high variability on grades and high nugget effect.

Met-Chem has considered the following factors for the Mineral Resources classification of the Lac Lamêlée iron deposit:

- The metamorphic and folded nature of the mineralization and its high longitudinal and lateral variability making some spatial correlations pretty difficult;
- The drilling density which is not uniform everywhere;
- The mixed nature of the main mineralized envelope (MHIF) with no quantification, at this stage, of the distribution ratio between hematite and magnetite;
- Some of the holes from the 2011 drilling campaign were drilled down dip and did not provide relevant mineralized intersections;
- The non-continuous sampling and assaying for some holes of the 2011 drilling campaign;
- The results of the 294 HLS tests required by Met-chem and performed in the summer of 2014 that used a density of 3.9 were not successful. Additional tests using a density of 3.3 were re performed on limited samples (23 samples) and have delivered better results. However the limited number of these samples has not allowed Met-Chem to interpolate the Weight Recovery during the resource estimate;
- The need to performed more additional density tests and refine the density model;
- The QA/QC results that highlight an issue related to certain samples of the 2011 drilling campaign that were analyzed at ACTLAB laboratory in Ancaster (See the QA/QC Section 11.6).

Taking all these factors into account, Met-Chem's QP found it appropriate to classify all tonnes estimated within the MIF, HIF and MHIF mineralized envelopes and limited by Lac Lamêlée as Inferred Mineral Resources.

The QPyrxM which has a substantial tonnage and potential of 175 Mt (excluding volumes under Lac Lamêlée) was not considered as Mineral Resource since at this stage since there has been no characterisation work that has attested an economic potential for its magnetite disseminations that are associated with iron silicates.

14.13 Global Mineral Inventory

The Global Mineral Inventory represents the total tonnage of all blocks constrained within the iron oxides that were interpolated and reported between the bottom of the overburden and the bottom of the resource model. It is also based on the application of a cut-off grade of 15% on the T Fe.

Table 14.16 summarizes the Global Mineral Inventory of the Lac Lamêlée iron deposit.

Table 14.16 – Summary of the Global Mineral Inventory (Cut-Off of 15% Fe)

Category	Tonnage (Mt)	T Fe (%)
Global	451.7	28.85

14.14 Mineral Resources Statement

Under CIM definitions, Mineral Resources should have a reasonable prospect of economic extraction. Met-Chem chose to exclude the portion of the mineralization that lies below Lac Lamêlée from the Mineral Resource estimate since the complete dewatering of Lac Lamêlée, the construction of dykes to cut-off portions of the lake or underground mining of this mineralized material would most likely not be an economic option for the Project. However, these options should be evaluated in further detail in the next phase of the Project.

In order to determine the mineralized zones that can be potentially mined without affecting the lake, Met-Chem created a pit shell with an overall pit slope of 52 degrees and limited the crest of the pit to a minimum distance of 50 m from the lake.

An economic analysis was then carried out on the mineralized material within this pit shell which determined that its entirety has a reasonable prospect of economic extraction. The analysis was carried using the economic parameters presented in Table 14.17 which are discussed in more detail Section 16.4, Pit Optimization. These parameters are preliminary estimates for developing the economic pit and should not be confused with the operating costs subsequently developed for the PEA and presented in Section 21 of this report.

Table 14.17 – Economic Parameters (Canadian Dollars)

Item	Units	Value
Mining Cost	$/t (mined)	2.50
Processing Cost	$/t (milled)	3.00
General and Administration Cost	$/t (milled)	1.00
Transportation Cost	$/t (conc.)	16.00
Sales Price (FOB Sept-Îles)	$/t (conc.)	100.00

The Mineral Resource Estimate for the Lac Lamêlée iron deposit contains 354.1 Mt of Inferred Mineral Resources at an average Total Fe grade of 29.49%, using a cut-off grade of 15% T Fe.

Table 14.18 presents the Mineral Resource Estimate.

Table 14.18 – Mineral Resource Estimate

Category	Resources (Mt)	T Fe (%)
Inferred	354.1	29.49

Mineral resources cannot be considered Mineral Reserves until they have demonstrated economic viability. Environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues may materially affect the estimate of mineral resources. The quantity and grade of reported Inferred Mineral Resources in this estimate are uncertain in nature and there has been insufficient exploration to define these Inferred Mineral Resources as Indicated or Measured Mineral Resources and it is uncertain if further exploration will result in upgrading them to the Indicated or Measured Mineral Resource categories.

15. Mineral Reserve Estimate

Since this report is a Preliminary Economic Assessment (PEA) report, no Mineral Reserves have been estimated for Lamêlée as per NI 43-101 regulations. In-pit Mineral Resources are described in Section 16.0

16 Mining Methods

The mining methods and In-pit Mineral Resource estimate for the Lac Lamêlée South deposit were prepared by Jeffrey Cassoff, Eng., Lead Mining Engineer with Met-Chem Canada Inc. and Qualified Person. All of the work related to the mine design for the PEA was done using MineSight® Version 9.10. MineSight® is a commercially available software that has been used by Met-Chem for over 30 years.

16.1 Block Model

The mine design for the PEA is based on the Mineral Resource block model that was prepared by Met-Chem Canada Inc. and presented in Section 14 of this report. The 3-Dimensional block model is composed of blocks that are 30 m x 30 m x 15 m high and contains only Mineral Resources in the Inferred category.

Lamêlée Iron Ore Ltd. supplied Met-Chem with a topographic surface that was created through the interpolation of aerial photographs with a precision of +/- 10 m. This topographic surface was incorporated into the block model.

Using the drillhole logs, Met-Chem developed a surface representing the top of bedrock. All material above this surface is considered overburden which is defined as loose sand and gravel that can be excavated without the need for drilling and blasting. The overburden was also incorporated into the block model.

In order to determine the value of iron contained within each block of mineralized material, Soutex Inc. provided Met-Chem with the following formula to calculate the weight recovery as a function of the total iron. The formula is based on the results of the metallurgical testwork as is presented in more detail in Section 13 of this report.

Weight Recovery % = 1.4952 x Total Fe% - 8.1543

In order to calculate the amount of concentrate that is produced from a given mineralized block in the model, the tonnage of the block is multiplied by its weight recovery. The formula assumes that the grade of the concentrate will be 64.3% Fe.

16.2 Material Properties

The material properties for the different rock types are presented below. These properties are important in estimating the In-pit Mineral Resources, the equipment fleet requirements as well as the dump and stockpile design capacities.

a) Density

Section 14 of this report presented the in-situ dry density of the mineralized material which was estimated to be 3.35 t/m^3. A density of 2.8 t/m^3 was used for the waste rock and 2.1 t/m^3 for the overburden, typical values for similar projects in the region.

b) Swell Factor

The swell factor reflects the increase in volume of material from its in-situ state to after it is blasted and loaded into the haul trucks. A swell factor of 45% was used for the PEA, which is a typical value used for open pit hard rock mines. Once the rock is placed in the waste dumps and stockpiles, the swell factor is reduced to 30% due to compaction.

c) Moisture Content

The moisture content reflects the amount of water that is present within the rock formation. It affects the estimation of haul truck requirements and must be considered during the payload calculations. The moisture content is also an important factor for the process water balance.

Since the Mineral Resources are estimated using the dry density, they are not affected by the moisture content value. A moisture content of 1.5% was used for the PEA. This value is typical for similar projects in the region.

16.3 Mining Method

The mining method selected for the Project is a conventional open pit, drill and blast, truck and shovel operation with 15 meter high benches.

Topsoil and overburden will be stripped and stockpiled for future reclamation use. The mineralization and waste rock will then be drilled, blasted and loaded into rigid frame haul trucks with hydraulic shovels. The mineralized material will be hauled to the primary crusher and the waste rock will be hauled to the waste rock piles.

To properly manage water infiltration into the pit, a sump will be established at the lowest point on the pit floor. Water collected in this sump will be pumped to a collection point at surface.

The mine will operate 365 days per year, 24 hours per day. The fleet requirements and manpower are based on this work schedule.

16.4 Pit Optimization

A pit optimization analysis was conducted to determine the cut-off grade and to what extent the deposit can be mined profitably. The pit optimization analysis was done using the MS-Economic Planner module of MineSight® Version 9.10. The optimizer uses the 3D Lerchs-Grossman algorithm to determine the economic pit limits based on input of mining and processing costs and revenue per block. Since this study is at a PEA level, NI 43-101 guidelines allow Inferred Mineral Resources to be used in the optimization and mine plan.

Table 16.1 presents the parameters that were used for the pit optimization analysis. All figures are in Canadian Dollars. The cost and operating parameters that were used are preliminary estimates for developing the economic pit and should not be confused with the operating costs subsequently developed for the PEA and presented in Section 21.

Using the cost and operating parameters, a series of 10 pit shells was generated by varying the selling price (revenue factor) from 35 to 200 $/t.

Figure 16.1 shows a typical section through the deposit with several of the pit shells. The tonnages and grades associated with each of the pit shells are presented in Table 16.2. The Net Present Value (NPV) of each shell was calculated assuming a selling price of $ 100 /t of concentrate (FOB Sep-Îles), a discount rate of 8% and an annual production of 5 Mt of concentrate.

Figure 16.2 presents the results in a graphical format.

The pit optimization analysis shows that the open pit design should be based on PIT05 (Revenue Factor - 0.65). This pit shell contains 271 Mt of Mineral Resources at a strip ratio of 1.7 to 1. Mining additional resources with an open pit beyond the limits of this pit shell increases the strip ratio but does not provide much of an increase in NPV. For example, the difference in PIT06 and PIT05 is 14 Mt of mineralization but the incremental strip ratio to access these tonnes is 3.8 to 1. Upon completion of the PEA, Met-Chem confirmed that the pit optimization exercise was still valid using the updated cost estimate developed in the Study.

Table 16.1 – Pit Optimization Parameters

Item	Units	Value
Mining Cost	$/t (mined)	2.50
Processing Cost	$/t (milled)	3.00
General and Administration Cost	$/t (milled)	1.00
Transportation Cost	$/t (conc.)	16.00
Sales Price (FOB Sept-Îles)	$/t (conc.)	100.00
Overall Pit Slope	Degrees	52
Discount Rate	%	8

Figure 16.1 – Typical Section

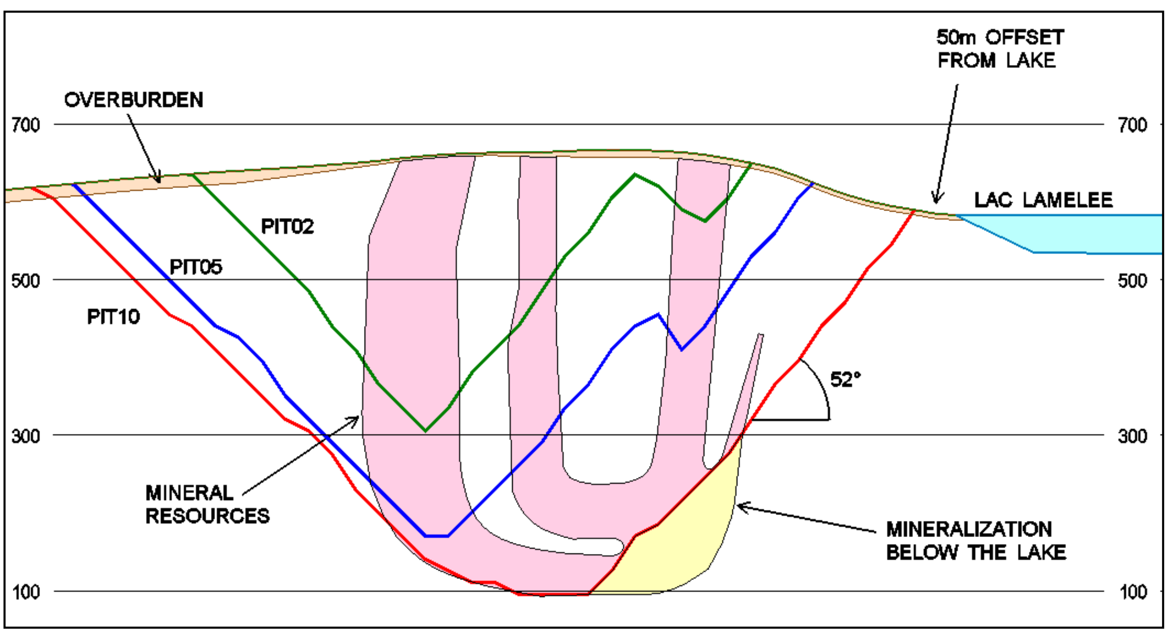
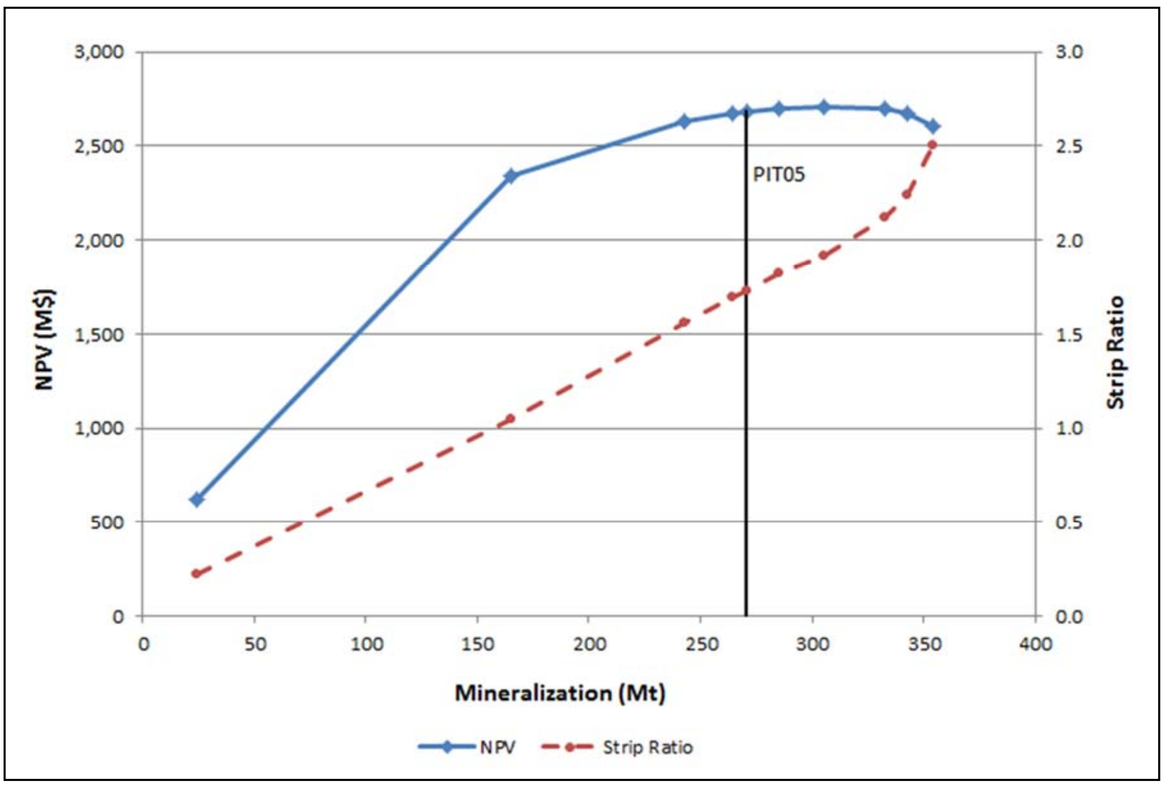


Table 16.2 – Pit Optimization Results

Pit Shell	Revenue Factor	Mineralization (Mt)	Total Fe (%)	WR (%)	Waste (Mt)	Strip Ratio	NPV (M$)	Mine Life (y)
PIT01	0.35	24	33.8	42.4	5	0.2	619	3
PIT02	0.50	165	31.1	38.3	173	1.0	2,339	13
PIT03	0.60	243	30.3	37.2	378	1.6	2,628	19
PIT04	0.63	265	30.2	37.0	447	1.7	2,673	20
PIT05	**0.65**	**271**	**30.2**	**36.9**	**467**	**1.7**	**2,684**	**20**
PIT06	0.68	285	30.1	36.8	520	1.8	2,701	21
PIT07	0.70	305	29.8	36.3	584	1.9	2,710	23
PIT08	0.85	332	29.6	36.1	705	2.1	2,699	24
PIT09	1.00	343	29.5	36.0	769	2.2	2,676	25
PIT10	2.00	354	29.5	35.9	888	2.5	2,603	26

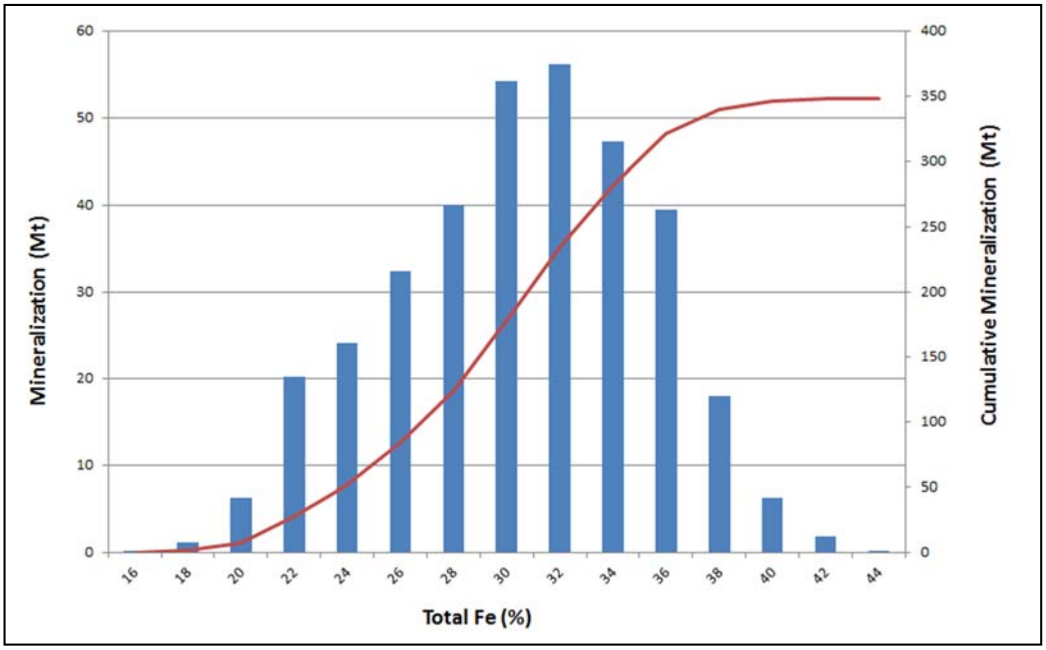
Figure 16.2 – Pit Optimization Results



A cut-off grade is calculated for each deposit to determine whether the material being mined will generate a profit after paying for the processing, transportation and G&A costs. Material that is mined below the cut-off grade is either sent to the waste dump or stockpiled for future processing. Using the economic parameters presented in Table 16.1, the cut-off grade for the PEA was calculated to be Total Fe > 8.6%. In order to account for a profit margin and to be in-line with the other projects in the region, it was decided to use a cut-off of Total Fe > 15%.

Figure 16.3 presents a histogram of the grades and tonnage of the Mineral Resources. The histogram shows that the Lac Lamêlée South deposit contains virtually no tonnage below the cut-off grade.

Figure 16.3 – Grade Tonnage Curve



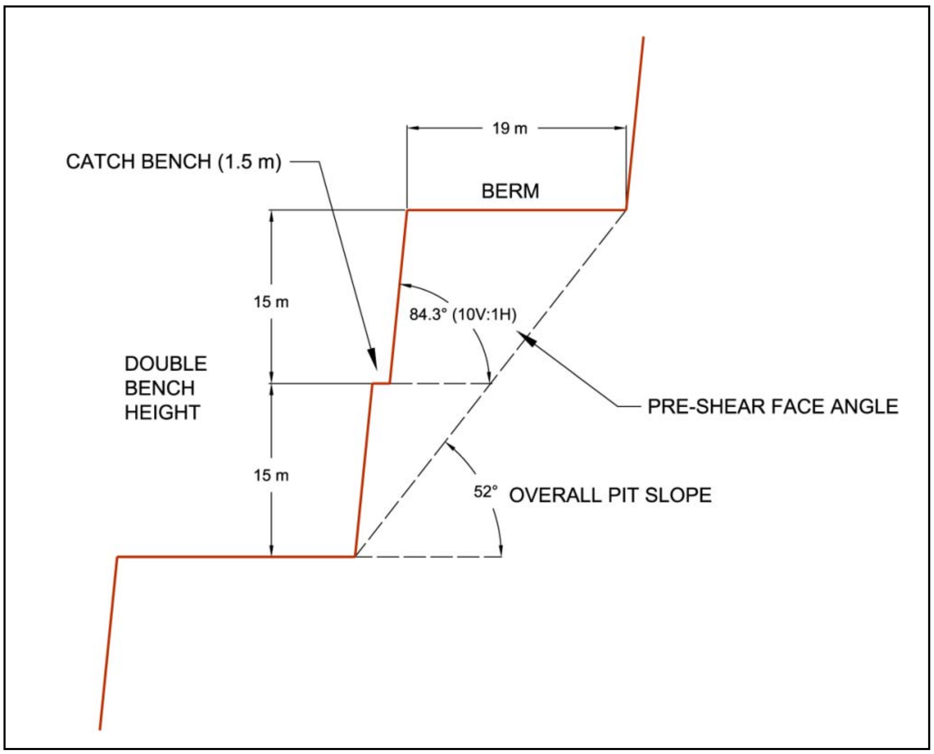
16.5 Mine Design

An open pit was designed using the optimized pit shell as a guideline. The pit design process includes smoothing the pit wall, adding ramps to access the pit bottom and ensuring that the pit can be mined using the selected equipment. The following section provides the parameters that were used for the detailed pit design and presents the results.

16.5.1 Geotechnical Pit Slope Parameters

An inter-ramp angle of 52° was used for the final pit walls. The final pit wall includes a 19 m berm for every two (2), 15 m high benches and considers a face angle of 84.3° assuming that pre-shearing blasting techniques will be used. This design is based on Met-Chem's internal database for similar deposits in the region. An offset from Lac Lamêlée of 50 m was used. The pit wall configuration is presented in Figure 16.4. A minimum mining width of 30 m has also been considered in the pit design.

Figure 16.4 – Pit Wall Configuration



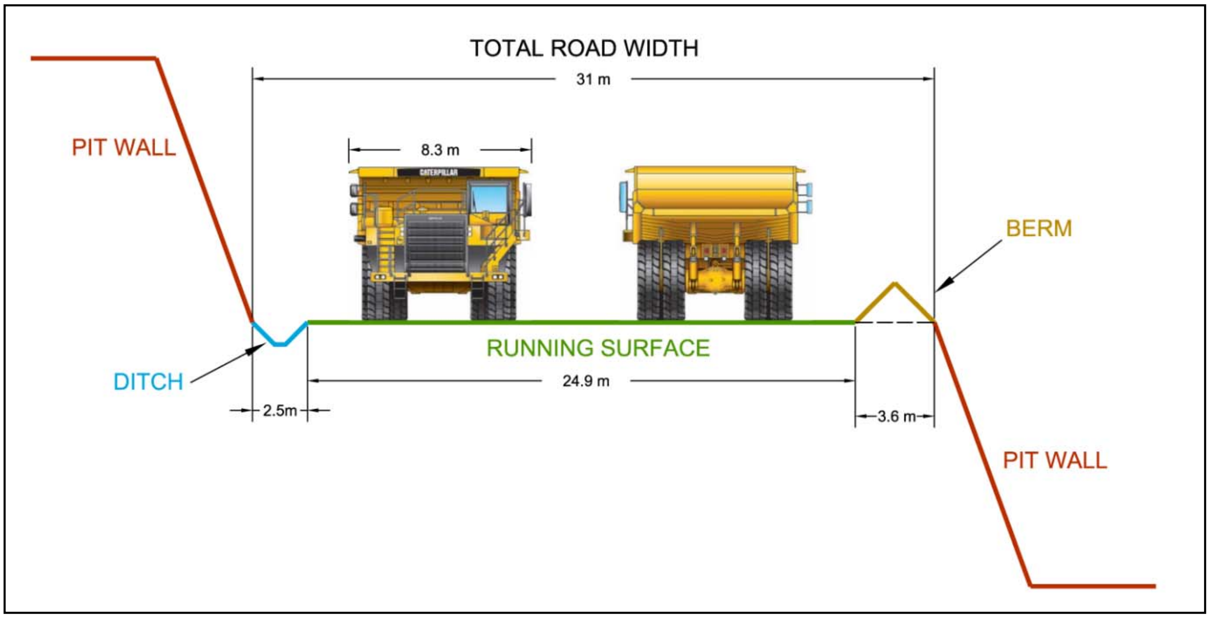
16.5.2 Haul Road Design

The ramps and haul roads were designed with an overall width of 31 m. For double lane traffic, industry practice indicates the running surface width to be a minimum of three (3) times the width of the largest truck. The overall width of a 227-tonne (250-tons) rigid frame haul truck is 8.3 m which results in a running surface of 25 m. The allowance for berms and ditches increases the overall haul road width to 31 m.

A maximum ramp grade of 10% was used. This grade is acceptable for a 227-tonne rigid frame haul truck.

presents a typical section of the in-pit ramp design.

Figure 16.5 – Ramp Design



16.5.3 Mine Dilution and Mining Recovery

In every mining operation, it is impossible to perfectly separate the ore and waste as a result of the large scale of the mining equipment and the use of drilling and blasting. In order to account for mining dilution, a diluted Total Fe% grade value was assigned for each block of mineralization that neighbours a waste block.

For the mining dilution calculation is was assumed that for each 30 m wide block of mineralization, 1 m of the neighbouring waste block (3.3%) will be included as dilution. A Total Fe grade of 0% was used for the waste. The addition of mining dilution resulted in lowering the Total Fe% of the In-pit Mineral Resources from 30.2% to 29.7%.

16.5.4 Pit Design Results

The open pit design for the Lac Lamêlée South deposit resulted in a large open pit that contains 93% of the In-pit Mineral Resources as well as a small satellite pit that contains the remaining 7%. The large pit is approximately 1,700 m long and 1,000 m wide at surface with a maximum pit depth of 500 m. The total surface area of this pit is roughly 130 ha and the overburden thickness averages 14 m.

The ramp accesses the pit at the 600 m elevation on the southeast side. The ramp descends down the south wall until the 390 m elevation where it separates into two (2) ramp systems. The lowest elevation in the pit is at 150 m.

The smaller satellite pit has a surface area of 30 ha and a maximum depth of 250 m.

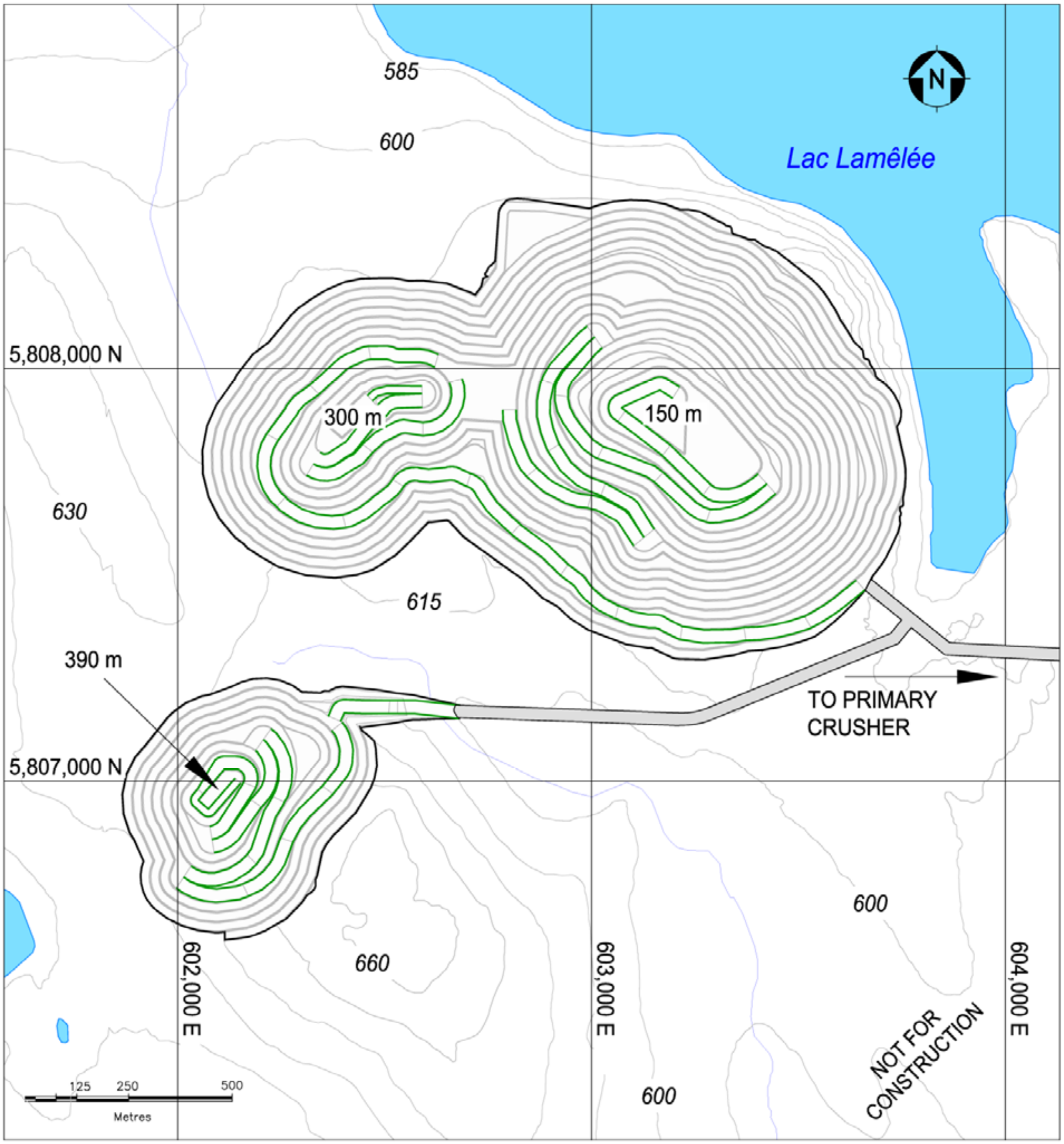
Combined, both pits include 272 Mt of Inferred Mineral Resources at a Total Fe grade of 29.7% (Weight Recovery of 36.3%). In order to access these Resources, 45 Mt of overburden and 591 Mt of waste rock must be mined. The total waste quantity of 636 Mt results in a stripping ratio of 2.3 to 1. Table 16.3 presents the In-Pit Mineral Resources for the Lac Lamêlée South deposit and Figure 16.6 presents the pit design.

Table 16.3 – Lac Lamêlée South In-Pit Mineral Resources

Description	Resources[1] (Mt)	Total Fe (%)	WR (%)	OB (Mt)	Waste (Mt)	Total Waste (Mt)	Strip Ratio
Big pit	253.5	36.2	29.7	39.0	525.2	564.2	2.2
Small Pit	18.2	37.1	30.3	6.0	66.0	72.0	4.0
Total	**271.7**	**36.3**	**29.7**	**45.0**	**591.2**	**636.2**	**2.3**

1 – All Mineral Resources are in the Inferred category.

Figure 16.6 – Pit Design



16.5.5 Overburden Stockpile and Waste Rock Pile Design

The overburden stockpile and waste rock piles were designed to contain the volumes that are expected to be mined from the two (2) open pits. The piles are located inside the claims controlled by Lamêlée Iron Ore Ltd. and intentionally avoid areas that have the highest potential for Mineral Resource expansion. The piles were designed with an overall slope of 26.6° (2H:1V), which is achieved by placing a 10.8 m wide berm for each 15 m in elevation. The face angle of each lift is 38° which is the angle of repose of the overburden and waste rock. The piles were designed so that they are a minimum distance of 100 m from the pit limits and the lakes and 50 m from the claim boundaries.

In order to minimize the overall footprint of the waste rock pile and to shorten the haul distances, the waste rock will be placed inside of the smaller pit once the Resources are completely mined out.

The topsoil and overburden stockpile was designed on the south side of the large open pit, to the west of the primary crusher. The stockpile has a capacity of 28 Mm^3, a footprint area of 65 ha and a top elevation of 660 m. Material that is placed in this stockpile will be used for future reclamation.

Two (2) waste rock piles have been designed, one to the south of the overburden stockpile and the other on the west side of the property. The combined capacity of the waste rock piles is 275 Mm^3, with a total footprint area of 450 ha. Both waste rock piles have a top elevation of 675 m.

Figure 16.7 shows a typical section through the overburden stockpile and waste rock piles and Figure 16.8 presents their general layout.

Figure 16.7 – Overburden Stockpile and Waste Rock Pile Configuration

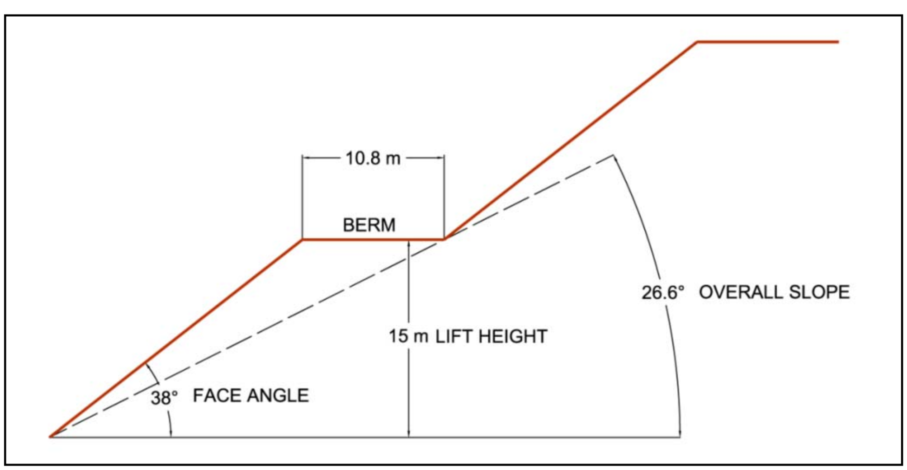
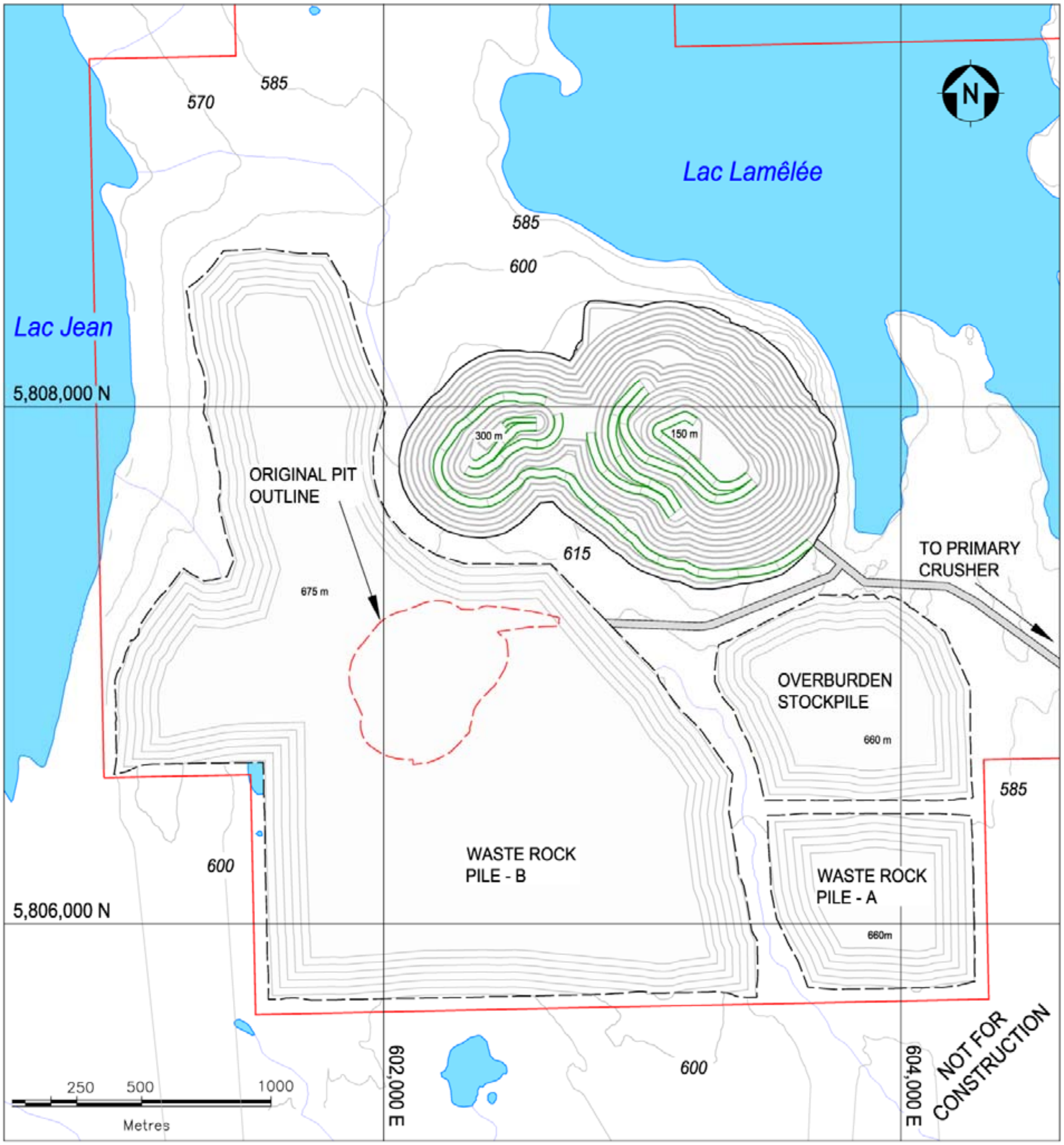


Figure 16.8 – Overburden Stockpile and Waste Rock Pile Layout



16.6 Mine Planning

A production schedule (mine plan) was developed for the Project which targets the production of 5 Mt of iron concentrate per year. In order to account for start-up and commissioning, the production in Year 1 has been limited to 3.5 Mt (70% capacity). The mine plan runs for 20 years, until the In-pit Mineral Resources are depleted. The mine plan was established annually for the first ten (10) years of production, followed by two (2), three (3) year periods and one (1) four year period.

A pre-production period of six (6) months has been included before the start of the operation. This period includes tree clearing, topsoil and overburden removal, mine haul road construction and the development of the pit for production. During pre-production, 3.0 Mt of overburden and 4.5 Mt of waste rock are removed.

Mining will begin in the eastern part of the large pit where there is a topographic high and the mineralization is closer to surface. In Year 4, mining operations will begin in the satellite pit and both pits will be mined simultaneously. Mining both pits at the same time allows for more opportunities to blend the mineralization. The In-pit Mineral Resources from the satellite pit will be depleted by the end of Year 10 and the entire mining operation will be in the large pit.

The mine production schedule is presented in able 16.4. The table provides the tonnages that are mined in each period of the mine plan as well as the weight recovery and Total Fe%. The weight recovery throughout the mine plan averages 36.3% and varies from a high of 38.0% between Years 14 to 16 to a low of 34.9% in Year 8.

The total material mined ranges from 29 Mt in Year 1 and reaches a peak of 60 Mt per year in Year 8. Figure 16.9 presents a chart showing the tonnages that will be mined each year as well as the weight recovery. The tonnages have been annualized for the three (3) and four (4) year periods. Figure 16.10 and Figure 16.11 present the status of the pit, waste rock piles and overburden stockpile at the end of Year 7 and Year 10.

Figure 16.9 – Mine Production Schedule

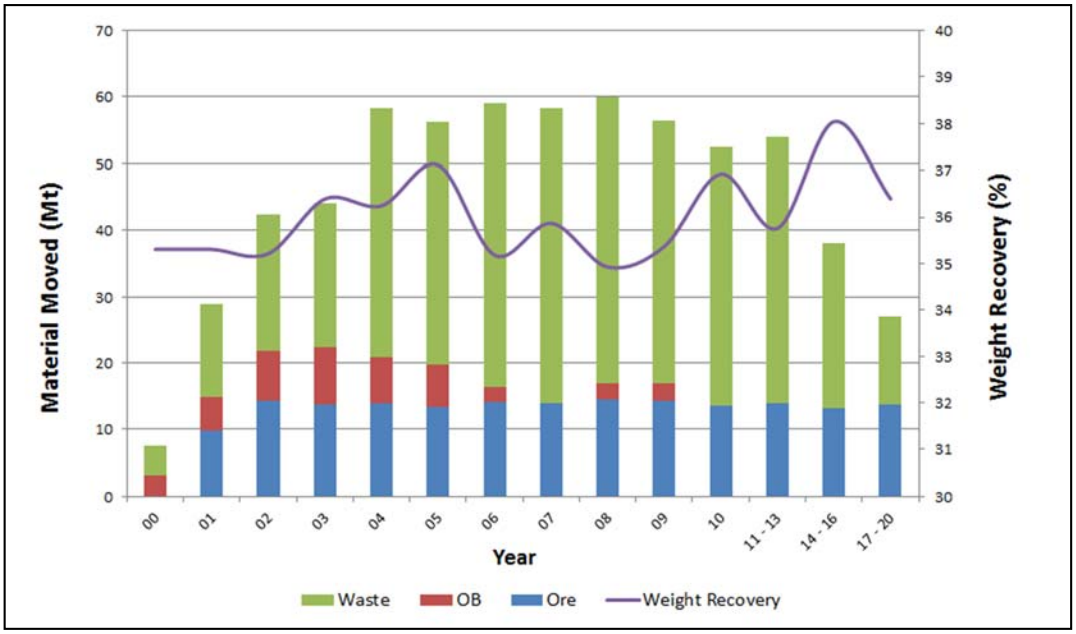


Table 16.4 – Mine Production Schedule

Description	Units	Pre-Prod	Year 01	Year 02	Year 03	Year 04	Year 05	Year 06	Year 07	Year 08	Year 09	Year 10	Years 11 - 13	Years 14 - 16	Years 17 - 20	Total
Concentrate	**Mt**	**0.0**	**3.5**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**	**15.0**	**15.0**	**20.0**	**98.6**
ROM to Plant	**Mt**	**0.0**	**9.8**	**14.3**	**13.8**	**13.8**	**13.4**	**14.1**	**14.0**	**14.4**	**14.2**	**13.5**	**42.0**	**39.4**	**55.0**	**272**
Weight Recovery	%	0.0	35.3	35.2	36.4	36.2	37.1	35.2	35.9	34.9	35.4	36.9	35.8	38.0	36.4	**36.3**
Total Fe	%	0.0	29.0	29.0	29.8	29.7	30.3	28.9	29.4	28.8	29.1	30.2	29.3	30.9	29.7	**29.7**
Total Waste	Mt	**7.5**	**19.0**	**28.2**	**30.3**	**44.5**	**42.9**	**44.9**	**44.3**	**45.6**	**42.1**	**38.9**	**119.9**	**75.0**	**53.1**	**636**
Overburden	Mt	3.0	4.9	7.6	8.6	6.9	6.3	2.3	0.0	2.5	2.7	0.0	0.0	0.0	0.0	**45**
Waste Rock	Mt	4.5	14.1	20.6	21.7	37.6	36.6	42.6	44.3	43.1	39.4	38.9	119.9	75.0	53.1	**591**
Total Material	**Mt**	**7.5**	**28.9**	**42.4**	**44.1**	**58.3**	**56.3**	**59.0**	**58.3**	**60.0**	**56.4**	**52.5**	**161.9**	**114.4**	**108.0**	**908**
Strip Ratio		**n/a**	**1.9**	**2.0**	**2.2**	**3.2**	**3.2**	**3.2**	**3.2**	**3.2**	**3.0**	**2.9**	**2.9**	**1.9**	**1.0**	**2.3**

Run of mine tonnages are on a dry basis.

Figure 16.10 – End of Year 7

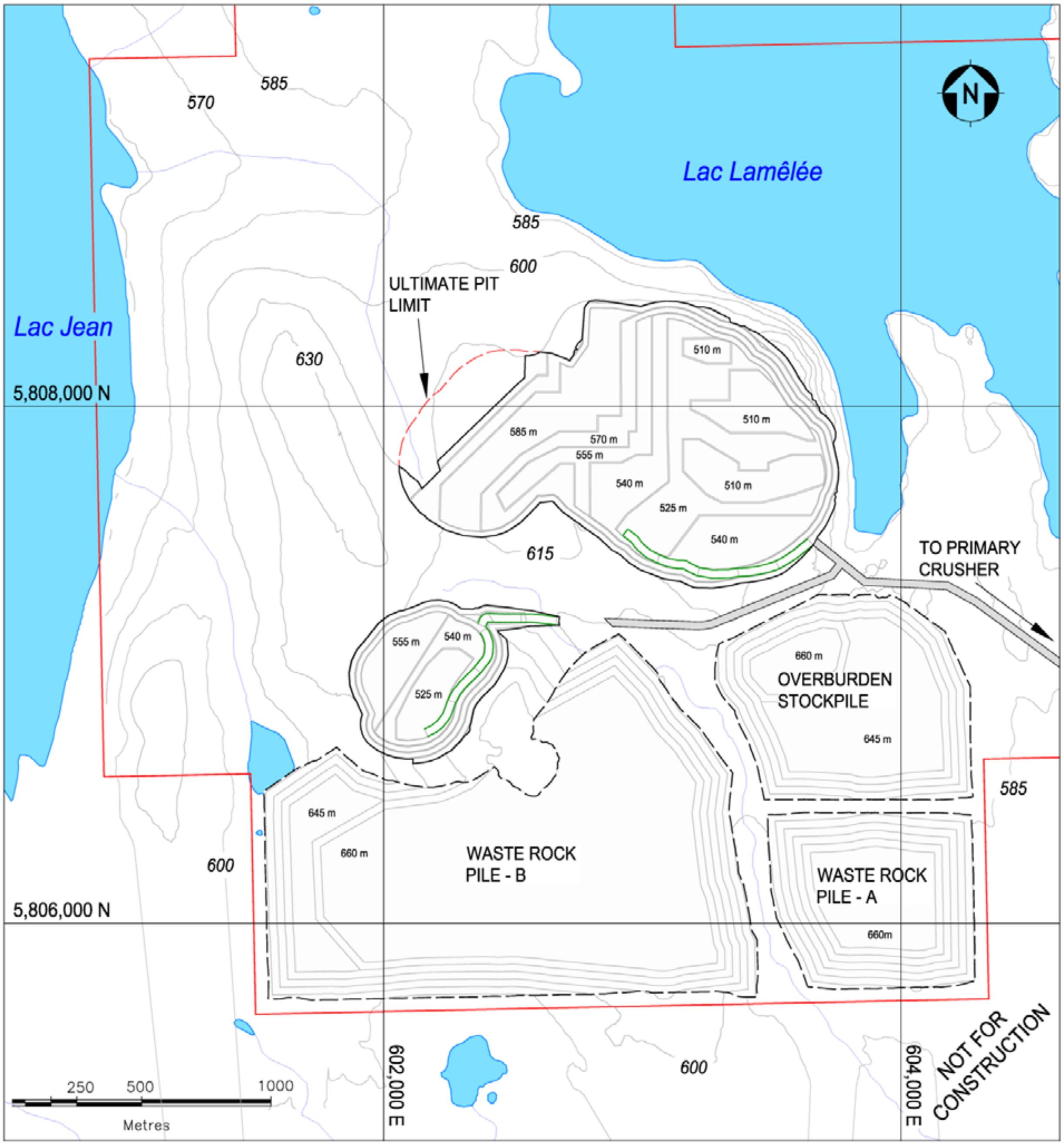
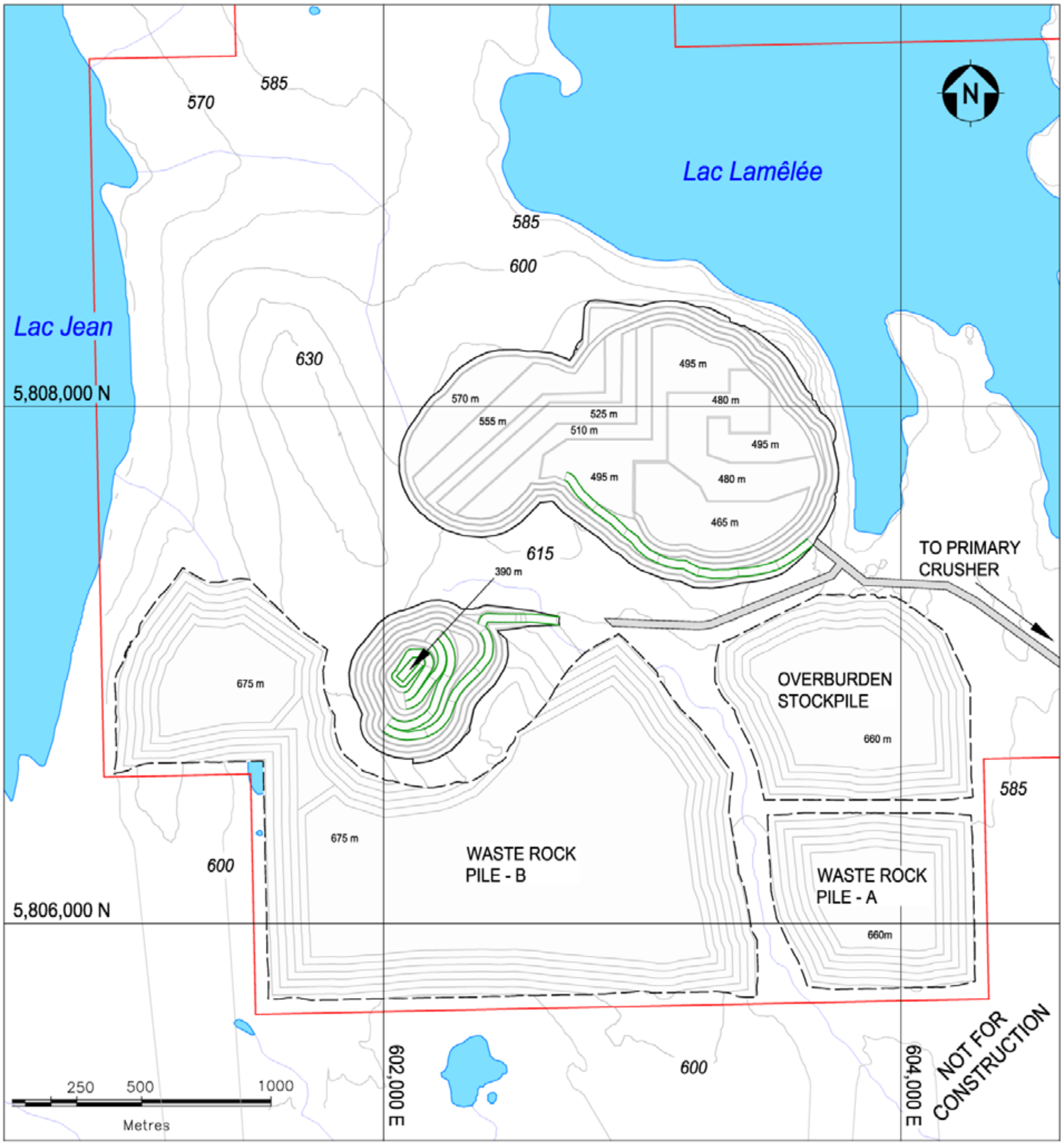


Figure 16.11 – End of Year 10



16.7 Mine Equipment Fleet

The following section discusses equipment selection and fleet requirements in order to carry out the mine plan. The mine will be operated with an owner fleet which is presented in Table 16.5. The table presents the fleet requirements during peak production and identifies the Caterpillar model to give the reader an appreciation for the size of each machine.

Table 16.5 – Mining Equipment Fleet

Equipment	Typical Model	Description	Units
Major Equipment			
Haul Truck	CAT 793F	Payload – 227 tonne (250 tons)	22
Shovel	CAT 6060FS	Bucket – 26.5 m^3	3
Production Drill	CAT MD6640	311 mm hole (12 ¼")	3
Support Equipment			
Track Dozer	CAT D10T	450 kW (600 hp)	3
Road Grader	CAT 16M	250 kW (335 hp)	2
Wheel Loader	CAT 994H	1,100 kW (1,475 hp)	1
Utility Excavator	CAT 336D	200 kW (270 hp)	1
Secondary Drill	CAT MD5150	152 mm hole (6 inch)	1
Cable Reeler	CAT 980K	274 kW (365 hp)	1
Water / Sand Truck	CAT 777	90,000 litres	1
Powder Truck	Ford F250	300 kW (400 hp)	2
Lighting Plant	MAGNUM MLT3080	6 kW (8 hp)	6
Service Equipment			
Fuel and Lube Truck	Peterbuilt 365	330 kW (440 hp)	1
Mechanic Truck	Peterbuilt 348	250 kW (335 hp)	1
Boom Truck	Peterbuilt 365	330 kW (440 hp)	1
Tire Handler	n/a	n/a	1
Lowboy	n/a	n/a	1
Transport Bus	Blue Bird	20 person	2
Pickup Truck	Ford F250	300 kW (400 hp)	12
Dewatering Pump	Godwin HL130M	220 kW (300 hp)	4

16.7.1 Haul Trucks

The haul truck selected for the Project is a rigid frame mining truck with a payload of 227 tonnes (250 tons). This size truck was selected since it matches well with the production requirements and results in a manageable fleet size. The following parameters were used to calculate the number of trucks required to carry out the mine plan. These parameters result in 5,361 working hours per year for each truck as is presented in Table 16.6

- Average Mechanical Availability – 85% ;
- Average Utilization – 90% (non-utilized time is accrued when the truck is not operating due to poor weather, blasting, shovel relocation and if no operator is available) ;
- Nominal Payload – 227 tonnes (160 m^3 heaped) ;
- Shift Schedule – Two (2), twelve (12) hour shifts per day, seven (7) days per week ;
- Operational Delays – 80 min/shift (this includes 15 minutes for shift change, 15 minutes for equipment inspection, 40 minutes for lunch and coffee breaks and 10 minutes for fuelling). Fuelling will be carried out once every two (2) shifts for 20 minutes ;
- Job Efficiency – 90% (54 min/h; this represents lost time due to queuing at the shovel and dump as well as interference on the haul road) ;
- Rolling Resistance – 3%.

Table 16.6 – Truck Hours

Description	Hours	Details
Total Hours	8,760	7 days per week, 24 hours per day, 52 weeks per year
Down Mechanically	1,314	15% of total hours
Available	7,446	Total hours minus hours down mechanically
Standby	745	10% of available hours (represents 90% utilization)
Operating	6,701	Available hours minus standby hours
Operating Delays	745	80 min/shift
Net Operating Hours	5,957	Operating hours minus operating delays
Working Hours	**5,361**	**90% of net operating hours (reflects job efficiency)**

Haul routes were generated for each period of the mine plan to calculate the truck requirements. These haul routes were imported in Talpac©, a commercially available truck simulation software package that Met-Chem has validated with mining operations. Talpac© calculated the travel time required for a 227-tonne haul truck to complete each route. Table 16.7 shows the various components of a truck's cycle time. The load time is calculated using a hydraulic shovel with a 26.5 m³ (63-tonne) bucket as the loading unit. This size shovel which is discussed in the following section can load a 227-tonne haul truck in four (4) passes for waste rock, five (5) passes for mineralized material and six (6) passes for overburden.

Table 16.7 – Truck Cycle Time

Activity	Duration (Sec)
Spot @ Shovel	30
Load Time[1]	120
Travel Time	Calculated by Talpac©
Spot @ Dump	30
Dump Time	30

1. Four (4) Passes @ 30 sec/pass.

Haul productivities (tonnes per work hour) were calculated for each haul route using the truck payload and cycle time. Table 16.8 shows the cycle time and productivity for the mineralization, overburden and waste haul routes in Year 5 as an example.

Table 16.8 – Truck Productivities (Year 5)

Material	Cycle Times (min)					Productivity	
	Travel	Spot	Load	Dump	Total	Loads/h	t/h
Mineralization	22.53	0.50	2.00	1.00	26.03	2.31	523
Overburden	8.32	0.50	3.00	1.00	12.82	4.68	1,061
Waste	13.42	0.50	2.50	1.00	17.42	3.44	781

Truck hour requirements were calculated by applying the tonnages hauled to the productivity for each haul route. A fleet of four (4) trucks is required in pre-production, followed by seven (7) in Year 1, ten (10) in Year 2, 11 in Year 3 and reaches a peak of 22 in Year 8.

16.7.2 Shovels

The main loading machine selected for the Project is an electric powered hydraulic shovel with a 26.5 m^3 bucket. This size shovel can handle the 15 m bench height and can load the 227-tonne haul trucks efficiently. The electric model of hydraulic shovel was chosen due to the availability of relatively low-cost electric power.

Met-Chem calculated that one (1) shovel is required in pre-production, two (2) during Years 1, 2 and 3, followed three (3) in Year 4. Each shovel will excavate roughly 20 Mtpy which is a reasonable assumption.

A wheel loader has been included in the fleet to support the shovels and carry-out any stockpile rehandling that is required.

16.7.3 Drilling and Blasting

Production drilling will be carried out with electric powered rotary drills. Using the following parameters; 85% mechanical availability, 70% utilization and a penetration rate of 25 m/h, Met-Chem calculated that one (1) drill is required in pre-production, two (2) during Years 1, 2 and 3, followed by three (3) in Year 4. Table 16.9 presents the drilling and blasting parameters.

A secondary track drill has been included in the fleet for development work, establishing pre-shear holes for wall stability control, blasting of oversized boulders and additional drilling that the main units will not be able to achieve.

Table 16.9 – Blasting Parameters

Parameter	Units	Mineralization	Waste Rock
Bench Height	m	15	15
Blasthole Diameter	mm	311	311
Burden	m	7.5	9.0
Spacing	m	7.5	8.5
Subdrilling	m	1.5	1.5
Stemming	m	4.0	4.0
Explosives Density	g/cm³	1.20	1.20
Powder Factor	Kg/t	0.40	0.33

Blasting will be carried out using bulk emulsion that will be purchased from one of the local suppliers. Since the operation is relatively small for an on-site manufacturing facility, the emulsion will be trucked to site and stored in bulk silos. Due to the remote nature of the site and the fact that road access can be limited during the winter, Met-Chem has proposed three (3) silos, each with a capacity to store 30,000 kg of emulsion. The on-site infrastructure also includes two (2) magazines, one for the storage of detonators and the other for the storage of packaged explosives. A garage and washing facility is also required for the bulk truck.

The bulk silos and magazines will be located at least 1.0 km from the accommodation camp and concentrator and respect other minimum distance requirements that are specified by the Canadian Explosives Regulations.

The cost for explosives used for the PEA is $ 0.40/t for mineralization and $ 0.33 /t for waste rock, which is based on budgetary pricing provided by explosive suppliers. The pricing considers an “all-in” down-the-hole service which means that the supplier will provide the emulsion and accessories as well as the bulk trucks and operators who will load the holes. Blast tie-in and detonation will be performed by Lamêlée’s blast crews. There will be two (2) crews each composed of a blaster and a blaster’s helper.

16.8 Mine Dewatering

Surface run-off, rainfall, snowmelt and groundwater will be accumulated in an in-pit sump on the pit floor and pumped to a collection point at surface. The mining fleet includes four (4) diesel powered centrifugal pumps to account for mine dewatering.

16.9 Mine Manpower

The manpower requirements for the mine have been categorized into Mine Operations, Mine Maintenance and Mine Technical Services. The Mine Operations and Mine Maintenance staff will be comprised of four (4) crews in order to provide 24 h/d coverage. The blasting crew is an exception since they will work on the day shift only. The Mine Technical Services staff will work on the day shift only as well. The total mine manpower requirements during peak production is expected to reach 218 employees. Table 16.10 shows the mine manpower requirement during peak production.

Table 16.10 – Mine Manpower

Description	Personnel
Mine Operations	
Mine Manager	1
Mine Superintendent	1
Pit Foreman	4
Equipment Operator	144
Labourer	8
Dispatcher / Trainer	8
Blaster	2
Blaster Helper	2
Mine Maintenance	
Maintenance Superintendent	1
Maintenance Foreman	4
Maintenance Planner	2
Mechanic / Electrician / Welder	24
Attendant	8
Mine Technical Services	
Mine Technical Superintendent	1
Mining Engineer / Geologist	4
Grade Control Technician	2
Surveyor	2
Total Mine Workforce	**218**

17 Recovery Methods

17.1 Similar Operations

Table 17.1 presents similar operation and project productions.

Table 17.1 – Similar Operations

Parameter	Units	Bloom Lake	Mont-Wright	Carol Lake	Fire Lake North	Kami
Owner	-	Cliffs Natural Resources	Arcelor Mittal	Rio Tinto	Champion	Alderon Iron Ore
Status	-	Operation	Operation	Operation	Project	Project
Ore						
Iron grade	%	28.5	30.2	38.0	30.0	29.5
Concentrate Production						
Rated	Mtpy	7.2	24	22.7	8.7	8.0
2013	Mtpy	5.9	18	15.4	-	-
Fe grade	%	66.0	66.0	65.0	65.0	65.2
Weight recovery	%	34.5	-	43.0	37.8	35.1
Iron recovery	%	79.9	-	73.6	82.0	77.7
Circuit						
Crushing		Gyratory	Gyratory	Gyratory	Gyratory	Gyratory
Grinding	-	AG	AG	AG	AG	AG
Classification size	mm	1	1.6	-	0.85	0.85
Gravity separation		Spirals	Spirals	Spirals + Hydrosizer	Spirals	Spirals
Magnetite separation		No	No	LIMS	No	LIMS

17.2 Process Design Criteria

17.2.1 Hypotheses and Requirements

The following hypotheses are used as a basis for this project:

- Based on similar operations in the area, it is assumed that the ore is suitable for autogenous grinding;
- Based on the Heavy Liquid Separation (HLS) tests results, it is assumed the iron oxides can be concentrated by conventional industrial gravity separation equipment;
- Based on the mineralogical and HLS tests results, it is assumed a screening at 850 µm is required to reach the SiO_2 specifications of the concentrate;

- The Quartz-Pyroxene-Magnetite (QPyrxM) iron formation is considered as waste and is not processed.

17.2.2 Symbols and Units

The metric system and its symbols are used for this project unless otherwise noted.

The meaning of the source codes used in the design criteria is listed in Table 17.2.

Table 17.2 – Source Codes

Description	Source Code
Criteria Provided by Owner	A
Standard Industry Practice	B
Soutex Recommendation	C
Vendor-Originated Criteria	D
Criteria from Process Calculations	E
Engineering Handbook Data	F
Assumed Data	G
Criteria Provided by "Technology Supplier"	H
Metallurgical Test Result	I
International, National, Local and Industry Design Codes and Regulations	J
Budget Quote from Supplier	K
Existing Equipment Specifications / Process data	L

17.2.3 Equipment Design Guidelines

In order to avoid confusion, the following definitions are used in this document:

- All tonnes (t), unless otherwise noted, are dry metric tonnes;
- All concentrations, grades, ratios and recoveries are by weight;
- Calendar time (h) = 8760 hours;
- Availability (%) = (Calendar time-Maintenance time)/Calendar time;
- Utilization (%) = (Calendar time-Maintenance time-Waiting time)/Calendar time;
- Average throughput = Annual tonnes processed/8760 h/Utilization;
- Design factor = Multiplying factor of the average throughput used to determine the design throughput:

- The design factor allows for production variation related to ore properties to reach the annual production. It does not provide additional capacity.

- Design throughput = (Annual tonnes processed*Design factor)/8760 h/Utilization.

17.2.4 Design Criteria

17.2.4.1 General

Table 17.3 presents the general process design criteria.

Table 17.3 – General Design Criteria

Parameter	Unit	Value	Source
General			
Operating Schedule			
Operating Hours per day	h	24	-
Annual operating days	d	365	-
Equipment utilization – crushing circuit	%	70	A
Equipment utilization – plant	%	92	A
Plant feed rate	t/a	13 791 909	E
Design factor	%	10	A
Plant Concentrate Production			
Concentrate production	t/a	5 000 000	A
Ore Characteristics			
Proportion of Iron Formation			
Magnetite Iron Formation (MIF)	%	3	A
Hematite Iron Formation (HIF)	%	4	A
Magnetite-Hematite Iron Formation (MHIF)	%	93	A
Quartz – Pyroxenes – Magnetite (QPyrxM)	%	-	A
Grades			
Iron (Fe)	%	29.7	A
Specific gravity			
Magnetite	-	5.20	F
Hematite	-	5.20	F
Gangue	-	2.75	F
Proportion of Iron in Ore	%	71.2	E
Moisture	%	1.5	A
Concentrate Specifications			
Grades			
Iron (Fe)	%	64.3	I
Silica (SiO_2)	%	4.5	A
Moisture			
Winter period	%	2.0	A
Summer period	%	4.0	A
Overall Plant Recovery			
Weight recovery	%	36.3	E
Iron recovery	%	78.4	E

The iron feed grade was provided by mining and geology (Met-Chem).

The iron concentrate grade was calculated based on the Fe vs. SiO_2 concentrate grade model developed from the testwork results.

The concentrate weight recovery was calculated based on the Fe head grade vs weight recovery developed from the testwork results and other assumptions.

17.2.4.2 Crushing and Ore Stockpiling

Table 17.4 presents the crushing and ore stockpiling process design criteria.

Table 17.4 – Design Criteria – Crushing and Ore Stockpiling

Parameter	Unit	Value	Source
Crushing Circuit			
General			
Average feed rate	t/h	2 249	E
Design feed rate	t/h	2 474	E
Gyratory Crusher			
Feed size – passing (F 100)	mm	1 200	A
Feed size – passing (F 80)	mm	800	D
Open Side Setting (OSS)	mm	205	C
Product size – passing (P 100)	mm	290	D
Product size – passing (P 80)	mm	168	D
Crushed Ore Stockpile			
Live capacity	h	24.0	A
Live capacity	t	45 179	E

17.2.4.3 Grinding and Classification

Table 17.5 presents the grinding and classification process design criteria.

Table 17.5 – Design Criteria – Grinding and Classification

Parameter	Unit	Value	Source
Grinding Circuit			
General			
Average feed rate	t/h	1 711	E
Design feed rate	t/h	1 882	E
AG Mill			
Design circulating load	%	50	C
Discharge % solids	%	72	C
Design ore specific autogenous grinding energy	kWh/t	4.5	G
Scalping Screen			
Average feed rate	t/h	2 567	E
Design feed rate	t/h	2 824	E
Screen opening	mm	5	C
Classification Screen			
Average feed rate	t/h	2 396	E
Design feed rate	t/h	2 635	E
Feed % solids	%	55	D
Screen opening	µm	850	I

The ore specific energy was assumed based on similar operation data.

17.2.4.4 Gravity Separation

Table 17.6 presents the gravity separation process design criteria.

Table 17.6 – Design Criteria – Gravity Separation

Parameter	Unit	Value	Source
Gravity Separation Circuit			
Rougher Spirals			
Average feed rate	t/h	1 711	E
Design feed rate	t/h	1 882	E
Design feed rate – Per spiral	t/h/spiral	4.4	D
Feed % solids	%	40.0	C
Concentrate weight recovery	%	50.1	G
Concentrate % solids	%	60.0	B
Cleaner Hydrosizers			
Average feed rate	t/h	857	E
Design feed rate	t/h	942	E
Design loading rate	$t/h/m^2$	60.0	C
Underflow weight recovery	%	64.0	G
Underflow % solids	%	80.0	B
Underflow % solids after	%	60.0	C
Scavenger Spiral			
Average feed rate	t/h	308	E
Design feed rate	t/h	339	E
Design feed rate – Per spiral	t/h/spiral	1.8	D
Concentrate % solids	%	60.0	B

17.2.4.5 Concentrate Filtration

Table 17.7 presents the concentrate filtration process design criteria.

Table 17.7 – Design Criteria – Concentrate Filtration

Parameter	Unit	Value	Source
Concentrate Filtration Circuit			
Concentrate Pan Filter			
Average feed rate	t/h	620	E
Design feed rate	t/h	682	E
Design filtration rate	$t/h/m^2$	5.0	G
Final concentrate moisture - Winter	%	2.0	A
Final concentrate moisture - Summer	%	4.0	A

17.2.4.6 Tailings Dewatering and Disposal

Table 17.8 presents the tailings dewatering and disposal process design criteria.

Table 17.8 – Design Criteria – Tailings Dewatering and Disposal

Parameter	Unit	Value	Source
Tailings Circuit			
Tailings Cyclone			
Average feed rate	t/h	1 091	E
Design feed rate	t/h	1 200	E
Average feed rate	m^3/t	4 516	E
Design feed rate	m^3/t	4 967	E
Underflow % solids	%	60.0	C
Tailings Thickener			
Average feed rate	t/h	273	E
Design feed rate	t/h	300	E
Design loading rate	$t/h/m^2$	0.4	G
Design rise rate	m/h	5.7	G
Underflow % solids	%	60.0	C

17.2.4.7 Process Water

Table 17.9 presents the process water process design criteria.

Table 17.9 – Design Criteria – Process Water

Parameter	Unit	Value	Source
Process Water			
Process Water Tank			
Tank live retention time	min	15	G
Tank live volume	m^3	1 300	E

17.3 Process Flowsheet

Figure 17.1 presents a simplified version of the process flow diagram. The recovery of magnetite from the gravity circuit tailings, and of stockpiled QPyrxM ore, was not considered in the PEA, but will be in the next phase of the project.

Figure 17.1 – Simplified Process Flow Diagram

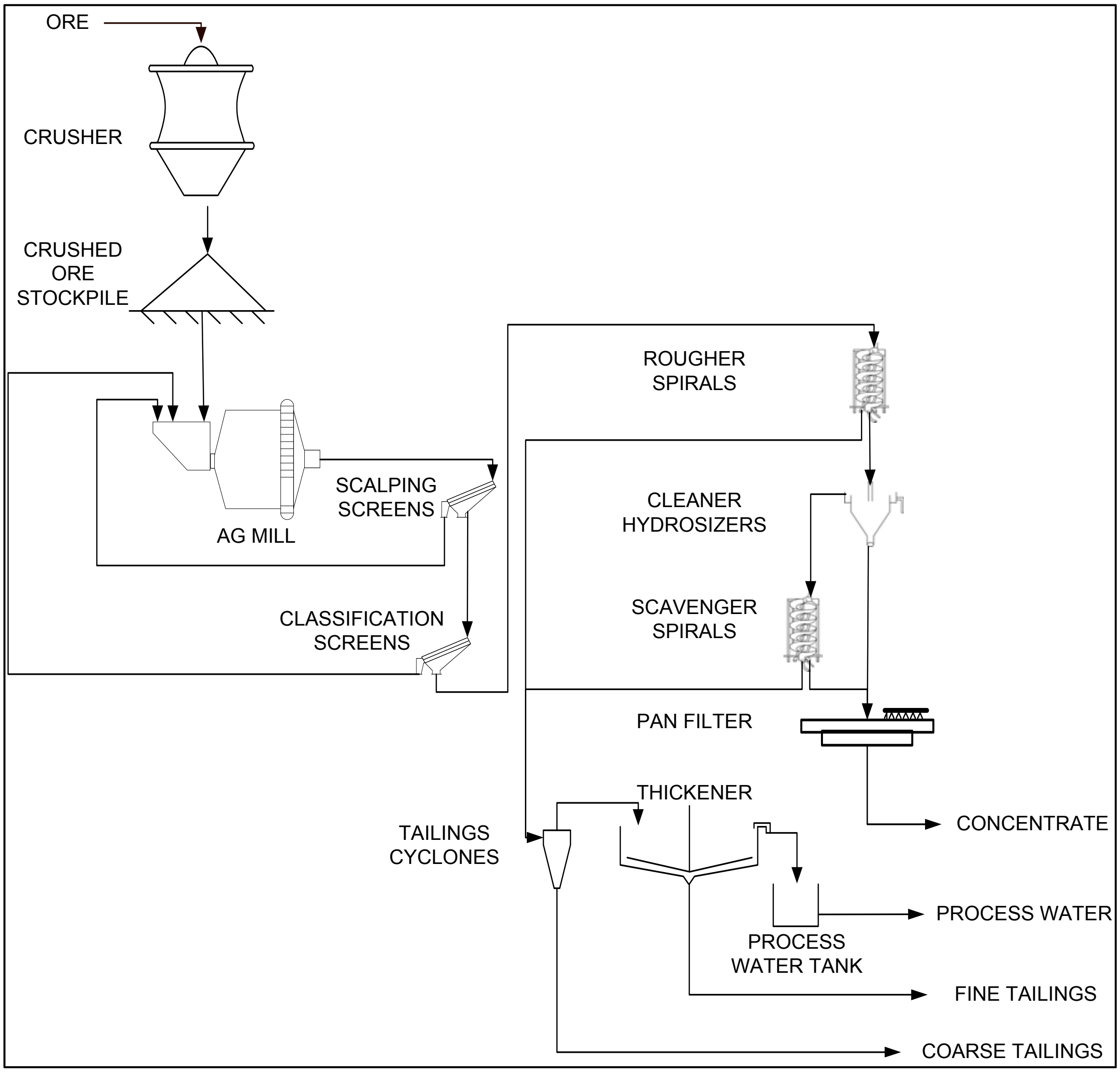


Table 17.10 presents a global mass balance of the concentrator.

Table 17.10 – Global Mass Balance

Description	Production		Fe Grade %	Recovery	
	t/h	t/y		Weight %	Fe %
Feed	1 711	13 791 909	29.7	100.0	100.0
Concentrate	620	5 000 000	64.3	36.3	78.4
Tailings	1 091	8 791 909	10.0	63.7	21.6

17.4 Process Description

17.4.1.1 Crushing and Ore Stockpiling

Mineralized material from the mine is delivered by trucks to the gyratory crusher equipped with two (2) dump points. A hydraulic hammer (rock breaker) is installed adjacent to the crusher to manipulate rocks in the feed pocket and to break the larger mineralized rocks so they can enter the crusher.

Crushed ore falls on a surge conveyor which transports it to the crushed ore stockpile.

Ore is withdrawn from the crushed ore stockpile by apron feeders located inside a reclaim tunnel. The apron feeders ensure a constant crushed ore feed to the mill feed conveyor. The mill feed tonnage is controlled by varying the apron feeder speed with a signal from the belt scale. A metal detector is installed on the mill feed conveyor to stop the conveyor when metal pieces are detected in order to protect the conveyor and mill liners.

17.4.1.2 Grinding and Classification

Crushed ore from the stockpile is fed into an Autogenous Grinding mill (AG mill). Ground ore is discharged from the mill as a slurry. The slurry feeds scalping screens: the screen oversize is returned to the mill and the screen undersize is pumped into distributors which equally distribute the slurry onto the classification screens. The distributors are equipped with valves allowing the feed to a screen to be stopped and the maintenance of the screen whilst in operation. The screens oversize is returned to the mill for further grinding, while the undersize consists in the grinding circuit product and is sent for upgrading to the gravity separation circuit.

17.4.1.3 Gravity Separation

The first stage of gravity separation is performed by rougher spirals that remove the coarse silica. The rougher spirals concentrate is sent to the cleaning hydrosizers that will efficiently remove medium and fine silica. The cleaning hydrosizers produce a high grade concentrate at their underflows. The hydrosizer overflow, consisting in fine iron minerals and fine silica, is processed by the scavenger spirals. As the scavenger spiral feed has a narrow size distribution, the spirals can produce a concentrate with an iron grade slightly lower than the hydrosizers concentrate.

The main concentrate launder combines the two (2) concentrates produced by the plant to produce a constant final concentrate and feed to the pan filters.

The tails of both the rougher and the scavenger spirals are final tails. The final tails are sent to the tailings cyclones to be processed in the tailings dewatering circuit.

17.4.1.4 Concentrate Filtration

The concentrate launder feeds a gravity distributor that distributes to the horizontal pan filters. The distributor is equipped with valves allowing the stoppage of a filter and its maintenance in normal operation.

There is a by-pass under the concentrate distributor which provides the possibility to send the concentrate to the floor instead of it being filtered. The floor is designed to contain the spill. The floor design collects the solids and redirects the liquid to the main sump nearby. This floor area is used as a temporary storage that makes room for material (concentrate or tails) without affecting the normal operation access points.

Vacuum filtration is provided by vacuum pumps. Pressurized air is provided by dedicated blowers. Air goes counter flow to the slurry direction to unclog the pan filter cloths. Each filter is equipped with a steam hood for increased concentrate drying during the winter to facilitate transportation. Rotating scrolls discharge the concentrate from the filters onto the concentrate collecting conveyor. Filtrate passes through a separation tank and flows to the thickener.

17.4.1.5 Tailings Dewatering and Disposal

Final tailings from the gravity separation circuit feed a cluster of classification cyclones. The tailings cyclone underflows consist in the coarse tailings. The tailings cyclone overflow feeds a thickener along with the filtrate tank overflow. The thickener overflow flows by gravity to the process water tank and it constitutes the main source of process water for the plant operation. The thickener underflow is the fine tailings.

During the summer, the fine tailings from the thickener underflow and the coarse tailings from the cyclone underflow are disposed of separately in the same settling basin. The coarse tailings are then used for dam building.

During the winter, the fine is mixed to the coarse tailings through a by-pass on the fine tailings line to the coarse tailings pump box. The tailings are then pumped and disposed of together.

17.4.1.6 Process Water

Process water is almost a closed loop circuit. The main source of process water is the thickener overflow. The process water losses are compensated by reclaiming water from the tailings basin overflow. All the process water goes through the process water tank.

17.5 Major Process Equipment Selection

Table 17.11 presents the major process equipment list. The equipment selection is based on the following assumptions:

- The scalping screen undersize is combined prior to feeding the classification screen distributors to avoid material segregation;
- The classification screens are fed through distributors with an automated valve on each port. The design production requires the use of all the available screens, while lower production levels and/or a lower circulating load can be handled with fewer screens allowing in-operation maintenance;
- The gravity separation circuit is configured as follows:
  - ➢ Rougher spirals: 18 banks of 24 spirals (2 x 6 twin starts);

- Cleaner hydrosizer: six (6) hydrosizers, each fed by the concentrate of three (3) rougher spiral banks;
- Scavenger spirals: six (6) banks of 32 spirals (2 x 8 twin starts), each fed by the overflow of one (1) hydrosizer.

- The pan filters are fed through a four-way distributor with an automated valve on each port. The average concentrate production can be handled by three (3) filters in operation allowing maintenance, while higher concentrate production will require the operation of all the pan filters.

Table 17.11 – Major Process Equipment List

Equipment	Model	Operating	Standby	Total
Crushing				
Gyratory Crusher	Sandvik CG820 (54" x 75")	1	-	1
Grinding				
Autogenous Grinding Mill	10.4 m x 5.5 m (34' x 18') dual pinion	1	-	1
Autogenous Grinding Mill Drive	-	2	-	2
Scalping Screen	3.7 m x 7.3 m (12' x 24')	2	-	2
Classification Screen	Derrick 2SG48-60W-5STK	10	-	10
Gravity Separation				
Rougher Spirals	Mineral Technology HC33 6 turns	432	-	432
Cleaner Hydrosizer	Weir 1.8 m circular, conical bottom	6	-	6
Scavenger Spiral	Mineral Technology WW6+, 7 turns	192	-	192
Concentrate Filtration				
Concentrate Pan Filter	FLSmidth 7.3 m or Bokela 7.7 m	4	-	4
Tailings				
Tailings Thickener	FLSmidth High Rate 41 m	1	-	1
Tailings Cyclones	Krebs gMAX26	10	2	12
Process Water				
Process Water Tank	TBD 1300 m^3 Live capacity	1	-	1

17.6 5.5 MTPY Case Study

For the current design of the plant, a factor of 10% was used to accept variations related to ore properties causing variations in the ore feed tonnage. This was done in order to reach the annual concentrate production.

In the event that the fluctuations of the ore properties are lower, there is a potential to exceed the production target of 5 MTPY of concentrate. This possibility will be reviewed in more detail in the next engineering phase.

The equipment sizing and selection is considered conservative and the majority of the equipment can lead to the production of 5.5 MTPY of concentrate without increasing their size, quantity or capacity. However, a change in the design criteria or a minor increase in the size or quantity of the following equipment would be required to allow the production of 5.5 MTPY:

- Autogenous Grinding Mill: The AG mill is selected considering the conservatively assumed average power requirement of 4.5 kWh/t. An actual lower ore hardness based on testwork, or a slight increase in the mill dimension and motor power would allow the production of 5.5 MTPY;
- Rougher and scavenger spirals: The amount of rougher and scavenger spirals is based on the conservatively assumed spiral capacity. A higher actual spirals capacity based on testwork with the actual ore, or the addition of spirals at the rougher and scavenger stage would allow the production of 5.5 MTPY.

17.7 QPyrxM Processing Opportunity

The QPyrxM lithology processing is not included in the PEA. Its processing represents an opportunity as it consists of 175 Mt, excluding the volumes under Lac Lamêlée.

The processing of the QPyrxM through a gravity circuit can be considered through a circuit allowing the processing of narrow size classes thus improving the density separation efficiency. Tests will be performed in the next phase to assess this possibility.

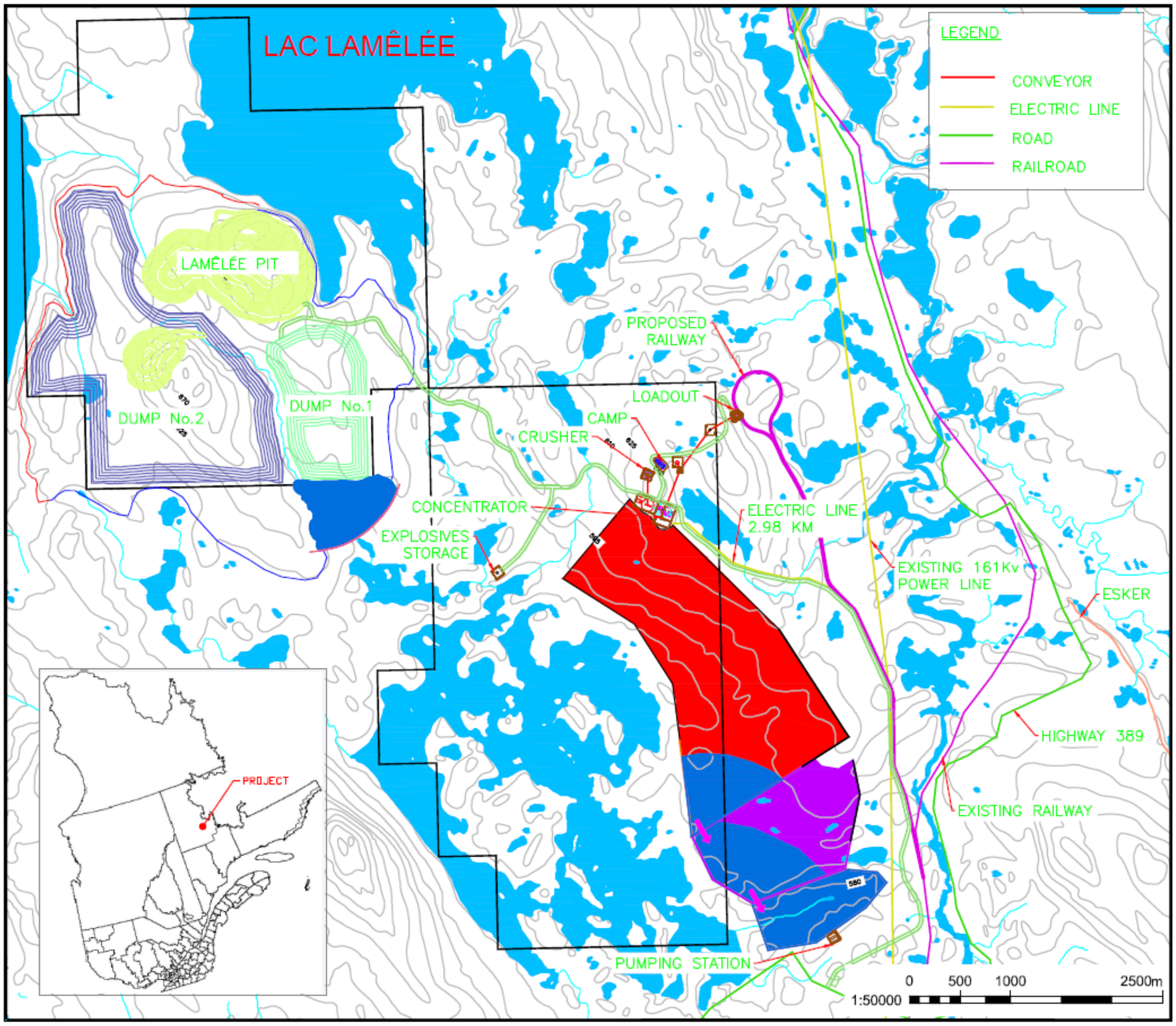
The recovery of the magnetite unit of the QPyrxM through a magnetic process has however the higher potential as the QPyrxM provided a final grade concentrate with high magnetite recovery with the Davis Tube at a grinding size of -150 µm. This magnetite plant could also process the gravity separation tailings and allow the recovery of the fine magnetite not recovered by the gravity process. A trade-off study between the processing of the QPyrxm and its disposal will be performed in the next phase.

18 Project Infrastructure

18.1 General Arrangement

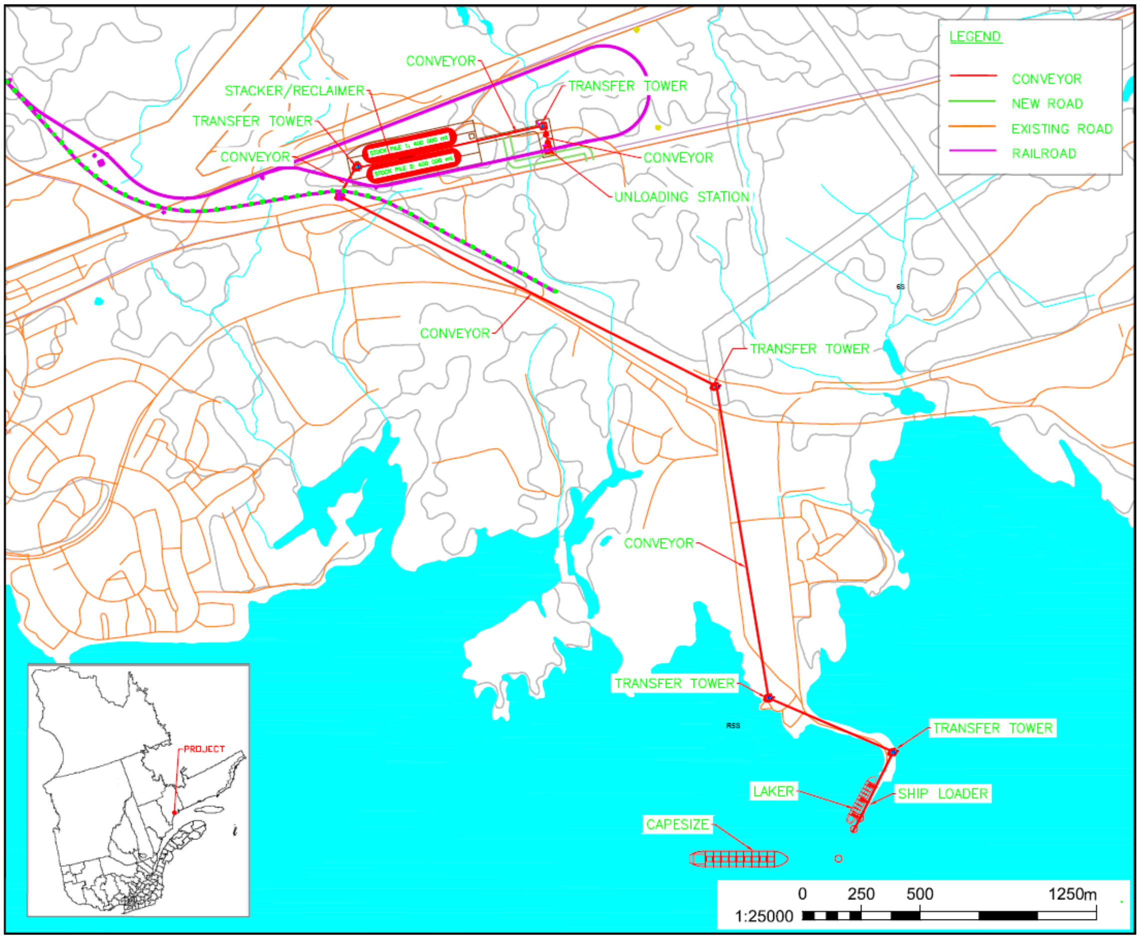
The Lamêlée Property is located 80 km (by road) south of the town of Fermont, Québec. The open pit, waste and overburden dumps, the crushing plant as well as the buildings, such as concentrator, offices and workshops, are located in between Lac Lamêlée to the north and Lac Hobdad to the south. Drainage ditches will be constructed around the open pit and dumps to direct water runoff to settling ponds to avoid contamination. The mineralized material will be hauled by the mine haul trucks to the gyratory crusher close to the concentrator. A haulage road will be constructed between the mine and the crusher. All crushed material will be stockpiled and subsequently reclaimed and transported to the concentrator via a short conveying system. The five (5) million tonnes iron concentrate annually produced in the concentrator will be conveyed to a storage silo or emergency stockpile. From there, the iron concentrate will be reclaimed and conveyed to the load-out station located about 1.3 km northeast of the concentrator and at the newly constructed railway loop. The railway loop will tie-in to an existing railway system for further transport. A haulage road will be required between the mine and crusher. An accommodation camp will be built near the concentrator. A 161 KV power line passes relatively close to the property that facilitates the projected supply of electrical power to the project. Figure 18.1 shows the general location map with the planned project development.

Figure 18.1 – General Location Map



The concentrate will be transported via an existing railway south to Port-Cartier, where the ore wagons (gondolas) will be transferred to a newly constructed railway loop and unloading station. The concentrate will be stored on two 400,000 tonne stockpiles, with a stacking system. A reclaimer will load the concentrate onto a system of five conveyors and transfer towers for transport to the ship loading station at the dock site and further onto a self-unloader Laker ship (37,000 tonne). The Laker ship will self-unload onto a Capesize type ship off-shore and the Capesize will transport the concentrate to market. The rail yard and dock site is illustrated on Figure 18.2.

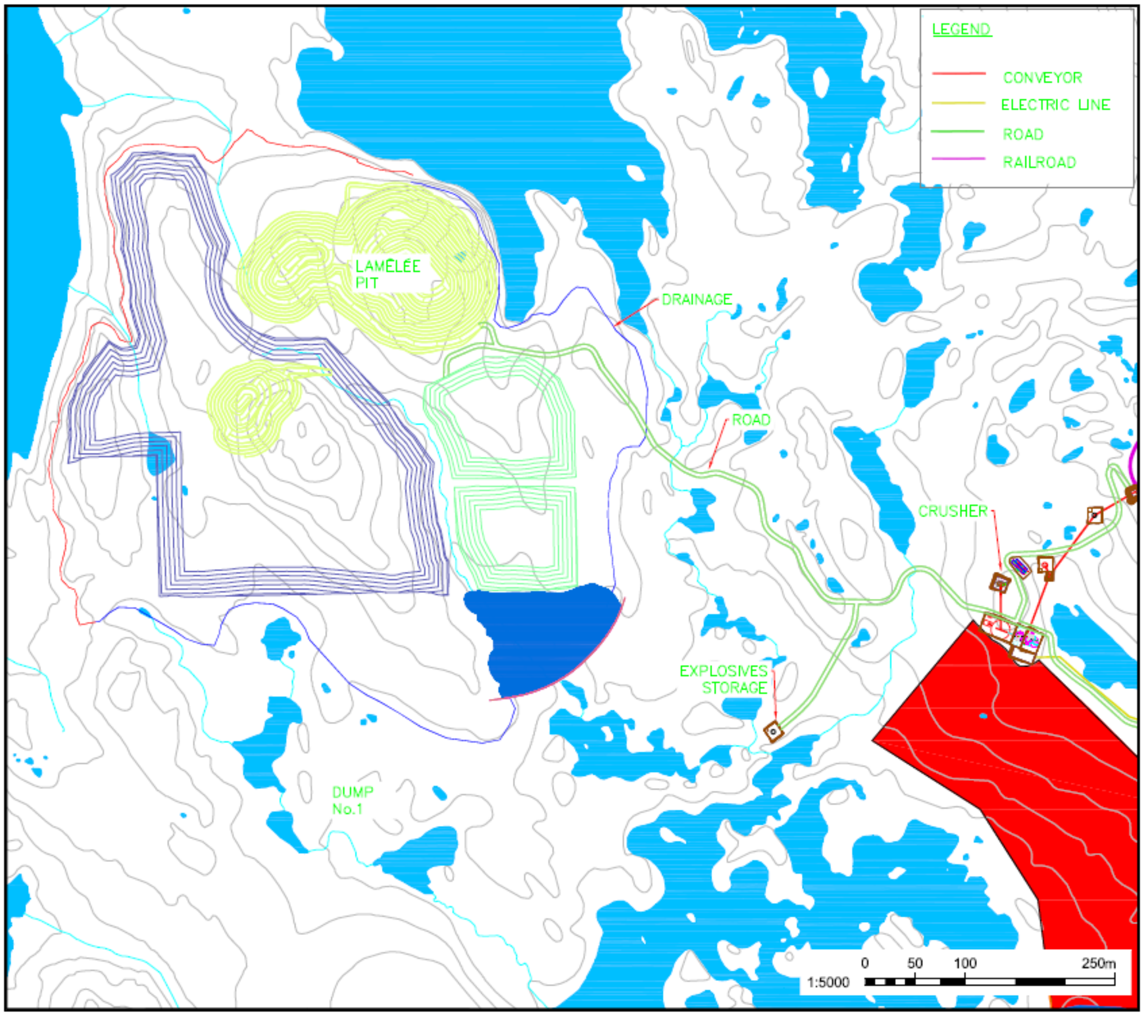
Figure 18.2 – Port Site Map



18.2 Mine, Crusher, Concentrator and Accommodation Camp Area

The mine road, the drainage system and the explosives storage are illustrated on Figure 18.3.

Figure 18.3 – Mine Site Installations and Infrastructures



18.2.1 Haulage Roads and Site Roads

The Lac Lamêlée deposit will be mined from two open pits, in detailed described in Section 16.0. The haulage roads from the pits to the crusher are designed with a width of 31 m, the same as those of the open pits, to accept 227 tonne (250 ton) rigid frame haul trucks. All roads were designed to minimize the cut and fill and respecting a maximum grade of 8%. The earth excavation will be used to backfill the lower points on the road alignment. The rock excavation will be used, without any further crushing, for the sub-base for a thickness of 1,000 mm. Finally, the base of the road will have a thickness of 400 mm and will be made of waste rock from mine. The roads in the mine area include:

- Haulage roads to the crusher;

- Haulage road from the pit to the waste dumps and the overburden dumps; and
- The access road to the explosives storage (shown in Figure 18.3). This road will be designed with a width of 10 m because the explosives trucks and other vehicles are much smaller than the haulage trucks.

18.2.2 Fuel Storage and Filling Station

The main storage facility for the diesel fuel for the mine equipment will be three double wall, galvanized steel 50,000 liters tanks installed on a pad. The three fuel tanks will be interconnected and will be used for the equipment fueling station, consisting of two mine truck fueling pumps.

18.2.3 Explosives Preparation and Storage

The explosives preparation and storage facilities will be constructed in a remote area, southwest of the concentrator (shown on Figure 18.1) at least 1 km from the road to the mine. It will be designed to the specifications and requirements of an explosives supplier. A dedicated access road serves the explosives storage area.

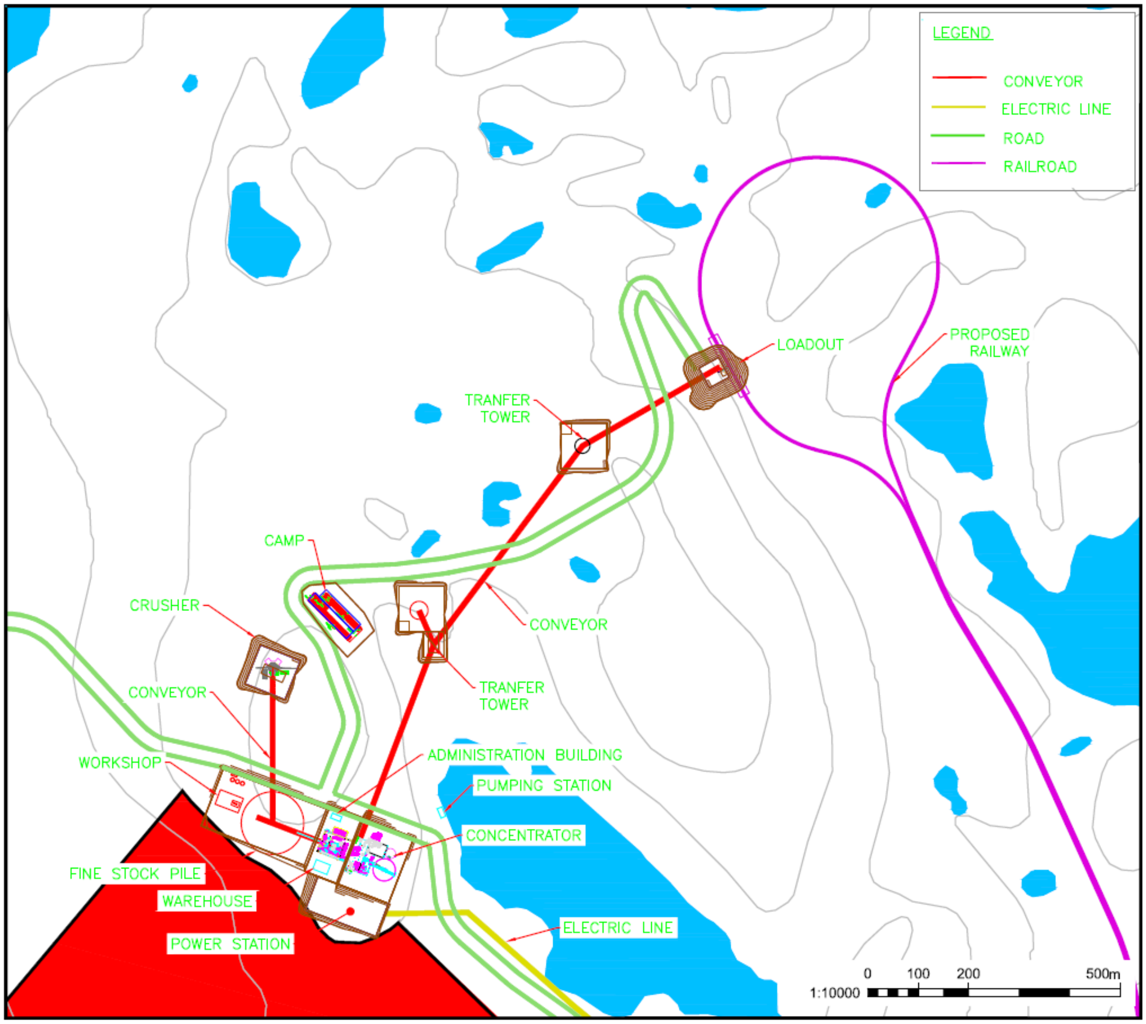
18.2.4 Crusher Plant

The mineralized material coming from the pit will be crushed in a gyratory crusher with a capacity of 2 474 tonnes per hour. Maximum size of the crushed material will be 35 cm. There will be two truck dump “stations”, one on each side of the crusher dump hopper. The crushed material will be transported by a “takeaway” conveyor to a crushed material stockpile.

18.2.5 Crushed Stockpile

The mineralized material from the crushed stockpile will be reclaimed via an apron feeder discharging on a conveyor, all located in a tunnel, for transport to the concentrator.

Figure 18.4 – Concentrator Site Installations and Infrastructures



18.2.6 Security Gate House and Parking

A security gate house will be installed at the start of the main access road, about 8.0 km southeast of the concentrator. The guard will authorize the entry of visitors to the concentrator and mine site. A parking area will be established for visitors and other non-employees near the concentrator. Employees will be transported from their point of arrival to the accommodation camp by company transport.

18.2.7 Administration Building

A modular building will be installed close to the concentrator. This building will include 12 modules of 3.6m x 18m. The administration building sections will house the offices for the project managers and other supervisory personnel as well as the concentrator supervisors, secretary, accounting, human resources, safety and first aid personnel. A section of this building will be reserved for the mine related operations such as offices for managers and department heads, surveyors, engineering and mine planning personnel, as well as secretary personnel.

18.2.8 Equipment Workshop

The workshop for mining equipment maintenance will be a light structure building unit. The building will be 48.8 metres long by 30.5 metres wide. Both ends of the structure will have a large door for the 227 tonne trucks. This workshop will be used for all maintenance jobs on all equipment.

18.2.9 Accommodation Camp

The camp will need to be erected at the beginning of the construction period, to accommodate the construction labor. The accommodation camp will need to include housing to accommodate 250 workers, a cafeteria large enough to accommodate all shift workers and supervisors, a meal preparation section, including all required cooking appliances and utilities, including refrigerators for food preparation. It will also include an entertainment/recreation room, and a medical clinic facility for first aid and minor interventions to serve the camp.

18.2.10 Site Roads

The access road from the guardhouse to the concentrator and from there to the accommodation camp is designed to minimize the cut and fill required, the road is 10 m wide and the maximum grade of the road is 7%. The total length of this road is approximately 7.2 km. The earth excavation will be used to backfill the lower points on the road alignment. The rock excavation will be used without any further crushing for the sub-base for a thickness of 1,000 mm. The final base of the road will have a thickness of 400 mm and will be made of crushed stone (MG-20).

The road from the accommodation camp to the load-out station is approximately1.4 km further to the northeast. This road will be following the same design as described above.

18.2.11 Site Drainage and Settling Ponds

A storm drainage system will be excavated that will exploit the natural drainage around the pits, roads, infrastructures and pads with a network of open ditches and culverts that will connect with one or more settling ponds.

Ditches and culverts will be designed for a 1 in 100 year recurrence event and will be checked for peak intensity flows. Sedimentation ponds will be designed for a 1 in 100 year recurrence event.

18.2.12 Services

Electrical power will be supplied to the project from a 161kV-35kV substation to be built near the concentrator and will be connected to the existing 161 kV Hydro-Québec power line located approximately 3 km from the concentrator.

A 35 kV transmission line network will distribute the power needed to the substations and PEB of different areas, such as the mine site, accommodation camp, the concentrator and other facilities. The mine site will be powered by a 7.2 kV transmission line from a substation 35kV-7.2kV that will provide all the power for the electric power shovels and the electric production drills.

A pump house will be constructed at a small lake close to the concentrator. Water will be pumped to a water treatment facility located inside the concentrator. Potable water will also be pumped to the accommodation camp. The pumping and distribution system will include a potable water reserve tank. Electrical connection and controls of all potable water equipment will be connected to the plant emergency power supply.

Central organic waste collection and on site composting equipment will be provided and inorganic waste will be disposed into an incinerator.

18.2.13 Communications

Telecommunications and radio systems will be provided to enable communication between individuals working in the different areas, as well as provide computer and internet services in all offices, control rooms etc.

18.2.14 Railroad Loop near the Concentrator

The rail loop located near the load-out station (shown on Figure 18.4) will be tied into an existing railroad. The total length of the loop and the connected rail line is approximately 7.0 km. The rail loop is designed to serve a train of at least 160 ore gondolas. The excavated material will be used to fill the lower points and a layer of 300 mm of sub-ballast and 300 mm of ballast will be required to support the rail infrastructure.

18.3 Port and Terminal Area

The iron concentrate will be transported by train over an existing railroad to the port of Port-Cartier. Near the end of the existing railroad a new rail line loop will be built to transport the concentrate to a new train un-loading system, concentrate storage area, conveying system and ship loading system. The new systems that will be built consist of the following:

- Railway Loop and Train Un-loading Station;
- Concentrate Stockpiles;
- Concentrate Stacking and Reclaiming System;
- Overland Conveyor System; and
- Ship Loading System.

The planned port site general arrangement has been shown in Figure 18.2.

18.3.1 Railroad Loop and Concentrate Storage Area at Port Site

A railway track will branch off an existing railroad at a point approximately 1.0 km north of Route 138 and approximately 4.2 km north of île à Bois. A rail loop section will be constructed to allow un-loading of trains and to permit trains to turn around without detaching locomotives and carrying out switching activities. The total required rail length for the new railroad connection and rail loop is 4 920 m. The railway loop section will allow for a train of 160 gondolas to unload. The excavated material will be used to fill the lower points and a layer of 300 mm of sub-ballast and 300 mm of ballast will be required to support the rail infrastructure.

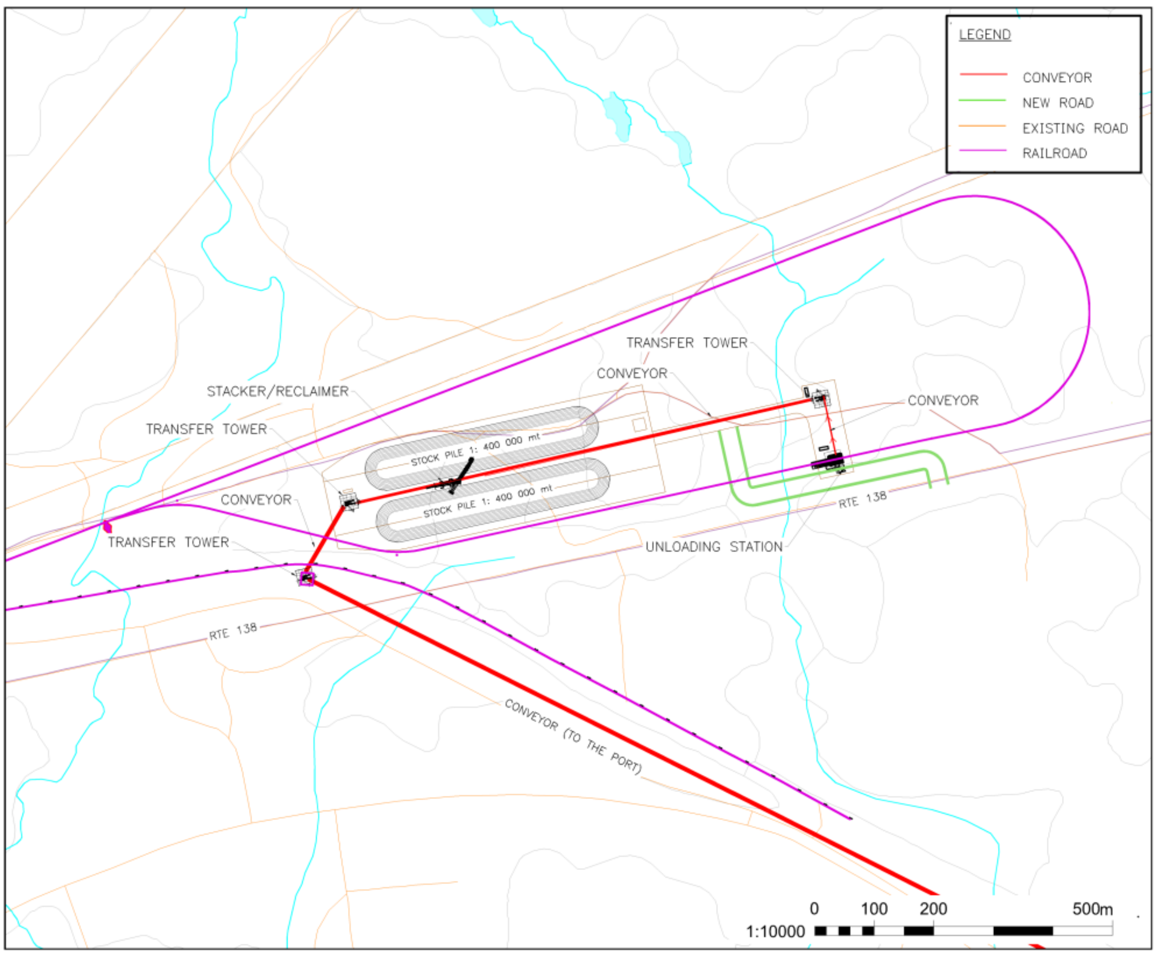
The railcar un-loading station is planned to be on the south side of the loop. It will consist of a rotary railcar dumper and positioner. The positioner will move the entire unit train and position each railcar into the rotary railcar dumper. The dumper will rotate the railcar around its couplers and unload the iron concentrate in a bin below the rail.

Using a conveyor system below the bin, the iron concentrate will be transported to a bucketwheel stacker/reclaimer. The stacker/reclaimer will stack the iron concentrate on two 400 000 tonnes concentrate stockpiles. A drainage channel around the stockpiles will direct the water runoff to a treatment pond.

An office building combined with a warehouse and a maintenance facility for the conveying systems and stacker and reclaiming system will be attached to the unloading station control room.

The new railway loop and associated structures are shown on Figure 18-5.

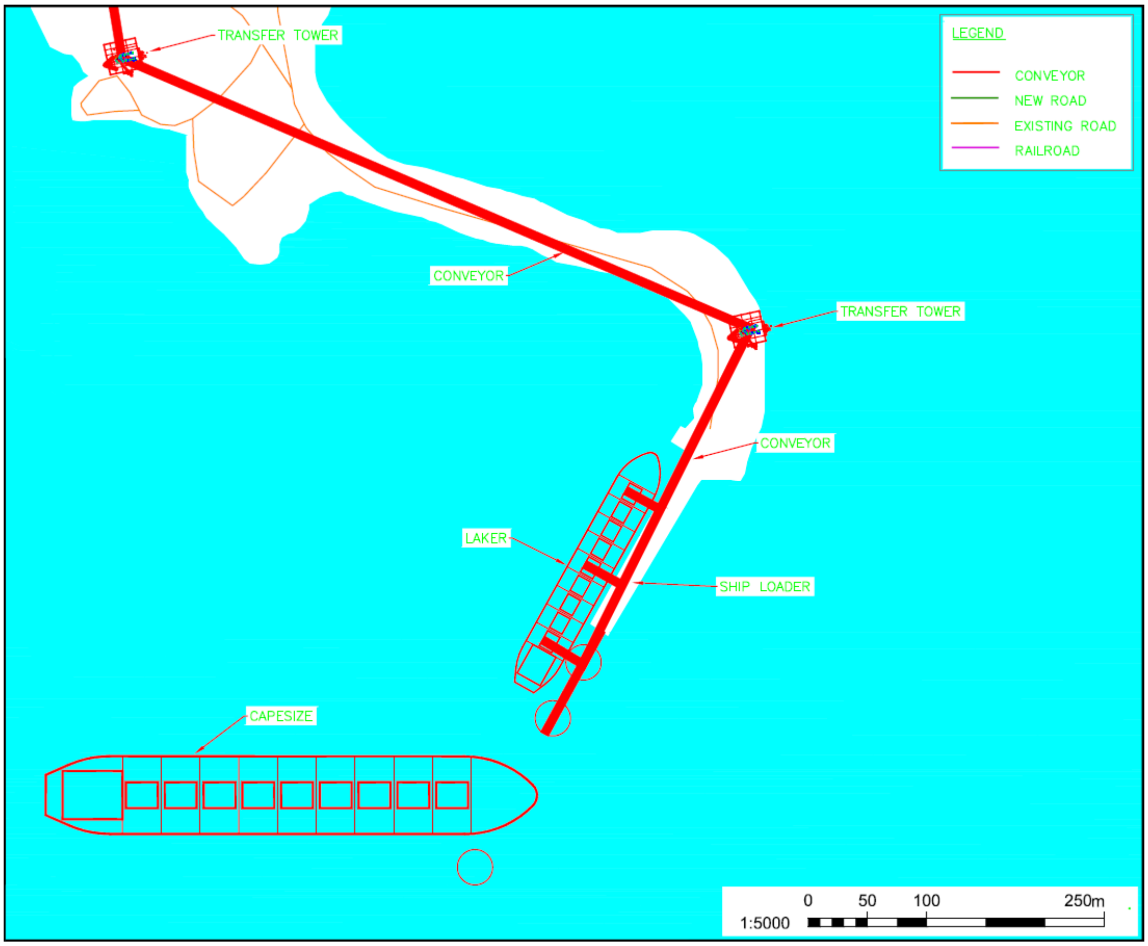
Figure 18.5 – New Railway Loop and Associated Structures



18.3.2 Reclaiming and Ship Loading System

To load the iron concentrate onto the ship, it will be first reclaimed from the stockpiles using the above mentioned bucketwheel stacker/reclaimer system. The concentrate will be subsequently transported via an overland conveyor system, consisting of five (5) conveyors and five (5) transfer towers, for a total length of about 4.2 km, to the dock site and loaded into ships for transport to market. The proposed total general arrangement has been shown in Figure 18.2 and the details for the ship loading system are illustrated on Figure 18.6.

Figure 18.6 – Overland Conveyor to Dock and Ship Loading System



18.3.3 Site Drainage and Settling Ponds

A storm drainage system will be excavated that will exploit the natural drainage around the infrastructures and stockpile pads with a network of open ditches and culverts that will connect with one or more settling ponds. Water from the settling ponds will, when after testing no contamination is shown, be discharged to the local sewage system.

18.3.4 Fuel Storage

No fuel storage will be required at this site. Maintenance and supervisory transport vehicles can be refueled at local stations. The maintenance oil and fuel supplies can be provided from barrels.

18.3.5 Services

Electrical power will be supplied to the project from an existing Hydro-Québec substation located approximately 4 km to the northeast. A 35 kV transmission line network will distribute the power needed to the substations and PEB of different areas.

Potable water will be supplied from the local municipal water system. Waste water will also be discharged into the municipal sewage system.

Telecommunications and radio systems will be provided to enable communication between individuals working in the different areas, as well as provide computer and internet services in all offices, control rooms etc.

19 Market Studies and Contracts

Most of these projections were obtained by reviews of Internet publications. The following forecast publications are used in this section:

- Lamelee, Market Update, October 3rd, 2014, BMO Capital Markets;
- Platts, McGraw Hill Financial;
- Metal Expert Consulting; and
- CRU, The Independent Authority, Mining/Metals/Fertilizers.

Summaries of the projections for the CFR China (Cost and Freight (and Port of Destination)) price are shown below.

19.1 Lamelee Market Update, BMO Capital Markets

The following quotations are from this document:

JP Morgan

In a projection by JP Morgan, a quotation by the "Latin America Equity Research – Iron ore" of March 31, 2014: *"Supply continues to catch up and should continue to outpace demand growth in 2015 and 2016 as well.*" was the back-up of their projection for the long term CFR China price.

Projected Long Term Price forecast US$80.00 CFR/dmt China

BMO Capital Markets

Following is a quotation from Material – Base Metals/Diversified of May 23, 2014: "BMO Research's view, *sustained lower iron ore prices are unlikely*… despite weaker current commodity prices, for the most part the diversified miners are well placed to maintain healthy dividends..". According to BMO the CFR China

Projected Long Term Price forecast US$115.00/dmt CFR China

Deutsche Bank

The projection by the Deutsche Bank is using the following quotation of Americas Metals & Mining – Ratings and PT Revisions of July 3, 2014: "On the back of slowing demand, especially from China, faster than expected capacity additions from the majors and tougher credit conditions for traders and steel mills in China, we are trimming our iron ore price forecast through to 2016."

Projected Long Term Price forecast US$80.00/dmt CFR China

Macquarie

The projection by Macquarie is using the following quotation of Canadian Iron Ore Developers of September 8, 2014: "The iron ore market is in the midst of a transition without precedent in recent commodity history, with the long-expected displacement cycle happening both earlier and more aggressively than anticipated. With the displacement cycle likely to continue over the coming two years at least…only occasional bounces into three figures should be expected in the coming years."

Projected Long Term Price forecast US$90.00/dmt CFR China

19.2 Platts, McGraw Hill Financial

This publication shows the forecast for iron ore by Morgan Stanley for 2014 down to US$105/dmt CFR China and down to US$90/dmt CFR China for 2015.

Projected Long Term Price forecast US$99.00/dmt CFR China

19.3 Metal Expert Consulting

The consensus forecast in their publication is based on the opinion of a number of world wide investment banks (7 banks) and varies from a minimum of US$85/dmt CFR China (4 banks) to a maximum of US$121/dmt CFR China (3 banks).

Projected Long Term Price forecast US$101.00/dmt CFR China

19.4 CRU - The Independent Authority

An independent review of the world iron ore markets has been prepared by CRU. Their long term price forecasting is based on the market eventually converging to long-run marginal cost. To achieve this CRU construct a cost curve of sample projects from around the world. Their base-case forecast is driven by this methodology.

Projected Long Term Price forecast US$88.00/dmt CFR China

19.5 Projected Iron Ore Market Price for PEA Study

It is proposed that the Midrange Value of the price projection studies is used in the development of the sales price for the study. Table 19.1 shows the development of the Midrange Value for the price calculation.

Table 19.1 – Projected Midrange CFR China Price Calculation

Publication Source	Forcast Price	Min & Max Value
JP Morgan	US$ 80.00	US$ 80.00
BMO	US$ 115.00	US$ 115.00
Deutsche Bank	US$ 80.00	
Macquarie	US$ 90.00	
Platts	US$ 99.00	
Metal Expert	US$ 101.00	
CRU	US$ 88.00	
Midrange Value		**US$ 97.50**

20 Environmental Studies, Permitting and Social Community Impact

20.1 Legal Framework

The Project is subject to numerous laws and regulations. The most significant laws, directives and regulations amongst the legislation and government directives to be considered and respected are presented here in after.

20.1.1 Provincial Legislation (Québec)

20.1.1.1 Environment Quality Act (CQLR c. Q-2)

Adopted in 1972, the Environment Quality Act3 (EQA) establishes in Article 22 that any project likely to affect the quality of the environment be the subject of a Certificate of Authorisation from the Minister of the Environment. This Certificate of Authorisation contains the project's specific construction or operational conditions.

Environmental Impact Assessment (EIA)

Depending on the nature or scope of a project, Section IV.1 of the Environment Quality Act (CQLR c. Q-2) requires any person or group to follow the Environmental Impact Assessment and Review procedure before undertaking a project targeted by Article 2 of the Regulation respecting the environmental impact assessment and review (CQLR c. Q-2, r. 23), prior to obtaining a certificate of authorisation from the government. The list of projects subject to the Environmental Impact Assessment and Review procedure is provided in the related Regulation (CQLR c. Q-2, r. 23).

Subparagraph 2, Paragraph (p), stipulates that mine opening and operation projects are subject to the provincial procedure. The Project should therefore be the subject of an environmental and social impact assessment. Therefore, six successive phases shall need to be completed in order to obtain the government decree authorising the project and closing the assessment procedure:

1. Project Notice

Any person who wishes to implement a project that is subject to the impact assessment and review must provide the Ministère du Développement durable, de l'environnement et de la lutte contre les changements climatiques (MDDELCC) with a project notice. This document shall describe the nature of the project as well as its components.

In return, the Minister shall send a directive to the proponent, aimed at establishing the framework for the environmental and social impact assessment to be prepared by the latter. This project-specific directive shall also comply with Directive 019 on the mining industry which includes the guidelines for all mining projects.

2. Impact Assessment

In general, the impact assessment report should describe the following aspects in detail: a) the project description, b) the description of the biophysical and human environment, c) the assessment of the project's negative effects on the environment, and d) the mitigation measures to be used to eliminate or reduce these impacts.

Once the impact assessment report has been submitted, the MDDELCC reserves the right to ask questions regarding aspects of the project, or to ask for additional information. Therefore, the proponent may have to answer one or more series of questions and comments.

3. Public Consultation (Bureau d'audience publique sur l'environnement – BAPE)

After having received the impact assessment's notice of admissibility, the Minister will make the document public and will mandate the *Bureau d'audience publique sur l'environnement* to begin the public consultation process as per the law.

4. Ministerial Environmental Analysis

At the same time as the BAPE consultation process, a group of ministerial experts will conduct an environmental analysis.

5. Government Decree

Once the Environmental Impact Assessment Process has been completed, and that the government decree has been obtained, the project's detailed engineering can be completed. This step shall take into account the mitigation measures presented in the EIA and the recommendations issued by decree. At this stage, a construction certificate of authorisation can be requested.

This certificate begins the process of requesting the various certificates of authorisation needed for the different aspects of the project (certificates of authorisation for infrastructure, for the mine's operation, etc.)

Certificates of Authorisation under Article 22 of the Environment Quality Act

The implementation of the Project will require obtaining numerous certificates of authorisation under Article 22 which stipulates that "No one may erect or alter a structure, undertake to operate an industry, carry on an activity or use an industrial process or increase the production of any goods or services if it seems likely that this will result in an emission, deposit, issuance or discharge of contaminants into the environment or a change in the quality of the environment, unless he first obtains from the Minister a certificate of authorization. However, no one may erect or alter any structure, carry out any works or projects, undertake to operate any industry, carry on any activity or use any industrial process or increase the production of any goods or services in a constant or intermittent watercourse, a lake, pond, marsh, swamp or bog, unless he first obtains a certificate of authorization from the Minister".

Certificate under Article 128.7 of the Act respecting the conservation and development of wildlife

Before carrying out any activity in aquatic, wetland and riparian environments in Québec, an authorisation under Article 128.7 of the Act respecting the conservation and development of wildlife (CQLR c.C-61.1) could be required.

Certificate under Article 32 of the Environment Quality Act

Article 32 of the Environment Quality Act stipulates that no one can establish a water supply intake and water purification devices nor carry out sewer work or install wastewater treatment devices before having submitted the plans and specifications to MMELCC and having received their authorisation.

Certificate of authorisation under Article 48 of the Environment Quality Act

Finally, Article 48 of the EQA specifies the requirement to obtain an authorisation before installing or placing any apparatus or piece of equipment aimed at preventing, reducing or preventing the release of contaminants into the air.

20.1.1.2 The Mining Act (CQLR c M-13.1)

Many aspects of The Mining Act were modified with its redrafting, adopted in December 2013.

Thus, a chapter has been added which includes provisions specific to Aboriginal communities.

It requires holders of claims to advise within 60 days the relevant municipality and property owner that the mining lease has been obtained and to inform the municipality and property owner at least 30 days before the start of any work. The law also requires these claim holders to provide an annual report regarding the work carried out to the Ministre de l'énergie et des ressources naturelles (MERN).

It is mandatory to declare the discovery of any mineral substance containing 0.1 % or more of uranium octaoxide, within 90 days of the discovery.

The Mining Act requires that a mining redevelopment and restoration plan, for which a certificate of authorisation set forth in the Environment Quality Act was issued, as well as an economic scoping and marketing study regarding processing in Québec, be submitted to the Minister before a mining lease can be granted.

Moreover, it also requires the prior holding of public consultations before a mining lease can be issued for a metal mine with a production capacity of less than 2,000 metric tonnes per day.

The Mining Act allows the government, at the moment of concluding a mining lease and for reasonable cause, to require that the economic spinoffs for Québec of the mining of the ore authorized by the lease be maximized.

It requires the holder of the lease to put together and maintain a monitoring committee to promote local community involvement throughout the project.

The Mining Act requires that holders of mining rights provide information regarding the amount and value of extracted ore, the duties paid under the Mining Tax Act (CQLR I-0.4) and all contributions paid to the Minister.

20.1.1.3 Depollution Attestation

The depollution attestation, renewable every five years, establishes the environmental conditions under which the industrial establishment can operate. It should be noted that the proponent shall submit depollution attestation request within at most one year after having begun operating its mining site.

20.1.1.4 Other Provincial Laws and Regulations

In addition to the previously-mentioned laws, the Project must comply with the following:

- Directive 019 on the mining industry (2012);
- Forest Act (CQLR c F-4.1);
- Watercourses Act (CQLR c. R-13, r. 1);
- Dam Safety Act (CQLR c. S-3.1.01, r. 1);
- Transportation of Dangerous Substances Regulation (CQLR c. Q-2 r. 32.);
- Petroleum Products Act (CQLR c P-30.01, r. 1.);
- Groundwater Catchment Regulation (CQLR c. Q-2, r. 6);
- Regulation respecting pits and quarries (CQLR c. Q-2, r. 7.);
- Act respecting threatened or vulnerable species (CQLR c. E-12.01);
- Act respecting the conservation and development of wildlife (CQLR c. C-61.1);
- Cultural Heritage Act (CQLR c. P-9.002);
- Regulation respecting wildlife habitats (CQLR c. C-61.1, r. 18);
- Dam Safety Regulation (CQLR S-3.1.01, r. 1);
- Act Respecting Occupational Health and Safety (CQLR c.S-2.1);
- Regulation respecting occupational health and safety in mines (CQLR c. S-2.1, r. 14);
- Clean Air Regulation (CQLR c. Q-2, r. 4.1);
- Soil Protection and Contaminated Sites Rehabilitation Policy.

These directives, laws or regulations may require that the project proponent obtain one or more specific Certificates of Authorisation (CA).

20.1.2 Federal Legislation (Canada)

20.1.2.1 Canadian Environmental Assessment Act

The Canadian Environmental Assessment Act 2012 (CEAA 2012) and its regulations establish the legislative basis for the federal practice of environmental assessment in most regions of Canada. The CEAA 2012 applies to projects described in the Regulations Designating Physical Activities. A project may also be designated by the Minister of the Environment if he or she is of the opinion that the carrying out of the project may cause adverse environmental effects, or that public concerns related to those effects warrant the designation.

Under 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;
- Effects that cross provincial or international boundaries;
- Effects that impact on Aboriginal peoples;
- Changes to the environment that are directly linked to federal decisions about a project.

The environmental assessment will consider a comprehensive set of factors that include cumulative effects, mitigation measures and comments received from the public.

In order to determine whether such a federal environmental assessment is required, the proponent shall provide the Canadian Environmental Assessment Agency with a project description if the latter is targeted by the regulation. The Agency, once it has received a complete project description, will have 45 days to determine whether an environmental assessment is necessary. This decision will be based on the likelihood of environmental effects that are within areas of federal jurisdiction. This 45-day timeframe includes a 20-day period during which the public will be invited to comment.

According to Article 16 (a) of the Regulations Designating Physical Activities, the Project is subject to a federal environmental assessment as it involves the construction, operation (and, eventually, the decommissioning and closure) of a new metal mine with a production capacity of over 3,000 t/day.

20.1.2.2 Other Laws

Given the Project's elements, various permits from federal authorities will be required under the following laws:

The Explosives Act (RSC. 1985, c. E-17)

This law governs the manufacture, testing, sale, storage and importation of explosives in Canada. Under Article 7 (1) (a), any disposal or storage of explosives requires approval.

The Fisheries Act (RSC. 1985, c. F-14)

On June 29, 2012, amendments to the Fisheries Act received Royal Assent. The changes will focus the Act on protecting the productivity of recreational, commercial and Aboriginal fisheries. The Government is now focusing protection rules on real and significant threats to the fisheries and the habitat that supports them, while setting clear standards and guidelines for routine projects.

According to the Department of Fisheries and Oceans of Canada (DFO), the new Fisheries Protection Program contains a new prohibition that manages threats to fish that are part of or support commercial, recreational or Aboriginal fisheries with the goal of ensuring their productivity and ongoing sustainability. The new prohibition is also supported by definitions of commercial, recreational and Aboriginal fisheries in the Act, as well as a definition of "serious harm to fish", which is the death of fish or any permanent alteration to, or destruction of, fish habitat. Thus, according to modified Article 35 (1), "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery". Further, Article 36 (3) stipulates that "no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water".

According to Article 37(1) of the Fisheries Act, "If a person carries on or proposes to carry on any work, undertaking or activity that results or is likely to result in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, or in the deposit of a deleterious substance in water frequented by fish or in any place under any conditions where that deleterious substance or any other deleterious substance that results from the deposit of that deleterious substance may enter any such waters, the person shall, on the request of the Minister — or without request in the manner and circumstances prescribed by regulations made under paragraph (3)(a) — provide the Minister with any plans, specifications, studies, procedures, schedules, analyses, samples, evaluations and other information relating to the work, undertaking or activity, or to the water, place or fish habitat that is or is likely to be affected by the work, undertaking or activity, that will enable the Minister to determine:

a) whether the work, undertaking or activity results or is likely to result in any serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery, that constitutes or would constitute an offence under subsection 40(1) and what measures, if any, would prevent that result or mitigate its effects; or;
b) whether there is or is likely to be a deposit of a deleterious substance by reason of the work, undertaking or activity that constitutes or would constitute an offence under subsection 40(2) and what measures, if any, would prevent that deposit or mitigate its effects."

The Project does include activities and infrastructure likely to cause such damage to fish and/or which require the discharge of substances considered to be deleterious into waters where fish live. Indeed, with no other information than what is currently available, the mining waste rock would be considered deleterious while the tailings will be dumped into water bodies likely to contain fish. Lamêlée Iron Ore Ltd. will therefore need to comply with the requirements of Article 37(1).

Navigation Protection Act (SC 1985, c. N-22)

Article 3 of the Act stipulates that "It is prohibited to construct, place, alter, repair, rebuild, remove or decommission a work in, on, over, under, through or across any navigable water that is listed in the schedule except in accordance with this Act or any other federal Act". In the event that such a work was constructed, an authorization request would be submitted to Transport Canada.

Migratory Birds Convention Act (SC 1994, c. 22)

Canada hosts approximately 450 species of native birds, the majority of which are protected under the Migratory Birds Convention Act, 1994, and are collectively referred to as "migratory birds". Environment Canada is responsible for implementing the Migratory Birds Convention Act, which provides for the protection of migratory birds through the Migratory Birds Regulations and the Migratory Birds Sanctuary Regulations.

Species at Risk Act (SC 2002, c. 29)

The purposes of the Species at Risk Act are to prevent wildlife species in Canada from disappearing, to provide for the recovery of wildlife species that are extirpated (no longer exist in the wild in Canada), endangered, or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered or threatened. Once a species is listed under the Species at Risk Act registry, it becomes illegal to kill, harass, capture or harm it in any way. SARA can apply if a species at risk is found at any time throughout the year within a mining lease.

Metal Mining Effluent Regulations (MMER)

The Metal Mining Effluent Regulations (MMER) was registered on June 6, 2002 and is under the Fisheries Act. It applies to all Canadian metal mines (except placer mines) that exceed an effluent flow rate of 50 cubic metres per day and deposit effluent into fisheries waters at any time after the regulations were registered. The MMER also considers any seepage and surface drainage water discharged from the site as being effluents. Each mining effluent must be discharged from an identifiable final discharge point. The MMER prescribes limits for arsenic, copper, cyanide, lead, nickel, zinc, total suspended solids (TSS), radium-226, and pH in mine effluent. Mines subject to the MMER are also required to conduct Environmental Effects Monitoring (EEM) programs in accordance with prescribed criteria. The objective of EEM is to evaluate the effects of mining effluent on the receiving aquatic environment, specifically with regard to effects on fish, fish habitat, and the use of fisheries resources. The owner or operator must thus monitor effluent quality and flow at least once a week. The Regulations also include provisions for reducing metal sampling frequency to once per quarter on certain conditions. Sampling will go back to being once a week if these conditions are no longer met. Monthly acute lethality tests must be conducted on each discharged effluent, using the standardized 96-hour testing method on rainbow trout and conducting monitoring tests on *Daphnia magna*. Moreover, the MMER also includes a requirement that effluent be non-acutely lethal to rainbow trout. However, there is no requirement that the effluent be non-acutely lethal to *Daphnia magna*. The MMER includes provisions (regulatory amendment) allowing the use of a natural water body frequented by fish for mine waste disposal. Thus, to be able to list the water body on Schedule 2 of the MMER, the proponent must conduct an assessment of alternatives for mine waste disposal in order to demonstrate that the selected mine waste disposal site (MWDS) is the most environmentally, technologically and socio-economically sensible solution. The proponent must also develop a compensation plan to compensate fish habitat loss stemming from the use of the water body. The effluents discharged from the MWDS must meet the Regulations' discharge limits and other requirements.

Lamêlée Iron Ore Ltd. plans on using bodies of water that are home to different varieties of fish as a MWDS; it must comply with the requirements of the MMER. The targeted water bodies must be listed on Schedule 2 of the Regulations and thus this requires an assessment of alternatives for tailings and mining waste rock disposal.

20.1.3 Environmental Permitting Schedule

The environmental permitting schedules (both provincial and federal) are presented in Table 20.1 and Table 20.2. Steps that are shadowed in gray represent a statutory analysis delay.

Table 20.1 – Provisional Schedule – Provincial

Steps	Duration (days [a])	Deadlines	
Project notice	15	2015-01-05	2015-01-19
Reception of the directive	22	2015-01-19	2015-02-09
Realization and submission of the impact	315	2015-01-26	2015-12-10
Compliance analysis and transmission of questions (first series)	56	2015-12-11	2016-02-05
Review and submission of answers to questions (first series)	60	2016-02-08	2016-04-08
Compliance analysis and transmission of questions (second series)	45	2016-04-11	2016-05-23
Review and submission of answers to questions (second series)	30	2016-05-23	2016-06-20
Receivability notice	30	2016-06-21	2016-07-22
Mandate for public information and consultation (BAPE)	15	2016-07-22	2016-08-08
Public information and consultation period	45	2016-08-08	2016-09-20
Public hearings 1 and 2 (with a pause of 21 days between each)	22	2016-09-21	2016-10-13
Submission of the BAPE's report	53	2016-10-13	2016-12-05
Submission of the environmental analysis report	30	2016-11-21	2016-12-21
Issuing of the government decree	60	2016-12-21	2017-02-20
Total	**798**		

Notes :

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Table 20.2 – Provisional Schedule – Federal

Steps	Duration (days)	Deadlines	
Project notice	15	2015-02-02	2015-02-16
Post the notice of commencement on the Registry Internet Site	1	2015-02-17	2015-02-18
Comments on Project notice	10	2015-02-18	2015-03-02
Revised Project notice	5	2015-03-03	2015-03-09
Public and Aboriginal comment period in regards to the EIA guidelines	30	2015-03-09	2015-04-08
Final EIA guidelines produced and submitted to the proponent	30	2015-04-09	2015-05-08
Environmental impact assessment and submission	275	2015-03-23	2015-12-23
Analysis of concordance	20	2015-12-28	2016-01-18
Preparation of complementary information	48	2016-01-19	2016-03-07
Public and Aboriginal comment period in regards to the EIA summary	30	2016-03-07	2016-04-07
Federal examination and transmission of comments (first series)	49	2016-03-21	2016-05-09
Present the revised EIA or additional information	52	2016-05-10	2016-07-01
Revised EIA or additional information examination by the Agency and transmission of comments (second series)	20	2016-07-01	2016-07-22
Present the revised EIA or additional information	28	2016-07-25	2016-08-22
Revised EIA or additional information examination by the Agency	20	2016-08-23	2016-09-12
Preparation of the draft environmental assessment report	50	2016-09-05	2016-10-24
Public and aboriginal comment period in regards to the draft EAR	30	2016-10-25	2016-11-23
Present the final EAR to the Environment Minister	60	2016-11-24	2017-01-23
Minister recommendation	60	2017-01-23	2017-03-24
Registration to the schedule 2 of MMER [b]	365	2017-03-24	2018-03-23

Notes:

a) Calendar days

b) Administrative procedures for the deposit of deleterious substances into fish habitat.

Table 20.3 – List of Required or Potentially Required Permits and Authorizations

Activities or Infrastructure	Permits- C.A- Authorizations	Laws and Regulations	Government Authority	Timeframe	Cost
Mining Project (impact assessment required)	Government decree	Article 31.1 of the Environment Quality Act (EQA)	MDDELCC	24-28 months	$1,000,000
Construction of secondary roads	Certificate of Authorisation	Article 22 of the EQA	MDDELCC	3 months	$5,000
Clearing	Clearing permit for mining activities	Forest Act	MFFP	3 months	$2,500
Work affecting fish habitats or wildlife habitats	Certificate of Authorisation	Article 128.7 of the Act respecting the conservation and development of wildlife	MFFP	3 months	$5,000
Location of piles and management facilities	Authorisation	Article 241 of the Mining Act	MRN	3 months	$2,500
Mining lease	Mining lease	Article 100 of the Mining Act	MRN	1 months	?
Extraction or exploitation of surface mineral substances, borrow pits	Non-exclusive lease	Article 140 of the Mining Act	MRN	3 months	$ 2500
Construction of dykes	Certificate of Authorisation	Article 5 of the Dam Safety Act	*Centre d'expertise hydrique du Québec* - MDDELCC	3 months	$10,000
Setting up of infrastructure and equipment: • Permanent or temporary roads	Multiple Certificates of Authorisation	Article 22 of the EQA	MDDELCC	3 months for each	$100,000
Use of high-risk petroleum products	Permits	Article 120 of the Safety Code	*Régie du bâtiment du Québec*	1 month	$2,500
Water intake, drinking water, wastewater, conduits…	Certificate of Authorisation	Article 32 of the EQA	MDDELCC	3 months	$7,000
Storage, transport of explosives	Permits	Regulation under the Explosives Act	*Sûreté du Québec*	1 months	$2,500
Mining operations	Depollution Attestation	Article 31.10 of the EQA	MDDELCC	4-5 months	$10,000
Mining	Mining Certificate of Authorisation	Article 22 of the EQA	MDDELCC	3 months	$25,000
Installation of devices or equipment aimed at preventing,	Certificate of Authorisation	Article 48 of the EQA	MDDELCC	3 months	$5,000
Federal Government					
Federal impact assessment	Authorization	CEAA	CEAA	24 to 28 months	Included in the provincial impact assessment
Activities affecting fish habitat	Authorization	Article 35.1 and 36.3 of the Fisheries Act	DFO	5 months	$50,000
Disposal of mine tailings and/or deleterious substances into fish habitat	Analysis of alternatives	Article 36.3 of the Fisheries Act, MMER	EC and DFO	16 to 24 months	$100,000
Construction of dykes or watercourse crossings	Approval	Article 5 of the Navigation Protection Act	Transport Canada	1 month	$1,000
				TOTAL	**$1,328,000**

20.2 Environmental Baseline Study (benchmark)

20.2.1 Site Location

The Property is located some 560 km north of Baie-Comeau and 80 km south of the City of Fermont, Québec. The property is accessible via Route 389. ArcelorMittal Exploitation Minière Canada S.E.N.C.'s railway line also runs along Route 389 and passes near the site. The closest airport is in Wabush in Labrador and Newfoundland.

20.2.2 Summary Description of the Physical Environment

20.2.2.1 Climate and Air Quality

The Property is located in a region characterized by a cold climate, with long winters and moderate precipitations. Its proximity to the Maritimes means that it receives more precipitations than what is generally seen in Northern Québec at similar latitudes.

The climate is thus characterized by long winters and relatively short summers. A wide range of temperatures are experienced, with the extremes observed at Wabush Lake, some 75 km to the north-east, being -47.8°C and 33.3°C. January is the coldest month, with an average temperature of -21.9 °C, whereas July is the hottest month, with an average temperature of 13.8°C. There's an observable trend upwards, the annual average temperature having increased by 1.9°C over the last 50 years. Total annual precipitation reaches on average 844.1 mm, with the most abundant precipitation being in the summer months, particularly July. Some 60 % of precipitation falls in the form of rain from April to November (Environment Canada, 2014)

Air quality has not been measured in the area. However, given the location of the facilities, the assumption can be made that the air quality is good.

20.2.2.2 Geology and Geomorphology

From a geological point of view, the Property is located in the metamorphic portion of the Grenville Province. This is a Precambrian portion of the Labrador Trough Geosyncline. Thus severe alterations changed the sedimentary sequence of this trough made up of quartzite, dolomite, quatzofeldspathic gneiss, silicate-magnetite-iron formations, hematite-quartz-iron formations, crystalline dolomite and quatzofeldspathic graphite gneiss. The territory's relief is that of an undulating plain, cut by numerous lakes and networks of hills running roughly north-west – south-east.

20.2.2.3 Hydrography

The Project site is located in the watersheds of the Pékans and Little Manicouagan rivers. The source of the Little Manicouagan River is north-west of the sector and it flows towards the Manicouagan reservoir. The Pékans River, whose source is west of the City of Fermont, flows into the Moisie River.

There are numerous lakes of varying sizes in and around the mining property, including Lake Jean, Lake Lamêlée, and Lake Hobdad. Nearby are lakes Fire and Bergeron to the south, lake Peppler to the south-west, and lakes Gull and Gull Nord to the north. On the other side of Route 389, there is also Lake du Don.

The named watercourses crossing the eastern area include the Peppler and Little Manicouagan rivers. However, the property also is home to many permanent and intermittent watercourses.

20.2.3 Summary Description of the Biological Environment

20.2.3.1 Vegetation and Wetlands

The Project site is located in the boreal zone, in the continuous boreal forest sub-zone, within the eastern spruce-moss forest. The landscape is pretty uniform as the forest cover is clearly dominated by black spruce, forming a number of monospecific stands but also growing amongst various companion species, such as balsam fir. Fir stands only occupy the odd hillside. Some hardwood trees, such as white birch, trembling aspen and, to a lesser extent, balsam poplar, also grow in the area. The undergrowth consists of feathermoss and ericaceous shrubs. There are few herbaceous species. Given the amount of precipitation, the spruce-moss forest bioclimatic domain is divided into two sub-domains. The fire cycle, the main element in forest dynamics, is much longer than in the east, where there are more fir stands and a higher proportion of spruce in spruce stands (*Ministère des forêts, de la faune et des parcs* - MFFP, 2014).

According to land cover data, taken from the GeoBase Circa 2000, the majority of stands which cover the mining property consist of black spruce. There is also a small proportion of hardwood and mixed stands.

For their part, potential wetlands are mainly found bordering the watercourses that cross the property or in ground depressions.

20.2.3.2 Aquatic Wildlife

There is currently no data available regarding aquatic wildlife in lakes Jean, Lamêlée or Hobdad. However, brook trout (*Salvelinus fontinalis)* is usually omnipresent in most of the area's watersheds. Other species likely to be present in the area watersheds include: lake whitefish (*Coregonus clupeaformis)*, northern pike (*Esox lucius)*, pearl dace (*Margariscus margarita*), lake trout (*Salvelinus namaycush*), Arctic char (*Salvelinus alpinus*), lake chub (*Couesius plumbeus)*, mottled sculpin (*Cottus bairdii*), round whitefish (*Prosopium cylindraceum*), burbot (*Lota lota),* white sucker (*Catostomus commersoni)* and longnose sucker (*Catostomus catostomus)*.

20.2.3.3 Avifauna

The avifauna found in the Lamêlée sector is a product of the available habitats, such as forests, wetlands and aquatic environments. There is no specific data regarding the local bird community. Therefore, a list of species that could possibly be present during the breeding season has been compiled based on their ranges (Gauthier et Aubry 1995). This exercise generated a list of 95 species from 29 families (Table 20.4). There are potentially 15 and 3 species, respectively, from the Anatidae (geese and ducks) and Phasianidae (grouse and ptarmigan) families, of interest to hunters. There are 9 potential diurnal birds of prey (Pandionidae, Accipitridae and Flaconidae) species, and 4 potential nocturnal birds of prey (Strigidae) species.

Table 20.4 – List of Avifauna Species Potentially Frequenting the Territory

Family	English Name	Scientific Name
Gavidae	Common loon	*Gavia immer*
Anatidae	Canada goose	*Branta canadensis*
	American wigeon	*Anas americana*
	American black duck	*Anas rubripes*
	Mallard	*Anas platyrhynchos*
	Northern pintail	*Anas acuta*
	Green-winged teal	*Anas crecca*
	Ring-necked duck	*Aythya collaris*
	Lesser scaup	*Aythya affinis*
	Harlequin duck	*Histrionicus histrionicus*
	Black scoter	*Melanitta americana*
	Surf scoter	*Melaniita perspicillata*
	Common goldeneye	*Bucephala clangula*
	Hooded merganser	*Lophodytes cucullatus*
	Common merganser	*Mergus merganser*
	Red-breasted merganser	*Mergus serrator*
Ardeidae	American bittern	*Botaurus lentiginosus*
Pandionidae	Osprey	*Pandion haliaetus*
Accipitridae	Northern harrier	*Circus cyaneus*
	Bald eagle	*Haliaeetus leucocephalus*
	Golden eagle	*Aquila chrysaetos*
	Sharp-shinned hawk	*Accipiter striatus*
	Northern goshawk	*Accipiter gentilis*
	Red-tailed hawk	*Buteo jamaicensis*
Falconidae	American kestrel	*Falco sparverius*
	Merlin	*Falco columbarius*
Phasianidae	Ruffed grouse	*Bonasa umbellus*
	Spruce grouse	*Falcipennis canadensis*
	Willow ptarmigan	*Lagopus lagopus*
Scolopacidae	Greater yellowlegs	*Tringa melanoleuca*
	Solitary sandpiper	*Tringa solitaria*
	Spotted sandpiper	*Actitis macularius*
	Least sandpiper	*Calidris minutilla*
	Short-billed dowitcher	*Limnodrumus griseus*
	Wilson's snipe	*Gallinago delicata*
Laridae	Herring gull	*Larus argentatus*
	Common tern	*Sterna hirundo*
	Arctic tern	*Sterna paradisaea*
Strigidae	Great horned owl	*Bubo virginianus*
	Northern hawk-owl	*Surnia ulula*
	Short-eared owl	*Asio flammeus*
	Boreal owl	*Aegolius funereus*
Caprimulgidae	Common nighthawk	*Chordeiles minor*
Alcedinidae	Belted kingfisher	*Megaceryle alcyon*
Picidae	Downy woodpecker	*Picoides pubescens*
	Hairy woodpecker	*Picoides villosus*
	Black-backed woodpecker	*Picoides arcticus*
	American three-toed woodpecker	*Picoides dorsalis*
	Northern flicker	*Colaptes auratus*
Tyrannidae	Olive-sided flycatcher	*Contopus cooperi*
	Acadian flycatcher	*Empidonax alnorum*
	Yellow-bellied flycatcher	*Empidonax*
Vireonidae	Red eyed vireo	*Vireo olivaceus*
Corvidae	Gray jay	*Perisoreus*
	American crow	*Corvus*
	Common raven	*Corvus corax*
Alaudidae	Horned lark	*Eremophila alpestris*
Hirundinidae	Tree swallows	*Tachycineta bicolor*
Paridae	Boreal chickadee	*Poecile hudsonicus*
Sittidae	Red-breasted nuthatch	*Sitta canadensis*
Troglodytidae	Winter wren	*Troglodytes hiemalis*
Regulidae	Golden crowned kinglet	*Regulus satrapa*
	Ruby-crowned kinglet	*Regulus calendula*
Turdidae	Gray-cheeked thrush	*Catharus minimus*
	Swainson's thrush	*Catharus ustulatus*
	Hermit thrush	*Catharus guttatus*
	American robin	*Turdus migratorius*
Sturnidae	European starling	*Sturnus vulgaris*
Bombycillidae	Cedar waxwing	*Bombycilla cedrorum*
	Bohemian waxwing	*Bombycilla garrulus*
Parulidae	Tennessee warbler	*Oreothlypis*
	Orange-crowned warbler	*Oreothlypis celata*
	Nashville warbler	*Oreothlypis*
	Yellow warbler	*Setophaga petechia*
	Magnolia warbler	*Setophaga magnolia*
	Yellow-rumped warbler	*Setophaga coronata*
	Black-throated green warbler	*Setophaga virens*
	Palm warbler	*Setophaga palmarum*
	Blackpoll warbler	*Setophaga striata*
	American redstart	*Setophaga ruticilla*
	Northern waterthrush	*Parkesia*
	Wilson's warbler	*Cardellina pusilla*
Emberizidae	Fox sparrow	*Passerella iliaca*
	Savannah sparrow	*Passerculus*
	Lincoln's sparrow	*Melospiza lincolnii*
	Swamp sparrow	*Melospiza georgiana*
	White-throated sparrow	*Zonotrichia albicollis*
	White-crowned sparrow	*Zonotrichia*
	Dark-eyed junco	*Junco hyemalis*
Icteridae	Rusty blackbird	*Euphagus carolinus*
Fringillidae	Pine grosbeak	*Pinicola enucleator*
	White-winged crossbill	*Loxia leucoptera*
	Common redpoll	*Acanthis flammea*
	Pine siskin	*Spinus spinus*

20.2.3.4 Mammals

There are many species of mammals, including large animals, fur animals as well as small animal species and micromammals, which are likely to frequent the territory.

The large animals likely to frequent the Project site are from the woodland caribou, moose and black bear forest ecotypes. Woodland caribou is an ecotype that is both considered threatened in Canada under the Species at Risk Act, and vulnerable in Québec under the Act respecting threatened or vulnerable species.

There are 19 small animal species likely to frequent the territory, 15 of which are fur animals (Table 20.5**Erreur ! Source du renvoi introuvable.**). The most abundant species potentially found are the grey wolf, Canada lynx, snowshoe hare and grouse species. The species usually present in smaller numbers in this sector include the red fox, ermine, American beaver and porcupine.

Table 20.5 – List of Small Animal Species likely to Frequent the Territory

Species	Scientific Name
Red squirrel	Tamia sciurus
Northern flying squirrel	Glaucomys sabrinus
Snowshoe hare	Lepus americanus
Groundhog	Marmota monax
American porcupine	Erethizon dorsatum
Beaver	Castor canadensis
Ermine	Mustela erminea
Least weasel	Mustela nivalis
Long-tailed weasel	Mustela frenata
American marten	Martes americana
Fisher	Martes pennanti
American mink	Mustela vison
Wolverine	Gulo gulo
Striped skunk	Mephitis mephitis
River otter	Lutra canadensis
Red fox	Vulpes vulpes
Grey wolf	Canis lupus
Canada lynx	Lynx canadensis
Muskrat	Ondatra zibethicus

20.2.3.5 Herpetofauna

Quebec herpetofauna includes 16 species of reptiles and 21 species of amphibians. The latter group is particularly linked to wetlands. According to the Atlas of Amphibians and Reptiles of Quebec (Bider et Matte 1994), seven species of amphibians and reptiles are likely to frequent the territory (Table 20.6).

Table 20.6 – List of Herpetofauna Species likely to Frequent the Territory

Order	Species	Habitat
Urodela	Blue-spotted salamander	In the soil, on woody debris or rocks in forests, les ecotones and bogs near breeding ponds
	Northern two-lined salamander	Watercourses with rocky substrates, lakes shores
Anura	American toad	Various habitats
	Spring peeper	Various habitats
	Wood frog	Forests
	Mink frog	Various permanent aquatic environments
Squamates	Common garter snake	Various habitats

20.2.3.6 Species at Risk

There is currently no available data regarding the possible presence of threatened or vulnerable plant species or species likely to be designated as such for the projected mining site.

According to the wildlife species' range, six terrestrial wildlife species at risk are likely to frequent the study area. The woodland caribou, whose ecotype is considered both threatened in Canada under the Species at Risk Act and vulnerable in Québec under the Act respecting threatened or vulnerable species, frequents the site. However, it is unlikely that wolverines which are designated as threatened in Québec and of special concern in Canada according to COSEWIC (2014), are present. The weasel, which is the least to be potentially present, is a species likely to be designated threatened or vulnerable. The rock vole and southern bog lemming are two micromammal species likely to be designated threatened or vulnerable in Québec, which also could be found in the area. Finally, the little brown bat is endangered according to COSEWIC (2014).

As for ''at-risk'' avifauna species, there are seven federally - or provincially-designated special-status species potentially present in the region according to their ranges, namely: the common nighthawk, the olive-sided flycatcher, the rusty blackbird, the golden eagle, the bald eagle, the short-eared owl and the harlequin duck.

20.2.4 Summary Description of the Human Environment

20.2.4.1 Land Development, Tenure and Zoning

The mining property is located within the unorganized territory of Rivière-Mouchalagane, in the Caniapiscau RCM, on the Côte-Nord (Region 09).

The majority of land in this sector is public, belonging to the Government of Québec. Road 389 right-of-way belongs to the *Ministère des Transports du Québec* (MTQ).

Two main authorities share responsibility for land development and resource management in limited study area, namely the Caniapiscau RCM and the *Ministère des Ressources Naturelles*. Besides the RCM's land use plan, which indicates that the mining property is located in an area whose proposed use is "natural resources", which authorizes mining, the mining site also falls under the *Plan régional de développement du territoire public – Côte-Nord* (PRDTP) (MRNF 2005) which is the preferred instrument for promoting harmonious development of public lands taking into consideration the region's economic, social and environmental interests. The projected mining site is located in PRDTP zone classified as "multiple use" where the intention is to "use the territory and develop its resources".

Being north of the 49th parallel, the Project is within the territory covered by the Plan Nord, which puts particular emphasis on developing mineral resources.

20.2.4.2 Land Use

<u>Built Environment and Recreation</u>

The limited study area has almost no built areas, except for a few cabins as well as ArcelorMittal Exploitation Minière Canada's (Fire Lake) and Champion Iron Mines Ltd.'s (Fire Lake North) mining facilities.

Two recreational leases have been issued for the leasing of land for recreational purposes, south-west of Lake Hobdad and bordering the Little Manicouagan River (Gestim mines 2014).

<u>Recreational Tourism</u>

The Caniapiscau RCM is part of the Duplessis tourism region. The Caniapiscau RCM is known for its large-scale mining sites. The area is also frequented for hunting, fishing, canoeing and hiking, as well as snowmobiling.

The *Défi du Grand Nord* snowmobile trail connects Port-Cartier (to the south) with Fermont (to the north). This 400-km long trail is unmarked and unmaintained, and needs a professional guide to use (FCMQ 2014). It is divided into two parts, namely the *Vers le Grand Nord* section, running north-south, and the Fire Lake trail, running east-west. From Port-Cartier one can travel to Fire Lake using the *Vers le Grand Nord* section by staying alongside the rail line on the eastern side. The Fire Lake trail, running east-west, links Fire Lake and Fermont. It passes Lake Knife where there is a base.

In terms of sport fishing, hunting and trapping, the mining site is within Fishing Zone 19 south, in the north-west portion of Hunting zone 19 south and within the management unit of furbearing animals (UGAF) 60. The fish species most often caught are brook trout, lake trout and northern pike. The occasional Arctic char is also caught. In terms of sport hunting, the species hunted are the moose and black bear. Small game species most likely to be hunted within the extended study area include ruffed grouse, willow ptarmigan and snowshoe hare.

Mining

According to Gestim mines (2014), the vast majority of the Lake Lamêlée sector territory is covered by active mining claims. The claims are distributed among the following companies: ArcelorMittal Exploitation Minière Canada S.E.N.C, Cliffs Québec Mine de fer Ltée, Champion Iron Mines Ltée, Quinto Mining Corp.

Finally, it should be mentioned that within the extended study area, mining exploration is forbidden within the territory of the projected Moisie River biodiversity reserve and allowed with conditions within the territory of the Hart Jaune River heritage site.

Forestry Operations

The majority of the Caniapiscau RCM's territory consists of public forest. Resinous trees, mainly black spruce and balsam fir, dominate at 96 %. The extremely slow regeneration of forests at these latitudes, distance from processing centres, and high production costs mean the forest has a low commercial value, except for areas to the south of the RCM. Thus, there are no commercial forestry operations within the Caniapiscau RCM, given the low cost-effectiveness of such operations, particularly north of the 52th parallel. The territory's only forestry activity is the gathering of heating wood by the local population (Caniapiscau RCM 1999)

Infrastructure

Extending over 570 km, Route 389 connects Route 138, at the City of Baie-Comeau, with Fermont, near the Labrador border. Route 389 was recognized in 2005 by the MTQ as being part of the National Highway System.

A rail line crosses the restricted study area from the north to the south. It belongs to AMMC and is used to transport iron ore concentrate from Mont-Wright to Port-Cartier. It runs over 420 km.

A 161-kV power line from the Hart-Jaune substation crosses the Fire Lake and Lake Lamêlée sector. It connects to the Lac-Hope substation located at Fire Lake.

Heritage, Archaeology

There are no known heritage elements protected under the Cultural Property Act registered in the *Registre du patrimoine culturel du Québec* (MCC, 2014).

Aboriginal Land Use

The Hart Jaune River is among the heritage sites covered in Schedule 4.6 of the Agreement-in-Principle of General Nature between the First Nations of Mamuitun and Nutashkuan and the Government of Quebec and the Government of Canada. This First Nation of Betsiamites heritage site includes the portion of the Little Manicouagan River to the south of Lake Peppler. Thus, since the Nitassinan of Betsiamites extends to the Little Manicouagan River, the Project site is included and this territory is thus likely to be used by the Innues for hunting, fishing and trapping, as well as gathering small fruit and plants of interest to Aboriginals.

However, the territory at this latitude is subdivided into nine Aboriginal trapping lots for the Innu community of Uashat mak Mani-Utenam (variable sized parts of the Saguenay beaver reserve's Trapping Lots 237, 242a, 243, 244, 245, 246, 255, 256 and 257). The Project site is included in Trapping Lot 255.

Landscape

Regionally, the extended study area is part of the Central Laurentides mountains natural province (MDDELCC, 2014). This natural province is to the north and east of the Manicouagan reservoir. The relief is generally uniform and consists of low hills and slopes. Typical vegetation consists of black spruce and moss forests. This unit's landscape is 100% forest.

20.2.5 Summary and Required Additional Data

Despite the previous summary description of the environmental and social components, the information remains incomplete with regard to the requirements of the required legal environmental assessment procedure. Thus, additional data will need to be gathered so as to meet government requirements in terms of specific biophysical and social data. The following additional work will need to be carried out:

- Geochemical study of tailings and waste rock
- Hydrogeological study
- Atmospheric modeling
- Hydrology and water quality
- Vegetation and wetlands inventory
- Photo-interpretation of the study area
- Complete characterization of fish habitat
- Identification of wildlife habitats
- Consultations with relevant socio-economic organizations
- Consultations with Aboriginals
- Archaeological potential study
- Landscape components inventory

20.3 Project Components likely to affect the Environment

20.3.1 General Description

The Project consists in the establishment of an open-pit mine and an industrial complex for the production of iron concentrate at the mining property, south of Fermont. It also includes transporting iron concentrate via ArcelorMittal's rail line between the mine and the City of Port-Cartier. The Project's main structures include:

- Two pits;
- Two waste rock piles;
- A overburden pile;
- A tailings management facility;
- A crusher

- An industrial complex to be used for processing the ore;
- A silo;
- A section of rail line to connect to the ArcelorMittal line;
- A water treatment system with sedimentation basins;
- An industrial wastewater treatment system;
- A camp;
- A water supply system;
- A wastewater treatment system;
- A regular and hazardous waste storage, management and recycling facility;
- An explosives storage site;
- Secondary roads on the site;
- A fuel park and fuelling stations.

The open pit will be mined conventionally as per this type of pit. Drilling and blasting will be used to extract ore and waste rock. The material will be loaded onto trucks then transported to a primary crusher close to the concentrator, while the waste rock will be dumped on the nearby piles. The concentrator will use a conventional gravity separation circuit to increase iron concentrations and produce iron concentrate. The final concentrate will be dried during the winter to avoid the formation of an ice block. Tailings will be thickened before being disposed of in a tailings management facility.

The tailings management facility will be located in the mining property's south-east section. A sedimentation basin will be installed downstream from the tailings management facility. The basin's effluent will be treated so as to comply with applicable regulations and requirements, such as those contained in Directive 019 on the mining industry and the MMER, before being discharged into the environment.

Two waste rock pile locations and one overburden pile have been determined. So far, no geochemical characterization study has been conducted on the waste rock. However, based on current knowledge of the characteristics of the waste rock extracted by mining companies in the region, it is assumed that the waste rock will not likely show any acid-generating potential. A more extensive characterization program will be conducted in the future.

The iron concentrate will be transported to the Port-Cartier port facilities via existing railway line. Lamêlée Iron Ore Ltd. has indeed concluded a memorandum of understanding with Canada Steamship Lines for the transhipment of iron ore concentrate by ship from Port-Cartier. An agreement has also been concluded with the City to guarantee access to the municipal wharf.

The Project's electricity will be provided by the 161-kV Hydro-Québec line situated to the east of the mining property, along the current Route 389.

20.3.2 Main Construction Phase Activities

Typically, the construction phase activities could include:

- Tree clearing;
- Soil stripping;
- Landscaping and levelling work;
- Drilling and blasting;
- Drainage activities;
- Borrow pit extraction;
- Common facility building activities;
- Traffic and transport;
- Waste management.

20.3.3 Main Activities planned for the Production Phase

The following activities are planned for the production phase:

- Ore extraction, treatment, handling and storage;
- Rail transport and transhipment activities;
- Various facility and machinery maintenance activities;
- Road traffic;
- Tailings and waste rock management;
- Water management;
- Waste storage and management.

20.4 Main Issues or Anticipated Impacts

Given the Project components described in the previous section (1), and based on available data on the environment (Section 1**Erreur ! Source du renvoi introuvable.**), a summary assessment of the Project's main impacts has been conducted for the construction, production and closure phases and is presented hereinafter.

20.4.1 Identification of Environmental and Social Impacts

The project's related environmental and social issues as well as the main mitigation measures are described in the following Table 20.7, 20.8 and 20.. together with preliminary mitigation measures. The optimization of the Project design will also be aimed at reducing the potential impact of environmental and social issues.

Table 20.7 – Project's Environmental Issues and Preliminary Mitigation Measures – Construction phase

Envir.	Component	Potential Impact	Mitigation Measures
Physical	**Air quality**	Emission of dust, GHG and other contaminants into the ambient air generated by the work site and machinery traffic	Use a dust suppressant if machinery traffic generates too much dust. The machinery used shall meet Environment Canada's emission standards for on-road and off-road vehicles. The machinery's idling time will be minimized
	Hydrology	Changes in the local flow regime	Temporarily disturbed flows will be progressively re-established after the work to avoid any sudden flow changes
	Hydrogeology	Increase in runoff rate. Changes in the local groundwater flow regime	A network of monitoring wells will be established around the new infrastructure, to check for changes in water levels.
	Groundwater quality	Risk of groundwater contamination through the accidental spillage of oils, hydrocarbons or any other dangerous liquids	The number of machinery fuelling sites will be minimized to reduce the number of at-risk sites. Any eventual leaks due to faulty valves or human error will be reported to the environmental overseer and, depending on the case, to maintenance for repair. Soaked surface soil will be immediately dug up and disposed of as per regulations
	Surface water quality	Discharge of fine particles and woody debris into the water. Risk of surface water contamination through the accidental spillage of oils, hydrocarbons or any other dangerous liquids	The number of machinery fuelling sites will be minimized to reduce the number of at-risk sites. Any eventual leaks due to faulty valves or human error will be reported to the environmental overseer and, depending on the case, to maintenance for repair. Soaked surface soil will be immediately dug up and disposed of as per regulations
	Soil quality	Risk of soil contamination through the accidental spillage of oils, hydrocarbons or any other dangerous liquids	The number of machinery fuelling sites will be minimized to reduce the number of at-risk sites. Any eventual leaks due to faulty valves or human error will be reported to the environmental overseer and, depending on the case, to maintenance for repair. Soaked surface soil will be immediately dug up and disposed of as per regulations.
Biological	**Vegetation and wetlands**	Loss of area – disturbance of vegetation	Minimize the new infrastructure's total footprint.
	Aquatic wildlife and habitats	Changes to fish habitat and its quality, even destruction of fish habitat and fish mortality	Minimize as much as possible encroachment in lakes and watercourses.
	Avifauna	Loss of habitat – disturbance of wildlife	The construction work will be conducted if possible outside the breeding season of the main species present at this latitude
	Terrestrial wildlife	Loss of habitat – disturbance of wildlife	The construction work will be conducted if possible outside the breeding season of the main species present at this latitude
	Species at risk	Unknown at this stage- lack of data.	Reduce the Project's footprint.
Human	**Land development- land tenure**	No impact	
	Land use	One-off changes in the practice of certain wildlife harvesting activities	
	Economy	Economic spinoffs for Fermont and Côte-Nord suppliers	
	Aboriginal communities	Innu encroachment and land use (Nitassinan of Betsiamites)	Signing of an agreement with the affected Aboriginal community
	Landscape	Changes to landscape units and associated visual fields	During the design phase, the configuration of piles and the tailings management facility as much as possible in harmony with the surrounding relief's natural topography
	Archaeology	Unknown at this stage- lack of data.	If, during the course of the work, vestiges of historical or archaeological interest were to be discovered, the work site overseer would be immediately informed and provisions made for the site's protection.

Table 20.8 – Project's Environmental Issues and Preliminary Mitigation Measures – Production phase

Envir.	Component	Potential Impact	Mitigation Measures
Physical	**Air quality**	Emission of dust, GHG and other contaminants into the ambient air generated by the work site and machinery traffic	Use a dust suppressant if machinery traffic generates too much dust. The machinery used shall meet Environment Canada's emission standards for on-road and off-road vehicles. The machinery's idling time will be minimized
	Hydrology	Changes in the local flow regime	
	Hydrogeology	Changes in the local groundwater flow regime	
	Groundwater quality	Risk of groundwater contamination through the accidental spillage of oils, hydrocarbons or any other dangerous liquids	The number of machinery fuelling sites will be minimized to reduce the number of at-risk sites. Any eventual leaks due to faulty valves or human error will be reported to the environmental overseer and, depending on the case, to maintenance for repair. Soaked surface soil will be immediately dug up and disposed of as per regulations
	Surface water quality	Discharge of fine particles and woody debris into the water. Risk of surface water contamination through the accidental spillage of oils, hydrocarbons or any other dangerous liquids	The number of machinery fuelling sites will be minimized to reduce the number of at-risk sites. Any eventual leaks due to faulty valves or human error will be reported to the environmental overseer and, depending on the case, to maintenance for repair. Soaked surface soil will be immediately dug up and disposed of as per regulations
	Soil quality	Risk of soil contamination through the accidental spillage of oils, hydrocarbons or any other dangerous liquids	The number of machinery fuelling sites will be minimized to reduce the number of at-risk sites. Any eventual leaks due to faulty valves or human error will be reported to the environmental overseer and, depending on the case, to maintenance for repair. Soaked surface soil will be immediately dug up and disposed of as per regulations.
Biological	**Vegetation and wetlands**	Minor disturbance of the vegetation	.
	Aquatic wildlife and habitats	Changes to fish habitat and its quality (mining effluent)	Reuse of process water. Rigorous water management.
	Avifauna	Negligible	
	Terrestrial wildlife	Negligible	
	Species at risk	Negligible	
Human	**Land development- land tenure**	Negligible	
	Land use	One-off changes in the practice of certain wildlife harvesting activities	
	Economy	Economic spinoffs for Fermont and Côte-Nord suppliers	
	Aboriginal communities	Innu encroachment and land use (Nitassinan of Betsiamites)	
	Landscape	Changes to landscape units and associated visual fields	The configuration of piles and the tailings management facility as much as possible in harmony with the surrounding relief's natural topography
	Archaeology	No impact	

Table 20.9 – Project's Environmental Issues and Preliminary Mitigation Measures – Closure phase

Envir.	Component	Potential Impact	Mitigation Measures
Physical	**Air quality**	Temporary increase then reduction in the emission of dust and other contaminants into the air	Use a dust suppressant if machinery traffic generates too much dust. The machinery used shall meet Environment Canada's emission standards for on-road and off-road vehicles. The machinery's idling time will be minimized
	Hydrology	Changes in the local flow regime after dismantlement of the infrastructure	
	Hydrogeology	No impact	.
	Groundwater quality	Possible percolation	
	Surface water quality	Risk of soil contamination through the accidental spillage of oils, hydrocarbons or any other dangerous liquids during closure work	The number of machinery fuelling sites will be minimized to reduce the number of at-risk sites. Any eventual leaks due to faulty valves or human error will be reported to the environmental overseer and, depending on the case, to maintenance for repair. Soaked surface soil will be immediately dug up and disposed of as per regulations
	Soil quality	Risk of soil contamination through the accidental spillage of oils, hydrocarbons or any other dangerous liquids during closure work	The number of machinery fuelling sites will be minimized to reduce the number of at-risk sites. Any eventual leaks due to faulty valves or human error will be reported to the environmental overseer and, depending on the case, to maintenance for repair. Soaked surface soil will be immediately dug up and disposed of as per regulations
Biological	**Vegetation et wetlands**	Vegetation – Introduction of alien invasive species during revegetation	It is recommended that locally-sourced indigenous species be used in priority to avoid introducing alien invasive species
	Aquatic wildlife and habitats	Negligible	
	Avifauna	Negligible	
	Terrestrial wildlife	Negligible	
	Species at risk	Unknown at this stage- lack of data.	
Human	**Land development- land tenure**	No impact	
	Land use	No impact	The rehabilitation and restoration work will restore a more natural state to the site adapted to the surroundings
	Economy	Economic spinoffs for Fermont and Côte-Nord suppliers	
	Aboriginal communities	Negligible	
	Landscape	Changes to landscape units and associated visual fields	Configuration of the site as much as possible in harmony with the surrounding relief's natural topography
	Archaeology	No impact	

20.4.1.1 Compensation Program

20.4.1.2 Fish Habitat

A program to compensate for the loss of fish habitat is also required as per Article 27.1 of the MMER to counter balance fish habitat losses associated with the storage of a deleterious substance in one or more water bodies.

Further, Subsection 35(2) of the Fisheries Act requires fish habitat compensation to compensate for the losses of fish habitat associated with the construction of the works themselves, such as a tailings dam. Compensation for loss of fish habitat is defined by the Department of Fisheries and Oceans' (DFO) Habitat Management Program as replacement of natural habitat, increase in productivity of existing habitat, or maintenance of fish production by artificial means' (DFO 1986). Compensation is considered as a management option only if proposed activities affecting habitat cannot be avoided by redesign, relocation, or by mitigating potential impacts. The main goal of any compensation program is to offset the loss of 'productive capacity' described in the 'no net loss' guiding principle outlined in the DFO Policy for the Management of Fish Habitat in Canada.

In the case of the Project, a preliminary loss calculation has established that nearly 9 ha of lakes and 1,000 metres of watercourse will be affected by the infrastructure construction and installation work (management facilities, piles, basins).

20.4.1.3 Wetlands

Under the Environment Quality Act and the Act Respecting Compensation Measures for the Carrying out of Projects Affecting Wetlands or Bodies of Water, it falls to the MDDELCC to authorize or not any projects affecting ponds, swamps, marshes and bogs. These measures specifically target the restoration, creation, protection or ecological enhancement of wetlands as well as water and terrestrial environments, in the latter case nearby the affected area. In the case of projects affecting wetlands, the MDDELCC favours an "avoid-minimize-compensate" sequence of mitigation which limits wetland loss (avoid), proposes design and implementation elements that optimize project quality while reducing impacts on the receiving environment (minimize) and establishes the environmental acceptability of proposed compensation measures (compensate).

In the case of the Project, the preliminary loss calculation has established that 32.5 ha of wetlands will be affected.

A compensation plan will help determine the measures to be taken and will summarily describe the nature of planned compensation actions. It will specify how these will be implemented and monitored.

20.5 Preliminary Environmental Management Plan

20.5.1 Environmental Surveillance

There will be environmental surveillance during the Project's construction phase, consisting in ensuring compliance with environmental commitments and obligations.

It also aims to check the incorporation or proposed mitigation measures into the Project and to ensure compliance with laws, regulations and other environmental considerations in the plans and specifications.

This general environmental surveillance will be conducted by the Project proponent. Surveillance tasks will include:

- Monitoring and overseeing all tasks requiring preventative, mitigation or corrective measures with regard to the environment;
- Ensuring that the work is carried out in compliance of the laws, regulations and conditions of the certificates of authorisation;
- Monitor infrastructure under construction ;
- Update project-generated hazardous waste storage and disposal condition monitoring registries;
- Monitor fuelling procedures for gas-powered equipment used for the project;
- Guide and monitor procedures to implement in case of accidental spillage, including monitoring temporary storage conditions for contaminated soil, if applicable;
- Ensure that schedules are met with regard to biologically-based restriction periods and adequate environmental monitoring related to the Project.

One of the surveillance program's activities will be to ensure that all required authorizations and permits have been requested and all certificates and permits have been duly obtained.

During the work, the mitigation measures shall be rigorously followed, especially when working near watercourses and water bodies. Care will be taken to ensure that as little suspended matter possible is discharged into the water, as well as avoiding any accidental leaking of oil products, etc.

In general, the environmental overseer shall regularly visit work areas, take note of the rigorous compliance by workers with various commitments, obligations, measures and other requirements, assess the quality and effectiveness of applied measures and note any non-compliance observed. He shall then inform the worksite overseer of his observations so that the appropriate corrective measures be agreed upon and implemented as soon as possible, if applicable.

20.5.2 Environmental Monitoring

An environmental monitoring program for the entire mining site shall be developed, both for the production phase and the closure phase. In accordance with federal and provincial requirements, the mining site's environmental monitoring will cover the following aspects:

- Mining effluent quality
- Domestic effluent quality;
- Surface water quality;
- Groundwater quality;
- Stability of retaining structures;
- Air quality;
- Monitoring of compensatory development and biological monitoring;
- Social environment;
- Post-closure monitoring.

The following paragraphs will present each aspect of the environmental monitoring program.

20.5.2.1 Mining Effluent Quality

The purpose of monitoring the mining effluents is to ensure that their quality complies with applicable standards and criteria, and to gather information which will be useful in assessing and interpreting the results of biological monitoring (benthos and fish). Further, it also verifies the effectiveness of mitigation measures implemented to reduce the potential impacts of the mining activities. Effluent monitoring includes mining effluent characterisation and sublethal toxicity testing using samples taken from the effluent.

Provincial Government Requirements

According to Directive 019, the operator must maintain or implement a wastewater monitoring network. Two types of monitoring must take place, regular monitoring and annual monitoring. Regular monitoring includes the grab sampling of each final effluent. A respective minimum of 24 hours, 4 days and 15 days is required between measurements or sampling for the parameters covered by tri-weekly, weekly and monthly monitoring. Sampling frequency will be maintained until the final cessation of mining activities. Annual monitoring will include once-a-year analysis and measurement of all required parameters, during the month of July or August or during the first flow days following the summer period. Annual sampling and monitoring are conducted during a single day and thus replace regular weekly and monthly monitoring for the week and month during which sampling takes place.

Federal Government Requirements

The Project should be subject to the MMER under the Fisheries Act. The Regulations require mines to develop and implement an aquatic Environmental Effects Monitoring (EEM) program for their site-specific effluents. According to the EEM program's requirements, the initial biological monitoring plan must be presented to Environment Canada for approval 12 months after the date at which the mine becomes subject to Article 7 of the MMER and no later than 6 months before the beginning of biological monitoring. As part of the EEM, effluent is currently characterized four times a year, no less than one month apart, on aliquots of effluent taken as per articles 12 and 13 of the MMER. A grab sample or composite sample of effluent is taken at least once a week and at a minimum interval of 24 hours, to register without delay the pH and concentrations of deleterious substances listed in Column 1 of Appendix 4 of the MMER.

Moreover, acute toxicity testing is conducted each month. They could be conducted once per quarter if established that the effluent hasn't generated any acute lethality for 12 consecutive months. These tests are conducted on rainbow trout and *Daphnia magna*.

Finally, the federal government-related environmental monitoring program also calls for biannual sublethal toxicity testing of effluents for 3 years on an effluent, then once per year afterwards. For each test, grab samples from the effluents are taken by the mine's personnel in plastic containers and sent by air to the analysis laboratory. For effluents discharged into freshwater, Environment Canada sets the tests to be conducted. Regarding tests conducted on *P. subcapitata*, mines can use either Environment Canada's protocol or the protocol published by the *Centre d'expertise en analyse environnementale du Québec* (CEAEQ). Sublethal toxicity testing is used to assess the effects of exposure to effluent on:

- Fathead minnow (*Pimephales promelas*) larvae growth and survival;
- *Ceriodaphnia dubia* (crustacean) reproduction and survival;
- *Pseudokirschneriella subcapitata* (microscopic green algae) growth;
- *Lemna minor* growth.

20.5.2.2 Domestic Effluent Quality

In the event that domestic effluent was established after the installation of the mining camp, this effluent's quality would need to be monitored.

20.5.2.3 Surface Water Quality

Surface water quality monitoring is conducted within the framework of the MMER's EEM for the federal government. It aims to provide information on the concentrations of contaminants in the exposure area as compared to the reference area (area not affected by the mine's operations). It includes the taking of two water samples, one sample at the exit of the final effluent (exposure area) and one sample from the reference area. Samples will be collected four times per year, no less than one month apart.

20.5.2.4 Groundwater Quality

In accordance with Directive 019, groundwater quality monitoring will consist in sampling groundwater and measuring water levels in the observation wells. This monitoring will be conducted twice a year, in the spring after the snow has melted when the water table is at its highest, and in the summer during low-water periods. Directive 019 mentions that the establishment of warning thresholds for each parameter to guard against loss of use of the protective surface waters. Warning thresholds usually equal 50 % of the criteria for seepage (*Résurgence dans les eaux de surface et infiltration dans les égouts* - RESIE) unless the natural background levels are higher.

20.5.2.5 Monitoring the Stability of Retaining Structures

A program to monitor the retaining structures (dams) is required under the Dam Safety Act (CQLR Chapter S-3.1.01). For the application of this Act, “dams” refer to structures used to divert or retain the waters of a watercourse or of a lake or reservoir mentioned in the *Répertoire toponymique du Québec*. The monitoring program includes the maintaining of a dam registry and systematic visual inspections throughout the year.

20.5.2.6 Air Quality Monitoring

In Quebec, air quality monitoring is governed by the Clean Air Regulation which among other things sets applicable standards for the emission of contaminants into the atmosphere, the frequency of controls and the number of parameters to be measured. The most problematic mine-related air contaminants are suspended particles. Monitoring should comply with the requirements specified in the *Guide de caractérisation et de suivi de l'air ambiant* (Couture, 2005). Sampling shall be conducted according to the procedures and reference methods set forth in the *Guide d’échantillonnage à des fins d’analyses environnementales – Cahier 4 – Échantillonnage des émissions atmosphériques en provenance de sources fixes*. A sampling report is systematically produced and sent to the Ministère.

20.5.2.7 Monitoring of Compensatory Development and Biological Monitoring

Aquatic Wildlife

Under the MMER, an EEM is required to determine the anticipated effects on the biophysical environment. The purpose of biological monitoring studies is to assess the effects of treated mining effluent on fish and their habitat as well as the effectiveness of mitigation measures.

Studying the Benthic Invertebrate community is a widely-used monitoring tool for indicating the state of fish habitat. According to the EEM guide, benthic invertebrate sampling should take place during the period of the year when benthic invertebrate diversity is at its peak. Benthos sampling is thus conducted in the fall. The comparison between data from the reference area and the exposure area will help assess the real effects of these project components on fish and their habitat. The community descriptors set forth in the Technical Guide (Environment Canada 2011) are then calculated for each station and for each area. Benthos environmental monitoring will last for the total lifespan of the Project and the closure phase.

The recommended method for conducting the study of fish consists in examining adult specimens of two relatively sedentary fish species who have been exposed to the effluent for an extended period. To assess the effluents' effect on the use of fish resources, two types of studies are conducted, namely the analysis of mercury in comestible fish tissue and the assessment of changes (taste and odour) to fish, if well-documented complaints have been recorded. According to the MMER, a fish tissue study is required when the total mercury concentration measured in the effluent is at or greater than 0.0001 mg/L. Fish and fish use monitoring consists in assessing whether differences can be detected for different effects indicators such as survival, growth, reproduction, the condition of individuals and mercury concentrations in tissue. Different measurements need to be analyzed in order to calculate the changes in the indicators used for fish monitoring. These measurements are:

- Length (fork length, total or standard);
- Total body mass;
- Age;
- Gonad mass;
- Egg mass;
- Fecundity;
- Liver or hepatopancreas mass;

- Anomalies (parasites, lesions, tumours, etc.);
- Sex;
- Mercury and heavy metal concentrations in tissue and the liver.

Summer is the preferred period for monitoring fish populations and their habitat. The results obtained (effect detected or not) during the initial fish monitoring as well as the final project completion schedule will determine the frequency and amount of monitoring for the total lifespan of the Project and the closure phase.

Development Monitoring

The purpose of monitoring is to assess the effectiveness and durability of the compensatory development. The integrity of each structure will be assessed during monitoring. A specific monitoring program will be developed.

20.5.2.8 Social Environment

The social environment monitoring program aims to assess the effectiveness of proposed mitigation measures for impacts on the social and human environment and during the operation of the mine. The results of monitoring will enable the program to be adjusted, if necessary, to better address the identified impacts. The monitoring method could involve setting up monitoring committees including representatives from area organizations and land users. The goals pursued by this committee would encompass the monitoring of the Project's real impacts, the Project's effect on land use and visits to the areas surrounding the mine, the concerns related to air quality, the effectiveness and relevance of proposed mitigation and improvement measures.

20.6 Conceptual Closure and Rehabilitation Plan

20.6.1 Legislation

The Mining Act (CQLR, C. M-13.1) is another important piece of provincial legislation that concerns the management of mining activities in the Province of Quebec. "The purpose of this Act is to promote mineral prospecting, exploration and development in keeping with the principle of sustainable development, while ensuring that Quebecers get a fair share of the wealth generated by mineral resources and taking into account other possible uses of the territory" (s.17).

Section 232.1 of the Act states that:

"Every operator who engages in mining operations determined by regulation in respect of mineral substances listed in the regulations must submit a rehabilitation and restoration plan to the Minister for approval and carry out the work provided for in the plan. The obligation shall subsist until the work is completed or until a certificate is issued by the Minister under Section 232.10."

Hence, as part of the project, a rehabilitation plan will be prepared (and approved by the MERN). 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 (MRN[12] and MEF[3], 1997) which provides the proponents with the rehabilitation requirements. The financial feasibility of the project will have to take into account the costs of all the work needed for the rehabilitation of the mining site.

20.6.2 General principles

The main objective of mine rehabilitation is to restore the site to a satisfactory condition by:

- Eliminating unacceptable health hazards and ensuring public safety;
- Limiting the production and circulation of substances that could damage the receiving environment and, in the long-term, trying to eliminate maintenance and monitoring;
- Restoring the site to a condition in which it is visually acceptable to the community;

Reclaiming the areas where infrastructures are located (excluding the accumulation areas) for future use.

[1] Ministère des ressources naturelles (active designation from 1994-1999)

[4] Ministère de l'environnement et de la faune (active designation from 1994-1999)

Specific objectives are to:

- Restore degraded environmental resources and uses of the land;
- Protect important ecosystems and habitats of rare and endangered flora and fauna, which favours the reestablishment of the biodiversity;
- Prevent or minimise 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 waste avoidance projects and prevent and/or reduce pollution.

The general guidelines of a rehabilitation plan include:

- Promotion of progressive restoration to allow a rapid reinstatement of the biodiversity;
- Monitoring and surveillance program;
- Maximisation of the recovery of previous land uses;
- Research new vocations for land uses;
- Habitat rehabilitation using operational environmental criteria;
- Ensure sustainability of the results of the restoration efforts.

The mining site rehabilitation plan focuses on land reclamation, reclamation of the Tailings Storage Facility (TSF) and waste rock piles as well as water basins, and surface drainage patterns to prevent erosion. At the end of the mining activities, the rehabilitation plan ensures a minimum of disturbance over the area of the mine site. The site will need to be brought to the MERN standards before it can be returned to the Government and that the mine owner would not be found responsible for its care.

20.6.3 Environmental aspects and assumptions

This section presents the environmental aspects driving the rehabilitation concepts.

Drainage

Whenever possible, the surface water drainage pattern will be restored to conditions resembling the original hydrological system.

Topsoil management

During site construction and ore body stripping, the overburden and topsoil will be salvaged separately and used for revegetation purposes. In the case where overburden would still be in place at the end of the mining operations, the slopes of the overburden storage area would be seeded.

Waste management

Demolition waste will be:

- Decontaminated when required;
- Recycled when cost-effective;
- Disposed of/or burned on site;
- Buried at an appropriate site.

All non-contaminated wastes will be sent to a landfill.

Hazardous materials

Facilities containing petroleum products, chemicals, solid wastes, hazardous wastes, and/or contaminated soil or materials will be dismantled and managed according to regulatory requirements.

Final restoration of the mine site and port facilities will be completed within three years following the end of commercial production.

Tailings and waste rock characteristics and disposal requirements

Environmental considerations relative to TSF and waste rock piles are outlined below.

Seismic Hazard

The Project's waste dumps and tailings ponds are located approximately at latitude 52°24' north and longitude 67°29' west. The seismic risk estimate for that area was taken from data published by the Ministry of Natural Resources of Canada (RNC, 2014). Peak ground horizontal accelerations for the Project site are summarized in Table 20.10.

Table 20.10 – Peak Ground Horizontal Accelerations for the Project

Probability of exceeding the value in 50 years	40%	10%	5%	2%
Recurring period (years)	1:100	1:475	1:1,000	1:2,475
Maximum ground acceleration (g)	0.003	0.011	0.019	0.036

Geotechnical Studies

Geotechnical studies to assess the ground conditions at the site of the proposed tailings management facility and waste rock dumps will have to be carried out.

The selection of the site and design of the peripheral dykes will need to be optimized when that information becomes available.

Tests will be necessary to assess the geotechnical characteristics of the foundations of both the tailings impoundment area itself and, in particular, on the tailings retaining dykes.

Tailings Properties

Disposal of tailings during winter can be problematic as the tailings will possibly freeze and the water within will not drain.

To reduce the risk of tailings freezing and to allow the tailings disposed during winter to thaw during summer, it is planned to separate the TSF into two separate cells: "Coarse Tailings" and "Fine Tailings". During summer, the finer portion of the tailings will be placed into the "Fine Tailings" (located south) while the coarse tailings will be placed into the "Coarse Tailings" cell (located north). During winter, the combined tailings will be placed into the "Coarse Tailings" cell to allow the "Fine Tailings" to thaw during the summer.

Geochemistry

Mineral deposits of the Project are similar to those found in the area (eg. Mount-Wright mine, Wabush Mine, Fire Lake mine, Bloom Lake mine, etc.). Historically, these operations have not shown signs of acid generation for the waste rock or the ore and are not susceptible to metal leaching.

The acid generating and metal leaching potentials will have to be confirmed for the feasibility study using the appropriate test protocols.

- Progressive rehabilitation and restoration

Progressive restoration is always favoured in order to rapidly reach the objectives of the rehabilitation program and help in an early habitat reestablishment to increase biodiversity.

For the Project, it is planned that the tailings will be stored into two distinct ponds: one for coarse tailings and the other for fine tailings. Progressive restoration of each tailings cell will not be possible since each tailings type will be stored in one big cell forming the whole tailings accumulation area. The complete restoration of the two tailings ponds may be achieved after the end of mine life.

Progressive restoration could be possible for the waste rock piles (or sectors in it), when at their maximum capacity.

20.6.4 Final closure and rehabilitation concept

The conceptual plan for final rehabilitation and restoration can be summarized as follows:

Tailings Storage Facility

The tailings management facilities are divided into two separate cells: coarse tailings and fine tailings. Coarse tailings cell and its dikes will be partially covered with a layer of top soil/overburden and seeded in order to reinstate vegetation cover. As for the fine tailings, due to its physical characteristics, it is possible that some equipment would be too heavy to access that cell. Thus, this conceptual plan considers that the surface of the fine tailings cell will be "hydroseeded" with equipment located on the dykes or specially built roads on the surface of the tailings. Such roads will be built using a separation geotextile and geogrid that will allow minimum bearing capacity for the restoration activities. The geogrid will first be covered by a layer of crushed muck. Once they will have served their purposes, the roads will be covered with a mixture of top soil/overburden that will be seeded.

The threshold of all tailings dikes' spillways will be lowered as much as possible to minimise the possibility of water accumulation in the various cells of the tailings pond. To protect the dikes against erosion, drainage channels made with rip rap will be developed every 200 m around the cells perimeter.

Waste Rock Piles

The waste rocks piles will be covered with a layer of top soil/overburden mixture and seeded. Prior to that, the slopes with be soften to a shallower angle, typically 3H: 1V to reduce surface erosion and thus improving vegetation growth.

Water management infrastructure

After five years of post-closure monitoring, or once it is confirmed that the effluent's quality complies with regulations, the water treatment plant will be dismantled. Water in the sedimentation and polishing ponds will be pumped out and the dykes will be breached to allow free-flowing of surface runoff. The area of the ponds will be covered with topsoil/overburden, and seeded to help vegetation growth, which will also consolidate the material that has accumulated into the pond.

Pumping stations and piping networks will be removed.

Access and Haul Roads

The access road to the site will be left intact and retroceded to a responsible entity (e.g., unorganized territory of Rivière-Mouchalagane or Innu nation of Mamuitun and Nutashkuan).

On-site haul roads and other mine roads will be scarified and seeded and culverts will be removed.

Railways

The railway and side line connecting the site to existing railway will be partly dismantled. The steel rail will be removed and disposed, or sold, but the foundation and ballast will be left in place. Areas with potential soil contamination, such as grease stations and switches, will be characterized and decontaminated following the applicable regulations.

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. For the cost estimate, no profits from the sales of equipment were considered. During dismantling works, beneficiation/recycling of construction material will be maximized. Remaining waste will be disposed of in a landfill.

All equipment and machinery will be sent out of the site for sale or recycling.

Explosives magazine and related facilities will be dismantled.

The facilities for drinking water supply and domestic wastewater treatment may be transferred to a competent administrative authority or will be dismantled.

Infrastructure relating to electrical supply and distribution will be dismantled if of no use for other parties.

Open Pits

During operations, the open pit located south-west of the Lamêlée pit will have been filled with waste rock. After operation, the Lamêlée pit will no longer be dewatered, and the pit will eventually fill up with groundwater and runoff water (rain and snow).

Security bunds will be constructed around the pit to prevent easy access.

Port Infrastructures

Project specific port infrastructures (rails and conveyors) will be dismantled. The site haul roads and ore pads will be scarified and seeded.

20.6.5 Monitoring program and post-closure monitoring

At the end of operations, the Project will submit a request to move into the post-operational monitoring phase. The monitoring program to be developed must be approved by the MDDELLC before implementation. The duration of the monitoring will depend on the time required to complete the restoration process, in order to then proceed with post-restoration monitoring. With respect to post-operational monitoring, a program will be developed for the post-restoration phase. This program must also be approved by the MDDELLC before implementation.

Physical stability

The physical stability of the tailings accumulation areas and the waste rock piles will be assessed, and signs of erosion will be noted. These components will be monitored on an annual basis for three years following mine closure.

Environmental monitoring

Monitoring of water quality (surface and groundwater) at specific locations such as tailings accumulation areas will continue for five years after the site is restored.

A program to monitor surface and groundwater quality at target locations such as, the tailings accumulation area will be carried out for at least five years after the site is restored.

Discontinuation of the post-restoration monitoring program must be authorized by the MDDELLC.

Agricultural monitoring

The purpose of the agricultural monitoring program is to assess the effectiveness of revegetation done as part of the mining site rehabilitation efforts.

Documenting the success of revegetation of the accumulation areas, agricultural monitoring will be undertaken following the establishment of a plant cover in the areas subject to the progressive restoration program. Monitoring will be conducted annually for three years following revegetation.

Once the mine site is closed, the restoration plan will be implemented and the vast majority of the site will be vegetated. Revegetation success will be monitored for three years. If required, reseeding will be carried out at spots where revegetation is not deemed satisfying.

Water Treatment Plant Operations

The water treatment plant will be in operation for five years after the mine closure. After five years of operation during post-closure monitoring, it is assumed that the quality of the effluent will comply with regulations.

20.6.6 Financial Guarantee

Under the Quebec Mining Act (CQLR, c M-13.1 Section 96.5 to 96.16), the operator must provide a financial guarantee equal to 100% of all anticipated closure costs and post-closure environmental monitoring, including the engineering effort required to implement the closure plan.

The provincial authorities require that closure cost estimate does not account for any residual value of equipment, building, structure, land etc.

The amount of the financial guarantee is set aside progressively in the first three years of production following the schedule below:

- First payment of 50% of the total guarantee in the 90 days after approbation of the closure plan
- Two payments of 25% each, each one at anniversary date of the approbation of the plan

This amount can be recovered by the operator after the minimum post-closure monitoring period and once the Ministère has judge the mine closure satisfactory.

21 Capital and Operating Costs

21.1 Capital Cost Estimate

This section covers the capital cost estimate for implementation of the mining, concentrating and handling as well as related infrastructures required for the development of the Lamêlée Iron Project. The following paragraphs outline the methodology used by CIMA+ personnel for the estimation of the capital cost of the project. The resulting estimate is based on the application of standard methods required to achieve a Project Evaluation Analysis Class 4 estimate with an accuracy range of -15% and +30%.

21.1.1 Scope of Estimate

The capital cost estimate covers the following areas:

- Mining: c/w initial cost for rolling stock, field services, site infrastructures as well as electrical distribution; work at the mine as well as the mine haulage road and the road between the mine and the concentrator are done by mining equipment and captured in the pre-production cost;
- Crushing: gyratory crusher c/w inlet & outlet chutes, stockpile feed conveyors, stockpile reclaim, access ramp and retaining wall. Earthworks, namely the pad for the gyratory crusher, are done by mining equipment and captured in the pre-production cost;
- Transportation of the ore from the mine to the crushed ore stockpile will be by mine haulage trucks. Ore stockpile and reclaim are included;
- Concentration area: c/w feed conveying from sized ore stockpiles, grinding, classification, gravimetric separation, product drying, tailings thickening and pipeline;
- Load out facilities, complete with concentrate storage and rail car feeding facilities;
- Tailings management facilities. Costs were provided by AMEC and included in the estimate as obtained;
- Infrastructures, including access & plant roads, electrical substation and distribution, process & gland seal water, reclaim water, potable water, domestic waste water treatment plant, fire water distribution, administration building, workshop, warehouse and security gate;
- Rail works, consisting of a rail loop at the process site and one at the port;
- Port installation and terminal, c/w a railcar dumper, stacking/reclaiming facilities, concentrate conveying to jetty area, ship loading equipment as well as electrical distribution.

21.2 Summary of the Capital Cost Estimate

The capital cost of the project is the cost for the initial development of the project. When additional capital expenditures are planned for future capital equipment additions and replacements they will be charged as sustaining capital expenditures. Table 21.1 shows the summary of the capital cost estimate.

Table 21.1 – Summary of Capital Cost Estimate

	Description	
WBS No	**Direct Cost**	**Total ($'000)**
0-0-00	General	59 881
1-0-00	Mining	34 575
2-0-00	Crusher, Conveyor and	220 399
3-0-00	Tailings Facility Management	110 891
4-0-00	Infrastructures	38 049
5-0-00	Railroad and Yard	22 766
6-0-00	Port and Terminal	129 957
	Total Direct Cost	**616 518**
	Project Indirect Costs	**Total ($'000)**
9-1-00	Owner's Costs	12 500
9-2-00	EPCM Services	64 335
9-3-00	Construction Field Indirects	26 623
9-9-10	Contingencies	75 134
9-9-20	Escalation (excluded)	0
9-9-30	Risk (excluded)	0
	Total Indirect Cost	**178 592**
	Mine – Pre-Production	21 561
	Total Project Cost	**816 617**

21.2.1 Lamêlée General Capital Cost

This section covers all direct costs to the project that cannot be expressly assigned to any dedicated WBS; it covers casual overtime, heavy lifts, scaffolding, heating & hoarding, freight, commissioning assistance by sub-contractors, room & board as well as transportation costs, vendor representatives, spare parts, first fills and special tools. The summary of the General Cost is shown in Table 21.2.

Table 21.2 – Summary of Lamêlée General Capital Cost Estimate

	Description	
WBS No	**Direct Cost**	**Total ($'000)**
0-0-00	GENERAL	
0-1-00	Process Site	43 856
0-2-00	Port Site	16 025
	Total	**59 881**

21.2.2 Lamêlée Mine Capital Cost

The capital cost for the Mining area includes the initial development of the open pit mine, including the haul roads to the gyratory crusher. It includes the planned pre-stripping and development of the areas for the low grade stockpile, the overburden stockpile and the waste dump. It includes the purchase of all initially purchased mining equipment required for the first two (2) years of operations (year of pre-production and the first year of production). The summary of the capital cost for the mine is shown in Table 21.3.

Table 21.3 – Summary of Lamêlée Mine Capital Cost Estimate

	Description	
WBS No	**Direct Cost**	**Total ($'000)**
1-0-00	MINING	
1-0-10	Mine Equipment	27 737
1-1-00	Lamêlée Mine	6 838
	Total	**34 575**

21.2.3 Concentrator

The capital cost for the Concentrator includes the costs for the gyratory crusher, conveyors and the concentrator building as well as all processing and related equipment. The cost for the fixed and mobile mechanical equipment is also included. It also includes the costs for services, power and its distribution as well as that for communications. Table 21.4 shows the summary of the costs for the concentrator.

Table 21.4 – Summary of Capital Cost Estimate of the Concentrator

	Description	
WBS No	**Direct Cost**	**Total ($'000)**
2-0-00	CONCENTRATOR	
2-0-10	Electrical Distribution	28 671
2-1-00	Concentrator Mobile Equipment	802
2-2-00	Crushing & Buffer Stockpile	34 635
2-3-00	Grinding	76 610
2-4-00	Classification	5 151
2-5-00	Gravimetric Separation & Drying	19 609
2-6-00	Tailings Thickening	14 972
2-7-00	Services	16 344
2-8-00	Reclaim Water Station	8 211
2-9-00	Load-Out	15 394
	Total	**220 399**

21.2.4 Tailings Facilities Management

The capital cost for the tailings facilities management include the costs for the mobile equipment, the pump stations in the concentrator and at the tailing disposal area for the reclaim water. It also includes the cost for the pipelines as well as that for the tailings dam construction. It was assumed that the material for the dams construction will be provided by the mine and only the cost for the haulage was assumed. No cost was assumed for the potential grouting under the dams. Table 21-5 shows the summary of the capital cost of the tailings facilities management systems.

Table 21.5 – Summary of Capital Cost Estimate of the Tailings Facilities Management

	Description	
WBS No	**Direct Cost**	**Total ($'000)**
3-0-00	TAILINGS FACILITIES MANAGEMENT	
3-1-00	Mobile Equipment	0
3-2-00	Pump Station	3 304
3-3-00	Tailings Pipeline	7 203
3-4-00	Tailings Dam (by AMEC)	97 700
3-5-00	Emergency Pond (by others, included with Tailings Dam)	0
3-6-00	Electrical Distribution	1 286
3-7-00	Road	1 398
	Total	**110 891**

21.2.5 Infrastructures

The cost of the infrastructures includes the costs for the various site roads as well as the cost of the buildings. The main roads are the road to the accommodation camp and concentrator and from the concentrator to the mine site. It also includes the road to the explosives storage facility. The accommodation camp and related facilities are included in this area, as well as the administration building and warehouse complex. The services are also included. A summary of the costs is shown in Table 21.6.

Table 21.6 – Summary of Capital Cost Estimate of the Infrastructures

	Description	
WBS No	**Direct Cost**	**Total ($'000)**
4-0-00	INFRASTRUCTURES	
4-1-00	Roads	4 614
4-2-00	Buildings	9 095
4-3-00	Services	4 033
4-4-00	Electrical Main Sub-Station 161kV-35kV & Distribution	20 140
4-5-00	Heat Tracing	167
	Total	**38 049**

21.2.6 Railroads and Yards

Because it is assumed that the gondolas will be rented the cost for this rental is included as an operating cost. The capital cost for the railroads and yards includes the costs for the railway loop at the concentrator, as well as the loop at the port site. A summary of the costs for the railroads and yards is shown in Table 21.7.

Table 21.7 – Summary of Capital Cost Estimate of the Railroad and Yard

	Description	
WBS No	**Direct Cost**	**Total ($'000)**
5-0-00	RAILROADS AND YARDS	
5-1-00	Mobile Equipment, ore gondolas (included with OPEX)	0
5-2-00	Rail Yard (loop at process site)	14 367
5-3-00	Rail Yard (loop at port site)	8 399
	Total	**22 766**

21.2.7 Port and Terminal

The capital cost for the port and terminal include the cost for all mobile equipment and stacking and reclaiming equipment, as well as the cost for the conveyor systems to the ship loader and the ship loading equipment. It also includes the costs of the infrastructures such as offices and concrete pads and the substation. Included also are the cost for the services. A summary of the costs for the port and terminal is shown in Table 21.8.

Table 21.8 – Summary of Capital Cost Estimate of the Port and Terminal

	Description	
WBS No	**Direct Cost**	**Total ($'000)**
6-0-00	PORT AND TERMINAL	
6-1-00	Mobile Equipment (included with OPEX)	0
6-2-00	Terminal	129 957
	Total	**129 957**

21.2.8 Project Indirect Costs

The indirect costs for the projects are the Owner's costs (see Section 21.3.10), costs for the management of the construction (EPCM see Section 21.3.10), the construction services and indirects (see Section 21.3.10) and contingencies (see Section 21.3.3). A summary of the project indirect costs is shown in Table 21.9..

Table 21.9 – Summary of Capital Cost Estimate of the Indirect Costs

	Description	
WBS No	**Indirect Cost**	**Total ($'000)**
9-0-00	PROJECT INDIRECT COSTS	
9-1-00	Owner's costs	12 500
9-2-00	EPCM Services	64 335
9-3-00	Construction Indirects	26 623
9-9-10	Contingency	75 134
9-9-20	Escalation (excluded)	0
9-9-30	Risk (excluded)	0
	Total	**178 592**

21.3 Basis of Estimate

21.3.1 Currency Base Date and Exchange Rate

The capital cost estimate is expressed in 3th quarter 2014 Canadian dollars. Prices obtained in other currencies were converted using currency exchange rates

It is assumed that the construction phase will extend on 24 months. It should be noted that escalation is excluded from this capital cost estimate as but included in the financial model.

21.3.2 Freight, Duties and Taxes

Freight costs were estimated on the basis of historical data; a compounded ratio of ocean and land freight were applied to equipment costs and estimated at 7.0% of the equipment costs (5% for land freight and 9% for ocean freight). For bulk material, only land freight is required and is estimated at 5%. Ocean freight is inclusive of duties and taxes. Freight costs for rolling stock are based on a budgetary quotation.

21.3.3 Design allowances and contingencies

For the purposes of this PEA, no design allowances were added to the estimated costs. Contingency, evaluated at 10.0% of all costs including rolling stock, was added to the estimate to reflect the engineering progress (evaluated at 2%).

21.3.4 Escalation and Risk

Escalation and risk are excluded from this capital costs estimate.

21.3.5 Civil and building works

Civil and building quantities were generally provided by engineering. In order to ascertain the full scope coverage, some minor additional elements of scope were added. Unit rates for supply and installation were estimated on the basis of recent in-house data and compared against benchmarks obtained from projects similar in nature and in site conditions.

An optimisation of quantities was performed in order to address elements of scope to be performed by Lamêlée as part of mining activities.

21.3.6 Equipment

Equipment for mechanical, electrical and instrumentation/control were provided by engineering; budgetary quotations were obtained for major mechanical equipment, namely standard belt conveyors (Continental) and gyratory crusher (Sandvik). Soutex has provided budgetary quotation prices for the concentrator equipment. The balance of the equipment was estimated based on recent in-house data. Installation manhours were estimated based on historical data or from well reputed estimating handbooks.

21.3.7 Piping and Pipelines

Piping and pipeline quantities, complete with materials of construction, were provided by engineering; budgetary quotations were obtained for all piping materials. Installation manhours were estimated based on historical data from in-house data for similar projects or from well reputed estimating handbooks.

21.3.8 Electrical and Instrumentation Equipment and Material

Electrical and instrumentation quantities, complete with supply and installation rates, were provided by engineering. All rates were based on recent in-house data from a project similar in nature and in site conditions.

21.3.9 Labour Costs

Labour costs were developed on the basis of the labour decree in effect in the Province of Québec. Labour crew mixes were developed for all disciplines and contractors' indirect costs as well as construction equipment costs were added in order to have all-inclusive labour crew mix wage rates.

For the purposes of this PEA, it was assumed that workers at the process site would have a 58 hour workweek, i.e. 5 days at 10 hours per day, 1 day at 8 hours with a 26/2/7 rotation schedule. Travelling cost are included and estimated at 600$ per rotation, based on Lamêlée information. Also included are the costs of labour during transportation, estimated at 16 hours per round trip (2 x 8 hours) at the workers base wage rate.

At the port area, workers would have a 50 hour workweek, i.e. 5 days at 10 hours per day, with no rotation, as it is assumed that 50% of the workforce would be local and 50% would be within weekly travelling distance. Living out allowances as well as transportation costs are included and based on the labour decree. Since workers are entitled to transportation costs, there is no need to add labour costs to cover for travelling time.

21.3.10 Indirect costs

Indirect costs were mostly estimated on the basis of historical ratios. Owner's costs are included in the estimate and evaluated at 12.5M$. EPCM services were also factored from the direct costs and divided between project management & project controls (2.4% of all direct cost, excluding rolling stock), engineering services (4.8% of all direct cost, excluding rolling stock), procurement services (1.2% of all direct cost, including rolling stock) and construction management services (3.6% of all direct cost, excluding rolling stock). Construction field indirect costs were factored from the total direct costs, excluding the rolling stock, at 5%.

21.4 Mine Closure and Remediation Cost Estimate

The closure costs presented in this PEA are preliminary in nature and will need to be detailed during the feasibility study. The closure plan is based on the mine closure guidebook published in 1997 by the Government of Quebec.

Mine closure costs for the Project are estimated at approximately $65.18 million spread over three years and must be secured in a trust fund at the beginning of mining operations. It is assumed that trust fund payments are made in the last pre-production year and in the first two years of operation in the proportions of 50/25/25 %, respectively. Table 21.10 below presents a summary of the mine closure capital costs estimate.

The closure costs include the dismantlement of the railway from the Project site to ArcelorMittal's railway line and the dismantlement of port facilities and restoration of the port site.

Table 21.10 – Project Preliminary Mine Closure Costs

Closure Cost Item	Cost ($'000)
Direct Costs	
Dismantlement of buildings in the industrial complex	11 438
Dismantlement of the piping network, pumping stations and sanitary infrastructures	436
Dismantlement of electric infrastructures	319
Dismantlement of port infrastructures	2 803
Dismantlement of railway infrastructures	1 787
Restoration of the industrial complex footprint	3 664
Restoration of haulage road footprint (5 years after final closure)	51
Restoration of waste rock dumps	10 949
Restoration of overburden pile footprint	439
Restoration of coarse tailings ponds (pond)	7 442
Restoration of coarse tailings cell (dykes)	691
Restoration of fine tailings cell (pond)	2 854
Restoration of fine tailings cell (dykes)	691
Restoration of the polishing ponds (5 years after final closure)	1 014
Restoration of the water pond at Dump #1 (5 years after final closure)	1 065
Lamêlée Pit	253
South-West pit (backfilled with Dump #2)	0
Sub-Total – Direct Costs	**45 896**
Indirect Costs	
Engineering and permitting	5 049
Post-Closure Monitoring	2 241
Contingencies on Direct Costs	11 474
Contingencies	520
Sub-Total – Indirect Costs	**19 284**
TOTAL	**65 180**

21.5 Sustaining Capital Cost Estimate

The Sustaining Capital are the capital expenditures during the life of the mine that are required to maintain or upgrade the existing asset and to continue the operation at the same level of production.

The sustaining capital estimate for the life of mine are summarized in the Tables 21.11 to 21.14.

Table 21.11 – Summary of Sustaining Capital Cost Estimate (Year 2 to 6)

Area	Year 2	Year 3	Year 4	Year 5	Year 6
	$'000	$'000	$'000	$'000	$'000
Mining Equipment	3 912	1 304	12 937	515	3 912
Tailings and Water Treatment					
TOTAL	3 912	1 304	12 937	515	3 912

Table 21.12 – Summary of Sustaining Capital Cost Estimate (Year 7 to 11)

Area	Year 7	Year 8	Year 9	Year 10	Year 11
	$'000	$'000	$'000	$'000	$'000
Mining Equipment		2 608		17 997	14 871
Tailings and Water Treatment				38 700	
TOTAL	0	2 608	0	56 697	14 871

Table 21.13 – Summary of Sustaining Capital Cost Estimate (Year 12 to 16)

Area	Year 12	Year 13	Year 14	Year 15	Year 16
	$'000	$'000	$'000	$'000	$'000
Mining Equipment			17 364		
Tailings and Water Treatment					
TOTAL	0	0	17 364	0	0

Table 21.14 – Summary of Sustaining Capital Cost Estimate (Year 17 to 20)

Area	Year 17	Year 18	Year 19	Year 20
	$'000	$'000	$'000	$'000
Mining Equipment	2 608			
Tailings and Water Treatment				
TOTAL	2 608	0	0	0

21.6 Operating Cost Estimate

21.6.1 Scope and Methodology

The operating costs for the project were estimated annually, based on the mine plan developed by Met-Chem. A summary of these operating costs are shown in the followings tables. The operating costs of the average life of mine (LOM) of operations have been detailed and are considered representative of the typical average cost for the life of the mine. The operation has been divided into six (6) areas namely:

- Mining;
- Concentrating;
- Tailings;
- General and Administration;
- Rail Transportation; and
- Port Handling.

The summary of the unit operating costs per tonne of ore and per tonne of concentrate of an average year of operations, are shown in Table 21.15.

Table 21.15 – Summary of an Average Year of Operations per Area

Area	Annual Cost	Unit Cost	
	$'000	$/tonne Mineralization	$/tonne Conc.
Mining	108 046	7.95	21.92
Concentrating	32 464	2.39	6.59
Tailings	8 131	0.60	1.65
General and Administration	34 714	2.55	7.04
Rail Transportation	56 379	4.15	11.43
Port Handling	30 454	2.24	6.18
TOTAL	**270 188**	**19.88**	**54.81**

21.6.2 Mine Operating Costs

The mine operating cost was estimated by Met-Chem for each period of the mine plan. This cost is based on operating the mining equipment, the manpower associated with operating the mine, the cost for explosives, dewatering, road maintenance and the payments that are associated with the financing of the equipment fleet. The following assumptions were used in order to determine the operating costs;

- Diesel Fuel Price – $1.00/litre;
- Explosives Cost – $0.40/t for run of mine feed and $0.33/t for waste;
- Power Cost – $0.0405/kWh (Hydro-Québec L-rate -20% as recently announced by the Québec government);
- Financing Rate – 6% for a 60 month period with a 25% downpayment.

Table 21.16 and 21.17 provide a breakdown of the mine operating costs into several components.

Table 21.16 – Operating Cost Breakdown (Activities and Manpower)

Area	Annual Cost	Unit Cost	
	$'000	$/tonne	$/tonne Conc.
Financing	16 640	0.37	3.38
Loading	6 400	0.14	1.30
Hauling	41 084	0.91	8.33
Drilling & Blasting	16 977	0.38	3.44
Support & Service	7 272	0.16	1.48
Manpower	19 674	0.44	3.99
TOTAL	**108 046**	**2.40**	**21.92**

Table 21.17 – Operating Cost Breakdown (Consumables and Manpower)

Area	Annual Cost	Unit Cost	
	$'000	$/tonne	$/tonne Conc.
Financing	16,640	0.37	3.38
Fuel	24,696	0.55	5.01
Tires	9,970	0.22	2.02
Repair / Parts	20,980	0.47	4.26
Electricity	876	0.02	0.18
Explosives	15,210	0.34	3.09
Manpower	19,674	0.44	3.99
TOTAL	**108,046**	**2.40**	**21.92**

The hourly operating cost for most of the mining equipment was supplied by the equipment manufacturers and suppliers which were used to develop the operating cost estimate. For certain equipment where hourly cost estimates were not obtained, Met-Chem used its internal database.

Table 21.18 provides a detailed breakdown of the hourly operating cost for the major equipment and support equipment. The parts category includes all costs associated with replacements parts and ground engaging tools.

Table 21.18 – Equipment Hourly Operating Costs

Equipment	Description	Fuel / Elec.	Tires	Parts	Total
		($/h)	($/h)	($/h)	($/h)
Haul Truck	Payload – 227 tonne	193.30	85.80	98.28	**377.38**
Shovel	Bucket – 26.5 m^3	43.74	n/a	555.74	**599.48**
Production Drill	311 mm hole (12 ¼")	38.73	n/a	126.10	**164.83**
Track Dozer	450 kW (600 hp)	79.50	n/a	65.52	**145.02**
Road Grader	250 kW (335 hp)	27.90	6.47	41.88	**76.25**
Wheel Dozer	1,100 kW (1,475 hp)	62.00	19.77	48.43	**130.20**
Wheel Loader	200 kW (270 hp)	160.00	80.67	222.26	**462.93**
Utility Excavator	152 mm hole (6 inch)	36.00	n/a	32.21	**68.21**
Secondary Drill	274 kW (365 hp)	45.00	n/a	61.47	**106.47**
Cable Reeler	90,000 litres	25.60	8.33	49.45	**83.38**
Water Truck	450 kW (600 hp)	75.00	29.08	59.70	**163.78**

The manpower cost for the mine operations was estimated to be $19.7 M per year. This manpower cost was calculated based on the number of employees and their annual salaries. A 40% fringe benefit has been included for the staff and hourly employees and 5% overtime has been considered for the hourly employees.

21.6.3 Concentrating Operating Costs

The concentrator operating cost estimate was partly prepared by Soutex. The crushing and concentration cost was estimated with the annual tonnage. The various processing steps detailed in Section 17.0 are grinding of the crushed ore classification and gravimetric separation with spirals followed by drying and transport of the filter cake to the concentrate load-out. The summary of the operating costs for the crushing and concentrating operation of an average year of operation are shown in Table 21.19.

Table 21.19 – Summary of an Average Year of Operation for Crushing and Concentrating Sector

Units	Annual Cost	Unit Cost
	$'000	$/t Conc.
Power	11 656	2.37
Mobile Equipment	146	0.03
Reagents	516	0.10
Consumables	8 360	1.70
Manpower	10 586	2.15
Other	1 200	0.24
TOTAL	**32 464**	**6.59**

In order to determine the operating costs the following assumptions were used;

- Power Cost – 0.0405/kWh (Hydro-Québec L-rate -20% as recently announced by the Québec government);
- Flocculent unit cost – 7.12 $/kg; and
- Coagulant unit cost – 4.62 $/kg.

21.6.4 Tailings Operating Costs

The tailings operating cost estimate was partly prepared by AMEC.

The tailings impoundment area and mine drainage costs include the manpower and the equipment required to do hydraulic deposition. The cost also included the water treatment at the exit of the tailings pond and a water treatment plant for the water collected around the mine site.

Table 21.20 shows the summary of the operating costs for the tailings impoundment area and the costs of the mine drainage operations of an average year of operation.

Table 21.20 – Summary of an Average Year of Operation for Tailings Sector

Units	Annual Cost	Unit Cost
	$'000	$/t Conc.
Tailings Impoundment and Dykes	4 131	0.83
Pumping Station	2 000	0.41
Water Treatment Plant	2 000	0.41
TOTAL	**8 131**	**1.65**

21.6.5 General and Administration Operating Costs

The general and administration costs include the operation of all the services manpower and infrastructures required to support the operations. The item included are:

- Site mobile equipment;
- Accommodation camp;
- Site administration including accounting human resources health and safety supply chain site maintenance IT and security;
- Fly-in / Fly-out cost; and
- Catering cost.

Table 21.21 shows the summary of the operating costs for the general and administration operation of average year of operation.

Table 21.21 – Summary of an Average Year of Operation for General and Administration Sector

Units	Annual Cost	Unit Cost
	$'000	$/t Conc.
Mobile Equipment	240	0.05
Catering	5 604	1.14
Fly-in/Fly-Out	2 607	0.53
Power	8 019	1.63
Manpower	7 716	1.56
Other	1 820	0.37
Royalties	8 708	1.76
TOTAL	**34 714**	**7.04**

In order to determine the operating costs the following assumptions were used;

- Supply and operation of the camp – $90 / person / day;
- Charter round trip cost – $50 000 / flight;
- Site communications - $ 1 000 000/year; and
- Office supplies - $250 000 / year;

21.6.6 Rail Operating Costs

The rail operating costs include a transportation contract with a carrier who will haul the ore gondolas from the loading operation the hauling to Port-Cartier and the unloading operation. The cost also includes the ore gondola rental and maintenance.

Table 21.22 shows the summary of the operating cost for the rail operations of an average year of operation.

Table 21.22 – Summary of an Average Year of Operation for Rail Sector

Units	Annual Cost	Unit Cost
	$'000	**$/t Conc.**
Haulage Cost	52 040	10.55
Gondola Maintenance	1 330	0.27
Gondola Rental	3 009	0.61
TOTAL	**56 379**	**11.43**

In order to determine the operating costs the following assumptions were used;

- Sub-contract unit cost – $0.0.325 / tonne / km;
- Hauling distance – 300 km;
- Amortization period of gondola – 20 years; and
- Interest rate of gondola – 5%.

21.6.7 Port Operating Costs

The port and terminal cost include the operation of a rotary railcar dumper a stacker/reclaimer and of a conveying system between the rail loop and the wharf and the operation of the ship loading equipment. It is also planned to load a smaller self-unloader ship that will load a bigger size ship off-shore.

Table 21.23 shows the summary of the operating costs for the port operations of an average year of operation.

Table 21.23 – Summary of an Average Year of Operation for Port Sector

Units	Annual Cost	Unit Cost
	$'000	**$/t Conc.**
Power	1 821	0.37
Equipment Maintenance	2 500	0.51
Manpower	1 487	0.30
Transhipping	24 646	5.00
TOTAL	**30 454**	**6.18**

Power Cost – 0.0405/kWh (Hydro-Québec L-rate -20% as recently announced by the Québec government).

21.6.8 Manpower

The site will be operating continuously 24 hour per day with 2 - 12 hour shifts with a turnaround every 2 weeks.

21.6.8.1 Mine Operations Manpower

The mine operations manpower has been estimated for three sections namely Operations Maintenance and Technical Services. The required manpower for the typical year (Year 5) has been shown in Table 21.24.

Table 21.24 – Estimated Mine Manpower Requirements

Position	Year 5
Operation	
Mine Manager	1
Mine Superintendent	1
Pit Foreman	4
Equipment Operator	144
Labourer	8
Dispatcher	4
Trainer	4
Blaster	2
Blaster Helper	2
Maintenance	
Maintenance Superintendent	1
Maintenance Foreman	4
Maintenance Planner	2
Mechanic/Electrician/Welder	24
Attendant	8
Technical Services	
Mine Technical Superintendent	1
Mining Engineer	2
Geologist	2
Grade Control Technician	2
Surveyor	2
TOTAL	**218**

21.6.8.2 Manpower for Crushing and Concentrating Operation

The crusher and concentrator operations manpower has been estimated for three sections namely Administration Operations/Maintenance and Metallurgy and Laboratory. The required manpower for the typical year 5 has been shown in Table 21.25.

Table 21.25 – Estimated Crushing and Concentrator Manpower Requirements

Position	Year 5
Administration	
Mill Superintendent	1
Mill General Foreman	1
Operation / Maintenance	
Mechanical Engineer	1
Electrical Engineer	1
Maintenance Planner	2
Control Room Operator	8
Crushing Operator	8
Grinding Operator	10
Gravity Separation Operator	10
Filtration and Loading Operator	10
Thickening & Reagent Operator	8
Electrician\Instrumentation	9
Programming Technician	2
Metallurgy and Laboratory	
Chief Metallurgist	1
Metallurgist	2
Metallurgical Technician	3
Chief Laboratory	2
Laboratory Technician	2
Laboratory Attendant	12
TOTAL	**93**

21.6.8.3 General and Administration Manpower

The site services and administration operations manpower has been estimated and the required manpower for the typical year 5 has been shown in Table 21.26 and Table 21.27.

Table 21.26 – Manpower General and Administration (On-site) Manpower Requirements

Position	Year 5
Administration	
General Manager	1
Accounting	
Junior Accountant	2
Accounts Payable Clerk	2
Human Resources	
Human Resources Supervisor	1
Human Resources Administrative	1
Training Coordinator	1
Trainer	
Health & Safety and Environment	
Health & safety Prevention officer	1
Senior Health & Safety Coordinator	1
Health & Safety Coordinator	1
Nurse	2
Environmental Coordinator	1
Environmental Technician	2
Supply Chain	
Buyer	1
Administrative Assistant	1
Warehouse Foreman	1
Inventory Analyst	1
Warehouse Clerk	4
Service Loader Operator	2
Site Maintenance	
Site Maintenance Manager	1
Electrical	4
Mechanical	6
Labour	6
Other	
Community Relations Manager	1
IT Manager	1
IT Technician	2
Security Officer	4
TOTAL	**51**

Table 21.27 – Manpower General and Administration (Off-site) Manpower Requirements

Position	Year 5
Corporate (Montreal)	
Chief Executive Officer	1
Chief Financial Officer	1
Chief Operation Officer	1
Vice-President	2
Accounting (Montreal)	
Senior Accountant	1
Payroll Supervisor	1
Junior Accountant	2
Accountant Payable Supervisor	1
Accounts Payable Clerk	2
Human Resources (Montreal)	
Human Resources Manager	1
Health & Safety and Environment (Montreal)	
Sustainable Development Manager	1
Sustainable Development Manager	
Supply Chain (Montreal)	
Supply Chain Manager	1
Senior Buyer MTL	1
Senior Logistic Coordinator & Camp Management	1
TOTAL	**17**

21.6.8.4 Port Site Operation Manpower

The Port Site operations manpower has been estimated and the required manpower for the typical year 5 has been shown in Table 21.28.

Table 21.28 – Estimated Port Site Operations Manpower Requirements

Position	Year 5
Operation	
Port Manager	1
Foreman	2
Operator	6
Labour	2
Security Officer	4
TOTAL	**15**

22 Economic Analysis

22.1 General

A preliminary economic analysis has been carried out for the Lamêlée Project by Michel L. Bilodeau ,using a cash flow model. The model is constructed using annual cash flows in constant third quarter 2014 Canadian dollars and is based on an iron concentrate production of 5 million tonnes per year. The price forecast of the iron concentrate is given in U.S. dollars and an exchange rate of USD 0.90 per CAD is assumed to convert the revenue estimates into Canadian dollars. As a general rule the financial assessment of projects of this nature is carried out on a “100% equity” basis i.e. the debt and equity sources of capital funds are ignored. No provision is made for the effects of inflation. Results are given before and after taxation. Current Canadian tax regulations are applied to assess the corporate tax liabilities while the recently proposed regulations in Quebec (Bill 55 December 2013) are applied to assess the mining tax liabilities.

The model reflects the base case and technical assumptions shown in the foregoing sections of this report and assumes that the owner will operate the project.

22.2 Assumptions

22.2.1 Economic Assumptions

The price forecast of the iron concentrate has been discussed in Section 19.0. For this analysis the following price has been assumed:

- Iron concentrate 64.3% Fe US$ 97.50/t CFR China

Assuming transportation costs of US$ 18.00 per tonne from Port Cartier to the China market the realised price of the product at Port Cartier is:

- Iron concentrate 64.3% Fe US$ 79.50/t (CAD 88.33) FOB Port Cartier

The following Discount Rates are assumed to determine net present values (NPV):

- Base Case 8%
- Variant 1 6%
- Variant 2 10%

22.2.2 Royalty Payments

The present economic analysis incorporates two royalty agreements. Both agreements consist of a 1.5 % NSR royalty of which 0.5% is subject to a buy-back option for a lump-sum of $1.5 M. As the buy-back option is more beneficial to the owner, the economic analysis considers an overall NSR royalty of 2 % combined with the buy-back option of $3 M exercised at the beginning of production.

22.2.3 Technical Assumptions

All the technical assumptions described in the report have been summarized in Table 22.1.

Table 22.1 – Technical Assumptions

Descriptions	Units	Value
Total Resources Mined (LOM)	M tonnes	271.8
Average Grade of Resource (to Plant) (LOM)	% Fe	29.7
Total Waste and Overburden (LOM)	M tonnes	636.2
Average Stripping Ratio	W:O	2.341
Average Weight Recovery	%	36.3
Total Concentrate Production (LOM)	M tonnes	98.6
Total Pre-production Capital Costs	$ M	816.7
Total Sustaining Capital Costs (LOM)	$ M	116.7
Mine Closure Costs	$ M	65.2
Salvage Value	$ M	39.8
Average Operating Costs excluding Royalty	$/t mill feed	19.24
Average Operating Costs excluding Royalty	$/t conc.	53.05

22.3 Financial Model and Results

The cash flow statement for the base case is shown in Table 22.2. Figure 22.1 shows the before-tax cash flows as well as the cumulative cash flow over the project's life. The payback period corresponds to the time at which the cumulative cash flow becomes positive (year 6).

Figure 22.1 – Before-tax Cash Flows and Cumulative Cash Flow

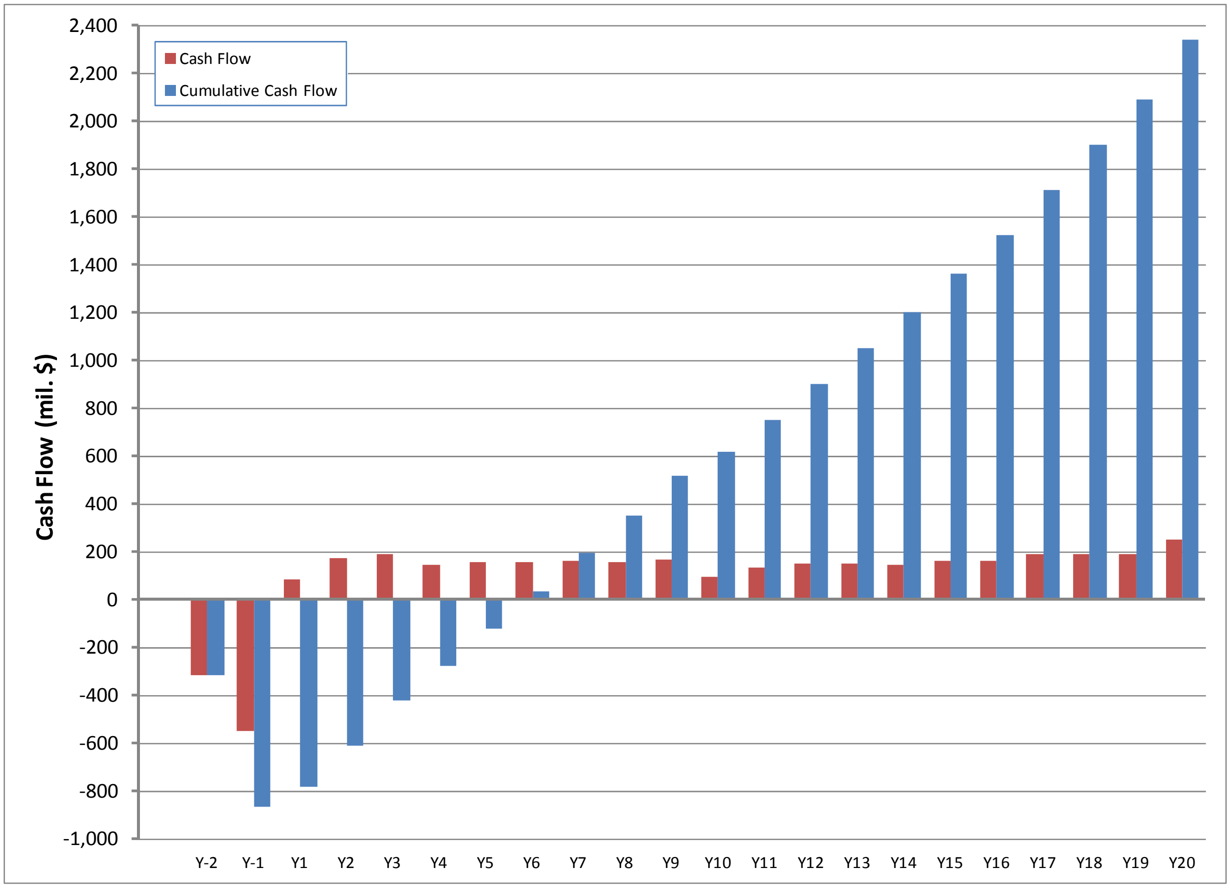


Table 22.2 – Cash Flow Statement

PEA LAC LAMÊLÉE

ANNUAL CASH FLOWS

	Unit			Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
All monetary values in CAD			2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
REVENUE													
Concentrate production	t					3,473,215	5,027,904	5,033,146	5,016,298	4,964,119	4,969,364	5,007,642	5,032,648
Selling Price CFR	$/t	Sens. Indexed				108.33	108.33	108.33	108.33	108.33	108.33	108.33	108.33
Sales	$	Sens. Indexed				376,264,906	544,689,570	545,257,444	543,432,244	537,779,560	538,347,728	542,494,597	545,203,530
Less: Shipping to China	$					69,464,290	100,558,075	100,662,913	100,325,953	99,282,380	99,387,273	100,152,849	100,652,959
Revenue FOB	$	Sens. Indexed				**306,800,615**	**444,131,496**	**444,594,531**	**443,106,292**	**438,497,180**	**438,960,455**	**442,341,749**	**444,550,571**
OPERATING COST													
Mine	$					67,636,130	85,867,379	90,033,954	121,887,233	117,276,195	117,375,882	116,542,258	123,177,089
Concentrator	$					32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530
Tailings and water treatment	$					8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000
General & Administration	$					25,032,989	25,295,789	25,361,489	25,936,364	25,936,364	26,199,164	26,199,164	26,346,989
Rail Yard Operation	$					40,615,027	57,448,290	57,505,047	57,322,626	56,757,667	56,814,453	57,228,913	57,499,658
Port Operation	$					23,173,870	30,947,316	30,973,525	30,889,285	30,628,392	30,654,615	30,846,009	30,971,037
NSR Royalty ($)	2.0%	Sens. Indexed				6,136,012	8,882,630	8,891,891	8,862,126	8,769,944	8,779,209	8,846,835	8,891,011
Total Operating Costs	$	Sens. Indexed				**203,188,558**	**249,035,934**	**253,360,436**	**285,492,165**	**279,963,091**	**280,417,853**	**280,257,709**	**287,480,314**
CAPITAL COST – DIRECT													
0000 - Mine Development	$				21,560,651								
0000 - Unassigned	$			23,952,456	35,928,684								
1000 - Mine	$			13,830,186	20,745,279								
2000 - Concentrator	$			88,159,497	132,239,246								
3000 - Tailings	$			58,034,291	87,051,436								
4000 - Infratracutures	$			15,219,589	22,829,384								
5000 - Rail	$			9,106,308	13,659,463								
6000 - Port	$			51,983,089	77,974,634								
CAPITAL COST – INDIRECT													
Total	$			57,758,707	86,638,060								
Total Direct & Indirect Capital Costs	$	Sens. Indexed		**318,044,124**	**498,626,837**								
CAPITAL COST – SUSTAINING													
Total	$	Sens. Indexed				**0**	**3,912,150**	**1,304,050**	**12,937,250**	**515,000**	**3,912,150**	**0**	**2,608,100**
SALVAGE VALUE ($)	5.0%	Sens. Indexed											
WORKING CAPITAL ($)	1.0	Sens. Indexed			**16,932,380**	**3,820,615**	**360,375**	**2,677,644**	**-460,756**	**37,897**	**-13,345**	**601,884**	**-1,055,175**
Cumulative Working Capital	$				16,932,380	20,752,995	21,113,370	23,791,014	23,330,258	23,368,154	23,354,809	23,956,693	22,901,518
SITE REHABILITATION													
Trust Fund Payments	$				**32,590,000**	**16,295,000**	**16,295,000**	**0**	**0**	**0**	**0**	**0**	**0**
Closure Costs	$			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Royalty Buy-back	$				**3,000,000**								
Total Tax Payments	$					**4,219,621**	**6,426,958**	**6,869,946**	**8,201,977**	**16,043,832**	**39,289,696**	**43,366,033**	**44,347,580**
Federal Corporate Taxes	$			0	0	0	0	0	0	3,783,343	16,269,805	18,114,082	18,381,564
Provincial Corporate Taxes	$			0	0	0	0	0	0	3,001,452	12,907,378	14,370,505	14,582,707
Mining Taxes	$			0	0	4,219,621	6,426,958	6,869,946	8,201,977	9,259,037	10,112,513	10,881,447	11,383,310
B-T CASH FLOW	$			-318,044,124	-551,149,217	83,496,442	174,528,037	187,252,401	145,137,633	157,981,192	154,643,798	161,482,156	155,517,331
Cumulative	$			-318,044,124	-869,193,340	-785,696,898	-611,168,861	-423,916,460	-278,778,827	-120,797,635	33,846,163	195,328,319	350,845,650
Payback Period work area					1.00	1.00	1.00	1.00	1.00	1.00	0.78	0.00	0.00
A-T CASH FLOW	$			-318,044,124	-551,149,217	79,276,821	168,101,079	180,382,455	136,935,656	141,937,360	115,354,101	118,116,123	111,169,751
Cumulative	$			-318,044,124	-869,193,340	-789,916,519	-621,815,440	-441,432,985	-304,497,329	-162,559,969	-47,205,868	70,910,255	182,080,006
Payback Period work area					1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.40	0.00

	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	TOTAL
All monetary values in CAD	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	
REVENUE													
Concentrate production	5,037,686	4,993,252	5,009,358	5,009,358	5,009,358	4,999,140	4,999,140	4,999,140	5,000,579	5,000,579	5,000,579	5,000,579	98,583,085
Selling Price CFR	108.33	108.33	108.33	108.33	108.33	108.33	108.33	108.33	108.33	108.33	108.33	108.33	
Sales	545,749,284	540,935,623	542,680,495	542,680,495	542,680,495	541,573,491	541,573,491	541,573,491	541,729,434	541,729,434	541,729,434	541,729,434	10,679,834,180
Less: Shipping to China	100,753,714	99,865,038	100,187,168	100,187,168	100,187,168	99,982,798	99,982,798	99,982,798	100,011,588	100,011,588	100,011,588	100,011,588	1,971,661,695
Revenue FOB	**444,995,570**	**441,070,585**	**442,493,327**	**442,493,327**	**442,493,327**	**441,590,693**	**441,590,693**	**441,590,693**	**441,717,846**	**441,717,846**	**441,717,846**	**441,717,846**	**8,708,172,485**
OPERATING COST													
Mine	110,426,354	123,216,613	128,332,463	128,332,463	128,332,463	115,856,916	115,856,916	115,856,916	88,728,028	88,728,028	88,728,028	88,728,028	2,160,919,338
Concentrator	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	32,463,530	649,270,605
Tailings and water treatment	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	8,131,000	162,620,000
General & Administration	26,346,989	26,346,989	26,346,989	26,346,989	26,346,989	26,215,589	26,215,589	26,215,589	25,854,239	25,854,239	25,854,239	25,854,239	520,106,977
Rail Yard Operation	57,554,204	57,073,101	57,247,492	57,247,492	57,247,492	57,136,853	57,136,853	57,136,853	57,152,438	57,152,438	57,152,438	57,152,438	1,127,581,773
Port Operation	30,996,225	30,774,056	30,854,589	30,854,589	30,854,589	30,803,497	30,803,497	30,803,497	30,810,694	30,810,694	30,810,694	30,810,694	609,071,363
NSR Royalty ($)	8,899,911	8,821,412	8,849,867	8,849,867	8,849,867	8,831,814	8,831,814	8,831,814	8,834,357	8,834,357	8,834,357	8,834,357	174,163,450
Total Operating Costs	**274,818,214**	**286,826,701**	**292,225,930**	**292,225,930**	**292,225,930**	**279,439,198**	**279,439,198**	**279,439,198**	**251,974,286**	**251,974,286**	**251,974,286**	**251,974,286**	**5,403,733,506**
CAPITAL COST – DIRECT													
0000 - Mine Development													21,560,651
0000 - Unassigned													59,881,140
1000 - Mine													34,575,465
2000 - Concentrator													220,398,743
3000 - Tailings													145,085,727
4000 - Infratracutures													38,048,974
5000 - Rail													22,765,771
6000 - Port													129,957,724
CAPITAL COST – INDIRECT													
Total													144,396,767
Total Direct & Indirect Capital Costs													**816,670,961**
CAPITAL COST – SUSTAINING													
Total	**0**	**56,696,734**	**14,871,092**	**0**	**0**	**17,364,400**	**0**	**0**	**2,608,100**	**0**	**0**	**0**	**116,729,025**
SALVAGE VALUE ($)												**39,755,515**	**39,755,515**
WORKING CAPITAL ($)	**1,000,707**	**449,936**	**0**	**0**	**-1,065,561**	**0**	**0**	**-2,288,743**	**0**	**0**	**0**	**-20,997,857**	**0**
Cumulative Working Capital	23,902,225	24,352,161	24,352,161	24,352,161	23,286,600	23,286,600	23,286,600	20,997,857	20,997,857	20,997,857	20,997,857	0	
SITE REHABILITATION													
Trust Fund Payments	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-65,180,000**	**0**
Closure Costs	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**65,180,000**	**65,180,000**
Royalty Buy-back													**3,000,000**
Total Tax Payments	**49,588,584**	**44,916,137**	**46,521,119**	**48,618,010**	**50,641,987**	**55,517,065**	**56,350,965**	**57,534,415**	**68,873,579**	**69,474,708**	**70,003,011**	**86,745,411**	**873,550,636**
Federal Corporate Taxes	21,118,075	18,261,151	16,324,334	16,754,381	17,365,536	19,128,087	19,200,102	19,584,928	23,323,800	23,503,266	23,688,843	28,631,568	303,432,864
Provincial Corporate Taxes	16,753,673	14,487,180	12,950,638	13,291,809	13,776,658	15,174,949	15,232,081	15,537,377	18,503,548	18,645,924	18,793,149	22,714,377	240,723,405
Mining Taxes	11,716,835	12,167,806	17,246,147	18,571,821	19,499,793	21,214,029	21,918,782	22,412,110	27,046,231	27,325,518	27,521,019	35,399,467	329,394,366
B-T CASH FLOW	169,176,649	97,097,214	135,396,304	150,267,396	151,332,957	144,787,095	162,151,494	164,440,237	187,135,460	189,743,560	189,743,560	250,496,933	2,342,614,509
Cumulative	520,022,299	617,119,513	752,515,817	902,783,214	1,054,116,171	1,198,903,266	1,361,054,760	1,525,494,997	1,712,630,457	1,902,374,016	2,092,117,576	2,342,614,509	
Payback Period work area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
A-T CASH FLOW	119,588,065	52,181,077	88,875,185	101,649,387	100,690,971	89,270,030	105,800,529	106,905,822	118,261,881	120,268,852	119,740,548	163,751,521	1,469,063,873
Cumulative	301,668,071	353,849,148	442,724,333	544,373,719	645,064,690	734,334,720	840,135,249	947,041,071	1,065,302,952	1,185,571,804	1,305,312,352	1,469,063,873	
Payback Period work area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

The cash flow statement shows both the proceeds from the sale of the concentrate on the China market and the revenue FOB Port Cartier net of concentrate shipping charges to China. The former is required in the Quebec mining tax assessment. The operating costs are listed by component and include the royalty payment of 2 % of FOB revenues. The pre-production capital costs are listed by component and have been allocated over a 2-year pre-production period in the proportions of 40/60 %. A salvage value of 5 % of total pre-production capital costs (excluding mine development) is assumed. A working capital equivalent to 1 month of operating costs is assumed on the basis that the buyer will pay for 80% of the concentrate shipment once the ship is loaded at Port Cartier. Working capital levels vary over the life of mine as annual operating costs increase and decrease. The estimated closure costs must be secured in a trust fund at the beginning of mining operations. Thus it is assumed that trust fund payments are made in the last pre-production year and in the first two years of operation in the proportions of 50/25/25 % respectively. It is assumed that the royalty buy-back option is exercised at the beginning of production i.e. at the end of pre-production.

The financial indicators of the Lamêlée Project are summarized in Table 22.3. On a before-tax basis the project has a Net Present Value (NPV) of $529.9 M at a discount rate of 8 % an Internal Rate of Return (IRR) of 15.4% and a payback period of 5.8 years. On an after-tax basis the NPV is $243.8 M at a discount rate of 8 % the IRR is 12.1% and the payback period is 6.4 years.

Table 22.3 – Summary of Financial Results

Description	Units	Value
Total Revenue FOB Port Cartier (LOM)	$ M	8 708.2
Total Operating Costs including Royalty (LOM)	$ M	5 403.7
Total Pre-production Capital Costs including Royalty Buy-back	$ M	819.7
Total Sustaining Capital Costs (LOM)	$ M	116.7
Initial Working Capital	$ M	16.9
Mine Closure Costs	$ M	65.2
Salvage Value	$ M	39.8
BEFORE TAX		
Total Cash Flow	$ M	2 342.6
Payback Period	years	5.8
NPV @ 8%	$ M	529.9
NPV @ 6%	$ M	796.2
NPV @ 10%	$ M	330.8
IRR	%	15.4
AFTER TAX		
Total Tax Payments (LOM)	$ M	873.6
Total Cash Flow	$ M	1 469.1
Payback Period	years	6.4
NPV @ 8%	$ M	243.8
NPV @ 6%	$ M	425.9
NPV @ 10%	$ M	106.9
IRR	%	12.1

Note: The calculation of the payback period is based on the start-up of the operation in 2017.

22.4 Sensitivity Analysis

A sensitivity analysis was prepared with the following three (3) parameters:

- Operating costs;
- Pre-production Capital costs;
- CFR Selling price of iron concentrate.

Each variable is examined one-at-a-time. An interval of ± 30% with increments of 10% was used for all three variables.

The before-tax results of the sensitivity analysis are shown in Figure 22.2 and Figure 22.3. Both the project's net present value (NPV) and internal rate of return (IRR) are more sensitive to changes in operating costs (OPEX) than to changes in capital costs (CAPEX), as evidenced by the steeper slope of the OPEX curves. As expected however, the project's financial performance is most sensitive to changes in selling price (PRICE). It can be observed that the project breaks even (NPV=0 or IRR=8%, dashed line in Figure 22.3) at a variation of about +23 % in operating costs. As well, the project breaks even at a selling price about 12 % lower than the base case price (i.e., at a CFR price of approximately US $86 per tonne).

Figure 22.2 – Sensitivity Analysis: Before-Tax NPV @ 8%

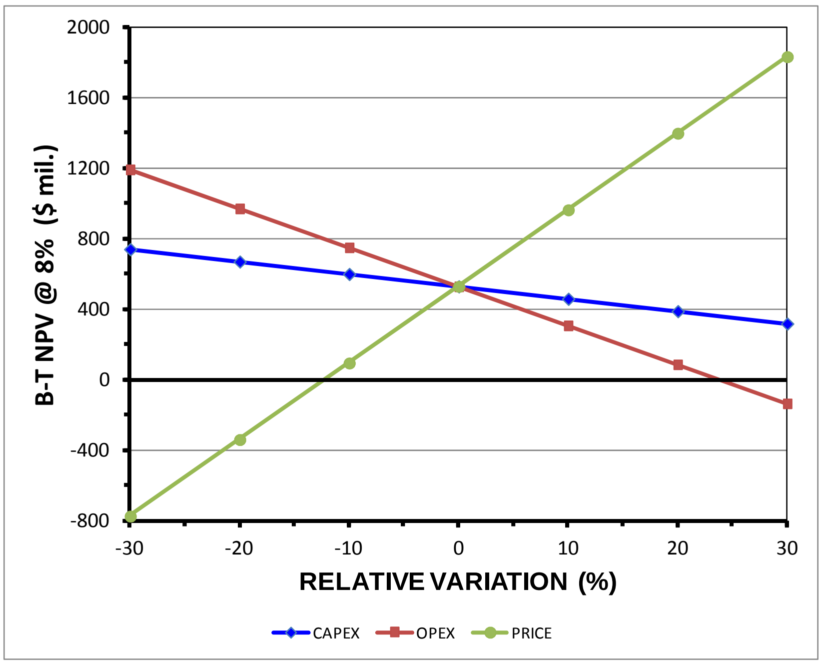
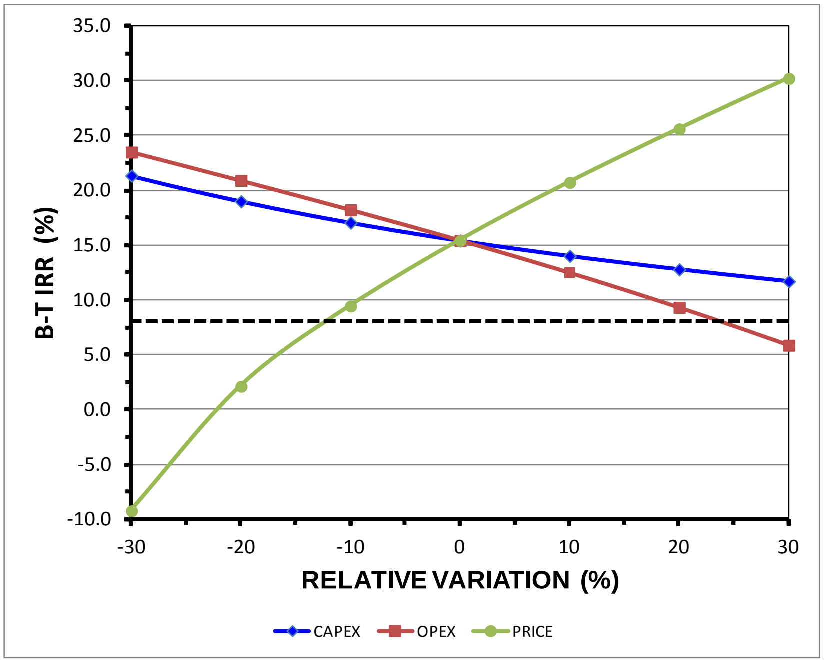


Figure 22.3 – Sensitivity Analysis: Before-Tax IRR



The after-tax results of the sensitivity analysis are shown in Figure 22.4 and Figure 22.5. The same conclusions as those drawn for the before-tax case can be made here concerning the sensitivity of the project to variations in CAPEX, OPEX and PRICE. It is noted that the project becomes marginal at the upper limit (+30%) of the CAPEX variation interval. On an after-tax basis, the project breaks even at a variation of about +16 % in operating costs and at a selling price about 8 % lower than the base case price (i.e., at a CFR price of approximately US $89 per tonne).

Figure 22.4 – Sensitivity Analysis: After-Tax NPV @ 8%

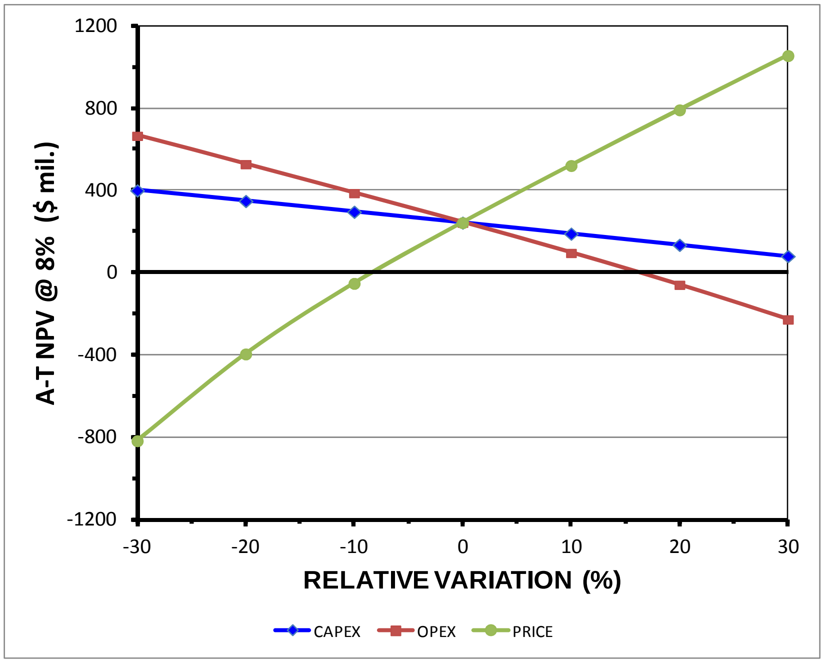
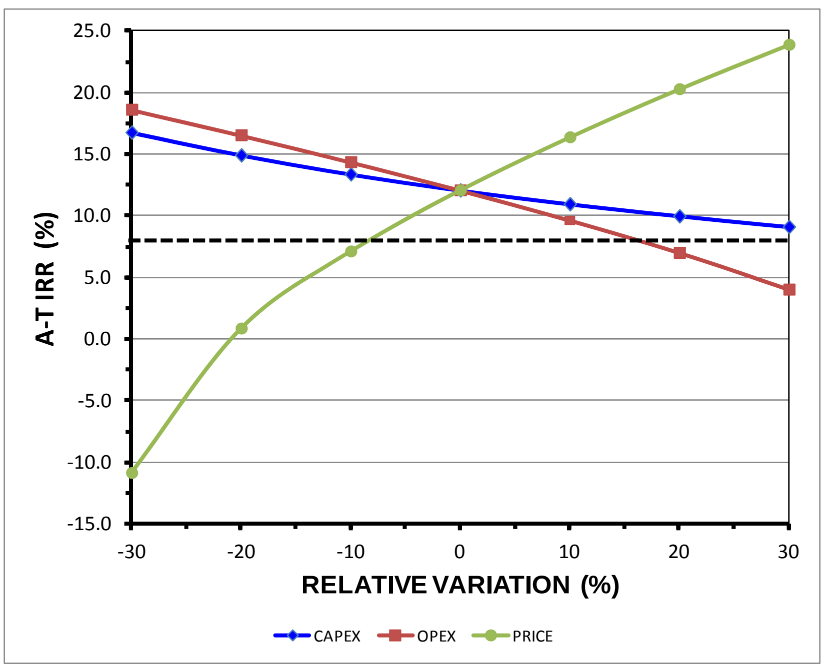


Figure 22.5 – Sensitivity Analysis: After-Tax IRR



22.5 Important Caution Regarding the Economic Analysis

The economic analysis contained in this report is preliminary in nature. It incorporates inferred mineral resources that are considered too geologically speculative to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. This should not be considered a prefeasibility or feasibility study. There can be no certainty that the estimates contained in this report will be realized. In addition, mineral resources that are not mineral reserves do not have demonstrated economic viability.

23 Adjacent Properties

The Lamêlée Iron Property is located in the southern extension of the Labrador Trough containing a large amount of iron hematite and magnetite deposits and exploration properties. The following companies have adjacent iron ore projects currently under development or under investigation:

- ArcelorMittal Mines Canada;
- Cliffs Natural Resources;
- Champion Iron Limited;

The iron mineralization in these properties is contained in the Sokoman Formation. However, the presence of mineralization in the adjacent properties is not necessarily indicative of the mineralization on the Lamêlée property that is the subject of the present report. Indeed, lateral facies changes in the Sokoman Formation have been documented.

The descriptions in this Section are drawn from publicly disclosed information by the owners of the adjacent properties. The qualified person has been unable to verify the information.

23.1 ArcelorMittal Mines Canada

Mount-Wright Mining Complex

There are some 1 000 employees at the Mont-Wright Mining Complex, which comprises an open-pit mine, an ore crusher and a concentrator, huge maintenance workshops, a large spare parts storage facility and a train loading system.

The facilities are complemented by an extensive fleet of mining equipment, including drilling machines, electric shovels and large-capacity loaders, as well as some thirty 200-250 short-tonne production haul trucks.

The mine, extending over 24 square kilometres, has reserves and resources of one billion tonnes of crude ore with an iron content of approximately 30%. Generally, every 2.6 tonnes of crude ore yields 1 tonne of concentrate.

According to an established plan, drilling machine operators carve deep holes (15.8 metres) in the ore-bearing rock, into which an explosive mixture is poured and blasted to split the rock. Blasting operations, each requiring about sixty holes, are carried out four to five times a week.

Power shovels and – less frequently – large-capacity loaders load the fragmented rock onto production trucks. The bucket of the biggest electric shovels can carry 35 cubic metres of rock, while three or four bucket loads are enough to fill a 250-tonne truck.

Each day, production truck drivers make about 1 000 runs from the mine, most of them to the unloading point: the ore crusher. Truck boxes are unloaded into one of two gyratory crushers, which break the ore into pieces some 20 centimetres in diameter. The crushed ore is moved by conveyor to one of the six storage silos in the concentrator.

The first step in the concentration process is to finely grind the ore in one of the six autogenous mills. The ground ore is then screened by vibration and particles too large to pass through the screens are returned to the grinder. The remainder is routed to the concentrator’s 8 640 spirals, divided into three separate circuits, in order to increase the iron content of the crude ore.

The concentrate is processed through filter tables to remove the water, and routed to the loading silo to be put on trains bound for Port-Cartier.

Fire Lake Open-Pit Mine

The open-pit mine at Fire Lake, located 55 kilometres 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 train, over the rail link that connects Fire Lake to the ArcelorMittal main railway line.

At Mont-Wright, the ore is carried to the crusher and broken up into fragments some 20 centimetres in diameter. The fragmented ore is then carried to the concentrator, where it is goes through the regular concentration process.

23.2 Cliffs Natural Resources

Bloom Lake Mine

The Bloom Lake mine and concentrator are located approximately nine miles southwest of Fermont Quebec part of the southwest corner of the Labrador Trough iron range. Cliffs' acquisition of Consolidated Thompson in 2011 included a 75% percent ownership in the property.

Operations consist of an open pit truck and shovel mine a concentrator that utilizes single-stage crushing an autogenous grinding mill and gravity separation to produce an iron concentrate. From the site concentrate is transported by rail to a ship loading port in Pointe Noire Quebec.

In operation since 2010 Bloom Lake has an annual rated capacity of 7.2 million of metric tons of iron concentrate.

Peppler Lake Deposit

Cliffs is now the owner of the Quinto Mining Corporation assets and the Peppler Lake Holdings. The Peppler Holdings contain the Peppler Lake magnetite-hematite taconite Lake Superior-type iron deposit at Lac Peppler and also a number of other iron ore prospects including Lamêlée Hill, Hobdad, Lac Jean and Faber, that have been identified from historical exploration and mapping programs.

The deposit is located approximately 48 km south of ArcelorMittal Mont-Wright iron mine and 20 km west of the Fire Lake Deposit which is under development by ArcelorMittal. ArcelorMittal completed a drill program on the Peppler Lake Property in 1955/56 and a reserve estimate in 1978.

The Property consists of the 55 claims that cover the Peppler Lake Deposit being part of the larger Peppler Holdings. The Peppler Holdings consist of several claim groups including the Property and the Lac Olga, Lac Casse, Lac Jean, Lamêlée Hill, Faber and Hobdad Hill groups. The Peppler Holding properties are located in the Manicougan - Mont-Wright district, approximately 240 km north of Port Cartier and Sept-Ilês and 50 km southwest of Fermont. The Peppler Holdings span an area that extends about 33 km east-west and 30 km north-south in NTS map areas 23B05, 06, 11 and 12.

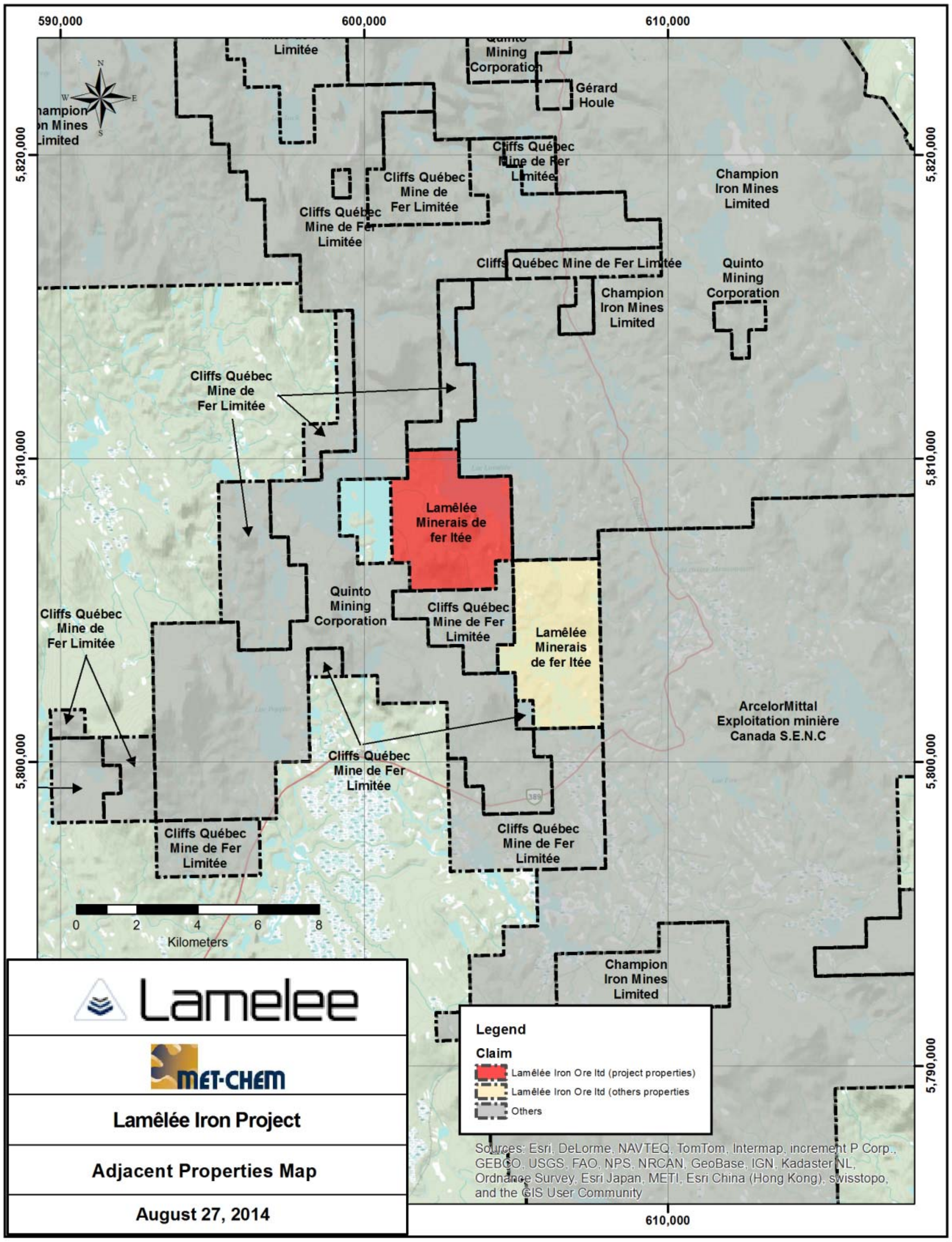
The Peppler Lake Property that covers the Peppler Lake Deposit is centred at approximately 52°21’N Latitude and 67°40’W Longitude, National Topographic Map reference 23B/05, Lac Peppler.

23.3 Champion Iron Limited

Champion's Fermont Holdings consist of 12 iron-rich mineral concessions totalling approximately 755 square kilometres in the Fermont Iron Ore District of northeastern Québec located 250 kilometres (km) north of the town of Port-Cartier and centered 60 km southwest of the town of Fermont. Currently, Champion holds a 100% direct interest in these projects.

Champion's Consolidated Fire Lake North Project is located in northeastern Québec contiguous to the north of ArcelorMittal's operating Fire Lake Mine, and located 60 km south of Cliff Natural Resources' Bloom Lake mine. The mine is located within the Fermont Iron Ore District, a world renowned iron ore mining camp at the Southern end of the Labrador Trough also located within the Grenville Province where it was metamorphosed to a coarser grain size overall. The four current producers in the region account for Canada's total iron ore production which is estimated at 47 million tonnes of Iron-ore concentrate per year and is expected to increase to 200 million tonnes per year over the next ten years, based on current expansion plans.

Figure 23.1 – Regional Claim map



24 Other Relevant Data and Information

In order to minimize some of the capital cost requirements for the PEA study, a number of assumptions have been made which are shown below:

- The crusher will be located beside the concentrator to eliminate the need for a long overland conveyor;
- It is assumed that no grouting is required for the tailing dams;
- The mining equipment will be financed, and will become the owner's property after financing;
- The mine modular workshop will be a heated "Sprung'' shed type;
- The access road going to the explosive plant and the concentrator will be built with the waste rock from the mine;
- All transfer towers will be open, so no dust collector bags will be necessary and the dust will be controlled at the source;
- The major structural steel will come from China, and a discounted total cost was assumed;
- Due to the experience of the small owner's management team the owner's costs were decided to be 3%; and
- The concentrate stockpiling equipment at the port will be modest and will consist of a stacker/reclaim conveyor.

For the next phase of the study, the use of the Liquefied Natural Gas (LNG) concept for the mining and other equipment will be considered. No potential operating cost savings were used in the PEA study.

25 Interpretation and Conclusions

25.1 Mineral Resources

The work completed by Met-Chem while preparing the resource estimate showed that additional drill holes were necessary to improve the understanding of the geology and structure of the deposit and to upgrade parts of the resources into higher resource categories. A better definition of the in situ density was also required.

The need for a better definition of the recoverable magnetic portion of the mineralization using Satmagan and Davis Tube testing was apparent. As well the proportion of magnetite to hematite in the deposit also needed to be better defined which could be achieved using heavy-liquid separation on selected samples.

A better correlation of the sporadically sampled 2011 drill holes with the rest of the holes should be achieved by re-sampling the mineralized intervals on a continuous basis in some of these holes.

The resources estimate will have to be updated once all the results from the analytical and testing laboratory are available.

The results from the updated resources estimate including resources upgraded into the Measured and Indicated categories and all the parameters required for a study at a level beyond the PEA, are necessary before proceeding to the next phase of development for the Project.

25.2 Mining Method

The In-Pit Mineral Resources for the Lamêlée Project which account for mining dilution and losses total 272 Mt of Inferred Mineral Resources at a Total Fe grade of 29.7% (Weight Recovery of 36.3%). In order to access these resources 636 Mt of overburden and waste rock must be mined which results in a stripping ratio of 2.3 to 1.

The mining method selected for the Project is a conventional open pit drill and blast truck and shovel operation which is carried out with an owner operated fleet. Following the development of a 20-year mine plan Met-Chem estimated the mine equipment fleet to include 22 haul trucks (227 tonne) 3 electric drive hydraulic shovels (26.5 m3 bucket), 3 production drills as well as a fleet of support and service equipment.

25.3 Processing and Metallurgy

Three (3) specimens from the three (3) principal units of the deposit that offer economic potential were used for the PEA metallurgical testwork program: High Mag (Magnetite Iron Formation – MIF), Hem/Spec (Magnetite-Hematite Iron Formation (MHIF) and QPyrxM (Quartzite-Pyroxene-Magnetite Formation).

The High Mag sample contains almost all of its iron under the magnetite form. The Hem/Spec sample contains most of its iron under the hematite form. The QPyrxM sample contains magnetite and hematite, but a significant amount of iron in silicates The QEMSCAN indicates that the liberation sizes for Fe-oxide particles are in the following ranges:

- High Mag: ±600 µm;
- Hem / Spec: 1700 to 850 µm;
- QPyrxM: 600 µm to 300 µm.

The drop weight test results indicate that in terms of impact and abrasion breakage, the High Mag and Hem/Spec samples are considered a very soft ore type, while the QPyrxM can be considered as a medium ore type. Since coarse and hard rocks were not systematically included in the samples (specimens) these results are not surprising. The Bond Ball Mill Work Index (BWI) testing however showed the High Mag and the Hem/Spec samples are above the 80th percentiles for the hardness in the SGS database.

Based on the HLS results the High Mag sample showed a gravity separation potential to produce a concentrate at 4.5 % SiO_2 at a grinding size close to 600 µm. The Hem/Spec sample showed a gravity separation potential to produce a concentrate at 4.5 % SiO_2 at a grinding size of 1700 µm. The QpyrxM sample did not show a potential for gravity separation. Fe-Mg silicate recovery is important and produces a concentrate with a high SiO_2 grade.

Based on the DTT results the High Mag sample showed interesting magnetic separation potential to produce a concentrate at 4.5 % SiO_2 at a grinding size of between 150 µm and 75 µm. The QPyrxM sample showed interesting magnetic separation potential to produce a concentrate at 4.5 % SiO_2 at a grinding size of around 150 µm. Low iron recovery should be expected considering only 50 % of the Fe is in a magnetite form.

The Mn grade is between 1.2 and 1.6 % in the concentrate produced either by gravity separation or by magnetic separation in the High Mag sample. The manganese is included in the magnetite minerals and cannot be removed by physical separation.

A conventional gravity process will enable the recovery of the iron minerals from the Hematite and Magnetite Iron Formations (HIF MIF MHIF) and the production of a sealable final iron concentrate at an average grinding size of 850 µm.

The processing of Quartzite-Pyroxene-Magnetite Formation (QPyrxM) through a conventional gravity circuit will not generate a sealable concentrate. A complex gravity circuit or a magnetite recovery circuit is required to process the QPyrxM. This will be assessed in the project's next phase.

The weight recovery model developed on HLS on geology samples predicts that the Lac Lamêlée South ore averaging an iron grade of 29.7 % Fe will allow the production of a concentrate at an average iron grade of 64.3 % Fe and 4.5 % SiO_2 with an average weight recovery of 36.3 %.

25.4 Infrastructures

The project has two main locations: the mine site and the port site. The mine site areas are the mine, the concentrator, the tailings, site infrastructures including an accommodation camp with a capacity of 250 workers. The project also has a rail loop at the mine site to load the concentrate produced and a unloading loop at the port site. The two loops are connected to the existing rail system. The port site includes the train unloading system, stacker / reclaimer and a ship loading system. The public electricity network is relatively close to both sites.

25.5 Permitting

The Project will be subject to environmental assessment (EA) in accordance with provincial and federal requirements. Following release from the provincial and federal EA processes, the project will require a number of approvals, permits and authorizations prior to initiation and throughout all stages in the life of the project. In addition, the proponent will be required to comply with any other terms and conditions associated with the EA release issued by the provincial and federal regulators.

25.6 Economic Analysis

A preliminary economic analysis has been carried out for the Project using a cash flow model. The model is constructed using annual cash flows in constant third quarter 2014 Canadian dollars and is based on an iron concentrate production of 5 million tonnes per year. As a general rule, the financial assessment of projects of this nature is carried out on a "100% equity" basis, i.e. the debt and equity sources of capital funds are ignored. No provision is made for the effects of inflation.

For this analysis, the following price has been assumed:

- Iron concentrate 64.3% Fe   US$ 97.50/t CFR China

Assuming transportation costs of US$ 18.00 per tonne from Port Cartier to the China market, the realised price of the product at Port Cartier is:

- Iron concentrate 64.3% Fe   US$ 79.50/t (CAD 88.33) FOB Port Cartier

The summary of the economic analysis is shown in Table 25.1.

Table 25.1 – Summary of Economic Analysis

Description	Units	Value
Total Revenue FOB Port Cartier (LOM)	$ M	8 708.2
Total Operating Costs including Royalty (LOM)	$ M	5 403.7
Total Pre-production Capital Costs including Royalty Buy-back	$ M	819.7
Total Sustaining Capital Costs (LOM)	$ M	116.7
Initial Working Capital	$ M	16.9
Mine Closure Costs	$ M	65.2
Salvage Value	$ M	39.8
BEFORE TAX		
Total Cash Flow	$ M	2 342.6
Payback Period	years	5.8
NPV @ 8%	$ M	529.9
NPV @ 6%	$ M	796.2
NPV @ 10%	$ M	330.8
IRR	%	15.4
AFTER TAX		
Total Tax Payments (LOM)	$ M	873.6
Total Cash Flow	$ M	1 469.1
Payback Period	years	6.4
NPV @ 8%	$ M	243.8
NPV @ 6%	$ M	425.9
NPV @ 10%	$ M	106.9
IRR	%	12.1

Both the project's net present value and internal rate of return are more sensitive to changes in operating costs than to changes in capital costs. As expected however the project's financial performance is most sensitive to changes in selling price. See Section 22.2 for a description of the key economic operating and technical assumptions used in preparing the economic analysis.

The economic analysis contained in this report is preliminary in nature. It incorporates inferred mineral resources that are considered too geologically speculative to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. It should not be considered a prefeasibility or feasibility study. There can be no certainty that the estimates contained in this report will be realized. In addition mineral resources that are not mineral reserves do not have demonstrated economic viability

25.7 Conclusion

With the estimated Capital Cost of $816.7 million and an estimated LOM Operating Cost of $54.81 per tonne of concentrate and an estimated price of US$ 97.50 per tonne CFR China the Economic Analysis has shown that the project has a potential of economic viability.

26 Recommendations

Based on the results of the PEA study, it is suggested to proceed with the Feasibility Study of the Project. The following studies should be carried out early in the next project phase:

26.1 Mining

Met-Chem recommends a complete geotechnical pit slope analysis as well as hydrogeology studies. These studies should evaluate the appropriate pit wall configuration as well as the effect of Lac Lamêlée on the open pit (wall stability and water inflows).

The hydrogeological study should provide an estimate of the quantity of water that is expected to be encountered during the mining operation.

26.2 Geology

In view of the information available at the time of the preparation of the resource estimate, Met-Chem provides the recommendations below. The new drilling program completed in the winter of 2014 fulfilled some of these and the opportunity exists to follow the other recommendations using the results from the drilling program.

- Complete additional drill holes in order to improve the understanding of the geology and structure of the deposit, thus enhance the reliability of the geological model. Additional drill holes will also upgrade the resources and raise parts of them into higher resource categories;
- Perform additional in situ density measurements on core samples, using the weight in air and in water technique;
- Add Satmagan and Davis Tube tests and Heavy-Liquids separation using samples from the 2011 drilling program; the Satmagan & Davis Tube tests are meant to calculate a regression between the two sets of results, whereas the Heavy-liquid tests are designed to help define the magnetite-hematite ratio within the mineralization;
- Re-sample and analyze some of the drill holes from the 2011 program that had been sporadically sampled, using a continuous sampling approach of the mineralized intervals;
- Update the resources estimate and the confidence level in the various parameters that can be calculated from the results of the 2014 drilling program once all the results from the analytical

and testing laboratories are available. This is required before proceeding with any further economic study as part of the next phase of development of the Project. Indeed, the present resources are all in the Inferred category, and all of them have to be upgraded into the Measured and/or Indicated categories to qualify for an economic study beyond the PEA level;

26.3 Metallurgy

The following tests are identified to bring the project to the next phase of the study.

26.3.1 Metallurgical samples selection

Composites samples representing the different lithology should be harvested: HIF MIF MHIF and QPyrxM. A composite representing the typical ore feed should also be generated.

A bulk sample of several tonnes of material is required for the testwork suggested. This bulk sample will contain autogenous grinding media size rocks that will enable the assessment of the autogenous grinding competency of the ore.

The metallurgical samples should be collected in a way that ensures a representative sampling method. The supervision by a qualified person is suggested.

26.3.2 Mineralogy

Additional mineralogy and liberation analysis is required on the composite samples to validate the mineral content and liberation size of the iron minerals.

26.3.3 Crushing

Bulk material angle of repose, transportation and handling tests should be carried out.

26.3.4 Grinding

The following work should be undertaken on composite samples:

- Bond crusher work index (CWI), Bond abrasion index (AI), JK drop weight (JK DWT), SAG Mill Comminution (SMC), Bond rod mill work index and Bond ball mill work index tests to confirmed the results obtained and increase the results representativity;

- JKSimMet simulations should be conducted to validate the grinding circuit design and performances;
- Unconfined Compressive Strength (UCS) tests should be planned if the abrasion index indicates potential to alternative crushing technologies;
- SAG Power Index (SPI) test should be conducted to calibrate the CEET software and perform simulations of the grinding circuit;
- MacPherson Autogenous Grindability Test and Autogenous media competency tests should be conducted to evaluate the competency of the rock for AG milling;
- An AG mill pilot plant is required at the feasibility level to determine the energy requirement and to validate the application of fully autogenous grinding to the ore if autogenous grinding is selected.

26.3.5 Screening

Screening testwork should be conducted to validate the scalping screens and the classification screens sizes.

26.3.6 Beneficiation testwork

Additional Heavy Liquid Separation tests are required on point and composite samples.

It is suggested to perform batch gravity separation test with spirals and hydrosizer to assess the process performance with the actual considered equipment. The testing of a more complex gravity separation process allowing the recovery of iron oxide from the QPyrxM should be conducted. The process should allow the processing of the ore in narrow size range to improve the density separation.

If testing with spirals is not possible, Wilfley Table parameters should be optimized to improve the process efficiency and to reproduce the expected gravity separation performances.

Additional Davis Tube Tests (DTT) tests are required to assess the magnetic recovery potential of the ore. The generated data should be used to perform a trade-off study between a gravity-only process, and gravity-magnetic process. If a magnetic process is to be included, Low Intensity Magnetic Separation (LIMS) including the regrinding step will have to be performed.

When the final beneficiation process will be defined, a pilot plant test should be conducted with the actual equipment to be used to validate the process performance and sizing.

26.3.7 Concentrate filtration and handling

Filtration tests on the concentrate should be performed.

Concentrate transportation and storage testwork, including the behavior at low temperature, should be conducted.

26.3.8 Tailings

Tailings settling testwork should be conducted. The tests should be performed on the fine tailings as well as the total tailings. Results should be used in a trade-off study to decide between the settling of the fine tailing prior to its mixing with the coarse tailings, or the settling of the total tailings together during the winter months.

26.4 Environnent

With respect to environmental considerations, WSP recommends to:

- Carry out the Environmental Impact Assessment (EIA) as well as any related studies;
- Continue discussions with local community and include additional stakeholders to identify key areas and subjects to be addressed during the advancement of the exploration project and through the future EIA phase of the project; and
- Conduct a geochemical testing to determine Acid Generating/Non-Acid Generating Potential of mineralized rock, waste rock and tailings as well at the respective potential for metal leaching/non-leaching.

26.5 Infrastructures

Initiate discussion with electric power company (Hydro-Québec) to confirm the power availability;

Initiate discussions with existing railroad owner for a n access agreement.

It is recommended that Lamêlée Iron Ore Ltd. initiates various future engineering studies to further develop the Lamêlée Project. Table 26.1 shows the recommended work program and estimated costs.

Table 26.1 – Recommended Work Program

Description	Cost
Environmental base line study and permitting	$1 000 000
Hydrogeological and geotechnical studies	$1 500 000
Updated Ni 43-101 mineral resources	$250 000
Detailed metallurgical test-work	$1 000 000
Bankable feasibility study	$2 750 000
General and administration	$1 500 000
Total	**$8 000 000**

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