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3	ISSUED	4/4/18	SAG	SAG	MES	MES
2	FINAL	8/14/2016	SAG	SAG	MES	MES
1	FOR REVIEW	7/30/16	SAG	SAG	KJS	MES
0	PRELIMINARY	6/9/16	SAG	SAG	KJS	MES

Pure Fonte Ltée

PURE FONTE LTÉE

PIG IRON PRODUCTION PLANT – FEASIBILITY STUDY
CUSTOMER Nº: 1821

tenova

TECHINT

TENOVA

TECHINT ENGINEERING & CONSTRUCTION

SECTION 1 - SUMMARY

CHAPTER 1.1

BACKGROUND

ESC.: N/A

JOB: CD-335

REVISION 3

REVISION

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FIGURES AND REFERENCES

Chapter's references:

[1] GRI. [Online]. Available: http://www.4-traders.com/METO-MFG-27506604/news/Metalo-Manufacturing-Inc-Sole-Investment-Completes-Restructuring-26228510/ .

[2] Petmin. [Online]. Available: http://petmin.co.za/.

[3] Metalo. [Online]. Available: http://www.metalo.ca/.

1.1 Background

1.1.1 Project Promoters

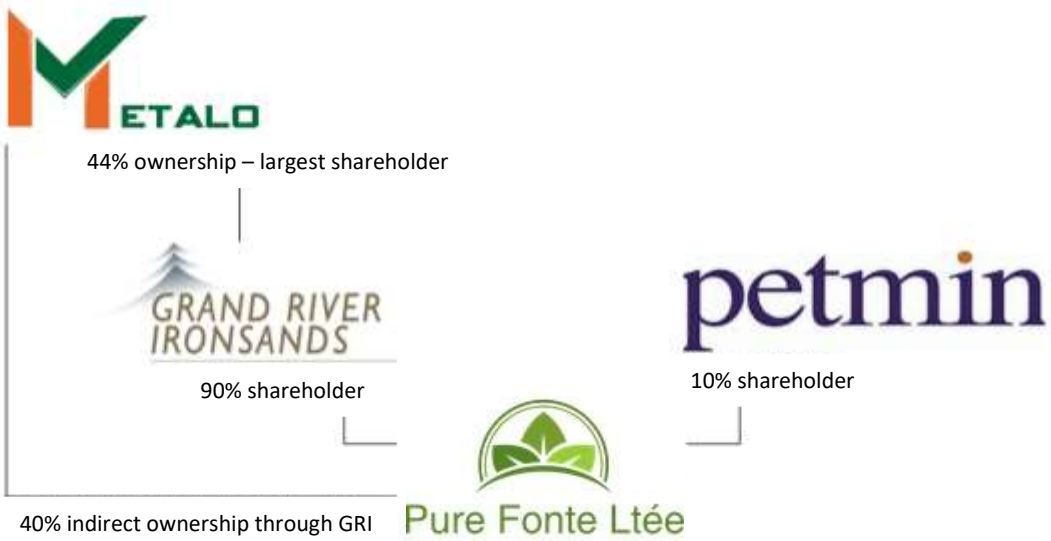

Figure 1.1-1.: PURE FONTE LTÉE Shareholders [1]

1.1.1.1 Grand River Ironsands Incorporated (GRI)

Grand River Ironsands Incorporated (GRI) was established in 2007 as a private company based in Nova Scotia, Canada, with its main asset being minerals sands in Happy Valley-Goose Bay, Newfoundland, Canada. The minerals sands are rich in iron ore, feldspar, garnet, zircon and silica quartz.

The development of the sands led to a joint venture known as **Pure Fonte Ltée (PFL)** with Petmin Limited, South Africa's largest producer of anthracite coal, created to develop a vertically integrated mining and smelting project whereby the iron ore from the sands deposit would be the feedstock for a pig iron smelter. GRI controls 90% of PURE FONTE LTÉE and Petmin the other 10%.

PURE FONTE LTÉE plans to construct a merchant pig iron plant and become North America's first dedicated producer of high quality pig iron. Due to the currently low iron ore prices, PURE FONTE LTÉE's first plant will purchase iron ore from current suppliers and the iron sands mine will not be built. However, the iron sands asset will remain a hedge against future increase in the iron ore price.

PURE FONTE LTÉE's plant be a low cost producer globally and will sit on the doorstep of the end users in North America - providing an additional and significant cost savings benefit for foundries and electric arc furnace steel mills.

GRI also owns electric arc furnaces in Easton, Pennsylvania that have been used for testing purposes for PURE FONTE LTÉE and that GRI is hoping to convert to other uses once PURE FONTE LTÉE has completed testing requirements.

GRI's largest shareholder (44%) is the publicly traded Metalo Manufacturing Inc. (CSE:MMI).

Figure 1.1-2.: photo from GRI website [1]

1.1.1.2 Petmin Limited (Petmin)

Petmin Limited (Petmin) is a high-growth multi-commodity mining company. It is geographically diversified with mining operations in South Africa and development projects in North America and South Africa. Petmin is focused on commodities that support the steel value chain and are required for urbanization and infrastructure growth. It is South Africa's leading producer of metallurgical anthracite, and is developing with GRI the PURE FONTE LTÉE project in North America to produce merchant pig iron. Petmin is listed on the JSE Ltd.

Petmin's corporate and operational management teams have a substantial stake in the business and a track record of delivering value to shareholders through operational efficiency combined with well-timed acquisitions and disposals. Petmin runs a decentralized management model with operational teams empowered by the executive to deliver.

Petmin's vision is to develop into a geographically-diversified multi-commodity mining company which delivers sustained and superior returns to shareholders through capital growth and payment of dividends; and to make a positive impact on the communities in which it operates.

Petmin's strategy is to grow through expansion of its cash producing assets, and acquisition and development of high potential projects into profitable operations, while retaining the option to dispose of assets at the maximum point of return. Due to the current state of the commodities market, cash preservation is critical and, despite a strong balance sheet, Petmin will in the short-term focus on projects that are cash generating and in the bottom quartile of the cost curve.

Petmin is focused on the steel value chain and commodities required for urbanization and infrastructure development. The company continues to diversify geographically and by commodity. A mix of quality cash-producing assets and phased investment in high potential projects enables Petmin to reduce its risk and retain a high degree of optionality.

Figure 1.1-3.: photo from Petmin website [2]

1.1.1.3 Metalo Manufacturing Inc.

Merchant Pig Iron (MPI) is the focus of **Metalo Manufacturing Inc.'s (MMI)** investment GRI, the major shareholder in North Atlantic Iron Corporation (PURE FONTE LTÉE).
MMI owns about 44% of GRI. With that MMI indirectly owns 40% of the PURE FONTE LTÉE project.

The design criteria for the pig iron plant centered on using proven technologies, such as natural gas-based direct reduction and conventional electric arc furnace, eliminating technology risks and the need of using coal.

Project partners have set a standard to be a low cost producer and able to compete with suppliers from Brazil, Russia, South Africa and Ukraine. Additionally, the ability to produce the highest purity metrics sought by foundries was also designed into the process.

Through MMI's shareholding in GRI, there is a mineral sands resource near Happy Valley-Goose Bay, NL (on a seaport). This mineral sands will be developed and serve as a hedge against any significant increases in iron ore. While this is not anticipated in the foreseeable future, the resource also contains other valuable minerals that are being further evaluated. The minerals of interest include magnetite, hematite, titan-magnetite, zircon, garnets, feldspars, silica, quartz, rutile, leucozene and ilmenite. Future efforts will focus on evaluating the economic potential of these minerals. On SEDAR, a technical report by SRK Consultants and Worley Parsons was published in June 2014.

Figure 1.1-4.: photo from Metalo website [3]

1.1.2 Project Overview

Project partners have invested more than US$30 million to date in the development of a financeable business model for a merchant pig iron plant in North America.

Currently, North America imports 3-5 million ton annually of pig iron, with less than 50,000 ton produced in the US and Canada. The remainder is imported from Brazil, Russia, Ukraine and South Africa.

The PURE FONTE LTÉE pig iron plant will initially product 425,000 metric tons annually, but is designed for future expansion. It will be located in Port Saguenay Quebec, a port about 54 nautical miles from the junction of the Saguenay and St. Lawrence rivers. The port operates year round and provides access to both the U.S. Great Lakes and Western Europe.

PURE FONTE LTÉE will produce MPI by transforming iron ore pellets into liquid iron which will be cast in molds into MPI for sale. The major components of PURE FONTE LTÉE's production flow sheet will include:

1. raw material handling of iron ore pellets and recycled iron bearing dusts and sludge from the production process;
2. the pre-reduction of the iron ore pellets into hot direct reduced iron ("DRI") in a gas based shaft furnace;
3. smelting of the hot DRI in an electric arc furnace ("EAF"); and
4. casting of the liquid iron from the EAF in molds for sale as MPI

PURE FONTE LTÉE will meet and exceed all current North American standards for emissions and in particular will be the first one to produce pig iron without using coal, making it the pig iron production plant with the lowest GHG footprint and lowest CO2 production in the World.

The PURE FONTE LTÉE plant will utilize low cost green electricity from Quebec hydro power, low cost natural gas distributed to the project site from the large resources available in North America, and low cost iron ore from current Canadian producers exporting from Port Cartier and Sept-Iles.

The plant will supply its product mainly to iron foundries with any excess production sold to steel mills. Foundries use MPI to make products such as engines, motors parts, ductile pipes and other cast iron products. Steel mills use the MPI as a blend with

scrap metal to make premium steel products for the automotive steel industry and other high quality steel products.

PURE FONTE LTÉE's plant will benefit from being located in Saguenay, Quebec, on the doorstep of the end markets in the U.S. north east, the Great Lakes and also Western Europe. This will provide a significant and additional cost advantage. This can be as much as $50/tonne.

The present document constitutes a Feasibility Study (FS) to be presented to project partners and stakeholders. This document has been an intense effort between the international equipment manufacturer and process specialist Tenova Group (Tenova), the engineering company Techint Engineering and Construction (Techint) and the construction company SNC Lavalin Inc. (SNC) and will form the basis for advancing the project.

The key principles of this BFS are the following:

1. **Safety**. A technology design that maximizes workforce safety and automates areas normally associated as being “high-risk” with respect to human interaction.

2. **Environment**. PURE FONTE LTÉE will be a global leader environmentally. Best in class technologies have been chosen to (i) minimize air emissions, including GHGs, (ii) re-use water discharge minimizing consumption and the impact to the local environment and (iii) minimize, recycle and utilize all iron bearing dust and sludge in the production process, and find users for the slag as aggregate.

3. **Quality**. PURE FONTE LTÉE will be able to produce a premium quality pig iron that can meet or exceed any available quality standards.

4. **Production cost**. PURE FONTE LTÉE will be able to produce pig iron at a delivered cost to customers that is lower than current global producers.

5. **Technology**. PURE FONTE LTÉE will use technology that is “known, proven and in-use”. The plant will also be expandable in size and/or easily convertible to making a high quality steel product.