GEOLOGICAL ASSESSMENT REPORT
ON THE DESGROSBOIS project

Iron Ore/Titanium/Vanadium Deposit
Beresford Township, Quebec, Canada

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For
On-track Exploration Ltd
Vanadium Venture Corporation

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APPENDIX

Samples Assays certificate (Als Canada Ttd / Als Chemex).
Claims validity (MERN)
1.0 Introduction

The purpose of this report is to summarize the previous exploration programs completed on the Desgrosbois property by different mining companies, also to evaluate the recent assessment field work completed on the property between August 24 and August 30th, 2019.

This report also summaries the geology as well as the economic potential of the Iron Ore, Titanium and Vanadium prospects of the property.

The information is based on the available geological and geochemical data of the deposit and on exploration programs and assay results completed between 1911 and 2011.

The government assessment reports, geological information and claim data are all gathered from the Ministry of Natural Resources of Quebec.

2.0 LOCATION & ACCESS

The Desgrosbois property is located in the south-central part of Quebec about 110 kilometers northwest of Montreal, approximately 8 kilometers north of the village of Ste-Agathe in Beresford Township, Terrebonne County. The property is located in map sheet area NTS 31J/01.

![Figure 1: Location of Desgrosbois project, Quebec, Canada.](image)

Electric power, Railway, Airport and Highways are only a few kilometers away from the property. Water supply is available in large quantities from several lakes located within the property boundary. The proximity of the property to water supply, power supply and civil infrastructures is of great value as these are prime factors for keeping the mining operation and transportation costs down.
Access to the properties is by Highway 117 connecting Montreal and Sainte-Agathe which lies approximately 8-10 kilometers south of the property of the property. Numerous paved roads are accessible through the property making most of the property area easily accessible.

The topography of the property for the most part is rolling hills, numerous ponds and small lakes exist on the property as a good source of water. All mineralized areas of interest are located comfortably within the property area. The northern part of the property consists of a strip of relatively flat land 60-100m wide lying immediately south of the highway. The remainder of the property consists of rocky terrain rising fairly steeply from the flat. Any heavy equipment could very easily be driven from the Highway to the main mineralized zones.

The climate around the property area is characterized by winter weather and snow accumulation extending from late October until late March. All secondary roads are maintained by municipalities, and highways by provincial authorities.

Figure 2 : Location of Main Fe-Ti-V prospects of Desgrosbois properties, Sainte-Agathe-des-Monts, Quebec.
3.0 PROPERTY STATUS

The Desgrobois property consists of 30 contiguous mineral claims (polygons) covering approximately 1,789.8 hectares located in Sainte Agathe area. The claim block is centered at GPS coordinates 548951 E and 5105036 N, with projection UTM-NAD83-Zone 18N.

Pertinent claim data is as follows:

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<thead>
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<th>Row/Column</th>
<th>Area (hectares)</th>
<th>Expiry Date</th>
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<td>2020/06/05</td>
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<td>09/09</td>
<td>59.67</td>
<td>2020/11/11</td>
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<tr>
<td>2526980</td>
<td>09/10</td>
<td>59.67</td>
<td>2020/11/11</td>
</tr>
</tbody>
</table>

The total area of the property is 17.9 square kilometers, 1,789.80 hectares and 4,402.9 acres.

The property was staked by Fayz Yacoub between May 29th 2018 and June 12th, 2018. The Desgrobois property is 100% owned by Fayz Yacoub of Surrey, British Columbia.
Figure 3: Location and land superficies covered by claim block of Desgrosbois Property, Quebec, Canada.
4.0 PROPERTY GEOLOGY

The area of the property is predominantly underlain by rock of a gabbroic phase of the anorthosite complex which underlies a large part of the Ste-Agathe area. Consisting predominantly of plagioclase, approaching labradorite in composition, the anorthosite contains varying amounts of pyroxene and quartz with minor occurrences of pyrite and pyrrhotite (Ensio, 1956). Bodies of titaniferous magnetite occur as massive concentrations and as disseminated zones in the anorthosite gangue.

Various theories have been advanced as to the origin of the magnetite bodies. The most accepted explanation is that the magnetite, although essentially of magmatic segregation origin, was injected as dykes after the emplacement of the anorthosite. The fact that the contacts between the magnetite and the anorthosite are usually quite sharp and distinct as is evidenced by drilling would add support to this theory.

5.0 HISTORICAL WORK

The subject property hosts multiple target areas of titanium-iron ore-vanadium mineralization, found as three (3) main prospects:

- Desgrosbois
- Titanium-Development
- Mine Ivry

The properties visited are located in the same area and are grouped into three claim areas: Desgrosbois, Ivry and Titanium-Development. The properties are located within 12km of the municipality of Ivry-sur-le-lac, Quebec. The titanium-iron or- vanadium mineralization may be considerably more extensive than current information suggests.

Desgrosbois is the target representing the greatest potential, because it represents an old mining pit of more than 300m$^2$ showing massive mineralization of Fe-Ti-V. The metalliferous potential is clearly demonstrated on the surface by the sampling of the pit and by several drill holes recorded by the MERN archives (Ministry of Energy and Natural Resources) suggesting historical resources of a total of 5.53 M tons of ore approximately 40.82% Fe and 10.99% TiO$_2$ (Hendricks, 1954).

Titanium-Development is the second most important target, as historical resources archived by the MERN suggest historical resources of a total of 2.59 M tons of ore at approximately 38.5% Fe and 30.84% TiO$_2$ (McGerrigle, 1962). No exploitation pit was observed on the surface, by several casings drilling were located on the surface.

Ivry is the third major target, as it also represents an old mining pit of more than 400m$^2$ showing massive Fe-Ti-V mineralization showing historical resources of 0.163Mt of ore at approximately 47.0% Fe and 19.0% TiO$_2$ (Hough, 1952, McGerrigle, 1962). Unfortunately, the claim block does not cover the pit, but it is owned by another person. Perhaps, the claims surrounding the pit cover the extension of the ore bodies extending towards the SE, ie towards the Titanium-Development Index.
5.1 The Desgrosbois (Fe-Ti-V) (NAD83-Zone 18N: 548951E-5105036N)

The Magnetite-Ilmenite deposit is well known since the beginning of the 20th Century. In 2013, first samples of the deposit taken from the two main outcrops were analyzed and subjected to beneficiation tests (Dulieux, 1913). The deposit was later described in some detail (Robinson, 1922; Osborn, 1935, 1944). In 1952, Fershing Amalgamated Mines Ltd started an extensive exploration programs on the property (Hagan, 1952).

In June 1952, two vertical drill holes No. 1 and 1A were drilled by Fershing Amalgamated Mines Ltd to test the depth and the persistence of the magnetite-ilmenite outcroppings. These holes were drilled to a depth of 60m and 29.5m (197 & 97 feet) respectively, and the results indicated that massive and disseminated ore was present.

In the fall of 1952, a magnetometer survey was made to try to delineate the lateral extent of the mineralized body. The results of this survey indicated the presence of two major anomalies.

In September and October of 1953, a total of 21 diamond drill holes totaling 1132m (3713 feet) were drilled on part of one of the two anomalies in the vicinity of diamond drill hole No 1 (figure 4). Only one out of 21 holes located at the south side of the deposit failed to yield any intersection of magnetite-ilmenite mineralization. It was expected that further drilling to the north and west would undoubtedly extend the mineralized body in these directions. A sole diamond drill hole 1A drilled in the second anomaly showed 12m (40 feet) of massive mineralization. This second anomaly was not explored by any further drilling.

The drilled mineralized body has an average thickness of approximately 29m (95 feet) and lies in an elliptical area with long and short dimensions of approximately 270m x 180m (900 x 600 feet). The massive body is overlain and interspersed with disseminated section having an average thickness of 5.5m (18 feet). The mineralized body is overlain with a capping and overburden having an average thickness of only 7.4m.

Figure 4: Location of diamond drill holes (DDH) on Desgrosbois prospect.
The calculation of the grade and tonnage of the Desgrosbois deposit are based on the results of a total of 22 diamond drill holes – diamond drill hole No 1 to diamond drill hole No 22 inclusive. The indicated reserves have been calculated by two independent engineers, J. Lyle Hendricks and Geo-Technical Development Company Limited. Their estimates agree very closely.

<table>
<thead>
<tr>
<th>Ore Type</th>
<th>Tonnage Estimation by J. Lyle</th>
<th>Tonnage Estimation by Geo-Tech</th>
<th>Fe %</th>
<th>TiO₂ mineralization</th>
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</thead>
<tbody>
<tr>
<td>Massive</td>
<td>5,527.433</td>
<td>5,200.000</td>
<td>40.87</td>
<td>10.99</td>
</tr>
<tr>
<td>Disseminated</td>
<td>1,051.400</td>
<td>1,135.000</td>
<td>25.67</td>
<td>6.64</td>
</tr>
<tr>
<td></td>
<td>6,578.833</td>
<td>6,335.000</td>
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</table>

It was emphasized that these reserves are based on drilling of one part of one anomaly without taking into account any other mineralized zones that may be developed in the second anomaly where a single test hole intersected 12.2m (40 feet) of magnetite grading 44.73% Fe and 11.56% TiO₂. Hendricks stated in his report that it was reasonable to assume that future development work would prove more reserves substantially higher than the tonnage already indicated.

Hunting Technical and Exploration Services Limited stated that the tonnage of the reserves would undoubtedly be increased by extending the drilled areas. They also pointed out that the possibility of the occurrence of additional bodies at depth or laterally had not been tested yet (figure 5).

![Figure 5: Interpretation of the mineralised unit and the diamond drill holes (DDH) on Desgrosbois prospect.](image-url)
5.2 Titanium-Development (Fe-Ti-V) (UTM-NAD83-Zone18N: 549241E / 5102742N)

The Titanium Development deposit is located at the southeastern part of the property, approximately 2.5 kilometers south of the Desgrosbois deposit. It is a deposit with estimated indicated reserves of 2.859 M tons at 38.5% Fe and 30.84% TiO₂ (McGerrigle, 1962, MERN, 2019).

In 1958 a total of 1228m (4,029 feet) of diamond drilling have been drilled by Titanium Development Corporation to investigate a geophysical magnetic anomaly delineated by a magnetometer survey over the southern part of the property (figure 6). A series of 45° holes have been drilled and intersected a mineralized body of magnetite-ilmenite and titanium oxide. Hole # 2 intersected 18.9m (62 feet) averaging 30.39% titanium oxide, hole # 4 intersected 33.5m (110 feet) averaging 32.02% titanium oxide, hole # 6 intersected ilmenite with average grade of 30.14% Titanium oxide, hole # 11 intersected 60 feet averaging 30.19% titanium oxide and two smaller sections over 6 feet of 31.04% titanium for a total of 21.6m (71 feet).

This figure represents material taken to a depth of 100m below the surface. An additional 1 M ton of lower grade material occur in association with the massive material which grades 20% and 30% TiO₂. The mineralized body occurs as three distinct zones of mineralization. These are either vertical or tabular bodies extending to the surface, and are obscured by an overburden varying from 0.5 to 10m. It has been estimated that at least 1 M tons of drill indicated reserve is minable by open pit methods and it may be rapidly and inexpensively prepared for mining operation.

Figure 6: Location of diamond drill holes (DDH) on Titanium Development prospect.

5.3 Mine Ivry Fe-Ti-V (UTM-NAD83-Zone18N: 548929 E-5103023N)

Mine Ivry is a past producing mine with a production records of 163,000 tons at 47% Fe and 19% TiO₂ (McGerrigle, 1962, MERN, 2019). The mine was active and producing between 1910 and 1918,
a total of about 16,000 tons of ilmenite ore was shipped to the Titanium Alloy Company of Niagara Falls, New-York for use in the manufacture of ferrotitanium, a deoxidizer of steel (Rose 1969). The results of a magnetic survey performed by R.J.M. Baxter, which suggested that the Ivry deposit extends to the east by outlining a magnetic zone of 2790 m² in extent is described in GM 01119 (Leblanc, 1951). The latter also refers to a magnetic separation test and assays for Fe-Ti performed by the American Smelting Company.

In 1952, Ivry is described as a mineralized zone having a minimum length of 225m (750 feet), contains segregated masses of titanium iron ore bodies consists of intergrowth of hematite and ilmenite. Previous work consisting of geophysical survey followed by diamond drilling of 1228m (4029 feet) was completed in 1952 by Geo-Technical Development Co (figure 7). Four mineralized zones were delineated by the drilling. The summary of tonnage and grade of these zones are as follows:

<table>
<thead>
<tr>
<th>Zone</th>
<th>Tons/vertical foot</th>
<th>Grade TiO₂ %</th>
<th>Grade x Tonnage</th>
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<td>A</td>
<td>1800</td>
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<td>55,512</td>
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<tr>
<td>A1</td>
<td>230</td>
<td>27.60</td>
<td>6,384</td>
</tr>
<tr>
<td>B</td>
<td>2350</td>
<td>30.61</td>
<td>71,933</td>
</tr>
<tr>
<td>C</td>
<td>5150</td>
<td>31.09</td>
<td>160,154</td>
</tr>
</tbody>
</table>

Total 9530 30.81 9530 tons/vertical foot

Vertical depth indicated by diamond drilling has proven ore to a depth of 92m (300 feet).

Figure 7 : Location of diamond drill holes (DDH) on Ivry Mine and Ivry-East prospect.

Between 2007 and 2008, a new aeromagnetic and ground-based gravimetric surveys conducted on the property by Trijet Mining Corp, results indicated important undiscovered Fe-Ti mineralized zone in the vicinity of the Ivry and Desgrosbois past producing open pit mines. The results obtained from
both surveys suggest that wherever positive or negative magnetic anomalies is found on the property, disseminated Fe-Ti mineralization are likely to be associated with these anomalies. The gravimetric survey delineated more than 24 M tons that contains nearly 30% vol. of ilmenite±magnetite (average Mineralization density of 3.14 g/cm³). Another 6.7 M tons of massive shallow seating Fe-Ti mineralization surrounding the Ivry pit that represents nearly 68% volume of ilmenite± magnetite (average-density of 3.67 g/cm³). These tonnage estimates are non-compliant to NI-43-101 exigences and are just indicative of the possible amount of mineralization at depth.

6.0 EXPLORATION CAMPAIGN 2019

In September 2019, Vanadium Venture Inc. (VVI) commissioned On Track Exploration (OTE) to engage the Geogenius Exploration Consulting team to assess the Fe-Ti-V metalliferous potential of these properties in the Sainte-Agathe-des-Monts area, Quebec, Canada.

The purpose of this exploration campaign is to describe the previous work done and to present new sampling results with an emphasis on Vanadium potential. All of the work consists of a site visit, geological geophysical anomaly reconnaissance, drone aerial photography, identification of old boreholes, sampling in the areas of interest, positioning with exact samples, cutting of samples for metallogeny and preparation of sampling maps.

The team consisted of geologists Stewart Jackson (PhD, P.Geo, Vanadium Venture Q.P.), Fayz Yacoub (P.Geo, President of On-Track Exploration Ltd), and author Jocelyn Pelletier (Msc, P. Geo, independent consultant geologist). The field assistants were experienced geotechnicians, Jean-Claude Ligot and Sean Lecler. For access logistics, the team was based in Sainte-Agathe-des-Monts, and the trip was done by SUV pickup truck.

The fieldwork was carried out from 24 to 31 August 2019. Preparation of the samples from 31 August to 1 September 2019. The maps and the report were produced during the months of September and October 2019. On 11 September 2019, a Due diligence visit was done by Ian Ilsley (President of Venture Vanadium Inc.) and the author.

6.1 Exploration methods and QAQC

Exploration activities were conducted at all times under the supervision of geologist member of Canadian professional order. The location of reconnaissance activities was done using maps from previous work, GPS (Garmin GPS-62), aerial imagery from Google Earth and drone. The stripping work was light being done by hand. Many drill hole casings were found during the reconnaissance survey in the mineralised area.

For quality assurance and quality control, all the sampling activity was done under my supervision as qualified and independent person. All of the samples were collected by myself or Sean Leclerc. Independent consultants took representative samples. All samples were identified, reviewed, photographed and packaged under my supervision during the preparation of sending samples. Throughout the stay the samples were kept under lock and key in my vehicle and the samples were
sent by myself to the shipping center, where the samples were delivered directly to the Chimitec laboratory in Val d'Or, Quebec.

6.2 Geochemical analysis method

The method for geochemical analysis of the metalliferous contents of the samples is the same as that used by Michel Boily, because it is the best suited for iron-titanium ore.

6.3 Sampling work

A total of 45 samples were collected for all areas of the mineralized showings (table 1). Most of samples were chip samples (20 to 60cm) crosscutting the mineralised zones, but it should be considered has continual non-selective samples. The mineralised unit shows ore zones with variation of concentration of mineralisation with podiform/pockets shape at small scale, but can be considered homogeneous composition at large scale.

Here is the subdivision of the sampling:
- 25 samples in the Desgrosbois sector, including 22 in the mine pit.
- 19 samples in the Ivry-East area.
- 1 sample in the Titanium Development sector

Three (3) maps were produced with sampling made this September 2019. Samples are located with a precision of ±1m, based GPS location and physical position with an aerial image made by a drone flying at 120m altitude. Maps produces covers these areas:

- Desgrosbois mining pit (22 samples) – figure 8
- Desgrosbois North (3 samples) – figure 9
- Ivry-East (19 samples) + Titanium Development (1 sample) – figure 10

Sampling maps provide the mineralised trends and grades for each area (see next pages).
Table 1: Results of the 45 samples taken of Desgrosbois project in September 2019.

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<th>SAMPLE</th>
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<th>ME-XRF21n</th>
<th>ME-XRF21n</th>
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<th>ME-XRF21n</th>
<th>ME-XRF21n</th>
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</thead>
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<tr>
<td>DESCRIPTION</td>
<td>Fe (%)</td>
<td>TiO2 (%)</td>
<td>V (%)</td>
<td>Cu (%)</td>
<td>S (%)</td>
<td>P (%)</td>
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<td>0.61</td>
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<td>0.005</td>
<td>0.064</td>
<td>0.011</td>
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<td>0.008</td>
<td>0.309</td>
<td>0.048</td>
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<td>&gt;30.0</td>
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<td>0.007</td>
<td>0.802</td>
<td>0.022</td>
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<td>29.9</td>
<td>0.18</td>
<td>0.005</td>
<td>0.208</td>
<td>0.03</td>
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<td>&gt;30.0</td>
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<td>0.008</td>
<td>0.879</td>
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<td>0.007</td>
<td>0.19</td>
<td>0.08</td>
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Figure 8: Sampling campaign made on Desgrosbois Main-Pit prospect, Desgrosbois Project, Quebec, Canada.
Figure 9: Sampling campaign made on Desgrosbois-North prospect, Desgrosbois Project, Quebec, Canada.
Figure 10: Sampling campaign made on Ivry-East and Titanium-Development prospect, Desgrosbois Project, Quebec, Canada.
**DISCUSSION**

**7.1 Property Potential**

**7.1.1 Desgrosbois Deposit**

Desgrosbois is the sector that shows the greatest potential, because the pit of the old mine on the surface shows the mineralization of gabbro rich in Fe-Ti-V oxides. The gabbro seems to form bands and podiform zones in the anorthosite. From surface and old documentation of the drilling, the mineralized bodies forms accumulation of massive (40-80%) magnetite-ilmenite (figure 11) in orthopyroxene rich zone, bordered by a diffusion halo (1-15%) of iron oxides in the anorthosite. Magnetite-ilmenite forms crystals size of 1-8mm in the gabbro zone, while 1-2mm in the mineralised halo in the anorthosite surrounding the gabbro zone.

The Desgrosbois deposit has had 21 holes (3910 feet) drilled in it which along with surface mapping and magnetic surveys of about 100 acres, In 1953 an estimate of 5.527 Mtons of massive high grade iron ore-titanium on (anomaly A) grading 40.81% iron and 10.99% titanium dioxide (figure 11). There is also a halo of 1.051 Mtons of disseminated material grading 25.67 % iron and 6.66% titanium dioxide around the high grade zone. Another highly magnetic body (anomaly B) measuring 182m (600 feet) length by 15.2-45.7m (50-150 feet) width tested by one drill hole intersected 12.2m (40 feet) of iron ore–titanium mineralization grading 44.73% iron and 11.56% titanium dioxide.

![Figure 11: Massive magnetite-ilmenite in orthopyroxene rich gabbro, Desgrosbois Fe-Ti-V ore.](image)

**7.1.2 Titanium Development Deposit**

Titanium Development shows only one outcrop on the surface, ie an anorthosite with low iron oxide release. Several drill casings testify to soundings, which are the only tools for understanding the body mineralized below. According to these ancient, drilling works the mineralization would be hematite, so a more oxidized expression of the mineralization. As for the Vanadium grades, we
do not know the mineralization results, because we do not have any drilling samples and, because they are made of hematite, we cannot predict the grades.

In 1958 a total of 1,228m (4,029 feet) of diamond drilling have been drilled by Titanium Development Corporation and an estimate of 2.869 Mtons grading 38.5% iron and 30.84% titanium dioxide was delineated as drill indicated reserves for open pit mining method to the deposit.

### 7.1.3 Mine Ivry

The Ivry mine is not owned by Vanadium Venture Inc., however, it is a preferred site for understanding Fe-Ti-V mineralization. The walls of more than 8m in height show massive oxide bodies, rather tabular and horizontal. High-grade zones vary from 40 to 95%, as they appear to follow the laws of accumulation and amalgamation (figure 12). It is possible to consider deposits of layered igneous types. It is highly recommended that Mine Ivry should be added to the Desgrosbois property as soon as possible in order potentially increase the property value.

![Massive magnetite-ilmenite in orthopyroxene rich gabbro, Desgrosbois Fe-Ti-V ore.](image)

Figure 12: Massive magnetite-ilmenite in orthopyroxene rich gabbro, Desgrosbois Fe-Ti-V ore.

Mine Ivry is a past producing mine with a production records of 163,000 tons at 47% Fe and 19% TiO2. Four mineralized zones were delineated by the drilling for a total of 9530 tons/vertical foot. Thus, altogether there is a possible over 8,000,000 tons of iron ore/titanium in these three target areas down to a minimum depth of 300 feet which an economical mining operation normally
attains. Additional tonnages may be obtained from one or more of these target areas when additional deep diamond drilling provides more complete grade information on them.

Open pit potential for iron ore was the main focus at the time of discovery and the economic potential for titanium was totally ignored thus, tonnage and grade for underground potential never been in the exploration plan and accordingly deep exploration holes never been drilled in the past to investigate the down extension of all three deposits.

Ivry-East is also a potential area, as mineralization forms massive magnetite-ilmenite mineralized bodies that extend into the Ivry mine pit. The shape of the bodies is distinguishable only on a single stripping and some outcrops, and seems to show tabular lenses slightly puddled body. There appears to be a link between the orientation and dip of the ore bodies of the Ivry mine and those of the Ivry-East extension.

7.2 Metallogeny

Whether from the old mine pits or from the drill holes the mineralized bodies seem to form horizontal and tabular lens bodies surrounded by Fe-Ti dissemination halo in the Morin anorthosite. The mineralization is made of Fe-Ti-V oxides, mostly magnetite-ilmenite for Desgrosbois mine and Ivry Mine. Whereas some mineralized zones are described as hematite and titanite ore in drilling performed in the Titanium Development zone (MENR, 2019). Thus, oxidation of the oxide formation medium would have varied over time, and perhaps even as a function of the depth of crystallization of the magma. Hematite ore could be under-estimate while it does not create electromagnetic anomalies.

Assays show a clear correlation with Iron and Vanadium, which validate the hypothesis of substitution in Magnetite. There is good correlation with high grade iron ore and titanium. There is an opposite correlation between silicate and high grade Iron-Titanium ore.

The sampling seems to show a correlation between Ti and iron, where all the mineralised samples contained important concentration of magnetite and ilmenite. It is known in the literature that magnetite can have the substitution of Fe for V in its mineralogical structure. On the other hand, the structure of ilmenite does not show a metal ion substitution of Ti or Fe.

7.3 What is TITANIUM?

Titanium Facts

• The chemical element Titanium has the symbol Ti and atomic number 22.
• Pure titanium is a transition metal with a lustrous silver-white color.
• Titanium will always be found bonded with another element and does not naturally occur on its own in a pure form.
• British pastor William Gregor discovered titanium in 1791. It was later named by German chemist Martin Heinrich Klaproth who called it titanium after the Titans of Greek mythology. It was not until 1910 that titanium was produced.

• and is not very good at conducting heat or electricity. was produced to 99.9% purity by New Zealander Matthew A. Hunter, the method became known as the Hunter Process.

• Titanium has two very useful properties; it is resistant to corrosion (including in sea water and chlorine) and has the highest strength-to-weight ratio of any metal.

• Titanium is as strong as a lot of steels, yet it is 45% lighter. The metal is also 60% denser than aluminum, but is over two times as strong resisting to impact and inflexible.

• Titanium has a melting point of 3,034 °F (1,668 °C) and a boiling point of 3,287 °C.

• Titanium is non-magnetic

• Even in large doses titanium remains non-toxic and does not have any natural role inside the human body, usually passing through without being absorbed.

• Titanium is present in most igneous rocks and their sediments; it is the 9th most abundant element in the Earth's crust and the 7th most abundant metal.

• Many elements such as iron, aluminum, nickel and vanadium are alloyed with titanium to produce strong lightweight alloys. These titanium alloys are used in the manufacturing of naval ships, spacecraft, missiles and aircraft, with around two thirds of all titanium metal produced is used in aircraft engines and frames.

• Titanium metal is also used in the production of high-end racing cars and motorcycles where reducing weight but maintaining strength is important.

• Titanium's strength-to-weight superiority has seen the metal used as a component in many other products in recent times including, laptops, firearms, tennis rackets, golf clubs, lacrosse sticks, football helmet grills, bicycles frames, camping cookware and utensils.

• Around 95% of all titanium is used to produce the compound titanium dioxide, which is a very bright and refractive white pigment that is used in paints, plastics, toothpaste, sunscreens, sports equipment and paper.

• The fact that titanium is strong, light, non-toxic and does not react without bodies make it a valuable medical resource. It’s used to make surgical implements and implants, such as hip joint replacements that can stay in place for up to 20 years.

• Titanium is now popular in designer rings and other jewelry due to its durability, its resistance to seawater and chlorine in swimming pools and as it is non-toxic.

7.3.1 Titanium Industries
At Titanium Industries, many manufacturers, engineers and designers that use titanium in a wide variety of products and projects. Titanium is extremely tough yet lightweight, boasting the highest strength to weight ratio of any structural metal. It takes far less titanium to produce a structure that matches the same strength of other metals. If individual plates of the same weight were made from titanium, copper and stainless steel, the titanium plate would be double the size of the copper, and 75% larger than the stainless steel. Conversely you could buy half as much titanium to do the same job as copper, slightly more than half as much to do the same job as stainless steel.

The equipment and capability of the metal gives the flexibility to meet a wide variety of the market needs – and so huge range of applications can be accomplishing from simple weight reduction to advanced body implants.

### 7.3.2 Titanium in the Aerospace market

The SR-71 “Blackbird” war plane was the first aircraft to use titanium extensively in its structure and skin. The aerodynamic friction that resulted from the intense speeds of which the aircraft was capable created so much aerodynamic friction that if any other metal was used, it would simply melt out of the sky. In fact, it was so fast, that if anyone fired a surface to air missile at it – the standard evasive procedure was to simply accelerate and outrun it! Holding the record of the fastest aircraft in the world for over 30 years, the Blackbird reached speeds of 3500km an hour, or three times the speed of sound. Today, about two thirds of all titanium metal produced is used in aircraft engines and frames. As an example, the A380 Aero bus uses approximately 70 tons of titanium for the aircraft structure and fittings.

### 7.3.3 Titanium in medical devices.

Titanium is one of the most biocompatible metals – the human body can handle it in large doses with no impact. In fact, it is estimated that we ingest around 0.8mg of titanium a day – most passes through us without being absorbed. Also, its density is very similar to human bone, which will readily adhere to it. These qualities make Titanium perfect for use in surgical implants, such as hip balls, sockets (joint replacements), heart stents and dental implants. Lasting in excess of 20 years with no effects, Titanium is a clear choice in the medical field. Its high strength to weight ratio also makes it the perfect choice for surgical instruments and other medical devices. Wheelchairs made from titanium provide the lightest weight, yet are very strong and children’s wheelchairs can be made to grow as the child becomes older.

### 7.3.4 Titanium in everyday products

Surprisingly, of all the mined and synthetic titanium minerals, approximately only 5% is used to produce titanium metal. The remaining 95% is used to manufacture pure titanium dioxides – a pigment that enhances brightness and opacity in paints and inks, paper, and plastics, and even in
food products and cosmetics. It’s also the metal used in the body of Apple’s PowerBook line – helping achieve a lightweight frame.

7.3.5 Titanium Art/Architecture

Titanium spontaneously forms a hard-protective oxide film upon contact with any oxygen. It’s this film that gives the metal its trademark shine and shimmer, with variations in the film’s thickness affecting the color that the metal projects. It also has remarkable elasticity, making it the metal of choice for artistic and architectural structures. For instance, the 40 m (131 foot) memorial to Yuri Gagarin (the first man to travel in space) in Moscow, is made of titanium for the metal’s attractive color and association with rocketry. The Guggenheim Museum, Bilbao is sheathed in titanium panels. It can also be used to help structural repair of historic buildings. Titanium was used as a part of the 2008 structural repair and stabilization for the Leaning tower of Pisa in Italy. The artist who chose Titanium for the Olympic Torch chose the metal for two reasons – its modern image of superior technology and its beautiful colors.

7.3.6 Titanium in Sporting Products

The high strength to weight ratio of Titanium makes it ideal for use in a wide range of sporting equipment. Titanium is a core material in the components of the world’s lightest bicycle, which weighs only 6 lbs.! Considering an average adult bike weighs 30 lbs. and racing bikes weigh around 15 lbs., this bike is extremely lightweight thanks to its titanium structure. The number 1 consumer of titanium for sporting goods is in manufacture of golf club heads. Most manufacturers such as Taylor Made, Cobra, Ping and Integra have a titanium line.

Titanium is also naturally resistant to corrosion and erosion – making it a great choice for safety equipment. When the 6000 bolts that secured the daring climbing track in Ton Sai first started to erode, they were replaced with stainless steel. However, the stainless-steel replacements only lasted 9 months, after which they had a corrosion problem that would break the bolt on a simple body weight charge. Metallurgists discovered that the only metal the climbers could trust with their lives was titanium.

7.4 Resume of VANADIUM

Vanadium is a bright white, soft, ductile metal with good structural strength. Vanadium is resistant to attack by alkalis, hydrochloric acid, sulfuric acid, and salt water. When present in compounds, vanadium exists mostly in the oxidation state V. The metal oxidizes in air at around 660°C to the pentoxide (V₂O₅).

7.4.1 Uses of Vanadium

The main use of vanadium is in alloys, especially with steel.
85% of all the vanadium produced goes into steel, 10% goes into alloys of titanium and 5% into all other uses. 7

A small amount of vanadium adds strength, toughness, and heat resistance.

It is usually added in the form of ferrovanadium, a vanadium-iron alloy.

Vanadium steel alloys are used in gears, axles and crankshafts.

Titanium-aluminum-vanadium alloy is used in jet engines and for high-speed aircraft.

Vanadium foil is used in cladding titanium to steel.

Vanadium-gallium tape is used in superconducting magnets.

Vanadium pentoxide is used in ceramics and as a catalyst for the production of sulfuric acid.

The first extensive industrial use of vanadium metal was over a century ago in the vanadium-steel alloy chassis of the Ford Model T car.

A 1908 advertisement for the Model T read, “Vanadium steel, the strongest, toughest and most enduring steel ever manufactured, is used throughout the entire car.”

7.4.2 Vanadium Battery

The vanadium redox battery (VRB), also known as vanadium flow battery (VFB) or vanadium redox flow battery (VRFB), is a type of rechargeable flow battery that employs vanadium ions in different oxidation states to store chemical potential energy. The vanadium redox battery exploits the ability of vanadium to exist in solution in four different oxidation states, and uses this property to make a battery that has just one electroactive element instead of two. For several reasons, including their relatively bulky size, most vanadium batteries are currently used for grid energy storage, such as being attached to power plants or electrical grids.

The main advantages of the vanadium redox battery are that it can offer almost unlimited energy capacity simply by using larger electrolyte storage tanks, it can be left completely discharged for long periods with no ill effects, if the electrolytes are accidentally mixed, the battery suffers no permanent damage, a single state of charge between the two electrolytes avoids the capacity degradation due to a single cell in non-flow batteries, the electrolyte is aqueous and inherently safe and non-flammable, and the generation 3 formulation using a mixed acid solution developed by the Pacific Northwest National Laboratory operates over a wider temperature range allowing for passive cooling.

The main disadvantages with vanadium redox technology are a relatively poor energy-to-volume ratio in comparison with standard storage batteries (although the Generation 3 formulation has doubled the energy density of the system), and the aqueous electrolyte makes the battery heavy and therefore only useful for stationary applications.

Numerous companies and organizations involved in funding and developing vanadium redox batteries include Vionx (formerly Premium Power), UniEnergy Technologies and Ashlawn Energy.
in the United States; Renewable Energy Dynamics Technology in Ireland; Gildemeister (formerly Cellstrom GmbH in Austria, energy division now defunct) in Germany; Cellennium in Thailand; Rongke Power; Prudent Energy in China; Sumitomo in Japan; H2, Inc. in South Korea; redT in Britain, Australian Vanadium in Australia, and the now defunct Imergy (formerly Deeya). Lately, also several smaller size vanadium redox flow batteries were brought to market (for residential applications) mainly from StorEn Technologies (USA), Schmid Group, VoltStorage and Volterion (all three from Germany), VisBlue (Denmark) or Pinflow energy storage (Czechia).

7.5  **Resume of IRON ORE**

The element iron (Fe) is one of the most abundant on earth, but it does not occur in nature in a useful metallic form. Iron ore is the term applied to a natural iron-bearing mineral in which the content of iron is sufficient to be commercially usable. Metallic iron, from which steel is derived, must be extracted from iron ore. By definition, steel is a combination of iron with a small amount of carbon.

Thousands of products having various chemical composition, forms, and sizes are made of iron and steel by casting, forging and rolling processes. The main applications are in manufacturing automobiles in airplanes, bridges, buildings, machinery and household appliances. Iron and steel comprise about 95 percent of all the tonnage of metal produced annually in the world. On the average, iron and steel are by far the least expensive of the world’s metals.

Iron Ore mining operation processes involve crushing the rock to a fine material then mechanically removing the iron minerals from the waste material. The principal ore minerals are magnetite, hematite and siderite. Magnetite and hematite can be removed from the waste materials by electromagnetic and flotation separation methods.

Rising global demand for raw materials driven by China and as the nation builds more cars, factories and plants, steelmakers have increased iron ore imports by 23% in the first half of 2006 and the prices of iron ore rose 19% from April 2006.
8.0 Conclusion

The Desgrosbois property comprises multiple target areas of high-grade titanium, low-grade iron ore, and significant levels of vanadium mineralization. Desgrosbois, Titanium Development and Mine Ivry, are the three (3) prospects, which show obviously Fe-Ti-V mineralised bodies on surface. The boundaries of the mineralized target zones were not well defined, by mapping and drilling. The titanium-iron ore mineralization may be considerably more extensive than current information suggests.

In the general area, there are many magnetic zones previously delineated which have had little, or no work done on them, some of these may prove to be of interest in conjunction with the main target areas of interest where tonnage reserves have been delineated by diamond drilling. Many drill hole casing were found in the mineralised areas.

Previous exploration on the property has shown very wide spread distribution of magnetite in the underlying rocks. Large mineralized bodies of magnetite rich rocks are either exposed on surface or intersected by diamond drilling with tonnage potential that has all indication of titanium-iron deposit. Surface and diamond drilling testing to date has shown grade and indicated tonnage well above that usually regarded as economic.

Recent geochemical rock sampling collected from the property during the 2019 assessment work confirms the high concentrations of Iron and Titanium obtained by several investigators over the last 80 years. The assays from this sampling campaign show metals concentration up to of 45%Fe, over 30% TiO$_2$, and 0.2 %V. Titanium concentration could be up to 50% like described in previous work. By this study, we have a better idea of the range of vanadium content, as well as an approximation of the correlation with the types of iron oxides.

All assumptions of historic resources based on historic drilling and open pit mining, with previously mentioned grade and tonnage still needs to be confirmed by more drill testing and bulk sampling. Now that the metalliferous potential is better known, it remains to replicate the old boreholes to ensure that the old work and the metalliferous potential are reliable, to offer a level of confidence of the content for investors.

It is concluded that the Desgrosbois property exhibits the potential to host viable tonnage and grade of Titanium and Iron ore deposits. Exploration work has made it possible to better evaluate the Vanadium potential of Fe-Ti-V oxide mineralization. The contents seem to vary between 0.1 and 0.2% V in high grade iron ore zone. There is a correlation between V and Fe of magnetite, but not directly with Ti.
9.0 Recommendations

The demand of titanium has recently gone high and a technology for titanium separation process is now closer than ever, and will dramatically reduce the production cost. The property is readily accessible and all facilities essential for large scale production are close at hand allowing for a low-cost operation.

An initial phase of continued exploration and development is recommended for the property as follows:

1) Compilation and evaluation of the previous database. The property data consists of geological, geochemical, and geophysical surveys.
2) The database represents the exploration work conducted on the property area between 1952 and 2004. At that time titanium was not the main focus.
3) A detailed geological study should be undertaken to determine more precisely the extent and the grade of Ti-Fe-V mineralization.
4) Produce a 3D model from historical data, to determine the shape, volume and approximate content of the ore body of each area of interest. This will give you an idea of the potential of these.
5) Drilling and bulk sampling the main target areas should continue in order to confirm previous results and to outline the full extent of the Ti-Fe-V mineralization. Reproduce the most successful historical drill holes in order to establish a level of confidence with these historical data.
6) Exploration adits and pits should be designed for a bulk sampling program.
7) Detailed drilling and reserve estimates should be recast using geological information such as drill intersections and grade, drill spacing, the depth of mineralization, method of sampling, drilling method and consistency of mineralization.
8) Metallurgical test work to establish the best process for separating the vanadium, titanium and iron from the mineralized ore material.
9) Using the 3D model and geophysics to define the next targets of interest, in order to enlarge their volume.
10) When all of this is done, a preliminary assessment of feasibility can be made with emphasis on the economics of the project. The project is expected to take about two years to complete at an estimated cost of $3,000,000 - 3,500,000 (Canadian dollars).
10.0 References


Dulieux, E., 1913. Preliminary report on some iron deposits in the Province of Quebec; Quebec 4466, Mine Branch Department, Department of Colonization, Mines and Fisheries, Repertory of Mining Operations; p. 65-130.


Keays, D.A. 1936. A magnetic survey of the Ivry ilmenite deposit; American Institute of Mining Engineers, Contribution no. 102, New York.


11.0 Certificate of Qualification

Moi, Jocelyn Pelletier, affirme être un professionnel qualifié en matière d’Exploration Minière, Sciences de la Terre, Métallogénie, Minéralogie, et Géologie Structurale.


Je détiens un diplôme de Maîtrise en Sciences de la Terre, réalisé à l’UQAM (Université du Québec à Montréal), de 2012 à 2016. Un mémoire de maîtrise a été réalisé sous la supervision de Michel Gauthier (PhD, Geo), où le sujet de l’étude porte le titre de : Étude du contrôle structural et paragénèse des minéralisations aurifères de la propriété Cúmearal, Sonora, Mexique.


Je détiens un diplôme de Baccalauréat en Administration, avec un volet de comptabilité environnementale, réalisé à l’ESG (école des sciences de la gestion) de l’UQAM) de 1996 à 1999.


J’ai pratiqué l’exploration minière et suivi des formations professionnelles pour l’or, l’argent, le cuivre, le zinc, le plomb, le bismuth, le tellurium, le nickel, les éléments du groupe platine à l’international dans 12 pays, dont le Canada, le États-Unis, le Mexique, la Colombie, le Pérou, le Brésil, le Congo, le Gabon, la République centrale d’Afrique, le Maroc, la Mauritanie, l’Albanie et le Cambodge. J’ai visité ou étudié plus de 200 gisements au cours de ces activités.

Sous cette signature, le 20 Février 2018, j’atteste les déclarations ci-dessus, et les informations relatives à ce rapport.

Jocelyn Pelletier, Msc, geo