Lac Dore Vanadium Project
Targeting World’s 1st Primary High Purity Vanadium Production

VANADIUM BATTERIES
Proven energy storage technology requiring a primary supply solution (Non-cyclical)

HIGH PURITY VANADIUM
Strong domestic market opportunity as foreign supply chain halted in 2016 (Open Market)

V₂O₅ FLAKE FOR STEEL
Market flexibility when steel market drives demand & price (Cyclical Market)
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Solution for climate change

Vision  To become the leading supplier of high purity vanadium products and world's first primary vanadium electrolyte (VE) producer

Mission  Maximize shareholder value by developing the most significant NI 43-101 resources of vanadium in North America
Corporate Overview

**Primary project**
- Leading North American vanadium asset: Lac Dore Vanadium Project
- Concentrate grade above global production average (1.08% V$_2$O$_5$)
- NI 43-101 resource: 99.1Mt @ 0.43% V$_2$O$_5$ (inferred) vanadium
- 621,214,000LB V$_2$O$_5$ in magnetite concentrate with 95% recovery

**Strategic advantages**
- 100% owned vanadium projects in a safe jurisdiction (Quebec, Canada)
- Size, grade, favorable metallurgy & nearby infrastructure
- Positioning to be a leading primary VE supplier
- Increasing demand for high purity vanadium products

**People**
- Experienced management
- World leading vanadium technical team
- Strong shareholder representation
- Community and government support

**Alliances and consultants**
- ios services géoscientifiques
- Canada CNRC-NRC
- METCHIB
- COREM
Board of Directors

Adriaan Bakker
President & Chief Executive Officer

13 years experience in mineral resource sector
Project finance, project management, marketing and M&A.

Stephen Pearce
Chief Financial Officer & Corporate Secretary

Law degree from the University of British Columbia and an Honors Bachelors Degree in economics from York University with an emphasis on corporate finance.
Mine management, and current corporate and securities law focus.

Paul Sorbara
M.Sc., P. Geo & Director

Designation of Professional Geologist received in 1991 from the Association of Professional Engineers and Geoscientists in British Columbia and in 1985.

John Hewlett
Director

Strategic investor in the resource market for over 30 years.
Project management and development.
Advisory Board

**Todd Richardson - Chief technical advisor**

Chemical & process Engineer, vanadium specialist with vanadium industry experience in both the technical and operational fields. His background includes management within all phases of design, construction, and operations of vanadium facilities.

**Terry Perles - Metal sales & marketing**

One of the world's most highly regarded vanadium authorities and former VP global sales for Stratcor/EVRAZ. Through TTP Squared Inc. and MoTiV Metals LLC now handles global sales and marketing for the leading producers of vanadium, molybdenum & titanium worldwide.

**Dr. Maria Skyllas–Kazacos - Professor Emeritus, scientific advisor**

Inventor of the Vanadium Redox Battery (VRB,VFB,VRFB) technology now commercialized in China, Japan, Europe, Korea and North America. Dr. Maria is currently pioneering Generation 2 VRB and Vanadium Oxygen Redox Fuel Cell technology at the University of New South Wales, Sydney, Australia.

**James A. MacLeod – Social and environmental advisor**

President of J.A. MacLeod Exploration and EnviroCree Ltd and regarded as a leading mining exploration technologist. Founder of the Mistissini Geological Resources Centre, Jim works closely with aboriginal communities as a consultant on projects and training in mining exploration.
Lac Dore Vanadium Project highlights

Size, Grade, Quality
- NI 43-101 vanadium resource
- Size: 99.1Mt @ 0.43% V2O5 inferred
- 621,214,000 million lbs V$_2$O$_5$
- 1.08% vanadium concentrate grade
- 95% recovery from concentrate
- Spans 45km$^2$
- Open at depth and along strike
- Favorable metallurgy
- 2002 SGS Pilot plant achieved 99.9% Vanadium Battery Electrolyte

Location
- Mining friendly Quebec, Canada
- Close to all infrastructure and mining town
- Adjoins fully permitted proposed mine site
- Highway access adjacent to recently approved train and truck transfer station
Infrastructure

Road access and mining town
35km south-west of Chibougamau, Québec, Highway 167 access

Power (161 kV)
Proposed substation approved
(1.5 km South of Lac Dore)

Railway
25 km to CN Rail head,
rail spur approved

Saguenay Rail & Private Port
Construction and port upgrade complete
Community – Chibougamau Region

Experienced workforce – Employment Opportunities
## NI 43-101 Resource Estimates

### Table: Project Details

<table>
<thead>
<tr>
<th>Project</th>
<th>Percentage owned</th>
<th>Project size (Acres)</th>
<th>Resource estimate (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lac Dore</td>
<td>100%</td>
<td>10976</td>
<td>99.1 (inferred)</td>
</tr>
<tr>
<td>Iron-T</td>
<td>100%</td>
<td>8650</td>
<td>14.38 (inferred)</td>
</tr>
<tr>
<td>Combined total</td>
<td>100%</td>
<td>19626</td>
<td>113.48 (inferred)</td>
</tr>
</tbody>
</table>

### Table: V$_2$O$_5$ lbs, Head Grade, and Concentrate Grade

<table>
<thead>
<tr>
<th>Project</th>
<th>V$_2$O$_5$ lbs</th>
<th>Head Grade</th>
<th>Concentrate Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lac Dore</td>
<td>621,214,000</td>
<td>0.43%</td>
<td>1.08%</td>
</tr>
<tr>
<td>Iron-T</td>
<td>99,835,000</td>
<td>0.42%</td>
<td>1.07%</td>
</tr>
<tr>
<td>Combined total</td>
<td>721,049,000</td>
<td>0.428%</td>
<td>1.079%</td>
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</tbody>
</table>

- Lac Dore NI 43-101 resource estimate complete and Preliminary Economic Assessment (PEA) pending announcement
- Iron-T NI 43-101 resource estimate complete
- Both resources contain significant Iron & Titanium grades
**Conventional Timeline**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase I</strong></td>
<td><strong>Phase II</strong></td>
<td><strong>Phase III</strong></td>
<td><strong>Phase IV</strong></td>
</tr>
<tr>
<td><strong>PEA</strong></td>
<td><strong>Feasibility Study</strong></td>
<td><strong>Construction</strong></td>
<td><strong>Production</strong></td>
</tr>
<tr>
<td>Preliminary Economic Study (NPV, Mine Economics, Market Study)</td>
<td>Engineering, Permitting, Pilot plant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Average development timeline for primary vanadium mines currently in operation globally. Not a current timeline for VanadiumCorp*
Brief History of Lac Dore Project

9 Resource estimates & extensive metallurgical testing

54 Drill holes

Former Quebec government project

2003 Pilot plant achieved 99.9% Vanadium Battery Electrolyte
Primary vanadium production

- **Vanadium recovery**: is comprised of beneficiation from magnetite, sodium salt roasting, water leaching and solution treatment process.

- **Beneficiation**: magnetite is crushed and milled to the required particle size. Magnetic separation is utilized to separate iron from the crushed rock.

- **Sodium salt roasting**: the water insoluble vanadium is converted to water-soluble form. In the next operation, vanadium is dissolved from the mineral by leaching in water.

- **Vanadium bearing solution**: is then treated to yield vanadium product. Solution treating methods differ from case to case and are generally tailored to product type and quality. 

*Source: Largo Resources Inc.*
New production model (Global 1st)

The Lac Dore preliminary economic assessment (PEA) is nearing completion and will highlight the following:

- Direct production of vanadium battery electrolyte (VE)
- Production model comparisons
- NPV, CAPEX, Mine life and IRR estimates
- Economics of producing high purity vanadium products
- Market pricing for VE, high purity vanadium products, V2O5 Flake
- Market report for high purity vanadium
- Employment potential
Uncommitted supply

- **100% owned** vanadium projects free of royalties, liens or commitments
- **Old model:** Demand from steel commanding production models, market saturation of contract miners trapped in the commodity price swings of the steel market
- **New model:** Uncommitted supply allows VanadiumCorp to consider primary electrolyte production and high purity vanadium
- **Advantage:** Current short supply of VE positions the technology at a high cost/KWH until a primary VE producer is established. Direct process and local production from a quality resource could dramatically lower the price of VE
- **Market Opportunity:** The energy stationary storage (ESS) market is growing exponentially in North America and demand for VE for VRB’s is expected accelerate with the emergence of the first low cost primary producer
- **Perfect storm:** Advantage of integrating VE process technology and burgeoning market demand with a significant vanadium resource
Advantage of supply

Proven Technology + Scalable Supply = Lower cost energy storage

Objective
- First primary VE producer
- Low cost production
- 100% Green battery
- North American production
- High purity product mix

Potential Result
- Stable supply ending expensive import of VE
- Low cost electrolyte = Low cost VRB
- Reuse or recycle vanadium indefinitely
- Market Dominance, low transport cost, free trade
- Production flexible to market demand
Importance of primary supply

- **Lithium Battery**
  - Many primary producers
  - Not reusable/recyclable
  - Ideal for smaller applications
  - ~3% Cost (Contained Lithium)

- **Vanadium Redox Battery**
  - Zero primary production
  - 100% Green Battery
  - Ideal for larger applications
  - ~42% Cost (Contained Vanadium Electrolyte)

**Notices:**
- Many primary producers
- Zero primary production
- Not reusable/recyclable
- Ideal for smaller applications
- 100% Green Battery
- Ideal for larger applications
Importance of Quality (metallurgy & low impurities)

Only a small fraction of global vanadium supply can meet the requirements of the high purity markets. With Vanadium Electrolyte (VE) purity tested up to 99.9% with low impurities. VanadiumCorp is targeting the fastest growing vanadium market segment with strategic advantage of location to demand.

VRBs use vanadyl sulfate VSO₄ as basis for their electrolyte. This electrolyte typically require a very low contaminant level in the soluble vanadium compound, notably for silica (<10 μg/l) and sodium (<100 μg/l), for an overall 99.999% purity. Chemicals with such purity are currently produced globally by:

- Evraz - Stratcor (USA) *Supply currently disrupted*
- Vanchem (RSA) *Supply currently disrupted*
- Dalian Bolong (PRC) *Supply currently disrupted*

Current VE production is reliant on disruptive secondary sources resulting in unstable supply, pricing and availability.

VE represents ~42% cost of a VRB
## Vanadium Project Comparison

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Bushveld Resources</th>
<th>Syrah Resources</th>
<th>TNG limited</th>
<th>Vanadiumcorp</th>
<th>Vanadiumcorp</th>
<th>Rutila Resources</th>
<th>American Vanadium</th>
<th>Largo Resources</th>
<th>Blackrock Metals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Bushveld Complex, South Africa</td>
<td>Mozambique</td>
<td>Northern Territory, Australia</td>
<td>Quebec, Canada</td>
<td>Quebec, Canada</td>
<td>Karatha, Australia</td>
<td>Quebec, Canada</td>
<td>Nevada, U.S.A.</td>
<td>Maracas, Brazil</td>
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<tr>
<td>Project</td>
<td>Bushveld Vanadium</td>
<td>Balama Graphite</td>
<td>Mount Peke</td>
<td>Lac Dore Vanadium</td>
<td>Iron-T Vanadium</td>
<td>Balla Balla</td>
<td>Gibellini</td>
<td>Maracas</td>
<td>Blackrock Metals</td>
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<tr>
<td>Deposit name</td>
<td>MML</td>
<td>Atika</td>
<td>Mount Peke</td>
<td>East</td>
<td>Genesis</td>
<td>Balla, Balla</td>
<td>Gibellini</td>
<td>Campbell pit</td>
<td>SouthWest</td>
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<td>Resources (million tonnes)</td>
<td>52</td>
<td>51.32</td>
<td>118</td>
<td>99.1</td>
<td>14.38</td>
<td>456</td>
<td>14.23</td>
<td>13.1</td>
<td>154</td>
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<td>Category</td>
<td>Measured</td>
<td>Measured</td>
<td>Measured</td>
<td>Inferred</td>
<td>Inferred</td>
<td>Measured</td>
<td>Inferred</td>
<td>Reserve</td>
<td>NA</td>
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<tr>
<td>In-Situ grades (%V₂O₅)</td>
<td>1.48%</td>
<td>0.38%</td>
<td>0.29%</td>
<td>0.43%</td>
<td>0.42%</td>
<td>0.64%</td>
<td>0.30%</td>
<td>1.34%</td>
<td>0.49%</td>
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<tr>
<td>Total V content in-situ (kilotonnes V₂O₅)</td>
<td>430</td>
<td>203</td>
<td>342.2</td>
<td>426.1</td>
<td>60.4</td>
<td>1,635</td>
<td>31</td>
<td>273</td>
<td>315.1</td>
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<tr>
<td>Concentrate Grade</td>
<td>2.01%</td>
<td>NA</td>
<td>1.20%</td>
<td>1.08%</td>
<td>1.07%</td>
<td>NA</td>
<td>NA</td>
<td>~2%</td>
<td>NA</td>
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<tr>
<td>V2O5 lbs (in-situ)</td>
<td>NA</td>
<td>177,800,000</td>
<td>684,400,000</td>
<td>852,200,000</td>
<td>120,800,000</td>
<td>2,803,200,000</td>
<td>19,800,000</td>
<td>974,652,000</td>
<td>630,200,000</td>
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<tr>
<td>V2O5 lbs (after concentration)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>621,214,000</td>
<td>99,806,817</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Capacity (tpa V₂O₅)</td>
<td>9,500</td>
<td>2,828</td>
<td>6,161</td>
<td>15,000</td>
<td>NA</td>
<td>20M</td>
<td>2,896</td>
<td>9600</td>
<td>2400</td>
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<tr>
<td>Strip ratio (Production cost factor)</td>
<td>4.39</td>
<td>0.04</td>
<td>0.95</td>
<td>0.85</td>
<td>0.85</td>
<td>0.33</td>
<td>0.22</td>
<td>0.48</td>
<td>NA</td>
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<tr>
<td>Mine life (years)</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>PEA Pending</td>
<td>TBA</td>
<td>18</td>
<td>~9</td>
<td>29</td>
<td>NA</td>
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<td>Status</td>
<td>PFS</td>
<td>Scoping</td>
<td>PFS</td>
<td>PEA</td>
<td>Development</td>
<td>PFS</td>
<td>Feasibility</td>
<td>Production</td>
<td>FS, Permitted</td>
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<td>Political Jurisdiction</td>
<td>Good</td>
<td>Poor</td>
<td>Good</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Excellent</td>
</tr>
<tr>
<td>Silica level (Main production cost factor)</td>
<td>NA</td>
<td>NA</td>
<td>~34%</td>
<td>&lt; 1%</td>
<td>&lt; 1%</td>
<td>NA</td>
<td>NA</td>
<td>~ 1%</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>Targeted products</td>
<td>V2O5</td>
<td>Graphite, V2O5</td>
<td>V2O5</td>
<td>High Purity V2O5</td>
<td>V2O5, Fe, Ti</td>
<td>V2O5</td>
<td>V2O5</td>
<td>V2O5</td>
<td>Ti, Fe</td>
</tr>
<tr>
<td>Oxidation</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Offtake Commitment(s)</td>
<td>Uncommitted</td>
<td>Graphite</td>
<td>Steel</td>
<td>Uncommitted</td>
<td>Uncommitted</td>
<td>Uncommitted</td>
<td>Uncommitted</td>
<td>Steel and Alloy</td>
<td>Iron</td>
</tr>
</tbody>
</table>

Source: Roskill & published reports
Uses of Vanadium

**Steel Alloy**
- High strength low alloy steel (HSLA)
- High Carbon steel alloys (HSS)
- Rebar and structured beams
- High speed tools and surgical instruments

**Titanium alloy**
- Ti-6Al-4V in airframes, jet engines and personal transports
- Dental implants

**Chemicals**
- Catalysts for sulfuric acid and synthetic rubber production
- Critical component in catalytic converter to remove sulfur dioxide
- NOx catalysts
- Vehicle catalyst alternative for platinum and nickel

**Energy Storage**
- Vanadium Electrolyte (VE)
- Grid scale vanadium redox battery (VRB)
- Lithium-vanadium based battery for electric vehicles
Unrivaled Steel Strength

“Green metal”

Vanadium reduces environmental impact and lowers capital requirements. Just 0.05% in steel can double yield strength and decrease structural weight by 30-40%.

highest strength to weight ratio of any alloy

- 92% of global vanadium production utilized in high-strength low-alloy (HSLA) steels.
- 6.2% CAGR demand increase since 2005 from increasing steel standards & environmental mandates.
Demand

- In 2014, consumption of vanadium moved above production
- Long term projection is for demand to outstrip supply
- China produces 58% of the global vanadium supply, mostly as a co-product from Chinese steel mills
- Over the past 10 years, roughly 65% of the growth in vanadium consumption has been fueled by growth in global steel production rates, and about 35% of the growth in vanadium consumption is attributed to increases in specific vanadium consumption rates
- Reverse projection: this relationship anticipated to reverse, with two thirds of the growth in vanadium consumption in the coming decade is expected to be a result of increasing global specific consumption rates, while slowing growth in global steel production rates will contribute one third of the growth in vanadium demand
From 2005 to 2010 vanadium production was in excess of consumption, leading to significant inventory accumulations. From 2011 onwards (with exception of 2013) consumption has been ahead of production, leading to some global inventory depletion.
Steel industry accounts for more than 92% of vanadium consumption

Long term projection is for demand to outstrip supply

In 2014, consumption of vanadium moved above production

China produces 58% of the global vanadium supply, mostly as a co-product from Chinese steel mills

The later years of the projection gap between supply and demand widens, clearly indicating a need for sources in the not too distant future which are not included in this projection
Since 1953, the Chibougamau Mining District, developed quickly and over thirty mines have produced more than 26 million tonnes of ore containing 1.3 million tonnes of copper, 335 tonnes of gold, 700 tonnes of silver, 135,000 tonnes of zinc and 4,000 tonnes of lead. Historically, it was the most important producer of copper in Eastern Canada, from 1960 to 1974. The region also includes the largest vanadium deposits in North America and perhaps the world, "The Lac Doré Complex".

In 2011, VanadiumCorp acquired title to the largest, at surface mineralized zone in the region subject to over 55,000 m of historic work, (former Canadian government assay).

In 2015, VanadiumCorp confirmed an NI 43-101 world class high purity vanadium resource, "The Lac Doré Vanadium Project!"

In 2016, subject to a positive economic study, construction of a pilot plant and feasibility study will commence. VanadiumCorp’s objective is to establish North America’s only primary vanadium producer.
Iron-T Vanadium Project

- Development stage vanadium project for long term growth
- Originally discovered in 1944 by Black & Freeman
- 100% owned project spans 8,650 acres
- NI 43-101 Inferred Resource of 14.38 Mt @ 0.42% V₂O₅
- Open at depth and along 22 km Strike
- Similar mineralogy to Bushveld Complex and Lac Doré Complex

- Consistent drill results along the entire 22km strike-length
- Favorable metallurgy and high recovery rates
- Located in mining friendly Quebec, Canada
Chibougamau Copper/Gold Projects

**Icon Copper-Gold Mine**
Former producing mine - Located at the south end of Lake Mistissini, the Icon Mine is comprised of a number of strategically assembled claims covering the former producing Icon Copper-Gold mine.

**Cornerback Copper-Gold Project**
Surrounds the CBAY Cornerbay Mine - Located at the south end of Chibougamau Lake, the key Cornerback claim package surrounds the mine formerly run by Campbell Resources as a producing mine. The project was entirely covered by the 2006 GSC-sponsored MEGATEM survey, which clearly indicated anomalies related to the Corner Bay mineralization. Extensive completed geophysics indicate potential continuation of Corner Bay Mine mineralization onto the Cornerback Project.

**Merrill Copper-Gold Project**
Located adjacent to the former producing Campbell Mine, Copper Rand and Merrill copper mines, the Merrill Project is ideally situated along-strike and down-dip extensions of these vein systems.

All projects are 100% owned, free of royalties or liens and available for option or JV.
Shares issued: 199.94 Million

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