Transition Metals

XTM - TSX.V

Empire Lake
V-Fe-Ti Opportunity

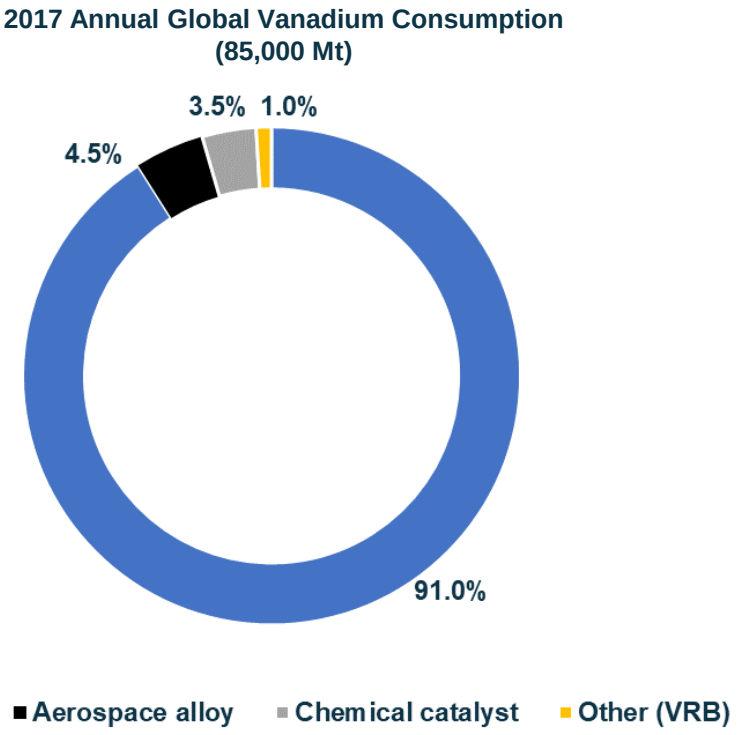
December 2018

Opportunity

- Vanadium has been the best performing Battery Metal since 2017 and is projected to have a strong growth profile over the coming years.
- The Empire Lake Property has the potential to host a large V-rich resource near surface.
- Early stage exploration has identified an extensive zone of mineralization approximately 1800 m long with a width that varies from 50-170 m. This zone could be potentially extended for a further 800 m with addition ground based exploration.
- No high resolution airborne geophysics or systematic ground based exploration has been completed on the property.
- At least two other V-bearing zones have yet to be followed up on.
- The property has considerable exploration upside potential for V as well as base (Cu-Ni) and precious metals (Pt-Pd).

Vanadium Markets

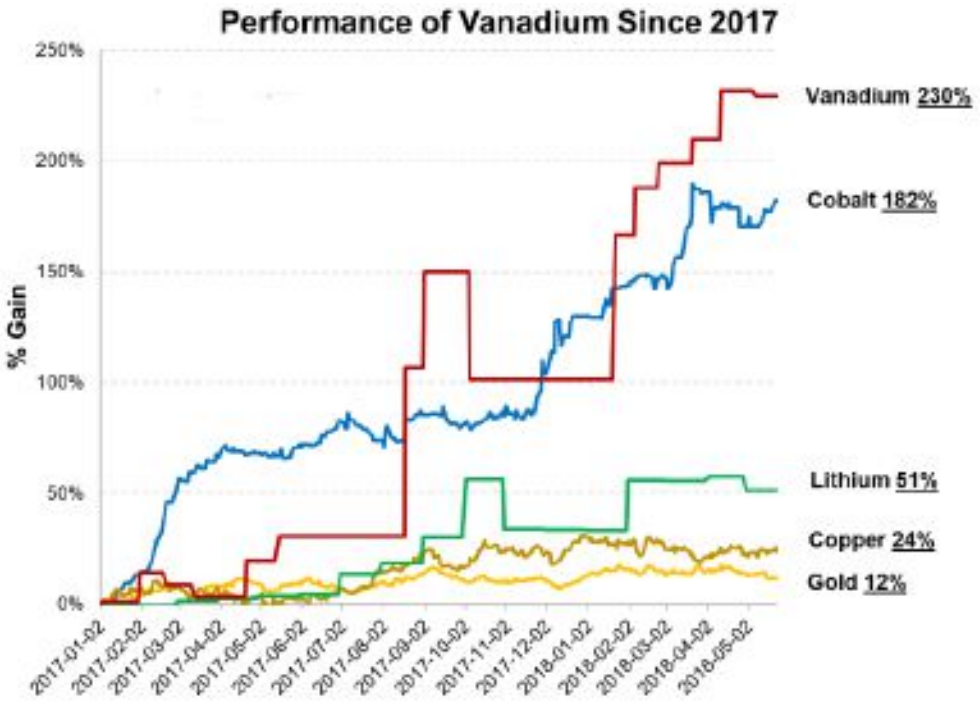
- Vanadium is a ductile and malleable transition metal.
- Primary market for Vanadium is steel production - 91% of demand.
- Using only 0.5% Vanadium doubles steel tensile strength and reduces weight by 30%.
- China implemented new rebar standard to cut down substandard steels beginning in November 2018, which will push Vanadium demand higher.



2 pounds Vanadium + 1 ton Steel = 2 x Strength

Vanadium - A Green Metal

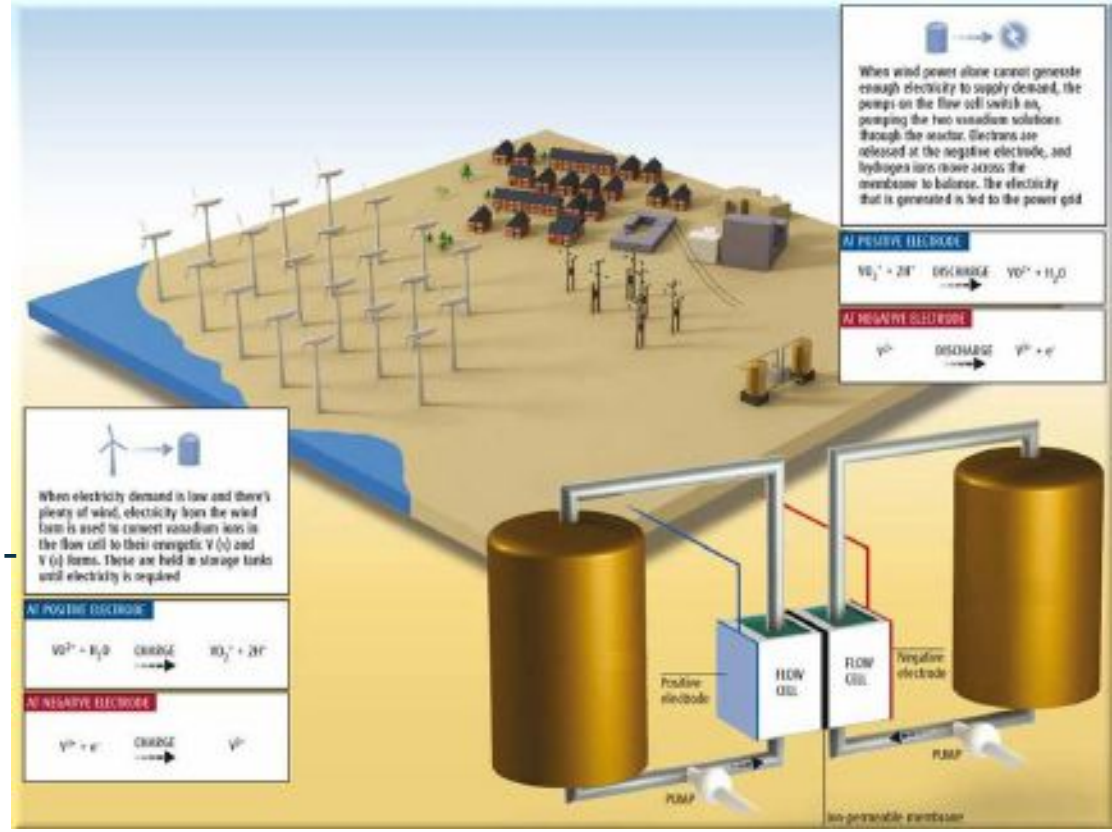
- Electric vehicles, clean energy storage and fuel efficiency driving battery metal fundamentals.
- Vanadium best performing battery metal .
- Demand for renewable energy growing at a record pace, need for utility-scale energy storage has neve been more crucial.
- Vanadium undergoing significant shif in supply / demand dynamics as Vanadium Redox Flow Batteries (VRFB) meet energy storage needs.



Vanadium Redox Flow Battery (VRFB)

Transition Metals

- VRFB is energy on demand, is scalable and holds energy indefinitely.
- Can rapidly release large amounts of energy.
- Cycle life is theoretically unlimited.
- Highest safety rating – no overheating or possibility of fire or explosions.
- Unique properties gives VRFB grid-like energy storage and can be used in load leveling, wind and solar, off-grid power supplies and uninterruptable power supplies.



VRFB looks well placed for growth in the renewable energy storage sector

Vanadium Redox Flow Battery (VRFB)

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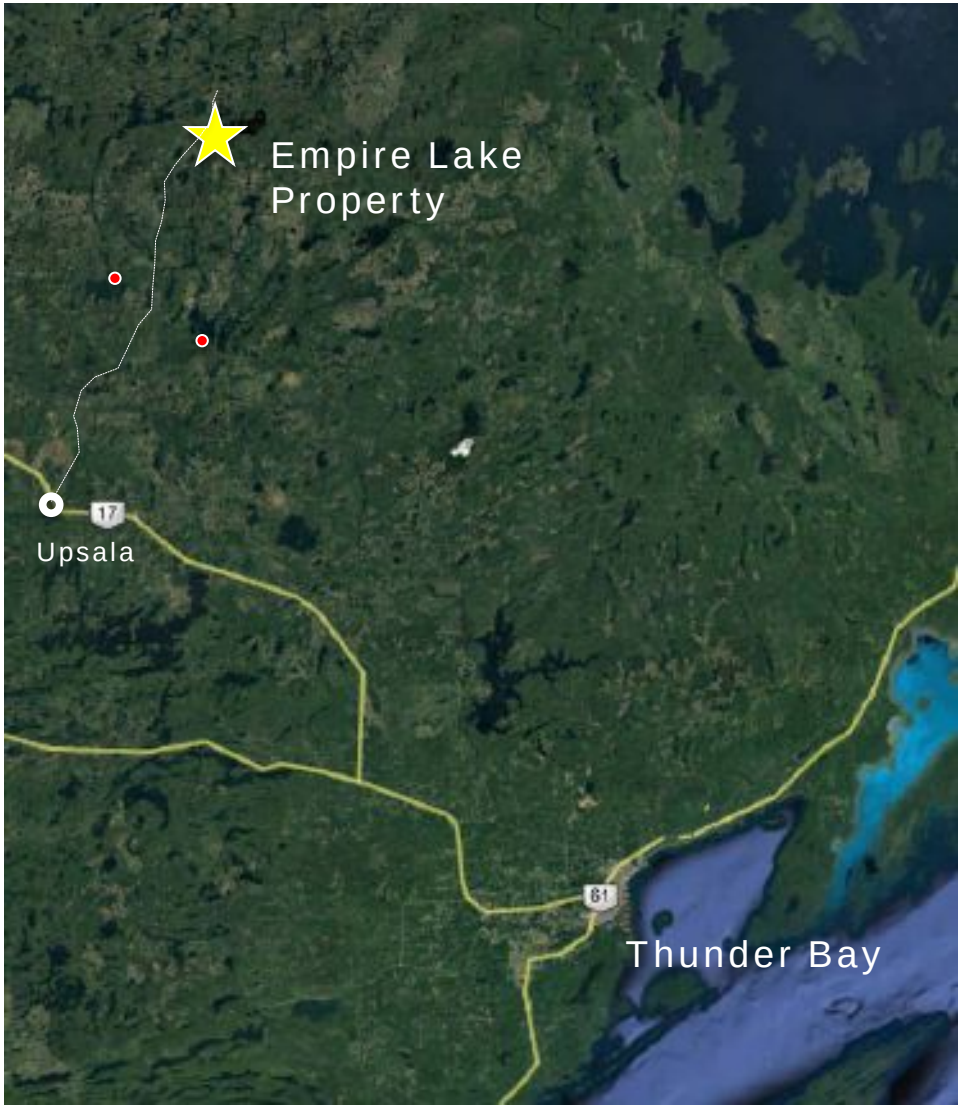
- Notable vanadium-flow battery is a 200 MW system being built on the Dalian peninsula in China to serve 7 million residents.
- Grid-connected battery storage capacity.
- Costing $500 million, it will be used to peak-shave ~8% of Dalian's expected load in 2020.
- Over 30 other large-scale projects in the planning phases.
- According to Azure International, VRFB demand in MW is growing at minimum 80% CAGR.

Largest chemical battery in the world. Expected completion date June 2019

Growth in this sector will increase the vanadium price further

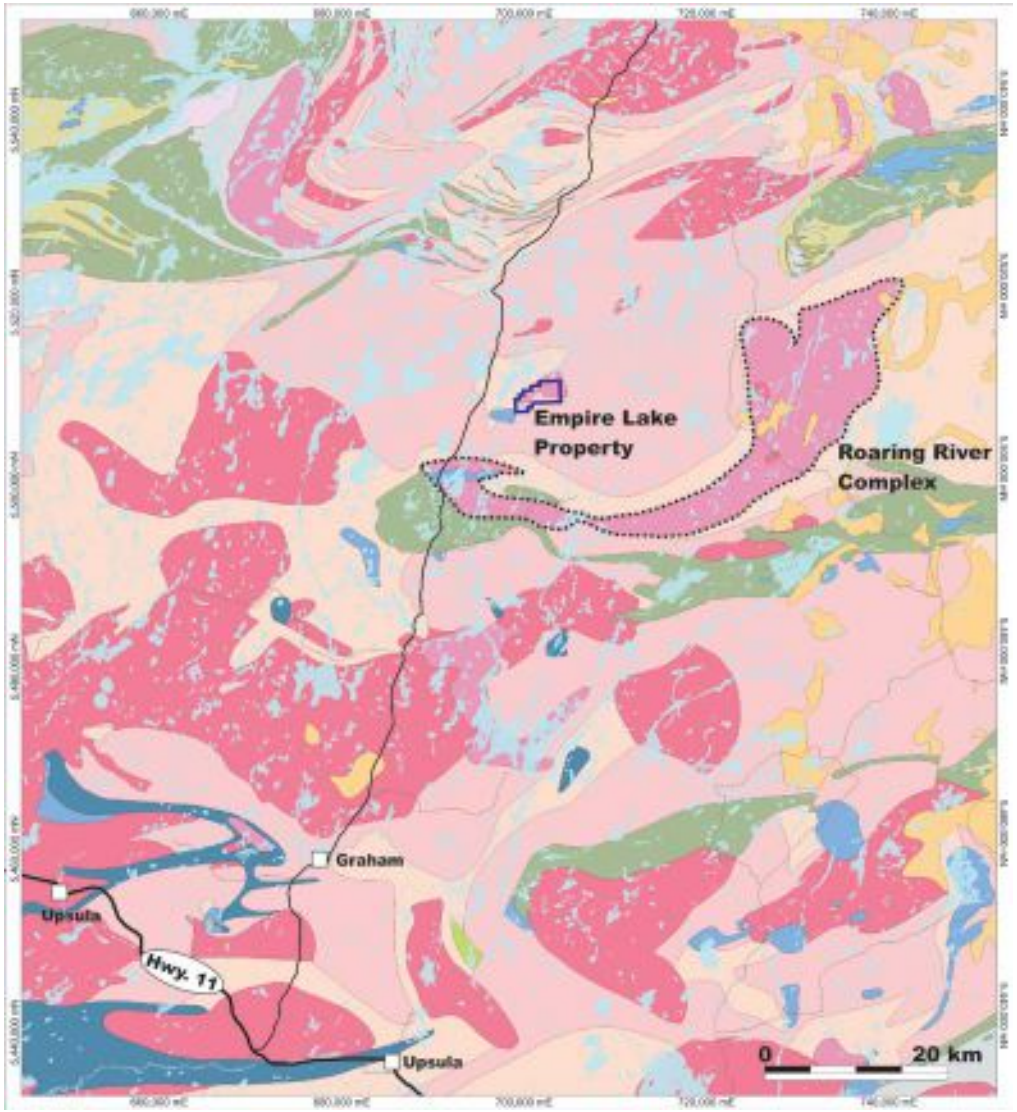
Empire Lake Property Location

- Located 160 km NW of Thunder Bay, Ontario with excellent road access.
- 75 km north of the TransCanada Highway (HWY 17) along the Graham Lake Road.
- Accommodations available at nearby fishing lodges (Pakashkan Lake, Wawang Lake).
- Empire Lake Area, Thunder Bay Mining District.



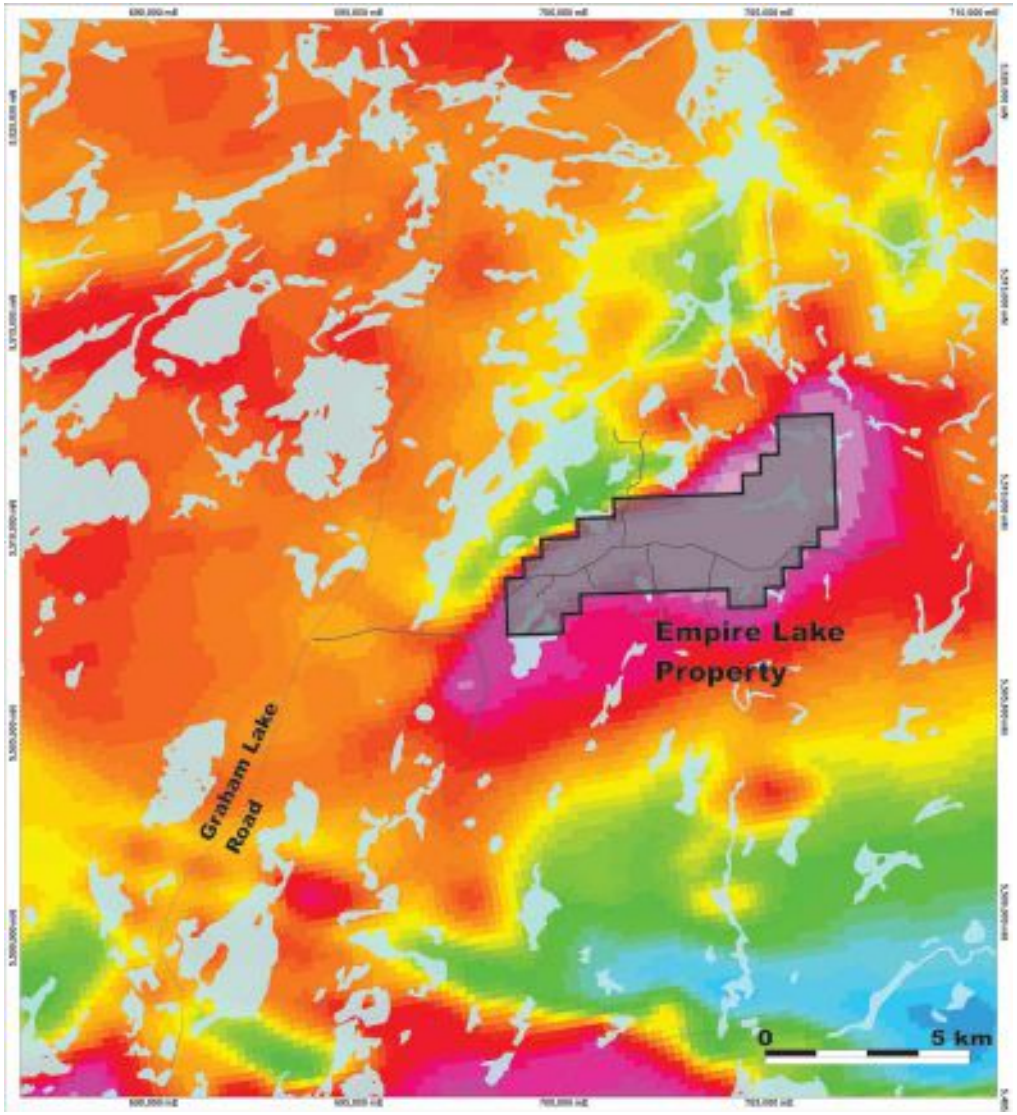
Regional Geology

- Located in the central Wabigoon Subprovince of the Superior Province.
- Archean in age, ranging from 3.5 Ga to 2.7 Ga.
- Property is part of the larger Roaring River Complex (RRC).
- 70 km in overall length and varies between 1-15 km wide.
- Components of the RRC include diorite through to granodiorite of Sanukitoid affinity.
- Derived from the shallow melting of mantle peridotite.
- High potential for Vanadium, base and precious metals.



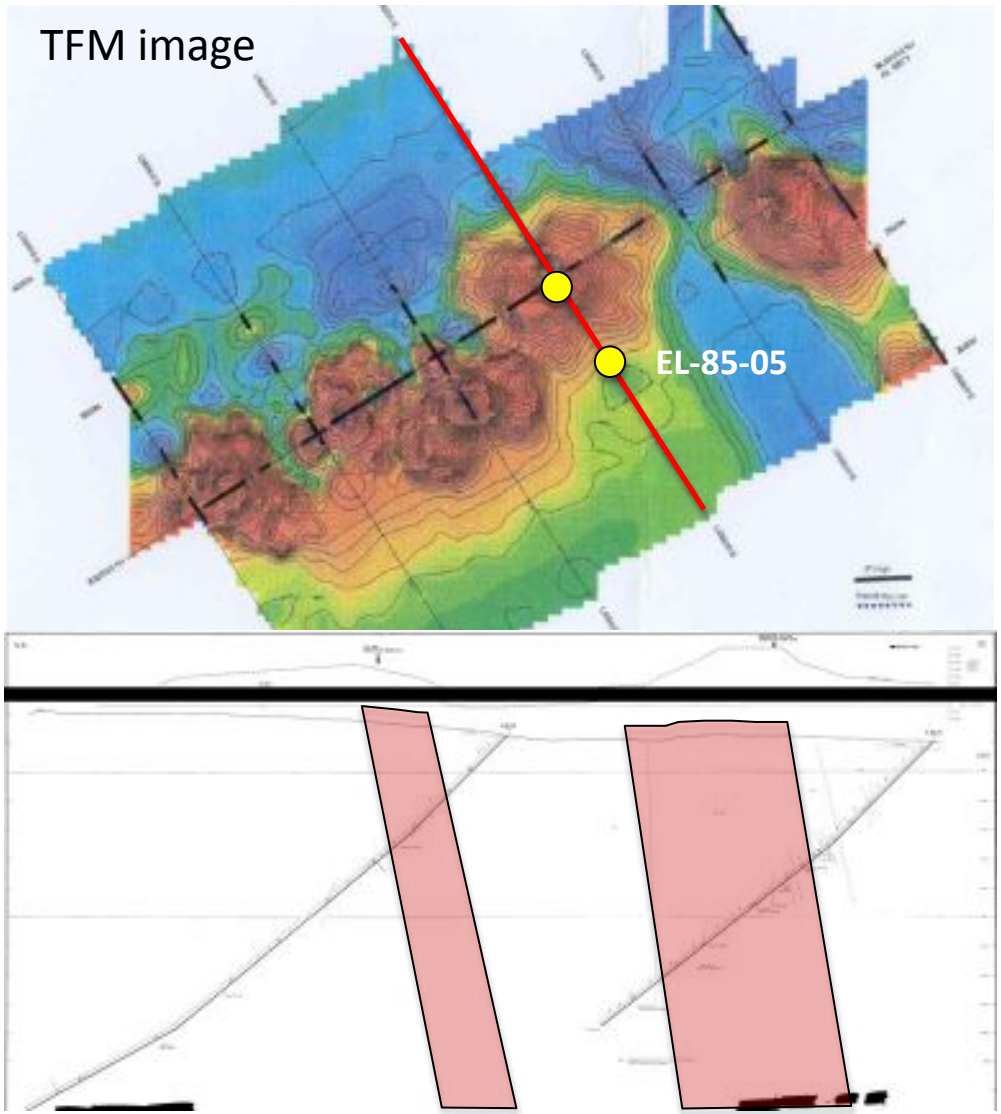
Regional Magnetics

- A 13 km by 4 km NE-SW trending magnetic anomaly.
- No detailed airborne geophysics has been completed over the property.
- Property located in Empire Lake Area of the Thunder Bay Mining District.
- 95 mining claims for 1986 ha.
- Low assessment work ($38,000) required by April 10, 2020.



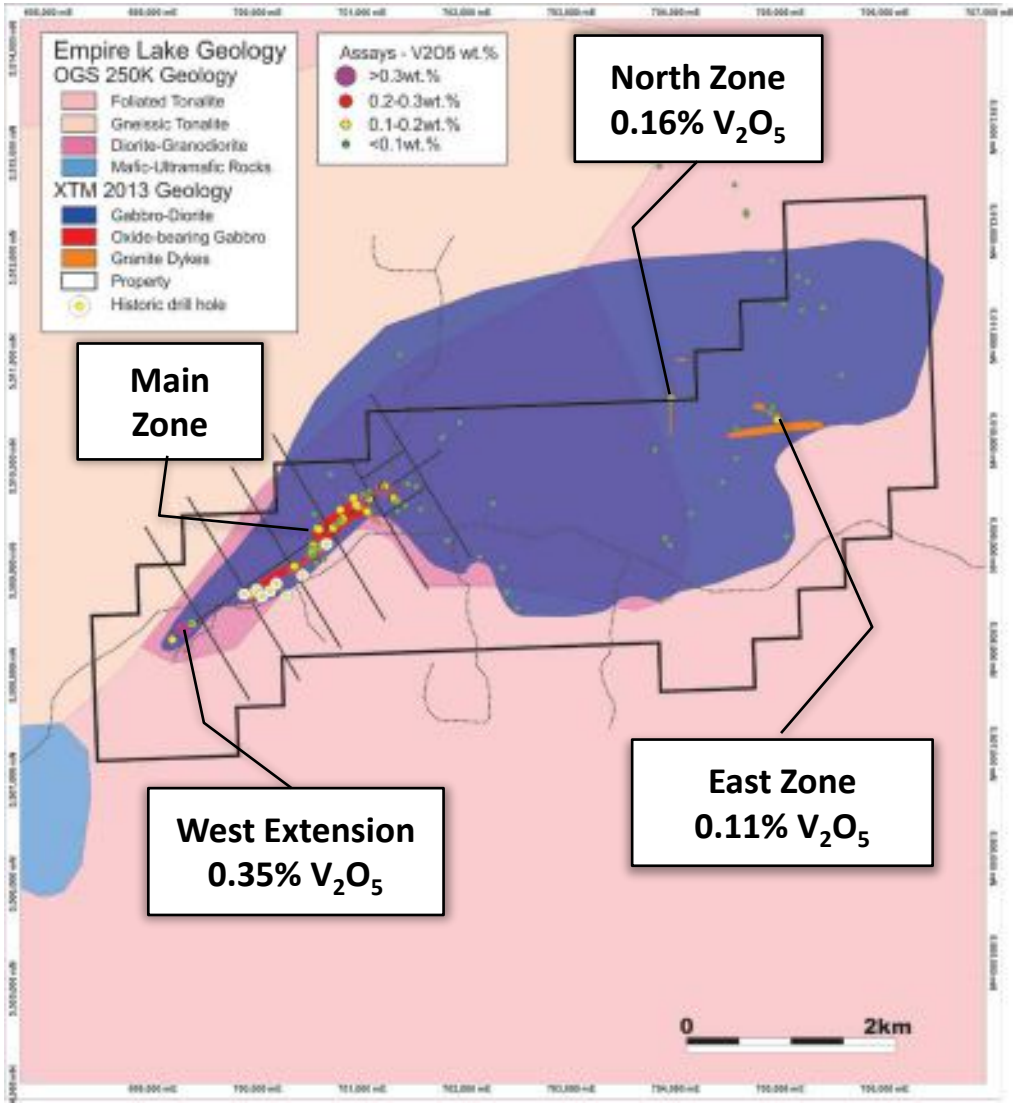
Work History

- Property has very little historic exploration work
- **1979-1980**: *Beth Canada* – ground magnetics, VLF. Two drill holes totaling 124m. No assays reported
- **1985**: *Fred Martinson* – Six drill holes for 880m. No assays reported
- **EL-85-05** reported a 52m zone of high-grade oxide mineralization
- **2012-2014**: *HTX Minerals (now Transition)* – Initially investigated for PGM's. Completed ground mapping, prospecting and channel sampling
- Identified consistent oxide mineralization over a strike length 1800m, 50-170m wide
- Grab samples of up to 0.55% V_2O_5, 53.5% Fe_2O_3 and 4.29% TiO_2



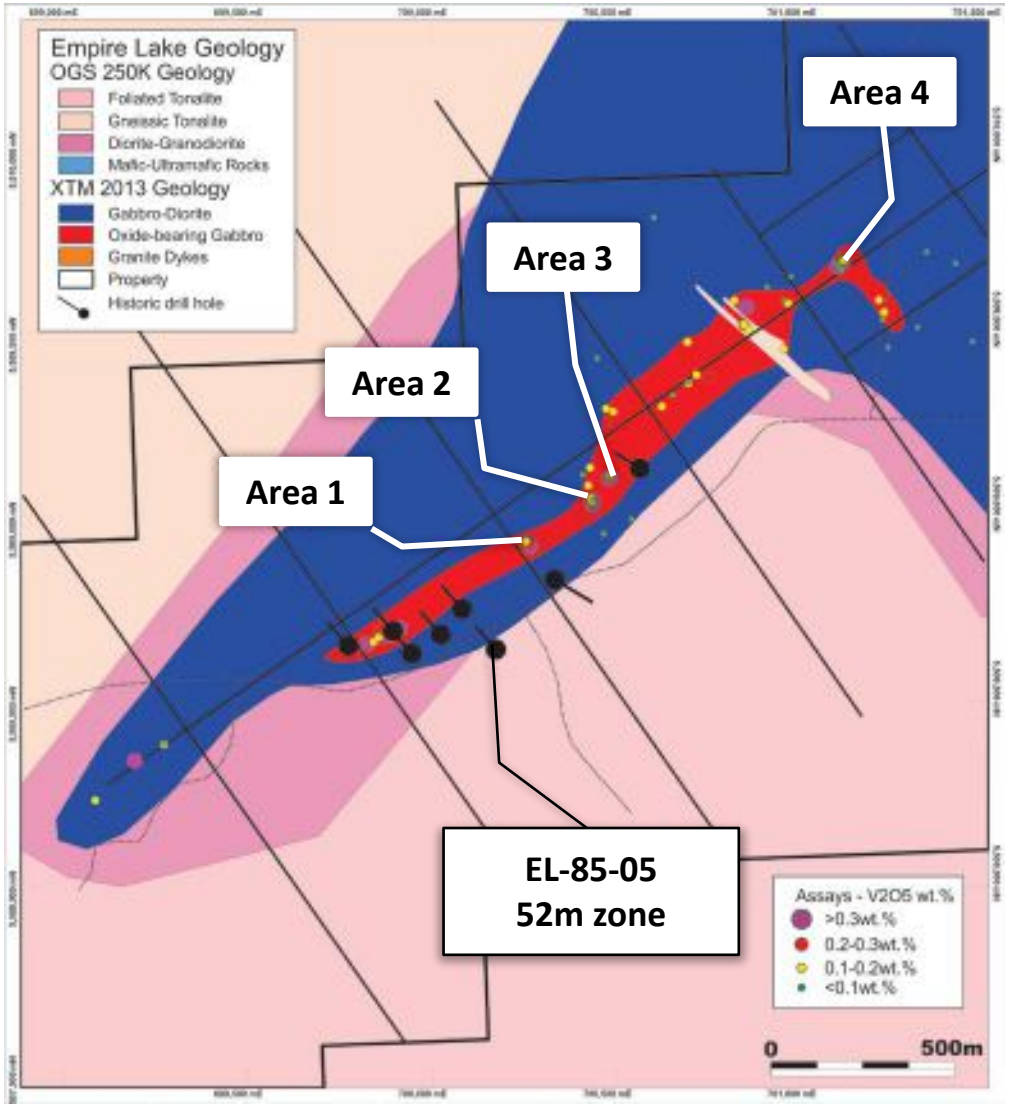
Geology

- Preliminary field mapping shows the intrusion to be 8.5 km long and up to 3.2 km wide tapering towards the E and W margins
- Country rock is dominated by massive to gneissic Tonalite
- Empire Lake Intrusion is comprised of four units:
  - Gabbro
  - Hornblende Gabbro
  - Diorite
  - Ferrogabbro – mineralized
- Very heterogeneous geology on a map to outcrop scale
- Preliminary prospecting has identified four areas of oxide mineralization
- Minor exploration at East and North Zones



V-Fe-Ti Mineralization

- Main Zone measures 1800m by 50-170m wide and consists of disseminated to banded oxide mineralization (1-50cm thick bands).
- Oxides are comprise of primarily magnetite and ilmenite.
- Disseminated chalcopyrite and pyrite occur throughout and carry elevated PGM's, up to 300ppb Pt+Pd+Au.
- West Extension could represent a continuation of the Main Zone for an additional 800m strike length.
- Oxide mineralization appears to dip to the SE and is likely in multiple oxide horizons.
- 4 separate areas were hand stripped and channel sampled.
  - 8m @ 0.37% V_2O_5



Metallurgy – Davis Tube Test

- In 2013 HTX Minerals completed Davis Tube Recovery tests on four composite samples collected from the property.
- Selected pulps from trench samples were used to give some general characteristics of the potential recoveries.
- Head grades varied between 44.15-60.80% Fe_2O_3, 0.37-0.58% V_2O_5 and 3.77-5.36% TiO_2.
- The resulting concentrates contained between 66.2-66.4% Fe_2O_3, 0.89-1.09% V_2O_5 and 0.74-2.73% TiO_2.
- Recoveries for V_2O_5 averaged 89%.
- Most of the TiO_2 ended up in the Tails – ilmenite.
- External review suggested a lower gauss (magnetic induction) should have been used.

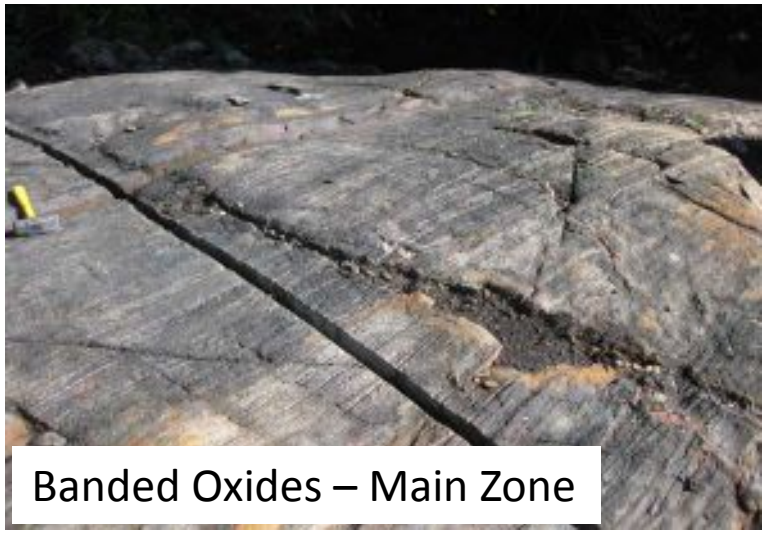
			Head Grade		
Sample	Trench	Samples	Fe_2O_3 %	V_2O_5 %	TiO_2 %
N500090	1	5	46.60	0.53	3.83
N500091	5	4	49.70	0.45	3.92
N500092	3	4	44.15	0.37	3.77
N500093	6	5	60.80	0.58	5.36

		Grade			Recoveries		
Sample	Product	Fe_2O_3 %	V_2O_5 %	TiO_2 %	Fe	V	Ti
N500090	Conc	66.20	1.09	0.81	74	87	8
	Tail	13.70	0.09	5.6	26	13	92
N500091	Conc	66.40	0.9	0.74	76	87	8
	Tail	14.70	0.1	6.02	23	13	92
N500092	Conc	63.40	0.89	2.73	80	92	29
	Tail	10.10	0.05	4.26	20	8	71
N500093	Conc	66.30	1	1.08	82	91	11
	Tail	17.20	0.12	9.98	18	9	89

Photos

Transition Metals

Magnetite – West Extension



Banded Oxides – Main Zone

Disseminated oxides in Diorite

Folded Banded Oxides – Main Zone

Summary

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