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VANADIUMCORP RESOURCE INC.

GEOLOGICAL REPORT
FOR THE
LAC DORÉ VANADIUM DEPOSIT,
QUÉBEC, CANADA

Report Date: October 11, 2018

B. Terrence Hennessey, P.Geo.

900 – 390 BAY STREET, TORONTO ONTARIO, CANADA M5H 2Y2
Telephone +1 416 362 5135   Fax +1 416 362 5763

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1.0 SUMMARY

Micon International Limited (Micon) was engaged by VanadiumCorp Resource Inc. (VanadiumCorp) to prepare an Exploration Report, also known as a Property of Merit Report, compliant with National Instrument 43-101 for its Lac Doré vanadium property located in Québec.

1.1 LOCATION

The Lac Doré Vanadium Project is located 30 km southeast of the town of Chibougamau, in central Québec. The project includes two properties which cover an area of 52.86 km^2 and consists of 114 map designated cells (see Section 4.0).

1.2 GEOLOGY AND MINERALIZATION

The Lac Doré deposit is hosted in the Lac Doré Anorthositic Complex, dated at 2.728 Ga. This Archean complex is at the core of the eastern end of the northern domain of the Abitibi Greenstone Belt, Abitibi sub-Province, and Superior Province in the Canadian Shield.

The complex is a lopolith, a sub-tabular intrusive body of mafic to anorthositic composition, strongly differentiated near its top. The lopolith is emplaced within the Waconichi Formation, a felsic volcanic and sedimentary pile, and folded along by the regional anticlinorium. The deposit is hosted in a homoclinal sequence of magnetite bearing layers within the South flank of the Lac Doré Anorthositic Complex. The top of stratigraphy is to the south.

According to Allard (1967), the Lac Doré Complex is divided in four major units. From top to bottom they are:

- The border zone (top, southeast).
- The granophyre.
- The layered zone.
- The Anorthositic zone (base, northwest).

The layered zone hosts the vanadiferous titanomagnetite deposit, while the anorthosite and the granophyre host most of copper-gold mineralization of the mining camp (outside of the current project).

The anorthosite zone (approximately 3,660 m in observed thickness) is composed of anorthosite, gabbro and titanomagnetite-bearing gabbro, plus some minor pyroxenite. The titanomagnetite abundance as well as the vanadium content increases in the upper 150 m of the unit, toward the layered zone.

The layered zone, which hosts the vanadiferous titanomagnetite deposit, consists of 450 to 900 m of rhythmically layered beds rich in pyroxene, titanomagnetite plus ilmenite,

intercalated with layers of anorthositic gabbro. The vanadium mineralization is located in the almost entirely in the lowermost part, namely the P1, P2 and P3 units (see Section 7.0). Vanadium strongly partitions into magnetite, and thus into the first titanomagnetite layers. The abundance of titanomagnetite decreases upward (Allard, 1967).

1.3 EXPLORATION

Since its acquisition in 2007 by VanadiumCorp, a limited amount of exploration work was conducted on the project, including:

- Three ground magnetic surveys, encompassing almost all of the current properties.
- Stripping and surface sampling on Lac Doré North property in 2008, which was recently remapped.
- A 10-hole exploration drill program on Lac Doré North in 2009.
- A brief channel sampling program on Lac Doré in 2012 aiming to duplicate former McKenzie Bay Resources samples, the results of which are not available.
- A 4-hole confirmation drill program in 2013 on Lac Doré, aiming to duplicate historical drill holes.
- A field verification program and surveying of historical drill holes location in the fall of 2015.

The Lac Doré vanadium deposit has a protracted exploration history, spanning more than 60 years. It was evaluated by drilling or trenching on nine occasions through time, by various past and present owners. It is still considered to be incompletely drilled. The results of the historic sampling are of variable quality, but at least some of the data are considered to be sufficiently accurate to be incorporated into a resource estimate, assuming sufficient care and precaution in estimation. The thorough coverage and exposure by the trenches provides some useful supporting information. A total of 50 holes and 33 trenches totalling 14,559.6 m are unevenly distributed on the property, including some segments traversing onto adjacent properties.

Trench sampling results have been converted to horizontal drill holes for the database, geological model and use in future resource estimates.

The current VanadiumCorp Lac Doré property encompasses the former East deposit and part of the former West deposit (Kish, 1971), previously the focus of exploration by SOQUEM and, subsequently, McKenzie Bay Resources (McKenzie Bay). The Lac Doré North property encompasses part of the Northeast Extension as formerly defined by McKenzie Bay. Through time, historical resource estimates were prepared for the East and West deposit, successively by the Québec department of Natural Resources (Assad 1968, Kish 1971, Avramtche 1975, SOQUEM (Dion, 1980)), LMBDS-Sidam on behalf of SOQUEM (LMBDS 1981), IOS Géoscientifiques Inc. (IOS) on behalf of McKenzie Bay (Tremblay et al., 1998), Cambior (Crépeau, 2000) and finally SNC-Lavalin on behalf of McKenzie Bay (2002). All previous resource estimates are considered to not be relevant today

1.4 RECOMMENDATIONS

The information available for historical drill hole surveys, analytical methods and chain of custody is somewhat limited and leads to the conclusion that the data requires further verification before it is used in preparing a mineral resource estimate. This despite the extensive trenching, mapping and sampling data. However, further work is justified by the possible similarity to the mineralization on the same stratigraphic horizon found on the adjacent BlackRock claims which has been the subject of a feasibility study (feasibility study understood to be in the process of being updated).

To accomplish this, a drilling program to cover 35 sections spaced 50 m apart is recommended from lines 7+00 E to 24+00 E. On each odd section, approximately 400 to 500 m of drilling will be required to cover the East deposit area. On each even section, 300 to 400 m of drilling will be required to fill in between holes from the bracketing sections, resulting in a dice 5 pattern.

It is recommended that holes be inclined at 45º to 50º toward the northwest (320° azimuth), and drilled using at least NQ-sized core to enable collecting sufficient material. It may be possible to drill two holes from each set up, requiring adjustments to the dip. Assaying and Davis tube testing every 3 m of core is recommended. It is also recommended that the mineralized portion of all drill holes be entirely sampled without gaps. Following this pattern from one end of the East deposit to the other, regardless of the presence of historic drill holes or trenches would require up to 16,000 m of drilling. The QP recommends that any theoretically planned hole in the dice five pattern falling close to an existing hole should be drilled in order to confirm historical results.

It is anticipated that approximately 60% of the core will need to be assayed for head and magnetite concentrate vanadium grade, the latter by Davis Tube. The budget recommended by the QP is summarized in Table 1.1.

Table 1.1
Proposed Exploration Budget

Activity	Amount (m)	Unit Cost (CDN$ per m)	Total (CDN$ '000)
Drilling	16,000	120	1,920
Assaying	9,600	80	256
Total			**2,176**

Drilling will also require logging for geotechnical purposes and estimating overburden thickness in more detail. Pending a successful outcome, further drilling along strike in both directions may be justified.

The QP has reviewed the proposed exploration program and finds it to be reasonable and justified. Should it fit with VanadiumCorp's strategic goals, it is Micon's recommendation that the company conduct the proposed exploration program.

2.0 INTRODUCTION

Micon International Limited (Micon) was engaged by VanadiumCorp Resource Inc. (VanadiumCorp) to prepare an Exploration Report, also known as a Property of Merit Report, compliant with National Instrument 43-101 for its Lac Doré vanadium property located in Québec.

Mr. B. Terrence Hennessey completed a site visit to the offices of IOS Services Géoscientifiques Inc. (IOS) and the Lac Doré field site on May 22 and 23, 2018. IOS, under contract, has conducted much of the more recent exploration work on the property. Exposures of mineralization were viewed in extensive trenches on the property and core from the VanadiumCorp drill program was reviewed against drill logs at IOS' warehouse.

Micon is pleased to acknowledge the helpful cooperation of VanadiumCorp's management and contract field staff, all of whom made any and all data requested available and responded openly and helpfully to all questions, queries and requests for material.

The Qualified Persons (QPs) have reviewed and analyzed data provided by VanadiumCorp, its consultants and previous operators of the property, and has drawn its own conclusions therefrom, augmented by its direct field examination. The QPs have not carried out any independent exploration work, drilled any holes or carried out any sampling and assaying on the property.

The descriptions of geology, mineralization and exploration are taken and amended from reports prepared by various companies or their contracted consultants. The conclusions of this report rely on data available in published and unpublished reports, information supplied by the various companies which have conducted exploration on the property, and information supplied by VanadiumCorp.

Most of the figures and tables for this report were largely reproduced, or derived, from reports written for VanadiumCorp. Where the figures and tables are derived from sources other than Micon, the source is acknowledged below the figure or table.

3.0 RELIANCE ON OTHER EXPERTS

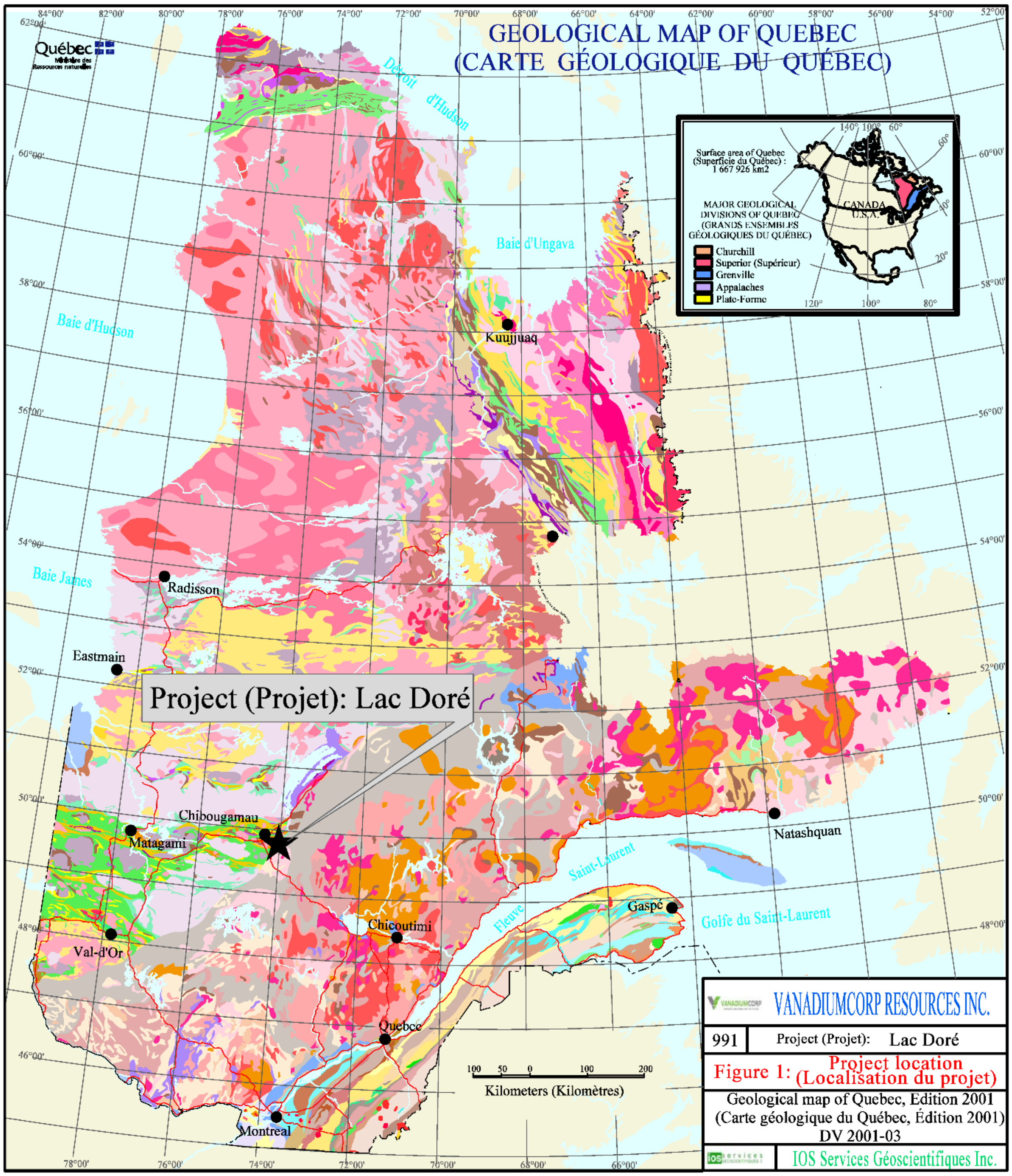
3.1 LEGAL AND POLITICAL MATTERS (SECTION 4.0)

Information presented in Section 4.0 of this report has been based upon the representations of the issuer, VanadiumCorp Resources Inc., regarding mining title, the legal status of its claims and permits, right of access, environmental liabilities and the existence of royalties or other encumbrances. Those representations were provided to the QP by email confirming VanadiumCorp's review and acceptance of an earlier draft of the current report (Bakker, 2018a) and, separately, in email attachments containing claim lists prepared by VanadiumCorp's contracted claim managers (Bakker, 2018b). The QP for Section 4.0 has not independently verified those representations, is not qualified to provide professional opinion on such matters and, to the extent permitted under Item 3 of Form 43-101F1, disclaims all responsibility therefor.

4.0 PROPERTY DESCRIPTION AND LOCATION

The Lac Doré project is found in central Quebec near the town of Chibougamau. The location of the project is shown in Figure 4.1.

Figure 4.1
Project Location Map



4.1 CLAIM LIST

A list of claims was downloaded from the MERNQ on-line registry and is provided in Appendix 1, along with assessment credits and obligations. All the titles are duly registered under the name of VanadiumCorp Resources (participant #93181). A claim map is provided in Figure 4.2.

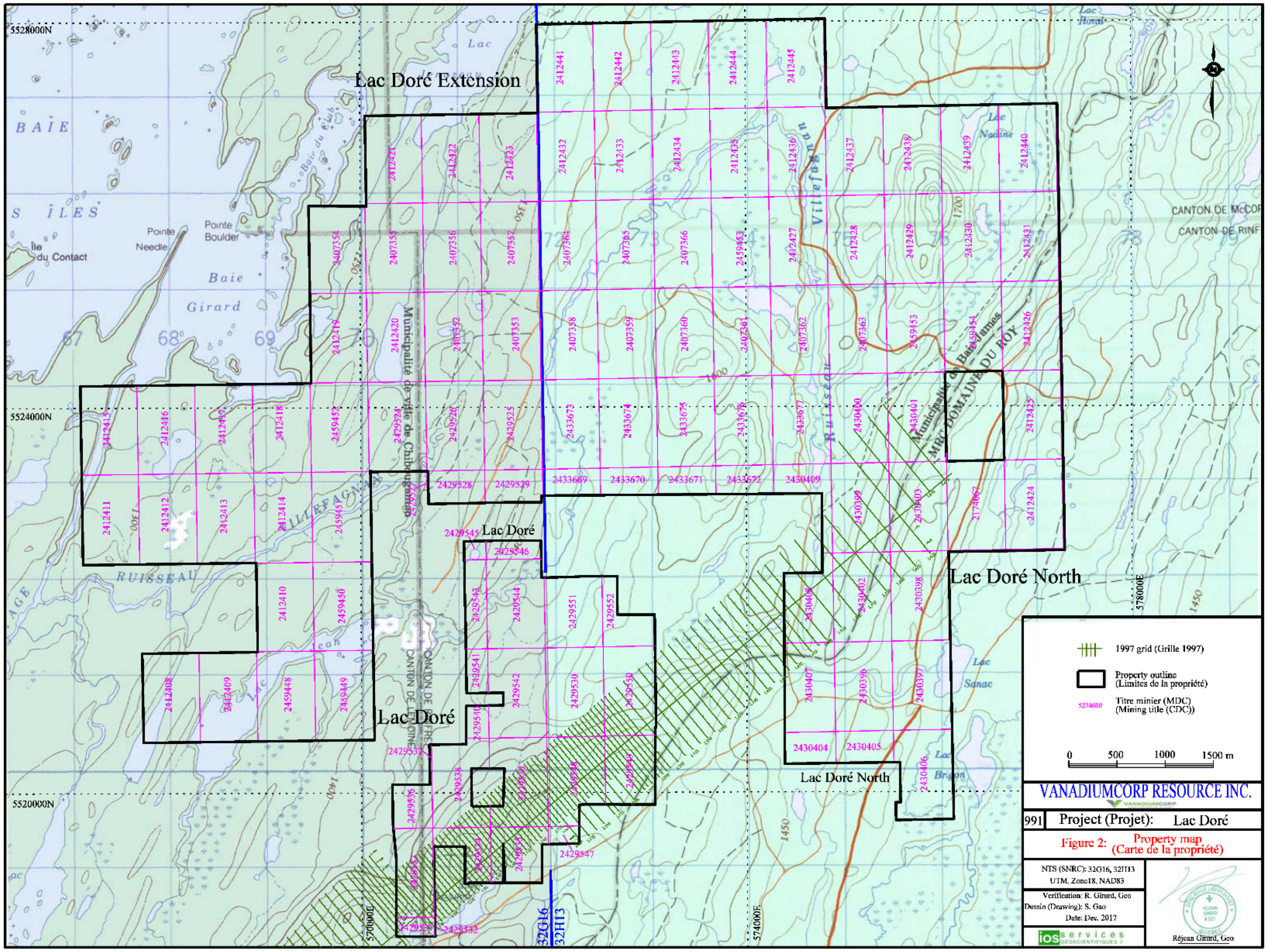
The three administratively distinct properties, Lac Doré, Lac Doré North and Lac Doré North Extension, consist of 114 map designated cells, mostly of 55.5 ha each. Map designated cells (CDC) are mining titles which are designated on a map through the Gestim web-based system, according to a pre-established grid measuring 30 seconds of longitude by 30 seconds of latitude.

The properties originally included 81 conventional claims marked by claim posts in the field. These were converted into map designated cells by the Minister in July, 2015 (Renvois au Ministre, dossier 32-9502 to 32-9510). Where former posted claims represented only a portion of the pre-established grid, the area of the cell was divided according to an outline agreed to between owners, VanadiumCorp and its neighbour BlackRock Metals (BlackRock). These outlines are currently irrevocable, defined by latitude and longitude coordinates, converted from UTM measurements obtained from a GPS survey or land surveyor measurement. Claim posts are still visible in the field but are obsolete and without any legal value. The original field-staked claims were acquired in numerous phases by VanadiumCorp, starting in 2007 and ending in the fall of 2014. In the course of the conversion process, anniversary dates and assessment credits were reset by the Minister. Field-staked claims are remnants from the former mining regime, all of which are currently converted into map designated cells in the area. As a result, a claim boundary conflict is no longer possible.

4.2 AREA AND EXTENT

The project covers two discontinuous groups of claims, Lac Doré to the southwest and Lac Doré North plus Lac Doré North Extension to the east and north. These two blocks are separated by a one-kilometre gap to the east and 400 m to the north of Lac Doré. They comprise a total of 114 titles for 5,286.69 ha (52.86 km^2 or 13,064 acres). Of these, 23 former field-staked claims, for 648.82 ha, are attributed to Lac Doré property, 15 titles are attributed to Lac Doré North for 701.9 ha, and 76 map designated cells, totalling 3,935.93 ha, belonging to Lac Doré North Extension are staked as a provision for future infrastructure. These claims extend over 4.5 km along the northeast-southwest axis of the mineralized zone (see exploration grid location on Figure 4.2), encompassing part of the former West deposit, the entire East deposit and part of the Northeastern deposits.

Figure 4.2
Lac Doré Claim Map



Source, IOS, 2018.

4.3 Location

The Lac Doré property is located in Lemoine and Rinfret townships, straddling NTS map-sheets 32G/16 (Chibougamau) and 32H/13 (Lac Mitshisso), about 30 km southeast of the town of Chibougamau (see Figure 4.1). Its boundaries are latitudes 49º 48’ 54” and 49º 54’ 00” North and longitudes 73° 55’ 29” and 74º 04’ 00” West WGS-84 (UTM-X: 567053 to 577250, UTM-Y: 5518521 to 5528013, NAD-83).

4.4 Claim Status

Within Québec, claims are valid until their renewal anniversary. Table 4.1 provides the anniversary dates, required credits and renewal fees. A total of $545,190.58 in assessment credits is currently available, although not evenly distributed. Renewal fees are $6,648.54 per two-year period, plus management cost.

Exploration titles in Québec are required to be renewed every two years, sixty days prior to their anniversary or up to their anniversary with a penalty. A fee is needed at each renewal. Renewal also requires filing of assessment credits accumulated from exploration expenditures. The management rules of assessment credits are complex. There are currently ample credits to renew the Lac Doré and Lac Doré North properties, but sufficient credits are not currently available for renewal of Lac Doré North Extension.

Table 4.1
Claim Status and Expenses

Property	Titles	Surface Area (ha)	Available Credit ($)	Required Work ($)	Renewal Fee ($)	Next Renewal
Lac Doré	23	648.82	433,440.87	19,402.50	1,129.55	23-Apr-20
LD North	15	701.94	111,076.55	15,502.50	867.39	03-Sep-20
LDN Ext.	76	3,935.93	673.16	56,095.00	4,651.60	15-May-20
Total	**114**	**5,286.69**	**545,190.58**	**91,000.00**	**6,648.54**	

Details for each claim are presented in Appendix 1 to this report.

4.5 Staking History

The first claims on the Lac Doré North property were acquired by field staking in 2007, to cover the northeastern extension of the deposit. The rest of the claims within the Lac Doré and Lac Doré North properties were acquired between 2007 and 2008, when those claims were allowed to lapse by McKenzie Bay Resources. The Lac Doré North Extension was acquired in 2014 to 2015 in order to accommodate possible infrastructure.

4.6 CLAIM IRREVOCABILITY

The Lac Doré and Lac Doré North properties are made of map designated cells, the validity of which cannot be challenged by a third party, and are irrevocable by law, as long as the renewal obligations are fulfilled by the owner.

4.7 SURVEYING

As the properties are map designated, their boundaries are defined by coordinates, and no land surveying is needed to certify their validity and field location.

4.8 EMBEDDED CLAIMS

Two adjacent isolated cells, belonging to BlackRock (CDC-2427688 and CDC-2427689) are enveloped within the Lac Doré property, close to its southwestern end, and are due for renewal on March 30, 2019.

An isolated cell (CDC-2429553) belonging to VanadiumCorp lies within the BlackRock property, very close to their Armitage deposit. This cell is to be renewed by February 25, 2020.

4.9 RELATION TO ADJACENT BLACKROCK METALS PROPERTIES

The Lac Doré property is totally surrounded by BlackRock claims. To the north and northwest, only a narrow strip (400 m) of claims belonging to BlackRock separates it from the Lac Doré North property. To the southwest, the limit of Lac Doré property is very close (100 to 120 m, corresponding to the irregular claim 5277107) to the outline of the mining lease acquired by BlackRock, covering their Southwestern deposit.

The western border of Lac Doré property is interlocked with the BlackRock property. These boundary complications straddle the West deposit and are a clear hindrance to its full development. BlackRock claim CDC-2430231 is an irregular cell which protrudes into the VanadiumCorp property, covering a 400 m stretch of the West deposit and likely precluding the inclusion of a portion of the deposit into any future resource estimate. Cell CDC-2430231 is an irregular cell with a thin sliver wedged within VanadiumCorp cell CDC-2429535, which will likely be a hindrance for any future VanadiumCorp pit design. Finally, CDC-2430235 and 2430236 form another embayment within VanadiumCorp land located north of the West deposit, which is not considered to be a hindrance at this time. Any potential future agreement to be made between VanadiumCorp and BlackRock to regularize the claim boundary will have to comply with the pre-established 30-second-of-arc cell grid.

BlackRock owns a large continuous property, encompassing a long stretch of the titanomagnetite-bearing layers. The property extends for about 14 km to the southwest of VanadiumCorp lands, including the Southwestern deposit, Armitage deposit, and a thin layer extending close to the Corner Bay mine property. The BlackRock property also includes a 2-

km-long stretch of the Northeastern deposit, separating the Lac Doré and Lac Doré North properties.

The locations of the various deposits are discussed and shown on figures in Section 6.

4.10 HISTORY OF PAST AND PRESENT PROPERTIES

Historical claims over the Lac Doré vanadium deposit and its extensions have a long and protracted history spanning half a century, with numerous interwoven historical liens, involving 13 different companies, entities or individuals, and more than 30 transactions.

The initial Lac Doré property was first staked in 1966 on behalf of the Québec Government. These 21 "K" posted claims, of 16 ha each, encompassed the East and West deposit. On July 6, 1977, the ownership of the claims was transferred to SOQUEM, a Québec mineral exploration crown corporation. In 1997, the property was granted for option to McKenzie Bay Resources, and then sold to the group in 1998. In 1999, the project was optioned to Cambior Inc., who relinquished the option in 2000. In 2002, claim ownership was passed to Lac Doré Mining Inc., a wholly owned subsidiary of McKenzie Bay International. These claims were accidentally allowed to lapse in 2007, clearing the ownership picture and making all liens obsolete. The land became available for staking.

In 2008, Lac Doré Mining Inc. sold their remaining properties as well as all their intellectual property to BlackRock. Historical core drilled within the current VanadiumCorp properties is currently stored by BlackRock and it is unclear if VanadiumCorp has any rights over it.

4.11 STATUS OF EXPLORATION EXPENDITURES

Until now, with the exception of the acquisition and claim management costs, total exploration expenditures incurred on the properties by VanadiumCorp is estimated to be somewhat less than $1 million.

4.12 REMAINING ENCUMBRANCES

The QP understands that all encumbrances accrued from Lac Doré Mining and previous owners are obsolete due to the expiry of the claims and later staking by VanadiumCorp. No liens or royalties are reported by VanadiumCorp administration, and no mortgages are recorded at Régistre des Hypothèques du Québec. No independent verification of all the potential encumbrances was performed and this report does not represent a legal title opinion in this regard.

4.13 RIGHT OF ACCESS

The properties straddle the territories of the municipality of Chibougamau, the James Bay municipality (MBJ) and the Domaine-du-Roy regional municipality (MRC). This partition implies that these various jurisdictions will need to be addressed regarding the issuance of permits, according to their respective regulations.

As the deposits straddle the limits of the municipalities of Chibougamau and James Bay any infrastructure construction, such as camps, sewage facilities and roads, depending on their location, may need to be permitted by the respective municipal authorities in Chibougamau-Chapais, Matagami or St-Félicien.

About 20% of the claims of the Lac Doré North property are located to the south of the divide between the James Bay and St-Lawrence watersheds. The area southeast of the divide is located in non-organized territories ("Territoires non-organisés") managed by the Domaine-du-Roy regional municipality ("MRC Domaine-du-Roy") in St-Félicien.

There is nothing preventing VanadiumCorp from accessing their properties. The only permitting required relates to regulations regarding logging activity and access to wet lands. Note that different permits, and slightly different permitting procedures, are required for intervention in the James Bay or Domaine-du-Roy jurisdictions. Current roads leading to the properties are in the public domain with no access restrictions, although they are not regularly maintained.

As a mineral rights owner, VanadiumCorp does not hold any surface rights. However, since the property is located on public lands, the claims grant a right of first refusal to obtain such surface rights within the property, when required.

The property straddles hunting and fishing zones 17 and 28. Exclusivity is not granted to outfitters or to the First Nations. No outfitters' camp is known in the vicinity, and no hunting or fishing cabins were noted within the property.

VanadiumCorp does not retain any rights to hydro, forestry, or other resources. There are no rivers with hydraulic potential in excess of 225 kW within or near the property, to which restrictions could apply.

4.14 First Nations

The area is located within the Eeyou Istchee-Baie James territory, regulated by the James Bay and Northern Québec Agreement ("Convention de la Baie James et du Nord Québecois") as well as the subsequent "Paix des Braves" treaty between the Québec Government and the Cree Nation. It is indicated as "Terres de Catégories III", and free of encumbrances relating to exploration activities. The deposit is located within traditional trap line no O59, belonging to Mr. Matthew Wapache Sr. from Ouje-Bougoumou, except for its north-eastern limit which lies in trap line no O57, belonging to Mr. James B. Wapache from Ouje-Bougoumou. According to the "Paix des Braves" treaty, any intervention affecting traditional activities, such as logging, needs approval from the trap line owners.

The area southeast of the watershed divide is located in non-organized territories ("Territoires non-organisés") managed by the Domaine-du-Roy regional municipality ("MRC Domaine-du-Roy") in St-Félicien. This area is not included in the James Bay and Northern Québec Agreement, and therefore falls under the general regulations of the

Ministère de l'Énergie des Ressources Naturelles du Québec relating to forestry and mining, and under the general regulations of the Ministère du Développement Durable, de l'Environnement et de la Lute au Changements Climatiques du Québec (MDDELCC) pertaining to environmental issues. This area lies within the Nitassinan, the traditional Innu ("Montagnais") territory. A treaty, named the "Approche Commune" is currently under negotiation between the Innu, and the Québec and the Canadian governments.

VanadiumCorp is required to inform and consult with the First Nation communities as well as with the local tallymen (i.e., Mr. Wapache) concerning any planned exploration work, in order to minimize interference with traditional trapping, hunting and fishing activities. In the event of the construction of the mine, the project will be submitted to review by First Nation communities. The Cree Nations are generally receptive to business opportunities.

4.15 LEASES

There is currently no surface lease or private land within the perimeter of the properties. No "*bail non-exclusif sur les ressources de surface*", or lease for sand and gravel, is currently valid within the property, although gravel pits are present. No mining lease or any other lease in regard to mineral resources, was ever active within the property. No evidence of any undeclared mineral exploitation or squatters was noted.

4.16 PERMITTING

With respect to exploration work, permitting is required for the following activities:

- The right to establish a temporary exploration camp within the property is granted by mining law. However, permits are required for construction from the James Bay Municipality, MERN and MDDELCC. The camp must be compliant with the MDDELCC regulations, CNESST regulations and MAPAQ regulations.
- Logging is required in order to access drill sites and clear drill pads, for which a permit needs to be requested from the forestry department of the Ministère de l'Énergie et des Ressources Naturelles du Québec. For this, the Minister must obtain approval from the Tallymen (trap line permit holders), according to the "Paix des Braves". No difficulty is expected.
- Trenching in excess of 50 m^2 requires a special permit from the Environment ministry (MDDELCC), and a rehabilitation plan may be requested.
- Extraction of more than 50 t of rock from a claim requires a special permit from the Natural Resources Department. Although no difficulty is expected, there may be a request for a restoration plan.
- Permission to drill on lakes must be requested from Environment Canada. No difficulty is expected.

4.17 ENVIRONMENTAL LIABILITIES

To the QP's knowledge there are two known environmental liabilities left by McKenzie Bay Resources. These liabilities are not legally transferable to VanadiumCorp, although a proactive attitude is expected. The first one is the reclamation plan in regard to the stripping done in 1997. A set of 36 trenches, for a total length of 8,538 m, of which 32 are located on the actual Lac Doré property, were dug on the deposit. Since this stripping exceeded the 10,000 m^3 limit, McKenzie Bay Resources was requested to file a reclamation plan in order to obtain its permit. According to this plan, McKenzie Bay Resources had to backfill any digging in excess of 1 m depth, and to replace top soil upon it. Second, McKenzie Bay Resources had liability in regard to a surface lease for its Laugon Lake camp. They were expected to clean the site, remove septic tanks and reclaim any soil contaminated by hydrocarbons. The camp site was reported to have been cleaned by BlackRock, with the exception of the septic tank removal and contaminated soil remediation. The cost of the trench rehabilitation was estimated in 1997 at $18,510, or about $35,000 in 2018 dollars.

4.18 ENVIRONMENTAL RESTRICTIONS

There is no sensitive breeding or spawning habitat known or reported in the former McKenzie Bay Resources environmental assessment study. There is no area where mining activity is restricted in the vicinity of the project, the nearest ones being the urban part of the town of Chibougamau and the "Catégorie I" land from Ouje-Bougoumou and Mistassini.

The Ashuapmushuan wildlife reserve "Réserve Faunique de Ashuapmushuan" is located about 20 km to the south of the property, while the Assinica, and Albanel-Mistassini-and-Waconichi-Lakes wildlife reserves "Réserve faunique d'Assinica et des Lacs-Albanel-Mistassini-et-Waconichi") is located about 40 km to the north. There is no severe restriction with respect to exploration activities related to these wildlife reserves which could affect the project. A series of wildlife habitats ("Refuges biologiques") are withdrawn from mineral exploration about 11 km to the northwest, which should not be considered a hindrance.

4.19 HISTORIC ENVIRONMENTAL IMPACT STUDY

In 2002, McKenzie Bay International, the parent company of McKenzie Bay Resources, commissioned Groupe-Conseil ENTRACO Inc. ("ENTRACO") to perform an environmental assessment. This assessment included numerous aspects, including a social and economic assessment, ecotoxicity and baseline survey, with respect to surface water quality, biological sensitivity, and more for the area covering the main deposit as well as the surrounding area affected by infrastructure. No natural contamination by vanadium was detected. This element is considered to be sequestered in minerals and practically insoluble in water. It does not significantly bioaccumulate and is of low ecotoxicity. Some aspects of this study, especially those related to the access corridor, were included in the BlackRock environmental study, and covered by their authorization certificate granted by the MDDELCC. It should be noted that this impact study predates the "Paix des Braves" treaty.

The adjacent project, currently under development by BlackRock, obtained its certificate of authorization (CA) from the MDDELCC. The certificate authorized the construction of a "12,000 tonne per day mining operation", a mill, a rail spur to the project, plus all required infrastructure.

There is no known exceptional environmental restriction attached to the territory of the Lac Doré Vanadium Project. Only the usual MDDELCC rules and items included in the James Bay and Northern Québec Agreement apply. Within the James Bay territory, a mining project approval protocol is established, under the joint Provincial-Federal-Cree Comev (Comité d'Evaluation) and Comex (Comité d'Examen des Repercussions sur l'Environnement et le Milieu Social) reviewing committees.

Contractors, during exploration activities, did not report any exceptional ecosystems such as mature ancestral forest or white cedar strands within the property.

4.20 ADEQUACY OF SIZE

The property of the Lac Doré Vanadium Project is considered to be of adequate size for an eventual mining operation. Additional ground was acquired to the north in this respect, separated from the deposit by a single claim-wide strip belonging to BlackRock that does not preclude access.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 PHYSIOGRAPHY

The Lac Doré deposit is located on a northeast-trending ridge culminating at an elevation of 530 m above sea level, limiting the Lac Doré lowlands to the north which have an elevation of 410 m. Total relief, reaching 120 m, is therefore present at the site. The mineralized zone extends parallel to the stratigraphy, as expressed by the crest of the elongated hill (Figure 5.1 and Figure 5.2).

The property is located along the height of land between the St-Lawrence River watershed to the south and the James Bay watershed to the north. Drainage to the north of the divide flows toward Lake Chibougamau, via the Villefagnan and Armitage rivers. Drainage south of the watershed flows toward Lac St-Jean, by way of the Boisvert River. No large lake is present on the property, the largest being Laugon Lake to the southwest. The mineralized portion of the property is well drained, with limited bogs and swamps on its southern limit.

Figure 5.1
View from the East Deposit Looking North.

In the distance are the hills behind the town of Chibougamau, with Lake Chibougamau in front of them. The former Campbell mine shaft, near Chibougamau used to be visible from this location. Source: IOS, 2018.

Figure 5.2
View of Logging Road Taken in 1997

The road follows along the crest of the ridge where the East and West deposits are located. Outcrops of anorthosite are visible on both sides. The area was logged about 30 years ago. Source: IOS, 2018.

5.2 VEGETATION

The property is covered by immature second growth forest, dominated by black spruce and poplar. Stands of alders, white willow and birch cover areas with poor drainage, such as to the southeast of the deposit. Heath is diverse and locally abundant. Most of the property was logged and reforested in the last three decades.

5.3 FAUNA

Large mammals are limited to moose and occasional wolf and black bear. Reindeer (woodland caribou, a threatened species) or white-tail deer (chevreuil) are not reported. Hare, ptarmigan, grouse, fox and beavers are common. Local fish are dominated by trout, bass and northern pike.

5.4 CLIMATE

A cold continental climate prevails in the Chibougamau area. It is characterized by warm summers (15ºC July average) and cold winters (-20ºC January average). Average annual precipitation is in the order 919 mm of water equivalent, with prevailing winds from the west. Snow is a common precipitation type, typically from late October to early May.

5.5 ACCESS

The property is accessible from paved Highway No. 167 between Chibougamau and St-Félicien (at Lac St-Jean). At kilometre 197 and 200, access is provided to Forestry Road No. 210 (also known as “Chemin de la Mine Lemoine” or “Chemin Gagnon Frères”). A network of poorly maintained, secondary forestry roads accesses the property at different locations from Forestry Road No. 210.. A distance of about 85 km by road separates the centre of the property from the town of Chibougamau. The property can also be reached from the north by way of another poorly maintained gravel road (locally known as the Cigam road).

The former Lac Audet railroad of Canadian National Railways’ Chibougamau-St-Félicien line is located on forestry road No. 210 approximately 2 km from the Highway No. 167 junction (Figure 5.3).

Figure 5.3
Local Railway Siding on Forestry Road No. 210

Source: Micon, 2018.

A seaport is available at La Baie (Port-Alfred), 400 km southeast, along the railroad. A commercial airport is located between the towns of Chibougamau and Chapais, about 85 km from the property. Additionally, a private helicopter base is operated in Chibougamau.

Much of the property is within range of cell phone towers in the Chibougamau area.

5.6 SERVICES

The Chibougamau-Chapais municipalities are both former copper and gold mining centres and have a combined population of about 11,000 residents. Additionally, the Cree communities of Mistissini and Ouje-Bougoumou each have a population of about 3,000 residents. Besides mining, the local economy is based on forestry and the service industry. Social, educational, commercial, medical and industrial services, as well as a helicopter base, airport and seaplane base are available at the town site, as well as forestry and mining offices of the Ministère de l'Énergie et des Ressources Naturelles du Québec.

Chibougamau is a former mining community where abundant and skilled manpower as well as equipment is available. It is well served by heavy equipment service and maintenance providers.

5.7 INFRASTRUCTURE

No infrastructure except for the poorly maintained logging roads is present within the property boundaries. No infrastructure was left on Lemoine mine site after its reclamation. No infrastructure was left at the Gagnon Frères sawmill and the Audet Lake railway siding. No infrastructure has yet been built on the BlackRock mining lease.

The property lies about 40 km from paved Highway no 167. Daily bus and road carrier trucking are available in Chibougamau with trips towards Lac St-Jean as well as the Abitibi region. The Canadian National Railway line (Chemin de Fer d'intérêt Local du Nord du Québec or CFILNQ) and the Hydro-Québec 161 kV power line are located along the route of Highway no 167. Bi-weekly railroad freight service is currently available, linking to the North American rail network. Although the traffic density is low, the track speed is limited to 25 mph and 167,000 lb-per-car loads. Loading facilities are available in Chibougamau, although it is likely that a siding could also be constructed on the forestry access road. Water is plentiful at the site.

There is no mining infrastructure currently available within the Lac Doré properties. Permitting for infrastructure construction for the BlackRock project, including a rail spur, a 161-kV power transmission line and a road, were reported to have been granted, while approval of their mining license is pending.

6.0 HISTORY

6.1 INTRODUCTION

The Lac Doré vanadium deposit has a protracted exploration history, spanning almost 60 years. The amount of data available is extensive. Over 200 studies and reports, both confidential and available to public, dealing with geology, assaying, metallurgy, market and technical-economic issues are available. Therefore, the review of historical work will encompass both the main deposit and its extensions although these will not necessarily be described in detail. A peculiarity is the relatively limited amount of drilling conducted on the deposits compared to the extensive metallurgical testing.

Each of the successive operators of the project started their work with geological mapping and ground magnetometer surveys. The largest effort in this regard was conducted on the main deposit by McKenzie Bay Resources Ltd. (McKenzie Bay) in 1997, and in subsequent years, on its extensions. The details available from this effort supersede the work by previous owners, except in regard to drilling.

6.2 ASSESSMENT AND GOVERNMENT WORK

The property, being located in the vicinity of an historic mining district, has abundant government and academic literature available. More than 400 government and university reports and maps are available for the NTS 32G/16 and 32H/13 map-sheets, plus more than 2,000 assessment files submitted by exploration companies. A thorough review of all literature is not considered relevant to the current report on vanadium mineralization. Only those dealing directly with the current project were reviewed. The most relevant governmental work is considered to be that of Allard (Allard, 1967a, 1970, 1981; Allard and Caty, 1969) who mapped and described the magnetite series of the Lac Doré anorthositic complex, and from which Dr. Allard predicted the vanadium occurrence. A regional compilation of the geology of the Complex was prepared by Daigneault and Allard (1990).

6.3 EARLY EXPLORATION WORK

In 1948, Dominion Gulf discovered the magnetite deposit as a regional anomaly on an aeromagnetic survey (GM 1028; Jerkins, 1955). It is reported (Drury, 1959) that they conducted field work from 1954 to 1956, including geological mapping, trenching, sampling and some geophysics.

From 1957 to 1959, Trepan Mining Corporation Ltd. explored the aeromagnetic anomaly for its iron ore potential. Trepan Mining conducted geological mapping, a ground magnetometer survey and a three-hole diamond drill program. Drill hole locations are not available, although they are suspected to be near the former forestry road leading to Armitage Lake. Vanadium was not assayed for (Derby, 1957; Bischoff, 1959; GM 06482). These drill holes are believed to be located outside of the current property.

Subsequent exploration work by Jalore Mining (a subsidiary of Jones and Laughlin Steel Company from Pittsburgh) and by Continental Ore Company included a "dip-needle" (ground magnetic) survey, six diamond drill holes and some metallurgical testing on a 1,000-tonne bulk sample (Gabrielson et al., 1971; Assad 1958; Drury, 1959; Dubuc, 1959; Allen, 1958; Jerkins, 1955; Oliver, 1958; Assad, 1956; and Penstone, 1956). The property was relinquished due to the high titanium content of magnetite, which renders it unsuitable for iron smelting with a conventional blast furnace.

The core was not assayed for vanadium by Jalore Mining, but was, subsequently, by the Ministère des Richesses Naturelles (MRN) in 1970. This work is considered of little use as the core could not be located. It was apparently found by Cambior (Crépeaux, 2000) however, since the Cambior technical team was disbanded its location is unknown. The core from these six drill holes is considered to be lost.

6.4 WORK CONDUCTED BY THE MINISTÈRE DES RICHESSES NATURELLES DU QUÉBEC

The vanadium content of the titanomagnetite layers was first indicated by Dr. Gilles O. Allard (1967a, 1967b), at that time working for the Quebec Department of Natural Resources (currently the Ministère de l'Énergie et des Resource Naturelles, MERN). The deposit was then staked on behalf of the Crown. From 1966 to 1975, the following work was completed:

- Geological mapping (Assad, 1968; Gobeil, 1976).
- Line cutting and surveying (Gobeil, 1976).
- Ground magnetometer survey.
- Bulk sampling.
- 13 exploratory diamond drill holes (Assad, 1968; Avramtchev, 1975), two of which are on the Southwest deposit (BlackRock project).
- Numerous metallurgical tests, both for alkali roasting and steel-slag smelting:
  - Cloutier et al., 1971.
  - Castonguay, 1975a, 1975b.
  - Boulay and Rubenicek, 1969.
  - Assad, 1967, 1968.
  - Canmet, 1976.
  - CRM, 1979.
  - QIT, 1978.
  - CRIQ, Union Carbide, IRSID (France), Ontario Research Foundation.
- Preliminary resource estimates (Assad, 1968; Kish, 1971; Cloutier et al., 1971; Avramtchev, 1975).

Those mineral resource estimates have not been reviewed by the QP and are not considered to be currently relevant. This report presents, in the recommendations section, a program of work designed to collect the data necessary for the estimation of a current, CIM-compliant, mineral resource.

Geological mapping and ground magnetic surveys conducted by the MRN are considered to be superseded by the more detailed McKenzie Bay surveys (Tremblay et al, 1998).

6.5 WORK CONDUCTED BY SOQUEM

The Lac Doré Vanadium Project was transferred to SOQUEM, a Québec crown corporation, in 1977. This corporation did some geological work until 1979. SOQUEM then carried out additional metallurgical testing until 1980. In 1981, SOQUEM abandoned the development program due to a weakening in the vanadium market.

- Exploration work:
  - Geological mapping: 1.1 km^2
  - Line cutting: 39.1 km
  - Magnetometer survey: 34.3 km Nolet, 1980
  - Gravity survey: 17.5 km Nolet, 1980
  - 19 diamond drill holes: 3,325 m Dion, 1980
  - Resource estimations: Dion, 1980
  - Pit design, LMBDS-Sidam: 1981
- Metallurgical testwork:
  - Pellet testing: Fossen 1978
  - Ti-V recovery: Hatch, 1980; Rautaruukki, 1980; CRM, 1981

The SOQUEM mineral resource estimates have not been reviewed by the QP and are not considered to be currently relevant. This report presents, in the recommendations section, a program of work designed to collect the data necessary for the estimation of a current, CIM-compliant, mineral resource.

SOQUEM's expenditures on the project have not been disclosed.

From 1983 to 1989, the project was reviewed and evaluated by various groups on behalf of SOQUEM:

- 1983: CRM (Malensky and Castonguay, 1983).
- 1989: Hydro-Québec (1989).
- 1989: Société Générale de Financement (Vallée, 1989).
- 1989: Hatch & Associates (Lachapelle, 1989).

6.6 WORK CONDUCTED BY MCKENZIE BAY

Within this report reference is made to several zones within the Lac Doré vanadium deposit (Armitage, Armitage Extension, East, Northeastern, Southwestern and West). Those zones are both within the property boundaries of VanadiumCorp and adjacent to it. Figure 6.21 shows their locations.

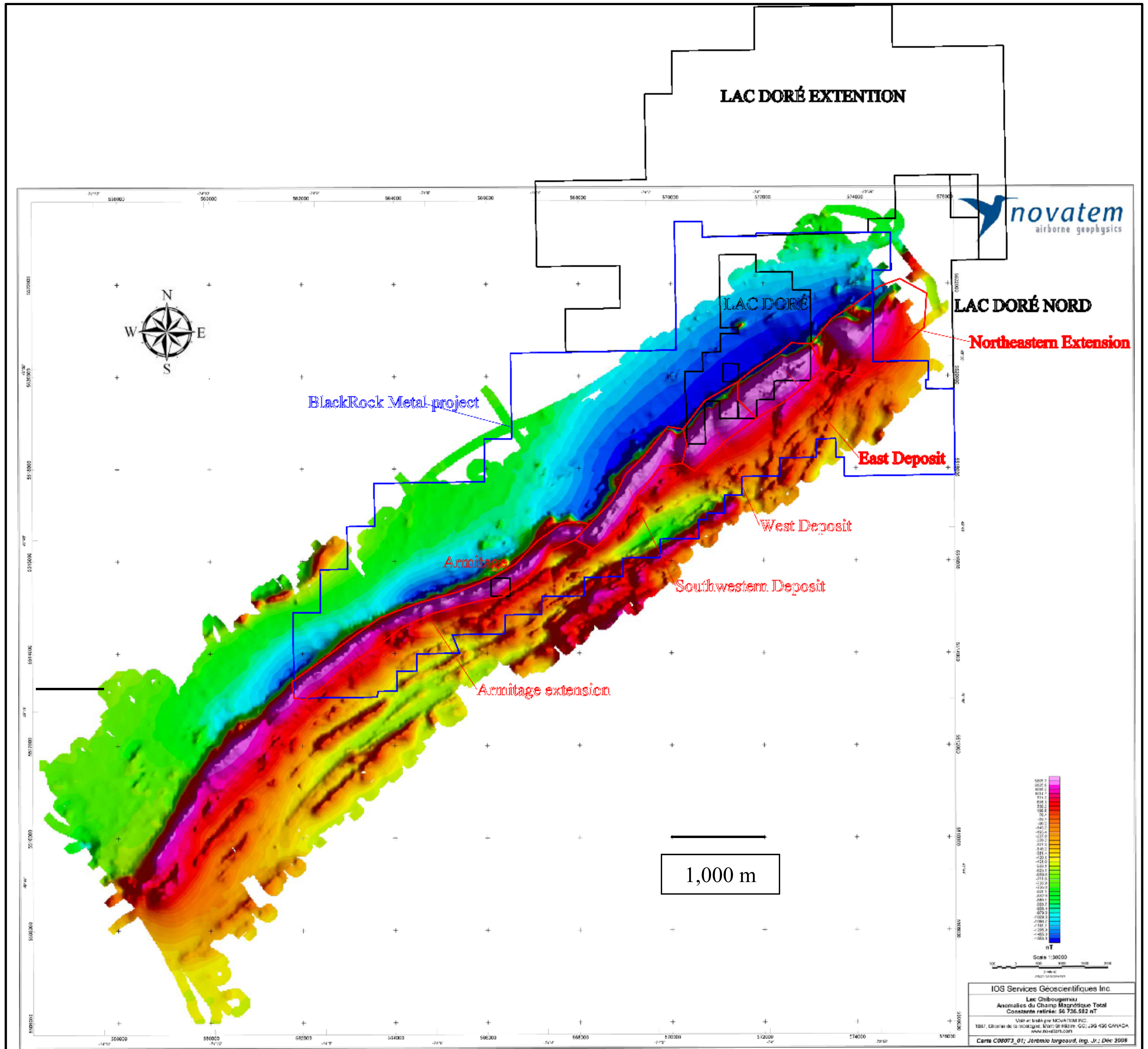
IOS, on behalf of McKenzie Bay, conducted a large stripping and sampling program in 1997 over the Southwest, West and East deposits (Tremblay et al., 1998). This campaign included the following:

- Line cutting, a ground magnetometer survey and detailed geological mapping over 70 line-km.
- Stripping and detailed mapping of 36 trenches for a cumulative length of 8,650 m (Figure 6.2 and Figure 6.3).
- Sampling and assaying of 1,734 samples (3 m long) for a total of 4,486.7 m of diamond-saw cut channels.
- Structural mapping and analysis (Lamontagne, 1998; Tremblay et al., 1998).
- Analytical QA/QC (Girard, 1997; Bédard and Girard, 1998).
- Ore microscopy and microprobe analysis (Lamontagne, 1998; Lamontagne and Lavoie, 1998; Bédard, 1998; Tremblay et al., 1998).
- Various market studies, processing and economic review (Girard, 1997).
- No metallurgical testing was carried out on behalf of McKenzie Bay within this program.

Between 1998 and 2001, various brief field programs were carried out by IOS on behalf of McKenzie Bay over the Armitage and Northeast extensions, for the purpose of assessment credits. This work mostly encompassed the extension of the historical deposits and the Armitage extension toward the southwest. It is scattered in numerous partial reports and includes:

- 1998: Line cutting (14.8 km), ground magnetometer survey and geological mapping over the Armitage extension (Lamontagne, 1998).
- 1999: Stripping of two trenches on the Armitage extension (Boudreault, 2000).
- 1999: Line cutting (23.1 km), ground magnetometer survey, and geological mapping over the Northeast extension. This campaign also included detailed mapping of 5 trenches dug in 1997 (14+00W to 24+00W) over the East deposit (Villeneuve, 1999).
- 2000: Line cutting (21.2 km), geological mapping and ground magnetometer survey over the south-western extremity of the Armitage extension (Boudreault, 2000). This campaign also included mapping, channel sampling (116.2 m) with a diamond saw and assaying (59 samples) of the two trenches excavated in 1999.

Figure 6.1
Location of Zones on and adjacent to the VanadiumCorp Property



Source, IOS, 2018.

Figure 6.2
Mechanized Stripping Done for McKenzie Bay in 1997

Source: IOS, 2018.

Figure 6.3
Trench 19+50E on the East Deposit

This trench was cleared and cleaned over a large width to provide an adequate view of the mineralization. See the pick-up truck in background for scale.
Source: IOS, 2018.

From 1997 to 1999: A series of ground magnetometer surveys was conducted covering the entire strike length of the deposit. These surveys, made with an analog flux-gate magnetometer, were not properly levelled and should be used with care but were helpful in selecting trenching and drilling sites. However, they are not reliable enough to make comparisons between the various parts of the deposit, model its geometry or to allow a reliable structural interpretation. The quality of these surveys led to the commissioning of the high resolution airborne survey by BlackRock.

From 1998 to 2000, the following metallurgical tests were carried out for McKenzie Bay by IOS:

- Review of the historical metallurgical tests (Girard, 1998).
- Crushing, work index and liberation of titanomagnetite (Lamontagne, 2000).
- Design of an optimum titanomagnetite recovery process with Davis tube tests for a routine separation protocol (Girard, 2000).
- Distribution of vanadium among oxide and silicate minerals (Girard, 2000).

In 2001, a drilling campaign was carried out by IOS on behalf of McKenzie Bay (Huss, 2003). This campaign included 14 holes for a total 2,187 m of drilling, distributed as follows:

- Northeast extension: 7 holes 1,016.7 m
- Southwest deposit: 1 hole 153 m
- Armitage extension: 6 holes 1,017 m

Of these holes, one is collared within the current Lac Doré North property, and two on the Lac Doré property, for a total of 438 m. The remaining holes are located outside of the current property boundaries.

6.7 WORK CONDUCTED BY CAMBIOR INC.

Within their option agreement with McKenzie Bay, Cambior (currently IAMGOLD Corporation) completed an in-house pre-feasibility study (Crépeau, 2000), which included:

- Preliminary resource estimates and pit design on the East and West zones.
- Market study for vanadium pentoxide and ferrovanadium (Taylor, 1998 in Service Techniques 1999).
- Financial analysis (Services Techniques, 1999).

The Cambior mineral resource estimates have not been reviewed by the QP and are not considered to be currently relevant. This report presents, in the recommendations section, a program of work designed to collect the data necessary for the estimation of a current, CIM-compliant, mineral resource.

Subsequently, the following work was carried out, until financial difficulties forced Cambior to withdraw from the project:

- Geological re-mapping of all trenches and re-logging of the core, including a due diligence and liability assessment (Magnan, 1999 in Service Techniques 1999).
- Davis tube testing (contracted to IOS, Villeneuve, 1999) and titanomagnetite concentrate assaying, as well as titanomagnetite content measurement using a "Satmagan" instrument.
- Preliminary environmental assessment, contracted to Entraco Groupe-Conseil (Entraco, 1999).
- Analytical testing to corroborate accuracy of assays and grade assessment (Crépeau, 2000). This verification confirmed the extent of the quality and robustness of available analyses.

6.8 SNC-LAVALIN FEASIBILITY STUDY

On April 11th, 2001, McKenzie Bay, in collaboration with SOQUEM, commissioned a bankable feasibility study awarded to SNC-Lavalin Inc. The study is dated October 11th, 2002. Only fragments of this study are publicly available on the SEC's EDGAR website. This study included:

- Review of geological data and grade assessment (Lafleur, 2002).
- Three confirmation drill holes (450 m in total) plus a small bulk sample, under IOS supervision (Boudreault, 2002).
- Production of a pit design and mining plan.
- Detailed ore petrography and mineral analysis, (Girard, 2002).
- Ore beneficiation process design, bench scale and pilot plant testing at Lakefield Research facilities.
- Pilot plant scale alkali roasting in Krupp Polysius facilities, followed by calcine leaching in Lakefield Research facilities.
- Hydrometallurgical process and bench scale testing.
- Infrastructure design, including utilities, tailing and calcine ponds, communication systems, automation, buildings, etc.
- Market study for the production of vanadium redox battery electrolyte by Secor Inc.
- Operating and construction cost estimate and financial analysis.
- Environmental study, compliant with COMEX-COMEV regulations by Entraco Groupe-Conseil Inc. (Archambault, 2002).
- Preliminary pit scope design and geotechnical investigation.

The SNC-Lavalin mineral resource estimates have not been reviewed by the QP and are not considered to be currently relevant. This report presents, in the recommendations section, a program of work designed to collect the data necessary for the estimation of a current, CIM-compliant, mineral resource. The SNC-Lavalin historical estimate encompasses the Southwestern and West deposit, which VanadiumCorp does not hold in their entirety.

6.9 WORK CONDUCTED BY LAC DORÉ MINING

Since completion of the feasibility study by SNC-Lavalin, and until their agreement with BlackRock, very limited work was conducted on the property by McKenzie Bay and subsequently Lac Doré Mining, a wholly owned subsidiary. Micon understands that hydrometallurgical processes were tested further at SGS-Lakefield Research Limited. No comprehensive report is known to have been issued.

6.10 WORK CONDUCTED BY BLACKROCK METALS

BlackRock acquired the remaining assets from Lac Doré Mining in 2008 and conducted the following work over the portion of the deposit currently owned by VanadiumCorp. This work was either conducted or supervised by IOS:

- Securing the historic core and cleaning the former McKenzie Bay camp site at Laugon Lake (located on current VanadiumCorp property). The historic core included the SOQUEM and MRN drill core from the East and West deposits as well as the McKenzie Bay holes on the Northeastern deposit and Armitage extension.
- High resolution airborne magnetometer and topographic survey over the entire length of the deposits (Largeault et al., 2008). The survey encompassed the East and West deposits, currently belonging to VanadiumCorp. This survey replicates with better accuracy the former ground magnetometer survey.

6.11 OTHER KNOWN MINERAL OCCURRENCES

No other mineral occurrences of economic significance are known within the property boundaries. Some apatite concentrations are reported in the upper stratigraphic unit "P4" (see Section 7) of the magnetite sequence, which are not volumetrically significant.

A small occurrence of gem quality vanadiferous titanite is reported within (or very near) the property, in the valley between Laugon and Coco lakes. The value of this occurrence has not been addressed and the occurrence never been properly located.

6.12 DETAILS ON THE HISTORICAL DRILLING

The historical drilling is considered valuable, due to its relative abundance, compared to the drilling and sampling completed by VanadiumCorp. This information, along with the extensive assay and mapping data from the trenching, provides the basis for the geological model that is intended to be used as a guide to future drilling, and the QP's recommendation for further exploration of the property. Therefore, a review of this data is presented in later sections. This historical data will be presented in Section 10 along with the VanadiumCorp drilling.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGY

The Lac Doré deposit is hosted in the Lac Doré Anorthositic Complex, dated at 2.728 Ga. The Archean complex is at the core of the eastern end of the northern domain of the Abitibi Greenstone Belt, Abitibi sub-Province, Superior Province of the Canadian Shield. The regional stratigraphy is dominantly east-west trending, south or north verging, depending on the side of the anticline, with metamorphic facies grading southward from greenschist to amphibolite (Chown et al., 1992).

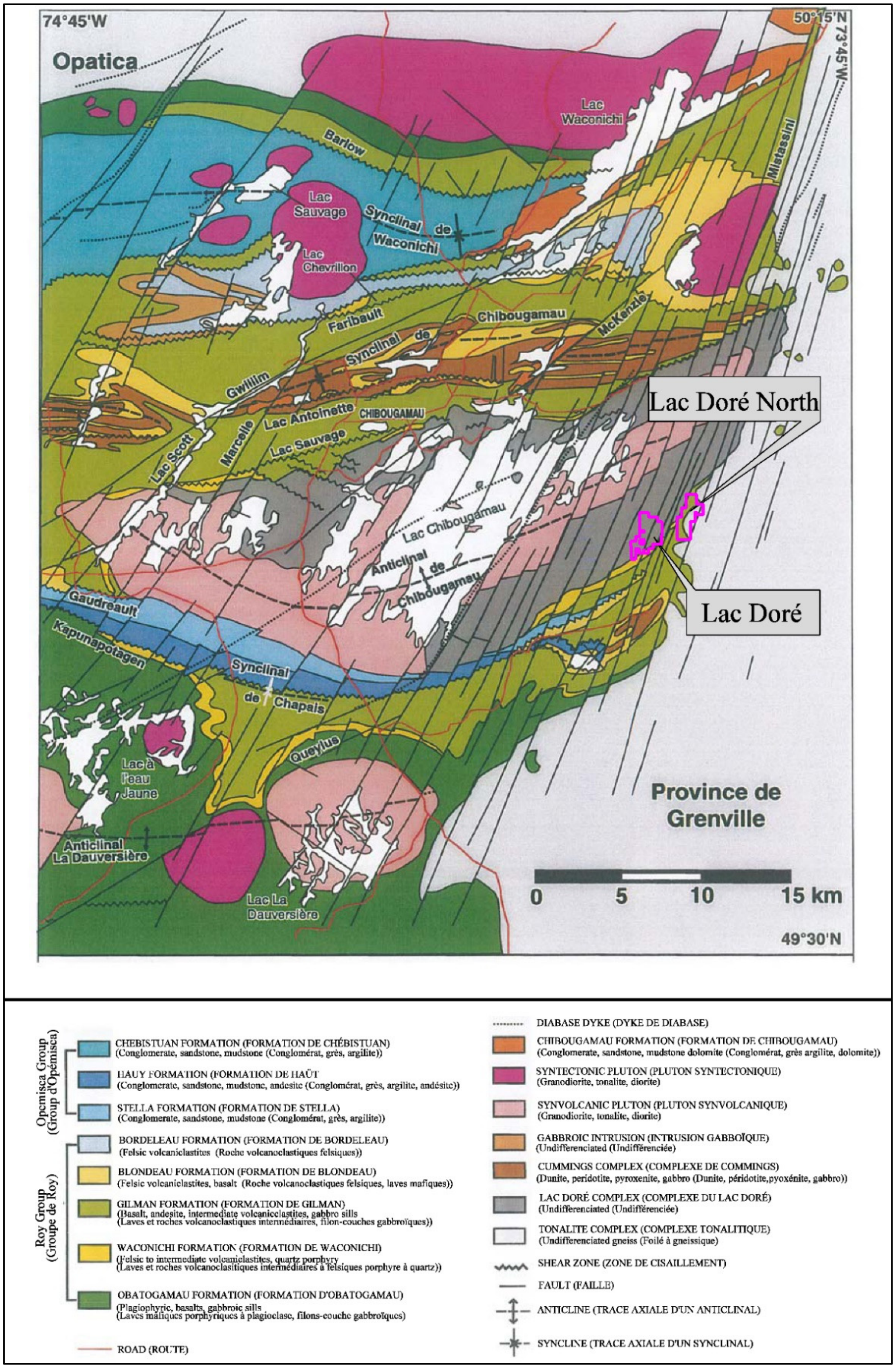
The volcano-sedimentary sequence in the Chibougamau area is shaped like an east-west trending anticlinorium, both flanks of which represent a mirror of the stratigraphy (Figure 7.1). The core of the anticlinorium is occupied by the Chibougamau pluton, the emplacement of which has resulted in tilting of the enclosing volcanic pile into an upright position, roughly symmetrical on both sides. The stratigraphy is comprised of the volcanic Roy Group, and overlying volcano-sedimentary Opemisca Group. The Roy Group consists of two volcanic cycles, with the basaltic Obatogamau Formation and felsic volcanoclastic Waconichi Formation (2.728 Ga) in the lower part. The basaltic Gilman Formation and felsic volcanoclastic Blondeau Formation are found in the upper cycle, capped by the volcano-sedimentary Bordeleau Formation. The Opemisca Group is known to occur only on the south limb of the anticlinorium, including the epiclastite dominated Chebistuan, Stella and Haüy Formations.

The lower cycle Waconichi Formation is truncated by the nearly conformable Lac Doré Anorthositic Complex, itself truncated by the Chibougamau tonalitic pluton (2.718 Ga). Some other minor late intrusions are reported.

The rocks are affected by multiple deformation events, including regional dome-and-basin type folding and associated shearing. A dense network of late faults dissects the area, dominantly northeast trending. These faults are either associated with, or are reactivated by, the Grenville orogenic event, the main expression of which being the Grenville Front to the southeast.

Most of the mines from the Chibougamau camp are shear hosted within the Lac Doré anorthosite, typically associated with fault intersections. Over 44 million tonnes of gold-copper ore have been extracted to date. The only significant exceptions are the small base metals-bearing volcanogenic massive sulphide deposits, such as the Lemoine Mine, hosted in the Waconichi Formation.

Figure 7.1
Geology of the Chibougamau Region (after Daigneault et Allard, 1996)



Source: IOS, 2018.

7.2 LOCAL GEOLOGY

The Lac Doré Complex is a lopolith, a sub-tabular intrusive body of mafic to anorthositic composition, strongly differentiated near its top. The lopolith is emplaced within the Waconichi Formation, a felsic volcanic and sedimentary pile, and folded along the regional anticlinorium. The deposit is hosted in a homoclinal sequence of magnetite bearing layers within the south flank of the Lac Doré Anorthositic Complex. The top of the stratigraphy is to the south.

According to Allard (1967), the Lac Doré Complex is divided in four major units. From top to bottom they are:

- The border zone (top, south-east).
- The granophyre.
- The layered zone.
- The Anorthositic zone (base, northwest).

The layered zone hosts the vanadiferous titanomagnetite deposit, while the anorthosite and the granophyre host most of copper-gold mineralization of the mining camp (outside of the current project limits).

The anorthosite zone (approximately 3,660 m in observed thickness) is composed of anorthosite, gabbro and titanomagnetite-bearing gabbro, plus some minor pyroxenite. The titanomagnetite abundance as well as the vanadium content increase in the upper 150 m of the unit, toward the layered zone.

The layered zone, which hosts the vanadiferous titanomagnetite deposit, consists up of 450 to 900 m of rhythmically layered beds rich in pyroxene, titanomagnetite plus ilmenite, intercalated with layers of anorthositic gabbro. The vanadium mineralization is located in the lowermost part, namely the P1, P2 and P3 units (see below). Vanadium strongly partitions into magnetite, and thus into the first titanomagnetite layers. The abundance of titanomagnetite decreases upward (Allard, 1967).

The vanadium-bearing magnetite deposit is described by Allard (1967) as:

> *"... an alternation of layers of solid titaniferous magnetite, magnetite rich gabbro, magnetite rich pyroxenite, gabbro and anorthositic gabbro. The solid magnetite layers range from a fraction of an inch to four feet. The magnetite band is everywhere at the same stratigraphic horizon, but each magnetite layer is discontinuous and exhibits marked changes in thickness and character along strike ..."*

Minor vanadium-bearing titanomagnetite layered series are reported on the north flank of the complex, near Magnetite Bay.

7.3 GEOLOGY OF THE DEPOSIT

The deposit was mapped by both MRN and SOQUEM geologists. At that time, it was covered by forest and overburden, with only about 1% exposed outcrop. Since the McKenzie Bay stripping program, and the recent logging activity, outcrops are more abundant and allow for a better understanding of the geology as presented in Figure 7.2 and Figure 7.3.

Dr. Allard's stratigraphy P1, A1, P2, A2 and P3 (see below)) was partly revised by Mr. Rejean Girard based on this mapping (Tremblay, 1998). The local stratigraphy is presently defined as follows, from bottom (north) to top (south), and more recently refined by Arguin (Figure 7.4):

- Footwall anorthosite, free of magnetite.
- P0: Anorthosite with small scattered beds of magnetite (Figure 7.9).
- P1: Anorthosite with abundant and thick beds of magnetite (Figure 7.8).
- P2: Magnetite and layered gabbros, main mineralized body (Figure 7.5 and Figure 7.6).
- P3: Magnetite-ilmenite bearing pyroxenite (Figure 7.7).
- Hanging wall, mainly gabbro and pyroxenite.

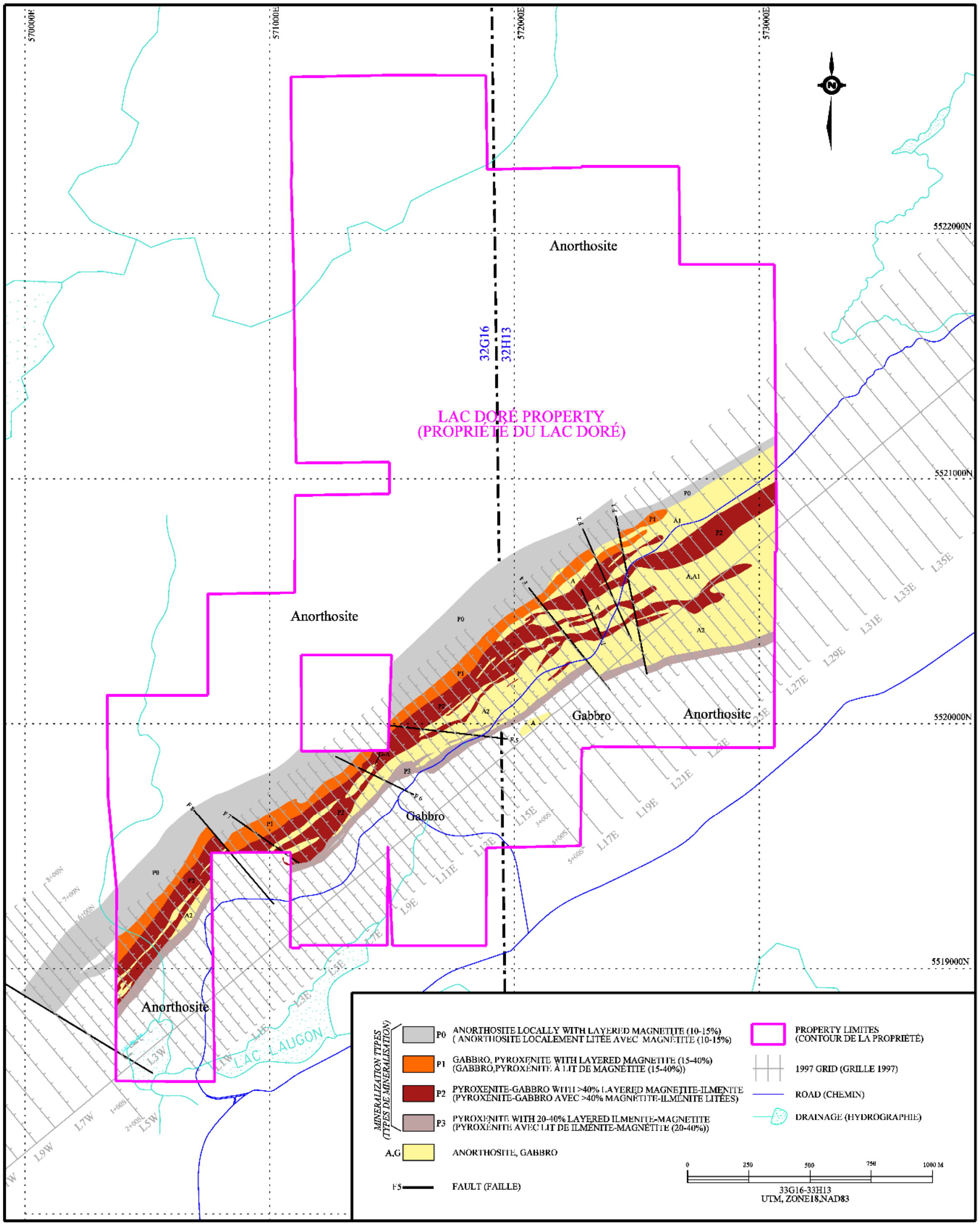
Lenses of anorthosite, metres to tens of metres in thickness, are intercalated within the above units, which were considered as stratigraphic units by Allard (1967).

The stratigraphy is more or less continuous along strike for the length of the deposit, from the southwestern tip of the Armitage extension to the northeastern end, where it is truncated by the Mistassini Fault (the Grenville Front). However, thicknesses are variable, and local complexities are noted.

The East and West deposits were reported as a bulge on P2, distinctly visible on the aeromagnetic survey. The presence of this prominent magnetic anomaly attracted exploration activity. Exploration work neglected the extensions of the deposit, except for the limited efforts by McKenzie Bay in the 1998 to 2000 period, until recent work by BlackRock over the Armitage extension.

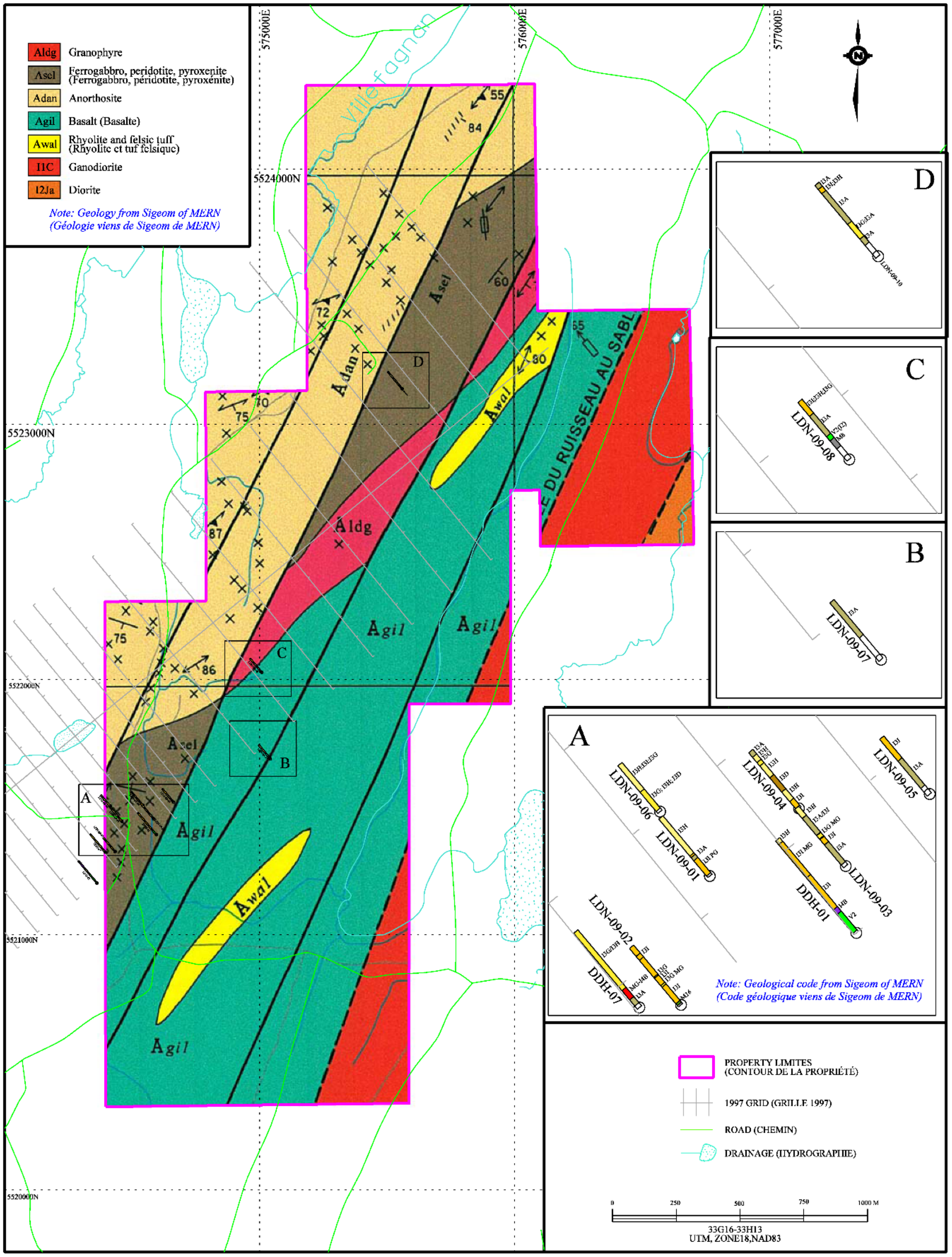
All of the various mineralized zones, from Armitage to Northeast, correspond to a package of horizons dipping steeply toward the southeast. These horizons extend, almost continuously, for 17 km, as expressed by the ground magnetometer survey and BlackRock aeromagnetic survey. The various mineralized zones, or extensions, were named on an historical basis, being separated only by late faults, topographic features or claim boundaries. However, the overall mineralized unit is uninterrupted.

Figure 7.2
Geology of the Lac Doré Property



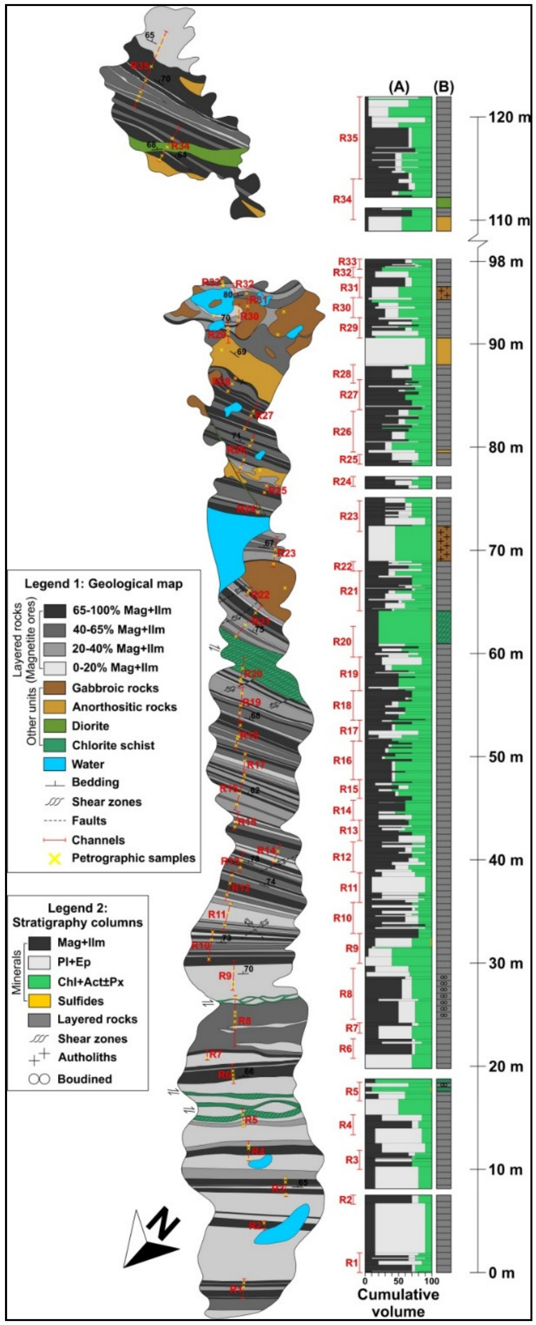
Source: IOS, 2018. Note: the tiny wedge in the south edge of the property boundary is a wedge claim, mentioned earlier, and is not a drafting error.

Figure 7.3
Geology of the Lac Doré North Property



Source: IOS, 2018.

Figure 7.4
Detailed Mapping of the Trench 19+50E



Note: The figure shows complicated layering across the deposit (grey shades), plus the presence of a few pods of barren anorthosite (brown), late dykes and schistose shear zones (Arguin, 2017). Visual estimation of the modal abundance of titanomagnetite, plagioclase and ferromagnesian minerals is indicated as bars, and shows the increase in chlorite and amphiboles toward the top of the sequence. Note the north arrow toward the bottom of the figure in order to present the stratigraphy in an upright position.
Source: IOS, 2018.

Figure 7.5
Layered Magnetite Series from P2 unit in Trench 19+50 E.

Note the small anorthosite dyke in the lower right.
Source: IOS, 2018.

Figure 7.6
Layered Magnetite Bearing Anorthositic Gabbro from P2 Unit.

Note the cross-bedding, indicative of magmatic unconformity.
Source: IOS, 2018.

Figure 7.7
Layered Gabbro with a Magnetite Band from P3 Unit.

Source: IOS, 2018.

Figure 7.8
Magnetite Band in Layered Anorthosite from P1 Unit.

Source: IOS, 2018.

Figure 7.9
Thin Magnetite Layers within Anorthosite, Typical of P0 Unit.

Picture taken on a stripped area located on Lac Doré North property.
Source: IOS, 2018.

For example, the East and West deposits are separated by a valley related to a small cross-fault with minimal displacement. The West and Southwest deposits are offset by the Coil Lake cross-fault corresponding to a second valley and are separated by a narrow stretch of lower grade material. The East and West zones bulge to a thickness of about 100 to 150 m, locally reaching up to 200 m. The Southeast body is narrower at 100 m in thickness, and locally injected with abundant anorthosite sills devoid of magnetite. The Armitage extension is continuous over more than 12 km with 50 to 100 m of thickness. Toward the northeast, the geology and stratigraphy are more difficult to decipher, being offset by a late faulting related to the Grenville Front.

The vanadium grade decreases progressively towards the stratigraphic top of the layered series as one proceeds southeastward. This is interpreted to be related to the early partitioning of vanadium into the magnetite which progressively depleted the magma during magmatic differentiation. Also, in the gabbroic and pyroxenitic top layers, the remaining vanadium is scavenged by ferromagnesian minerals, and is not amenable for metallurgical recovery. Therefore, layers above P3 are not considered part of the deposit. Nelsonite horizons, made of ilmenite and apatite, are reported in the upper series and the overlying granophyre, which are considered to be of no economic importance.

Conversely, as one proceeds toward the base of the layers, northwestward, the grade of vanadium in the magnetite increases to a level which may be sufficient to justify mining of isolated magnetite bands within the anorthosite, such as P0.

7.4 GEOCHEMISTRY

The vanadium hosted in magnetite and ilmenite is relatively refractory. It is not expected to be liberated from the host minerals and to yield any geochemical anomaly in the secondary environment. Furthermore, vanadium is a ubiquitous element, present in trace amounts in most rock types, thus having little contrast with the deposit. Exploration geochemistry is therefore not considered to be relevant.

A regional geochemical survey of lake-bottom sediments, conducted by the MRN in 2007 and 2011, covers the area, which is of little use for exploration of the project.

7.5 GEOPHYSICS

As the vanadium is largely contained in the magnetite, the mineralization is readily visible on the aeromagnetic survey. The 17-km long anomaly associated with the deposit is prominent on the regional map.

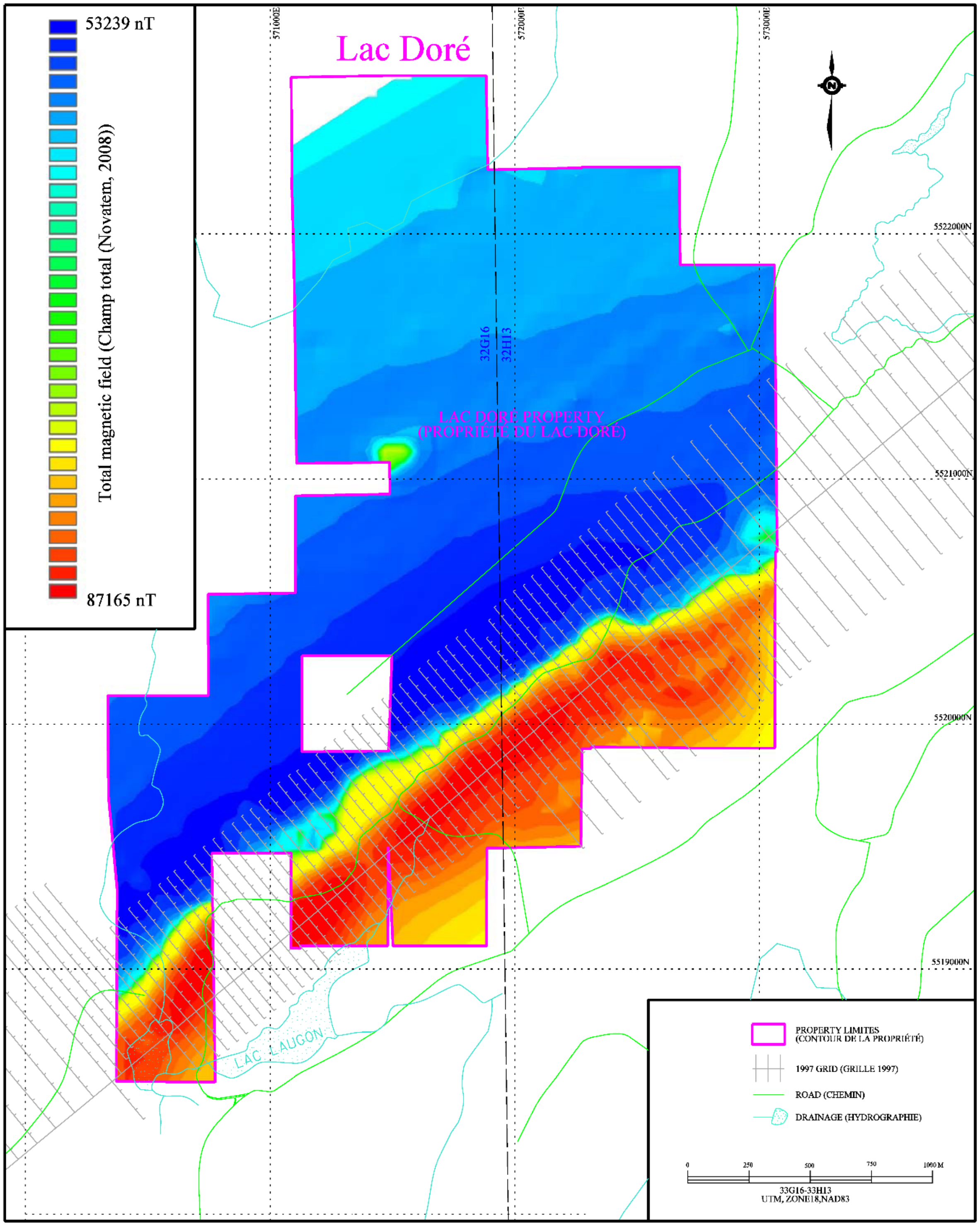
Ground magnetic surveys were carried out by Gulf Minerals, Trepan Mining and Jalore in the 1950's, using a dip-needle compass, as well as by MRN (Kish, 1971), SOQUEM (Nolet, 1980), and McKenzie Bay (Tremblay et al., 1998; Boudreault, 2000; Girard, 2001; Villeneuve, 1999). These surveys were carried out with an analog flux-gate instrument, which measures only the vertical component of the total field. The flux-gate was the standard instrument of MRN and SOQUEM at the time and was chosen by IOS for the McKenzie Bay survey for being less sensitive to lateral gradient and saturation than the available neutron precession units.

The various surveys conducted for McKenzie Bay are noisy, with numerous levelling discrepancies. For these reasons, in 2007, IOS recommended to BlackRock that it commission a low-altitude, high density airborne magnetic survey covering the entire area. For logistical reasons this last airborne survey encompassed a large part of VanadiumCorp's Lac Doré and Lac Doré North properties (Figure 7.10, Figure 7.11 and Figure 7.12). It can be seen that the East deposit has a significantly larger magnetic signature than the others.

No geophysical method allows for the detection or measurement of the vanadium itself.

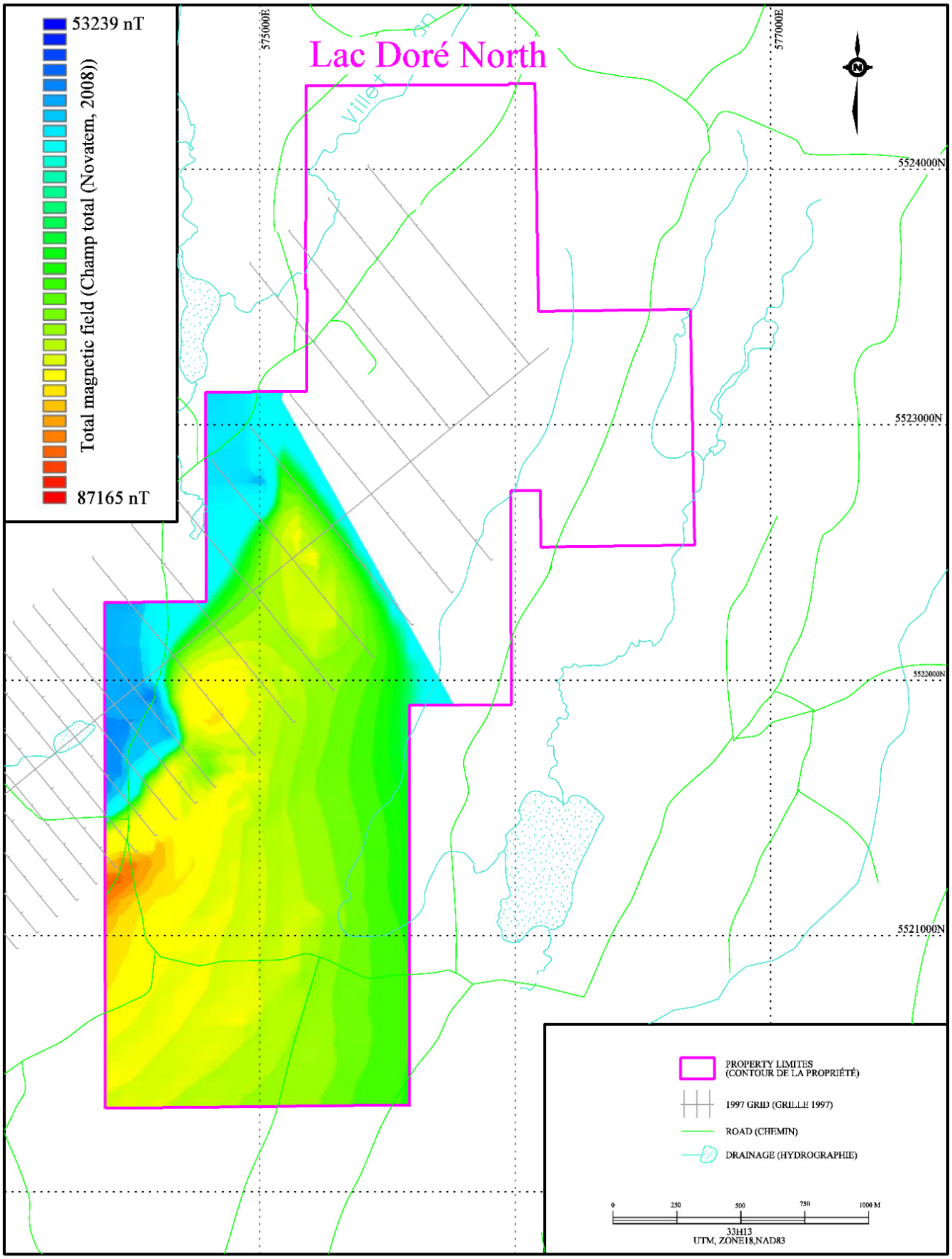
Electromagnetic and gravity surveys (Nolet, 1980) were carried-out by the MRN and SOQUEM, without providing conclusive results. Given the exposure of the hanging wall and footwall in several trenches and the quality of the airborne geophysics the QP considers that there is no need for testing other geophysical methods.

Figure 7.10
Lac Doré Aeromagnetic Map



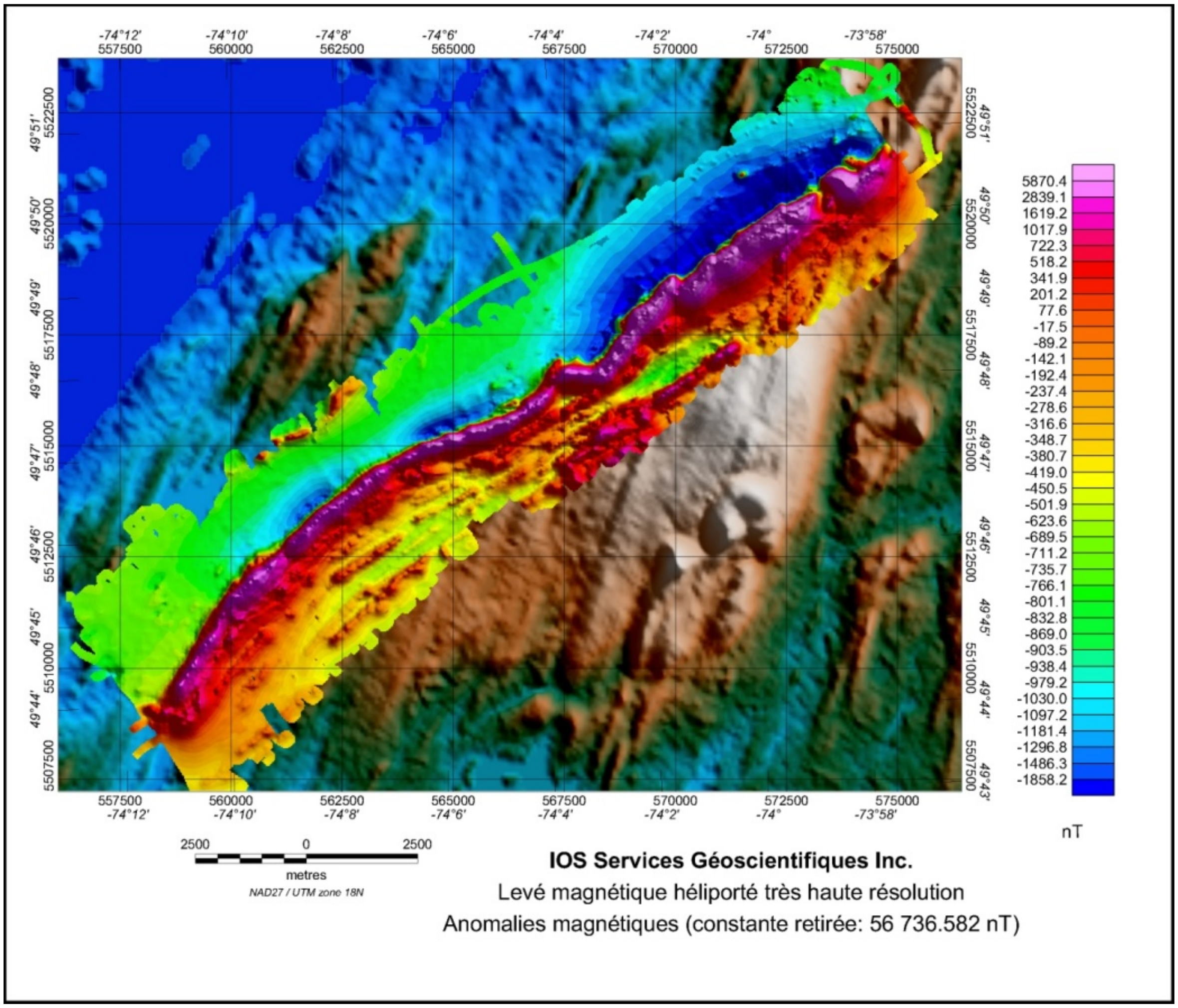
Source: IOS, 2018.

Figure 7.11
Lac Doré North Aeromagnetic Map



Source: IOS, 2018.

Figure 7.12
High Density Aeromagnetic Survey



Aeromagnetic survey (bright colours) over the entire length of the deposit, as provided by NovaTEM Inc. (Largeault et al., 2008). Dull colours in background are topography.
Source: IOS, 2018.

7.6 Glacial Geology

The glacial geology of the Chibougamau area is dominantly covered by the Chibougamau Till sheet (Martineau and Bouchard, 1984). This extensive till blanket is Wisconsinian in age and is reported to flow toward the southwest in the area (see drumlins and elongated crests visible on Figure 7.12). The hill where the deposit is located is covered by a thin veneer of till, while periglacial sandy material dominates the plains to the north toward Lake Chibougamau. Fluvio-glacial material is rare in the vicinity of the deposit.

7.7 Mineralization

Vanadiferous mineralization at Lac Doré is composed of titanomagnetite and ilmenite, hosted in anorthosite, anorthositic gabbros and gabbros, within the layered series of the Lac Doré

Complex. Magnetite and ilmenite, associated in various proportions depending on stratigraphy, are found either as massive beds, decimetres to metres thick, or as disseminations within anorthositic and gabbroic facies. Overall, the deposit contains about 30% magnetite, the main reservoir for vanadium, plus 10% ilmenite. Oxides are best described as orthocumulate phases in the massive beds, or intercumulate while disseminated in the host rock. Typical abundances and vanadium grades for the various units as estimated from McKenzie Bay channel samples (Tremblay et al., 1998) are provided in Table 7.1.

Table 7.1
Vanadium, Iron and Titanium Grades in Different Facies.

Lithology	Thickness (as calculated from surface sampling from visual estimation)	V_2O_5 (%)	Fe_2O_3 (%)	TiO_2 (%)	Mag (%)
P0 (base)	32 m	0.194	20.1	1.74	10
P1	49 m	0.340	41.5	4.27	15-30
P2	97 m	0.486	64.3	9.20	>40
P3 (summit)	38 m	0.163	48.6	6.43	20-30
Total	**216 m**	**0.353**	**49.8**	**6.49**	

The magnetite bearing layers form a definite horizon which can be traced from the Grenville Front in the northeast, to Lac Caché to the southwest, for a total length of 17 km. Cross faults, with short displacement, separate the East and West deposits, as well as the West and Southwest deposits. Magnetite beds are reported all along this horizon, with diverse abundance and thickness. The overall thickness of the sequence typically ranges between 60 to 100 m but increases to more than 200 m in the East deposit. The aeromagnetic signature is linear, suggesting a largely homoclinal sequence dipping steeply to the southeast. Although the overall mineralized envelope is fairly regular, detailed internal stratigraphy is complex, injected by dismembering anorthosite sills. Local tight folds and truncation of the stratigraphy are noted and are interpreted as magmatic slumps.

7.8 PETROGRAPHY

Vanadium is hosted in magnetite (70 to 80%) and in ilmenite (10 to 15%). These two minerals are associated in a complex manner. Titanium is partitioned into hemoilmenite and ulvöspinel or titanomagnetite, which are co-precipitated from the magma, with a granular relationship. The proportion of hemoilmenite and ulvöspinel is controlled by oxygen fugacity of the magma. With more oxygen being available, more hemoilmenite is formed. The primary magmatic oxides typically have grain sizes of a fraction of a millimetre to a few millimetres.

Titanomagnetite is a ferrous-ferric spinel which makes a discontinuous solid solution with ulvöspinel through a diadochic substitution at high temperature. At high temperature, this substitution can accommodate up to 20% TiO_2. No solid solution exists between ilmenite and titaniferous spinels. However, a complete solid solution exists between ilmenite and hematite at high temperature. At lower temperature, ulvöspinel is not stable and exsolves as ilmenite intergrowths in titaniferous magnetite. Titanomagnetite itself can accommodate up to a maximum of 4% TiO_2, the excess being exsolved as minute ilmenite intergrowths.

Similarly, ilmenite makes a complete solid solution with hematite at high temperature, and hemoilmenite may exsolve as ilmenite-hematite intergrowths at lower temperature. These various iron and titanium oxides react with iron-bearing silicates (pyroxene, etc.) during the course of metamorphism, making secondary magnetite, with or without titanium, with or without vanadium, plus a panoply of vanadium-bearing ferromagnesian silicates. These secondary oxides are mainly developed in the P2 and P3 horizons (Arguin J.P., PhD thesis in progress). Hematite is of very limited importance in the Lac Doré mineralization, typically restricted to secondary minerals of metamorphic or alteration origin. Vanadium weakly substitutes in hematite.

The vanadium head grade is at its maximum in P2, in the middle of the layered series. However, vanadium grades in-magnetite decrease systematically upward, while titanium head grade increases upward. Consequently, the best vanadium grades in magnetite concentrates are found in P0 and P1, with the bulk of the vanadium resources being hosted in P2. This is reflected in every former project assessment which targeted P2 only.

The Lac Doré mineralization typically consists of 80% magnetite and 20% granular ilmenite. The magnetite itself consists of 70 to 85% titaniferous magnetite with about 15 to 30% very minute intergrowths of ilmenite as exsolutions (Figure 7.13 and Figure 7.14), the proportions of which vary across stratigraphy.

The presence of these ilmenite exsolutions within titanomagnetite makes this mineralization unsuitable for iron production from blast furnaces, unless blended to decrease the titanium level below tolerance thresholds. Titanomagnetite typically grades about 1.8% V_2O_5, while the ilmenite typically grades 0.3% V_2O_5. The abundance of these ilmenite exsolutions in titanomagnetite causes dilution of the vanadium grade in the magnetic concentrate.

Vanadium grades in titanomagnetite and ilmenite are rather constant in P0, P1 and P2, and drop drastically in P3. The difference in vanadium grade of the concentrates produced from P0, P1 and P2 reflects the abundance of ilmenite exsolutions within the titanomagnetite. For a typical sample from P2, it is calculated that 86% of the vanadium is hosted in titanomagnetite, 8% of vanadium is in ilmenite (exsolutions plus granular grains) and 5% is hosted in ferromagnesian minerals (Table 7.2).

Table 7.2
Vanadium Grade (V_2O_5) in Different Mineral Species and Lithologies

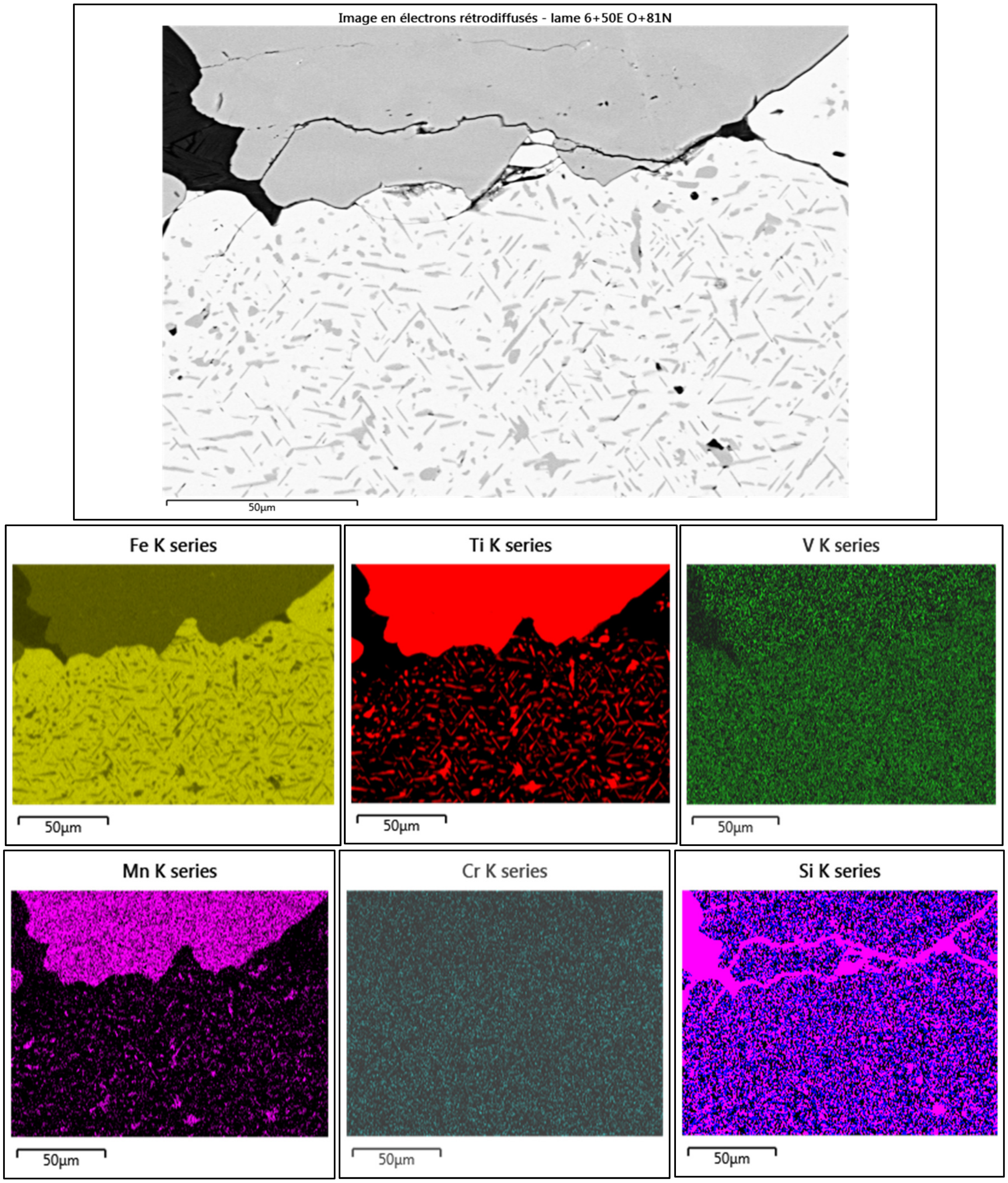
	P0 (weight %)	P1 (weight %)	P2 (weight %)	P3 (weight %)
Magnetite	1.78	1.84	1.74	1.04
Ilmenite	0.41	0.41	0.27	0.15
Mag. Conc.	1.6	1.5	1.3	0.8
Chlorite	-	-	0.1	N/A
Amphibole	-	-	0.1	N/A

Ilmenite can be processed along with titanomagnetite if the concentrate is smelted for the production of iron and titanium slag. Otherwise, it is technically possible, although likely not economic, to process ilmenite along with magnetite by salt roasting to recover its vanadium content. However, recovering vanadium from ferromagnesian silicates is not technically feasible. Not processing ilmenite and ferromagnesian silicate explains the reported low vanadium recovery, tested at about 70 to 80% in historical beneficiation testing.

In oxide minerals, vanadium is present as a sesquioxide V_2O_3 species, despite its grade being reported as pentoxide V_2O_5. The V_2O_3:V_2O_5 conversion factor is 1:1.21.

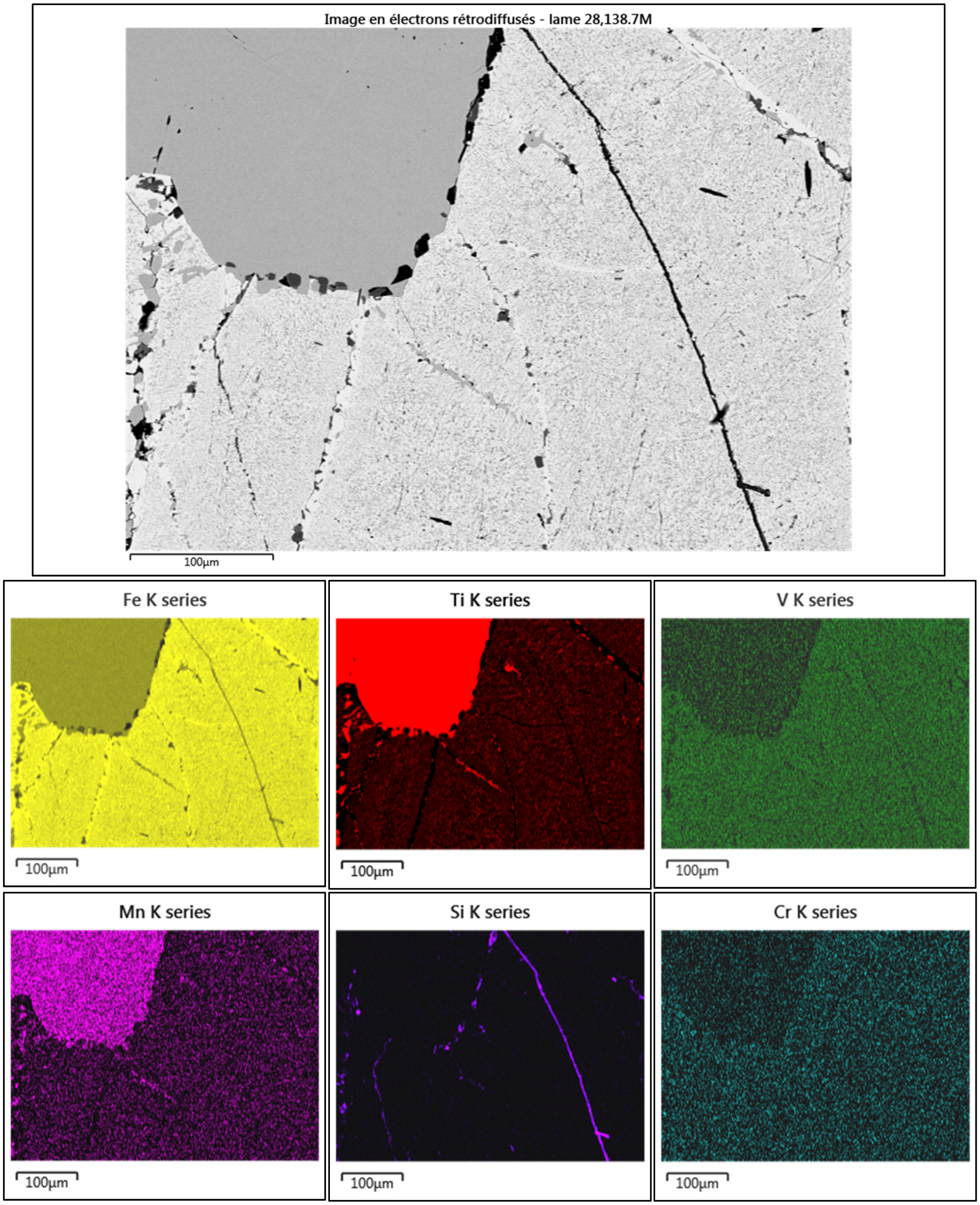
Chromium is almost entirely partitioned into the titanomagnetite as a chromite end-member. Conversely, manganese is partitioned into ilmenite as the pyrophanite end-member. These are the only two contaminants known to be significantly abundant and currently documented in these oxides.

Figure 7.13
X-Ray Map of Titanomagnetite and Ilmenite Grains from the P2 Horizon



Abundant ilmenite exsolutions, less than 10 µm across, are peppering the titanomagnetite (bottom), while no magnetite inclusion is present in granular ilmenite (top). A backscattered electron image (top, black and white) provides a clear view of the various minerals, while X-ray maps provide the distribution of each elements (colours). Image generated on IOS's scanning electron microscope.
Source: IOS, 2018.

Figure 7.14
X-Ray Map of Titanomagnetite and Ilmenite Grain from the P2 Horizon.



Ilmenite exsolutions, less than 1 µm across, are at the limit of the image resolution. Difference in vanadium, chromium and manganese distribution between ilmenite and titanomagnetite are clearly visible on X-Ray maps. Image generated on IOS' scanning electron microscope.
Source: IOS, 2018.

8.0 DEPOSIT TYPES

8.1 INTRODUCTION

In his discovery report, Allard (1967) made comparisons between the magnetite series of the Lac Doré Complex and the ones of the Bushveld Complex in South Africa. Similar series are also reported in the Skaergaard Complex in Greenland, the Muskox Complex in Nunavut, the Panzhihua Complex in China and the Cullin Complex in the British Tertiary Volcanic Province (northwestern British Isles). Another Archean equivalent is the Bell River Complex in the Matagami area, Quebec, Canada, which hosts the Iron-T Vanadium Project owned by VanadiumCorp. Such differentiated mafic intrusions are rather common, and many of them contain vanadium-bearing magnetite series. More than 80% of the vanadium produced worldwide is from such occurrences, which also includes nearly 100% of primary vanadium production.

8.2 METALLOGENY

Vanadium is a ubiquitous element, reported at levels reaching hundreds of ppm in many rock types. Vanadium is a polyvalent transition metal, with valences between V^{+2} to V^{+5}, which is the controlling factor in its distribution. Vanadium is a constituent in rare minerals from supergene environments, representing strong oxidizing conditions and where vanadium is present as tetravalent vanadyl $(V^{+4}O)^{+2}$ or the pentavalent vanadate radical $(V^{+5}O_4)^{-3}$ such as pentagonite, mounanaite, bannermanite and more than 200 exotic mineral species.

In reducing systems, V^{+2} has a chemical behaviour similar to iron in regard to most common ferromagnesian minerals, such as chlorite or pyroxene, where it substitutes into M^{+2} sites. Vanadium therefore does not tend to concentrate in a specific mineral in silicate dominated magmatic, hydrothermal or metamorphic systems. Conversely, under higher oxygen fugacity, vanadium in its V^{+3} state tends to substitute against Fe^{+3} in minerals such as magnetite (coulsonite or vuorelainenite are the vanadium end-member of the spinel family $(Fe\text{-}Mn)^{+2}V_2{}^{+3}O_4$) and hemo-ilmenite (karelianite V_2O_3 end-member as a diadochic substitution with $FeTiO_3$). Some other complex vanadium-titanium minerals are known, such as kyzylkumite and schreyerite, which are noted for reference only.

Massive iron oxide precipitation can occur in differentiating mafic magmatic systems, such as layered complexes. Triggering of this precipitation is apparently caused by silica saturation related to assimilation of the host rocks during migration and emplacement of the magma and by melting of the roof-rocks and the development of granophyre. Precipitation of these iron and titanium oxides may take on the form of a rhythmically layered series such as in the Lac Doré Complex or the Bushveld Complex, as pockets of massive oxide such as the "pipes" in the Bushveld Complex or the urbainite within the St-Urbain Anorthosite, or as broad horizons such as nelsonites (ilmenite-apatite-magnetite magmatic rocks typically associated with anorthosite) and cumberlandite (magnetite-ilmenite-olivine magmatic rocks typically associated with troctolite) deposits in the Lac St-Jean Anorthosite.

In all cases, vanadium is preferentially partitioned into the first oxides to precipitate. Only magnetite layered series and magnetite pipes are economically mined as vanadium sources. Vanadium within ilmenite ore, such as from the Lac Allard mine, is considered a contaminant with respect to titanium production. Vanadium-bearing titanomagnetite cannot be optically distinguished from vanadium-poor titanomagnetite on the basis of its appearance or physical characteristics. Identifying it necessitates assaying.

Given that layered mafic complexes are large geological features, spanning tens to hundreds of square kilometres in area, they can host extremely large magnetite deposits. The potential for such occurrences is easily identified in mineral exploration due to their prominent aeromagnetic signature. However, in most occurrences, the layers are thin, or the magnetite is disseminated, rendering mining of these deposits uneconomic. The titanium content of such magnetite generally makes them unsuitable for iron production through conventional blast furnace processes.

9.0 EXPLORATION

9.1 INTRODUCTION

A large amount of exploration work was conducted on the East and West deposits by prior owners. The most detailed work, excluding drilling, was conducted by IOS on behalf of McKenzie Bay.

VanadiumCorp conducted two trenching programs, two limited drilling programs and three ground magnetometer surveys between 2007 and 2013, plus some road improvement and a GPS survey (Aurus, 2013). IOS conducted a field program on behalf of VanadiumCorp in the fall of 2014, which included a differential GPS (DGPS) survey of drill collars, some verification and sampling of the 1997 trenches, re-mapping of the 2008 trenches and re-logging of the 2013 drill core.

9.2 GROUND MAGNETIC SURVEYS

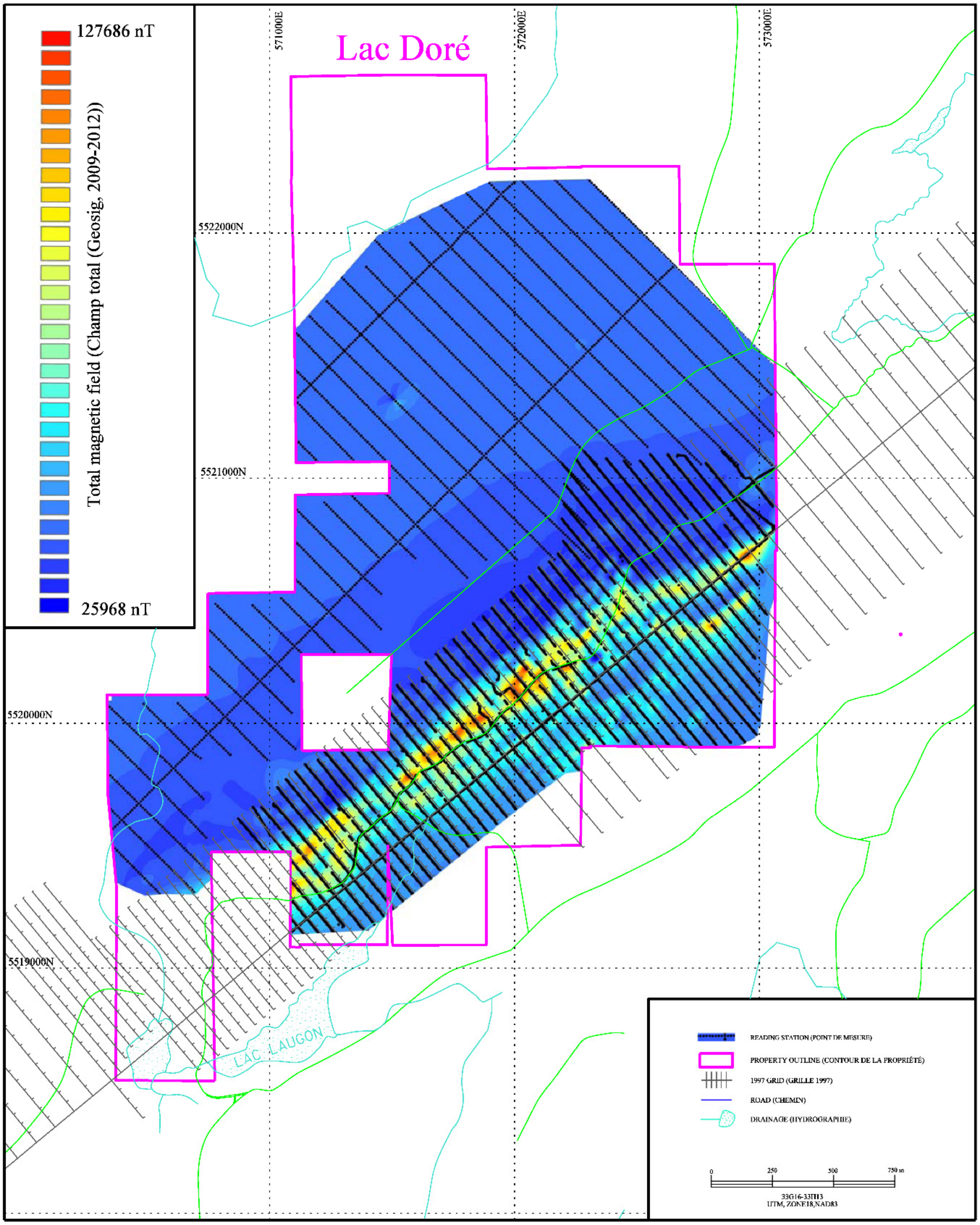
Three ground magnetometer surveys were conducted on behalf of VanadiumCorp, covering the Lac Doré (Tshimbalanga, 2009, 2012) and Lac Doré North (Tshimbalanga and Hubert, 2009) properties (Table 9.1). All three surveys were conducted in a similar manner by Geosig Inc., from Québec City, meaning they can be merged. The surveys were conducted using 2 GSM-19WV Overhauser (neutron precession) magnetometers, a mobile and a stationary unit. Lines were spaced every 100 m, oriented N315º, plus a baseline and tie lines. The location of the station was measured with handheld GPS devices. A base station was established and calibrated at 57,000 γ, providing an accuracy of 1 γ. Isopleth maps and profiles were provided. No vertical or horizontal gradient was measured or calculated, and no modelling was conducted. Results from these surveys were merged and re-gridded as a single map (Figure 9.1 and Figure 9.2).

For the purpose of the ground magnetometer survey, the former McKenzie Bay picket line network was refreshed and surveyed (Aurus, 2013), although the former line numbering was not respected.

Table 9.1
Magnetometer Surveys

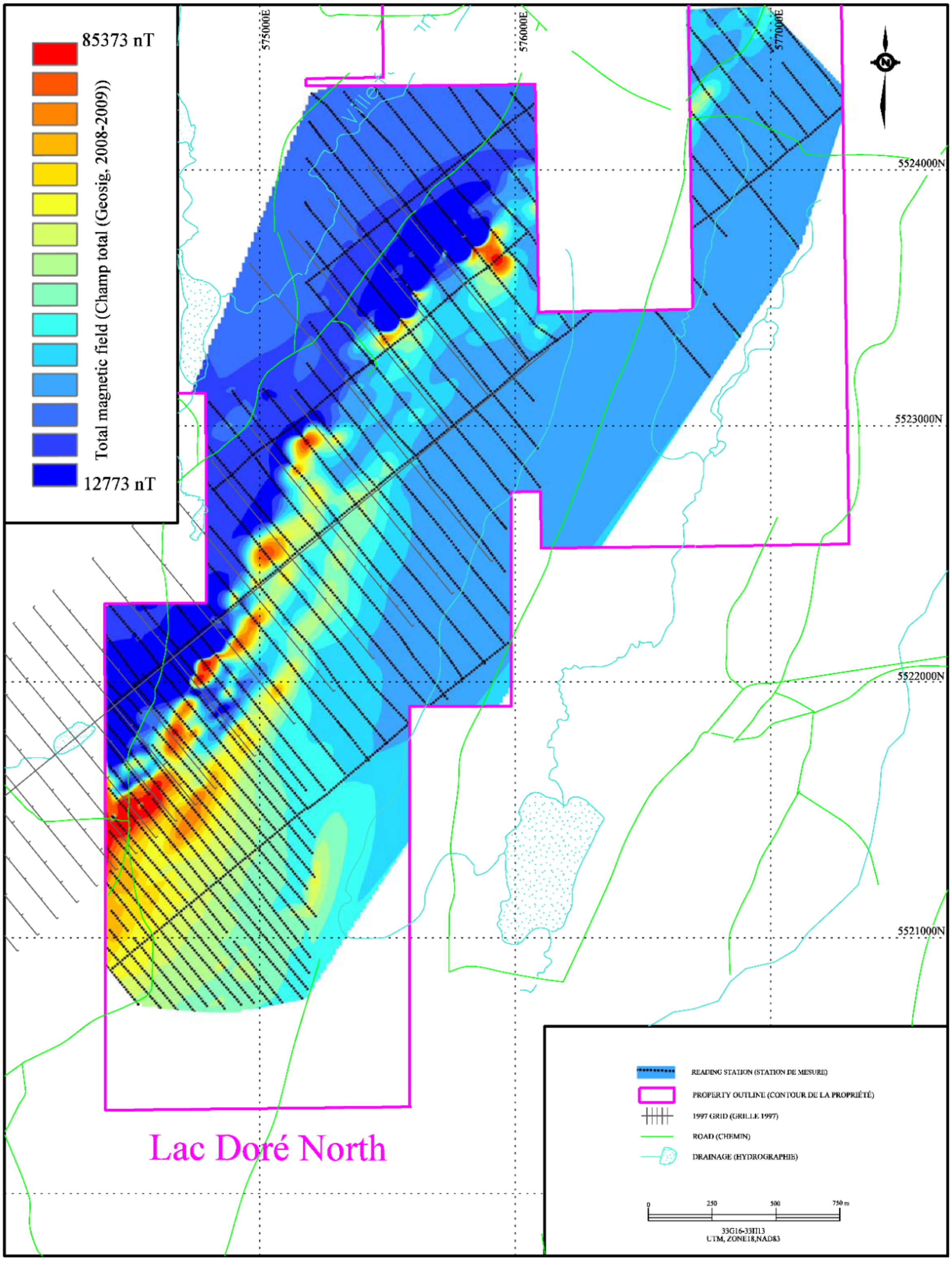
Year	Property	Length	Lines	Line Spacing	Station Spacing
2009	Lac Doré	35 km	35	100 m	12.5 m
2009	Lac Doré North	66.7 km	38	50/100 m	12.5 m
2012	Lac Doré	45 km	53	50 m	12.5 m

Figure 9.1
Lac Doré Ground Magnetic Map



Source: IOS, 2018.

Figure 9.2
Lac Doré North Ground Magnetic Map



Source: IOS, 2018.

9.3 2008 AND 2009 STRIPPING PROGRAM

Stripping programs were conducted by VanadiumCorp on the southwestern extremity of the Lac Doré North property in 2008 and 2009 (Figure 9.3). The area targeted seems to coincide with the most intense ground magnetic anomaly reported (Tshimbalanga and Hubert, 2009).

No report, sample location information, maps, field notes or assay databases regarding this stripping were made available to IOS; that information is reportedly being in the possession of third parties that have refused to provide it. For this reason, the stripping was re-mapped in the fall of 2014. Most sample tags were still present and assays available from certificates were relocated as far as possible (Block, 2015).

Figure 9.3
View of the Main Stripped Area Excavated in 2008, Lac Doré North Property

Note: the massive magnetite layer (dark band) in the middle of the picture.
Source: IOS, 2018.

9.4 2012 CHANNEL SAMPLING

Evidence of channel sampling conducted in the summer of 2012 on the McKenzie Bay trenches on the Lac Doré property was noticed. No data or reports were made available to Micon, nor was any report filed for assessment.

9.5 2014 - 2015 PROGRAM

In the fall of 2014 and summer of 2015, a brief field program was conducted. It included:

- Locating the historic drill holes collars and surveying them with a DGPS.

- Remapping of the 2008-2009 trenches.
- Verifying the current status of 1997 trenches and sampling any neglected intervals.
- Re-sampling and re-logging of 2013 drill core.

The work completed in 2014 was very limited. The trench mapping was completed to confirm and/or adjust previous mapping results prior to any future mineral resource estimate. The ultimate mapping results are shown in Figure 7.4 above.

The final results of all trenching are presented as pseudo drill holes in Table 10.4 below.

In the fall of 2015, a brief compilation program of work completed by others was conducted on CDC 2429553, which is embedded in BlackRock's Armitage property, for the purpose of assessment filing (Joly, 2015).

No exploration work was done on the claim in 2015 up to and including this date. The results of the 2008 BlackRock, helicopter-borne high definition surveys were compiled. Figure 9.4 shows the location of the claim relative to the local geology. Figure 9.5 shows the results of the airborne magnetometer survey.

This brief work indicated that hole AE-24-02, drilled by BlackRock for the purpose of their resource definition, is collared within this claim. The log for the hole shows a series of metre- to decimetre-scale ferrogabbro units with rich magnetite bands (20% to 40% magnetite). The drilling showed V_2O_5 grades ranging from 0.45% to 0.78%. However, the hole indicates that the claim does not encompass the magnetite series of the Armitage deposit.

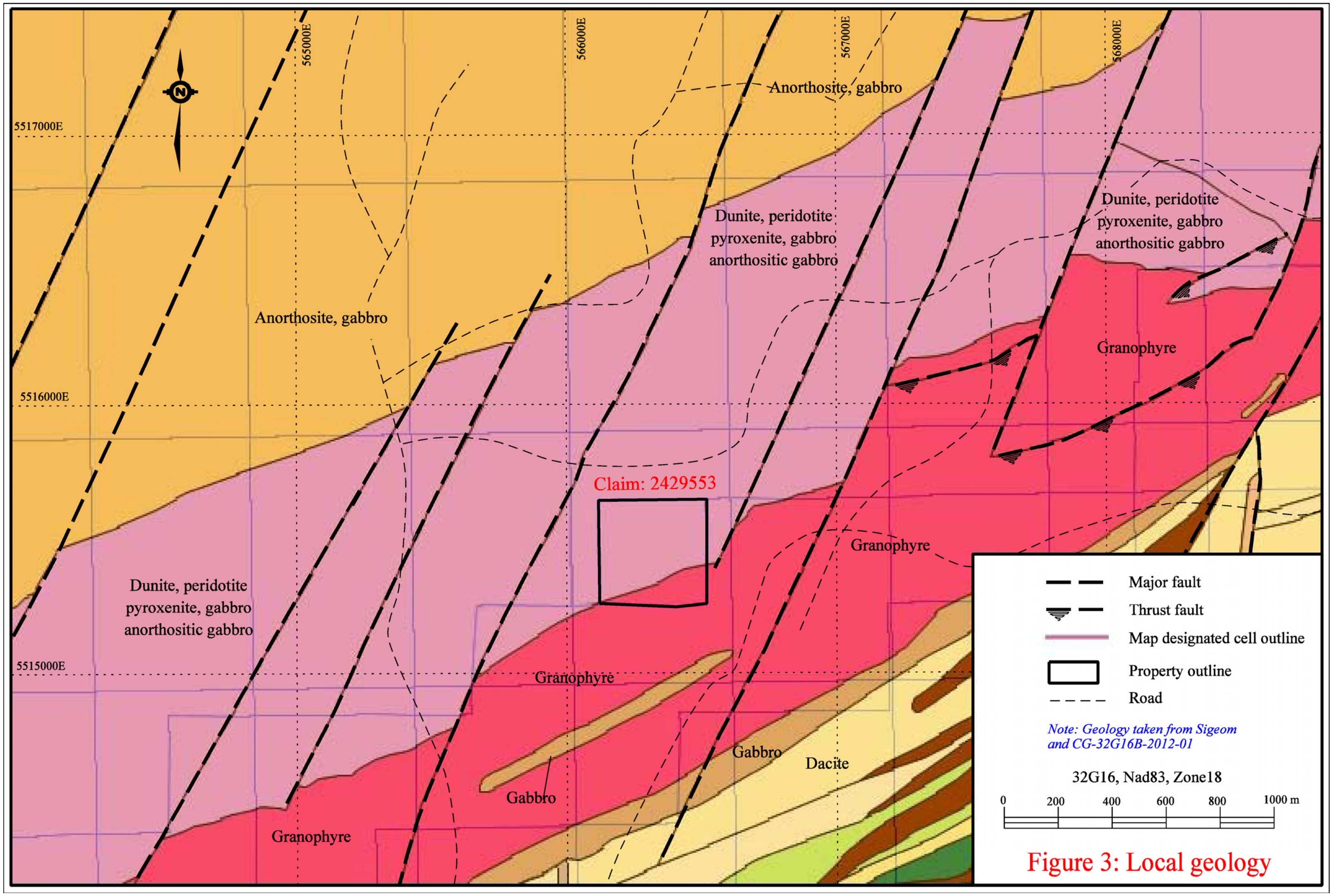
9.6 2016 PROGRAM

In the summer of 2016, two short mapping programs were conducted. The first, for assessment filing purposes, includes brief reconnaissance mapping on the Lac Doré Extension property, to the north of the deposit (Arguin, 2016). Only outcrops of granitic rocks of the Chibougamau Pluton were observed.

The second program consisted of detailed mapping of Trench 19+50 east, a wide trench excavated by McKenzie Bay in 1997. This program is part of a doctoral study on mineral textural relationships and contaminant distributions (Arguin, in progress), this mapping included extensive petrography work (Arguin, 2016).

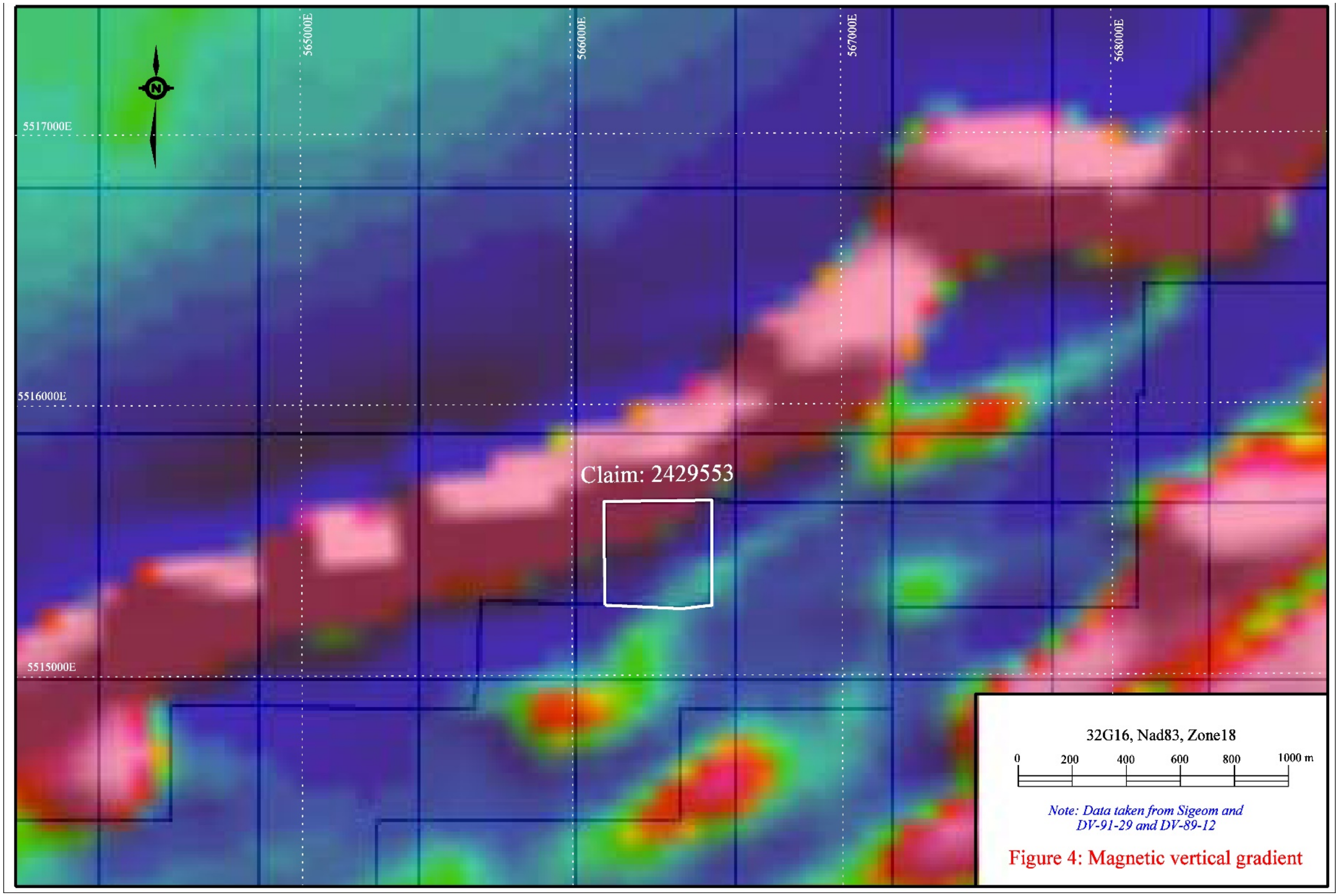
This work is related to Jean-Phillipe Arguin's thesis and was not conducted by VanadiumCorp. No report is currently available and no data have been transmitted to VanadiumCorp, although results are expected to be available upon publication of the thesis. Mr. Arguin was not paid by VanadiumCorp.

Figure 9.4
CDC 2429553 Local Geology



Source, Joly, 2015.

Figure 9.5
CDC 2429553 Vertical Gradient Magnetometer Results



Source, Joly, 2015.

9.7 2017 PROGRAM

In the summer of 2017, a short sampling program was conducted on Trench 19+50, as a complement to the 2016 program (Arguin, 2017).

In the autumn of 2017, a short sampling program was conducted on claim CDC-2429553 (Joly and Glencross, 2017).

This work is related to Jean-Phillipe Arguin's thesis and was not conducted by VanadiumCorp. No report is currently available and no data have been transmitted to VanadiumCorp, although results are expected to be available upon publication of the thesis. Mr. Arguin was not paid by VanadiumCorp.

In 2017 claim CDC 2429553 in the Armitage project was briefly revisited. The work completed consisted of one day of mapping and prospecting of 4 outcrops. Three grab samples were collected for whole rock composition and determination of their V_2O_5 content. The whole rock analysis returned high SiO_2 and low oxide iron content. No significant vanadium grades were returned.

9.8 VALIDITY OF AVAILABLE SURVEYS

The ground magnetometer surveys were conducted according to industry standards of the time but are superseded by the BlackRock high resolution helicopter-borne survey.

No report, sample locations, maps, field notes or assay database regarding the stripping conducted by VanadiumCorp was filed with the government or made available to Micon. The previous management of VanadiumCorp has refused to hand over to current management certain data in their possession.

10.0 DRILLING

10.1 INTRODUCTION

VanadiumCorp has completed limited drilling to date. Ten short exploration holes were drilled on the Lac Doré North property in 2009, and four confirmation holes were drilled on the Lac Doré property in 2013. This is in contrast with the amount of historical drilling completed by previous owners. The trenches will likely be used as drill holes in a future resource estimate, so they are discussed here.

The location of the trenches and drill holes from the Lac Doré property are summarized in Figure 10.1. The sampling and assaying procedures used are provided in Section 11.0. Figure 10.2 provides details of the drill holes and mineralized solids from the geological model in the immediate vicinity of the East Zone.

10.2 1997 MCKENZIE BAY TRENCHING

The 1997 trenching campaign carried out by IOS on behalf of McKenzie Bay provided systematic channel sampling on a more or less continuous section across the East and West deposits, on trenches spaced every 100 m (Tremblay, 1998). A gap in the trenching pattern exists between 0+50E at the western end of the West deposit, and 2+00W due to topographic constraints.

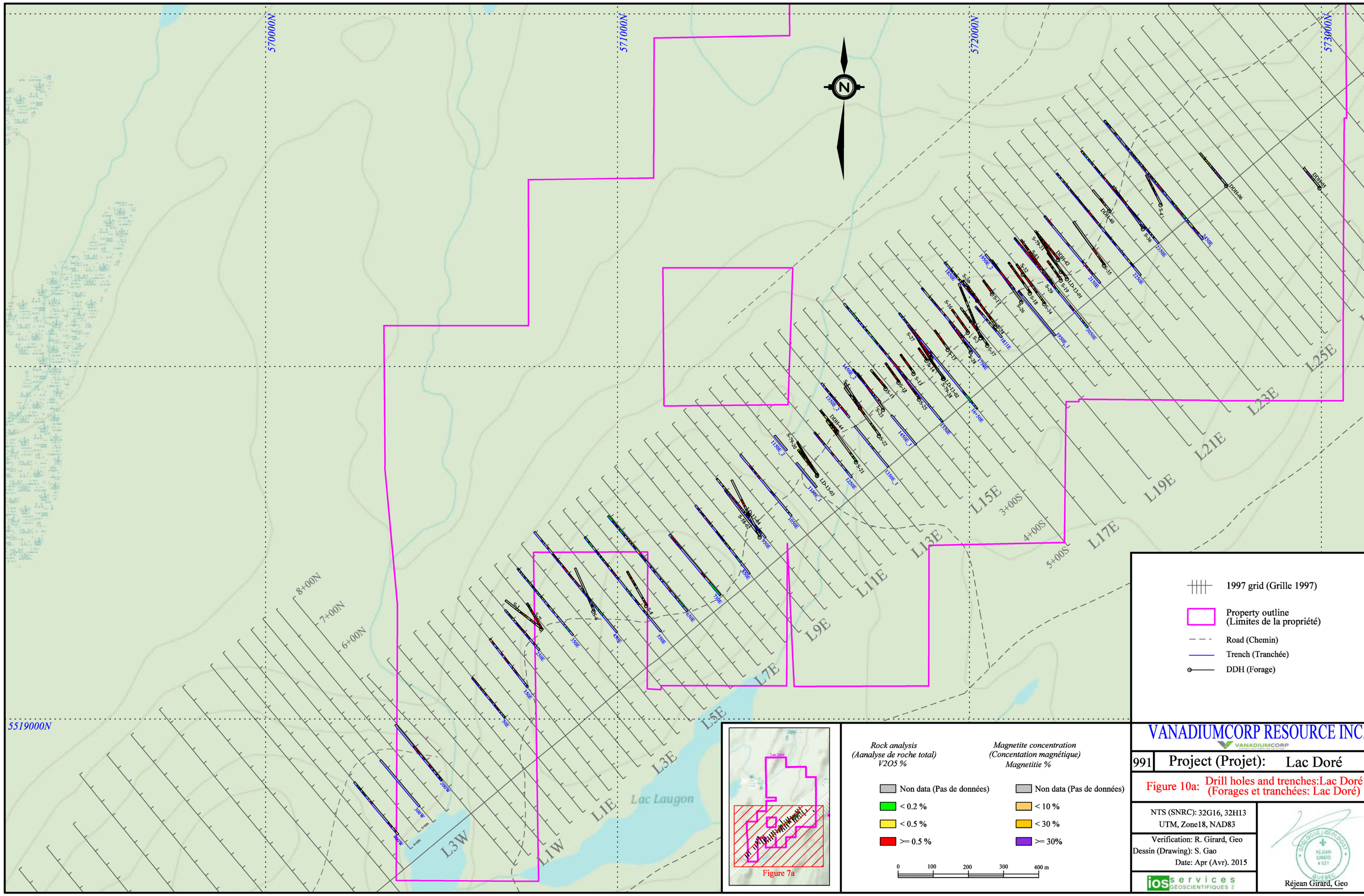
These trenches are generally systematic and continuous, being interrupted only by topographic irregularities or to avoid ripping out the road.

The trench locations were established with the use of a magnetometer, to locate the limits of the magnetite mineralization. Land surveying was made in 1997 and more recently reviewed (Aurus, 2013). Overburden was typically less than a metre thick. The quality of these trenches is sufficient to consider them as equivalent to horizontal drill holes for purposes of a later mineral resource estimate. The trenches within VanadiumCorp's Lac Doré vanadium project are listed in Table 10.1.

It should be noted that segments of trenches 2+50E, 3+50E, 4+50E, 5+50E, 2+00W, 3+00W and 4+00W are partly located on BlackRock property.

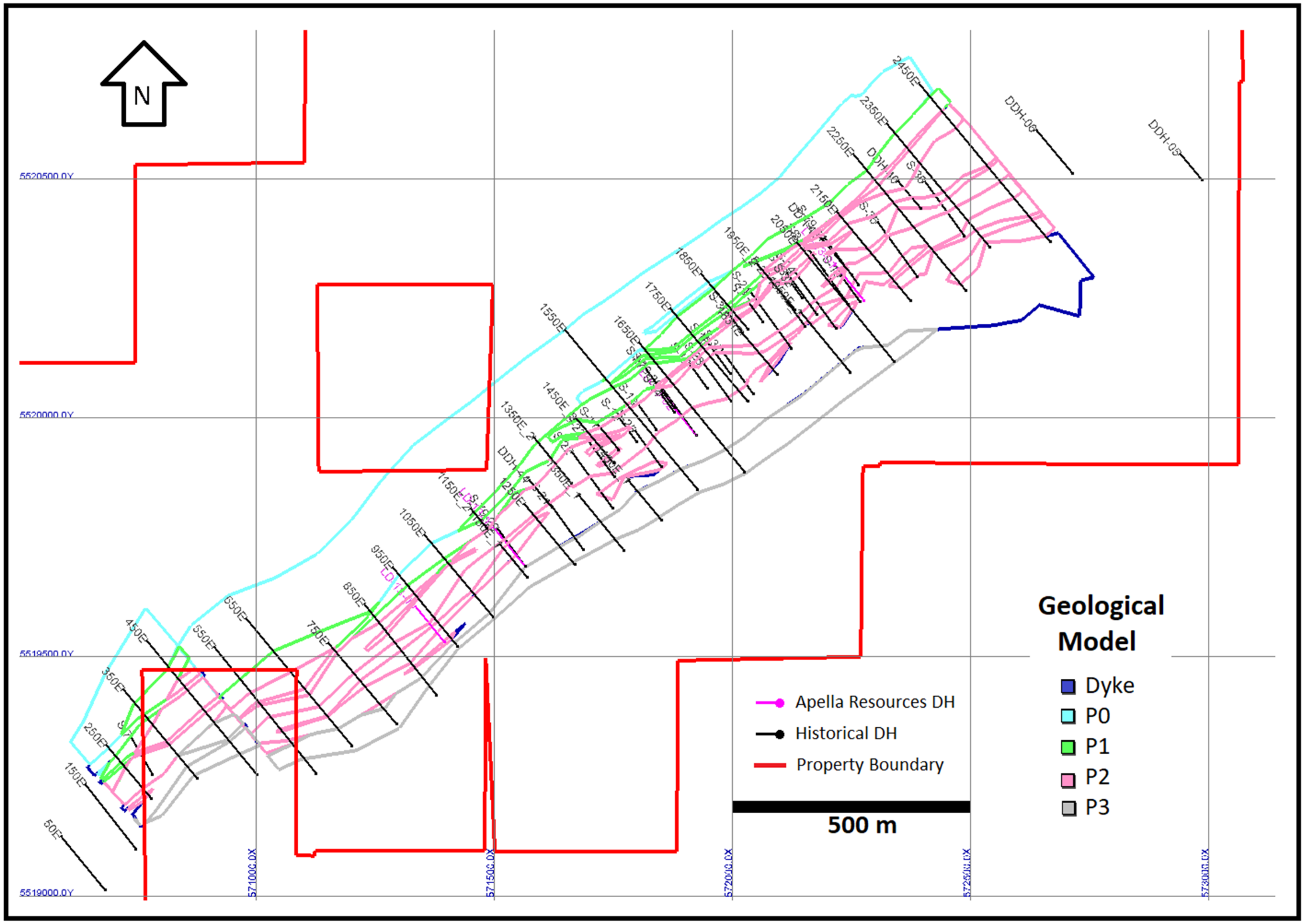
No trenching was undertaken on the Northeast deposit by McKenzie Bay.

Figure 10.1
Drill Hole and Trench Locations, Lac Doré Property



Source, IOS, 2018.

Figure 10.2
Drill Hole Location Details Near The East Zone



Source: Micon, 2018.

Table 10.1
Location of 1997 Trenches

Deposit	Line	Station (from)	Station (to)	Length (m)	Stratigraphy
East	24+50E	0+72S	3+66N	438	P0-P1-P2-P3
East	23+50E	0+00	3+40.5N	340.52	P0-P1-P2
East	22+50E	0+37S	3+38N	375	P0-P1-P2
East	21+50E	0+19N	2+66N	246.63	P2
East	20+50E	0+57S	2+72N	328.97	P0-P1-P2-P3
East	19+50E	0+13S	1+52N	164.9	P2-P3
East	19+50E	1+60N	2+88N	128.26	P1-P2
East	18+50E	1+86N	3+41N	155	P0-P1-P2-P3
East	18+31E	0+75N	1+90N	115.22	P2-P3
East	18+25W	1+00N	1+46N	45.74	P2-P3
East	18+25W	2+50N	3+88N	138.22	P0-P1-P2
East	17+50E	0+74N	3+30N	255.8	P0-P1-P2
East	16+50E	0+38S	3+12N	349.76	P0-P1-P2-P3
East	15+50E	0+00	4+37N	437.24	P0-P1-P2-P3
East	14+50E	0+08S	1+00.5N	108.57	P3
East	14+50E	1+55N	2+77N	122.13	P1-P2
East	13+50E	0+15N	1+64N	148.93	P3
East	13+50E	1+79N	3+04N	124.6	P1-P2
East	12+50E	0+44N	2+10.5N	166.44	P2-P3
East	11+50E	0+87N	1+76.5N	89.51	P2-P3
East	11+50E	2+21N	2+75N	54.22	P1
West	10+50E	0+70N	2+96N	225.97	P1-P2-P3
West	9+50E	0+67N	2+85N	218	P1-P2-P3
West	8+50E	0+20N	2+67.5N	247.51	P1-P2-P3
West	7+50E	0+25N	2+50N	224.6	P1-P2-P3
West	6+50E	0+50N	2+35N	185	P0-P1-P2-P3
West	6+50E	2+65N	4+01.5N	136	P0-P1-P2-P3
West	5+50E	0+54N	1+15N	61	P3
West	5+50E	3+45N	3+98N	53	P0
West	4+50E	4+30N	4+99N	68.65	P0-P1
West	3+50E	3+85N	4+50N	65	P0-P1
West	2+50E	2+55N	3+85N	130	P0-P1-P2
West	1+50E	1+73N	3+47N	174.14	P1-P2-P3
West	0+50E	1+50N	2+97N	146.67	P1-P2-P3
West	2+00W	1+25N	3+32N	206.7	P1-P2
West	3+00W	1+09N	2+15N	171.67	P2
West	4+00W	0+84N	0+95N	11	P2

Note: Segments of these trenches belonging to BlackRock were excluded.

10.3 1958 DRILLING BY JALORE MINING LTD.

Six holes were drilled by Jalore Mining in 1958, five of which are within the main Lac Doré property. In the Jalore Mining report, the hole’s azimuths were indicated to be S28ºE in the old four-quadrant system, which translates as N152º in the more conventional system. However, every subsequent report indicates them as being drilled towards the northwest. Since the drill collars are not available anymore, field verification is not possible. These holes are thus considered or oriented N308º to N339º or about 20º clockwise to the actual grid.

The core was AX size and was split for sampling. Jalore Mining assayed the core for iron and titanium in their private laboratory, and only the results indicated in the logs are available. The core was recovered by the MRN in 1970, quarter-split and submitted to CRM (Centre de Recherches Minérales, a former governmental metallurgy research facility, currently COREM) for vanadium assaying and for Davis tube tests to concentrate the magnetite (Kish, 1971; Castonguay, 1967). The core was not preserved. The information obtained from these holes is of little use and not considered to be useful for the estimation of a mineral resource estimate.

10.4 1959 Drilling by Trepan Mining

A series of five holes (T-1 to T-5) were drilled by Trepan Mining southeast of Armitage lake, on the Armitage deposit (BlackRock) in 1959 (Bischoff, 1959). Being located outside the outline of the current VanadiumCorp properties, no attempt was made to evaluate them.

10.5 1970-1974 Drilling by the Québec Government

Ten of the 13 holes drilled by the MRN are located within the Lac Doré property boundary, nine of which are on the East deposit. Two of the remaining holes are on the Southwest deposit while the last two are on the West deposit but outside of the VanadiumCorp property (on BlackRock property).

Four holes were drilled in 1970 (DDH-07 to DDH-10) and logged by contract geologists of the MRN (Kish, 1971). Another nine holes (DDH-11 to DDH-19) were drilled in 1974 (Avramtchev, 1975), from which only the logs are available (Table 10.2) with detailed reports missing.

The holes are oriented approximately parallel to current grid-lines, i.e. between N320º and N330°. The MRN grid was oriented with an east-west baseline and due north lines, which explains why holes are indicated to be at an angle to the section lines in the logs. No evidence of this grid remains in the field. Casings were not left behind, and old drill pads are not readily visible. However, evidence of the pads or access trails were recently located (Block, 2015).

Logging and footage markings on this core were not done in a conventional manner, as they did not insert marker blocks at the end of each run. Accurate metering and re-logging of this core is not considered to be possible. Furthermore, significant handling and transport of the core boxes caused the split core to shift and mix in the boxes. Finally, the core resided for 20 years in the core-racks of the Niobec Mine, near the tailings pond, and are thus heavily contaminated with niobium-rich carbonatite dust. The core is BQ in diameter and was sampled by half-splitting.

The drill logs were obtained from the assessment files, as conventional paper logs, which were captured into a Microsoft Office Excel spreadsheet by IOS in 1997 and converted to Geotic's database format. The core is currently stored at a BlackRock facility, but is of little use due to its poor state of conservation.

Table 10.2
List of Drill Holes and Their Collar Location with Known Accuracy

Owner	Line	Station	Note	UTMX-83	UTMY-83	UTMZ	Precision XY
Apella Resources Inc.*	20+83E	0+88N	DGPS-2014-Collar	572276.951	5520245.674	505.35	1
Apella Resources Inc.*	16+31E	0+92N	DGPS-2014-Collar	571924.704	5519963.991	499.822	1
Apella Resources Inc.*	12+26E	1+11N	DGPS-2014-Collar	571565.328	5519689.772	497.671	1
Apella Resources Inc.*	9+45E	1+00N	DGPS-2014-Collar	571395.498	5519531.445	513.247	1
Apella Resources Inc.*	45+30E	3+74S	DGPS-2014-Collar	574456.718	5521443.34	461.374	1
Apella Resources Inc.*	44+32.6E	4+50S	DGPS-2014-Collar	574427.135	5521324.953	459.034	1
Apella Resources Inc.*	46+31.4E	4+46S	DGPS-2014-Collar	574581.287	5521451.879	454.796	1
Apella Resources Inc.*	46+31.4E	3+78S	DGPS-2014-Collar	574537.359	5521503.952	457.972	1
Apella Resources Inc.*	47+32.7E	4+44.5S	DGPS-2014-Collar	574658.156	5521515.61	457.655	1
Apella Resources Inc.*	45+30E	3+00S	DGPS-2014-Collar	574412.741	5521500.6	458.99	1
Apella Resources Inc.*	51+34.7E	5+58S	DGPS-2014-Collar	575039.042	5521685.824	474.514	1
Apella Resources Inc.*	53+22.5E	2+70.5S	DGPS-2014-Collar	575003.942	5522066.281	464.567	1
Apella Resources Inc.*	57+07E	0+10N	GPS-2014-PAD	575127	5522491	466	5
Apella Resources Inc.*	64+51E	2+40N	DGPS-2014-Collar	575536.566	5523137.464	486.576	1
Jalore Mining	25+00E	2+40N	Not located				
Jalore Mining	39+96.96E	1+78N	Not located				
Jalore Mining	46+30.94E	1+81N	Not located				
Jalore Mining	36+30.94E	2+20. N	Not located				
Jalore Mining	31+82E	1+86N	Not located				
McKenzie Bay	46+00E	5+00S	GPS-2014-PAD	574593	5521388	448	3
McKenzie Bay	28+00E	1+75S	GPS-2014-PAD	572986	5520499	527	5
McKenzie Bay	26+00E	0+00	GPS-2014-PAD	572714	5520513	503	5
McKenzie Bay	44+00E	4+25S	GPS-2014-PAD	574392	5521318	457	10
McKenzie Bay	23+00E	1+60N	GPS-2014-PAD	572396	5520439	487	10
McKenzie Bay	21+00E	1+50N	GPS-2014-PAD	572251	5520300	494	10
McKenzie Bay	13+00E	1+70N	GPS-2014-PAD	571622	5519813	497	10
MERN	36+92.15E	2+19.42N	GPS-2014-PAD	571762	5519934	-	10
MERN	37+32.72E	2+12.58N	GPS-2014-PAD	571799	5519951	-	10
MERN	37+81.94E	2+07.09N	GPS-2014-PAD	571841	5519976	-	10
MERN	38+35.16E	2+13.6N	GPS-2014-PAD	571878	5520013	-	10
MERN	39+0.43E	2+5.82N	GPS-2014-PAD	571948	5520062	485	10
MERN	39+74.95E	2+11.27N	GPS-2014-PAD	571996	5520093	486	10
MERN	40+96.02E	2+59.23N	GPS-2014-PAD	572064	5520202	486	10
MERN	41+74.14E	1+97.18N	DGPS-1997-Pad	572177.46	5520217.64	493.78	3
MERN	42+75.36E	1+68.81N	GPS-2014-PAD	572268	5520244	495	10
MERN	25+00E	2+40.37N	Not located				
SOQUEM	35+00E	1+00N	GPS-2014-PAD	571688	5519724	487	10
SOQUEM	36+00E	1+25N	DGPS-1997-Pad	571748.56	5519812.24	503.53	3
SOQUEM	36+50E	1+75N	GPS-2014-PAD	571753	5519877	485	5
SOQUEM	40+50E	1+80.5N	DGPS-1997-Pad	572124.86	5520145.34	498.35	5
SOQUEM	37+50E	1+41N	DGPS-2014-Collar	571851.264	5519897.838	498.718	1
SOQUEM	41+50E	1+93N	Calc'd. from grid	572152.96	5520192.14	495.3	15
SOQUEM	38+50E	2+11N	GPS-2014-PAD	571878	5520022	485	10
SOQUEM	39+50E	1+61N	GPS-2014-PAD	571998	5520035	492	5
SOQUEM	42+50E	1+75N	Calc'd. from grid	572244.46	5520237.34	493.78	15
SOQUEM	40+50E	2+69N	GPS-2014-PAD	572021	5520179	487	10
SOQUEM	42+00E	2+50N	DGPS-2014-Collar	572146.338	5520252.115	497.514	1
SOQUEM	42+50E	2+62N	Calc'd. from grid	572193.26	5520308.34	481.58	15
SOQUEM	42+00E	1+50N	DGPS-1997-Pad	572218.16	5520187.14	499.87	5
SOQUEM	40+50E	1+50N	DGPS-1997-collet	572388.36	5520296.34	496.21	3
SOQUEM	45+50E	1+50N	DGPS-2014-Collet	572487.544	5520381.272	504.867	1
SOQUEM	40+00E	1+50N	DGPS-2014-Collar	572044.598	5520050.242	495.055	1

Owner	Line	Station	Note	UTMX-83	UTMY-83	UTMZ	Precision XY
SOQUEM	34+00E	1+50N	DGPS-2014-Collar	571565.418	5519689.618	497.632	1
SOQUEM	43+00E	1+75N	Calc'd. from grid	572265.7	5520278.7	493	15
SOQUEM	38+50E	1+50N	DGPS-2014-Collar	571924.697	5519963.96	499.824	1
McKenzie Bay (trench)	10+50E	0+70N	Calc'd. DGPS 1997	571498.06	5519584.14	502.62	5
McKenzie Bay (trench)	11+50E	0+87N	Calc'd. DGPS 1997	571569.46	5519667.03	496.82	5
McKenzie Bay (trench)	11+50	2+21N	Calc'd. DGPS 1997	571484.76	5519770.04	496.82	5
McKenzie Bay (trench)	12+50E	0+44N	Calc'd. DGPS 1997	571669.46	5519693.44	499.87	5
McKenzie Bay (trench)	13+50E	0+15N	Calc'd. DGPS 1997	571772.66	5519723.34	509.02	5
McKenzie Bay (trench)	13+50E	1+79N	Calc'd. DGPS 1997	571662.46	5519863.94	501.4	5
McKenzie Bay (trench)	14+50E	0+08S	Calc'd. DGPS 1997	571851.86	5519786.44	510.54	5
McKenzie Bay (trench)	14+50E	1+55N	Calc'd. DGPS 1997	571750.76	5519906.44	502.62	5
McKenzie Bay (trench)	1+50E	1+73N	Calc'd. DGPS 1997	570748.76	5519097.74	502.31	5
McKenzie Bay (trench)	15+50E	0+00	Calc'd. DGPS 1997	571927.66	5519850.64	509.02	5
McKenzie Bay (trench)	16+50E	0+38S	Calc'd. DGPS 1997	572025.76	5519887.84	510.54	5
McKenzie Bay (trench)	17+50E	0+74N	Calc'd. DGPS 1997	572032.46	5520034.94	504.44	5
McKenzie Bay (trench)	18+31E	0+75N	Calc'd. DGPS 1997	572095.56	5520090.54	501.4	5
McKenzie Bay (trench)	18+50E	1+86N	Calc'd. DGPS 1997	572033.56	5520185.84	495.91	5
McKenzie Bay (trench)	19+50E	0+13S	Calc'd. DGPS 1997	572247.96	5520095.84	505.97	5
McKenzie Bay (trench)	19+50E	1+60N	Calc'd. DGPS 1997	572131.76	5520227.04	493.78	5
McKenzie Bay (trench)	2+00W	1+25N	Calc'd. DGPS 1997	570504.46	5518832.74	481.58	5
McKenzie Bay (trench)	20+50E	0+57S	Calc'd. DGPS 1997	572339.96	5520118.44	509.02	5
McKenzie Bay (trench)	21+50E	0+19N	Calc'd. DGPS 1997	572374.96	5520245.24	495.3	5
McKenzie Bay (trench)	22+50E	0+37S	Calc'd. DGPS 1997	572490.56	5520267.04	501.4	5
McKenzie Bay (trench)	23+50E	0+00	Calc'd. DGPS 1997	572540.46	5520358.34	501.4	5
McKenzie Bay (trench)	24+50E	0+72S	Calc'd. DGPS 1997	572667.46	5520368.94	509.02	5
McKenzie Bay (trench)	2+50E	2+35N	Calc'd. DGPS 1997	570781.46	5519203.34	504.44	5
McKenzie Bay (trench)	3+00W	1+09N	Calc'd. DGPS 1997	570440.76	5518760.24	484.02	5
McKenzie Bay (trench)	3+50E	2+04N	Calc'd. DGPS 1997	570877.06	5519245.64	513.59	5
McKenzie Bay (trench)	4+50E	1+30N	Calc'd. DGPS 1997	571002.06	5519254.14	524.26	5
McKenzie Bay (trench)	0+50E	1+50N	Calc'd. DGPS 1997	570683.66	5519012.04	493.78	5
McKenzie Bay (trench)	5+50E	0+54N	Calc'd. DGPS 1997	571126.76	5519256.24	524.26	5
McKenzie Bay (trench)	6+50E	0+50N	Calc'd. DGPS 1997	571201.86	5519314.14	521.21	5
McKenzie Bay (trench)	7+50E	0+25N	Calc'd. DGPS 1997	571295.86	5519359.14	519.68	5
McKenzie Bay (trench)	8+50E	0+20N	Calc'd. DGPS 1997	571379.26	5519420.34	505.97	5
McKenzie Bay (trench)	9+50E	0+67N	Calc'd. DGPS 1997	571423.96	5519521.94	507.49	5

* VanadiumCorp work was recorded as Apella Resources in the assessment filing registry at the time.

The quality and level of detail of the logging by the MRN is adequate except for potential issues with depth measurement. There are no rock quality designation (RQD), density, photographs or other measurements available. The precision of the azimuth measurement is uncertain, considering the magnetic deviation occurring on the deposit, and the absence of GPS devices which did not exist at that time. Drill setup orientation was probably made by aligning the rig with the lines, the quality of which cannot be verified. The dip of the holes was measured with acid tests. Sampling procedures are not described nor is the chain of custody. Only Davis tube magnetite analyses are available for the 1970 holes conducted at CRM. Averages of head grade analysis are reported, but individual analyses were not disclosed. Holes drilled in 1974 have both head grade and magnetite concentrate assays.

10.6 1979 DRILLING BY SOQUEM

In 1979, SOQUEM conducted the first resource definition drill program with 19 holes drilled, for 3,325 m, over the East deposit (Dion, 1980) (Table 10.2). The holes were spaced between 50 to 100 m along sections, with sections every 100 to 200 m. Holes were oriented parallel to the sections (N324º). Collars were located by grid coordinates. The grid was surveyed by a land surveyor, providing accurate relative location. However, the grid position was anchored on a local datum (E40+00.23, S0+25.07) which is no longer available. Some collars, as well as most drilling pads, were recently located and measured with a DGPS (Block, 2015). Drill cores are BQ in diameter, with very good recovery.

The orientation of the holes was apparently based on grid lines, while the dip was measured with acid tests. Sampling proceeded by splitting the core and combining pieces, typically of 3-m length. The core was stored at the Niobec Mine until it was recovered by McKenzie Bay in 1997. It is currently stored at the BlackRock facility in Chibougamau. Access to the core was declined by BlackRock. However, due to the numerous manipulations and transportation of core, their current integrity is uncertain. Assaying of head grade was conducted by Chimitec (Québec City) while magnetite concentration, using the Davis tube method, was conducted by CRM on composite samples.

10.7 2001 Exploration Drilling By McKenzie Bay

In 2001, McKenzie Bay conducted an exploration drilling campaign outside of the East and West deposits (Huss, 2003), for a total of 2,187 m (Table 10.2). Of the 14 holes, one (DDH-01) is located on Lac Doré North property, while two (DDH-5 and DDH-6) are within the Lac Doré property. The remaining 11 holes are collared on BlackRock property. This drilling was conducted by L. Huss, professional geologist, under IOS's supervision.

Holes were located to intersect the ground magnetic anomaly, oriented parallel to the grid, and located according to grid pickets. The holes were NQ in diameter, and dip deviation was measured with acid tests, which precluded the measurement of downhole azimuth. Accurate collar locations were recently measured by DGPS for most holes. The core is currently stored in BlackRock Metal's facility, access to which was declined to VanadiumCorp and IOS.

Only Davis tube magnetite concentrates were analyzed, without head grade analysis. Rejects were not preserved, so head grade analysis is not possible. Samples were typically 3 m in length, for a total of 497 samples. However, due to budgetary constraints, samples were not assayed until 2003, under the Cambior option. They were then combined into 197 samples, typically 9 m in length. Of these, 166 were selected for Davis tube testing and assaying of the magnetite concentrate.

10.8 2002 Confirmation Drilling by SNC-Lavalin

Under the supervision of SNC-Lavalin, as part of their due diligence on the deposits, IOS conducted a three-hole drill program, aiming to certify former SOQUEM and MRN results on the East deposit (Boudreault, 2002) (Table 10.2). These holes were not duplicates of former holes, as they test surface results obtained from trenching. The program was directed by Mr. Alexandre Boudreault, junior engineer, under the supervision of IOS, during the fall of 2002. The holes were NQ in diameter and located according to line pickets. Dips were measured with a clinometer at the collar, and by acid tests at depth, and thus did not include measurement of the downhole azimuth.

The core was logged according to industry standards and the information was recorded on a Microsoft Excel spreadsheet. However, these data were stored on floppy disks which are now corrupted and on backup-tapes which cannot be read by modern computers. They were not available in digital format and needed to be recaptured. RQD was measured and are the only such measurements taken over the history of the project. Sampling was done with a core splitter, for a total of 107 samples, plus QA/QC materials. The core is currently stored in a BlackRock facility, access to which was declined to VanadiumCorp and IOS.

In addition to these three drill holes, trench 11+50E was resampled for a length of 15 m. Sampling was conducted with a diamond rock saw, cutting a 5-cm wide strip beside former sample locations, for a total of 15 samples.

Samples were crushed and prepared at COREM for head grade analysis. Davis tube testing was not conducted. Material from these samples is no longer available and cannot be tested by magnetic concentration. No magnetite concentrate assays were available. It may be possible to use the logging to help inform a geological model.

10.9 2009 VanadiumCorp Drilling

In 2009, VanadiumCorp (recorded as Apella Resources in the assessment filing registry) conducted a drilling program on their Lac Doré North property, for a total of 10 holes representing 1,129.94 m of coring (Figure 10.3, Table 10.2). The program was conducted by Mr. Roger Moar, P.Geo., under the supervision of Mr. Christian Derosier, P.Geo.

No report was produced for this program. Only drill logs were submitted for the assessment files, and only the Geotic drilling database was made available to VanadiumCorp. Casings were left in a few of the holes and capped with aluminium plugs. A wooden peg was inserted in the holes where no casing was left. Collar coordinates were recently measured by DGPS.

The core was HQ in diameter and was stored in a previously rented facility in Chibougamau which is now closed. It was recovered by IOS and moved to its facility in the Saguenay. The core was examined by Gennady Ivanov, P.Geo., and the logs reviewed. Downhole surveys were conducted by a Flex-it device. However, since Flex-it measurements are based on magnetic anisotropy, the downhole azimuth measurements may not be reliable. RQD, density or magnetic susceptibility were not measured, nor were photographs taken.

Samples were taken with the use of a diamond saw. A total of 254 composite samples consisting of segments of up to 3 m in length were collected. It was noted that wall rock to the titanomagnetite rich layers was not sampled. Samples were crushed and pulverized at the Centre d'Étude Appliquée sur le Quaternaire (CEAQ-TJCM), in Chibougamau, and shipped for assay at ALS Minerals in Val-d'Or.

Most of the holes are located on the west side of the Lac Doré North property, aiming to test the large magnetic anomaly and the magnetite layers visible in the trenches. Four holes were testing other targets further east. Surprisingly, these do not coincide with a magnetic anomaly, and their purpose is uncertain. The holes were located outside the East and West deposits.

Figure 10.3
View of Capped Casing of Hole LDN-09-01,

Source: IOS, 2018. Drilled for VanadiumCorp in 2009 on the Lac Doré North property.

10.10 2013 VanadiumCorp Drilling

In 2013, VanadiumCorp conducted a short drill program consisting of four holes on their Lac Doré property totalling 600 m. These drill holes aimed to duplicate former SOQUEM holes, as shown in Table 10.3. It should be noted that these duplicate holes were shorter than the original holes, with slightly different orientation and dip, and that they were collared up to 20 m away from the reported position of the original holes. Confusion in the labelled hole numbers was noted by IOS between LD-13-03 (not existing in the field) and LD-13-04B (as indicated on the peg). The database provided also indicates that LD-13-04 is a twin of DDH-71-02 which does not exist. It is considered to be a twin of S-58-02. Finally, a discrepancy was noted for LD-13-03, which is indicated as being on section 34+00 in the provided database, but on section 33+00 on the map.

Table 10.3
2013 Confirmation Drill Holes

2013 Hole	SOQUEM Hole	Line	Station
LD-13-01	S-77-31	43+00E	1+75N
LD-13-02	S-77-38	38+50E	1+50N
LD-13-03	S-77-20	33+00E	1+50N
LD-13-04	S-58-02	35+00E	1+75N

The holes drilled in 2013 were HQ in diameter. They were reportedly located with the use of a handheld GPS, with downhole surveys made by acid tests. Collars were all visited by IOS, and their DGPS location measured (Block, 2015). They were originally described by Mr. Christian Derosier, P.Geo., using a Geotic database. They were recently re-logged due to some deficiencies (Ivanov, 2015), and detailed photographs taken. RQD, recoveries and magnetic susceptibility were measured along with fracture descriptions. Density measurements are not available. Half core was sampled with the use of a diamond saw, and samples shipped to the CEAQ-TJCM facilities in Chibougamau, for a total of 122 samples representing 317.05 m of core. Core was stored in a warehouse in Chibougamau until it was recovered and transferred to the IOS facility in Saguenay. Coarse rejects were recovered from CEAQ-TJCM, re-assayed at COREM and a magnetite concentrate collected by Davis tube.

10.11 Mineralized Intersections

Mineralized intersections were published officially only for the 2009 (November 30, 2009 press release) and 2013 programs (April 2, 2013 press release). Neither SOQUEM nor McKenzie Bay published their intersections or calculated them in their reports. Intersections were initially calculated by Girard (2014), using uniform parameters and "Explorpac" (Gemcom). The QP has recalculated the intersections within an interpreted mineralized solid (Table 10.4). McKenzie Bay channel samples are included as "horizontal drill holes", assuming unsampled intervals as barren rock. Segments of holes or trenches outside of the property (within the BlackRock property), namely trenches 3+50E, 4+50E, 5+50E and 6+50E, as well as for drill holes S1 and S7, were not excluded.

Table 10.4 shows all drill hole and trench intersections (used as pseudo drill holes) within the mineralized solids (the geological model) as calculated by the QP. Each intersection has been divided by subdomain (P0, P1, P2, P3 and barren anorthosite dykes). The barren dykes were not sampled as they contain little or no magnetite and typically show a grade of near zero.

Table 10.4
Drill Hole and Trench Intersection Grades and Width

Hole-ID	From	To	Length	Magnetite (%)	V_2O_5 (%)	Head V_2O_5 (%)	Rock Code
LD-13-01	2.60	92.89	90.29	6.81	0.37	0.03	dy
LD-13-01	92.89	136.24	43.35	35.71	1.50	0.54	P2
LD-13-01	136.24	143.76	7.52	0.00	0.45	0.00	dy
LD-13-01	143.76	150.00	6.24	43.78	1.44	0.63	P2
LD-13-02	2.45	78.58	76.13	0.15	0.09	0.00	dy
LD-13-02	78.58	150.00	71.42	36.49	0.83	0.30	P2
LD-13-03	1.80	13.23	11.43	14.27	0.87	0.12	P3
LD-13-03	13.23	47.00	33.77	0.00	0.00	0.00	dy
LD-13-03	47.00	69.05	22.05	13.10	1.02	0.13	P2
LD-13-03	69.05	75.00	5.95	23.25	1.27	0.30	dy
LD-13-03	75.00	129.00	54.00	25.85	1.32	0.34	P2
LD-13-03	129.00	132.00	3.00	0.00	0.00	0.00	dy
LD-13-03	132.00	150.00	18.00	15.95	1.69	0.27	P2
LD-13-04	2.80	11.98	9.18	32.47	0.64	0.21	dy

Hole-ID	From	To	Length	Magnetite (%)	V_2O_5 (%)	Head V_2O_5 (%)	Rock Code
LD-13-04	11.98	26.54	14.56	15.31	0.31	0.05	P2
LD-13-04	26.54	47.00	20.46	0.27	0.20	0.00	dy
LD-13-04	47.00	69.57	22.57	29.89	1.07	0.32	P2
LD-13-04	69.57	78.54	8.97	0.00	0.00	0.00	dy
LD-13-04	78.54	129.06	50.52	22.96	1.07	0.25	P2
LD-13-04	129.06	134.62	5.56	0.00	0.00	0.00	dy
LD-13-04	134.62	150.00	15.38	32.49	1.46	0.47	P2
S-11	4.88	10.45	5.57	43.96	1.09	0.48	P2
S-11	10.45	18.99	8.54	28.90	1.15	0.33	dy
S-11	18.99	43.43	24.44	40.56	1.37	0.56	P2
S-11	43.43	47.85	4.42	3.22	1.05	0.03	dy
S-11	47.85	58.83	10.98	41.02	1.45	0.59	P2
S-11	58.83	64.71	5.88	4.93	0.71	0.04	dy
S-11	64.71	75.82	11.11	23.81	1.49	0.35	P2
S-11	75.82	87.17	11.35	0.00	0.00	0.00	dy
S-12	5.16	23.04	17.88	17.93	0.90	0.16	dy
S-12	23.04	65.84	42.80	42.93	1.26	0.54	P2
S-12	65.84	70.50	4.66	0.00	0.00	0.00	dy
S-12	70.50	100.56	30.06	30.42	1.60	0.49	P2
S-12	100.56	107.75	7.19	0.00	0.72	0.00	dy
S-12	107.75	114.36	6.61	34.26	1.44	0.49	P2
S-12	114.36	120.70	6.34	0.02	0.72	0.00	P1
S-13	0.00	21.55	21.55	0.00	0.19	0.00	dy
S-13	21.55	89.09	67.54	40.05	1.19	0.48	P2
S-13	89.09	93.57	4.48	0.01	0.89	0.00	dy
S-13	93.57	112.17	18.60	38.47	1.41	0.54	P2
S-13	112.17	114.91	2.74	19.07	1.44	0.27	P1
S-14	0.00	5.30	5.30	0.00	0.00	0.00	dy
S-14	5.30	99.67	94.37	41.18	1.07	0.44	P2
S-14	99.67	107.59	7.92	3.95	0.36	0.01	dy
S-15	0.00	23.56	23.56	0.00	0.00	0.00	dy
S-15	23.56	75.50	51.94	42.62	1.27	0.54	P2
S-15	75.50	79.19	3.69	0.00	0.00	0.00	dy
S-15	79.19	86.87	7.68	44.18	1.43	0.63	P2
S-16	9.60	67.88	58.28	43.29	1.23	0.53	P2
S-16	67.88	84.13	16.25	0.14	0.85	0.00	dy
S-16	84.13	99.67	15.54	32.29	1.43	0.46	P2
S-17	13.29	49.07	35.78	43.21	1.37	0.59	P2
S-17	49.07	53.34	4.27	0.05	1.37	0.00	dy
S-17	53.34	64.00	10.66	37.11	1.53	0.57	P2
S-18	0.00	3.05	3.05	0.02	1.36	0.00	dy
S-18	3.05	15.06	12.01	27.74	1.46	0.41	P2
S-18	15.06	50.35	35.29	1.97	0.16	0.00	dy
S-18	50.35	100.89	50.54	44.44	1.38	0.61	P2
S-18	100.89	106.99	6.10	0.03	1.25	0.00	dy
S-18	106.99	125.27	18.28	40.95	1.59	0.65	P2
S-18	125.27	131.98	6.71	0.04	0.79	0.00	dy
S-18	131.98	139.29	7.31	31.14	1.49	0.46	P2
S-19	0.00	13.41	13.41	0.00	0.00	0.00	dy
S-19	13.41	43.98	30.57	32.85	1.20	0.39	P2
S-19	43.98	64.13	20.15	2.47	0.84	0.02	dy

Hole-ID	From	To	Length	Magnetite (%)	V_2O_5 (%)	Head V_2O_5 (%)	Rock Code
S-19	64.13	94.79	30.66	23.31	1.44	0.34	P2
S-21	2.65	47.35	44.70	25.93	0.84	0.22	P3
S-21	47.35	134.38	87.03	0.00	0.05	0.00	dy
S-21	134.38	195.10	60.72	25.03	1.56	0.39	P2
S-22	0.00	27.04	27.04	0.00	0.00	0.00	dy
S-22	27.04	63.15	36.11	26.62	0.85	0.23	P2
S-22	63.15	107.76	44.61	0.06	0.11	0.00	dy
S-22	107.76	175.25	67.49	26.62	1.61	0.43	P2
S-22	175.25	189.10	13.85	0.00	0.00	0.00	dy
S-22	189.10	195.10	6.00	25.05	1.66	0.42	P2
S-22	195.10	225.00	29.90	0.00	0.00	0.00	dy
S-23	4.83	15.03	10.20	33.97	1.00	0.34	P2
S-23	15.03	31.30	16.27	0.00	0.00	0.00	dy
S-23	31.30	55.80	24.50	37.77	1.25	0.47	P2
S-23	55.80	65.55	9.75	0.61	0.49	0.00	dy
S-23	65.55	124.40	58.85	33.58	1.53	0.51	P2
S-23	124.40	170.73	46.33	2.05	0.47	0.01	dy
S-24	0.00	25.04	25.04	0.00	0.00	0.00	dy
S-24	25.04	143.44	118.40	38.43	1.41	0.54	P2
S-24	143.44	152.64	9.20	0.65	0.62	0.00	dy
S-24	152.64	164.44	11.80	30.05	1.87	0.56	P2
S-24	164.44	199.36	34.92	0.00	0.00	0.00	dy
S-24	199.36	211.36	12.00	19.21	1.60	0.31	P1
S-24	211.36	231.00	19.64	0.00	0.00	0.00	dy
S-25	0.00	4.15	4.15	0.00	0.00	0.00	dy
S-25	4.15	46.40	42.25	3.84	0.25	0.01	P2
S-25	46.40	81.32	34.92	0.62	0.09	0.00	dy
S-25	81.32	175.12	93.80	39.55	1.36	0.54	P2
S-25	175.12	189.00	13.88	0.82	0.38	0.00	dy
S-26	0.00	14.22	14.22	0.04	0.28	0.00	dy
S-26	14.22	36.15	21.93	32.92	1.39	0.46	P2
S-26	36.15	49.57	13.42	0.00	0.00	0.00	dy
S-26	49.57	129.87	80.30	33.25	1.68	0.56	P2
S-26	129.87	137.60	7.73	1.36	0.54	0.01	dy
S-26	137.60	149.25	11.65	29.67	1.62	0.48	P2
S-26	149.25	171.75	22.50	0.00	0.00	0.00	dy
S-26	171.75	177.75	6.00	21.02	1.72	0.36	P2
S-26	177.75	188.32	10.57	0.00	0.00	0.00	P1
S-26	188.32	198.59	10.27	0.00	0.00	0.00	dy
S-26	198.59	200.70	2.11	0.00	0.00	0.00	P1
S-27	0.00	9.45	9.45	0.00	0.00	0.00	dy
S-27	9.45	106.30	96.85	32.03	1.14	0.37	P2
S-27	106.30	128.30	22.00	19.59	1.50	0.29	P1
S-27	128.30	143.30	15.00	0.00	0.00	0.00	dy
S-27	143.30	152.30	9.00	24.03	1.47	0.35	P1
S-27	152.30	164.60	12.30	0.00	0.00	0.00	dy
S-28	0.00	35.43	35.43	0.25	0.09	0.00	dy
S-28	35.43	106.80	71.37	44.12	1.20	0.53	P2
S-28	106.80	122.35	15.55	0.00	0.00	0.00	dy
S-28	122.35	150.17	27.82	30.46	1.52	0.46	P2
S-29	9.00	18.00	9.00	31.10	1.23	0.38	P2

Hole-ID	From	To	Length	Magnetite (%)	V_2O_5 (%)	Head V_2O_5 (%)	Rock Code
S-29	18.00	33.00	15.00	5.12	1.25	0.06	dy
S-29	33.00	49.80	16.80	43.70	1.27	0.55	P2
S-29	49.80	66.50	16.70	0.00	0.00	0.00	dy
S-29	66.50	83.30	16.80	29.51	1.35	0.40	P2
S-29	83.30	91.63	8.33	0.00	0.00	0.00	dy
S-29	91.63	130.80	39.17	38.94	1.57	0.61	P2
S-29	130.80	138.39	7.59	3.87	1.48	0.06	dy
S-29	138.39	158.71	20.32	35.54	1.73	0.61	P2
S-29	158.71	167.16	8.45	4.47	1.19	0.05	dy
S-29	167.16	191.25	24.09	20.32	1.63	0.33	P2
S-29	191.25	200.60	9.35	0.00	0.00	0.00	dy
S-30	1.15	60.30	59.15	31.19	1.58	0.49	P2
S-30	60.30	74.70	14.40	0.00	0.00	0.00	dy
S-32	0.90	48.80	47.90	33.60	1.61	0.54	P2
S-33	0.90	56.00	55.10	36.47	1.57	0.57	P2
S-33	56.00	61.00	5.00	2.09	1.47	0.03	dy
S-33	61.00	76.00	15.00	43.28	1.53	0.66	P2
S-33	76.00	85.50	9.50	0.00	0.54	0.00	dy
S-33	85.50	95.00	9.50	27.77	1.63	0.45	P2
S-33	95.00	100.30	5.30	0.00	0.00	0.00	dy
S-34	1.35	13.30	11.95	0.00	0.00	0.00	dy
S-34	13.30	37.00	23.70	19.18	1.27	0.24	P2
S-34	37.00	61.40	24.40	0.00	0.00	0.00	dy
S-34	61.40	84.20	22.80	38.90	1.28	0.50	P2
S-34	84.20	99.00	14.80	0.00	0.00	0.00	dy
S-34	99.00	157.50	58.50	42.68	1.40	0.60	P2
S-34	157.50	164.75	7.25	1.33	1.66	0.02	dy
S-34	164.75	186.50	21.75	43.42	1.57	0.68	P2
S-34	186.50	197.00	10.50	0.00	0.00	0.00	dy
S-34	197.00	206.00	9.00	34.19	1.66	0.57	P2
S-34	206.00	208.78	2.78	0.00	0.00	0.00	P1
S-35	0.00	1.77	1.77	0.00	0.00	0.00	dy
S-35	1.77	42.00	40.23	32.94	1.22	0.40	P2
S-35	42.00	53.80	11.80	0.00	0.00	0.00	dy
S-35	53.80	78.80	25.00	38.37	1.48	0.57	P2
S-35	78.80	200.30	121.50	0.00	0.00	0.00	dy
S-36	0.00	9.70	9.70	0.00	0.00	0.00	dy
S-36	9.70	20.70	11.00	40.60	1.11	0.45	P2
S-36	20.70	84.50	63.80	0.00	0.00	0.00	dy
S-36	84.50	104.75	20.25	46.44	1.28	0.59	P2
S-36	104.75	119.60	14.85	0.00	0.00	0.00	dy
S-36	119.60	183.00	63.40	34.25	1.55	0.53	P2
S-36	183.00	200.30	17.30	0.00	0.00	0.00	dy
S-37	0.00	53.15	53.15	0.00	0.06	0.00	dy
S-37	53.15	228.00	174.85	39.62	1.30	0.52	P2
S-37	228.00	243.35	15.35	0.00	0.00	0.00	dy
S-37	243.35	250.60	7.25	23.77	1.49	0.35	P1
S-37	250.60	268.30	17.70	0.00	0.00	0.00	dy
S-7	4.11	87.08	82.97	34.10	0.82	0.28	P2
S-7	87.08	97.54	10.46	0.00	0.37	0.00	dy
S-7	97.54	124.97	27.43	42.53	1.13	0.48	P2

Hole-ID	From	To	Length	Magnetite (%)	V_2O_5 (%)	Head V_2O_5 (%)	Rock Code
S-7	124.97	157.89	32.92	24.35	0.92	0.22	P1
S-7	157.89	176.48	18.59	7.39	0.48	0.04	dy
S-7	176.48	183.49	7.01	32.79	1.24	0.41	P1
S-79-20	1.00	14.15	13.15	6.38	0.28	0.02	P3
S-79-20	14.15	52.33	38.18	0.00	0.12	0.00	dy
S-79-20	52.33	83.10	30.77	35.48	1.53	0.54	P2
S-79-20	83.10	94.00	10.90	0.00	0.00	0.00	dy
S-79-20	94.00	116.10	22.10	29.67	1.64	0.49	P2
S-79-20	116.10	145.50	29.40	9.65	0.82	0.08	dy
S-79-20	145.50	151.60	6.10	29.67	1.57	0.47	P2
S-79-31	2.04	29.00	26.96	34.30	1.18	0.40	P2
S-79-31	29.00	72.95	43.95	0.00	0.00	0.00	dy
S-79-31	72.95	127.70	54.75	38.71	1.56	0.60	P2
S-79-31	127.70	133.50	5.80	1.59	1.06	0.02	dy
S-79-31	133.50	152.50	19.00	37.67	1.73	0.65	P2
S-79-31	152.50	163.80	11.30	0.00	0.00	0.00	dy
S-79-31	163.80	174.80	11.00	32.19	1.60	0.52	P2
S-79-31	174.80	188.92	14.12	0.00	0.00	0.00	dy
S-79-38	0.00	79.60	79.60	0.00	0.00	0.00	dy
S-79-38	79.60	199.90	120.30	40.35	1.11	0.45	P2
S-79-38	199.90	208.85	8.95	0.00	0.00	0.00	dy
S-79-38	208.85	225.25	16.40	0.00	0.00	0.00	P1
S-79-38	225.25	256.10	30.85	0.00	0.00	0.00	dy
1050E	11.00	22.50	11.50	21.78	0.64	0.14	P3
1050E	22.50	73.00	50.50	0.00	0.00	0.00	dy
1050E	73.00	92.00	19.00	27.72	0.75	0.21	P2
1050E	92.00	140.00	48.00	0.00	0.00	0.00	dy
1050E	140.00	158.00	18.00	28.20	1.41	0.40	P2
1050E	158.00	173.00	15.00	15.62	1.51	0.24	P1
1050E	173.00	177.00	4.00	0.00	0.00	0.00	dy
1050E	177.00	184.60	7.60	22.70	1.50	0.34	P1
1050E	184.60	225.97	41.37	0.00	0.00	0.00	P0
1150E_1	0.00	34.78	34.78	2.03	0.15	0.00	P3
1150E_1	34.78	86.50	51.72	0.00	0.00	0.00	dy
1150E_1	86.50	89.51	3.01	0.00	0.00	0.00	P2
1250E	18.44	60.41	41.97	9.86	0.31	0.03	P3
1250E	60.57	122.30	61.73	5.42	0.20	0.01	dy
1250E	122.30	166.44	44.14	30.99	1.17	0.36	P2
1350E_1	36.55	84.00	47.45	6.43	0.26	0.02	P3
1350E_1	84.00	148.93	64.93	0.00	0.00	0.00	dy
1350E_2	0.00	9.70	9.70	0.00	0.00	0.00	dy
1350E_2	9.70	79.00	69.30	29.65	1.38	0.41	P2
1350E_2	79.00	91.00	12.00	1.95	0.56	0.01	dy
1350E_2	91.00	114.97	23.97	19.24	1.43	0.28	P1
1350E_2	114.97	124.60	9.63	0.04	0.45	0.00	P0
1450E_1	13.71	92.00	78.29	1.63	0.09	0.00	P3
1450E_1	92.00	108.57	16.57	0.00	0.00	0.00	dy
1450E_2	0.00	6.00	6.00	0.00	0.00	0.00	dy
1450E_2	6.00	19.00	13.00	36.87	0.97	0.36	P2
1450E_2	19.00	28.00	9.00	0.00	0.00	0.00	dy
1450E_2	28.00	64.00	36.00	45.60	1.13	0.52	P2

Hole-ID	From	To	Length	Magnetite (%)	V_2O_5 (%)	Head V_2O_5 (%)	Rock Code
1450E_2	64.00	76.00	12.00	6.90	0.32	0.02	dy
1450E_2	76.00	94.00	18.00	25.10	1.36	0.34	P2
1450E_2	94.00	97.00	3.00	0.00	0.00	0.00	dy
1450E_2	97.00	119.50	22.50	11.69	1.46	0.17	P1
1450E_2	119.50	122.13	2.63	0.00	0.00	0.00	dy
1550E	0.00	63.27	63.27	2.91	0.07	0.00	P3
1550E	64.02	159.00	94.98	0.00	0.03	0.00	dy
1550E	159.00	238.00	79.00	31.49	1.07	0.34	P2
1550E	238.00	257.00	19.00	8.05	0.70	0.06	dy
1550E	257.00	300.00	43.00	12.44	1.34	0.17	P1
1550E	300.00	313.93	13.93	0.00	0.00	0.00	dy
1550E	313.93	437.24	123.31	0.00	0.00	0.00	P0
1650E	0.00	66.02	66.02	0.00	0.00	0.00	P3
1650E	66.02	203.00	136.98	0.00	0.00	0.00	dy
1650E	203.00	243.56	40.56	9.06	0.19	0.02	P2
1650E	243.56	251.57	8.01	0.00	0.00	0.00	dy
1650E	254.24	266.42	12.18	31.35	1.27	0.40	P2
1650E	266.42	319.05	52.63	26.32	1.24	0.33	P1
1650E	319.05	323.00	3.95	0.00	0.00	0.00	dy
1650E	323.00	335.89	12.89	12.29	1.40	0.17	P1
1650E	335.89	353.00	17.11	0.00	0.00	0.00	P0
1750E	0.00	70.00	70.00	0.00	0.04	0.00	dy
1750E	70.00	133.00	63.00	37.24	0.95	0.35	P2
1750E	133.00	153.00	20.00	0.00	0.18	0.00	dy
1750E	153.00	157.00	4.00	49.30	1.29	0.64	P2
1750E	157.00	173.00	16.00	0.00	0.00	0.00	dy
1750E	173.00	193.00	20.00	20.91	1.34	0.28	P1
1750E	193.00	199.00	6.00	0.00	0.00	0.00	dy
1750E	199.00	243.00	44.00	13.95	1.25	0.17	P1
1750E	243.00	255.80	12.80	2.48	0.97	0.02	P0
1831E	0.00	24.00	24.00	0.00	0.00	0.00	dy
1831E	24.00	45.00	21.00	6.30	0.39	0.02	P2
1831E	45.00	48.00	3.00	0.00	0.00	0.00	dy
1831E	48.00	67.00	19.00	38.36	0.79	0.30	P2
1831E	67.00	89.50	22.50	0.97	0.16	0.00	dy
1831E	89.50	115.22	25.72	30.16	0.86	0.26	P2
1850E	0.00	39.00	39.00	34.39	1.01	0.35	P2
1850E	39.00	41.00	2.00	0.00	0.00	0.00	dy
1850E	41.00	57.00	16.00	38.89	1.32	0.51	P2
1850E	57.00	74.00	17.00	27.13	1.49	0.40	P1
1850E	74.00	80.00	6.00	0.00	0.00	0.00	dy
1850E	80.00	116.00	36.00	18.48	1.25	0.23	P1
1850E	116.00	134.00	18.00	7.12	1.20	0.09	P0
1850E	134.00	146.00	12.00	0.00	0.00	0.00	dy
1850E	146.00	155.00	9.00	0.00	0.00	0.00	P0
1950E_1	0.00	31.94	31.94	4.21	0.19	0.01	P3
1950E_1	32.08	149.00	116.92	0.00	0.03	0.00	dy
1950E_1	149.00	164.90	15.90	15.96	1.34	0.21	P2
1950E_2	0.00	2.87	2.87	0.00	0.00	0.00	dy
1950E_2	2.87	83.00	80.13	37.54	1.32	0.50	P2
1950E_2	83.00	92.49	9.49	19.39	1.31	0.25	dy

Hole-ID	From	To	Length	Magnetite (%)	V_2O_5 (%)	Head V_2O_5 (%)	Rock Code
1950E_2	92.49	110.00	17.51	27.79	1.51	0.42	P2
1950E_2	110.00	128.26	18.26	0.00	0.00	0.00	dy
2050E	2.20	45.25	43.05	6.64	0.17	0.01	P3
2050E	45.25	144.00	98.75	4.01	0.29	0.01	dy
2050E	144.00	172.00	28.00	40.18	0.96	0.39	P2
2050E	172.00	180.00	8.00	0.00	0.32	0.00	dy
2050E	180.00	234.00	54.00	41.15	1.11	0.46	P2
2050E	234.00	243.00	9.00	10.66	1.29	0.14	dy
2050E	243.00	327.00	84.00	37.51	1.22	0.46	P2
2050E	327.00	328.97	1.97	0.00	0.00	0.00	dy
2150E	0.00	32.00	32.00	0.00	0.00	0.00	dy
2150E	32.00	64.00	32.00	37.37	0.90	0.34	P2
2150E	64.00	74.00	10.00	0.00	0.00	0.00	dy
2150E	74.00	80.00	6.00	29.20	0.99	0.29	P2
2150E	80.00	137.00	57.00	0.00	0.00	0.00	dy
2150E	137.00	147.00	10.00	32.26	1.35	0.44	P2
2150E	147.00	213.00	66.00	0.00	0.00	0.00	dy
2150E	213.00	246.63	33.63	39.26	1.45	0.57	P2
2250E	0.00	22.00	22.00	0.00	0.00	0.00	dy
2250E	22.00	58.00	36.00	34.97	0.94	0.33	P2
2250E	58.00	180.00	122.00	0.00	0.03	0.00	dy
2250E	180.00	234.00	54.00	36.87	1.26	0.46	P2
2250E	234.00	249.00	15.00	0.00	0.00	0.00	dy
2250E	249.00	306.00	57.00	12.34	0.77	0.10	P2
2250E	306.00	333.00	27.00	15.03	0.96	0.14	P1
2250E	333.00	375.00	42.00	0.00	0.00	0.00	P0
2350E	0.00	20.00	20.00	0.00	0.00	0.00	dy
2350E	20.00	38.00	18.00	12.07	0.67	0.08	P2
2350E	38.00	61.00	23.00	0.00	0.00	0.00	dy
2350E	61.00	85.00	24.00	22.13	0.73	0.16	P2
2350E	85.00	126.00	41.00	0.00	0.00	0.00	dy
2350E	126.00	251.00	125.00	26.46	1.08	0.29	P2
2350E	251.00	278.00	27.00	0.00	0.00	0.00	dy
2350E	278.00	317.00	39.00	10.89	1.21	0.13	P1
2350E	317.00	340.52	23.52	0.84	0.58	0.00	P0
2450E	0.00	21.24	21.24	0.48	0.12	0.00	dy
2450E	21.24	69.68	48.44	25.02	0.72	0.18	P2
2450E	69.68	78.72	9.04	0.00	0.00	0.00	dy
2450E	78.72	130.00	51.28	20.76	0.88	0.18	P2
2450E	130.00	180.00	50.00	0.00	0.00	0.00	dy
2450E	180.00	372.00	192.00	12.60	0.95	0.12	P2
2450E	372.00	411.00	39.00	4.55	0.65	0.03	P1
2450E	411.00	438.00	27.00	0.00	0.00	0.00	P0
250E	0.00	14.17	14.17	0.49	0.15	0.00	dy
250E	14.17	26.00	11.83	38.82	0.85	0.33	P2
250E	26.00	42.00	16.00	0.00	0.00	0.00	dy
250E	42.00	89.00	47.00	29.83	1.26	0.38	P2
250E	89.00	108.00	19.00	17.20	1.39	0.24	P1
250E	108.00	116.35	8.35	10.72	1.44	0.15	dy
250E	116.35	128.00	11.65	20.75	1.51	0.31	P1
250E	128.00	149.97	21.97	2.25	1.20	0.03	dy

Hole-ID	From	To	Length	Magnetite (%)	V_2O_5 (%)	Head V_2O_5 (%)	Rock Code
350E	15.00	39.00	24.00	9.70	0.56	0.05	P3
350E	39.00	69.00	30.00	0.00	0.00	0.00	dy
350E	69.00	108.00	39.00	39.29	0.94	0.37	P2
350E	108.00	114.00	6.00	0.00	0.00	0.00	dy
350E	114.00	150.00	36.00	27.79	1.25	0.35	P2
350E	150.00	175.00	25.00	13.59	1.44	0.20	P1
350E	175.00	186.00	11.00	0.00	0.00	0.00	dy
350E	186.00	213.00	27.00	11.60	1.53	0.18	P1
350E	213.00	246.00	33.00	10.58	1.40	0.15	P0
450E	64.03	95.00	30.97	3.14	0.37	0.01	P3
450E	95.00	100.00	5.00	0.00	0.00	0.00	dy
450E	100.00	142.00	42.00	11.31	0.70	0.08	P3
450E	142.00	188.00	46.00	30.12	0.87	0.26	P2
450E	188.00	195.00	7.00	0.00	0.00	0.00	dy
450E	195.00	243.00	48.00	27.98	1.22	0.34	P2
450E	243.00	251.00	8.00	0.00	0.52	0.00	dy
450E	251.00	263.00	12.00	34.80	1.47	0.51	P2
450E	263.00	310.00	47.00	14.74	1.43	0.21	P1
450E	310.00	325.00	15.00	0.00	0.00	0.00	dy
450E	325.00	337.00	12.00	16.50	1.58	0.26	P1
450E	337.00	368.65	31.65	2.09	0.32	0.01	P0
550E	55.00	81.00	26.00	13.91	0.43	0.06	P3
550E	81.00	111.00	30.00	32.51	0.80	0.26	P2
550E	111.00	132.00	21.00	0.00	0.00	0.00	dy
550E	132.00	141.00	9.00	3.70	1.27	0.05	P2
550E	141.00	147.00	6.00	0.00	0.00	0.00	dy
550E	147.00	156.00	9.00	19.60	1.29	0.25	P2
550E	156.00	174.00	18.00	0.00	0.00	0.00	dy
550E	174.00	237.00	63.00	25.31	1.25	0.32	P2
550E	237.00	312.00	75.00	9.56	1.30	0.12	P1
550E	312.00	344.13	32.13	1.20	0.52	0.01	P0
650E	17.00	73.00	56.00	2.37	0.19	0.00	P3
650E	73.00	85.00	12.00	50.90	0.81	0.41	P2
650E	85.00	108.00	23.00	0.00	0.00	0.00	dy
650E	108.00	120.00	12.00	7.22	0.58	0.04	P2
650E	120.00	143.00	23.00	0.00	0.00	0.00	dy
650E	143.00	163.00	20.00	16.41	0.50	0.08	P2
650E	163.00	185.00	22.00	0.00	0.00	0.00	dy
650E	185.00	206.00	21.00	34.67	1.33	0.46	P2
650E	206.00	274.00	68.00	12.92	1.41	0.18	P1
650E	274.00	351.50	77.50	0.75	0.40	0.00	P0
750E	1.00	53.00	52.00	8.35	0.55	0.05	P3
750E	53.00	82.50	29.50	52.08	0.76	0.40	P2
750E	82.50	143.00	60.50	0.62	0.07	0.00	dy
750E	143.00	150.00	7.00	15.36	0.54	0.08	P2
750E	150.00	173.00	23.00	0.00	0.00	0.00	dy
750E	173.00	216.00	43.00	39.42	1.25	0.49	P2
750E	216.00	224.60	8.60	0.00	0.00	0.00	dy
850E	42.50	64.00	21.50	0.00	0.00	0.00	P3
850E	64.00	89.00	25.00	0.00	0.00	0.00	dy
850E	89.00	152.00	63.00	29.93	0.85	0.25	P2

Hole-ID	From	To	Length	Magnetite (%)	V_2O_5 (%)	Head V_2O_5 (%)	Rock Code
850E	152.00	173.00	21.00	0.00	0.00	0.00	dy
850E	173.00	200.00	27.00	33.93	1.27	0.43	P2
850E	200.00	233.00	33.00	18.78	1.20	0.23	P1
850E	233.00	247.51	14.51	2.53	0.63	0.02	P0
950E	17.00	26.00	9.00	0.00	0.00	0.00	P3
950E	26.00	35.00	9.00	0.00	0.00	0.00	dy
950E	35.00	50.00	15.00	37.96	0.62	0.24	P2
950E	50.00	75.00	25.00	4.40	0.22	0.01	dy
950E	75.00	112.50	37.50	31.74	0.92	0.29	P2
950E	112.50	126.00	13.50	0.00	0.00	0.00	dy
950E	126.00	167.00	41.00	40.18	0.92	0.37	P2
950E	167.00	218.00	51.00	13.79	1.31	0.18	P1

The trenches (pseudo drill holes) are close to horizontal in orientation while the drill holes vary in dip from -37º to -65º. As a result, the relationship between intersected width and true width is variable. It is best shown graphically in Figures 10.4 and 10.5 below, which compares drill holes to the interpreted mineralized solids. All drill hole azimuths are between 320º and 330º, approximately normal to the strike.

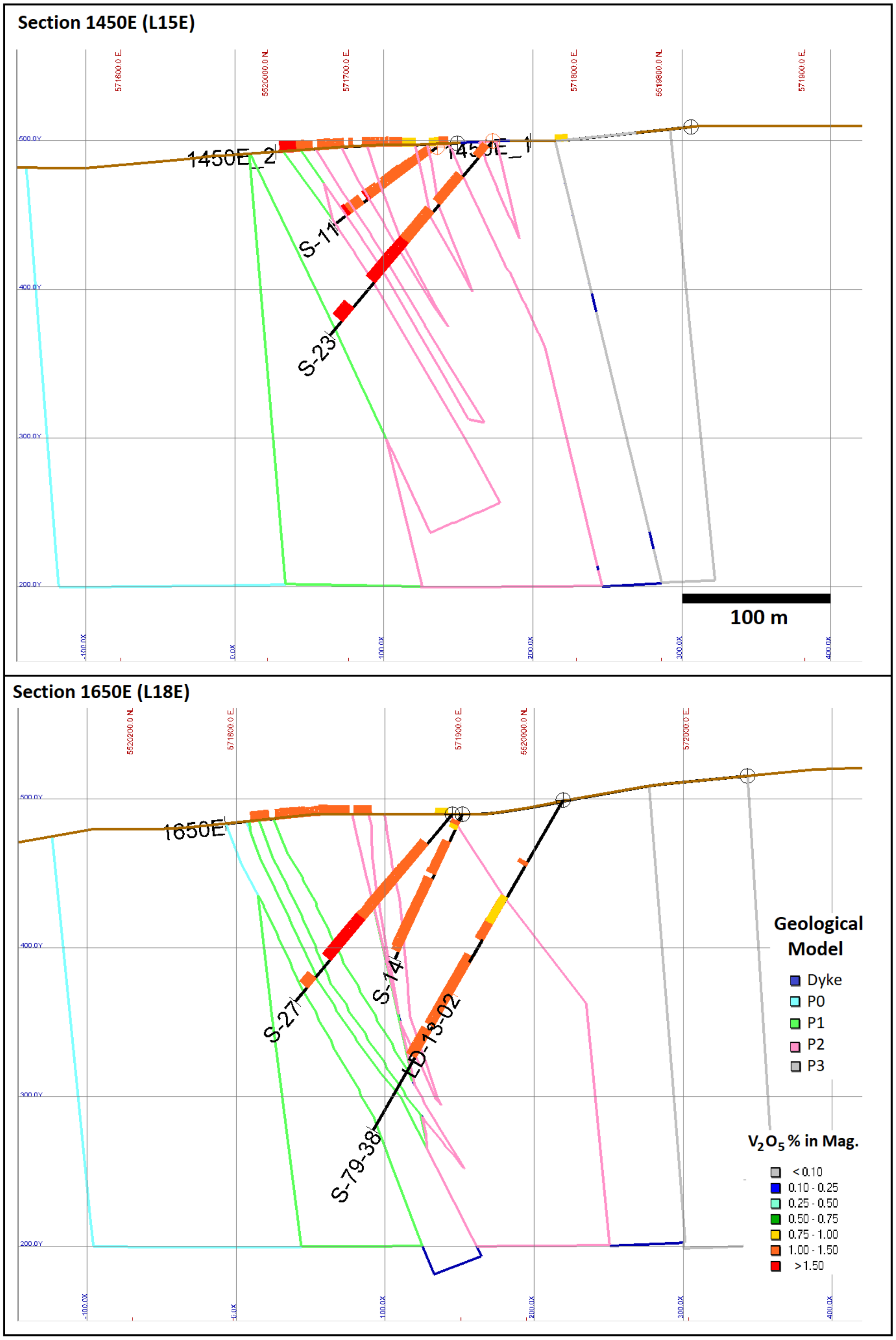
Although the tenor of the vanadium grade in the magnetite tends to decrease stratigraphically upward, as described above, there are no significantly higher grades intervals within lower grade sections of the banded magnetite.

10.12 DISCUSSION ABOUT DRILLING RESULTS

The VanadiumCorp Lac Doré properties include 54 drill holes, mostly from historic drill programs. The majority of these drill holes are located on the Lac Doré property, specifically on the East deposit. Of the 35 holes available on the East deposit, 31 are considered by the QP to be sufficiently documented and reliable to be used for an initial interpretation of mineralized solids. The remaining four holes are not sufficiently documented to be incorporated.

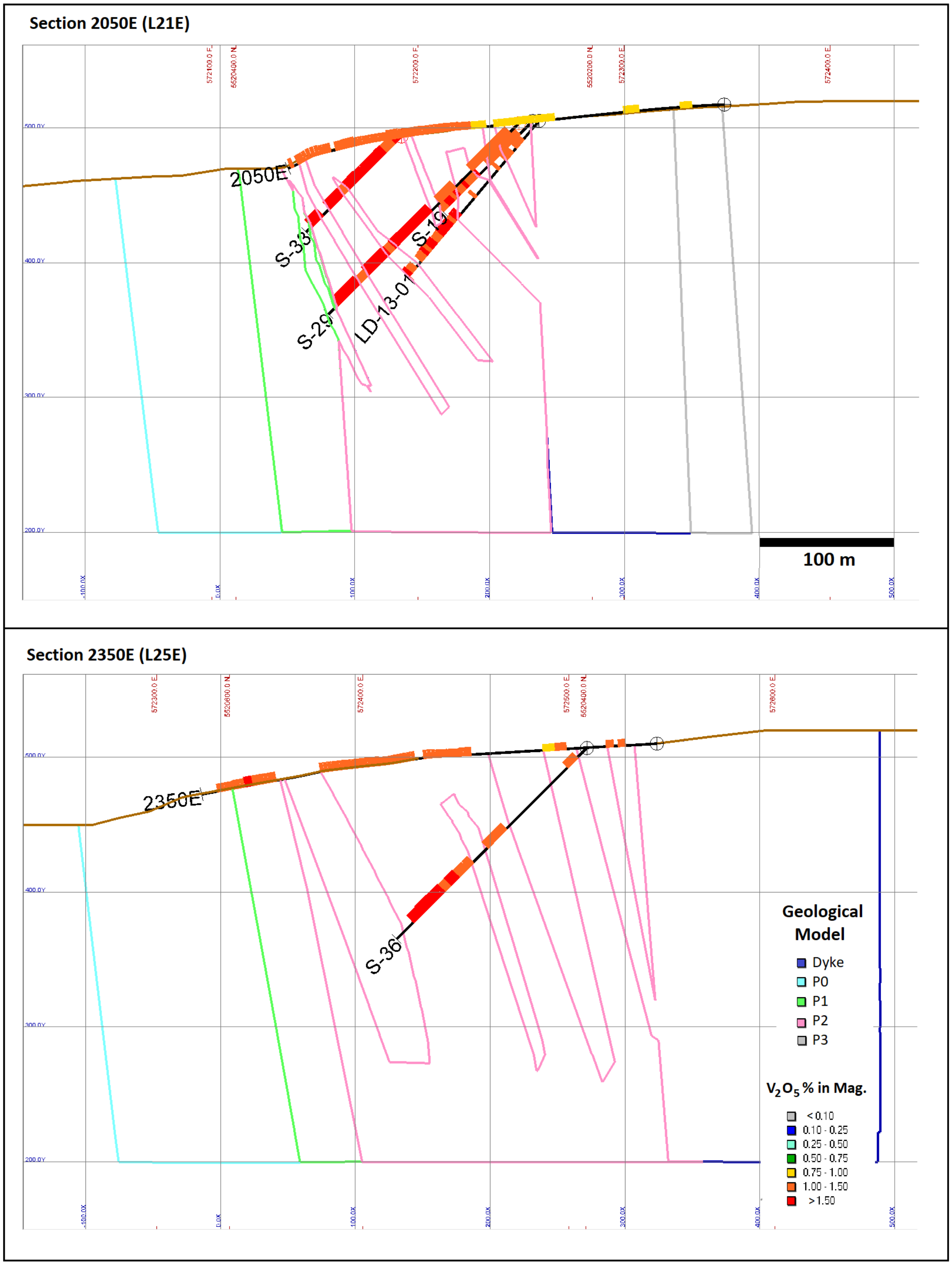
Drilling on the West deposit is sparse with only four holes, two of which are located outside of VanadiumCorp property, and two traversing through the VanadiumCorp and BlackRock properties. Similarly, 11 holes are within the Lac Doré North property, on the Northeastern deposit, seven of which are within a tight cluster. These drill holes provide only a partial interpretation of this deposit.

Figure 10.4
Section Showing Relationship of Drilling and Trenching to Interpreted Mineralization



Source: Micon, 2018.

Figure 10.5
Section Showing Relationship of Drilling and Trenching to Interpreted Mineralization



Source: Micon, 2018.

Most of the holes are located within the P2 unit, which is the dominant body of titanomagnetite mineralization. Only a few drill holes have passed through the entire stratigraphy of magnetite layers, excluding P0 which was not intersected by any drill holes. P0 is intersected in many of the trenches. This is considered to be partially due to the significant thickness of the layers in question and the relatively short drill holes. However, this is not considered to be a hindrance to initial geological modelling as sufficient coverage from nearly continuous trench sampling and mapping, as well as other drill intersections provides sufficient information. Discrimination of stratigraphic units has not been attempted for any drill holes except for the ones drilled in 2001 and 2002 by McKenzie Bay and the 2009 and 2013 VanadiumCorp confirmation drilling. Distribution of stratigraphic units was extrapolated from the surface trenching, where they were carefully mapped, and the information is relatively extensive (Tremblay, 1998). This was simplified by the dykes being of near zero grade.

The drilling an trenching has been used to create a geological model of the mineralized units which should prove useful for future drill hole planning.

The somewhat irregular drilling pattern is enhanced with the regular and thorough mapping and channel sampling conducted by McKenzie Bay and has been reviewed by the QP. Such systematic trenching is not available on the Northeastern deposit and trenches on the West deposit are spaced too far apart to be allow for resource estimation at this time.

Drilling of the Northeastern deposit suggests the deposit is affected by faulting related to the Grenville Front, which creates stacking and truncation of the stratigraphy, in stark contrast to East and West deposits. This interpretation is confirmed by mapping of a large stripped outcrop. Detailed interpretation of the Northeastern deposit has never been attempted. It seems that further to the east, the P2 unit disappears, leaving a thick non-economic P3 unit.

10.13 DRILL CORE STORAGE

The drill core from Trepan Mining and Jalore Mining is considered lost.

The drill core from the MRN was recovered by SOQUEM and was stored at the Niobec Mine storage facility. In 1997, the core, along with the SOQUEM core, was recovered by McKenzie Bay and stored at the Laugon Lake camp site. In 1999, core-racks were built at Laugon Lake, and the core was properly stored. However, it is considered unlikely that the integrity of this core was maintained through time.

The core from the 2001 drill holes completed by McKenzie Bay and SNC-Lavalin was stored at the Laugon Lake camp site. Later, this storage facility was left unattended, and some core was vandalized. The integrity of this core is likely to be partial.

In the summer of 2008, the core stored at Laugon Lake was transferred, in new core boxes with covers and strapped on palettes, to a secured BlackRock facility. Access to the core was denied by BlackRock.

VanadiumCorp drill core is currently stored in racks in the IOS secured facility, located in Saguenay, QC.

10.14 MICON OPINION

While few of the drill holes have down-hole surveys the QP does not consider this to be of significance deterrence to the initial modelling of mineralized solids due to their relatively short depth. Significant deviation is not expected over the short distances. The geological model should prove useful in future drill hole planning.

It is the QP's opinion that the drilling and trenching density is adequate to produce an initial geological model.

11.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

11.1 McKenzie Bay Channel Sampling

All of the channel sampling for McKenzie Bay was completed by IOS personnel using a uniform protocol. Channels of about 4 cm width and depth were cut using diamond saws, parallel to the trench axis. Samples were typically 3 m in length, weighing 10 to 20 kg per sample. Aluminium tags were nailed into the rock for sample location identification. Locations were chained from the line's pickets. Sample length disregarded the geology, except that barren anorthosite dykes were typically not sampled, and was kept as constant as possible.

Samples were chiseled out of the channels, bagged and shipped to Laboratoire S. L. (1997) or IOS facilities (1998) for crushing and grinding. No witness samples were kept, since the trenches are readily accessible. Rejects from crushing were kept temporarily for eventual metallurgical processing but were finally discarded in 2002. It is reported that a rigorous chain of custody was implemented by IOS, due to concerns about tampering in the aftermath of the Bre-X scandal. The program has been audited by various investor and financial fund representatives, who expressed their concern on this issue, specifically since vanadium is hosted in a common mineral (magnetite) and not in a distinctive vanadium mineral as most other metals. The chain of custody was agreed on and on no occasion was access to the samples granted to a client representative or to Glen McCormick. All samples were collected, manipulated, expedited and prepared for assaying by IOS technical staff.

The effect of weathering was tested upon a few samples, by collecting twin duplicates below the initial sample. No discrepancies were noted, and no weathering is noticeable at the surface of the trenches (Tremblay et al., 1998).

11.2 Jalore Mining and Trepan Mining Core Sampling

No information is available on sampling procedures used by Jalore and Trepan although the MRN resampled the core in 1971 at which time some magnetite concentrates were made (Castonguay, 1967).

11.3 MRN Core Sampling

The core drilled by the MRN was BQ in size and was split with a standard knife blade core splitter. The samples were shipped to CRM for assaying. Details on the sampling procedures used are not available, and the rejects were discarded. Depth markers were not inserted in the core boxes, neither were the sample's limits, implying that it would be impossible to properly quarter-split this core to replicate the assays.

11.4 SOQUEM Core Sampling

The core drilled by SOQUEM was BQ in size and was split with a standard core splitter. Samples were shipped to Chimitec in Québec City for assaying. Detailed sampling procedures are available (Dion, 1980), and rejects were discarded. According to IOS' 1997 observations of the core, sample intervals matched what was recorded in SOQUEM's logs, and the split was thorough and properly regular, although sample limit marks and tags were not visible anymore. Contrary to the MRN core, the depth markers were properly located. Various sections of the core were resampled by quarter-splitting (Bédard and Girard, 1998), and submitted to ALS Chemex for confirmation assays. However, due to the multiple manipulations on the core through time, pieces have now shifted in the boxes and exact positions cannot be certified.

11.5 McKenzie Bay Core Sampling

The NQ core from the 2001 and 2002 McKenzie Bay drill programs was split in half on site using a hydraulic core splitter, operated by IOS staff. The samples were bagged and shipped to the IOS facility by internally owned and operated trucks for crushing and pulverizing. As per the 1997 trenching program, access to the core or samples was not granted to the client's representatives. Sampling, up to metres in length, encompassed all magnetite bearing units. This core is now understood to be stored at the BlackRock facility and access to it was denied. A proper chain of custody, similar to that for the channel samples and described in Section 11.1 above, was implemented for the two McKenzie Bay drill programs.

11.6 VanadiumCorp Core Sampling

The NQ core from the 2009 and 2013 drill programs was halved with a diamond saw in a facility rented in Chibougamau. The work was completed by Glen McCormick Exploration staff, a non-independent contractor. The QP at the time, in the course of his visit, witnessed the core as being properly sawn and the samples to be in their correct position. The samples were bagged by McCormick staff and shipped to the CEAQ-TJCM facilities for crushing and pulverizing. This core, the coarse crushing rejects as well as the pulps are now stored in the IOS facility at Saguenay. Coarse rejects from the 2013 program were aliquoted to 1 kg. This aliquot was used for re-assaying and Davis tube testing by IOS (Ivanov, 2015). No chain of custody was implemented by VanadiumCorp or Glen McCormick. The CEAQ-TJCM is known to be an independent public organization and to have a rigorous chain of custody protocol. One was also implemented in the IOS facility as described above.

11.7 Sample Security and Tampering Issues

The historical drilling programs were sampled either by a government or a crown corporation representative, and falsification of the sample results is not considered to be a concern.

Since the 1997 trenching program of McKenzie Bay was carried out in the aftermath of the Bre-X scandal, much care was devoted to sample security. Samples were trucked by IOS employees to the IOS or Laboratoires S. L. preparation facilities, and preparation was done under IOS supervision (Bédard et Girard, 1998). Crushing and grinding was performed with a jaw crusher and a roll mill or a disk mill, prior to being aliquoted with a riffle splitter. Samples were shipped to the assaying laboratories by national courier. Tampering issues are not considered to be problematic considering the size of the sample, the abundance of vanadium and it's embedding in the magnetite structure. McKenzie Bay representatives did not access the samples in the course of the programs.

Samples from VanadiumCorp drilling programs were collected by Mr. Glen McCormick, a local prospector and contractor, who was granted securities from the same company. Thus neither Mr. McCormick nor his employees are considered independent. All core samples were reassayed under the supervision of IOS, including hand held XRF (HH-XRF) confirmation testing prior to shipment to the laboratory by national courier.

11.8 HEAD GRADE ASSAYS AND QA/QC

Core samples from the various drilling programs were assayed using different methods and laboratories (Table 11.1). Jalore Mining and MRN did not report any quality control procedures. SOQUEM conducted a proficiency test comparing the various laboratories but did not insert reference materials. Their assays are considered to be internally consistent, but not necessarily accurate.

In 1997 McKenzie Bay implemented a proper quality control system, including a proficiency test and the systematic insertion of certified as well as internal reference materials (Bédard et Girard, 1998). The protocol was respected by subsequent historic drilling programs. McKenzie Bay also resampled earlier SOQUEM drill core in an effort to complete a reconciliation of both sets of assays. The results were ambiguous, suggesting previous SOQUEM assays underestimated the vanadium content by a fraction of a percent.

Table 11.1
Compilation of Head Grade Assays and Davis Tube Testing for the Various Programs

Program	Year	Samples	Laboratory	Method	Davis Tube	Laboratory
Jalore	1953	361	Jalore		124	CRM
MRN	1971	122	CRM	XRF	109	CRM
MRN	1973	274	CRM	XRF	270	CRM
SOQUEM	1979	691	Chimitec	AA	150	CRM
MKBY	1997	1347	Chemex Lab	ICP-AES	481	IOS/COREM
MKBY	2001	497	Not assayed		166	IOS/COREM
MKBY	2002	107	Chemex Lab	ICP-AES	0	
Apella	2009	254	ALS-Chemex	ICP-AES	0	
PacOre	2013	210	COREM	XRF	109	IOS/COREM

Numbers encompass the entire historic database, thus including some segments of core and channel samples located on BlackRock property.

11.9 DAVIS TUBE TESTING OF MRN AND SOQUEM SAMPLES

Davis tube testing is a standardized method for magnetite recovery, extensively used by the iron ore industry. By this method magnetite can be recovered from a finely pulverized material, with excellent recovery and cleanliness. This method is reputed to emulate results from magnetite concentration circuits in a mill. Almost all samples from the various drill and trench programs were tested this way, with the exception of the 2002 confirmation holes of McKenzie Bay. The performance of the Davis tube magnetic separation is sensitive to liberation, and therefore to the grain size distribution of the feed. As for head grade assays, magnetite concentrate assays are sensitive to analytical methods. Slightly different procedures were used for samples from MRN and SOQUEM and for subsequent samples from McKenzie Bay and VanadiumCorp.

Samples from the MRN and SOQUEM drill holes were tested for their titanomagnetite content by Davis tube at CRM. The tests were conducted, in most instances, on composite samples representing intervals up to 10 m. Little detail is available on instrument settings, other than the testing was performed on material ground with a dry ball mill until reaching 60% passing 200 mesh, using a 15 g aliquot, 2 amperes current and a 10-minute wash. A standardized protocol is expected.

No grindability or liberation tests are available, which does not mean they were not conducted. Magnetite concentrates were assayed for iron, titanium and vanadium. No measurement of the remaining silica and lime is available, estimates of which are required for summation to 100% (Figure 11.1).

Most of these tests were conducted as complete individual metallurgical tests, providing head grade, concentrate and reject analyses, except for the MRN samples where only 20% of samples were submitted to such a metallurgical balance (Richard, 1975), thus allowing calculation of mass balances. Procedures between batches should be identical, although such details cannot currently be assessed. Assaying of the concentrates was made by X-ray fluorescence (XRF) on a borate glass bead by CRM. A limited number of samples (17) were reassayed in 1999, by CRM, on behalf of Cambior, yielding a regression coefficient of 78%.

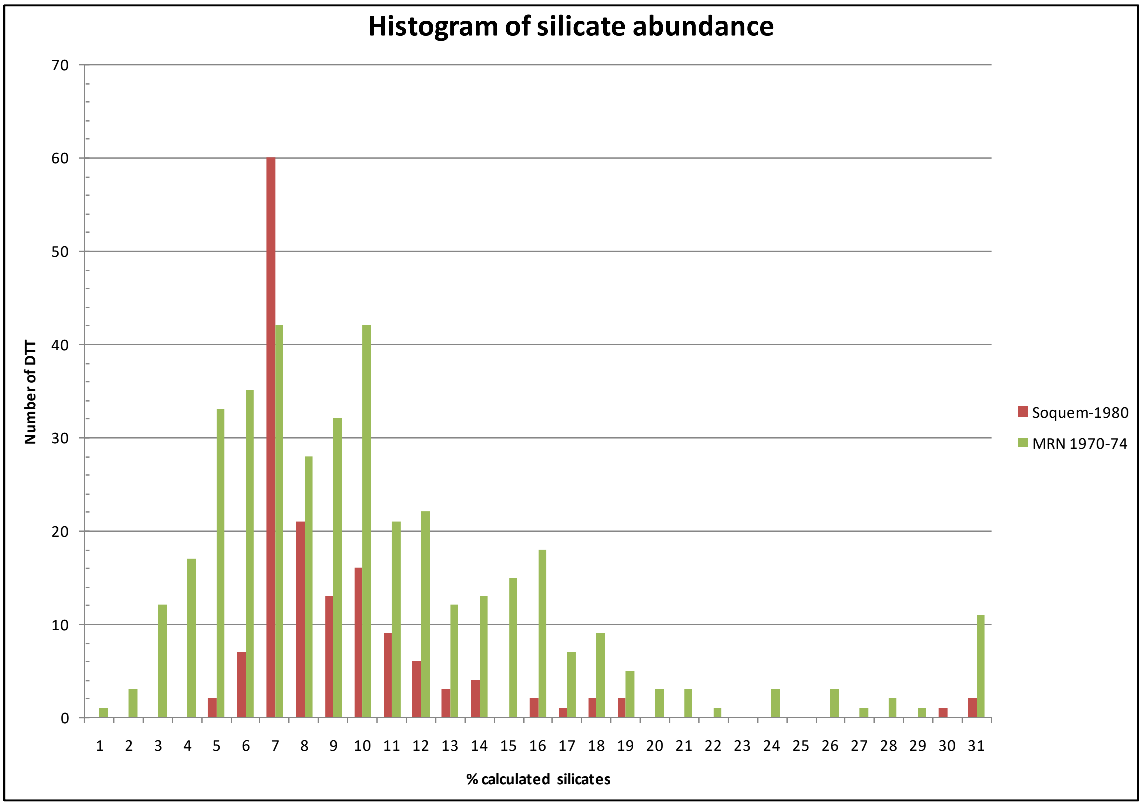
No liberation or grindability study is available to support the results. No laboratory accreditation existed at the time of the programs.

11.10 DAVIS TUBE TESTING OF MCKENZIE BAY CHANNEL SAMPLES

In early 1999, IOS was mandated by McKenzie Bay to initiate titanomagnetite concentration tests on their channel samples with the use of the Davis tube. An extensive series of tests were carried out to assess the best protocol for grinding, concentration and assaying (Girard, 2000), the specifications of which were maintained for subsequent programs. Grain size after milling was tested, adjusting the mill plate spacing and the material recycling in order to maximize liberation and minimize fineness and silica contamination. Optimum performance required 90% <100 µm milling, which was controlled with by conventional sieving.

Production of magnetite concentrates was contracted to IOS by Cambior later in 1999. Adjacent sample aliquots were typically combined in groups of three, in order to represent intersections of about 6 to 9 m. Proportions used for combining proceeded based on the number of samples only, which were not weighted according to sample length, according to Cambior’s instruction. Magnetite separation with a Davis tube involved a complex procedure with multiple passes using increasing magnetic field strength and water flow rates, and systematic quality control under a microscope to ensure an appropriate amount of liberation. Magnetite concentrates and tails were shipped back to Cambior.

Figure 11.1
Distribution of Silicates in Titanomagnetite Concentrates Obtained from Davis Tube Testing

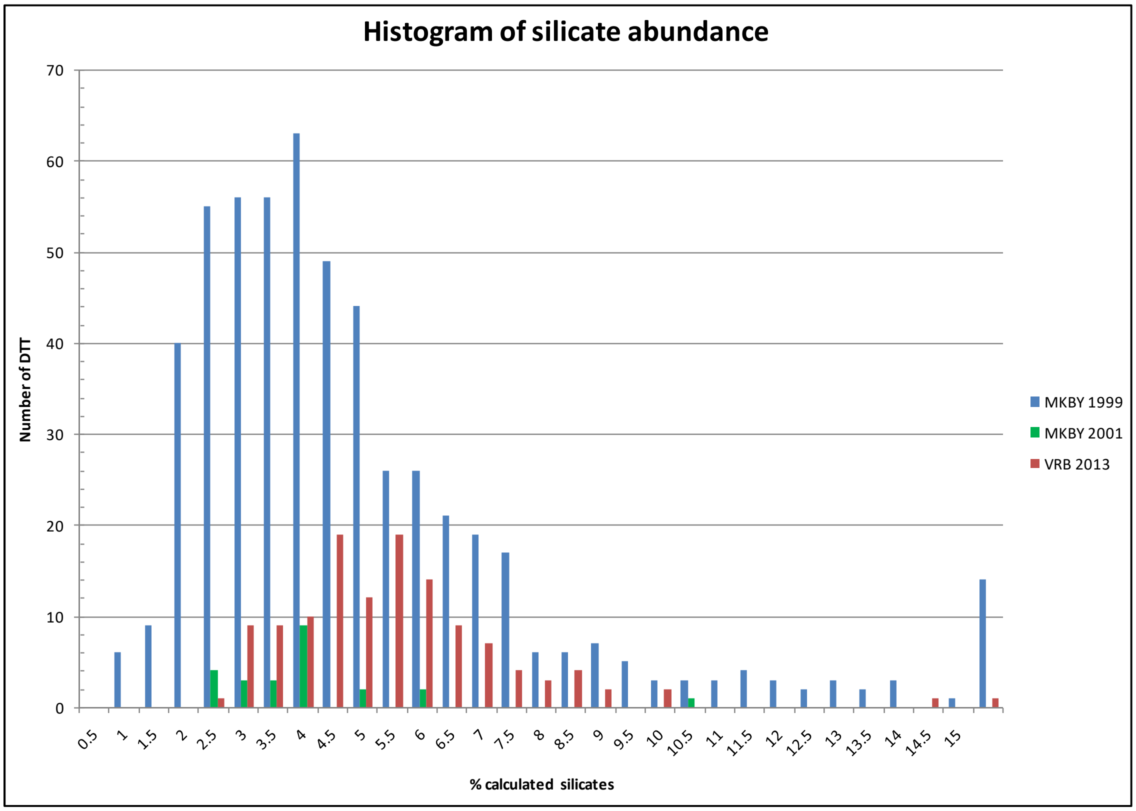


Distribution of silicates in titanomagnetite concentrates obtained from Davis tube testing (DTT), as calculated by the non-summation to 100% of the iron, titanium and vanadium assays. Note that MRN 1970-74 and SOQUEM 1980 testing were not conducted according to the same procedure, the titanomagnetite from MRN concentrates being less liberated. The maximum silicate abundance is elevated, with a mode of 7%, suggesting about 4-5% silica.
Source: IOS, 2018.

From the 1,347 samples, 481 titanomagnetite concentrate composites were made, of which 401 are from the East and West deposits. Sample aliquots were milled to 100 µm (150 mesh), and the titanomagnetite separated with the Davis tube according to a complex protocol and reprocessed until quality specifications were met (i.e. <4% silicates in the concentrate, <10% magnetite in the rejects, <5% losses, and >5 g magnetite, Villeneuve, 2000).

Concentrates and rejects were shipped to Cambior. Analyses were made at COREM using XRF on fused borate glass beads for the titanomagnetite concentrates and the non-magnetic rejects, as well as atomic absorption for vanadium (only on head grade). A subset of samples of titanomagnetite concentrate was also analysed by neutron activation (NAA) at Activation Laboratories (Actlabs). Titanomagnetite concentrates were assayed for all major oxides, yielding an average of 1.95% SiO_2 and 0.32% CaO (Figure 11.2). Fineness of grinding is suspected as the main cause of the discrepancy. No metallurgical study has yet been conducted to assess the issue.

Figure 11.2
Distribution of Calculated Silicates Retained in Magnetite Concentrates after Processing by Davis Tube



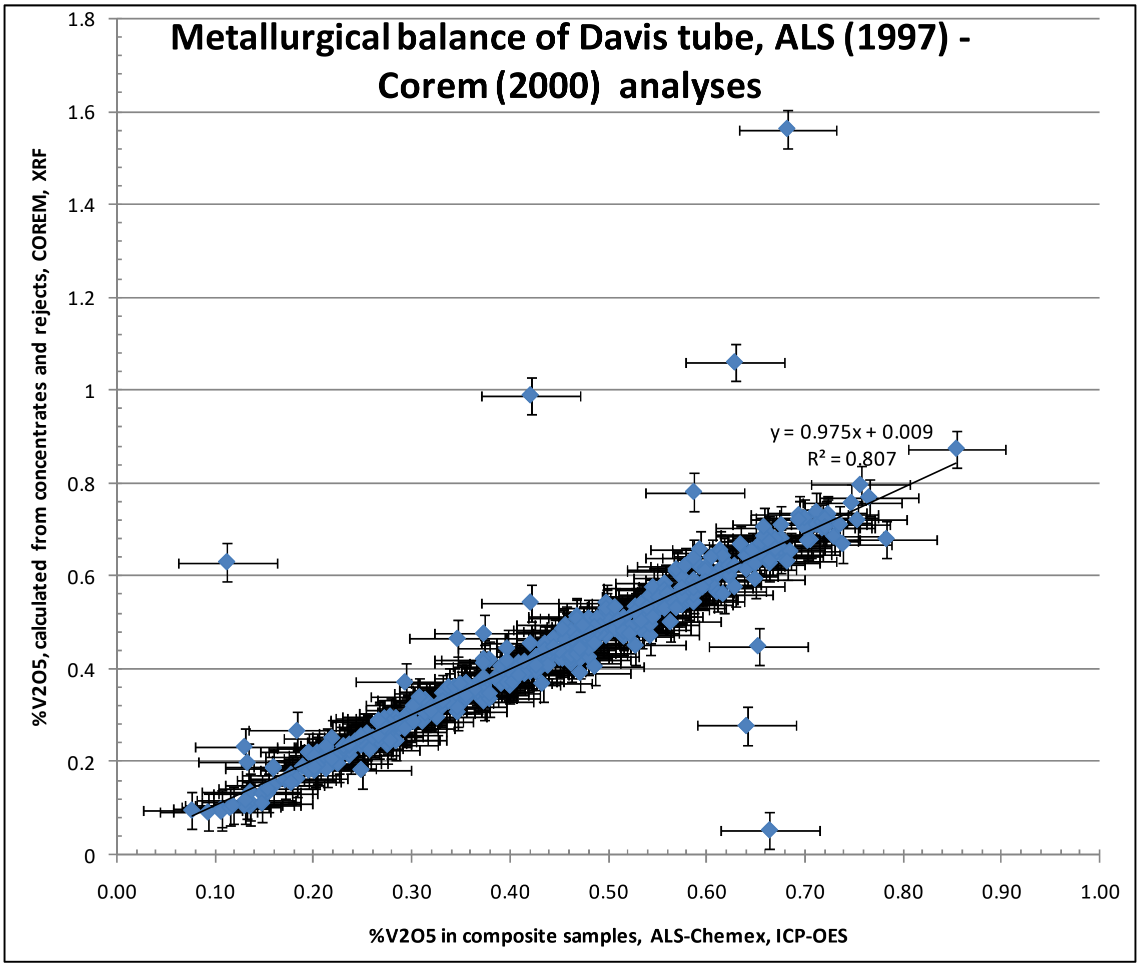
Source: IOS, 2018.

Davis tube magnetite concentrates were prepared by IOS for the Cambior (1999), McKenzie Bay (2001) and VanadiumCorp (2013) samples, prior to shipment to the laboratory for analysis. VanadiumCorp employees did not participate in any sample preparation. The sample preparation methods and quality control measures employed before dispatch of samples to the analytical or testing laboratory, the method or process of sample splitting and reduction, and the security measures taken are explained elsewhere in this Section and Section 10.0.

The abundance of titanomagnetite was also measured in the McKenzie Bay 1999 samples with the use of a magnetic susceptibility meter, or “Satmagan” (saturation magnetic analyzer), by COREM. The correlation between Satmagan and Davis tube testing is noisy and presents a bias.

Since the non-magnetic fractions were submitted to analysis, a metallurgical mass balance can be calculated. Theoretically, the amount of vanadium in the head sample should balance with the amount of vanadium in the magnetite concentrate plus the amount of vanadium in the non-magnetic rejects. The discrepancies are close to the analytical errors for both the composite samples assayed by XRF at ALS-Chemex and at COREM (Figure 11.3) as well as the samples assayed at Actlabs by NAA. About 6% of the composite samples show some discrepancies. Older CRM Davis tube tests indicate both concentrate, head grade and tails analysis, but it is uncertain if these were analyzed or calculated (Durocher, 1980), their mass balance being perfect.

Figure 11.3
Comparison of Vanadium Metallurgical Balance Calculated from Magnetite Concentrates and Rejects vs. Composite Sample Head Analyses.



Results are within the error of the analysis, which is estimated at 0.05% V_2O_5 for the composite samples and at 0.04% for the metallurgical balance calculated from concentrates and rejects. Note that 0.3% of test results are erratic.
Source: IOS, 2018

A thorough quality control system was implemented by Cambior for assays, either for magnetite concentrates, for head samples or for non-magnetic rejects (Crépeau, 2000). About 2% of samples were certified reference material, including the ones used by IOS to certify the head grade assays (SARM-12 at 0.093% V_2O_5 or 520 ppm V and JSS-831-1 at 0.535% V_2O_5 or 3,000 ppm V), all results being within tolerance limits. Cambior also had three internal reference materials (IRM) manufactured at COREM, for both head grade materials and titanomagnetite concentrates. These were made from Lac Doré mineralized material and certified only for their vanadium content (MRI-99-08 at 1.18% V_2O_5, MRI-99-09 at 0.49% V_2O_5 and MRI-99-10 at 0.65% V_2O_5). Their IRMs were inserted so as to represent about

10% of the population. Averages obtained from the assays of these IRMs were slightly overestimated compared to certified value.

Finally, 95 analytical duplicates were assayed at COREM, with variations within tolerance.

Samples collected from the McKenzie Bay drill holes in 2002 were not submitted for Davis tube testing. Conversely, samples collected from the McKenzie Bay drill holes in 2001 were submitted for Davis tube testing in 2003 but were not sent for head grade analysis. Of these programs, only 26 concentrates were produced from drill holes located within VanadiumCorp properties. They will not likely be included in any future mineral resource estimate being located outside of the East and West deposits.

IOS does not have laboratory certification. COREM was, at the time of the program, an ISO-9001 accredited facility. However, it did not have the ISO-17025 accreditation for vanadium assays. Quality control of Davis tube concentrate is a complex task summarized below.

11.11 Davis Tube Testing of VanadiumCorp Core Samples

Samples from the 2009 drill core were not tested for the magnetite content by Davis tube.

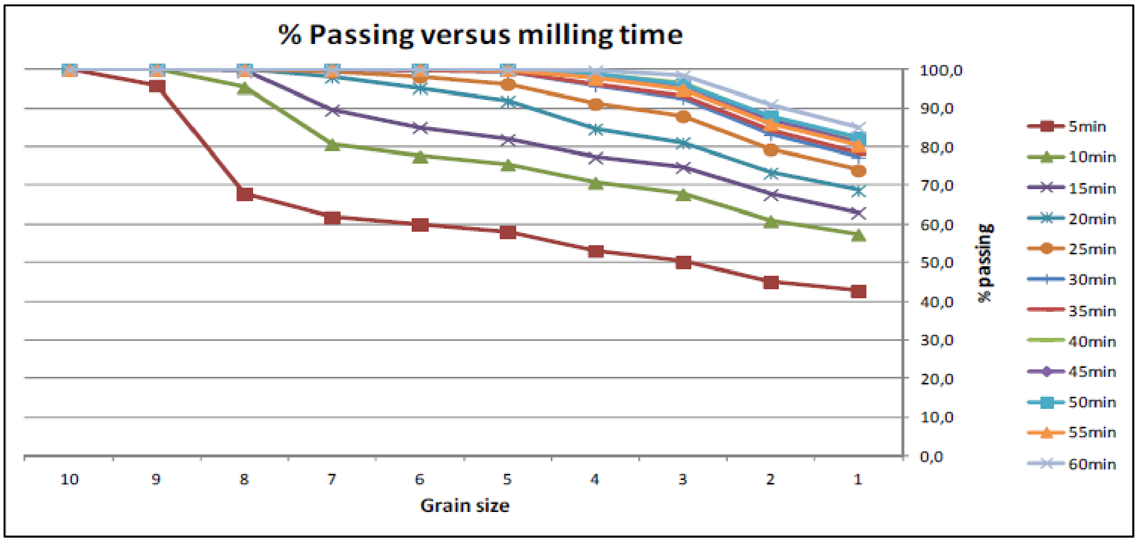
Samples from the 2013 confirmation drill program were recently tested by Davis tube (Ivanov, 2015). The magnetic concentration of 109 samples out of the 210 available was conducted by IOS. The separation process was somewhat different from the 1999 one, using a simplified procedure in better accordance with industry practice and developed in the course of a large iron-ore project. Analysis of the magnetite concentrates was conducted by COREM by means of XRF on fused borate glass beads. The samples were not composited, but only samples with sufficient iron grades were processed.

A liberation study was conducted (Figure 11.4), by pulverizing the material with laboratory rod mills for variable processing times ranging from 5 to 60 minutes. An efficient liberation was reached after 45 minutes of milling in which the grain size of the particles reached 97.4% less than 75 microns. Not much improvement was observed by longer milling time with the titanomagnetite concentrate giving a maximum of 63.59% Fe (Ivanov, 2015). Routine milling of the sample was conducted using the same rod mills with unalloyed carbon steel barrels and rods to prevent contamination from vanadium-steel alloys.

Titanomagnetite was concentrated from samples ranging between 5 and 50 grams using a 3,200-gauss magnetic field, which is somewhat more intense than usually used. The concentrates contain an average of 1.7% SiO_2. No recycling procedure was implemented to improve concentrate purity.

The quality control procedures included the calculation of metallurgical mass balance, purity evaluation through microscope examination of concentrate and tails, reprocessing of 10% of tails, and an HH-XRF analysis of concentrates and tails of every sample.

Figure 11.4
Grindability Curves Obtained by Laboratory Rod Mills on VanadiumCorp Samples.



Davis tube testing of the material indicates that titanomagnetite purity reaches a plateau after 45 minutes of milling.
Source: IOS, 2018.

11.12 DENSITY MEASUREMENTS

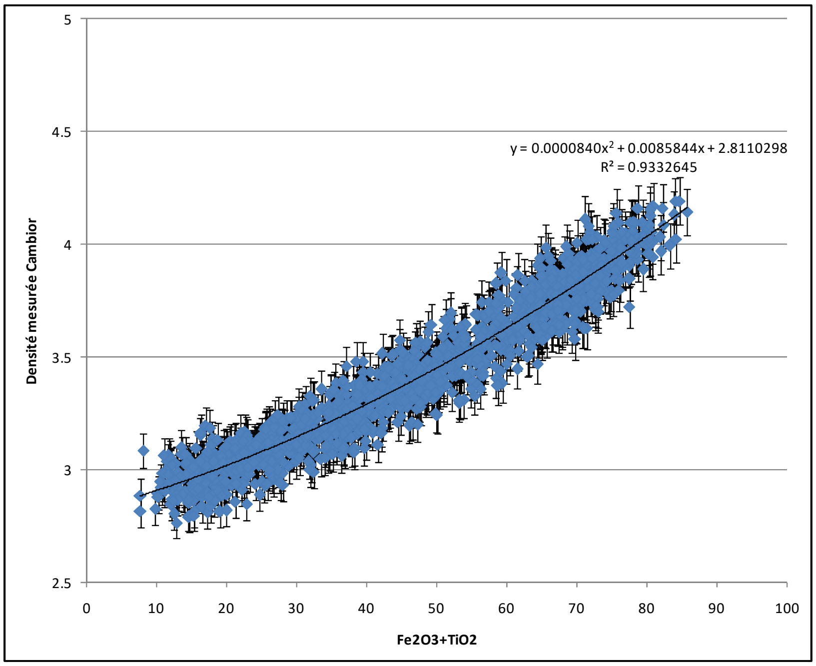
Accurate density measurement is essential for the estimation of mineral resources in iron mineralization. Density may vary from 2.65 g/cm^3 in a barren silicate rock to 5.15 g/cm^3 in pure magnetite. Using an average density over the deposit instead of real measured density on numerous samples can significantly underestimate the total resource.

No reliable density measurements were made by the MRN. All measurements reported by Kish (1971), Avramtchev (1975), Dion (1980) and Nolet (1980) used selected samples not corresponding to core intervals. Density measurements were made by SOQUEM, using a protocol considered to be deficient.

Cambior measured the density of 1,689 samples from the 1997 McKenzie Bay channel samples on crushed material (Crépeau, 2000). An aliquot of the crushed material was weighed and immersed in water in a graduated cylinder to calculate its volume. The comparison between the measured density and the iron plus titanium content indicates about 15% of the population showing a discrepancy of more than 7%. If such measurement discrepancies are considered as manipulation or typing errors and are removed, the regression coefficient (R^2) is improved to 93% (Figure 11.5). The density is then best calculated by the following equation:

$$SG = 0.0000677\ (Fe_2O_3 + TiO_2 + V_2O_5)^2 + 0.009832\ (FeO_3 + TiO_2 + V_2O_5) + 2.78977841$$

Figure 11.5
Comparison of Density Measured by Cambior and Iron Plus Titanium Weight %



A regression coefficient (R^2) of 93% if the discrepant samples are removed. An equation can be drawn to calculate density. Error bars are calculated from the precision of the various measurements.
Source: IOS, 2018.

11.13 MICON OPINION

Given the very high magnetite content of the mineralization security of the core prior to sampling does not seem to be an issue as "salting" would be impractical.

IOS has expressed some concern and made certain observations about the relative accuracy of some of the older analyses compared to the newer ones. These concerns have generally been expressed as possibilities.

Some variation in analyses is inevitable as sampling and analytical error cannot be totally eliminated. Based on analyses and observations presented in Section 12.0 below, it is the QP's opinion that while certain irregularities and inconsistencies have been found in the sampling and analyses described above, the results can be used to make a preliminary geological model useful for drill planning.

Certain additional recommendations are made in Section 26.0 in order to advance this project to mineral resource status.

12.0 DATA VERIFICATION

The QP has reviewed the data validation completed by previous consultants to VanadiumCorp. In addition, the QP has visited the Lac Doré property and IOS offices as described below.

12.1 SITE VISIT

The QP completed a site visit to the offices of IOS and the Lac Doré field site on May 22 and 23, 2018.

During the trip the QP visited the extensive trench locations on the East and West deposits and confirmed the presence of channel sampling and aluminum sample markers on the outcrop. The QP also reviewed and confirmed the lithological mapping of the trenches and the nature of the mineralization and diluting anorthosite dykes compared to the geological model being presented.

Several more recent drill hole collars were found on the property, and their locations were confirmed by GPS.

The QP also visited the trenches on the Northeast deposit to see the structural folding and faulting caused by the nearby Grenville Front.

IOS's offices, warehouse and laboratory were visited to review the equipment and procedures used for core logging and Davis tube testing. Two drill holes from the 2013 drill program were laid out and their logging and lithologies were checked against the drill logs. No discrepancies were found.

At the IOS offices several reports for assessment work or other internal purposes were reviewed.

Due to the lack of access to the core from older drill programs described above the QP was unable to review that core.

The QP found no significant issues with the work conducted.

12.2 GEOLOGICAL MODEL REVIEW

The QP reviewed the geological model and the informing mapping and sampling data during a long video conference call with M. D'Amours. The geological model was found to be a reasonable representation of the current informing data.

The lack of precise drill hole survey information for the older drilling noted above, means that there may be some variance in the mineralized volumes of the geological model. However, the unit contacts are well established in the trench mapping and the geological model should be suitable for future drill hole planning.

12.3 CHECK SAMPLING

Due to the late spring and the heavy snow pack, access to the project site only became available in late May, 2018. There was still some ice on the lakes and frequent patches of snow in the bush at the time of the visit. However, the access road and trenches, along with any other areas with good sun exposure were clear and accessible.

Three grab samples from magnetite-rich bands in the P1 and P2 units were collected during the field visit.

Given that review of the project's data was well underway at that time, it was considered unlikely that quantitative analytical results for these check samples would be returned in time for inclusion on the original scheduled date for this report. Consequently, it was decided to use a portable, hand-held XRF analyser (Thermo Scientific, Model Niton XL3t), owned by IOS, to confirm that the samples collected contain significant vanadium. Instrument readings were completed by an IOS employee under the QP's direct supervision at all times.

Limitations of this analytical method include known interference issues with chromium and titanium when analysing for vanadium, and the narrow window and sampling depth of the hand-held unit, such that readings are taken from only a few grains of magnetite. Consequently, the QP is of the opinion that, although the XRF analyser results are read as a percentage vanadium content, those values should not be disclosed as a quantitative measure but should be used simply to determine whether the magnetite present at Lac Doré was significantly vanadiferous, and that the instrument was capable of determining this.

The XRF did determine that the magnetite was enriched in vanadium. While the readings are from a relatively small area of the hand sample, they confirm that the magnetite at Lac Doré contains anomalous amounts of vanadium, at approximately the grade expected. In addition, as previously reported, the sampling shows that the magnetite in the P1 unit is richer in vanadium than that in the P2. Note that these analyses are of intact rock samples which have not undergone crushing, grinding and magnetic upgrading. However, they are from bands observed to be rich in magnetite.

12.4 DATA ENTRY CHECKS

Scanned assay certificates from COREM were manually compared against the assay table entries in the sample database. 106 samples from four batches belonging to four VanadiumCorp drill holes (LD-13-01, LD-13-02, LD-13-03 and LD-13-04) were checked. No discrepancies were found.

12.5 OTHER CONSIDERATIONS

While certain irregularities and inconsistencies have been found in the drill hole surveys and sampling and analyses of a portion of the data described above in Sections 10.0, 11.0 and 12.0, it is the QP's opinion these data are sufficient to justify further exploration of the property in light of the mineral resource and mineral reserve declared by BlackRock on the same magnetite beds of the Lac Doré intrusive on the adjacent claims (see Section 23.3).

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

It is reported that extensive metallurgical testing on Lac Doré mineralization, including bench and pilot scale programs by various independent laboratories, has been carried out by past owners of the project and the Québec Department of Natural Resources (Ministère des Richesses Naturelles du Québec [MRNQ]). The QP has not verified those results.

14.0 MINERAL RESOURCE ESTIMATES

There are no mineral resources to disclose for the Lac Doré Project at this time.

15.0 MINERAL RESERVE ESTIMATES

There are no mineral reserves to report for the Lac Doré deposit at this time.

16.0 MINING METHODS

This section is not applicable to a property of merit report.

17.0 RECOVERY METHODS

This section is not applicable to a property of merit report.

18.0 PROJECT INFRASTRUCTURE

This section is not applicable to a property of merit report.

19.0 MARKET STUDIES AND CONTRACTS

This section is not applicable to a property of merit report.

20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

This section is not applicable to a property of merit report.

21.0 CAPITAL AND OPERATING COSTS

This section is not applicable to a property of merit report.

22.0 ECONOMIC ANALYSIS

This section is not applicable to a property of merit report.

23.0 ADJACENT PROPERTIES

The Lac Doré and Lac Doré North properties are located in the vicinity of the Chibougamau mining district. The area has experienced intense exploration activity in the past and recurrent waves of staking. The VanadiumCorp properties are currently enclosed within and surrounded by claims of various other companies except to the north of the Lac Doré North property (see Figure 23.1).

23.1 LAND AVAILABILITY

The area encompassing the 17 km-long aeromagnetic anomaly associated with the magnetite layers is currently entirely covered by either VanadiumCorp or BlackRock claims. VanadiumCorp's Lac Doré property is surrounded by the BlackRock property, while Lac Doré North is partly enclosed.

23.2 PROPERTIES IN CONFLICT

No dispute of claims is currently reported in the vicinity of the Lac Doré and Lac Doré North properties.

23.3 SURROUNDING PROPERTIES

23.3.1 BlackRock Metals Inc.

BlackRock holds 308 map-designated cells, for 52 km^2, covering the Southwest and Armitage Deposits, as well as surrounding lands for exploration or infrastructure. These claims include the area currently under request for a mining lease (Renvoi au Ministre #41080, registered December, 2014). Their titles are reported to be in good standing and well managed.

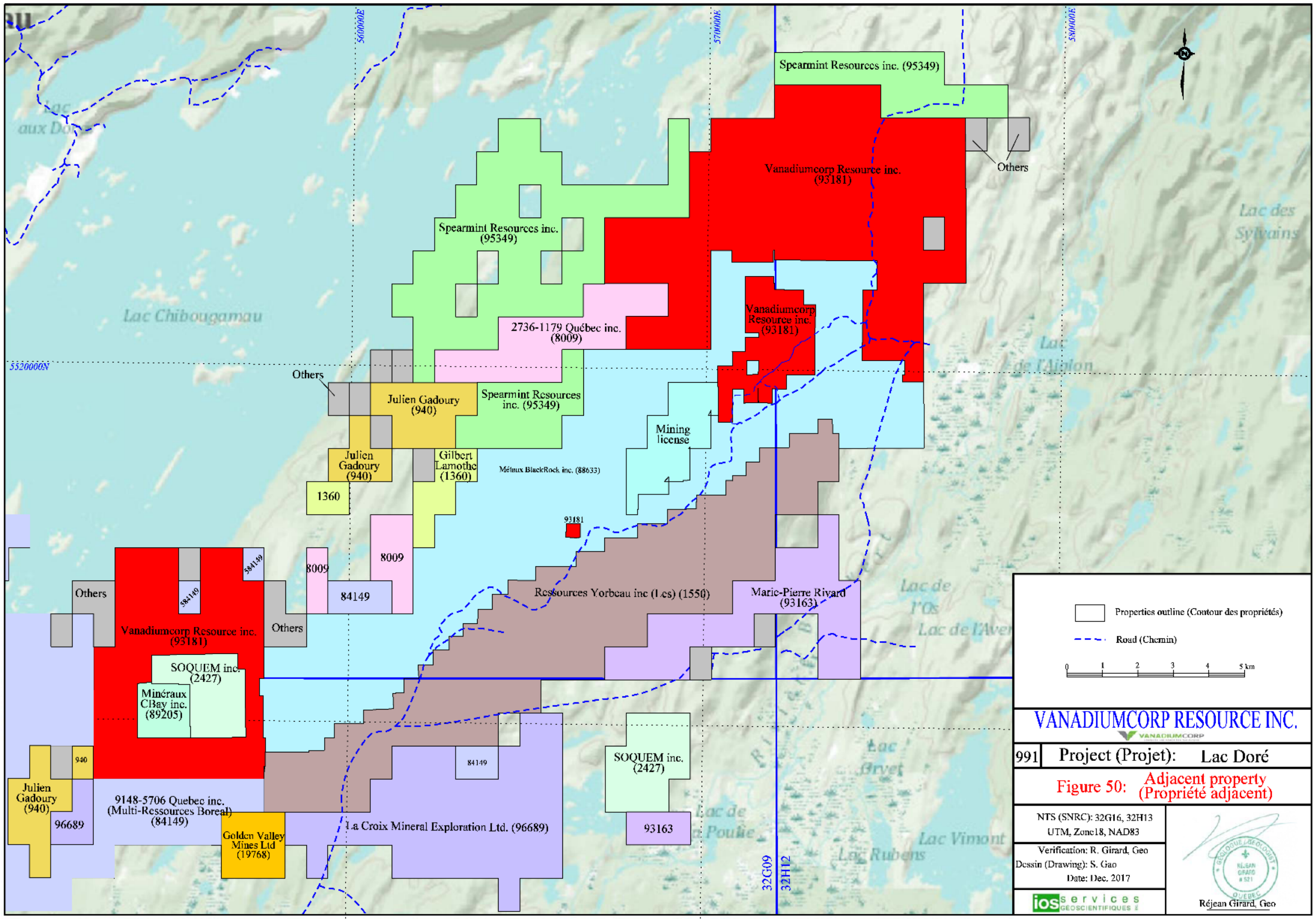
BlackRock conducted important stripping and drilling efforts in order to estimate a mineral resource on the Southwest and Armitage Deposits, and are currently reported to be updating a feasibility study for the construction of a mine producing vanadiferous titanomagnetite (VTM).

A strip of claims to the south of initial BlackRock property, was acquired by BlackRock from Cogitore Resources (Cogitore press release, November 7, 2014).

Work conducted by BlackRock and available in the assessment files includes:

- The Southwest deposit was trenched (1,638 m, 2009) and drilled (103 holes for 23,066 m in 2010, 2011 and 2012).
- The Armitage Deposit was trenched and drilled (81 holes for 18,763 m (2011 to 2012).

Figure 23.1
Adjacent Properties



Source: IOS, 2018.

The BlackRock environmental and social assessment study, conducted by Entraco Groupe-Conseil, was published by the Canadian Environmental Assessment Agency (Federal Agency) in May, 2013 (www.ceaa-acee.gc.ca/050/documents_staticpost/62105/90328/vol1-eng.pdf). It contains limited information regarding the proposed mine and its resources.

On April 9, 2018 BlackRock filed on SEDAR (www.sedar.com) a Technical Report summarizing the result of a feasibility study, dated June 20, 2014. The study was prepared by BBA in cooperation with Lamont Expert Conseil, SGS and Journaux Assoc. (Allaire et al. 2014). Despite BlackRock's private company status, the Technical Report was filed at the request of the Autorité des Marchés Financiers (AMF).

BlackRock reports that, while the Technical Report has an effective date of September 20, 2013, and was signed on June 20, 2014, since its preparation the project has been redefined at a lower magnetite concentrate production tonnage that is shipped exclusively to a second transformation plant to produce high purity pig iron and ferrovanadium. The development plan for the project has been redefined, as were the schedule, financial assumptions and the general economic context.

The reported mineral resource estimates for the two deposits are shown in Table 23.1 and Table 23.2.

Table 23.1
Mineral Resources - Southwest Zone
(At a 6% Satmagan cut-off)

Cat.	Vol. (Mm^3)	Ton. (Mt)	Dens. (t/m^3)	% Sat	% TiO_2	% V_2O_5	% Fe_2O_3	% Al_2O_3	% P_2O_5	% S
Meas.	54.6	193.2	3.54	15.4	7.0	0.43	37.6	13.8	0.034	0.17
Ind.	13.0	46.4	3.56	15.7	7.3	0.42	38.4	13.4	0.034	0.18
M+I	67.6	239.6	3.54	15.5	7.0	0.42	37.8	13.7	0.034	0.17
Inf.	13.9	49.8	3.59	16.6	7.7	0.44	39.7	12.9	0.034	0.18

Table 23.2
Mineral Resources - Armitage Zone
(At a 6% Satmagan cut-off)

Cat.	Vol. (Mm^3)	Ton. (Mt)	Dens. (t/m^3)	% Sat	% TiO_2	% V_2O_5	% Fe_2O_3	% Al_2O_3	% P_2O_5	% S
Meas	53.7	187.5	3.49	13.7	6.6	0.38	34.7	14.8	0.028	0.28
Ind	11.0	38.5	3.50	13.5	6.9	0.37	35.0	14.5	0.026	0.33
M+I	64.7	226.0	3.50	13.7	6.7	0.37	34.8	14.7	0.028	0.29
Inf	9.9	34.7	3.52	13.5	7.2	0.36	35.5	14.3	0.025	0.38

The author of this report has been unable to verify the mineral resource information on the adjacent properties set out above. The BlackRock deposits are contained within the same units of the Lac Doré layered mafic intrusive as the VanadiumCorp mineralization. However, the QP cannot confirm that the information is necessarily indicative of the mineralization on the property which is the subject of this report. Figure 23.2 and 23.2 show the location of the

Southwest and Armitage deposits as well as the layered mafic intrusive. Figure 23.3 and Figure 23.4 show details of the zones.

The V_2O_5 head grade presented in the tables above is determined from whole rock analyses of samples and represents total vanadium. The vanadium grades of the VanadiumCorp drilling presented in Section 10 of this report are calculated from analyses determined from Davis Tube magnetite concentrates and represents vanadium-in-magnetite head grade. The BlackRock data may therefore be disclosing vanadium in silicates and other oxides in addition to that in magnetite.

The mineral resources from BlackRock are reported to have been classified using the CIM guidelines although the version is not specified. The tables use the categories specified by the CIM.

As a result of the feasibility study BlackRock have also declared a mineral reserve for the project (Tables 23.3 and 23.4). This 2013 reserve envisioned the sale of magnetite to the steel industry.

Table 23.3
Southwest Pit - Proven and Probable Reserves
(At a 6.5% SAT cut-off grade)

Classification	Tonnes ('000)	%SAT	%TiO2	Fe (Wt%)	Ilmenite (Wt%)
Proven	175,234	16.07	7.24	20.75	5.16
Probable	25,317	17.23	8.02	22.23	5.94
Total Proven & Probable	**200,551**	**16.22**	**7.34**	**20.93**	**5.26**

SAT = Satmagan

Table 23.4
Armitage Pit - Proven and Probable Reserves
(At a 6.5% SAT cut-off grade)

Classification	Tonnes ('000)	%SAT	%TiO2	Fe (Wt%)	Ilmenite (Wt%)
Proven	181,220	14.01	6.71	18.08	4.68
Probable	23,382	13.58	7.18	17.53	5.23
Total Proven & Probable	**204,602**	**14.01**	**6.71**	**18.08**	**4.74**

SAT = Satmagan

The author of this report has been unable to verify the mineral reserve information on the adjacent properties set out above. The BlackRock deposits are contained within the same units of the Lac Doré layered mafic intrusive as the VanadiumCorp mineralization. However, the QP cannot confirm that the information is necessarily indicative of the mineralization on the property which is the subject of this report. Figure 23.2 show the location of the Southwest and Armitage deposits as well as the layered mafic intrusive. Figure 23.3 and Figure 23.4 show details of the zones.

In its filing notice to the AMF, BlackRock disclosed the following about its plans for the Armitage and Southwest deposits:

> "Since the preparation of the September 20, 2013 report, the project has been redefined at a lower magnetite concentrate production tonnage that is shipped exclusively to a second transformation plant to produce high purity pig iron and ferrovanadium."

In 2014, BlackRock announced that the scope of their project was changed to a mine complex with a nominal capacity of 800,000 tonnes of VTM per year, to be shipped to the Grande-Anse seaport in the Saguenay region. A 500,000 tonne per year smelter dedicated to the production of pig iron and ferrovanadium was announced for this location.

As demonstrated in Figure 23.3 the Armitage and Southwest zones are located on the same stratigraphic horizon in the Lac Doré intrusive as the VanadiumCorp mineralization. However, it has not yet been demonstrated that the tenor and quality of the mineralization on the BlackRock claims is indicative of that on VandaiumCorp's land.

23.3.1.1 Limitations and Similarities

While the mineralization found on the Lac Doré and Lac Doré North properties is a continuation of the mineralization on the adjacent BlackRock properties, there is no guarantee that VanadiumCorp deposits are equivalent to BlackRock deposits in regard to the resource and economic viability. Only a thorough feasibility study, including all the various aspects of such a project, will establish its economic viability.

23.3.2 Yorbeau Resources Inc.

Yorbeau Resources Inc. (Yorbeau) recently acquired the former Cogitore property to the south of BlackRock. Yorbeau is a company dedicated to base metal exploration, and their presence is not considered a hindrance. Their property is anchored on the former Lemoine Mine, which was a small, but rich, volcanogenic massive sulphide deposit. Important exploration efforts were conducted by Cogitore on this property.

23.3.3 Third parties

To the northeast, north and northwest, the Lac Doré North property is bounded by map designated cells belonging to Spearmint Resources Inc. a corporation unknown to Micon. A few cells to the Northeast belong to individual prospectors.

23.3.4 Land Available for Staking

Land is available for staking only to the east of Lac Doré North property.

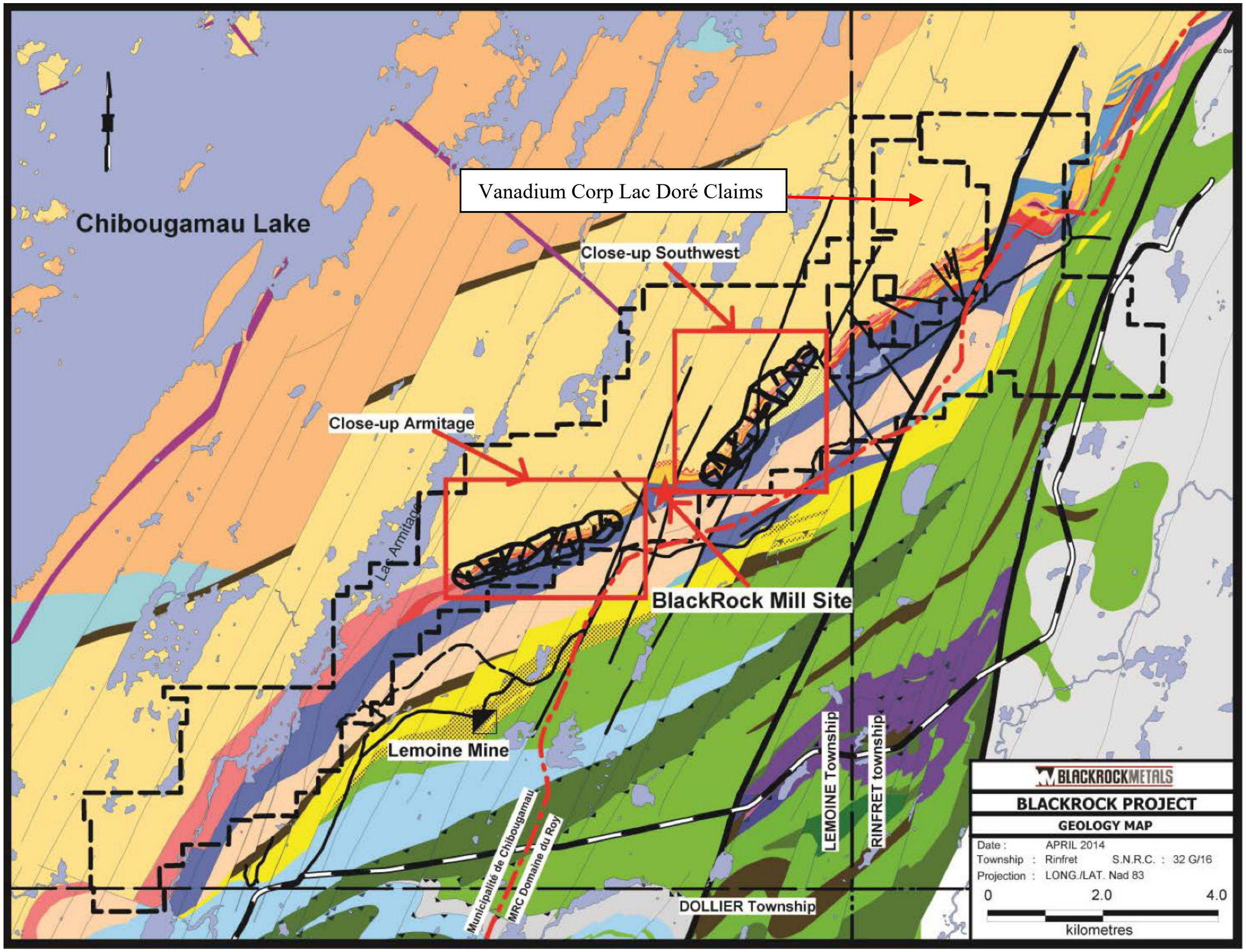
23.4 AVAILABILITY OF INFORMATION

Information regarding the adjacent properties was obtained from the Gestim on-line registry of the Natural Resources Ministry. Information regarding exploration work upon these properties was obtained from the on-line report library available at the *Ministère de l'Énergie et des Ressources Naturelles du Québec*.

23.5 VALIDATION OF INFORMATION

The results of work conducted by BlackRock and Cogitore on their properties has not been verified by the QP.

Figure 23.2
Armitage and Southwest Zone Locations



Source: Allaire et al., 2018. Legend on Figure 23.2.

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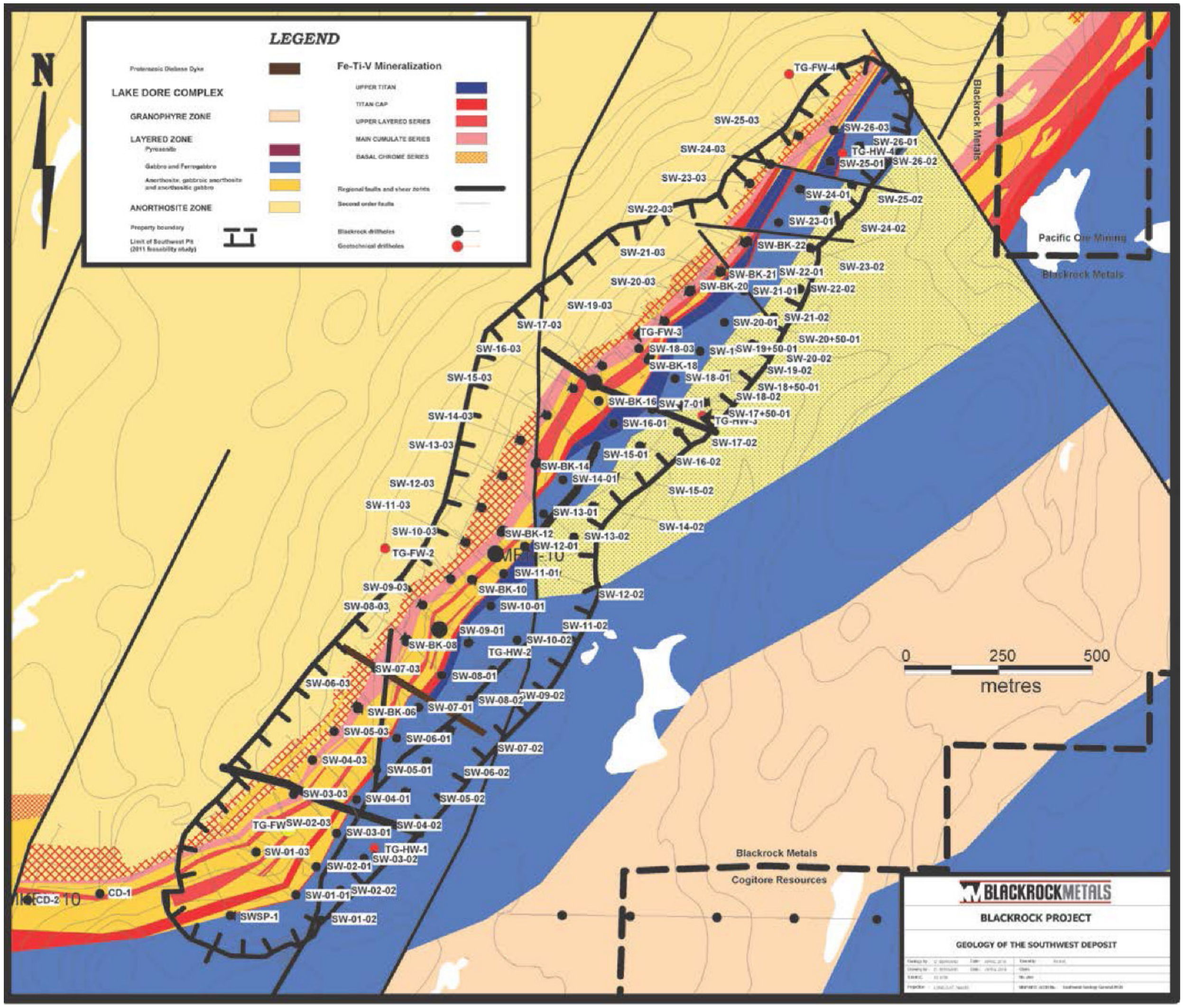
Figure 23.3
Southwest Zone Details and Legend



Source: Allaire et al., 2018.

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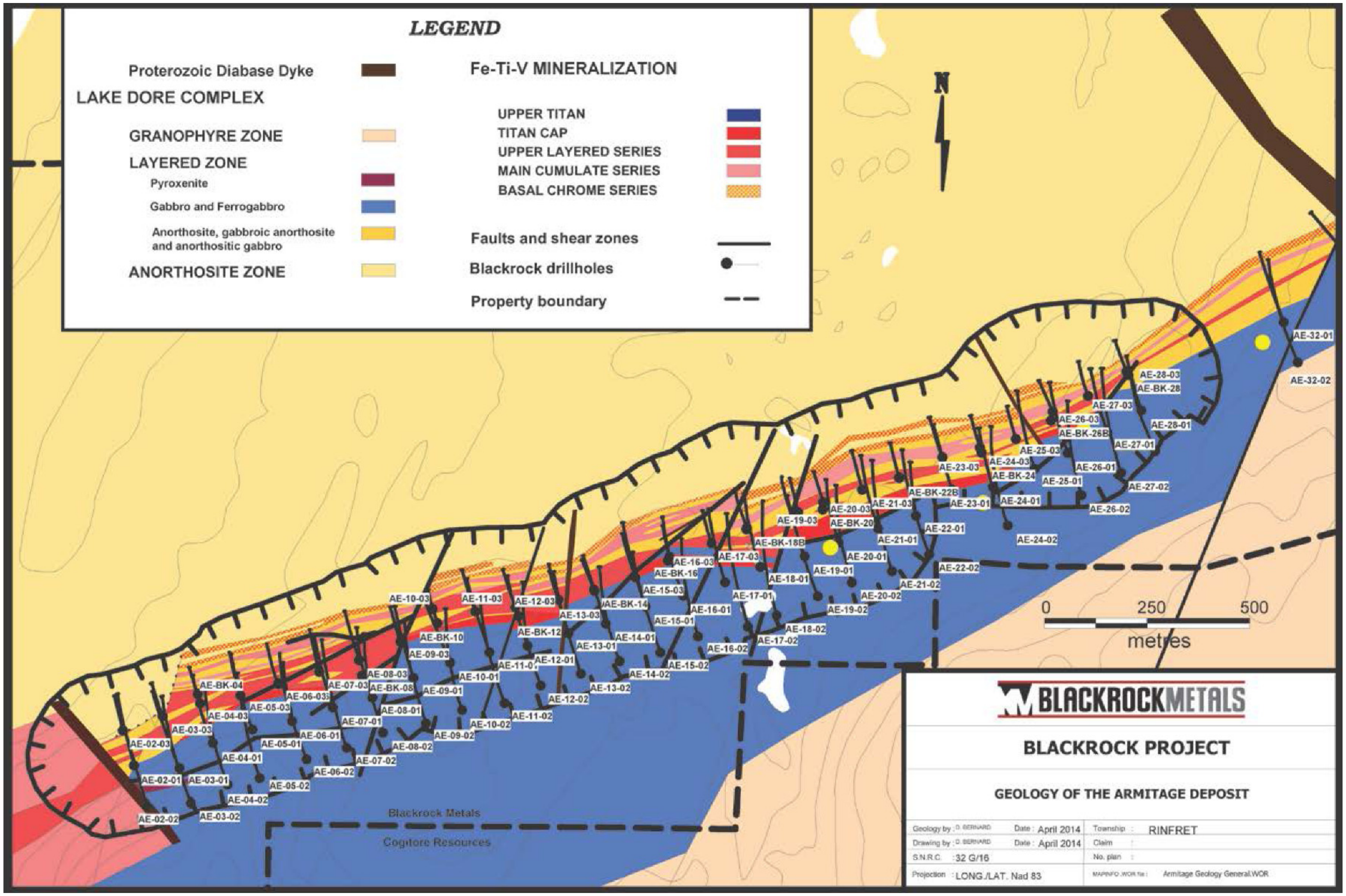
Figure 23.4
Armitage Zone Details and Legend



Source: Allaire et al., 2018.

24.0 OTHER RELEVANT DATA AND INFORMATION

All relevant data and information has been presented in other Sections of this report.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 GEOLOGY AND MINERALIZATION

The Lac Doré deposit is hosted in the Lac Doré Anorthositic Complex, dated at 2.728 Ga. This Archean complex is at the core of the eastern end of the northern domain of the Abitibi Greenstone Belt, Abitibi sub-Province, and Superior Province in the Canadian Shield.

The complex is a lopolith, a sub-tabular intrusive body of mafic to anorthositic composition, strongly differentiated near its top. The lopolith is emplaced within the Waconichi Formation, a felsic volcanic and sedimentary pile, and folded along by the regional anticlinorium. The deposit is hosted in a homoclinal sequence of magnetite bearing layers within the south flank of the Lac Doré Anorthositic Complex. The top of stratigraphy is to the south.

According to Allard (1967), the Lac Doré Complex is divided in four major units. From top to bottom they are:

- The border zone (top, southeast).
- The granophyre.
- The layered zone.
- The Anorthositic zone (base, northwest).

The layered zone hosts the vanadiferous titanomagnetite deposit, while the anorthosite and the granophyre host most of copper-gold mineralization of the mining camp (outside of the current project).

The anorthosite zone (approximately 3,660 m in observed thickness) is composed of anorthosite, gabbro and titanomagnetite-bearing gabbro, plus some minor pyroxenite. The titanomagnetite abundance as well as the vanadium content increases in the upper 150 m of the unit, toward the layered zone.

The layered zone, which hosts the vanadiferous titanomagnetite deposit, consists of 450 to 900 m of rhythmically layered beds rich in pyroxene, titanomagnetite plus ilmenite, intercalated with layers of anorthositic gabbro. The vanadium mineralization is located in the lowermost part, namely the P1, P2 and P3 units, although a small amount of mineralization occurs in the P0 unit (see Section 7.0). Vanadium strongly partitions into magnetite, and thus into the first titanomagnetite layers. The abundance of titanomagnetite decreases upward (Allard, 1967).

25.2 EXPLORATION

Since its acquisition in 2007 by VanadiumCorp, a limited amount of exploration work was conducted on the project, including:

- Three ground magnetic surveys, encompassing almost all of the current properties.

- Stripping and surface sampling on Lac Doré North property in 2008, which was recently remapped.
- A 10-hole exploration drill program on Lac Doré North in 2009.
- A brief channel sampling program on Lac Doré in 2012 aiming to duplicate former McKenzie Bay Resources samples, the results of which are not available.
- A 4-hole confirmation drill program in 2013 on Lac Doré, aiming to duplicate historical drill holes.
- A field verification program and surveying of historical drill holes location in the fall of 2015.

The Lac Doré vanadium deposit has a protracted exploration history, spanning more than 60 years. It was evaluated by drilling or trenching on nine occasions through time, by the various past and present owners, although not in a systematic manner. It is still considered to be incompletely drilled. The results of the historic sampling are of variable quality, but at least some of the data are considered to be sufficiently accurate to be incorporated into a resource estimate, assuming sufficient care and precaution in estimation. The thorough coverage and exposure by the trenches provides some useful supporting information. A total of 50 holes and 33 trenches, totalling 14,559.6 m, are unevenly distributed on the property, including some segments traversing onto adjacent properties.

Trench sampling results have been converted to horizontal drill holes for the database, geological model and use in future resource estimates.

The QP considers this and the apparent similarities to the mineralization on the BlackRock claims to be sufficient justification for the continued exploration of the VanadiumCorp claims in order to validate the early drill results and to confirm drill hole sample locations

26.0 RECOMMENDATIONS

26.1 PROPOSED EXPLORATION PROGRAM

The information available for the historical drill hole surveys, analytical methods and chain of custody is somewhat limited and leads to the conclusion that the data requires further verification before it is uses in preparing a mineral resource estimate. This despite the extensive trenching, mapping and sampling data. However, further work is justified by the possible similarity to the mineralization on the same stratigraphic horizon found on the adjacent BlackRock claims (study understood to be in the process of being updated).

To accomplish this, a drilling program to cover 35 sections spaced 50 m apart is recommended from lines 7+00 E to 24+00 E. On each odd section, approximately 400 to 500 m of drilling will be required to cover the East deposit area. On each even section, 300 to 400 m of drilling will be required to fill in between holes from the bracketing sections, resulting in a dice 5 pattern.

It is recommended that holes be inclined at 45º to 50º toward the northwest, (320° azimuth), and drilled using at least NQ-sized core to enable collecting sufficient material. It may be possible to drill two holes form each set up, requiring adjustments to the dip. Assaying and Davis tube testing every 3 m of core is recommended. It is also recommended that the mineralized portion of all drill holes be entirely sampled without gaps.

Following this pattern from one end of the East deposit to the other, regardless of the presence of historic drill holes or trenches would require up to 16,000 m of drilling. The QP recommends that any theoretically planned hole in the dice five pattern falling close to an existing hole be drilled in order to confirm historical results.

It is anticipated that approximately 60% of the core will need to be assayed for head and magnetite concentrate vanadium grade, the latter by Davis Tube. The budget recommended by the QP is summarized in Table 26.1.

Table 26.1
Proposed Exploration Budget

Activity	Amount (m)	Unit Cost (CDN$ per m)	Total (CDN$ '000)
Drilling	16,000	120	1,920
Assaying	9,600	80	256
Total			**2,176**

Drilling will also require logging for geotechnical purposes and estimating overburden thickness in more detail.

Pending a successful outcome further drilling along strike in both directions may be justified.

The QP has reviewed the proposed exploration program and finds it to be reasonable and justified. Should it fit with VanadiumCorp's strategic goals, it is Micon's recommendation that the company conduct the proposed exploration program.

27.0 DATE AND SIGNATURE PAGE

The effective date of this technical report is October 11, 2018.

"B. Terrence Hennessey" {signed and sealed}

B. Terrence Hennessey, P.Geo.
Date of signature: October 11, 2018

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29.0 CERTIFICATES

CERTIFICATE OF AUTHOR

B. Terrence Hennessey

As author of this report entitled "Geological Report For The Lac Doré Vanadium Deposit Québec, Canada", with an effective date of October 11, 2018, (the "Technical Report"), I, B. Terrence Hennessey, P.Geo., do hereby certify that:

1. I am employed by, and carried out this assignment for, Micon International Limited, 900 – 390 Bay Street, Toronto, Ontario M5H 2Y2. tel. (416) 362-5135, e-mail thennessey@micon-international.com.
2. I hold the following academic qualifications:

   B.Sc. (Geology) McMaster University 1978.
3. I am a registered Professional Geoscientist with the Association of Professional Geoscientists of Ontario (membership # 0038); as well, I am a member in good standing of several other technical associations and societies, including:
   - The Canadian Institute of Mining, Metallurgy and Petroleum (Member).
   - Society of Economic Geologists (Fellow)
4. I have worked as a geologist in the minerals industry for over 35 years.
5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) and, by reason of my education, past relevant work experience and affiliation with a professional association, fulfill the requirements to be a Qualified Person for the purposes of NI 43-101. My work experience includes 7 years as an exploration geologist looking for iron ore, gold, base metal and tin deposits, more than 10 years as a mine geologist in both open pit and underground mines and 20 years as a consulting geologist working in precious, ferrous and base metals as well as industrial minerals.
6. I visited the Lac Doré project site in Quebec during the period May 21 to May 23, 2018, to review the results of exploration at site.
7. I have had no previous involvement with the property that is the subject of the Technical Report.
8. I am independent of VanadiumCorp Resource Inc. and related entities as defined in Section 1.5 of NI 43-101.
9. I am responsible for all Sections of this Technical Report.
10. I have read NI 43-101 and Form 43-101F1 and the portions of this Technical Report for which I am responsible have been prepared in compliance with that instrument and form.
11. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make this technical report not misleading.

Signing Date: October 11, 2018

"B. Terrence Hennessey" {signed and sealed}

B. Terrence Hennessey, P.Geo.

30.0 APPENDICES

APPENDIX 1
Claim Lists

Lac Doré

NTS Sheet	Claim No.	Ownership	Registration Date	Expiration Date	Renewal Date *	Area (ha)	Excess Work ($)	Required Fees ($)	Required Work ** ($)
32H13	2429530	100%	24/07/2015	23/06/2020	23/04/2020	55.53	24,037.36	64.09	1,170.00
32G16	2429531	100%	24/07/2015	23/06/2020	23/04/2020	7.64	14,747.85	32.77	487.50
32G16	2429532	100%	24/07/2015	23/06/2020	23/04/2020	0.07	0.00	32.77	487.50
32G16	2429533	100%	24/07/2015	23/06/2020	23/04/2020	36.70	22,882.77	64.09	1,170.00
32G16	2429534	100%	24/07/2015	23/06/2020	23/04/2020	22.24	42,594.81	32.77	487.50
32G16	2429535	100%	24/07/2015	23/06/2020	23/04/2020	31.42	39,479.07	64.09	1,170.00
32G16	2429536	100%	24/07/2015	23/06/2020	23/04/2020	19.06	18,379.87	32.77	487.50
32G16	2429537	100%	24/07/2015	23/06/2020	23/04/2020	0.02	0.00	32.77	487.50
32G16	2429538	100%	24/07/2015	23/06/2020	23/04/2020	45.85	24,387.87	64.09	1,170.00
32G16	2429539	100%	24/07/2015	23/06/2020	23/04/2020	50.05	69,911.45	64.09	1,170.00
32G16	2429540	100%	24/07/2015	23/06/2020	23/04/2020	8.06	1,525.39	32.77	487.50
32G16	2429541	100%	24/07/2015	23/06/2020	23/04/2020	10.54	2,144.75	32.77	487.50
32G16	2429542	100%	24/07/2015	23/06/2020	23/04/2020	53.57	10,648.50	64.09	1,170.00
32G16	2429543	100%	24/07/2015	23/06/2020	23/04/2020	21.42	2,521.92	32.77	487.50
32G16	2429544	100%	24/07/2015	23/06/2020	23/04/2020	55.52	8,635.24	64.09	1,170.00
32G16	2429545	100%	24/07/2015	23/06/2020	23/04/2020	4.47	0.00	32.77	487.50
32G16	2429546	100%	24/07/2015	23/06/2020	23/04/2020	10.92	2,239.65	32.77	487.50
32H13	2429547	100%	24/07/2015	23/06/2020	23/04/2020	6.11	15,925.75	32.77	487.50
32H13	2429548	100%	24/07/2015	23/06/2020	23/04/2020	49.76	66,847.54	64.09	1,170.00
32H13	2429549	100%	24/07/2015	23/06/2020	23/04/2020	37.90	30,160.22	64.09	1,170.00
32H13	2429550	100%	24/07/2015	23/06/2020	23/04/2020	50.50	23,209.18	64.09	1,170.00
32H13	2429551	100%	24/07/2015	23/06/2020	23/04/2020	44.77	8,177.43	64.09	1,170.00
32H13	2429552	100%	24/07/2015	23/06/2020	23/04/2020	26.70	4,984.25	64.09	1,170.00
					Total	**648.82**	**433,440.87**	**1,129.55**	**19,402.50**

* - 60 Days before expiry date.

** - Field work that should be complete 60 days before expiration.

Source, IOS, 2018.

Lac Doré North

NTS Sheet	Claim No.	Ownership	Registration Date	Expiration Date	Renewal Date *	Area (ha)	Excess Work ($)	Required Fees ($)	Required Work ** ($)
32H13	2174067	100%	04/11/2008	03/11/2020	03/09/2020	55.51	0.00	64.09	1,170.00
32H13	2430396	100%	30/07/2015	20/04/2020	19/02/2020	55.53	5,558.44	64.09	1,170.00
32H13	2430397	100%	30/07/2015	20/04/2020	19/02/2020	55.53	4,778.45	64.09	1,170.00
32H13	2430398	100%	30/07/2015	20/04/2020	19/02/2020	55.52	3,217.25	64.09	1,170.00
32H13	2430399	100%	30/07/2015	20/04/2020	19/02/2020	55.51	5,556.04	64.09	1,170.00
32H13	2430400	100%	30/07/2015	20/04/2020	19/02/2020	55.50	2,434.83	64.09	1,170.00
32H13	2430401	100%	30/07/2015	20/04/2020	19/02/2020	55.50	4,774.83	64.09	1,170.00
32H13	2430402	100%	30/07/2015	20/04/2020	19/02/2020	55.52	11,755.01	64.09	1,170.00
32H13	2430403	100%	30/07/2015	20/04/2020	19/02/2020	55.51	8,633.80	64.09	1,170.00
32H13	2430404	100%	30/07/2015	20/04/2020	19/02/2020	16.92	1,562.66	32.77	487.50
32H13	2430405	100%	30/07/2015	20/04/2020	19/02/2020	19.13	1,830.45	32.77	487.50
32H13	2430406	100%	30/07/2015	20/04/2020	19/02/2020	53.10	0.00	64.09	1,170.00
32H13	2430407	100%	30/07/2015	20/04/2020	19/02/2020	48.38	54,783.01	64.09	1,170.00
32H13	2430408	100%	30/07/2015	20/04/2020	19/02/2020	40.12	3,691.27	64.09	1,170.00
32H13	2430409	100%	30/07/2015	20/04/2020	19/02/2020	24.66	2,500.51	32.77	487.50
					Total	**701.94**	**111,076.55**	**867.39**	**15,502.50**

* - 60 Days before expiry date.
** - Field work that should be complete 60 days before expiration.
Source, IOS, 2018.

Lac Doré Extension

NTS Sheet	Claim No.	Ownership	Registration Date	Expiration Date	Renewal Date *	Area (ha)	Excess Work ($)	Required Fees ($)	Required Work ** ($)
32G16	2407352	100%	16/07/2014	15/07/2020	15/05/2020	55.49	0.00	64.09	780.00
32G16	2407353	100%	16/07/2014	15/07/2020	15/05/2020	55.49	0.00	64.09	780.00
32G16	2407354	100%	16/07/2014	15/07/2020	15/05/2020	55.48	0.00	64.09	780.00
32G16	2407355	100%	16/07/2014	15/07/2020	15/05/2020	55.48	0.00	64.09	780.00
32G16	2407356	100%	16/07/2014	15/07/2020	15/05/2020	55.48	0.00	64.09	780.00
32G16	2407357	100%	16/07/2014	15/07/2020	15/05/2020	55.48	0.00	64.09	780.00
32H13	2407358	100%	16/07/2014	15/07/2020	15/05/2020	55.49	0.00	64.09	780.00
32H13	2407359	100%	16/07/2014	15/07/2020	15/05/2020	55.49	0.00	64.09	780.00
32H13	2407360	100%	16/07/2014	15/07/2020	15/05/2020	55.49	0.00	64.09	780.00
32H13	2407361	100%	16/07/2014	15/07/2020	15/05/2020	55.49	0.00	64.09	780.00
32H13	2407362	100%	16/07/2014	15/07/2020	15/05/2020	55.49	0.00	64.09	780.00
32H13	2407363	100%	16/07/2014	15/07/2020	15/05/2020	55.49	0.00	64.09	780.00
32H13	2407364	100%	16/07/2014	15/07/2020	15/05/2020	55.48	0.00	64.09	780.00
32H13	2407365	100%	16/07/2014	15/07/2020	15/05/2020	55.48	0.00	64.09	780.00
32H13	2407366	100%	16/07/2014	15/07/2020	15/05/2020	55.48	0.00	64.09	780.00
32G16	2412408	100%	22/09/2014	21/09/2020	22/07/2020	55.53	0.00	64.09	780.00
32G16	2412409	100%	22/09/2014	21/09/2020	22/07/2020	55.53	0.00	64.09	780.00
32G16	2412410	100%	22/09/2014	21/09/2020	22/07/2020	55.52	0.00	64.09	780.00
32G16	2412411	100%	22/09/2014	21/09/2020	22/07/2020	55.51	0.00	64.09	780.00
32G16	2412412	100%	22/09/2014	21/09/2020	22/07/2020	55.51	0.00	64.09	780.00
32G16	2412413	100%	22/09/2014	21/09/2020	22/07/2020	55.51	0.00	64.09	780.00
32G16	2412414	100%	22/09/2014	21/09/2020	22/07/2020	55.51	0.00	64.09	780.00
32G16	2412415	100%	22/09/2014	21/09/2018	22/07/2018	55.50	0.00	64.09	780.00
32G16	2412416	100%	22/09/2014	21/09/2020	22/07/2020	55.50	0.00	64.09	780.00
32G16	2412417	100%	22/09/2014	21/09/2020	22/07/2020	55.50	0.00	64.09	780.00
32G16	2412418	100%	22/09/2014	21/09/2020	22/07/2020	55.50	0.00	64.09	780.00
32G16	2412419	100%	22/09/2014	21/09/2020	22/07/2020	55.49	0.00	64.09	780.00
32G16	2412420	100%	22/09/2014	21/09/2020	22/07/2020	55.49	0.00	64.09	780.00
32G16	2412421	100%	22/09/2014	21/09/2018	22/07/2018	55.47	0.00	64.09	780.00
32G16	2412422	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32G16	2412423	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412424	100%	22/09/2014	21/09/2020	22/07/2020	55.51	0.00	64.09	780.00

NTS Sheet	Claim No.	Ownership	Registration Date	Expiration Date	Renewal Date *	Area (ha)	Excess Work ($)	Required Fees ($)	Required Work ** ($)
32H13	2412425	100%	22/09/2014	21/09/2020	22/07/2020	55.50	0.00	64.09	780.00
32H13	2412426	100%	22/09/2014	21/09/2020	22/07/2020	55.49	0.00	64.09	780.00
32H13	2412427	100%	22/09/2014	21/09/2020	22/07/2020	55.48	0.00	64.09	780.00
32H13	2412428	100%	22/09/2014	21/09/2020	22/07/2020	55.48	0.00	64.09	780.00
32H13	2412429	100%	22/09/2014	21/09/2020	22/07/2020	55.48	0.00	64.09	780.00
32H13	2412430	100%	22/09/2014	21/09/2020	22/07/2020	55.48	0.00	64.09	780.00
32H13	2412431	100%	22/09/2014	21/09/2020	22/07/2020	55.48	0.00	64.09	780.00
32H13	2412432	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412433	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412434	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412435	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412436	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412437	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412438	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412439	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412440	100%	22/09/2014	21/09/2020	22/07/2020	55.47	0.00	64.09	780.00
32H13	2412441	100%	22/09/2014	21/09/2020	22/07/2020	55.46	0.00	64.09	780.00
32H13	2412442	100%	22/09/2014	21/09/2020	22/07/2020	55.46	608.30	64.09	780.00
32H13	2412443	100%	22/09/2014	21/09/2020	22/07/2020	55.46	64.86	64.09	780.00
32H13	2412444	100%	22/09/2014	21/09/2020	22/07/2020	55.46	0.00	64.09	780.00
32H13	2412445	100%	22/09/2014	21/09/2020	22/07/2020	55.46	0.00	64.09	780.00
32G16	2429524	100%	24/07/2015	28/09/2020	29/07/2020	55.50	0.00	64.09	780.00
32G16	2429525	100%	24/07/2015	28/09/2020	29/07/2020	55.50	0.00	64.09	780.00
32G16	2429526	100%	24/07/2015	28/09/2020	29/07/2020	55.50	0.00	64.09	780.00
32G16	2429527	100%	24/07/2015	28/09/2020	29/07/2020	0.25	0.00	32.77	325.00
32G16	2429528	100%	24/07/2015	28/09/2020	29/07/2020	20.07	0.00	32.77	325.00
32G16	2429529	100%	24/07/2015	28/09/2020	29/07/2020	18.93	0.00	32.77	325.00
32H13	2433669	100%	01/10/2015	30/09/2021	31/07/2021	16.51	0.00	32.77	325.00
32H13	2433670	100%	01/10/2015	30/09/2021	31/07/2021	16.82	0.00	32.77	325.00
32H13	2433671	100%	01/10/2015	30/09/2021	31/07/2021	17.17	0.00	32.77	325.00
32H13	2433672	100%	01/10/2015	30/09/2021	31/07/2021	17.41	0.00	32.77	325.00
32H13	2433673	100%	01/10/2015	30/09/2021	31/07/2021	55.50	0.00	64.09	780.00
32H13	2433674	100%	01/10/2015	30/09/2021	31/07/2021	55.50	0.00	64.09	780.00
32H13	2433675	100%	01/10/2015	30/09/2021	31/07/2021	55.50	0.00	64.09	780.00

NTS Sheet	Claim No.	Ownership	Registration Date	Expiration Date	Renewal Date *	Area (ha)	Excess Work ($)	Required Fees ($)	Required Work ** ($)
32H13	2433676	100%	01/10/2015	30/09/2021	31/07/2021	55.50	0.00	64.09	780.00
32H13	2433677	100%	01/10/2015	30/09/2021	31/07/2021	55.50	0.00	64.09	780.00
32G16	2459448	100%	30/08/2016	29/08/2020	29/06/2020	55.53	0.00	64.09	780.00
32G16	2459449	100%	30/08/2016	29/08/2020	29/06/2020	55.53	0.00	64.09	780.00
32G16	2459450	100%	30/08/2016	29/08/2020	29/06/2020	55.52	0.00	64.09	780.00
32G16	2459451	100%	30/08/2016	29/08/2020	29/06/2020	55.51	0.00	64.09	780.00
32G16	2459452	100%	30/08/2016	29/08/2020	29/06/2020	55.50	0.00	64.09	780.00
32H13	2459453	100%	30/08/2016	29/08/2020	29/06/2020	55.49	0.00	64.09	780.00
32H13	2459454	100%	30/08/2016	29/08/2020	29/06/2020	55.49	0.00	64.09	780.00
32H13	2459455	100%	30/08/2016	29/08/2020	29/06/2020	55.48	0.00	64.09	780.00
					Total	**3,935.93**	**673.16**	**4,651.60**	**56,095.00**

* - 60 Days before expiry date.
** - Field work that should be complete 60 days before expiration.
Source, IOS, 2018.