NI 43-101 TECHNICAL REPORT

WOODSTOCK PROJECT MINERAL RESOURCE ESTIMATE

(PLYMOUTH MANGANESE-IRON DEPOSIT)

WOODSTOCK AREA

NEW BRUNSWICK, CANADA

Prepared For:

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1.0 SUMMARY

1.1 Introduction

Canadian Manganese Company Inc. (“CMC” or the “Company”) retained Mercator Geological Services Limited (“Mercator”) with respect to completing an updated Mineral Resource estimate (“MRE”) for the Plymouth manganese-iron deposit (Plymouth Deposit) that comprises the Woodstock Project (“Project”) located in New Brunswick, Canada. This Technical Report documents the updated MRE, which was prepared in accordance with the CIM Definition Standards for Mineral Resources and Reserves as amended in 2014 (CIM Standards 2014). The Technical Report was prepared in accordance with National Instrument 43-101 (“NI 43-101”) Form F-1. CMC is a public company reporting issuer listed on the NEO Exchange Inc. under the symbol CDMN and on the OTCQB Market under the symbol CDMNF (NEO: CDMN; OTCQB: CDMNF), and is based in Toronto, Ontario, Canada.

1.2 Property Description and Ownership

The Project is located in western New Brunswick, Canada, approximately 5 km west of the town of Woodstock (pop. 5,200) and 100 km north of the city of Fredericton (pop. 58,220). The Project is comprised of Mineral Claim Number 5472, that contains 232 mineral claim units (5,875 ha) located in Carleton County, New Brunswick. It includes the Plymouth Deposit and is 100% owned by CMC. CMC is also the owner of surface rights covering an area of 53 ha within Mineral Claim 5472 that cover a portion of the Plymouth Deposit.

1.3 Accessibility, Climate, Local Resources, Infrastructure and Physiography

The Project is located in western New Brunswick, Canada approximately 5 km west of the town of Woodstock (pop. 5,200), approximately 15 km east of the town of Houlton, Maine, USA (pop. 6,123), and approximately 100 km north of the city of Fredericton (Figure 5.1). It is well served by air and land transportation options and local communities provide good access to accommodations, grocery stores and restaurants, tool rental, hardware stores, hospital, and gas stations.

Temperate zone climatic conditions prevail and are governed by the eastward flow of continental weather patterns. The average annual temperature is approximately 10˚C, with an average summer maximum of 30˚C and an average winter minimum of -30˚C. Winter conditions are prevalent on site from late November until late March or early April. Frost depth is 2.0 m. Annual precipitation is approximately 1,000 mm with 60% of this occurring as rain and the remainder as snow. Mineral exploration field programs can efficiently be undertaken from May through to late November in all areas. Winter programs such as drilling and geophysical surveys can also be implemented year-round but delays due to poor winter weather conditions such as heavy snow fall should be expected.

The Project is located within the Saint John River watershed and is primarily agricultural land with forested sections. Overburden thickness typically ranges between 0 and 10 metres in depth. Topographic elevations on the claims range between 120 and 180 metres above sea level. Local surface drainage systems consist of several small lakes, rivers, and streams plus the large, southeast flowing Meduxnekeag River, that occurs within a pronounced valley that crosses the northern portion of Mineral Claim 5472.

The Project is well positioned with respect to infrastructure. In addition to proximity to several towns and the provincial capital, a railway line is accessible in nearby Houlton, Maine and grid electrical power is readily accessible. The extensive surface drainage systems present in the Saint John River watershed provide readily accessible potential water sources for incidental exploration use such as diamond drilling. They also provide good potential as higher volume sources of water such as those potentially required for future mining and milling operations.

The agriculture and forestry industries are the dominant employers in the region, with J.D. Irving Ltd. and McCain Foods Limited being major employers in western New Brunswick. The local rural and urban economies provide a large base of skilled trades, professional, and service sector support that can be accessed for exploration and resource development purposes.

1.4 History

The history of exploration and mining in the Woodstock area, including the Plymouth Deposit, is poorly recorded for the period prior to 1970, but historical operations at Iron Ore Hill and in the Woodstock area included development and production of approximately 70,000 tons (63,497 tonnes) of iron ore between 1848 and 1884. This iron ore was locally smelted. The manganese (Mn) potential of these occurrences may not have been fully appreciated until 1936, when the Geological Survey of Canada (GSC) published geological mapping for the area. This work highlighted several occurrences of iron formation rocks including some of the main deposits in the Moody Hill and Iron Ore Hill areas. This included chemical analyses of several of the iron (Fe) formations and highlighted the high Mn content of the material, with reported ranges between 10.48% and 15.0% Mn. In 1943, the iron mineralization was assessed by Noranda Mines Limited using flotation technology to produce manganese and iron concentrates.

In 1952 the New Brunswick Resources Development Board completed a review of New Brunswick manganese occurrences and in 1954 the GSC completed a preliminary review of the Woodstock area manganese occurrences. Between 1953 and 1960 the Hartford and Plymouth deposits were held by Strategic Manganese Corporation. The firm completed various metallurgical investigations and geological and magnetic surveys and 34,021 feet (10,369 m) of drilling, including 17,388 feet (5,300 m) on the Plymouth Deposit.

Between 1965 and 1968 the Chemical Engineering Department of the University of New Brunswick undertook investigations of the manganese mineralization in the Project area. In 1968, the GSC published a Memoir on the Woodstock area that included a regional geological map showing locations of the various iron-manganese prospects. This was followed in the early 1970's by an unsuccessful effort by Mandate Refining Company to roast pyritic waste rock with iron-manganese mineralized material.

Between 1976 and 1980 Minuvar Limited carried out general exploration work and in 1984 Mineral Resource Research Limited (MRR) staked the iron-manganese deposits in the Woodstock area. Detailed geological mapping and trenching over the Plymouth Deposit was carried out along with one core hole.

In the 1985 the NBDNRE collected samples from the Plymouth Deposit. Between 1985 and 1987 a substantial body of metallurgical study was carried out in conjunction with programs offered under the Canada-New Brunswick Mineral Development Agreement. This included evaluation of selected processing options by Witteck Development to produce Electrolytic Manganese Metal (EMM) or high-purity manganese precipitate. Two of ten processing options were deemed favourable.

Between 1988 and 2010 MRR undertook a comprehensive technical program to evaluate the Plymouth Deposit in an attempt to establish an accurate description of the deposit, including potential grade and tonnage aspects. This included bulk sampling, trenching, core drilling and geochemical analyses. A total of five holes were drilled, totalling 2,086 feet (636 m). Metallurgical processing options continued to be assessed sporadically until purchase of the exploration property by Buchans Minerals Corporation (BMC) in August of 2010. Canadian Manganese Company Inc. (CMC) was incorporated under the Canada Business Corporations Act on June 13, 2011, for the purpose of acquiring the Woodstock Project in New Brunswick and to pursue the exploration and development of the property to produce speciality manganese metals. CMC was a wholly owned subsidiary of BMC until December 31, 2019. Details on the exploration and drilling programs completed by BMC and CMC since acquiring the Project are disclosed in Section 9 and 10 of this Technical Report and summarized below in Section 1.6.

1.5 Geology and Mineralization

The Project area is underlain by a belt of Ordovician and Silurian siltstones and slates, collectively referred to as the Aroostook-Percé belt. Late Ordovician to Early Silurian sediments of the Matapedia Group's Whitehead Falls Formation are overlain by Early Silurian sediments of the Perham Group's Smyrna Mills Formation, which are laterally extensive over much of western and northwestern New Brunswick and Maine, including the Project area. These sequences in the Project area were affected by upright folding during the mid-Devonian Acadian Orogeny and were also affected to lesser degrees by Silurian deformation.

The Woodstock area iron-manganese deposits are interpreted to represent a series of Early Silurian manganiferous iron formations that are hosted by the Smyrna Mills Formation. The Smyrna Mills Formation is composed of dark grey, non-calcareous, silty shale with minor interbeds of green and red mudstone, and associated ferro-manganiferous siltstone. Six main iron-manganese deposits have been identified in the Woodstock area to date and are interpreted to have formed in the shallow marine basin in which the Smyrna Mills Formation was deposited. Sharp contacts between basin-fill units of red or green shale characterise the stratigraphic succession and both lensing and compositional variation of the manganiferous units have been interpreted to indicate that the deposits are stratigraphically separated and not one continuous unit. The Plymouth Deposit that is the focus of this report is interpreted to consist of an assemblage of iron and manganese oxide and carbonate-silicate-oxide facies rocks that comprise a sub-unit of the Smyrna Mills Formation.

The steeply dipping, northeast trend of bedrock units in the Project area is a function of two folding generations (F1 and F2) associated with the mid-Devonian Acadian Orogeny, which is also marked in this area by a sub-greenschist facies regional metamorphic imprint.

Historical interpretations of the mineralization of the Plymouth Deposit indicated that the iron-manganese mineralization can be subdivided into oxide, silicate-carbonate-oxide, and carbonate facies. The iron-manganese oxide facies that comprises the deposit stratigraphy is represented by red to maroon siltstone and red chert and characterized by the mineral assemblage magnetite, hematite, braunite (Mn+2Mn+36[O8SiO4]) and bixbyite ([Mn,Fe]2O3) and ranges between 30% and 80% iron-manganese oxides. Work by CMC since 2011 has shown that the manganese mineralization of economic interest in both the red and grey siltstones is dominated by manganese carbonate in the form of rhodochrosite ($MnCO_3$). The iron mineralization in these lithologies was found to be different, with the dominant iron minerals in red siltstone being oxides in the form of hematite, magnetite, and ilmenite. The dominant iron mineral in the grey siltstone was found to be carbonate in the form of siderite. Layers of iron-manganese mineralization are crosscut by minor veins of quartz, quartz-carbonate, chlorite, and sulfide.

1.6 Exploration and Drilling

After acquiring the Project in 2010, CMC engaged Tetra Tech (formerly Wardrop Engineering Inc.) to review and update the two processes that had generated positive operating margins in the earlier work carried out by Witteck. Results of the Tetra Tech study were for internal working purposes only but were succeeded by more comprehensive economic and hydrometallurgical reviews undertaken by Thibault and Associates Ltd. (Thibault) for CMC.

In 2011, CMC completed a five-hole (1,040 m) core drilling program on the Property and further work by Thibault was focused on bench scale hydrometallurgical testing to confirm and optimize the process for leaching manganese from typical Plymouth Deposit mineralization. In 2013, 16 additional diamond drill holes were completed (4,082 m) along 7 section lines separated by intervals of approximately 100 m along the length of the deposit. Site supervision, logging, sampling and project record keeping were the responsibility of BMC personnel in accordance with that company's field operations and Quality Assurance and Quality Control (QA/QC) protocols. In 2021-2022, CMC completed an infill program comprising 25 diamond drill holes (7,098 m) along 8 sections lines across the deposit to decrease the drill intercept spacing to 50 m x 50 m and to support an updated MRE with the objective of upgrading a substantial portion of the deposit to the Measured and Indicated categories. In July of 2022, CMC completed an initial drilling program at its North Hartford project area consisting of 4 diamond drill holes (1,185.8 m) along one section line across the deposit to test historically documented Mn-Fe mineralization. Site supervision, logging, sampling, and project record keeping for the 2021-2022 Plymouth and 2022 North Hartford programs were the responsibility of Mercator personnel in accordance with the company's field operations and QA/QC protocols.

CMC initiated a second core drilling program at North Hartford in February of 2023 consisting of 29 proposed holes designed to provide initial definition the historically delineated deposit at that site. This program was ongoing at the time of report preparation and was being managed by Mercator on behalf of CMC. Core logging results to date are consistent with expectations but no analytical data for the program has been received yet.

The BMC-CMC drilling programs account for the majority of drill hole and analytical data used in the current Plymouth Deposit MRE. However, Mercator also included validated results for 6 surface historical diamond drill holes completed in 1985 and 1987 (1,040 m) and two trenches competed in 1987 by a previous operator that were incorporated as horizontal drill holes.

Results of the 2011, 2013 and 2021-2022 drilling programs demonstrate continuity of deposit extent and grade consistency across significant mineralized widths. Examples of representative intercepts from different deposit areas include 11.41% Mn over 45.0 m in hole PL-11-006, 11.43% Mn over 89.0 m in hole PL-11-007, 11.28% Mn 217.4 m in hole PL-13-022A, 9.32% over 202.0 m in PL-13-020, 10.87% Mn over 240.0 m in hole PL-22-41, and 11.72% Mn over 128.0 m in hole PL-22-038. Shorter mineralized intervals occur locally, such as 7.41% Mn over 29.5 m in PL-13-018 and 14.38% Mn over 18.0 m in hole PL-22-040. True widths of the mineralized intercepts are estimated to be between 75% and 90% of the reported intervals. No substantial issues with respect to core loss were reported. Mercator is of the opinion that validated core drilling and trenching results from the BMC, CMC and MMR programs are acceptable for use in Mineral Resource estimation programs.

Mercator prepared a MRE for the Plymouth Deposit based on the validated drilling and trenching results in 2013 and subsequently updated this estimate in 2014 to support a Preliminary Economic Assessment (PEA) of the deposit that was prepared by Tetra Tech. Tetra Tech, Thibault and Mercator contributed to this assessment and the associated NI 43-101 Technical Report. Results of the PEA (Kesavanathan et al., 2014) were positive with respect to production and marketing of EMM from the deposit at a processing rate of 3000 tonnes per day.

Subsequent to the 2014 PEA, Mercator prepared a new MRE for the Plymouth Deposit (Harrington et al., 2021) with an Effective Date of November 10, 2021. A key supporting premise of this estimate was that Manganese Sulphate Monohydrate (MSM) and High Purity Manganese Sulphate Monohydrate (HPMSM) would be produced from processing of mineralized material at the site. This differed substantially from the EMM production premise applied in the 2014 PEA. The current MRE is premised on production of only HPMSM and incorporates final processing of project concentrate at a port facility in New Brunswick.

1.7 Sample Preparation, Analysis and Security

Sample preparation, analysis, and security aspects of the diamond drilling programs completed by CMC plus predecessor exploration firms were reviewed to the degrees possible by Mercator. Various levels of documentation were available for this assessment. Detailed information is not consistently present for historical work carried out prior to BMC’s work (pre-2011) with respect to the reporting of drill logs, sample records, laboratory assay certificates, verifiable location data, sample preparation, analysis, and security. Detailed support documentation for historical drilling during the 1950s is largely absent and only rudimentary information is available for the small programs carried out in 1985 and 1987. In contrast, the BMC programs carried out in 2011 and 2013 include good descriptions of procedures and associated protocols. In addition, the CMC programs carried out in 2021 and 2022 were designed and implemented by Mercator staff and have adequate documentation and descriptions of procedures and protocols.

On the basis of poor support documentation, Mercator and CMC have not included results from 1950's era historical drilling programs in the project database used in the current resource estimate. Only data from the MMR programs in 1985 and 1987, the programs by BMC in 2011 and 2013, and the 2021-2022 program by CMC respectively, are included in the current MRE database.

BMC-CMC carried out systematic programs of Quality Assurance and Quality Control that included insertion of certified reference materials, blank samples, analysis of duplicate quarter core samples and submission of pulp split check samples to an independent laboratory for analysis. ALS Global (ALS) provided primary laboratory services and SGS Canada (SGS) provided check sample services. Both are fully accredited, and ISO registered analytical services firms that are independent of CMC. Descriptions of program security during the CMC period indicate that industry standards were applied but this aspect of earlier programs could not be directly assessed.

Mercator's review of combined BMC and CMC project results showed that no indications of problematic sample cross-contamination were present and that good correlation between duplicate pulp split analyses indicates acceptable precision. Acceptable sample homogeneity at the ¼ core scale is also indicated by results of the field ¼ core duplicate program. Independent laboratory check sample program results show that the XRF analytical methods used by both ALS and SGS produced highly comparable results.

Based on the overall review and the above observations, the QP considers the 2011, 2013 and 2021-2022 drilling dataset and compiled and validated earlier program data sets to be acceptable for use in resource estimation programs

1.8 Data Verification

The data verification program carried out by Mercator for the Project consisted of the following main components:

(1) Review of public record and internal source documents cited by previous operators plus BMC and CMC with respect to key geological interpretations, previously identified geochemical or geophysical anomalies, and historical and current diamond drilling results that support the current MRE for the Project; and

(2) Completion of multiple site visits to the Project between November 25, 2021, and February 18th, 2023, by report author Kevin MacRae, which included visual inspection of the Plymouth Deposit from the roadside and across the deposit, and completion of a limited drill collar location check program for 2011 and 2013 CMC drilling program holes. In addition, author MacRae completed multiple site visits to the North Hartford Deposit between July 19 and August 1, 2022, which included visual inspection of the Project area, inspection of drilling locations, and confirming bedrock lithologies in outcrop. Mercator staff were responsible for data compilation, designing, and assisting BMC and CMC with the 2011 and 2013 drilling programs as well as implementing and supervising the 2021-2022 drill programs (Plymouth and North Hartford) and the 2023 drill program (North Hartford) that was ongoing at the report date. In addition, Mercator staff were responsible for interpreting data sets for future exploration targeting using mining industry

standards and CIM Mineral Exploration Best Practice Guidelines. Mercator staff completed data verification procedures throughout the entire process, including review of QAQC procedures and results.

(3) Completion of several site visits to the Project between November 1st, 2021, and February 8th, 2023, by author Cullen, the most recent being on February 8th, 2023. Drill core and site inspections plus reviews of field work, safety and QAQC protocols were carried out during these visits.

The report authors are of the opinion that results of the data validation program, including multiple relevant site visits, indicate that industry standard levels of technical documentation and detail are evident in the 2011, 2013, 2021-2022 and 2023 drilling and other exploration program results for the Project, and that the associated Plymouth Deposit drilling digital database is acceptable for Mineral Resource estimation use.

1.9 Mineral Processing and Metallurgical Testing

1.9.1 Introduction

The following summary is taken primarily from the 2021 NI 43-101 Technical Report prepared by Mercator to support the November 10, 2021 MRE for the Plymouth Deposit. It remains relevant at the current date and CMC is expanding upon these results through studies being planned by Metals Strategies Inc. on behalf of CMC. Focus of current planning is toward development and refinement of a new processing flowsheet that will produce Electrolytic Manganese Metal (EMM) as a feedstock for production of High Purity Manganese Sulphate Monohydrate (HPMSM) as the preferred product for final sale. This processing scenario is incorporated in the cut-off grade and pit optimization aspects of the current MRE.

1.9.2 Summary of CMC Project Testing

Since 2011, several phases of process development test programs have been completed. Bench scale metallurgical and hydrometallurgical test programs were conducted by Thibault from 2011 to 2015 using core samples obtained from the 2011 drilling of the Plymouth Deposit. The bench scale testing and process development program was based on the development of process technology to produce high purity EMM. Blending of the core samples was defined by CMC to represent typical processing feedstocks relative to run-of-mine mineralization characteristics.

Preliminary testing and an assessment of alternative technologies relative to the characterization of the core samples indicated that direct sulphuric acid leaching of the feedstock and subsequent solution purification unit operations can produce a high purity manganese sulphate to produce high purity manganese chemicals and metal. To improve on hydrometallurgical operations, metallurgical unit operations were developed to remove acid consuming minerals prior to leaching unit operations.

Conceptual design of a fully integrated flowsheet to include metallurgical and hydrometallurgical operating was defined for the treatment of the various types of feedstocks of the Plymouth Deposit. Semi-continuous bench scale electrowinning tests over an eight-hour duration consistently produced EMM with a metallic manganese content (based on trace metal impurity analysis) of greater than 99.99% (greater than 4N grade) and with a total manganese content (based on trace metal and non-metallic trace element analysis) ranging from 99.70% to 99.76% manganese. Typical specifications for commercially produced EMM state the minimum total manganese content as 99.70%. A technical and economic assessment of EMM production was completed and reported in the NI 43-101 PEA Technical Report prepared by Tetra Tech for CMC dated July 10, 2014.

Subsequent to the 2014 PEA CMC shifted focus from evaluating the production of EMM to evaluating the production of MSM and HPMSM products to address battery market opportunities. Process development studies and preliminary bench scale studies were completed from 2014 to 2015 to assess alternative process technologies to produce high purity MSM from solution phase manganese sulphate used to produce EMM. A flowsheet was developed to include precipitation of calcium and magnesium prior to the crystallization of MSM, based on co-production of MSM with EMM or sole production of MSM.

A high purity MSM (HPMSM - greater than 99% Mn) produced by sulfuric acid dissolution of EMM with subsequent purification of manganese sulfate solution and crystallization was not tested because production of MSM from EMM was considered at the time to have a high production cost with high energy consumption. On this basis it was categorized as not competitive for the production HPMSM for battery end use - based on MSM purity ranging from 31.8% to 32.0% Mn.

Evaporation and crystallization tests were conducted on manganese sulfate solution produced from flowsheet simulation tests. Precipitation methods to remove calcium and magnesium have been tested and MSM grades of 31.3% Mn were achieved. Bench scale studies on product purity and yield had not been completed as of November of 2021, nor had studies designed to optimize MSM processing technology, including solution purification and crystallization unit operations for battery grade end use. These were identified in 2021 as being subjects of ongoing and future development programs.

Based on a 2021 assessment of HPMSM production technologies, it was determined that process optimization to improve on Plymouth Deposit MSM purity and yield could be achieved by defining the optimum operating parameters such as crystallization temperature, manganese sulfate concentration, solution acidity and the use of proprietary reagents to improve on calcium and magnesium removal. Additional research and laboratory studies were recommended to optimize processing approaches for production of MSM and HPMSM from Plymouth Deposit mineralization.

The results of bench scale testing for development of a purely hydrometallurgical process for the production of a market grade EMM product from the Plymouth Deposit indicated that the process is technically viable, with resulting EMM having a metallic manganese content of greater than 99.99% and a total manganese content ranging from 99.70% to 99.76% manganese. Further bench scale testing was recommended to constrain production of MSM and HPMSM to a similar level of confidence.

1.10 Mineral Resource Estimate

The definition of Mineral Resource and associated Mineral Resource categories used in this Technical Report are those incorporated by reference into NI 43-101 and set out in CIM Definition Standards (May 10, 2014).

The MRE for the Project was prepared under the supervision of Mr. Matthew Harrington, P. Geo., with an effective date of March 1, 2023. A summary of the Plymouth Deposit MRE constrained within a conceptual open pit shell is presented in Table 1-1 and is based on verified results of 51 diamond drill holes (12,952 m), including 25 drill holes (7,098 m) completed by CMC in 2021-2022, 15 drill holes (3,974 m) completed in 2013 by BMC, five drill holes (1,040 m) completed by BMC in 2011, and six drill holes (699 m) completed by MRR in 1985 and 1987. Two trenches completed in 1988 were represented as horizontal drill holes and also contribute to the estimate.

Table 1-1: Plymouth Deposit Mineral Resource Estimate – Effective Date: March 1, 2023

Cut-off (Mn %)	Category	Tonnes (Mt)	Mn (%)	Fe (%)
4.75	Measured	28.8	10.38	14.45
	Indicated	27.9	9.74	13.55
	Measured and Indicated	56.7	10.07	14.01
	Inferred	17.7	10.02	13.62

Notes:

1) Mineral Resources were prepared in accordance with the CIM Standards (May 10, 2014) and CIM MRMR Best Practice Guidelines (November 2019).

2) Mineral Resources are defined within an optimized pit shell with average pit slope angles of 45º in bedrock and 20º in overburden; a 3.78:1 strip ratio applies (waste: mineralized material)

3) Pit optimization parameters include pricing of US$1,760 (CDN$2,288)/t Mn in High Purity Manganese Sulphate Monohydrate (HPMSM) containing 32% Mn, a currency exchange rate of CDN$1.30 to US$1.00, mining at US$5.50 (CDN$7.15)/t, a 2.5% gross metal royalty, combined processing, G&A and selling cost (1,500 t/d process rate) at US$199.17 (CDN$258.92)/t processed, and overall Mn recovery to HPMSM of 77%. Fe content did not contribute to the pit optimization process.

4) Mineral Resources are reported at a cut-off grade of 4.75% Mn within the optimized pit shell. This cut-off grade reflects the marginal cut-off grade used in pit optimization to define Reasonable Prospects for Eventual Economic Extraction using open pit mining methods.

5) Mineral Resources were estimated using GEOVIA Surpac® 2021 software and Ordinary Kriging methods applied to 3 m downhole assay composites. No grade capping was applied. Model block size is 10 m x 10 m x 10 m with partial percent volume estimation applied.

6) Bulk density was estimated using Ordinary Kriging methods applied to drill core specific gravity data; it is assumed that specific gravity approximates bulk density for the materials modelled. The average deposit bulk density for Mineral Resources is 3.13 g/cm^3.

7) Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues

8) Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

9) Figures may not sum due to rounding.

1.11 Environmental Studies, Permitting and Social Impacts

Environmental permitting will be required for any future development of the Plymouth Deposit. Both provincial and federal government departments may be involved in such permitting, with lead responsibility resting with the province of New Brunswick. While this technical report does not contain any characterization of a specific site development approach or strategy, CMC previously identified in its 2014 technical report filed on SEDAR a potential open pit mine development scenario for this site with associated production of EMM. In 2021 this focus shifted to direct hydrometallurgical production of MSM and HPMSM. The Company is currently pursuing a processing approach that is based on conventional production of HPMSM from EMM, with HPMSM being the primary product for sale. This scenario is conceptual only at this time but was applied in the pit optimization process that supports the current MRE. Detailing of specific environmental permitting and social impact assessment considerations based on a specific potential or proposed project design is difficult at this time. Notwithstanding this limitation, the main areas of study and assessment that must feed into any future project permitting activities fall under the main categories listed below.

1. Site History
2. Climate
3. Wildlife And Vegetation
4. Aquatic Ecosystem
5. Watershed and Wellfield Protected Areas
6. Environmentally Significant Areas
7. Environmental Assessment and Permitting
8. Mine Closure and Reclamation Plan
9. Community Engagement, inclusive of Indigenous Communities in the area

The Environmental Assessment and Permitting category (Item 7 above) frame the manner in which work carried out to address the other categories is undertaken and a summary of relevant provincial and federal legislation appears in Section 20.2. CMC initiated work on most of the categories noted prior to 2014, including that of Community Engagement. This very important aspect of any development path is recognized as being of foremost importance for the Project and CMC has initiated contact with the Woodstock First Nation, the Town of Woodstock, the Meduxnekeag River Association, and local landowners. CMC has also acquired surface title ownership to a large percentage of the land overlying the Plymouth Deposit and has entered into access agreements, as necessary, to carry out core drilling activities on adjoining land not owned by the company. Community and government contact activities by CMC staff and consultants with respect to the Plymouth Deposit Project were ongoing at the Effective Date of this Technical Report.

1.12 Interpretations and Conclusions

1.12.1 Project Rationale

The importance of high purity manganese applications in the emerging battery metals market has become increasingly clear, and industry efforts to define and develop opportunities for production of high-quality manganese products such as EMM, HPEMM and HPMSM has accelerated. Based on analysis of world supply and demand trends for battery metals carried out for CMC most recently by Metal Strategies Inc. and previously by Benchmark Mineral Intelligence Inc., it is clear that opportunities for new producers of HPMSM in particular will begin to appear in the early 2020's period and continue to rise gradually through 2040.

Subsequent to the 2014 PEA by Tetra Tech, CMC shifted its Project focus from EMM to MSM and HPMSM products to better address significant forecasted growth in battery market opportunities. This was first represented in the processing scenario associated with the 2021 Mineral Resource pit shell optimization for the Plymouth Deposit. The Company continued to modify its approach to producing and marketing high purity manganese products from any future operation, with the current view being focused primarily on production of HPMSM from EMM for final sale. This scenario is applied in the current MRE pit optimization.

1.12.2 Mineral Resources

The current optimized Mineral Resource pit shell and associated 4.75% Mn cut-off grade define Reasonable Prospects for Eventual Economic Extraction using conventional open pit mining methods. The current cut-off grade of 4.75% Mn is slightly lower than the 5.0 % Mn cut-off grade applied in the 2021 Mineral Resource estimate and primarily reflects application of a slightly higher Mn price in 2023. The infill and expansion core drilling program completed by CMC in 2021-2022 is directly reflected in both categorization of the current Mineral Resource and expansion of the total resource inventory from the 2021 level. Indicated and Measured category tonnages account for 76% of the 2023 deposit total, and Inferred category tonnage accounts for the remaining 24%. In contrast, the entire 2021 Mineral Resource estimate was categorised as Inferred. Results of CMC's 2021-2022 deposit expansion and infill drilling program, combined with the lower Mineral Resource reporting cut-off grade of 4.75% Mn, are responsible for increase in the total Mineral Resource inventory for the Plymouth Deposit by 73% from the 2021 inventory total.

Results of the 2021-2022 drilling program confirmed that the Plymouth Deposit remains open to the northeast and southwest along strike, and also down dip on both the northwest and southeast limbs of the regional fold that affects the deposit. Faulting near the southwest limit of drilling appears to have reduced the deposit width in this area but the deposit extension remains open to the southwest at present. Completion of one additional section of drilling (3 holes per section) across the northeast and southwest strike extensions of the deposit could provide helpful geotechnical and geological information in these deposit-limit areas and should be considered. There is, however, no current need for substantive new definition or infill drilling programs on the Plymouth Deposit. The existing large inventory of Measured and Indicated category Mineral Resources is sufficient to support Prefeasibility Study (PFS) or

Feasibility Study (FS) level evaluations of the deposit's economic viability, and this work should now be the focus of CMC's near-term Project efforts.

1.12.3 Project Risks

The Project is subject to various project risks. Prominent among these are: (1) metal price fluctuations, (2) potential regulatory challenges with respect to future environmental permitting of any future operating site, (3) identification of unforeseen geotechnical issues that may affect mine development, (4) inconsistency between actual bedrock tonnages and metal grades with respect to the mineral resource estimate and its supporting mode, and (5) successful development of a cost-effective processing flowsheet for EMM and HPMSM production. All of these must be addressed on an ongoing basis to minimize and manage their potential impact on the Project. Notwithstanding the above assessment, the report authors have not identified any significant risks or uncertainties that could reasonably be expected to affect the reliability or confidence in the drilling information and Mineral Resource Estimate disclosed in this Technical Report.

1.12.4 North Hartford Deposit Initial Drilling Programs

The North Hartford Deposit is located approximately 3 km northeast of the Plymouth and CMC completed a four-hole core drilling program at this location in August of 2022. Results of the program confirmed that a substantial mineralized zone similar in lithologies and metal grades to the Plymouth Deposit is present at this location. In late February of 2023, the Company initiated a deposit delineation (29 holes) core drilling program at North Hartford that was ongoing at the Effective Date of this Technical Report. Laboratory results are not yet available for the 2023 program, but geological units intercepted to date are similar to those encountered in the August 2022 program. Successful completion of the current North Hartford drilling program should provide a sufficient drilling database to support future preparation of a Maiden Mineral Resource Estimate for the deposit.

1.13 Recommendations

1.13.1 Recommended Work Programs

The following recommendations with respect to further evaluation of the Project are based on work completed to date by CMC and its various contractors and consultants. The premise underlying the recommendations is that a PFS for the Plymouth Deposit based on the current Mineral Resource Estimate should be undertaken as the next stage of its technical and economic evaluation. It is recommended that this be carried out as a two-Phase program, the first of which predominantly consists of identifying and assembling all technical, economic, and other information required to support preparation of the PFS. Phase II is first focused on assembling, analyzing and interpreting Phase I results and acquiring additional data where necessary. This is followed by completion of the detailed PFS evaluation of project viability and preparation of a NI 43-101 Technical Report that documents all contributing work programs and results. Expenditure estimates for completion of the recommended Phase I and II work programs are presented below.

1.13.1 Phase I and Phase II Recommended Budgets

As noted above, the main objective of Phase I is to complete all preparatory work necessary to produce a PFS for future development of the deposit. The current inventory of Measured and Indicated category Mineral Resources should be sufficient for PFS purposes. Phase I proposed expenditures totalling $CDN 1,925,000 are presented below in Table 1.3 and are focused on acquisition of geotechnical, metallurgical, engineering, environmental, marketing and community consultation inputs for the Phase II program. Phase II work programs address preparation of the actual PFS and include progression of time-sensitive environmental permitting studies required for future project development. Phase II proposed expenditures totalling $CDN1,650,000 are presented below in Table 1-2.

Scheduling of Phase II programs logically follows completion of those assigned to Phase I but progression to Phase II work is not specifically contingent on prior receipt of all Phase I results.

Table 1-2: Budget for Recommended Phase I and Phase II PFS Programs

Item	Phase	Program Component	Estimated Cost ($CDN)
1	Phase I	Geotechnical, engineering, environmental, marketing and community consultation studies required to support PFS level inputs for Phase II	$1,000,000
2	Phase I	Metallurgical testing and pre-concentration flow sheet design studies to support PFS level design and costing inputs for EMM and HPMSM production inputs for Phase II	$500,000
3	Phase I	Core drilling for geological assessment of deposit strike extensions or acquisition of metallurgical testing material	$250,000
	Subtotal		$1,750,000
		Contingency	$175,000
	Total		**$1,925,000**
1	Phase II	Preparation of a PFS defining Mineral Reserves based on an updated MRE plus final pre-concentration flow sheet, geotechnical, environmental, geological, engineering, market study, socio-economic and community consultation programs initiated in Phase I	**Estimated Cost ($CDN)**
	Subtotal		$1,500,000
		Contingency	$150,000
	Total		**$1,650,000**

2.0 INTRODUCTION

2.1 Scope of Reporting

Canadian Manganese Company Inc. ("CMC" or the "Company") retained Mercator Geological Services ("Mercator") with respect to completing an updated Mineral Resource estimate ("MRE") for the Plymouth manganese-iron deposit ("Plymouth Deposit") that comprises the Woodstock Project ("Project") located in New Brunswick, Canada. This Technical Report documents the MRE, which was prepared in accordance with the CIM Definition Standards for Mineral Resources and Mineral Reserves as amended in 2014 ("CIM Standards 2014"). The Technical Report was prepared in accordance with National Instrument 43-101 ("NI 43-101") Form F-1. CMC is a public company reporting issuer listed on the NEO Exchange Inc. under the symbol CDMN and on the OTCQB Market under the symbol CDMNF (NEO: CDMN; OTCQB: CDMNF), and is based in Toronto, Ontario, Canada.

The Project consists of Mineral Claim Number 5472 that contains 232 mineral claim units (5,875 ha) that include coverage of the Plymouth Deposit and the nearby North Hartford Deposit where core drilling is currently being carried out. CMC holds a 100% interest in Mineral Claim 5472 and is also the owner of surface rights covering an area of 53 ha over a portion of the Plymouth Deposit.

This Technical Report summarizes recent and historical drilling and recent metallurgical testing work completed on the Project by CMC that forms the basis of the MRE and makes recommendations for further exploration and evaluation programs.

2.2 Qualified Persons

The report authors are independent Qualified Person's (QP) as defined by NI 43-101 and are responsible for all sections of this report as summarized in Table 2-1 and in each Certificate of Qualified Person included in Section 28. Neither the authors of this report or the firms with which they are employed have any material present or contingent interest in the outcome of this report, nor do they have any financial or other interest that could be reasonably regarded as being capable of affecting their independence in the preparation of this report. This Technical Report has been prepared in return for professional fees based upon agreed commercial rates and the payment of these fees is in no way contingent on the results of this report. The report authors are not a director, officer or other direct employee of CMC and do not have shareholdings in this company.

2.3 Personal Inspections (Site Visits) and Data Verification

2.3.1 Site Visits by Kevin MacRae, P. Geo.

QP Kevin MacRae completed multiple personal inspections (site visit) of the Project between November 25, 2021 and March 31, 2022 and July 19 to August 1, 2022. This site visits were completed for the purposes of executing the 2021-2022 drilling program, overseen by the QP, as well as to complete site inspection, ground truthing, completing a collar coordinate check program and to satisfy NI 43-101 "personal inspection" and data verification requirements. During his personal inspection, Mr. MacRae visited claim group 5472 that contains the Plymouth Deposit and MRE as well as the North Hartford Deposit. Author MacRae verified the geology, mineralization, local infrastructure, and accessibility into the project area for future exploration and development activities by CMC. Mr. MacRae completed 6 collar pickups from historical drilling as well as reviewed a total of 5 drill holes from the

Table 2-1: Technical Report Author Responsibilities

Responsible Person - QP	Firm	Area of Responsibility	Relevant Sections (Items)
Mathew Harrington, P. Geo.	Mercator	• Resource estimation • Overall responsibility • No site visit	1, 14 (except 14.5), 24, 25, 26
Kevin-Dane MacRae, P.Geo.	Mercator	• Site visits November 25, 2021 -S August 1, 2022 • Exploration/Drilling	10, 11, 12, 15, 16, 17, 18, 23, 27
Michael Cullen, P. Geo.	Mercator	• Site Visit February 8, 2023 • Geology, deposit types, supervision	2, 3, 4, 5, 6, 7, 8, 9, 13, 20, 28
Lawrence Elgert, P. Eng.	AGP	• Pit optimization • No site visit	14.5

2011 and 2013 CMC drilling programs at the Project. In addition, he was responsible for the logging and sampling Quality Assurance and Quality Control (QA/QC) programs for the 2021-2022 drilling.

A summary of the results from the collar coordinate check program are discussed in Section 12 of this Technical Report (Data Verification).

During the site visits Mr. MacRae completed the following tasks and inspections:

- Review and inspection of the CMC core storage facility in Woodstock including select core intervals from the 2011 and 2013 drilling programs and visually comparing the core to original drill logs and sampled intervals;
- Supervise and execute 2021-2022 exploration program activities on behalf of CMC including data capturing, data verification and adherence to QA/QC protocols;
- Limited drill collar location coordinate check program from the 2011 and 2013 CMC drilling programs for data verification purposes, comparison to the original results;
- Reviewed the data collection and QA/QC procedures for the Woodstock drilling and sampling programs completed by CMC; and
- Completed a field inspection of the Woodstock project between November 25, 2021, and March 31, 2022 and again between July 19 and August 1, 2022. The inspection was completed over the Plymouth and North Hartford Deposits near Woodstock (Figure 2.1 and 2.2).

The personal inspection completed by Mr. MacRae during the aforementioned timeframes, confirmed the following:

- The CMC core storage facility at Woodstock was well organized and there was evidence of proper QA/QC procedures in place for core logging and sampling;

- Manganese mineralization is evident in the core samples reviewed and sample intervals were properly documented in core boxes and in the core logging database;
- Access to the Project is excellent through secondary roads and well-maintained trails owned by private landowners with private agreements in place. Exploration and drilling activities can be carried out easily without material obstacles.

In addition, based on a detailed review of the available historical exploration and drilling data, geophysical data, and QA/QC procedures, including exploration programs completed by CMC, Mr. MacRae is satisfied that this meets the data verification requirements set out under NI 43-101. The CMC field programs were designed according to CIM Mineral Exploration Best Practice Guidelines, and no issues or fatal flaws were detected during the personal inspection.

Figure 2-1: Plymouth Deposit Area from Plymouth Road (Viewing East)

(Source: Mercator 2023)

Figure 2-2: North Hartford Deposit Area (Viewing Northeast)

(Source: Mercator 2023)

2.3.2 Site Visits by Michael Cullen, P. Geo.

Several site visits to the Project were undertaken by author Cullen between November 1st, 2021 and February 8th, 2023. The most recent visit was on February 7th and 8th of 2023 and was carried out satisfy NI 43-101 "personal inspection" and data verification requirements. At that time, field and equipment access conditions were checked on the Plymouth Deposit area and equipment access and drill hole location checks were carried out on the North Hartford Deposit area. A meeting was also conducted with the primary landowner associated with the CMC North Hartford core drilling program. Selected drill core from both the 2021-2022 CMC drilling program at Plymouth and 2022 drilling program at North Hartford was inspected at the CMC core facility near Woodstock, NB and associated logging and sampling data were checked for accuracy against the Project drilling database. Field checks on two North Hartford drill collar locations (HF22-01 and HF22-02) were also carried out with satisfactory results. Drill core and site inspections plus reviews of field work, safety and QAQC protocols were carried out during earlier site visits. Further details of Mr. Cullen's site visits appear in Section 12 of this Technical Report.

Based on site visit results and detailed review of the available historical exploration and drilling data, geophysical data, and QA/QC procedures, including exploration programs completed by CMC, authors MacRae and Cullen are satisfied that their efforts and associated results meet data verification requirements set out under NI 43-101. The CMC field programs were designed according to CIM Mineral Exploration Best Practice Guidelines, and no issues or fatal flaws were detected during the personal inspection.

2.4 Information Sources

Sources of information, data and reports reviewed as part of this Technical Report can be found in Section 27 (References). The report authors (QPs) take responsibility for the content of this report and believe the data review to be accurate and complete in all material aspects. Table 2-2 presents various abbreviations that have been assembled for general information purposes. The QP notes that not all of these abbreviations appear in the report text.

Exploration claims information, historical assessment and technical reports, and exploration and drilling data were either acquired by Mercator or supplied by CMC. Historical and recent drilling data was loaded into a Surpac database and validated by report author Matthew Harrington prior to evaluation and use in the MRE.

Table 2-2: Table of Abbreviations

Abbreviation	Meaning		
3D	three-dimensional		
AA	atomic adsorption		
Actlabs	Activation Laboratories Ltd.		
AGP	AGP Mining Consultants Ltd.		
ALS	ALS Laboratories		
BMC	Buchans Minerals Corporation		
$CDN	Canadian Currency		
CALA	Canadian Association for Laboratory Accreditation		
CMC	Canadian Manganese Company Inc.		
CIM	Canadian Institute of Mining, Metallurgy and Petroleum		
DEM	digital elevation model		
DGPS	differential global positioning satellite		
EL	exploration licence		
EM	electromagnetic		
FA-AA	fire assay-atomic absorption		
FS	Feasibility Study		
GPS	global positioning satellite		
GSC	Geological Survey of Canada		
g/t	grams per tonne		
HPMSM	High Purity Manganese Sulphate Monohydrate		
ICP-OES	Inductively Coupled Plasma Optical Emission Spectrometry		
IP	Induced Polarization		
LiDAR	light detection and ranging		
MSM	Manganese Sulphate Monohydrate		
Mercator	Mercator Geological Services Ltd.		
MRR	Mineral Resource Research Limited		
Mt	millions of tonnes		
MRE	Mineral Resource Estimate		
NI 43-101	National Instrument 43-101		
NBDNRE	New Brunswick Department of Energy and Resource Development		
NSR	net smelter return (royalty)		
oz	ounce		
PEA	Preliminary Economic Assessment		
P.Geo.	Professional Geologist		
ppb	parts per billion		
ppm	parts per million		
PFS	Preliminary Feasibility Study		
QA/QC	quality assurance and quality control		
QP	Qualified Person		
RC	reverse circulation		
Thibault	Thibault and Associates Ltd.		
$US	United States Currency		
UTM	Universal Transverse Mercator		
VLF-EM	very low frequency electromagnetic		
k	thousand	°	degree symbol

Abbreviation	Meaning		
Ma	million	%	percent
Ga	billion	Ba	Barium
ca	circa	PGE	Platinum Group Elements
et al.	and others	REE	Rare Earth Elements
C	Celsius	Pb	Lead
ha	hectare	Pd	Palladium
kg	kilogram	Au	Gold
km	kilometre	Ag	Silver
lbs	pounds	As	Arsenic
ft	foot	Cu	Copper
"	inch	Ni	Nickel
µm	micrometre	Zn	Zinc
m	metre	Fe	Iron
mm	millimetre	Mn	Manganese
cm	centimetre	K	Potassium
ml	millilitre	Th	Thorium
/	per	Co	Cobalt
g	gram (0.03215 troy oz)	Pb	Lead
oz	troy ounce (31.04 g)	Bi	Bismuth
Oz/T to g/t	1 oz/T = 34.28 g/t	Ca	Calcium
Sn	tin	In	Indium
st	short ton (2000 lb or 907.2 kg)	ppm	parts per million
ppb	parts per billion	t	tonne (1000 kg or 2204.6 lb)
tpd	tonnes per day		

3.0 RELIANCE ON OTHER EXPERTS

The authors are relying upon information provided by CMC concerning any legal, political, environmental, or community consultation matters, and also for any option, joint venture or royalty matters relating to the Project. Mercator staff acquired mineral titles information on Mineral Claim 5472, that is the subject of this Technical Report, from the New Brunswick Department of Energy and Resource Development electronic database of mineral titles (known as “NB e-CLAIMS”). This information showed the subject mineral claim to be in good standing at the effective date of this report and at the report date. However, Mercator has not independently verified the status of, nor legal titles relating to, Mineral Claim 5472 and its associated claim units. No warranty or guarantee, be it express or implied, is made by the authors with respect to the completeness or accuracy of the Mineral Claim 5472 mineral title comprising the Woodstock Project.

The QP is also relying upon specific market study and metal pricing information provided by Metal Strategies Inc. that were applied in the pit shell optimization associated with the MRE described in Section 14 of this Technical Report. Additionally, they are relying upon information previously presented in Section 13 of the 2021 NI 43-101 Mineral Resource Technical Report (Harrington et al., 2021) prepared by Mercator for CMC. In all instances, the QP takes responsibility for the stated reliance and associated information.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 Property Location and Description

The Project is comprised of Mineral Claim 5472, that contains 232 mineral claim units (5,875 ha) located in Carleton County, New Brunswick, approximately 5 km west of the Town of Woodstock (Table 4-1 and Figure 4-1). It includes the Plymouth Deposit and the North Hartford Deposit and is 100% owned by CMC. CMC is also the owner of surface rights covering an area of 53 ha within Mineral Claim 5472 that covers a portion of the Plymouth Deposit. This exploration holding is centred at map coordinates 603460 m Easting and 5113320 m Northing (UTM NAD83 Zone 19N) within NTS Map Sheet 21J/04 (Figure 4-1).

Table 4-1: Mineral Claims Table for Woodstock Project

Claim Number	Claim Group Name	Beneficial Owner	Number of Claim Units	Issue Date	Expiry Date	Area (Ha)
5472	Woodstock Mountain	Canadian Manganese Company Inc. (100%)	232	2008-11-14	2023-11-14	5,875
			232			**5,875**

The New Brunswick Department of Energy and Resource Development electronic database of mineral titles known as "NB e-CLAIMS" (http://nbeclaims.gnb.ca/nbeclaims) confirms that the mineral claim comprising the Woodstock Project as described above in Table 4-1 was, at the Effective Date and Report Date, in good standing , and that no legal encumbrances were registered with New Brunswick Department of Energy and Resource Development against this mineral claim. The QP confirms that payment of claim acquisition fees associated with the claim identified in Table 4-1 is documented in NB e-CLAIMS. The QP makes no further assertion concerning the legal status of the property. Mineral Claim 5472 has not been legally surveyed to date and there is no requirement to do so at this time.

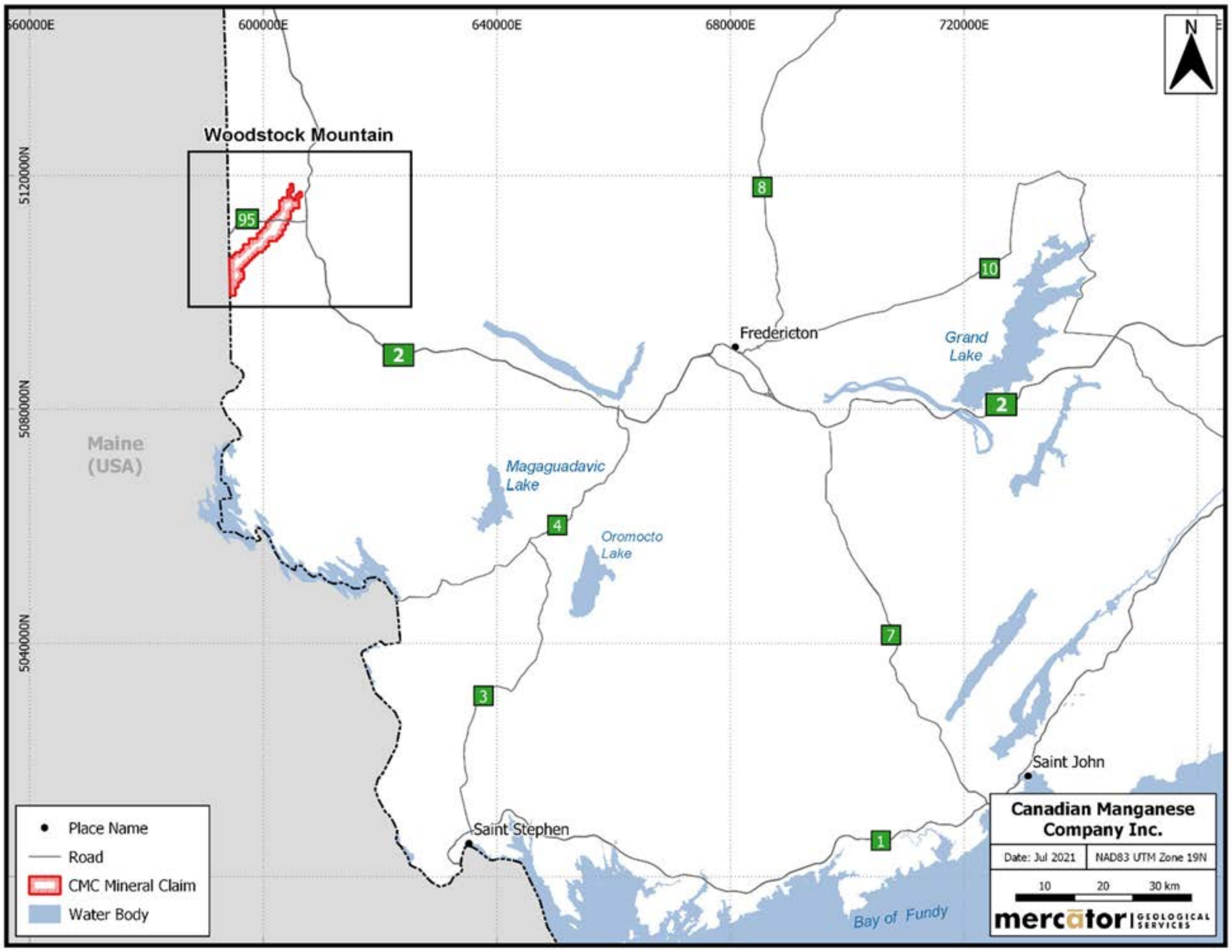
4.2 Option Agreements and Royalties

CMC owns the surface rights for a portion of the Project area (130 acres or 52.6 ha), which covers the northern part of the Plymouth Deposit. That portion of the Project is subject to a 1% gross sales royalty retained by the vendors of the property and CMC retains buyback rights for half of this royalty. CMC owns 100% of the Project and there are currently no option agreements in place.

4.3 Surface Rights and Permitting

As defined under the New Brunswick Mining Act ("*Mining Act*"), minerals are generally owned by the Crown, however, some land grants reserved only specific minerals to the Crown and therefore other minerals were, in fact, transferred to the grantee. Prior to 1810, it was common for gold and silver, and a few other minerals to be reserved to the Crown. The *Mining Act* defines a mineral as any natural, solid, inorganic, or fossilized organic

Figure 4-1: Woodstock Property Location Map



(Source: Mercator 2023)

substance, and such other substances as are prescribed by regulation to be minerals, but does not include:

- Sand, gravel, ordinary stone, clay or soil unless it is to be used for its chemical or special physical properties, or both, or where it is taken for contained minerals;
- Ordinary stone used for building or construction;
- Peat or peat moss;
- Bituminous shale, oil shale, albertite, or intimately associated substances or products derived therefrom;
- Oil or natural gas; or
- Such other substances as are prescribed by regulation not to be minerals.

Crown-owned minerals are property separate from the soil; that is, a landowner owns the surface rights but does not own mineral rights, unless some minerals were granted with the land and each conveyance since the granting has preserved the ownership of those minerals. By means of the *Mining Act*, the province makes Crown-owned minerals available for exploration and development. Prospectors (persons or companies that hold prospecting licences), holders of claims, and holders of mining leases have the right to prospect, explore, mine, and produce those minerals, whether they are on Crown-owned or privately-owned lands. They also have the right of access to the minerals; however, they are liable for any damage they cause.

All Crown-owned minerals are available for prospecting and staking except in:

- Lands withdrawn from staking for all or certain minerals, e.g., coal and potash are currently withdrawn from prospecting and staking;
- Lands already staked or leased;
- First Nations reserves. Minerals in First Nations reserves are administered through the Indian Act of Canada; and
- National and Provincial Parks, Protected Natural Areas, and Military Lands.

Mineral claim acquisition in New Brunswick is an online process (NB e-CLAIMS) and can be completed by selecting mineral claim units ("claim units") from an interactive map or by inputting claim unit numbers in the application. For acquisition, the minimum size of a claim is 1 claim unit and the maximum number of units in a claim should not exceed 256 contiguous available claim units. To fully benefit from all the options available via NB e-CLAIMS, holders of earlier ground staked claims should convert their titles to the current map staked system of claim units and claims. Conversion of ground staked mineral claims to map staked claims is to be voluntarily completed until such time as the Recorder's office will control any outstanding conversions.

Mineral claim unit renewal fees and yearly work requirements are summarized in Table 4-2 below.

Table 4-2: Amount of Assessment Work Required Per Mineral Claim Unit (Mines Act)

Service Type	Description	Fee/Charge ($)
Renewal Fees	1 to 5	10
	6 to 10	20
	11 to 15	30
	16 and more	50
Other Fees	Grouping ≥2 contiguous Mineral Claims into 1 group (per resulting group)	20
	Transfer (all or part per Mineral Claim Unit)	10
	Notice of dispute (per Mineral Claim)	20
	Payment in lieu of required work in the first year of a Mineral Claim Unit (per Mineral Claim Unit)	20
Mineral Claim Work Expenditure Requirement (per Mineral Claim Unit and per year)	Year 1	100
	Year 2	150
	Year 3	200
	Year 4	250
	Year 5 to 10	300
	Year 11 to 15	500
	Year 16 to 25	600
	Year 26 and over	800

Land access permission is required from surface rights holders in New Brunswick before mineral exploration activities can be undertaken. Surface titles to lands covered by the Woodstock Project are held by CMC and various private landowners or the Province of New Brunswick (the "Crown"). As discussed above, the Plymouth deposit occurs partially within the property limits of a 130-acre (52.6 Ha) parcel of land owned by CMC. This land parcel covers the northern part of the deposit, while the surface rights over the southern portion of the deposit are owned by a private landowner. For both Crown land and private land, mineral exploration licence holders must come to an agreement with the landholder in order to gain the right to access and be able to conduct exploration work on the land.

For work on Crown Land, it is necessary to submit a Notice of Planned Work on Crown Land – Form 18.1 to the Recorder (New Brunswick Regulation 86-99 under the Mining Act, s.20.1). The Recorder will review the submitted form and, in most cases, will grant permission on behalf of the Department of Natural Resources and Energy Development. In some cases, the Recorder will advise the claim holder that a reclamation plan and security are required before work can commence. If work is to be conducted on a Crown Land Lease, the claim holder needs to obtain permission from the Lessee (Mining Act, 1985 s.110).

For Private Land, a claim holder needs to contact the landowner as soon as possible after staking and advise of such. A Notice of Planned Work on Private Land - Form 18 (New Brunswick Regulation 86-99 under the Mining Act, 1985 s.20) must be delivered to the landowner if intrusive work of any kind is planned. A copy of the completed Form 18 must also be submitted to the Recorder indicating how and when the landowner was notified. The claim holder must attempt to reach an agreement with the landowner regarding any surface disturbance such as damage and/or interference with use and enjoyment of the land, including plans for reclamation. If the claim holder is unable to contact the landowner, it is necessary to notify the Recorder that a reasonable effort to do so has been made. If the claim holder is unable to reach an agreement with a landowner within 60 days of contact, work may be done after a security is deposited with the Recorder. The claim holder is required to notify landowners prior to each year of work (Mining Act, 1985 s.110).

Special permission from a landowner or appropriate authority is required prior to causing actual damage to, or interference with the use and enjoyment of the following lands: lands in cities, town and villages, lands occupied by railway stations and switching yards and railway rights of way, lands within the boundaries of a public highway, lands occupied by a building or a public highway, lands occupied by a building or curtilage thereof, gardens and cultivated lands and other lands that are prescribed by regulation

Reference:
https://www2.gnb.ca/content/gnb/en/departments/erd/energy/content/minerals/content/Minerals_exploration/LandAccessAndUse.html

4.4 Permits or Agreements Required for Exploration Activities

The Project is located on private land, some of which is owned by CMC. The Company has executed land access agreements with private landowners to complete exploration work, primarily consisting of diamond drilling, on its mineral claim to date as described in this Technical Report. These land access agreements would cover any land disturbance or other damage associated with the intended exploration work and need to be renewed on a regular basis. Agreements would also have to be developed, as necessary, to allow certain aspects of recommended future work programs, such as further diamond drilling or environmental monitoring well installations, to proceed.

4.5 Other Liability and Risk Factors

The QP is not aware of any environmental liabilities associated with the Project. As noted above, CMC will require permits to conduct recommended future exploration work on the property. CMC has advised the QP that its liability, at the effective date of this report, was limited to activities carried out under their exploration permits issued by the Government of New Brunswick. These permits are for site activities related to diamond drilling and general site access but do not include impacts associated with historical site use. Development of a future mining operation at the Plymouth Deposit require that the issue of site liabilities be addressed in the related mining and environmental permitting process.

The QP is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the recommended work program on the property.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Accessibility

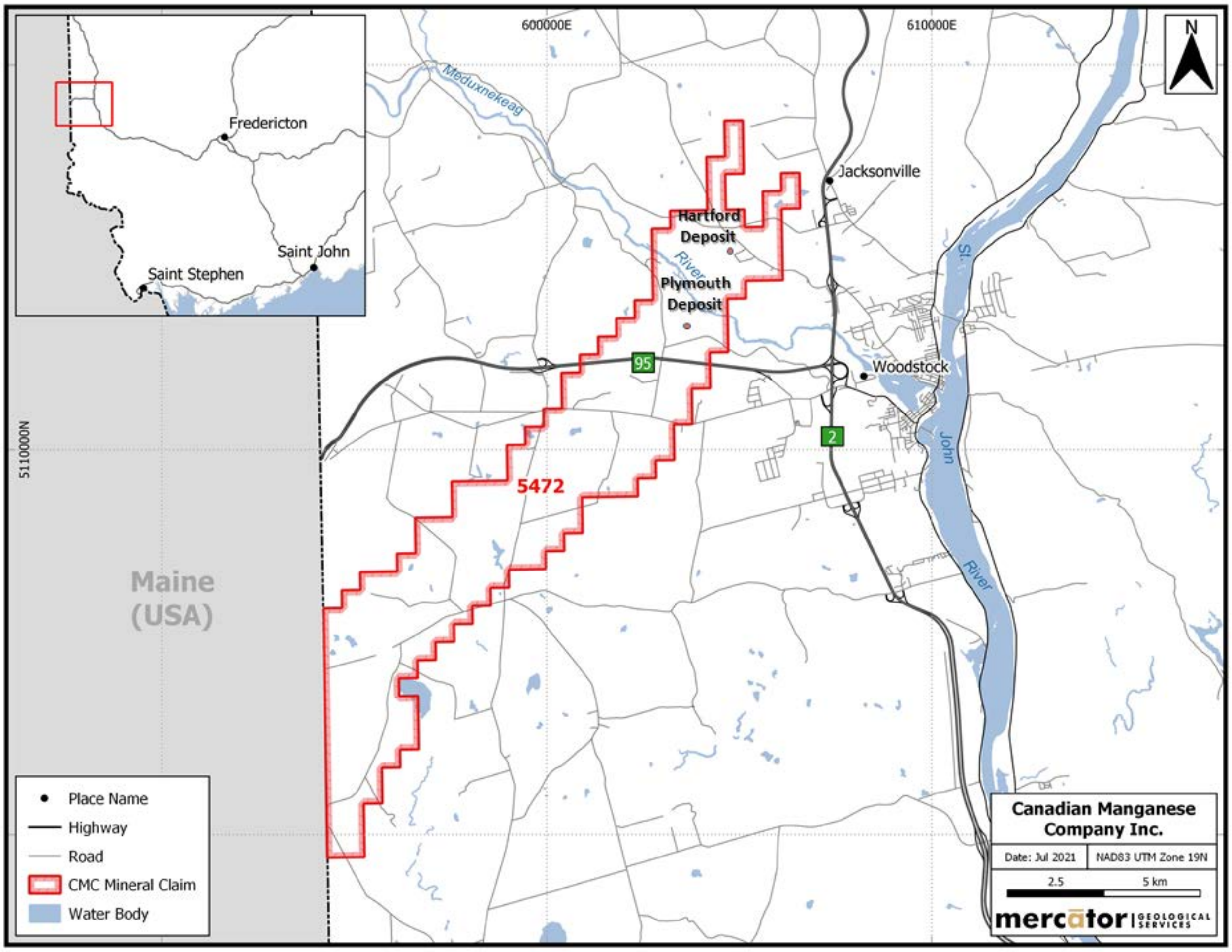
The Project is located in western New Brunswick, Canada approximately 5 km west of the town of Woodstock (pop. 5,200), approximately 15 km east of the town of Houlton, Maine, USA (pop. 6,123), and approximately 100 km north of the City of Fredericton (pop. 58,220) (Figure 5-1). The closest international airport is the Greater Moncton Roméo LeBlanc International Airport (YQM) located approximately 270 km northeast of the Project. Regional airline service (Air Canada and Porter Airlines) is also available from Saint John Airport (YSJ) and Fredericton Airport (YFC) with daily direct flights from Montréal and Toronto. The region can be accessed via the Trans Canada highway or Route 95 which joins the I-95 Interstate highway at the USA border. Mineral Claim 5472 is easily accessible, with the Trans-Canada Highway being located approximately 4 km to the east and Highway 95, which extends westward in Canada to the USA border, being located less than 1 km north of Plymouth Road which crosses the Project area. The closest town to offer full services is Woodstock, which includes full-service accommodations, grocery stores and restaurants, tool rental, hardware stores, a hospital, police and fire and gas stations.

5.2 Climate and Physiography

The Project is in the temperate zone of North America, and although the property is within 157 km of the ocean (Bay of Fundy), climatic conditions are more humid continental, governed by the eastward flow of continental weather patterns. The average annual temperature is approximately 10˚C, with an average summer maximum of 30˚C and an average winter minimum of -30˚C. Winter conditions are prevalent on site from late November until late March or early April. Frost depth is approximately 1.0 m to 2.0 m. Annual precipitation is approximately 1,000 mm with 60% of this occurring as rain and the remainder as snow. Mineral exploration field programs can efficiently be undertaken from May through to late November in all areas. Winter programs such as drilling and geophysical surveys can also be implemented year-round but delays due to poor winter weather conditions such as heavy snow fall should be expected.

The Project is located within the Saint John River watershed and is primarily agricultural land with forested sections. Overburden thickness typically ranges between 0 and 10 metres in depth. Topographic elevations on the claims range between 120 and 180 metres above sea level. Local surface drainage systems consist of several small lakes, rivers, and streams plus the large, southeast flowing Meduxnekeag River, that occurs within a pronounced valley that crosses the northern portion of Mineral Claim 5472.

Figure 5-1: Location Map – Woodstock Project



(Source: Mercator 2023)

5.3 Local Resources and Infrastructure

The Project is well positioned with respect to infrastructure. The town of Woodstock offers motels, medical services, hardware stores, grocery stores, emergency services, police services, a hospital, and gas stations. A railway line is accessible in Houlton, Maine, and the existing electrical grid power is readily accessible.

The extensive surface drainage systems present in the Saint John River watershed provide readily accessible potential water sources for incidental exploration use such as diamond drilling. In combination with ground water resources, they also provide good potential as higher volume sources of water such as those potentially required for future mining and milling operations.

Exploration staff and consultants, as well as forestry, heavy equipment and drilling contractors can be sourced from within New Brunswick and surrounding provinces such as Nova Scotia and Quebec. The agriculture and forestry industries are the dominant employers in the region, with J.D. Irving Ltd. being a major employer in western New Brunswick. The local rural and urban economies provide a large base of skilled trades, professional, and service sector support that can be accessed for exploration and resource development purposes.

6.0 HISTORY

6.1 Woodstock Property

The history of exploration and mining in the Woodstock area, including the Plymouth Deposit, is poorly recorded for the period prior to 1970, but historical operations at Iron Ore Hill and in the Woodstock area included development and production of approximately 70,000 tons (63,497 tonnes) of iron ore (Fe) between 1848 and 1884. This iron ore was locally smelted. The manganese potential of these occurrences may not have been fully appreciated until 1936, when the Geological Survey of Canada (GSC) published geological mapping for the area. This work highlighted several occurrences of iron formation rocks including some of the main deposits in the Moody Hill and Iron Ore Hill areas. This included chemical analyses of several of the iron formations and highlighted the high Mn content of the material, with reported ranges between 10.48% and 15.0% Mn (Caley, 1936). In 1943, the iron mineralization was assessed by Noranda Mines Limited using flotation technology to produce manganese and iron concentrates. In addition, regional scale mapping was completed by White (1943) for the State of Maine and in 1947 the Maine Geological Survey published a review of the manganese deposits of Aroostook County that are correlative with those in the Woodstock area (Miller, 1947).

In 1952, the New Brunswick Resources Development Board completed a review of New Brunswick manganese occurrences (Sidwell, 1952) and in 1954, the GSC completed a preliminary review of the Woodstock area manganese occurrences (Anderson, 1954). The United States Bureau of Mines and Maine Geological Survey also initiated studies of similar manganese deposits across the US border in Aroostook County, Maine in 1952. Work undertaken between 1952 and 1962 in Maine included metallurgical studies on mineralization from the Maple Mountain-Hovey Mountain deposits (Eilertsen, 1952; Conley, 1952; Lamb et al., 1953; MacMillan and Turner, 1956), description of iron ores from the Littleton Ridge Mn deposit (Pavlides, 1955), bulk sampling of the Dudley Mn deposit (Eilertsen and Earl, 1956), investigation of various Aroostook County occurrences (Eilertsen, 1958), and detailed geological investigation of the Maple and Hovey Mountain area deposits (Pavlides, 1962).

Between 1953 and 1960, the Hartford and Plymouth deposits were held by Strategic Manganese Corporation, a subsidiary of Stratmat Limited (“Stratmat”). While conducting a gravity survey southwest from the Iron Ore Hill area to the Maine border, Stratmat discovered the North and South Hartford deposits, as well as the Plymouth deposit (Sidwell, 1954). Over the period of 1953 to 1957, Stratmat completed various metallurgical investigations and geological and magnetic surveys, and 34,021 feet (10,369 m) of drilling, including 17,388 feet (5,300 m) on the Plymouth Deposit (Sidwell, 1957).

Between 1965 to 1968, the Chemical Engineering Department of the University of New Brunswick undertook three investigations of the manganese mineralization in the Project area. These investigations included examination of possible chemical processing techniques for manganese mineralization such as leaching with sulphuric acid (Bien, 1965) and sulfidation (Sansom, 1968), as well as upgrading by agglomeration, as an alternative to flotation (Lalvani, 1965).

In 1968, the GSC published a Memoir on the Woodstock area that included a regional geological map showing locations of the various iron-manganese prospects (Anderson, 1967). This report provides detailed descriptions of the main deposits and documents the location of several occurrences located southwest of the Plymouth Deposit and extending south to the Maine border.

In the early 1970's, Mandate Refining Company held the claims and worked towards development of a method of roasting pyritic waste with iron-manganese mineralized material. This was unsuccessful and the claims were abandoned.

In 1972, the New Brunswick Department of Natural Resources and Energy ("NBDNRE") published a geological report on the stratigraphy and structure of the area (Hamilton-Smith, 1972). This report included several geological maps showing locations of iron-manganese occurrences throughout the area, including those covered by the current CMC holding.

Between 1978 and 1979, one inch to quarter mile geology maps for the area were published by the New Brunswick Geological Survey (Venugopal, 1978).

Between 1976 and 1980, Minuvar Limited held the claims and undertook geological mapping and geochemical sampling of available trenched and outcropping bedrock exposures in 1976. It also conducted magnetometer and very low frequency electromagnetic (VLF-EM) ground geophysical surveys over the Plymouth Deposit (Gilders, 1978).

In 1984, Mineral Resource Research Limited (MRR) staked the iron-manganese deposits in the Woodstock area and in 1985 completed detailed geological mapping and trenching over the Plymouth Deposit and drilled one hole (DDH-85-1) to test the deposit. This hole reportedly missed the mineralized zone, as it was drilled sub-parallel to strike (Roberts, 1985).

In the fall of 1985, the NBDNRE collected samples from the Plymouth Deposit for submission to the New Brunswick Research and Productivity Council (RPC) for mineralogy studies and chemical analysis (Webb, 1986).

In 1986, a sampling program was completed over the Plymouth and Hartford deposits funded by the Canada-New Brunswick Mineral Development Agreement (Wilson and Bamwoya 1986). Work was completed by Atlantic Analytical Services (Atlantic Analytical) and RPC. Five samples from the Plymouth deposit and three samples from South Hartford deposit were collected for mineralogy and grade determinations, including five 200 kg samples collected from five trenches, excavated, and sampled in January of 1986. The original trench was previously sampled by the NBDNRE in 1985 but was not sampled during this sampling campaign. This work was reportedly undertaken during a period of heavy snow fall that hindered the program. Results showed that all of the Plymouth samples were of inferior quality, assaying an average of only 5.13% manganese, and one of the samples assayed as low as 0.46% Mn and contained substantial quantities of mud and soil. These same samples were used in a follow-up study by the Process Studies Group of the Mineral Resources Branch of NBDNRE that included various leach tests. The reported head grade of the sample was 7.29% manganese and 11.3% iron (O'Donnell, 1988).

In 1986, funded by the Canada-New Brunswick Mineral Development Agreement, Witteck Development Inc. ("Witteck"), was contracted by the Department of Supply and Services (Government of Canada) to undertake a detailed processing study, using the Atlantic Analytical samples collected from the Plymouth Deposit (Newman and Bartlett, 1987). Witteck completed a detailed investigation that included metallurgical test work and an evaluation of selected processing options. Head assays for the Plymouth samples were determined to range from 6.27% to 8.41% manganese and averaged 7.2% manganese. Despite the low head grades, metallurgical test work by Witteck identified processes for which marginal economics might be achieved. Witteck evaluated ten processing techniques designed to produce Electrolytic Manganese Metal (EMM) or high-purity manganese precipitate, of which two were identified as being potentially viable.

In 1987, MRR also completed a ground magnetometer and VLF-EM survey over the Plymouth Deposit (Prince, 1987). The magnetometer survey was successful in outlining the deposit, with results obtained being comparable to those of earlier surveys (Gilders, 1976).

In 1988, MRR undertook a comprehensive technical program to evaluate the Plymouth Deposit in an attempt to establish an accurate description of the deposit, including potential grade and tonnage aspects (Roberts and Prince, 1988). This program included bulk sampling, trenching, core drilling and geochemical analyses. Highlights include excavation of two trenches across the deposit and drilling of two drill holes, beneath each trench, to allow interpretation of sections across the deposit at depth. A total of five holes (DDH-81-1 to DDH-81-5) were drilled, totalling 2,086 feet (636 m).

In 1991, Ikejiani et al. (1991) prepared an interim report on an investigation to evaluate the use of microwave-hydrochloric acid digestion processing of the Woodstock mineralized material. In 1991, MMR contracted Industrial Research and Development Company Ltd. to evaluate the use of microwave-hydrochloric acid digestion processing of the Woodstock mineralized material.

In 2007, a thesis study of the Woodstock deposits was completed by Mr. Bryan Way, as part of a Master of Science degree in Geology at the University of New Brunswick, under the supervision of Dr. David Lentz. This research lead MRR to re-acquire mineral claims over the Plymouth and Hartford deposits by staking in 2008 and MRR made various archived samples and drill cores available to Mr. Way for sampling and study.

In August 2010, Buchans Minerals Corporation (BMC) acquired the Woodstock Project from MRR. CMC was incorporated under the Canada Business Corporations Act on June 13, 2011, for the purpose of acquiring the Woodstock Project in New Brunswick and to pursue the exploration and development of the property to produce speciality manganese metals. CMC was a wholly owned subsidiary of BMC until December 31, 2019. Further details on the exploration and drilling completed by BMC and CMC since acquiring the Project are disclosed in Section 9 and 10 of this Technical Report.

In 2010 BMC (Moore, 2011) undertook a compilation of previous work on the property including contracting a comprehensive review of previous metallurgical test work and economic study completed by Witteck, (Newman and Bartlett, 1987). Review of the Witteck study was contracted to Wardrop Engineering (Wardrop, a Tetra Tech Company), while BMC undertook a review of previous exploration on the property. This work yielded positive results as it provided BMC with valuable information (limited drill logs and assays) to support potential existence of a Mineral Resource comparable to the historical resource estimate reported by Sidwell (1957); while Wardrop's review of the Witteck study suggested the deposit may be amenable to modern leach processing for commercial production of EMM or other high-purity manganese products desired by modern industrial markets. BMC's review of Witteck's work also showed that Witteck had tested a poor-quality sample containing between 6.27% and 8.41% Mn (averaging 7.2% Mn), compared to previously published historical resource estimates that suggested the deposit was of significantly higher grade, averaging 11.0% Mn (Moore, 2011).

In 2011 BMC drilled 5 confirmation holes into the Plymouth Deposit (1,040 m), from which NQ cores were sampled for preliminary metallurgical test work undertaken by process engineering consultants, Thibault and Associates Inc. (Thibault) of Fredericton, NB. Drilling confirmed grades and widths in keeping with historical resource estimates with BMC completing two drilling fences spaced 100 m apart across the central portion of the deposit (Moore, 201).

Following drilling, Thibault completed bench scale metallurgical tests on a composite sample derived from coarse reject material prepared from core assay samples. The average weighted grade for the composite sample was 11.07% manganese and 15.25% iron. Their work included a series of leach tests that achieved sulphuric acid leach recoveries ranging from 85.9% to 89.4%; while reducing acid leach tests ranged from 91.7% to 96.4%. Though preliminary, these initial metallurgical results were considered highly encouraging and further test work was recommended.

BMC, through CMC and Minco, contracted Thibault to complete additional bench scale metallurgical test work on the Plymouth Deposit to follow up on favourable results achieved by Thibault in 2011. Since April 2011, Thibault was also engaged to conduct bench scale hydrometallurgical tests to confirm and optimize a process for leaching manganese from typical Plymouth Deposit mineralization for the ultimate commercial production of saleable end products such as EMM and manganese carbonate. Since 2011, all test work has been conducted on a representative composite sample prepared from the 2011 drill program that has an average weighted grade of 11.07% manganese and 15.25% iron. Additional details regarding metallurgical testing are available in Section 13 of the 2021 Technical Report.

In early 2012, BMC contracted Mercator to complete a NI 43-101 Technical Report (Webster et al., 2012) on the property. This report was completed for regulatory purposes and was later filed on SEDAR on February 27, 2012.

In 2013, CMC drilled 16 holes into the Plymouth Deposit (4,082 m - NQ core) as a diamond drilling program designed to collect sufficient additional data to support preparation of a MRE in accordance with NI 43-101 and the CIM Standards. This work was contracted to Mercator and resulted in an Inferred MRE to a depth of 150 metres relying on data from both the 2013 and 2011 CMC drilling programs as well as historical drilling by MRR in 1987. Results of the 2013 drill program were considered favorable as the program intersected mineralization bearing grades and widths anticipated from the historical resource estimate reported by Sidwell (1957). The geologic limits of the mineralization were compiled by BMC based upon historically interpreted sections (Sections 10N to 16N) and were subsequently used to constrain Mercator's MRE. The 2013 estimate (Cullen et al., 2013) was superseded by another prepared in 2014 by Tetra Tech (Kesavanathan et al. 2014) and both are fully documented in NI 43-101 Technical Reports filed on SEDAR. CMC does not consider the 2013 or 2014 estimates to be current. They were both superseded by the 2021 estimate by Mercator that has an Effective Date of November 10, 2021. Mercator concluded that infill drilling at a 50-metre intercept spacing would be necessary to upgrade much of the existing MRE to the Indicated category, and also that then-current Inferred resource was of sufficient size and integrity to support a Preliminary Economic Assessment (PEA).

In December 2013, CMC retained Tetra Tech to prepare a PEA for the Project and this is described in a NI 43-101 Technical Report by Tetra Tech that has an effective date of July 10, 2014 (Kesavanathan et. al., 2014). The 2014 PEA is no longer current, and CMC is not relying upon the results of that study at this time. **This PEA was preliminary in nature and included Inferred Mineral Resources that are considered too speculative for application of modifying factors to categorize them as Mineral Reserves.**

The 2014 PEA examined two mining operation scenarios for the Project based on the 2014 MRE by Mercator and two mill throughput rates: 3,000 t/d and 1,500 t/d. The 3,000 t/d mill throughput rate was utilized as the base case operational scenario for the PEA study. A matrix of four processing options was selected to form the basis for economic analysis of the Woodstock Project. Tetra Tech concluded that the Plymouth Deposit had good potential to support a future mining and processing operation focused on production of EMM, with potential for associated production of high purity manganese products. It was recommended that CMC complete further diamond drilling to improve confidence in the mineral resource classification. It was also recommended that CMC complete further bulk sampling and metallurgical testing programs to advance the Project to a Prefeasibility Study (PFS) level of assessment.

6.2 Previous Mineral Resource Estimates and Past Production

Other than the current MRE discussed in Section 14 of this Technical Report, and the preceding but no longer current 2013, 2014 and 2021 Plymouth Deposit estimates prepared by Mercator for CMC, no other Mineral Resource or Mineral Reserve estimates prepared in accordance with the CIM Standards have been completed for the Plymouth Deposit. Table 6-1 below presents results of the 2013, 2014 and 2021 MREs disclosed in accordance with NI 43-101 and prepared in accordance with the CIM Standards applicable at the Effective Dates. The 2013 estimate was superseded by that of 2014 and both are fully documented in NI 43-101 Technical reports prepared by Mercator and filed on SEDAR (Cullen et al., 2013, Kesavanathan et al., 2014, and Harrington et al., 2021). CMC is not considering the 2013, 2014 or 2021 estimates to be current and is not relying upon them at this time. They are all superseded by the 2023 estimate that is documented in this Technical Report.

Table 6-1: Tabulation of 2013, 2014 and 2021 Mineral Resource Estimates Prepared by Mercator for CMC

Year	Mn % Cut-off	Category	Rounded Tonnes	Mn %	Fe %
***2021**	**5.0**	**Inferred**	**43,070,000**	**10.01**	**14.32**
**2014	3.5	Inferred	44,770,000	9.85	14.15
***2013	5.0	Inferred	43,710,000	9.98	14.29

*Notes to 2021 Estimate:

1. Mineral Resources were prepared in accordance with the CIM Standards (2014) and CIM MRMR Best Practice Guidelines (2019).
2. Mineral Resources are defined within an optimized conceptual pit shell with average pit slope angles of 45⁰ in bedrock and 20⁰ in overburden.
3. Pit optimization parameters include: pricing of US$1500 /tonne for High Purity Manganese Sulphate Monohydrate – 32% Mn (HPMSM – 32 % Mn), US$ 935/tonne for Manganese Sulphate Monohydrate – 32% Mn (MSM – 32%Mn), exchange rate of CDN$1.30 to US$ 1.00, mining at CDN $6.50/t, combined processing and G&A (1000 tpd) at CDN $193.22/t processed and a process recovery of manganese to MSM and HPMSM of 85%. Iron was not considered in the pit optimization but has potential for future commercial value.
4. Mineral Resources are reported at a cut-off grade of 5 % Mn within the optimized conceptual pit shell. This cut-off grade reflects total operating costs used in pit optimization and is used to define Reasonable Prospects for Eventual Economic Extraction by open pit mining methods.
5. Mineral Resources were estimated using Inverse Distance Squared methods applied to 3 m downhole assay composites. No grade capping was applied. Model block size is 10 m (x) by 10 m (y) by 10 m (z).
6. Bulk density was estimated using Inverse Distance Squared methods applied to drill core sample data; it is assumed that specific gravity approximates bulk density for the materials modelled.
7. Mineral resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues
8. Mineral Resources are not mineral reserves and do not have demonstrated economic viability.
9. Mineral Resource tonnages are rounded to the nearest 10,000.

**Notes to 2014 Estimate:

1. Tonnages have been rounded to the nearest 10,000 t.
2. The 3.5% manganese cut-off value for this resource statement is bolded above and is based on parameters established by the 2014 TetraTech PEA and reflects a reasonable expectation of economic viability based on market conditions and open pit mining methods.
3. Mineral Resources that are not mineral reserves do not have demonstrated economic viability.
4. This estimate of Mineral Resources may be materially affected by environmental permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.

***Notes to 2013 Estimate

1. The 5% Mn cut-off value for this resource statement reflects a reasonable expectation of economic viability for deposit of this nature based on market conditions and open pit mining methods.
2. Mineral Resources that are not mineral reserves do not have demonstrated economic viability.
3. This estimate of Mineral Resources may be materially affected by environmental permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.

Two historical estimates that appear in reporting prepared prior to the introduction of NI 43-101 disclosure standards and the CIM Standards were reviewed by Mercator. The first is reported in Sidwell (1957) and the second in Roberts and Prince (1990). Presence of these historical estimates is noted herein for completeness, but CMC is not considering them to be current. A Qualified Person as defined in NI 43-101 has not carried out sufficient assessments to qualify them as current mineral resource estimates and CMC is not relying upon them at this time.

Small-scale production from the Woodstock area iron-manganese occurrences occurred shortly after their discovery in 1848, with a reported 70,000 tons (63,502 tonnes) mined from the Iron Ore Hill occurrence and a lesser amount from the Moody Hill occurrence (Sidwell, 1957). Neither of these is located on CMC holdings. Gross (1967) reported that the iron-manganese produced from the Woodstock area during this period was found to have exceptionally good physical qualities and was shipped to England for use by the Royal Navy.

6.3 2014 Preliminary Economic Assessment

In December 2013, CMC retained Tetra Tech to complete a PEA for the Project with an effective date of July 10, 2014 (Kesavanathan et. al., 2014).). This work was previously referenced above.

Note: The 2014 PEA is no longer current, and CMC is not relying upon the results of that study. This PEA was preliminary in nature and included Inferred Mineral Resources that are considered too speculative geologically, on which to apply economic considerations to categorize them as Mineral Reserves. There was no certainty that this PEA would be realized. A brief summary of this PEA is disclosed below only to inform the reader of all available scientific and technical information related to the Project.

In the 2014 PEA, Tetra Tech examined two mining operation scenarios for the Project based on the 2014 MRE prepared by Mercator (noted in Table 6-1 above) and two mill throughput rates: 3,000 t/d and 1,500 t/d. The 3,000 t/d mill throughput rate was utilized as the base case operational scenario for the PEA study. A matrix of four processing options were selected to form the basis for economic analysis of the Woodstock Project.

Tetra Tech concluded that the Plymouth Deposit had good potential to support a future mining and processing operation. Tetra Tech recommended that CMC complete further diamond drilling to improve confidence in the Mineral Resource classification, complete bulk sampling and further metallurgical testing, and advance the Project to a PFS level of technical and economic evaluation.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Woodstock Property Geology

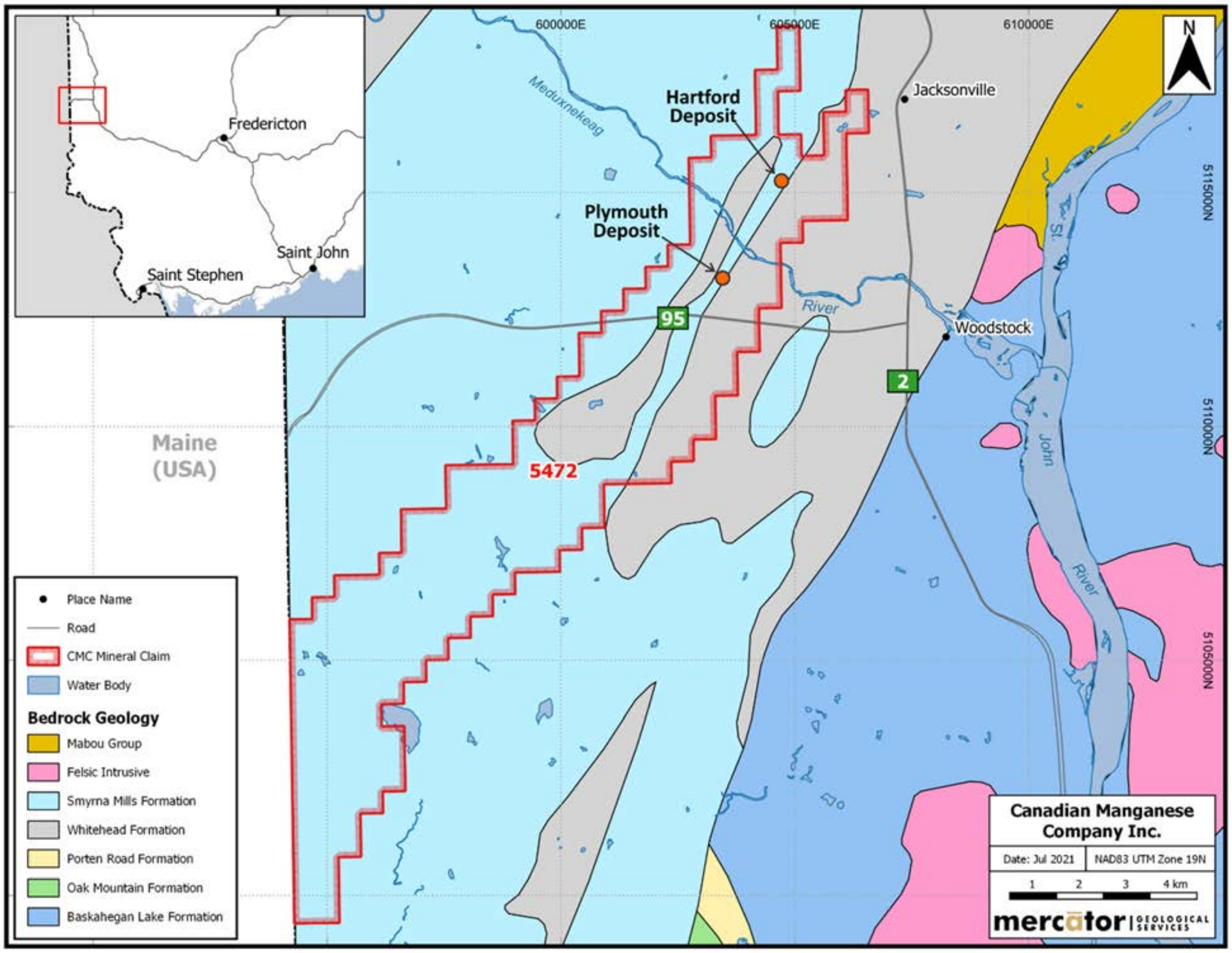
Government mapping in the Project area shows it to be underlain by a belt of Ordovician and Silurian siltstones and slates, collectively referred to as the Aroostook-Percé belt. This includes Late Ordovician to Early Silurian sediments of the Matapedia Group's Whitehead Falls Formation that are overlain by Early Silurian sediments of the Perham Group's Smyrna Mills Formation, which are laterally extensive over much of western and northwestern New Brunswick and Maine (Fyffe and Fricke, 1987; NBDNRE, 2000). Figure 7-1 presents a geological interpretation for the area that is based on a compilation of government mapping results.

The Woodstock area manganese-iron deposits are interpreted to represent a series of Early Silurian manganiferous banded iron formations (BIFs). Six main deposits were identified by gravimetric survey results from the mid-1950s and defined as being large, lenticular-shaped bodies within the Silurian Smyrna Mills Formation. These deposits are interpreted to have formed in a shallow marine basin and are in sharp contact with units of red or green shale (Sidwell, 1957; Roberts and Prince, 1990; Force et al., 1991). Stratigraphic lensing and compositional variation of the manganiferous units has been interpreted to indicate that the deposits are stratigraphically separated and not one continuous unit. The current orientation of bedrock units is primarily a function of two folding generations (F1 and F2). F1 folds trend northeast and are slightly overturned south of the Plymouth Deposit and have axial planes ranging from nearly vertical, to 85° northwest. Fold axes plunge shallowly (< 5 degrees) to the northeast and southwest. F2 folds overprint F1 structures and have axial planes trending northwest, (approximately 320°) and dipping steeply north at approximately 80° (Roberts and Prince, 1990). Both sets of folds were generated during the mid-Devonian Acadian Orogeny and were affected by associated regional sub-greenschist metamorphism. Earlier Silurian deformation is not well represented in the Plymouth area.

The White Head Formation consists of dark grey to bluish-grey fine-grained argillaceous limestone with interbedded calcareous shale. The Smyrna Mills Formation is composed of dark grey coloured, non-calcareous, silty shale with minor layers of green and red mudstone, and associated ferro-manganiferous siltstone (Smith and Fyffe, 2006). There is great variation in shale and/or siltstone in the Smyrna Mills Formation and this is interpreted to indicate highly variable ocean redox conditions during deposition of the host sequence.

The Plymouth Deposit has been described as an assemblage of iron and manganese oxide and carbonate-silicate-oxide facies rocks that formed within a shallow marine basin. Roberts and Prince (1990) described the Plymouth deposits as Banded Iron Formations (BIFs) within a series of sedimentary-volcanic units, but alternative hypotheses suggest the iron-manganese mineralization could have originated from a variety of sources including oceanic hydroxides and/or the weathering of terrestrial bedrock, with deposition occurring in a continental margin marine setting (Way et al., 2009; Way, 2012). The lack of volcanic association in the associated stratigraphy supports the more recent assessment, which is favoured at present.

Figure 7-1: Woodstock Property Geological Map



(Source: Mercator 2023)

7.2 Mineralization

Historical interpretation of the mineralization of the Plymouth Deposit indicated that the iron-manganese mineralization can be subdivided into oxide, silicate-carbonate-oxide, and carbonate facies (Sidwell, 1957; Gilders, 1976; Roberts and Prince, 1990). These stratiform deposits are analogous to the Type IIA deposits of bedded manganese oxides and carbonates described by Macharmer (1987). The iron-manganese oxide facies present in the Project area is represented by red to maroon siltstone, and red chert characterized by the mineral assemblage magnetite, hematite, braunite (Mn+2Mn+36[O8SiO4]) and bixbyite ([Mn,Fe]2O3) and ranges between 30% and 80% iron-manganese oxides. Manganese mineralization is predominantly present in the form of rhodochrosite (MnCO3) and minor sursassite (Mn2Al3[(SiO4)(Si2O7)(OH)3]) crosscuts syngenetic iron-manganese mineralization (Sidwell, 1957). Greenish grey siltstone units interbedded with the red and maroon units also carry potentially economic levels of manganese. Bedded layers of both iron-manganese mineralization types are locally observed to be crosscut by veins of quartz, quartz-carbonate, chlorite and iron sulfides (Way et. al., 2009).

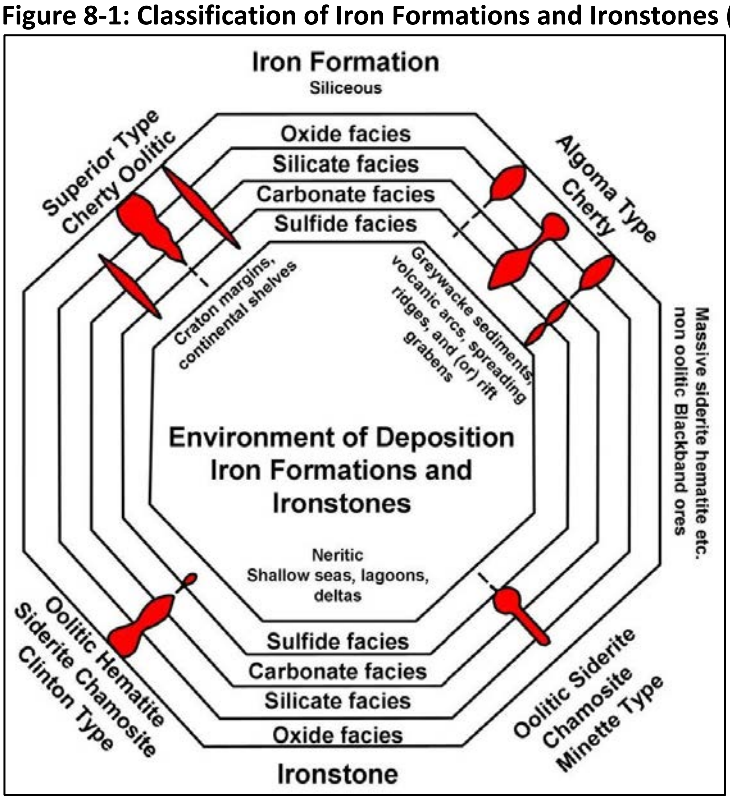
As a result of work completed by BMC-CMC and Thibault on the Plymouth Deposit since 2011, it has been recognized that the manganese mineralization in both the red and grey siltstone lithotypes that comprise the deposit is dominated by manganese carbonate in the form of rhodochrosite. The iron mineralization in red and grey siltstones was found to be different, with the dominant iron minerals in the red siltstones being oxides in the form of hematite, magnetite and ilmenite, while the dominant iron mineral in the grey siltstone is a carbonate, predominantly in the form of siderite. A more detailed description of the analysis of the mineralogy of the Plymouth Deposit is found in Section 13.2.2 of this Technical Report.

8.0 DEPOSIT TYPES

The manganese and iron mineralization that forms the Plymouth Deposit is bedded and stratiform in nature and is recognized as being of primary sedimentary origin. Manganese is predominantly in the form of the carbonate mineral rhodochrosite and iron occurs in both oxide (hematite, magnetite, and ilmenite) and carbonate minerals (predominantly siderite). The deposit has been classified by some past workers as being of the Algoma Type banded iron-formation (BIF) group as defined by Gross (1965; 1996). More recent research reported by Way (2012) and Way et al. (2009) indicates that the Plymouth Deposit and its correlatives in this area that include the North Hartford Deposit, also held by CMC, are more appropriately classified as Clinton Type ironstones. Figure 8-1 presents the classification system referred to and distinguishes these deposit types based on associated sedimentary environments of deposition.

The lack of a clear geochemical signature indicating volcanogenic or hydrothermal input in the continental margin, marine sedimentary environment that prevailed during deposition of the deposits supports their classification as Clinton Type. Way (2012) identified various lithofacies in the deposit area and interpreted them as defining a range of shallow marine chemical depositional environments. Evidence of an anoxic reducing environment is interpreted as being present in sequences that underlie the main iron and manganese bearing units, with these gradually transitioning to more oxygen rich environments that favoured precipitation of the banded, sedimentary iron and manganese oxides and carbonates that comprise the deposit. Mineralogic banding that characterizes the deposit could be explained as a reflection of seasonal fluctuations of dissolved Fe2+ and Mn2+ within the overlying column of seawater (Way 2012).

Figure 8-1: Classification of Iron Formations and Ironstones (Gross, 1965; 1996)



9.0 EXPLORATION

9.1 Woodstock Project

As discussed in Section 6, in August 2010, BMC acquired the Project from MRR, a private, Fredericton-based company. CMC was incorporated under the Canada Business Corporations Act on June 13, 2011, for the purpose of acquiring the Project and to pursue exploration and development of the property to produce speciality manganese metals. CMC was a wholly owned subsidiary of BMC until December 31, 2019. This section refers to exploration completed by both BMC and CMC. Reference is made to BMC for work carried out up to December 31, 2019 and CMC is referenced for programs carried out subsequent to that date.

The acquisition of the property was largely driven by the BMC's review of past metallurgical test work completed in 1987 by Witteck and funded by the Canada New Brunswick Mineral Development Agreement. Witteck evaluated 10 processing techniques designed to produce electrolytic manganese metal or high purity manganese precipitate, of which they identified two with positive operating margins that may have been potentially economic in 1987. The information was reviewed by BMC who engaged Wardrop in August 2010 to review and update the two processes with positive operating margins presented by Witteck, using current cost and market data. Following this evaluation, Wardrop concluded that under current market conditions and given larger tonnage through-puts, both Witteck flowsheets are feasible and that with newer and more robust flowsheet options, improved process recoveries and concentrate grades could be expected (Moore, 2011). Wardrop's review was succeeded by more comprehensive hydrometallurgical reviews undertaken by Thibault for BMC, and key elements of their work have been disclosed in BMC news releases and are further summarized in Section 13 of this report.

BMC carried out a 5-hole (1,040 m) core drilling program on the property in 2011 and the details of this program are discussed in Section 10 of this Technical Report.

BMC engaged Thibault in 2011 to conduct bench scale hydrometallurgical tests to confirm and optimize the process for leaching manganese from typical Plymouth Deposit mineralization. Drill core samples and coarse reject material derived from BMC's 2011 drilling program were delivered to Thibault for this work, which included gravity concentration tests as well as a series of bench scale hydrometallurgical tests, to confirm and optimize a process of leaching the manganese from the host rock. In addition, tests were conducted towards the goal of producing a purified manganese leach solution that could provide the basis for producing end products such as EMM. Details of the metallurgical test work carried out by Thibault appear in Section 13 of this Technical Report.

In 2013, BMC completed 16 core drill holes totalling 4,082 m to define 7 cross sections of the deposit as a basis for resource estimation for the Plymouth Deposit. The program was planned by Mercator with input from BMC technical staff. Details of this program are discussed in Section 10 of this report. Results of this drilling program, plus those for several validated historical drill holes from 1989, form the basis of the 2013 and 2014 MRE programs mentioned earlier in Section 6.0 of this Technical Report.

From December 2021 to April 2022, CMC completed a 7,098 m core drilling program at the Plymouth Deposit consisting of 25 holes, including one abandoned hole (PL-22-048 abandoned at 23 m). NQ size (47.6 mm diameter) core was recovered, and the program was designed and implemented by Mercator to provide optimum infill hole coverage to upgrade a substantial portion of the existing Inferred category Mineral Resource to Indicated and

Measured Mineral Resource status. Details of this drilling program are discussed in Section 10 of this Techncial Report.

In July 2022, CMC carried out a 4-hole, 1,186 m drilling program at its North Hartford Deposit, which occurs within Smyrna Mills Formation units located approximately 2.2 km along-strike to the northeast from the Plymouth Deposit. Drilling was planned along one section line crossing the North Hartford Deposit to test historically documented manganese and iron mineralization. Details of this program appear in Section 10 of this Technical Report.

10.0 DRILLING

10.1 Introduction

This Section describes the 2011, 2013 and 2021-2022 diamond drilling programs completed on the Plymouth Deposit by CMC and BMC and also covers initial drilling carried out by CMC in 2022 and 2023 on its nearby North Hartford Deposit. As in the previous section, reference is made to BMC for work carried out up to December 31, 2019 and CMC is referenced for programs carried out subsequent to that date. The holes associated with these programs provide the main base of technical information that supports the current MRE, and no subsequent drilling has been completed on the Plymouth Deposit. This Section also describes the 2022 diamond drilling program completed on the North Hartford Deposit by CMC.

The 2011 and 2013 drilling programs by BMC were contracted to Maritime Diamond Drilling Limited (“Maritime”). of Hilden, Nova Scotia, Canada and completed using a Longyear 38 drilling rig supported by a bulldozer and Timberjack equipment for drill moves and day to day support. NQ size core (47.6 mm diameter) was recovered, and drilling was carried out on a two shift per day basis. Site supervision, logging, sampling, and project record keeping were the responsibility of BMC personnel in accordance with BMC field operations and QA/QC protocols that are discussed in Section 10 and Section 11 of this Technical Report.

The 2021-2022 drilling programs at Plymouth and North Hartford were contracted to Maritime and completed using a Longyear 38 drilling rig supported by a bulldozer for drill moves and day to day support. NQ size core (47.6 mm diameter) was recovered, and drilling was carried out on a two shift per day basis. Site supervision, logging, sampling, and project record keeping were the responsibility of Mercator personnel in accordance with CMC field operations and QA/QC protocols that are discussed in Section 10 and Section 11 of this Technical Report.

CMC initiated a program of deposit definition core drilling at North Hartford in Late February of 2023. Logan Drilling Group of Stewiacke NS (“Logan”) was contracted to carry out drilling operations and the program was designed and is being managed by Mercator staff. A 29-hole program of NQ drilling is planned and the program was ongoing at the Effective Date of this Technical Report. None of the 2022 or 2023 core drilling at North Hartford contributes to the current Plymouth Deposit MRE and no analytical results for the 2023 program had been received by CMC at the Effective Date of this Technical Report.

The QP has verified the drilling, core logging, sampling, and QA/QC procedures used during the 2011,2013 and 2021-2022 and 2023 drilling programs and is of the opinion that BMC, CMC and Mercator field staff used appropriate procedures meeting the CIM Exploration Best Practice Guidelines at the respective program times and that the assay results obtained from these drilling programs are suitable for use in the MRE discussed in Section 14 of this Technical Report.

10.2 2011 Drilling Program

In 2011, BMC completed a 1,040 m NQ diamond drilling program at the Plymouth Deposit consisting of five holes. These holes were designed to assess the extent of the deposit as defined by results of a magnetometer survey carried out by MRR in 1987, and to confirm assay results reported by MRR in 1988. All logging and sampling associated with the program was conducted by BMC geologists and technicians. Collar coordinates and drill hole orientation data for the 2011 Woodstock program are presented in Table 10-1 and hole locations are presented in Figure 10-1.

Table 10-1: Plymouth Deposit 2011 Drill Hole Collar Location, Orientation and Depth Data

Hole No.	*Northing (m)	*Easting (m)	*Elevation (m-asl)	Depth (m)	Dip (deg)	Az. (deg)
PL-11-006	5113442.78	603513.49	117.94	150	-45.1	128.2
PL-11-007	5113471.49	603471.29	117.69	176	-44	129.5
PL-11-008	5113498.20	603432.21	119.05	251	-43.2	125.1
PL-11-009	5113318.94	603511.00	127.91	200	-45.3	132.7
PL-11-010	5113357.60	603462.21	123.93	263	45.4	128.3

**UTM NAD 83 Zone 19 Coordination; above sea level elevation*

Assays from the initial three holes were released by BMC on September 7, 2011 and demonstrated grade and continuity over broad widths. Significant intercepts included 11.41% Mn over 45.0 m in hole PL-11-006, 11.43% Mn over 89.0 m in hole PL-11-007, and 9.22% Mn over 63.0 m in hole PL-11-008. Additional drilling results were released on September 17, 2011, and included results for two intersections in hole PL-11-009. The upper intercept from a depth of 10 m to 54 m returned 8.61% Mn over 44.0 m and the lower intercept from 69 m to 147 m returned 12.51% Mn over 78.0 m. Hole PL-11-010 also included two intersections with an upper intercept from 10 m to 111 m returning 11.27% Mn over 101.0 m and a lower intercept from 153 m to 231 m returning 11.67% Mn over 78.0 m.

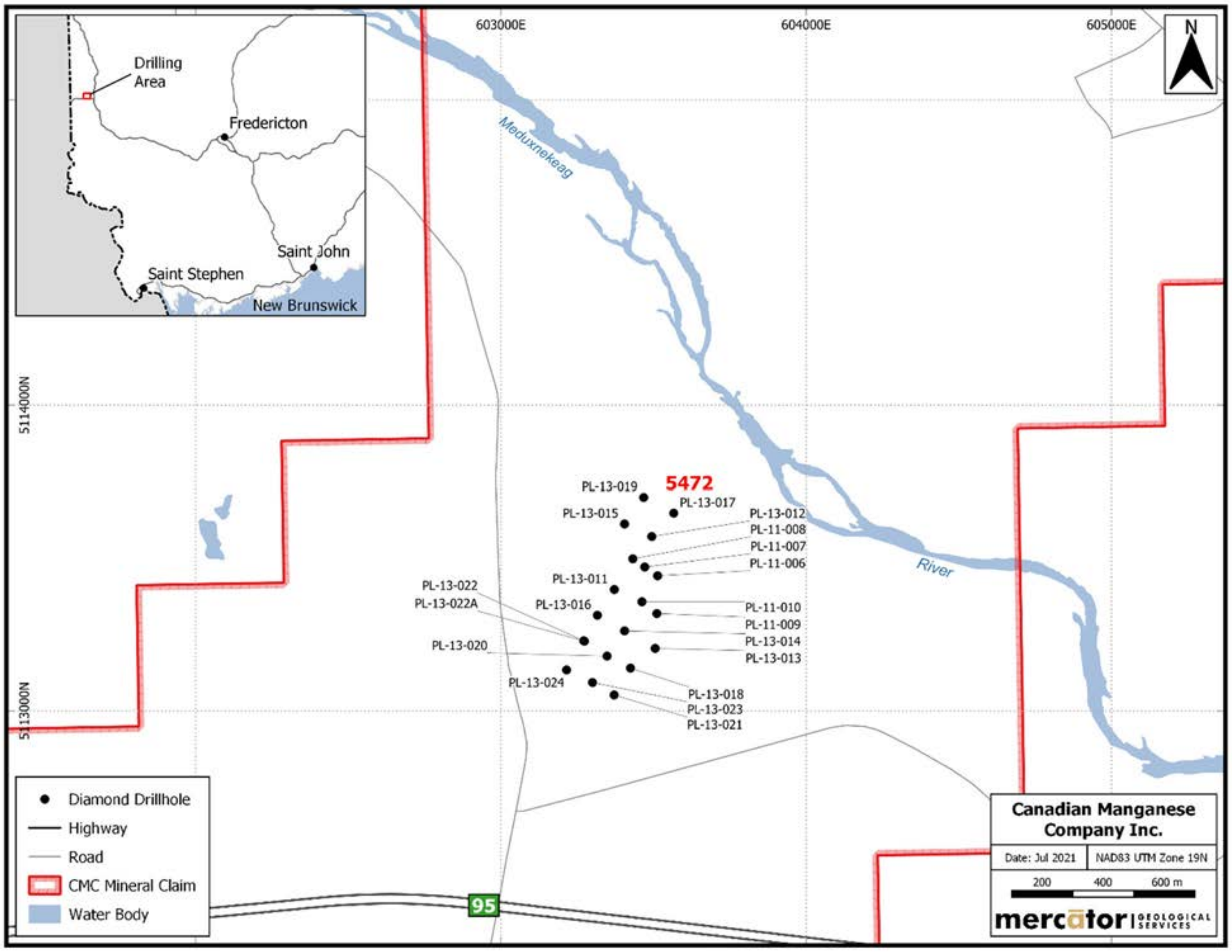
Significant intercepts for the 2011 program are summarized below in Table 10-2. True widths of the mineralized intercepts are estimated to be approximately 87% of the reported drill core lengths. Drilling was completed on two sections spaced approximately 100 m apart and was designed to confirm the deposit's grade and thickness and to collect fresh core samples for metallurgical testing. Core loss was not identified as a problem during this program.

Table 10-2: Significant Intercepts from the 2011 Drill Program.

Hole No.	From (m)	To (m)	*Length (m)	Mn %	Fe %
PL-11-006	5	50	45	11.41	13.14
PL-11-007	21	110	89	11.43	14.90
PL-11-008	80	143	63	9.22	12.75
PL-11-009	10	54	44	8.61	12.59
and	69	147	78	12.51	16.34
PL-11-010	10	111	101	11.27	16.01
and	153	231	78	11.67	16.57

*True widths average ~87% of intercept lengths

Figure 10-1: Woodstock Project 2011 and 2013 Drill Hole Locations



(Source: Mercator 2023)

10.3 2013 Drilling Program

The 2013 drilling program was carried out by BMC and totalled 16 diamond drill holes comprising 4,082 m of coring along 7 sections crossing the Plymouth Deposit. Section spacing along the length of deposit was approximately 100 m and holes were planned to provide data to support preparation of a mineral resource estimate.

Collar coordinates and drill hole orientation data for the 2013 drilling program are shown in Table 10-3 and hole locations appear above in Figure 10-1. The drilling was angled to crosscut the mineralization and estimated true widths, based on the interpretation of geological cross sections, typically range between 70 and 90% of the intercept length.

Table 10-3: Plymouth Deposit 2013 Drill Hole Data

Hole No.	*Northing (m)	*Easting (m)	*Elevation (m)	Depth (m)	Dip (Deg)	Az. (Deg)
PL-13-011	5113397.72	603371.70	126.021	401	-45.2	121.5
PL-13-012	5113571.33	603494.39	108.54	200	-45	122.5
PL-13-013	5113204.72	603505.52	127.93	137	-45	118
PL-13-014	5113262.11	603405.28	128.96	275	-45.6	123.5
PL-13-015	5113612.54	603405.15	113.83	305	-45	132.5
PL-13-016	5113313.32	603316.27	127.28	404	-45	122.5
PL-13-017	5113647.98	603566.41	97.29	170	-45	113.5
PL-13-018	5113140.12	603424.52	130.01	92	-45	118
PL-13-019	5113699.05	603467.88	108.82	305	-44.7	120.5
PL-13-020	5113179.55	603347.85	131.62	227	-45	118
PL-13-021	5113052.14	603371.14	131.39	131	-45	118
PL-13-022	5113229.72	603271.35	135.69	119	-45	118
PL-13-023	5113092.99	603300.24	137.32	245	-45	118
PL-13-024	5113134.23	603215.20	139.16	338	-45	121.5
PL-13-025	5113439.02	603282.06	123.15	377	-45	120.5
PL-13-022A	5113228.50	603273.66	135.75	356	-45	118.5

** UTM NAD 83 Zone 19N Coordination; sea level elevation datum*

Drill hole PL-13-011 was drilled at the northwest end of a line of previously drilled holes (Section 13 North) and completed a central section across the deposit (Figure 10-1). The hole returned assays averaging 11.25% Mn over 113.85 m core length (approximately 95 m true width). Interpretation of this section indicates mineralization is likely hosted by a folded sedimentary sequence, occurring as several lobes of mineralization, within a synclinal fold structure. Drilling also confirmed the near-surface extent of the deposit at this location as being approximately 225 m wide, with a depth extent exceeding 100 m.

Three holes were drilled on Section 12 North, where the deposit is interpreted to be approximately 190 m wide at surface and extending to depths of 230 m or more, and 2 holes drilled on Section 15 North intersected mineralization projected to be 45 m wide at surface and extending to a depth of 140 m or more below surface (Figure 10-1). Highlights from the three holes on Section 12 North include hole PL-13-014, that intersected 11.08% Mn over 202.5 m core length (approximately 136 m true width); hole PL-13-016 that intersected 10.1% Mn over 99.0 m core length (approximately 78 m true width), as well as two deeper intercepts of 11.56% Mn over 30.0 m core length and 13.23% Mn over 39.0 m core length (23 m and 31 m approximate true widths respectively). The most easterly hole on this section, PL-13-013, intersected 11.43% Mn over 19.0 m core length (16 m approximate true width).

Highlights from the two holes on Section 15 North include hole PL-13-012 that returned assays averaging 10.82% Mn over 53.0 m core length, (45 m approximate true width) and hole PL-13-015, that returned an upper intercept averaging 10.01% Mn over 21.0 m core length, (17 m approximate true width) and a deeper intercept averaging 10.06% Mn over 36.0 m core length (30 m approximate true width).

Highlights from the three holes on Section 11 North include hole PL-13-022A that intersected 11.28% Mn over 217.4 m core length (180 m approximate true width); hole PL-13-020 that intersected 9.32% Mn over 202.0 m (139 m approximate true width); including two sections of 10.21% Mn over 63.5 m core length and 10.52% Mn over 39.0 m core length, (44 m and 27 m approximate true widths respectively). The most easterly hole on this section, PL-13-018, intersected 7.41% Mn over 29.5 m core length, from 44.0 to 73.5 m, (20 m approximate true width), plus an upper section assaying 11.38% Mn over 3.1 m from 7.9 to 11.0 m (2 m true width).

Hole PL-13-025 (the westernmost hole drilled on Section 13 North), drilled in the deposit's central area, returned an intercept of 9.17% Mn over a core length of 82.8 m, (77 m approximate true width), which extends mineralization to depths of 100 to 150 m below surface. At the northern limit of the drill program, two holes drilled on Section 16 North extended the deposit along strike, since both holes intersected two lobes of mineralization. The larger lobe returned intercepts of 6.28% Mn over 58.3 m core length, (hole PL-13-017, 55 m approximate true width) and a deeper intercept of 5.25% Mn over 27.0 m core length was returned from hole PL-13-019 (26 m approximate true width). A second lobe, located immediately east of the larger lobe, also returned favourable assays, including 10.97% Mn over 6.0 m core length in hole P-13-017 and 6.14% Mn over 6.0 m core length, in hole PL-13-019, (true widths at approximately 85% of intercept). While these results demonstrate the deposit remains open to the north, it appears that the higher-grade mineralized sections are thinner and are diluted by beds of less mineralized rock to the North.

Drilling on the southern end of the deposit along Section 10 North (i.e. 600 m south along strike of Section 16 North) confirmed mineralization in this area and shows that mineralization remains open to the south; however, increasing dilution is also apparent along this section. At this location, drilling intersected at least three mineralized lobes that extend from surface where the mineralization measures approximately 65 m in width, to a depth of at least 175 m (Figure 10-1). Highlights on this section include intercepts of 5.99% Mn over 20.5 m core length, (PL-13-023, 19 m approximate true width) and 8.59% Mn over 31.4 m core length (PL-13-023, 30 m approximate true width), and 9.84% Mn over 29.0 m core length (PL-13-023, 27 m approximate true width). Drilling on this section also indicates the deposit remains open down dip.

Significant intercepts from the 2013 drilling program are summarized below in Table 10-4. The drilling was angled to crosscut the mineralization and estimated true widths are generally based on the interpretation of geological cross sections and are typically 75% to 90% of the intercept width.

As was the case in 2011, core loss was not identified as being of concern for the 2013 drilling program.

Table 10-4: Significant Intercepts from the 2013 Drill Program

Hole No.	From (m)	To (m)	*Length (m)	Mn %	Fe %
PL-13-011	51.65	165.50	113.85	11.25	12.53
PL-13-012	56.00	109.00	53.00	10.82	12.94
PL-13-013	11.80	30.80	19.00	11.43	12.76
PL-13-014	3.50	206.00	202.50	11.08	15.79
PL-13-015	152.00	173.00	21.00	10.01	14.99
and	185.00	221.00	36.00	10.06	9.85
PL-13-016	89.00	188.00	99.00	10.11	13.12
and	215.00	245.00	30.00	11.56	14.20
and	302.00	341.00	39.00	13.23	17.41
PL-13-017	15.70	74.00	58.30	6.28	9.40
and	89.00	95.00	6.00	10.97	10.15
PL-13-018	7.90	11.00	3.10	11.38	18.92
and	44.00	73.50	29.50	7.41	10.70
PL-13-019	113.00	140.00	27.00	5.25	8.59
and	173.00	179.00	6.00	6.14	9.89
PL-13-020	12.00	214.00	202.00	9.32	13.91
PL-13-021	17.70	18.60	0.90	16.40	10.02
PL-13-023	41.00	61.50	20.50	5.99	10.98
and	90.60	122.00	31.40	8.59	13.09
and	152.00	181.00	29.00	9.84	12.81
PL-13-024	106.50	143.00	36.50	7.77	12.49
and	152.00	194.00	42.00	7.28	11.28
and	209.00	278.00	69.00	8.75	13.10
PL-13-025	152.00	234.80	82.80	9.17	13.95

**True widths range between 70% and 90% of intercept length*

10.4 2021-2022 Plymouth Drilling Program

The 2021-2022 infill drilling program was carried out by CMC and totalled 25 diamond drill holes comprising 7,098 m of coring along 8 sections crossing the Plymouth Deposit. Section spacing along the length of deposit was approximately 100 m and holes were planned to provide optimum infill hole coverage to upgrade a substantial portion of existing Inferred category Mineral Resources to Indicated and Measured Mineral Resource status. For this purpose, a "diamond" hole distribution pattern based on a 50 x 50 metre drill collar spacing factor across the deposit was applied to provide a drill intercept spacing of 50 metres along each section. Holes were drilled at angles of -45 to -60 degrees toward azimuth 120 degrees or azimuth 300 degrees to crosscut the mineralization and estimated true widths, based on the interpretation of geological cross sections, typically range between 70 and 90% of the intercept length.

Collar coordinates and drill hole orientation data for the 2021-2022 drilling program are shown in Table 10-5 and hole locations appear below in Figure 10-2.

Table 10-5: Plymouth Deposit 2021-2022 Drill Hole Data

Hole No.	*Northing (m)	*Easting (m)	Elevation (m-asl)	Depth (m)	Dip (Deg)	Az (Deg)
PL-21-026	5113777.35	603454.80	111.5	326	-45	119.7
PL-21-027	5113730.14	603544.75	105.6	326	-45	118.5
PL-21-028	5113539.55	603354.33	119.3	278	-45	119.1
PL-21-029	5113626.67	603494.16	107.6	227	-45	120
PL-21-030	5113514.01	603506.58	113.04	227	-45	118.6
PL-21-031	5113556.97	603622.75	103.5	290	-45	301.2
PL-22-032	5113418.26	603465.83	119.6	308	-50	120.4
PL-22-033	5113378.75	603550.10	118.0	209	-50	120.7
PL-22-034	5113454.75	603369.50	124.1	217	-50	120.4
PL-22-035	5113366.32	603286.09	125.9	275	-50	117
PL-22-036	5113310.56	603402.71	126.6	302	-50	119.4
PL-22-037	5113288.97	603257.54	129.8	404	-49	119.2
PL-22-038	5113217.13	603566.94	127.0	509	-49	303.4
PL-22-039	5113064.39	603462.01	131.5	356	-49	299.3
PL-22-040	5113196.18	603424.12	129.5	152	-49	119.8
PL-22-041	5113246.47	603345.12	132.1	284	-49	116
PL-22-042	5113171.68	603299.55	134.0	281	-49	123.8
PL-22-043	5112999.37	603316.28	131.6	152	-49	117.3
PL-22-044	5113054.17	603239.92	138.7	224	-49	108.5
PL-22-045	5113054.17	603239.92	138.7	257	-60	120.1
PL-22-046	5113269.82	603214.03	130.3	383	-50	117.5
PL-22-047	5113343.62	603253.80	127.3	452	-50	119.5
PL-22-048	5113440.91	603274.70	122.8	23	-58	117.9
PL-22-048A	5113440.55	603276.21	122.9	318.9	-58	118.4
PL-22-049	5113508.76	603289.50	119.2	317	-50	115.7

**UTM NAD 83 Zone 19N Coordination; sea level elevation datum*

Results of the 2021-2022 drill program are considered favorable as the program intersected mineralization bearing grades and widths anticipated from the historical resource estimate of Sidwell (1957) and the more recent CMC estimates by Mercator. The program has shown that no substantive departures from previously modelled geology of the key Unit 4 and 3 zones have been encountered. Geological interpretation of drilling results continues to suggest the deposit is comprised of a generally steep, west dipping and locally overturned sedimentary sequence occurring within either several lobes of a larger synclinal fold structure, or as a steeply west dipping homoclinal stratigraphic sequence bound by a fault along its western margin. The deposit is comprised of variably mineralized red (Unit 4) and green (Unit 3) siltstones and slate occurring near the base of the Smyrna Mills Formation, where mineralized units occur stratigraphically above a transitional unit (Unit 2) of typically barren grey to green siltstones and slates (also Smyrna Mills Formation) lying in conformable contact above calcareous blue grey siltstones and slates of the Whitehead Formation.

The deposit's eastern contact is believed to be a conformable contact, whereas the deposit's western contact is locally sheared and faulted as observed in holes PL-13-22 and PL-13-22A, PL-22-46, (Section B & C), PL-21-029, PL-22-34, PL-22-41, (Sections C through G) and may be structural. Interpretation of a structural contact along the deposit's western margin may in part explain the abrupt contact relationship observed in this area where rocks of the Whitehead Formation appear to lie in contact with mineralized rocks of Unit 3 and 4 without significant thicknesses of the transitional Unit 2 rocks between these units. This relationship could also be explained by a synclinal fold structure or a homoclinal west dipping sequence that has undergone shearing on its western contact so that rocks of Units 3 and 4 lie in almost direct contact with rocks of the Whitehead Formation.

Another geological relationship worth noting is that rocks of Units 3 and 4 are not always mineralized with respect to manganese and iron, as barren sections of these units were intersected west of the main deposit in drill hole PL-13-15 and more recently in PL-21-026 and PL-21-027, where abundant light grey limestone clasts within Unit 4 are observed (Section H). Another feature of note within the deposit is the rapid and often repetitive intercalation of the mineralized red and green units (Units 3 and 4), particularly observed in PL-21-27, PL-22-41, and PL-22-42 in the current program. This relationship is interpreted to have resulted from rapid and cyclic redox changes during deposition, though some of the reversals may be attributable to folding in the deposit. Evidence of folding was typically observed in core as macroscopic, concentric, tight folds, though no obvious isoclinal folds were observed. As a result, the rapid intercalation of the red and green units is not considered to be attributable to intense isoclinal folding and associated faulting within the deposit. While local brittle shears are commonly observed in core, faulting is generally believed to account for only local changes in grade and geology throughout the deposit.

Based on drilling completed to date, the deposit is believed to be open at depth, where mineralization has typically been intersected to depths ranging between 100 and 225 m below surface. PL-22-38 (Section D) intersected mineralization at a vertical depth of 360 m and was still in Unit 3 at a final drill hole depth of 509 m targeting the western extent at depth. Likewise, the deposit is also believed to be open in both strike directions, though it appears likely that the mineralization thins along strike where intercalated sequences of barren rock increase in thickness. Furthermore, at the southernmost extent of the 2022 drill program, PL-22-43 & PL-22-44 encountered a near surface fault zone which truncates the deposit, offsetting lithologies of Units 3 and 4 and resulting in large intervals of Unit 2 and 1, potentially indicating a termination or fault offset of the southern extent of the deposit along strike. Further drilling is required to gain a sense of orientation and magnitude of the displacement. Results from the recent drilling also confirmed a continuation and extension of a western, shallow (40 - 80 m depth) infolded sequence of Units 3 and 4 from (Section D through Section G) observed in drillholes: PL-21-28, 22-48A, 22-49 (previously noted only just north of historical Section G (PL-13-15).

Eleven holes had significant intercepts of mineralized siltstone measuring 100 m or greater in down hole length, four of which had mineralized intercepts greater than 200 m in down hole length, with grades ranging from 9.80 to 10.87% Mn (Holes 36, 39, 41 & 42).

The thickest and most consistently mineralized portion of the deposit appears to occur in its south-central segment (Sections C to E) and corresponds with a well-defined magnetometer survey anomaly.

Significant intercepts from the 2022 drilling program are summarized below in Table 10-6 and results are plotted on interpreted cross sections (Figures 10-3 to 10-10).

As was the case in both previous drilling programs, core loss was not identified as being of concern for the 2021-2022 drilling program.

Table 10-6: Significant Intercepts from the 2021-2022 Plymouth Drill Program

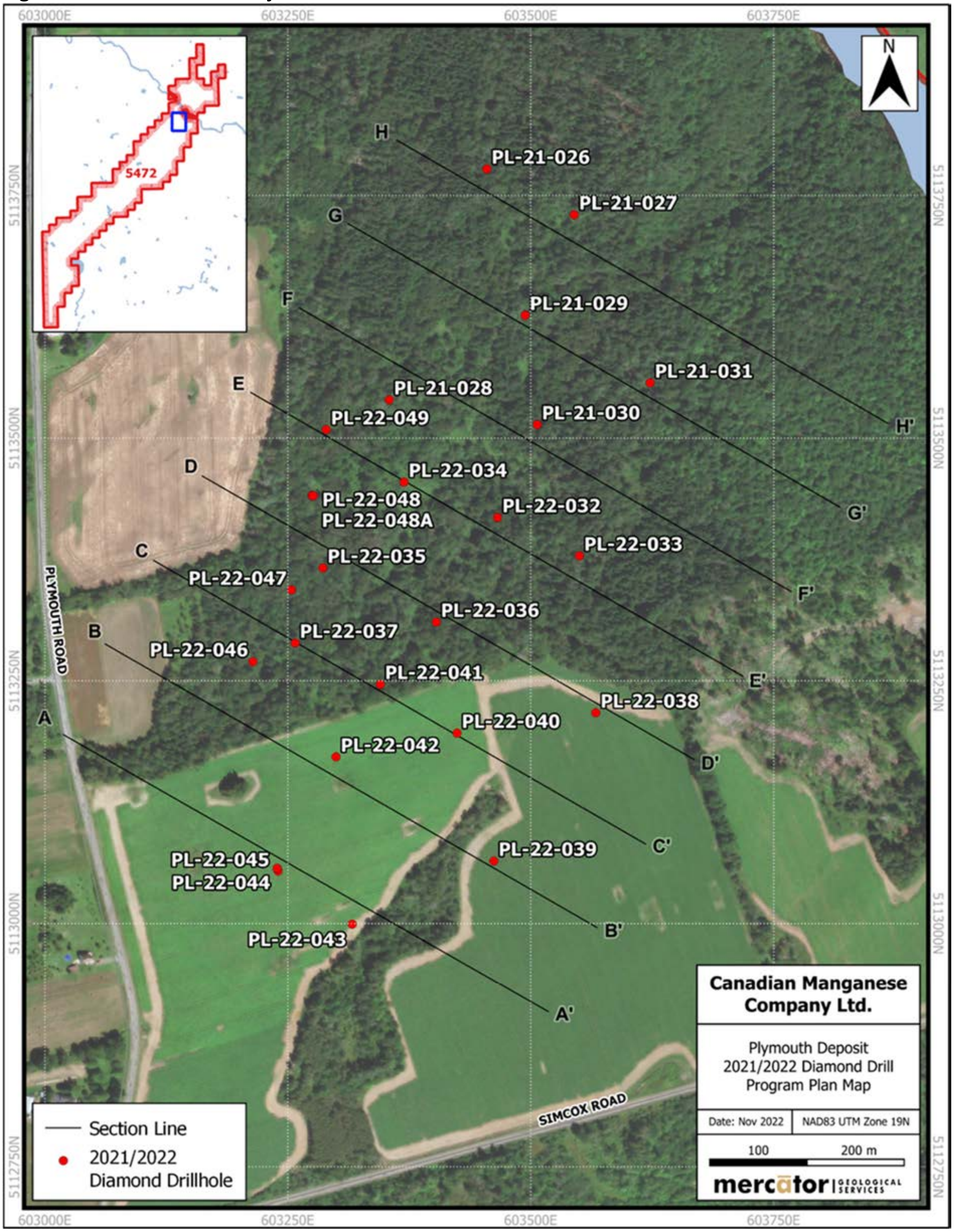
Hole ID	From (m)	To (m)	*Length (m)	Mn %	Fe %
PL-21-026	105.10	112.80	7.70	9.28	13.59
and	*284.00*	*290.00*	*6.00*	*5.72*	*10.85*
PL-21-027	106.77	140.00	33.23	5.23	8.81
PL-22-028	149.00	210.05	61.05	10.25	13.80
incl	*161.00*	*173.00*	*12.00*	*12.65*	*18.10*
incl	*179.00*	*191.00*	*12.00*	*11.86*	*15.58*
incl	*196.57*	*206.00*	*9.43*	*13.50*	*12.55*
PL-21-029	82.64	137.91	55.30	9.99	11.23
including	*91.00*	*137.91*	*46.91*	*10.36*	*11.13*
and	*121.00*	*137.91*	*16.91*	*11.77*	*9.33*
PL-21-030	7.40	80.00	72.60	8.63	11.04
including	*62.00*	*80.00*	*18.00*	*10.18*	*12.46*
PL-21-031	8.85	119.00	110.15	9.15	12.15
including	*14.00*	*56.00*	*42.00*	*11.26*	*14.05*
PL-22-032	9.30	104.00	94.70	10.58	14.85
incl.	*11.00*	*23.00*	*12.00*	*14.72*	*19.45*
incl.	*35.00*	*53.00*	*18.00*	*14.09*	*17.74*
PL-22-033	9.50	38.00	28.50	9.87	13.15
incl.	*11.00*	*20.10*	*9.10*	*12.50*	*13.80*
and	*94.20*	*155.50*	*61.30*	*9.94*	*14.61*
incl	*101.90*	*122.00*	*20.10*	*12.28*	*16.23*
incl	*140.00*	*155.50*	*15.50*	*11.46*	*15.26*
incl	*140.00*	*140.75*	*0.75*	*20.14*	*13.13*
PL-22-034	81.15	179.60	98.45	9.70	12.71
incl.	*122.00*	*137.00*	*15.00*	*12.05*	*16.15*
incl.	*145.00*	*179.60*	*34.60*	*12.46*	*14.56*
incl.	*146.39*	*172.00*	*25.61*	*13.48*	*15.34*
or	*146.39*	*166.00*	*19.61*	*14.74*	*17.07*
PL-22-035	116.00	234.00	118.00	9.76	12.32

Hole ID	From (m)	To (m)	*Length (m)	Mn %	Fe %
incl	*170.00*	*185.00*	*15.00*	*15.42*	*17.37*
incl	*199.10*	*231.97*	*32.87*	*12.98*	*16.37*
PL-22-036	7.90	266.00	258.10	9.80	13.95
incl.	*62.00*	*152.00*	*90.00*	*11.54*	*16.55*
incl.	*215.00*	*242.00*	*27.00*	*12.45*	*17.00*
incl.	*257.00*	*266.00*	*9.00*	*12.36*	*16.05*
PL-22-037	130.00	247.83	117.83	9.15	13.19
incl.	*196.08*	*236.00*	*39.92*	*12.42*	*17.90*
and	*311.00*	*373.60*	*62.60*	*8.29*	*11.65*
PL-21-038	26.20	154.20	128.00	11.72	16.14
incl.	*47.00*	*68.00*	*21.00*	*13.51*	*18.79*
incl.	*74.00*	*133.00*	*59.00*	*12.96*	*17.45*
incl.	*110.00*	*133.00*	*23.00*	*14.11*	*19.72*
and	*267.10*	*452.00*	*184.90*	*8.98*	*12.40*
PL-22-039	75.35	317.70	242.35	10.18	13.87
incl.	*77.15*	*110.00*	*32.85*	*13.63*	*16.19*
incl.	*101.00*	*110.00*	*9.00*	*17.80*	*9.92*
incl.	*113.90*	*137.00*	*23.10*	*13.50*	*16.31*
incl.	*122.00*	*137.00*	*15.00*	*15.42*	*18.38*
incl.	*167.00*	*173.00*	*6.00*	*16.42*	*16.48*
incl.	*215.00*	*310.80*	*95.80*	*11.27*	*15.63*
incl.	*230.00*	*248.00*	*18.00*	*13.55*	*17.47*
incl.	*257.00*	*269.00*	*12.00*	*15.54*	*20.57*
incl.	*288.10*	*310.80*	*22.70*	*11.27*	*15.88*
PL-22-040	16.90	146.70	129.80	10.27	14.63
incl.	*29.00*	*47.00*	*18.00*	*14.38*	*19.71*
and	*113.00*	*134.00*	*21.00*	*12.40*	*16.80*
PL-22-041	32.00	272.00	240.00	10.87	15.15
incl	*57.90*	*86.00*	*28.10*	*12.55*	*17.03*
incl	*120.80*	*167.00*	*46.20*	*12.91*	*18.35*
incl	*230.00*	*248.00*	*18.00*	*13.81*	*18.99*
PL-22-042	36.50	236.90	200.40	10.12	14.69
incl.	*62.00*	*86.00*	*24.00*	*12.25*	*16.76*
incl.	*149.00*	*185.00*	*36.00*	*12.16*	*16.44*
incl.	*191.20*	*236.90*	*45.70*	*11.41*	*15.67*
incl.	*209.00*	*236.90*	*27.90*	*12.03*	*16.22*

Hole ID	From (m)	To (m)	*Length (m)	Mn %	Fe %
PL-22-043	0	152	No Significant Mineralization encountered		
PL-22-044	86	93.65	7.65	7.90	13.98
and	*126.25*	*131*	*4.75*	*11.41*	*8.46*
and	*146*	*151.2*	*5.2*	*10.07*	*13.28*
PL-22-045	158.00	176.00	18.00	7.97	12.24
incl.	*161.00*	*167.00*	*6.00*	*12.60*	*15.93*
and	*197.70*	*240.95*	*43.25*	*9.58*	*13.71*
incl	*209.00*	*237.90*	*28.90*	*10.82*	*14.94*
incl	*210.80*	*212.00*	*1.20*	*15.42*	*18.64*
incl	*240.50*	*240.95*	*0.45*	*21.71*	*9.58*
PL-22-046	181.4	283.7	102.3	11.48	14.75
incl.	*217.55*	*254*	*36.45*	*13.46*	*17.83*
incl.	*266.00*	*283.70*	*17.70*	*15.28*	*15.80*
and	*368*	*383.2*	*15.2*	*7.65*	*13.04*
PL-22-047	145.00	236.00	91.00	10.75	14.81
incl	*178.40*	*203.00*	*24.60*	*13.84*	*19.04*
incl	*209.00*	*234.90*	*25.90*	*13.47*	*17.97*
or	*212.70*	*233.00*	*20.30*	*13.96*	*18.35*
and	*415.60*	*416.75*	*1.15*	*20.28*	*12.40*
PL-22-048	0	23	Hole Abandoned before reaching target depth		
PL-22-048A	73.00	81.35	8.35	9.87	14.23
and	*215.00*	*272.00*	*54.00*	*11.02*	*14.52*
incl	*236.00*	*260.00*	*24.00*	*13.92*	*18.80*
PL-22-049	60.95	98.30	37.35	8.39	10.80
incl	*83.00*	*95.00*	*12.00*	*11.49*	*12.05*
and	*188.60*	*263.00*	*74.40*	*10.68*	*13.93*
incl.	*201.00*	*218.00*	*17.00*	*12.39*	*16.27*
incl.	*224.00*	*245.00*	*21.00*	*13.71*	*16.97*
incl.	*224.00*	*260.00*	*36.00*	*12.39*	*15.21*

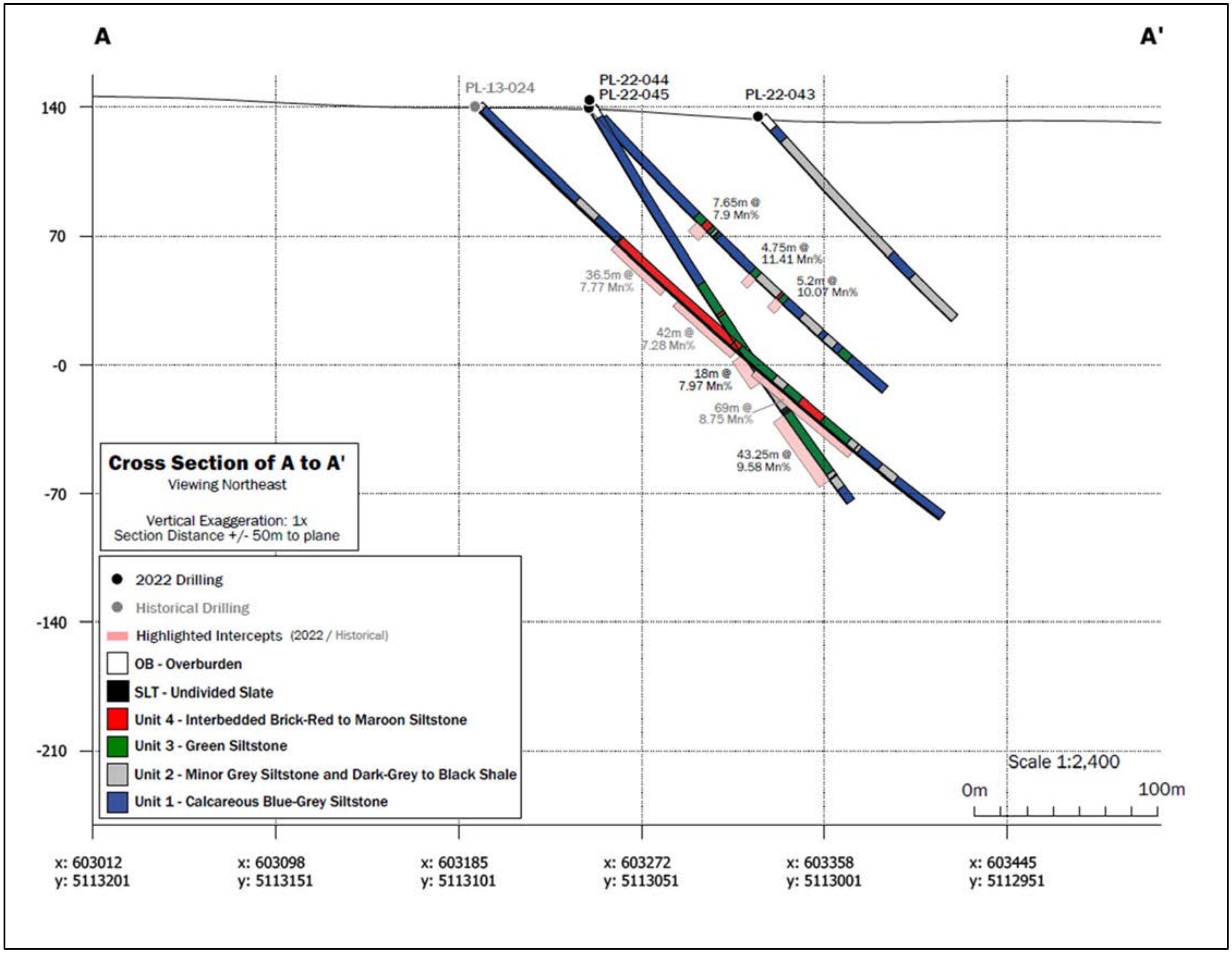
**True widths range between 70% and 90% of intercept length*

Figure 10-2: Woodstock Project 2021-2022 Drill Hole Locations



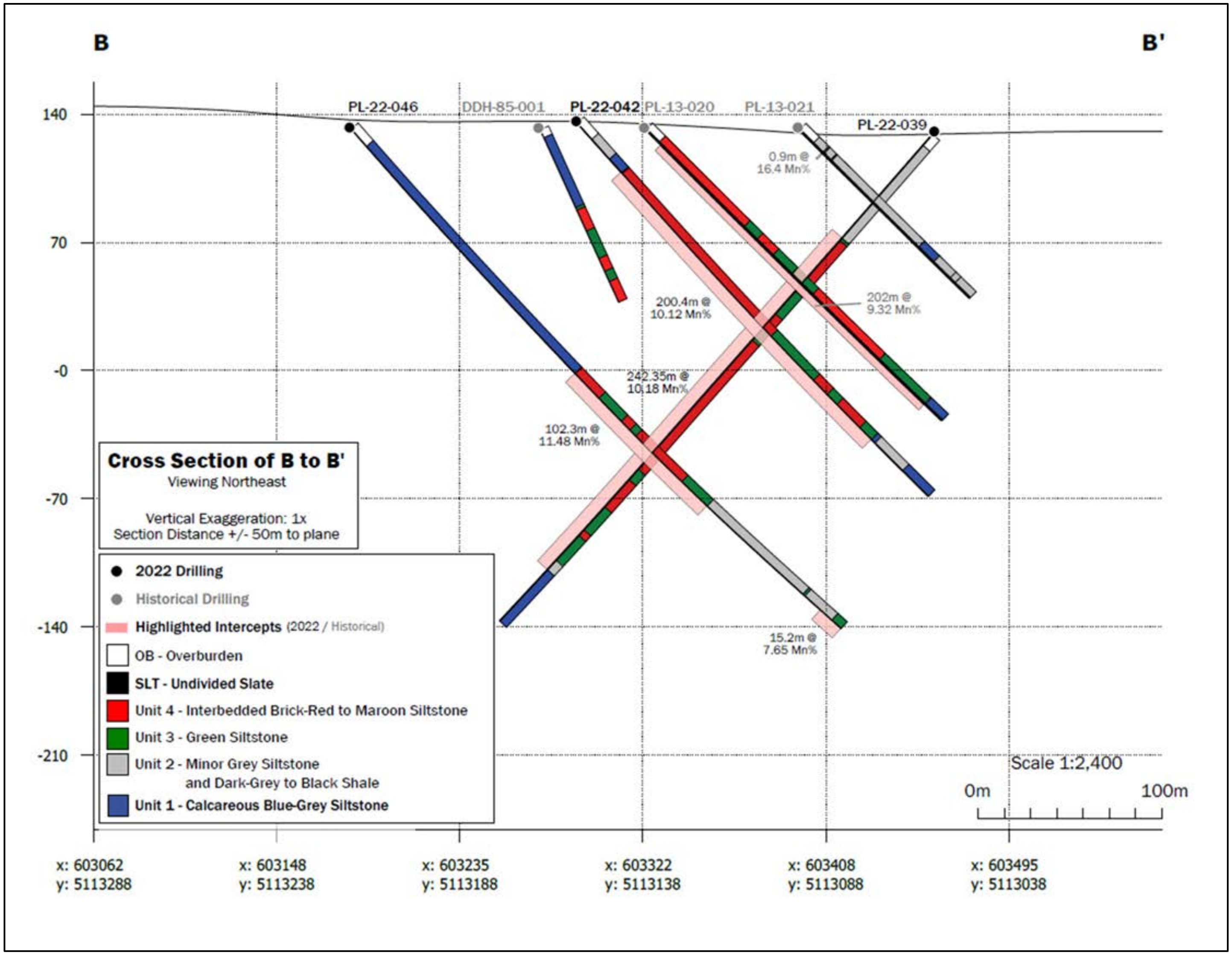
(Source: Mercator 2023)

Figure 10-3: Simplified geological section (A-A') through the Plymouth Deposit showing Mn (%) intersections over drilled core lengths (m)



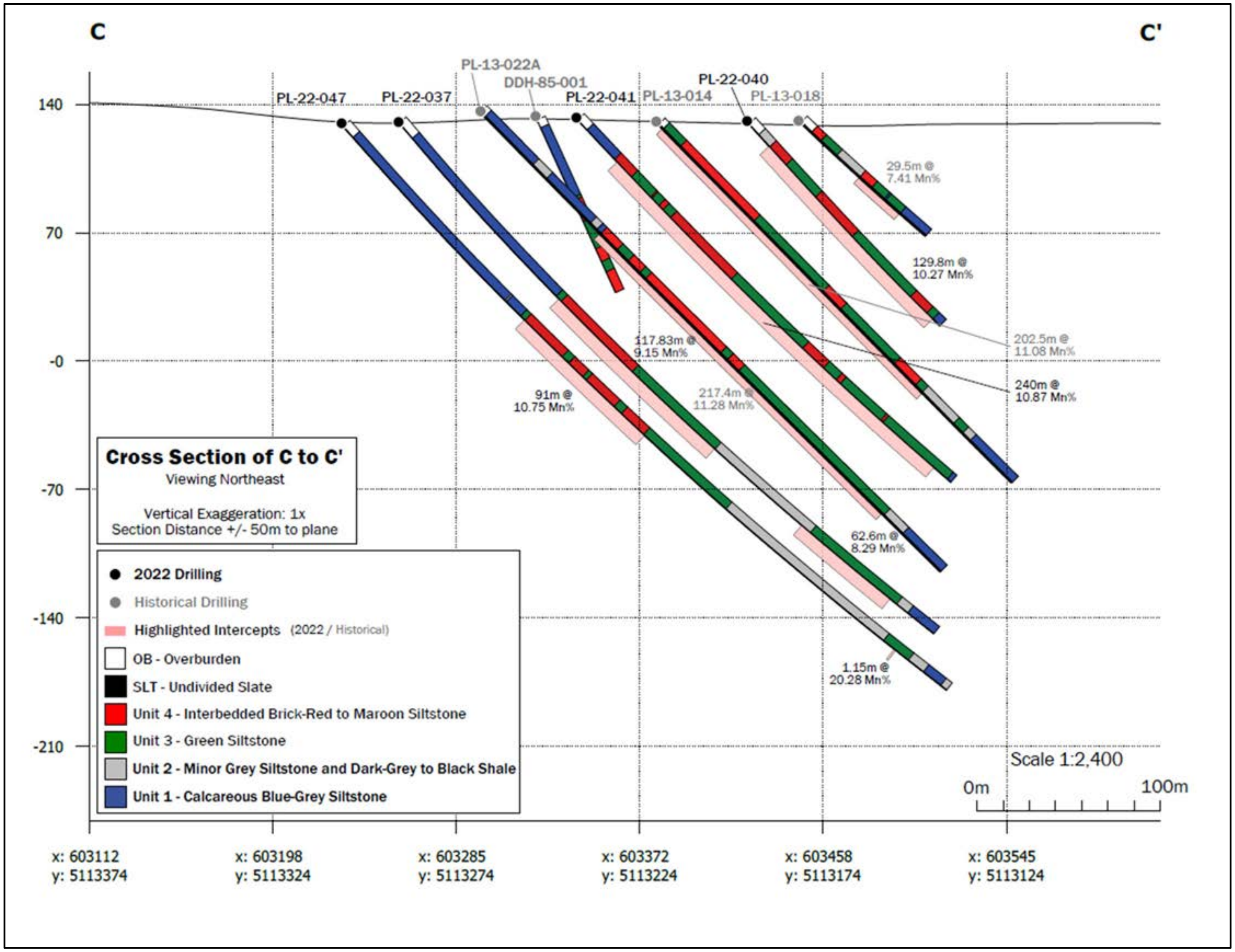
See Figure 10-2 for section location

Figure 10-4: Simplified geological section (B-B') through the Plymouth Deposit showing Mn (%) intersections over drilled core lengths (m)



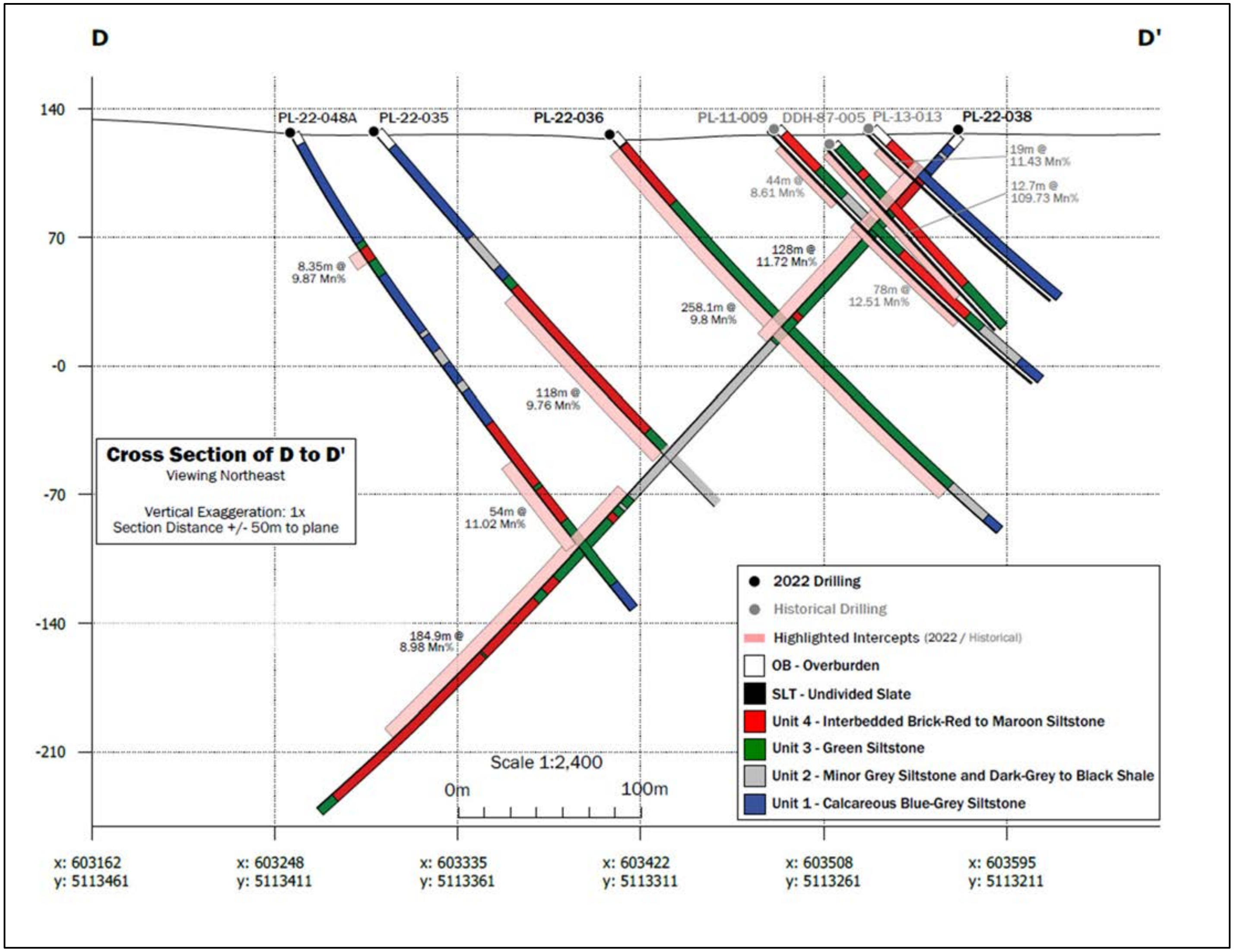
See Figure 10-2 for section location

Figure 10-5: Simplified geological section (C-C') through the Plymouth Deposit showing Mn (%) intersections over drilled core lengths (m)



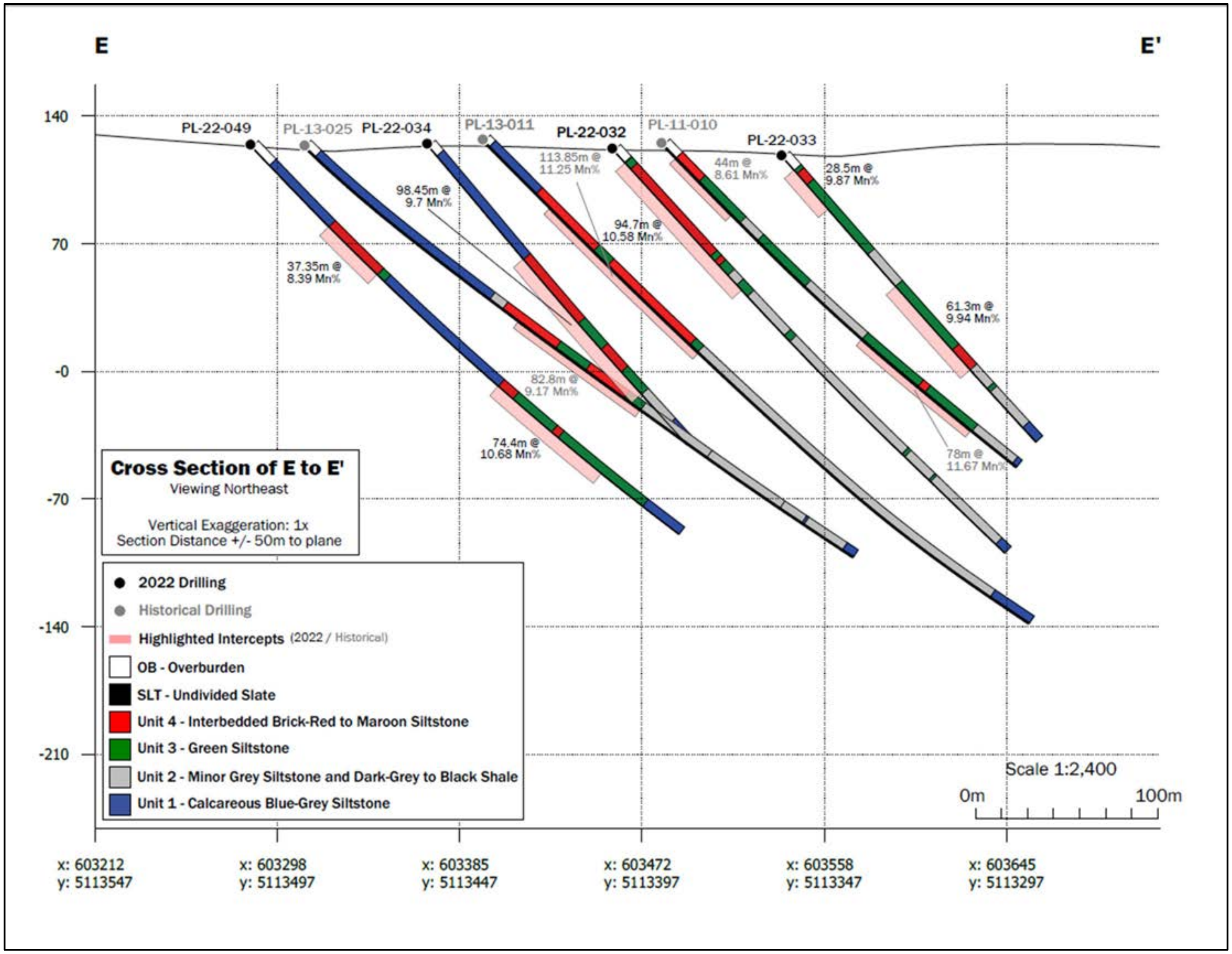
See Figure 10-2 for section location

Figure 10-6: Simplified geological section (D-D') through the Plymouth Deposit showing MN (%) intersections over drilled core lengths (m)



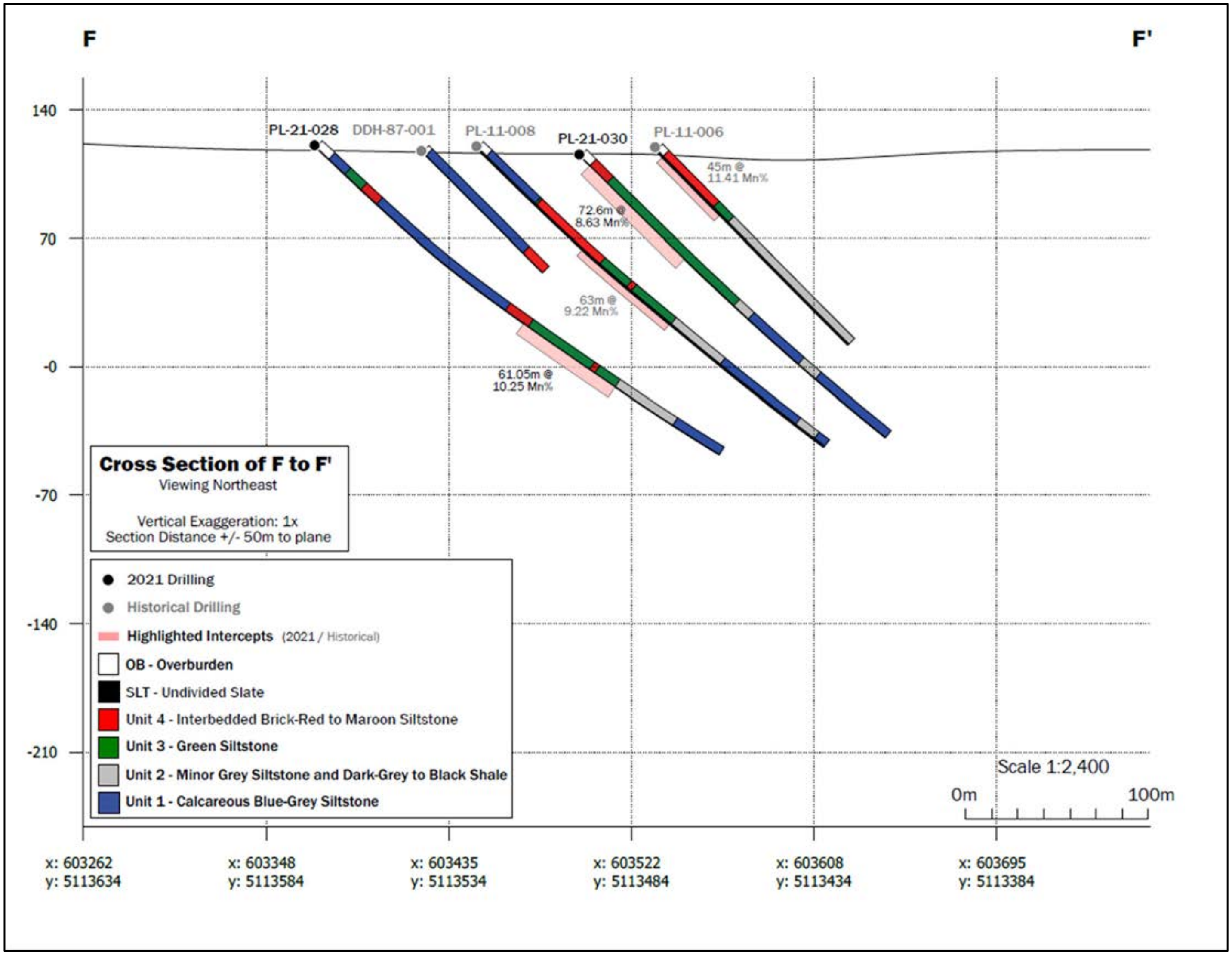
See Figure 10-2 for section location

Figure 10-7: Simplified geological section (E-E') through the Plymouth Deposit showing Mn (%) intersections over drilled core lengths (m)



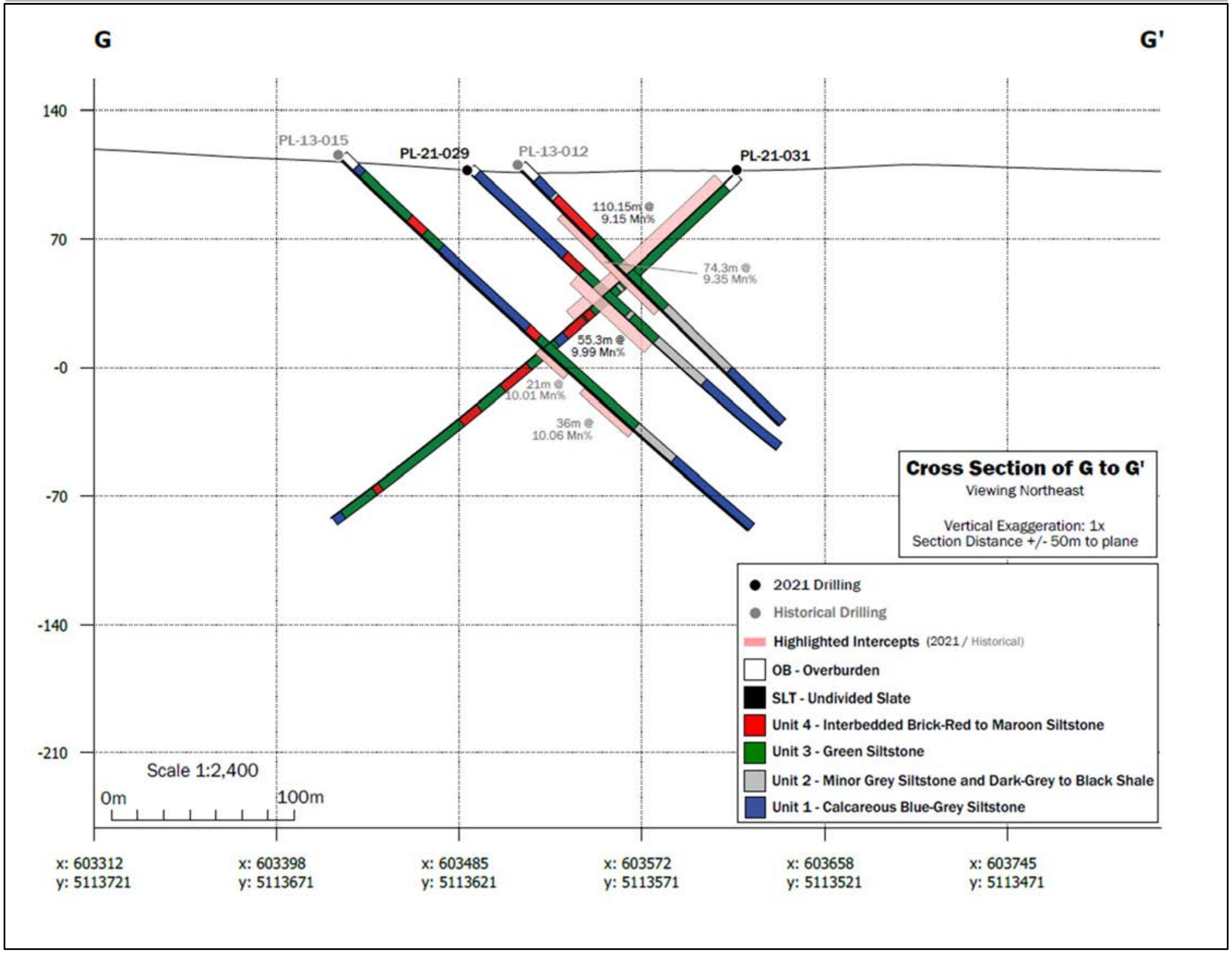
See Figure 10-2 for section location

Figure 10-8: Simplified geological section (F-F') through the Plymouth Deposit showing Mn (%) intersections over drilled core lengths (m)



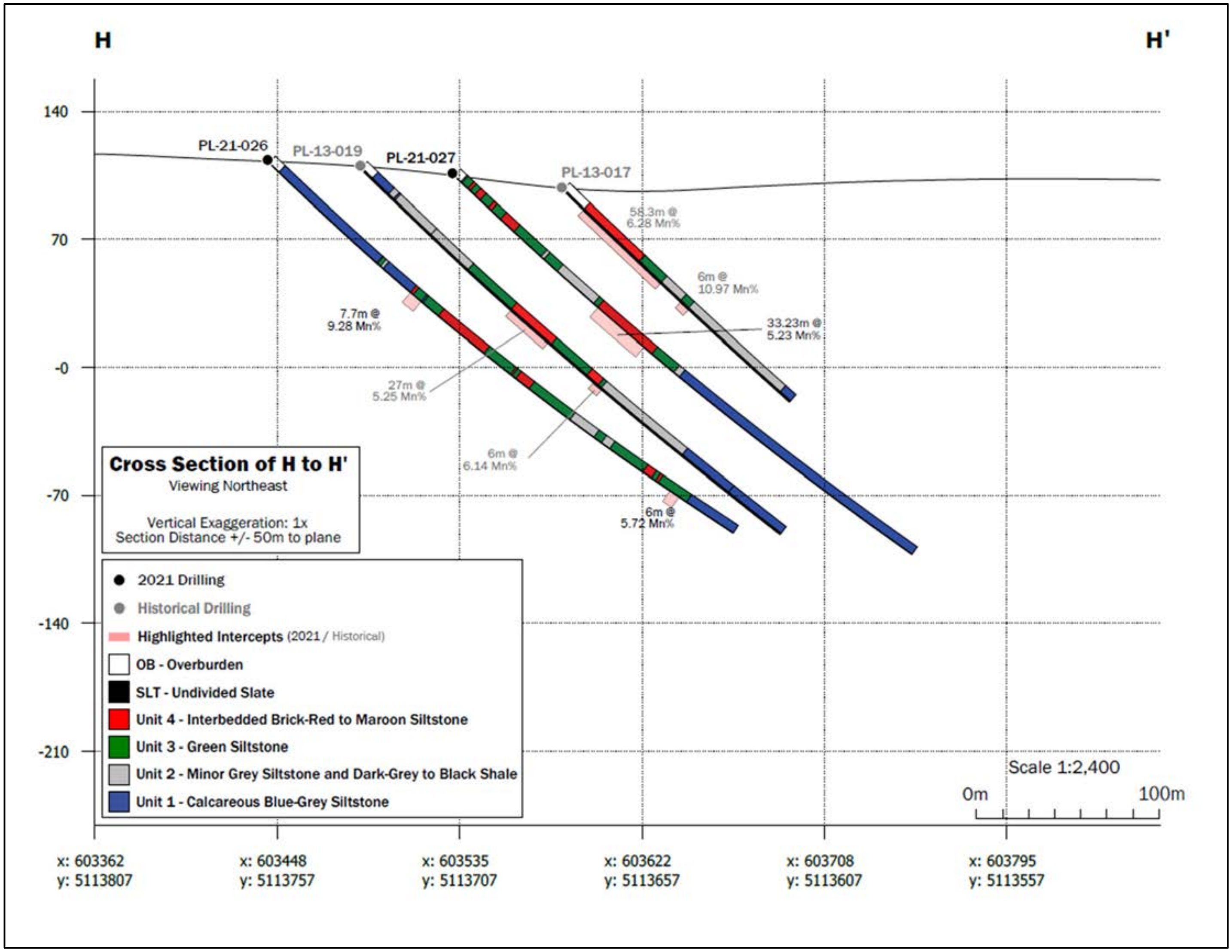
See Figure 10-2 for section location

Figure 10-9: Simplified geological section (G-G') through the Plymouth Deposit showing Mn (%) intersections over drilled core lengths (m)



See Figure 10-2 for section location

Figure 10-10: Simplified geological section (H-H') through the Plymouth Deposit showing Mn (%) intersections over drilled core lengths (m)



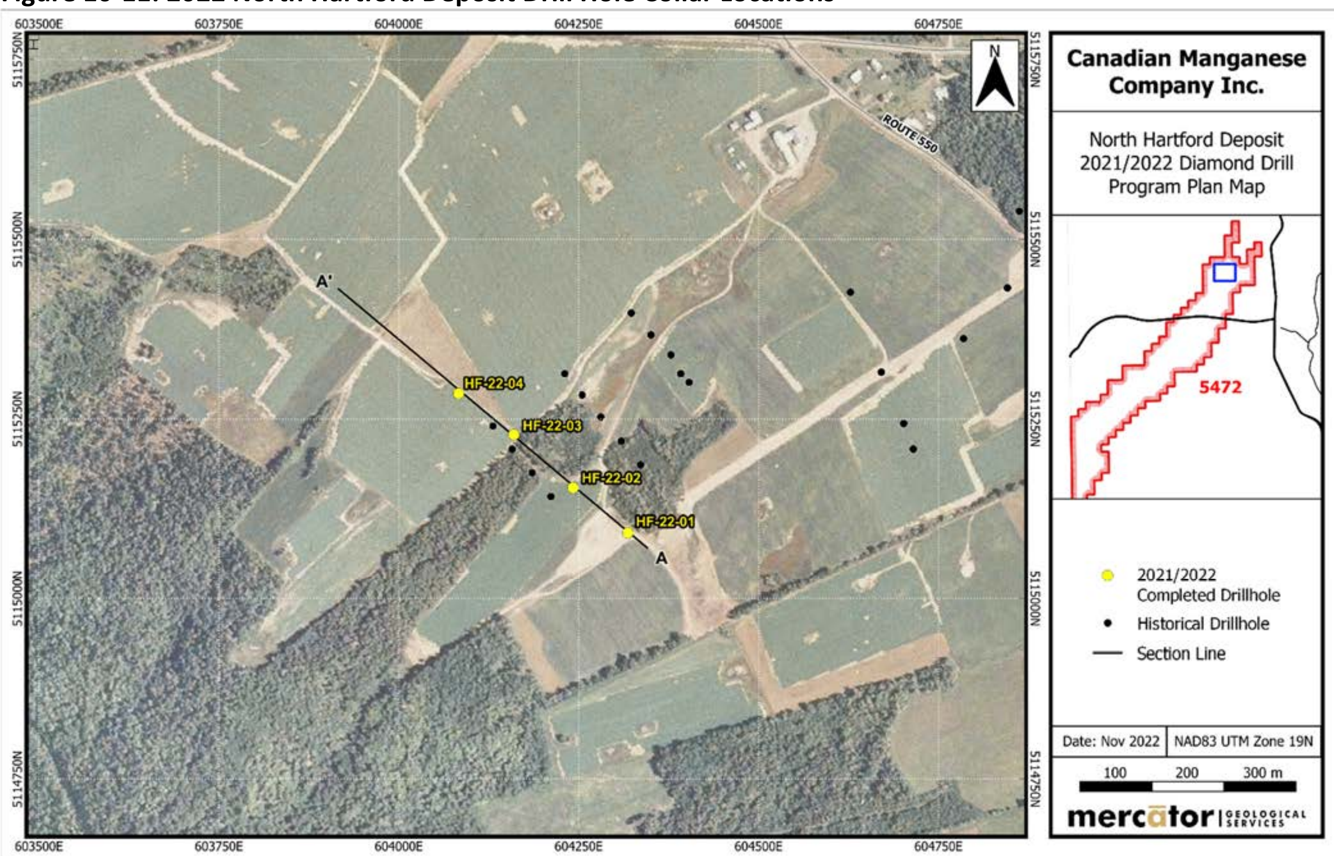
See Figure 10-2 for section location

10.5 2022 North Hartford Drilling Program

The 2022 drilling program at CMC's North Hartford location was carried out in late July 2022 and totalled 4 diamond drill holes comprising 1,186 m of coring along one section crossing the North Hartford Deposit. Hole spacing was approximately 100 m between holes to provide coverage at depth and to aid in interpreting the geology of the deposit. The program was again designed to test historically documented Mn-Fe mineralization in the Hartford area, located on Company holdings approximately 2.2 km northeast of the Plymouth Deposit.

Collar coordinates and drill hole orientation data for the North Hartford drilling program are shown in Table 10-7 and hole locations appear below in Figure 10-11. Drilling was again contracted to Maritime. After completion of logging and half core sampling, a total of 397 samples were sent for analysis at ALS Global using the ME-XRF26s method. Core logging and sampling procedures were carried out following the same protocols developed and used in the Plymouth Deposit drilling program described in detail above.

Figure 10-11: 2022 North Hartford Deposit Drill Hole Collar Locations



(Source: Mercator 2023)

Table 10-7: North Hartford Deposit 2022 Drill Hole Data

Hole No.	*Northing (m)	*Easting (m)	Elevation (m-asl)	Depth (m)	Dip (Deg.)	Az (Deg.)
HF-22-01	5115091.70	604318.36	145.15	263	-45	317
HF-22-02	5115154.52	604242.05	144.97	333.8	-55	317
HF-22-03	5115228.36	604159.75	146.31	326	-55	314
HF-22-04	5115285.55	604083.01	150.25	263	-55	315

**UTM NAD 83 Zone 19N Coordination; sea level elevation datum*

Results from the 2022 North Hartford drilling program are considered favourable as they confirm historical documentation of mineralization in the area. Details regarding program results are summarized below.

Drill hole HF-22-01 was drilled at the southeast extent of the property towards the northwest. The hole returned assays having a weighted average of 5.78% Mn over 53.3 m (200.7 – 254.0 m). Interpretation of this section indicates that georeferenced historical gravity anomalies show ~100 m of discrepancy with respect to the southern limit of the deposit in this area. Hole HF-22-01 cored White Head Formation for approximately 112 m before intersecting Smyrna Mills Formation.

Drill hole HF-22-02 intersected three lobes of mineralization that extend from near surface to a depth of 260 m below surface. Highlights from the hole include 10.53% Mn over 84.2 m (59 – 143.2 m), 10.05% Mn over 77.1 m (209.9 – 287.0 m) and 8.7% Mn over 30.85 m (302.0 – 332.85 m). This hole also confirmed that hole 1 was stopped early in what is interpreted to be a steep anticlinal structure between the first and second lobes of mineralization.

Drill hole HF-22-03 intersected three lobes of mineralization, albeit at lower grades than those observed in HF-22-02. Highlights from the hole include 7.96% Mn over 21.85 m (5.7 – 27.55 m), 7.3% Mn over 31.6 m (60.4 – 92.0 m) and 5.39% Mn over 76.45 m (104.0 – 180.84 m).

Drill hole HF-22-04 was the most northwestern and final hole drilled along the section and intersected one main lobe of mineralization grading 6.03% Mn over 20.6 m (183.1 – 203.7 m). This hole also encountered a cherty siltstone layer as well as several dark grey to black calcareous units with minor sandstone intercalations interpreted by consultant Bryan Way to be the Upper Member of the Smyrna Mills Fm. Historical references have stated the southwestern tip of the deposit is overturned and this could be reflective of what’s being observed in drill core.

The most significant result from the North Hartford program came from hole HF-22-02 with a mineralized intercept of 84.2 m in core length at 10.53 % Mn. Drilling along this section indicates that the deposit remains open down dip and confirms historical drilling in terms of both widths and grades. All four holes intersected unmineralized or barren Unit 3 and Unit 4 lithologies and it is recommended that Portable XRF spot testing be carried out to further refine future sampling and drilling programs at North Hartford.

Selected significant intercepts from the North Hartford drilling program that are presented in Table 10-8 are plotted on an interpreted cross section in Figure 10-4.

Demobilization of drilling equipment was completed on August 2nd after completion of the final drill hole, HF-22-04. All sites and trails were inspected by Kevin-Dane MacRae, P. Geo. to ensure they were left in good order. Sites located on farmland owned by Neil and Linda Markey were also inspected with Mr. Rob Metherell, the leased farmer, and confirmed to have been left in good order.

Significant intercepts from the 2022 drilling program are summarized below in Table 10-8 and results are plotted on an interpreted cross section (Figures 10-12).

As was the case in both previous drilling programs, core loss was not identified as being of concern for the 2022 North Hartford drilling program.

Table 10-8: Significant Intercepts from the 2022 North Hartford Drill Program

Hole ID	From (m)	To (m)	Length (m)	Mn %	Fe %
HF-22-01	170.00	179.00	9.00	4.94	9.13
and	***200.70***	***254.00***	***53.30***	***5.78***	***9.89***
incl	*203.00*	*209.00*	*6.00*	*11.86*	*17.31*
incl	*218.00*	*236.70*	*18.70*	*8.21*	*11.72*
incl	*227.00*	*236.70*	*9.70*	*10.76*	*14.41*
and	*250.00*	*251.00*	*1.00*	*21.22*	*6.58*
HF-22-02	**59.00**	**143.20**	**84.20**	**10.53**	**14.55**
incl	*86.00*	*125.00*	*39.00*	*12.33*	*18.22*
incl.	*110.00*	*125.00*	*15.00*	*13.37*	*21.92*
and	***209.90***	***287.00***	***77.10***	***10.05***	***13.30***
incl	*239.00*	*281.15*	*42.15*	*11.79*	*15.12*
incl	*239.00*	*257.20*	*18.20*	*13.32*	*17.44*
and	***302.00***	***332.85***	***30.85***	***8.70***	***11.60***
incl	*313.60*	*324.40*	*10.80*	*12.15*	*13.35*
HF-22-03	**5.70**	**27.55**	**21.85**	**7.96**	**11.90**
incl	*10.40*	*26.00*	*15.60*	*9.40*	*13.79*
and	*45.35*	*46.30*	*0.95*	*14.78*	*5.84*
and	***60.40***	***92.00***	***31.60***	***7.30***	***9.73***
incl	*71.00*	*76.85*	*5.85*	*10.67*	*15.09*
incl	*82.50*	*92.00*	*9.50*	*9.62*	*10.16*
and	***104.00***	***180.84***	***76.45***	***5.39***	***8.78***
incl	*157.60*	*179.00*	*21.40*	*6.80*	*11.20*
incl	*159.05*	*171.60*	*12.55*	*7.79*	*13.32*
incl	*159.05*	*166.15*	*7.10*	*9.72*	*16.00*
and	247.30	266.00	18.70	4.85	6.87
incl	257.00	266.00	9.00	6.42	6.53
and	300.15	305.00	4.85	10.73	18.00
HF-22-04	163.10	164.75	1.65	10.54	8.73
and	**183.10**	**203.70**	**20.60**	**6.03**	**11.04**

Hole ID	From (m)	To (m)	Length (m)	Mn %	Fe %
incl	183.10	189.25	6.15	10.50	13.30

** Note: Downhole core sample lengths are specified. True widths of the mineralized intercepts have not been determined at this time.*
***Note: All holes were drilled at angles ranging between -45 and -55 towards the deposit to test mineralization at variable depths below surface.*

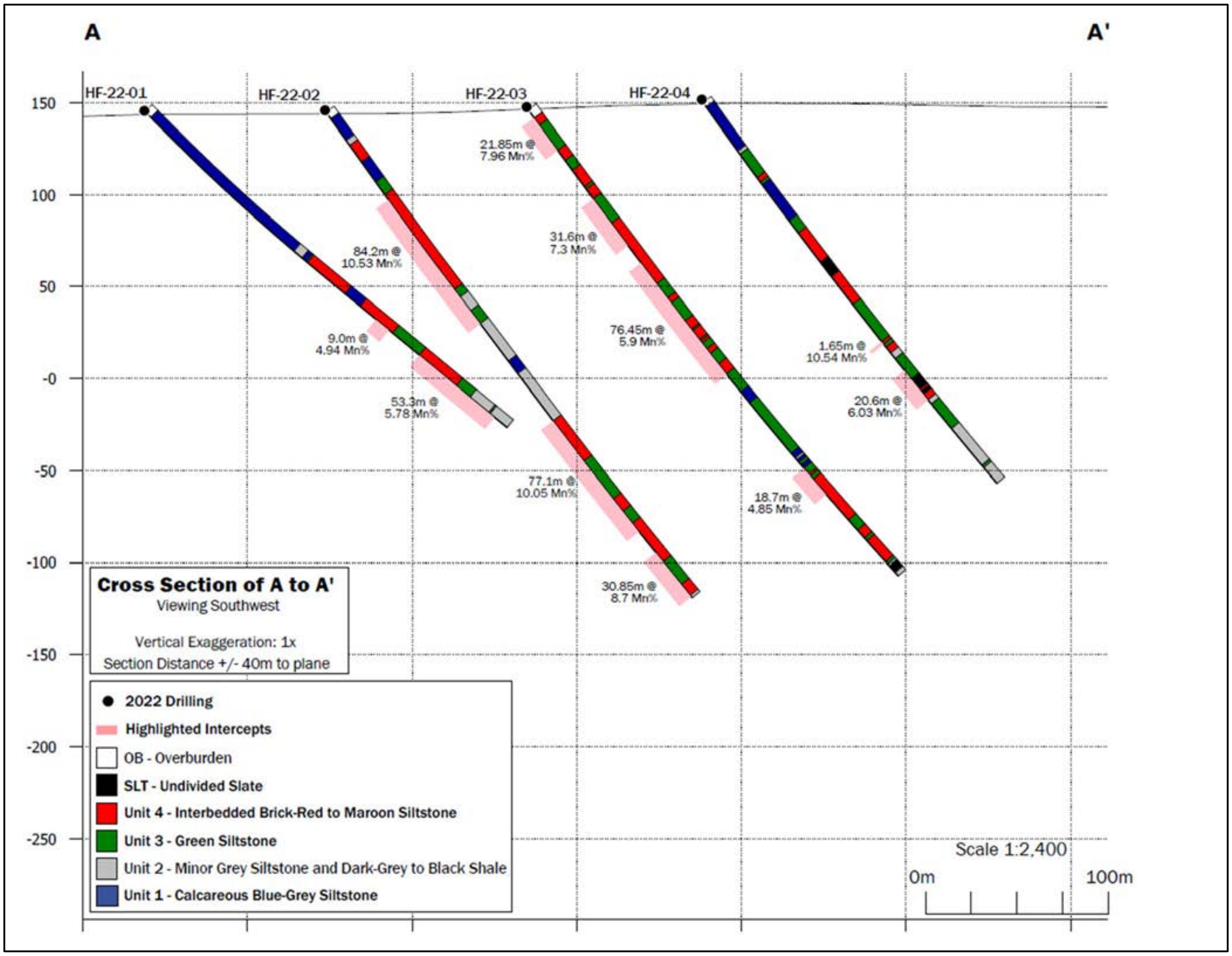
10.6 2023 North Hartford Drilling Program

As noted earlier in Section 10, CMC initiated a program of deposit definition core drilling at North Hartford in Late February of 2023. Logan was contracted to carry out drilling operations and the program was designed and is being managed by Mercator staff. A 29-hole program of NQ drilling is planned and the program was ongoing at the Effective Date of this Technical Report. None of the 2022 or 2023 core drilling at North Hartford contributes to the current Plymouth Deposit MRE and no analytical results for the 2023 program had been received by CMC at the Effective Date of this Technical Report.

10.7 Other Core Drilling Programs – MRR 1988

In 1988, MRR undertook a comprehensive technical program to evaluate the Plymouth Deposit in an attempt to establish an accurate description of the deposit, including potential grade and tonnage aspects (Roberts and Prince, 1988). This program included bulk sampling, trenching, core drilling and geochemical analyses. Highlights include excavation of two trenches across the deposit and drilling of two drill holes, beneath each trench, to allow interpretation of sections across the deposit at depth. A total of five holes (DDH-81-1 to DDH-81-5) were drilled, totalling 2,086 feet (636 m). Mercator staff reviewed reporting associated with this program (Roberts and Prince, 1988) and verified that analytical results and program standards of conduct were consistent with industry standards of the work period. Quality of the drilling data and related analytical results was deemed to be acceptable for use in Mineral Resource estimation programs.

Figure 10-12: Simplified Geological Section (A-A') through the North Hartford Deposit Showing Mn (%) Intersections and Drilled Core Length (m)



See Figure 10-11 for section location
(Source: Mercator 2023)

10.8 Adequacy of Core Drilling Programs

The QP is of the opinion that the 2011, 2013 and 2021-2022 and 2023 drilling programs by CMC on the Plymouth Deposit and North Hartford Deposit were carried out using industry standard practices and that data associated with the programs is acceptable for use in a Mineral Resource estimation program. Review of the validated results for drilling carried out by MRR in 1988 have also been deemed by the QP to be acceptable for such use.

11.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

11.1 Introduction

Sample preparation, analysis, and security aspects of the diamond drilling programs completed by CMC predecessor companies BMC (2011), BMC (2013) and CMC (2021-2022) are presented below. Various levels of documentation were available for these programs, the most useful being sourced in the Government of New Brunswick assessment reporting online portal. Detailed information is not consistently present for historical work carried out prior to BMC's work (pre-2011), with respect to the reporting of drill logs, sample records, laboratory assay certificates, verifiable location data, sample preparation, analysis, and security. Detailed support documentation for historical drilling during the 1950s is largely absent and only rudimentary information is available for the small programs carried out in 1985 and 1987. In contrast, the BMC and CMC programs carried out in 2011, 2013 and 2021-2022 include good descriptions of procedures and associated protocols.

On the basis of poor support documentation, Mercator and BMC have not included results from 1950's era historical drilling programs in the project database used in the current resource estimate. Only data from the MMR programs in 1985 and 1987, the programs by BMC in 2011 and 2013, and the Plymouth program by CMC in 2021-2022 respectively, are included in the Mineral resource estimate database, which is addressed below.

11.2 Pre-BMC Sampling Program Summary

In 1985, MRR completed a single drill hole (85-001), but related reporting filed with the Government of New Brunswick does not include specific descriptions of project sample preparation, analysis, and security procedures. BQ sized drill core was systematically logged, and 14 samples were sent for analysis to Acme Analytical Laboratories Ltd. (Acme) in Vancouver, BC. It is not specified whether these were half-core or full-core samples. Acme operated as an independent, commercial laboratory at that time, and at present is a fully accredited and ISO-certified company. The lab provided Inductively Coupled Plasma Emission Spectroscopy (ICP-ES) 36 element analysis of submitted samples in 1985. Standard rock crushing and pulverising procedures were used to produce a 0.5gram sub-sample for analysis which was digested in Aqua Regia at 95°C for one hour prior to determination of elemental concentrations.

Drill hole 85-001 was abandoned due to poor ground conditions before the targeted mineralized zone could be reached. The QP's review of the logging and sample record for this program showed that the MRR (1985) records were complete and of acceptable detail. No comments with respect to sampling, logging or security protocols appear in the program report by Roberts (1985).

In 1987, MRR completed four drill holes and two surface trenches. The results were reported by Andersen and Prince (1988) in an assessment report submitted to the Government of New Brunswick. BQ-sized core was recovered and systematically logged during the drilling program. Half core samples were obtained by sawing the core after it had been logged. Each hole was sampled from top to bottom. The half core samples were placed in labelled plastic bags prior to shipment to the laboratory. All samples were sent to the Research and Productivity Council of New Brunswick (RPC) in Fredericton for crushing to minus 1/8-inch mesh. A split for pulverization was cut from this material and all samples and splits were returned to MRR.

The trenching program produced chip samples of approximately 8 lb weight (3.6 kg) for routine laboratory analysis, with these corresponding to 20 ft (~9m) sections of the trenched zone. For each chip sample interval, a 150 lb (68 kg) bulk sample was also collected. All samples were submitted to RPC for initial processing and then returned to MMR. Bulk samples were stored for future assessment and the core samples were organized for subsequent analysis.

The prepared core sample analytical splits were sent to X-Ray Assay Laboratories Ltd. (XRAL) in Don Mills, Ontario for pulverization to minus 200 mesh, using an agate mill and subsequent analysis of multiple elements. Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) methods were used for Co, Ga, Mo, In, Cs, La, Ce, Eu, Gd, Dy, Er, Lu, Hf, Ta, and W; Direct Current Plasma methods were used for Pb, Cd, Ag, Ge, Zn, Cu, Ni, Cr, V, B, and Be; Fire Assay Direct Current Plasma (FA-DCP) methods were used for Au; Atomic Absorption methods were used for Li, As, Se, and Sb; and, X-ray Fluorescence methods were used for S and Sn. Major oxides (MnO, Na2O, MgO, Al2O3, SiO2, P2O5, CaO, MgO, TiO2 and Fe2O3) were also analyzed by XRAL. No details of sample digestion, for methods requiring such, were included in program reporting. XRAL was an independent, commercial laboratory at that time, and was taken over by the SGS Group in 1988. The SGS Group was an independent, commercial analytical services firm at that time and at present is an independent, international, fully accredited, ISO-registered analytical services firm.

As was the case in 1985, no comments with respect to security protocols appear in the program report by Andersen and Prince (1988). All results and interpretations of the 1987 program by MRR were subsequently re-published by the New Brunswick Department of Natural Resources and Energy as Open File Report 90-4.

Based on review of drill logs and all other reporting components, the QP has concluded that core logging, core sampling and project management activities for the MRR 1988 programs were consistent with industry standards of the day. It is assumed that this level of attention was also extended to project security issues, but this cannot be verified. Validated data from the drilling program and two trenches noted above are considered acceptable for use in a mineral resource estimation program.

11.3 2011 and 2013 BMC Drilling Programs

The following description of sample preparation and core handling protocols applies to the 2011 and 2013 drilling programs completed by BMC. Program details were discussed with BMC staff during site visits by Mercator staff in December 2011 and March 2013.

In 2011, BMC completed five NQ drill holes and an additional 16 NQ holes in 2013. All core from both programs was logged and sampled by BMC staff at rented facilities located in Woodstock, NB. Core sample intervals were marked by the logging geologist and core was then cut by staff technicians to create half core splits. One split was retained in the wooden core box for archival purposes, with a sample tag affixed at each sample interval and the other was placed in a labelled plastic bag along with a corresponding sample number tag and placed in the shipment queue. Quality control samples were inserted at this time and sample batches were then shipped by commercial courier to the Sudbury preparation laboratory operated by ALS Limited (ALS). After preparation in Sudbury, sample pulps were analysed at the ALS laboratory in Vancouver, BC. At the time, ALS was an accredited, independent commercial analytical firm registered to ISO 9001: 2008 and ISO/IEC 17025:2005 standards.

Each sample was crushed to ≥70% at 6 mm size, followed by a 250 g riffle split which was pulverized, such that ≥85% of the material passed through a 75 micron sieve. ALS inserted blanks (one per 20 samples) and certified standards (nominally one per 20 samples) for preparation and assay. In addition, CMC submitted blind blank samples (nominally one per 20 samples) and blind certified reference standards (one per 20 samples) for preparation and assay in keeping with QA/QC protocols. The 2011 samples were analyzed by ALS in Vancouver using its ME-ICP06 analytical package, while sulphur and specific gravity determinations were carried out using the Leco (S-IR08) and pycnometer (OG-GRA08B) methods, respectively. ALS's ME-ICP06 analytical package employs the use of a lithium metaborate or tetraborate fusion followed by acid digestion and ICP-AES analysis. In addition to the ICP analyses, ALS also re-assayed all samples using the X-ray fluorescence (XRF – ALS code ME-XRF06) method as a check on the ICP method. The latter dataset reflects slightly higher extraction of both Mn and Fe from the sample matrix and was chosen for all future core analysis.

The 2013 core samples were logged, sampled, and prepared in the same manner as those in 2011 but the XRF method (ALS code ME-XRF06) was the primary analytical method applied. Additionally, sulphur and specific gravity determinations were carried out using Leco (S-IR08) and pycnometer (OG-GRA08B) methods, respectively. An independent check sample pulp was prepared for every 20th sample and analysed at SGS Canada Inc. (SGS) using XRF methods (SGS XRF-76 code).

Security for core, samples and related documentation during both field programs was the responsibility of BMC site staff, under overall direction of Mr. Paul Moore, P. Geo., then Vice President of Exploration for CMC. Site staff were responsible for transport of core boxes by pick-up truck from drill sites to the company's secure logging facility located in Woodstock, where clean up, tag checking, logging, and sampling were carried out. Complete photographic records of core from all drill holes were created prior to logging and half-core sampling using diamond saws. Sampling was carried out after lithological, geotechnical, and magnetic susceptibility logging procedures were completed. Mineralized zones encountered in the 2011 and 2013 drilling were additionally assessed through collection of qualitative Mn and Fe values at 1.5 to 3.0 m intervals using a hand-held XRF unit (Niton XL3t-950 XRF Analyzer) to establish sampling intervals.

In addition to the standard logging procedures described above, site staff also quantitatively logged assayed intervals according to their colour with respect to percentage of red coloured mineralization compared to non-red mineralization, as it was deemed to have potential implications to future mineral processing. This was done by measuring the combined core length of preserved red coloured core and dividing by the combined length of total preserved core. This allowed calculation of a percentage of red per each assayed interval. The red percentage measurement was also recorded in the assay database used for resource estimation. All logging data were recorded digitally in the project drill hole database, that was subject to scheduled off-site backup.

After insertion of quality control samples in the sample stream, the bagged samples were grouped in batches of six to 10 and placed in a plastic mesh bag for shipment to the ALS preparation laboratory in Sudbury, Ontario. All samples bagged for shipment remained in the locked, logging facility, until shipment by commercial carrier to ALS. Sample shipment forms were used to list all samples in each shipment and laboratory personnel cross-checked samples received against this list and reported any irregularities by fax or email to BMC. BMC advised the QP that it did not encounter any issues with respect to sample processing, delivery, or security for the 2011 and 2013 drilling programs.

Based on the above, the QP is of the opinion that sample preparation, security and analytical procedures used by BMC in the 2011 and 2013 drilling programs were consistent with industry standards.

11.4 2021-2022 CMC Plymouth and 2022 North Hartford Drilling Program

The following description of sample preparation and core handling protocols applies to the 2021-2022 drilling programs completed by CMC. Program details were provided by Mercator staff as the QP for this Section managed the program on behalf of CMC.

From December 2021 to April 2022, CMC completed twenty- five NQ drill holes totalling 7,098 m on the Plymouth Deposit. In addition, from July to August 2022, CMC completed four NQ drill holes totalling 1,187 m on the Company's North Hartford Project. All core from the programs was logged and sampled by Mercator staff at rented facilities located in Beardsley, NB. Core sample intervals were marked by the logging geologist and core was then cut by staff technicians to create half core splits. Samples were predominantly collected using a nominal three metre core length, except where specific geological parameters required a smaller interval to be sampled. One half of the core was retained in the wooden core box for archival purposes, with a sample tag affixed at each sample interval and the other was placed in a labelled plastic bag along with a corresponding sample number tag and placed in the shipment queue. Quality control samples were inserted at this time and sample batches were then shipped by commercial courier to the Moncton preparation laboratory operated by ALS Global Limited (ALS), while analytical determinations were completed at the ALS laboratory facility in Vancouver, BC. ALS is an independent commercial analytical firm with operations throughout the world and is ISO 9001: 2015 and ISO/IEC 17025:2005 certified.

Each sample was crushed to ≥70% at 2 mm size, followed by a 250 g riffle split which was pulverized, such that ≥85% of the material passed through a 75-micron sieve. ALS inserted blanks (one per 20 samples) and certified standards (nominally one per 20 samples) for preparation and assay. In addition, Mercator submitted blank samples (nominally one per 20 samples), certified standards (one per 20 samples), and field duplicates (halved core from storage split into two quartered samples) once every 20 samples for preparation and assay, to ensure appropriate QA/QC protocols were applied. In addition, CMC instructed ALS to prepare and analyze one in every 20 samples for Specific Gravity on solid objects (OG-GRA08) and as a pulp duplicate (2nd pulp prepared from the same coarse reject and labeled with suffix “pd”). Also during preparation, ALS prepared one in 40 samples as a coarse reject split check as well as a check assay sample (2nd pulp labeled with suffix “cd”) that will be forwarded to SGS Canada Inc’s laboratory facility at Lakefield, Ontario for check assay. SGS is also an independent commercial analytical firm with operations throughout the world and holds various recognized ISO certifications including ISO 9001 and ISO/IEC 17043: 2010. At the time of the Effective Date of this Technical Report, independent SGS duplicate results for the 2021 and 2022 drill programs were not available.

The 2021-2022 core samples were analyzed using ALS’s ME-XRF26s (borate fusion) procedure which was a modification from the ME-XRF06 used in prior drill programs due to an increase in crucible destruction as a result of elevated Mn values. Sulphur and specific gravity analyses were determined using their Leco (S-IR08), immersion and pycnometer (OA-GRA08 & OA-GRA08b) methods respectively. Samples submitted to SGS for check assays will be analyzed using SGS’s XRF-76 borate fusion XRF analytical procedure.

Security for core, samples and related documentation during both field programs was the responsibility of Mercator site staff, under overall direction of Mr. Kevin MacRae, P. Geo., Senior Project Geologist. Mercator staff were responsible for transport of core boxes by pick-up truck from drill sites to the company’s secure logging facility located in Beardsley, where clean up, tag checking, logging, and sampling were carried out. Complete photographic records of core from all drill holes were created prior to logging and half-core sampling using diamond saws. Sampling was carried out after lithological, geotechnical, and magnetic susceptibility logging procedures were completed. Mineralized zones encountered were additionally assessed through collection of qualitative Mn and Fe values at 3.0 and 5.0 m intervals using a hand-held XRF unit (Niton XL3t-950 GOLDD+ XRF Analyzer) to establish sampling intervals.

In addition to the standard logging procedures described above, Mercator staff also quantitatively logged assayed intervals according to their colour with respect to percentage of red coloured mineralization compared to non-red mineralization, as it was deemed to have potential implications to future mineral processing. This was done by measuring the combined core length of preserved red coloured core and dividing by the combined length of total preserved core. This allowed calculation of a percentage of red per each assayed interval. The red percentage measurement was also recorded in the assay database used for resource estimation. All logging data were recorded digitally in the online MX Deposit project drill hole database, that was exported and organized and combined with the previous drill programs into an Access database on Mercator’s server.

After insertion of quality control samples in the sample stream, the bagged samples were grouped in batches of three to five and placed in a plastic mesh bags for shipment to the ALS preparation laboratory in Moncton, New Brunswick. All samples bagged for shipment remained in the locked, logging facility, until shipment by commercial carrier to ALS. Sample shipment forms were used to list all samples in each shipment and laboratory personnel cross-checked samples received against this list and reported any irregularities by fax or email to Mercator. The QP is not aware of any issues with respect to sample processing, delivery, or security for the 2021-2022 drilling programs.

Based on the above, the QP is of the opinion that sample preparation, security and analytical procedures used by BMC/CMC in the 2011 and 2013 and Mercator in the 2021-2022 drilling programs were consistent with industry standards.

11.5 Quality Control and Quality Assurance (QA/QC) Programs

Review of historical reporting for the 1985 and 1987 MRR drilling and trenching programs on the Woodstock Project showed that no formal QA/QC programs were applied by the operators of the field programs. The commercial laboratories that provided analytical services would, however, have implemented routine, industry standard QA/QC protocols that included insertion of certified standards and blank samples, plus analysis of duplicate pulp split samples.

BMC implemented a QA/QC program in 2011 that consisted of insertion of certified reference materials and blank samples. ALS was the primary laboratory used for the 2011,2013 and 2011-2022 analytical programs. However, a modified approach was used for the 2013 and 2022 drilling programs, which included addition of a ¼ core field duplicate and duplicate pulp split components, analysis of check samples at an independent, third-party laboratory and modification of some sampling frequencies. SGS provided independent check sample analysis services in 2013. Duplicate splits, blanks, certified reference materials and in-house standard samples were routinely analyzed by both laboratories for their own internal QA/QC purposes. As noted previously, both ALS and SGS are independent, fully accredited, ISO registered firms that provide analytical services domestically and internationally.

The 2011 QA/QC program included the following components:

- Certified reference materials: 1 in every 20 samples
- Blanks samples: 1 in every 20 samples

The 2013 QA/QC program included the following components:

- Certified reference materials: 1 in every 20 samples
- Blanks samples: 1 in every 20 samples
- Field ¼ core duplicate: 1 in every 20 samples
- Pulp duplicate: 1 in every 20 samples
- Check Assay Pulp: 1 in every 20 samples

The 2021-2022 QA/QC programs included the following components:

- Certified reference materials: 1 in every 20 samples
- Blanks samples: 1 in every 20 samples
- Field ¼ core duplicate: 1 in every 20 samples
- Pulp duplicate: 1 in every 20 samples
- Check Assay Pulp: 1 in every 40 samples
- Coarse Reject Split Check: 1 in every 40 samples
- Specific Gravity by Immersion: 1 in every 20 samples

Results of the 2011,2013 and 2021-2022 QA/QC programs are discussed below.

11.5.1 2011 QA/QC Results

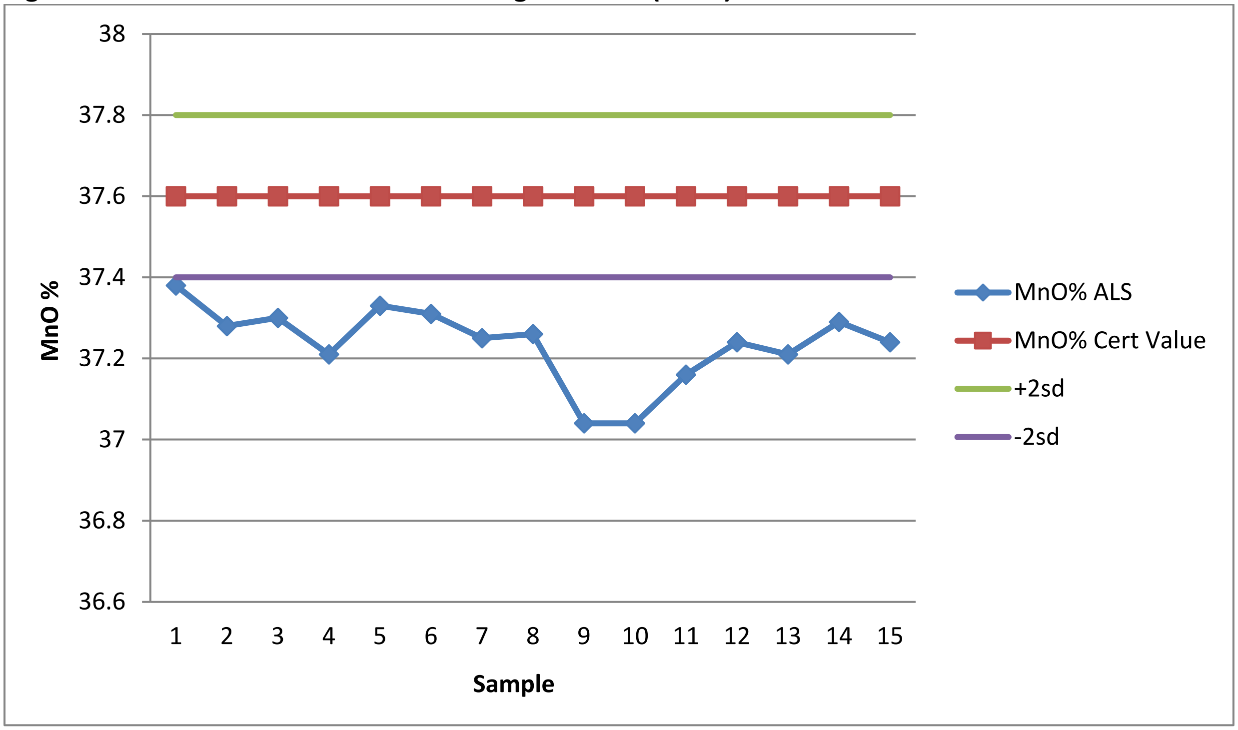
In 2011, BMC used the NOD-P-1 certified reference material obtained from the United States Geological Survey. Recommended values for this material are presented below in Table 11-1. NOD-P-1 was prepared from deep sea manganiferous nodule material collected from a depth of 4,300 m in the Pacific Ocean at Latitude 14°50' N and Longitude 124°28' W. Notably, the material is very sensitive to moisture and can absorb as much as 10% by weight of moisture over a 24-hour period. As such, it is not an optimal certified reference material for use in drilling program QA/QC applications. BMC selected this standard after searching without success for a more appropriate manganese standard.

Table 11-1: Certified Reference Material NOD-P-1 Values

Oxide	**Wt %**	**± 1 SD**	**Oxide**	**Wt %**	**±1 SD**
SiO_2	13.9	0.034	MnO	37.6	0.1
Al_2O_3	4.8	0.092	Na_2O	2.2	0.006
Fe_2O_3 T	8.3	0.044	K_2O	1.2	0.014
CaO	3.1	0.016	TiO_2	0.5	0.003
MgO	3.3	0.014	P_2O_5	0.46	0.005
Element	**µg/g**	**±1 SD**	**Element**	**µg/g**	**±1 SD**
Ba	3350	28	Pb	560	6
Co	2240	11	Sr	680	3
Cu	11500	49	V	570	10
Mo	760	4	Zn	1600	6
Ni	13400	64			

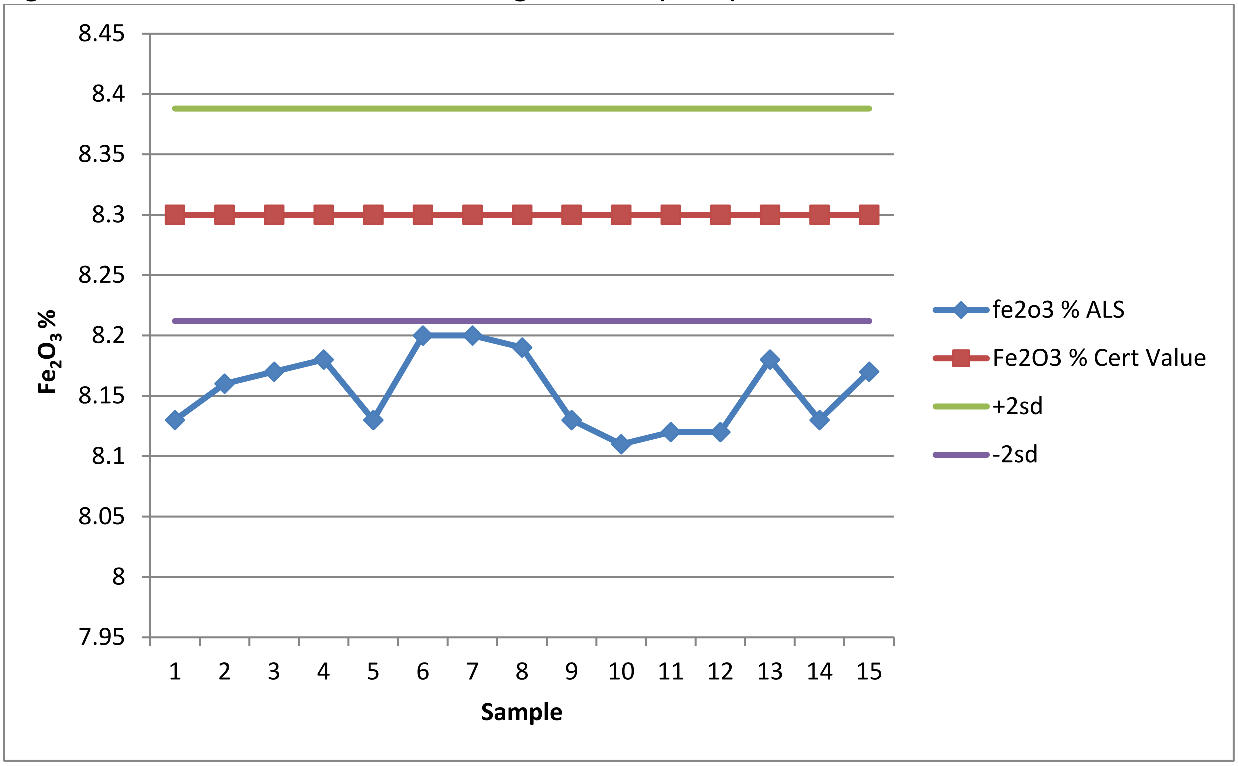
A total of 15 analyses of this certified reference material were returned for the 2011 drilling program and results for MnO and Fe_2O_3 are presented below in Figures 11-1 and 11-2. Project control limits for review of reference material data were set by Mercator staff in 2011, as the certified mean value, plus or minus 2 and 3 standard deviations. Figure 11-1 shows that 2011 MnO data for this material consistently falls below the mean minus 2 standard deviations level and that 8 samples fell below the mean minus 3 standard deviations level. Figure 11-2 shows that 2011 Fe_2O_3 data also consistently fall below the mean minus 2 standard deviations level and that 11 samples fell below the mean minus 3 standard deviations level. In combination, these define a low bias in the primary dataset for both Fe_2O_3 and MnO. BMC investigated these low bias trends through ALS and found that the primary meta-borate fusion and ME-ICP06 analytical package did not provide sufficient extraction of Mn and Fe to match reference material results that were based on original XRF analysis.

Figure 11-1: NOD-P-1 Standard – 2011 Program MnO (N=15)



(Source: Mercator 2023)

Figure 11-2: NOD-P-1 Standard – 2011 Program Fe_2O_3 (N=15)



(Source: Mercator 2023)

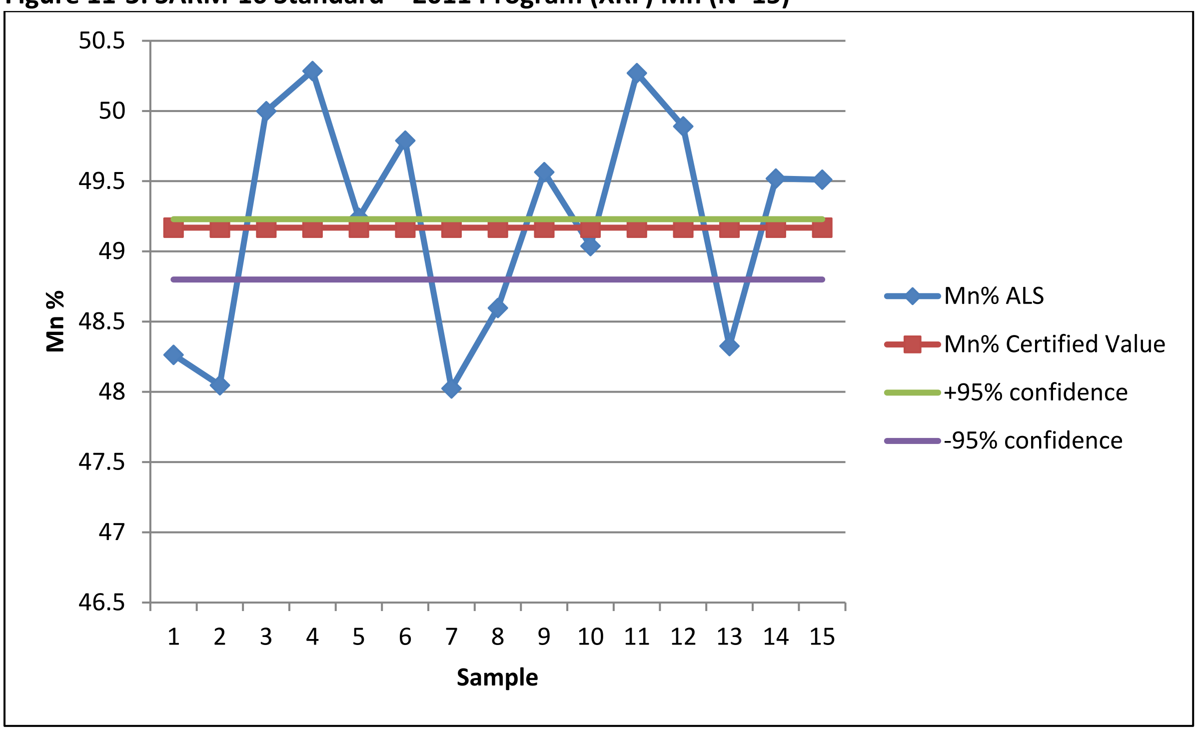
Based on the initial ALS ME-ICP06 results, BMC elected to have all sample splits re-analyzed using the ALS ME-XRF06 protocol. The SARM-16 certified reference material was obtained by BMC from the South African Bureau of Standards in Pretoria, South Africa, and used for the re-analysis program. The sample material was sourced from the Wessels manganese deposit in the northern Cape Province, South Africa and has certified mean values of 49.17% Mn and 11.48% Fe. For report purposes, MnO and Fe_2O_3 values reported by ALS were converted to Mn% and Fe% values, respectively, using a factor of 0.774 for Mn% and a factor of 0.699 for Fe%. Certified reference values for the material appear in Table 11.2 below and results of the 2011 QAQC certified standard program are presented in Figures 11-3 and 11-4 below.

Table 11-2: Certified Reference Material SARM-16 Values

Metal	Wt %	95% Confidence Interval (Low)	95% Confidence Interval (High)
Mn	49.17	48.8	49.23
Fe	11.48	11.42	11.54
SiO_2	5.04	4.89	5.06
CaO	4.7	4.66	5.08
MgO	0.76	0.67	0.77
P	0.033	0.031	0.035
K_2O	0.02	0.01	0.02
BaO	0.6	0.59	0.68
S	0.017	0.16	0.19
Zn	364	336	370

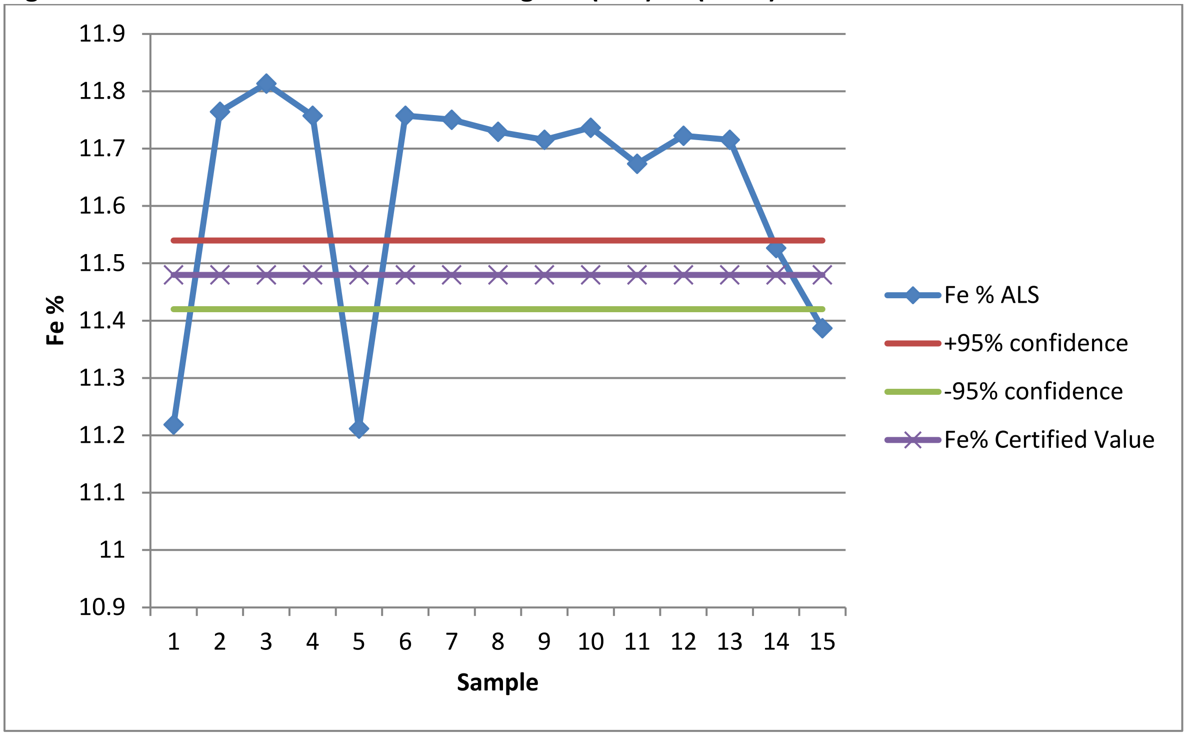
Results for manganese range between 48.02% and 50.29% and only 1 value falls within the 95% confidence interval for the material. Data are generally distributed evenly about the mean value. Those for iron range between 11.21% and 11.81% and 11 of the 15 samples define a positive bias trend between 11.7% and 11.8% levels. Only one value falls within the 95% confidence interval.

Figure 11-3: SARM-16 Standard – 2011 Program (XRF) Mn (N=15)



(Source: Mercator 2023)

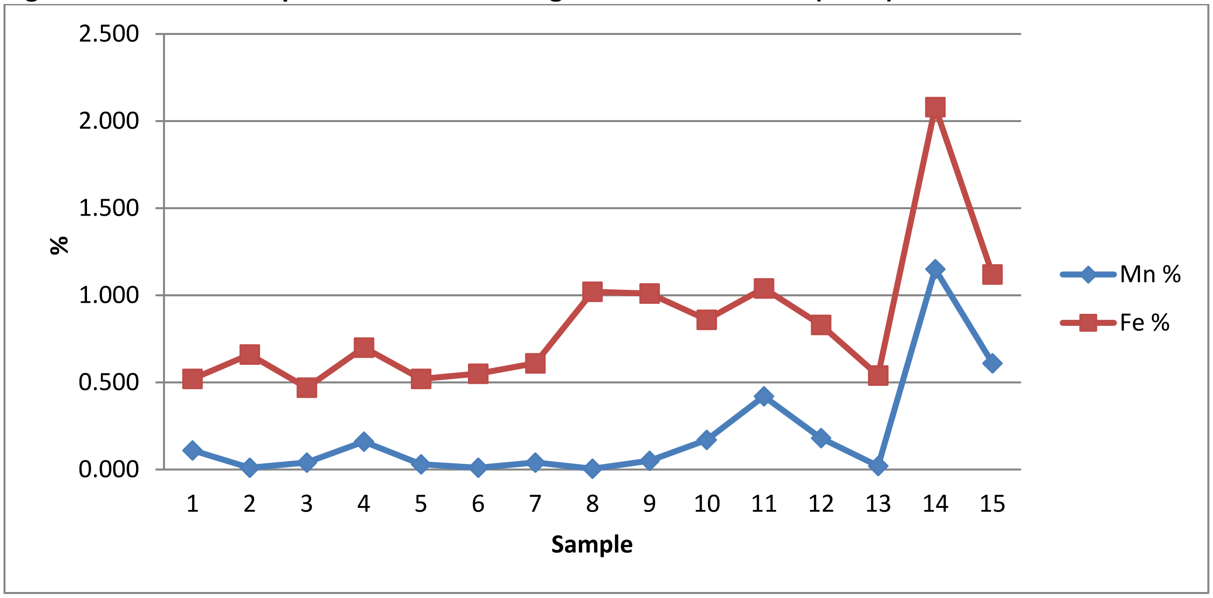
Figure 11-4: SARM-16 Standard – 2011 Program (XRF) Fe (N=15)



(Source: Mercator 2023)

A total of 15 analyses of blank sample material were returned for the 2011 program and results for manganese and iron are presented below in Figure 11-5. The blank material consisted of nepheline syenite sand blasting sand obtained by BMC from Bell and Mackenzie Co. Ltd. of Hamilton, Ontario, Canada. Figure 11-5 indicates that 2011 MnO results average 0.20% for this material and range between 0.005% and 1.15%. Fe_2O_3 values average 0.84% and range between 0.47% and 2.08%. A single sample spike in both datasets is present and defined by respective dataset values. The source of this spike is unclear, but the preceding sample in the preparation stream contained high levels of both MnO and Fe_2O_3. This suggests that preparation stage cross contamination may have occurred in this instance. However, the following blank sample also shows elevated metal levels and, in combination with the spike sample, may represent a change in the blank material composition itself, possibly due to non-homogeneity of the sample splits. Dataset core values associated with the intervals of these two blank samples do not suggest systematic cross-contamination.

Figure 11-5: Blank Sample Results – 2011 Program MnO and Fe_2O_3 (N=15)



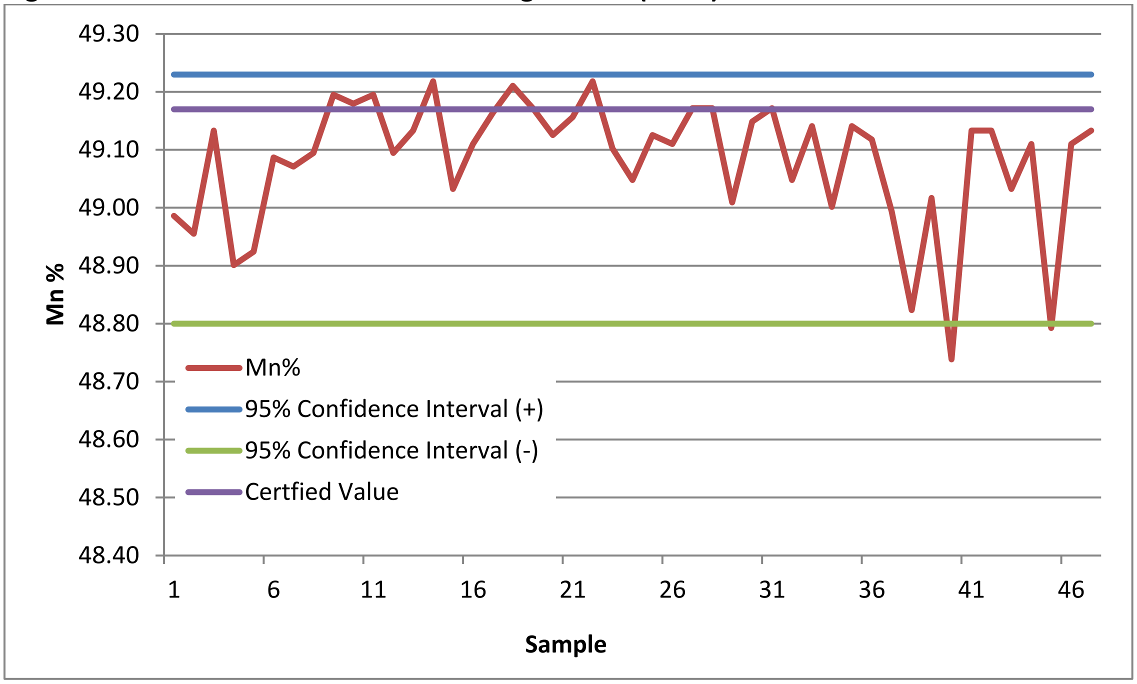
(Source: Mercator 2023)

11.5.2 2013 QA/QC Results

The SARM-16 certified reference material used for the 2011 re-analysis program by BMC was the only certified standard used for the 2013 drilling program.

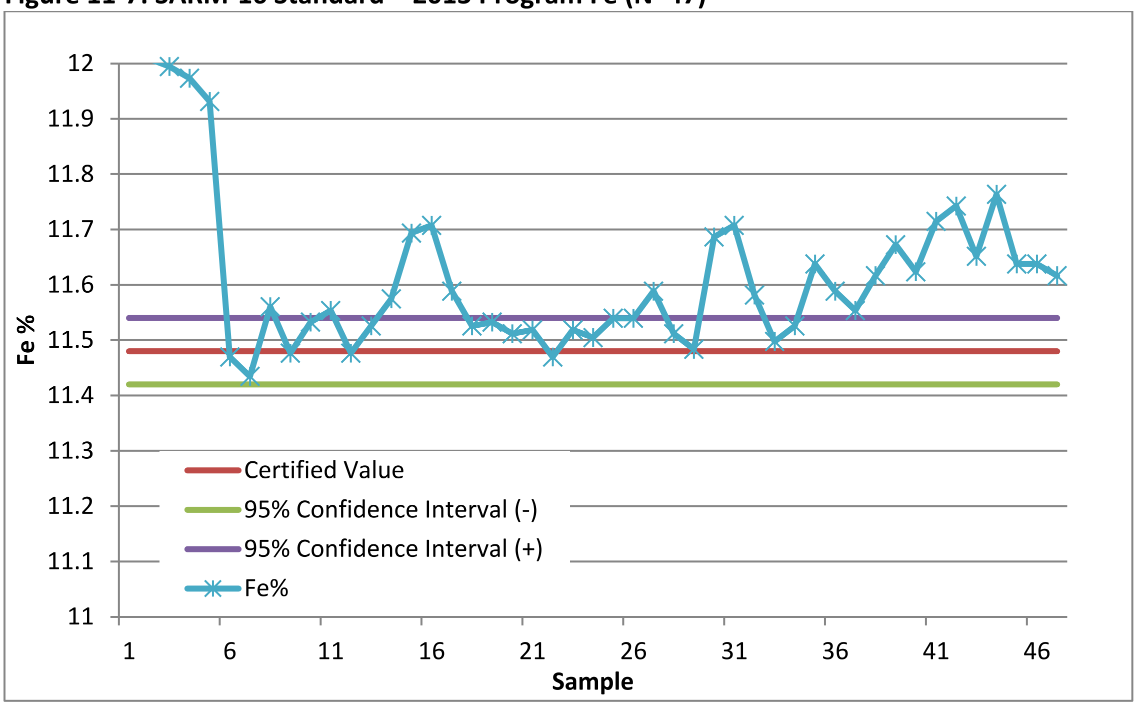
A total of 47 analyses of this certified standard material were returned for the 2013 program and results for Mn and Fe are presented below in Figures 11-6 and 11-7. MnO% and $Fe_2O_{3\%}$ values reported by ALS were converted to Mn% and Fe% values, respectively, using a factor of 0.774 for Mn% and a factor of 0.699 for Fe %. Mn values for the SARM-16 dataset have a mean of 49.08% and all but two results fall within the 95% confidence limits for the material. Two exceptions fall within .04% and .01 % of the lower 95% confidence interval limit. The SARM-16 Fe dataset has a mean value of 11.62% with minimum and

Figure 11-6: SARM-16 Standard – 2013 Program Mn (N=47)



(Source: Mercator 2023)

Figure 11-7: SARM-16 Standard – 2013 Program Fe (N=47)

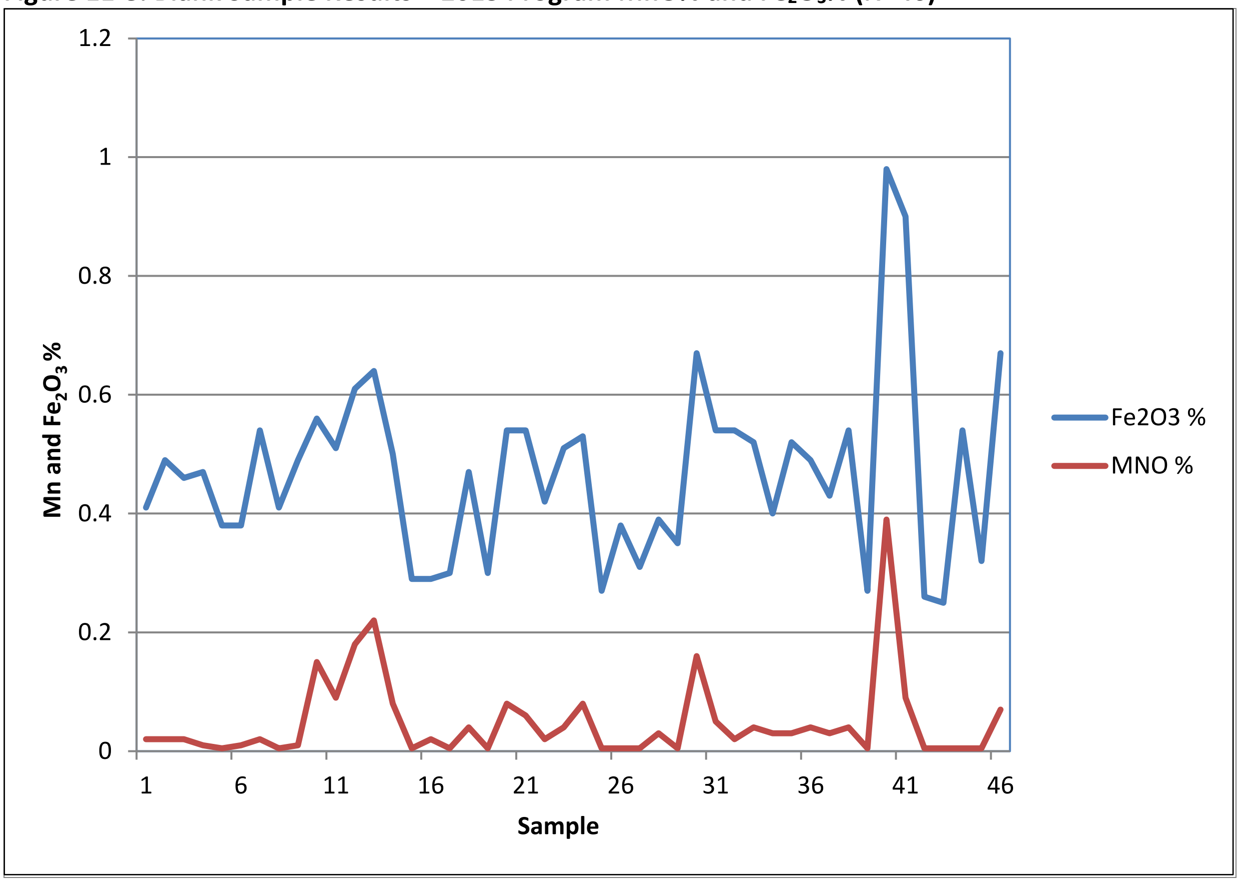


(Source: Mercator 2023)

maximum values of 11.43% and 12.01% respectively. No samples reported below the lower 95% confidence interval level, but 26 of the 47 samples exceeded the upper 95% confidence interval limit.

A total of 46 analyses of blank sample material were returned for the 2013 program and results for MnO and Fe_2O_3 are presented below in Figure 11-8. The blank material consisted of crushed high-purity quartzite having an average top size of ½ inch that was obtained from Atlantic Silica Inc., of Poodiac, New Brunswick. Figure 11-8 shows that all 2013 MnO results fall below the 0.4% level and that Fe_2O_3 values all fall below 1%. The average MnO value is 0.049% for this material and values range between 0.005% and 0.39%. Fe_2O_3 values average 0.47% and range between 0.25% and 0.98%. A single sample spike in both datasets is present and is associated with the maximum dataset values. The source of this spike is not apparent.

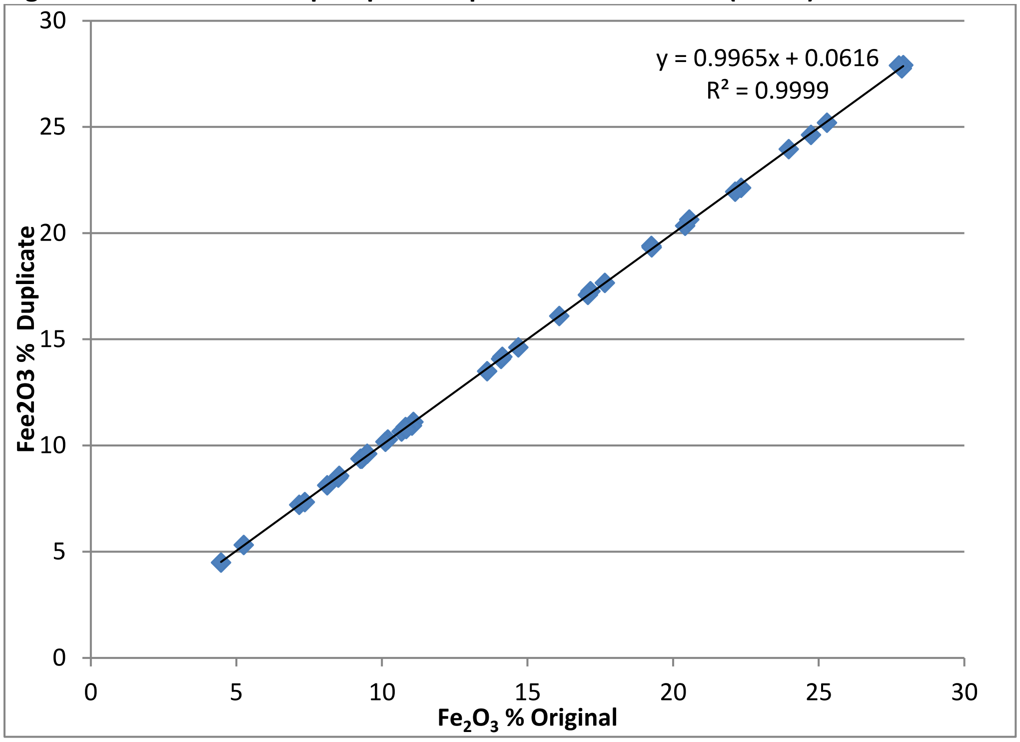
Figure 11-8: Blank Sample Results – 2013 Program MnO% and Fe_2O_3% (N=46)



(Source: Mercator 2023)

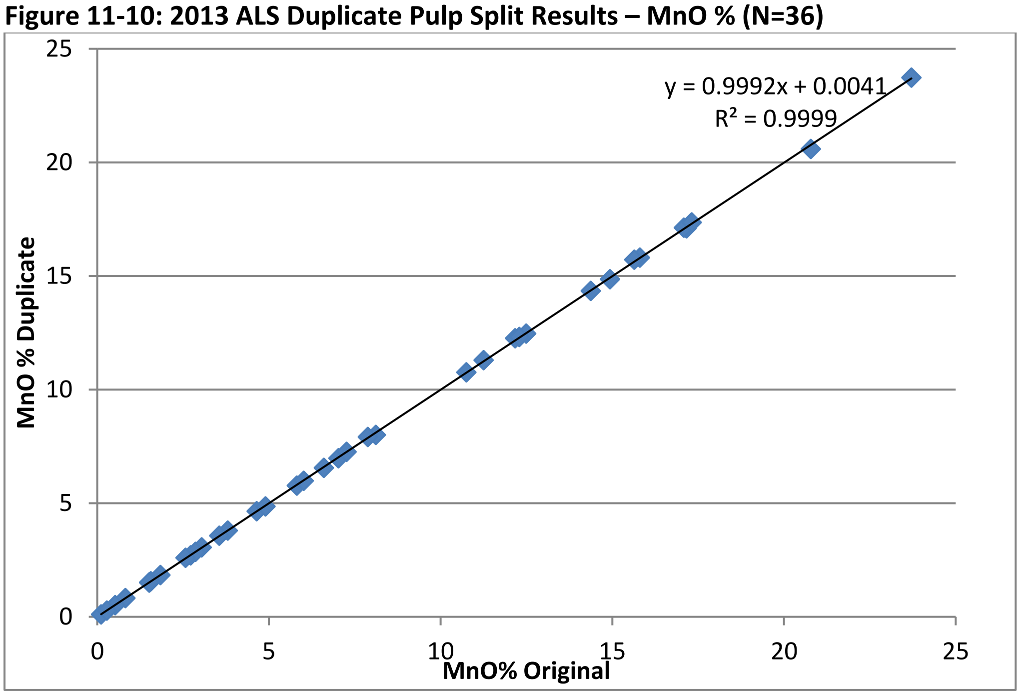
Duplicate sample pulp splits were prepared by ALS at a nominal 1 in 20 rate during the 2013 program, with an additional pulp split from each of the samples being prepared for submission as a third-party check sample. MnO and Fe_2O_3 results for a total of 36 duplicate pulp splits were reviewed by Mercator and are presented below in Figures 11-9 and 11-10. Duplicate split pairs correlate well along a 1:1 trend, with Fe_2O_3 having an R^2 value of 0.999 and MnO having an R^2 value of 0.998. These results and associated trends are interpreted as indicating that the pulp splits are homogenous and that associated analyses reflect acceptable precision.

Figure 11-9: 2013 ALS Pulp Duplicate Split Results - Fe_2O_3 % (N= 36)



(Source: Mercator 2023)

Figure 11-10: 2013 ALS Duplicate Pulp Split Results – MnO % (N=36)

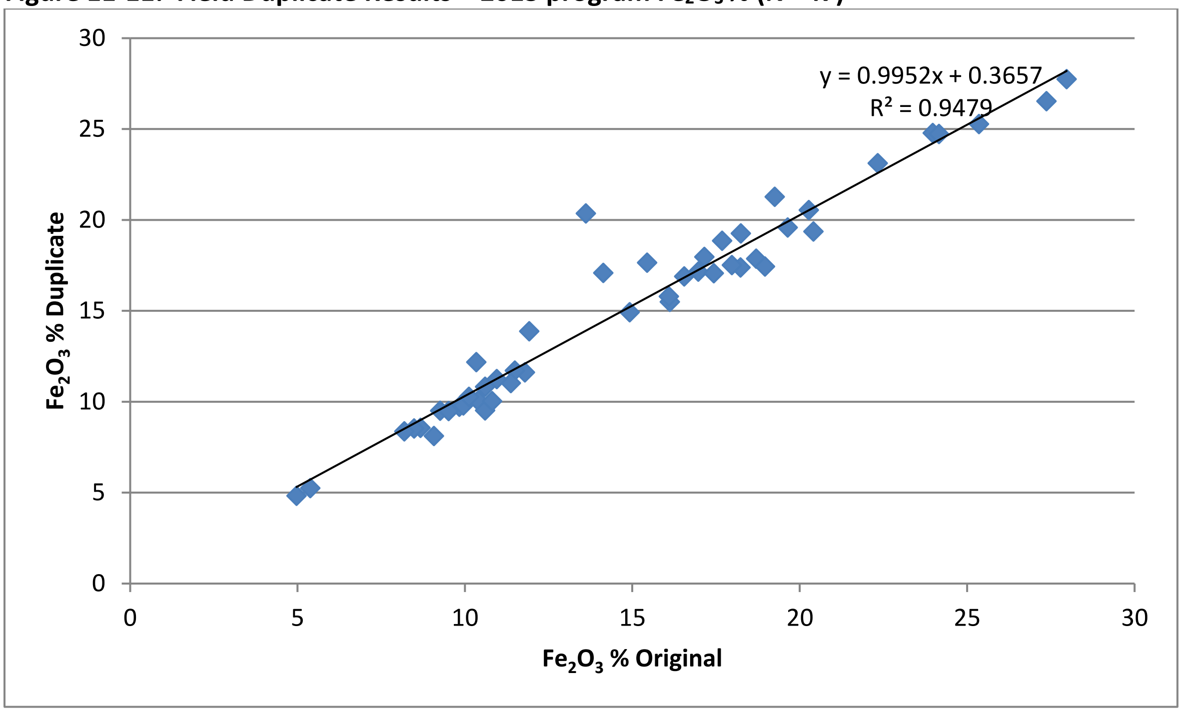


(Source: Mercator 2023)

In 2013, BMC also prepared quarter (¼) core field duplicate samples at a nominal 1 in 20 frequency. For these samples, the primary core sample was also a ¼ core sample to allow a full half core to remain in the archive for possible future use in metallurgical studies. Both samples were prepared by ALS and analyzed according to the project protocol.

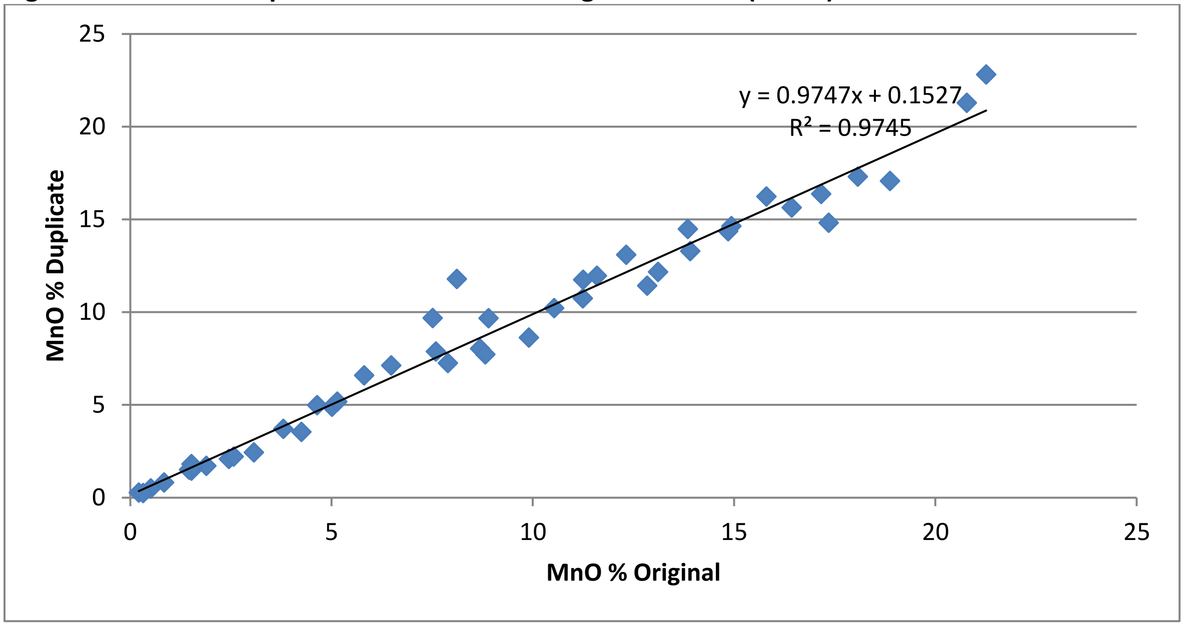
A total of 47 quarter core field duplicate samples were submitted for analysis in 2013 and comparisons of MnO and Fe_2O_3 results for corresponding ¼ core splits are presented in Figures 11-11 and 11-12. The sample pairs correlate well along a 1:1 trend, with Fe_2O_3 having an R^2 value of 0.947 and MnO having an R^2 value of 0.974. This indicates that substantial homogeneity exists within the core samples at the level of the quarter core sub-sample. Good correlation is anticipated in such sedimentary deposits.

Figure 11-11: Field Duplicate Results – 2013 program Fe_2O_3 % (N= 47)



(Source: Mercator 2023)

Figure 11-12: Field Duplicate Results – 2013 Program MnO % (N= 47)

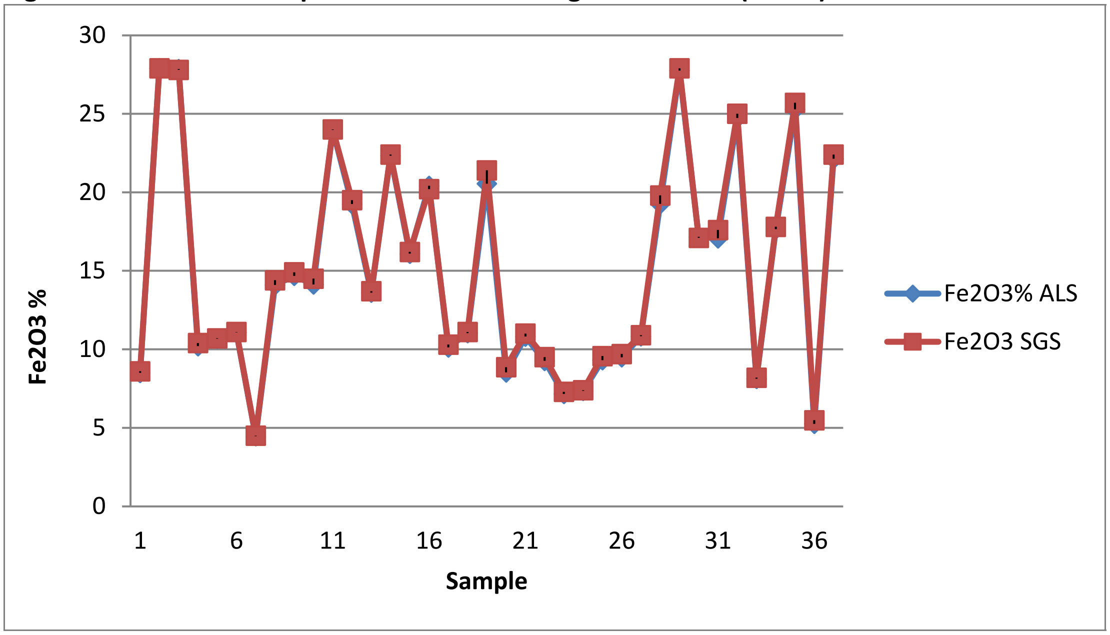


(Source: Mercator 2023)

Check sample pulps were prepared by ALS from core samples used to prepare the duplicate split pulps discussed above. These pulps were sent to SGS for analysis using XRF methods (SGS XRF-76 code) and reflect a nominal 1 in 20 rate within the core sample submission stream. As noted earlier, SGS is a fully accredited, independent analytical firm having ISO registration and an international scope of operations.

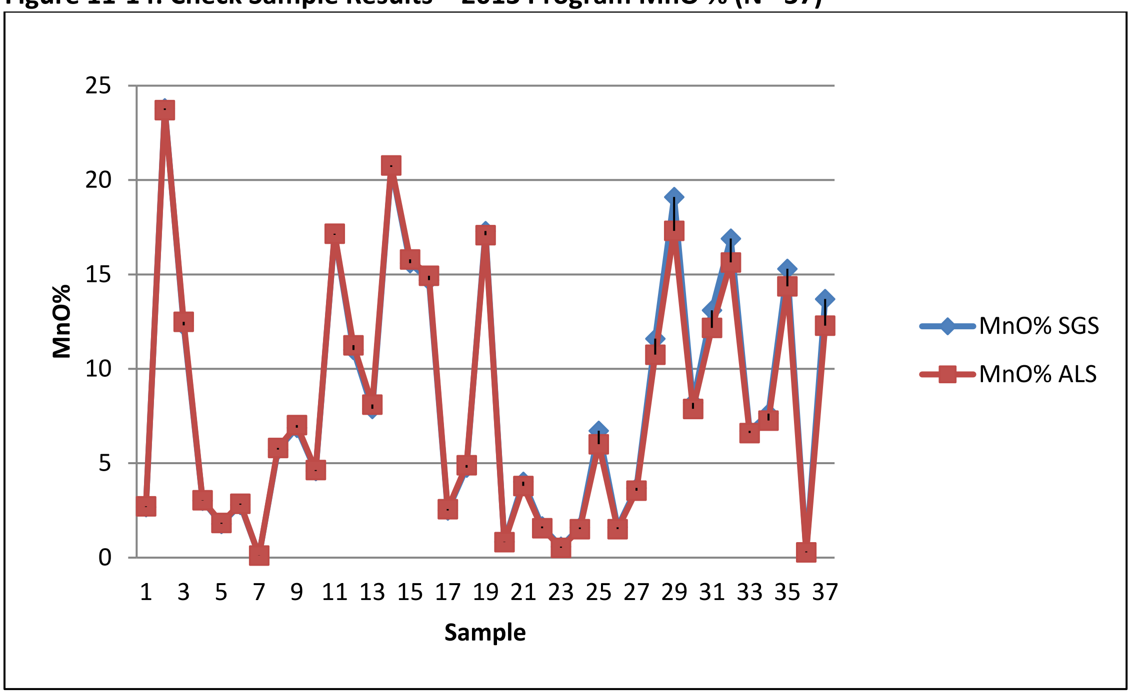
Results for a total of 37 check sample pulps were reviewed by Mercator staff and are presented below in Figures 11.13 and 11.14. Check sample duplicate pairs correlate well along a 1:1 trend, with Fe_2O_3 having an R^2 value of 0.999 and MnO having an R^2 value of 0.998. Results from the two laboratories correlate very well and no issues arising from the check sample program were identified with the project dataset.

Figure 11-13: Check Sample Results – 2013 Program Fe_2O_3 % (N= 37)



(Source: Mercator 2023)

Figure 11-14: Check Sample Results – 2013 Program MnO % (N= 37)



(Source: Mercator 2023)

11.5.3 2021-2022 QA/QC Results

The SARM-16 certified reference material used for the 2011 and 2013 programs by BMC was one of two certified standards used for the 2021-2022 drilling program. CMC also used certified standard, OREAS 173, during the 2022 program. OREAS 173 consists of powdered manganese ores sourced from the Glosam Mine situated within Postmasburg Manganese Field located in the Northern Cape Province of South Africa. A small quantity of barren oxidized siliciclastic material was added by the supplier to achieve the desired Mn grade. The standard is again composed mainly of braunite group minerals including (braunite, partridgeite and bixbyite) (certified value of 28.3% Mn with acceptable lower and upper tolerance limits of 28.21% and 28.38% Mn respectively) and samples were delivered in prepackaged 10 g packets directly from OREAS in Sudbury, Ontario. For report purposes, MnO and Fe_2O_3 values reported by ALS were converted to Mn% and Fe% values, respectively, using a factor of 0.774 for Mn% and a factor of 0.699 for Fe%. Certified reference values for OREAS 173 appear below in Table 11-3. Details and certified reference values for SARM-16 appear above in Table 11-2.

Table 11-3: Certified Reference Material OREAS 173 values

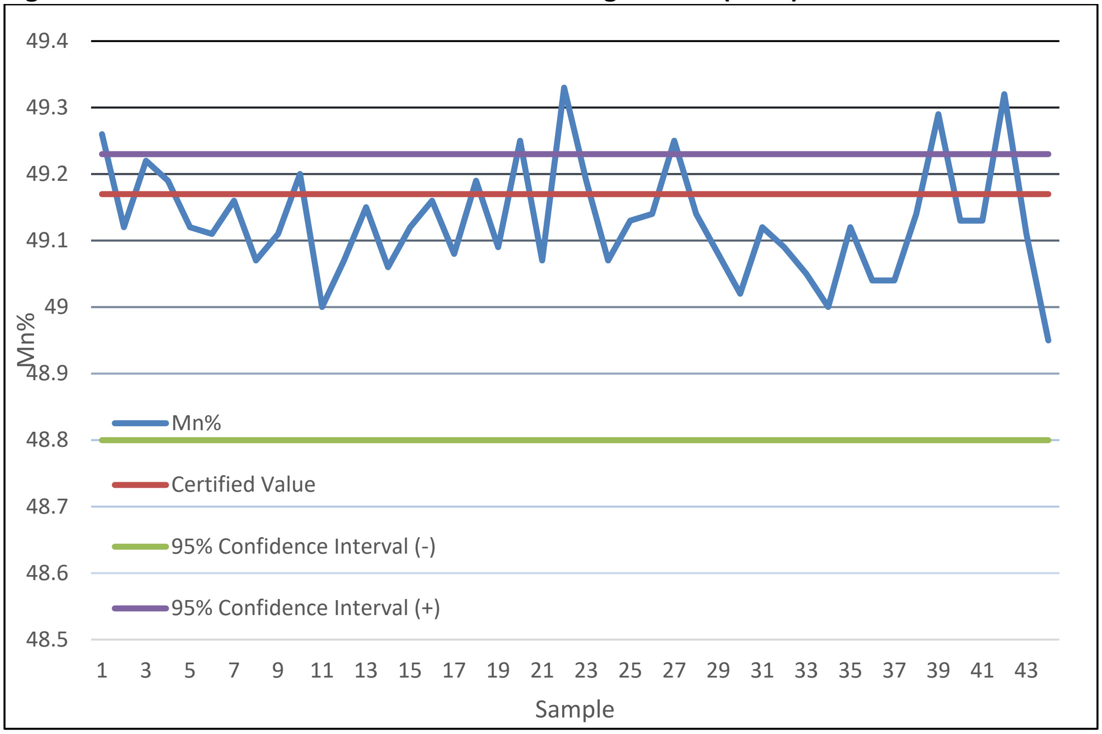
Metal	Wt %	95% Confidence Interval (Low)	95% Confidence Interval (High)
MnO	36.54	36.33	36.75
Mn	28.3	28.13	28.46
Fe_2O_3	36.08	35.89	36.26
Fe	25.23	25.11	25.36
P (ppm)	391	388	395
P_2O_5	0.09	0.089	0.090

A total of 44 analyses of the SARM-16 and 60 analyses of the OREAS 173 certified reference materials were returned for the 2021-2022 program and results for Mn and Fe are presented below in Figures 11-15 to 11-18.

Mn values for the SARM-16 dataset have a mean of 49.129% and all but six results fall within the 95% confidence limits for the material. The six exceptions fall within .03% and .1 % of the upper 95% confidence interval limit. The SARM-16 Fe dataset has a mean value of 11.509% with minimum and maximum values of 11.33% and 11.66% respectively. Four samples reported below the lower 95% confidence interval level, whereas 7 of the 44 samples exceeded the upper 95% confidence interval limit (Figures 11-15 & 11-16).

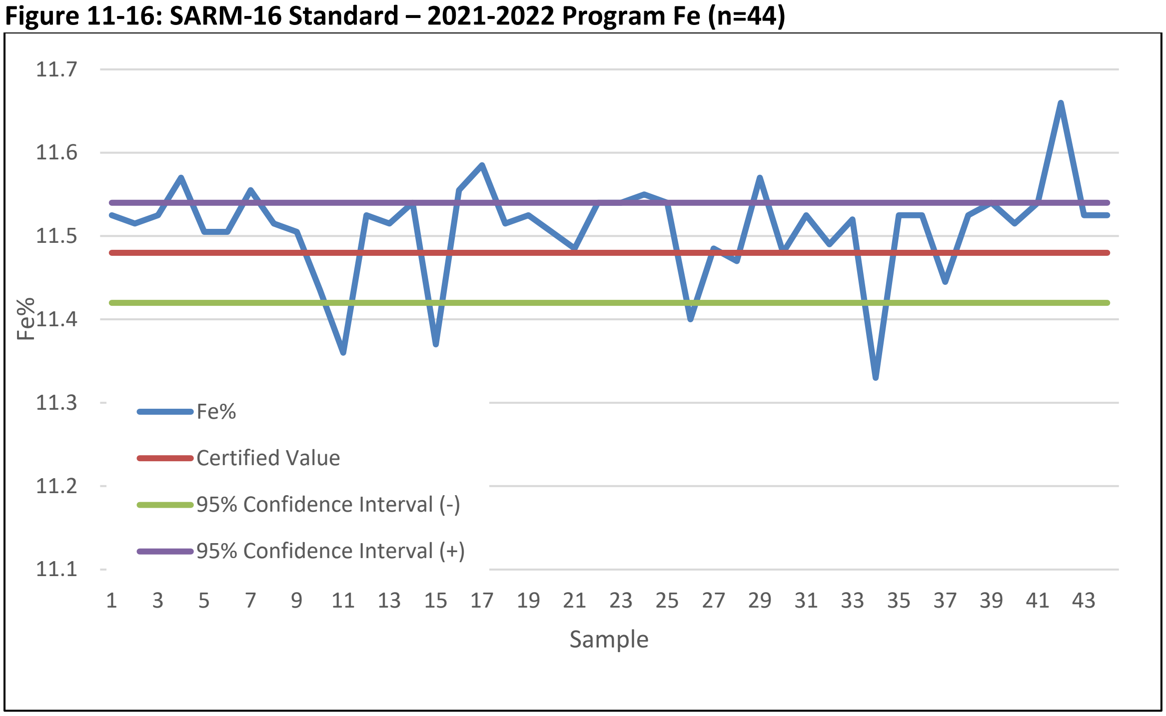
Mn values for the OREAS 173 dataset have a mean of 28.298% and all but three results fall within the 95% confidence limits for the material. One sample reported higher than the upper 95% confidence interval at 28.53%. Two samples fall within .05% and .17 % of the lower 95% confidence interval limit. The OREAS 173 Fe dataset has a mean value of 25.234% with minimum and maximum values of 24.89% and 25.38% respectively. Six samples reported below the lower 95% confidence interval level, whereas two samples exceeded the upper 95% confidence interval limit (Figures 11-17 & 11-18).

Figure 11-15: SARM-16 Standard – 2021-2022 Program Mn (n=44)



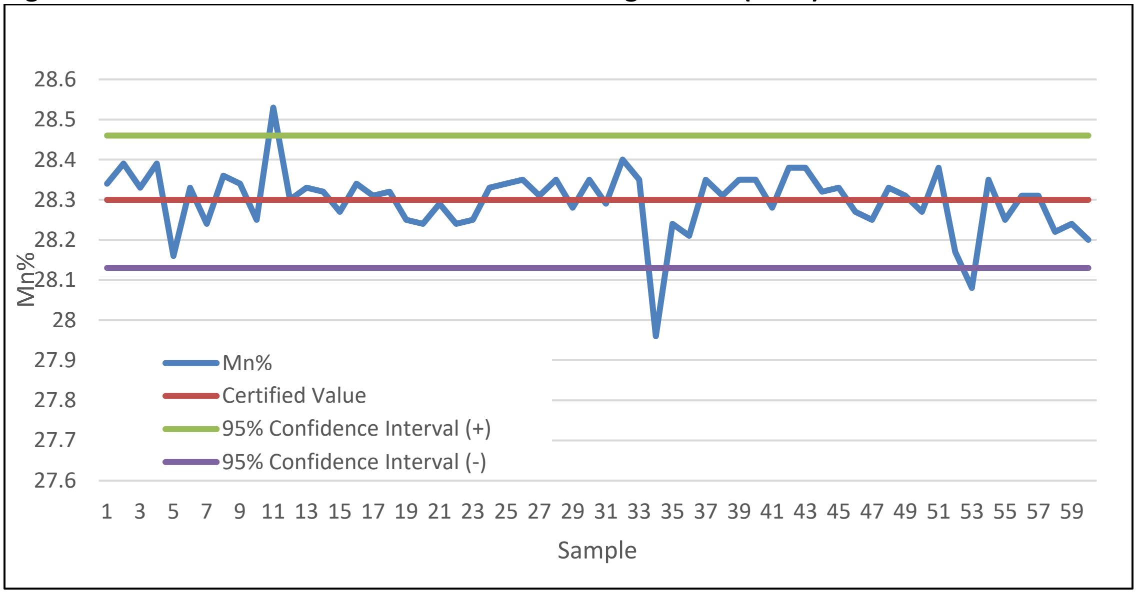
(Source: Mercator 2023)

Figure 11-16: SARM-16 Standard – 2021-2022 Program Fe (n=44)



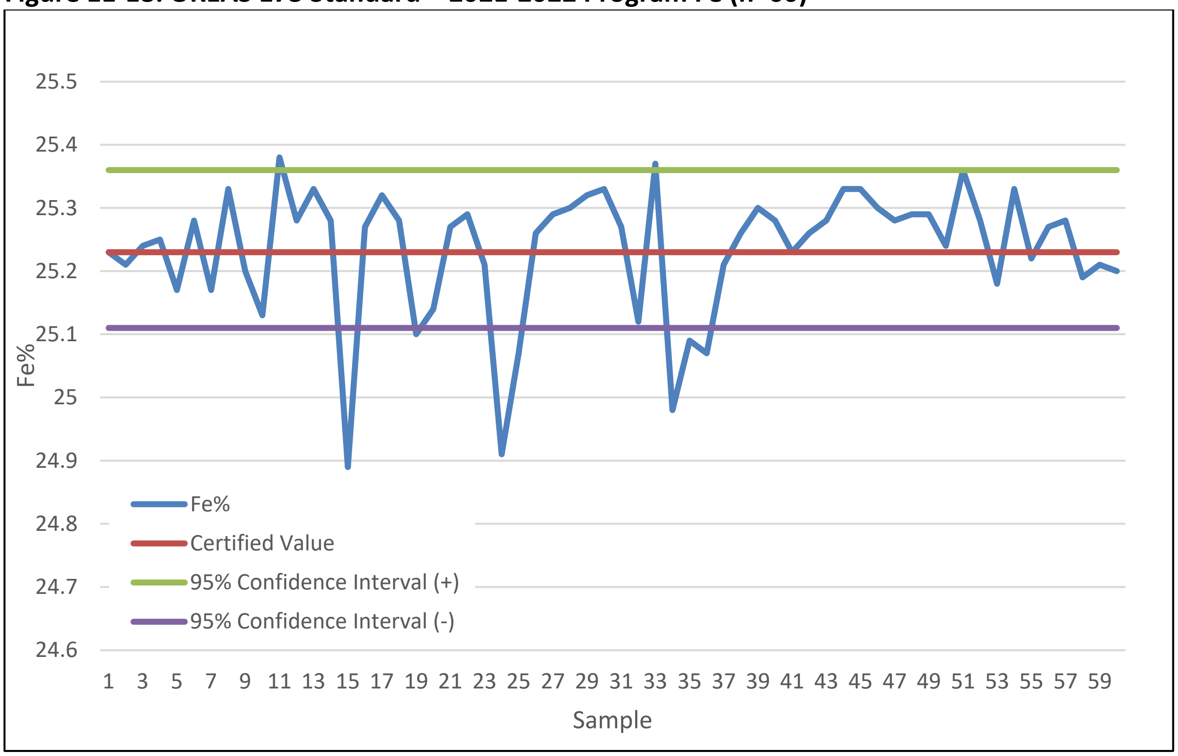
(Source: Mercator 2023)

Figure 11-17: OREAS 173 Standard – 2021-2022 Program Mn (n=60)



(Source: Mercator 2023)

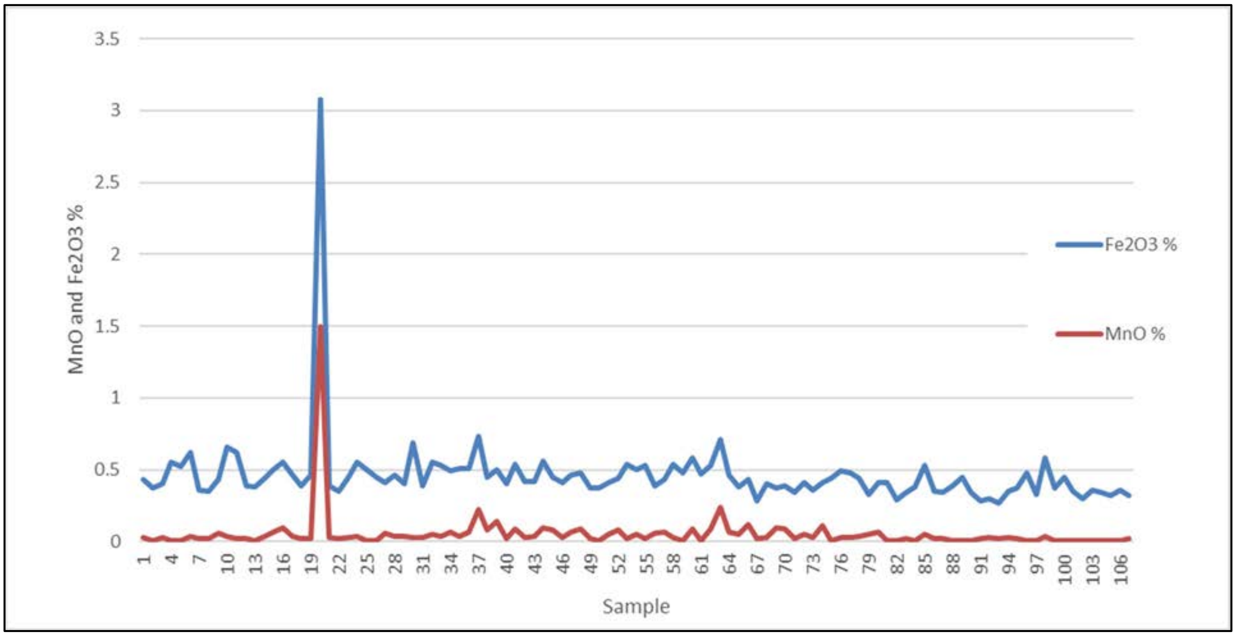
Figure 11-18: OREAS 173 Standard – 2021-2022 Program Fe (n=60)



(Source: Mercator 2023)

A total of 107 analyses of blank sample material were returned for the 2021-2022 program and results for MnO and Fe_2O_3 are presented below in Figure 11-19. The blank material consisted of crushed high-purity quartzite having an average top size of ½ inch that was obtained from Atlantic Silica Inc., of Poodiac, New Brunswick. Figure 11-19 shows that all but one of the 2022 MnO results fall below the 0.4% level and that Fe_2O_3 values all fall below 1.5%. The average MnO value is 0.055% for this material and values range between 0.005% and 1.5% with all but one falling below 0.24%. Fe_2O_3 values average 0.46% and range between 0.25% and 3.08%. A single sample spike in both datasets is present and is associated with the maximum dataset values. The source of this spike is not apparent.

Figure 11-19: Blank Sample Results – 2021-2022 Program MnO% & Fe2O3% (n=107)

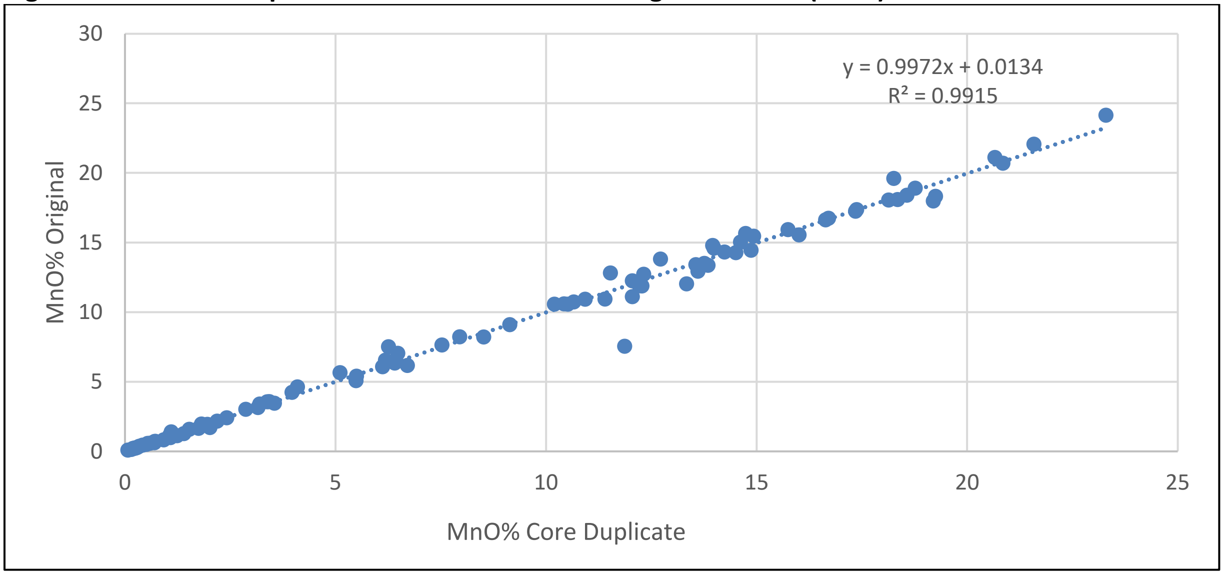


(Source: Mercator 2023)

In 2021-2022, CMC also prepared quarter (¼) core field duplicate samples at a nominal 1 in 20 frequency. The primary core sample was a ½ core sample with these ¼ core samples coming from the remaining half core in the archive being split. Both samples were prepared by ALS and analyzed according to the project protocol.

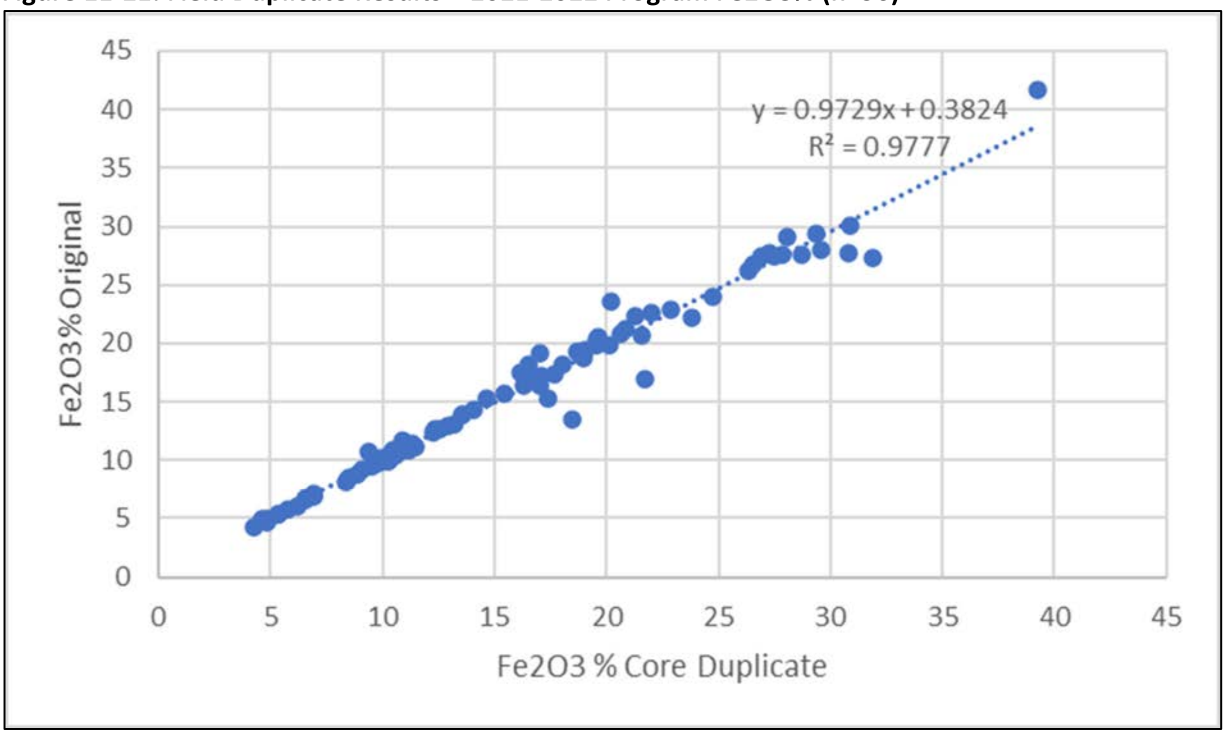
A total of 96 quarter core field duplicate samples were submitted for analysis in 2021-2022 and comparisons of MnO and Fe_2O_3 results for corresponding ¼ core splits are presented in Figures 11-20 and 11-21. The sample pairs correlate well along a 1:1 trend, with Fe_2O_3 having an R^2 value of 0.9777 and MnO having an R^2 value of 0.9915. This indicates that substantial homogeneity exists within the core samples at the level of the quarter core sub-sample. Good correlation is anticipated in such sedimentary deposits.

Figure 11-20: Field Duplicate Results – 2021-2022 Program MnO% (n=96)



(Source: Mercator 2023)

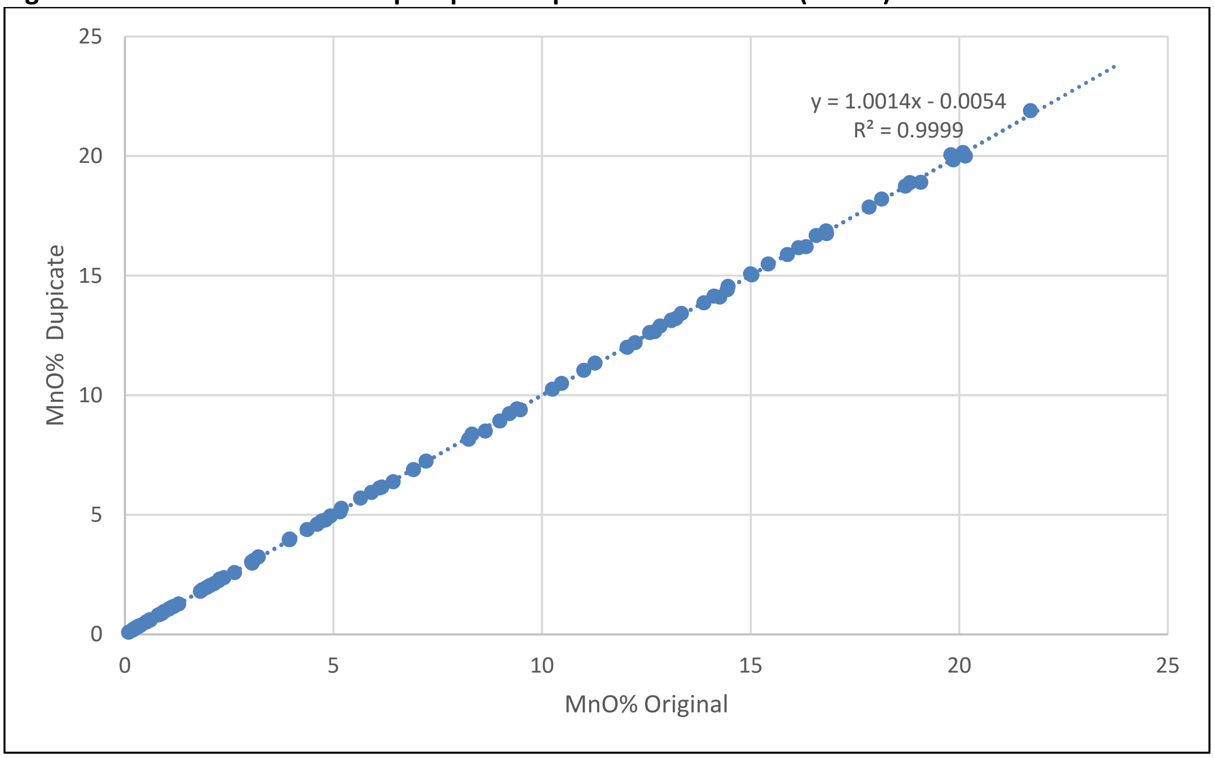
Figure 11-21: Field Duplicate Results – 2021-2022 Program Fe2O3% (n=96)



(Source: Mercator 2023)

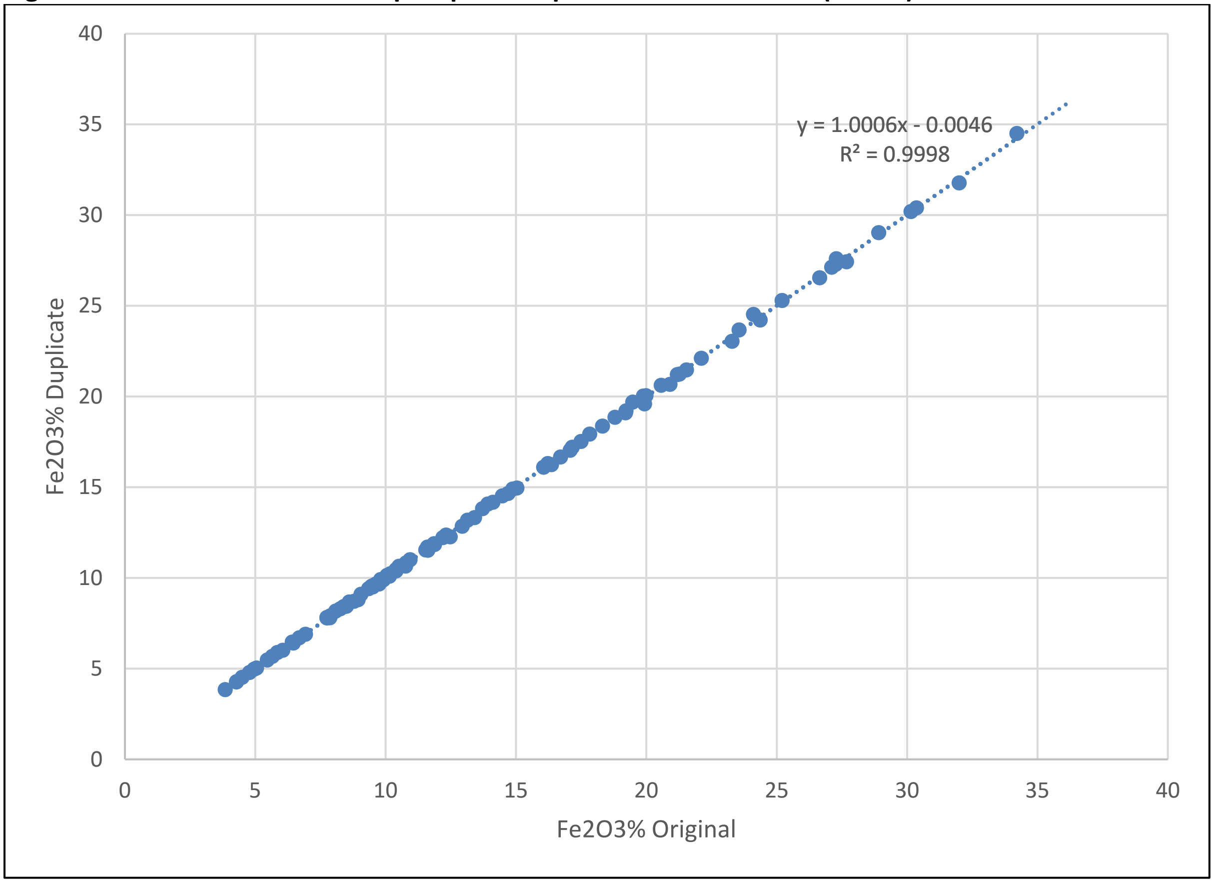
Duplicate sample pulp splits were prepared by ALS at a nominal 1 in 20 frequency during the 2021-2022 program. MnO and Fe_2O_3 results for a total of 106 duplicate pulp splits were reviewed by Mercator and are presented below in Figures 11-22 and 11-23. Duplicate split pairs correlate well along a 1:1 trend, with Fe_2O_3 having an R^2 value of 0.9998 and MnO having an R^2 value of 0.9999. These results and associated trends are interpreted as indicating that the pulp splits are homogenous and that associated analyses reflect acceptable precision.

Figure 11-22: 2021-2022 ALS Pulp Duplicate Split Results - MnO% (n=106)



(Source: Mercator 2023)

Figure 11-23: 2021-2022 ALS Pulp Duplicate Split Results - Fe2O3 % (n=106)



(Source: Mercator 2023)

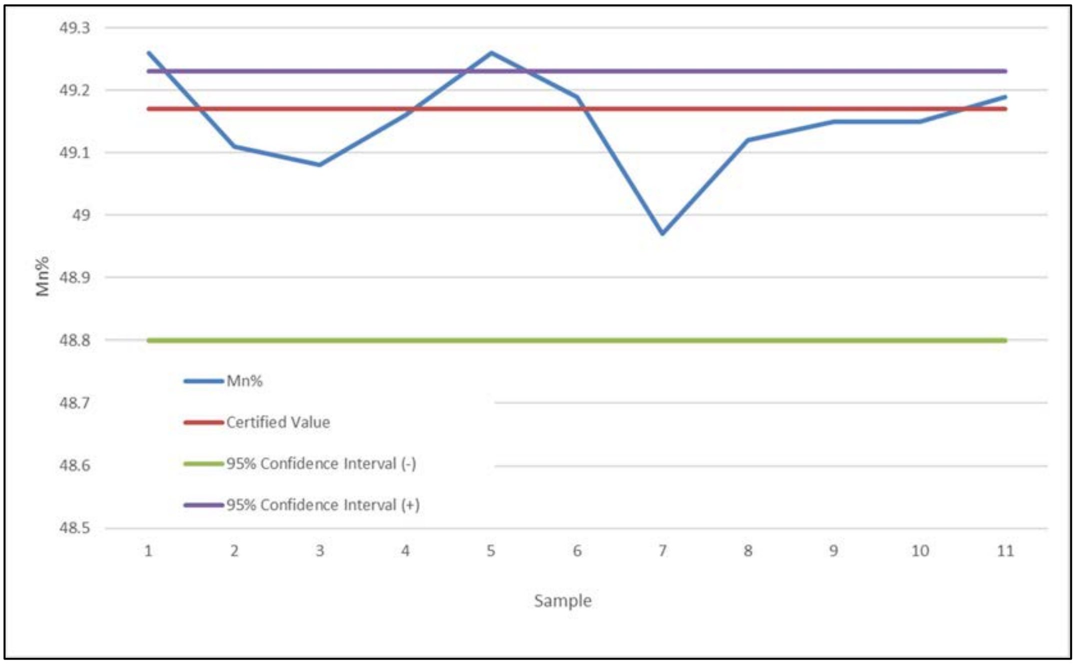
11.5.4 2022 North Hartford QAQC Results

The SARM-16 and OREAS 173 certified reference material used for the 2021-2022 drilling program by CMC were the only certified standards used for the 2022 North Hartford drilling program. A total of 11 analyses of the SARM-16 and 12 analyses of the OREAS 173 certified standard materials were returned for the 2021-2022 program and results for Mn and Fe are presented below in Figures 11-24 to 11-27.

Mn values for the SARM-16 dataset have a mean of 49.149% and all but two results fall within the 95% confidence limits for the material. The two exceptions fall within .09% of the upper 95% confidence interval limit. The SARM-16 Fe dataset has a mean value of 11.504% with minimum and maximum values of 11.43% and 11.575% respectively. One sample reported above the upper 95% confidence interval level. (Figures 11-24 & 11-25).

Mn values for the OREAS 173 dataset have a mean of 28.31% and all but one result falls within the 95% confidence limits for the material. The one outlier sample reported lower than the lower 95% confidence interval at 28.08% by 0.05%. The OREAS 173 Fe dataset has a mean value of 25.184% with minimum and maximum values of 25.05% and 25.32% respectively. Two samples reported below the lower 95% confidence interval level. (Figures 11-26 & 11-27).

Figure 11-24: SARM-16 Standard – 2022 North Hartford Program Mn (n=11)

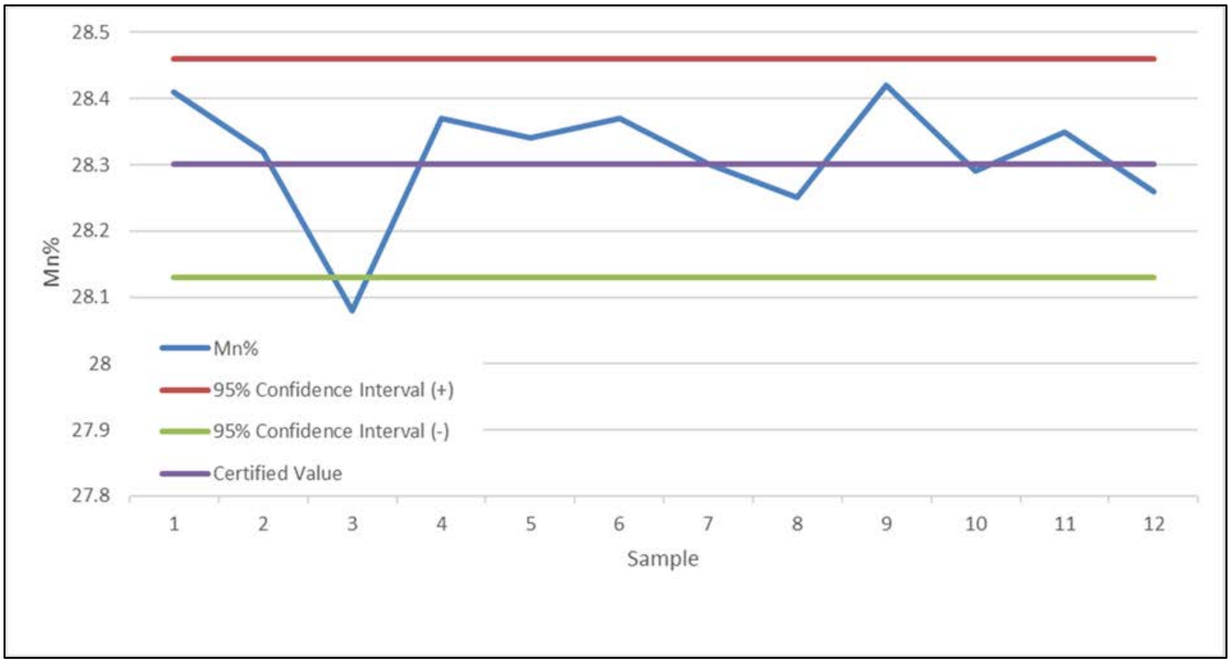


(Source: Mercator 2023)

Figure 11-25: SARM-16 Standard – 2022 North Hartford Program Fe (n=11)

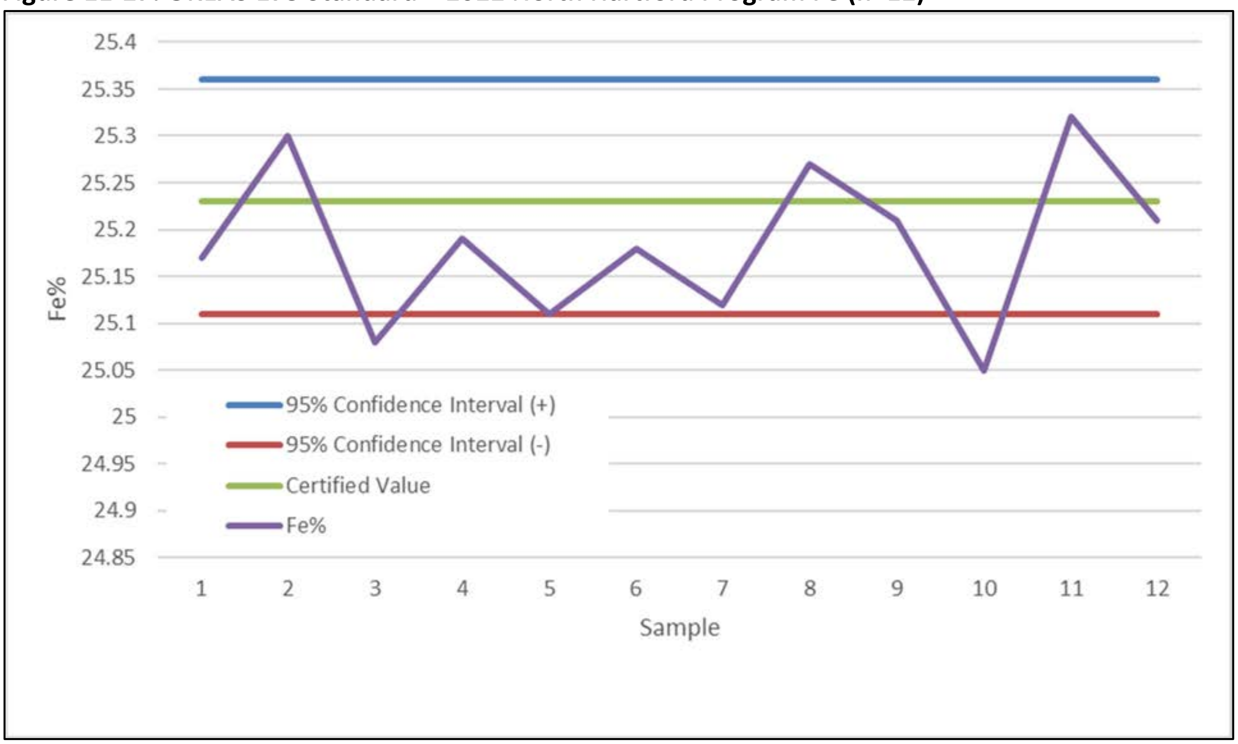
(Source: Mercator 2023)

Figure 11-26: OREAS 173 Standard – 2022 North Hartford Program Mn (n=12)



(Source: Mercator 2023)

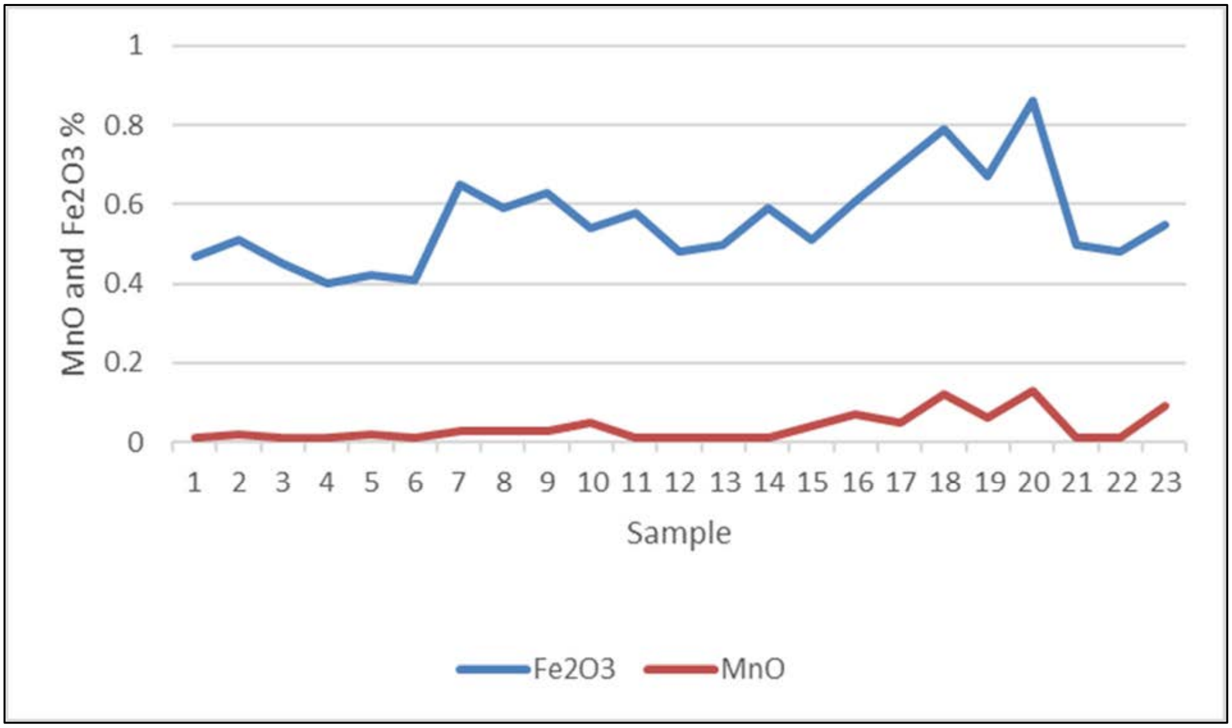
Figure 11-27: OREAS 173 Standard – 2022 North Hartford Program Fe (n=12)



(Source: Mercator 2023)

A total of 23 analyses of blank sample material were returned for the 2022 North Hartford program and results for MnO and Fe_2O_3 are presented below in Figure 11-28. The blank material consisted of the identical crushed high-purity quartzite having an average top size of ½ inch that was obtained from Atlantic Silica Inc., of Poodiac, New Brunswick. Figure 11.28 shows that all the 2022 North Hartford MnO results fall below the 0.2% level and that Fe_2O_3 values all fall below 0.9%. The average MnO value is 0.036% for this material and values range between 0.01% and 0.13%. Fe_2O_3 values average 0.56% and range between 0.4% and 0.86%.

Figure 11-28: Blank Sample Results – 2022 North Hartford Program MnO% & Fe2O3% (n=23)

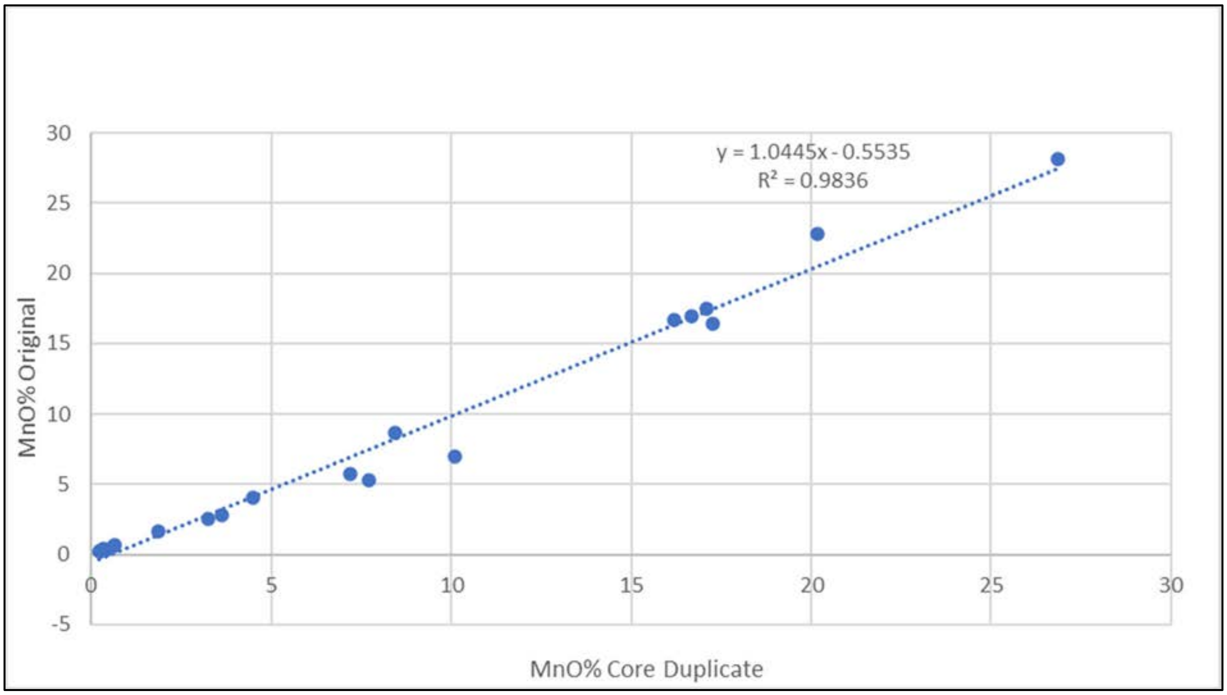


(Source: Mercator 2023)

During the 2022 North Hartford Program, CMC also prepared quarter (¼) core field duplicate samples at a nominal 1 in 20 frequency. The primary core sample was a ½ core sample with these ¼ core samples coming from the remaining half core in the archive being split. Both samples were prepared by ALS and analyzed according to the project protocol.

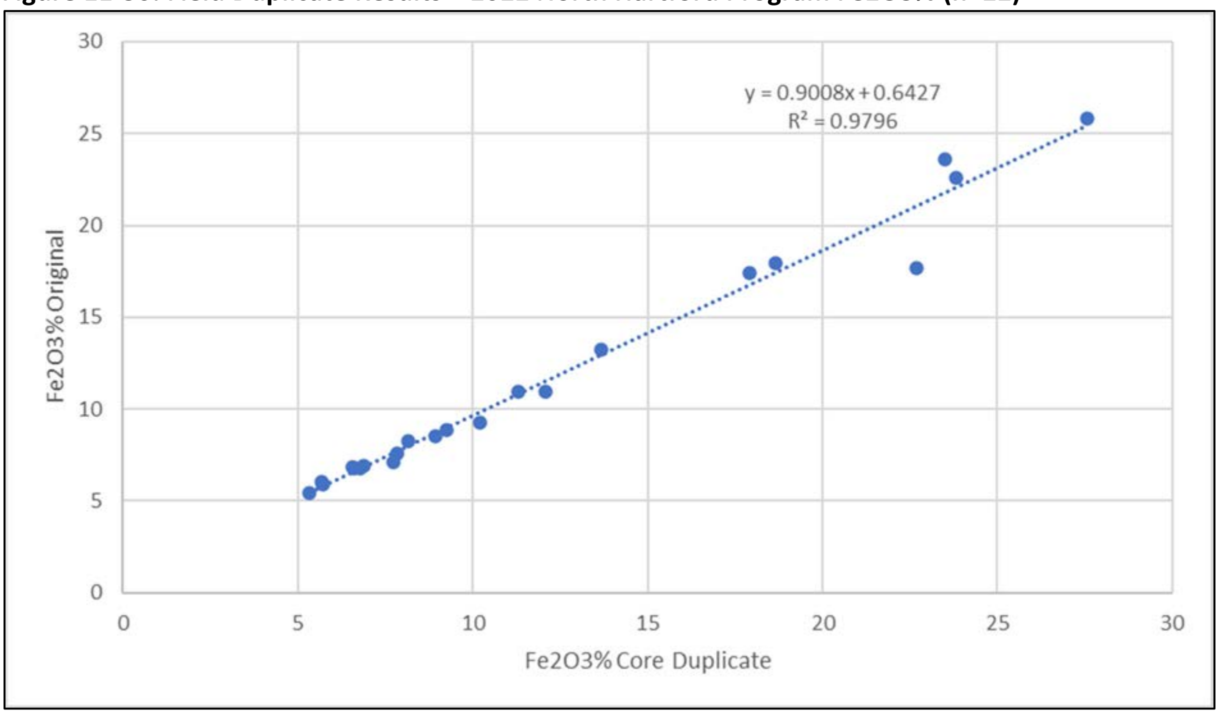
A total of 22 quarter core field duplicate samples were submitted for analysis and comparisons of MnO and Fe_2O_3 results for corresponding ¼ core splits are presented in Figures 11-29 and 11-30. The sample pairs correlate well along a 1:1 trend, with Fe_2O_3 having an R^2 value of 0.9796 and MnO having an R^2 value of 0.9836. This indicates that substantial homogeneity exists within the core samples at the level of the quarter core sub-sample. Good correlation is anticipated in such sedimentary deposits.

Figure 11-29: Field Duplicate Results – 2022 North Hartford Program MnO% (n=22)



(Source: Mercator 2023)

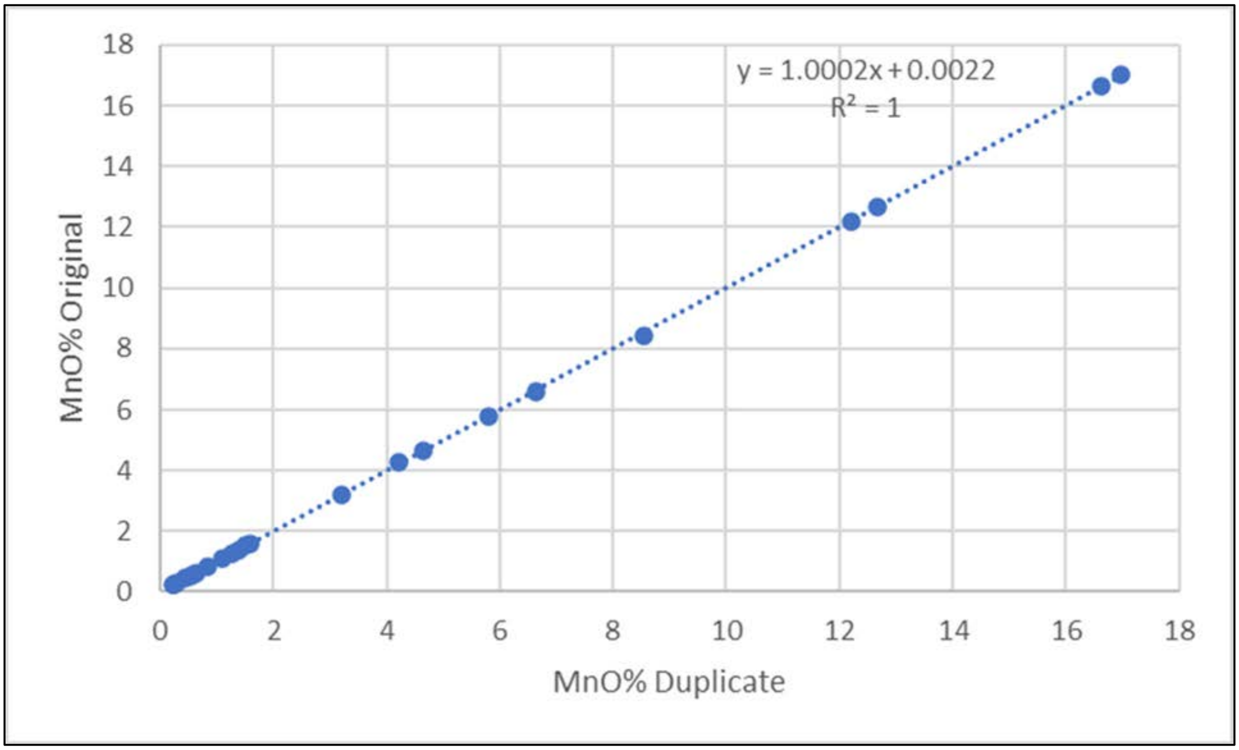
Figure 11-30: Field Duplicate Results – 2022 North Hartford Program Fe2O3% (n=22)



(Source: Mercator 2023)

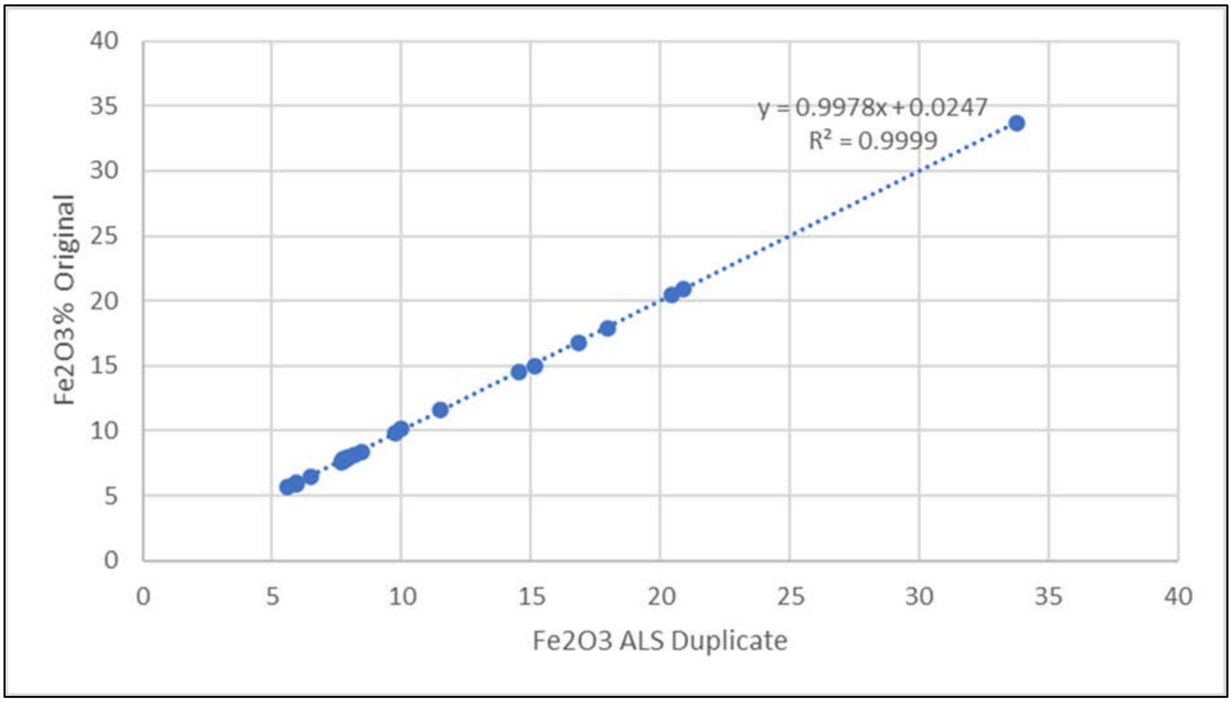
Duplicate sample pulp splits were prepared by ALS at a nominal 1 in 20 frequency during the 2021-2022 program. MnO and Fe_2O_3 results for a total of 23 duplicate pulp splits were reviewed by Mercator and are presented below in Figures 11-31 and 11-32. Duplicate split pairs correlate well along a 1:1 trend, with

Figure 11-31: 2022 North Hartford ALS Pulp Duplicate Split Results - MnO% (n=22)



(Source: Mercator 2023)

Figure 11-32: 2022 North Hartford ALS Pulp Duplicate Split Results - Fe2O3% (n=23)



(Source: Mercator 2023)

Fe_2O_3 having an R^2 value of 0.9999 and MnO having an R^2 value of 1. These results and associated trends are interpreted as indicating that the pulp splits are homogenous and that associated analyses reflect acceptable precision.

11.6 Opinion on Sample Preparation, QA/QC Protocols, and Analytical Methods

The QP is of the opinion that sample preparation, analysis and security methodologies employed during the 2011,2013 and 2021-2022 drilling programs by BMC-CMC are consistent with current CIM standards and best practice guidelines and are sufficient for this Project.

Review of QA/QC program results for the 2011 and 2013 drilling programs showed that the NOD-P-1 certified reference material used in 2011 was not well matched to the borate fusion-ICP-ES analytical method originally used and produced results that systematically show low bias. This was in part addressed by BMC having all of the 2011 ICP assayed samples re-analysed by ALS using their XRF method, and the XRF method was also used for the 2013 and 2021-2022 assay analyses. ALS's ME-XRF26s (borate fusion) procedure used during the 2021-2022 program was a modification from the ME-XRF06 used in prior drill programs due to an increase in crucible destruction as a result of elevated Mn values. Subsequent use of the SARM-16 certified reference standard produced better results, but in part included a slight high bias trend.

Notwithstanding the points noted above, accuracy of the associated datasets is considered to be adequate for current Mineral Resource estimation purposes. Use of the OREAS 173 certified reference standard produced acceptable results, but in part included a slight low bias trend. Similar to the SARM-16 results, accuracy of the OREAS 173 datasets is considered to be adequate for current Mineral Resource estimation purposes.

No substantive indications of sample cross-contamination are apparent in the blank sample data sets and good correlation between duplicate pulp split analyses indicates acceptable precision. Sample homogeneity at the ¼ core scale is indicated by results of the field ¼ core duplicate program. Independent laboratory check sample program results from the 2011 and 2013 programs show that the XRF analytical methods used by ALS and SGS produce highly comparable results.

Based on the above observations, the QP considers the 2011, 2013 and 2021-2022 drilling dataset to be of acceptable quality for use in Mineral Resource estimation programs. As previously identified in the 2021 Technical Report (Harrington et al., 2021), the QP recommends that consideration be given to development of at least three project-specific internal certified reference materials for use in future drilling or sampling programs. These should reflect the low, mid, and high levels of the Plymouth Deposit's grade spectrum and be prepared by an accredited independent laboratory or analytical services firm.

12.0 DATA VERIFICATION

12.1 Overview

Data verification procedures carried out by the QP for the Project consisted of two main components:

(1) Review of public record and internal source documents cited by previous operators and BMC-CMC with respect to key geological interpretations, previously identified geochemical or geophysical anomalies, and historical and current diamond drilling results that support the current MRE for the Project. The diamond drilling database was checked in detail, as described in Section 14.3.2, and determined to be acceptable for resource estimation use.

(2) Completion of multiple site visits to the Project between November 25, 2021, and March 31, 2022 and July 19 to August 1, 2022 by report author Kevin MacRae which included visual inspection of the Plymouth and North Hartford Deposits from the roadside and from historical trenching excavation locations. Details of site visit activities carried out by Mr. MacRae are presented in Section 2.3 of this Technical Report. No issues were identified that negatively impact the findings and conclusions of this Technical Report.

(3) Completion of multiple site visits to the Project by author Michael Cullen during the November 2021 through February 2023 period, the most recent being on February 8, 2023.

Mercator staff were responsible for data compilation, designing, and assisting BMC-CMC with the 2011 and 2013 drilling programs as well as implementing the 2021-2022 exploration program. In addition, Mercator staff were responsible for interpreting data sets for future exploration targeting using current industry standard practices and CIM Mineral Exploration Best Practice Guidelines. Report author Kevin MacRae supervised the 2021-2022 exploration activities on behalf of CMC and routinely completed data verification procedures throughout the entire process including review of QAQC procedures and results. Author Cullen provided overall Project supervision on behalf of Mercator.

12.2 Site Visits by Kevin MacRae, P. Geo.

12.2.1 Summary

Author MacRae completed multiple site visits to the Project between November 25, 2021, and March 31, 2022. The specific focus of the visits was to:

(1) Review historical drill core from BMC 2011 and 2013 program and log drill core from the 2021-2022 program carried out by CMC.
(2) Carry out drill collar coordinate checks for both historical and the 2021-2022 programs, and
(3) Visit representative bedrock exposures of Project area geological units and surrounding site infrastructure.

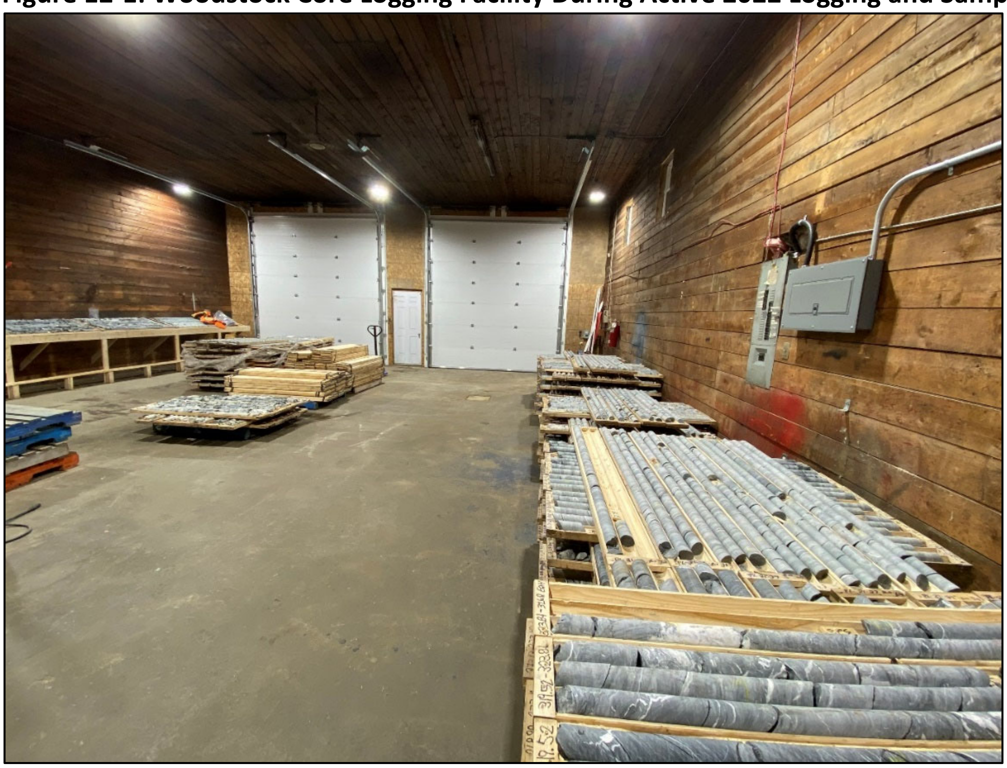
12.2.2 Plymouth Deposit

12.2.2.1 CMC Core Facility and Plymouth Site Features

The CMC core logging facility is within the town of Beardsley, located approximately 5 km to the south of the town of Woodstock, NB. The rented facility consists of a large metal and wood building containing both an office and cutting room. The facility contains logging tables as well as two core saws and general core logging supplies. The storage area is located in an adjacent building and contains palletized historical and recent drill core and palletized reject and pulp material. Access to the core facility and storage is secure after hours and remained undisturbed at the time of the site visits. (See Figures 12-1 & 12-2).

The Plymouth Deposit site is accessed by a paved road network and then by farm roads and brushed-out drill trails extending north and east to gain access to the drill sites (Figure 12-3 to 12-5). The property consists primarily of forested cover in its northern half and farmland in the southwest (Figures 12-4 & 12-5). There are historical excavations from work performed by MRR in 1987 (Trench 1 & 2) near the center of the property. These were visited and outcropping units of mineralized green and red non calcareous siltstone (Units 3 & 4) that are consistently seen in CMC drill core are readily apparent. This verifies the sequence of surface and drill core bedrock geology in this area of the property.

Figure 12-1: Woodstock Core Logging Facility During Active 2022 Logging and Sampling Operations.



(Source: Mercator 2023)

Figure 12-2: Woodstock Core Storage Facility for 2011, 2013 and 2021-2022 Drill Core.

(Source: Mercator 2023)

Figure 12-3: Maritime Diamond Drilling Ltd. Rig on Plymouth Drill Hole PL-22-033

(Source: Mercator 2023)

Figure 12-4: Plymouth Deposit Area Seen from Plymouth Road (Viewing East)

(Source: Mercator 2023)

Figure 12-5: Plymouth Deposit Area Access Trail to Northern Drill Pads (Viewing North).

(Source: Mercator 2023)

12.2.2.2 Core Review

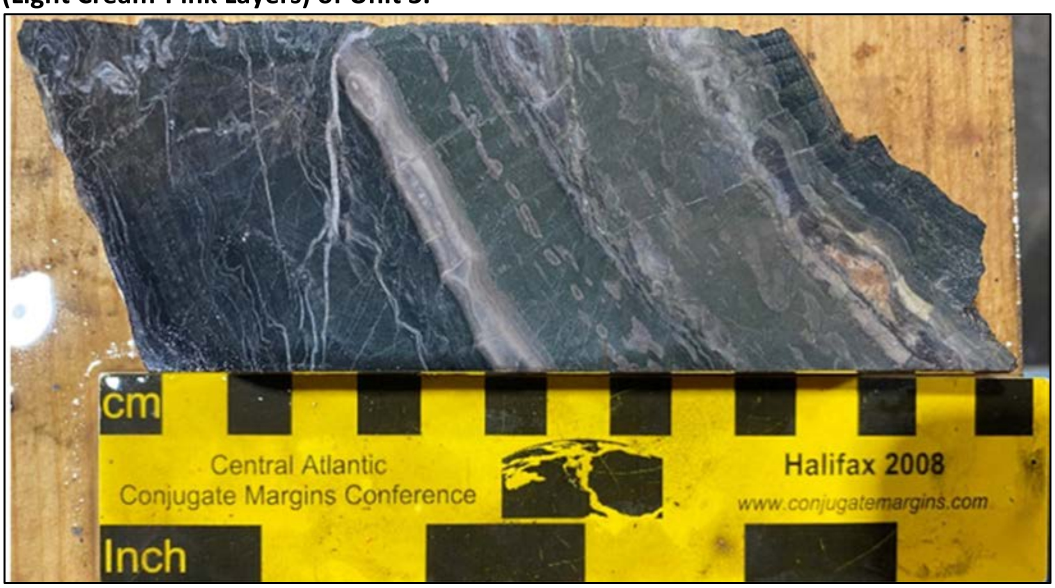
As part of the personal inspection, author MacRae examined a total of four BMC-CMC drill holes (PL-11-013, PL-13-014, PL-13-017, and PL-13-018) at the CMC Woodstock core storage facility and compiled a core reference library for future drilling programs (Figure 12-6). Drilling database lithocode entries, mineralization and sample record intervals were spot checked against the archived core and no substantial errors were identified. Sample tags and associated intervals represented in the core boxes matched digital records in all instances. Lithocodes were also found to consistently correlate with recognizable rock units. Importantly, clear identification of Mn-Fe ellipsoidal nodules and siltstone colour and their percentages was consistently apparent. Good correlation exists between BMC-CMC core records and database entries. As represented in the logs, core recovery was noted as being good to excellent and spot checked in the reviewed holes with intervals of wash away and poor core recovery clearly identified.

During the 2021-2022 CMC program, author MacRae also confirmed the presence of manganese and iron mineralization in drill core while completing logging operations as well as while reviewing historical logs at depths specified in BMC logs and verified various lithological descriptions in logs against corresponding core intervals (Figure 12-7). Observations of the mineralized intervals from the Property include mineralization associated with mineralized intervals of green and red siltstones of the Lower Smyna Mills Fm. (Units 3 &4), Mn-Fe carbonate rhodochrosite nodules and observations of hematite, specularite, magnetite and siderite.

Figure 12-6: PL-13-014 Drill Core Laid Out for Inspection by Author MacRae Displaying :ithology Units 4 and 3 up to 205.4 m, Transitioning to Unit 2 Thereafter.

(Source: Mercator 2023)

Figure 12-7: CMC 2022 Drill Core Displaying Mn Carbonate Mineralization (Rhodochrosite) Layering (Light Cream-Pink Layers) of Unit 3.



(Source: Mercator 2023)

Due to the extensive core sample QA/QC program implemented by CMC and managed by Mercator, which includes systematic analysis of check samples at an Independent, accredited laboratory other than the primary accredited laboratory used for core sample analysis, author MacRae did not include collection and analysis of additional core check samples for site visit purposes.

12.2.2.3 Verification of Historical Drill Hole Collar Coordinates

Mercator also completed a limited field check on drill collar coordinates. This was done by recording field locations for six historical drill holes using a Garmin GPS Map64s hand-held GPS unit and comparing their UTM coordinates with their corresponding drilling database entries (Figure 12-8). Results of the drill collar field check program are detailed below in Table 12-1. These are additional to those previously checked by Mercator. Drillholes were assessed and coordination checks against database records showed that easting, northing, and elevation values collected in the field have a variation of only a few metres in easting and northing. One check elevation reading for drill hole PL-13-025 exhibited a variance of 40 m in elevation and appears to be a pickup error as adjacent sites from 2021, (48 & 48A), show elevations in the range of the database record.

Mercator staff were responsible for staking proposed hole IDs for the 2021-2022 program and comparing their UTM coordinates with the corresponding collar pickup entries from an independent certified land surveyor taken at program completion. The QP considers that field collar location data are comparable with database records and provide reasonable verification of drill collar locations. Drilling site inspections carried out by the QP during the site visits also showed that care had been applied to minimize surface disturbances. Little evidence of refuse and no excessive rutting or unnecessary forest cutting were noted.

Table 12-1: Mercator Drill Collar Coordinate Checking Program Results

Hole ID	*Easting (m)	*Northing (m)	*Elevation (m)	*Check Easting (m)	*Check Northing (m)	*Check Elevation (m)
PL-13-025	603282.1	5113439	123.1476	603281	5113442	83
PL-13-019	603467.9	5113699	108.8249	603466	5113702	112
PL-13-012	603494.4	5113573	108.5495	603493	5113574	109
PL-11-008	603432.2	5113498	119.0547	603427	5113508	116
PL-11-007	603471.3	5113472	117.6964	603470	5113468	122
PL-11-006	603513.5	5113443	117.9492	603515	5113445	120

**Note: NAD 83 Zone 19 North coordinates and sea level elevation datum*

Figure 12-8: Labelled Drill Hole Casing for BMC Drill Hole PL-13-012

(Source: Mercator 2023)

12.2.3 North Hartford Site Visit

12.2.3.1 Introduction

Author MacRae completed multiple site visits to the North Hartford Project between July 15 and August 1, 2022 with the focus on program planning & implementation, review of drill core from the 2022 drill program and to visit representative bedrock exposures of Project area geological units and surrounding site infrastructure.

12.2.3.2 Material Sampling Validation

The North Hartford Project lies 2.2 km to the northeast of the Plymouth site along highway 550. The site is comprised of rolling farmland with lesser amounts of forested sections and locally residential. The Project site consists of farm roads in fair to good condition to gain access to the drill sites (Figure 12-9). The one item noted by the QP was that no water source exists on the property that would reliably support a 24-hour drilling program. The 2022 program utilized a trucking and storage means of getting water to site (Figure 12-10). Due to the nature of the land use, all historical casings have been removed. (Figure 12-11). There are local outcrops and tilled fragments of red and green siltstone observed in the fields, verifying the sequence of bedrock geology on the property seen in drill core (Figure 12-12).

Figure 12-9: North Hartford Project Area (Viewing Northeast)

(Source: Mercator 2023)

Figure 12-10: Water Truck and Storage System to Support 2022 North Hartford Program

(Source: Mercator 2023)

Figure 12-11: Drill Hole HF-22-02 Collar Location with Casing Removed (Viewing East)

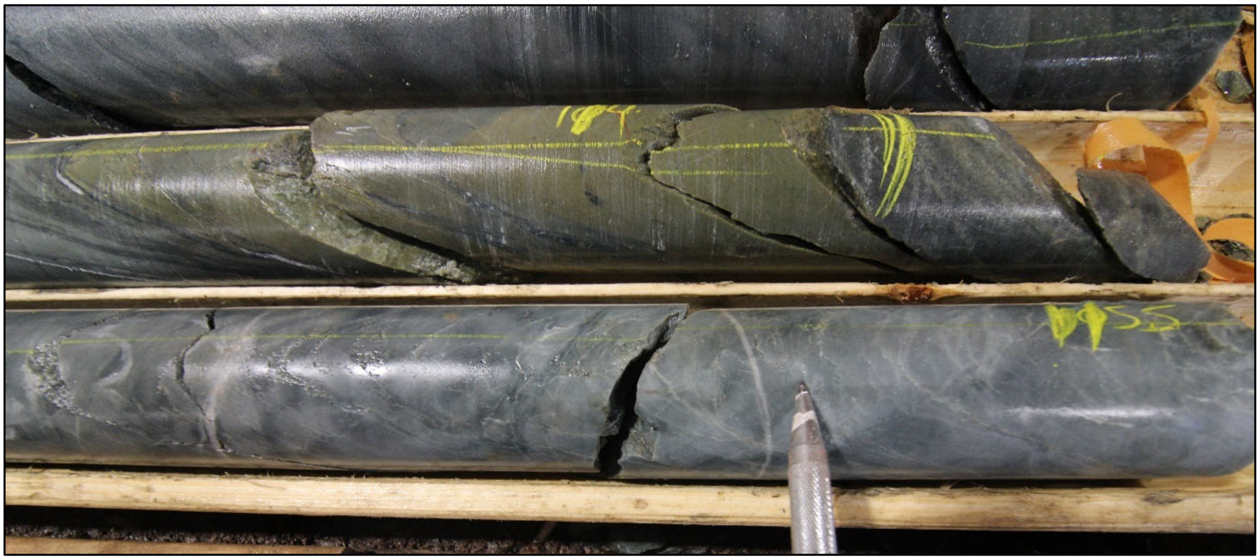
(Source: Mercator 2023)

During the 2022 CMC North Hartford program, Mr. MacRae confirmed the presence of manganese and iron mineralization in drill core, historically documented in the Hartford area, while completing logging operations (Figure 12-12). Observations of the mineralized intervals from the Property include mineralization associated with interbedded mineralized intervals of green and red siltstones of the Lower Smyrna Mills Fm. (Units 3 & 4), Mn-Fe carbonate rhodochrosite nodules and observations of hematite, specularite, magnetite and siderite. The 2022 program also resulted in observations of a cherty brown to grey siltstone layer not observed during the previous programs at Plymouth (Figure 12-13). Currently, the QP interprets the interval to represent the stratigraphically above, Upper Member of the Smyrna Mills Fm. As historical casings were removed, no collar coordinate checks were available at the Project.

Figure 12-12: HF-22-01 Drill Core Laid Out for Inspection by Author MacRae Displaying Interbedded Mineralized Units 4 and 3

(Source: Mercator 2023)

Figure 12-13: HF-22-04 Drill Core (108.3 m – 118.3 m) Displaying Grey-Brown Cherty/Silicified Unit Interpreted as Upper Member of the Smyrna Mills Fm.



(Source: Mercator 2023)

12.2.1 Site Visits By Michael Cullen, P. Geo.

Author Cullen completed multiple site visits to the Project during the November 2021 through February 2023 period, the most recent being on February 8, 2023. These were carried out to assist with setup and management of the 2021-2022 and 2023 drilling programs, provide review and assessment of technical and site safety practices and protocols, and to fulfil Project site inspection requirements as defined under NI 43-101. Reviews of drill core and associated logging records, sampling records and site conditions were routinely completed during the visits and discussions were undertaken with site staff with respect to geological, technical, and logistical aspects of the field programs. Two meetings with local landowners were also attended. Due to the extensive core sample QA/QC program implemented by CMC and managed by Mercator, which includes systematic analysis of check samples at an Independent, accredited laboratory other than the primary accredited laboratory used for core sample analysis, author Cullen did not include collection and analysis of additional core check samples for site visit purposes.

The most recent site visit by author Cullen was focused on a brief review of core from North Hartford holes HF-2022-02 and HF-2022-03 and assessment of site conditions at North Hartford for drilling equipment access. A brief site assessment was also completed at the Plymouth site where drilling had been carried out in 2022. Remediated drill sites at both locations were variably snow covered at the time, which restricted close inspection of surface disturbance, but no obvious conditions warranting follow up were noted.

Results of site visit inspections carried out by author Cullen are consistent with the more detailed undertakings of this kind carried out by author MacRae.

12.3 Review of Supporting Documents, Databases, and Assessment Reports

As mentioned above, the QP also obtained copies of relevant historical assessment work reports as part of the data validation procedures. Additional documents such as previous NI 43-101 Technical Reports summarising drilling program results were also reviewed. Key aspects of this historical reporting are in part referenced in this Technical Report and were obtained through online searching of historic assessment reports available through the provincial government online report database and previous Technical Reporting. Results of the reference documentation checking program showed that in all instances considered, digital and hard copy records accurately reflect content of referenced source documents. Source documents were acquired either directly from CMC or from publicly accessible New Brunswick government assessment report sources.

The QP also validated project drilling and sampling database entries for 1985, 1987, 2011, 2013 and 2021-2022 drilling and trenching campaigns at Plymouth to support the current Mineral Resource estimation program. This included systematic checking of database entries against source documents, with correction of deficiencies where necessary. Checking of database content consisted of collar coordination checks for all drill holes against source records, spot checks of core sample record entries and checking of assay results entries against source laboratory reports and certificates. In addition to these manually coordinated checks, routine digital assessment of drill hole datasets for issues such as end of hole errors, conflicting sample records, survey record errors, etc., were carried out using scripts run within the GEOVIA Surpac® modeling software. No substantive issues were identified from checking activities. Approximately 80 percent of the database entries were checked against source records.

12.4 Opinion on Data Verification

The QP is of the opinion that results from the site visits and data validation program components discussed above indicate that industry standard levels of technical documentation and detail are evident in the recent 2011,2013 and 2021-2022 and 2023 drilling results for the Project and also in selected data sets from 1985 and 1987 programs. In addition, the QP is of the opinion that the associated, validated drilling digital database is acceptable for Mineral Resource estimation use.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

The information presented in this report section was previously disclosed in the Technical Report (Harrington et al., 2021) filed on SEDAR by CMC to support the 2021 MRE. No additional mineral processing or metallurgical testing programs have been carried out since that time, but CMC recognizes that additional work on these fronts is required. To that end, it is planning to pursue further assessments in the near future to move the Project forward and has retained the services of Metal Strategies Inc. of West Chester, Pennsylvania, USA to address this requirement.

The QP has included below all Section 13 content from Harrington et al. (2021) Technical Report without change, since it documents important conclusions and concepts that bear on assessment by the QP of Reasonable Prospects for Eventual Economic Extraction with respect to the current MRE documented in Section 14 of this Technical Report. The Section 13 text from Harrington et al. (2021) was originally developed by D. Thibault, P. Eng., of Thibault and Associates Ltd., and the current QP takes responsibility for inclusion of this text in this Technical Report.

13.2 Background to Current Programs

The acquisition of this property was largely driven by BMC's review of past metallurgical test work completed in 1987 by Witteck and funded by the Canada New Brunswick Mineral Development Agreement. Witteck evaluated 10 processing techniques designed to produce electrolytic manganese metal or high purity manganese precipitate, of which they identified two with positive operating margins that may have been potentially economic in 1987. The information was reviewed by BMC who engaged Wardrop in August 2010 to review and update the two processes with positive operating margins presented by Witteck, using current cost and market data. Following this evaluation, Wardrop concluded that under then-current market conditions and given larger tonnage through-puts, both Witteck flowsheets were feasible and that with newer and more robust flowsheet options, improved process recoveries and concentrate grades could be expected (Moore, 2011).

BMC subsequently engaged the metallurgical consulting firm Thibault in 2011 to conduct bench scale hydrometallurgical tests to confirm and optimize the process for leaching manganese from typical Plymouth Deposit mineralization. Details of the metallurgical test work carried out by Thibault for CMC are reported below in Sections 13.3.1 through 13.3.15.

13.3 Thibault Test Programs

13.3.1 Introduction

Since 2011, several phases of process development test programs have been completed. Bench scale metallurgical and hydrometallurgical test programs were conducted by Thibault from 2011 to 2015 using core samples obtained from the 2011 drilling of the Plymouth Deposit. The bench scale testing and process development program was based on the development of process technology to produce high purity EMM. Blending of the core samples was defined by CMC to represent typical processing feedstocks relative to run-of-mine ore characteristics.

Testing and an assessment of alternative technologies relative to the characterization of the core samples, indicated that direct sulphuric acid leaching of the feedstock and subsequent solution purification unit operations can produce a high purity manganese sulphate to produce high purity manganese chemicals and metal. To improve on hydrometallurgical operations, metallurgical unit operations were developed to remove acid consuming minerals prior to leaching unit operations.

Conceptual design of a fully integrated flowsheet to include metallurgical and hydrometallurgical operating was defined for the treatment of the various types of feedstocks at the Woodstock property. A technical and economic assessment of EMM production was completed and reported in the NI 43-101 PEA Technical Report prepared by Tetra Tech for CMC dated July 10, 2014.

Subsequent to the 2014 PEA, CMC shifted focus from evaluating the production of EMM to evaluating the production of MSM and HPMSM products to address battery market opportunities. Process development studies and initial bench scale studies were completed from 2014 to 2015 to assess alternative process technologies to produce high purity MSM from solution phase manganese sulphate used to produce EMM. Optimization or intensification of MSM processing technology (including solution purification and crystallization unit operations for battery grade end use) was not conducted and is the subject of future development programs.

Since 2011, several phases of process development test programs have been completed and the key results are summarized in the following sections. Measures to optimize on the process technology for MSM and/or EMM production are in progress based on the work completed to date.

13.3.2 Mineralogy

Crushed drill core samples for all five of the 2011 Plymouth deposit drillholes (PL-11-006, PL-11-007, PL-11-008, PL-11-009, PL-11-010) were delivered to Thibault in bags containing approximately 3.0 m of core each. To represent the general properties of the Plymouth Deposit, a weighted average bulk composite sample of all five drillholes, containing a total of seven mineralized intersections as defined by CMC, was split from these core samples and blended accordingly. This sample is referred to as the “bulk” composite sample.

The Plymouth Deposit is hosted within bands of brick-red siltstone and green-grey siltstone, which imparts a distinct color characteristic to the drill core samples. Based on the results of historical metallurgical testing, it was suggested that the brick-red siltstone and green-grey siltstone hosted samples may differ in mineralogy with respect to the types of manganese and iron minerals present. Therefore, drill core samples within the mineralized intersections were categorized by CMC according to this color characteristic and two additional weighted average composite samples were split and blended to generate a brick-red siltstone hosted composite sample, referred to as the "red" sample and a green-grey siltstone hosted composite sample, referred to as the "grey" sample. Along with the bulk composite sample, the red and grey composite samples were tested to assess the variability of certain process parameters with respect to these sections of the Plymouth deposit. Weighted average composite samples of the mineralized intersections were also blended for each individual drillhole.

Thibault sub-contracted SGS in Lakefield, Ontario to perform Semi-Quantitative X-Ray Diffraction (XRD) analysis on the 2011 drill core samples. The work was conducted to determine the major and minor mineral phases that occur in the deposit and, furthermore, to quantitatively determine the relative amount of manganese and iron present in the Plymouth deposit in their respective mineral forms (i.e. carbonate, oxide and silicate forms). Both manganese and iron mineralogy has a direct impact on the development of a process flowsheet for the Plymouth Deposit.

According to the results of the XRD scan, quartz, rhodochrosite, chlorite, plagioclase, and hematite were present in moderate amounts (i.e. 10 to 30 wt%) in the bulk composite sample. Rhodochrosite ($MnCO_3$) was the only manganese mineral detected by the scan and was present at a grade of 20.5 wt% rhodochrosite (9.8 wt% manganese) in the bulk composite sample. It is possible that trace amounts of other manganese species (i.e. manganese oxides) were not detected in the XRD scan because they are either not crystalline or are present as solid solutions. Manganese assayed as rhodochrosite by XRD represents approximately 90% of the manganese was defined by Inductively Coupled Plasma – Optical Emission Spectroscopy (ICP-OES).

Iron was also reported as having a strong presence in all composite samples and was found to be present in both oxide form (hematite, magnetite, ilmenite) and as a carbonate (siderite). Oxide forms of iron minerals were generally dominant in the "red" composite sample, which contained 16.4 wt% hematite while the grey composite sample contained only 3.6 wt% hematite. Siderite, on the other hand, was determined to be the dominant iron species in the grey composite sample at 9.5 wt% siderite versus 2.3 wt% siderite in the red composite sample. The bulk composite sample contained 10.4 wt% hematite and 6.0 wt% siderite.

The most prominent mineral species in the grey composite sample were reported as quartz, rhodochrosite, chlorite, and plagioclase. Rhodochrosite was the only manganese species detected at 22.3 wt% rhodochrosite (10.7 wt% manganese).

Quartz, rhodochrosite, plagioclase, and hematite were all found to be present in moderate amounts in the red composite sample. Rhodochrosite was found to be present at 19.3 wt% rhodochrosite (9.2 wt% manganese).

Overall, the XRD results indicated that the Plymouth Deposit consists largely of silica-based compounds, quartz and mica, rhodochrosite, and iron. Table 13-1 gives the results of the semi-quantitative XRD scan of the bulk, red and grey 2011 drill core composite samples.

Table 13-1: XRD Mineralogy Results for 2011 Woodstock Manganese Deposit Drill Core Composite Samples

Mineral	Chemical Formula	Bulk Composite (wt%)	Grey Composite (wt%)	Red Composite (wt%)
Quartz	SiO_2	15.1	13.4	16.9
Rhodochrosite	$MnCO_3$	20.5	22.3	19.3
Albite	$Na[AlSi_3O_8]$	11.4	12.8	11.0
Orthoclase	$KAl_2[AlSi_3O_8]$	3.7	3.1	4.1
Muscovite	$KAl_2AlSi_3O_{10}[F,OH]_2$	8.5	9.6	9.6
Rectorite	$(Na,Ca)Al_4(Si,Al)_8O_{20}(OH)_4{\cdot}2H_2O$	3.0	-	6.8
Clinochlore	$(Mg_5Al)(AlSi_3)O_{10}(OH)_8$	11.9	14.7	7.0
Hydroxylapatite	$Ca_5(PO_4)_3(OH)$	2.8	2.6	3.3
Dolomite	$CaMg(CO_3)_2$	2.1	2.4	1.3
Hematite	Fe_2O_3	10.4	3.6	16.4
Siderite	$FeCO_3$	6.0	9.5	2.3
Magnetite	Fe_3O_4	3.6	3.5	1.9
Ilmenite	$FeTiO_3$	0.9	2.4	-

13.3.3 Bond Work Index

The Bond Work Index for samples of quartered drill core selected by CMC as being representative of a typical of brick-red siltstone hosted mineralized material (i.e. the red sample) and green-grey siltstone hosted mineralized material (i.e. the grey sample) was measured by SGS.

For the red sample, the Bond Rod Mill Grindability Index was reported as 16.8 kWh/t and the Bond Ball Mill Grindability Index was reported as 22.0 kWh/t. For the grey sample, the Bond Rod Mill Grindability Index was reported as 17.1 kWh/t and the Bond Ball Mill Grindability Index was reported as 20.9 kWh/t.

13.3.4 Metallurgical Test Program Assays

Over the course of developing a process flowsheet to produce EMM (completed in phases spanning from October 2011 to March 2014) elemental analysis of the bulk, red and grey test program composite head samples was tested several times and the results demonstrate excellent reproducibility. The Mineral Engineering Center (MEC) at Dalhousie University performed most of the analytical work for the metallurgical test programs using ICP-OES analytical methods. A standardized manganese sample (Brammer Standard DH 4303) was scanned with each solid sample set to support the accuracy of the results. Quality assurance and confidence in MEC assay results for head grade analysis of the bulk, red and grey composite samples were verified by ALS Canada Limited (ALS), who performed the analysis of drill core samples from the 2011 drill program, using both ICP-OES and X-Ray Fluorescence (XRF) analytical methods.

Table 13-2, Table 13-3 and Table 13-4 give the elemental composition of the bulk, red and grey test program samples, respectively, as determined by MEC using ICP-OES following size reduction of the samples to approximately 80% passing 75 µm (hydrometallurgical test program feed particle size specification).

Table 13-2: Assay Results for Bulk Composite Sample Following Size Reduction to P80 <75 µm

Parameter	Assay Result (g/t)			
	Bulk Composite Head Sample			
	Oct. 25, 2011 Screened to -74 µm	Nov. 11, 2011 Screened to -74 µm	Feb. 24, 2012 Ground to P_{80} of 62 µm	Feb. 20, 2013 Ground to P_{80} of 67 µm
Al	56,447	52,435	48,519	47,702
As	75	69	64	73
Ba	1,226	1,162	1,022	1,039
Be	2	2	2	2
Bi	11	7	<5	11
Ca	17,194	17,031	18,399	18,026
Ce	60	65	64	59
Co	116	121	117	125
Cr	128	74	67	57
Cu	88	93	57	74
Fe	139,961	140,288	144,973	148,814
Ga	27	25	36	26
K	13,794	13,441	12,691	12,176
La	25	25	26	26
Li	21	17	33	47
Mg	16,667	15,347	15,047	14,935
Mn	96,229	106,920	109,492	107,442
Na	9,067	8,344	8,611	8,441
Ni	61	61	54	59
P	4,038	3,840	4,788	4,344
Pb	48	88	96	264
Se	<100	<100	<100	<50
Sr	364	334	356	371
Ta	<50	<50	56	<25
Ti	2,491	2,409	2,210	2,164
V	65	70	64	61
Zn	94	96	91	135
Zr	74	67	58	63

Table 13-3: Assay Results for Red Composite Sample Following Size Reduction to P80 < 75 Micron

Parameter	Assay Result (g/t)			
	Red Composite Head Sample			
	Nov. 7, 2011 Screened to -74 µm	July 12, 2013 Screened to -74 µm	Nov. 20, 2013 Ground to P_{80} of 73 µm	Nov. 20, 2013 Ground to P_{80} of 25 µm
Al	45,436	48,836	41,100	41,392
As	93	90	88	80
Ba	1,572	1,638	1,676	1,575
Be	2	2	2	2
Bi	<5	<5	6	6
Ca	21,763	19,027	17,653	16,783
Ce	60	56	53	50
Co	115	123	124	117
Cr	73	69	62	58
Cu	79	101	38	35
Fe	151,419	159,792	157,257	148,871
Ga	26	11	22	18
K	15,261	15,421	14,842	13,854
La	25	27	22	21
Li	9	40	33	32
Mg	12,930	12,429	12,063	11,275
Mn	105,381	105,393	103,034	97,637
Na	9,880	10,429	9,363	8,690
Ni	59	84	61	57
P	4,786	4,309	4,506	4,299
Pb	102	48	66	66
Se	<100	<50	<50	<50
Sr	436	489	514	483
Ta	<50	41	<25	<25
Ti	2,313	2,322	2,160	2,041
V	55	55	54	51
Zn	89	102	78	74
Zr	83	88	64	61

Table 13-4: Assay Results for Grey Composite Sample Following Size Reduction to P80 < 75 Micron

Parameter	Assay Result (g/t)			
	Grey Composite Head Sample			
	Nov. 7, 2011 Screened to -74 µm	July 12, 2013 Screened to -74 µm	Nov. 20, 2013 Ground to P_{80} of 70 µm	Nov. 20, 2013 Ground to P_{80} of 27 µm
Al	41,950	45,050	45,009	43,968
As	56	56	65	58
Ba	623	645	726	589
Be	2	2	2	2
Bi	15	<5	6	6
Ca	21,151	18,786	18,259	17,814
Ce	62	49	57	57
Co	114	119	131	128
Cr	78	59	74	71
Cu	89	91	50	47
Fe	153,132	161,219	151,539	130,640
Ga	21	<10	20	<50
K	8,286	8,524	8,798	8,530
La	25	27	23	23
Li	12	52	48	48
Mg	15,411	14,780	15,197	14,705
Mn	104,274	108,962	107,505	107,307
Na	7,624	8,276	7,205	7,029
Ni	51	55	67	61
P	4,823	4,468	4,745	4,708
Pb	108	46	86	79
Se	<100	<50	<50	<50
Sr	245	278	300	291
Ta	<50	42	<25	<25
Ti	2,086	2,071	2,076	1,993
V	60	59	60	59
Zn	91	71	83	79
Zr	75	80	62	60

The range of manganese and iron head assays for the bulk, red and grey composite samples following size reduction are listed in Table 13-5 and are representative of the average life-of-project head grades to the processing plant referenced in the 2014 PEA, based on the proposed mine production schedule, with a 3,000 t/d processing scenario at 9.86% manganese and 14.20% iron or 1,500 t/d processing at 10.11% manganese and 14.45% iron grades.

Table 13-5: Summary of Manganese and Iron Head Assays for Metallurgical Test Program Composite Samples

Metallurgical Test Program Samples	Mn Assay (wt%)	Fe Assay (wt%)
Bulk Composite (2011 Drill Core) Following Size Reduction	9.62 to 10.95	14.00 to 14.88
Red Composite (2011 Drill Core) Following Size Reduction	9.76 to 10.54	14.89 to 15.98
Grey Composite (2011 Drill Core) Following Size Reduction	10.43 to 10.90	13.06 to 16.12

13.3.5 Hydromet Testing (Fall 2011-Spring 2012)

A scoping-level bench scale test program was initiated in October of 2011 to explore options for hydrometallurgical extraction (leaching) of manganese from the samples and to quantify a preliminary leach extraction efficiency for manganese from the 2011 drill core composite samples. Approximately 65 leach tests were completed under varying conditions of reagent type, reagent addition rate, leach time, leach temperature, slurry density and solid particle size.

Since the majority of the manganese present in the 2011 drill core composite samples was determined by XRD analysis to be present in the form of a carbonate, it was concluded that sulphuric acid alone would be capable of producing high manganese extraction rates.

Sulphuric acid (H_2SO_4) at various concentrations was used to extract manganese from the bulk samples. At an initial acid concentration of 50 g/L, 10 wt% pulp density and leach temperature of 85°C, the extraction of manganese was found to be 86.9 wt% allowing a 4 hour leach residence time for the bulk composite sample. Under the same conditions, the extraction of manganese from the red composite sample was 89.2 wt%, whereas the extraction of manganese from the grey composite sample was 97.7 wt%. With increasing initial acid concentration, manganese extraction from all samples was observed to reach a plateau at a concentration of approximately 50 g/L sulphuric acid, while the extraction of iron continued to increase linearly with increasing acid concentration.

Kinetic sulphuric acid leach tests were performed at initial acid concentrations of 50 g/L and 100 g/L. At the higher initial acid concentration, manganese extraction efficiency was found to plateau after approximately two hours, and at the lower initial acid concentration the same effect was observed after approximately three to four hours, indicating that acid concentration has a significant effect on the leach kinetics. Moreover, a preliminary review of the leach test results indicated that acid concentration is the most significant factor affecting the hydrometallurgical extraction of manganese from the Plymouth deposit drill core samples.

Subsequent leaches were performed at a controlled pH of 1.0 by addition of sulphuric acid to the slurry on a semi-continuous basis throughout the duration of the test. The semi-continuous addition of sulphuric acid to the leach over time was more representative of a continuous leach process as it would normally be conducted in a full-scale hydrometallurgical plant setting. At a controlled pH of 1.0, under the same leach conditions described above, the extraction of manganese was 94.1 wt% for the bulk composite sample and 98.0 wt% and 99.1 wt% respectively for the red and grey composite samples.

Further testing on the bulk composite sample was performed under controlled conditions, such that the pH was maintained throughout the tests at pH 3.0, 4.0, 5.0, and 6.0 by semi-continuous addition of sulphuric acid. Manganese extraction after six hours reached a maximum of 56.1 wt% at a pH of 3.0 and extraction was observed to decrease with increasing slurry pH, with negligible extraction of manganese being observed at pH 6.0. Co-extraction of iron was also found to decrease with increasing pH, with no co-extraction of iron being observed at slurry pH greater than 4.0. Further testing to determine if extending the leach residence time beyond six hours could improve on manganese extraction at elevated pH was conducted; however, the leach extraction was found to reach a plateau after approximately eight hours in all tests.

Acid leaching tests were also performed at varying temperatures and leach reaction times, using an initial acid concentration of 100 g/L sulphuric acid. At the conditions tested, only a small increase in manganese extraction was observed between 60°C and 85°C and both reactions reached a plateau for manganese extraction within two hours. Leach reactions performed at ambient temperature demonstrated a significant reduction in manganese extraction relative to those performed at 60°C and above.

The leachability of varying crushed ore particle size fractions was also evaluated to determine the significance of grinding prior to the leach stage. A manganese extraction of 92.6 wt% was observed for the finest particle size fraction (- 75 µm), with leach extraction decreasing to 73.1 wt% for the largest particle size fraction tested (+1.0 mm/-2.0 mm), indicating that grinding of the ore will be required prior to leaching.

13.3.6 Pre-concentration Testing (Fall 2012-Spring 2013)

In the Fall of 2012, scoping-level bench scale test programs were completed to assess the amenability of the 2011 drill core samples to pre-concentration (or upgrading) by means of High Gradient Separation (HGMS), heavy media separation (HMS) and open cell flotation. The objectives for pre-concentration were threefold:

(1) to upgrade the manganese content of the run-of-mine mineralized material;
(2) to selectively reject acid-consuming gangue minerals to reduce the consumption of sulphuric acid in the leaching section of the hydrometallurgical process for production of EMM, and;
(3) to reject bulk gangue minerals to reduce the tonnage of solids to be processed through the hydrometallurgical circuit.

The results of preliminary bench scale testing for pre-concentration of the 2011 drill core composite samples are discussed in the proceeding sections.

13.3.7 High Gradient Magnetic Separation Testing

Initial testing of HGMS testing was completed by SGS on a 5 kg sub-sample of the 2011 drill core bulk composite sample, ground to a P_{80} of 84 µm (particle size distribution determined by SGS using a Malvern Mastersizer 2000). Whole rock analysis using lithium borate fusion method with elemental analysis by XRF of the sample by SGS resulted in an average head grade of manganese and iron in the sample of 11.2% and 15.5%, respectively, which agreed well with previous head grade assays of the bulk composite 2011 drill core sample. As a precursor to the completion of the HGMS tests, the head samples was subjected to three stages of LIMS using a bench scale Eriez wet drum magnetic separator set to a field intensity of 1,000 Gauss in order to reject ferromagnetic iron minerals which may interfere with HGMS testing.

The first pass LIMS tailings (non-magnetics) contained 97.6% of the total manganese and 93.3% of the total iron in 96.8% of the original sample weight. The LIMS tails were dried and 100 g sub-samples were riffled out for use as feed to the HGMS test unit.

The results of the initial HGMS tests showed a strong correlation between recovery of manganese and recovery of iron, with manganese being slightly more strongly recovered to the HGMS concentrates than iron. An analysis of the separation factor for manganese and iron showed that the best separation of manganese from iron occurred at low magnetic intensity (5,000 Gauss) and high slurry velocity (75 mm/s). This test resulted in a manganese grade of 15.8% and an iron grade of 17.8% in the magnetic concentrate; however, the recovery of manganese was low at a reported value of 33.6%.

The range of slurry velocity that was achievable using the HGMS test unit at SGS was limited due to the size of the slurry feed and discharge tubing relative to the sample size, and follow-up bench scale HGMS testing was completed at Metso Minerals Process Engineering Laboratory (Metso) in Sweden.

As a result of low separation factors for manganese and iron, and the low recoveries of manganese observed in the HGMS testing completed at SGS, a finer particle size distribution was selected for the feed sample for HGMS testing to be conducted at Metso. A 5 kg sub-sample of the ground 2011 drill core bulk composite sample (original P_{80} of 62 µm as determined by Malvern Instruments Master Particle Sizer M3.1) was wet screened to generate a 2 kg, minus 20 µm sub-sample to serve as feed to the Metso HGMS test program. The particle size distribution of the resulting feed sample was analyzed by Metso using a Malvern Mastersizer, which returned a P_{80} of 22 µ. Elemental analysis of the Metso magnetic separation test program samples was completed by MEC by near total acid digestion followed by ICP-OES for elemental analysis. A standardized manganese ore sample (Brammer Standard DH 4303) was scanned with each solid sample set to support the accuracy of the results.

The feed sample was run through a single stage low intensity magnetic separator operated at 1,000 Gauss to remove ferromagnetic minerals from the feed samples to the HGMS unit. The LIMS tailings contained

98.9% of the total manganese and 91.2% of the total iron in 97.4% of the original sample weight. The LIMS magnetic concentrate assayed 54.6% iron and indicates that there may be potential for production of a saleable grade iron ore product from the LIMS circuit. The LIMS tails were dried and split into six, 45.5 g sub-samples and six 76.0 g sub-samples to serve as feed for 12 individual HGMS tests.

The HGMS test unit was a Metso Minerals HGMS 10-15-20, used in conjunction with a type XF (fine) matrix. The field intensity was varied from 4,500 to 16,300 Gauss while the slurry velocity and matrix loading were varied from 95 to 193 mm/s and from 0.3 to 0.5 g/cm^3, respectively. Once again, the results showed a strong relationship between the recovery of manganese and the recovery of iron, with recoveries ranging from 62.6 to 93.8% for manganese and from 45.5 to 90.6% for iron, depending on the test parameters. On average, approximately 11.0% of the total iron was rejected relative to manganese recovery (i.e. 11.0% lower recovery of iron to HGMS magnetics than recovery of manganese) and selectivity for manganese over iron was found to improve at higher slurry velocities.

Trends for aluminum, magnesium and silica were also followed to serve as an indicator of the behavior of acid-consuming gangue minerals when subjected to HGMS. Recovery of aluminum, magnesium and silica to the magnetic fraction was highly variable and generally increased with increasing field intensity and decreased with increasing slurry velocity through the matrix and increasing matrix loading. Selectivity for manganese over aluminum, magnesium and silica improved at higher slurry velocities through the HGMS matrix.

By employing a combination of LIMS and HGMS as a means of pre-concentration, it was concluded that the manganese content of the Bulk composite sample could be upgraded by selectively rejecting gangue minerals. At the optimum test conditions, the average results of these two tests are defined as manganese concentrate grade of 15.6% at 86.7% recovery, overall mass rejection of 34.0%, iron rejection of 25.8%, aluminum rejection of 49.6%, magnesium rejection of 33.4% and silica rejection of 48.2% achieved relative to HGMS feed.

When considering all factors, including the degree of manganese upgrading achieved, recovery of manganese and rejection of gangue minerals, HGMS was identified as a technically viable pre-concentration method for upgrading of mineralized material from the Plymouth Deposit.

13.3.8 Heavy Media Separation Testing

Scoping-level bench scale HMS testing was conducted at MEC on the crushed (70% minus 6 mm) bulk composite, red composite and grey composite 2011 drill core samples. Approximately 5.0 kg of 70% minus 6 mm crushed material was split from each of the bulk, red and grey feedstock composite 2011 drill core samples and classified using a 1 mm screen. The -1 mm material was screened out prior to heavy media test work, as this is near the practical lower particle size limit for commercial operation of a heavy media circuit. The +1 mm material was used for bench scale heavy media testing at specific gravities of 2.65, 2.75, 2.85, and 2.96 using tetrabromoethane diluted with acetone as the heavy media. Testing at higher specific gravities was conducted using diiodomethane diluted with acetone. Elemental analysis of HMS head and product samples was completed by MEC by near total acid digestion of the solids followed by elemental analysis by ICP-OES. A standardized manganese reference material (Brammer Standard DH 4303) was scanned with each solid sample set to support the accuracy of the results.

For all three composite 2011 drill core samples, a high proportion of the crushed material reported to the -1 mm fraction (in the range of 40% to 45%) as the 2011 drill core samples had been pre-crushed to 70% minus 6 mm for assaying purposes by ALS. Due to the relatively high proportion of fines that were present in the pulp rejects from the 2011 drill core samples, limited upgrading was observed by HMS once the fines were re-combined with the upgraded coarse (+1 mm) material and the results discussed herein are reported relative to the +1 mm fraction that was used as feed for the upgrading tests.

The viability of HMS is, therefore, limited by the crush particle size distribution and further work to assess grade-recovery relationships relative to an optimum crush size as feed to the HMS circuit would be required to provide a definitive conclusion regarding the technical viability of HMS for upgrading of the Plymouth Deposit. Overall, the results of heavy media testing on the +1 mm fractions of the bulk, red and grey composite 2011 drill core samples indicated that, at the relatively coarse particle sizes required for HMS, the manganese and iron minerals are not sufficiently liberated from each other or from the gangue, to allow for a high degree of pre-concentration of manganese or rejection of iron by this method.

A summary of the results for the heavy media test conducted at a specific gravity of 2.96 (considered to represent the optimum operating point for HMS based on bench scale testing completed to date) for each sample is given below. The results reported below consider only the results for the +1 mm size fraction (the fraction of total feed material subjected to heavy media testing not including recombination of the upgraded material with the -1 mm fines fraction).

Bulk Composite Sample:

- Manganese grade of 15.2% achieved at 89.5% recovery
- Overall mass rejection of 32.1% achieved relative to HMS test feed
- Iron rejection of 16.0% achieved relative to HMS test feed
- Aluminum rejection of 55.4% achieved relative to HMS test feed
- Magnesium rejection of 39.5% achieved relative to HMS test feed
- Red Composite Sample:
- Manganese grade of 16.0% at 88.8% recovery
- Overall mass rejection of 34.3% achieved relative to HMS test feed
- Iron rejection of 11.9% achieved relative to HMS test feed
- Aluminum rejection of 64.2% achieved relative to HMS test feed
- Magnesium rejection of 51.8% achieved relative to HMS test feed
- Grey Composite Sample:
- Manganese grade of 15.0% at 91.6% recovery
- Overall mass rejection of 15.2% achieved relative to HMS test feed
- Iron rejection of 15.6% achieved relative to HMS test feed

- Aluminum rejection of 45.8% achieved relative to HMS test feed
- Magnesium rejection of 30.4% achieved relative to HMS test feed.

13.3.9 Open Cell Flotation Testing

Ten bench scale rougher flotation tests were completed by Thibault on a sub-sample of the bulk composite 2011 drill core sample ground to various particle sizes ranging from a P_{80} of 75 µm to a P_{80} of 41 µm (as determined by wet screening). Four of the rougher float tests were subsequently followed up with rougher-scavenger and cleaner open circuit flotation tests. Analysis of the head and product samples from the flotation test program was completed by Accurassay Laboratories (Accurassay) in Thunder Bay, Ontario by means of whole rock analysis using a lithium borate fusion method with elemental analysis by XRF.

Flotation of rhodochrosite is not commonly practiced in industry, therefore, optimum conditions for flotation were largely unknown and extensive development of the reagent scheme and operating parameters for flotation was not completed. In general, it is noted that the reagent scheme should consist of a fatty acid collector, a pH modifier and a slime/gangue dispersant. All rougher flotation tests employed high-intensity conditioning (HIC) prior to flotation to remove slime particles from the surface of the valuable particles and to promote effective conditioning with flotation reagents. Heating of the slurry to approximately 45°C was also completed throughout the HIC and flotation stages to improve on the solubility of the fatty acid collectors.

Of the two collector-dispersant reagent schemes tested, Aero 704 (Cytec Industries) and sodium silicate were found to provide a better flotation response than FS-100 (Clariant Mining Solutions) and carboxymethyl cellulose. In most cases, a separate frother was not required, as the collectors used in the test program provide sufficient froth. A reduction in the flotation feed particle size negatively impacted the recovery of manganese and the presence of excessive slimes (as a result of high chlorite and clay content of the ore) is believed to be at least partly responsible for low-manganese recoveries observed throughout the test program. Furthermore, the optimum reagent scheme for highly selective flotation of manganese was not identified to achieve a technically viable separation between rhodochrosite and gangue (siderite, hematite, chlorites, clays) minerals.

The recovery of manganese was found to be limited throughout the rougher, scavenger and cleaner stages of flotation and additional collector added to the rougher-scavenger and cleaner stages generated only a marginal improvement in the recovery of manganese. Due to the low recovery, manganese grades in both the rougher and cleaner concentrates were also limited. The results of the scoping-level flotation tests indicate that higher recoveries would not be obtained in a closed circuit at the conditions tested and further development of the reagent scheme and other operating parameters such as conditioning time, pH, and pulp density would be required to produce an acceptable manganese recovery. Low recoveries of manganese combined with the high technical risk for development of an unconventional flotation circuit resulted in the suspension of further flotation testing.

The results of the most favorable rougher flotation test (BFL-01) are summarized as follows:

- Manganese grade of 17.4% at 68.6% recovery
- Overall mass rejection of 53.4% achieved relative to flotation feed
- Iron rejection of 56.2% achieved relative to flotation feed
- Aluminum rejection of 69.3% achieved relative to flotation feed
- Magnesium rejection of 59.5% achieved relative to flotation feed
- Silica rejection of 66.0% achieved relative to flotation feed.

13.3.10 Hydromet Testing (Fall 2012-Spring 2013)

The Fall 2012–Spring 2013 bench scale hydrometallurgical test program was based on the recycle of spent electrolyte solution to the leach, which is commonly practiced in most leach-electrowinning circuits. In a conventional EMM plant, a portion of the acid required for leaching of fresh ore or concentrate is provided by recycling the spent electrolyte solution from the electrowinning cell. All hydrometallurgical testing conducted as part of the Fall 2012–Spring 2013 test program was completed using a 20 kg riffled sub-sample of the bulk composite 2011 drill core sample ground to a P_{80} of 67 µm (as determined by Malvern Instruments Master Particle Sizer M3.1) and included the use of a synthetic spent electrolyte solution having the following approximate composition:

- Manganese concentration = 15 g/L as Mn (present in solution as $MnSO_4$)
- Ammonium sulphate concentration = 140 g/L as $(NH_4)_2SO_4$
- Sulphuric acid concentration = 50 g/L as H_2SO_4.

MEC performed most of the analytical work on the hydrometallurgical solutions and solids by ICP-OES. A standardized manganese reference material (Brammer Standard DH 4303) was scanned with each solid sample set to support the accuracy of the results.

Initial leach tests using the synthetic spent electrolyte solution were conducted as stand-alone leaches (leach residue is filtered from the pregnant leach solution prior to entering solution purification unit operations) at leach pulp densities ranging from 10 to 30% solids. These tests demonstrated slow filtration rates and precipitation of ammonium-based double sulphate salts was observed upon cooling of the solution during and after filtering.

To overcome slow filtration rates and precipitation of double sulphate salts of manganese, the solid-liquid separation step between the leach and the initial stage of solution purification (iron precipitation) was eliminated. A total of thirteen combined leach-primary iron precipitation tests were completed at different acidities, temperatures, pulp densities and batch reaction times for both unit operations. The operating conditions for the test program are defined as:

- Leach pH controlled at 1.5;

- Pulp density of 20% w/w;
- Batch residence time of 8 hours in leach;
- Leach temperature controlled at 60˚C;
- Primary iron precipitation reaction pH controlled in the range of 4.0 to 4.5, and;
- Batch residence time of 8 hours in primary iron precipitation reaction.

Applying the above process operating conditions, the average recovery of manganese in the combined leach-primary iron precipitation unit operations was approximately 7% lower than previous leach tests completed on the Bulk composite sample at a set-point leach pH of 1.0. It should be noted that, although the manganese extraction in the leach at the selected operating conditions was slightly lower than that reported for the Fall 2011–Spring 2012 hydrometallurgical test program, the current results were obtained for a higher leach pulp density at a higher operating pH (lower acid concentration in the leach) and lower reaction temperature.

The residual iron and aluminum concentrations in the pregnant leach solution following the primary iron precipitation step ranged from 2.0 to 3.0 g/L for iron and from 10.0 to 25.0 mg/L for aluminum. Residual iron and aluminum, as well as copper and zinc, are further removed in the secondary iron precipitation step, which is operated at a pH of 5.5 to 6.0 for a batch residence time of 3.5 hours at 60°C. Following the secondary iron precipitation step, the residual iron and aluminum concentrations were observed to fall to a range of 0.2 to 3.5 mg/L for iron and 0.4 to 0.6 mg/L for aluminum. Typical concentrations of copper and zinc following the secondary iron precipitation reaction were reported to be in the range of 0.3 to 0.8 mg/L for copper and 0.7 to 6.8 mg/L for zinc.

Operating conditions for a sulphide precipitation step using ammonium sulphide for tertiary solution purification have also been identified and the ability to remove cobalt, nickel and zinc to very low levels in the feed solution to the EMM electrowinning unit operation has been confirmed. Manganese concentrations in the final purified leach solution ranged from 30.0 to 35.0 g/L as manganese and typical concentrations of trace impurities in the final purified leach solution were reported as:

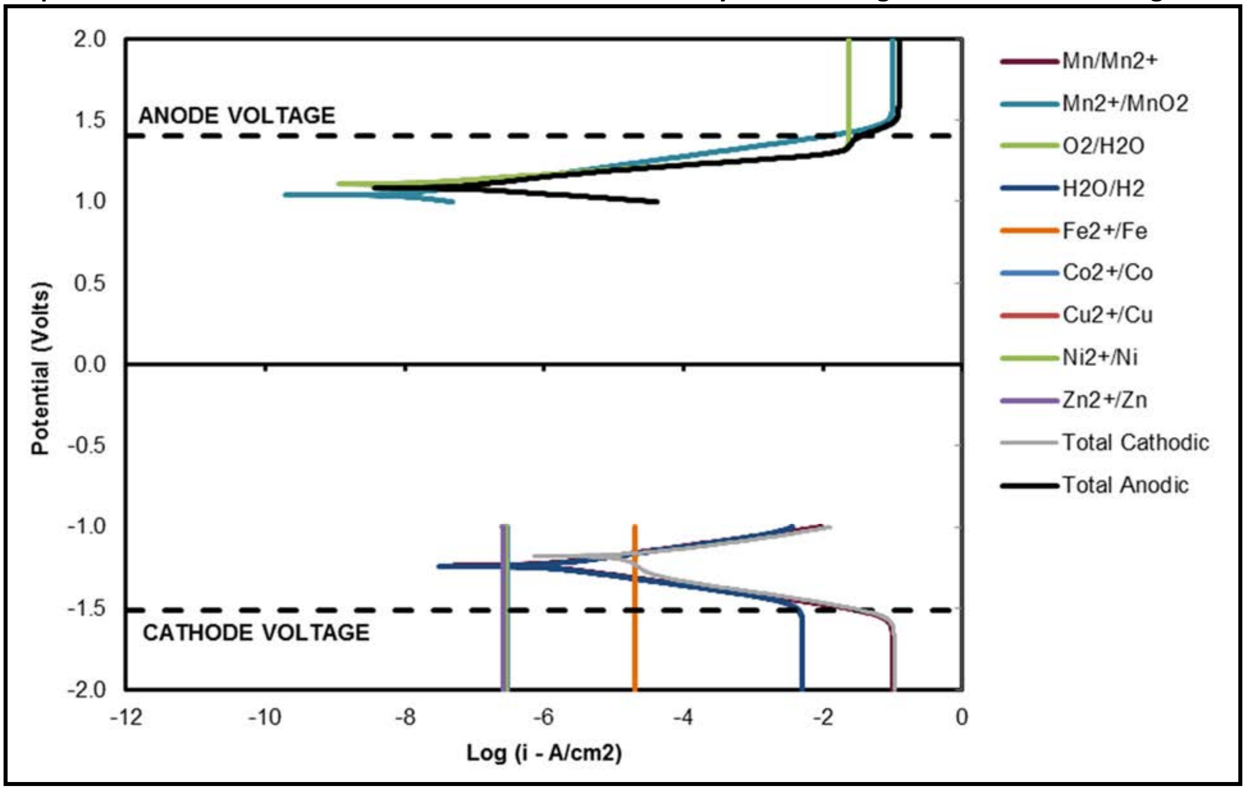
- <0.1 mg/L cobalt, nickel, cadmium, copper, titanium and vanadium
- <0.5 mg/L antimony and tin
- <0.5 mg/L aluminum
- mg/L arsenic
- 0.3 mg/L chromium
- mg/L for iron
- mg/L lead
- 0.5 mg/L molybdenum
- 10.2 mg/L selenium
- 0.3 mg/L zinc.

The concentrations of aluminum, cobalt, copper, iron, molybdenum, nickel, and zinc all meet the maximum tolerable impurity concentrations defined as target specifications for electrowinning of manganese based on operating data from commercial EMM operations.

Target specifications for trace heavy metals such as selenium and lead, as well as alkali and alkaline earth metals such as calcium, potassium, magnesium and sodium have not been defined and further bench and/or pilot scale testing of the electrolysis unit operation under various sets of operating conditions will be required to assess the impact of these impurities. The results of bench and pilot scale EMM electrowinning tests will then be used to form the basis for site and process specific target specifications for manganese sulphate electrolyte purity.

An electrochemical model (Evans Diagram) was developed to assess the predicted EMM product quality relative to the final purified leach solution composition. Based on Evans Diagram model predictions, using the purified manganese sulphate solution composition given above, the theoretical grade of EMM that would be expected to be produced is more than the typical market specification of 99.7%. The author notes that Evans Diagram predictions of cell potential and metal quality relative to electrowinning cell operating parameters are based on detailed thermodynamic calculations of the actual electrochemical potentials of the components in the process solution, considering electrochemical reaction kinetics and electrowinning cell design parameters. The Evans Diagram model does not provide sufficient detail to predict the impact of auto-catalytic reactions and synergistic effects of impurities in the solution and the results of the Evans Diagram model should be confirmed by bench and pilot scale testing of electrowinning operations. An example Evans Diagram is shown in Figure 13-1.

Figure 13-1: Evans Diagram for Production of Electrolytic Manganese Metal from Purified Manganese Sulphate Solution Produced in Accordance with the CMC Hydrometallurgical Process Block Diagram



(Thibault: 2021)

13.3.11 Hydrometallurgical Testing (Fall 2013-Spring 2014)

From initial hydrometallurgical test programs conducted in 2011-2012, it was apparent that the red and grey composite samples possessed distinct characteristics with respect to leachability of iron and other impurity elements and sulphuric acid consumption in the leaching unit operation. Due to the higher proportion of oxide to carbonate iron minerals in the red composite sample relative to the grey composite sample the extent of iron dissolution from the red sample has been observed to be less than that from the grey sample, which impacts both the consumption of sulphuric acid in the leach and consumption of pulverized limestone in the primary iron precipitation stage.

As an integral part of the Fall 2013-Spring 2014 hydrometallurgical test program, two bench scale flowsheet simulation tests were completed at the standard process conditions defined in Section 13.7 for the bulk composite sample on the red and grey composite samples to quantify reagent consumptions and operating parameters.

Three identical bench scale flowsheet run-through tests were completed for each of the red and grey composite samples to support the reproducibility of the results. Each flowsheet run-through test included the following unit operations:

- Sulphuric acid leach;
- Primary iron precipitation stage;
- Secondary iron precipitation stage, and:
- Sulphide precipitation tertiary solution purification stage.
- The conditions for the combined leach-primary iron precipitation unit operations are listed as follows:
- Leach pH controlled at 1.5;
- Pulp density of 20% w/w;
- Batch residence time of eight hours in leach;
- Leach temperature controlled at 60°C;
- Primary iron precipitation reaction pH controlled in the range of 4.0 to 4.5;
- Batch residence time of eight hours in primary iron precipitation reaction, and;
- Primary iron precipitation reaction temperature controlled at 60°C.

The key results of the flowsheet simulation tests for the leach-primary iron precipitation unit operation for the red and grey composite samples are given in Table 13-6 and are compared to previous results for the bulk composite sample.

Table 13-6: Key Results of Leach-Primary Iron Precipitation Flowsheet Run-Through Tests on Red and Grey Composite Samples

Sample Description	Sulphuric Acid Consumption ($g/g\ Mn_{REC}$)	Pulverized Limestone Consumption ($g/g\ Mn_{REC}$)	Solid Residue Generation Ratio (g Residue/g Ore)	Manganese Recovery (wt%)
Red Composite	4.59 (range of 4.54 to 4.62)	1.64 (range of 1.60 to 1.73)	1.06 (range of 1.05 to 1.07)	86.51 (range of 86.25 to 86.69)
Bulk Composite	5.34 (range of 5.27 to 5.39)	2.67 (range of 2.37 to 3.01)	1.20 (range of 1.15 to 1.25)	87.99 (range of 86.91 to 88.84)
Grey Composite	6.21 (range of 6.15 to 6.26)	5.59 (range of 5.40 to 5.84)	1.65 (range of 1.62 to 1.69)	89.09 (range of 88.39 to 90.10)

The residual iron concentrations in the pregnant leach solution following the primary iron precipitation step ranged from 1.2 to 2.8 g/L for the red composite sample and from 7.1 to 10.5 g/L for the grey composite sample. Following the secondary iron precipitation step, which is operated at a pH of 5.5 to 6.0 for a batch residence time of 3.5 hours at 60°C, iron concentrations were further reduced to a range of 2.1 to 2.8 mg/L for the red sample and 2.0 to 3.8 mg/L for the grey sample. Consumption of lime in the secondary iron precipitation stage for the red and grey ore were defined as 3.25 and 11.30 kg CaO/m^3 of solution processed, respectively.

The sulphide precipitation stage was more effective at reducing the levels of trace heavy metals from leaching of the grey composite sample than it was for the red composite sample and this was due, in part, to lower leach extractions of copper, cobalt and nickel being observed for the grey sample and in part due to high background levels of these metals being reported in the synthetic advance electrolyte solutions used in the flowsheet run-through test. Adjustment of the dosage of the ammonium sulphide reagent relative to the loading of heavy metals in the feed to the sulphide precipitation stage is expected to alleviate this issue, as has been the case for previous bench scale testing of the sulphide precipitation reaction.

Preliminary tests to assess the use of activated carbon adsorption technology for removal of residual reactive sulphides from the sulphide precipitation reaction filtrate has also been completed. Excess sulphide ions in the advance electrolyte feed to the electrowinning circuit may contribute to elevated levels of sulphur becoming incorporated into the electroplated manganese deposits under certain circumstances, reducing the overall quality of the EMM product. In bench scale testing, three out of four samples of activated carbon were found to be capable of removing more than 80% of sulphide ions from the advance electrolyte, resulting in residual sulphide concentrations of less than 1.0 mg/L.

The proposed integrated flowsheet for production of EMM from the Plymouth Deposit includes a unit operation for recovery of soluble manganese from high concentration waste streams such as the spent electrolyte bleed and solid residue wash water streams. Scoping-level bench scale tests were conducted to confirm manganese recovery rates and reagent consumption for this unit operation. From these tests, it was concluded that a manganese recovery of 97.3% was achievable at a lime addition rate of approximately 2.2 kg CaO/kg manganese in the feed solution.

13.3.12 Hydrometallurgical Processing of HGM Concentrate

Reagent consumptions in the hydrometallurgical circuit for processing of a HGMS concentrate product have been estimated based on the process chemistry (stoichiometry) relative to the rejection of acid consuming gangue as defined by the bench scale HGMS testing completed by Metso. Leach extraction of manganese for the present study are based on preliminary bench scale test program results for leaching of red and grey HGMS concentrate samples, which demonstrated leach extractions of 89.75% and 91.11%, respectively, for manganese. The overall manganese recovery in the hydrometallurgical portion of the process block diagram has therefore been defined as 90% and accounts for internal recycle and recovery of waste streams containing manganese.

The red and grey HGMS concentrate samples produced from pilot testing of the integrated magnetic separation circuit flowsheet were used in subsequent bench scale hydrometallurgical test programs to refine leach and solution purification unit operation operating parameters and to confirm reagent consumption rates for processing of concentrate.

13.3.13 Bench Scale Production of EMM (Fall 2013-Spring 2014)

The Fall 2013–Spring 2014 hydrometallurgical test program also included preliminary bench scale testing of the EMM electrowinning unit operation and a bulk flowsheet run-through on a blend of the red and grey composite samples was completed to generate a sufficient volume of advance electrolyte representative of the CMC process flowsheet for testing. The flowsheet simulation test included leaching, primary, and secondary iron precipitation and tertiary solution purification unit operations and resulted in the production of approximately 25 L of purified advance electrolyte having a composition as defined by Table 13-7.

Table 13-7: Elemental Composition of Advance Electrolyte Produced from Bulk Simulation of the CMC Hydrometallurgical Flowsheet Developed for Processing of the Plymouth Manganese Deposit

Advance Electrolyte Solution Composition Produced from Bulk Flowsheet Run-Through	
Parameter	**Assay Result (mg/L)**
Al	<0.5
As	1.5
Ba	0.6
Be	<0.01
Bi	3.0
Ca	891
Co	0.4
Cr	0.5
Cu	<0.1
Fe	0.9
K	42
Li	10
Mg	2,107
Mn	33,849
Ni	0.5
P	2.4
Pb	3.2
Se	12
Sr	2.4
Ti	<0.1
V	<0.1
Zn	<0.1

The concentrations of aluminum, cobalt, copper, iron, nickel and zinc in the advance electrolyte produced from the flowsheet simulation tests all met the maximum tolerable impurity concentrations defined as target specifications for electrowinning of manganese based on operating data from commercial EMM operations.

Using a 1.2 L bench scale electrowinning cell, test programs were undertaken to investigate a range of conditions by which EMM could be produced. The effects of solution purity, pH, temperature, current density, manganese concentration, and the presence of additives on current efficiency, specific energy consumption and plate morphology were explored in a series of short duration (two to four hour) scoping-level electrowinning tests. Based on these short duration tests, the most favorable conditions were selected for completion of a second series of tests which were carried out over a longer period (eight hours). Analysis of the EMM flake product was performed by Luvak Inc. using direct current plasma emission spectroscopy for trace elements (ASTM E 1097-12); inert gas fusion for hydrogen (ASTM E 1447-09), oxygen and nitrogen (ASTM E 1019-11); and combustion infrared detection for carbon and sulphur (ASTM E 1019-11).

Semi-continuous bench scale electrowinning tests over an eight-hour duration have consistently produced EMM with a metallic manganese content (based on trace metal impurity analysis) of greater than 99.99% (greater than 4N grade) and with a total manganese content (based on trace metal and non-metallic trace element analysis) ranging from 99.70% to 99.76% manganese. Typical specifications for commercially produced EMM state the minimum total manganese content as 99.70%. Commercial specifications for maximum trace element concentrations can vary widely based on the intended end use of the EMM product and are often tailored to suit a specific end user's requirements. Analysis of the EMM flake product produced from the final eight-hour duration bench scale electrowinning tests are given by Table 13-8.

Table 13-8: Analysis of Final EMM Flake Products Produced from Bench Scale Electrowinning Tests

Element	EMM Flake Product #1	EMM Flake Product #2	EMM Flake Product #3	EMM Flake Product #4
Carbon (wt%)	0.013	0.013	0.010	0.001
Sulphur (wt%)	0.043	0.037	0.047	0.041
Oxygen (wt%)	0.197	0.195	0.148	0.155
Nitrogen (wt%)	0.008	0.005	0.007	0.005
Hydrogen (wt%)	0.0302	0.0339	0.0275	0.0305
Copper (wt%)	<0.0005	<0.0005	0.0017	<0.0005
Iron (wt%)	0.0030	0.0020	0.0028	0.0010
Total Metallic Manganese (wt%)	99.99	99.99	99.99	99.9
Total Manganese (wt%)	99.70	99.71	99.75	99.76

Based on the results of these bench scale tests, the following operating conditions have been selected to serve as the basis for the conceptual design and costing of the EMM electrowinning circuit:

- Current density of 550 A/m^2;
- Cell voltage of 4.4 V, and;
- Current efficiency of 65%.

13.3.14 Characterization of Solid Residues (Fall 2011-Spring 2014)

Preliminary test work and analysis has been performed to characterize the composition, acid generating potential and leachability of trace metals from the solid waste streams that would be generated from processing of the Plymouth deposit. The two major solid waste streams for disposal are the magnetic separation pre-concentration circuit tailings and the hydrometallurgical circuit leach-primary iron precipitation solid residue. Solid residues generated from the secondary iron precipitation stage and the manganese hydroxide precipitation stage are recycled to the leach and therefore do not require disposal. The amount of solid residue generated from the sulphide precipitation step is exceedingly small relative to the other solid waste streams and has not been characterized to date due to the very limited quantities that are generated in bench scale tests.

Bench scale testing of the magnetic separation circuit did not produce sufficient sample quantities for completion of detailed testing for characterization of the environmental stability of the pre-concentration tailings. The tailings from the magnetic separation pre-concentration circuit should, however, be similar in nature to the feed solids. Table 13.9 gives results of modified acid-base accounting by the Sobek method for the bulk, red and grey 2011 composite drill core samples used in the bench scale test programs completed to date. As demonstrated by the data in Table 13-9, the composite samples are non-acid generating (Net Neutralizing Potential >20 kg $CaCO_3$/t).

Table 13-9: Results of Acid Base Accounting Analysis for 2011 Bulk Composite Hydrometallurgical Test Program Samples

	2011 Drill Core Bulk Composite Sample	2011 Drill Core Red Composite Sample	2011 Drill Core Grey Composite Sample
Paste pH	8.8	9.0	8.3
Total Sulphur (%)	0.227	0.071	0.284
Acid Production Potential (kg $CaCO_3$/t)	7.1	2.2	8.9
Neutralizing Potential (kg $CaCO_3$/t at pH 8.3)	148	156	152
Net Neutralizing Potential (kg $CaCO_3$/t)	140	153	143
Ratio of Neutralizing Potential to Acid Production Potential	20.8	70.1	17.1

The Red and Grey composite samples were also subjected to the standard Toxicity Characteristic Leaching Procedure (TCLP) by US EPA Method 1311 (pH ≈ 4.5) and a custom TCLP procedure in which the aqueous leachate solution remain at its naturally alkaline pH (pH ≈ 9.0). The analysis of the leachate generated from both the standard and custom TCLP tests are given by Table 13-10. It can be shown from the data in that the leachate generated from aqueous leaching of the red and grey composite samples is relatively benign and does not contain elevated levels of deleterious heavy metals (e.g. arsenic, cadmium, cobalt, chromium, copper, nickel, lead and zinc).

Table 13-10: Results of TCLP Leachate Analysis for "Red" and "Grey" Composite Test Program Samples

Element	Red Sample TCLP Leachate Analysis @ pH 4.5 (mg/L)	Red Sample TCLP Leachate Analysis @ pH 9.0 (mg/L)	Grey Sample TCLP Leachate Analysis @ pH 4.5 (mg/L)	Grey Sample TCLP Leachate Analysis @ pH 9.0 (mg/L)
Ag	<0.002	<0.002	<0.002	<0.002
Al	0.590	0.260	1.160	0.820
As	<0.02	<0.02	<0.02	<0.02
Ba	5.410	0.110	2.780	0.060
Be	0.002	<0.002	0.002	<0.002
Bi	<0.02	<0.02	<0.02	<0.02
B	0.150	0.030	0.090	0.030
Ca	170.0	2.5	83.3	2.4
Cd	<0.0002	<0.0002	<0.0002	<0.0002
Co	0.078	<0.002	0.076	<0.002
Cr	<0.02	<0.02	<0.02	<0.02
Cu	<0.02	<0.02	<0.02	<0.02
Fe	<0.40	<0.40	0.90	2.0
K	29.0	2.6	21.5	2.9
Li	0.040	0.006	0.058	0.008
Mg	13.5	0.8	14.2	1.3
Mn	246.0	0.13	277.0	1.21
Mo	<0.002	<0.002	<0.002	0.021
Ni	0.03	<0.02	0.04	<0.02
Pb	0.003	<0.002	0.009	<0.002
Rb	0.069	0.004	0.049	0.004
Sb	<0.002	<0.002	<0.002	0.003
Se	<0.020	<0.020	<0.020	<0.020
Sn	<0.002	<0.002	<0.002	<0.002
Sr	12.2	0.53	2.92	0.17
Te	<0.002	<0.002	<0.002	<0.002

Element	Red Sample TCLP Leachate Analysis @ pH 4.5 (mg/L)	Red Sample TCLP Leachate Analysis @ pH 9.0 (mg/L)	Grey Sample TCLP Leachate Analysis @ pH 4.5 (mg/L)	Grey Sample TCLP Leachate Analysis @ pH 9.0 (mg/L)
Tl	<0.002	<0.002	<0.002	<0.002
U	<0.002	<0.002	<0.002	<0.002
V	<0.02	<0.02	<0.02	<0.02
Zn	0.03	<0.02	0.03	<0.02

A composite sample of the solid residue generated from leach-primary iron precipitation stage of each of the Fall 2013-Spring 2014 red and grey bench scale flowsheet simulation tests and a sample of the solid residue generated from the bulk flowsheet simulation test was submitted for semi-quantitative XRD analysis to identify the mineral phases present. The results of the XRD analysis are summarized in Table 13-11. The elemental composition of the solid residues is given by Table 13-12.

Table 13-11: Semi-Quantitative XRD Mineralogy Results for Leach-Primary Goethite Reaction Solid Residues Generated from Red and Grey Composite Sample Flowsheet Run-Through Tests

Mineral	Chemical Formula	Red Residue (wt%)	Grey Residue (wt%)	Bulk Flowsheet Run-Through Residue (wt%)
Gypsum	$CaSO_4 \cdot 2H_2O$	78.2	74.6	79.3
Goethite	$FeO \cdot OH$	12.7	0.5	12.8
Ferrihydrite	$Fe_2O_3 \cdot 0.5H_2O$	4.2	0.2	4.2
Quartz	SiO_2	3.4	8.5	3.4
Albite	$NaAlSi_3O_8$	-	5.4	-
Illite	$(K,H_3O)(Al,Mg,Fe)_2(Si,Al)_4O_{10}[(OH)_2(H_2O)]$	-	4.0	-
Smectite	$(Ca_{0.17}(Al,Fe,Mg)_2(Si,Al)_4O_{10}[(OH)_2 \cdot H_2O)]$	-	2.8	-
Siderite	$FeCO_3$	-	1.9	-
Jarosite	$KFe_3(OH)_6(SO_4)_2$	-	1.2	-
Chlorite	$(Mg,Fe)_3(Si,Al)_4O_{10}(OH)_2 \cdot (Mg,Fe)_3(OH)_6$	-	0.9	-

Table 13-12: Elemental Composition of Leach-Primary Iron Precipitation Reaction Solid Residues from Bench Scale Hydrometallurgical Tests on Red and Grey Composite Samples

Element	Red Residue (mg/kg)	Grey Residue (mg/kg)	Bulk Flowsheet Run-Through Residue (mg/kg)
Al	43,853.8	26,458.0	40,357
As	92.1	61.3	73.9
Ba	964.8	291.2	294.9
Be	2.0	1.3	1.7
Bi	3.9	8.3	<1
Ca	72,780.7	131,375.0	75,560
Co	<5	<5	66.3
Cr	46.0	30.7	55.6
Cu	32.6	30.4	45.8
Fe	145,827.7	68,019.1	109,914
K	13,086.7	5,069.7	10,274.4
Li	22.7	16.5	17.7
Mg	5,440.5	3,130.5	4,421.0
Mn	13,123.5	7,110.7	13,430.9
Ni	27.1	21.3	46.7
P	4,290.9	2,789.6	4,203.4
Pb	72.3	27.1	43.8
Se	<50	<50	<50
r	441.8	213.7	367.2
Ti	2,095.3	1,220.2	1,909.7
V	54.4	37.5	52.7
Zn	39.0	21.7	41.7

As demonstrated by Table 13-12, the major solid residue stream generated from the hydrometallurgical processing of the Plymouth Deposit is primarily comprised of gypsum, silica and minor amounts of phyllosilicate type minerals. For the red composite residue sample and for the bulk flowsheet run-through test residue sample, iron was mainly precipitated as goethite and ferrihydrite, while for the grey composite sample; iron was also present in minor quantities as goethite, jarosite, siderite, and ferrihydrite.

A portion of the red and grey composite leach-primary iron precipitation stage residue samples were re-pulped to 50% solids and neutralized using hydrated lime to a pH of 8.5 for one hour. The average lime consumption rate for residue neutralization was reported as 10.5 kg CaO/t solid residue. The neutralized residues were then filtered, dried and submitted for acid-base accounting by the modified Sobek method. As a result of the large amount of sulphates present in the residue samples, acid generating potential was calculated based on the amount of sulphide sulphur present in the samples, calculated as the difference of the total sulphur and sulphate sulphur as shown in Table 13-13.

Table 13-13: Results of Acid Base Accounting Analysis for Treated/Neutralized Red and Grey Leach-Primary Iron Precipitation Solid Residues

	Red Residue	Grey Residue
Paste pH (1:1)	7.1	7.2
Total Sulphur (%)	5.417	11.02
Total Sulphate Sulphur (%)	5.414	10.89
Total Sulphide Sulphur (%)	0.003	0.14
Acid Production Potential (kg $CaCO_3$/tonne)	0.10	4.27
Neutralizing Potential (kg $CaCO_3$/tonne at pH 8.3)	9.1	11.5
Net Neutralizing Potential (kg $CaCO_3$/tonne)	8.9	7.2
Ratio of Neutralizing Potential to Acid Production Potential	91.0	2.7

The paste pH of the neutralized residues is near neutral, and the net neutralizing potential is positive, indicating that the solid residues have a low potential for acid generation.

Composite red and grey leach-primary iron precipitation solid residues were also submitted for the standard TCLP (pH ≈ 4.5). In addition to trace metals, the leachate was analyzed for ammonia due to the presence of high background levels of ammonium sulphate throughout the hydrometallurgical process. The results of the TCLP leachate analysis are summarized in Table 13-14. The leachability of metals from the solid residue samples was relatively low and leachability of iron compounds was not detected. This data supports the selection of process conditions in the primary iron precipitation stage to promote the formation of goethite (FeO·OH), which is considered an environmentally stable precipitated iron complex. Concentrations of aluminum, manganese and ammonia were slightly elevated in the TCLP leachate; however, residue washing procedures have not been optimized by process testing completed to date and further optimization of residue washing procedures will likely reduce the concentrations of these compounds in the TCLP leachate. Despite expectations that metals and ammonia levels in the solids residue leachate could be minimized by further optimization of residue washing procedures, all direct run-off and leachate from the tailings will be routed to a wastewater treatment system for removal of soluble metals and ammonia prior to being discharged to the environment.

Table 13-14: Results of TCLP Leachate Analysis for Leach-Primary Iron Precipitation Reaction Residues Generated from Leaching of Red and Grey Composite Samples

Element	Red Residue TCLP Leachate Analysis (mg/L)	Grey Residue TCLP Leachate Analysis (mg/L)
Ag	<0.002	<0.002
Al	4.77	4.20
As	0.03	<0.02
Ba	0.08	0.02
Be	<0.002	<0.002
Bi	<0.02	<0.02
B	0.05	0.06
Ca	805.0	780.0
Cd	<0.0002	0.0002
Co	0.026	0.098
Cr	<0.02	<0.02
Cu	0.06	0.03
Fe	<0.4	<0.4
Hg	<0.000025	<0.000025
K	1.6	0.8
Li	0.003	0.008
Mg	4.9	20.3
Mn	18.0	34.4
Mo	<0.002	<0.002
NH_3	25.0	25.0
Ni	0.02	0.10
Pb	0.003	<0.002
Rb	0.010	0.007
Sb	<0.002	<0.002
Se	<0.02	<0.02
Sn	<0.002	<0.002
Sr	4.04	1.05
Te	<0.002	<0.002
Tl	<0.002	<0.002
U	<0.002	0.003
V	<0.02	<0.02
Zn	0.03	0.05

13.3.15 Manganese Sulfate Monohydrate Characterization Test (2014-2015)

Studies were conducted to assess the recovery of MSM from manganese sulfate solutions. A conceptual flowsheet was developed to include precipitation of calcium and magnesium prior to the crystallization of MSM, based on co-production of MSM with EMM or sole production of MSM.

A high purity MSM (greater than 99% Mn) produced by sulfuric acid dissolution of EMM with subsequent purification of manganese sulfate solution and crystallization was not tested. Production of MSM from EMM is considered to have high production costs with high energy consumption and not considered competitive for the production of HPMSM for battery end use - based on MSM purity ranging from 31.8% to 32.0% Mn.

Preliminary evaporation and crystallization tests were conducted on manganese sulfate solution produced from flowsheet simulation tests. Precipitation methods to remove calcium and magnesium have been tested and MSM grades of 31.3% Mn were achieved. Bench scale studies to optimize on product purity and yield have not been completed.

Based on an assessment of HPMSM production technologies, process optimization to improve on MSM purity and yield can be achieved by defining the optimum operating parameters such as crystallization temperature, manganese sulfate concentration, solution acidity and the use of proprietary reagents to improve on calcium and magnesium removal.

The results of bench scale testing for development of a hydrometallurgical process for the production of a market grade EMM product from the Plymouth Deposit indicate that the process is technically viable and EMM with a metallic manganese content of greater than 99.99% and with a total manganese content ranging from 99.70% to 99.76% manganese. Further bench scale testing is recommended to constrain production of MSM and HPMSM to a similar level of confidence.

14.0 MINERAL RESOURCE ESTIMATES

14.1 Summary

The definition of Mineral Resource and associated Mineral Resource categories used in this Report are those incorporated by reference into NI 43-101 and set out in CIM Definition Standards (May, 10 2014). Assumptions, metal threshold parameters and deposit modeling methodologies associated with the Project Mineral Resource estimate are discussed below.

The MRE for the Project was prepared under the supervision of Mr. Matthew Harrington, P. Geo., with an effective date of March 1, 2023. A summary of the Plymouth Deposit MRE constrained within a conceptual open pit shell is presented in Table 14-1.

Table 14-1: Plymouth Deposit Mineral Resource Estimate – Effective Date: March 1, 2023

Cut-off (Mn %)	Category	Tonnes (Mt)	Mn (%)	Fe (%)
4.75	Measured	28.8	10.38	14.45
	Indicated	27.9	9.74	13.55
	Measured and Indicated	56.7	10.07	14.01
	Inferred	17.7	10.02	13.62

Notes:

1) Mineral Resources were prepared in accordance with the CIM Standards (May 10, 2014) and CIM MRMR Best Practice Guidelines (November 2019).

2) Mineral Resources are defined within an optimized pit shell with average pit slope angles of 45° in bedrock and 20° in overburden; a 3.78:1 strip ratio applies (waste:mineralized material)

3) Pit optimization parameters include: pricing of US$1,760 (CDN$2,288)/t Mn in High Purity Manganese Sulphate Monohydrate (HPMSM) containing 32% Mn, a currency exchange rate of CDN$1.30 to US$1.00, mining at US$5.50 (CDN$7.15)/t, a 2.5% gross metal royalty, combined processing, G&A and selling cost (1,500 t/d process rate) at US$199.17 (CDN$258.92)/t processed, and overall Mn recovery to HPMSM of 77%. Fe content did not contribute to the pit optimization process.

4) Mineral Resources are reported at a cut-off grade of 4.75% Mn within the optimized pit shell. This cut-off grade reflects the marginal cut-off grade used in pit optimization to define Reasonable Prospects for Eventual Economic Extraction using open pit mining methods.

5) Mineral Resources were estimated using GEOVIA Surpac® 2021 software and Ordinary Kriging methods applied to 3 m downhole assay composites. No grade capping was applied. Model block size is 10 m x 10 m x 10 m with partial percent volume estimation applied.

6) Bulk density was estimated using Ordinary Kriging methods applied to drill core specific gravity data; it is assumed that specific gravity approximates bulk density for the materials modelled. The average deposit bulk density for Mineral Resources is 3.13 g/cm^3.

7) Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues

8) Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

9) Figures may not sum due to rounding.

14.2 Geological Interpretation Used in Resource Estimation

The Plymouth Deposit is interpreted as a stratiform deposit of sedimentary origin that is comprised of an assemblage of manganese carbonate and manganese carbonate-silicate-oxide mixed with iron oxide minerals, occurring within a steeply dipping, folded sedimentary sequence of Silurian age. Mineralized units show substantial drill section to drill section continuity and have been modeled as laterally continuous bedded deposits.

14.3 Methodology of Resource Estimation

14.3.1 Overview of Estimation Procedure

The MRE is based on verified results of 51 diamond drill holes (12,952 m), including 25 drill holes (7,098 m) completed by CMC in 2021-2022, 15 drill holes (3,974 m) completed in 2013 by BMC/CMC, five drill holes (1,040 m) completed by BMC in 2011, and six drill holes (699 m) completed by MRR in 1985 and 1987. Two trenches completed in 1988 were represented as horizontal drill holes and also contribute to the MRE. Modelling was performed using GEOVIA Surpac™ v. 2021 (Surpac) and Seequent Leapfog™ Geo 2022.1 (Leapfrog) modeling software. Block model volume, grade, and density modeling was performed using Surpac with manganese percent, iron percent and specific gravity values for the block model estimated using ordinary kriging (OK) interpolation methodology from 3 m down hole assay composites. The resource block model was set up with a block size of 10 m (x) by 10 m (y) by 10 m (z) with partial percent volume estimation applied. The predominant manganese compound in the deposit is manganese carbonate ($MnCO_3$).

Metal grade assignment was peripherally constrained by wire-framed solid models based on sectional geological interpretations and a minimum included grade of 5% manganese over 6 m down-hole. The deposit has a folded geometry with an axial surface trending southwest northeast and near vertical, to steeply dipping eastern and western limbs. The main solid model measures approximately 780 m along strike, averages 100 m in width and extends to a maximum depth of 440 m below surface on the western limb and measures approximately 575 m along strike, averages 50 m in width and extends to a maximum depth 315 m on the eastern limb. The main solid model hinge zone averages 175 – 200 m in width. Three additional separate solid models were developed along the peripheral limits of the western limb of the main solid that measure 10's of meters along strike and in depth and several meters in thickness. These constrain mineralization within the defined minimum parameters that demonstrates less continuity and consistency than the main solid model. The grade domains solid models are constrained by the topography surface and/or overburden solid model. To assess the distribution of reduced and oxidized host stratigraphy a geological model delineating the deposit lithological units was developed in Leapfrog.

Interpolation ellipsoid ranges and orientations were developed through assessment of variography, combined with geological interpretations and drill hole spacing. Major axis orientations conform to the dip direction, the semi-major axes occur in the strike direction and are perpendicular to the major axes, while minor axes are oriented at a high angle to stratigraphy. A combination of dynamic and directional anisotropy was applied to the interpolation ellipsoid orientations. Manganese grade, iron grade, and specific gravity interpolation was completed independently and constrained to block volumes using a four-interpolation pass approach. Interpolation passes, implemented sequentially from pass one to pass four progress from being restrictive to more inclusive in respect to ellipsoid ranges, composites available, and the number of composites required to assign block grades. Grade domain boundaries were set as hard boundaries for grade estimation. Grade interpolation was restricted to the 3 m assay composites associated with the drill hole intercepts assigned to each deposit area solid.

The requirement for Reasonable Prospects for Eventual Economic Extraction set out in the CIM Standards (2014) was assessed by means of developing an optimized open pit shell to constrain Mineral Resources. This shell was based on the mineral deposit block model and developed by Lawrence Elgert, P.Eng., of AGP Mining Consultants Inc., through application of metal pricing, operating parameters, and recovery parameters developed by Metal Strategies Inc. on behalf of CMC. Pit optimization parameters include metal pricing of US$1,760 (CDN$2,888)/t for High Purity Manganese Sulphate Monohydrate containing 32% Mn (HPMSM), a currency exchange rate of CA$1.30 to US$1.00, mining at US$5.50 (CDN$7.15)/t, a 2.5 % gross metal royalty, combined processing, G&A and selling cost (1,500 t/d process rate) at US$199.17 (CDN$258.92)/t processed, and an overall manganese recovery to HPMSM of 77%. No value for the deposit's iron content was assigned for optimization purposes. The optimized pit shell supports a 3.78:1 strip ratio with average pit slopes of 20° in overburden and 45° in bedrock.

Mineral Resources are reported at a cut-off grade of 4.75% Mn within the optimized pit shell. This cut-off grade reflects the marginal cut-off grade used in pit optimization and is considered to define Reasonable Prospects for Eventual Economic Extraction by open pit mining methods.

Measured, Indicated, and Inferred Mineral Resources are defined as all blocks with interpolated manganese grades from the first, second, third or fourth interpolation pass, respectively, that meet the specified pit-constrained cut-off grade and demonstrate reasonable continuity. Orphan blocks and discontinuous zones of mineral resource categorization were refined through application of categorization solid models.

14.3.2 Data Validation

The MRE is based on verified results of 51 diamond drill holes (12,952 m), including 25 drill holes (7,098 m) completed by CMC in 2021-2022, 15 drill holes (3,974 m) completed in 2013 by BMC/CMC, five drill holes (1,040 m) completed by BMC in 2011, and six drill holes (699 m) completed by MRR in 1985 and 1987. Two trenches completed in 1988 were represented as horizontal drill holes and also contribute to the MRE. Drill hole coordinates are located in UTM NAD83 Zone 19 coordination.

The 2021-2022 CMC diamond drill program was managed by Mercator personnel and Mercator geologists were responsible for all aspects associated with logging, sampling, and data management using Sequent MX Deposit® software. A verification program for the 2021-2022 drill hole database was completed under the supervision of the QP that included all drill hole collar locations and down hole survey results and 30

% of the drill hole lithology entries and core sample analytical dataset. Acceptable results were returned for all records that were verified. Validation checks on overlapping intervals, inconsistent drill hole identifiers, improper lithological assignment, unreasonable assay value assignment, and missing interval data were also performed. The 2021-2022 program results were subsequently merged with the November 2021 Mineral Resource project database. A total of 3,083 core samples and 2,888 specific gravity determinations are compiled on the deposit and a total of 1,901 core samples and 1,751 specific gravity determinations occur within the limits of the grade domain solids.

14.3.3 Modelling: Topography, Lithology, and Grade

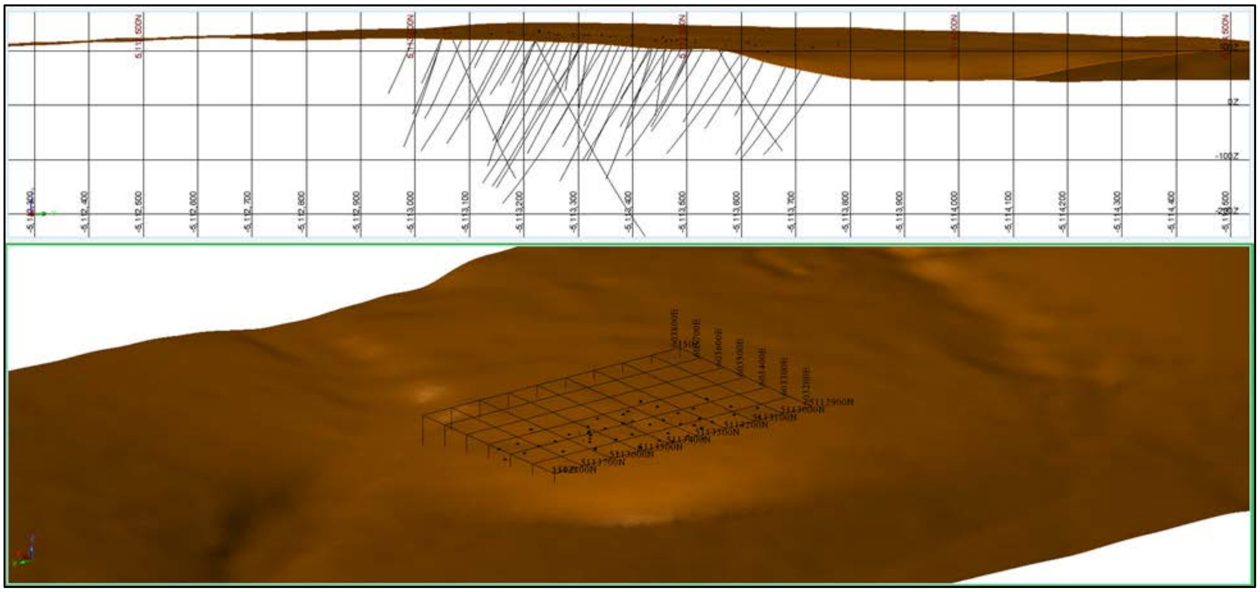
14.3.3.1 Topography Surface

A digital terrain model (DTM) point dataset for the Property was acquired by the QP from the New Brunswick GeoNB geographic information platform. The elevation dataset supports a spacing of approximately 70 m and the absolute vertical accuracy of a single point is approximately 2.5 m. The GeoNB elevation point dataset and project drill collar elevation dataset were merged and a DTM of topography was developed in Leapfrog using an adaptive resolution of 100 m. Lateral extents have been extended approximately 17,000 m east-west and 14,000 m north-south over the regional area. The QP reviewed drill collar positions in respect to the surface and an acceptable agreement is present. Figure 14-1 presents longitudinal and isometric views of the DTM of topography in the deposit area.

14.3.3.2 Overburden Solid Model

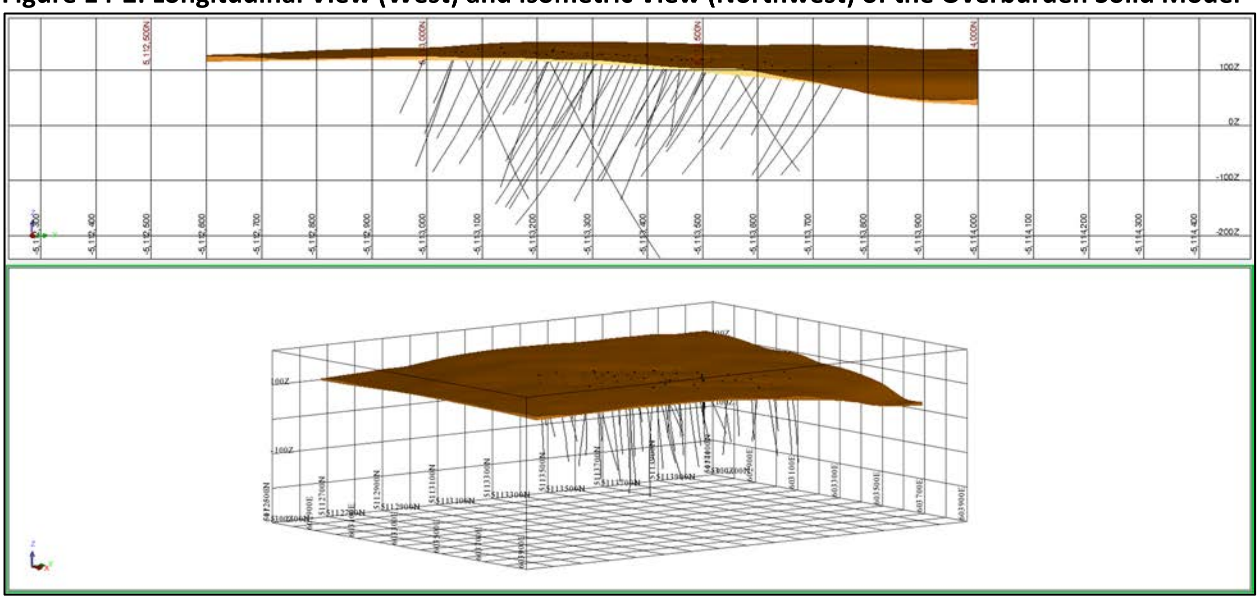
An overburden solid model was developed in Leapfrog from drill hole litho-codes and the topography surface. The topography surface and/or overburden solid model were used to constrain the surface projections of the grade domain and lithological solid models. Overburden thickness averages approximately 3 m, with maximum thicknesses of approximately 10 m, in the deposit area. Figure 14-2 presents longitudinal and isometric views of the overburden solid model.

Figure 14-1: Longitudinal View (West) and Isometric View (Northwest) of the DTM of Topography



(Source: Mercator, 2023)

Figure 14-2: Longitudinal View (West) and Isometric View (Northwest) of the Overburden Solid Model



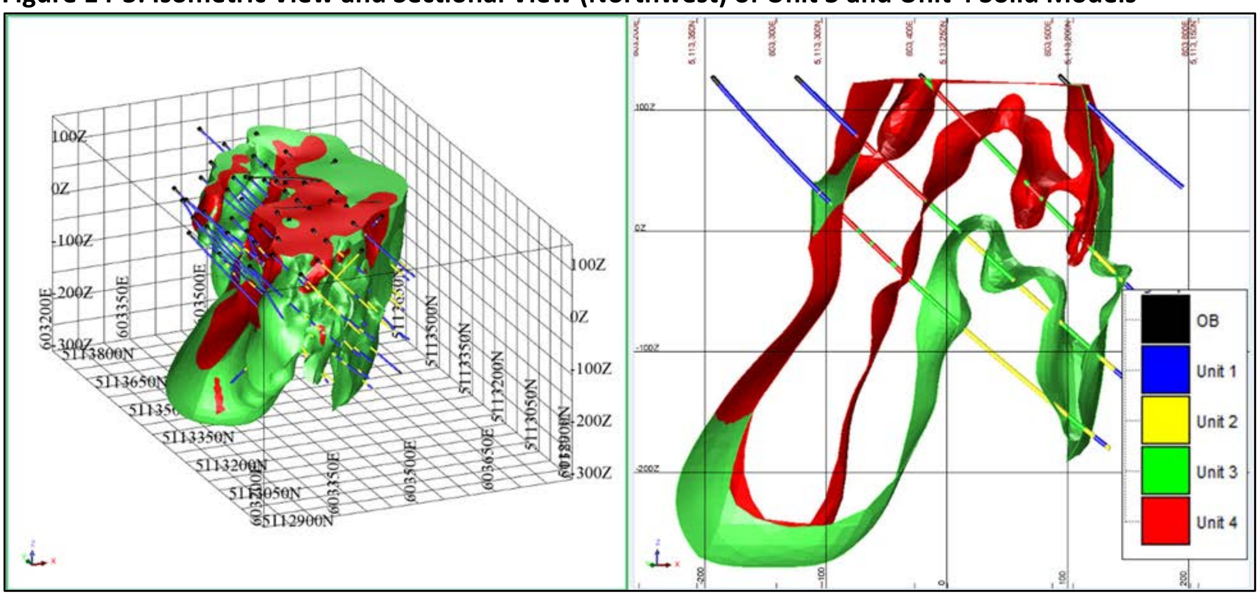
(Source: Mercator, 2023)

14.3.3.3 Stratigraphic Solid Model

The Plymouth Deposit is an assemblage of bedded, manganese carbonate and manganese carbonate-silicate-oxide sedimentary units. Four main stratigraphic classifications are commonly associated with the deposit strata, these being numbered as Units 1 through 4, with iron and manganese minerals and oxides most commonly associated with Units 3 and 4. Unit 3 is composed of laminated non-calcareous green-grey siltstone with associated iron and manganese carbonate siltstone. Unit 4 is composed of laminated dark red to maroon shale and iron-manganese oxide-carbonate siltstone. Mineralization is predominantly associated with high amounts of hematite and rhodochrosite with minor amounts of magnetite and manganese-silicate minerals.

A geological model was developed in Leapfrog to define the continuity, orientation, and geometry of each stratigraphic Unit. Solid models for each unit were developed from grouped lithocodes in the drill hole database with minor changes applied by the QP based on review of drill core photos. The developed solid models provide definition of a folded geometry with an axial surface trending southwest-northeast and near vertical, to steeply dipping eastern and western limbs. Good continuity is present along strike and in the dip direction for the primary manganese hosting Unit 3 and Unit 4 (Figure 14-3). Manganese mineralization was observed to be continuous between Unit 3 and Unit 4 contacts. Stratigraphic solid models provide resolution of the reduced and oxidized host stratigraphy and were developed to provide guidance for grade domain interpretation.

Figure 14-3: Isometric View and Sectional View (Northwest) of Unit 3 and Unit 4 Solid Models



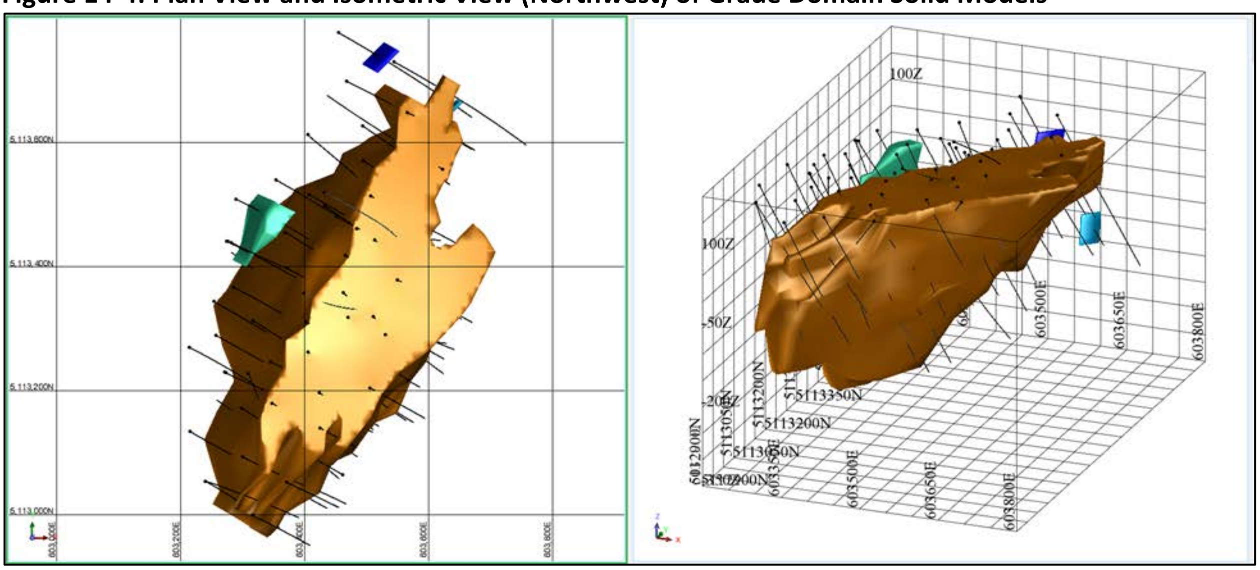
(Source: Mercator 2023)

14.3.3.4 Grade Domain Solid Models

To best assess manganese and iron mineralization of the Plymouth Deposit, wireframed grade domain solid models were developed in Surpac using a minimum threshold of 6 % manganese over 6 m lengths downhole from vertical northwest-southeast geological sections of drill hole analytical results and the stratigraphic geological model. Solid models were snapped to the respective intercepts and extended half the distance to a constraining drill hole or 25 m along strike and 100 m along dip if a constraining drill hole was not present. The grade domains solid models are constrained by the topography surface and/or overburden solid model.

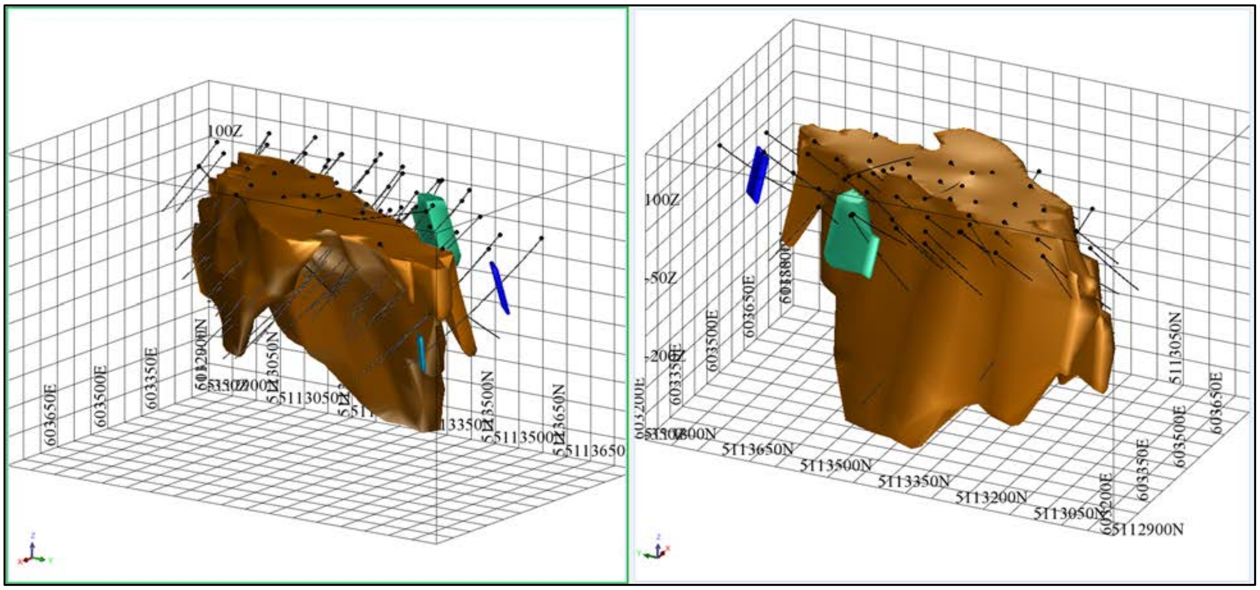
The deposit has a folded geometry with an axial surface trending southwest-northeast and near vertical, to steeply dipping eastern and western limbs. The main solid model measures approximately 780 m along strike, averages 100 m in width and extends to a maximum depth of 440 m below surface on the western limb and measures approximately 575 m along strike, averages 50 m in width and extends to a maximum depth 315 m on the eastern limb (Figure 14-4 and Figure 14-5). The main solid model hinge zone averages 175 – 200 m in width. Three additional separate solid models were developed along the peripheral limits of the western limb of the main solid that measure 10’s of meters along strike and in depth and several meters in thickness (Figure 14-4 and Figure 14-5). These constrain mineralization within the defined minimum parameters that demonstrates less continuity and consistency than the main solid model.

Figure 14-4: Plan View and Isometric View (Northwest) of Grade Domain Solid Models



(Source: Mercator 2023)

Figure 14-5: Isometric View (Southwest and Northeast) of Grade Domain Solid Models



(Source: Mercator 2023)

14.3.4 Assay Sample Assessment and Down Hole Composites

The predominant manganese compound in the deposit is manganese carbonate ($MnCO_3$). The laboratory reports manganese oxide percentage (MnO%) and iron oxide percentage (Fe_2O_3%) to achieve a balance of all elements as compounds. Respective oxide values were converted to manganese percentage (Mn%) and iron percentage (Fe%) respectively, using a factor of 0.774 for Mn% and a factor of 0.699 for Fe%.

The drill core analytical data set used in the resource estimate contains 1,901 sample records and 1,751 specific gravity determinations occuring within the grade domain solid models. Sample lengths range between 0.35 m and 9.45 m and have an average length of 2.93 m. Over 90% of samples measure 3.0 m in length. The majority of samples measuring larger than 3 m in length are associated with the two trenches. Based on these results, downhole assay composites over 3.0 m intervals were developed for manganese percent and iron percent.

Downhole composites over 3 m intervals were developed for manganese percent, iron percent, and specifc gravity using the Surpac best fit option set to a 3 m target value. Downhole composites generated outside of a 25% tolerance interval of the nominal length were either manually re-generated or merged with adjacent composites to meet the selection conditions. Compositing was constrained based on the drill hole intersections with the grade domain solid models. Intervals missing assay values for manganese and/or iron percent were set to a null value, zero percent, prior to compositing for each metal.

Descriptive statistics were calculated for manganese percentage and iron percentage from the 3 m composite datasets are presented in Table 14-1.

Table 14-2: Manganese and Iron Statistics for 3 m Composites

Parameter	Manganese (%)	Iron (%)
Mean Grade	9.98	14.07
Maximum Grade	21.02	28.71
Minimum Grade	0	0
Variance	13.72	18.66
Standard Deviation	3.70	4.32
Coefficient of Variation	0.37	0.31
Number of Composites	1,864	1,864

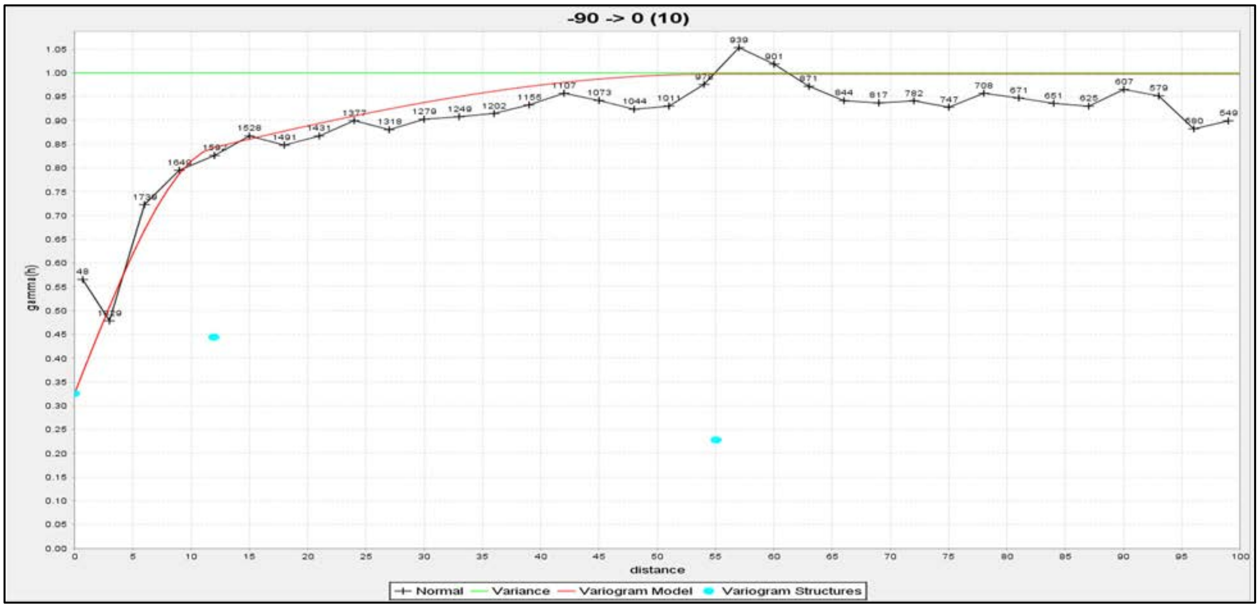
No high-grade capping factors were applied to the 3 m assay downhole composites or the contributing drill core sample analytical results. Through analysis of metal grade distribution, by means of frequency histogram, cumulative frequency plots, probability plots, rank/percentile, and decile analysis, it was concluded that maximum grade values that occur in the dataset are consistent with the mineralization styles present and do not represent high-grade outliers. Higher-grade values lay within zones where drill log descriptions of lithology and mineralogy support presence of spatially correlative higher-grade material.

14.3.5 Variography and Interpolation Ellipsoids

Manually derived models of geology and grade distribution provided definition of the primary southwest-northeast and sub-vertical trend associated with the folded host stratigraphy. To assess spatial aspects of grade distribution within the Plymouth Deposit, downhole and directional variograms were developed for manganese percentage based on the 3 m downhole composite dataset defined by the grade domain solid models. Variogram assessment was not completed on iron percent because it is of secondary interest.

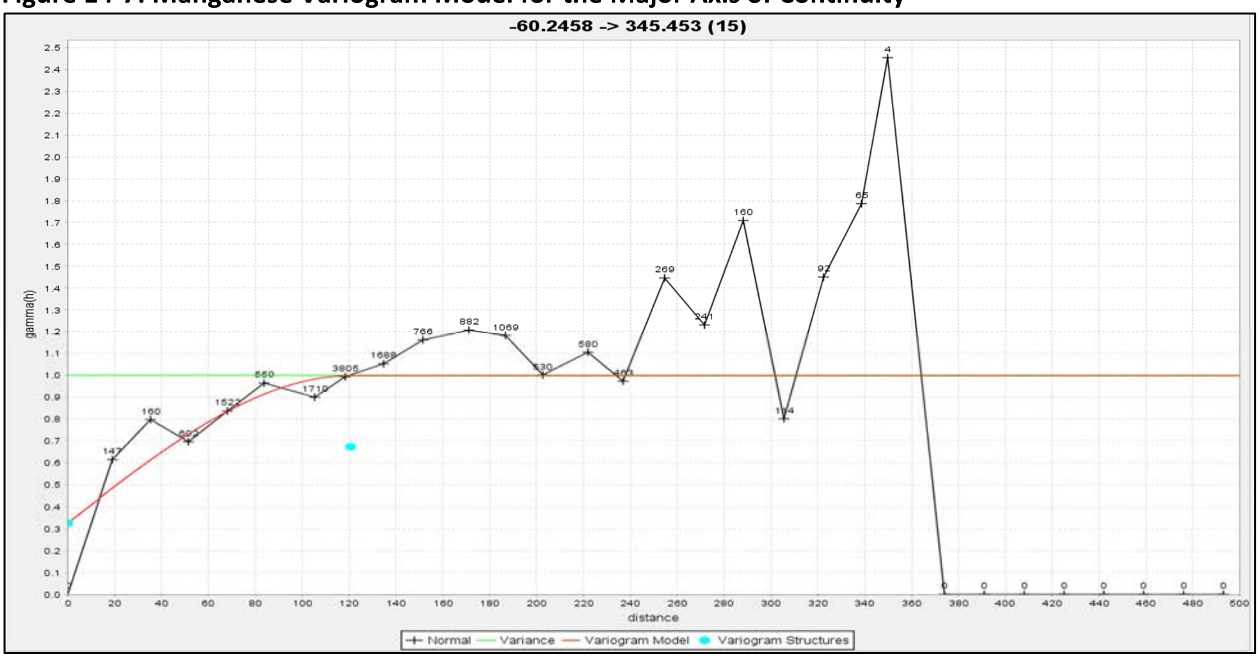
Downhole variograms provided definition of a normalized nugget of 0.33 (Figure 14-6) and spherical model results with two structures. The first structure supported a normalized sill of 0.44 and a range of 12 m and the second structure supported a normalized sill of 0.23 and a range of 55 m. The downhole variogram provides guidance and definition of nugget values and minor axis ranges for the directional variogram assessment. Best directional experimental variogram results were developed within a plane trending towards an azimuth of 295° and a plunge of 70° using a spread angle of 15° and a spread limit of 30°. The plane orientation corresponds to the down-dip trend of the Plymouth area and assesses grade continuity along strike and in the down-dip direction. Application of spherical models provided definition of an anisotropy ellipsoid along an azimuth of 345° with a plunge of 60° and a dip of 45° using Surpac's ZXY LRL (left-right-left) axes of rotation convention. A single structure was modelled for the primary axis trend supporting a normalized sill of 0.68 and a range of 125 m. Maximum ranges of continuity of 87 m for the secondary axis trend and 39 m for the third axis trend were defined. Figure 14-7 presents results of the primary variogram assessment, Figure 14-8 presents results of the secondary variogram assessment, and Figure 14-9 presents variogram results along all axes.

Figure 14-6: Downhole Manganese Variogram



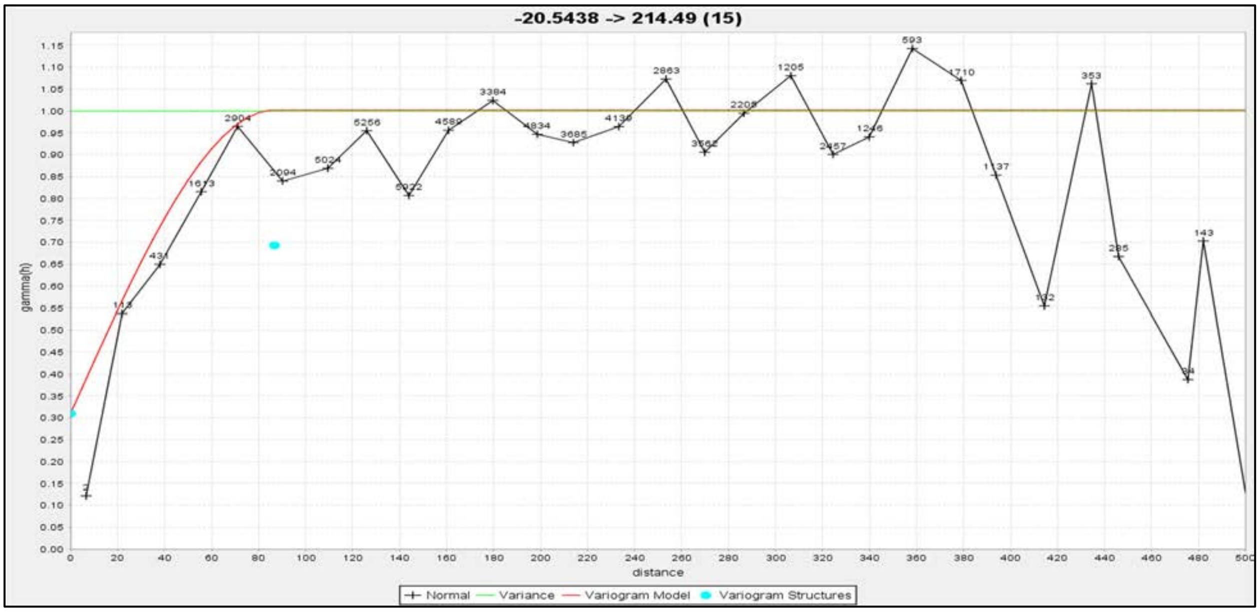
(Source: Mercator 2023)

Figure 14-7: Manganese Variogram Model for the Major Axis of Continuity



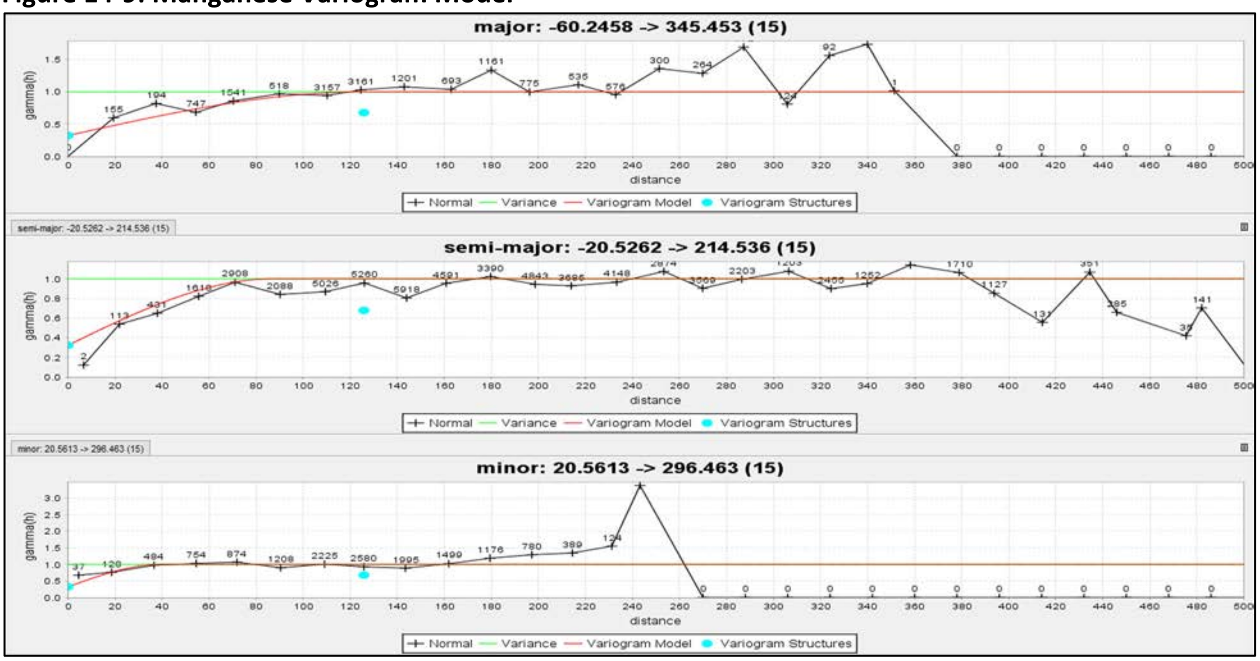
(Source: Mercator 2023)

Figure 14-8: Manganese Variogram Model for the Semi-Major Axis of Continuity



(Source: Mercator 2023)

Figure 14-9: Manganese Variogram Model



(Source: Mercator, 2023)

Interpolation ellipsoid ranges and orientations were developed through the consideration of the variogram assessment in combination with geological interpretations and drill hole spacing. A total of 5 interpolation domains were developed, 2 for the main grade domain solid and 1 each for the 3 peripheral grade domain solids. Interpolation domains were created to accommodate local variations in deposit geometry and to independently assess more restricted occurrences of mineralization. To better respect the folded geometry of mineralization, a dynamic anisotropy interpolation approach was used for most of the main grade domain solid. Static orientations were used for the near surface southwestern area of the main grade domain solid where dynamic anisotropy orientations could not be resolved and for the three peripheral grade domain solids.

Major axis orientations conform to the dip direction, approximately 296° on the western limb and 116° on the eastern limb, with plunges ranging between near vertical and 70°. The semi major axes occur in the strike direction perpendicular to the major axes while minor axes are oriented at a high angle to stratigraphy in the downhole direction. Base ranges of 125 m, 90 m, and 40 m were derived for the major, semi-major and minor axes, respectively, from the variogram assessment.

14.3.6 Setup of Three-Dimensional Block Model

The block model extents are presented below in Table 14-3 and were defined using UTM NAD83 (Zone 19) coordination and elevation relative to sea level. No rotation was applied to the block model. Standard block size for the model is 10 m by 10 m by 10 m (X, Y, Z) with no units of sub-blocking allowed. A secondary block extended in north and east directions was developed to facilitate pit optimization.

Table 14-3: Block Model Spatial Extent Parameters

Type	Y (Northing m)*	X (Easting m)*	Z (Elevation m)*
Minimum Coordinates	5,112,800	603,100	-350
Maximum Coordinates	5,113,870	603,810	200
User Block Size	10	10	10
Minimum Block Size	10	10	10
Rotation	0	0	0

* UTM NAD83 (Zone 19N) coordination; elevation relative to sea level

14.3.7 Mineral Resource Estimate

Block model partial percentage volume estimates were estimated for each of the grade domain solids, the overburden solid, and below the surface of topography. Blocks intersecting the grade domain solids and assigned a volume grater than 0 % were accepted for manganese and iron grade interpolation and coded with the respective solid model identifier to correspond with the appropriate 3 m assay composite dataset and interpolation parameters.

Manganese and iron grade interpolation was completed independently using Ordinary Kriging (OK), with the parameters derived from assessment of manganese also applied to the iron grade interpolation. A four-interpolation pass approach was applied, implemented sequentially from pass 1 to pass 4, that progresses from being restrictive to more inclusive in respect to ellipsoid ranges, composites available, and number of composites required to assign block grades. Interpolation pass ranges reflect 60 %, 100 %, and 140 % of the ranges defined from variogram assessment for the first pass, second pass, and third pass, respectively. The fourth pass reflects the same parameters applied in the third pass except for equal ranges applied to the major and semi-major axes. A total of 5 interpolation domains, using dynamic anisotropy interpolation or a unique interpolation ellipsoid orientation, were applied. Grade domain boundaries were set as hard boundaries for grade estimation purposes. Block discretization was set at 3 x 3 x 3. Interpolation parameters are summarized in Table 14-4.

Table 14-4: Summary of Interpolation Parameters

Interpolation Pass	Range			Contributing Composites		
	Major (m)	Semi-Major (m)	Minor (m)	Minimum	Maximum	Maximum per Drill Hole
1	75	54	24	9	16	4
2	125	90	40	5	12	4
3	175	126	40	1	4	4
4	175	175	40	1	4	4

14.3.8 Bulk Density

Bulk density information used in the resource estimate is based on drill core data collected in the 2011, 2013, and 2021-2022 drill programs and reflect results from 1,751 separate specific gravity determinations by ALS (pycnometer method - ALS OA-GRA08b code) within the grade domain solid models. For current purposes it is assumed that specific gravity values approximate insitu bulk density values. These results were composited at best fit 3 m down-hole support length and an interpolated specific gravity model was developed using the OK methodology described for manganese block grade interpolation. Descriptive statistics for specific gravity composites are presented in Table 14-5

Table 14-5: Specific Gravity Statistics for 3 m Composites

Parameter	Specific Gravity
Mean Value	3.12
Maximum Value	4.09
Minimum Value	2.48
Variance	0.04
Standard Deviation	0.19
Coefficient of Variation	0.06
Number of Composites	1,647

14.4 Model Validation

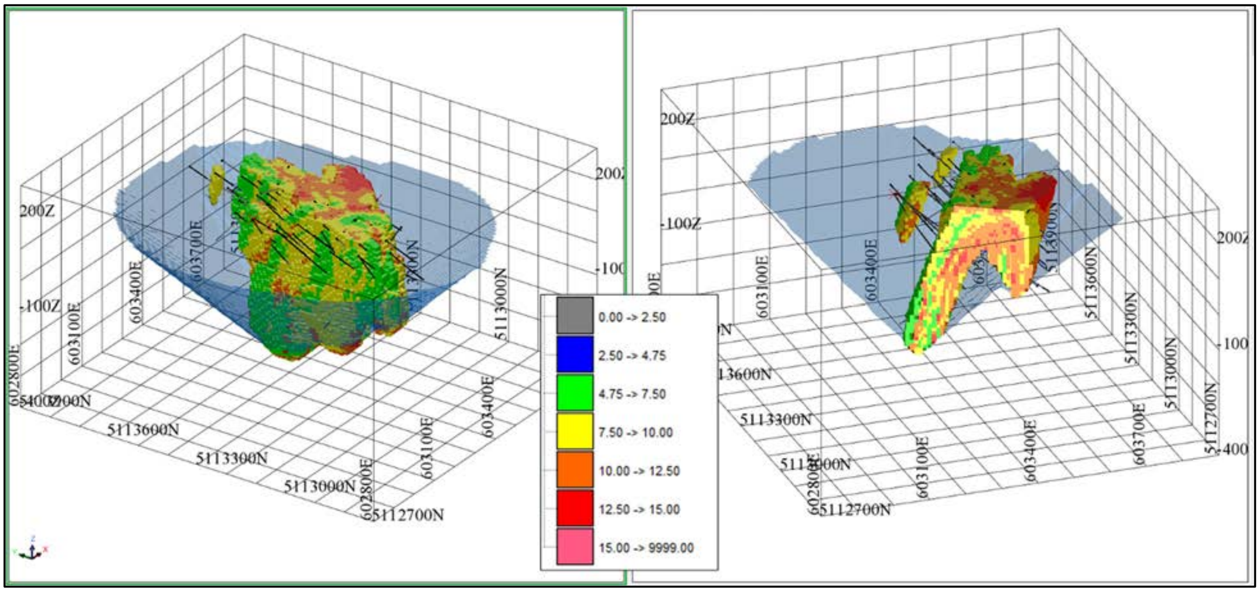
Block volume estimates for each Mineral Resource solid were compared with corresponding solid model volume reports generated in Surpac and results show good correlation, indicating consistency in volume capture and block volume reporting. Results of block modelling were reviewed in three-dimensions and compared with deposit interpretations for geology and grade distribution. Block grade distribution was shown to have acceptable correlation with the grade distribution of the underlying drill hole data (Figure 14-10 to Figure 14-14).

Descriptive statistics were calculated for the drill hole composite values used in block model interpolations and these were compared to values calculated for the individual blocks (Table 14-6). The mean weighted average drill hole composite grades for the Plymouth Deposit area compare well with the respective block values.

Swath plots were created in the easting, northing, and vertical directions comparing average composite grades and global volume weighted block grades for each deposit area (Figure 14-15 to Figure 14-17). Swath plots show an acceptable correlation between the two grade populations and limited local bias. Areas of higher variance between composite grades and block grades is related to low composite density and/or low tonnages. These areas are more sensitive to grade-volume relationships, the ratio of block volume to each drill hole and the associated composites, which can significantly impact average values.

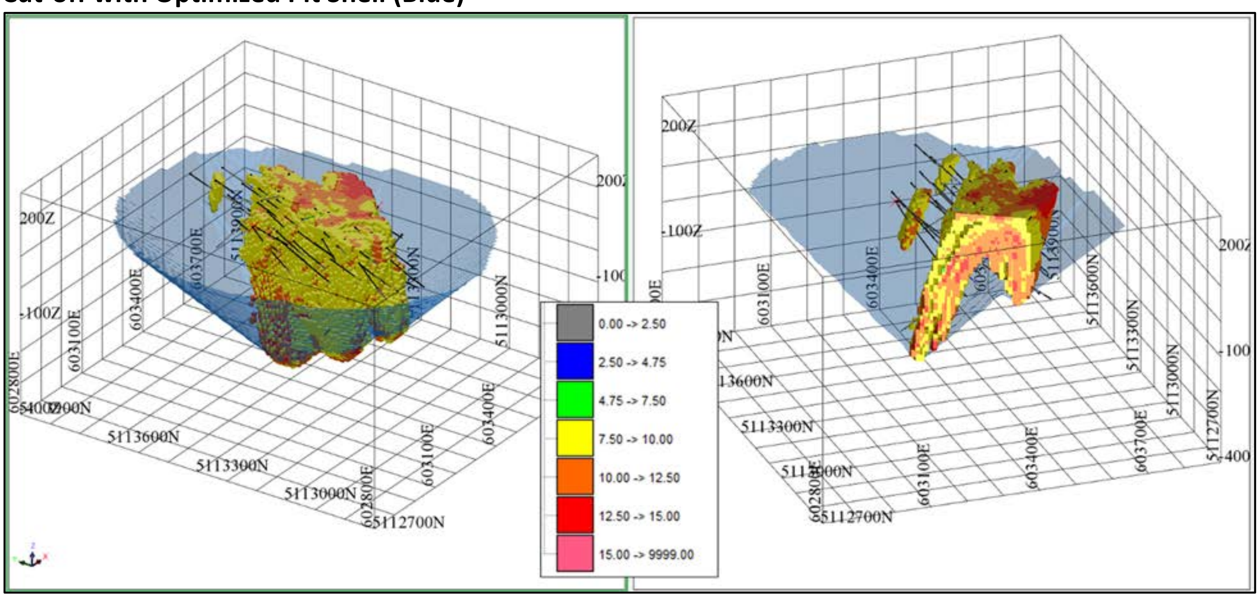
A comparative interpolation model was developed for manganese percent using inverse distance squared (IDS) methods and the 3.0 m composite population as a check against the OK interpolation results. Results are presented in Figure 14-18 and the models are considered acceptably comparable. The OK model results in marginally larger tonnages between 5% and 8% Mn cut-off, whereas the IDS model results in marginally larger tonnages above a 9% Mn cut-off. The ID2 model supports marginally higher average manganese grades at most cut-offs.

Figure 14-10: Oblique and Sectional View towards the Northeast of Manganese Values Above a 4.75 % Cut-off with Optimized Pit Shell (Blue)



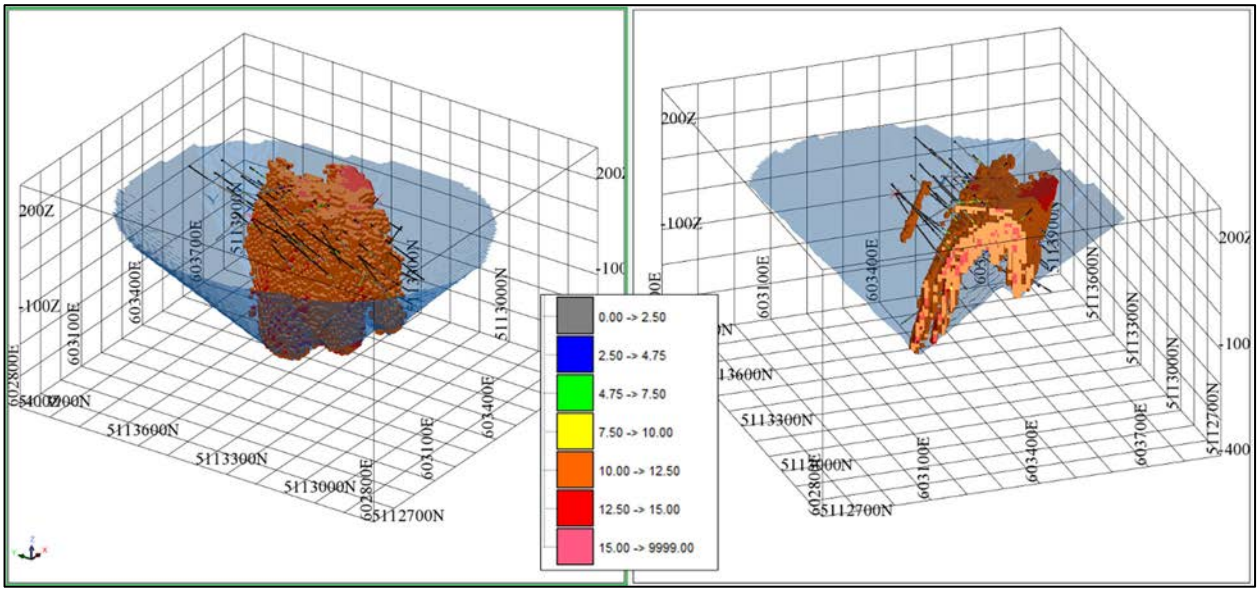
(Source: Mercator 2023)

Figure 14-11: Oblique and Sectional View towards the Northeast of Manganese Values Above a 7.5 % Cut-off with Optimized Pit Shell (Blue)



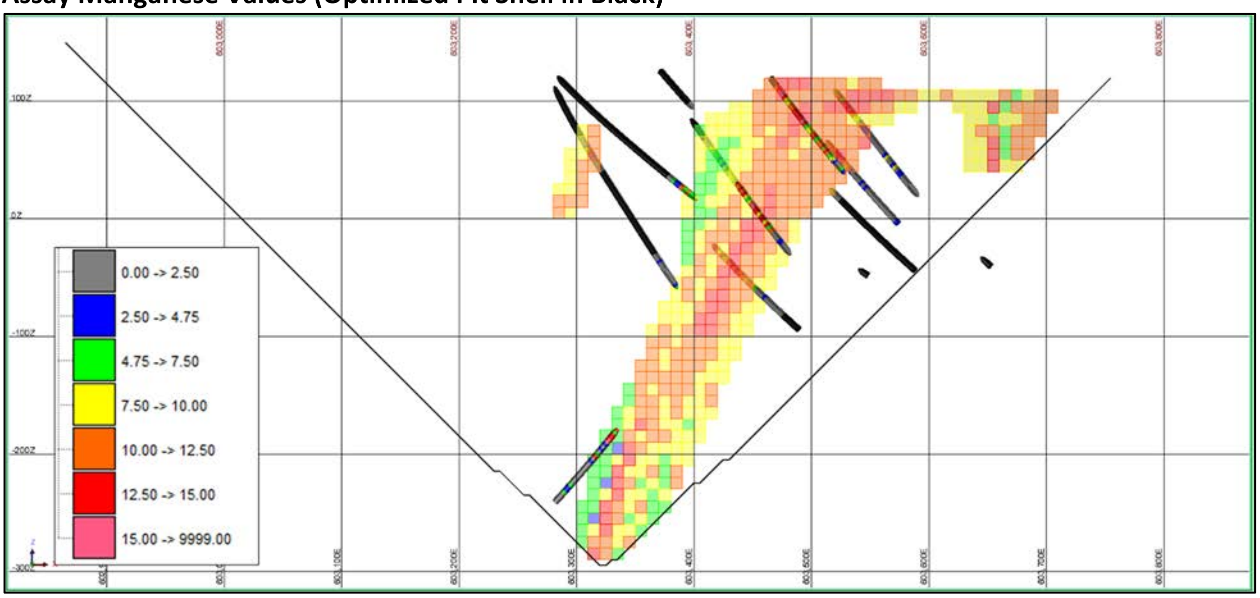
(Source: Mercator 2023)

Figure 14-12: Oblique and Sectional View towards the Northeast of Manganese Values Above a 10 % Cut-off with Optimized Pit Shell (Blue)



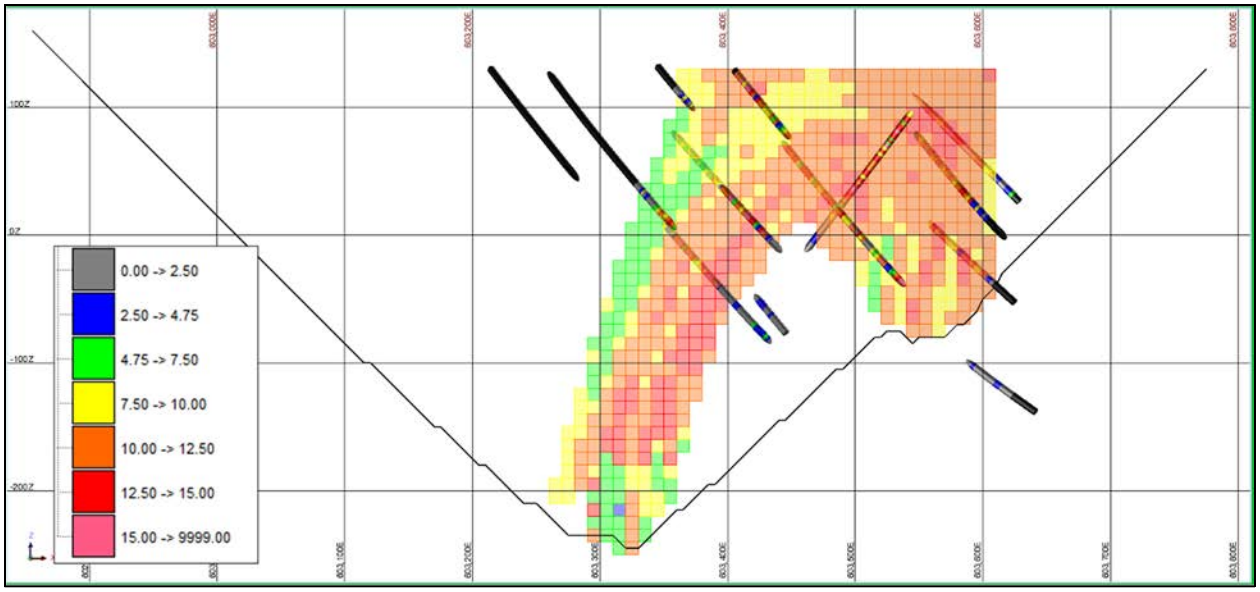
(Source: Mercator 2023)

Figure 14-13: Representative Cross-Section (5113410 North) Looking North Comparing OK Block and Assay Manganese Values (Optimized Pit Shell in Black)



(Source: Mercator 2023)

Figure 14-14: Representative Cross-Section (5113260 North) Looking North Comparing OK Block and Assay Manganese Values (Optimized Pit Shell in Black)

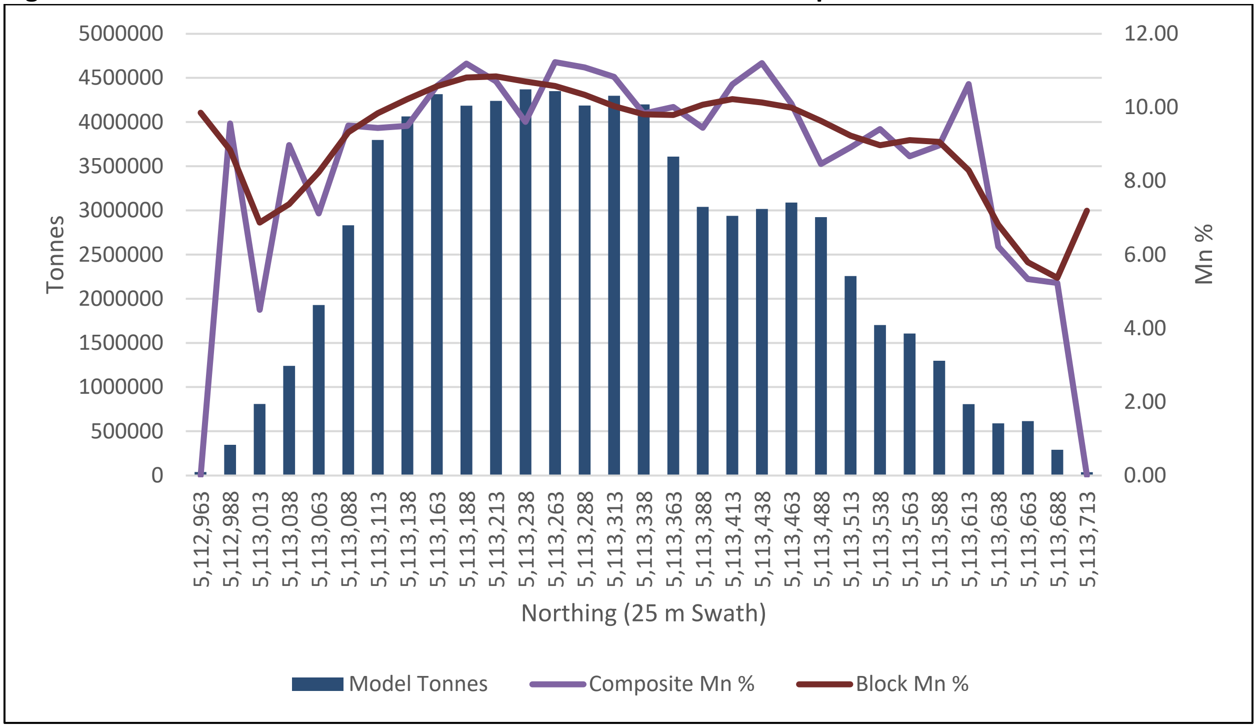


(Source: Mercator 2023)

Table 14-6: Comparison of Statistics between Block and 3 m Composite Values

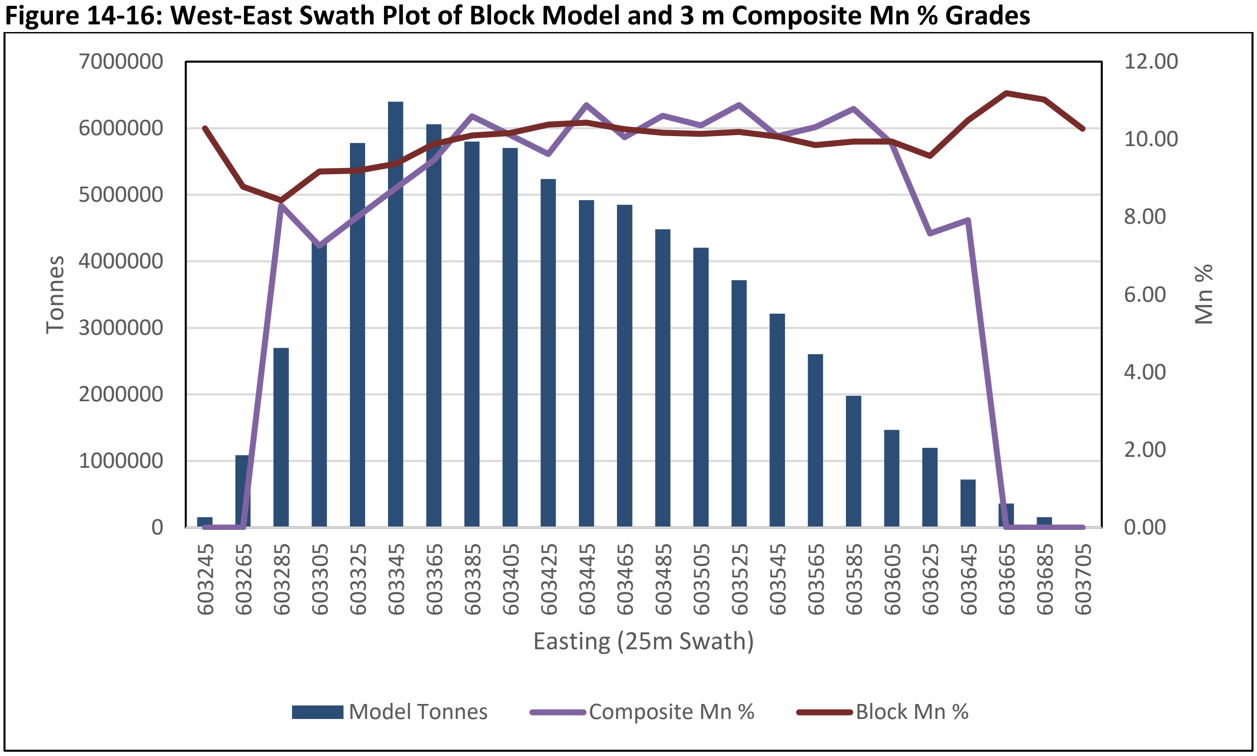
	Blocks			Composites		
Item	**Mn (%)**	**Fe (%)**	**Density (g/cm^3)**	**Mn (%)**	**Fe (%)**	**Density (g/cm^3)**
Mean Value	9.64	13.40	3.11	9.98	14.07	3.12
Minimum Value	0.00	0.00	2.70	0.00	0.00	2.48
Maximum Value	19.54	22.27	3.57	21.02	28.71	4.09
Variance	5.89	8.91	0.01	13.72	18.66	0.04
Standard Deviation	2.43	2.99	0.11	3.70	4.32	0.19
Coefficient of Variation	0.25	0.22	0.04	0.37	0.31	0.06
Number of Samples	31,303	31,303	31,303	1,864	1,864	1,647

Figure 14-15: South-North Swath Plot of Block Model and 3 m Composite Mn % Grades



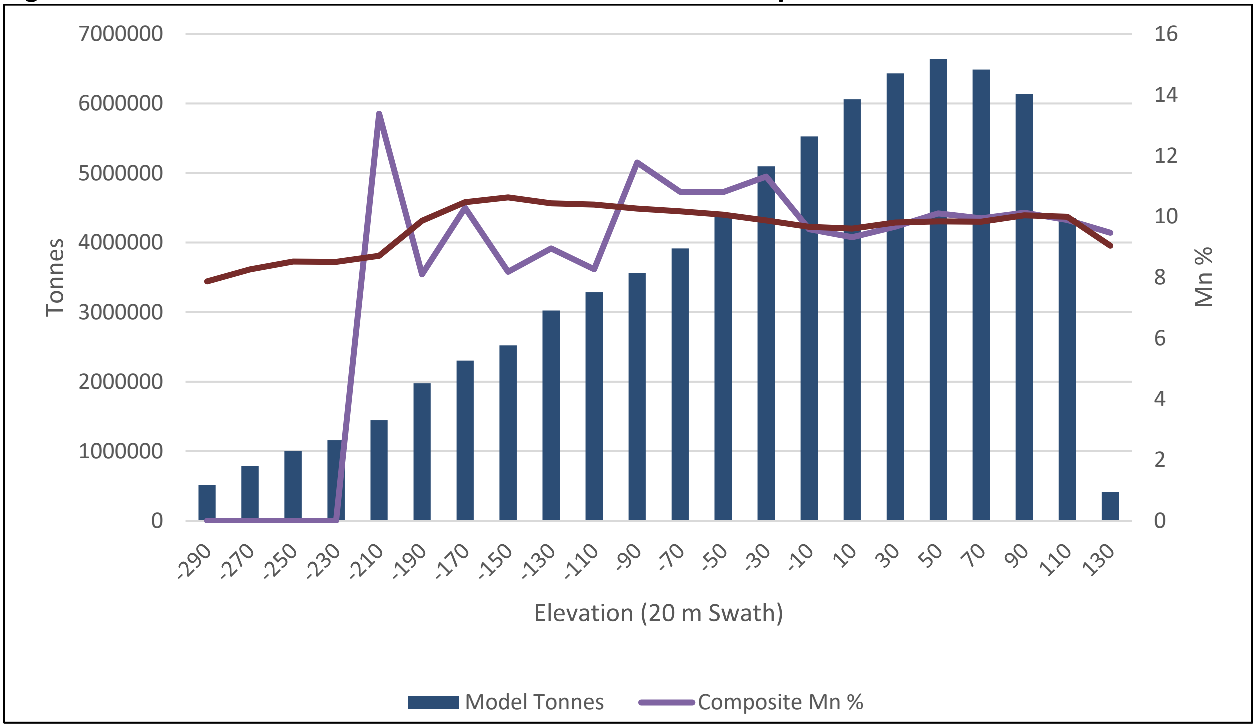
(Source: Mercator 2023)

Figure 14-16: West-East Swath Plot of Block Model and 3 m Composite Mn % Grades



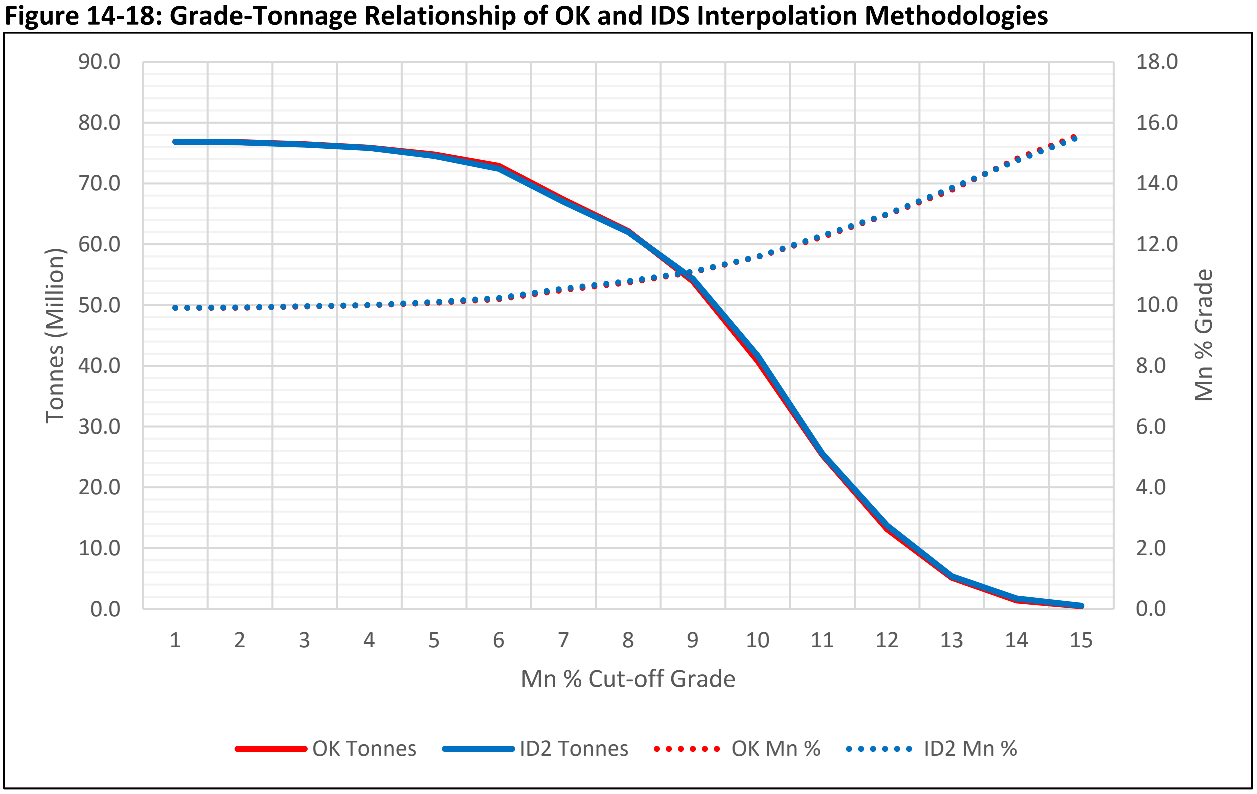
(Source: Mercator 2023)

Figure 14-17: Elevation Swath Plot of Block Model and 3 m Composite Mn % Grades



(Source: Mercator 2023)

Figure 14-18: Grade-Tonnage Relationship of OK and IDS Interpolation Methodologies



(Source: Mercator 2023)

14.5 Reasonable Prospects for Eventual Economic Extraction

To report a Mineral Resource in accordance with CIM Definition Standards (May 10, 2014), the Mineral Resource estimate must demonstrate Reasonable Prospects for Eventual Economic Extraction.

To report the Mineral Resources, an optimized open pit shell obtained using the Lerchs-Grossman (LG) algorithm was used to constrain the potentially economic mineralization. The QP generated the pit shell with Hexagon Mine Plan 3D version 16.03, MineSight® Economic Planner version 4.00-13 software using the input parameters summarized in Table 14-7. Metal Strategies Inc. provided updated metal pricing, mining costs, and recovery factors to be applied for the pit optimization based on their review of the 2021 MRE and the associated metallurgical studies, metal pricing and market forecasts, and cost assumptions. Based on these parameters, a cut-off grade of 4.75 % Mn was determined and reflects the marginal cut-off grade used in pit-optimization. The optimized pit shell supports a 3.78:1 strip ratio.

The reader is cautioned that the results from the pit optimization are used solely for the purpose of addressing Reasonable Prospects for Eventual Economic Extraction by an open pit and do not represent an attempt to estimate Mineral Reserves. The results are used as a guide to assist in the preparation of a Mineral Resource statement and to select an appropriate Mineral Resource reporting cut-off grade.

Table 14-7: Pit Optimization Parameters

Parameter	Units	Value
Mining Cost – Rock	US$ /t	5.50
Mining Cost – Overburden	US$/t	5.50
Processing Rate	Tonnes /day	1,500
Processing Recovery	%	77
Mining Recovery	%	100
Processing Plus General and Administrative (G&A) Plus Selling Cost	US$/t processed	199.17
Metal Price	US$/tonne HPMSM (32%)	1,760
Exchange Rate	CDN$ to US$	1.30:1.00
Gross Metal Royalty	%	2.5
Pit Slope Angle (Overburden)	Degrees	20
Pit Slope Angle (Rock)	Degrees	45

No value for the deposit’s iron content was assigned for optimization purposes but potential for by-product production of specific iron products has been identified and requires further study through completion of additional metallurgical testing.

14.6 Resource Category Parameters Used in Current Mineral Resource Estimate

Definitions of Mineral Resources and associated Mineral Resource categories used in this Technical Report are those set out in the CIM Definition Standards (May 10, 2014) as referenced in NI 43-101. Measured, Indicated, and Inferred categories have been assigned to the Plymouth Deposit.

Several factors were considered in defining resource categories, including drill hole spacing, geological interpretations and number of informing assay composites, and average distance of assay composites to block centroids. Specific definition parameters for each resource category applied in the current estimate are set out below.

Measured Resources: Measured Mineral Resources are defined as all blocks with interpolated manganese grades from the first interpolation pass that meet the specified pit-constrained cut-off grade.

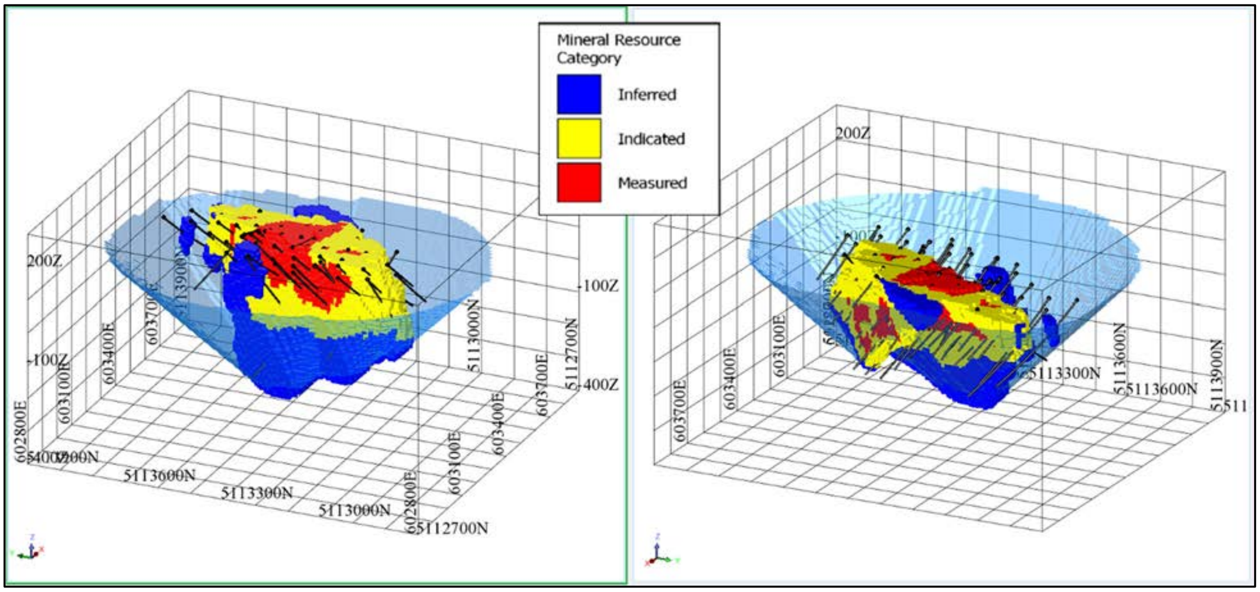
Indicated Resources: Indicated Mineral Resources are defined as all blocks with interpolated manganese grades from the first and second interpolation passes that were not previously assigned to the Measured category and meet the specified pit constrained cut-off grade.

Inferred Resources: Inferred Mineral Resources are defined as all blocks with interpolated manganese grades from the first, second, third and fourth interpolation passes that were not previously assigned to the Measured or Indicated category and meet the specified pit constrained cut-off grade.

Application of the selected Mineral Resource categorization parameters specified above defined distribution of Measured, Indicated, and Inferred MRE blocks within the block model. To eliminate isolated and irregular category assignment artifacts, the peripheral limits of blocks in close proximity to each other that share the same category designation and demonstrate reasonable continuity were wireframed and developed into discrete solid models. All blocks within these “category” solid models were re-classified to match that model’s designation. This process resulted in more continuous zones of each Mineral Resource category and limited occurrences of orphaned blocks of one category as imbedded patches in other category domains.

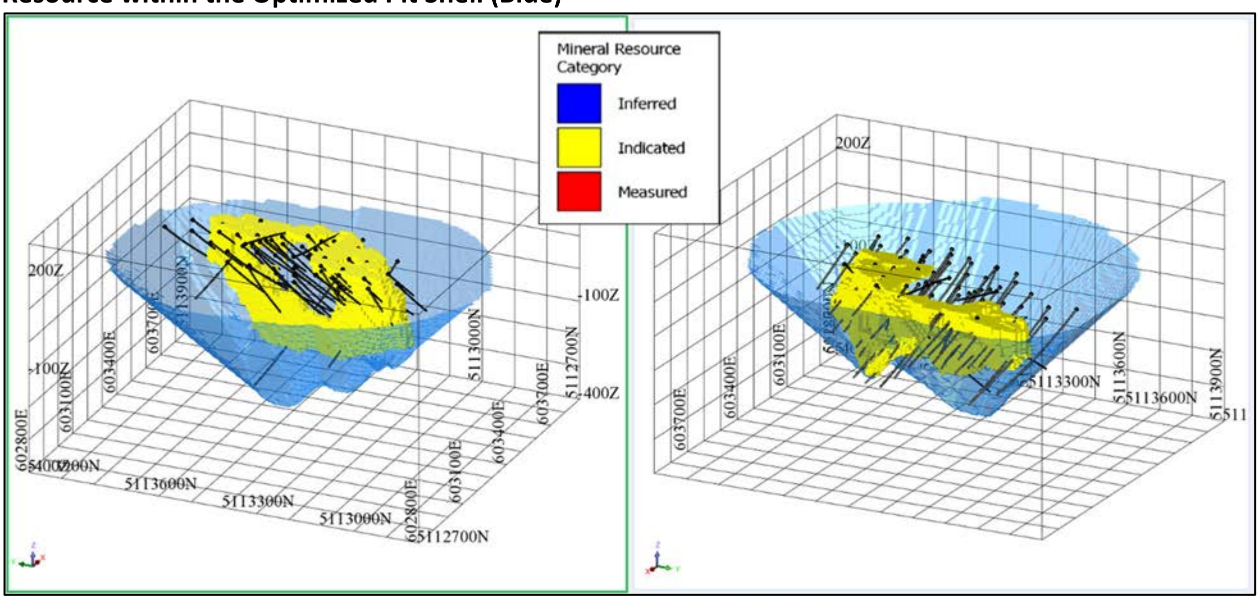
Mineral Resource category distribution demonstrates continuous zones of each category designation (Figure 14-19 to Figure 14-21).

Figure 14-19: Oblique View Looking Northeast (Left) and Southwest (Right) of the Mineral Resource Categorization within the Optimized Pit Shell (Blue)



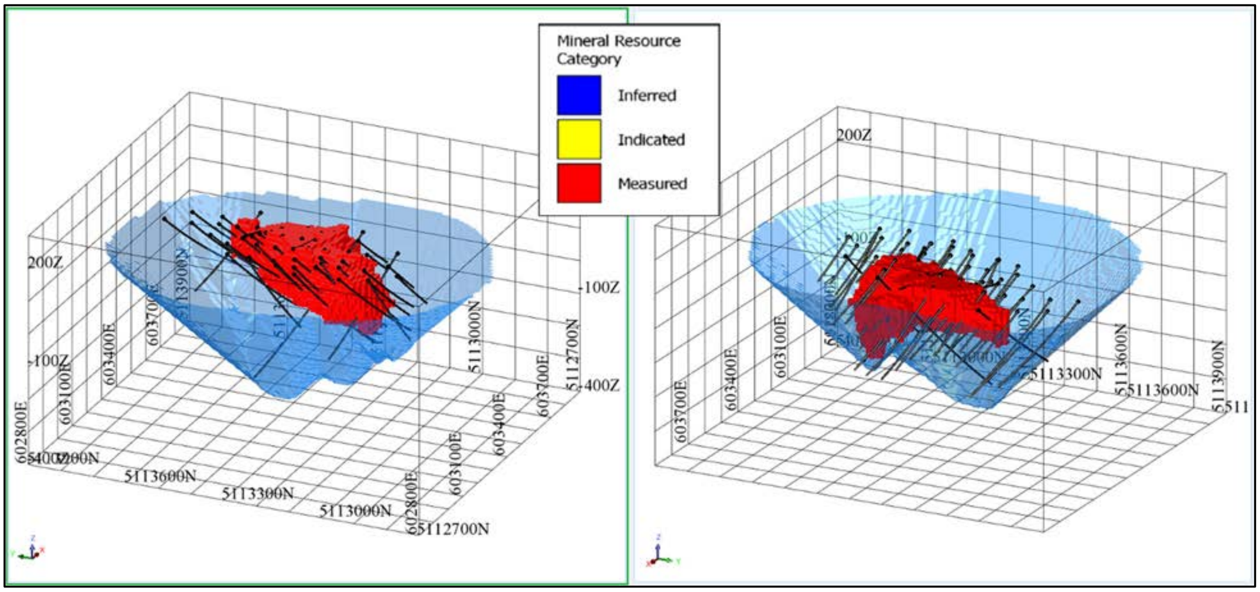
(Source: Mercator 2023)

Figure 14-20: Oblique View Looking Northeast (Left) and Southwest (Right) of the Indicated Mineral Resource within the Optimized Pit Shell (Blue)



(Source: Mercator 2023)

Figure 14-21: Oblique View Looking Northeast (Left) and Southwest (Right) of the Measured Mineral Resource within the Optimized Pit Shell (Blue)



(Source: Mercator 2023)

14.7 Statement of Mineral Resource Estimate

Block grade, block density and block volume parameters for the Plymouth Deposit were estimated using methods described in preceding sections. Subsequent application of resource category parameters set out above resulted in the MRE presented in Table 14-8. Mineral Resources are defined at a manganese cut-off grade of 4.75 % within an optimized pit shell. The 4.75 % Mn cut-off grade is based on the parameters discussed in Section 14.5 above and reflect Reasonable Prospects for Eventual Economic Extraction using conventional open pit mining methods. Results are reported in accordance with CIM Definition Standards (May 10, 2014). A cut-off grade sensitivity tabulation is presented in Table 14-9 for comparative purposes but does not constitute part of the Mineral Resource statement.

Table 14-8: Plymouth Deposit Mineral Resource Estimate – Effective Date: March 1, 2023

Cut-off (Mn %)	Category	Tonnes (Mt)	Mn (%)	Fe (%)
4.75	Measured	28.8	10.38	14.45
	Indicated	27.9	9.74	13.55
	Measured and Indicated	56.7	10.07	14.01
	Inferred	17.7	10.02	13.62

Notes:

1) Mineral Resources were prepared in accordance with the CIM Standards (May 10, 2014) and CIM MRMR Best Practice Guidelines (November 2019).

2) Mineral Resources are defined within an optimized pit shell with average pit slope angles of 45^o in bedrock and 20^o in overburden; a 3.78:1 strip ratio applies (waste: mineralized material)

3) Pit optimization parameters include: pricing of US$1,760 (CA$2,288)/t Mn in High Purity Manganese Sulphate Monohydrate (HPMSM) containing 32% Mn, a currency exchange rate of CA$1.30 to US$1.00, mining at US$5.50 (CA$7.15)/t, a 2.5% gross metal royalty, combined processing, G&A and selling cost (1,500 t/d process rate) at US$199.17 (CA$258.92)/t processed, and overall Mn recovery to HPMSM of 77%. Fe content did not contribute to the pit optimization process.

4) Mineral Resources are reported at a cut-off grade of 4.75% Mn within the optimized pit shell. This cut-off grade reflects the marginal cut-off grade used in pit optimization to define Reasonable Prospects for Eventual Economic Extraction using open pit mining methods.

5) Mineral Resources were estimated using GEOVIA Surpac® 2021 software and Ordinary Kriging methods applied to 3 m downhole assay composites. No grade capping was applied. Model block size is 10 m x 10 m x 10 m with partial percent volume estimation applied.

6) Bulk density was estimated using Ordinary Kriging methods applied to drill core specific gravity data; it is assumed that specific gravity approximates bulk density for the materials modelled. The average deposit bulk density for Mineral Resources is 3.13 g/cm^3.

7) Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues

8) Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

9) Figures may not sum due to rounding.

Table 14-9: Plymouth Deposit Cut-off Grade Sensitivity Analysis Within Mineral Resources

Type	Mn % Cut-off	Category	Tonnes (Mt)	Mn %	Fe %
***Pit Constrained**	**4.75**	**Measured**	**28.8**	**10.38**	**14.45**
		Indicated	**27.9**	**9.74**	**13.55**
		Measured and Indicated	**56.7**	**10.07**	**14.01**
		Inferred	**17.7**	**10.02**	**13.62**
Pit Constrained	6.00	Measured	28.3	10.48	14.56
		Indicated	26.6	9.95	13.74
		Measured and Indicated	54.9	10.22	14.16
		Inferred	17.3	10.13	13.72
Pit Constrained	7.25	Measured	27.0	10.66	14.78
		Indicated	24.2	10.28	14.07
		Measured and Indicated	51.2	10.48	14.44
		Inferred	14.6	10.78	14.41
Pit Constrained	8.50	Measured	24.3	10.96	15.15
		Indicated	20.5	10.70	14.47
		Measured and Indicated	44.8	10.84	14.84
		Inferred	13.4	11.04	14.69

Notes:
This table shows sensitivity of the March 1, 2023 MRE to cut-off grade. The base cut-off value of 4.75% Mn is bolded for reference and defines the 2023 MRE reporting cut-off grade.

14.8 Comparison with the Previous Mineral Resource Estimate

The previous MRE for the deposit was prepared by Mercator on behalf of CMC and had an effective date of June 30, 2021. Deposit modelling associated with the 2023 estimates is more highly constrained in comparison with 2021 due to the influence of the infill core drilling program carried out buy CMC in 2021-2022. The infill drilling factor is also directly reflected in the conversion of a large percentage of 2021 Inferred category resources to Indicated and Measured categories in 2023. A modest in increase ($260/t) in HPMSM pricing applied in the 2023 pit optimization is also present and contributes substantively to definition of the associated cut-off grade of 4.75% Mn, which is lower than the 5.0% Mn cut-off grade applied in 2021. Finally, expansion of total deposit resources above the 2021 inventory level primarily reflects confirmation of strike and dip extensions to the main mineralized zones that comprise the deposit, the largest of which occurs at the down-dip margin of the deposit's main mineralized zone solid.

14.9 Project Risks that Pertain to the Mineral Resource Estimate

The accuracy of a MRE is a result of the quantity and quality of available data and the assumptions and judgements used in the geological interpretation and engineering. This is, in part, dependent on analysis of drilling results and statistical conclusions which may prove to be unreliable or inaccurate. The estimation of a Mineral Resource is inherently uncertain, involves subjective judgement about many relevant factors, and may be materially affected by, among other things, environmental, permitting, legal, title, taxation, sociopolitical, and marketing issues. Inferred Mineral Resources are uncertain in nature and there has been insufficient exploration to define Inferred Mineral Resources as Indicated or Measured Mineral Resources. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

Factors that may materially impact the Mineral Resource include, but are not limited to, the following:

- Changes to the long-term HPMSM prices assumptions including unforeseen long term negative market pricing trends, and changes to the CA$:US$ exchange rate.
- Changes to the deposit scale interpretations of mineralization geometry and continuity
- Variance associated with density assignment assumptions and/or changes to the density values applied.
- Inaccuracies of deposit modelling and grade estimation programs with respect to actual metal grades and tonnages contained within the deposit.
- Changes to the input values for mining, processing, and G&A costs to constrain the Mineral Resource.
- Changes to metallurgical recovery assumptions including metallurgical recoveries that fall outside economically acceptable ranges.
- Variations in geotechnical, hydrological, and mining assumptions.
- Changes in the assumptions of marketability of the final product.
- Issues with respect to mineral tenure, land access, land ownership, environmental conditions, permitting, and social license.

At this time, the QP does not foresee any other significant risks and uncertainties that could reasonably be expected to affect the reliability or confidence in the drilling information and associated MRE disclosed in this Technical Report. The QP is of the opinion that Mineral Resources were estimated using industry accepted practices and conform to the CIM Definition Standards (May, 2014) and CIM MRMR Best Practice Guidelines (November 2019).

20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL IMPACTS

20.1 Introduction

Environmental permitting will be required for any future development of the Plymouth Deposit. Both provincial and federal government departments may be involved in such permitting, with lead responsibility resting with the province of New Brunswick. While this technical report does not contain any characterization of a specific site development approach or strategy, CMC previously identified in its 2014 technical report filed on SEDAR a potential open pit mine development scenario for this site. CMC's perspective on potential future develop scenarios at Plymouth has evolved substantially since 2014 and the company no longer fees that the 2014 approach will be followed. This primarily reflects the substantial change in interest away from potential EMM production and toward production of MSM and HPMSM. As a result, detailing of specific environmental permitting and social impact assessment considerations based on a specific potential or proposed project design is not possible at this time. Notwithstanding this limitation, the main areas of study and assessment that must feed into any future project permitting activities fall under the main categories listed below.

10. Site History
11. Climate
12. Wildlife And Vegetation
13. Aquatic Ecosystem
14. Watershed And Wellfield Protected Areas
15. Environmentally Significant Areas
16. Environmental Assessment and Permitting
17. Mine Closure and Reclamation Plan
18. Community Engagement, Inclusive of Indigenous Communities In The Area

The Environmental Assessment and Permitting category (Item 7 above) frames the manner in which work carried out to address the other categories is undertaken and a summary of relevant provincial and federal legislation appears below in report section 20.2. CMC initiated work on most of the categories noted prior to 2014, including that of Community Engagement. This very important aspect of any development path is recognized as being of foremost importance for the Project and CMC has initiated contact with the Woodstock First Nation, the Town of Woodstock, the Meduxnekeag River Association, and local landowners. CMC has also acquired surface title ownership to a large percentage of the land overlying the Plymouth Deposit and has entered into access agreements, as necessary, to carry out core drilling activities on adjoining land not owned by the company. Community and government contact activities by CMC staff and consultants with respect to the Plymouth Deposit Project were ongoing at the Effective Date of this Technical Report.

20.2 Environmental Assessment and Permitting Process

The following summaries of provincial and federal environmental assessment (EA) processes and references to key legislation were prepared through consolidation of information previously presented by CMC in the company's 2014 and 2021 technical reports. Only minor changes have been made to meet current context.

20.2.1 Provincial Level

Any future Plymouth Deposit development project would be subject to the *Environmental Impact Assessment Regulation* (87-83) (EIAR) under the *Clean Environment Act* (CEA), as well as the federal EA process under the *Canadian Environmental Assessment Act 2012* (CEAA 2012). There is no formal EA cooperation agreement between New Brunswick and Canada, but the EA requirements are often combined for both jurisdictions, which makes it possible to streamline the EA processes.

The EA and permitting process for a development in New Brunswick is administered by the Project Assessment Branch of the NB Department of Environment and Local Government (NBDELG) and a process for mining and processing a mineral commodity typically is considered a Class 1 undertaking under the Clean Environment Act (CEA), *Environmental Impact Assessment Regulation* (87-83). If after the Determination/Comprehensive review of the project the Minister approves it to proceed under the *Clean Environment Act*, certificates for Approval to Construct and Approval to Operate will be issued and other permits necessary for operation can be applied for through the appropriate licensing agency. Among the approvals is a mining lease. Following determination approval, the proponent is expected to submit a feasibility study (or an appropriate presentation of the economic viability of the project) and a detailed mining and reclamation plan, including an estimate of required financial security to the Standing Committee on Mining and the Environment (SCME).

The SCME operates under the direction of the Minister of Natural Resources and is comprised of representatives from the New Brunswick Department of Energy and Mines, the New Brunswick Department of Environment and Local Government, and Environment Canada and coordinates the mine approval process. The mine approval process addresses the requirements of environmental, mining, and land use legislation. Although the SCME coordinates the process, the participating agencies are responsible for issuing the required approvals.

Other project related approvals may include a Mining Lease, License of Occupation, Crown Land Lease, Harvest Permit, Quarry Permit, Development and Building Permit, Approval and License for Petroleum Storage, approval to install an On-site Sewage Disposal System, and a Watercourse and Wetland Alteration Permit. Reclamation and rehabilitation of the environment after completion of mining would be required under provisions of the *Mining Act* of New Brunswick (Section 111.1a).

Community engagement opportunities would have to be provided by CMC throughout any EA process to provide project specific information and seek out issues, concerns, and ideas for inclusion in the environmental impact statement. Proof of such engagement is required throughout the EA process. Aboriginal consultation on the part of the province is handled by the Aboriginal Affairs Secretariat (AAS) and this important aspect of community contact and consultation should be developed as early in any EA process as possible. Although it is not currently undergoing an EA for the Plymouth Deposit project, CMC had previously established contact with the Woodstock First Nation and has maintained such contact to the present.

20.2.2 Federal Level

Any future Plymouth Deposit development project would be subject to an environmental assessment under the *Canadian Environmental Assessment Act 2012* (CEAA 2012) if the planned production rate met the 3000 tonne per day qualifying threshold that defines a "designated project" under that legislation. A project at a lesser production rate would be subject to a standard environmental assessment administered by the Canadian Environmental Assessment Agency (CEA Agency).

In order to commence the EA process, a project description must be submitted to the CEA Agency. The Minister and Federal Cabinet may refer a designated project from the federal EA process into the provincial EA process, and vice versa, if it is determined that the province will undertake an equivalent assessment or if the project is deemed to have the potential for significant environmental impact regardless of whether or not the project is "designated" under CEAA 2012. EAs completed by the CEA Agency must reach a final determination within one year (365 days) and assessments completed by a review panel or joint review panel must reach a final decision within two years (24 months) of commencement of the EA process. The Minister and Federal Cabinet have the authority to extend these timelines in extenuating circumstances. These timelines do not include time required for the proponent to gather additional information, if requested, to complete the assessment.

A project such as this is considered a natural resource development and the Major Project Management Office (MPMO) would provide overarching project management for the federal EA process should the Project be captured under CEAA 2012. The MPMO is administered by Natural Resources Canada whose role is to provide guidance to project proponents and other stakeholders, coordinate project agreements and timelines between federal departments and agencies, and to track and monitor the progression of major resource projects through federal regulatory review process. The MPMO has no legislative authority.

Any project at Plymouth would also be required to comply with the *Metal Mining Effluent Regulations* (MMER – SOR/2002-222) and conditions of the *Navigation Protection Act* (NPA) and the federal Fisheries Act.

23.0 ADJACENT PROPERTIES

The CMC Project is located adjacent to the Battery Hill Project manganese-iron deposits currently held by Manganese X Energy Corp. ("Manganese X"). The Battery Hill Project contains the Moody Hill, Sharpe Farm, and Iron Ore Hill deposits, and is located approximately 4 km north of the Plymouth Deposit, near the village of Jacksonville, NB. The style of mineralization in the Battery Hill Project is broadly comparable to that found in the Plymouth Deposit, but average manganese and iron grades for Mineral Resources are lower, typically being in the 6% to 7% Mn range. Manganese X has developed a metallurgical extraction process with a relatively low estimated unit cost that has substantially contributed to definition of a Mineral Resource reporting cut-off grade of 2.5% Mn for the Battery Hill Project. This is substantially lower than the current Plymouth Deposit Mineral Resource reporting cut-off grade 4.75% Mn. The current NI 43-101 MRE was prepared for the Battery Hill Project in 2022 by Mercator and defines approximately 35 million tonnes of Measured and Indicated Mineral Resources grading 6.4% Mn and approximately 28 million tonnes of inferred Mineral Resources grading 6.5% Mn, at a 1.5% Mn cut-off. This MRE supported a 2022 PEA prepared by Wood and a NI 43-101 Technical Report, Effective Date 12 May, 2022, can be found on the company's website and also on SEDAR.

The Manganese X Battery Hill Project contains broadly similar geology and structure to the Plymouth Deposit. However, the QP has not independently verified the technical information for the adjacent property on behalf of CMC and information related to the adjacent property is not necessarily indicative of the mineralization potential at the CMC Woodstock Project discussed in this Technical Report.

24.0 OTHER RELEVANT DATA AND INFORMATION

The authors are not aware of any other relevant data or information that is considered material to the subject matter of this technical report.

25.0 INTERPRETATION AND CONCLUSIONS

25.1.1 Project Rationale

The importance of high purity manganese applications in the emerging battery metals market has become increasingly clear, and industry efforts to define and develop opportunities for production of high-quality manganese products such as EMM, HPEMM and HPMSM has accelerated. Based on analysis of world supply and demand trends for battery metals carried out for CMC most recently by Metal Strategies Inc. and previously by Benchmark Mineral Intelligence Inc., it is clear that opportunities for new producers of HPMSM in particular will begin to appear in the early 2020's period and continue to rise gradually through 2040.

Subsequent to the 2014 PEA by Tetra Tech, CMC shifted its Project focus from EMM to MSM and HPMSM products to better address significant forecasted growth in battery market opportunities. This was first represented in the processing scenario associated with the 2021 MRE pit shell optimization for the Plymouth Deposit. The Company continued to modify it's approach to producing and marketing high purity manganese products from any future operation, with the current view being focused primarily on production of HPMSM from EMM for final sale. This scenario is applied in the current Mineral Resource estimate pit optimization.

25.1.2 Mineral Resources

The current optimized Mineral Resource pit shell and associated 4.75% Mn cut-off grade define Reasonable Prospects for Eventual Economic Extraction using conventional open pit mining methods. The current cut-off grade of 4.75% Mn is slightly lower than the 5.0 % Mn cut-off grade applied in the 2021 MRE and primarily reflects application of a slightly higher Mn price in 2023. The infill and expansion core drilling program completed by CMC in 2021-2022 is directly reflected in both categorization of the current Mineral Resource and expansion of the total resource inventory from the 2021 level. Indicated and Measured category tonnages account for 76% of the 2023 deposit total, and Inferred category tonnage accounts for the remaining 24%. In contrast, the entire 2021 MRE was categorised as Inferred. Results of CMC's 2021-2022 deposit expansion and infill drilling program, combined with the lower Mineral Resource reporting cut-off grade of 4.75% Mn, are responsible for increase in the total Mineral Resource inventory for the Plymouth Deposit by 73% from the 2021 inventory total.

Results of the 2021-2022 drilling program confirmed that the Plymouth Deposit remains open to the northeast and southwest along strike, and also down dip on both the northwest and southeast limbs of the regional fold that affects the deposit. Faulting near the southwest limit of drilling appears to have reduced the deposit width in this area but the deposit extension remains open to the southwest at present. Completion of one additional section of drilling (3 holes per section) across the northeast and southwest strike extensions of the deposit could provide helpful geotechnical and geological information in these deposit-limit areas and should be considered. There is, however, no current need for substantive new definition or infill drilling programs on the Plymouth Deposit. The existing large inventory of

Measured and Indicated category Mineral Resources is sufficient to support PFS or FS level evaluations of the deposit's economic viability, and this work should now be the focus of CMC's near-term Project efforts.

25.1.3 Project Risks

The Project is subject to various project risks. Prominent among these are: (1) metal price fluctuations, (2) potential regulatory challenges with respect to future environmental permitting of any future operating site, (3) identification of unforeseen geotechnical issues that may affect mine development, (4) inconsistency between actual bedrock tonnages and metal grades with respect to the MRE and its supporting mode, and (5) successful development of a cost-effective processing flowsheet for EMM and HPMSM production. All of these must be addressed on an ongoing basis to minimize and manage their potential impact on the Project. Notwithstanding the above assessment, the report authors have not identified any significant risks or uncertainties that could reasonably be expected to affect the reliability or confidence in the drilling information and MRE disclosed in this Technical Report.

25.1.4 North Hartford Deposit Initial Drilling Programs

The North Hartford Deposit is located approximately 3 km northeast of the Plymouth and CMC completed a four-hole core drilling program at this location in August of 2022. Results of the program confirmed that a substantial mineralized zone similar in lithologies and metal grades to the Plymouth Deposit is present at this location. In late February of 2023, the Company initiated a deposit delineation (29 holes) core drilling program at North Hartford that was ongoing at the Effective Date of this Technical Report. Laboratory results are not yet available for the 2023 program, but geological units intercepted to date are similar to those encountered in the August 2022 program. Successful completion of the current North Hartford drilling program should provide a sufficient drilling database to support future preparation of a Maiden Mineral Resource estimate for the deposit.

26.0 Recommendations

26.1 Introduction

The following recommendations with respect to further evaluation of the Project are based on work completed to date by CMC and its various contractors and consultants. The premise underlying the recommendations is that a PFS of the Plymouth Deposit based on the current MRE should be undertaken as the next stage of its technical and economic evaluation. It is recommended that this be carried out as a two-Phase program, the first of which predominantly consists of identifying and assembling all technical, economic, and other information required to support preparation of the PFS. Phase II is focused on assembling, analyzing and interpreting Phase I results and acquiring additional data where necessary. This is followed by completion of the detailed PFS evaluation of project viability and preparation of a NI 43-101 Technical Report that documents all contributing work programs and results. Expenditure estimates for completion of the recommended Phase I and II work programs are presented below in section 25.2.2.

The main Phase I work program recommendations are as follows:

- A geotechnical assessment of the Plymouth Deposit area designed and executed by qualified professionals should be undertaken to establish data required for future open pit design programs. This will require dedicated core drilling support plus assessment of existing archived drill core. An initial core drilling allocation of 1,200 m is recommended.

- Baseline environmental permitting and community consultation studies, including consultation with Indigenous communities, should continue. This should expedite transition of the Project through the PFS stage of evaluation. Installation of ground water monitoring wells to augment existing surface water monitoring activities will be required.

- The northeast strike extension of the Plymouth deposit should be tested by one additional drilling section comprised of 3 drill holes located 100 m northeast of the current drilling limit. Results will better define geology in this area that adjoins the Meduxnekeag River valley. A core drilling allocation of 1200 m is recommended.

- The southwest strike extension of the Plymouth Deposit should be tested by one additional drilling section comprised of 3 drill holes located 100 m southwest of the current drilling limit. Results will better define potential faulting in this area as well as assess the deposit extension. A core drilling allocation of 1200 m is recommended.

- Advanced metallurgical and processing studies required to define a PFS level processing flowsheet and associated costs should be carried out.

- A maiden MRE for the North Hartford Deposit should be completed as soon as possible based on results of the 2022-2023 CMC core drilling program.

The main Phase II work program recommendation is as follows:

- A PFS for the Plymouth Deposit should be prepared in accordance with the CIM Standards, with the basis being results of the various technical and other information inputs assembled in the Phase I programs referenced above.

26.2 Phase I and Phase II Recommended Budgets

As noted above, the main objective of Phase I is to complete all preparatory work necessary to produce a PFS for future development of the deposit. The current inventory of Measured and Indicated category Mineral Resources should be sufficient for PFS purposes. Phase I proposed expenditures totalling $CDN 1,925,000 are presented below in Table 26.1 and are focused on acquisition of geotechnical, metallurgical, engineering, environmental, marketing and community consultation inputs for the Phase II program. Phase II work programs address preparation of the actual PFS and include progression of time-sensitive environmental permitting studies required for future project development. Phase II proposed expenditures totalling $1,650,000 are presented below in Table 26-1.

Scheduling of Phase II programs logically follows completion of those assigned to Phase I but progression to Phase II work is not specifically contingent on prior receipt of all Phase I results.

Table 26-1: Budget for Recommended Phase I and Phase II PFS Programs

Item	**Phase**	**Program Component**	**Estimated Cost ($CDN)**
1	Phase I	Geotechnical, engineering, environmental, marketing and community consultation studies required to support PFS level inputs for Phase II	$1,000,000
2	Phase I	Metallurgical testing and pre-concentration flow sheet design studies to support PFS level design and costing inputs for EMM and HPMSM production inputs for Phase II	$500,000
3	Phase I	Core drilling for geological assessment of deposit strike extensions or acquisition of metallurgical testing material	$250,000
	Subtotal		$1,750,000
		Contingency	$175,000
	Total		**$1,925,000**
1	Phase II	Preparation of a PFS defining Mineral Reserves based on an updated MRE plus final pre-concentration flow sheet, geotechnical, environmental, geological, engineering, market study, socio-economic and community consultation programs initiated in Phase I	**Estimated Cost ($CDN)**
	Subtotal		$1,500,000
		Contingency	$150,000
	Total		**$1,650,000**

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28.0 CERTIFICATES OF QUALIFIED PERSONS

CERTIFICATE OF QUALIFIED PERSON

Matthew D. Harrington, P. Geo.

I, Matthew D. Harrington, P. Geo., do hereby certify that:

1. I am currently employed as Senior Resource Geologist and President with:

   Mercator Geological Services Limited
   65 Queen Street, Dartmouth, NS B2Y 1GA

2. The Technical Report to which this certificate applies is titled "*NI 43-101 Technical Report, Mineral Resource Estimate for the Woodstock Project (Plymouth Manganese-Iron Deposit), Woodstock Area, New Brunswick, Canada*" with an effective date of March 1, 2023.

3. I hold a Bachelor of Science degree (Honours, Geology) in 2004 from Dalhousie University and I have worked as a geologist in Canada and internationally since my graduation. My relevant experience with respect to this Project includes extensive professional experience with respect to geology, mineral deposits and exploration activities in the Northern Appalachians and elsewhere. I have recent specific experience in assessment of Mn-Fe deposits in the Woodstock area and contributed to the Technical Report titled *"NI 43-101 Technical Report on the Preliminary Economic Assessment on the Woodstock Manganese Property, New Brunswick",* Canada prepared by Tetra Tech, with an effective date of July 10, 2014, and filed on SEDAR under Canadian Manganese Company Inc. I also contributed to the earlier 2013 Plymouth Deposit Technical Report as well as the 2021 Plymouth Deposit Mineral Resource Estimate Technical Report prepared by Mercator with an Effective Date of November 10, 2021, and titled *"Updated NI 43-101 Technical Report for the Woodstock Project (Plymouth Manganese-Iron Deposit), Woodstock Area, New Brunswick, Canada"*, that is filed on SEDAR under Canadian Manganese Company Inc. I also contributed to the SEDAR-filed June 2021 NI 43-101 Mineral Resource estimate Technical Report prepared for the Battery Hill Project manganese-iron deposit located on the Woodstock area property held by Manganese X Energy Corp.

4. I am a member in good standing of the Association of Professional Geoscientists of Nova Scotia (Registration Number 0254), the Association of Professional Engineers and Geoscientists of Newfoundland and Labrador (Member Number 09541), and the Order des Geologues du Quebec (Registration Number 2345).

5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I have not visited the Woodstock Project.

7. I am responsible for Sections 1, 14(except 14.5), 24, 25, and 26 of this Technical Report.

8. I have previous involvement with the Woodstock Project that is the subject of this Technical Report as described in item 3 above.

9. I am independent of Canadian Manganese Company Inc. as described in Section 1.5 of NI 43-101.

10. I have read NI 43-101 and this Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

11. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make this Technical Report not misleading.

Signed, sealed and dated this 17th day of April 2023.

[“Original signed and stamped by Matthew Harrington, P. Geo.”]

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Matthew Harrington, P. Geo.

CERTIFICATE OF QUALIFIED PERSON

Kevin-Dane MacRae, P. Geo.

I, Kevin-Dane MacRae, P. Geo., do hereby certify that:

1. I am currently employed as Senior Project Geologist with:
   Mercator Geological Services Limited
   65 Queen Street, Dartmouth, NS B2Y 1GA
2. The Technical Report to which this certificate applies is titled "*NI 43-101 Technical Report, Mineral Resource Estimate for the Woodstock Project (Plymouth Manganese-Iron Deposit), Woodstock Area, New Brunswick, Canada*" with an effective date of March 1, 2023.
3. I received a Bachelor of Science degree (Honours, Geology) in 2011 from St. Francis Xavier University and I have worked as a geologist in Canada since my graduation. My relevant experience with respect to this Project includes extensive professional experience with respect to geology, mineral deposits and exploration activities in Northern Manitoba, Northern Appalachians and elsewhere. I have specific experience in assessment of Mn-Fe deposits in the Woodstock area and contributed to planning and supervising the 2021-2022 and 2023 drilling programs described in this Technical Report.
4. I am a member in good standing of the Association of Professional Geoscientists of Nova Scotia (Registration Number 241), the Association of Professional Engineers and Geoscientists of New Brunswick (Member Number L6421) and L'Ordre des Géologues du Québec (Member Number 02245).
5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I completed multiple site visits on the Woodstock Project between November 2021 and August 2022.
7. I am responsible for sections 10, 11, 12, 15, 16, 17, 18, 23 and 27 of this Technical Report.
8. I have previous involvement with the Woodstock Project that is the subject of this Technical Report as described in item 3 above.
9. I am independent of Canadian Manganese Company Inc. as described in Section 1.5 of NI 43-101.
10. I have read NI 43-101 and this Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
11. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make this Technical Report not misleading.

Signed, sealed and dated this 17th day of April 2023.

["Original signed and stamped by Kevin-Dane MacRae, P. Geo."]

____

Kevin-Dane MacRae, P. Geo.

CERTIFICATE OF QUALIFIED PERSON

Michael Cullen, P. Geo.

I, Michael P. Cullen, P. Geo., do hereby certify that:

1. I am currently employed as Chief Geologist with:

   Mercator Geological Services Limited
   65 Queen Street, Dartmouth, NS B2Y 1GA

2. The Technical Report to which this certificate applies is titled "*NI 43-101 Technical Report, Mineral Resource Estimate for the Woodstock Project (Plymouth Manganese-Iron Deposit), Woodstock Area, New Brunswick, Canada*" with an effective date of March 1, 2023.

3. I received a Master of Science (Geology) degree from Dalhousie University in 1984 and a Bachelor of Science Degree (Honours, Geology) in 1980 from Mount Allison University. I am a registered member in good standing of the Association of Professional Geoscientists of Nova Scotia (Registration Number 064), Newfoundland and Labrador Professional Engineers and Geoscientists (Member Number 05058) and Association of Professional Engineers and Geoscientists of New Brunswick, (Registration Number L4333). I have worked as a geologist in Canada and internationally since graduation and have been employed by Mercator Geological Services Limited since 2001. I am a "Qualified Person" for the purposes of National Instrument 43-101 (the "Instrument") My relevant experience with respect to this Project includes extensive professional experience with respect to geology, mineral deposits and exploration activities in the Northern Appalachians and elsewhere. I have recent specific experience in assessment of Mn-Fe deposits in the Woodstock area and contributed to the Technical Report titled "NI 43-101 Technical Report on the Preliminary Economic Assessment on the Woodstock Manganese Property, New Brunswick", Canada prepared by Tetra Tech, with an effective date of July 10, 2014, and filed on SEDAR under Canadian Manganese Company Inc. I also contributed to the earlier 2013 NI 43-101 Plymouth Deposit Mineral Resource Estimate Technical Report prepared by Mercator and supervised preparation of the June 2021 Technical Report titled "Updated NI 43-101 Technical Report for the Woodstock Project (Plymouth Manganese-Iron Deposit), Woodstock Area, New Brunswick, Canada, prepared for Canadian Manganese Company Inc. by Mercator and filed on SEDAR under Canadian Manganese Company Inc.

4. I am a member in good standing of the Association of Professional Geoscientists of Nova Scotia (Registration Number 64) and the Association of Professional Engineers and Geoscientists of Newfoundland and Labrador (Member Number 09541), and the Association of Professional Engineers and Geoscientists of New Brunswick.

5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I have visited the Woodstock Project numerous times, the most recent being on February 8 of 2023.

7. I am responsible for Sections 2, 3, 4, 5, 6, 7, 8, 9, 13, and 20 of this Technical Report.

8. I have recent previous involvement with the Woodstock Project as described in item 3 above.
9. I am independent of Canadian Manganese Company Inc. as described in Section 1.5 of NI 43-101.
10. I have read NI 43-101 and this Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
11. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make this Technical Report not misleading.

Signed, sealed and dated this 17th day of April 2023.

[“Original signed and stamped by Kevin-Dane MacRae, P. Geo.”]

____
Michael Cullen, P. Geo.

CERTIFICATE OF QUALIFIED PERSON

Lawrence Elgert, P. Eng.

I, Lawrence Elgert, P. Eng., do hereby certify that:

1. I am currently employed as Principal Mining Engineer with:

   AGP Mining Consultants Inc.
   Suite 246-132K Commerce Park Dr., Barrie, ON L4N 0Z7

2. The Technical Report to which this certificate applies is titled "*Updated NI 43-101 Mineral Resource Estimate Technical Report for the Woodstock Project, (Plymouth Manganese-Iron Deposit), Woodstock Area, New Brunswick, Canada*" with an effective date of March 1, 2023.

3. I am a graduate of the Montana College of Mineral Science and Technology with a B.S in Mining Engineering in 1989. I have practiced my profession in the mining industry continuously since graduation. My relevant experience includes over 30 years where I have been directly involved in mine planning and design, ore control, geomechanics, production forecasting and management, slope stability monitoring and operations, mainly for open-pit precious and base metal and coal mines.

4. I am a member in good standing of Engineers and Geoscientists BC (Registration Number: 29807).

5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I have not visited the Woodstock Project. I have previous involvement with the Woodstock Project as a co-author of the 2021 NI 43-101 Technical Report titled "Updated NI 43-101 Technical Report for the Woodstock Project (Plymouth Manganese-Iron Deposit), Woodstock Area, New Brunswick, Canada", prepared for Canadian Manganese Company Inc. by Mercator and filed on SEDAR under Canadian Manganese Company Inc.

7. I am responsible for section 14.5 of the Technical Report.

8. I am independent of Canadian Manganese Company Inc. as described in Section 1.5 of NI 43-101.

9. I have read NI 43-101 and this Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

10. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make this Technical Report not misleading.

Signed, stamped and dated this 17th day of April 2023.

["Original signed and stamped by Lawrence Elgert, P. Eng."]

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Lawrence Elgert, P. Eng.

Permit To Practice 1003765