



Electric Metals (USA) Limited
Emily Manganese Project
NI 43-101 Technical Report
Project No. 219001



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1. SUMMARY

1.1 Terms of Reference

In 2023, North Star Manganese Inc (NSM), an indirect subsidiary of Electric Metals (USA) Limited, commissioned Forte Dynamics, Inc. (Forte) to complete a technical study to estimate the mineral resources of the Emily Manganese Deposit (Emily), in Minnesota, USA (the “Report”). North Star Manganese is a 100% indirectly held subsidiary of Electric Metals (USA) Limited, a corporation incorporated under the federal laws of Canada and listed on the TSX Venture Exchange (TSX.V: EML) and on the OTC Venture Market in the United States (OTCQB: EMUSF). The study was prepared in accordance with National Instrument 43-101 (NI 43-101) Standards of Disclosure for Mineral Projects format.

1.2 Location

Emily is located approximately 143 miles (230km) north of Minneapolis, MN in northern Crow Wing County and is on the northern portion of the Emily District, of Minnesota’s Cuyuna Iron Range, approximately 2 miles (3.2 km) north, northwest of the City of Emily, Minnesota, and west of State Highway 6, as shown on Figure 4-1.

The deposit is accessed by paved roads and benefits from proximity to medium to large cities and regional industrial centres (iron mining and processing), with major domestic and international transportation linkages, as shown in Table 4-1.

1.3 History

The deposit was discovered by Pickands Mather Mining Company in the 1940’s while exploring for iron ore and has been explored by a variety of companies. U.S. Steel proposed the West Ruth Lake iron ore mining operation, along with two nearby iron ore mines, in the 1950’s. All three proposed iron ore mines contained moderate to high-grade manganese concentrations associated with the iron ore. However, by the early 1960’s iron ore operations ceased production in the Cuyuna Iron Range and the West Ruth Lake complex was not developed. In the late 1950’s Minnesota’s iron ore operations moved to the Mesabi Iron Range for the mining of taconite and production of taconite pellets for steel mills.

1.4 Geology

The Cuyuna Iron Range is about 100 miles (160km) west-southwest of Duluth in Aitkin, Cass, Crow Wing, and Morrison Counties. It is part of an Early Proterozoic geologic terrane which occupies much of east-central Minnesota. The Cuyuna Iron Range is traditionally divided into three districts, the Emily District, the North Range, and the South Range.

Since their discovery in 1904, it has been recognized that the iron-formations and associated mineral deposits of the Cuyuna Iron Range in east-central Minnesota contained appreciable quantities of manganese, and large quantities of manganese were extracted as manganese iron ores from several mines on the North Range from 1911 to 1967. The presence of this manganese resource sets the Cuyuna Iron Range apart from other iron-mining districts of the Lake Superior region.

The depositional sequence at the Emily deposit records two periods of transgression and regression within the chemical sediments of the Emily Iron Formation bracketed by periods of clastic deposition. The Emily Iron Formation is constructed from a sequence of fine- and coarse-grained iron formation subunits that correspond to rise and fall of sea level during deposition. Manganese accumulation is also associated with the rise and fall of sea level and subsequent mineral deposition.

1.5 Exploration and Drilling

After discovery by the Pickands Mather Mining Company in the 1940's, historic drilling was performed by U.S. Steel in the 1950s (Strong, 1959), the USBM and the Minnesota Manganese Resources Company in the 1990s, and Cooperative Minerals in 2011 and 2012. This work continued to support the premise that a potentially significant endowment of manganese exists in this area. The majority of historical drillholes defining the manganese enriched zones were executed in the 1940's-1950's since the objective was to define iron ore resources, leaving them susceptible to deviations from current industry best practices.

In April of 2022, NSM contracted Big Rock Exploration (BRE) to begin scoping and developing a drill program on NSM's lands in Sections 20 and 21, T138N, R26W. The goal was to demonstrate the westward and down dip extension of the existing mineral resource estimate on the eastern portions of the property. The drill program was initiated in February of 2023 and completed in July of 2023. A total of 3,995m (13,107 ft.) of core was drilled from 29 completed drill holes. A finalized bedrock geology and drill hole collar location map of the 29 holes completed in 2023 and all historic drill holes is presented in Figure 10-1. From the new data collected during this drill program, BRE has been able to confirm the lateral and down dip extensions of manganese mineralization on NSM's eastern land package, as well as its continuation westward approximately 1.25 kilometers (0.8 mi.) across the recently secured "Frank" and "Guelich" 40-acre parcels.

Geological and exploration drilling data and assay analysis for the Report has been provided by BRE and NSM.

Forte has followed industry best practices in preparing the contents of this report. Data used in this report has been verified where possible, work performed by BRE has been reviewed, and the QP confirms that the data was collected using best practice standards.

1.6 Metallurgical Testing

Testing has been performed in campaigns since the 1990's by a variety of laboratories for a variety of companies. Metallurgical testing has been performed in by Kemetco Research Inc, a metallurgical laboratory in Richmond, Canada. Current work by Kemetco is focused on manganese recovery and developing a process flow to produce high purity manganese sulphate monohydrate (HPMSM) and other high-grade manganese products. HPMSM is currently one of the high value manganese products.

1.7 Mineral Resource Estimate

The Mineral Resource Estimate was estimated using Leapfrog™ software from Seequent, with statistical support in MicroModel™ from RKM Associates. The mineral domains were developed in Leapfrog cooperatively with BRE and Forte, and they are based on 5 logged portions of the Paleoproterozoic Emily Iron Formations (Peif), Peif1 through Peif5. The mineral resource was estimated in Peif1, Peif2, and Peif3 using inverse distance squared weighting with a dynamic anisotropy for each of the three domains. Peif4 and Peif5 were thin and low grade and were not estimated.

The mineral resource has been tabulated at three cutoff grades, 5%, 10%, and 15% Mn, and limited to an area with a thickness greater than 4 meters, representing a minimum mining thickness. The resources are reported as Indicated Mineral Resource and as Inferred Mineral Resource based on the parameters described in Section 14.11, a sales price of \$2,500/t MnSO₄, and the morphology of the higher-grade zones of the Emily iron formations.

The classified mineral resources with a potential for economic extraction are shown in Table 1-1.

Table 1-1: NSM Emily Classified Mineral Resource Estimate

Domain	Class	Cutoff (Mn%)	Metric Tons (kt)	Density (g/cm ³)	Mn (%)	Fe (%)	SiO ₂ (%)
High Grade	Indicated	15	4,242.46	3.08	22.37	21.73	25.75
		10	5,897.21	3.11	19.69	22.46	29.13
		5	6,640.57	3.11	18.40	22.57	30.51
	Inferred	15	3,178.09	3.12	20.26	20.43	29.69
		10	4,818.23	3.15	17.61	20.36	32.29
		5	5,442.12	3.13	16.52	20.17	33.58
Domain	Class	Cutoff (Mn%)	Metric Tons (kt)	Density (g/cm ³)	Mn (%)	Fe (%)	SiO ₂ (%)
Low Grade	Indicated	15	21.97	3.06	16.50	15.40	29.43
		10	337.12	2.97	11.98	21.55	33.80
		5	7,834.08	2.88	6.69	21.89	44.38
	Inferred	15	6.65	3.13	16.32	16.08	26.27
		10	96.44	3.09	12.09	24.65	32.61
		5	4,160.72	2.86	6.34	20.44	34.16
Domain	Class	Cutoff (Mn%)	Metric Tons (kt)	Density (g/cm ³)	Mn (%)	Fe (%)	SiO ₂ (%)
Total	Indicated	15	4,264.43	3.08	22.34	21.70	25.77
		10	6,234.33	3.10	19.27	22.41	29.38
		5	14,474.66	2.98	12.06	22.20	38.02
	Inferred	15	3,184.74	3.12	20.25	20.42	29.68
		10	4,914.67	3.15	17.50	20.44	32.29
		5	9,602.84	3.01	12.11	20.29	33.83

Mineral Resources are not Mineral Reserves and have not been demonstrated to have economic viability. There is no certainty that the Mineral Resource will be converted to Mineral Reserves. The quantity and grade or quality is an estimate and is rounded to reflect the fact that it is an approximation. Quantities may not sum due to rounding.

1.8 Conclusions

The NSM Emily Project demonstrated good continuity of mineralization, with a large low grade mineral resource and a higher-grade core more amenable to beneficiation and processing to saleable manganese products.

Due to the thick layer of glacial till at the surface, it is assumed that Emily minerals would be extracted by underground mining. Based on the analysis herein, and the expected market prices for manganese sulfate, Emily carries Mn grades sufficient to support such an operation.

No capital cost estimate has been developed and no analysis has been performed to determine if there is sufficient mineralized material to develop the project. The deposit is open to the west and north of current drilling and down dip if those surface and mineral rights can be secured.

The metallurgical testing is ongoing and insufficiently advanced to define the purity of MnSO₄ and various other manganese products that can be produced, or the total production costs and process circuits needed to produce salable products.

1.9 Risks and Uncertainties

There has been no historical mining in the Emily District and mining ceased in the Cuyuna Iron Range in the 1960's.

To date there have been no difficulties with the permitting for exploration drilling. Minnesota is a significant mining state, ranking 5th in production value for 2022, and has a well-defined permitting approach for mining operations. It is important that the government relations and the community outreach programs be maintained to enhance the facility with which construction and operating permits may be obtained.

There is an incomplete understanding of the hydrogeology of the area, and successful underground mine construction and operations will require a detailed understanding of the technical and economic hurdles imposed by the saturation of the glacial tills overlying the deposit.

Metallurgical test work has shown that manganese can be recovered from the samples, but a process flow chart that will produce high value manganese products has yet to be finalized. The principal manganese mineral, manganite, a high-grade manganese mineral, is not the pyrolusite more commonly found in producing operations around the world.

1.10 Recommendations

The QPs recommend that ongoing exploration continue to refine the geological model, the domain model, and the resource classification. This will improve the reliability of the model for project decision making.

Through earlier drilling by U.S. Steel and others, there are extensions to the Emily deposit that do not have current data available for inclusion in the mineral resource estimate. North Star Manganese should drill to the west and north-west on lands it controls and endeavor to acquire more surface and mineral rights, surrounding the current mineral resource.

The drilling of the controlled land would improve the definition of the mineral resources at Emily. Additional drilling would permit the upgrade in confidence of inferred mineral resource to indicated mineral resource and potentially a mineral reserve if the necessary modifying factors can be confirmed. The drilling of additionally acquired surrounding lands would further define the deposit and enhance the engineering of the project.

Metallurgical test work should focus on production of marketable products. Completing flow sheet development to allow a more definitive determination of the economic cutoff grade will be an important next step to advancing the project.

Table 1-2: Budget

Concept	Units		Unit Cost		Total
Exploration/Infill Core Drilling NQ	4000	meter	\$400	\$/m	\$1,600,000
Metallurgical Core Drilling PQ	2000	meter	\$700	\$/m	\$1,400,000
Metallurgical test work	1	unit	\$100,000	each	\$100,000
Land Acquisition	1	unit	\$250,000	each	\$250,000
Total					\$3,350,000

2. INTRODUCTION

2.1 Qualifications of Consultants

The qualified persons responsible for this report are:

- ✦ Amanda Irons, CPG, American Institute of Professional Geologists (AIPG), Senior Resource Geologist, Forte Dynamics, is a Qualified Person (QP) defined by NI 43-101 and is responsible for Sections 7-12, 14 other than sections 14.11 through 14.13, and the overall content of this report. Mrs. Irons is independent of NSM.
- ✦ Donald E. Hulse, PE, SME Registered Member (SME-RM), Director of Mining Resources, Forte Dynamics is a QP as defined by NI 43-101 and is responsible for Sections 1 through 6, 14.11 through 14.13, 15 through 25, and a contributor of the overall content of this report. Mr. Hulse is independent of NSM.
- ✦ Deepak Malhotra, PhD, SME-RM, Director of Metallurgy, is responsible for Section 13. Mr. Malhotra is independent of NSM.

2.2 Effective Date

The effective date of this report is December 31, 2023.

2.3 Units of Measurement

All units of measurement are in the Metric system. Costs are in U.S. dollars.

3. RELIANCE ON OTHER EXPERTS

Big Rock Exploration (BRE) staff provided documentation related to geological setting and mineralization (Section 7), deposit types (Section 8), exploration (Section 9), drilling (Section 10), sample preparation, analysis, and security (Section 11), quality control testing (Section 12.2), geologic model (Section 14.1), domaining (Section 14.4), and specific gravity (Section 14.4 and 14.9).

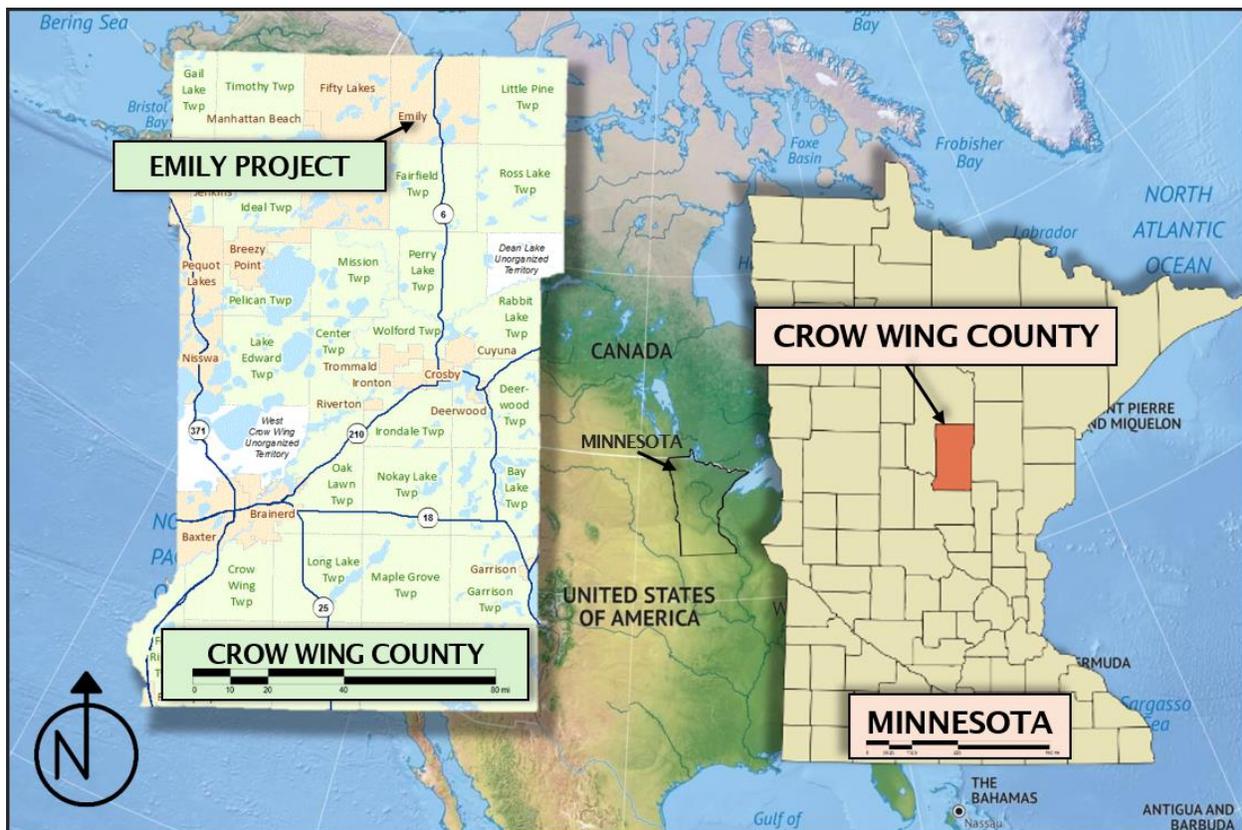
NSM management provided additional documents related to property description and location (Section 4), accessibility, climate, local resources, infrastructure, and physiography (Section 5), history (Section 6), mineral processing and metallurgical testing (Section 13), environmental studies, permitting and social or community impact (Section 19), and adjacent properties (Section 23).

Data was reviewed and accepted by the QPs.

4. PROPERTY DESCRIPTION AND LOCATION

The Project is located near the center of the State of Minnesota, United States of America. Minnesota is situated in the Upper Midwest, Great Lakes, and northern region of the United States. Minnesota shares its northern border with the Canadian Provinces of Ontario and Manitoba, its eastern border with the states of Wisconsin and Michigan, its southern border with Iowa, and its western border with North Dakota and South Dakota.

The Project is in northern Crow Wing County and is on the northern portion of the Emily District, of Minnesota’s Cuyuna Iron Range, approximately 2 miles (3.2 km) north, northwest of the City of Emily, Minnesota, and west of State Highway 6, as shown on Figure 4-1.



**Figure 4-1: Location of the Emily Project in Crow Wing County, Minnesota
(Source: North Star Manganese)**

The Project is in the Emily District of the northern portion of the historic Cuyuna Iron Range in Minnesota, as shown on Figure 7-5.

Mines in the Cuyuna Iron Range mined iron ore and manganese from 1907 to 1967 and sold stockpiled iron ore and manganese through 1982. The Project is located south of the western end of Mesabi Iron Range, which hosts the largest iron ore mining and processing operations in the United States and North America. The location offers nearby services, equipment suppliers and labor associated with the iron mining and processing industry.

Regionally, the Project site benefits from proximity to medium to large cities and regional industrial centers (iron mining and processing), with major domestic and international transportation linkages, as shown in Table 4-1.

Table 4-1: Regional Cities and Transportation Linkages

Regional City	Distance from the Project Site	Rail Connections	Water Shipping Connections	Airport Connections
Brainerd, MN	38 miles / 61 km southwest	One Class -1 Railroad		Brainerd Lakes (Regional)
Grand Rapids, MN	47 miles / 76 km northeast	One Class -1 Railroad		Range (Regional)
Duluth, MN / Superior, WI	109 miles / 175 km east	Two Class -1 Railroads	Great Lakes and Ocean shipping	Duluth (International)
Minneapolis, MN	149 miles / 240 km south	Three Class -1 Railroads		Minneapolis/St. Paul (International)
St. Paul, MN (State Capital)	154 miles / 248 km south	Three Class -1 Railroads	Mississippi River barge shipping	Minneapolis/St. Paul (International)

4.1 Ownership and Mining Rights

The Project’s mineral assets are held by multiple leases and are a mix of mineral and surface rights, and mineral rights (without the surface rights). The underlying manganese mineral assets assessed in this Report are owned by Cooperative Minerals Resources LLC (CMR) and People’s Security Company, Inc. (PSC), both subsidiaries of Crow Wing Power Corporation (CWP), a Minnesota electric cooperative, and by two private landowners, the Guelich lease and the Frank lease.

Crow Wing Power’s interest is via a contract mining and sales arrangement between NSM and CMR, where NSM has the exclusive right to mine and purchase manganese ore and separate property lease and a manganese processing agreement between NSM, CMR and PSC which provides NSM exclusive rights to the properties and extend certain downstream processing arrangements between the parties.

The Guelich and Frank private leases provide NSM with the right to mine manganese and pay the landowners a net smelter return royalty on the mined material.

The land leases are located in the northeast and southeast quarters of the northeast quarter, and the northeast quarter of the southeast quarter of Section 20, Township 138 North, Range 26 West, the northwest and northeast quarters of the southwest quarter, the northwest, southwest and southeast quarters of the northeast quarter, and the northwest quarter and the west half of the northeast quarter of the southeast quarter of Section 21, Township 138 North, Range 26 West, all in Crow Wing County, Minnesota. Table 4-2 below lists the parcels, their location, mineral and surface rights, and acreage. Figure 4-2 is a map of the boundaries of each land holding.

Table 4-2: Project Land Parcels

Parcel	Location	Surface Rights	Mineral Rights	Acres / Hectares
NE ¼ NE ¼	S20 T138 N R26 W	X	X	41.02 / 16.60
SE ¼ NE ¼	S20 T138 N R26 W	X	X	41.06 / 16.60
NE ¼ SE ¼	S20 T138 N R26 W	X	X	41.30 / 16.71
NW ¼ SW ¼	S21 T138 N R26 W	X	X	38.72 / 15.67
NE ¼ SW ¼	S21 T138 N R26 W	X	X	39.19 / 15.86
NW ¼ NE ¼	S21 T138 N R26 W	-	X *	37.86 / 15.32
SW ¼ NE ¼	S21 T138 N R26 W	X	X	37.60 / 15.22
NW ¼ SE ¼	S21 T138 N R26 W	X	X	38.16 / 15.44
SE ¼ NE ¼	S21 T138 N R26 W	-	X *	35.36 / 14.31
W ½ NE ¼ SE ¼	S21 T138 N R26 W	-	X *	18.95 / 7.67
Total Area Acres / Hectares	-	277.05 / 112.12	369.22 / 149.40	369.22 / 149.40

**In these land parcels, mineral rights include manganese and all other non-coal and non-iron ore resources (coal and iron ore mineral rights are reserved by the State).*

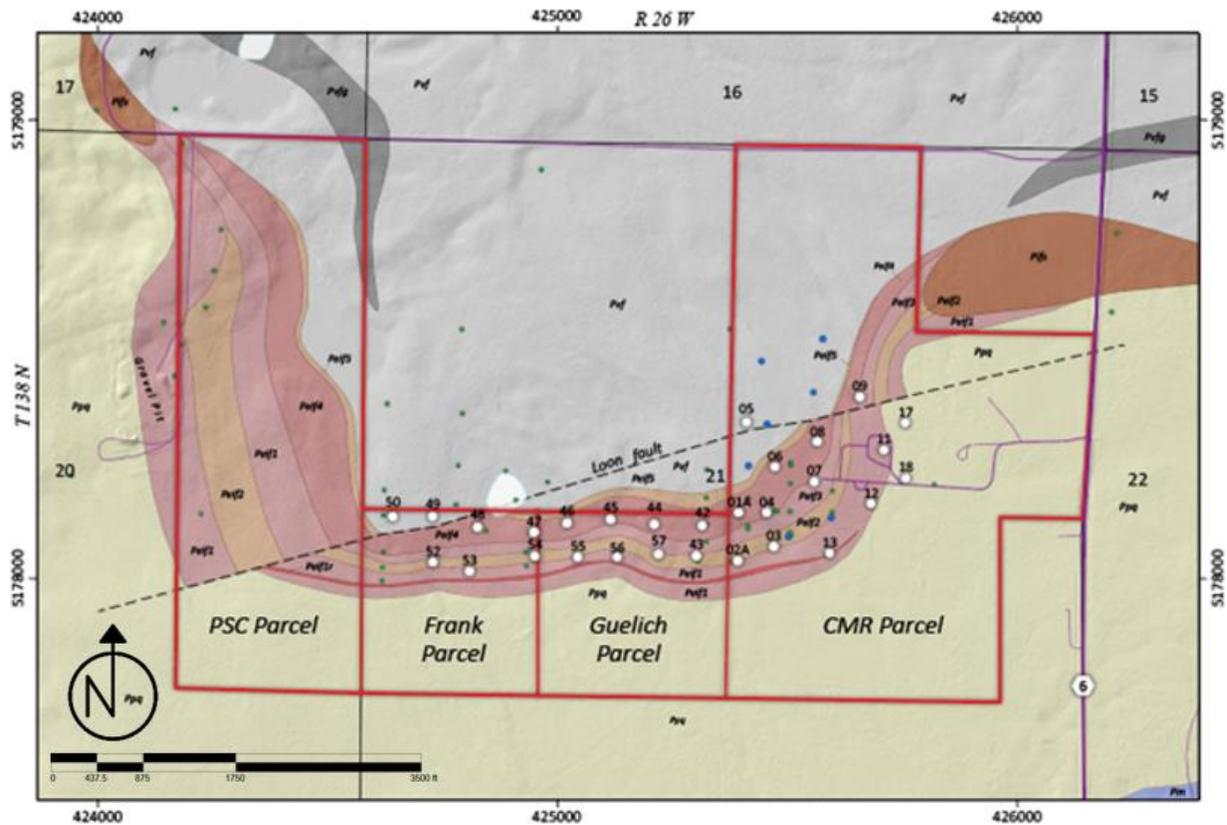


Figure 4-2: Land Holdings (Steiner, A., et. al., 2024)

4.2 Permits and Authorizations

All exploratory drilling and general operations for this program were conducted on private land (surface and minerals). As such, and per Minnesota State Statutes, regulatory oversight of drilling activities was overseen by the Minnesota Department of Natural Resources (DNR) and the Minnesota Department of Health. The following entities, roles and license numbers were involved in the drilling, oversight, and abandonment of all drill holes for the project:

- ✦ DNR Registered Explorer: North Star Manganese Inc – License No. E23-0126
- ✦ MDH Registered Explorer: Big Rock Exploration LLC – License No. 3228
- ✦ MDH Registered Explorer: Timberline Drilling Inc. – License No. 4166
- ✦ MDH Certified Responsible Individual – Gabriel Sweet, MSc PG – License No. 2992

These permits were used during the 2023 drilling season and the QP assumes they can be renewed as needed by completion of the necessary requirements.

4.3 Environmental Permits

The Emily project is an exploration stage project and permits will be acquired as needed.

5. ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Accessibility

The Project is located approximately 2 miles (3.2 km) north of the City of Emily, Minnesota, and is accessed by Minnesota State Highway 6, which runs adjacent to the Project site. The nearest airport is the Brainerd Lakes Regional Airport situated approximately 34 miles (54.7km) southwest of the Project. The nearest Class -1 Railroad terminals are via the Burlington Northern Santa Fe line with a terminal and service yard in Brainerd, approximately 38 miles (61.2km) southwest of the Project, and a terminal in Grand Rapids, approximately 47 miles (75.6) northeast of the Project.

5.2 Climate

The climate at Emily will vary seasonally from daytime high temperatures in the summer of up to 81 degrees Fahrenheit (27.2 degrees Celsius) and 5 degrees Fahrenheit (-20.6 degrees Celsius) in winter. Average precipitation is 27 inches (68.6 centimeters) per year and the annual average snowfall is 45 inches (165.1 centimeters), with the greatest accumulation in December through March.

5.3 Local Resources and Infrastructure

Local infrastructure and resources are well established in the Emily area. Historical iron ore mining on the Cuyuna Iron Range has left a permanent mark on the landscape and infrastructure through an excellent network of roads, rail connections, and utilities. However, there is no current iron ore mining activity in the Cuyuna Iron Range, only sand, gravel, and aggregate operations.

Minnesota is the fifth highest mineral producing state, with iron ore being the primary mineral commodity by value in Minnesota, leading the country in iron ore production. A significant portion of the iron ore mined in the United States over the past one hundred years has come from mines in Minnesota, specifically the Mesabi Iron Range, located to northeast of the Project area. The Mesabi Iron Range extends approximately 120 miles (201 km) in length, from Grand Rapids Minnesota in the west to Babbitt Minnesota in the east and includes both historic and current mining operations. Grand Rapids is approximately 47 miles (76 km) to the northeast of the Project. Currently, there are six mining-processing complexes on the Mesabi Iron Range, and these operations currently supply more than 90% of domestic U.S. iron ore production in the form of taconite and taconite pellets (manufactured iron pellets). Mining and processing infrastructure and services are readily available in the area.

The Project area is serviced by State and Federal roads and highways, regional and international air transport, and local, national, and international rail connections, via the Burlington Northern Santa Fe Railroad at Brainerd and Grand Rapids and are linked to domestic and international waterways. St. Paul is approximately 154 miles (248 km) south of Emily and is the northernmost commodity transshipment riverport on the Mississippi River and the Gulf of Mexico.

The lake seaports of Duluth Minnesota and Superior Wisconsin are also connected to the nearby rail junctures. Duluth is located on the north shore of Lake Superior at the westernmost point of the Great Lakes. Superior Wisconsin is immediately adjacent, and to the east of Duluth. The ports of Duluth and Superior are accessible to oceangoing vessels from the Atlantic Ocean 2,300 miles (3,700 km) via the Great Lakes Waterway and the Saint Lawrence Seaway. Duluth and Superior are major transportation centers for the transshipment of bulk commodities, including coal, taconite pellets, agricultural products, steel, limestone, and cement, as well as manufactured goods, shown on Figure 5-1.



Figure 5-1: Emily Project in Proximity to Great Lakes Shipping

5.4 Physiography

The Project area is in the Mississippi River Watershed, with an eventual flow into the Gulf of Mexico, as shown on Figure 5-2.



Figure 5-2: Emily Project Location Relative to the Mississippi River Watershed

5.5 Topography

The Project properties range from 1280 – 1325 feet (390 – 404 meters) above sea level. The local topography is relatively low and flat, as shown on Figure 5-3. There are no bedrock outcrops at the Project site due to approximately 200 feet (61 meters) of glacial outwash and till surface cover. The Project area, totaling 369.22 mineral acres (149.40 hectares) and 277.05 surface acres (112.12 hectares), includes a small, seasonal endorheic wetland, approximately 10-12 acres (4-5 hectares) in size.



Figure 5-3: Emily Project Lands

In the immediate Emily area, the area is relatively flat due to glacial scraping, and includes glacial lakes. Regionally, there are some localized areas of rugged relief due to numerous natural glacial lakes and a limited number of man-made lakes. The latter are the remains of historical iron ore mining operations. Low lying hills and ridges frequently occur beside lakes, especially the post-mining lakes.

The landscape includes lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, and wide, poorly drained peat lands. Vegetation in the area is common of Laurentian mixed forest regions, consisting of areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps. Drainage from the area follows the Upper Mississippi River Basin.

6. HISTORY

The following history was reported to Forte by NSM and previous NI 43-101 reports. In general, these items have not been verified by the QP.

6.1 Ownership

- ✦ In 1913, two holes were drilled by Osterburg & Johnson in the greater Emily Project area.
- ✦ In the 1940's Pickands Mather Mining Company (today, part of Cleveland-Cliffs Corporation), while exploring for iron ore during a search for a geologic connection between the north-west section of the Cuyuna Iron Range and the western end of the Mesabi Iron Range, discovered the Emily District, including the Emily manganese deposit (the Project area).
- ✦ The Oliver Mining Company (a historic U.S. Steel company) operated in the Cuyuna Iron Range to 1969, and specifically in the Emily District from 1951 to 1960. Project area lands, including land adjacent properties, owned, or leased by Oliver Mining from private owners and the State of Minnesota, were explored by Oliver Mining during this period. Upon completion of the exploration, including extensive geophysical work and drilling, U.S. Steel (Oliver Mining's parent corporation) designed an open pit mine for the West Ruth Lake area, which includes the Project property (Strong 1959). By the early-1960s U.S. Steel decided not to proceed with the West Ruth Lake Mine and two nearby proposed mines, the East Ruth Lake Mine, and the Mary Lake Mine, and proceeded to move its iron mining operations to the Mesabi Iron Range and the mining of taconite and production of taconite pellets for its steel mills.
- ✦ In the 1960s, Pickands Mather's Chief Mining Engineer, Delno W. Carlton, converted a lease containing manganese-rich iron ores held since the 1950s and purchased five (5) mineral parcels, two (2) with surface rights (together, the "Carlton Properties"), from Pickands Mather Mining Company.
- ✦ On November 20, 2008, a subsidiary of Crow Wing Power (the future CMR) signed an Agreement for Purchase of Land and Mineral Rights on the Carlton Properties from Camilla C. Carlton, Steven C. and Katherine D. Carlton, and Raymond Culp (sellers). The sellers received U.S. two million, five hundred thousand dollars (\$2,500,000) with the residual obligation of U.S. two million dollars (\$2,000,000) to be paid to the sellers within thirty (30) days following the receipt of all necessary governmental permits for full operation of a mine and after full production of the mine has commenced, they reserved certain royalty interests in the mineral parcels, and the deeds for the lands were conveyed on December 16, 2008. Deeds for the lands were conveyed to Hunt Enterprises, LLC (predecessor company to CMR) on December 16, 2008. The deeds are applicable to the following:
 - Two (2) surface parcels in Crow Wing County, Minnesota:
 - the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 21 / Township 138 North / Range 26 West (37.60 surface acres - 15.22 surface hectares), and
 - the NW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 21 / Township 138 North / Range 26 West (38.72 surface acres - 15.67 surface hectares).
 - Five (5) mineral parcels in Crow Wing County, Minnesota:
 - the NW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 21 / Township 138 North / Range 26 West (37.86 mineral acres - 15.32 mineral hectares) and the State of Minnesota mineral reservation on the production of coal and iron ore on this parcel,

- the SW ¼ of the NE ¼ of Section 21 / Township 138 North / Range 26 West (37.60 mineral acres - 15.22 mineral hectares),
 - the NW ¼ of the SE ¼ of Section 21 / Township 138 North / Range 26 West (38.72 mineral acres – 15.67 mineral hectares),
 - the SE ¼ of the NE ¼ of Section 21 / Township 138 North / Range 26 West (35.36 mineral acres - 14.31 mineral hectares) and the State of Minnesota mineral reservation on the production of coal and iron ore on this parcel, and
 - the W ½ of the NE ¼ of the SE ¼ of Section 21 / Township 138 North / Range 26 West (18.95 mineral acres - 7.67 mineral hectares) and the State of Minnesota mineral reservation on the production of coal and iron ore on this parcel.
- ✦ On May 15, 2019, People’s Security Company, Inc., a wholly owned subsidiary of Crow Wing Power, purchased certain lands in Crow Wing County, Minnesota: The deeds are applicable to the following:
- Three (3) surface and mineral parcels in Crow Wing County, Minnesota:
 - the NE ¼ of the NE ¼ of Section 20 / Township 138 North / Range 26 West (41.02 mineral acres – 16.60 mineral hectares),
 - the SE ¼ of the NE ¼ of Section 20 / Township 138 North / Range 26 West (41.02 mineral acres – 16.60 mineral hectares), and
 - the NE ¼ of the SE ¼ of Section 20 / Township 138 North / Range 26 West (41.30 mineral acres – 16.71 mineral hectares).
- ✦ On April 22, 2020, CMR and PSC signed a series of agreements with NSM on the mining and processing of manganese minerals which established two general arrangements (described in Item 1.0 of this Report):
- a contract mining and sales arrangement between NSM and CMR for the extraction of manganese from the property whereby NSM has the exclusive right to mine and purchase the manganese minerals; and
 - separate property leases and a manganese processing agreement between NSM, CMR and PSC, where CMR and PSC, collectively, will receive as rent for their properties a portion of NSM’s distributed profits from downstream sale of processed advanced materials from any mineralized materials mined by NSM from the AOI.
 - As part of the agreements, NSM also has a right to purchase the CMR and PSC properties for thirty million, two hundred and fifty thousand dollars (\$30,250,000) at any time prior to the initiation of commercial production. There are no limitations on NSM or CMR/PSC to negotiate a different purchase and sale arrangement.
- ✦ On January 17, 2023, NSM signed a series of agreements and entered into a fifty (50)-year property lease, with two (2) renewals of thirty-five (35)-years each, with Jay W. Guelich and Jeffery L. Guelich, tenants in common (the “Guelich Property”).
- The Guelich Property is in the NE ¼ of the SW ¼ of Section 20 / Township 138 North / Range 26 West (39.19 acres – 15.86 hectares) and consists of both surface and mineral rights.
 - Lease terms include annual lease payments of U.S. six thousand dollars (\$6,000) escalating at three percent (3%) per year, one-time payments of U.S. one-thousand five hundred dollars (\$1,500) per drill pad developed (multiple drill holes can be drilled from each pad), and a two and one-half percent (2½%) Net Smelter Return Royalty of any

- products or commodities mined and sold from the Guelich Property. NSM has a royalty buy-back agreement on the Guelich Property.
- NSM also has the right to purchase the Guelich Property at any time for its assessed fair market value, plus fifteen (15%) percent. The Net Smelter Return Royalty is independent of any property purchase.
- ✦ On February 3, 2023, NSM signed a series of agreements and entered into a fifty (50)-year property lease, with two (2) renewals of thirty-five (35)-years each, with Kenneth R. Frank and Juile M. Frank, Trustees of the Frank Living Trust (the “Frank Property”).
 - The Frank Property is located in the NW ¼ of the SW ¼ of Section 20 / Township 138 North / Range 26 West (38.72 acres – 15.67 hectares) and consists of both surface and mineral rights.
 - Lease terms include annual lease payments of U.S. six thousand dollars (\$6,000) escalating at three percent (3%) per year, one-time payments of U.S. one-thousand five hundred dollars (\$1,500) per drill pad developed (multiple drill holes can be drilled from each pad), and a two and one-half percent (2½%) Net Smelter Return Royalty of any products or commodities mined and sold from the Frank Property. NSM has a royalty buy-back agreement on the Frank Property.
 - NSM also has the right to purchase the Frank Property at any time for its assessed fair market value, plus fifteen (15%) percent. The Net Smelter Return Royalty is independent of any property purchase.
- ✦ As of the date of this Report, all leases are current.

6.2 Work History

- ✦ Exploration work by the Pickands Mather Mining Company from 1945 to 1962 defined the “Carlton Reserve” at the Project site.
- ✦ In 1951, Oliver Mining Company leased lands in the area and conducted extensive geophysical work detailed exploration through 1959.
- ✦ Extensive studies of the Emily deposit were conducted in the 1990s by the United States Bureau of Mines, the University of Minnesota, and the Minnesota Geological Survey.
- ✦ The United States Bureau of Mines undertook exploration work in 1995.
- ✦ John E. Pahlman completed a resource estimation of the Emily deposit in 1996 following the 1995 exploration work and this was reported in a United States Bureau of Mines document.
- ✦ In 2008 with the acquisition of the Project property to the present, CMR has spent more than U.S. \$23 million on technical studies, exploratory drilling, process development and bench-level pilot processing to extract, upgrade and process manganese carbonate (MnCO₃), Electrolytic Manganese Metal (EMM), and Electrolytic Manganese Dioxide (EMD). Significant activities undertaken by CMR included:
 - Michael Ward of Marston & Marston Inc. completed a resource estimation of the Emily deposit as part of a due diligence study on the property, in 2008.
 - CMR initiated a pilot test involving a borehole mining tool in 2009 to assess the effectiveness of extracting manganese enriched zones to the surface for commercial

mining using this technique. Rice Lake Construction was contracted to undertake this pilot test.

- Barr Engineering performed a geotechnical and hydrogeological investigation in conjunction with the borehole mining pilot test being undertaken in 2009.
- Rice Lake Construction completed the borehole mining pilot test in the fall of 2011.
- Barr Engineering undertook and completed a resource drilling program in the fall of 2011. Part of this program included a geotechnical analysis of the manganese enriched zone.
- Barr Engineering undertook and completed a resource drilling program in the fall and winter of 2012.

6.3 Historical Mineral Resource Estimates

- ✦ In 1950, A. D. Chisholm (Pickens Mather Mining Company) estimated a manganese resource of 2,142,500 short tons grading at 20.82% manganese at the Emily deposit. No cut-off grade was stipulated with this estimation.
- ✦ In 1950s U.S. Steel (Oliver Mining Company) undertook additional drilling, and in 1959 designed the West Ruth Lake Open Pit Mine, targeting 24,012,200 short tons manganese resource @ 15.29% Mn and 23.38% Fe (Strong 1959). The West Ruth Lake Mine included the CMR Property (including the Pickens Mather “Carlton Reserve”), the Guelich Property, the Frank Property, and the PSC Property and certain portions of adjacent land outside their original pit domain as part of the total reserve of the proposed mine.
- ✦ In 1996, John E. Pahlman (United States Bureau of Mines) estimated 500,000 short tons of manganese contained in 7.2 acres of ore containing a Mn>10% cut-off grade at the Emily deposit. No manganese grade was stipulated with this estimate.
- ✦ In 2008, Michael Ward (Marston & Marston Inc.) estimated 2,102,000 short tons of mineral grading at 19.8% manganese with a Mn>10% cut-off grade at the Emily deposit. This was estimated for the CMR mineral parcels only.
- ✦ In 2012 through 2016, Barr Engineering prepared a scoping level estimate of about 2.8 million short tons of mineralized rock grading at 20.37% manganese at a Mn>10% cut-off grade at the Emily deposit. The internal estimate was prepared for CMR on their own mineral parcels only and cannot be considered representative of the overall deposit.

The first references to estimating reserves in Emily District date from 1950. Unpublished scoping level work was done as recently as 2012, These mineral resources are considered “historical” in nature, as a qualified person has not done sufficient work to classify the historical estimate as current mineral resources or mineral reserves. NSM is not treating the historical estimates as current mineral resources or mineral reserves.

- ✦ BRE was contracted by NSM in October 2021 to perform basic modeling of the manganese (Mn) resource on their Emily Property in northcentral Minnesota. The work undertaken was for internal analysis and future drill targeting, and included:
 - An updated basic geological model for the Emily Manganese Deposit area of interest (AOI),
 - An internal resource model and grade-tonnage estimate (non – NI 43-101 Compliant) for the Emily Manganese Deposit AOI for future drill targeting purposes.

The mineral resources noted in this section are now considered “historical” in nature. The first references to estimating reserves in Emily District dated from 1950, and these historical works do not comply with the modern industry standards in terms of quality control and quality assurance of the information provided by drilling, sampling, and laboratory analysis. It is not possible to track an effective control or work replication for this historical data which does not comply with current NI 43-101 or similar industry standards. For these reasons item “14. Mineral Resources Estimates” of this report supersedes all previous estimations.

In 2020, Barr produced a qualifying National Instrument 43-101 Technical Report, “Resource Estimate on the Emily Property, Minnesota USA”, for NSM. The report was an updated assessment of the original work undertaken by Barr in 2012, using more sophisticated and advanced modeling software, including a reassessment of the geology and drilling data from the prior period. At an Mn>10% cut-off grade, Barr estimated 5,685,310 Indicated short tons @ 19.20% Mn and 23.02% Fe and 777,777 Inferred short tons @ 22.48% Mn and 22.15% Fe on the CMR lands (Table 6-1).

Table 6-1: Barr 2020 Resource Estimate of Emily Manganese Deposit

Category	Mn Cutoff %	Avg Mn %	Avg Fe %	Short Tons
Indicated – Total	5	14.31	23.66	9,719,425
Inferred - Total	5	17.33	21.44	1,176,006
Indicated – Total	10	19.20	23.02	5,685,310
Inferred - Total	10	22.48	22.15	777,777
Indicated – Total	15	23.71	21.12	3,448,357
Inferred - Total	15	24.51	21.55	644,216
Indicated – Total	20	27.63	19.12	2,108,731
Inferred - Total	20	26.90	20.36	481,695

Table 6-1 above was taken from: Resource Estimate on the Emily Property, Minnesota USA, Prepared for North Star Manganese Inc, June 12, 2020, Barr Engineering Company, page 13.

The 2022 Barr NI 43-101 Technical Report was prepared as an update to the Barr NI 43-101 Technical Report issued in 2020, and principally addressed the addition of important and significant mineral rights acquisitions associated with the Project. Since the change is focused on the addition of mineral rights, it does not change the Resource Estimate of 2020.

The Barr reports of June 2020 and June 2022 were prepared in accordance with with Canadian National Instrument 43-101 standards as of those dates; the Barr reports are superseded by this Report.

7. GEOLOGICAL SETTING AND MINERALIZATION

The Emily deposit is hosted by rocks of the Paleoproterozoic Animikie Basin (the Emily Iron Formation). The stratigraphy, structure, and high-grade manganese mineralization within these rocks is the result of long periods of sedimentation, deformation, and erosion along the ancestral southern margin of the Superior Craton. The driving force in the sedimentation and deformation of these rocks occurred during the Paleoproterozoic Penokean Orogeny, as briefly described below.

7.1 Penokean Orogeny

The Penokean orogeny began at about 1880 Ma when an oceanic arc, the Paleoproterozoic Pembine–Wausau terrane, collided with the southern margin of the Archean Superior (Laurentia) craton marking the end of a period of south-directed subduction. The docking of the buoyant craton to the arc resulted in a subduction jump to the south and development of back-arc extension both in the initial arc and adjacent craton margin to the north. Synchronous extension and subsidence of the Laurentia craton resulted in the development of broad shallow seas overlapping the Archean craton. The classic Superior-type banded iron-formations of the Lake Superior District, including those in the Marquette, Gogebic, Mesabi, and Gunflint Iron Ranges, formed in that sea. The newly established subduction zone caused continued arc volcanism until about 1850 Ma when a fragment of Archean crust, now the basement of the Marshfield terrane, arrived at the subduction zone.

The convergence of Archean blocks of the Superior and Marshfield cratons resulted in the major contractional phase of the Penokean orogeny. Rocks of the Pembine–Wausau arc were thrust northward onto the Superior craton causing subsidence of a foreland basin in which sedimentation began at about 1850 Ma in the south (Baraga Group rocks) and 1835 Ma in the north (Rove Formation). A thick succession of arc-derived turbidites constitutes most of the foreland basin-fill along with lesser volcanic rocks. In the southern fold and thrust belt, tectonic thickening resulted in high-grade metamorphism of the sediments by 1830 Ma. At this same time, a suite of post-tectonic plutons intruded the deformed sedimentary sequence and accreted arc terranes marking the end of the Penokean orogeny. A regional geologic map of the Penokean orogen, modified from Schulz and Cannon (2007), is given in Figure 7-1.

The Penokean deformation in Minnesota includes a southern intensely and complexly deformed series of thrust panels (Cuyuna North, Cuyuna South, Moose Lake, McGrath-Little Falls panels) that gives way northward to progressively more weakly and simply deformed rocks (Emily District) across a belt about 66 miles (100km) wide. Farther north strata in the Mesabi and Gunflint Iron Ranges are essentially undeformed (Holst, 1991). It should be noted that the “more weakly and simply deformed rocks” of the Emily District have been shortened ~250% into a series of shallowly east-plunging anticlines and synclines. Substantial progress has been made in deciphering the structure of the poorly exposed rocks of the Minnesota foreland through the use of aeromagnetic and gravity data and drillhole information. Southwick and Morey (1991) and Southwick et al. (1988) have presented syntheses of this information.

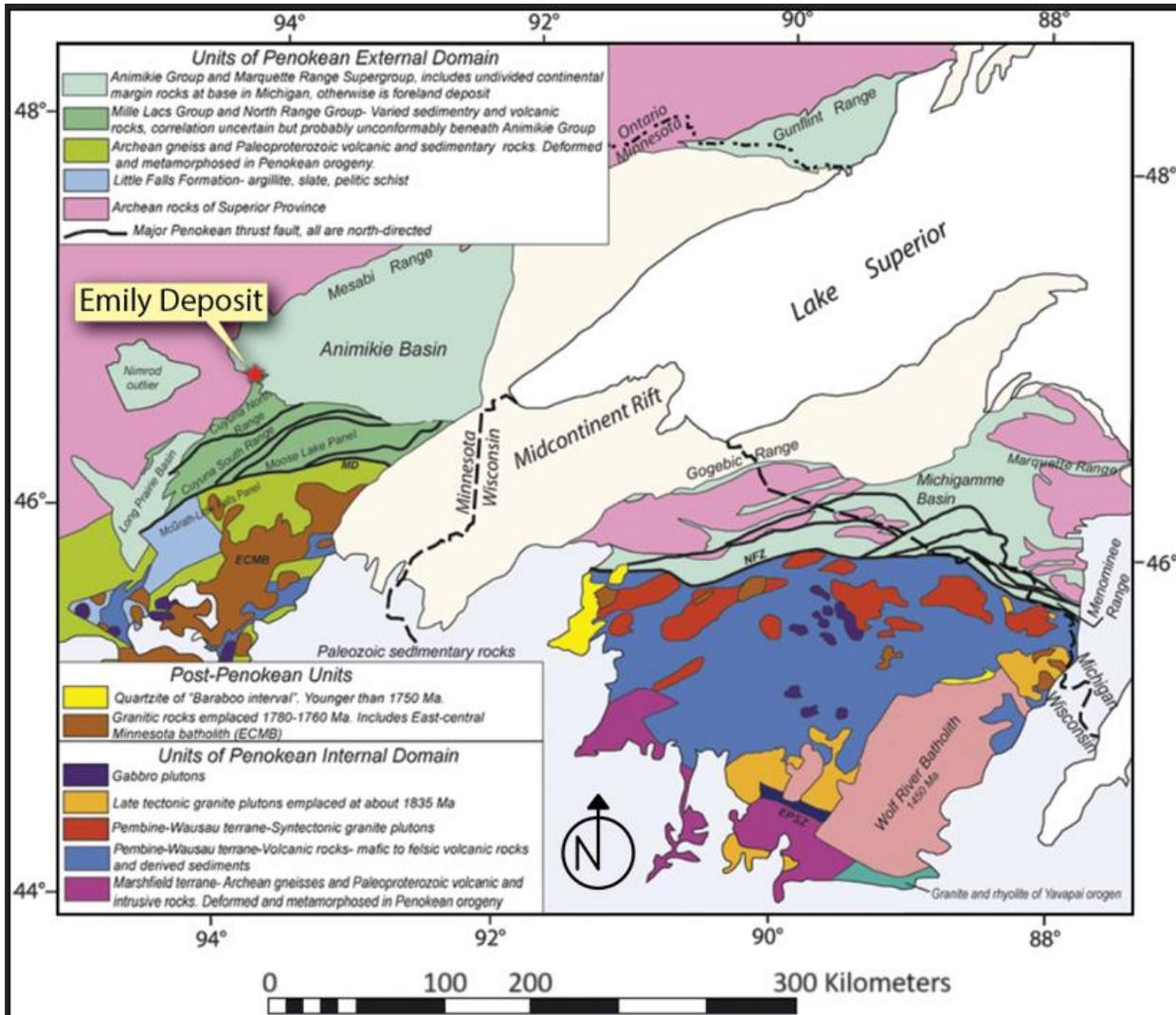


Figure 7-1: Generalized Geologic Map of the Penokean Orogen

Notes: Abbreviations: ECMB - East-Central Minnesota Batholith; EPSZ - Eau Pleine Shear Zone; MD - Malmo Discontinuity; NFZ - Niagara Fault Zone. Modified from Schulz and Cannon, 2007.

The complex thrust panels on the south, like comparable structures in Michigan, appear to be thin-skinned slices without Archean basement. However, as in Michigan, this area of thin-skinned thrusting is also the area where Archean-cored gneiss domes developed during post orogenic collapse of the Penokean orogen (Holm and Lux, 1996; Schneider et al., 2004). Farther north, basement-cover relations are not well known except for the Mesabi Iron Range where Paleoproterozoic strata are mostly nearly flat lying above an undisturbed unconformity with Archean basement rocks. A schematic north-south geologic cross section of the Penokean orogeny in Minnesota, modified from Southwick and Morey (1991) is presented in Figure 7-2.

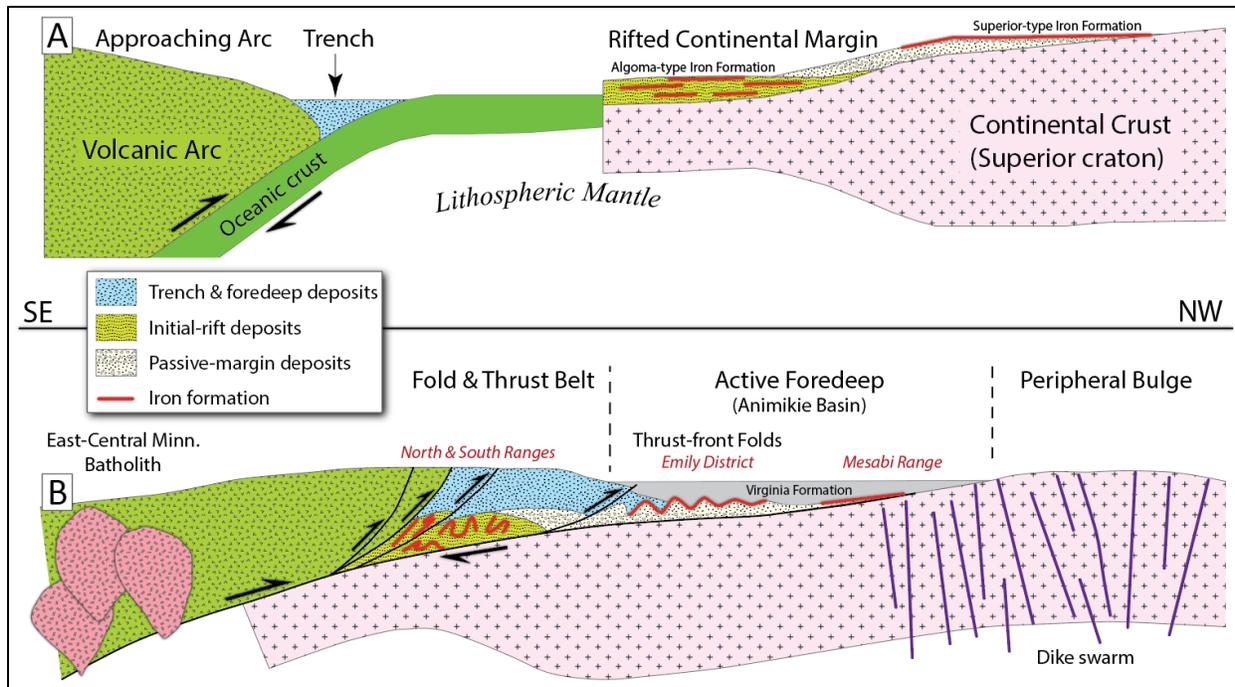


Figure 7-2: Schematic Diagram Illustrating the Interpreted Tectonic Setting of the Penokean Orogen in Minnesota

Notes: A) continental margin sedimentation, and B) thin-skinned thrusting and deformation related to the Penokean orogeny. Modified from Southwick & Morey, 1991

7.2 Post Penokean Weathering and Erosion

Perhaps the most important component in the formation of the high-grade manganese resource at the Emily deposit is the vast amount of time (measured in hundreds of millions of years) upon which the newly formed and uplifted Penokean mountains of the southern Laurentia craton weathered and eroded. As plate tectonic forces moved Laurentia across the globe to its current position on planet Earth there were long periods of time when it resided within the tropical weathering zone (+30° to -30° latitude) near the Earth's equator. It is believed that the supergene enrichment of manganese (to >50 wt.% elemental Mn) at the Emily deposit largely formed during the protracted periods of time that the area resided within the tropical weathering zone. A paleogeographic reconstruction of the location of Laurentia on planet Earth is given in Figure 7-3.

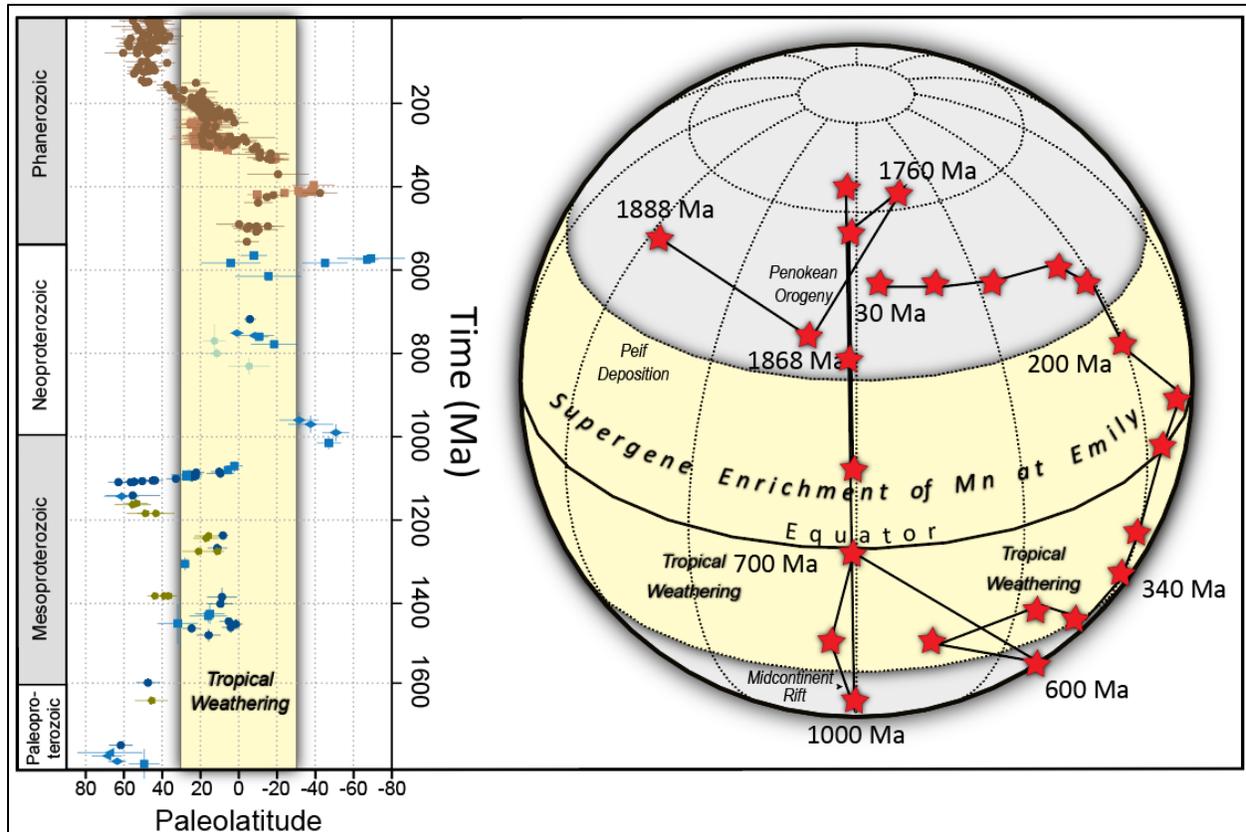


Figure 7-3: Paleogeographic Reconstruction of the Laurentia Craton from the Paleoproterozoic to Present Times (Steiner, A., et. al., 2024)

7.3 Animikie Basin Mineral Resources

To gain a true understanding of the geology and mineral resources of the Emily Manganese Deposit, it is best to start with an understanding of the regional-scale geologic setting and its contained ferrous mineral resources. For this Report, a brief description of Minnesota’s Paleoproterozoic Iron Ranges (Figure 7-4: Mesabi and Cuyuna) and their contained ferrous mineral resources is included herein. These Paleoproterozoic Iron Ranges include several categories of marine chemocline mineral systems outlined in recent USGS publications (Schulz et al., 2017 and Hofstra and Kreiner, 2020). These categories include:

- 1) Superior-iron deposits (Mesabi Iron Range, Gunflint Iron Range and the Emily District of the Cuyuna Iron Range) and
- 2) Algoma-type iron +/- manganese deposits (Cuyuna North and South Iron Ranges, and the Vermilion Iron Range).

7.3.1 Superior Type Iron Resources of the Mesabi Iron Range

Superior type iron formation resources of Minnesota are exemplified by the long-standing mining of iron resources of the Biwabik Iron Formation along the length of the Mesabi Iron Range. The Mesabi Iron Range is largely located in St. Louis and Itasca counties and has been the most important iron ore district in the United States since ~1890s. The Mesabi Iron Range is 120 miles (193km) long, averages one to two miles wide, and is comprised of rocks of the Paleoproterozoic Animikie Group. The Animikie Group on the Mesabi Iron Range consists of three major conformable formations: Pokegama Formation at the base; Biwabik Iron Formation in the middle; and the overlying Virginia Formation. On the Mesabi Iron Range, these three formations generally dip gently to the southeast at angles of 3-15 degrees.

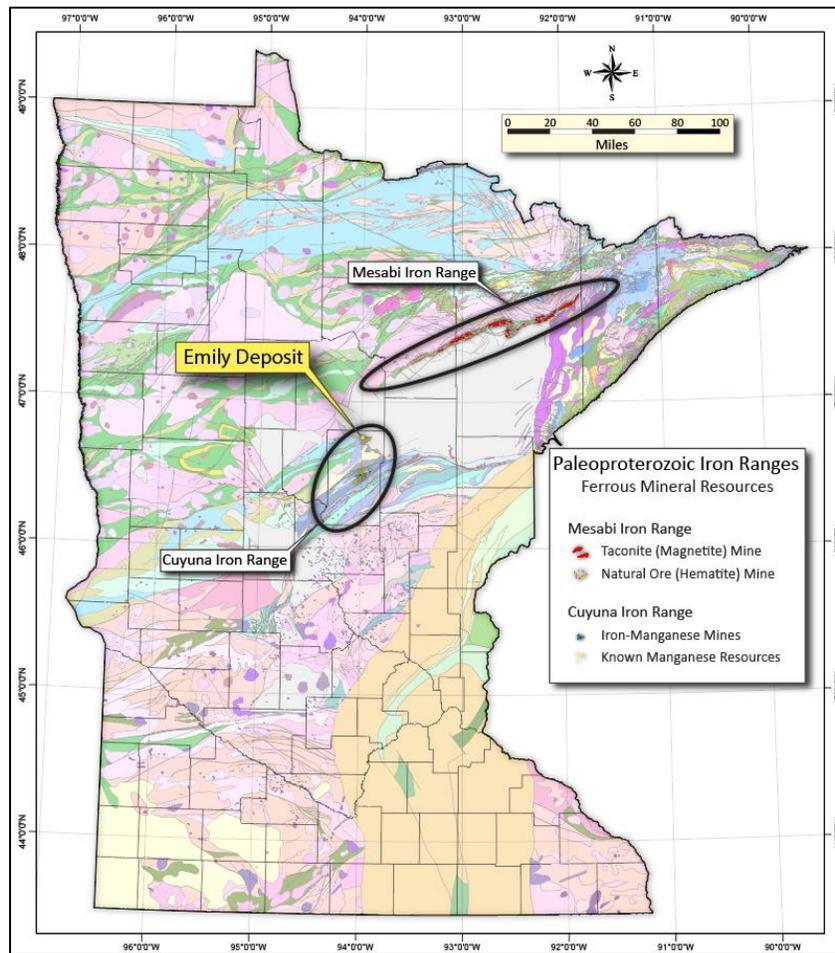


Figure 7-4: Location Map of Identified Ferrous Mineral Resources in Minnesota (Steiner, A., et. al., 2024)

Since the early 20th century, the Biwabik Iron Formation has been subdivided into four informal members referred to as (from bottom to top): Lower Cherty member, Lower Slaty member, Upper Cherty member, and Upper Slaty member (Wolff, 1917). The cherty members are typically characterized by a granular (sand-sized) texture and thick-bedding (beds \geq several inches thick); whereas the slaty members are typically fine-grained (mud-sized) and thin-bedded (≤ 1 cm thick beds). The cherty members are largely composed of chert and iron oxides (with zones rich in iron silicate minerals), while the slaty members are

composed of iron silicates and iron carbonates with local chert beds. Both cherty and slaty iron-formation types are interlayered at all scales, but one rock type or the other predominates in each of the four informal members, and they are so-named for this dominance Severson et. al. (2009).

Leached and iron enriched direct ores (or 'natural ores' – direct shipping ores, without processing) were the first materials mined, with the first shipments beginning in 1892, from strongly oxidized pockets along fault and fracture zones and the blanket oxidation of the iron formation at the surface. Taconite, which is the material that is mined today using magnetic separation methods, constitutes most of the iron formation and pertains to the hard, non-oxidized portions of the iron-formation. Production has been dominated by vertically integrated steelmakers since 1901, and therefore the mining and utilization of these manganese resources has been dictated largely by U.S. ironmaking capacity and demand.

7.3.2 Mn-Fe Resources of the Cuyuna Iron Range

The Cuyuna Iron Range is about 100 miles (160 km) west-southwest of Duluth in Aitkin, Cass, Crow Wing, and Morrison Counties. It is part of an Early Proterozoic geologic terrane which occupies much of east-central Minnesota. The Cuyuna Iron Range is traditionally divided into three districts, the Emily District, the North Range, and the South Range (Figure 7-5). The Emily District extends from the Mississippi River northward through Crow Wing County and into southern Cass County and comprises an area of about 450 sq.mi. (1,165 km²). Although exploration drilling was extensive in the Emily District, mining never commenced. The North Range, a much smaller area about 11.8 miles (19 km) long and 5 miles (8 km) wide, is near the cities of Crosby and Ironton, including the former town of Manganese, in Crow Wing County, and the South Range extends approximately 62 miles (100 km) and up to 3 miles (5 km) in width, near Deerwood and Brainerd, in Atkin, Crow Wing and Morrison counties.

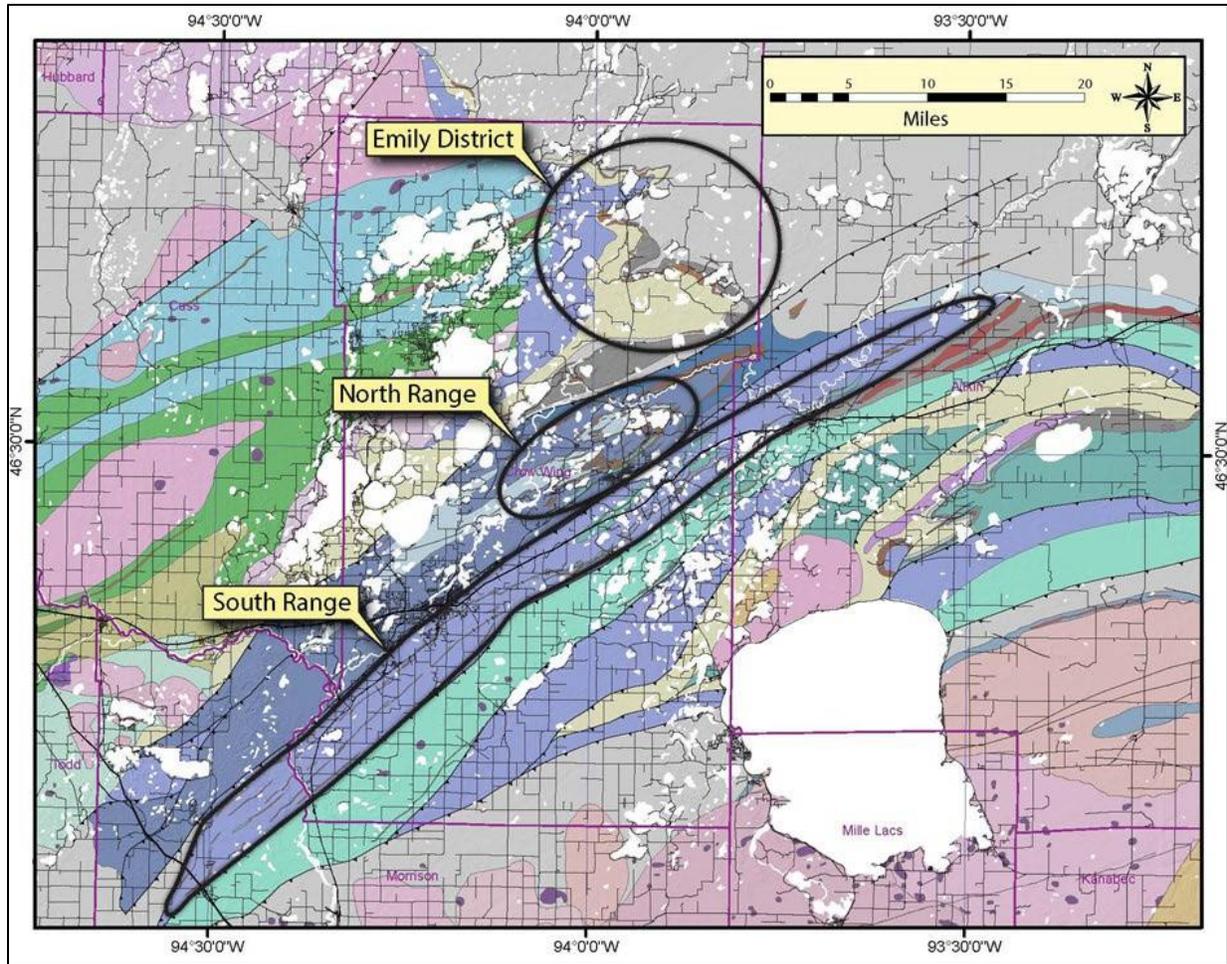


Figure 7-5: Bedrock Geologic Map of the Cuyuna Iron Range (Steiner, A., et. al., 2024)

Since their discovery in 1904, it has been recognized that the iron-formations and associated deposits of the Cuyuna Iron Range in central Minnesota contained appreciable quantities of manganese. The largest quantities of manganese were extracted as manganiferous iron ores from several mines on the North range from 1911 to 1967. The presence of this manganese resource sets the Cuyuna Iron Range apart from other iron-mining districts of the Lake Superior region.

Although relatively small, the North Range was the principal site of mining activity (Figure 7-6), which had largely ceased by 1967. The South Range, principally dominated by open pit mines and limited underground mines, in the 1910s and 20s, comprises an area of northeast-trending, generally parallel belts of iron-formation extending from near Randall in Morrison County northeast for about 62 miles (100 km).

In addition to the three named districts, numerous linear magnetic anomalies occur east of the range proper, and may indicate other, but currently poorly defined, beds of iron-formation. Limited exploration has occurred east of the three districts.

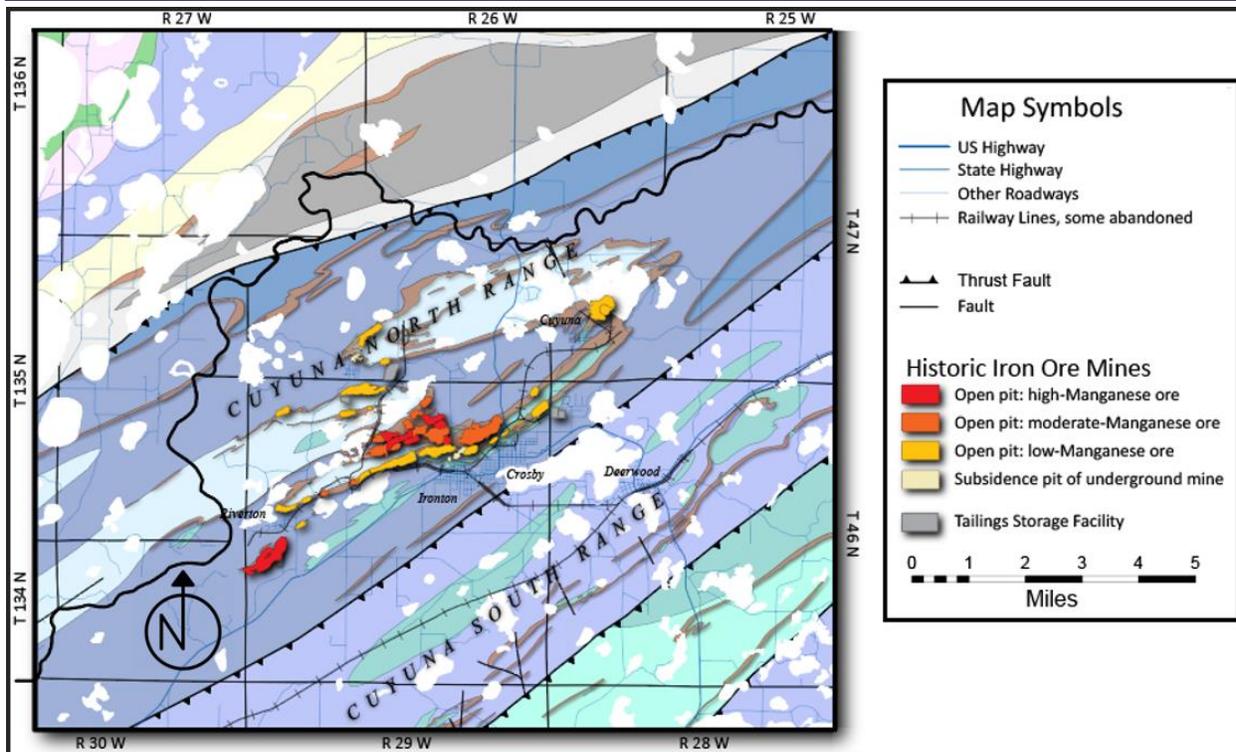


Figure 7-6: Bedrock Geology and Open Pit Fe-Mn Mine Map of the North Range of the Cuyuna Iron Range (Steiner, A., et. al., 2024)

Three major insights regarding the geology of the Cuyuna Iron Range have emerged from the geologic mapping (Schmidt, 1963) and associated studies which utilized geophysical and drilling data (Southwick et al., 1988).

- ✦ First, there is clear evidence that iron sedimentation occurred at several different times and under varying geological conditions. This observation invalidates the stratigraphic premises of Morey (1978). Major iron-formations are associated stratigraphically with volcanic rocks in the South Range, with black shale, argillite, and rare volcanic rocks in the North Range, and with shallow-water deposits of sandstone and siltstone in the Emily District.
- ✦ Second, the iron-rich strata of the Emily District are correlative with the Biwabik Iron Formation of the Mesabi Range, as inferred by Marsden (1972) and Morey (1978). However, they and the other sedimentary rocks of the well-known Animikie Group occur above a major deformed unconformity that cuts across previously deformed, somewhat older sedimentary and volcanic rocks of the North Range. There, a prominent iron-rich unit named the Trommald Formation, as well as several other units beneath the unconformity, forms part of a locally twice-deformed sequence. Therefore, the rocks of the North Range and the Emily District cannot be correlative but are separate stratigraphic entities. Because the stratigraphic succession of folded sedimentary rocks on the North Range comprises a distinct stratigraphic entity, Southwick et al., (1988) referred to it informally as the North Range group with the understanding that a formal name may be justified later. As defined by Schmidt (1963), the stratigraphic sequence in the North Range consists of a quartz-rich lower unit named the Mahnomen Formation, a middle iron- and locally manganese-rich sequence assigned to the Trommald Formation, and an upper greywacke shale interval called the Rabbit Lake Formation.

- Third, Southwick et al., (1988) recognized several geophysically defined structural discontinuities in the southern part of the Cuyuna Iron Range, within and southeast of the South Range. These discontinuities are marked by demonstrable contrasts in metamorphic grade, by differing structural styles, and by different lithic components. One of the most pronounced of these, the Serpent Lake structural discontinuity, passes along the south edge of the North Range. This discontinuity is interpreted as a tectonic boundary, probably involving major thrust faults between slices of folded rocks. Thus, it seems certain that the iron-rich strata of the South Range are not correlative with either the Trommald Formation of the North Range or the iron-rich strata of the Emily District.

The fact that iron-formation occurs within three different stratigraphic and structural contexts in the Cuyuna Iron Range is of considerable importance to the ultimate development of the manganese resources. Currently the Emily District, the North Range, and the South Range, while geographically taken together as the Cuyuna Iron Range, geologically, the three areas are recognized as separate entities, and regional syntheses cannot extrapolate mineralogical and structural attributes from one entity to another.

7.3.3 Cuyuna Iron Range Manganese Resources

There are additional manganese and manganiferous iron occurrences in the Cuyana Range. Although attempts have been made, including reports by the U.S. Department of the Interior, the U.S. Geological Survey and the State of Minnesota, there is no credible estimate of the size and potential of the manganese resources withing the Cuyuna Iron Range.

8. DEPOSIT TYPES

The depositional sequence at the Emily deposit records two periods of transgression and regression within the chemical sediments of the Emily Iron Formation bracketed by periods of clastic deposition. The Emily Iron Formation is constructed from a sequence of fine- and coarse-grained iron formation subunits that correspond to rise and fall of sea level during deposition (Figure 8-1). The sequence of transgressions and regressions observed at Emily is consistent with similar sequences in the Biwabik Iron Formation on the Mesabi Iron Range. The variations in water depth and corresponding grain size, composition, and morphology have previously been linked to changing sediment sources and input due to regional tectonics driven by the Penokean orogen. The observed changes play a critical role in the initial distribution of manganese and subsequent remobilization during supergene processes highlighting the importance in understanding the sequence.

1. **Pokegama Formation** - The base of the stratigraphic section at the Emily deposit is the Pokegama formation. The Pokegama formation was deposited during a period of high-clastic sediment input into a shallow basin where sediments are sources from the Archean in what is now northern Minnesota and southern Ontario. It has been hypothesized that the transition from clastic sedimentation during the Pokegama formation to chemical sedimentation during the Emily Iron Formation is the result of inundation of Laurentia by a shallow sea.
2. **Emily Iron Formation**
 - a. **Peif1** - Inundation of the continent cut off clastic sediment sources and allowed for the accumulation of chemical sediments forming iron formation in the Animikie basin. This transition from clastic to chemical sedimentation is recorded in the interbedded quartzose sands and granular iron formation that characterizes the base of the Peif1 subunit. Deposition of the medium to coarse grained granules and sand grains in Peif1 occurred in the foreshore to shoreface. Granules are composed of ferruginous chert, though there is abundant evidence for dissolution of granules (pock-marked oxidation in granular iron formation) that may be the result of dissolution of granules of varying composition (e.g., Fe-silicates).
 - b. **Peif1r** - The Peif1r unit, a stromatolitic horizon, indicates a period where the shoreface is exposed allowing for the growth of microbial mats before being inundated again as water levels continue to rise.
 - c. **Peif2** - Increasing water depth reduced wave and current action on sediments, resulting in the accumulation and preservation of finely laminated banded iron formation as Peif2. The accumulation of Mn- and Fe-carbonate mineralization is likely the most important process occurring during deposition of the Emily Iron Formation; this unit is interpreted to be the source of Mn during subsequent supergene enrichment discussed in the following section.
 - d. **Peif3** – The depositional environment at the Emily deposit returns to the shoreface due to sea level fall during Peif3. Granular iron formation interbedded with finer grained sediments suggest water depth is somewhat deeper than Peif1 but much shallower than Peif2.
 - e. **Peif4** – A rise in sea level occurred at the onset of massive chert of Peif4. Cherts are commonly deposited in deeper water where iron precipitates formed in the oxic zone dissolve in poorly oxygenated deeper waters. Only silica hydroxides can accumulate in these deeper waters, eventually forming massive chert.

- f. **Peif5** – The bedded chert in Peif5 is discontinuous making it difficult to confidently assess the depositional environment. However, the abundance of chert suggests a deeper water origin than units Peif1, Peif2, or Peif3.
- 3. **Virginia Formation** – Water depth continues to increase as does the input of clastic material into the Animikie basin. Chemical sedimentation is overwhelmed by clastic input, resulting in greywacke and slates of the Virginia formation.

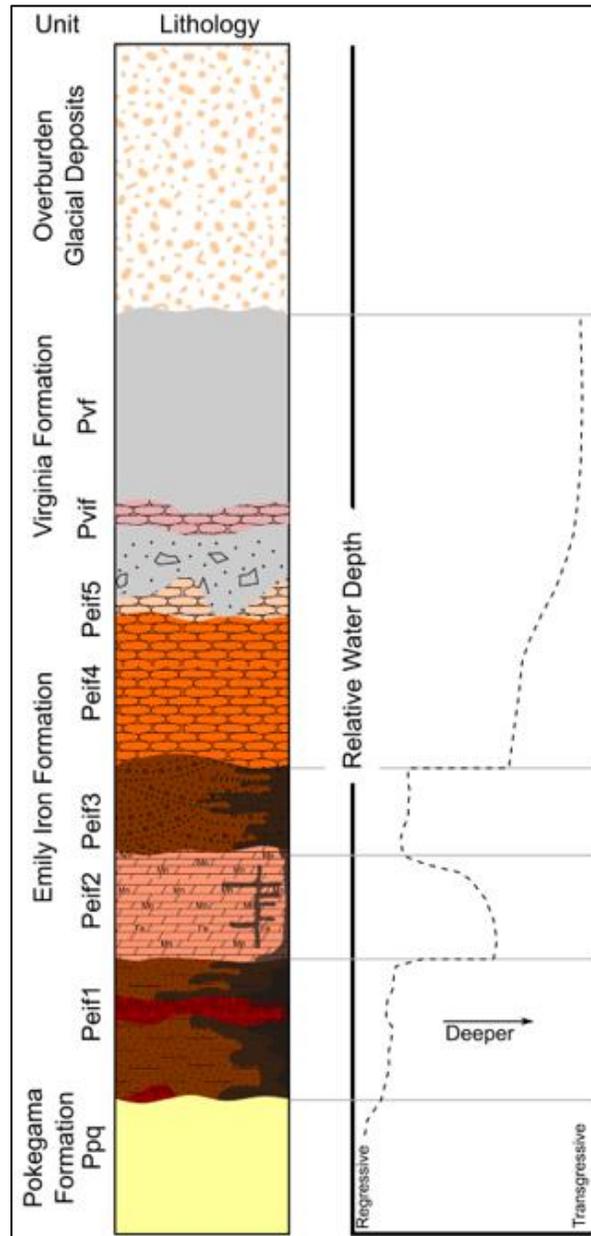


Figure 8-1: Stratigraphic Units at the Emily Deposit and Relative Water Depth (Steiner, A., et. al., 2024)

The Emily Iron Formation is unique among Superior type iron formations in its endowment with manganese. The Biwabik Iron Formation on the Mesabi Iron Range is documented to contain siderite (Fe-carbonate) but manganese is generally conspicuously absent. However, the manganeseiferous iron formation of the North Range provides insight into the origin of the heterogeneous distribution of manganese in the Superior Type iron formations in Minnesota.

The manganese-rich Algoma-type Trommald Iron Formation on the Cuyuna North Range, located 30 miles (48.3km) SSE of the town of Emily (Figure 7-5), has historically been mined for iron and manganese and has previously been attributed to manganese mineralization at the Emily Deposit. Morey (1992) argued manganese travelled in brines from the uplifted North Range to the Emily Deposit and formed Mn-oxides on the seafloor. However, recent work on chemistry of ancient oceans suggests that carbonates are the stable phase in the expected shallow-water depositional environment of the Emily deposit (Mitra et al. 2022). While the brine migration mechanism proposed by Morey (1992) does not accommodate the observed mineralogy, it does not preclude seawater connection between the deposition of the Trommald and the Emily Iron Formations. Both Algoma and Superior type iron formations have been linked to distal hydrothermal activity (Aftabi et al., 2022), though the two differ in depositional environment.

Algoma-type iron formations are deposited in deep water settings while Superior-type are deposited in shallow water, but in the case of the Cuyuna District, it is possible the two are connected through ocean chemistry. Metal-enriched waters exhaled in deep water, perhaps associated with a rifted margin or the Penokean orogen, may initially precipitate some manganese with iron on the sea floor forming Algoma-type iron formations such as the Trommald formation. Migration of metalliferous waters from the deep ocean to the shoreline then brings the remaining manganese into the depositional zone for Superior-type iron formation like the Emily Iron Formation.

9. EXPLORATION

While there was earlier exploration drilling in the area by various parties from 1913 on, the deposit was originally discovered by the Pickands Mather Mining Company in the 1940's while exploring for iron. Subsequent historic drilling by U.S. Steel in the 1950s (Strong, 1959), the USBM and the Minnesota Manganese Resources Company in the 1990s, and Cooperative Minerals Resources in 2011 and 2012 has continued to support the premise that a potentially significant endowment of manganese exists in this area.

The majority of historical drillholes defining the manganese enriched zones were executed in the 1940's-1950's, and record keeping does not meet current industry best practices (such as a lack of downhole surveying, and confirmation of/confidence in sampling protocols). The legacy nature of these data prevent inclusion in current resource modeling, although the data was valuable for exploration drill hole targeting. A formal technical review of all accessible legacy data and a "back of the envelope" bulk mineralization model was produced for NSM in 2022 by BRE (Berg et al., 2022). In the review, BRE identified strong indications of westward and down-dip continuation of manganese mineralization from Cooperative Minerals Resources' 2011-2012 drilling and the subsequent mineral resource estimate published by NSM (2020 and 2022).

In April of 2022, NSM contracted BRE to begin scoping and developing a drill program on NSM's lands in Sections 20 and 21, T138N, R26W. The goal was to demonstrate the westward and down dip extension of the existing mineral resource estimate on the eastern portions of the property (Berg et al., 2022), demonstrate the presence of similar mineralization to the center and west of the property, and to leverage the program as much as possible to gain additional insight into future project parameters and considerations (e.g., collection where possible of geotechnical, hydrological, and geometallurgical data).

The drill program was initiated in February of 2023 and completed in July of 2023. A total of 13,107 feet of core was drilled from 29 completed drill holes. A finalized bedrock geology and drill hole collar location map of the 29 holes completed in 2023 and all historic drill holes is presented in Figure 10-1. From the new data collected during this drill program, BRE has been able to confirm the lateral and down dip extensions of manganese mineralization on NSM's eastern land package, as well as it's continuation westward approximately 0.7 miles (1.25km) across the recently secured "Frank" and "Guelich" 40-acre parcels (respectively).

10. DRILLING

Figure 10-1 is a map showing historic drillholes and 2023 drillholes. A total of 32 drill holes were drilled in the 2023 program, and 29 were completed to the planned depth. Table 10-1 is a summary of the 2023 drill program, inclusive of failed drill holes, totaling approximately 13,689 linear feet (inclusive of overburden).

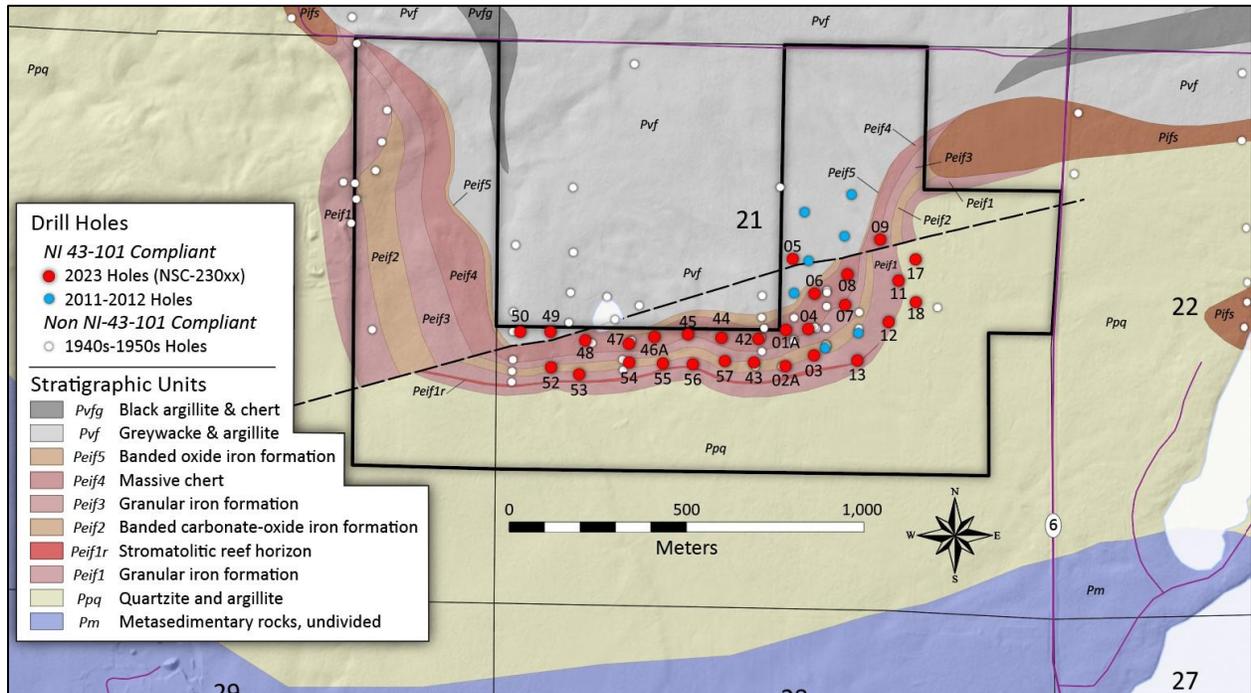


Figure 10-1: Map of Drillholes and Emily Property Boundary

Table 10-1: Holes Drilled in 2023 Drill Program

#	Hole ID	MDH ID	Pad	Core Size	Status	Start Date	End Date	TD Ft	Notes
1	NSC-23001	23651	B	PQ	Temp. Aband.	2/4/2023	2/7/2023	133	Failed
2	NSC-23001A	23692	B	PQ	Temp. Aband.	2/7/2023	2/15/2023	553	
3	NSC-23002	32652	C	PQ	Temp. Aband.	2/16/2023	2/19/2023	239	Failed
4	NSC-23002A	32693	C	HQ	Temp. Aband.	2/19/2023	2/25/2023	456.9	
5	NSC-23004	32653	D	PQ	Perm. Aband.	2/28/2023	3/3/2023	348	
6	NSC-23005	32654	E	PQ	Perm. Aband.	3/1/2023	3/27/2023	533	
7	NSC-23006	32655	A	PQ	Temp. Aband	3/3/2023	3/9/2023	627	
8	NSC-23006	32656	F	PQ	Temp. Aband	3/6/2023	3/18/2023	524	
9	NSC-23008	32658	G	PQ	Temp. Aband	3/19/2023	3/23/2023	418	
10	NSC-23009	32659	N	PQ	Perm. Aband.	3/30/2023	4/2/2023	428	
11	NSC-23013	32663	I	PQ	Temp. Aband	4/7/2023	4/8/2023	283	
12	NSC-23012	32662	J	PQ	Perm. Aband.	4/12/2023	4/13/2023	253	
13	NSC-23017	32677	M	PQ	Perm. Aband.	4/14/2023	4/15/2023	368	
14	NSC-23007	32657	H	PQ	Perm. Aband.	4/15/2023	4/19/2023	426	
15	NSC-23011	32661	L	PQ	Perm. Aband.	4/19/2023	4/20/2023	283	
16	NSC-23018	32678	K	PQ	Perm. Aband.	4/21/2023	4/23/2023	254	
17	NSC-23043	32695	AP	PQ	Perm. Aband.	4/24/2023	4/28/2023	484	
18	NSC-23042	32694	AO	PQ	Perm. Aband.	4/28/2023	5/4/2023	574	
19	NSC-23044	32696	AQ	PQ	Perm. Aband.	5/6/2023	5/10/2023	599	
20	NSC-23057	32697	AR	PQ	Perm. Aband.	5/11/2023	5/14/2023	457	
21	NSC-23056	32699	AT	PQ	Perm. Aband.	5/16/2023	5/18/2023	349	
22	NSC-23045	32698	AS	PQ	Perm. Aband.	5/25/2023	5/28/2023	529	
23	NSC-23055	32809	AV	PQ	Perm. Aband.	5/29/2023	6/1/2023	352	
24	NSC-23046	32700	AU	PQ	Perm. Aband.	6/2/2023	6/3/2023	210	Failed
25	NSC-23046A	32810	AU	PQ	Perm. Aband.	6/3/2023	6/14/2023	469	
26	NSC-23047	32801	AW	PQ	Perm. Aband.	6/14/2023	6/23/2023	543	
27	NSC-23048	32802	AY	PQ	Perm. Aband.	6/25/2023	6/30/2023	544	
28	NSC-23054	32808	AX	PQ	Perm. Aband.	7/1/2023	7/5/2023	424	
29	NSC-23053	32807	AZ	HQ	Perm. Aband.	7/6/2023	7/10/2023	343	
30	NSC-23052	32806	BB	PQ	Perm. Aband.	7/11/2023	7/17/2023	433	
31	NSC-23049	32803	BA	PQ	Perm. Aband.	7/18/2023	7/25/2023	653	
32	NSC-23050	32804	BC	PQ	Perm. Aband.	7/27/2023	7/31/2023	609	

11. SAMPLE PREPARATION, ANALYSIS AND SECURITY

11.1 Sample Preparation and Analysis

For the 2023 drilling campaign, samples within the Emily Iron Formation were marked out by geologists nominally at 4-foot intervals (but range from 0.6' to 11.7' at the discretion of the geologist) and nominally 10-foot intervals within the hanging wall Virginia Formation and footwall Pokegama Formation. Sample boundaries honor all lithology and mineralization boundaries logged by geologists. Drill core was split ($\frac{1}{4}$ core for PQ size core and $\frac{1}{2}$ core for HQ size core) using a diamond core saw and put into cloth bags for shipping.

Sample preparation and geochemical analyses of drill core from the 2023 drilling program were performed by ALS Laboratories (Reno, Nevada and Vancouver, British Columbia). Drill core was crushed to 2mm (70% passing) then an aliquot of 250g was split and pulverized to 75-micron powder. The powder was mixed with a lithium tetraborate flux and fused into a glass disk. Fused disks were analyzed by X-ray fluorescence for major and minor elements including manganese (XRF-21u). Samples that exceed the upper detection limit for manganese (>25% Mn) were analyzed by inductively coupled atomic absorption spectroscopy. Refer to Section 12.2 for more details on sample analysis.

11.2 Security

Drill core processing took place on the secure CMR facility site, so samples did not have to leave the property between drilling and logging/sampling. The facility is locked up when no active work is being conducted. Shipping of samples to the lab was provided by Dayton Freight Lines Inc., who picked up the samples at the CMR facility and delivered them to ALS in Reno.

12. DATA VERIFICATION

12.1 Site Visits

Mr. Donald Hulse, SME-RM and Ms. Amanda Irons QP-AIPG visited the project on June 28, 2023.

During the visit there was extensive review of drill core, and field review of the drill locations and core handling during drilling (Figure 12-1). The core handling meets industry standards, and the core storage and security exceeds most operations.

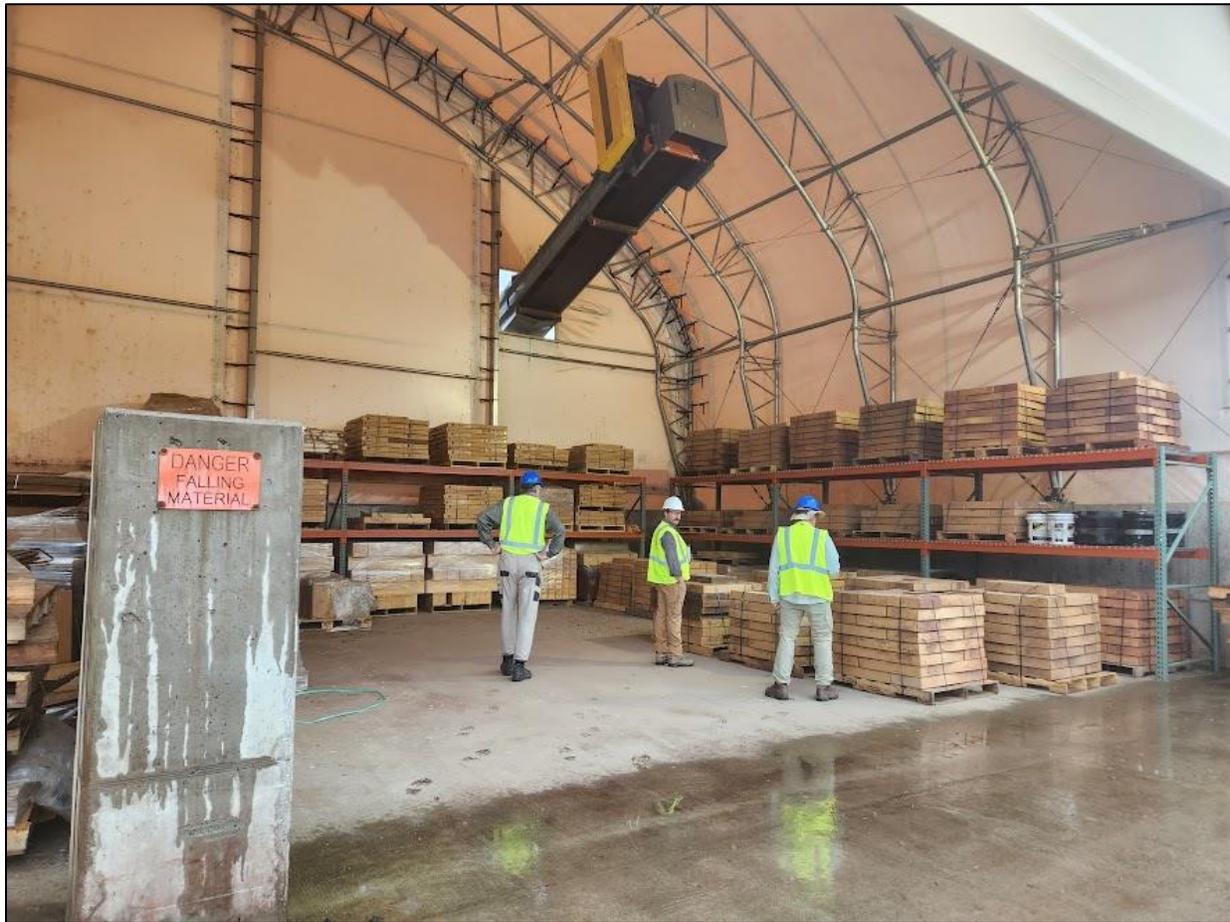


Figure 12-1: Core Storage Facility On Site

Core logging was well organized and systematic (Figure 12-2).

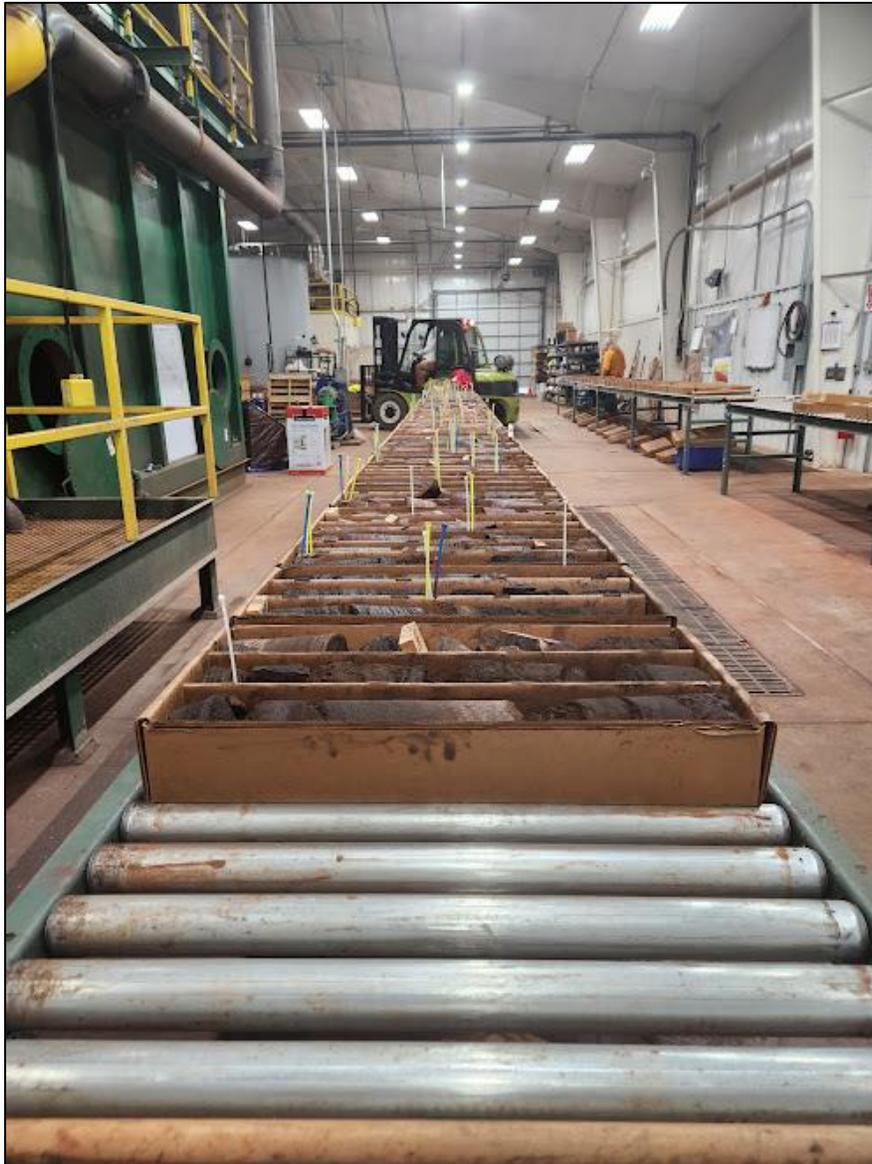


Figure 12-2: Core Logging Tables

12.2 Quality Control Testing

Modern geochemical analyses are available for 29 boreholes drilled during the 2023 campaign and from 7 boreholes drilled during the Barr Engineering campaign in 2011 and 2012. A total of 2274 assays of drillcore are included in this dataset.

Quality assurance and control samples were inserted in-line with samples and submitted to the laboratory to assess the quality of the sampling procedures and the accuracy of analyses. Control samples constitute 20% of all sampling and are divided (5% of each) into certified reference materials (CRMs), field duplicates (two samples from the same interval consisting of $\frac{1}{4}$ core), pulp duplicates (a second split taken from the pulverize stage at the lab), and blanks. The blank material used for the project was 99% pure silica sand. Descriptions of the four CRMs were deployed during the 2023 drilling program include:

- ◆ **Low Grade** – OREAS 36, OREAS 630B - Where Mn concentrations are expected to be below 10%, loggers should use OREAS 630b (3.49% Mn) and OREAS 36 (1.27% Mn). These two low-grade samples should be used in an alternating pattern, and both should appear in all batches. In the event of systemic failures on one standard, the batch and still be reviewed using the other.
- ◆ **Medium Grade** – OREAS 173 - Where Mn concentrations are expected to be between 10 and 30%, OREAS 173 (28.3 % Mn) should be used.
- ◆ **High Grade** – OREAS 175 Where Mn concentrations are expected to exceed 30%, OREAS 175 (41.04 %) should be used.

Graphs of the control sample performance for the four CRMs are given in Figure 12-3 and for the 99% pure silica sand blank in Figure 12-4. Results of ¼ core field duplicates and ground pulp duplicates are presented in Figure 12-5. The summary memos of QAQC data and subsequent BRE recommendations for individual sample batches for this project are drawn from the North Star Manganese Emily Project Batch NSM-23-001 QAQC report (BRE, 2023).

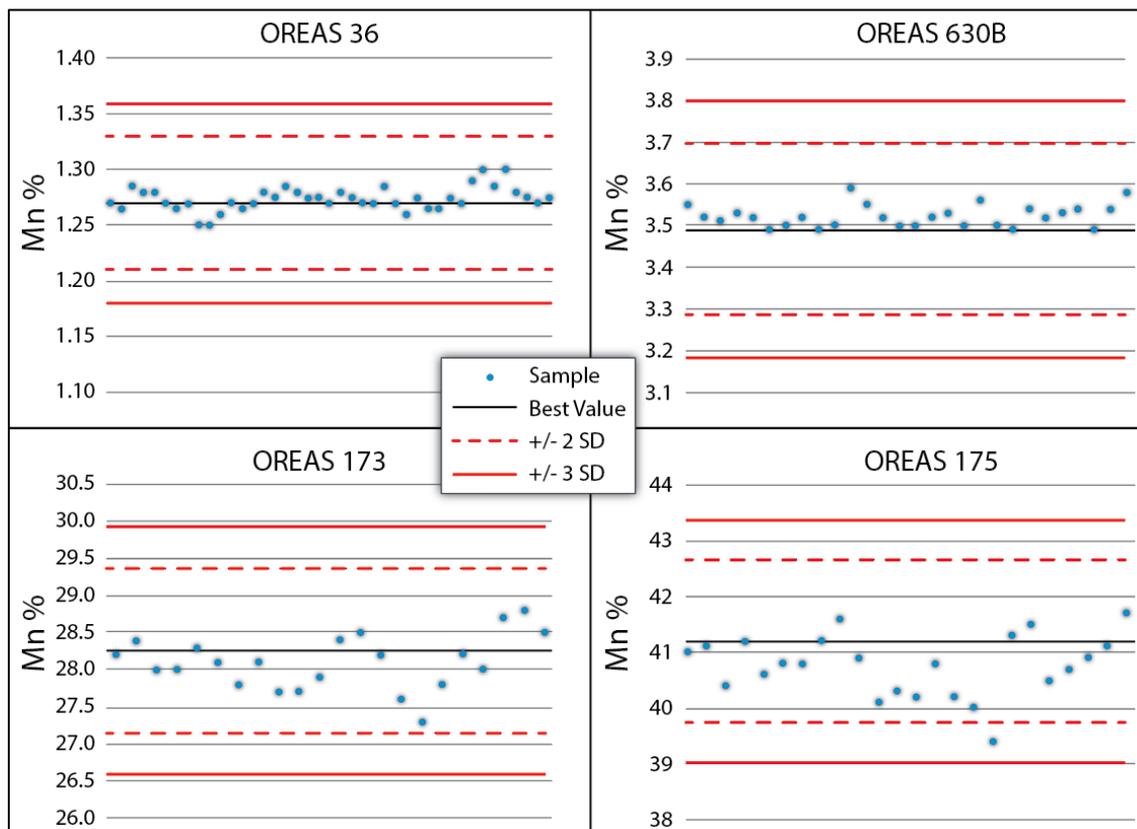


Figure 12-3: Compiled Results for Certified Reference Materials Analysed In-Line with Drill Core Samples.

Note: One and Two Standard Deviation Gates are Derived from OREAS Certificates.

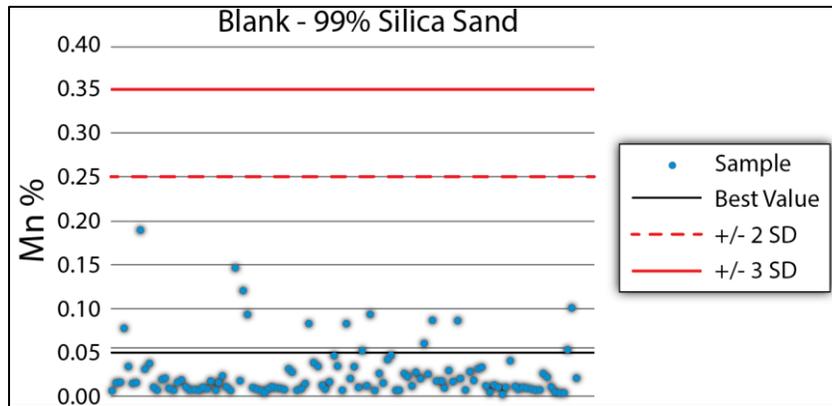


Figure 12-4: Compiled Results of Blanks Analyzed In-Line with Drill Core Samples.

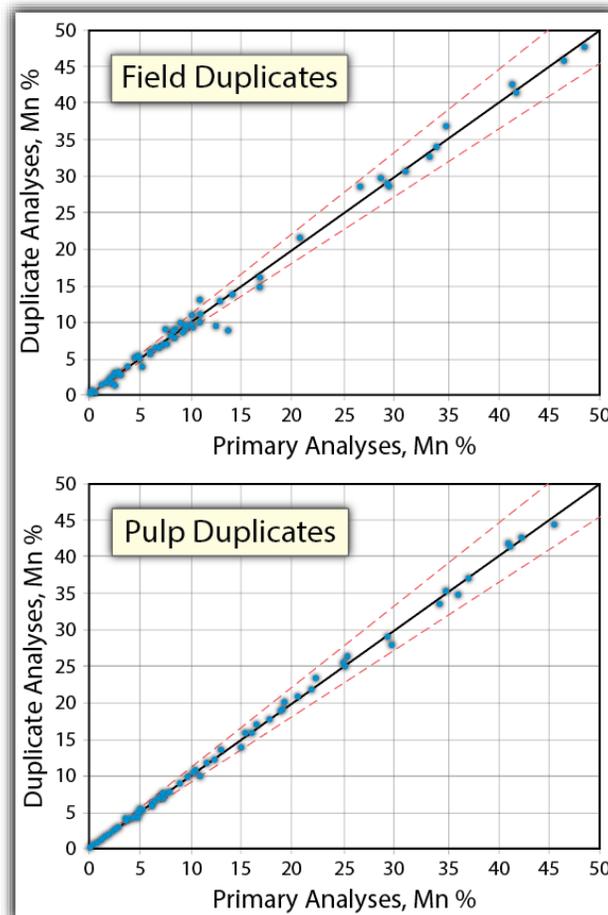


Figure 12-5: Compiled Results of Field and Pulp Duplicate Analyses. Gates Represent ± 10 from Unity.

13. MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

Testing has been performed in campaigns since the 1990's by a variety of laboratories for a variety of companies. Recent work was performed for Barr Engineering in 2013 for an earlier technical report at several qualified laboratories. The current work is being performed by Kemetco Research, Inc. (Kemetco), Richmond, British Columbia, Canada. The historical and current test work are summarized below.

13.2 Historical Work

13.2.1 United States Bureau of Mines Test Work (1990 – 1992)

The United States Bureau of Mines Twin Cities Research Center in Minneapolis, Minnesota undertook extensive research into the extraction of manganese from enriched zones of the Emily Prospect. A paper describing the Emily deposit and discussing an in-situ mining research program is included in the Society of Mining, Metallurgy, and Exploration (SME) 1992 Transactions, Volume 294.

The Bureau conducted site characterization studies on the Emily deposit, including regional stratigraphic relationships from existing geologic databases, deposit geometry, geologic structure, hydrologic conditions, accessibility of the mineralized material to a leach field, surface subsidence potential and data collected from laboratory leaching experiments. This information was used to evaluate the technical, environmental, and economic feasibility of in-situ mining of manganese at the Emily deposit. The Bureau published three reports based on findings from chemical analyses of 47 intervals of drill core collected from Emily in 1996.

13.2.2 Coleraine Minerals Research Laboratory (CMRL) Test Work (1995, 2009, and 2011)

The CMRL in Coleraine, Minnesota obtained manganese samples from Emily in 1995 when a sonic drill hole was completed, as well as samples from a borehole mining pilot test that took place from 2009 to 2011. Approximately 600 short tons of material were forwarded to the CMRL.

In 1995, 2009 and 2011, CMR requested CMRL to evaluate mineral samples collected from Emily. The samples consisted of manganiferous iron ore. The manganese minerals pyrolusite (MnO_2), manganite ($\text{MnO}(\text{OH})$) and psilomelane ($\text{BaMn}^{2+}\text{Mn}^{4+}_8\text{O}_{16}(\text{OH})_4$) were identified. Emily drill core material collected in 1995 was used for process upgrading tests. The manganese sample from the Emily demonstration plant delivered to CMRL in 2011 was dried and loaded into 55-gallon drums. Additional truckloads of the CMR Emily manganese samples were stored at Midland Research, Nashwauk, Minnesota.

Experimental work with the 1995 core samples indicated that the upper level (200-300 ft) of lower grade material (average 8.7% MnO_2) was difficult to process using standard mineral processing physical separation methods due both to the large fraction of very fine (minus 500-Mesh; 25 micron) material as well as the association of the manganese grains with iron and silica even at a very fine grind. Work with the lower level (300-400 ft) of higher-grade material (average 23.6% MnO_2) indicated that could be physically upgraded to 33.7% MnO_2 using gravity concentration methods and high intensity magnetic separation and further upgraded to 43% MnO_2 using additional chemical flotation.

Due to the overall poor upgrading ability and recovery of Emily manganese minerals using a combination of gravity and high intensity magnetic separation techniques followed by chemical flotation, SO_2 leaching was recommended for further testing of manganese extraction. This technique is common in manganese mining operations due to low cost and high manganese extraction efficiency. The process is undertaken at ambient temperature and atmospheric pressure in open leaching tanks. Once manganese is leached, it

can then be oxidized to form chemical manganese dioxide (CMD [MnO_2]) which is one of the more valuable forms of manganese in high demand throughout the world. The CMD can then be converted to lithium manganese dioxide (LMO [LiMnO_2]) for use in the rechargeable electric car battery industry.

13.2.3 Barr Engineering Process Development (2013)

Barr Engineering performed a combination of mineralogical analysis, process test work, flowsheet development, and preliminary cost estimation for CMR in 2013. This demonstrated technical feasibility of producing purified electrolytic manganese metal (EMM), purified electrolytic manganese dioxide (EMD) and manganese carbonate (MnCO_3).

Based on the results of the mineral liberation analysis (MLA), conceptual process schemes were determined. The steps of these conceptual processes indicated which test work would be required for initial investigation. They included comminution, gravity and magnetic separation for pre-concentration, and chemical leaching. A representative bulk sample was assembled from the available 2011-2012 exploration drill cores and used to undertake testing to clarify and quantify conceptual flowsheets.

13.2.3.1 Comminution

Comminution tests conducted at Hazen Research, Inc. (Hazen) yielded Bond rod mill and Bond ball mill work indexes of 14.4kWh/mt and 15.8 kWh/mt respectively, indicating relatively hard rock similar to iron ore material currently mined in the Mesabi Iron Range.

13.2.3.2 Gravity Separation

Hazen tested gravity pre-concentration of the material using both spiral separators and shaking tables. Initial diagnostic tests using heavy liquid separation indicated the potential to remove up to 50% of the quartz while rejecting only 2-5% of the Mn and Fe. Spiral and shaking table experiments, however, proved difficult, and very little gangue material could be removed efficiently from the feed.

13.2.3.3 Mineralogical Analysis

Based on the 2011-2012 drill cores, the mineralogy of Emily was quantified through MLA, confirming Mn and Fe measurements previous undertaken using whole rock analysis. The MLA analysis indicated fine dissemination of quartz, hematite, and manganese oxides, confirming that physical beneficiation was not sufficient to upgrade the manganese to a saleable product.

13.2.3.4 Magnetic Separation

High-intensity magnetic separation (SLon technology) was tested by Outotec. Barr provided Outotec with both run of mine (ROM) feed and gravity pre-concentrate material to evaluate the suitability of the SLon to reject quartz while maintaining high recovery of iron and manganese. Outotec investigated several operational variables and found an optimum setting for operation. However, the ability to reject relatively pure quartz and maintain high Fe and Mn recoveries was not established.

13.2.3.5 Leaching

Barr commissioned Kemetco Research, Inc. (Kemetco) to undertake parametric leach tests to provide an initial determination of leaching conditions and the ultimate Mn recovery potential. SO_2 -based leaching was selected because it is the most common approach used in commercial upgrading of Mn. Using an SO_2 -based leaching protocol Kemetco demonstrated that more than 80% of the Mn could be recovered from the feed without requiring pre-concentration. Kemetco also performed a larger batch leach and used the purified leach solution in laboratory-scale electrowinning to produce both EMM, EMD and manganese carbonate products.

13.3 Recent Metallurgical Test Work (2023)

Market conditions currently favor the production of high purity manganese sulphate monohydrate (HPMSM). The present focus of metallurgical studies on samples from the Emily Deposit are designed to produce HPMSM and other high purity manganese products.

In September 2023, North Star Manganese (NSM) engaged Kemetco Research Inc. in Richmond, BC, Canada, to perform a laboratory test program on two composites of drill core samples collected from the 2023 drilling campaign. Kemetco was selected because of their extensive experience working on manganese deposits for the EV battery industry and their prior experience with the Emily Deposit samples.

Kemetco commenced work in late 2023 on chemical and mineralogical characterization on the two composites, including physical separation methods and direct leaching of the resource composites using reductive acidic leaching.

Due to the apparent fine dissemination of ore minerals and some similarities in physical properties of the component minerals, physical separation methods have not been effective. However, direct leaching results using sulfurous acid (sulfur dioxide) and sulphuric acid have been successful in achieving high manganese extractions. Leaching conditions have been optimized to produce a Primary Leach Solution (PLS) which is suitable for downstream purification and potential production of high purity manganese sulphate monohydrate, which is the current preferred product for the EV battery industry.

13.3.1 Metallurgical Sample Selection

Metallurgical samples were selected from the eastern end of the deposit within the area that previous resources were defined by Barr and where the first NSM 2023 drill holes were completed. The selection of samples was coordinated by Dr. Ian Pringle, technical advisor for Electric Metals who used geochemical data for manganese, iron, and silica as well as a range of other elements for the sample selection. The drill core samples were combined into two composites for the current metallurgical tests.

The strategy of the current metallurgical work is to investigate a broad flowsheet approach on a High-Grade (HG; High Mn) composite and a Low-Grade (LG; Lower Mn, Higher Fe, High SiO₂) composite. Table 13-1 summarizes major elements and ratios in the two Kemetco composites.

Table 13-1: Major Elements in High- and Low-Grade Manganese Composites

	Sample	Mass	Mn	Fe	SiO ₂	Fe / Mn	SiO ₂ / Mn	Al ₂ O ₃	K ₂ O	CaO	MgO
	#	kg	%	%	%			%	%	%	%
Comp 1 HG	22	107	34.0	21.5	5.7	0.63	0.17	1.6	1.0	2.1	0.26
Comp 2 LG	18	121	15.6	20.5	39.0	1.32	2.51	1.5	0.4	0.9	0.15
Average Grade	40	228	24.2	21.0	23.3	0.87	0.96	1.6	0.7	1.4	0.20

The 40 samples which make up the HG and LG composites were selected from the first 255 drill core intervals (average 1.5m length) from the 2023 drilling and which contain more than 5% manganese. The HG composite (indicated by the green square) has 34% Mn with low SiO₂, while the LG sample (indicated by the yellow square) (15.5% Mn) has significantly more quartz and silicates (Figure 13-1 and Figure 13-2.)

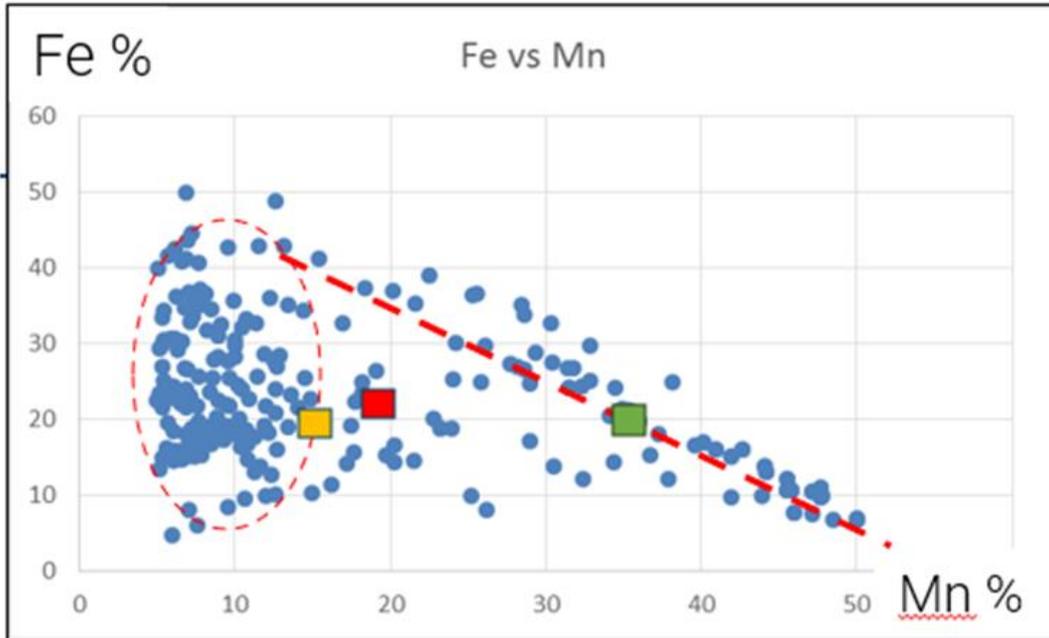


Figure 13-1: Iron versus Manganese Plot for 2023 Drilling Campaign Comparing Grades in HG and LG Composites

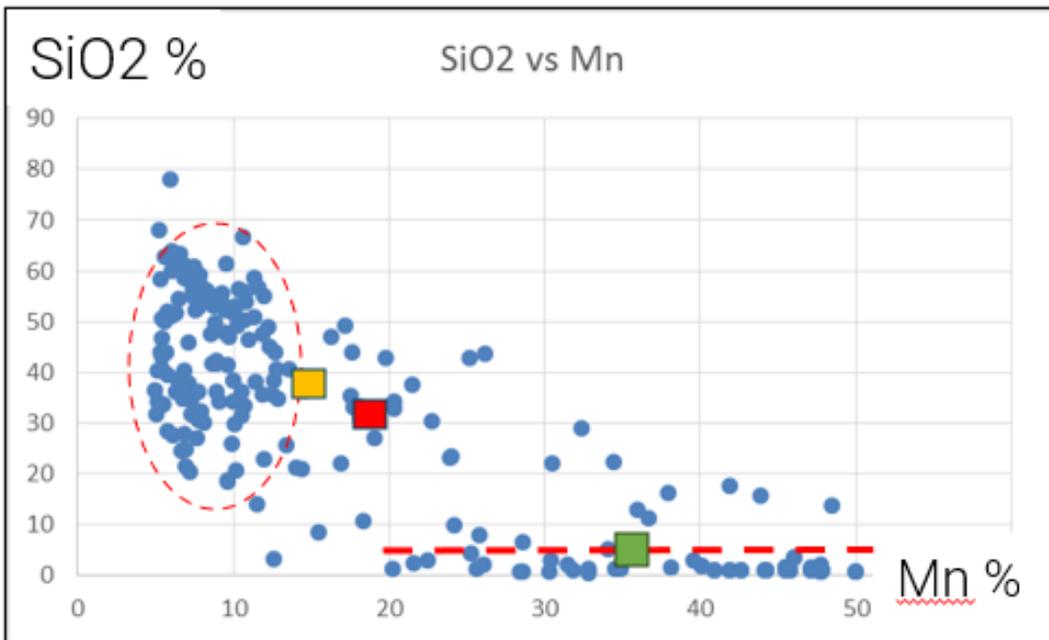


Figure 13-2: Silica versus Manganese Plot for 2023 Drilling Campaign Comparing Grades in HG and LG Composites

13.3.2 Mineralogical Characteristics

The two metallurgical composites (HG and LG) were prepared at Kemetco and subjected to Diagnostic Leaching and Mineralogical characterization using X-ray diffraction analysis.

The diagnostic acid leach tests clearly indicated that high manganese extractions would only be achievable using a reductant which increased extraction from 5-12% Mn to more than 95% Mn when compared to an acid-only leach (Table 13-2). Potassium dissolution tracked that of Manganese. Iron extraction also required the action of a reductant, however overall extraction of iron was limited to 15% (HG) and 9% (LG).

Table 13-2: Results of Diagnostic Leach Tests

Sample	Mn (%)	K (%)	Fe (%)
HG (Composite 1)			
Assay	36.9	0.61	17.7
% Extractable with H ₂ SO ₄	5.1	7.8	2.2
% Extractable with reductant	95.6	100.0	14.8
LG (Composite 2)			
Assay	15.9	0.30	17.7
% Extractable with H ₂ SO ₄	11.6	9.9	2.8
% Extractable with reductant	95.5	94.1	9.2

Note: SO₂ is reductant

X-ray diffraction (XRD) results identified the main manganese-bearing minerals as manganite, braunite and cryptomelane, while hematite and subordinate goethite are the main iron-bearing minerals (Table 13-3). HG (Composite 1) had significantly lower quartz and silicates and was considered the preferred sample for beneficiation test work.

Table 13-3: Quantitative XRD Results Identifying Mineral Distribution by Percentage

Mineral	Ideal Formula	HG Composite 1	LG Composite 2
Manganese Minerals			
Manganite	$Mn^{3+}O(OH)$	24	12.9
Cryptomelane	$K(Mn^{4+}, Mn^{2+})_8O_{16}$	14.1	5.7
Braunite	$Mn^{2+}Mn^{3+}_6(SiO_4)_8O_8$	15.8	2.3
Pyrolusite	MnO_2	3.3	
Rhodochrosite	$MnCO_3$		1.2
Birnessite	$(Na, Ca, K)_x(Mn^{4+}, Mn^{3+})_2O_4 \cdot 1.5H_2O$		0.4
Iron Minerals			
Hematite	$\alpha-Fe_2O_3$	22.7	22.2
Goethite	$\alpha-Fe^{3+}O(OH)$	10.9	4.9
Gangue Minerals			
Quartz	SiO_2	3.2	38.6
Aegirine – Augite	$NaFe^{3+}Si_2O_6 - (Ca, Na)(Mg, Fe, Al, Ti)(Si, Al)_2O_6$		9.9
Calcite	$CaCO_3$	5.2	1.3
Rutile	TiO_2	0.8	0.5
Total		100	100

13.3.3 Metallurgical Test Work

Kemetco performed a test program to evaluate beneficiation of LG composite with an intent on recovering and upgrading manganese while potentially rejecting silica and iron. These investigations include magnetic, gravity, and heavy media separation, and were ineffective.

Leaching of the mineral and hydrometallurgical processing is considered necessary for extraction of manganese and refining as a saleable product. An initial series of ten leaching tests using ground samples have been completed. These tests were conducted at temperatures between 50°C and 90°C with varying stoichiometric addition rates of sulphuric acid and SO₂ gas. Manganese extractions of more than 95% (average) were obtained in these 5-hour leaching tests using both composites. Optimized conditions were chosen to bulk leach a combination of HG and LG (Composites 1 and 2). This test achieved over 98% Mn extraction and produced a pregnant leach solution (PLS) with a manganese content of 130 g/l for downstream purification.

Following the bulk leach, a subsample has been subjected to a jarosite precipitation. This test demonstrated successful removal of potassium, sodium, and iron from solution in the jarosite precipitate. Follow-up impurity removal test work is in progress and production of HPMSM through crystallization is planned in the current metallurgical program at Kemetco.

13.3.4 Planned Test Work

The metallurgical test work is ongoing on the two composite samples with the objective of developing a viable process flowsheet for the project. Future work will focus on the optimization of the proposed approaches.

14. MINERAL RESOURCE ESTIMATES

The mineral resource estimate was completed by Ms. Amanda Irons CPG-AIPG and a Qualified Person under the CRIRSCO codes.

14.1 Geologic Model

A three-dimensional geological model was produced in LeapFrog Geo by BRE to incorporate all data into a coherent and comprehensive illustration of the current interpretation of stratigraphy and structure of the Emily manganese deposit upon completion of the 2023 drilling campaign. This model primarily utilizes diamond drilling data from 2023 as well as 2011 and 2012. Historic non-compliant drilling data were also used to guide the interpretation to aid in overall geological understanding and potential future work. A plan view of the model is presented in Figure 14-1 with the glacial overburden removed. The Forte QP undertook a detailed review of the model and agrees with the interpretations.

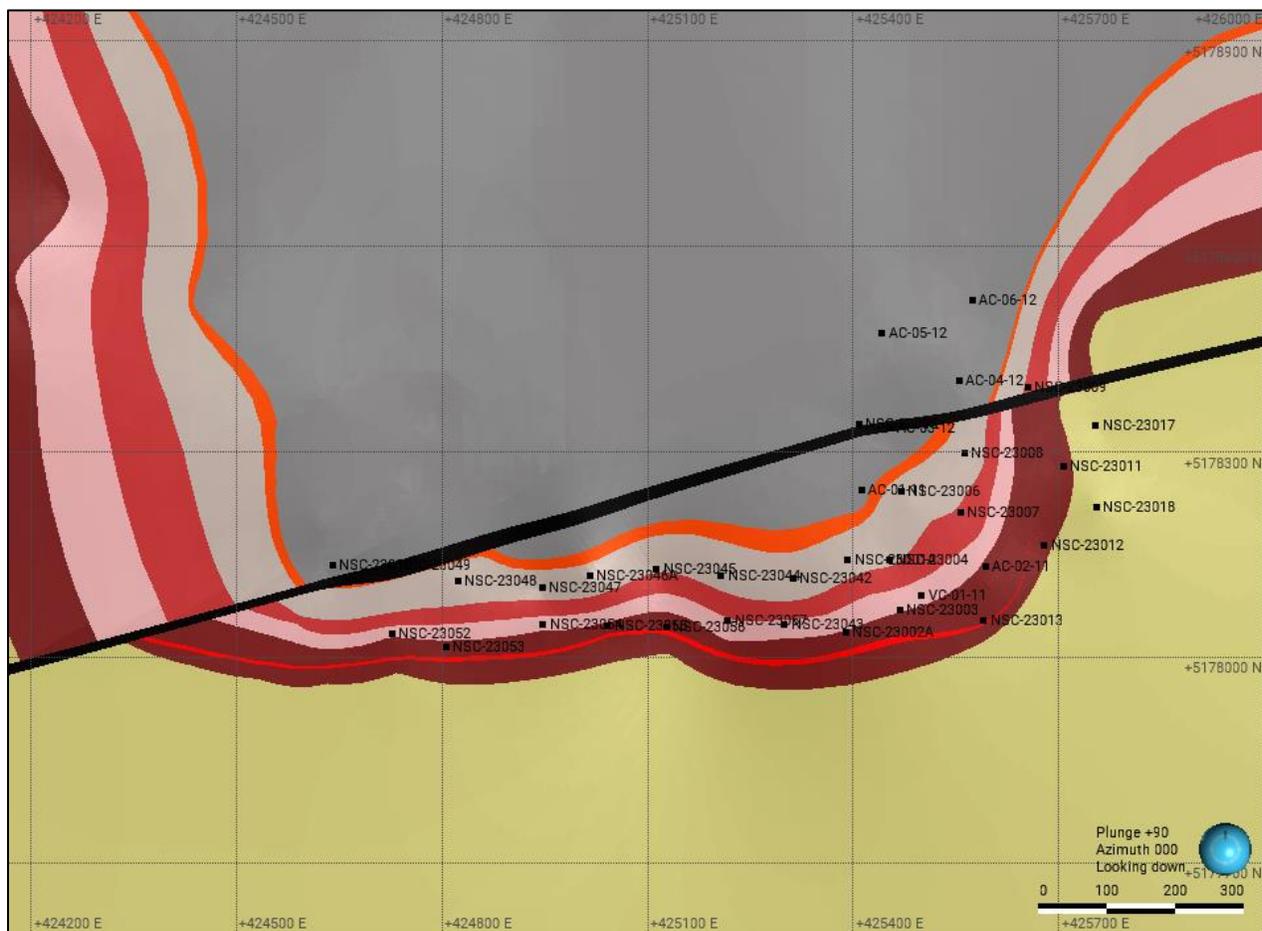


Figure 14-1: Plan View of the Bedrock Geology and Drill Holes used in Resource Estimate (Steiner, A., et. al., 2024)

14.2 Lithological Domains

All available historic drilling data in the area was compiled and reviewed by BRE to assign basic lithology codes to each interval, breaking out the Virginia, Emily Iron, and Pokegama formations (Pvf, Peif, and Ppq). The Emily Iron Formation (Peif) was better defined and separated into five subunits (Peif1-Peif5).

During and after the drilling campaign of 2023, data from the new drill holes was incorporated into the geological model, and ongoing refinements to the interpretation of the individual subunits were made. At this time, a sixth subunit was identified that is entirely contained within the Peif1 subunit. This is the Peif1r (Peif1 'reef') unit, which appears to have significant control over the concentration of manganese oxide mineralization.

Overburden and an interpreted fault (the Loon Fault) were also incorporated within the model. The lithological domains and corresponding codes are seen in Table 14-1 below.

Table 14-1: Interpreted Lithological Domains and Corresponding Codes used in Geologic Model

Interpreted Lithology	Code
OB	0
Peif1	1
Peif1r	10
Peif2	2
Peif3	3
Peif4	4
Peif5	5
Ppq	6
Pvf	7
Loon Fault	100

14.3 Geostatistics

As an initial step, the QP has evaluated the descriptive statistics of the logged lithologies. Statistics are shown in

Table 14-2 and a comparative Box and Whisker plot is shown in

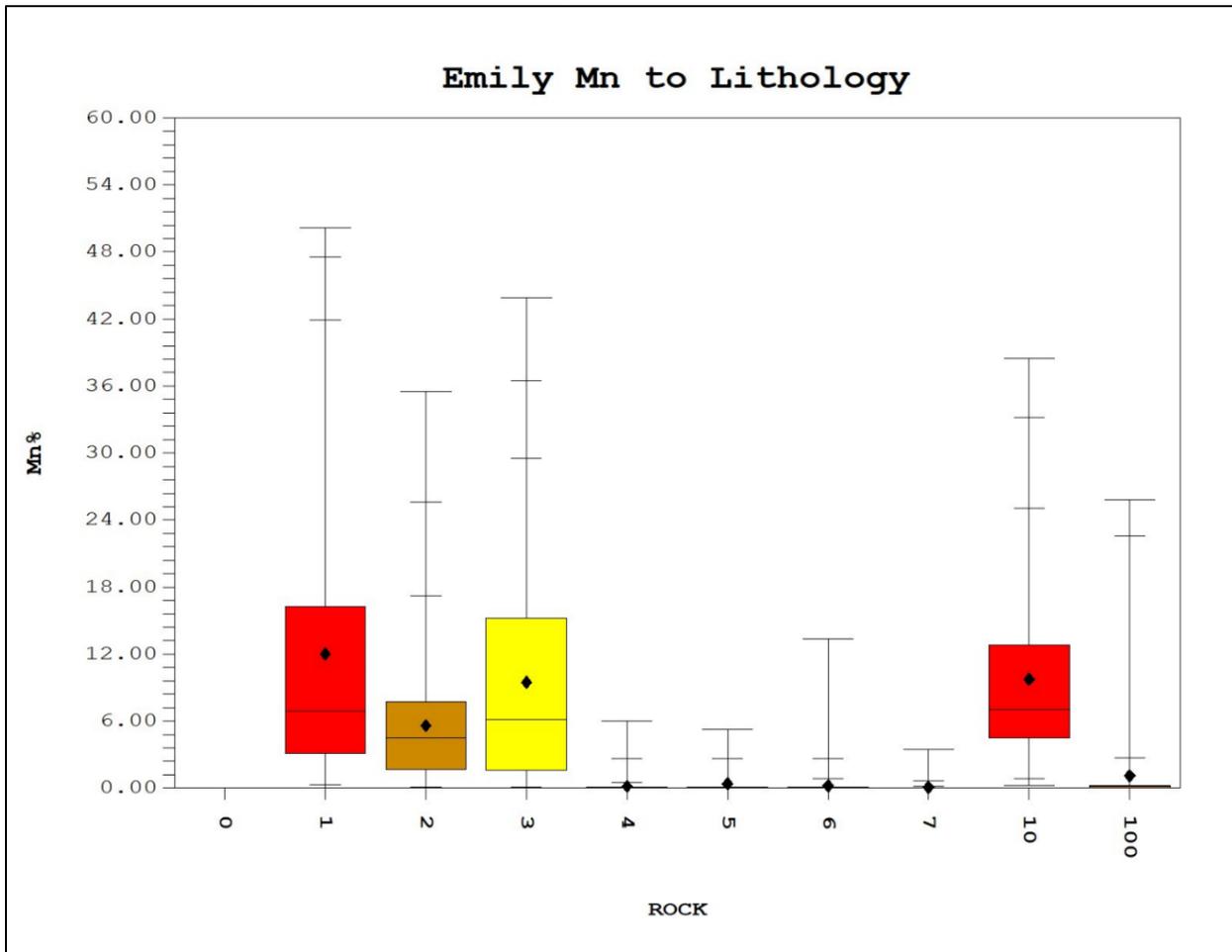


Figure 14-2.

Table 14-2: Length-Weighted Statistics of Mn% within Interpreted Lithologies

Lith	Count	Length	Mean	Standard Deviation	Coefficient of Variation	Variance	Min	Lower Quartile	Med	Upper Quartile	Max
OB	0	0									
Peif1	968	975.02	11.50	12.44	1.08	154.85	0.02	3.04	6.72	14.75	50.14
Peif2	286	281.54	5.86	5.67	0.97	32.17	0.04	1.91	4.56	8.02	35.50
Peif3	314	304.49	9.11	9.74	1.07	94.91	0.02	1.37	5.60	14.30	43.90
Peif4	275	309.95	0.15	0.43	2.96	0.19	0.01	0.03	0.05	0.10	5.98
Peif5	27	24.84	0.51	1.38	2.71	1.90	0.01	0.02	0.05	0.09	5.26
Peif1r	84	74.46	8.96	7.33	0.82	53.69	0.22	4.24	6.90	11.45	38.50
Ppq	304	509.89	0.14	0.52	3.78	0.27	0.00	0.02	0.03	0.07	13.40
Pvf	123	145.39	0.07	0.34	4.96	0.12	0.01	0.01	0.01	0.02	3.45
Loon Fault	109	115.76	1.26	4.50	3.58	20.23	0.01	0.05	0.13	0.24	25.83

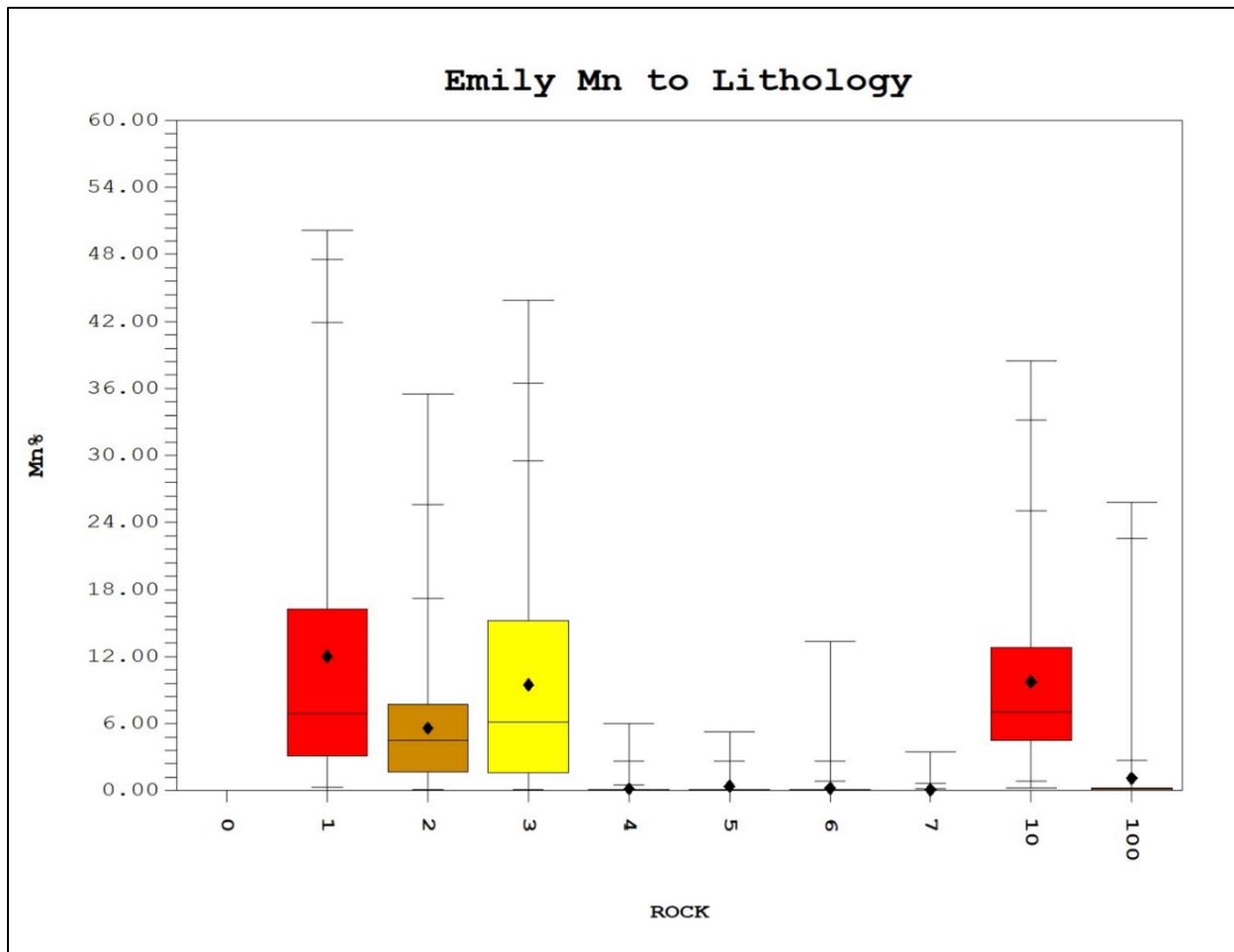


Figure 14-2: Box and Whisker Plot of Mn% and Lithological Domains

Based on the statistics provided, the Forte QP determined the domains to be used within the resource are Peif1, Peif1r, Peif2, and Peif3.

Cumulative frequency plots showed the distribution of Mn within each lithological domain. Peif1 and Peif1r show close correlation and therefore were combined to one domain (Figure 14-3). Peif1-1r and Peif3 display a significant change in distribution of higher grades at approximately 10% Mn, while Peif2 displayed lower grades (Figure 14-4).

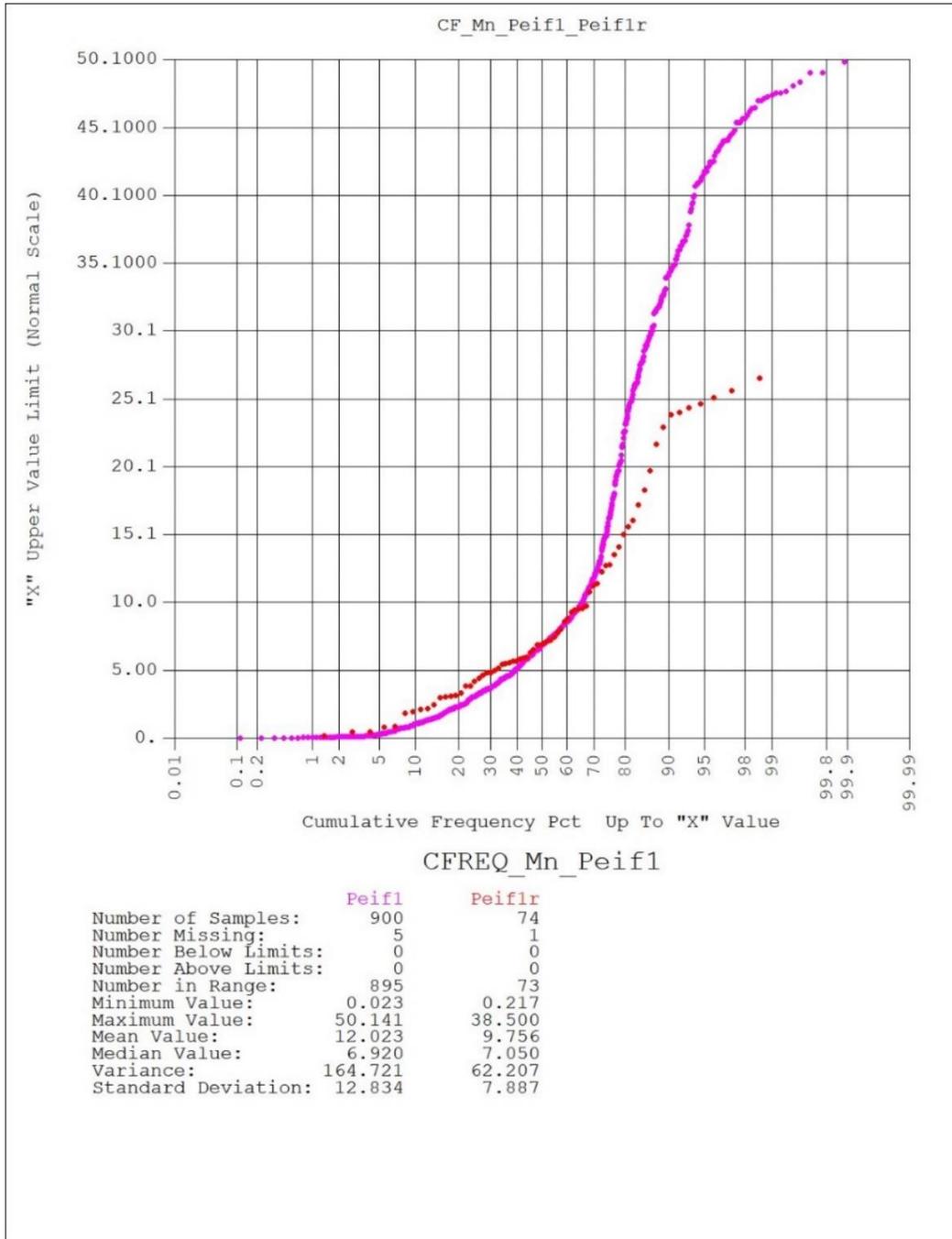


Figure 14-3: CF Plot of Mn within Peif1 and Peif1r

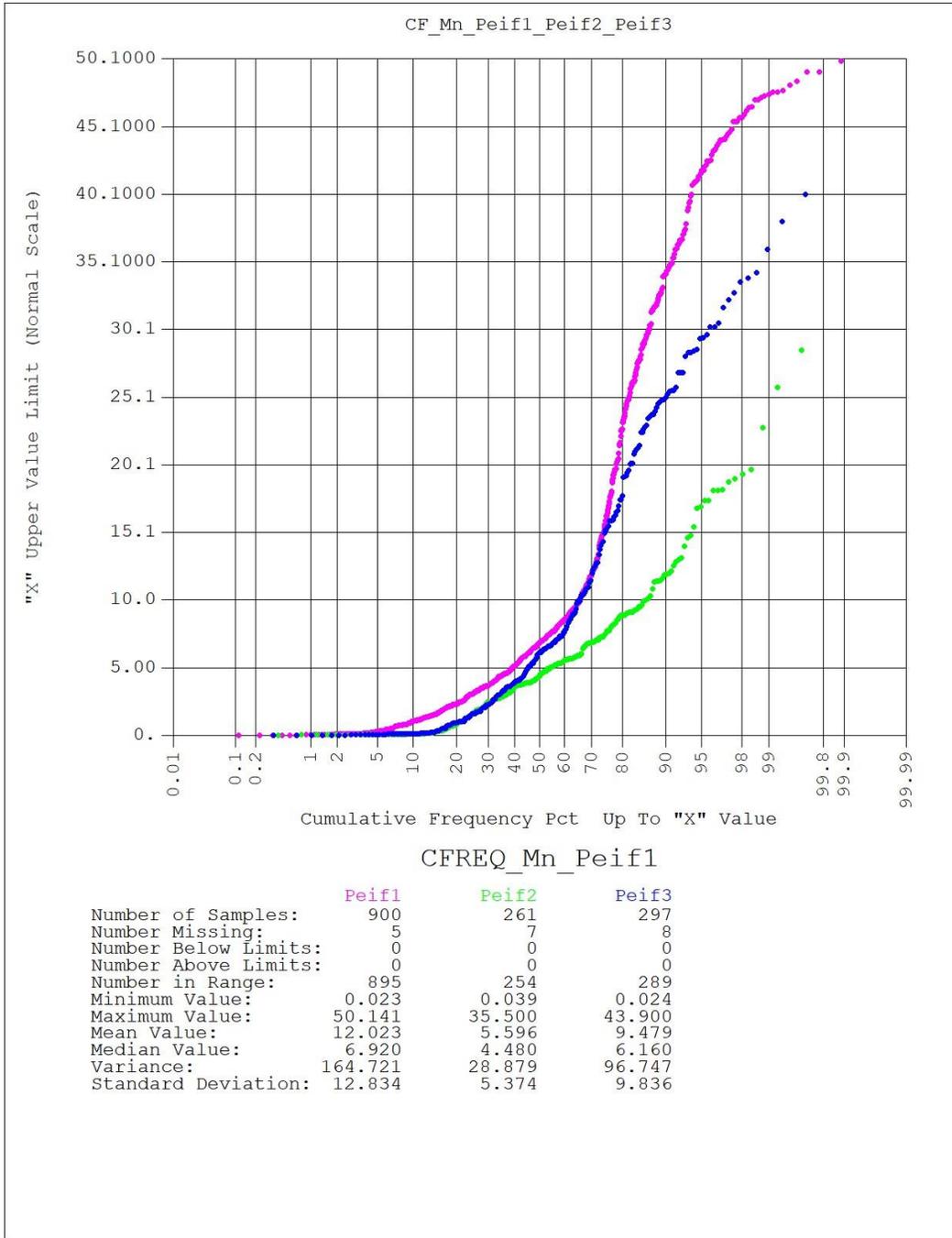


Figure 14-4: CF Plot of Mn within Peif1, Peif2 and Peif3

14.4 Domaining

High grade Mn mineralization was modeled by creating indicator shells at a 10% cutoff within the Peif1-1r and Peif3 lithological domains. Drillholes were coded with “lithologies” corresponding to intervals of >10% manganese within each lithological domain. BRE identified four unique horizons as containing significant lateral continuity of manganese mineralization greater than 10%. The uppermost is contained within the Peif3 subunit, below which is a somewhat less continuous mineralization horizon within the Peif2. The main mineralized horizon is found straddling the Peif1r fully contained within the Peif1 subunit, and the lower zone is found within the Peif1 at or near the contact with the Ppq (Figure 14-5).

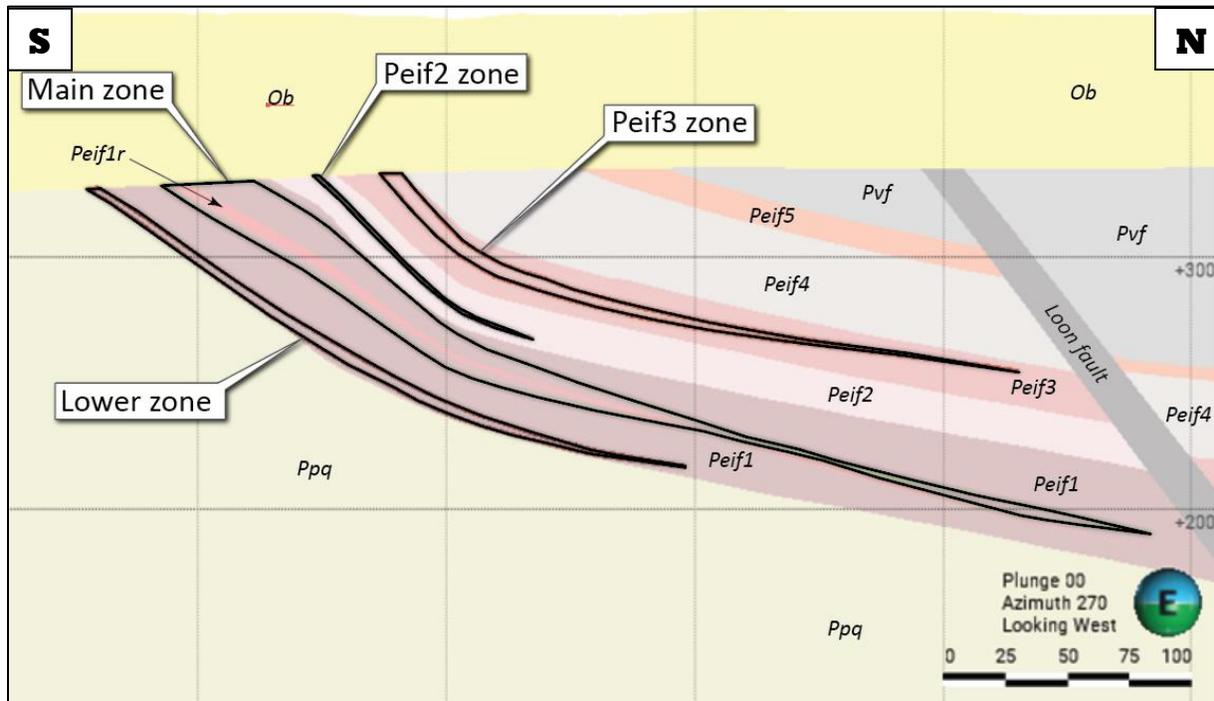


Figure 14-5: Cross Section Showing Lithological Domains and 10% Indicator Shells Interpreted by BRE (Steiner, A., et. al., 2024)

The Forte QP combined the main and lower horizon within the Peif1 and Peif1r as one high-grade domain and used the uppermost horizon from Peif3 as another high-grade domain. Everything outside of the Peif1-1r and Peif3 10% indicator shells and within the lithological domains were labeled as “low-grade” Mn. Figure 14-6 shows an example of the change in distribution at 10% for Peif1-1r. The lithological domain for Peif2 was all labeled as low-grade.

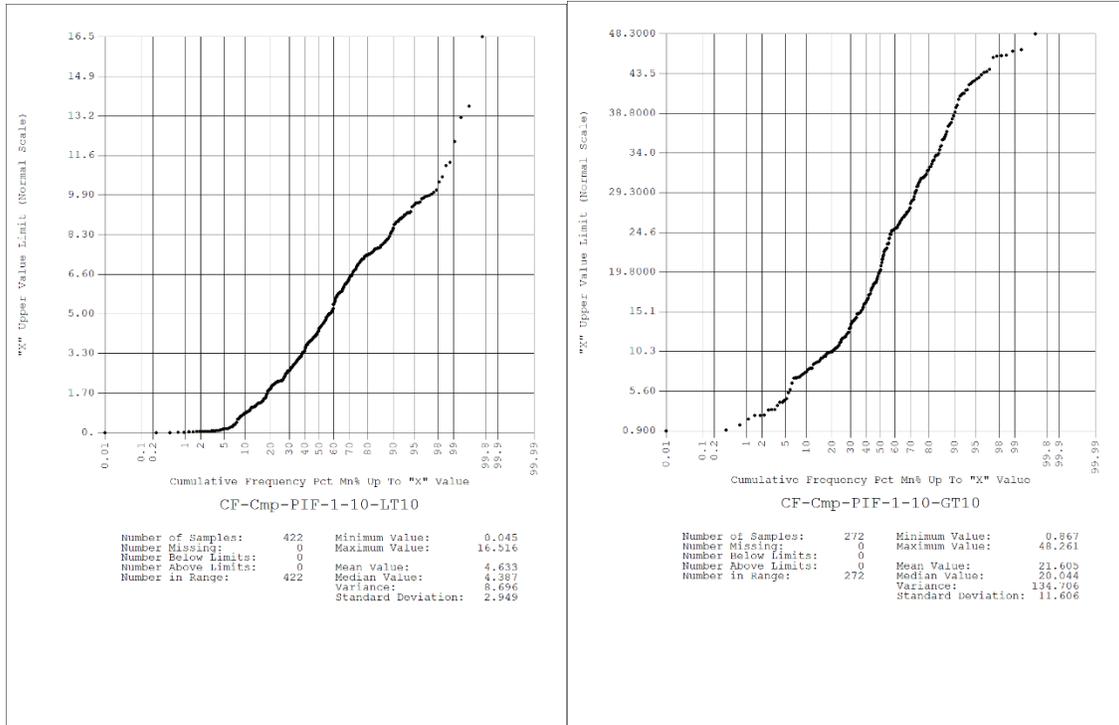


Figure 14-6: CF Plots of Peif1-1r Less than 10% Mn (Left), and Greater than 10% Mn (Right)

The domains used for estimating Fe and SiO₂ were not limited to an indicator model and are just within the Peif1-1r, Peif2, and Peif3 lithological domains.

14.5 Compositing

A composite study was performed to analyze the effects of dilution and variance reduction on composites of various lengths. The objective was to smooth random variance while retaining the intrinsic variability of the grades and the resolution of the mineral contacts. A graph of the results at a 5% cutoff is shown in Figure 14-7. There is an initial inflection point in both grade and variance at about 1.4 meters. As the average sample length is 5 ft or 1.524 meters, this was selected as the composite length. 1.5 meters corresponds to one half of the vertical block size providing adequate vertical resolution to the estimate.

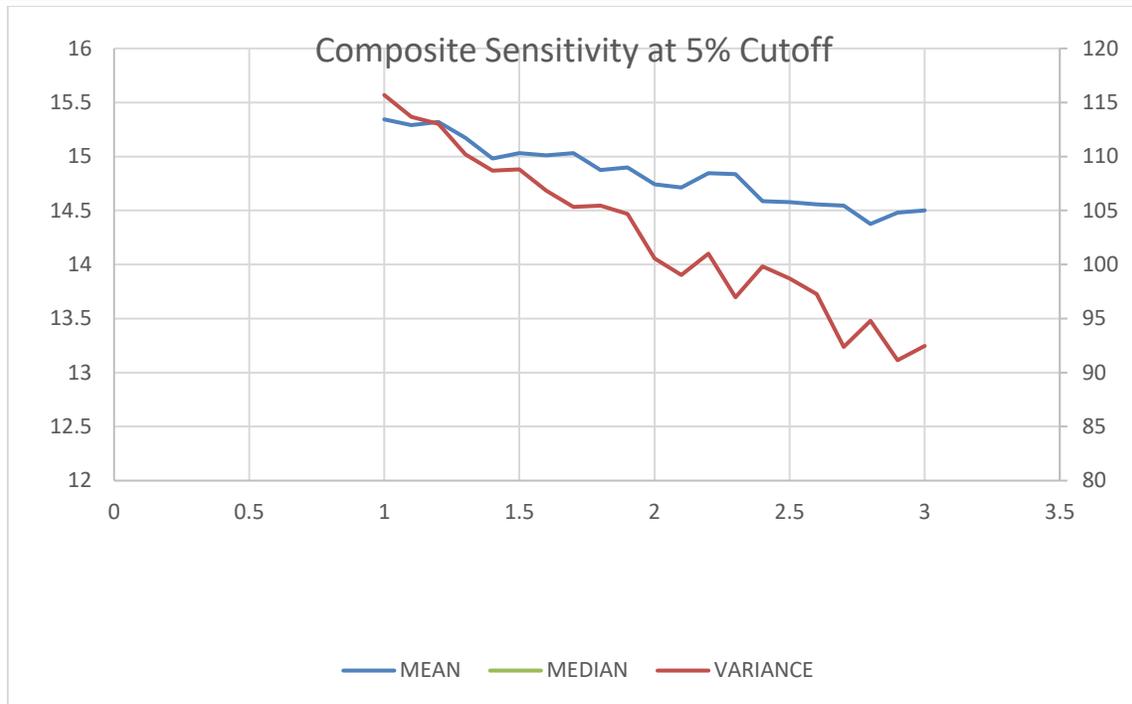


Figure 14-7: Emily Composite Length Study

Rather than using the lithology domain boundaries to physically control the compositing at contacts, compositing was done to the entire drillhole. The grades composited include Mn, Fe, and SiO₂.

14.5.1 Grade Capping

The cumulative distribution plots that were developed for the domain groupings of Mn determined the capping of outlier high grades. Plots were also for Fe within each domain, without any high-grade/low-grade separation. The analyses show that there were small distributions of samples at very high grades. To mitigate any risk potential, Mn and Fe grades in the composite files were capped. Table 14-3 shows the capping of both Mn and Fe within each domain. Capping on SiO₂ was only done in the Peif1-1r domain at 80%.

Table 14-3: Mn and Fe Capping Values

Domain	Mn %	Fe %
Peif1-1r HG	47	36
Peif1-1r LG	16	
Peif2	20	36
Peif3 HG	30	50
Peif3 LG	16	

14.6 Specific Gravity

BRE provided Forte with specific gravity (S.G.) results of 730 samples from the 2023 drilling campaign. S.G. measurements were collected at regular intervals from all logging units and mineralization styles on core samples approximately 10-15cm in length. Samples were weighed using a high-precision scale with a hanging basket suspended in a water bath. The weight of the dry core sample was recorded from the top plate of the scale and a wet weight was collected with the sample fully submerged in water using the suspended basket. S.G. was calculated using Archimedes method via equation 1 below. Porous rock was occasionally encountered, requiring the sample to be left in the water bath to fully saturate before recording the wet measurement.

$$eqn. 1 \frac{wt_{dry}}{wt_{dry}-wt_{wet}} = S.G.$$

Duplicate S.G. samples were collected and sent to ALS Laboratories. S.G. results for the entire dataset range from ~2 to 4.7 and average 2.85. The averages for individual logging units vary from the overall average by as much as 15%. The weighted average S.G. values by formation is given in Table 14-4 and the distribution of sample S.G. values for map units are presented in Figure 14-8. Logging subunits of the Emily Iron Formation Peif3 and Peif1r have the highest average S.G. at 3.29 and 3.12, respectively, while the Virginia (Pvf) and Pokegama formation (Ppq) have the lowest specific gravities at 2.48.

Table 14-4: S.G. Values by Iron Formation

Low Grade					
Domain	Number	Min	Max	Mean	Std Dev
Peif1	179	2.15	4.00	2.77	0.33
Peif2	75	2.36	4.08	3.06	0.37
Peif3	52	2.43	4.78	3.11	0.47
High Grade					
Domain	Number	Min	Max	Mean	Std Dev
Peif1	147	2.07	4.30	3.01	0.49
Peif2	N/A				
Peif3	36	2.5	4.49	3.54	0.52

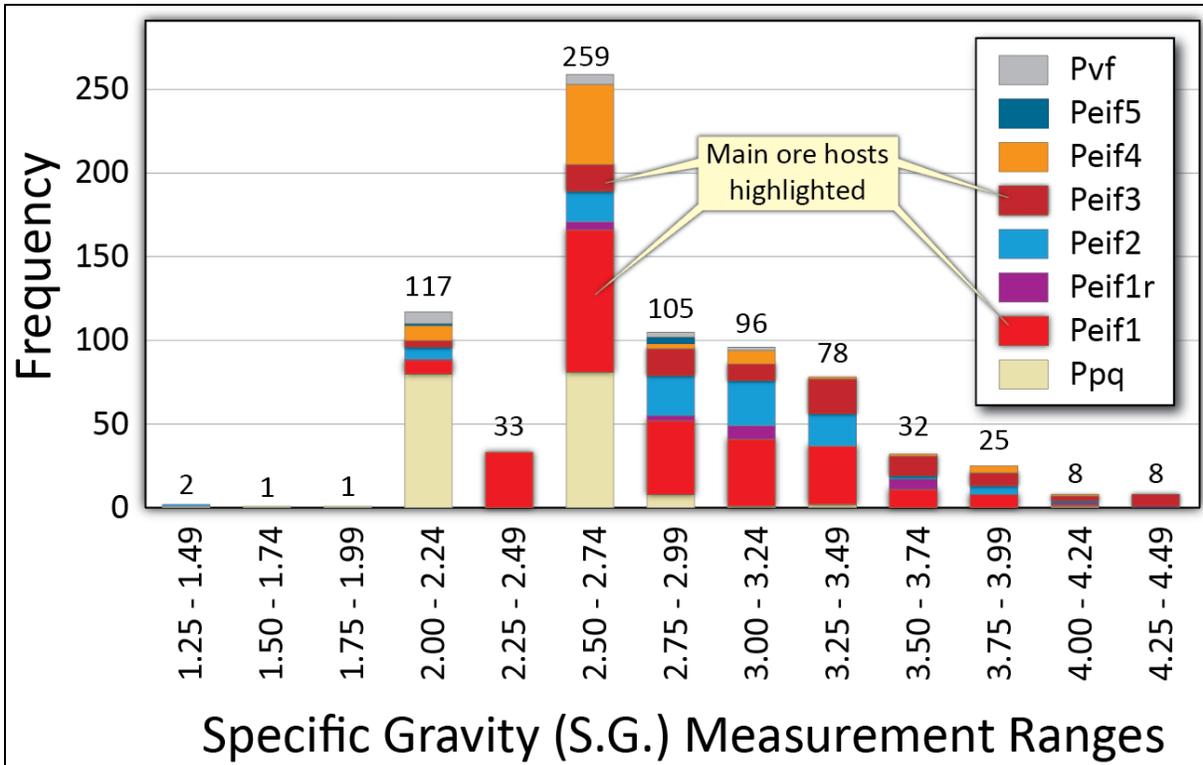


Figure 14-8: Histogram Showing the Distribution of Specific Gravity Data from the 2023 Drilling Program at the Emily Deposit (Steiner, A., et. al., 2024)

14.7 Variography

Variograms were developed in LeapFrog Edge software for composites within each domain based on the capped 1.525 meters composites used in the grade estimation. The variograms results were initially used to help confirm the interpreted directional controls on mineralization, however, a variable orientation of each domain was used to direct the orientation of the search. The variograms were used to set the search limits within each domain.

14.8 Block Model Parameters

The block model used for resource estimation is a 4m x 2m x 1.5m, orthogonal, non-rotated block model. Smaller blocks are used to better emulate the strike and dip of the mineralized zones.

14.9 Block Grade Estimation Methodology

Block grade estimation was completed using LeapFrog Edge software. Grade estimates use inverse distance to the second power (ID2), within each domain. Blocks were estimated with a single pass search at about 1.5 variogram ranges for the Mn domains, and 1.5 of the variogram ranges for the Fe and SiO₂ domains. Search ranges are shown in Table 14-5.

Table 14-5: Grade Estimation Search Parameters

Domain	Search Parameters (meters)								
	Mn			Fe			SiO ₂		
	Major	Inter	Minor	Major	Inter	Minor	Major	Inter	Minor
Peif1-1r HG	150	150	25	150	150	15	150	150	6
Peif1-1r LG	150	225	12						
Peif2	150	450	6	150	225	6	150	225	6
Peif3 HG	150	150	50	150	150	8	150	150	8
Peif3 LG	150	225	12						

Each grade estimate uses a single pass, with a minimum of 6 and a maximum of 14 composite samples used to estimate grades. A maximum of 3 composites are used per drill hole, thus requiring at least two drill holes to contribute to each block estimate.

14.9.1 Specific Gravity / Density Estimation

A large isometric search was run to be certain that specific gravity was estimated in each block within the high-grade and low-grade domains.

14.10 Resource Classification

The classification technique utilizes the average distance of the closest samples around the blocks. The variogram results were also used to help develop the mineral resource classification and a distance of half the variogram was used. For the High-Grade combined Mn domains, a distance limit of 80 meters was used to classify indicated material. Indicated for the combined Low-Grade domains uses an average distance limit of 100 meters (Table 14-6). Indicated and inferred resources were also constrained to NSM’s property boundary. Figure 14-9 and Figure 14-10 displays a histogram of the average distance for the combined High-Grade and Low-Grade Mn domains with the selected classification distances. All classifications were based on the Mn estimates, as Mn is the dominant economic metal.

Table 14-6: Resource Classification

Domains	Classification	Average Distance (m)
High Grade	Indicated	<80
	Inferred	>80
Low Grade	Indicated	<100
	Inferred	>100

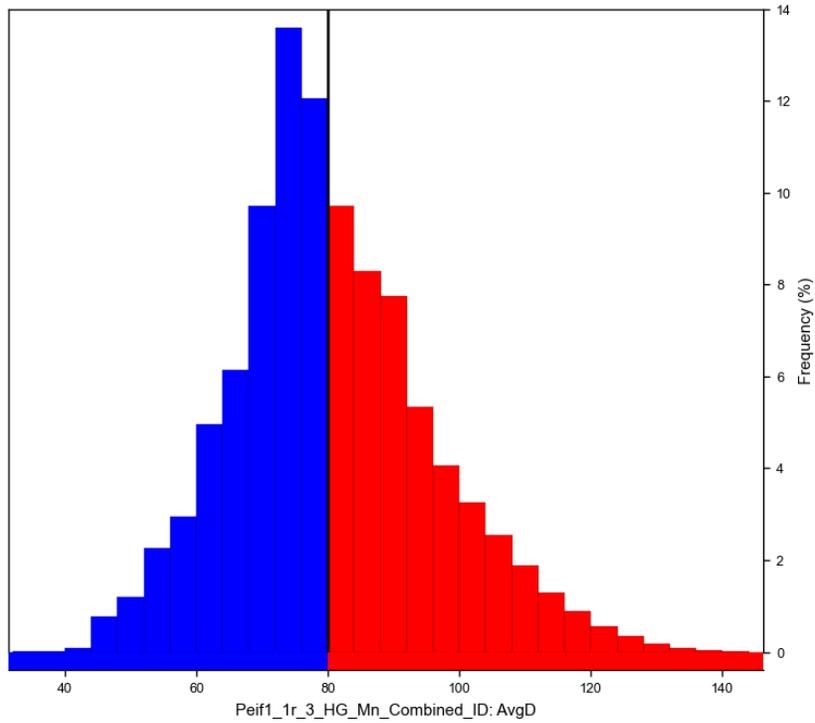


Figure 14-9: Histogram Showing Avg. Distance to Sample in Combined High-Grade Mn Domains

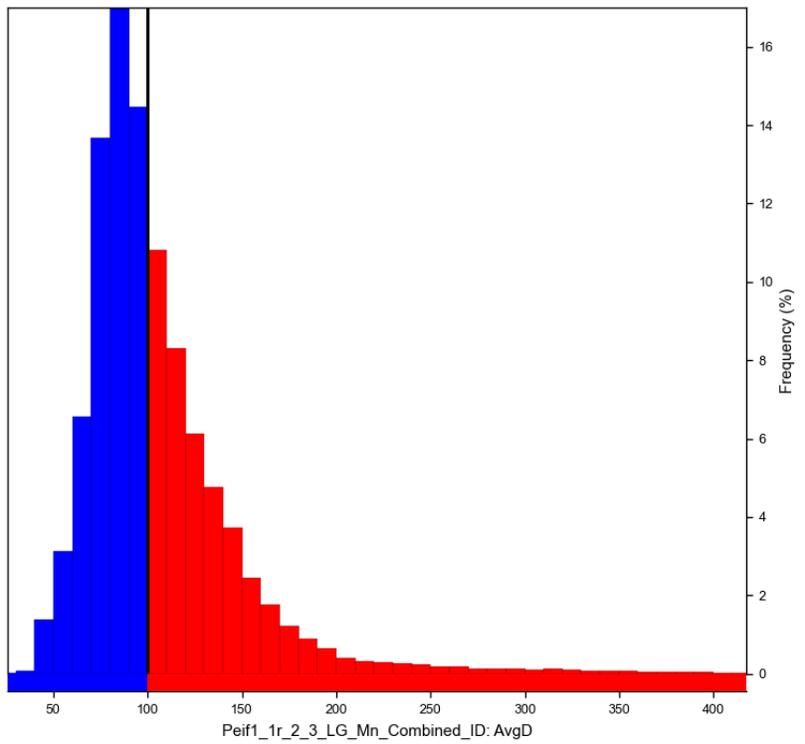


Figure 14-10: Histogram Showing Avg. Distance to Sample in Combined Low-Grade Mn Domains

14.11 Cutoff Grade

Cutoff grade is one measure used to meet the test of ‘reasonable prospects for economic extraction.’ Accordingly, the cutoff grade is estimated based on price and recovery assumptions as discussed herein.

The parameters for the processing cost are based on comminution, iron/manganese separation, leaching and crystallization of the Manganese sulfate. Further refinement will be needed. The mine operating costs were estimated based on an underground cut and fill scenario using cemented fill to reduce the risk of subsidence. Due to potential water handling issues in the glacial till overburden the QP has increased common underground operating costs from U.S. \$100 to \$160/tonne for mining, processing, and administrative costs.

MnSO₄ pricing was based on internet references including CPM Group and S&P Global¹ where European and U.S. pricing is close to \$2,400/tonne and Chinese pricing less than \$1,000/tonne. The QP has reviewed pricing from \$1,000 to \$3,000/tonne for battery grade MnSO₄. Current and ongoing test work estimates a total manganese recovery of 95%.

Based on these ranges the QP has calculated potential cutoff grades in percent contained manganese and the sensitivity is shown in Table 14-7. This shows a range of cutoff grades from 2% to 6% Mn. Although there is a sizable mineral resource above 5% manganese, the mineral processing consultants have indicated that certain efficiencies are possible with higher feed grades. Due to the nature of the deposit, there is a continuous core of material greater than 10% that results in an average grade of ~18%, potentially bringing these efficiencies to the operation. While the current mineral resource reports at 10% Manganese, the QP suggests that it be reported at 5% Manganese while evaluating the potential of higher grade.

Table 14-7: Cutoff Grade Sensitivity

Cutoff %Mn	Price US\$/t MnSO ₄	Total Operating Cost US\$/tonne						
		\$100	\$110	\$120	\$130	\$140	\$150	\$160
	\$1,000	3.82	4.21	4.59	4.97	5.35	5.74	6.12
	\$1,500	2.55	2.80	3.06	3.31	3.57	3.82	4.08
	\$2,000	1.91	2.10	2.29	2.49	2.68	2.87	3.06
	\$2,500	1.53	1.68	1.84	1.99	2.14	2.29	2.45
	\$3,000	1.27	1.40	1.53	1.66	1.78	1.91	2.04

14.12 Potential for Economic Extraction

To complete the justification for potential economic extraction, the QP analyzed the overall thickness of the orebody. Based on a mechanized cut and fill the QP assumed that the minimum thickness for effective mining was 4 meters. This permits adequate working height, potentially leaving a crown pillar and minimizing dilution.

The QP believes that the cutoff grade as presented combined with a minimum mining height constitutes reasonable prospects for potential economic extraction. Mineral resources are not mineral reserves and have not been demonstrated to have economic viability.

¹ <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/manganese-sulfate-bottleneck-looms-over-us-european-ev-manufacturers-73926378>

14.13 Validation of Resource Estimate

The resource estimate has been validated by visual review of the block model by global statistical review.

14.13.1 Visual Review of Block Model

Visual review of the block model shows good agreement between block and composite grades. Mineralization appears to be well constrained to areas of drilling. An example section of the model is shown in Figure 14-11.

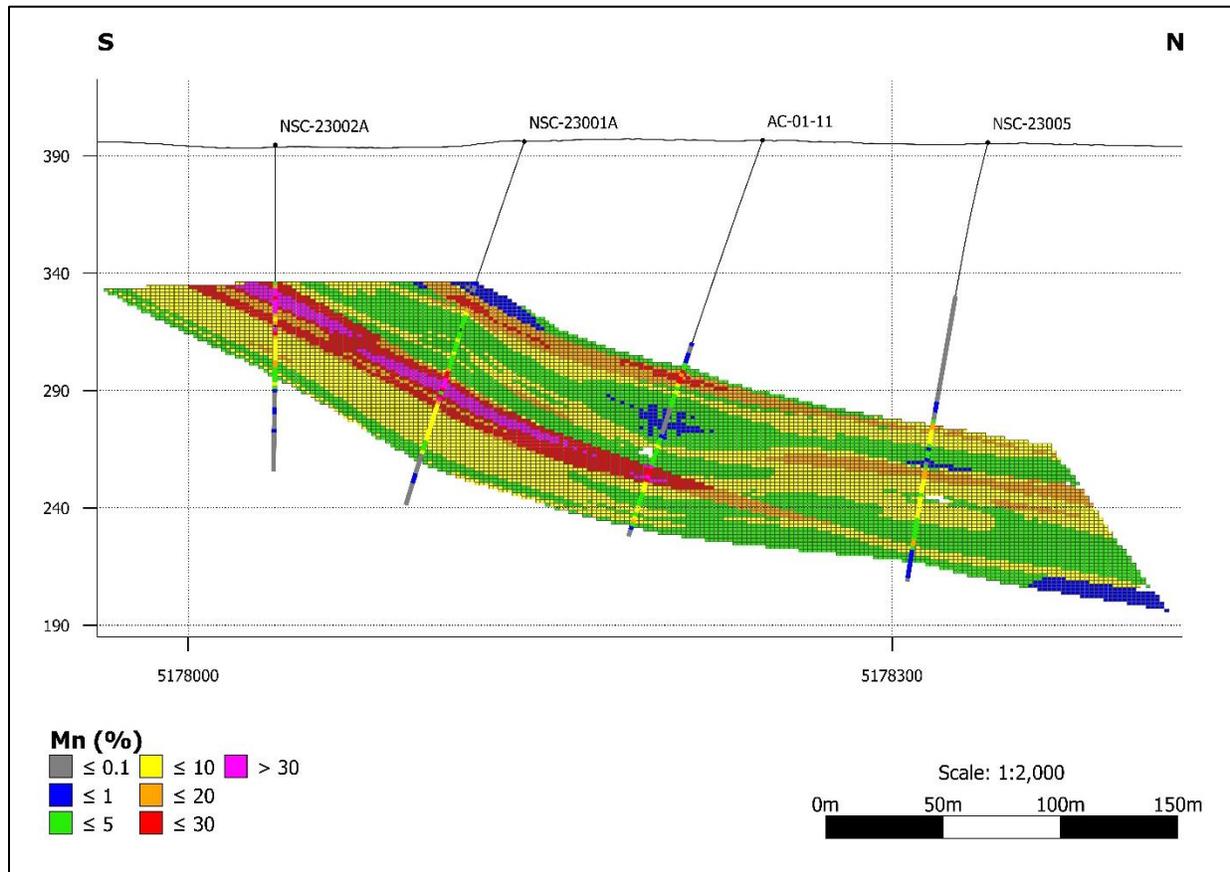


Figure 14-11: Cross Section of Block Model and Composite DHs Looking West

14.13.2 Global Statistical Review

The global statistics of the low-grade and high-grade zones was reviewed, and the cumulative frequency graphs are shown in Figure 14-12. The volume variance reduction shows that they are slightly oversmoothed, however the mean grades are similar, and the general performance of the model is appropriate for the deposit style.

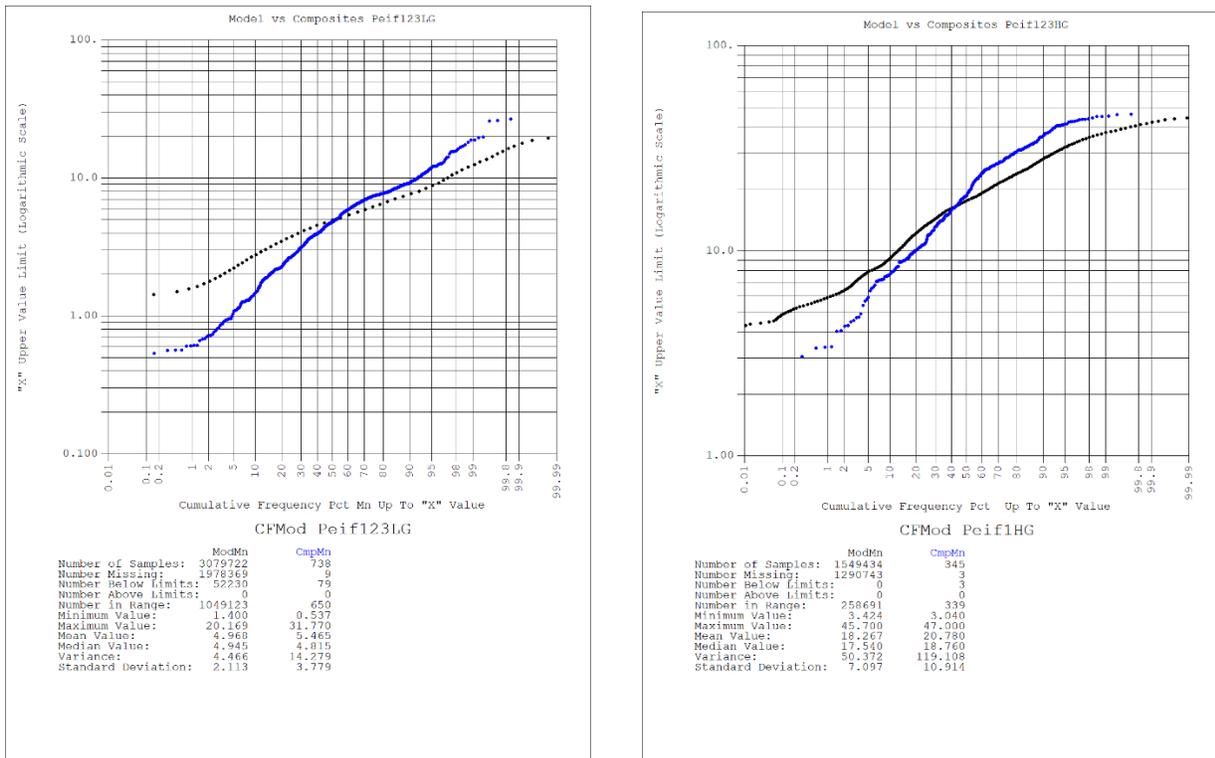


Figure 14-12: Statistical Comparison of Grade Distribution Low and High Grade

14.14 Mineral Resource Tabulation

The mineral resource has been tabulated at three cutoff grades, 5%, 10%, and 15% Mn, and limited to an area with a thickness greater than 4 meters, as discussed above. The resources are reported as Indicated Mineral Resource and as Inferred Mineral Resource based on the parameters described in Section 14.11, a sales price of U.S. \$2,500/t MnSO₄, and the morphology of the higher-grade zones of the Emily iron formations.

The classified mineral resources with a potential for economic extraction are shown in Table 14-8.

Table 14-8: NSM Emily Classified Mineral Resource Estimate

Domain	Class	Cutoff (Mn%)	Metric Tons (kt)	Density (g/cm ³)	Mn (%)	Fe (%)	SiO ₂ (%)
High Grade	Indicated	15	4,242.46	3.08	22.37	21.73	25.75
		10	5,897.21	3.11	19.69	22.46	29.13
		5	6,640.57	3.11	18.40	22.57	30.51
	Inferred	15	3,178.09	3.12	20.26	20.43	29.69
		10	4,818.23	3.15	17.61	20.36	32.29
		5	5,442.12	3.13	16.52	20.17	33.58
Domain	Class	Cutoff (Mn%)	Metric Tons (kt)	Density (g/cm ³)	Mn (%)	Fe (%)	SiO ₂ (%)
Low Grade	Indicated	15	21.97	3.06	16.50	15.40	29.43
		10	337.12	2.97	11.98	21.55	33.80
		5	7,834.08	2.88	6.69	21.89	44.38
	Inferred	15	6.65	3.13	16.32	16.08	26.27
		10	96.44	3.09	12.09	24.65	32.61
		5	4,160.72	2.86	6.34	20.44	34.16
Domain	Class	Cutoff (Mn%)	Metric Tons (kt)	Density (g/cm ³)	Mn (%)	Fe (%)	SiO ₂ (%)
Total	Indicated	15	4,264.43	3.08	22.34	21.70	25.77
		10	6,234.33	3.10	19.27	22.41	29.38
		5	14,474.66	2.98	12.06	22.20	38.02
	Inferred	15	3,184.74	3.12	20.25	20.42	29.68
		10	4,914.67	3.15	17.50	20.44	32.29
		5	9,602.84	3.01	12.11	20.29	33.83

Mineral Resources are not Mineral Reserves and have not been demonstrated to have economic viability. There is no certainty that the Mineral Resource will be converted to Mineral Reserves. The quantity and grade or quality is an estimate and is rounded to reflect the fact that it is an approximation. Quantities may not sum due to rounding.

14.15 Comparison to earlier estimates

This estimate can be compared to the prior mineral resource estimates. Although information is unclear on what historical drilling may have been used, the resources can be compared to the land position and to the meters of drilling. A tonnage summary of modern (since 1996) mineral resource estimates is presented in Table 14-9.

Table 14-9: Emily Project Mineral Resource History

Year	Holes	Length Drilled		Mineral Rights		Mineral Resource Metric Tons x 1000	
	Number	Feet	Meters	Acres	Hectares	Indicated	Inferred
1996	N/A			7.2	2.9		454
2008	N/A			167	67.6		1,905
2012	7	1861	567.2	291.3	117.9		2,540
2020	7	1861	567.2	291.3	117.9	5,150	710
2023	29	7141.5	2176.7	369.2	149.4	6,230	4,900

Note:

The 2020 resource estimate used the same drill data in the 2012 report, but the geological controls were reinterpreted. The 2020 classification, which uses average drill spacing, is not comparable to the 2023 (Forte) classification.

Historical drilling shows additional intercepts of the iron formations in Section 20, and farther to the north in Section 21. These areas have not yet been available for drilling.

15. MINERAL RESERVE ESTIMATES

There are no Mineral Reserve Estimates for the NSM Emily Manganese Project.

16. MINING METHODS

Due to several factors the Emily project is assumed to be mined by underground methods. The most likely option is multi-level cut and fill with primary and secondary stopes being mined in sequence and filled to minimize the potential for subsidence. Stairstep room and pillar with backfill is also a potential extraction method. A likely outcome is a combination of these two methods.

Cemented backfill is important both for surface integrity and subsidence control and to limit water infiltration to the workings from the glacial till overlying the deposit. This protects both the workings (and workers) and the ground water above the iron ore formations.

16.1 Design Parameters

The QP has assumed a minimum effective mining height of 4 meters to control dilution and allow working room. This will be refined when the deposit geometry and grades are more completely understood.

Further work will be necessary to finalize the expected recovery and process operating costs.

17. PROJECT INFRASTRUCTURE

As part of the CMR surface leases, NSM has the rights to use the structures and facilities located in the SW ¼ of the NE ¼ of Section 21, Township 138 North, Range 26 West, Crow Wing County, Minnesota.

There is a core shed and storage facility, pump station, electric utility plant, and water holding and clarifier tanks, and asphalt roads and parking areas present on the property (Figure 17-1). The facilities also include electric power and running water.



Figure 17-1: Storage Facilities and Core Shed

18. MARKET STUDIES AND CONTRACTS

MnSO₄ pricing was based on internet references including CPM Group and S&P Global² where European and U.S. pricing is close to \$2,400/tonne and Chinese pricing less than \$1,000/tonne. The QP has reviewed pricing from \$1,000 to \$3,000/tonne for battery grade MnSO₄. Early test work estimates a total manganese recovery of 95%.

Current projections for developing the green economy call for increased production and use of electric vehicles. As manganese is a critical mineral for the manufacturing of electric vehicle batteries it is expected that the manganese market will grow. The “Manganese Market Research Report” published by Market Research Future states that “*The manganese industry is projected to grow from USD 23.2 billion in 2022 to USD 32.7 billion by 2030. Growing demand for steel products ... and batteries are the key market drivers ...*”

² <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/manganese-sulfate-bottleneck-looms-over-us-european-ev-manufacturers-73926378>

19. ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

All activities associated with exploration, mining, mineral processing, product production and facility closing will be required to meet the County and State requirements, and Federal conditions where applicable, as appropriate for the type of operation being proposed and operated.

There are currently no environmental liabilities pending on the project site.

19.1 Environmental Studies

For the 2023 exploration program, the following environmental studies were undertaken by Barr Engineering:

- ✦ Integrated Project Schedule Development (Q3/Q4 2022), including major engineering, environmental review, & permitting milestones
- ✦ Environmental Support for Drilling Program (Q3 2022 to present), including drill site and access review for wetlands, sensitive species, and cultural resources
- ✦ Permitting and Compliance Activities (Q3 2022 to present), including construction stormwater (permit, compliance plan, inspections) and water appropriations (permit, tracking)
- ✦ Hydrogeology Background Information Review & Summary (Q1 2023)

North Star Manganese has initiated a comprehensive assessment for the future baseline environmental studies required for the Project with WSP Global, New York. This work will be ongoing throughout 2024.

19.2 Current Permits

The only ongoing permits at the Project site are:

- ✦ The Minnesota Construction Stormwater General Permit MNR100001 – Permit ID # C00065734, associated with final drill site and road reclamation from the 2023 exploration program, which will be ongoing through the summer of 2024, and
- ✦ The City of Emily issued an Interim Use Permit (IUP) for the structures and facilities located in the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 21, Township 138 North, Range 26 West, Crow Wing County, Minnesota. This is a renewable 5-year permit with the next renewable date of March 2, 2026.

All other permits associated with water use and drilling for the 2023 program are complete.

20. CAPITAL AND OPERATING COSTS

There are no Capital and Operating Costs estimated for the NSM Emily Manganese Project.

21. ECONOMIC ANALYSIS

There is no Economic Analysis for the NSM Emily Manganese Project.

22. ADJACENT PROPERTIES

There are no other mineral properties adjacent to the Emily project site.

23. OTHER RELEVANT DATA AND INFORMATION

The QPs are not aware of any other relevant data concerning the NSM Emily Manganese Project.

24. INTERPRETATION AND CONCLUSIONS

24.1 Interpretation & Conclusions

The NSM Emily Project demonstrated good continuity of mineralization, with a large low grade mineral resource and a significant higher-grade core more amenable to beneficiation and processing to saleable manganese products.

Due to the rather thick layer of glacial till at the surface, it is assumed that Emily minerals would be extracted by underground mining, thus avoiding a large open pit. Based on the analysis herein, and the expected market prices for manganese sulfate, Emily carries manganese grades sufficient to support such an operation.

No capital cost estimate has been developed and no analysis has been performed to see if there is sufficient mineralized material to develop the project. The deposit is open to the west of current drilling and down dip if those surface and mineral rights can be secured.

The metallurgical testing is still too preliminary to definitively define the purity of HPMSM and other high-grade manganese products that can be produced, or the total production costs and process circuits needed to produce the final products.

24.2 Risks and Uncertainties

There has never been any mining in the Emily District and mining ceased in the Cuyuna Iron Range in the 1960's.

To date there have been no difficulties with the permitting for exploration drilling. Because Minnesota is a significant mining state, ranking 5th in production value for 2022, it has a well-defined permitting approach for mining operations. Thus, it is important that the government relations and the community outreach be maintained to enhance the facility with which construction and operating permits may be obtained.

There is an incomplete understanding of the hydrogeology of the area, and successful underground mine construction and operations will require a detailed understanding of the technical and economic hurdles imposed by the saturation of the glacial tills overlying the deposit.

Metallurgical test work has shown that manganese can be recovered from the Emily resource, but a process flow chart that will produce high value manganese products has yet to be finalized. The principal manganese mineral, manganite, a high-grade manganese mineral, is not the lower grade pyrolusite more commonly found in current operations around the world.

25. RECOMMENDATIONS

The QPs recommend that ongoing exploration continue to refine the geological model, the domain model, and the resource classification. This will improve the reliability of the model for project decision making.

Through earlier drilling U.S. Steel and others, there are extensions to the Emily deposit that do not have current data available for inclusion in the mineral resource estimate. North Star Manganese should drill to the west and north-west on lands it controls and endeavor to acquire more surface and mineral rights, surrounding the current mineral resource.

The drilling of the controlled land would permit better definition of the mineral resources at Emily. Additional drilling would permit the upgrade in confidence of inferred mineral resource to indicated mineral resource and potential a mineral reserve if the necessary modifying factors can be confirmed. The drilling of additionally acquired surrounding lands would further define the deposit and enhance the engineering of the project.

Metallurgical test work should focus on production of marketable products. Completing flow sheet development to allow a more definitive determination of the economic cutoff grade will be an important next step to advancing the project.

Table 25-1: Budget

Concept	Units		Unit Cost		Total
Exploration/Infill Core Drilling NQ	4000	meter	\$400	\$/m	\$1,600,000
Metallurgical Core Drilling PQ	2000	meter	\$700	\$/m	\$1,400,000
Metallurgical test work	1	unit	\$100,000	each	\$100,000
Land Acquisition	1	unit	\$250,000	each	\$250,000
Total					\$3,350,000

26. REFERENCES

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27. GLOSSARY

27.1 Mineral Resources

The mineral resources and mineral reserves have been classified according to the “CIM Definition Standards for Mineral Resources and Mineral Reserves” (May 10, 2014). Accordingly, the Resources have been classified as Measured, Indicated or Inferred, any Reserves have been classified as Proven, and Probable based on the Measured and Indicated Resources as defined below.

A **Mineral Resource** is a concentration or occurrence of solid material of economic interest in or on the Earth’s crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

An **Inferred Mineral Resource** is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

An **Indicated Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.

A **Measured Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve.

27.2 Mineral Reserves

Modifying Factors are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social, and governmental factors.

A **Mineral Reserve** is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.

The reference point at which Mineral Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.

The public disclosure of a Mineral Reserve must be demonstrated by a Pre-Feasibility Study or Feasibility Study.

A **Probable Mineral Reserve** is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proven Mineral Reserve. The Qualified Person(s) may elect to convert Measured Mineral Resources to Probable Mineral Reserves if the confidence in the Modifying Factors is lower than that applied to a Proven Mineral Reserve.

Probable Mineral Reserve estimates must be demonstrated to be economic, at the time of reporting, by at least a Pre-Feasibility Study.

A **Proven Mineral Reserve** is the economically mineable part of a Measured Mineral Resource. A Proven Mineral Reserve implies a high degree of confidence in the Modifying Factors. Application of the Proven Mineral Reserve category implies that the Qualified Person has the highest degree of confidence in the estimate with the consequent expectation in the minds of the readers of the report. The term should be restricted to that part of the deposit where production planning is taking place and for which any variation in the estimate would not significantly affect the potential economic viability of the deposit.

Proven Mineral Reserve estimates must be demonstrated to be economic, at the time of reporting, by at least a Pre-Feasibility Study. Within the CIM Definition standards the term Proved Mineral Reserve is an equivalent term to a Proven Mineral Reserve.

APPENDIX A

QUALIFIED PERSON CERTIFICATES

CERTIFICATE OF QUALIFIED PERSON

Amanda Irons, AIPG-QP

Senior Resource Geologist - Forte Dynamics, Inc.
12600 W Colfax Ave, Ste A-540
Lakewood, CO 80215
Email: airons@fortedynamics.com

This certificate applies to the report entitled: "North Star Manganese Inc Emily Manganese Project NI 43-101 Technical Report", effective date December 31,2023, issued on May 24, 2024.

I, **Amanda Irons.**, do hereby certify that:

- 1) I am a Senior Resource Geologist for Forte Dynamics, Inc., with a business address of 12600 W Colfax Ave, Ste A-540, Lakewood, Colorado 80215 USA.
- 2) I graduated with a Bachelor of Science in Geological Engineering in 2013 from the Colorado School of Mines in Golden, Colorado, and with a Professional Masters in Mineral Exploration in 2018 from the Colorado School of Mines. I have worked as a geologist for 12 years with specific expertise in 3-dimensional geological modeling in Leapfrog, mineral resource estimation, domain analysis, and statistical quality control of geological data. I am a Certified Professional Geologist of the American Institute of Professional Geologists.
- 3) I have read the definition of "qualified person" set out in National Instrument 43-101- Standards of Disclosure for Mineral Projects ("NI 43-101") and 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" within the meaning of NI 43-101.
- 4) I have personally inspected the property that is a subject of this Mineral Resource Estimate on June 28, 2023.
- 5) I am the QP responsible for Sections 7 through 14, except for 14.11 through 14.13, and a contributor of the overall content of this report.
- 6) I am independent of the issuer, Electric Metals (USA) Limited, according to Section 1.5 of NI 43-101.
- 7) I have had no prior involvement with the property that is the subject of the Technical Report.
- 8) I have read NI 43-101, Form 43-101 F1 -Technical Report, 43-101 CP-Standards of Disclosure for Mineral Projects, and confirm that the Technical Report has been prepared in compliance with such instrument, form, and companion policy.
- 9) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the portions of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
- 10) I consent to the filing of the Technical Report with any securities regulatory authority, stock exchange and other regulatory authority and any publications by them, including electronic publication in the public company files on their websites accessible by the public.

Dated this 24th day of May 2024.

Amanda Irons, CPG

CERTIFICATE OF QUALIFIED PERSON**Donald E. Hulse P.E. SME RM**

Director of Mining Resources Forte Dynamics, Inc.

12600 W Colfax Ave, Ste A-540

Lakewood, CO 80215

Email: dhulse@fortedynamics.com

This certificate applies to the report entitled: "North Star Manganese Inc Emily Manganese Project NI 43-101 Technical Report", effective date December 31, 2023, issued on May 24, 2024.

I, **Donald E. Hulse P.E.**, do hereby certify that:

- 11) I am the Director of Mining Resources for Forte Dynamics, Inc., with a business address of 12600 W Colfax Ave, Ste A-540, Lakewood, Colorado 80215 USA.
- 12) I graduated with a degree in Mining Engineering, Bachelor of Science in 1982 from the Colorado School of Mines in Golden, Colorado. I have worked as a mining engineer for 42 years with specific expertise in mine design, mine strategic planning, mineral resource estimation in a variety of deposits including iron ore deposits. I am a Registered Member of the Society of Mining Engineers, and a Professional Engineer in the State of Colorado, USA.
- 13) I have read the definition of "qualified person" set out in National Instrument 43-101- Standards of Disclosure for Mineral Projects ("NI 43-101") and 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" within the meaning of NI 43-101.
- 14) I have personally inspected the property that is a subject of this Mineral Resource Estimate on June 28, 2023.
- 15) I am the QP responsible for Sections 1 through 6, 14.11 through 14.13, 15 through 25, and a contributor of the overall content of this report.
- 16) I am independent of the issuer, Electric Metals (USA) Limited, according to Section 1.5 of NI 43-101.
- 17) I have had no prior involvement with the property that is the subject of the Technical Report.
- 18) I have read NI 43-101, Form 43-101 F1 -Technical Report, 43-101 CP-Standards of Disclosure for Mineral Projects, and confirm that the Technical Report has been prepared in compliance with such instrument, form, and companion policy.
- 19) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the portions of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
- 20) I consent to the filing of the Technical Report with any securities regulatory authority, stock exchange and other regulatory authority and any publications by them, including electronic publication in the public company files on their websites accessible by the public.

Dated this 24th day of May 2024.

Donald E. Hulse P.E., SME-RM

CERTIFICATE OF QUALIFIED PERSON
Deepak Malhotra, Ph.D., SME RM
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This certificate applies to the report entitled: "North Star Manganese Inc Emily Manganese Project NI 43-101 Technical Report", effective date December 31,2023, issued on May 24, 2024.

I, **Deepak Malhotra, Ph.D.**, do hereby certify that:

- 21) I am the Director of Metallurgy for Forte Dynamics, Inc., with a business address of 12600 W Colfax Ave, Ste A-540, Lakewood, Colorado 80215 USA.
- 22) I graduated with a degree in Metallurgical Engineering, Master of Science in 1973 from the Colorado School of Mines in Golden, Colorado. In addition, I graduated with a degree in Mineral Economics, Ph.D. in 1978 from the Colorado School of Mines in Golden, Colorado. My relevant experience includes working as a metallurgist and mineral economist for 50+ years since my graduation with specific expertise in mineral processing, metallurgical testing, and recovery methods. I am a member of the Society of Mining Engineers.
- 23) I have read the definition of "qualified person" set out in National Instrument 43-101- Standards of Disclosure for Mineral Projects ("NI 43-101") and 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" within the meaning of NI 43-101.
- 24) IO have not personally inspected the property that is a subject of this Mineral resource Estimate..
- 25) I am the QP responsible for Section 13.
- 26) I am independent of the issuer, Electric Metals (USA) Limited, according to Section 1.5 of NI 43-101.
- 27) I have had no prior involvement with the property that is the subject of the Technical Report.
- 28) I have read NI 43-101, Form 43-101 F1 -Technical Report, 43-101 CP-Standards of Disclosure for Mineral Projects, and confirm that the Technical Report has been prepared in compliance with such instrument, form, and companion policy.
- 29) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the portions of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
- 30) I consent to the filing of the Technical Report with any securities regulatory authority, stock exchange and other regulatory authority and any publications by them, including electronic publication in the public company files on their websites accessible by the public.

Dated this 24th day of May 2024.

Deepak Malhotra, Ph.D., SME-RM