UNITED STATES SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 8-K

CURRENT REPORT

PURSUANT TO SECTION 13 OR 15(d) OF THE
SECURITIES EXCHANGE ACT OF 1934

Date of Report (Date of earliest event reported): February 11, 2022

CLEVELAND-CLIFFS INC.
(Exact name of registrant as specified in its charter)

Ohio	1-8944	34-1464672
(State or Other Jurisdiction of Incorporation or Organization)	*(Commission File Number)*	*(IRS Employer Identification No.)*

200 Public Square,	Suite 3300,	Cleveland,	Ohio	44114-2315
(Address of Principal Executive Offices)				*(Zip Code)*

Registrant's telephone number, including area code: (216) 694-5700

Not Applicable

(Former name or former address, if changed since last report)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

☐ Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)

☐ Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)

☐ Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))

☐ Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered:
Common Shares, par value $0.125 per share	CLF	New York Stock Exchange

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (Section 230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (Section 240.12b-2 of this chapter).

Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Item 8.01. Other Events.

Cleveland-Cliffs Inc. (the "Company") is filing this Current Report on Form 8-K to provide the Technical Report Summaries ("TRS's") relating to iron ore mineral resources and reserves at the Company's Hibbing Taconite Property, Minorca Property, Northshore Property and United Taconite Property and the related qualified person consents. Due to maximum file size limitations with respect to submissions to the Securities and Exchange Commission's Electronic Data Gathering, Analysis, and Retrieval system, the Company is unable to file the TRS's as attachments to the Company's Annual Report on Form 10-K for the year ended December 31, 2021 (the "Form 10-K"). The TRS's and related qualified person consents filed as exhibits hereto will be incorporated into the Form 10-K by reference to this filing.

Item 9.01. Financial Statements and Exhibits.

(d) **Exhibits.**

Exhibit Number	Description
23.1	Consent of SLR International Corporation regarding Hibbing Taconite Property, Minnesota, USA (filed herewith).
23.2	Consent of SLR International Corporation regarding Minorca Property, Minnesota, USA (filed herewith).
23.3	Consent of SLR International Corporation regarding Northshore Property, Minnesota, USA (filed herewith).
23.4	Consent of SLR International Corporation regarding United Taconite Property, Minnesota, USA (filed herewith).
96.1	Technical Report Summary on the Hibbing Taconite Property, Minnesota, USA, prepared for the Company by SLR International Corporation with an effective date of December 31, 2021 (filed herewith).
96.2	Technical Report Summary on the Minorca Property, Minnesota, USA, prepared for the Company by SLR International Corporation with an effective date of December 31, 2021 (filed herewith).
96.3	Technical Report Summary on the Northshore Property, Minnesota, USA, prepared for the Company by SLR International Corporation with an effective date of December 31, 2021 (filed herewith).
96.4	Technical Report Summary on the United Taconite Property, Minnesota, USA, prepared for the Company by SLR International Corporation with an effective date of December 31, 2021 (filed herewith).
101	Cover Page Interactive Data File - the cover page XBRL tags are embedded within the Inline XBRL document.
104	The cover page from this Current Report on Form 8-K, formatted as Inline XBRL.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

CLEVELAND-CLIFFS INC.

Date:	February 11, 2022	By:	/s/ James D. Graham
		Name:	James D. Graham
		Title:	Executive Vice President, Chief Legal Officer & Secretary

EXHIBIT 23.1

SLR International Corporation
22118 20th Ave SE, Suite G202, Bothell, WA 98021 USA

February 10, 2022

CONSENT OF QUALIFIED PERSON

Re: Form 10-K of Cleveland-Cliffs Inc. (the “Company”)

SLR International Corporation (**SLR**”), in connection with the Company’s Annual Report on Form 10-K for the year ended December 31, 2021 (the “**Form 10-K**”), consents to:

- the public filing by the Company and use of the technical report titled “Technical Report Summary on the Hibbing Taconite Property, Minnesota, USA” (the “**Technical Report Summary**”), with an effective date of December 31, 2021 and dated February 7, 2022, that was prepared in accordance with Subpart 1300 of Regulation S-K promulgated by the U.S. Securities and Exchange Commission, as an exhibit to and referenced in the Form 10-K;

- the incorporation by reference of the Technical Report Summary into the Company’s Registration Statement on Form S-3 (Registration No. 333-237324) and Registration Statements on Form S-8 (Registration Nos. 333-255571, 333-255572, 333-237144, 333-217506, 333-210954, 333-204369, 333-197687, 333-197688 and 333-184620) (collectively, the “**Registration Statements**”);

- the use of and references to our name, including our status as an expert or “qualified person” (as defined in Subpart 1300 of Regulation S-K promulgated by the U.S. Securities and Exchange Commission), in connection with the Form 10-K, the Registration Statements and the Technical Report Summary; and

- any extracts from or a summary of the Technical Report Summary in the Form 10-K and incorporated by reference in the Registration Statements and the use of any information derived, summarized, quoted, or referenced from the Technical Report Summary, or portions thereof, that was prepared by us, that we supervised the preparation of, and/or that was reviewed and approved by us, that is included or incorporated by reference in the Form 10-K and the Registration Statements.

SLR is responsible for authoring, and this consent pertains to, the Technical Report Summary. SLR certifies that it has read the Form 10-K and that it fairly and accurately represents the information in the Technical Report Summary for which it is responsible.

SLR International Corporation
Per:

(Signed) ***Richard J. Lambert***

Richard J. Lambert, P.E., P.Eng.
Global Technical Director
Technical Director, Mining Advisory US

EXHIBIT 23.2

SLR International Corporation
22118 20th Ave SE, Suite G202, Bothell, WA 98021 USA

February 10, 2022

CONSENT OF QUALIFIED PERSON

Re: Form 10-K of Cleveland-Cliffs Inc. (the “Company”)

SLR International Corporation (“**SLR**”), in connection with the Company’s Annual Report on Form 10-K for the year ended December 31, 2021 (the “**Form 10-K**”), consents to:

- the public filing by the Company and use of the technical report titled “Technical Report Summary on the Minorca Property, Minnesota, USA” (the “**Technical Report Summary**”), with an effective date of December 31, 2021 and dated February 7, 2022, that was prepared in accordance with Subpart 1300 of Regulation S-K promulgated by the U.S. Securities and Exchange Commission, as an exhibit to and referenced in the Form 10-K;

- the incorporation by reference of the Technical Report Summary into the Company’s Registration Statement on Form S-3 (Registration No. 333-237324) and Registration Statements on Form S-8 (Registration Nos. 333-255571, 333-255572, 333-237144, 333-217506, 333-210954, 333-204369, 333-197687, 333-197688 and 333-184620) (collectively, the “**Registration Statements**”);

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SLR International Corporation
Per:

(Signed) ***Richard J. Lambert***

Richard J. Lambert, P.E., P.Eng.
Global Technical Director
Technical Director, Mining Advisory US

EXHIBIT 23.3

SLR International Corporation
22118 20th Ave SE, Suite G202, Bothell, WA 98021 USA

February 10, 2022

CONSENT OF QUALIFIED PERSON

Re: Form 10-K of Cleveland-Cliffs Inc. (the "Company")

SLR International Corporation (**SLR**"), in connection with the Company's Annual Report on Form 10-K for the year ended December 31, 2021 (the "**Form 10-K**"), consents to:

- the public filing by the Company and use of the technical report titled "Technical Report Summary on the Northshore Property, Minnesota, USA" (the "**Technical Report Summary**"), with an effective date of December 31, 2021 and dated February 7, 2022, that was prepared in accordance with Subpart 1300 of Regulation S-K promulgated by the U.S. Securities and Exchange Commission, as an exhibit to and referenced in the Form 10-K;
- the incorporation by reference of the Technical Report Summary into the Company's Registration Statement on Form S-3 (Registration No. 333-237324) and Registration Statements on Form S-8 (Registration Nos. 333-255571, 333-255572, 333-237144, 333-217506, 333-210954, 333-204369, 333-197687, 333-197688 and 333-184620) (collectively, the "**Registration Statements**");
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SLR International Corporation
Per:

(Signed) ***Richard J. Lambert***

Richard J. Lambert, P.E., P.Eng.
Global Technical Director
Technical Director, Mining Advisory US

EXHIBIT 23.4

SLR International Corporation
22118 20th Ave SE, Suite G202, Bothell, WA 98021 USA

February 10, 2022

CONSENT OF QUALIFIED PERSON

Re: Form 10-K of Cleveland-Cliffs Inc. (the "Company")

SLR International Corporation ("**SLR**"), in connection with the Company's Annual Report on Form 10-K for the year ended December 31, 2021 (the "**Form 10-K**"), consents to:

- the public filing by the Company and use of the technical report titled "Technical Report Summary on the United Taconite Property, Minnesota, USA" (the "**Technical Report Summary**"), with an effective date of December 31, 2021 and dated February 7, 2022, that was prepared in accordance with Subpart 1300 of Regulation S-K promulgated by the U.S. Securities and Exchange Commission, as an exhibit to and referenced in the Form 10-K;

- the incorporation by reference of the Technical Report Summary into the Company's Registration Statement on Form S-3 (Registration No. 333-237324) and Registration Statements on Form S-8 (Registration Nos. 333-255571, 333-255572, 333-237144, 333-217506, 333-210954, 333-204369, 333-197687, 333-197688 and 333-184620) (collectively, the "**Registration Statements**");

- the use of and references to our name, including our status as an expert or "qualified person" (as defined in Subpart 1300 of Regulation S-K promulgated by the U.S. Securities and Exchange Commission), in connection with the Form 10-K, the Registration Statements and the Technical Report Summary; and

- any extracts from or a summary of the Technical Report Summary in the Form 10-K and incorporated by reference in the Registration Statements and the use of any information derived, summarized, quoted, or referenced from the Technical Report Summary, or portions thereof, that was prepared by us, that we supervised the preparation of, and/or that was reviewed and approved by us, that is included or incorporated by reference in the Form 10-K and the Registration Statements.

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SLR International Corporation
Per:

(Signed) ***Richard J. Lambert***

Richard J. Lambert, P.E., P.Eng.
Global Technical Director
Technical Director, Mining Advisory US

EXHIBIT 96.1

Technical Report Summary on the Hibbing Taconite Property, Minnesota, USA
S-K 1300 Report

Cleveland-Cliffs Inc.

SLR Project No: 138.02467.00001
February 7, 2022
Effective Date: December 31, 2021

Technical Report Summary on the Hibbing Taconite Property, Minnesota, USA

SLR Project No: 138.02467.00001

Prepared by
SLR International Corporation
22118 20th Ave SE, Suite G202
Bothell, WA 98021 USA
for

Cleveland-Cliffs Inc.
200 Public Square, Suite 3300
Cleveland, OH 44114

Effective Date – December 31, 2021
Signature Date - February 7, 2022

FINAL

Distribution: 1 copy – Cleveland-Cliffs Inc.
1 copy – SLR International Corporation

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1.0 EXECUTIVE SUMMARY

1.1 Summary

SLR Consulting Ltd (SLR) was retained by Cleveland-Cliffs Inc. (Cliffs) to prepare an independent Technical Report Summary (TRS) for the Hibbing Taconite Property (HibTac or the Property), located in Northeastern Minnesota, USA. The owner of the Property, Hibbing Taconite Company (Hibbing Taconite), is a joint venture (JV) between subsidiaries of Cliffs (85.3% ownership) and U.S. Steel Corporation (U.S. Steel) (14.7%). The Property is managed by Cleveland-Cliffs Hibbing Management LLC, a wholly-owned subsidiary of Cliffs.

The purpose of this TRS is to disclose year-end (YE) 2021 Mineral Resource and Mineral Reserve estimates for HibTac.

Cliffs is listed on the New York Stock Exchange (NYSE) and currently reports Mineral Reserves of pelletized ore in SEC filings. This TRS conforms to the United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300) and Item 601 (b)(96) Technical Report Summary. SLR visited the Property on April 28, 2021.

The Property includes the Hibbing Taconite Mine (the Mine) and processing facility (the Plant) in Hibbing, Minnesota. The Mine is a large, operating, open-pit iron mine that produces pellets from a magnetite iron ore regionally known as taconite.

The Property commenced operations in 1976 as a JV between Bethlehem Steel Corporation (Bethlehem) (75%), Pickands Mather and Co. (Pickands Mather) (15%), and Steel Company of Canada (Stelco) (10%). Cliffs first became involved in the JV when it purchased Pickands Mather's 15% share of the JV in 1986 and another 8% share from Bethlehem in 2002. In 2003-2004, ArcelorMittal USA (AMUSA) acquired Bethlehem's 62% share and became the largest shareholder of the JV. Cliffs managed the JV through a subsidiary until 2019 when AMUSA assumed control of the operation. In 2020, Cliffs acquired the US assets of AMUSA and again became the operator of the Property.

The open-pit operation has a mining rate of approximately 24 million long tons (MLT) of ore per year and produces 6.2 MLT of iron ore pellets, which are shipped by freighter via the Great Lakes to Cliffs' steel mill facilities in the Midwestern USA.

1.1.1 Conclusions

The Property has been a successful producer of iron pellets for over 45 years. The update to the Mineral Resource and Mineral Reserve does not materially change any of the assumptions from previous operations. An economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves for a remaining five-year mine life.

SLR offers the following conclusions by area.

1.1.1.1 Geology and Mineral Resources

- Above a crude magnetic iron (MagFe) cut-off grade of 13%, Measured and Indicated Mineral Resources exclusive of Mineral Reserves attributable to Cliffs' 85.3% ownership at HibTac are estimated to total 9.1 MLT at an average grade of 19.2% MagFe.

- The HibTac deposit is an example of Lake Superior-type banded iron formation (BIF) deposits. Both the site and corporate technical teams have a strong understanding of the HibTac geology and mineralization, as well as their processing characteristics.
- Exploration sampling, preparation, analyses, and security processes for both physical samples and digital data are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources.
- Quality assurance and quality control (QA/QC) results for the 2021 verification study are appropriate for the style of mineralization and are sufficient to generate a drill hole assay database that is adequate for Mineral Resource estimation in compliance with international reporting standards. In conjunction with good agreement between planned and actual product produced over more than 45 years, it is SLR's opinion that procedures meet minimum S-K 1300 guidelines.
- The key economic variable (KEV) in the block models for HibTac compare well with the source data.
- The methodology used to prepare the block model is appropriate and consistent with industry standards.
- The block model represents an acceptable degree of smoothing at the block scale for prediction of quality variables at HibTac. Visually, blocks and composites in cross-section and plan view compare well.

1.1.1.2 Mining and Mineral Reserves

- The HibTac JV has been in production since 1976 and specifically under 100% Cliffs operating management of the JV since 2020.Cliffs conducts its own Mineral Reserve estimations.
- Total Proven and Probable Mineral Reserves are approximately 109 MLT of crude ore at an average grade of 18.7% MagFe.
- Mineral Reserve estimation practices follow industry standards.
- The life of mine (LOM) of HibTac is limited to the next five years, with mining operations ceasing in 2026.
- The geotechnical design parameters used for pit design are reasonable and supported by previous operations.
- The LOM production schedule is reasonable and incorporates large mining areas and open benches.
- An appropriate mining equipment fleet, maintenance facilities, and manpower are in place, with various options for additions and replacements estimated, to meet the LOM production schedule requirements.
- Sufficient storage capacity for waste stockpiles and tailings has been identified to support the production of the Mineral Reserve.

1.1.1.3 Mineral Processing

- Three ore types are processed at Hibbing and are referred to as blend components 1-7 (lean ore, <20%), 1-5/1-6 (high-grade ore, >60%), and 1-3/1-4 (low-grade ore, <30%).

- Routine plant samples are collected and analyzed in the HibTac onsite laboratory for process control, product quality monitoring, and reporting to comply with plant and cargo specifications.
- The crushing plant consists of two Allis Chalmers gyratory crushers that crush run of mine (ROM) ore to minus 10 in.The concentrator is based on nine lines of autogenous grinding (AG) mills with two stages (rougher and finisher) of magnetic separation, hydrocyclone classification to close the milling circuits, and hydro-separators for classification of non-magnetic tailings. Finisher magnetic concentrate is screened to obtain final product at 100% passing (P_{100}) 325 mesh. The magnetic concentrate reports to the concentrate thickener, and the non-magnetic fraction reports to the tailings.
- Concentrate is filtered using vacuum disc filters to approximately 9.25% moisture and blended with bentonite prior to pelletizing to produce standard compression pellets, and limestone is added to the mix when producing high-compression pellets.
- Each pelletizing line consists of four Sala balling drums, which discharge across roll screens, producing green (unfired) balls. Sized green balls are conveyed to three 13 ft-wide by 243 ft-long Dravo Traveling Grate indurating furnaces. Pellets discharged from the indurating furnaces are the final product and are conveyed to the pellet load-out bins or to the emergency stockpile.
- Final pellet production is determined by actual train shipments once per month and compared with operating plant measurements. Typical adjustments are in the range of 2,000 long tons (LT) to 3,000 LT over a total production of 700,000 LT (<0.5% adjustment).
- The ore delivered to the primary crusher from 2015 to 2020 averaged 28,083,000 wet long tons (WLT) per year (WLT/y) with an average crude magnetic iron grade of 17.7% and concentrate silica content of 4.6%. Weight recovery to concentrate averaged 26.4% over this period, and wet pellet production averaged 7,400,200 WLT/y. Pellet grades averaged 66.1% Fe, 4.5% SiO_2, and 2.1% moisture for the period.

1.1.1.4 Infrastructure

- The Property is in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.
- The HibTac tailings storage facility (TSF) has been operating since 1976 and is currently operating under the requirements of the Minnesota Department of Natural Resources (MDNR).The TSF is a paddock dam-type TSF consisting of five cells: West Area 1, 2, and 3 (WA-1, WA-2, and WA-3 with approximately 2,080 acres, 510 acres, and 1,000 acres of impoundment area, respectively), which are used for tailings deposition; SD-3 Reservoir (approximately 1,340 acres of impoundment area), which is used as a return water reservoir; and East Area (approximately 830 acres of impoundment area), which is currently not in use but will be brought into production at a later date.

1.1.1.5 Environment

- Hibbing Taconite maintains the requisite state and federal permits and is in compliance with all permits. Environmental liabilities and permitting are further discussed in Section 17 of this TRS.
- A mine closure plan is not required by the state of Minnesota until at least two years in advance of deactivation of the mining area. HibTac's current mine life is projected at five years; therefore, a detailed closure plan has not been prepared. Cliffs performs annual reviews of changes to HibTac's Asset Retirement Obligation (ARO) cost estimate and has calculated ARO legal obligations for closure and reclamation costs.

1.1.2 Recommendations

1.1.2.1 Geology and Mineral Resources

1. Continue to develop and expand the QA/QC program to ensure that the program includes defined limits where follow-up is required, and that results are reviewed and documented in a report including conclusions and recommendations regularly and in a timely manner.
    a. Quality results documented in this report support an initial standard and duplicate submission rate of 5% each.
    b. HibTac should submit a small number of "preparation duplicate" samples to a secondary accredited laboratory to document capability(ies), cost, and time efficiency of alternate provider(s) and confirm that results are comparable to those of the current provider.

1.1.2.2 Mining and Mineral Reserves

1. Complete additional permitting work at HibTac to finalize decision on conversion of on-strike Mineral Resources to Mineral Reserves and update mine planning accordingly.

1.1.2.3 Mineral Processing

1. While plant operational performance including concentrate and pellet production and pellet quality continue to be consistent year over year, continue to maintain diligence in process-oriented metallurgical testing and in plant maintenance going forward.

1.1.2.4 Infrastructure

1. The Operations, Maintenance, and Surveillance (OMS) Manual for the TSF should be updated with the Engineer of Record (EOR) in accordance with Mining Association of Canada (MAC) guidelines and other industry-recognized, standard guidance for tailings facilities.
2. The remediation, or resolution, of items of concern noted in TSF audits or inspection reports should be documented, prioritized, tracked, and closed out in a timely manner.

1.1.2.5 Environment

1. While it is acknowledged that a closure plan and other post-mining plans are not required to be prepared until two years prior to anticipated closure, SLR recommends that a closure plan including costing be completed to prepare the operation for eventual closure in approximately five years.

1.2 Economic Analysis

1.2.1 Economic Criteria

An un-escalated technical-economic model was prepared on an after-tax, discounted cash flow (DCF) basis, the results of which are presented in this subsection. Key criteria used in the analysis are discussed in detail throughout this TRS. General assumptions used are summarized in Table 1-1 with all physicals reported per WLT pellet.

Table 1-1: Technical-Economic Assumptions
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	Value
Start Date	December 31, 2021
Mine Life	Five years
Three-Year Trailing Average Revenue	$98/WLT pellet
Operating Costs	$75.29/WLT pellet
Sustaining Capital	$27 million
Discount Rate	10%
Discounting Basis	End of Period
Inflation	0%
Federal Income Tax	20%
State Income Tax	None – Sales made out of state

Table 1-2 presents a summary of the estimated mine production over the five year mine life.

Table 1-2: LOM Production Summary
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	Units	Value
ROM Crude Ore	MLT	109.3
Total Material	MLT	220.8
Grade	% MagFe	18.7
Average Mining Rate	MLT/y	58

Table 1-3 presents a summary of the estimated plant production over the five year mine life.

Table 1-3: LOM Plant Production Summary
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	Units	Value
ROM Material Milled	MLT	109.3
Annual Processing Rate	MLT/y	24.7
Process Recovery	%	25.5
Total Pellet	MWLT	27.8
Annual Pellet Production Rate	MWLT/y	6.3

1.2.2 Cash Flow Analysis

The indicative economic analysis results presented in Table 1-4 indicate an after-tax Net Present Value (NPV), using a 10.0% discount rate, of $269 million at an average blended wet pellet price of $98/WLT. SLR notes that after-tax Internal Rate of Return (IRR) is not applicable, as the Plant has been in operation for a number of years. Capital identified in the economics is for sustaining operations and plant rebuilds as necessary.

The economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

Table 1-4: LOM Indicative Economic Results
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	$ Millions	$/WLT Pellet
Three-Year Trailing Revenue ($/WLT Pellet)		98
Pellet Production (MWLT)	27.8	
Gross Revenue	**2,726**	
Mining	553	19.87
Processing	961	34.57
Site Administration	64	2.30
Pellet Transportation and Storage	288	10.35
General / Other Costs	228	8.20
Total Operating Costs	**2,094**	**75.29**
Operating Income (excl. D&A)	**632**	**22.71**
Federal Income Tax	(126)	(4.54)
Depreciation Tax Savings	13	0.46
Accretion Tax Savings	7	0.27
Net Income after Taxes	**526**	**18.89**
Sustaining + TSF Capital	(27)	(0.97)
Closure Costs	(172)	(6.20)
Cash Flow	**327**	**11.72**
NPV 10.0%	**269**	

1.2.3 Sensitivity Analysis

The HibTac operation is nominally most sensitive to market prices (revenues) followed by operating cost. For each dollar movement in sales price and operating cost, respectively, the after-tax NPV changes by approximately $18 million.

1.3 Technical Summary

1.3.1 Property Description

The Property is located in St. Louis and Itasca Counties in Northeastern Minnesota, USA, on the Mesabi Iron Range, immediately north of the city of Hibbing, Minnesota. The open pit is also known historically as the Hull-Rust-Mahoning Mine and, based on its historical production, is the largest operating open-pit mine in Minnesota. The mining and processing operation and TSF are located between latitude 47°25’48” N and 47°31’48” N and longitude 93°04’54” W and W 92°54’36” W. The Mine and Plant have the capacity to produce approximately 8.0 MWLT of iron ore pellets annually.

Hibbing Taconite is a joint venture between Cliffs (85.3%) and U.S. Steel (14.7%). Hibbing Taconite controls 36,280 acres in a combination of mineral and surface rights through ownership and lease and is the operator of the mine, process plant, and rail loading facility. The Property boundary comprises approximately 6,420 acres of mineral leases granted by private landowners and 220 acres granted by the State of Minnesota.

1.3.2 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

The Property is easily accessed via paved roads from Hibbing, Minnesota by Highway 169, four miles north toward Chisholm to County Highway 5, then 2.3 mi north on Highway 5 to the mine access road, and two miles west to the facilities on the Hibbing Taconite complex road. Duluth, a major port city on Lake Superior, is 76 mi southeast of the Property via US Highway 53 and MN Highway 37Duluth has a regional airport with several flights daily to major hubs in Minneapolis and Chicago. A rail line operated by Burlington Northern Santa Fe Railway (BNSF) extends from the processing facility to the port in Superior, Wisconsin.

The climate in Northern Minnesota ranges from mild in the summer to winter extremes.The annual average temperature is 36.9°F. The annual average high temperature is 48.6°F, whereas the annual average low temperature is 25.1°F. By month, July is on average the hottest month (77°F), and January is the coldest (-4°F).

The HibTac operation employs 733 employees who live in the surrounding cities of Hibbing, Chisholm, Virginia, Mountain Iron, Eveleth, Buhl, Biwabik, Hoyt Lakes, and Aurora. Personnel also commute from Duluth and the Iron Range. St. Louis County has an estimated population of approximately 200,000 people.

The Property is located in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is currently in place. Infrastructure items include high-voltage electrical supplies, natural gas pipelines that connect to the North American distribution system, water sources, paved roads and highways, railroads for transporting finished products, port facilities that connect to the Great Lakes, and accommodations for employees. Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems.

The Property is located at an elevation of approximately 1,400 ft above sea level (FASL), just east of the Itasca County line.The generally gentle topography in the area is punctuated by hummocky hills and long, gentle moraines, remnants of glacial ingress and egress. The landscape ranges from semi-rugged, lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, to large, flat, poorly drained peatlands. The MDNR characterizes the area as being within the Laurentian Mixed Forest (LMF) Province.In Minnesota, the LMF is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps.

1.3.3 History

Exploration for high-grade, direct-shipping iron ore (DSO) deposits in the Hibbing area began in the 1890s.Focused exploration for beneficiation-grade magnetite deposits, regionally known as taconite deposits, however, did not begin until the 1940s. HibTac has operated as a joint venture among several companies since 1976.

1.3.4 Geological Setting, Mineralization, and Deposit

The HibTac deposit is an example of Lake Superior-type BIF deposits, specifically the Biwabik Iron Formation (Biwabik IF), which is interpreted to have been deposited in a shallow, tidal, marine setting and is characterized as having four main members (from bottom to top): Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty. Cherty units generally have a sandy granular texture, are thickly bedded, and are predominantly composed of chert, magnetite, iron silicates (talc, stilpnomelane), and, in specific geologic units, carbonate (ankerite). Slaty units are fine grained, thinly bedded, and comprised of iron silicates and iron carbonate, with local chert beds, and they are typically uneconomic. The mineral targeted at HibTac is magnetite. Supergene weathering and oxidation has locally altered the primary assemblage to hematite, goethite, and chert, generally increasing in intensity with proximity to isolated occurrences of Cretaceous Coleraine Formation south of the mine and faults or fracture zones. Partial or complete oxidation of magnetite to hematite precludes recovery by magnetic separation, resulting in local degradation of potential ore intervals to waste rock. The nomenclature of the members is not indicative of metamorphic grade; instead, "slaty" and "cherty" are colloquial descriptive terms used regionally.

1.3.5 Exploration

Diamond drilling (DD) is the principal method of exploration utilized at HibTac. A combination of historical and current DD core drilled by Cliffs and its predecessors is used in mine planning. Near-mine exploration drilling is conducted on a 400 ft x 400 ft grid. Since drilling began in 1938, Cliffs and its predecessors have completed 3,665 DD drill holes totaling 620,670 ft.

1.3.6 Mineral Resource Estimates

Mineral Resource estimates for the HibTac deposit were prepared by Cliffs and audited and accepted by SLR using available data from 1938 to 2019.

The 2021 HibTac Mineral Resource estimate was completed using a conventional block modeling approach. The general workflow included the construction of a geological or stratigraphic model representing the Biwabik IF from mapping, drill hole logging, and sampling data, which were used to define discrete domains and surfaces representing the upper contact of each unit of non-iron formation and iron formation subunits. The geologic model was then imported into Maptek's Vulcan™ (Vulcan) software by Cliffs for resource estimation. Sub-blocked model estimates used inverse distance squared (ID^2) and length-weighted, 10 ft, uncapped composites to estimate KEVs, including magnetic iron (determined by Saturation Magnetization Analyzer [Satmagan]), wtrec, and silica in concentrate in an omni-directional single search pass approach, using hard boundaries between subunits, ellipsoidal search ranges, and a search ellipse orientation informed by geology. Density for the iron formation is calculated in the block model as a function of Satmagan crude magnetic iron and total iron content.

Mineral Resources were classified in accordance with the definitions for Mineral Resources in S-K 1300. Blocks were classified as Measured, Indicated, or Inferred using distance-based and qualitative criterion. Cliffs classifies the Mineral Resources based primarily on drill hole spacing and influenced by geologic continuity, ranges of economic criteria, and reconciliation. Some post-processing is undertaken to ensure spatial consistency and to remove isolated and fringe blocks. The resource area is limited by a polygon and subsequent pit shell based on practical mining limits. A block of mineralized material is classified as Measured if the distance to the nearest drill hole is within 400 ft and estimated with interpolation pass 1. If the nearest drill hole is between 400 ft and 1,200 ft and estimated in pass 2, it is classified as Indicated. All remaining blocks are classified as Inferred; they are considered waste and excluded from the Mineral Resource estimate.

Estimates were validated using standard industry techniques including visual grade comparisons, reviews of block model coding, and statistical reviews of the global accuracy of the estimated variables and evaluation of the local accuracy through the preparation of comparative statistics.

To ensure that all Mineral Resource statements satisfy the "reasonable prospects for eventual economic extraction" requirement, the Mineral Resource estimate for HibTac considered factors significant to technical feasibility and potential economic viability. Mineral Resources were defined and constrained within LOM phase units prepared by Cliffs. Table 1-5 summarizes the estimates of Mineral Resources for the operating areas and developed projects of HibTac as of December 31, 2021.

Table 1-5: Summary of HibTac Mineral Resources – December 31, 2021
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Class	Crude Ore Mineral Resources	Crude Ore MagFe	Process Recovery	Pellets	Cliffs Attributed Basis	Cliffs Crude Ore Mineral Resources	Cliffs Pellets
	(MLT)	(%)	(%)	(MWLT)	(%)	(MLT)	(MWLT)
Measured	10.1	19.2	25.4%	2.6	85.3	8.6	2.2
Indicated	0.6	18.7	25.0%	0.1	85.3	0.5	0.1
Total Measured + Indicated	**10.7**	**19.2**	**25.4%**	**2.7**	**85.3**	**9.1**	**2.3**

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Mineral Resources are reported exclusive of Mineral Reserves and have been rounded to the nearest 100,000.
3. Mineral Resource estimates are based on a cut-off grade formula dependent on a few variables and restricted to material greater than 13% MagFe.
4. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
5. Bulk density is calculated based on magnetic iron and total iron content.
6. Mineral Resources are 85.3% attributable to Cliffs and 14.7% attributable to U.S. Steel.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

Resource estimates take account of the minimum block size that can be selectively extracted. Mineral Resources are exclusive of Mineral Reserves and are reported at a 13% MagFe cut-off grade. Mining recovery is typically 100%, although the grade tends to be diluted by 1% MagFe due to geological conditions and mining practices.

The SLR QP is of the opinion that, with consideration of the recommendations summarized in this section, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work.

1.3.7 Mineral Reserve Estimates

Mineral Reserves in this TRS are derived from the current Mineral Resources.The Mineral Reserves are reported as crude ore and are based on open pit mining from the Hibbing Mine. Crude ore is the unconcentrated ore as it leaves the mine at its natural *in situ* moisture content. The Proven and

Probable Mineral Reserves for HibTac are estimated as of December 31, 2021 and summarized in Table 1-6.

Table 1-6: Summary of HibTac Mineral Reserves – December 31, 2021
Cleveland-Cliffs Inc. – Hibbing Taconite Property

	Crude Ore Mineral Reserves (MLT)	Crude Ore MagFe (%)	Process Recovery (%)	Wet Pellets (MLT)	Cliffs Attributed Basis (%)	Cliffs Crude Ore Mineral Reserves (MLT)	Cliffs Wet Pellets (MLT)
Proven	100.1	18.7	25.4	25.5	85.3	85.4	21.7
Probable	9.1	18.7	25.6	2.3	85.3	7.8	2.0
Proven & Probable	**109.3**	**18.7**	**25.5**	**27.8**	**85.3**	**93.2**	**23.7**

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb and has been rounded to the nearest 100,000.
2. Mineral Reserves are estimated based on a cut-off grade formula dependent on a few variables and restricted to material greater than 13% MagFe.
3. The Mineral Reserve mining stripping ratio (waste units to crude ore units) is at 1.0.
4. Pellets are reported as a wet standard equivalent containing 65% Fe.
5. Tonnage estimate based on December 31, 2021 production depletion from surveyed topography on June 15, 2021.
6. Mineral Reserve tons are as delivered to the primary crusher; pellets are as loaded onto lake freighters in Superior, Wisconsin.
7. Classification of the Mineral Reserves is in accordance with the S-K 1300 classification system.
8. Mineral Reserves are 85.3% attributable to Cliffs and 14.7% attributable to U.S. Steel.
9. Numbers may not add due to rounding.

SLR is not aware of any risk factors associated with, or changes to, any aspects of the modifying factors such as mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

1.3.8 Mining Methods

HibTac is mined using conventional surface mining methods. The Mine requires large 200-plus ton mining trucks, and some areas of the pit require long hauls. The surface operations include:

- Clearing and grubbing
- Overburden (glacial till) removal
- Drilling and blasting (excluding overburden)
- Loading and haulage

The Mineral Reserve is based on the ongoing annual average ore production of 21.9 MLT from the Group I, II, III, IV, and V pits, producing an average of 5.6 MLT/y of wet pellets for domestic consumption. The HibTac operations have no current expansion plans and are likely to cease operating once the reserves are depleted by 2026.

Mining and processing operations are scheduled 24 hours per day, and the mine production is scheduled to directly feed the processing operations.

The current LOM plan has mining scheduled for five years and mines the known Mineral Reserve.The average stripping ratio is 1.0 waste units to 1 crude ore unit (1.0 stripping ratio).

There are 20 mining pits/phases with varying dimensions, with a maximum depth of approximately 600 ft attained in two of the pits/phases.

Primary production for all mine pits includes drilling 16.00 in.-diameter rotary blast holes. A production blast hole of 40 ft depth is drilled. Burden and spacing varies depending on the material being drilled. The holes are filled with explosive and blasted. A combination of front-end loaders (FEL) and electric shovels load the broken material into 240 ton-payload mining trucks for transport from the pit.

The Mine follows strict crude ore blending requirements to ensure that the Plant receives a uniform head grade. Generally, three groupings of geological subunits are mined at one time to obtain the best blend for the Plant. Operationally, blending is done on a shift-by-shift basis. Sixteen ore characteristics are tracked. Magnetic susceptibility probing of blast holes delineates zones of oxidized waste rock. Crude ore is hauled to the crushing facility and either direct tipped to the primary crusher or stockpiled in an area adjacent to the primary crusher. Haul trucks are alternated to blend delivery from the multiple crude ore loading points. The crude ore stockpiles are used as an additional source for blending and production efficiency.

The major pieces of pit equipment include electric shovels, FELs, haul trucks, drills, bulldozers, and graders. Extensive maintenance facilities are available at the mine site to service mine equipment and the rail fleet.

1.3.9 Processing and Recovery Methods

Three ore types are blended at HibTac and delivered to the crushing plant. Two Allis Chalmers gyratory crushers crush ROM ore to grinding mill feed size, which is conveyed to a 450,000-ton, crushed-ore stockpile (COSP). Crushed ore is reclaimed from the COSP to the concentrator. The concentrator consists of nine autogenous grinding (AG) and magnetic separation process lines, beginning with 36 ft-diameter x 15 ft EGL AG mills. The AG mills feed rougher magnetic separators, which produce a rougher magnetic concentrate and a non-magnetic tailing. The rougher magnetic concentrate is pumped to hydrocyclones for classification. The cyclone underflow slurry is returned to the AG mill for additional grinding, and the cyclone overflow slurry is pumped to finisher magnetic separators. The finisher magnetic separator product is pumped to the finisher product screens, and the screen undersize is final concentrate reporting to the concentrate thickener.

Concentrate is thickened and then pumped to agitated storage tanks in the pelletizing plant prior to filtration. Concentrate is filtered using vacuum disc filters and blended with bentonite prior to pelletizing to produce standard compression pellets. When high-compression pellets are required, limestone is added in addition to the bentonite.

The filter cake is transported by belt conveyors to the pellet plant concentrate bins. The concentrate is rolled in balling drums to produce green balls and sized using roll screens. Travelling grate furnaces are used for drying, preheating, and firing the pellets. Pellets discharged from the indurating furnaces are the final product and are conveyed to the pellet load-out bins or to the emergency stockpile.

1.3.10 Infrastructure

The Property is in a historically important, iron-producing region of Northeastern Minnesota. All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.

Infrastructure items include:

- Mine and Plant concentrator facilities near Hibbing, Minnesota.
- Power is supplied to the site by Minnesota Power. The site load is approximately 167 MW.
- Natural gas supplied by Northern Natural Gas from pipelines that connect into the North American distribution system.
- The water for mining and processing operations is provided by makeup water from the Scranton and Morton pits and recycled water from the TSF. The makeup water is provided at approximately 5,000 gpm by pit pumps. The source of makeup water is adjusted based on the mine plan. The reclaim water from the tailings is used for process water at the Plant. The water supply is more than adequate, especially considering that the mine is in a net positive water situation requiring daily discharge of excess water from pit dewatering.
- Paved roads and highways.
- Finished taconite pellets are transported by BNSF Rail to its Allouez Taconite Facility in Superior, Wisconsin, approximately 90 mi from the Plant facilities.
- The port is controlled and operated by BNSF Rail and includes pellet screening, 72,000 LT of pellet storage, and ship loading either directly from rail cars to ship or from stockpiles to ship. The vessels are 25,000 LT- to 55,000 LT-capacity lakers that transport pellets to steel mills on the Great Lakes.
- Rail yards and workshops are operated by BNSF Rail.
- TSF.
- Accommodations for employees.
- Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems.

1.3.11 Market Studies

Cliffs is the largest producer of iron ore pellets in North America. It is also the largest flat-rolled steel producer in North America. In 2020, Cliffs acquired two major steelmakers, AMUSA and AK Steel (AK), vertically integrating its legacy iron ore business with steel production and emphasis on the automotive end market.

Cliffs owns or co-owns five active iron ore mines in Minnesota and Michigan. Through the two acquisitions and transformation into a vertically integrated business, the iron ore mines are primarily now a critical source of feedstock for Cliffs' downstream primary steelmaking operations. Based on its ownership in these mines, Cliffs' share of annual rated iron ore production capacity is approximately 28.0 million tons, enough to supply its steelmaking operations and not have to rely on outside supply.

The importance of the steel industry in North America and specifically the USA is apparent by the actions of the US federal government by implementing and keeping import restrictions in place. It is important for middle-class job generation and the efficiency of the national supply chain. It is also an industry that supports the country's national security by providing products used for US military forces and national infrastructure. Cliffs expects the US government to continue recognizing the importance of this industry and does not see major declines in the production of steel in North America.

HibTac pellets are shipped to Cliffs' steelmaking facilities in the Midwestern USA. For cash flow projections, Cliffs uses a blended pellet revenue rate of $98/WLT Free on Board (FOB) Mine based on a three-year trailing average for 2017 to 2019. Based on macroeconomic trends, SLR is of the opinion that Cliffs pellet prices will remain at least at the current three-year trailing average of $98/WLT or above for the next five years.

1.3.12 Environmental Studies, Permitting and Plans, Negotiations, or Agreements with Local Individuals or Groups

Hibbing Taconite indicated that it presently has the requisite operating permits for the operation of the Mine and Plant and estimates the mine life to be five years. These permits include county, state, and federal permits related to air quality, surface water quality, water appropriation, hazardous waste generation, and wetlands. Multiple permits are planned to support future operations including an amendment to the Permit to Mine. Environmental monitoring and reporting during operations primarily include water and air quality monitoring.

Closure plans and other post-mining plans are required to be prepared at least two years prior to the anticipated closure; however, Cliffs conducts an in-depth review every three years to ensure that the asset retirement obligation legal liabilities are accurately estimated based on current laws, regulations, facility conditions, and cost to perform services. These cost estimates are conducted in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 410.

With respect to community agreements, HibTac is located in close proximity to the towns of Hibbing and Chisholm, Minnesota. Cliffs employs a public relations expert who is located in Forbes, Minnesota, only 30 mi away from HibTac, with the goal of responding to residents' complaints in a systematic manner. Hibbing Taconite has an ongoing lease agreement with the City of Hibbing's Public Utilities Department that provides access to Hibbing Taconite-owned property where the city operates a well. In 2017, Hibbing Taconite executed a land swap agreement with the City of Hibbing that was part of a plan to relocate the community's mine overlook and educational center so mining activities could commence at the former location (which was located on the HibTac Property) without significantly impacting the community.

1.3.13 Capital and Operating Cost Estimates

Sustaining capital expenditure estimates for the remaining LOM are presented in Table 1-7. Additional concurrent closure expenditures are associated with Hibbing Taconite's decision to move to a more conservative method of TSF design with the addition of downstream fill to strengthen the dam cross-section.

Table 1-7: LOM Capital Costs
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Type	Values	Total	2022	2023	2024	2025	2026
Sustaining	$ millions	27.0	15.4	7.9	2.4	1.3	0.1
Concurrent Closure	$ millions	29.4	18.8	10.7			
Total	**$ millions**	**56.5**	**34.2**	**18.6**	**2.4**	**1.3**	**0.1**

Operating costs are based on a full run rate with a combination of both standard and flux production consistent with what is expected for the LOM. A LOM average operating cost of $75.29/WLT pellet is estimated over the remaining five years of the LOM and is shown in Table 1-8.

Table 1-8: LOM Operating Costs
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	LOM ($/WLT Pellet)
Mining	19.87
Processing	34.57
Site Administration	2.30
Pellet Transportation and Storage	10.35
General / Other	8.20
Operating Cash Cost	**75.29**

Cliffs' forecasted capital and operating cost estimates are derived from annual budgets and historical actuals over the long life of the current operation. According to the American Association of Cost Engineers (AACE) International, these estimates would be classified as Class 1, with an accuracy range of -3% to -10% to +3% to +15%.

2.0 INTRODUCTION

SLR Consulting Ltd (SLR) was retained by Cleveland-Cliffs Inc. (Cliffs) to prepare an independent Technical Report Summary (TRS) for the Hibbing Taconite Property (HibTac or the Property), located in Northeastern Minnesota, USA.The owner of the Property, Hibbing Taconite Company (Hibbing Taconite), is a joint venture (JV) between subsidiaries of Cliffs (85.3% ownership) and U.S. Steel Corporation (U.S. Steel) (14.7%).The Property is managed by Cleveland-Cliffs Hibbing Management LLC, a wholly owned subsidiary of Cliffs.

The purpose of this TRS is to disclose December 31, 2021 Mineral Resource and Mineral Reserve estimates for HibTac.

Cliffs is listed on the New York Stock Exchange (NYSE) and currently reports Mineral Reserves of pelletized ore in SEC filings.This TRS conforms to the United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300) and Item 601 (b)(96) Technical Report Summary.

The Property includes the Hibbing Taconite Mine (the Mine) and processing facility (the Plant) in Hibbing, Minnesota.The Mine is a large, operating, open-pit iron mine that produces pellets from a magnetite iron ore regionally known as taconite.

The Property commenced operations in 1976 as a JV between Bethlehem Steel Corporation (Bethlehem) (75%), Pickands Mather and Co. (Pickands Mather) (15%), and Steel Company of Canada (Stelco) (10%). Cliffs first became involved in the JV when it purchased Pickands Mather's 15% share of the JV in 1986 and another 8% share from Bethlehem in 2002. In 2003-2004, ArcelorMittal USA (AMUSA) acquired Bethlehem's 62% share and became the largest shareholder of the JV. Cliffs managed the JV through a subsidiary until 2019 when AMUSA assumed control of the operation. In 2020, Cliffs acquired the US assets of AMUSA and again became the operator of the Property.

The open-pit operation has a mining rate of approximately 24 million long tons (MLT) of ore per year and produces 6.2 MWLT of iron ore pellets.

2.1 Site Visits

SLR Qualified Persons (QPs) visited the Property on April 28, 2021.The SLR team all toured the tailings basin, plant laboratory, concentrator and pelletizing facilities plus rail pellet load-out site, and the mine offices and operational areas.

2.2 Sources of Information

Technical documents and reports on the Property were obtained from Cliffs' personnel. During the preparation of this TRS, discussions were held with personnel from Cliffs:

- Kurt Gitzlaff, Director – Mine Engineering, Cliffs Technical Group (CTG)
- Michael Orobona, Principal Geologist, CTG
- Adam Schaum, Lead Mine Engineer, CTG
- Scott Gischia, Director – Environmental Compliance
- Dean Korri, Director –Basin & Civil Engineering

- Tushar Mondhe, Senior Manager – Operations and Capital Operations Finance
- Ralland Hess – Area Manager, Mine
- Angela Schwenk – Section Manager, Mine Engineering
- Daniel Aagenes – Area Manager, Plant
- Corie Ekholm – Section Manager, Plant Technical Services
- Wade Hansen, Concentrator Operations
- Zachary Wheaton, Pellet Plant Operations
- Phillip Larson, Mine Geologist
- Tasha Niemi – Area Manager, Environmental

This TRS was prepared by SLR QPs.The documentation reviewed, and other sources of information, are listed at the end of this report in Section 24, References.

2.3 List of Abbreviations

The U.S. System for weights and units has been used throughout this report. Tons are reported in long tons (LT) of 2,240 lb unless otherwise noted. All currency in this report is US dollars (US$ or $) unless otherwise noted.

Abbreviations and acronyms used in this TRS are listed below.

Unit Abbreviation	Definition	Unit Abbreviation	Definition
a	annum	LT/d	long tons per day
A	ampere	LT/h	long tons per hour
acfm	actual cubic feet per minute	M	mega (million); molar
bbl	barrels	Ma	one million years
Btu	British thermal units	MBtu	thousand British thermal units
d	day	MCF	million cubic feet
°F	degree Fahrenheit	MCF/h	million cubic feet per hour
fasl	feet above sea level	mi	mile
ft	foot	min	minute
ft^2	square foot	MLT/y	million long tons per year
ft^3	cubic foot	MPa	megapascal
ft/s	foot per second	mph	miles per hour
g	gram	MVA	megavolt-amperes
G	giga (billion)	MW	megawatt
Ga	one billion years	MWh	megawatt-hour
gal	gallon	MWLT	million wet long tons
gal/d	gallon per day	oz	Troy ounce (31.1035g)
g/cm^3	grams per cubic centimeter	oz/ton	ounce per short ton
g/L	gram per liter	ppb	part per billion
g/y	gallon per year	ppm	part per million
gpm	gallons per minute	psia	pound per square inch absolute
hp	horsepower	psig	pound per square inch gauge
h	hour	rpm	revolutions per minute
Hz	hertz	RL	relative elevation
in.	inch	s	second
in^2	square inch	ton	short ton
J	joule	stpa	short ton per year
k	kilo (thousand)	stpd	short ton per day
kg/m^3	Kilogram per cubic meter	t	metric tonne
kVA	kilovolt-amperes	US$	United States dollar
kW	kilowatt	V	volt
kWh	kilowatt-hour	W	watt
kWLT	thousand wet long tons	wt%	weight percent
L	liter	WLT	wet long ton
lb	pound	y	year
LT	long or gross ton equivalent to 2,240 pounds	yd^3	cubic yard

Acronym	Definition
AA	atomic absorption
AACE	American Association of Cost Engineers
AG	autogenous grinding
AIST	Association for Iron & Steel Technology
AK	AK Steel
AMUSA	ArcelorMittal USA
ANFO	ammonium nitrate fuel oil
ANSI	American National Standards Institute
ARD	acid rock drainage
ARO	asset retirement obligation
ASC	Accounting Standards Codification
ASQ	American Society for Quality
ASTM	American Society for Testing and Materials
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
BF	blast furnace
BFA	bench face angle
BH	bench height
BIF	banded iron formation
BLS	United States Bureau of Labor Statistics
CBOD5	carbonaceous biochemical oxygen demand, 5 day test
CCD	counter-current decantation
CCP	Conceptual Closure Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Cost and Freight
COA	certificates of analysis
CRIRSCO	Committee for Mineral Reserves International Reporting Standards
CSS	closed-side setting
CTW	calculated true width
D&A	depreciation and amortization
DCF	discounted cash flow
DD	diamond core drilling
DRI	direct reduced iron
DSO	direct-shipping iron ore
DT	Davis Tube
EAF	electric arc furnace
EAP	Emergency Action Plan
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	environmental management system
EPA	United States Environmental Protection Agency
EPRT	External Peer Review Team
ESOP	Environmental Standard Operating Procedures
EOR	Engineer of Record

FASB	Financial Accounting Standards Board
FEL	front-end loader
FOB	Free on Board
FoS	factor of safety
GHG	greenhouse gas
GIM	Geoscientific Information Management
GPS	global positioning system
GSI	Geological Strength Index
GSSI	General Security Services Corporation
HBI	Hot briquetted iron
HRC	hot-rolled coil
HTW	horizontal true width
ID^2	Inverse distance squared
ID^3	Inverse distance cubed
IF	iron formation
ICFM	inlet air capacity
IIMA	International Iron Metallics Association
IRA	inter-ramp angle
IRR	Internal Rate of Return
ISO	International Standards Organization
KEV	key economic variables
LG	Lerchs-Grossmann
LiDAR	light imaging, detection, and ranging
LIS	Liberation Index Study
LLP	Lerch Laboratory Procedures
LMF	Laurentian Mixed Forest
LOM	life of mine
MAC	Mining Association of Canada
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MLT	million long tons
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MR	moving range
MRCC	Midwestern Regional Climate Center
MTP	Main Tailing Pumphouse
MTW	measured true width
NAD	North American Datum
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGO	non-governmental organization
NGVD	National Geodetic Vertical Datum
NIST	National Institute of Standards and Technology
NNG	Northern Natural Gas
NOAA	National Oceanic and Atmospheric Administration

NOLA	Nuclear On-Line Analyzer
NPDES	National Pollution Discharge Elimination System
NPV	Net Present Value
NRRI	Natural Resources Research Institute
NSM	Northshore Mining Company
OBM	Ore Base Metallics
OMS	Operations, Maintenance and Surveillance
PLC	Programmable Logic Controller
PMF	probable maximum flood
POK	Pokegama Quartzite
PSD	Prevention of Significant Deterioration
QA/QC	quality assurance and quality control
QP	Qualified Person
RC	rotary circulation drilling
RCRA	Resource Conservation and Recovery Act
RMA	reduced major axis
ROM	run of mine
RPD	relative percent difference
RQD	Rock Quality Designation
RTR	risk and technology review
SDS	State Disposal System
SEC	United States Securities and Exchange Commission
SG	specific gravity
SMU	selective mining unit
SQL	Structured Query Language
SPC	statistical process control
SPT	standard penetration testing
TMDL	Total Maximum Daily Load
TRS	Technical Report Summary
TSF	tailings storage facility
TSP	total suspended particulates
TRIR	total recordable incident rate
UCS	uniaxial compressive strength
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
XRF	x-ray fluorescence

3.0 PROPERTY DESCRIPTION

3.1 Property Location

The Property is located in St. Louis and Itasca Counties in Northeastern Minnesota, USA, on the Mesabi Iron Range, immediately north of the town of Hibbing, Minnesota. The open pit is also known historically as the Hull-Rust-Mahoning Mine and, based on its historical production, is the largest operating open-pit mine in Minnesota. The mining and processing operation and tailings storage facility (TSF) are located in the center of the Mesabi Iron Range Mining District between longitude W 93°03’ and W 92°54’ 36” and latitude N 47°25’ 48” and N 47°31’ 48”Figure 3-1 shows the location of the Property. The Mine and Plant have the capacity to produce approximately 8.0 MWLT of iron ore pellets annually.

3.2 Land Tenure

Hibbing Taconite controls 36,280 acres in a combination of mineral leases, surface leases, and owned property and is the operator of the mine, process plant, and rail loading facility.

3.2.1 Mineral Rights

The Property Boundary comprises approximately 6,420 acres of mineral leases granted by private landowners and 220 acres granted by the State of Minnesota as illustrated in Figure 3-2. Mineral leases generally include surface rights. Where the mineral leases do not include surface mining rights, Hibbing Taconite controls the surface through ownership or surface leases with the owner of the surface. Approximately 1,150 acres of owned property is associated with the mineral lease acreage.

As shown in Table 3-1, Hibbing Taconite mineral leases expire between 2022 and 2056, with a number of leases that expire during the remaining five-year mine life. No scheduled mining activity on any of those leases will take place after their expiration date and all include time for proper reclamation.

In order to maintain the mineral leases until expiration, Hibbing Taconite must continue to make minimum prepaid royalty payments each quarter and pay property taxes. When mining occurs, a royalty is due per long ton of crude ore mined, or long ton of pellets produced from the crude ore mined; the royalty is payable to the respective lessors quarterly. Royalty rates per long ton fluctuate based on industry and economic indexes. Minimum prepaid royalty payments may be credited against royalties due when mining occurs. Specific terms and provisions of the mineral leases are confidential.

Table 3-1: Property Mineral Leases
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Name	Expiration Date
Higgins (Red Cross)	Holdover
State of Minnesota #5075-N, Lamberton	3/18/2023
Day Lands	12/31/2023
State 2063	4/11/2025
Penobscot	12/30/2026
L&W Leetonia	12/31/2026
Bennett-Longyear / Great Northern 50% (Ontario 50%)	12/31/2026

Name	Expiration Date
Bennett-Longyear #3, Ontario # 3	12/31/2026
Great Northern 100%	12/31/2026
Morris-Burt	12/31/2026
Morris	12/31/2026
Mahoning	1/1/2027
McClintock-Crosby	12/31/2028
USSC Overriding	12/31/2028
USSC Direct	12/31/2028
Day Development	8/1/2034
Pillsbury-Alexandria	1/1/2037
Sargent #1	12/31/2037
Crosby, Wilson G. Trust	12/31/2040
Sheridan	12/31/2040
Winifred	12/31/2040
Laura	12/31/2040
Christine McClintock	9/2/2041
McClintock-Kirby	9/2/2041
Sargent #2	10/1/2041
Burt	12/31/2041
Cyprus Rust	12/31/2041
Rust Group I & Group II	12/31/2041
Hull Group I & Group II	1/1/2042
Galob	11/21/2042
Greene	4/12/2043
Wheeler	6/30/2049
Gray Annex	6/30/2049
Roy Mine	5/1/2056

3.2.2 Surface Rights

The Property consists of approximately 30,670 acres of owned property (1,150 acres associated with mineral leases) in and around HibTac as illustrated in Figure 3-2. To maintain ownership, the property taxes must be paid to St. Louis and Itasca Counties.

There are quarterly royalty payments made on the Hibbing Taconite mine mineral leases to multiple third parties. The details of the royalties are confidential between Hibbing Taconite and the lessors.

Figure 3-1: Property Location Map

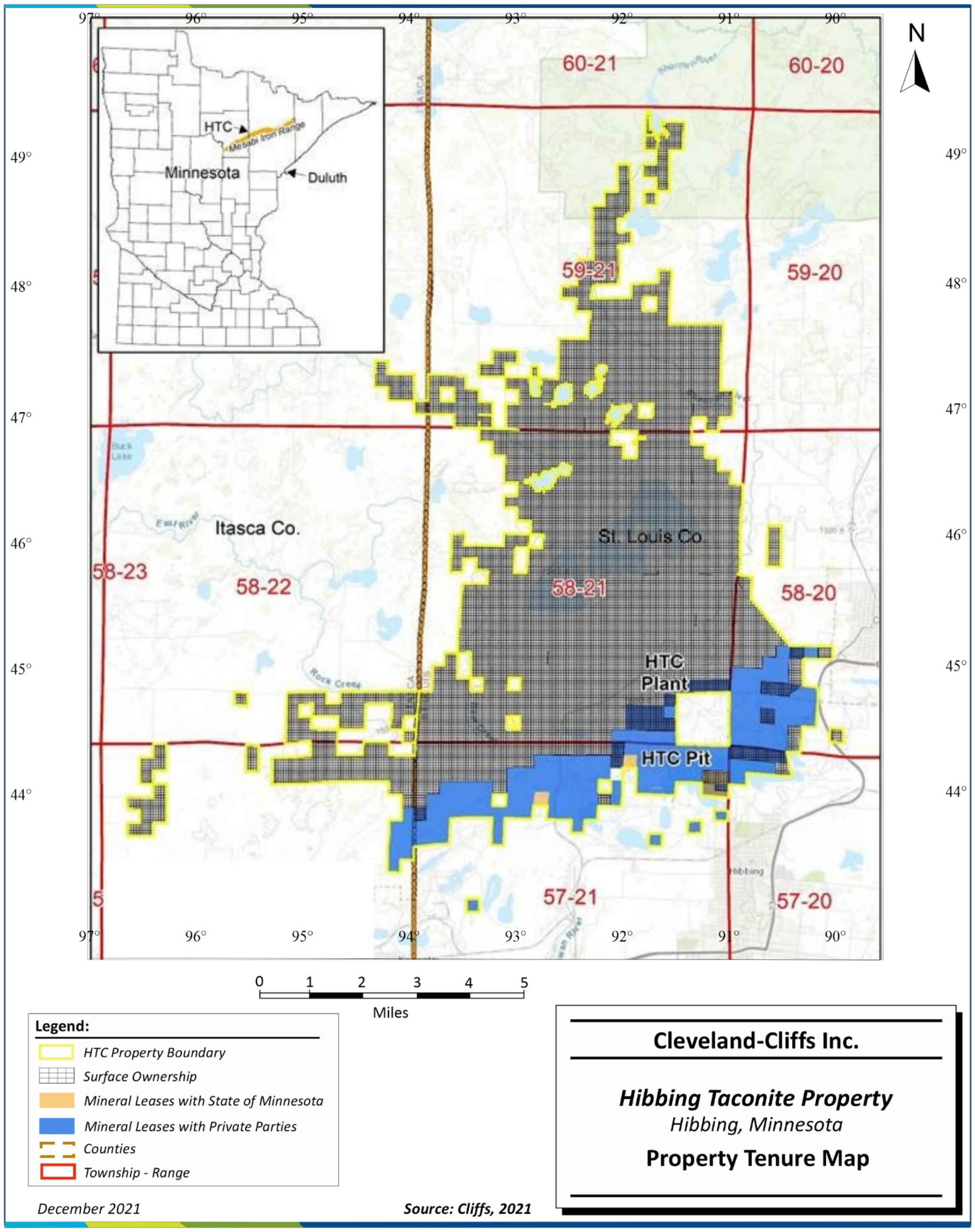


Figure 3-2: Property Mineral Tenure Map

3.3 Encumbrances

Hibbing Taconite grants leases, licenses, and easements for various purposes including miscellaneous community land uses, utility infrastructure, and other third-party uses that encumber the Property but do not inhibit operations.

Cliffs has outstanding standby letters of credit, which were issued to back certain obligations of Hibbing Taconite, including certain permits and certain tailings basin projects. Additionally, Hibbing Taconite has and may continue to enter into lease agreements for necessary equipment used in the operations of the mine.

Hibbing Taconite has prepared an asset retirement obligation cost for the site of approximately US$143 million, which covers monitoring and maintenance, reclamation and revegetation, remediation, structure removal, and watershed restoration. This amount does not include costs for long-term water management at the tailings basin, namely post-closure seepage control.

3.4 Royalties

Reference Section 3.2 of this TRS for royalty information. No overriding royalty agreements are in place.

3.5 Other Significant Factors and Risks

No additional significant factors or risks are known.

SLR is not aware of any environmental liabilities on the Property. Cliffs has all required permits to conduct the proposed work on the Property. SLR is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the Property.

4.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

4.1 Accessibility

The Property is easily accessed via paved roads from Hibbing, Minnesota by Highway 169, four miles north toward Chisholm to County Highway 5, then 2.3 mi north on Highway 5 to the mine access road, and two miles west to the facilities on the Hibbing Taconite complex road. Duluth, a major port city on Lake Superior, is 76 mi southeast of the Property via US Highway 53 and MN Highway 37Duluth has a regional airport with several flights daily to major hubs in Minneapolis and Chicago. A rail line operated by Burlington Northern Santa Fe Railway (BNSF) extends from the Plant to the port in Superior, Wisconsin. Refer to Section 3.1 of this TRS and Figure 3-2 for the location of roads providing access to the Property.

4.2 Climate

The climate in Northern Minnesota ranges from mild in the summer to winter extremes. The annual average temperature is 37°F. The annual average high temperature is 49°F, whereas the annual average low temperature is 25°F. July is on average the hottest month (77°F), and January is the coldest (-4°F) (National Oceanic and Atmospheric Administration [NOAA], 1991-2020). Table 4-1 presents complete climate data for the area for 1991 to 2020.

Table 4-1: Northern Minnesota Climate Data (1991 to 2020)
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high (°F)	16.9	22.5	35.4	49.5	63.4	72.2	76.7	74.9	65.7	50.8	34.3	21.4	48.6
Daily mean (°F)	6.2	10.5	23.8	37.1	49.5	58.9	63.5	61.6	53	40.2	25.6	12.3	36.9
Average low (°F)	−4.4	−1.4	12.2	24.8	35.7	45.7	50.3	48.3	40.3	29.7	16.9	3.1	25.1
Precipitation (in.)	0.51	0.53	0.91	1.61	2.76	4.36	3.85	3.09	3.06	2.35	1.09	0.64	24.76
Snowfall (in.)	15	7.1	7.8	3.7	0	0	0	0	0	1.2	13.2	12.3	60.3

Source: NOAA, 2021

Precipitation as rain in the Hibbing area ranges from less than one inch in December, January, and February, to approximately three to four inches per month during the summer, averaging approximately 25 in. annually. Annual snowfalls average 60 in. during November through March.Approximately half of the precipitation arrives during the summer months.

The Property is in production year-round.

4.3 Local Resources

Labor is readily available in the Property area. Medical facilities with trauma centers are located in the cities of Virginia, Hibbing, and Duluth, Minnesota. Table 4-2 presents a list of the major population centers and their distance by road to the Property.

Table 4-2: Nearby Population Centers
Cleveland-Cliffs Inc. – Hibbing Taconite Property

City/Town	Medical Center	Population 2010 Census	Mileage to Site
Hibbing, MN	Level III	16,361	10
Gilbert, MN	n/a	1,799	28
Eveleth, MN	n/a	3,718	26
Virginia, MN	Level IV	8,712	23
Duluth, MN	Level I and II	85,884	80

Source U.S. Census Bureau, Google Maps

As of Q4 2021, the HibTac operation employs 733 employees who live in the surrounding cities of Hibbing, Chisholm, Virginia, Mountain Iron, Eveleth, Buhl, Biwabik, Hoyt Lakes, and Aurora.Personnel also commute from Duluth and the Iron Range. St. Louis County has an estimated population of approximately 200,000 people.

4.4 Infrastructure

The Property is located in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is currently in place. Infrastructure items include high-voltage electrical supplies, natural gas pipelines that connect to the North American distribution system, water sources, paved roads and highways, railroads for transporting finished products, port facilities that connect to the Great Lakes, and accommodations for employees. Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems. Additional information regarding HibTac supporting infrastructure can be found in Section 15 of this TRS.

4.5 Physiography

The Property is located at an elevation of approximately 1,400 feet above sea level (FASL), just east of the Itasca County line. The mine and mineral leases are located in both St. Louis and Itasca counties. The generally gentle topography in the area is punctuated by hummocky hills and long gentle moraines, remnants of glacial ingress and egress. The landscape ranges from semi-rugged, lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, to large, flat, poorly drained peatlands. Topography includes rolling till plains, moraines, and flat outwash plains formed by the Rainy Lobe glacier. Most striking is the Giants Range, a narrow bedrock ridge rising 200 ft to 400 ft above the surrounding area. Bedrock is locally exposed near terminal moraines but is generally rare.

The Minnesota Department of Natural Resources (MDNR) characterizes the area as being within the Laurentian Mixed Forest (LMF) Province, which covers over 23 million acres of northeastern Minnesota. In Minnesota, the Province is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps. Vegetation is a mixture of deciduous and coniferous trees. White pine-red pine forest and jack pine barrens are common on outwash plains. Aspen-birch Forest and mixed hardwood-pine forest are present on moraines and till plains. Wetland vegetation includes conifer bogs, lowland grasses, and swamps. Prior to settlement, the area consisted of forest communities dominated by white pine, red pine, balsam fir, white spruce, and aspen-birch.

Brown glacial sediments form the parent material for much of the soils in the area. Soils are varied and range from medium to coarse textures. Soils are formed in sandy to fine-loamy glacial till and outwash sand. Soils on the Nashwauk Moraine have a loamy cap with dense basal till below at depths of 20 in. to 40 in. These soils are classified as boralfs (cold, well-drained soils developed under forest vegetation) (Minnesota Department of Natural Resources, 2011).

5.0 HISTORY

5.1 Prior Ownership

HibTac has operated as a joint venture among several companies since 1976. The ownership changes and effective percentages held by each company are described in Table 5-1.

Table 5-1: Ownership History
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Ownership	%
1976 – INITIAL START-UP	
Bethlehem Steel Corporation (Bethlehem)	75%
Pickands Mather & Co (Pickands Mather)	15%
Stelco (Steel Company of Canada)	10%
1978 – Phase II added	
Bethlehem	62%
Pickands Mather	15%
Stelco	7%
Republic	16%
1986 – Cliffs acquires Pickands Mather	
Bethlehem	70%
Cliffs	15%
Stelco	15%
2002 – Cliffs acquires an additional 8% ownership	
Bethlehem	62%
Cliffs	23%
Stelco	15%
2003 – International Steel Group (ISG) acquires Bethlehem assets	
ISG	62%
Cliffs	23%
Stelco	15%
2004 –AMUSA acquires ISG	
AMUSA	62%
Cliffs	23%
Stelco	15%
2007 –US Steel acquires Stelco	
AMUSA	62%
Cliffs	23%
U.S. Steel	15%
2019 – AMUSA becomes operator of Hibbing Taconite	

Ownership	%
AMUSA	62%
Cliffs	23%
U.S. Steel	15%
2020 – Cliffs acquires AMUSA's assets and becomes operator of Hibbing Taconite	
Cliffs	85%
U.S. Steel	15%

5.2 Exploration and Development History

Initial observations of iron-bearing rocks in the Mesabi Iron Range are attributed to Henry H. Eames, the first state geologist of Minnesota, in 1866. Mr. Eames mentioned that "enormous bodies of iron ore occurred" in the northern part of the state (Eames, 1866).

Exploration for high-grade, direct-shipping iron ore (DSO) deposits in the Hibbing area began in the early 1890s.Test pitting, later diamond core and churn drilling, and dip-needle surveys were used to delineate DSO deposits.The understanding of this work in the immediate Property area is limited, with poor documentation of activities maintained on site. Coincident with early exploration activity, the aerial extent of the unenriched Biwabik Iron Formation (Biwabik IF) sub-crop was delineated, and the magnetite-bearing iron formation was documented. Between 1895 and 1976, thirty-four separate mines operated within the current Property limits, shipping more than 600 MLT of iron ore and iron ore concentrates. Focused exploration for beneficiation-grade magnetite deposits, regionally known as taconite, however, did not begin until the 1940s when Pickands Mather and its managed subsidiaries Erie Mining Company and Ontario Iron Company commenced evaluation activity that included geophysical surveys, metallurgical testing, and diamond core drilling on regular-spaced grids designed to delineate taconite and characterize its weight recovery and metallurgical properties. A brief history of the initial regional exploration can be found in the Field Trip 2 Guidebook (Severson et al., 2016) and references therein.

Drilling since the late 1960s has primarily consisted of infill diamond drilling for operational purposes and comprises the database currently used for resource estimation. Cliffs and Hibbing Taconite have not evaluated detailed records or results of early, non-drilling prospecting methods used during initial exploration activities such as geophysical surveys, mapping, trenching, and test pits conducted prior to taconite mining development in the 1970s.

In 2007, Hibbing Taconite contracted EDCON-PRJ to fly a high-resolution, ultralight aeromagnetic survey over and beyond the eastern portion of the Property, which included the area immediately east of Highway 169, with the purpose of understanding continuity of magnetic response, and large scale structural features and oxidation of the BIF. The exploration target area east of the highway was not subsequently developed.

Exploration at the Property by previous owners, consisting of primarily diamond drilling, is described in Section 7 of this TRS.

5.3 Historical Reserve Estimates

HibTac typically produces new Mineral Reserve estimates every three years. Mineral Reserves reported to the SEC between 2001 and 2015 are summarized in Table 5-2. These Mineral Reserves were not prepared under the recently adopted SEC guidelines; however, they followed SEC Guide 7 requirements for public reporting of Mineral Reserves in the US.

Table 5-2: Historic Reserves
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Year	Crude Ore (000 LT)			Pellets (000 LT)			Strip Ratio	All Material Ratio	Pellet Weight Recovery
	Proven	Probable	Total	Proven	Probable	Total			
2001(1)	708,400	235,000	943,400	170,900	57,000	227,900	0.71	7.08	24.2
2002(2)	628,207	119,717	747,924	158,126	30,395	188,521	0.67	6.64	25.2
2006(3)	552,200	64,200	616,400	144,400	16,200	160,600	0.74	6.67	26.1
2009(4)	406,000	29,600	435,600	104,700	9,600	114,300	1.01	7.67	26.4
2013(5)	295,400	20,700	316,100	77,500	5,300	82,800	1.19	8.36	26.2
2015(6)	275,100	24,700	299,900	73,000	6,300	79,600	1.14	8.06	26.5

Notes:

1. As of December 31, 2000; natural moisture; based on Hibbing Taconite Reserve Estimate 2000
2. As of December 31, 2001; dry moisture; based on Hibbing Taconite Reserve Estimate 2001
3. As of December 31, 2005; dry moisture; based on Hibbing Taconite Reserve Estimate 2005
4. As of December 31, 2008; dry moisture; based on Hibbing Taconite Reserve Estimate 2008
5. As of December 31, 2012; dry moisture; based on Hibbing Taconite/SRK Reserve Estimate 2012
6. As of September 30, 2014; dry moisture; based on Hibbing Taconite Reserve Estimate 2015

5.4 Past Production

Production between 2010 and 2021 is listed in Table 5-3.

Table 5-3: Historical Production
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Year	Crude Ore (1) MLT	Rock Stripping (1) MLT	Surface Stripping (1) MLT	Total Material MLT	Pellet Production (Wet) MLT
2010	22.4	15.2	12.1	49.6	5.9
2011	28.3	12.7	22.0	63.0	7.8
2012	29.5	13.1	23.8	66.3	8.1
2013	28.1	21.1	13.6	62.8	7.7
2014	27.3	24.3	12.0	63.7	7.7
2015	29.4	26.2	6.3	61.9	8.1
2016	30.3	28.5	5.0	63.9	8.2
2017	29.5	26.8	8.4	64.8	7.7
2018	28.8	31.1	4.8	64.7	7.8
2019	28.1	24.4	7.5	60.0	7.5
2020	21.5	17.7	6.1	45.2	5.5
2021	28.8	21.0	9.9	59.7	7.6

Notes:

1. Values from Hibbing Taconite Met Balance forms

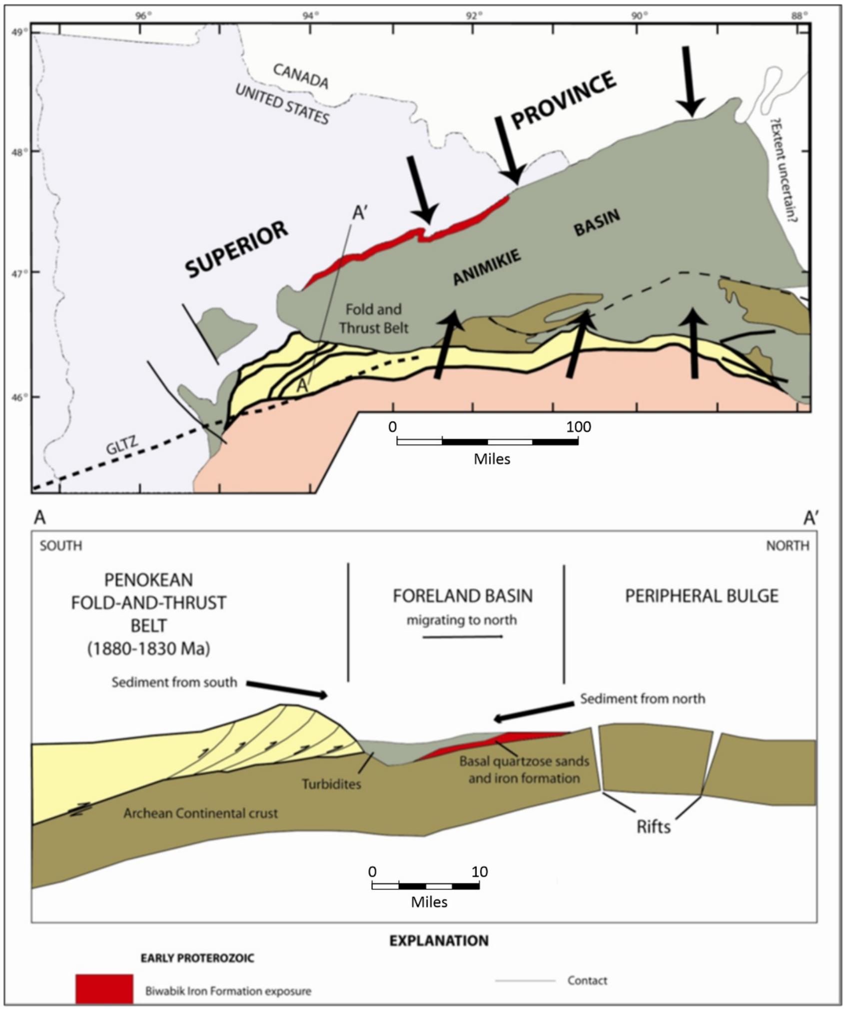
6.0 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

6.1 Regional Geology

Essential aspects of the regional geology in the Lake Superior region have been understood since the early 1900s, and the geologic understanding of the area has remained relatively unchanged over the years.

Iron ores produced within the region range from high-grade, structurally controlled ore bodies amendable to direct shipping to more disseminated, stratigraphically controlled, low-grade iron ores locally termed taconite. Taconite is observed in a sequence of Paleoproterozoic metasedimentary rocks overlying Archean granitic rocks in the Lake Superior region.A fold and thrust belt attributed to the Penokean orogeny (1,880 Ma to 1,830 Ma) developed a northward migrating foreland basin known as the Animikie Basin (Ojakangas, 1994, Figure 6-1).Sedimentary rocks within this basin include the basal Pokegama Quartzite (POK), the overlying Biwabik Iron Formation (Biwabik IF), and argillite and graywacke of the Virginia Formation (Jirsa and Morey, 2003).

The Mesabi Iron Range is a term used to designate the outcrop of the Animikie Group, defining a northeast-trending homocline dipping 5° to 15° to the southeast. The Biwabik IF is sectioned by a number of post-Penokean orogeny, high-angle normal and reverse faults associated with near-vertical reactivated faults in the Archean basement (Morey, 1999). The most notable structural feature of the Biwabik IF is located east of Hibbing, between Virginia and Eveleth, where the paired Virginia syncline and Eveleth anticline result in an S-curve surface trace of the Biwabik IF (Jirsa and Morey, 2003, Figure 6-2).



Cleveland-Cliffs Inc.

Hibbing Taconite Property

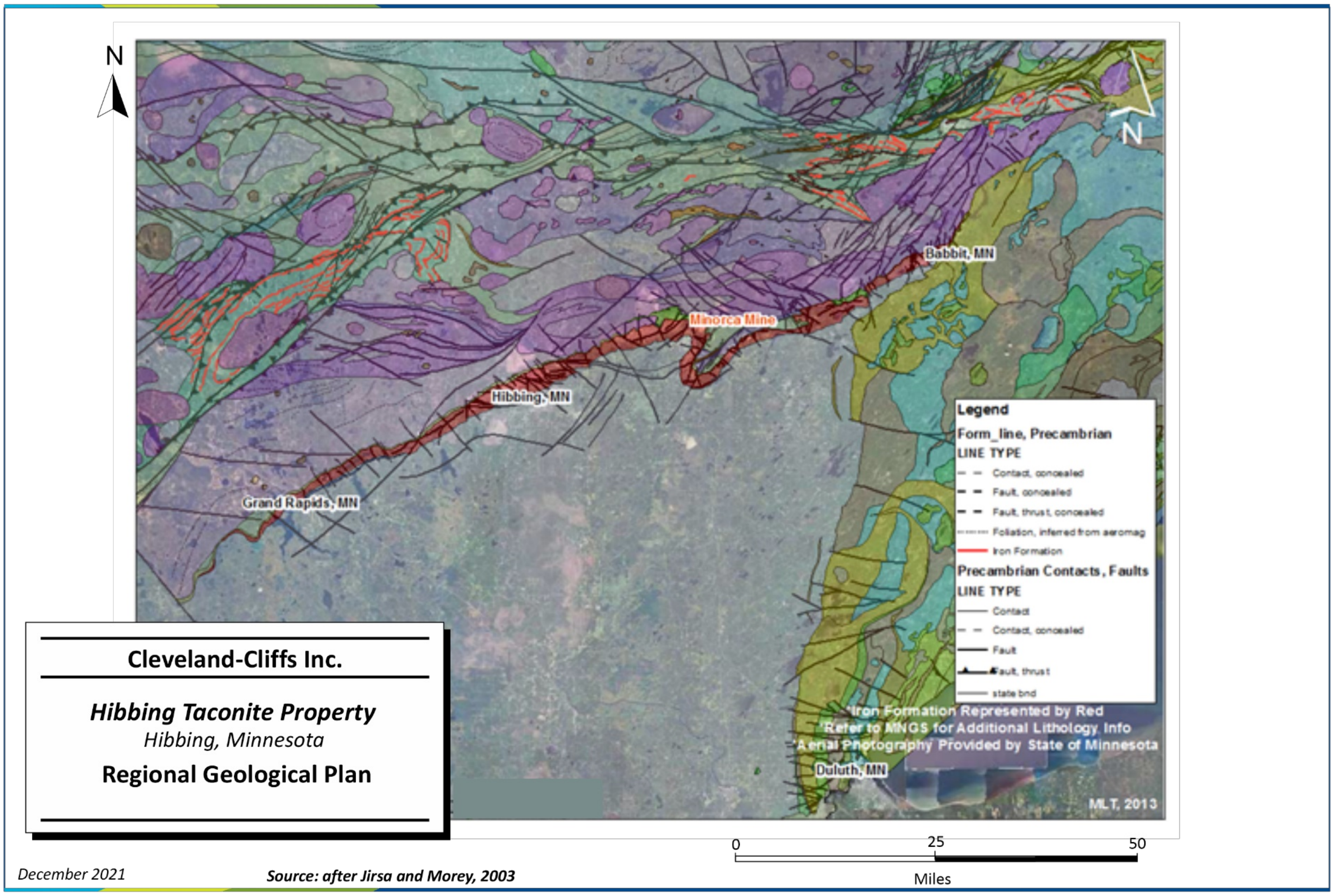
Hibbing, Minnesota

Location of the Animikie Basin and Diagrammatic Cross-section Showing Development of the Basin

December 2021

Source: Ojakangas, 1994

Figure 6-1: Location of the Animikie Basin and Diagrammatic Cross-section Showing Development of the Basin



Cleveland-Cliffs Inc.

Hibbing Taconite Property
Hibbing, Minnesota
Regional Geological Plan

December 2021

Source: after Jirsa and Morey, 2003

Figure 6-2: Regional Geological Plan

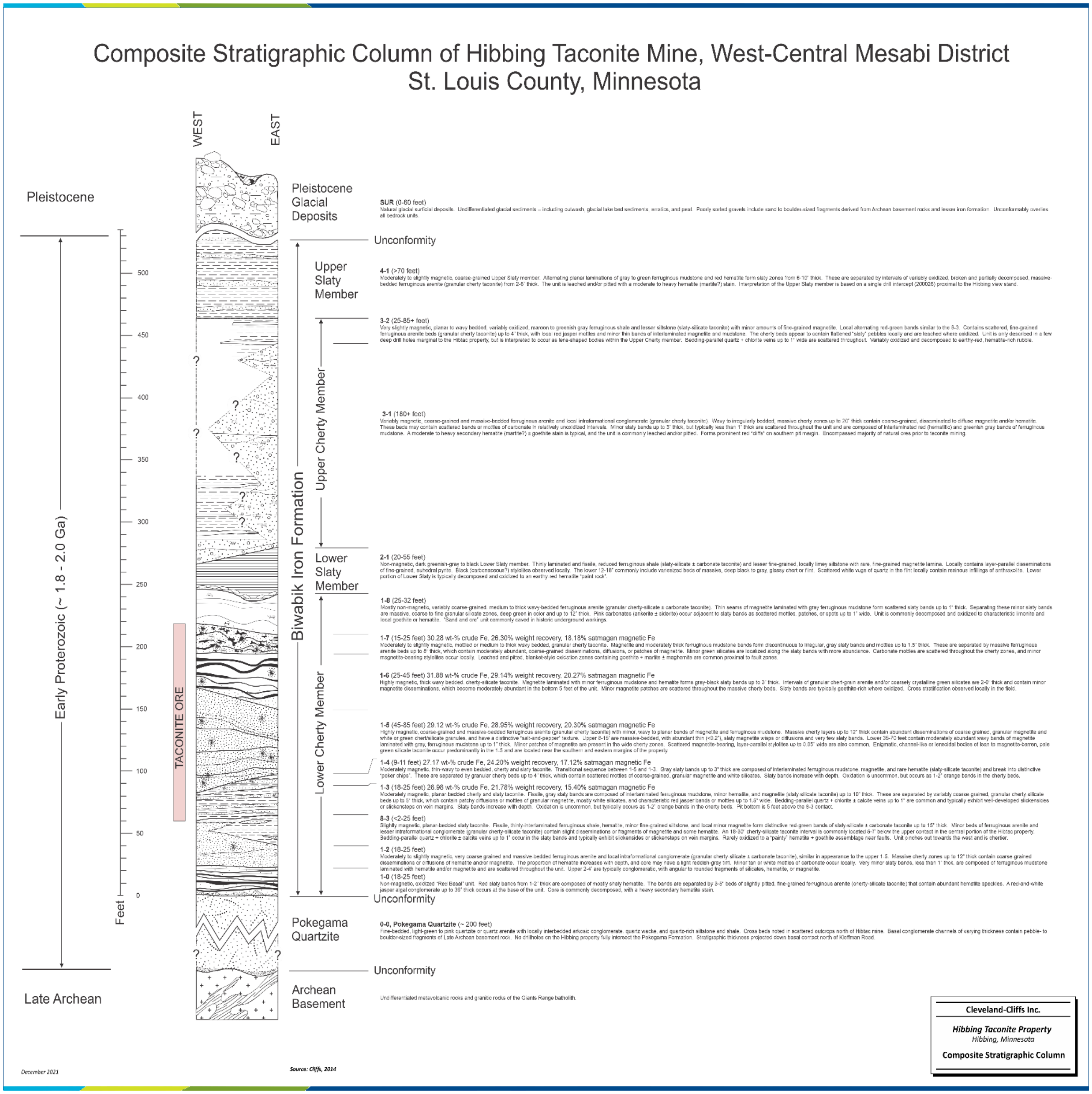
6.2 Local Geology

The Early Proterozoic Biwabik IF is a narrow belt of iron-rich strata varying in width from 1,300 ft to 3.2 mi and extending approximately 125 mi from Grand Rapids eastward past Babbitt, Minnesota.The true thickness varies from approximately 150 ft to 700 ft. The Biwabik IF is interpreted to have been deposited in a shallow, tidal marine setting and is characterized as having four separate lithostratigraphic members (from bottom to top: Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty (Severson, Heine, and Patelke, 2009).“Cherty” members have a sandy, granular texture, are thickly bedded, and are composed of silica and iron oxide minerals. The “slaty” members are fine grained, thinly bedded, and comprise iron silicates and iron carbonates, with local chert beds. The cherty members are representative of deposition in a high-energy environment, whereas the slaty members were probably deposited in a muddy, lower-energy environment below the wave base. Interbedding is ubiquitous, and contacts are generally gradational. The iron content for the cherty members is approximately 31%, while the iron content of the slaty members is approximately 26%. It is important to note that nomenclature of the units is not indicative of metamorphic grade; instead “slaty” and “cherty” are colloquial descriptive terms used regionally.

The four members of the Biwabik IF are further subdivided into twelve locally recognized subunits within the HibTac area.Figure 6-3 illustrates the stratigraphy of these subunits and their general descriptions. Nomenclature for these subunits is based on their relative location within the four members. They are subdivided based on geologic characteristics observed in diamond drill core. Many of the contacts between subunits are gradational and do not provide a sharp geologic contact. Geologic contacts are occasionally adjusted to fit assay data once received.

The Biwabik IF is underlain by the basal, Early Proterozoic age POK, which unconformably overlies Archean igneous and metamorphic basement rocks. The Virginia Formation lies stratigraphically atop the Biwabik IF south of the current pit extents but is not exposed on the mine property.All Precambrian rocks are unconformably overlain by Pleistocene glacial deposits. A local geology cross-section is provided in Figure 6-4.

Isolated DSO material exists within the lower-grade taconite ores, the origins of which have been debated for many years.Some of the more recent publications suggest a genesis linked to crustal-scale groundwater convection related to igneous activity. Much of the evidence supporting this conclusion comes from the isotopic analysis of leached and replaced silicate and carbonate minerals (Morey, 1999). Within the Biwabik IF, metamorphic processes produced assemblages diagnostic of greenschist facies to the west, increasing in grade to the east. Mineralogy in unaltered taconite is dominated by quartz, magnetite, hematite, siderite, ankerite, talc, chamosite, greenalite, minnesotaite, and stilpnomelane (Perry et al., 1973).



Composite Stratigraphic Column of Hibbing Taconite Mine, West-Central Mesabi District
St. Louis County, Minnesota

SUR (0-60 feet)
Natural glacial surficial deposits. Undifferentiated glacial sediments – including outwash, glacial lake bed sediments, erratics, and peat. Poorly sorted gravels include sand to boulder-sized fragments derived from Archean basement rocks and lesser iron formation. Unconformably overlies all bedrock units.

4-1 (>70 feet)
Moderately to slightly magnetic, coarse-grained Upper Slaty member. Alternating planar laminations of gray to green ferruginous mudstone and red hematite form slaty zones from 6-10' thick. These are separated by intervals of variably oxidized, broken and partially decomposed, massive-bedded ferruginous arenite (granular cherty taconite) from 2-6' thick. The unit is leached and/or pitted with a moderate to heavy hematite (martite?) stain. Interpretation of the Upper Slaty member is based on a single drill intercept (200026) proximal to the Hibbing view stand.

3-2 (25-85+ feet)
Very slightly magnetic, planar to wavy bedded, variably oxidized, maroon to greenish gray ferruginous shale and lesser siltstone (slaty-silicate taconite) with minor amounts of fine-grained magnetite. Local alternating red-green bands similar to the 8-3. Contains scattered, fine-grained ferruginous arenite beds (granular cherty taconite) up to 4' thick, with local red jasper mottles and minor thin bands of interlaminated magnetite and mudstone. The cherty beds appear to contain flattened "slaty" pebbles locally and are leached where oxidized. Unit is only described in a few deep drill holes marginal to the Hibtac property, but is interpreted to occur as lens-shaped bodies within the Upper Cherty member. Bedding-parallel quartz + chlorite veins up to 1" wide are scattered throughout. Variably oxidized and decomposed to earthy-red, hematite-rich rubble.

3-1 (180+ feet)
Variably magnetic, coarse-grained and massive-bedded ferruginous arenite and local intraformational conglomerate (granular cherty taconite). Wavy to irregularly bedded, massive cherty zones up to 20' thick contain coarse-grained, disseminated to diffuse magnetite and/or hematite. These beds may contain scattered bands or mottles of carbonate in relatively unoxidized intervals. Minor slaty bands up to 3' thick, but typically less than 1' thick are scattered throughout the unit and are composed of interlaminated red (hematitic) and greenish gray bands of ferruginous mudstone. A moderate to heavy secondary hematite (martite?) ± goethite stain is typical, and the unit is commonly leached and/or pitted. Forms prominent red "cliffs" on southern pit margin. Encompassed majority of natural ores prior to taconite mining.

2-1 (20-55 feet)
Non-magnetic, dark greenish-gray to black Lower Slaty member. Thinly laminated and fissile, reduced ferruginous shale (slaty-silicate ± carbonate taconite) and lesser fine-grained, locally limey siltstone with rare, fine-grained magnetite lamina. Locally contains layer-parallel disseminations of fine-grained, euhedral pyrite. Black (carbonaceous?) stylolites observed locally. The lower 12-18" commonly include variesized beds of massive, deep black to gray, glassy chert or flint. Scattered white vugs of quartz in the flint locally contain resinous infillings of anthraxolite. Lower portion of Lower Slaty is typically decomposed and oxidized to an earthy-red hematite "paint rock".

1-8 (25-32 feet)
Mostly non-magnetic, variably coarse-grained, medium to thick wavy-bedded ferruginous arenite (granular cherty-silicate ± carbonate taconite). Thin seams of magnetite laminated with gray ferruginous mudstone form scattered slaty bands up to 1" thick. Separating these minor slaty bands are massive, coarse to fine granular silicate zones, deep green in color and up to 12' thick. Pink carbonates (ankerite ± siderite) occur adjacent to slaty bands as scattered mottles, patches, or spots up to 1" wide. Unit is commonly decomposed and oxidized to characteristic limonite and local goethite or hematite. "Sand and ore" unit commonly caved in historic underground workings.

1-7 (15-25 feet) 30.28 wt-% crude Fe, 26.30% weight recovery, 18.18% satmagan magnetic Fe
Moderately to slightly magnetic, mottled or medium to thick wavy bedded, granular cherty taconite. Magnetite and moderately thick ferruginous mudstone bands form discontinuous to irregular, gray slaty bands and mottles up to 1.5' thick. These are separated by massive ferruginous arenite beds up to 8' thick, which contain moderately abundant, coarse-grained disseminations, diffusions, or patches of magnetite. Minor green silicates are localized along the slaty bands with more abundance. Carbonate mottles are scattered throughout the cherty zones, and minor magnetite-bearing stylolites occur locally. Leached and pitted, blanket-style oxidation zones containing goethite + martite ± maghemite are common proximal to fault zones.

1-6 (25-45 feet) 31.88 wt-% crude Fe, 29.14% weight recovery, 20.27% satmagan magnetic Fe
Highly magnetic, thick wavy bedded, cherty-silicate taconite. Magnetite laminated with minor ferruginous mudstone and hematite forms gray-black slaty bands up to 3' thick. Intervals of granular chert-grain arenite and/or coarsely crystalline green silicates are 2-6' thick and contain minor magnetite disseminations, which become moderately abundant in the bottom 5 feet of the unit. Minor magnetite patches are scattered throughout the massive cherty beds. Slaty bands are typically goethite-rich where oxidized. Cross stratification observed locally in the field.

1-5 (45-85 feet) 29.12 wt-% crude Fe, 28.95% weight recovery, 20.30% satmagan magnetic Fe
Highly magnetic, coarse-grained and massive-bedded ferruginous arenite (granular cherty taconite) with minor, wavy to planar bands of magnetite and ferruginous mudstone. Massive cherty layers up to 12' thick contain abundant disseminations of coarse grained, granular magnetite and white or green chert/silicate granules, and have a distinctive "salt-and-pepper" texture. Upper 8-15' are massive-bedded, with abundant thin (<0.2"), slaty magnetite wisps or diffusions and very few slaty bands. Lower 35-70 feet contain moderately abundant wavy bands of magnetite laminated with gray, ferruginous mudstone up to 1" thick. Minor patches of magnetite are present in the wide cherty zones. Scattered magnetite-bearing, layer-parallel stylolites up to 0.05" wide are also common. Enigmatic, channel-like or lensoidal bodies of lean to magnetite-barren, pale green silicate taconite occur predominantly in the 1-5 and are located near the southern and eastern margins of the property.

1-4 (9-11 feet) 27.17 wt-% crude Fe, 24.20% weight recovery, 17.12% satmagan magnetic Fe
Moderately magnetic, thin-wavy to even bedded, cherty and slaty taconite. Transitional sequence between 1-5 and 1-3. Gray slaty bands up to 3" thick are composed of interlaminated ferruginous mudstone, magnetite, and rare hematite (slaty-silicate taconite) and break into distinctive "poker chips". These are separated by granular cherty beds up to 4' thick, which contain scattered mottles of coarse-grained, granular magnetite and white silicates. Slaty bands increase with depth. Oxidation is uncommon, but occurs as 1-2' orange bands in the cherty beds.

1-3 (18-25 feet) 26.98 wt-% crude Fe, 21.78% weight recovery, 15.40% satmagan magnetic Fe
Moderately magnetic, planar-bedded cherty and slaty taconite. Fissile, gray slaty bands are composed of interlaminated ferruginous mudstone, minor hematite, and magnetite (slaty-silicate taconite) up to 10' thick. These are separated by variably coarse-grained, granular cherty-silicate beds up to 5' thick, which contain patchy diffusions or mottles of granular magnetite, mostly white silicates, and characteristic red jasper bands or mottles up to 1.5" wide. Bedding-parallel quartz + chlorite ± calcite veins up to 1" are common and typically exhibit well-developed slickensides or slickensteps on vein margins. Slaty bands increase with depth. Oxidation is uncommon, but typically occurs as 1-2' orange bands in the cherty beds. Pit bottom is 5 feet above the 8-3 contact.

8-3 (<2-25 feet)
Slightly magnetic, planar-bedded slaty taconite. Fissile, thinly-interlaminated ferruginous shale, hematite, minor fine-grained siltstone, and local minor magnetite form distinctive red-green bands of slaty-silicate ± carbonate taconite up to 15" thick. Minor beds of ferruginous arenite and lesser intraformational conglomerate (granular cherty-silicate taconite) contain slight disseminations or fragments of magnetite and some hematite. An 18-30' cherty-silicate taconite interval is commonly located 5-7' below the upper contact in the central portion of the Hibtac property. Bedding-parallel quartz + chlorite ± calcite veins up to 1" occur in the slaty bands and typically exhibit slickensides or slickensteps on vein margins. Rarely oxidized to a "painty" hematite + goethite assemblage near faults. Unit pinches out towards the west and is chertier.

1-2 (18-25 feet)
Moderately to slightly magnetic, very coarse grained and massive bedded ferruginous arenite and local intraformational conglomerate (granular cherty silicate ± carbonate taconite), similar in appearance to the upper 1-5. Massive cherty zones up to 12" thick contain coarse grained disseminations or diffusions of hematite and/or magnetite. The proportion of hematite increases with depth, and core may have a light reddish-gray tint. Minor tan or white mottles of carbonate occur locally. Very minor slaty bands, less than 1' thick, are composed of ferruginous mudstone laminated with hematite and/or magnetite and are scattered throughout the unit. Upper 2-4' are typically conglomeratic, with angular to rounded fragments of silicates, hematite, or magnetite.

1-0 (18-25 feet)
Non-magnetic, oxidized "Red Basal" unit. Red slaty bands from 1-2' thick are composed of mostly shaly hematite. The bands are separated by 3-5' beds of slightly pitted, fine-grained ferruginous arenite (cherty-silicate taconite) that contain abundant hematite speckles. A red-and-white jasper algal conglomerate up to 36" thick occurs at the base of the unit. Core is commonly decomposed, with a heavy secondary hematite stain.

0-0, Pokegama Quartzite (~ 200 feet)
Fine-bedded, light-green to pink quartzite or quartz arenite with locally interbedded arkosic conglomerate, quartz wacke, and quartz-rich siltstone and shale. Cross beds noted in scattered outcrops north of Hibtac mine. Basal conglomerate channels of varying thickness contain pebble- to boulder-sized fragments of Late Archean basement rock. No drillholes on the Hibbing property fully intersect the Pokegama Formation. Stratigraphic thickness projected down basal contact north of Kleffman Road.

Undifferentiated metavolcanic rocks and granitic rocks of the Giants Range batholith.

Figure 6-3: Stratigraphic Column for the Hibbing Taconite Deposit

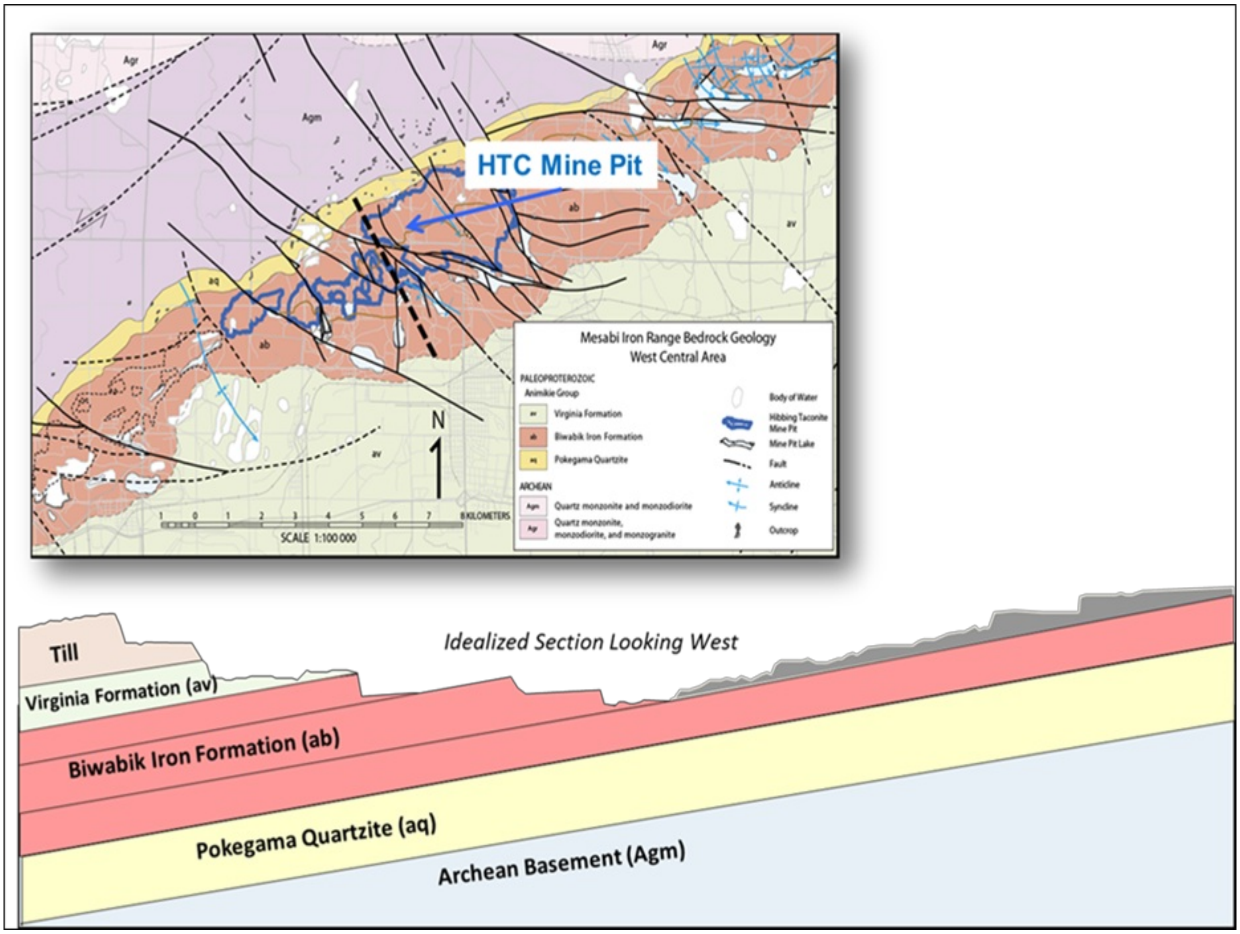


Figure 6-4: Property Geology and Generalized Cross-section for the Hibbing Taconite Deposit

6.3 Property Geology

The Biwabik IF at HibTac consists primarily of carbonates, iron silicates, fine-grained quartz, and iron oxides.These layers are visually distinct, locally separated into slaty beds and cherty beds. The ratio of slaty to cherty beds and distance between these beds are key indicators used during logging, as well as bedding style, texture, color, and magnetic strength. Slaty beds are dark gray in nature, consisting primarily of magnetite in mineralized zones, and range from 0.04 in. to upwards of one inch in thickness. Cherty beds range from gray to green in color depending on the ratio of fine-grained quartz (gray color) to iron silicates (green color). These beds vary in thickness to upwards of twelve inches and may or may not contain disseminated magnetite. Carbonates typically occur as granular, re-crystallized grains of varying size and commonly occur in late-stage quartz-carbonate-filled fractures, which run variably (orientation, length, width, continuity) throughout the iron formation. The Upper Slaty and Lower Slaty members are visually distinctive, as they are dominated by slaty beds; however, these beds rarely contain any notable iron oxide content.

The taconite ores mined at HibTac are from several locally recognized, informal subunits of the Lower Cherty member. Waste rock units (Lower Slaty and Upper Slaty members) cap the Lower Cherty and Upper Cherty members and are distinctively fissile and weakly magnetic as compared to the ore units. The POK, which underlies the Biwabik IF, is not exposed in the pit but is intersected at the base of the iron formation in diamond drilling.The Virginia Formation caps the Biwabik IF and is found predominantly in historical holes drilled south of the current pit extents.A brief description of the lithological units in the immediate Property area is listed below from youngest to oldest.

6.3.1 Pleistocene Glacial Deposits

Surficial deposits of 0 to 60 ft in thickness unconformably overlie all bedrock units. Undifferentiated glacial sediments include outwash, glacial lake bed sediments, glacial erratics, and peat. Poorly sorted gravels include sand- to boulder-sized fragments derived from Archean basement rocks and lesser iron formation.

6.3.2 Upper Slaty Member

Unit 4-1: This member is generally more than 70 ft thick. The Upper Slaty member is moderately to slightly magnetic and coarse grained. Alternating planar laminations of gray to green ferruginous mudstone and red hematite form slaty zones from six to ten inches thick. These are separated by intervals of variably oxidized, broken and partially decomposed, massive to bedded ferruginous arenite (granular cherty taconite) from two to six inches thick. The unit is leached and/or pitted with a moderate to heavy hematite stain.

6.3.3 Upper Cherty Member (Composite Subunit 3-1)

The Upper Cherty member comprised the majority of “natural” (DSO) ores in the Hibbing area prior to the era of taconite beneficiation.The remaining material is variably oxidized on the current Property and can be decomposed largely to earth-red, hematite-rich rubble in fault zones and near most current exposures, so there is little data from historical drilling (before 2005). Fresher intercepts in drill core occur south of the current HibTac pit and (predominantly) east of Highway 169, where the subunits are modeled. The Upper Cherty is modeled as a single rock package (3-1) over most of the Property.

6.3.3.1 Subunit UC4

This subunit ranges from 25 ft to 130 ft thick. It is comprised of moderately to strongly magnetic, gray (red-gray where weathered), thick- to massive-bedded (8 in. to 24 in. thick), medium-grained ferruginous arenite (cherty taconite) with abundant and distinct, fine-grained pink carbonate and magnetite mottling, as well as disseminated fine- to medium-grained magnetite. There are very minor bedded ooidal jasper beds 12 in. to 24 in. thick. Minor moderately magnetic, greenish-gray and red, thin and wavy ferruginous mudstone beds that are 0.1 in. to 1.0 in. thick occur near the western margins of the Property; however, such "slaty" beds can reach thickness greater than 3.0 in. in proximity to the upper and lower contacts. Along the eastern margin of the active property and beyond – in particular east of highway 169 – the unit becomes significantly thinner (25 ft to 55 ft) and contains green-gray and red, thin and wavy ferruginous shale beds, 0.5 in. to 3.0 in. thick, throughout. The subunit typically has a pitted appearance due to weathering of carbonate mottles.

6.3.3.2 Subunit UC3

This subunit ranges from 0 to 25 ft thick. It is moderately magnetic and consists of alternating bands of gray, medium- to thick-bedded (3 in. to 12 in. thick), fine- to medium-grained ferruginous arenite (cherty taconite) and olive to maroon, wavy and thickly laminated (one to eight inches thick) slaty taconite, with occasional hummocky cross-stratification. Magnetite occurs as disseminations and wavy-bedded, medium- to coarse-grained bands, and occasionally replaces rip up mud clasts. The unit contains diffuse ooidal jasper mottles, as well as yellow-gray carbonate stringers. The roof is a 4 in. to 24 in. thick, white and red-orange algal mat zone composed of stromatolites and oncolites that occasionally occurs as an algal breccia that has a strongly magnetic matrix of massive magnetite. UC3 is typically only observed east of the Albany Pit area, and pinches out further west.

6.3.3.3 Subunit UC2

This unit ranges from 0 to 50 ft thick. It is moderately to strongly magnetic. It comprises gray to beige-gray, medium- to thick-bedded and medium- to coarse-grained, granular and conglomeratic ferruginous arenite (granular cherty silicate taconite) with non-magnetic, wavy-bedded, green to red-green, thinly laminated ferruginous shale beds that range from one to four inches thick (slaty silicate ± carbonate taconite). Cherty beds contain abundant zones of course- to very coarse-grained pebble conglomerate that includes angular clasts of magnetite from $^{1}/_{16}$ in. to ¼ in. in width. Subrounded mudstone rip-up clasts are commonly observed in cherty beds immediately adjacent to the slaty beds. Abundant yellow-gray carbonate stringers are observed in and around the slaty beds. This unit is typically only observed east of the Albany Pit area and pinches out along the western margin of the Property.

6.3.3.4 Subunit UC1

This unit ranges from one foot to 25 ft thick. It is a non-magnetic, transitional unit between the Upper Cherty and Lower Slaty members of the Biwabik IF. It consists predominantly of green-gray to dark green, fine-grained, thinly laminated ferruginous shale and siltstone beds (slaty silicate taconite) ranging from six inches to 12 in. thick, interlaminated with gray, fine-grained and thin-bedded ferruginous arenite (cherty silicate taconite) that are typically one to two inches thick but can locally be up to six inches in thickness. The UC1 unit significantly thins out towards the western margin of the HibTac property, where it can be as little as one foot in thickness.

6.3.4 Lower Slaty Member

Modeled as LS_21, the Lower Slaty member is from 20 ft to 55 ft in thickness and is non-magnetic and dark greenish-gray to black in color.It is thinly laminated and fissile, containing reduced ferruginous shale (slaty-silicate ± carbonate taconite) and lesser fine-grained, locally limey siltstone with rare, fine-grained magnetite laminae. Locally it contains layer-parallel disseminations of fine-grained, euhedral pyrite. Black stylolites are observed locally. The lower 12 in. to 18 in. commonly include variably sized beds of massive, deep black to gray, glassy chert or flint. Scattered white vugs of quartz in the flint locally contain resinous infillings of anthraxolite. The lower portion of the Lower Slaty member is typically decomposed and oxidized to an earthy-red hematite “paint rock”.

6.3.5 Lower Cherty Member

The ore-grade intervals are contained with the Lower Cherty member, specifically, the 1-7 through the 1-3. The magnetic iron content ranges from approximately 15% to 18%, with the higher percentages found in the 1-5 and 1-6.

6.3.5.1 Subunit 1-8

Modeled as LC_18, subunit 1-8 is from 25 ft to 32 ft in thickness and is mostly non-magnetic. It is a variably coarse-grained, medium to thick wavy-bedded ferruginous arenite (granular cherty-silicate ± carbonate taconite). Thin seams of magnetite laminated with gray ferruginous mudstone form scattered slaty bands up to one inch thick. Separating these minor slaty bands are massive, coarse to fine, granular silicate mineral zones that are deep green in color and up to 12 in. thick. Pink carbonate minerals (ankerite ± siderite) occur adjacent to slaty bands as scattered mottles, patches, or spots up to one inch wide. The unit is commonly decomposed and oxidized to characteristic limonite and local goethite or hematite. The 1-8 is the “sand and ore” subunit commonly caved in historical underground workings.

6.3.5.2 Subunit 1-7

Modeled as LC_17, the 1-7 ranges from 15 ft to 25 ft in thickness and is moderately to slightly magnetic with medium to thick bedding. In this subunit, the taconite is granular and cherty. Magnetite and moderately thick ferruginous mudstone bands form discontinuous to irregular, gray slaty bands and mottles up to 1.5 in. thick. These are separated by massive ferruginous arenite beds up to eight inches thick that contain moderately abundant, coarse-grained disseminations, diffusions, or patches of magnetite. Minor green silicate minerals are localized along the slaty bands with more abundance. Carbonate mottles are scattered throughout the cherty zones, and minor magnetite-bearing stylolites occur locally. Leached and pitted, blanket-style oxidation zones containing goethite + martite ± maghemite are common proximal to fault zones.

6.3.5.3 Subunit 1-6

Modeled as LC_16, the 1-6 ranges between 25 ft and 45 ft in thickness and is highly magnetic. It has thick, wavy beds of cherty-silicate taconite. Magnetite laminated with minor ferruginous mudstone and hematite forms gray-black slaty bands up to three inches thick. Intervals of granular chert-grain arenite and/or coarsely crystalline green silicates are two to six inches thick and contain minor magnetite disseminations, which become moderately abundant in the bottom five feet of the unit. Minor magnetite patches are scattered throughout the massive cherty beds. Slaty bands are typically goethite rich where oxidized. Cross-stratification is observed locally in the field.

6.3.5.4 Subunit 1-5

Modeled as LC_15, subunit 1-5 ranges between 45 ft and 85 ft in thickness and is highly magnetic. The unit is a coarse-grained, massive to bedded ferruginous arenite (granular cherty taconite) with minor, wavy to planar bands of magnetite and ferruginous mudstone. Massive cherty layers up to 12 in. thick contain abundant disseminations of coarse-grained, granular magnetite and white or green chert/silicate mineral granules, resulting in a distinctive "salt-and-pepper" texture. The upper eight feet to 15 ft are massive to bedded, with abundant thin (<0.2 in.), slaty magnetite curls, wisps, or diffusions and very few slaty bands. The lower 35 ft to 70 ft contains moderately abundant wavy bands of magnetite laminated with gray, ferruginous mudstone up to one inch thick. Minor patches of magnetite are present in the wide cherty zones. Scattered magnetite-bearing, layer-parallel stylolites up to 0.05 in. wide are also common. Enigmatic, channel-like or lensoidal bodies of lean to magnetite-barren, pale-green silicate taconite occur predominantly in subunit 1-5 and are located near the southern and eastern margins of the Property.

6.3.5.5 Subunit 1-4

Modeled as LC_14, subunit 1-4 ranges between 9 ft and 11 ft in thickness and is a moderately magnetic, thin-bedded, cherty and slaty taconite that has wavy to even bedding. This is a transitional sequence between subunits 1-5 and 1-3. It is described as having gray slaty bands up to three inches thick, composed of interlaminated ferruginous mudstone, magnetite, and rare hematite (slaty-silicate taconite) that break into distinctive "poker chips." These are separated by granular cherty beds up to four inches thick, which contain scattered mottles of coarse-grained, granular magnetite and white silicate minerals. Slaty bands increase with depth. Oxidation is uncommon but occurs as one- to two-inch orange bands in the cherty beds.

6.3.5.6 Subunit 1-3

Modeled as LC_13, subunit 1-3 ranges from 18 ft to 25 ft thick and is a moderately magnetic, planar-bedded, cherty and slaty taconite. Within the subunit, fissile, gray slaty bands are composed of interlaminated ferruginous mudstone, minor hematite, and magnetite (slaty-silicate taconite) up to 10 in. thick. These are separated by variably coarse-grained, granular cherty-silicate mineral beds up to five inches thick, which contain patchy diffusions or mottles of granular magnetite, mostly white silicate minerals, and characteristic bright red jasper bands or mottles up to 1.5 in. wide. Bedding-parallel quartz + chlorite ± calcite veins up to one inch wide are common and typically exhibit well-developed slickensides or slickensteps on vein margins. Slaty bands increase with depth. Oxidation is uncommon, but typically occurs as one- to two-inch orange bands in the cherty beds. Pit bottom is in Unit 1-3 and five feet above the subunit 8-3 contact.

6.3.5.7 Subunit 8-3

Modeled as LC_83, subunit 8-3 ranges from less than two feet up to 25 ft in thickness. It is a slightly magnetic, planar-bedded slaty taconite. Fissile, thinly interlaminated ferruginous shale, hematite, minor fine-grained siltstone and local minor magnetite form distinctive red-green bands of slaty-silicate ± carbonate taconite up to 15 in. thick. Minor beds of ferruginous arenite and lesser intraformational conglomerate (granular cherty-silicate taconite) contain slight disseminations or fragments of magnetite and some hematite. An 18 in. to 30 in. cherty-silicate taconite interval is commonly located five to seven feet below the upper contact in the central portion of the Property. Bedding-parallel quartz + chlorite ± calcite veins up to one inch occur in the slaty bands and typically exhibit slickensides or slickensteps on vein margins. Rarely oxidized, the unit has a "painty" hematite + goethite assemblage near faults. Subunit 8-3 pinches out towards the west of the Property and is chertier.

6.3.5.8 Subunit 1-2

Modeled as LC_12, subunit 1-2 ranges from 18 ft to 25 ft thick. It is moderately to slightly magnetic, very coarse grained, and composed of massive to bedded ferruginous arenite and local intraformational conglomerate (granular cherty-silicate ± carbonate taconite). It is similar in appearance to the upper portion of subunit 1-5. Subunit 1-2 has massive cherty zones up to 12 in. thick that contain coarse-grained disseminations or diffusions of hematite and/or magnetite. The proportion of hematite increases with depth, and core may have a light reddish-gray tint. Minor tan or white mottles of carbonate minerals occur locally. Very minor slaty bands, less than one inch thick, are composed of ferruginous mudstone laminated with hematite and/or magnetite and are scattered throughout the subunit. The upper two to four feet are typically conglomeratic, with angular to rounded fragments of silicate minerals, hematite, or magnetite.

6.3.5.9 Subunit 1-0

Modeled as LC_10, subunit 1-0 ranges from 18 ft to 25 ft thick and is non-magnetic, oxidized, and is referred to as the "Red Basal" unit. In this subunit, red slaty bands from one to two inches thick are composed of mostly shaly hematite. The bands are separated by three- to five-inch beds of slightly pitted, fine-grained ferruginous arenite (cherty-silicate taconite) that contain abundant hematite speckles. A red and white jasper algal conglomerate up to 36 in. thick occurs at the base of subunit 1-0. Drill core is commonly decomposed, with a heavy secondary hematite stain.

In the Mine area, the four members of the Biwabik IF comprise a total thickness of approximately 580 ft.Average thicknesses of the four members of this formation are shown in Table 6-1.

Table 6-1: Relative Thickness of the Four Members of the Biwabik Iron Formation
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Member	Thickness (ft)
Upper Slaty	70+
Upper Cherty – 4 subunits	205-265
Lower Slaty	20-55
Lower Cherty – 9 subunits	175-298

6.3.6 Pokegama Quartzite (0-0)

Drilling in the Pokegama Formation intersects fine-bedded, light-green to pink quartzite or quartz arenite with (locally) interbedded arkosic conglomerate, quartz wacke, and quartz-rich siltstone and shale. Cross-beds are noted in scattered outcrops north of HibTac. Basal conglomerate channels of varying thickness contain pebble- to boulder-sized fragments of Late Archean basement rock. No drill holes on HibTac fully intersect the Pokegama Formation. Stratigraphic thickness of approximately 200 ft is projected down the basal contact north of Kleffman road.

6.4 Mineralization

Mineralization consists predominantly of a primary assemblage of magnetite in a matrix of chert, iron silicate (talc, stilpnomelane), and carbonate (ankerite) formed by low-temperature diagenesis. Supergene weathering and oxidation has locally altered this primary assemblage to hematite, goethite, and chert, generally increasing in intensity with proximity to isolated occurrences of Cretaceous Coleraine Formation south of the Mine and faults or fracture zones. Partial or complete oxidation of magnetite to hematite precludes recovery by magnetic separation, resulting in local degradation of potential ore intervals to waste rock.

The mineral of economic interest at HibTac is magnetite, bound in rock referred to as taconite. The recoverable magnetic iron (MagFe) in ore generally ranges from 13% to 30%. Quartz, carbonates, and iron silicates are the common gangue minerals. The deposit is layered and consistent. HibTac targets the Lower Cherty member as the primary mineralized zone, in particular subunits 1-7 through 1-3, as shown below in Table 6-2.

Table 6-2: Relative Thicknesses and Magnetic Iron Content of Subunits of the Lower Cherty Member of the Biwabik Iron Formation
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Subunits of Lower Cherty Member	Thickness (ft)	Average Magnetic Iron Content
1-8	25-32	
1-7	15-25	18% Magnetic Fe
1-6	25-45	20% Magnetic Fe
1-5	45-85	20% Magnetic Fe
1-4	9-11	17% Magnetic Fe
1-3	18-25	15% Magnetic Fe
8-3	0-25	
1-2	18-25	
1-0	18-25	

6.5 Deposit Types

6.5.1 Mineral Deposit

The HibTac iron ore deposit is a classic example of a BIF deposit of the Lake Superior type. Lake Superior-type BIFs occur globally and are exclusively Precambrian in age, deposited from approximately 2,400 Ma to 1,800 Ma. Although the genesis of iron formations has been debated over the years, it is certain that they were deposited more or less contemporaneously and in similar marine depositional environments. Some of the most prolific iron districts in the world are hosted in these rocks, such as those found in the Pilbara district of Australia and the Animikie Group of Minnesota.Theories as to their formation center on the hypothesis that at stages in the Earth's history, the oceans were acidic and contained tremendous amounts of dissolved iron. The conventional explanation for the majority of these deposits is that oxygen-producing life forms such as stromatolites, found fossilized in BIFs, began to produce sufficient oxygen to oxidize the sulfide or free ion forms of iron within seawater. The iron content in seawater rose and fell for over a billion years, and the last of the Precambrian BIFs is thought to have been deposited around 1800 Ma (Guilbert and Park, 1986).

While there are some remaining high-grade iron deposits in the area, the majority of the iron ore is regionally referred to as taconite. Taconite is a type of BIF that is characterized as an iron-bearing sedimentary rock with greater than 15% Fe, where the iron minerals are interbedded with silicates or carbonates. Iron content ($FeO+Fe_2O_3$) in taconites is generally 25% to 30%. Higher-grade DSO ores are believed to have formed from the leaching and dissolution of silica found in the taconites, resulting in smaller zones that can contain greater than 60% iron (Morey, 1999). These high-grade deposits are predominantly related to the high-angle, steeply dipping faults common along the Mesabi Iron Range.

Geological classification of BIFs is made on the basis of mineralogy, tectonic setting, and depositional environment. The original facies concept provided for oxide-, silicate-, and carbonate-dominant iron formations that were thought to relate to the environment of deposition (James, 1954), as follows:

- Oxide-rich BIF typically consists of alternating bands of hematite [$Fe_2^{3+}O_3$] with or without magnetite [$Fe^{2+}Fe_2^{3+}O_4$]. Where the iron oxide is dominantly magnetite, siderite [$Fe^{2+}CO_3$] and iron silicate are usually also present.
- Silicate-rich BIF is usually dominated by the minerals greenalite, minnesotaite, and stilpnomelane.Greenalite [$(Fe^{2+}, Mg)_6Si_4O_{10}(OH)_8$] and minnesotaite [$(Fe^{2+}, Mg)_3Si_4O_{10}(OH)_2$] are ferrous analogues of antigorite and talc respectively, while stilpnomelane [$K_{0.6}$ (Mg, Fe2+, Fe3+)$_6Si_8Al(O, OH)_{27}\cdot 2\text{-}4H_2O$] is a complex phyllosilicate.
- Carbonate-rich BIF is usually dominated by the minerals ankerite [$Ca\ Fe^{2+}(CO_3)_2$] and siderite, both of which display highly variable compositions. Similar proportions of chert and ankerite (and/or siderite) are typically expressed as thinly bedded or laminated alternating layers (James, 1966).

These classification schemes commonly overlap within Lake Superior-type deposits, defying classification by this method.Almost all of the minerals described in the three classifications can be found in many of the deposits of the Mesabi Iron Range.Lake Superior-type deposits are generally classified based on their size and depositional environments (Guilbert and Park, 1986). These deposits are typically large and are associated with other sedimentary rocks. Deposition of the Lake Superior-type deposits occurred in shallow marine conditions, with transgressive sequences commonly observed in the regional stratigraphy (Simonson and Hassler, 1996). It is common to observe shallow-marine bedforms and sedimentary depositional textures in these deposits.

7.0 EXPLORATION

Exploration for magnetic iron-formation resources at HibTac has relied predominantly on diamond core drilling (DD) and Liberation or Davis Tube (DT) analyses of recoverable magnetic concentrate for over four decades. Most exploration work by Cliffs has been and continues to be near-mine diamond core drilling conducted using a 400 ft x 400 ft grid. Limited ground magnetic surveying has been used locally in the past to define oxidized zones.

7.1 Drilling

7.1.1 Type and Extent

DD is the principal method of exploration utilized at HibTac. A combination of historical and current DD core drilled by Cliffs and its predecessors is used in mine planning. Initial diamond drilling in the 1940s by Pickands Mather (Erie Mining Company) identified the potential for a magnetic iron formation-hosted iron resource. HibTac resource delineation drilling took place from 1967 to 1969, totaling 7,342 ft of drilling in 38 holes. In 1974, Hibbing Taconite commenced a program of systematic infill and step-out drilling; exploration has proceeded in conjunction with these development drilling activities. Between 1974 and 2019, Hibbing Taconite completed a total of 351,566 ft of drilling in 1,808 drill holes. Additional stratigraphic and assay data from beyond the limits of Hibbing Taconite drilling has been obtained through public records or exchange with other mining companies.

Exploration holes at HibTac are used to determine lithology, crude MagFe content, weight recovery, relative grinding power and grind size required to achieve silica targets, and concentrate SiO_2 content, and identify any offsetting or oxidized structures within the deposit and/or surrounding rock. These lead to factors for determining economic viability based on stripping ratio, cut-off grade, and ability for the plant site to process the ore. Exploration also helps identify areas that will need to be avoided or mined around due to geological or structural anomalies.

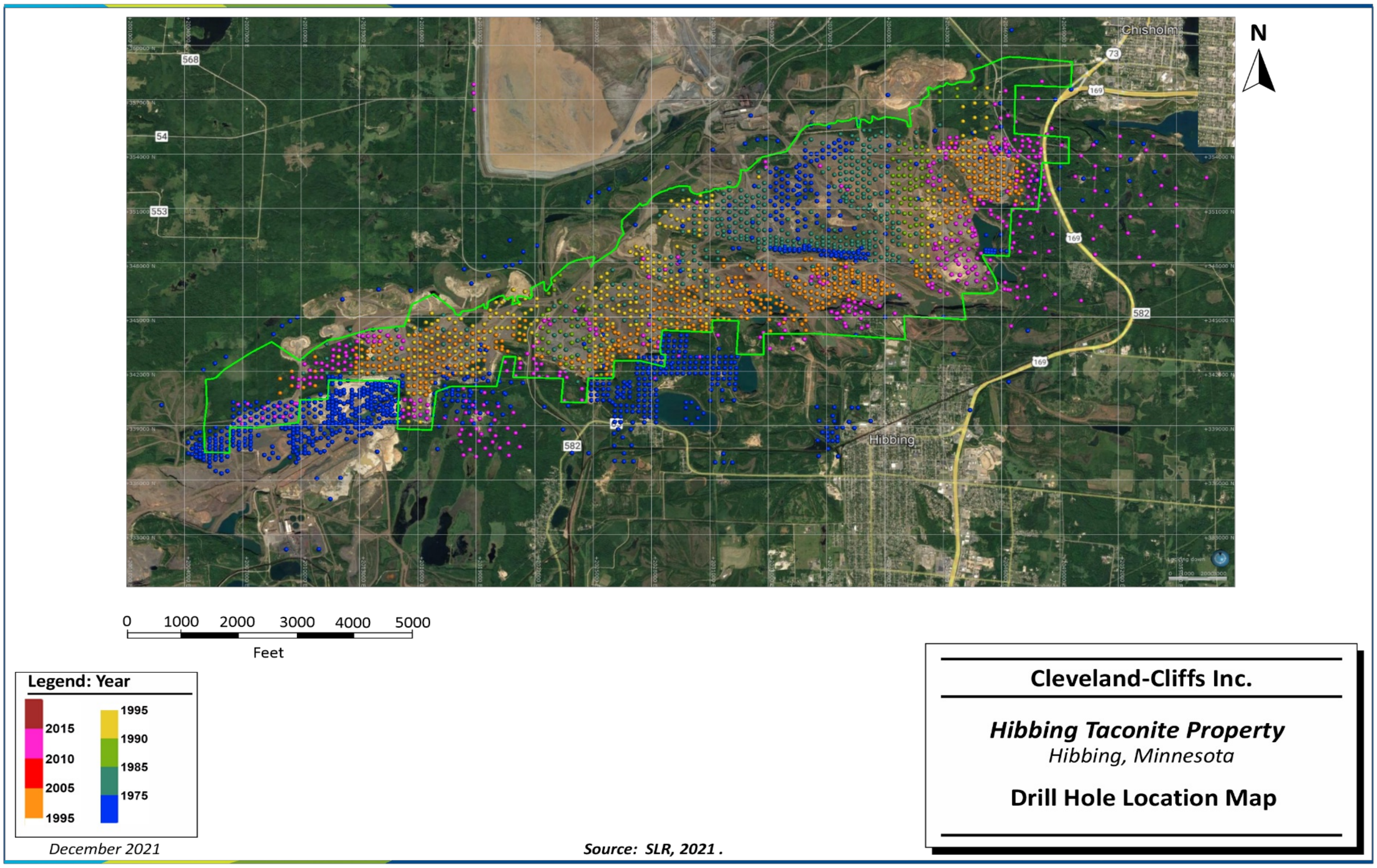
HibTac is a mature mine property that has been extensively drilled to the limits of the current mineral tenement. The last significant drilling outside the current Permit to Mine limits occurred in 2014. Drilling within the Permit to Mine limits during the period 2015-2019 has focused on definition and infill drilling of material included in the current life of mine (LOM) plan. Additional exploration and delineation drilling is contingent on acquisition of additional mineral leases.

No drilling has been conducted since Cliffs resumed management of Hibbing Taconite in December 2020.

As of the effective date of this TRS, Cliffs and its predecessors have compiled a drill hole database containing lithologic, geotechnical, and assay records for 3,665 diamond core and cuttings holes totaling 620,670 ft (Table 7-1 and Figure 7-1), of which 1,857 drill holes totaling 269,104 ft consist of DD holes drilled by Pickands Mather between 1942 and 1973, and DD and non-core holes drilled by predecessor and competitor companies within the limits of the Property and on adjacent parcels. Most of these 1,857 holes contain limited lithologic or assay data and are not used to directly support Mineral Resource estimation.

Table 7-1: Summary of Drilling Database
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Company	No. Holes	Footage	Core	Cuttings	Period
Hibbing Taconite Company	1,808	351,566	x		1974-2019
Oliver Iron Mining Company	926	103,369		x	
National Steel Pellet Company	270	52,023	x		
Mahoning Ore & Steel Company	479	48,747		x	1895-1955
U.S. Steel Corporation	79	37,750	x		
Pickands, Mather & Co.	61	11,638	x		1947-1973
Hanna Ore Mining Co.	27	10,046		x	
Crete Mining Co.	12	4,336		x	
Burrall Reserve	1	791	x		
Donner Mining Co.	2	404			
	3,665	**620,670**			



Source: SLR, 2021 .

Figure 7-1: Drill Hole Location Map

7.1.2. Procedures

7.1.2.1 Collar Coordinates and Surveying

Drill collars are planned using Maptek's Vulcan™ (Vulcan) software. Currently, the location of the drill hole is set by the geologist, with collars marked and surveyed using global positioning system (GPS). Drill hole locations are staked in the field and marked with a lath of unique properties and color to distinguish it from other posts or markers in the pit or surrounding area. Identifying marks (in permanent marker) indicate the hole number.

DD collar locations are recorded on the original drill logs created at the time of drilling, including easting and northing coordinates in local grid (modified Minnesota State Plane, NAD 27 datum) and elevation of collar in feet above sea level National Geodetic Datum of 1929 (NGVD29).

The collar of each completed drill hole is surveyed by Hibbing Taconite's contracted surveyor. The collar coordinates (XYZ – preferably Minnesota State Plane Coordinates) are verified by the project geologist. Final survey data are validated in the office by the project geologist and incorporated into the digital acQuire drill hole database.

Surveying methods have evolved over the years with advancements in technology, moving from optical methods to electronic distance measurement and to GPS, which is currently in use. SLR is of the opinion that, for the deposit type, all survey methods used for the collar locations would be expected to provide adequate accuracy for the drill hole locations. All drilling follows applicable Minnesota Department of Health (MDH) and MDNR regulations and requirements.

Due to the relatively shallow depth and vertical nature of most drill holes, downhole deviation survey are not typically conducted; however fourteen drill holes in the database that were drilled at an angle did receive a downhole deviation survey with a non-magnetic reflex gyro and were found to have minimal deviation. Drill holes pierce the generally flat lying Biwabik IF at near perpendicular angles.

7.1.2.2 Drill Site Reclamation

For exploratory borings outside the Permit to Mine, HibTac follows all applicable regulations concerning MDH and U.S. Environmental Protection Agency (EPA) regulations including: notification, drilling, abandonment, Storm Water Pollutant Prevention Plan (SWPPP) inspections, and site reclamation. As necessary, sites are re-graded and topsoil is replaced. Sites are re-seeded with an approved State of Minnesota reclamation mix when required.

7.1.2.3 Drill Core Sample Collection

All drilling follows MDH and MDNR regulations and requirements.

During drilling, core samples are boxed with depths marked in feet using wooden run blocks. The core is transported from the drill site by the mine geologist or by the drilling company and taken to an onsite core logging facility. The mine geologist confirms procedures for packaging and handling of core in the boxes, such as the inclusion of footage markers at the end of core runs and labeling core boxes with sequential numbering and footage of core included in the box.

Drilling footages are verified visually, as taconite is a very competent rock. Core recovery is generally very good. Core is sometimes lost in zones of intense oxidation, which is very rare in potential ore but common in waste rock.

7.1.2.4 Drill Core Logging

Logging includes rock types (lithologic member and subunit), magnetic characteristics, taconite type, degree of oxidation, mineralogy, textures, alteration, structural information, and a general geologic description. Boundaries of geological subunits are often gradational (e.g., more slaty than cherty versus more cherty than slaty, thin beds becoming more prevalent than thick beds) and may not provide a sharp geologic contact. As magnetite is the primary mineral of interest, a hand magnet is utilized during core logging and indicates relative magnetic iron content of a sample interval prior to assaying (e.g., slight, moderate, strong). Geotechnical core measurement includes core recovery and rock quality designation (RQD).

Core logging and photography is performed by geologic zones, which are separated by visual and physical characteristics, including relative magnetism, to determine subunit lithology. Drilling footages are verified visually by the mine engineer/geologist. Core was not photographed prior to 2003.

Logging records are entered into Microsoft (MS) Excel spreadsheets or manually on paper logs prior to import into an acQuire database and stored digitally onsite. Prior to 2014, MS Access was used for the database, and logs were uploaded from an MS Excel templateThe logging records are sent with the samples to the laboratory, and hard copies of most of HibTac's drill logs are stored on site.

Drilling footages are verified visually, as taconite is a very competent rock. Core recovery is generally very good. The drill core data is stored digitally by drill hole ID.

7.1.2.5 Drill Core Sampling

In ore zones, samples for the laboratory are prepared in approximately 10 ft lengths but can range from five feet to 15 ft when intervals do not break evenly or within a defined geological unit. Core is split with a hydraulic splitter or rock saw. Samples are tagged and bagged for delivery to the contracted analytical laboratory. Sample tags reflect the operation, hole number, and from/to sample interval, with tags placed inside the sample bag and a second tag on the outside of the bag. Preserved half core is stored in original core boxes while the other half follows the normal assaying procedure. Half core, typically conserved for state-leased lands and property outside the mine operations area, is retained for future use. For holes internal to the mine operations area, whole core is sampled.

Drill core logging and sample interval selection are performed by the mine geologist. Digital core logs are stored on a common server. Digital assay information is stored in original MS Excel files delivered by the laboratory as well as in an acQuire drill hole database.Save samples are stored in core storage buildings leased from Cliffs by the contracted laboratory. Type drilling and sampling information is summarized in Table 7-2.

Table 7-2: Core vs. RC Drilling Summary
Cleveland-Cliffs Inc. – Hibbing Taconite Property

	Diamond Drilling	RC Drilling	Total Drilling
No. of Holes Drilled	2,219	1,444	3,663
Footage Drilled	453,768	166,498	620,266

7.1.2.6 Sample Storage and Data Security

Drill core is transported directly from the drill rig to the core logging facility at HibTac by either the drilling contractor or Cliffs' personnel. Core storage for unlogged and unsampled core is located at the HibTac logging facility.

Whole core is placed in labeled bags for submission to the assay laboratory. Some archived drill core or coarse reject is consumed during re-assaying programs conducted sporadically for specific local areas of the Mine.

Core samples are currently prepared and analyzed at the independently owned Lerch Brothers Inc. (Lerch) facilities in Hibbing, Minnesota, where they are transported by HibTac operations personnel or the laboratory. Lerch is accredited with ASQ/ANSI ISO-9001:2015 for its system of quality management. Each shipment of core samples is accompanied by a sample sheet with dispatch number recording all the sample information and required analyses. The data are stored digitally on HibTac's shared servers. Unused sample materials are saved and stored in barrels at Lerch's facilities in Hibbing, Minnesota.

Digital copies of drill core analyses received from Lerch are stored in a backed-up network drive with restricted permissions, as well as within an acQuire database, which retains daily, weekly, monthly, and yearly backups.

Electronic storage of an as-drilled collar location file for each annual drilling program is accomplished using the database management system acQuire. A hard copy printout of the collar file with other documents relevant to the drill holes is stored in file cabinets at the HibTac Mine Geology office.

It is the QP's opinion that there are no known drilling, sampling, or recovery factors that could materially affect the accuracy and reliability of the results and that the results are suitable for use in the Mineral Resource estimation.

7.2 Hydrogeology and Geotechnical Data

Refer to Section 13.2 Pit Geotechnical and Section 15.4 Tailings Disposal for this information.

8.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

Lerch, which leases Cleveland-Cliffs' Hibbing Research laboratory facilities and equipment, provides contract analytical services that include all diamond drill core processing and analyses for HibTac. Lerch is accredited with ASQ/ANSI ISO-9001:2015 for its system of quality management. Core processing flowsheets, test procedures, and quality control procedures required for Lerch's ISO accreditation are used for HibTac drill core.

Only DD exploration holes are used for assaying and used in resources modeling. Magnetic susceptibility probing of blast holes is used to check ore contacts as well as confirm expected magnetic iron grade during production. Reconciliations between actual production and modeled production provide insight into the accuracy of the modeled assay data versus actual production.

8.1 Sample Preparation and Analysis

Sampling of iron formation is performed to evaluate the magnetite-bearing taconite ore potential and characterize the metallurgical properties of the material. Therefore, conventional whole rock elemental assaying approaches utilized in evaluating most metallic ore deposits are eschewed in favor of methods designed to qualify and characterize recoverable magnetic concentrate.

8.1.1 Sample Preparation

The core is stage-crushed to 100% passing ¼ in. in size; initially crushed to minus one inch with a jaw crusher, then further reduced to -0.5 in. with a jaw crusher, and finally reduced to -$^{1}/_{4}$ in. in a roll crusher.

The sample is split into the following parts:

- Standard Davis Tube test and x-ray fluorescence (XRF) analysis: 40 g
- Liberation Index Study (LIS): 1,500 g
- Fee holder sample split: 500 g
- -10 mesh sample: 1,200 g are crushed to -10 mesh
- Excess sample: 2,000 g of excess crushed to -$^{1}/_{4}$ in.

8.1.2 Sample Analysis

The Davis Tube method and Saturation Magnetization Analyzer (Satmagan) are used to determine the crude MagFe percent, percent weight recovery (% wtrec), and concentrate silica in samples.

8.1.2.1 -200 Mesh Davis Magnetic Tube Separation Test

Iron formation samples interpreted by the logging geologist to have magnetic iron contents below 10%, or concentrate silica contents significantly above 10%, are assayed using the single-sample DT assay method per Lerch Laboratory Procedures (LLP). The DT method provides the same primary data as the LIS method (described below) at a greatly reduced cost. The single sample analysis does not provide the ability to target a specific grind and therefore has the potential to have more variation in the results than would be expected from the LIS method. The potential variation of the DT method limits the use of this testing method to only samples expected to be below economic cut-off grades.

The samples are initially reduced using stage crushing with jaw and rolls crushers to $^1/_4$ in. (LLP-60-02, LLP-60-03, LLP-60-04).From a working sample of 800 g, a 50 g sample is split out for further size reduction (LLP-60-05). Using a pulverizer, the 50 g subsample is ground to 100% passing 20 mesh (LLP-60-07). Using a buckboard and muller (LLP-60-10), the subsample is processed to 100% passing 200 mesh.Subsamples are split from the 100% passing 200 mesh sample for Satmagan MagFe analysis (LLP-60-12) and crude ore total soluble iron assay (LLP-30-02)A 15 g (0.529 oz) split is measured and utilized for the DT magnetic separation (LLP-60-11).Each DT concentrate is weighed, and total iron (LLP-30-02) and silica (LLP-30-05) assays are performed. Weight recovery is calculated as the ratio of recovered DT concentrate to DT head sample weight.

Sample preparation requires using a buckboard and muller to grind the sample to 100% -200 mesh. The buckboard is a cast iron plate with three steel sides and a smooth upper surface. It measures 18 in. by 24 in. The buckboard and muller pulverization method is used to reduce small amounts of -20 mesh material to -200 mesh under controlled conditions. The sample to be pulverized is poured on a 200 mesh screen, and oversize material is placed on the buckboard. The muller is passed over the sample 15 times, and the ground material is screened on the 200 mesh screen. Material that is +200 mesh is returned to the buckboard and the process is repeated until the entire sample is ground to -200 mesh. The buckboard and muller grinding method provides a more consistent particle size distribution than a pulverizer and requires less time than grinding mills. Figure 8-1 presents the HibTac DT drill core procedure.

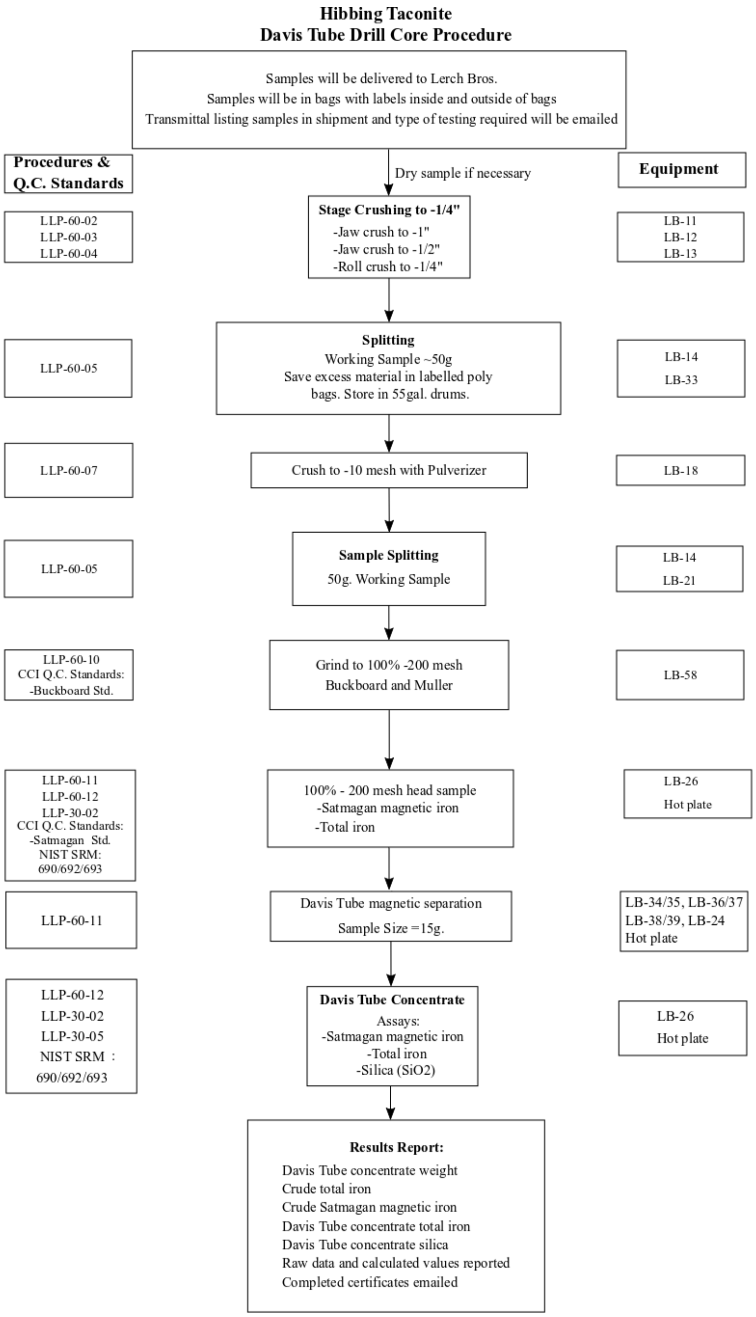


Figure 8-1: Davis Tube Drill Core Procedure

Davis Tube analysis involves a ground sample suspended in water being moved back and forth along the length of the tube while a magnet is positioned in a mid-point in the tube. The magnetic material in the sample clings to the side of the tube where the magnet is positioned. This magnetic material is then collected and weighed to determine % wtrec (as compared to the initial weight of the sample which enters this process). After weighing, the concentrate material is assayed for silica and iron by wet chemistry (see below).

Procedure LLP-60-11 is followed for recovering magnetic iron using the Davis Tube (Eriez Model EDT with a 1.5 in. inner diameter).The magnet is electric and is set at 100% strength with 115 V DC.A 15 g (0.359 oz) sample (100% passing 200 mesh) is put through the Davis Tube magnetic separator. Wash water of 19 psig is used for testing. The water flow is verified prior to each use. After the sample is run in the Davis Tube, the sample is dried and demagnetized. A weight is taken of the Davis Tube retained sample; the concentrate is tested for:

- Weight of magnetic fraction recovered in the tube
- Satmagan MagFe
- Total Fe
- Silica

Separated products of the test include tails and the tube concentrate. The excess head material is analyzed with Satmagan for magnetic iron (described below in section 8.1.2.3).

The DT tails are usually discarded but can be saved for future testing upon request.

8.1.2.2 Liberation Index Test

Potential crude ore grade samples are prepared according to LLP for LIS.Crude ore samples are initially reduced using stage crushing with jaw and roller crushers to -¼ in., with further crushing to -10 mesh using a gyratory crusher and buckboard and muller (LLP-60-02, LLP-60-03, and LLP-60-04).A subsample of approximately 1,000 g (2.2 lb) is collected (LLP-60-05) and further reduced to -20 mesh (LLP-60-06). Then it is screened through a 325 mesh screen, the oversize and undersize fraction weights are recorded, and the sample is recombined (LLP-60-08).

After the sample is recombined, and following LLP-60-09, three 200 g (0.44 lb) subsamples are split from the sample. The individual 200 g subsamples are charged separately into 4 in. x 6 in. grinding ball mills along with 100 mL (0.0264 gal) of water, 77 - ¾ in. balls (2,300 g to 2,450 g, 5 lb to 5.4 lb), and 117 - ½ in. balls (1,100 g to 1,160 g, 2.4 lb to 2.6 lb). The three subsamples are ground for six minutes, 10 minutes, and 14 minutes at 96 rpm. After the end of each timed grind, the mill charge is screened through a 10 mesh screen to recover the grinding balls.

Each ground subsample is wet screened through a 325 mesh screen, dried, and weighed to determine the percent passing 325 mesh. Subsamples are split from the 10 minute grind for Satmagan magnetite determination (LLP-60-12) (LLP-30-02) and a crude ore total soluble iron assay (LLP-30-02).A 15 g (0.359 oz) split is obtained from each subsample for DT magnetic testing (LLP-60-11). Each DT concentrate is reduced to 100% passing -200 mesh, weighed, and iron (LLP-30-02) and silica (LLP-30-05) assays are obtained.Weight recovery is calculated as the ratio of recovered DT concentrate to DT head sample weight.

The DT concentrate silica is established for each timed grind. Then, for each principal assay parameter (wtrec, DT concentrate iron, kWh/LT, and % -325 mesh), a grind-grade, power-grade, or recovery-grade relationship is plotted (as naturally (x) vs. DT concentrate silica). A linear regression is calculated for the three data points, and the grade, grind, or power value corresponding to target 3.45% concentrate silica is determined; this is the value included in the assay database. DT magnetic iron is calculated as the product of the percent weight recovery and percent concentrate iron at 3.45% target concentrate silica. The plant target concentrate silica of 4.15% is empirically determined to be equivalent to 3.45% target concentrate silica from the Davis Tube.

Experience at HibTac in utilizing the Liberation Index data has proven its superior capabilities for ore grading purposes over the standard -200 mesh data. However, additional, hypothetical -200 mesh DT parameters of weight recovery and concentrate silica are modeled from the Liberation Index data, in order to maintain a consistent historical record for the -200 mesh data set, especially for mine planning purposes.

Silica and weight recovery at HibTac are projected from the LIS test as if they were from a -200 mesh DT, assuming that 100% passing -200 mesh reflects (on average) a narrow range of passing %-325 mesh, based on 3,600 like samples. Then silica has an empirical adjustment added to it (approximately 2% depending on the geologic unit) for an “adjusted silica” to be used in ore grading and resource estimation.

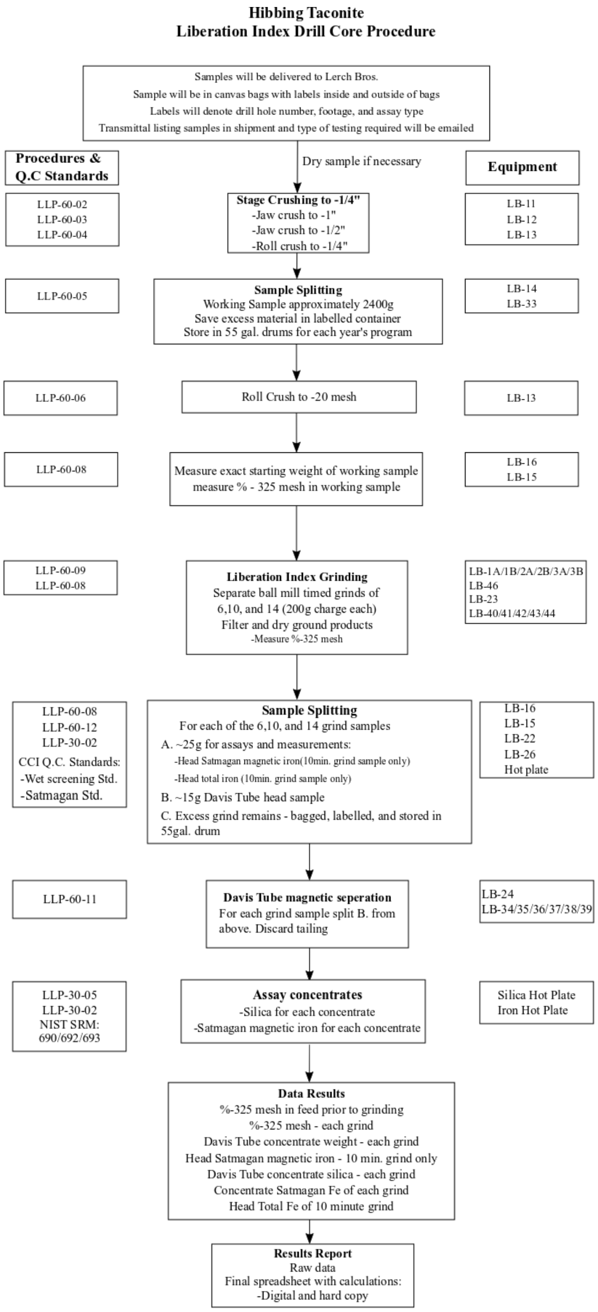


Figure 8-2: Liberation Index Testing Procedures

8.1.2.3 Satmagan Magnetic Iron Determination

A direct measure of the magnetic iron in crude ore is carried out with a Saturation Magnetization Analyzer (Satmagan), which measures the total magnetic force acting on a sample to a precision of 0.1%. Satmagan analysis involves a ground sample being placed into a Satmagan machine, which is used to measure the magnetic field of the sample, which is then reported as a percent MagFe in the sample.

The Satmagan is a magnetic balance in which the sample is weighed gravitationally and in a magnetic field. The ratio of the two weights is linearly proportional to the amount of magnetic material in the magnetically saturated sample.

Per Lerch procedure LLP-60-11, a minimum of two grams of sample ground to 100% -200 mesh is needed for Satmagan analysis.Any oversize material is further processed with a mortar and pestle, and the sample to be tested is placed in a plastic testing container. Per LLP-60-12, the prepared sample is demagnetized using the demagnetization coil (demag coil). While the demag coil is on, the sample is moved into and out of the magnetic field until the sample is demagnetized. A blank sample is run on the Satmagan on a daily basis to ensure the device is zeroed.The sample is placed on the magnetic balance and the strength of the magnetic field is noted.

The Satmagan calibration is verified daily by Lerch technicians using two HibTac magnetic iron standards with a known magnetic iron content to ensure the machine is operating within specifications. The machine is re-calibrated every six months, or as necessary, using 17 HibTac standards. The labeled standards have a known weight percent magnetic iron, and each of the 17 standards are measured once. The results are plotted, and the equation used to calculate a calibration curve. The explanation of the calibration procedures is supplied in the user’s manual for the Satmagan instrument. If the results of verification standards are not within specifications, the Satmagan is re-calibrated.

8.1.2.4 Total Iron Determination Using Dichromate Titration

Total Iron (Titanium Trichloride) Titration is based on ASTM E246-10, Standard Test Method for Determination of Iron in Iron Ores and Related Materials by Dichromate Titrimetry; and Test Method – B - Iron by the Stannous Chloride Reduction Dichromate Titration Method (Modified).

Per procedure LLP-30-02, in the titrimetric method, iron oxide samples are digested in hydrochloric acid and reduced to Fe^{2+} by $SnCl_2$ in a nearly boiling solution. After cooling, Fe^{2+} is titrated with a potassium dichromate solution of known concentration. When all Fe^{2+} is consumed by potassium dichromate, violet color indicates the titration endpoint in the presence of the indicator sodium diphenylamine sulfonate. The percent total iron is a direct reading off the titrating solution burette. The value is corrected against percent total iron based on the analyses of three total iron standards analyzed each shift.

8.1.2.5 Hydrofluoric Acid Silica Determination

Silica values reported are based on American Society for Testing and Materials (ASTM) E247-96, Standard Test Method for Determination of Silica in Manganese Ores, Iron Ores, and Related Materials by Gravimetry.Per procedure LLP-30-05, samples are first partially digested in hydrochloric acid to dissolve the non-silica components of the sample. The sample is then filtered and rinsed with more hydrochloric acid. The rinsed sample is then treated with hydrofluoric acid and sulfuric acid to dissolve the silica and remove residual iron, aluminum, and titanium. The silica is desiccated to drive off water, and the weight is recorded.

8.1.2.6 Density

A water-immersion method has been used by Hibbing Taconite to determine the density of drill core samples in order to obtain density factors for each subunit. The procedure used by Hibbing Taconite weighs the entire core sample interval suspended from a spring scale in air and while immersed in water. The density of the sample is calculated with the difference of the submerged weight of the sample and the dry weight of the sample. The density is calculated using the dry weight divided by the difference in the dry and suspended weight:

*Density (sample) = density (water) * (dry weight) / (dry - immersed weight)*

A density study was performed at HibTac in 2004-2005, comprising more than 1,100 core samples from the deposit. Samples were typically full 10 ft run lengths. Tonnage factors (volume/mass), or the inverse of density, are used at HibTac because units are in feet and long tons. Results of the study indicate that tonnage factor is a function of the iron content of the rock, and that function is now used to assign density to the block model for the Biwabik IF. The tonnage factor of glacial overburden is set at 18.0 ft^3/LT, and the tonnage factor of stockpile material is set at 15.0 ft^3/LT.

Currently, density for the Biwabik units is calculated in the block model as a function of Satmagan MagFe (smgfe) and total crude iron (ciron) content. The equation is:

$$\text{Density (LT/ft}^3\text{)} = 1 / (13.05566 - (0.03179 * (\text{smgfe})) - (0.0420424 * (\text{ciron}))).$$

8.2 Quality Assurance and Quality Control

Quality assurance (QA) consists of evidence to demonstrate that the assay data has precision and accuracy within generally accepted limits for the sampling and analytical method(s) used in order to have confidence in a resource estimate. Quality control (QC) consists of procedures used to ensure that an adequate level of quality is maintained in the process of collecting, preparing, and assaying the exploration drilling samples. In general, QA/QC programs are designed to prevent or detect contamination and allow assaying (analytical), precision (repeatability), and accuracy to be quantified. In addition, a QA/QC program can disclose the overall sampling-assaying variability of the sampling method itself.

Hibbing Taconite does not yet have a formal procedure for exploration drill core QA/QC (see section 8.2.1 below). When Roscoe Postle Associates Inc. (RPA), now part of SLR, audited Mineral Resource documentation for other Cliffs operations in autumn 2019, RPA recommended there be a campaign QA/QC report for every DD program and formal documentation of QA/QC procedures.

8.2.1 QA/QC Procedure

There is no formal HibTac QA/QC procedure for drill core processing and analysis. For future campaign reports, a formalized procedure should be referenced in the campaign QA/QC report.

Prior to the 2010 drilling program, no standards, blanks, or duplicate samples were inserted into the stream of DD samples. Beginning with the 2010 drilling program, duplicate samples and standards were inserted into the sample stream. However, templates for QA/QC analysis of standards and duplicates were not created until 2015 (Orobona, 2015) and were not implemented in real time until 2017, for a portion of the 2015 DD program that was deferred pending implementation of controls on Satmagan instrument calibration and sample preparation, and tooling/testing of new LIS mills recommended in Orobona (2015). Active monitoring of quality assurance sample results only proceeded for a short time before AMUSA assumed management of the Mine, and the 2018-2019 DD program results were only reviewed upon resumption of Cliffs' management preceding this TRS.

8.2.2 Reference Materials (Standards)

A crude ore standard (HTCCOS) was prepared in 2009 from ore-grade material collected from the HibTac Mine A 10-tonne (metric ton of 2,204.6 lb) sample was crushed to -¼ in., homogenized, and then split into approximately 5 kg subsamples by the Coleraine Mineral Research Laboratory of the University of Minnesota. The standard is analyzed according to the current crude ore characterization procedure (using three timed grinds) and undergoes the same series of preparation, magnetic separation, and chemical assay steps that crude ore samples undergo. Use of this standard commenced in conjunction with assaying of drill core obtained during the 2010 HibTac drilling program.

8.2.2.1 Sample Preparation

For every standard tested at Lerch, a screen size analysis is run to ensure consistency in sample preparation to -20 mesh. Results are tabulated on a tracking spreadsheet and illustrated in Figure 8-3. The spreadsheet chart template used for analysis is not shared with Lerch.

Results of screen analyses are entirely within historical norms established during baseline testing conducted prior to the study period (red limits on Figure 8-3), and it is Cliffs' and SLR QP's opinion that the sample preparation process meet industry best practice. Due to the very consistent overall results illustrated in Figure 8-3, mean ($\bar{x}$) and moving range ($\overline{MR}$) control charts created for each individual %-passing and sieve-size range bin are not detailed in this TRS.

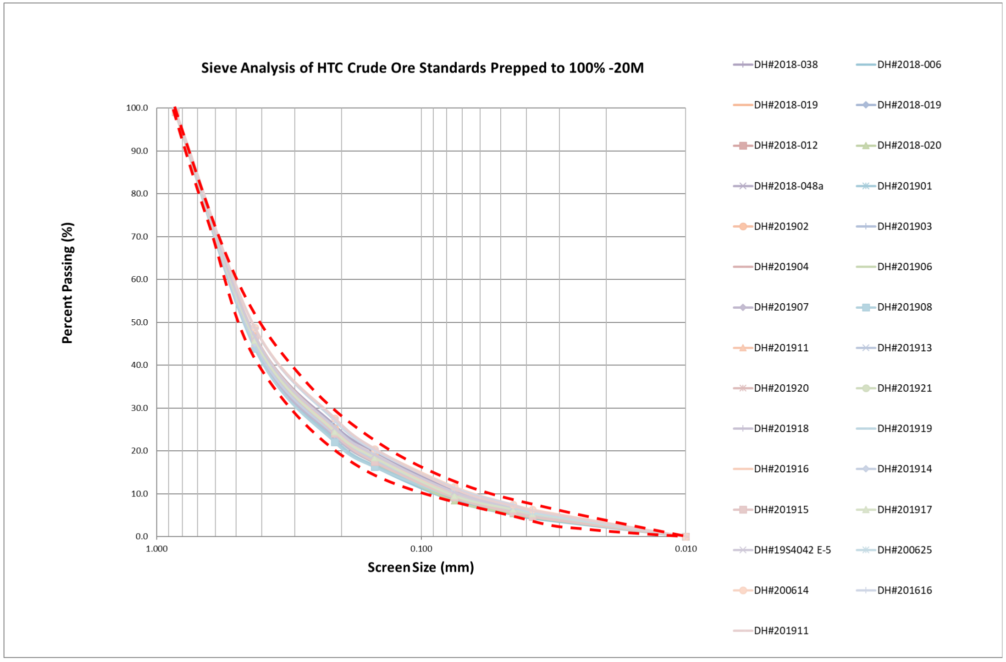


Figure 8-3: Sieve Analysis of HibTac Crude Ore Standards (HTCCOS) Prepared to 100% -20M

8.2.2.2 Liberation Index Study Analytical Test Work

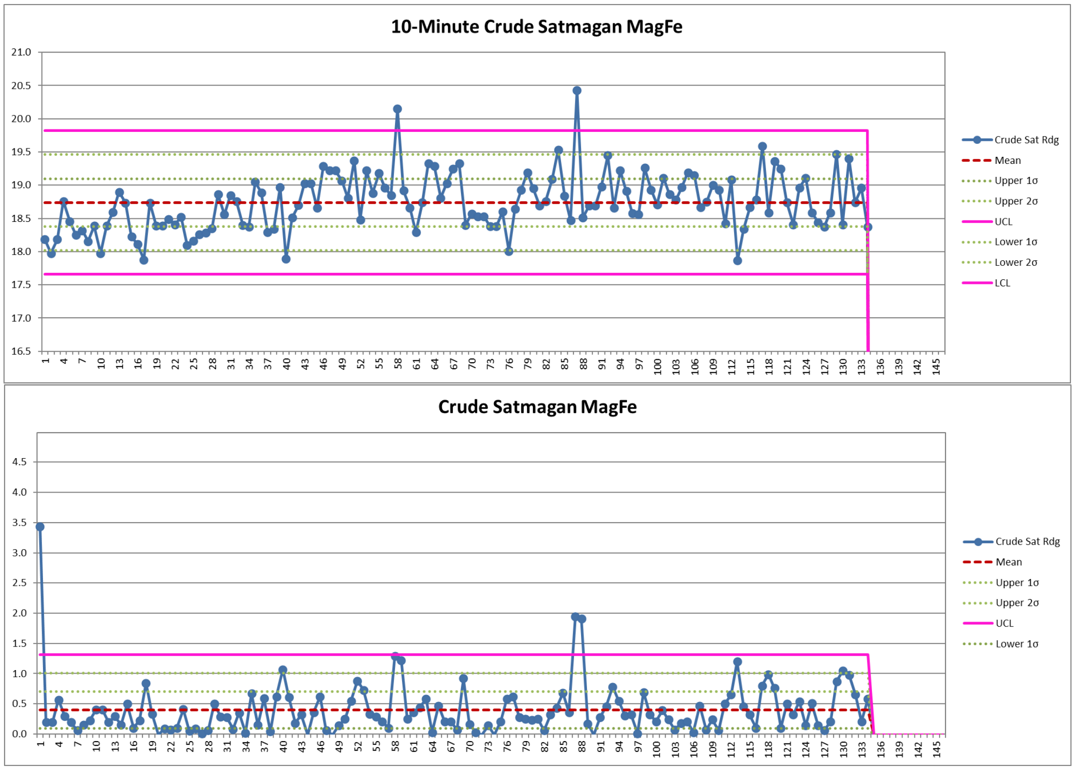
Available data include all standards analyzed since 2010. Following a period of standard sampling without QA/QC analysis from 2010 through 2015, statistical process control (SPC) charts for individuals $\bar{x}$ and $\overline{MR}$ were re-established in 2016 for all physical and chemical measurements and calculated variables from the LIS crude ore characterization protocol. Active monitoring of QA sample results only proceeded for a short time before AMUSA assumed management of the Hibbing JV, and the 2018-2019 DD program results were only reviewed upon resumption of Cliffs' management preceding this report. Therefore, there has only been a limited window of active monitoring and investigations of failures.

Data are currently tracked and charted on a spreadsheet stored on the CTG LAN.

Control limits are based on the common approach for Shewhart control charts. For "individuals", control limits are ± 2.66 * $\text{Mean}_{\text{moving range}}$. For the MR charts, control limits are 3.267 * $\text{Mean}_{\text{moving range}}$. In both cases, 1σ and 2σ are respectively one-third and two-thirds of the difference between the mean(s) and control limits. This approach is commonly used in statistical process control software and narrows control limits relative to three standard deviations (SD) from the mean of the data.

8.2.2.2.1 Crude Satmagan Magnetic Iron 2016-2019

Satmagan MagFe is measured on the 10-minute grind prior to DT concentration using the Satmagan instrument (Figure 8-4).There were two instances of points beyond the control limits during the study period. Ensuing data quickly returned to control, and the instances were not investigated. However, the incidence for standard sample HT0001325 is coincident with increased crude Fe, so the higher Satmagan Fe may be “real” and a function of variation in standard mixing/splitting. Historically, crude MagFe has been the single most important variable for reporting of Mineral Resources at HibTac.

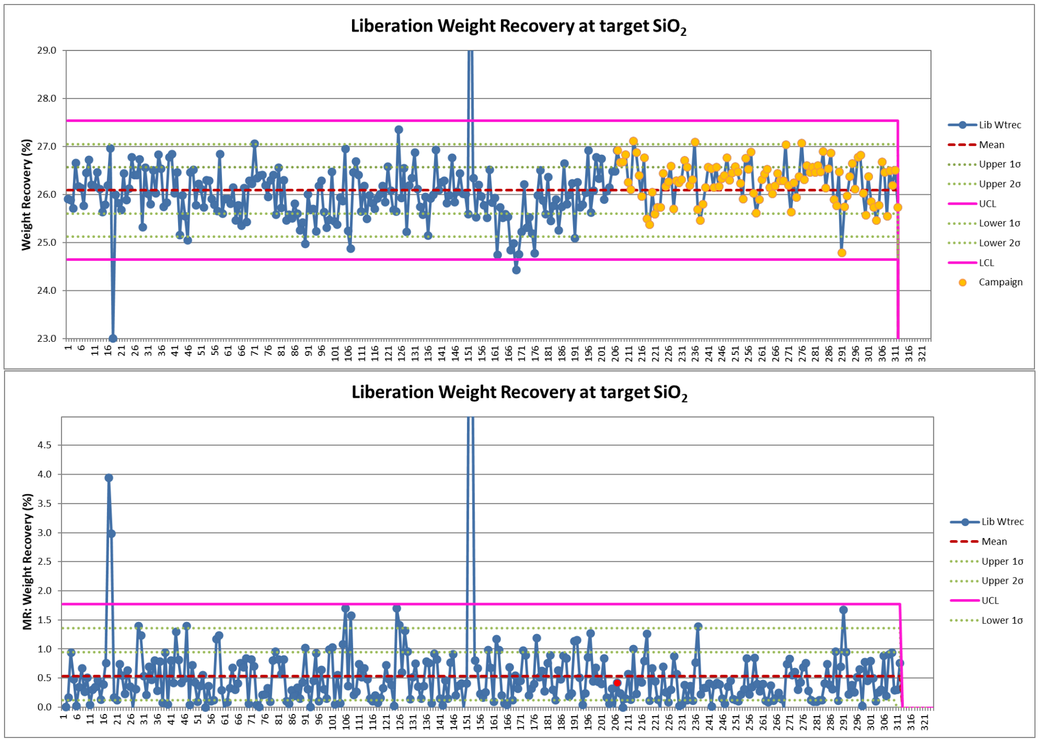


Tests for Special Causes - Individuals: Crude Satmagan Reading Number of Data Points Failing Tests = 0								
Observation No.	Test 1: 1 point more than 3 Stdev from CL	Test 2: 9 points in a row on same side of CL	Test 3: 6 points in a row all increasing or all decreasing	Test 4: 14 points in a row alternating up and down	Test 5: 2 out of 3 points more than 2 Stdev from CL (same side)	Test 6: 4 out of 5 points more than 1 Stdev from CL (same side)	Test 7: 15 points in a row within 1 Stdev from CL (either side)	Test 8: 8 points in a row more than 1 Stdev from CL (either side)

Figure 8-4: Crude Satmagan Magnetic Iron 2016-2019

8.2.2.2.2 Liberation Weight Recovery 2010-2019

Liberation weight recovery at target silica is calculated from grade-recovery curves generated by three timed grinds. Figure 8-5 illustrates the good continuity of Liberation weight recovery over the entire period of quality sampling. For the study period's standards results (highlighted in orange), the only failures were stretches of more than nine points on either side of the CL, and no samples were outside of tolerance limits. These occurrences were not investigated. The control limits here are based on all the data collected since 2010; however, control limits based on the study period are virtually identical.



Tests for Special Causes - Individuals: Liberation Weight Recovery

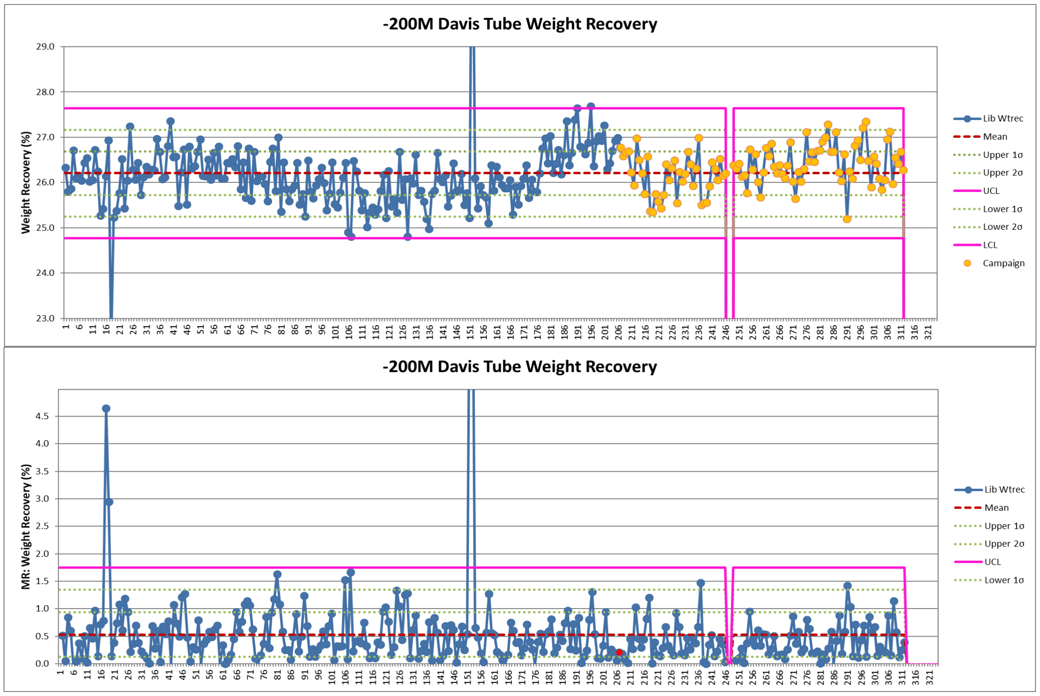
Number of Data Points Failing Tests = 0

Observation No.	Test 1: 1 point more than 3 Stdev from CL	Test 2: 9 points in a row on same side of CL	Test 3: 6 points in a row all increasing or all decreasing	Test 4: 14 points in a row alternating up and down	Test 5: 2 out of 3 points more than 2 Stdev from CL (same side)	Test 6: 4 out of 5 points more than 1 Stdev from CL (same side)	Test 7: 15 points in a row within 1 Stdev from CL (either side)	Test 8: 8 points in a row more than 1 Stdev from CL (either side)

Figure 8-5: Liberation Weight Recovery 2010-2019

8.2.2.2.3 Modeled -200 Mesh Davis Tube Weight Recovery

Modeled -200 mesh DT weight recovery is also calculated from grade-recovery curves generated by three timed grinds. Theoretically, the -200 mesh DT parameters of weight recovery and concentrate silica can be modeled from the Liberation Index data (Mahin and Graber, 2001).The key to this modeling is the assumption that the relative grind fineness at 100% -200 mesh possesses a relatively narrow range of equivalent percent passing 325 mesh based on 3,600 like samples that were each subjected to the LIS and DT tests.If so, a target 325 mesh number can be utilized in the grind-grade-recovery equations of the LIS test results to predict the -200 mesh parameters. Modeled -200 mesh DT weight recovery is the weight recovery used in HibTac ore grading and Mineral Resource estimations. Figure 8-6 illustrates the good continuity of weight recovery over the entire period of quality sampling. For the study period's standards results, no failures were noted. The control limits here are based on all the data collected since 2010; however, control limits based on the study period are virtually identical.



Tests for Special Causes - Individuals: -200M DT Weight Recovery
Number of Data Points Failing Tests = 0

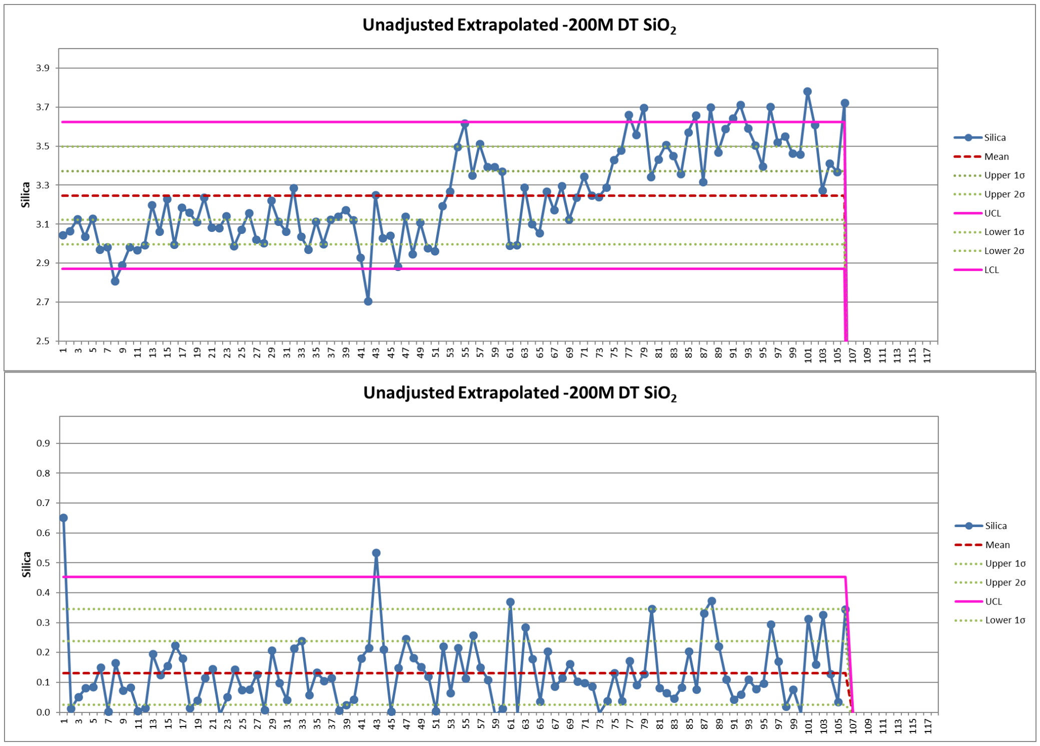
Observation No.	Test 1: 1 point more than 3 Stdev from CL	Test 2: 9 points in a row on same side of CL	Test 3: 6 points in a row all increasing or all decreasing	Test 4: 14 points in a row alternating up and down	Test 5: 2 out of 3 points more than 2 Stdev from CL (same side)	Test 6: 4 out of 5 points more than 1 Stdev from CL (same side)	Test 7: 15 points in a row within 1 Stdev from CL (either side)	Test 8: 8 points in a row more than 1 Stdev from CL (either side)

Figure 8-6: Modeled -200 mesh Davis Tube Weight Recovery

8.2.2.2.4 Modeled -200 Mesh Silica (unadjusted)

Modeled -200 mesh DT silica is also calculated from grade-grind curves generated by three timed grinds. Theoretically, the -200 mesh DT parameters of weight recovery and concentrate silica can be modeled from the Liberation Index data. The key to this modeling is the assumption that the relative grind fineness at 100% -200 mesh possesses a relatively narrow range of equivalent percent passing 325 mesh. If so, a target 325 mesh number can be utilized in the grind-grade-recovery equations of the LIS test results to predict the -200 mesh parameters.

The apparent step change during the reporting period observed in Figure 8-7 was not investigated, as it occurred during the period of AMUSA's management of HibTac. However, the step is coincident with a new DD analysis campaign following a year hiatus between HibTac DD programs.In that time, there would have been wear on the grinding mills from other site(s) DD programs.



Tests for Special Causes - Individuals: Silica
Number of Data Points Failing Tests = 0

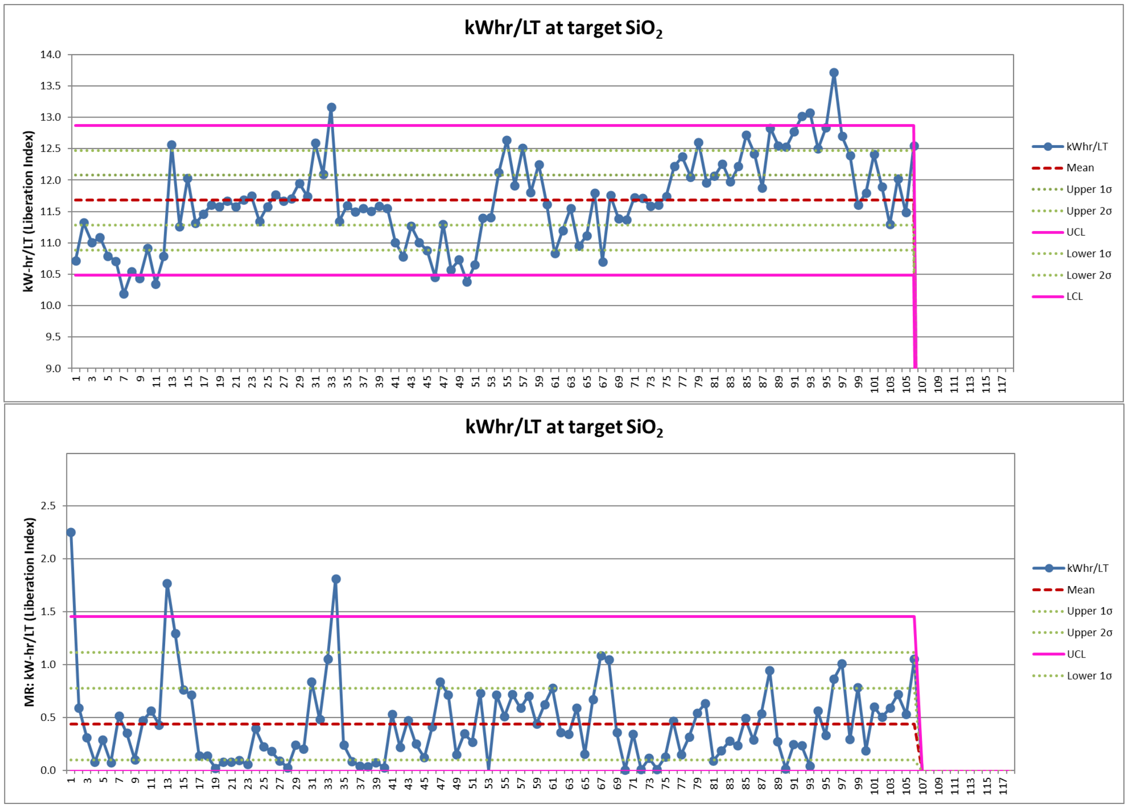
Observation No.	Test 1: 1 point more than 3 Stdev from CL	Test 2: 9 points in a row on same side of CL	Test 3: 6 points in a row all increasing or all decreasing	Test 4: 14 points in a row alternating up and down	Test 5: 2 out of 3 points more than 2 Stdev from CL (same side)	Test 6: 4 out of 5 points more than 1 Stdev from CL (same side)	Test 7: 15 points in a row within 1 Stdev from CL (either side)	Test 8: 8 points in a row more than 1 Stdev from CL (either side)

Figure 8-7: Modeled -200 Mesh Davis Tube Silica (unadjusted)

8.2.2.2.5 kWh/LT 2016-2019

The Liberation Index, kWh/LT, at target silica is calculated from power-grade curves generated by three timed grinds. It is a measure of the relative power required to achieve target silica liberation.

Observed step changes and periods of potential drift during the reporting period observed in Figure 8-6 were not investigated, as they largely occurred during the period of AMUSA's management of HibTac.



Tests for Special Causes - Individuals: kW-hr/LT
Number of Data Points Failing Tests = 0

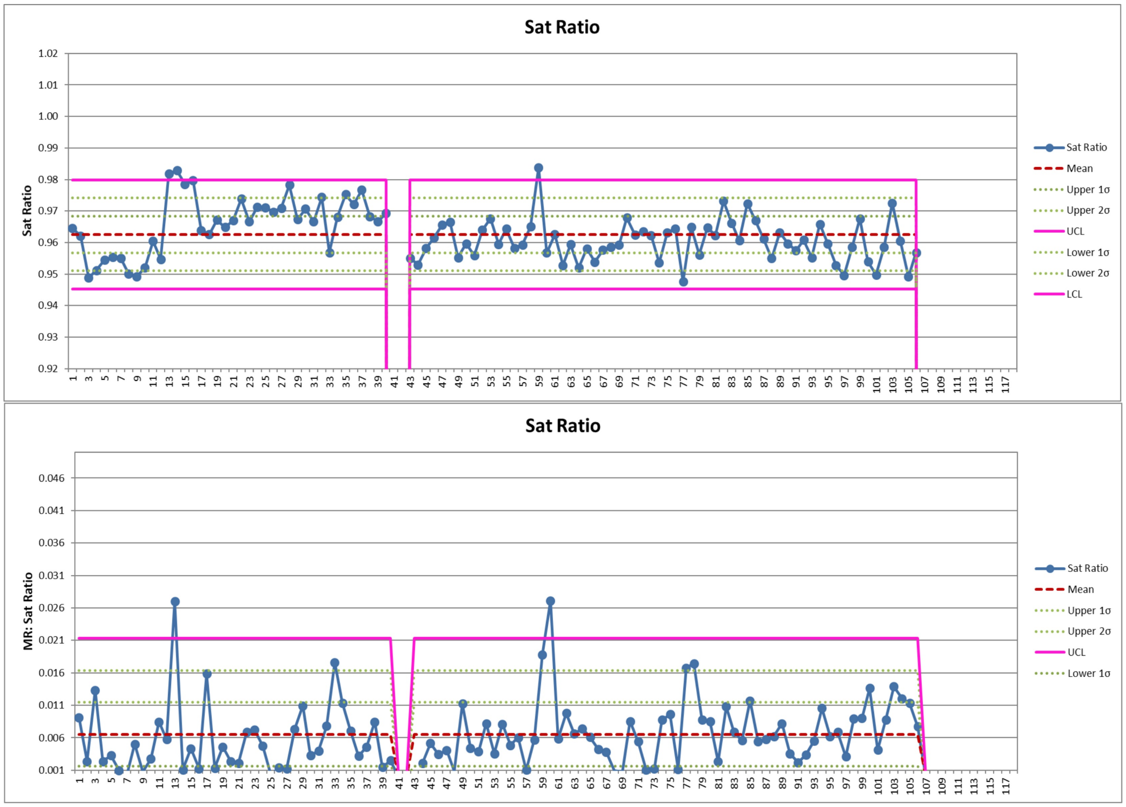
Observation No.	Test 1: 1 point more than 3 Stdev from CL	Test 2: 9 points in a row on same side of CL	Test 3: 6 points in a row all increasing or all decreasing	Test 4: 14 points in a row alternating up and down	Test 5: 2 out of 3 points more than 2 Stdev from CL (same side)	Test 6: 4 out of 5 points more than 1 Stdev from CL (same side)	Test 7: 15 points in a row within 1 Stdev from CL (either side)	Test 8: 8 points in a row more than 1 Stdev from CL (either side)

Figure 8-8: kWh/LT 2016-2019

8.2.2.2.6 Sat Ratio

Sat Ratio (Figure 8-7) is calculated as the ratio of Satmagan MagFe and total Fe of the 10-minute DT concentrate.It is used to model oxidation zones of waste rock (Sat Ratio < 0.9).

There were four sequential points hovering near or above the upper control limit. All other data were in apparent control, and the occurrence was not investigated.



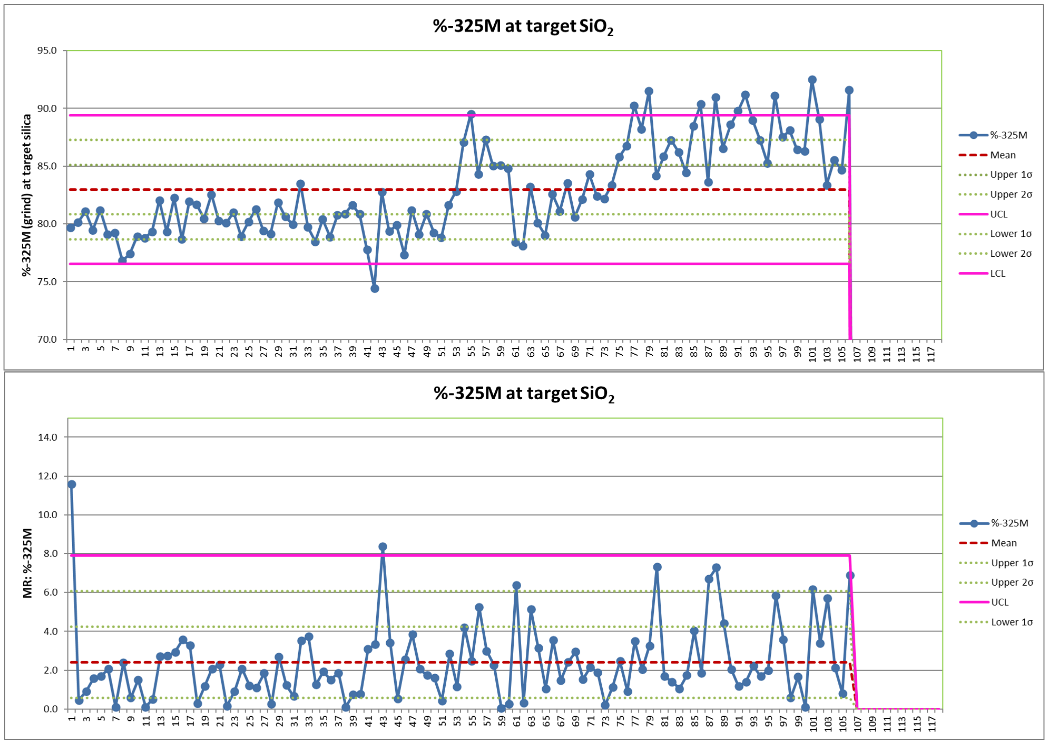
Tests for Special Causes - Individuals: Sat Ratio
Number of Data Points Failing Tests = 0

Observation No.	Test 1: 1 point more than 3 Stdev from CL	Test 2: 9 points in a row on same side of CL	Test 3: 6 points in a row all increasing or all decreasing	Test 4: 14 points in a row alternating up and down	Test 5: 2 out of 3 points more than 2 Stdev from CL (same side)	Test 6: 4 out of 5 points more than 1 Stdev from CL (same side)	Test 7: 15 points in a row within 1 Stdev from CL (either side)	Test 8: 8 points in a row more than 1 Stdev from CL (either side)

Figure 8-9: Sat Ratio 2016-2019

8.2.2.2.7 Grind at Target Silica

Grind (%-325 mesh) at target silica (Figure 8-8) is calculated from grind-grade curves generated by three timed grinds, where the-325 mesh fraction is screened and weighed from each timed grind's mill product, and silica is measured for each grind's DT concentrate. The step change in higher grind at target silica as seen on the control chart was not investigated, and its significance was not determined, as it occurred during AMUSA's management of the HibTac operation. However, the step is coincident with a new DD analysis campaign following a year hiatus between HibTac DD programs.In that time, there would have been wear on the grinding mills from other site(s) DD programs.



Tests for Special Causes - Individuals: %-325M at target SiO_2
Number of Data Points Failing Tests = 0

Observation No.	Test 1: 1 point more than 3 Stdev from CL	Test 2: 9 points in a row on same side of CL	Test 3: 6 points in a row all increasing or all decreasing	Test 4: 14 points in a row alternating up and down	Test 5: 2 out of 3 points more than 2 Stdev from CL (same side)	Test 6: 4 out of 5 points more than 1 Stdev from CL (same side)	Test 7: 15 points in a row within 1 Stdev from CL (either side)	Test 8: 8 points in a row more than 1 Stdev from CL (either side)

Figure 8-10: Grind at Target Silica

8.2.2.2.8 HTCCCOS Standards Results Discussion

Additional control charts are maintained and monitored for feed kWh/LT and individual timed-grinding results (6-minute, 10-minute, 14-minute) for DT concentrate Satmagan MagFe, %-325 mesh (grind), weight recoveries, and silica that were used to calculate final results at target silica. Results for individual timed grinds should be the first element of investigation for any out-of-control final results. Prior to submission of final results to Cliffs, the Lerch laboratory manager reviews the coefficient of determination (r^2) for each grind versus grade-power-recovery curve generated by the three timed grinds for all standards samples (and normal samples in the dispatch). Any r^2 less than 0.9 triggers an automatic re-analysis of the DT products for each grind of the LIS test, so Cliffs does not typically receive results that fail this internal laboratory check.

Standards generally performed within the range of acceptability for the main derived variables (±3σ) except where noted above. These instances were not investigated, largely due to transition to external site management. As-received monitoring and investigation of "failures" or trends is recommended by Cliffs and SLR QP for the future.

8.2.3 Duplicates

Beginning with the 2010 drilling program, a program of assaying duplicate samples was incorporated into the standard HibTac work program. Preparation duplicate samples consist of paired assays split from the –¼ in. coarse crush material and then prepared and analyzed in the same sample batch. The preparation duplicates are not "blind." To date, all duplicate sample pairs have been assayed by Lerch in Hibbing, Minnesota.

For each analyte or measured/calculated variable, plots generated include x-y (scatter) and a time series of mean relative percent difference.

Scatter plots include the standard least squares trendline (the typical regression used by spreadsheet software). A second least squares trendline is generated assuming all error in "X." The RMA line, the reduced major axis, assumes that neither axis depends on the other and is a best-fit regression that should closely trend with the 1:1 line for a sample set in good precision.

Control limits to the mean relative percent difference between duplicate pairs are based on 3SD from the mean of data, where 1σ and 2σ are obviously 1SD and 2SD from the mean of the data.The Shewhart control approach used for the standards is not appropriate, since the QC metrics are not currently set up to track moving range.

Also monitored are Thompson and Howarth plots (Thompson and Howarth, 1978), where the mean of each replicate pair is plotted against the absolute difference between the two analyses. On these plots, lines are drawn for any predefined precision level (e.g., 10% and/or 20%) and percentile (e.g., 90th or 99th), and the overall quality of the replicate analyses at different concentration ranges can be grasped at a glance. Precision within 20% is recommended for HibTac data unless otherwise noted. Pairs that deviate from the general trend should be identified and discussed with the laboratory. Two additional ways to plot the same results include plotting the mean of duplicates against the ratio between duplicates and the mean of duplicates against the relative standard deviation (RSD). An acceptable RSD of 15% is approximately equal to the recommended 20% relative difference acceptance. Each plot has advantages and disadvantages; using all four provides insight into data quality and analytical precision.

In the following figures (Figure 8-11 through Figure 8-16), data from the 2016-2019 study period is plotted as orange points to compare with the larger set of historical results dating back to 2010 (blue points). Control limits and trend lines are based on the larger population. As the resource QA database expands, results will be e-mailed to the site geologist and shared in a central location.

8.2.3.1 Crude Satmagan Magnetic Fe Preparation Duplicates

For all duplicate pairs from the 2016-2019 study period but one, the absolute difference is within 10% of the mean for Satmagan MagFe, and the RMA is very close to the 1:1 line, demonstrating excellent precision. For the single data point, the absolute difference is at just under 20% of the mean. The time series of mean relative percent difference demonstrates improved precision with time, corresponding to process improvements implemented immediately before the study period (Orobona, 2015) and monitoring of QA/QC results. Results triggered no investigations.

8.2.3.2 Modeled -200 Mesh Davis Tube Weight Recovery Preparation Duplicates

Modeled -200 mesh DT weight recovery is calculated from grade-recovery curves generated by three timed grinds. Theoretically, the -200 mesh DT parameters of weight recovery and concentrate silica can be modeled from the Liberation Index data. The key to this modeling is the assumption that the relative grind fineness at 100% -200 mesh possesses a relatively narrow range of equivalent percent passing 325 mesh based on 3,600 like samples that were each subjected to the LIS and DT tests. If so, a target 325 mesh number can be utilized in the grind-grade-recovery equations of the LIS test results to predict the -200 mesh parameters.

For all duplicate pairs from the 2016-2019 study period, the absolute difference is within the recommended 20% of the mean for weight recovery (all are within 10% for recoveries within the range of ore grades), and the RMA of the greater population is very close to the 1:1 line, demonstrating excellent precision. The time series of mean relative percent difference demonstrates improved precision with time. Results triggered no investigations.

Liberation weight recovery (weight recovery at target silica calculated from grade-recovery curves generated by three timed grinds) results are virtually identical and are not illustrated here.

8.2.3.3 Modeled -200 Mesh Davis Tube Silica (unadjusted)

Modeled -200 mesh DT silica is calculated from grind-grade curves generated by three timed grinds. Theoretically, the -200 mesh DT parameters of weight recovery and concentrate silica can be modeled from the Liberation Index data. The key to this modeling is the assumption that the relative grind fineness at 100% -200 mesh possesses a relatively narrow range of equivalent percent passing 325 mesh. If so, a target 325 mesh number can be utilized in the grind-grade-recovery equations of the LIS test results to predict the -200 mesh parameters.

For all but two duplicate pairs from the 2016-2019 study period, the absolute difference is within the recommended 20% of the mean for unadjusted silica, and the RMA of the greater population is very close to the 1:1 line, demonstrating acceptable precision. Results triggered no investigations.

8.2.3.4 kWh/LT (Liberation Index) Preparation Duplicates

The Liberation Index, kWh/LT, at target silica is calculated from power-grade curves generated by three timed grinds. For all duplicate pairs from the 2016-2019 study period, the absolute difference is within the recommended 20% of the mean for the Liberation Index (all but one are within 10%), and the RMA is very close to the 1:1 line for the greater population, demonstrating excellent precision. The time series of mean relative percent difference demonstrates improved precision with time, corresponding to process improvements implemented immediately before the study period (Orobona, 2015) and monitoring of QA/QC results. Results triggered no investigations.

8.2.3.5 Grind (%-325 Mesh) Preparation Duplicates

Grind at target silica is calculated from grind-grade curves generated by three timed grinds. For all duplicate pairs from the 2016-2019 study period, the absolute difference is within the recommended 20% of the mean for Grind estimated at target silica (all but three are within 10%), and the RMA of the greater population is very close to the 1:1 line, demonstrating excellent precision. The time series of mean relative percent difference demonstrates improved precision with time, corresponding to process improvements implemented immediately before the study period (Orobona, 2015) and monitoring of QA/QC results. Results triggered no investigations.

8.2.3.6 Sat Ratio Preparation Duplicates

The Sat Ratio is the proportion of Satmagan MagFe to total Fe from wet chemistry in the 10-minute grind Davis Tube concentrate. For all duplicate pairs from the 2016-2019 study period, the absolute difference is within the recommended 20% of the mean for silica estimated at target Grind (almost all are within 10%), and the RMA is very close to the 1:1 line for the greater population, demonstrating excellent precision. The time series of mean relative percent difference demonstrates slightly improved precision with time, corresponding to Satmagan calibration improvements implemented immediately before the study period (Orobona, 2015) and monitoring of QA/QC results. Results triggered no investigations.

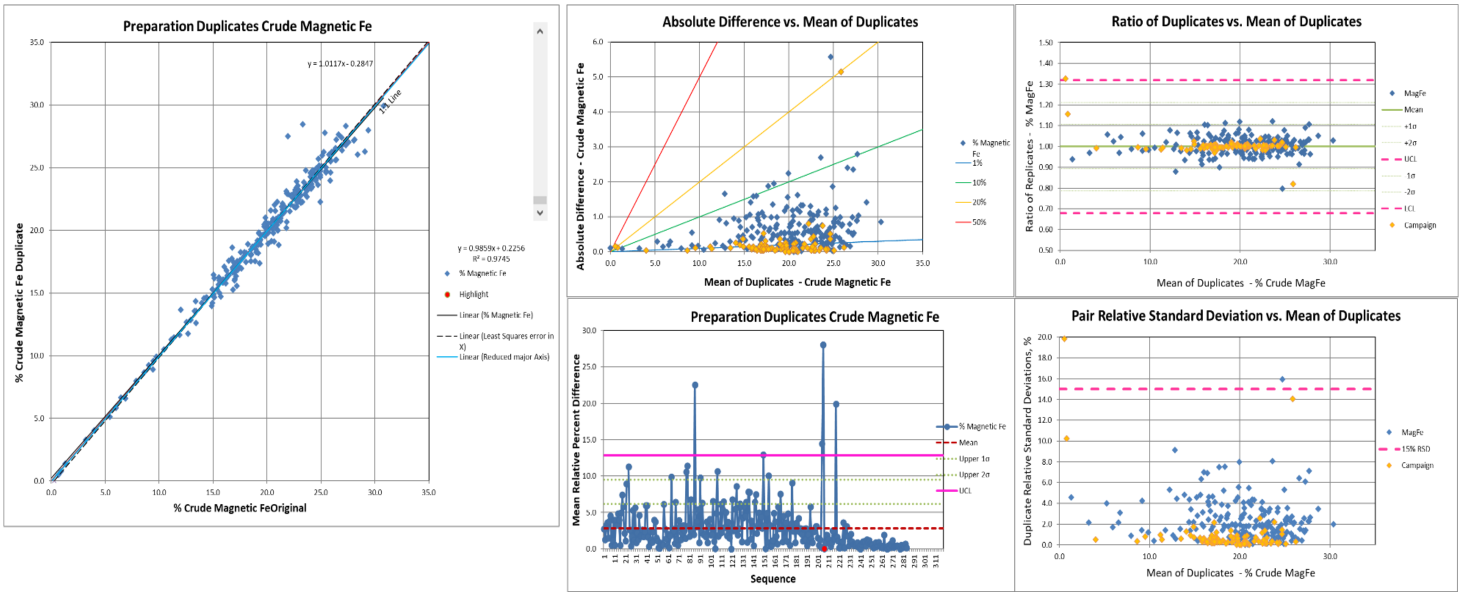


Figure 8-11: Crude Satmagan Magnetic Fe Preparation Duplicates

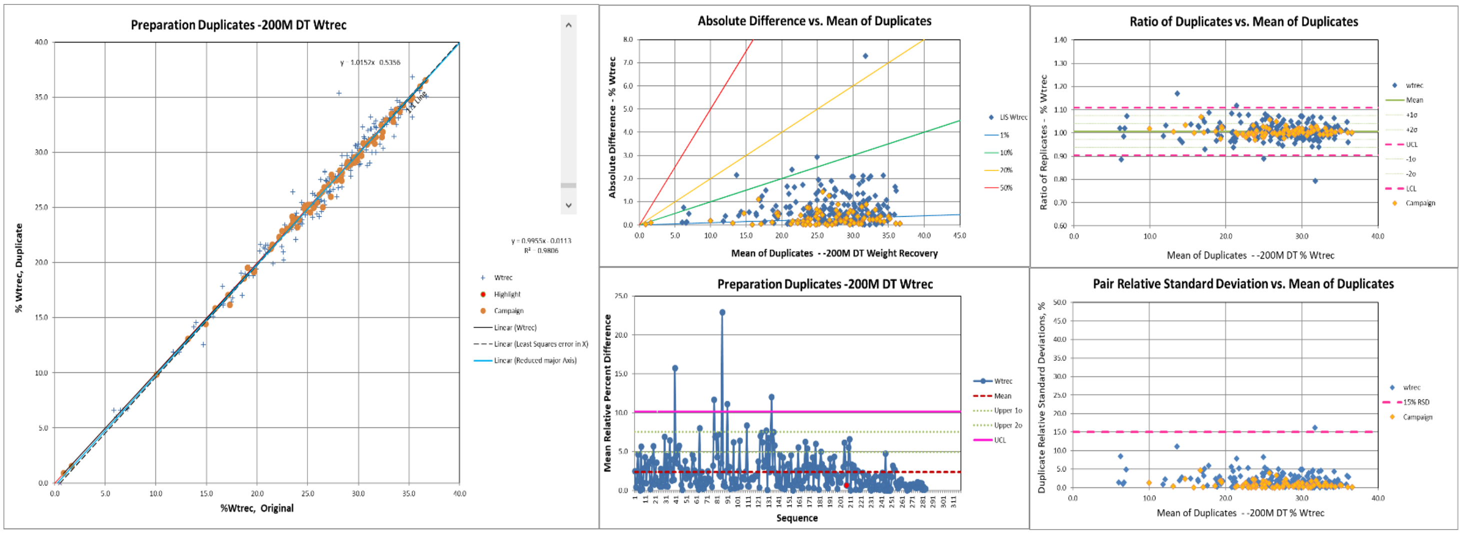


Figure 8-12: Modeled -200 Mesh Davis Tube Weight Recovery Preparation Duplicates

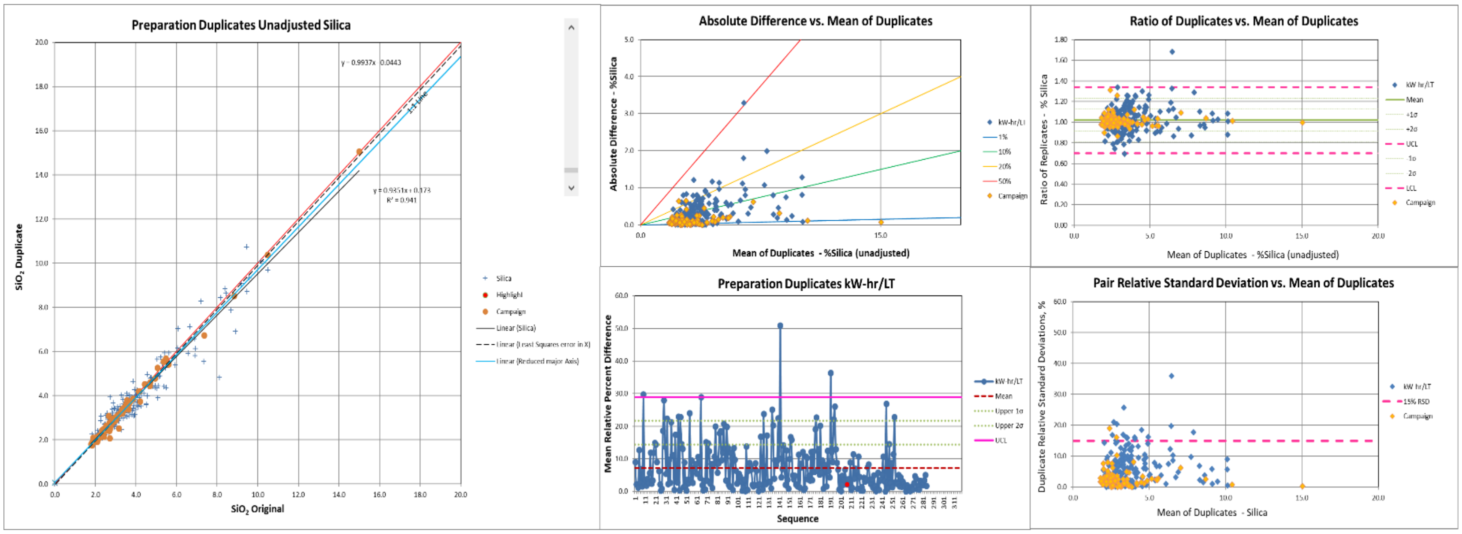


Figure 8-13: Modeled -200 mesh Davis Tube Silica Preparation Duplicates

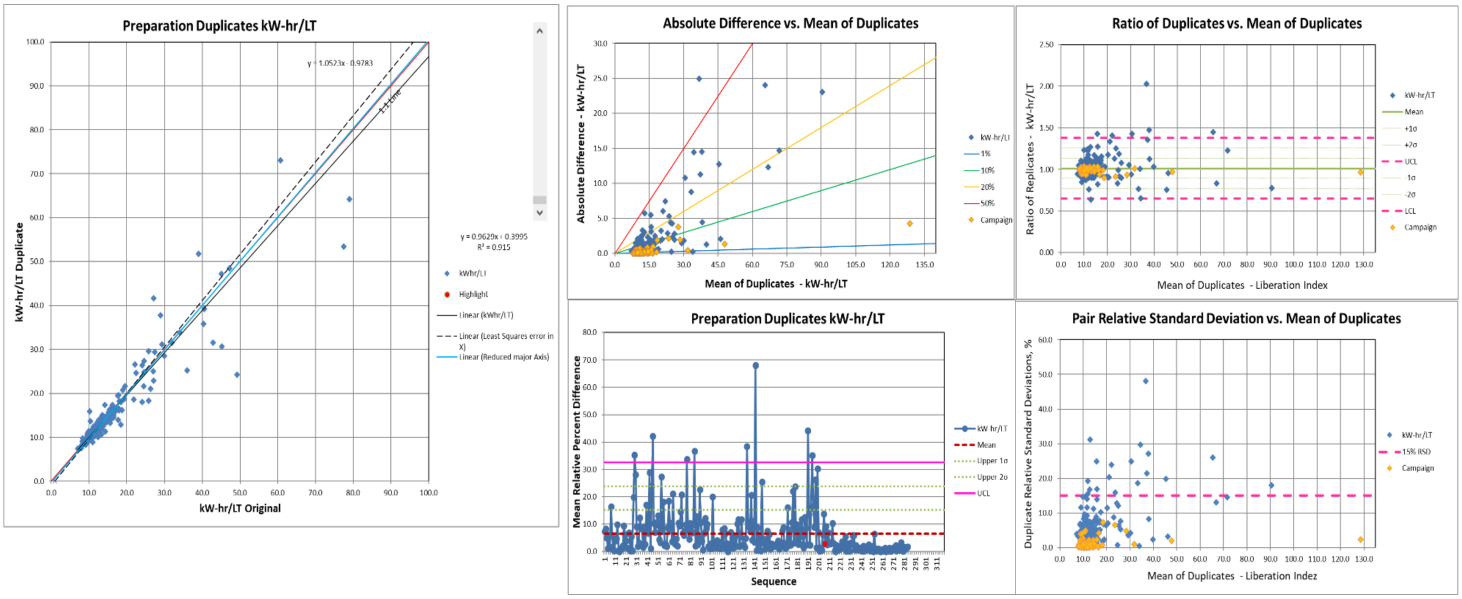


Figure 8-14: kWh/LT (Liberation Index) Preparation Duplicates

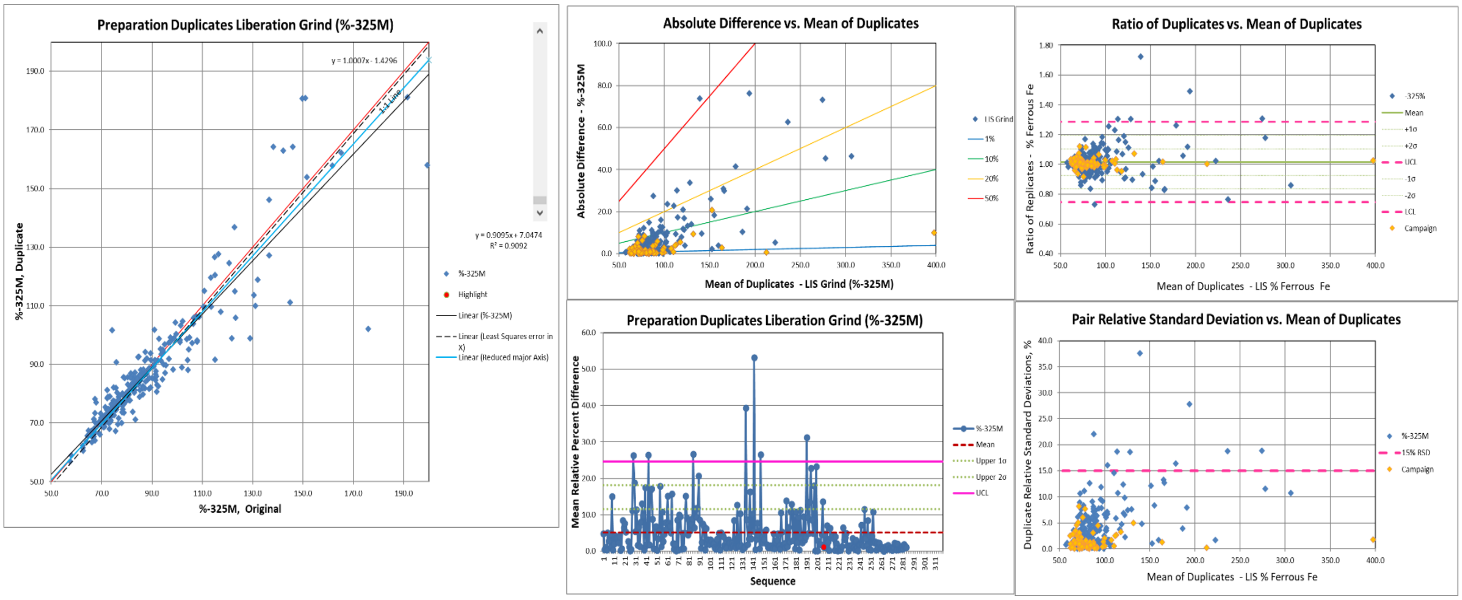


Figure 8-15: Grind (%-325 Mesh) Preparation Duplicates

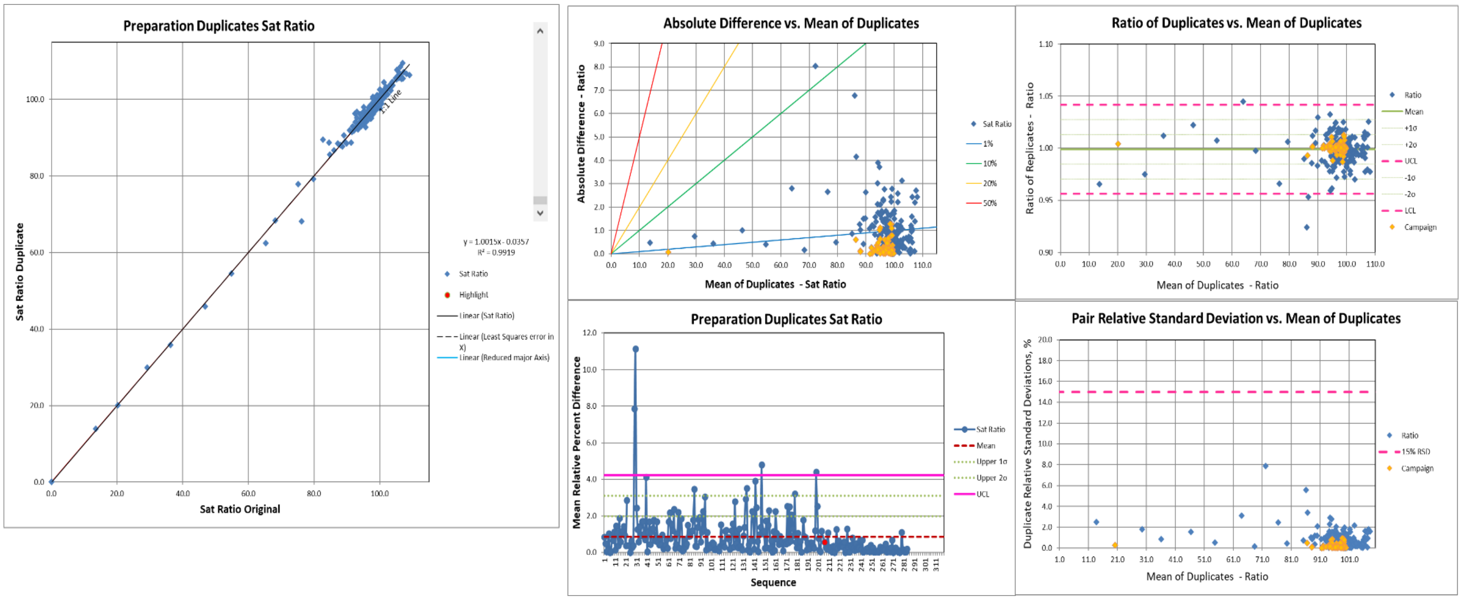


Figure 8-16: Sat Ratio Preparation Duplicates

8.2.3.7 Duplicates Discussion

Additional charts are maintained and monitored for crude Fe, 10-minute concentrate Fe, and for individual timed-grinding results (6-minute, 10-minute, 14-minute) for DT silica, Satmagan MagFe, %-325 mesh, and weight recoveries that were used to calculate final results at target silica.Results for individual timed grinds should be the first element of investigation for any out-of-control final results. Also, prior to submission of final results to Cliffs, the Lerch laboratory manager reviews the coefficient of determination (r^2) for each grind versus grade-power-recovery curve generated by the three timed grinds for all duplicate samples (and normal samples in the dispatch). Any r^2 less than 0.9 triggers an automatic re-analysis of the DT products for each grind of the LIS test, so Cliffs does not typically receive results that fail this internal laboratory check.

The RSD is widely used in analytical chemistry to express the precision and repeatability of an assay. For the case of a duplicate pair, RSD is the square root of the square of the difference divided by two, divided by the duplicate pair mean:

$$RSD= \sqrt{} \ [(x1 – x2)^2/2] / (x1 + x2)/2, \text{ expressed as a percentage}$$

In general, variation in the precision of grading variables is statistically negligible with increasing grade. However, the key analytical flowsheet variable controlling the accuracy of these assays is believed to be the recovery of concentrate from the Davis Tube. Virtually all campaign samples were well within an acceptable RSD of 15% for all major grading variables, which is approximately equal to a 20% relative difference acceptance.

Duplicate pairs are analyzed close enough in sequence that time-based biases are not observed in scatter plots or ratio plots for any variable.

8.2.4 Blanks

Due to the preponderance of metallurgical testing rather than traditional assays, blanks are not used in conjunction with QA/QC procedures, nor are they relevant.

8.2.5 Check Assays

Check assays are not currently conducted for HibTac drill core. Cliffs' Northshore Mine has the equipment and capability to conduct similar test work. Potential external providers include the Natural Resources Research Institute (NRRI) laboratory in Coleraine, Minnesota and Midland Research in Marble, Minnesota. Lerch is a small, independent provider that relies on Cliffs' facilities and equipment; strategic evaluation of additional laboratory providers should be considered, and a calibration study has recently been initiated by NRRI as possible overflow support for Cliffs' nearby United Taconite drill program.

8.3 Conclusions

QA/QC results for the period 2016-2019 are appropriate for the style of mineralization and are sufficient to generate a drill hole assay database that is adequate for mineralized material estimation by international reporting standards and supported with good agreement between planned and actual production over more than 45 years. Data are specifically robust for the key grading variables of -200 mesh weight recovery and magnetic iron for the study period; however, lack of analysis during the study period prevented investigation and documentation of failures that could have explained variation and further reduced variability.

The SLR QP is of the opinion that HibTac's sample preparation and analytical QA/QC results from the 2016-2019 reporting period are acceptable to validate the drill hole assay database used for Mineral Resource estimation and meet S-K 1300 minimum standards for reporting to the SEC.Sample preparation and analyses follow established, written procedures maintained by Lerch. The laboratory is accredited with ASQ/ANSI ISO-9001:2015 for its system of quality management. The samples are securely delivered to the assay laboratory, and the logging and sampling methods are professionally conducted in an unbiased manner.

8.4 Recommendations

1. Quality results documented in this report support an initial standard and duplicate submission rate of 5% each.
2. HibTac should submit a small number of "preparation duplicate" samples to a secondary accredited laboratory to document capability(ies), cost, and time-efficiency of alternate provider(s) and confirm that results are comparable to those of the current provider.

9.0 DATA VERIFICATION

The SLR QP visited HibTac on April 28, 2021. While at site, the QP spoke with the technical team and found them to have a strong understanding of the mineralization types and their processing characteristics, and of how the analytical results are tied to the results. SLR received the project data from Cliffs for independent review as a series of MS Excel spreadsheets, a Vulcan database, and associated digital files (lithologic surfaces, topography surface, and pit shapes).

Data verification is the process of confirming that data has been generated with proper procedures, transcribed accurately from its original source into the project database, and is suitable for use for the purpose of the TRS.

During 2021, a data verification exercise was performed by Cliffs geologists (Larson, 2021) and audited by SLR for a random subset of HibTac drill holes for database drill collar, assay, and geotechnical data against as-drilled records. Approximately 10% of the drill holes (30 holes of 301 HibTac DD holes) within the current, 2021 LOM perimeter footprint were selected for database verification. Holes were selected to provide spatial coverage of the future mining areas and represent holes from a variety of time periods. Figure 9-1 shows the location within the HibTac LOM areas of the drill holes selected for verification.

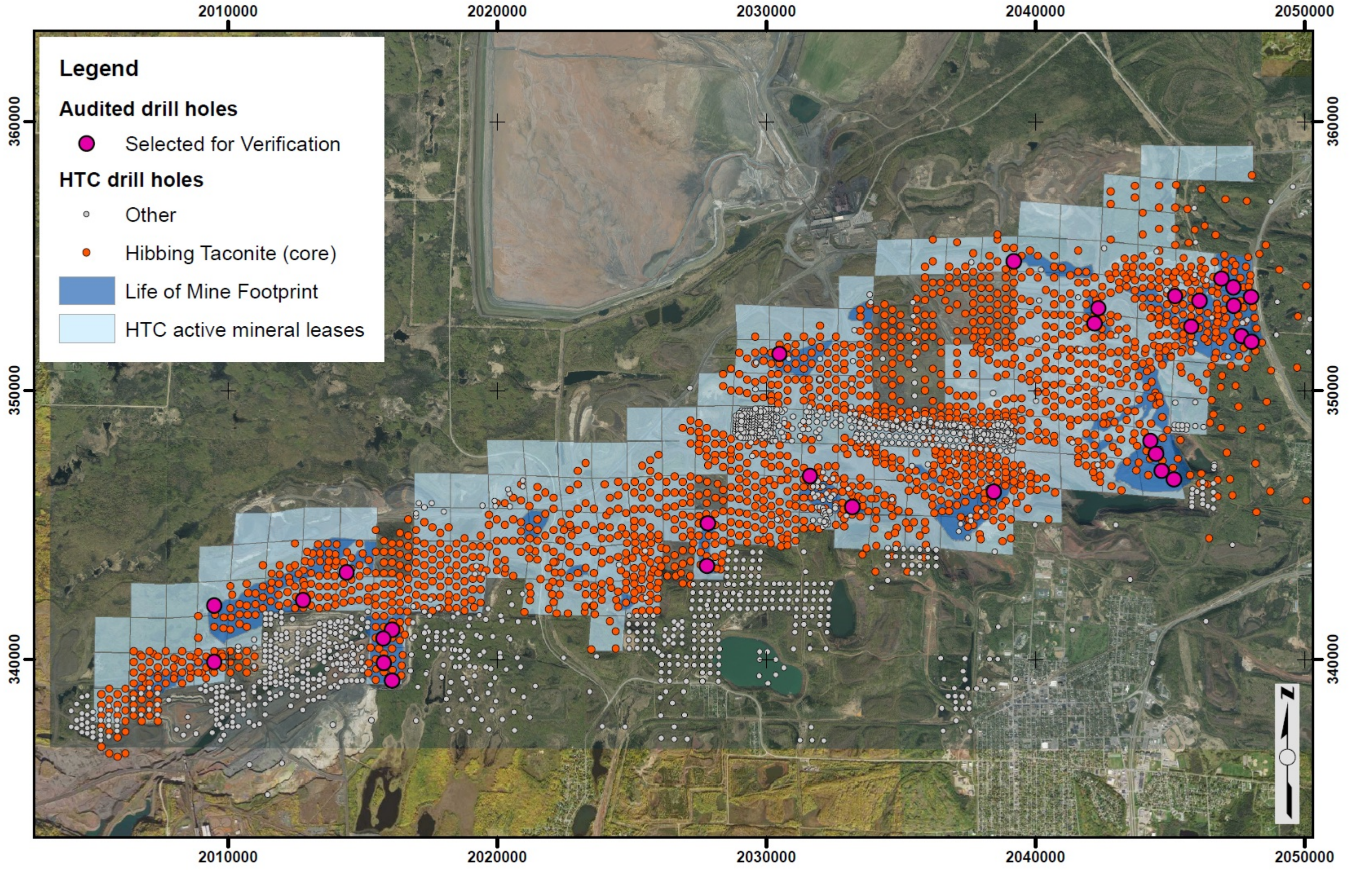
The following aspects were reviewed:

- Collar survey information relative to historical logs or paper recorded logging. Comparison of database drill collar elevations against logs shows that the elevations of six of 30 drill holes were rounded to the nearest foot, likely due to rounding, resulting in lower-precision vertical control on the drill holes. The six audited holes drilled between 2014 and 2018 show discrepancies in horizontal control, approximately three feet north-south and 55 ft east-west. These discrepancies were likely introduced during a coordinate conversion exercise.
- A comparison of original lithology logging to the current database. Original classification of the Biwabik IF into the Upper Slaty, Upper Cherty, Lower Slaty, and Lower Cherty members has long been recognized throughout the Mesabi District. Throughout the history of drilling, HibTac geologists have evolved the classification scheme to further subdivide the original members into smaller subunits, each having continuity across appreciable areas. In preparation for the use of Vulcan for geologic modeling in 2019, HibTac's geological staff developed the currently utilized classification of the Biwabik IF that recognizes 16 subunits based on lithologic, metallurgical, and mineralogical characteristics within the local mine area.
- Printed/scanned lithologic logs were located for 29 of the 30 drill holes. Lithologic logs were compared against hard copy and scanned original construction records. Parameters checked include interval footages and logged lithologic units. All drill logs selected for examination were found to have recorded a geological interpretation based on the classification scheme that was in use at the time of drilling. No discrepancies were identified or noted during Cliffs' internal audit.
- Assays used for modeling crude ore grades and characteristics at HibTac are direct measurements taken from laboratory assays. Printed/scanned assay data sheets were located for 28 of the 30 drill holes. Hard copy or scanned assay data sheets were not located for any drill holes for calendar years 1991 and 1995. A hard copy or digital scanned log was not located for drill hole 201552. Database assay values for 9912 and 9945 reflect the original -200 mesh DT

assays, and not later LIS re-assays. Thirteen of twenty-four -200 mesh DT assays for hole 200028 are updated in the database to reflect later LIS re-assays. Geotechnical data for drill holes from 2014-2019 are not included with the drill logs.

- Assay records were limited to a check on the total iron (crude). The selected holes span essentially the life span of the property and include holes that were assayed using both the single-grind, -200 mesh DT assay and the three-grind Liberation Index assay (since 2000). Since the method for calculating grading parameters such as weight recovery, magnetic iron, and concentrate silica are calculated slightly different for the two assay methods and are not reflected as raw data, comparison between assay results and database values are limited to total iron (crude).
- Seventy-eight feet of 6,165.2 cumulative assay feet were missing from two drill holes in the database. In addition, total iron (crude) was missing for 168 ft in one drill hole. No discrepancies between hard copy or digital (scanned) total iron and database iron values were noted.

HibTac has been in near-continuous production for almost 45 years. There has been adequate drilling to develop the Mineral Resource models that have been used in the Mineral Reserve models and for historically successful mine planning. The Mineral Resource models have performed well, indicating the drill hole database contains valid data. The SLR QP is of the opinion that database verification procedures for HibTac comply with industry standards and are adequate for the purposes of Mineral Resource estimation.



Author: Phillip Larson
Date: 23-Sep-2021 15:35

Scale: 1:60,000
Coordinate System: Hibbing Taconite Company pit coordinates - long format

Figure 9-1: Drill Hole Database Verification Map

10.0 MINERAL PROCESSING AND METALLURGICAL TESTING

10.1 Historical Metallurgical Testing

Metallurgical testing was conducted in the 1970s to develop the processing plant flowsheet. The testing resulted in the successful commissioning of the Plant. A description of the current process and plant performance is provided in Section 14 of this TRS.As the mine has expanded over the years, drill core samples were taken and analyzed to classify ore and waste rock for resource estimation, reserve classification, and ore grading. The ore is material that has metallurgical properties suitable for economic processing. These properties have been developed based on previous test work and processing plant experience.

Hibbing Taconite is a registered ISO 9001:2015 – ASQ/ANSI/ISO 9001:2015 company by SRI Quality System Registrar. This certification demonstrates the company's ability to consistently provide products and services that meet customer, applicable statutory, and regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system, including processes for improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements. Hibbing Taconite has held an ISO9001 Quality Management Certification since 1997.

The HibTac laboratory has written Standard Operating Procedures (SOP) for each of the tests conducted. The procedures follow ASTM procedures where applicable. Calibration and standard checks are performed regularly to ensure precise and accurate results.

10.2 Sampling and Metallurgical Testing

10.2.1 Drill Sample Preparation and Testing

Hibbing Taconite has historically conducted programs of systematic infill and step-out diamond drilling to identify the Mineral Resource and update mine plans accordingly. The drill core analysis is performed by Lerch. Lerch is an ISO9001:2015 Quality Management certified company.More information on drill core analysis can be found in Section 8 of this TRS.

10.2.2 Process Plant Metallurgical Sampling and Testing

10.2.2.1 Process Plant Routine Sample Locations

Hibbing Taconite conducts plant sampling for the purposes of process control and product quality reporting for compliance with daily plant and cargo specifications. These samples are collected on a routine basis from established sample collection points. The concentrate sample is a composite of concentrate samples composited throughout the shift. Filter cake samples are composited from the filter cake table feeders on each line. Green-ball samples are collected from each balling drum and composited by line. Pellet samples are collected from the discharge end of each individual furnace every three hours.

10.2.2.2 Concentrate and Pellet Sampling Procedures

Hibbing Taconite has an onsite metallurgical laboratory that continuously samples concentrate and pellets. The results are used to make process adjustments and ensure that a high-quality pellet is produced.

Plant concentrate is continuously run through the Nuclear On-Line Analyzer (NOLA) to measure the silica (SiO_2) content. This analysis guides the concentrator in making process adjustments to meet silica specifications. A composited shift sample from the NOLA is analyzed for grind, Blaine (specific surface area of fines per mass), Satmagan iron, ferrous iron, silica, and trace elements. A DT analysis is run on the daily composite sample to determine percent magnetic iron. This information is used to monitor the ore blend and process performance.

10.2.2.3 Plant Concentrate Sample Preparation Flowsheet

Figure 10-1 presents the concentrate sample handling and preparation procedures. Filter cake samples are collected every three hours from each phase of the plant (phase 1 is furnace lines 1 and 2; phase 2 is furnace line 3). Each sample is analyzed for moisture, Blaine, and grind. Green-ball samples are collected every three hours from each line and analyzed for moisture.

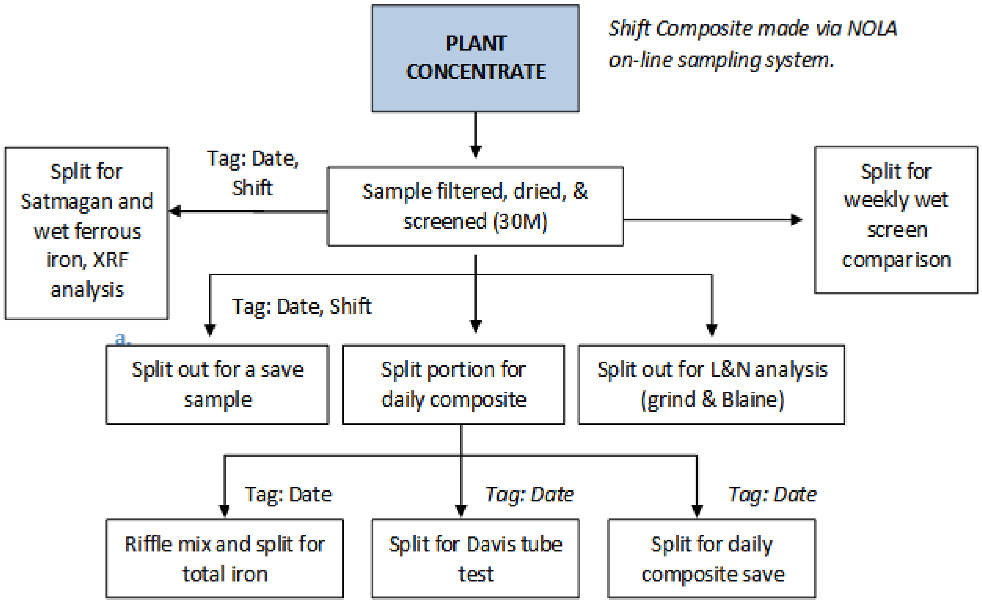


Figure 10-1: Plant Concentrate Sample Handling Flowsheet

10.2.2.4 Pellet Sample Preparation Flowsheet

Figure 10-2 presents the pellet sample handling and preparation procedures. Pellet samples are collected every three hours from each running line. An analysis is carried out to determine the compression strength and after tumble percent +¼ in. and percent -28 mesh. Pellets are also composited into shift and daily samples, which are analyzed for size distribution, iron, silica, and trace elements. Silica and trace elements are determined by an XRF spectrometer.These analyses determine what process adjustments are needed to produce a high-quality product and assist in determining the cause of any quality issues. Below is the pellet sample handling flowsheet.

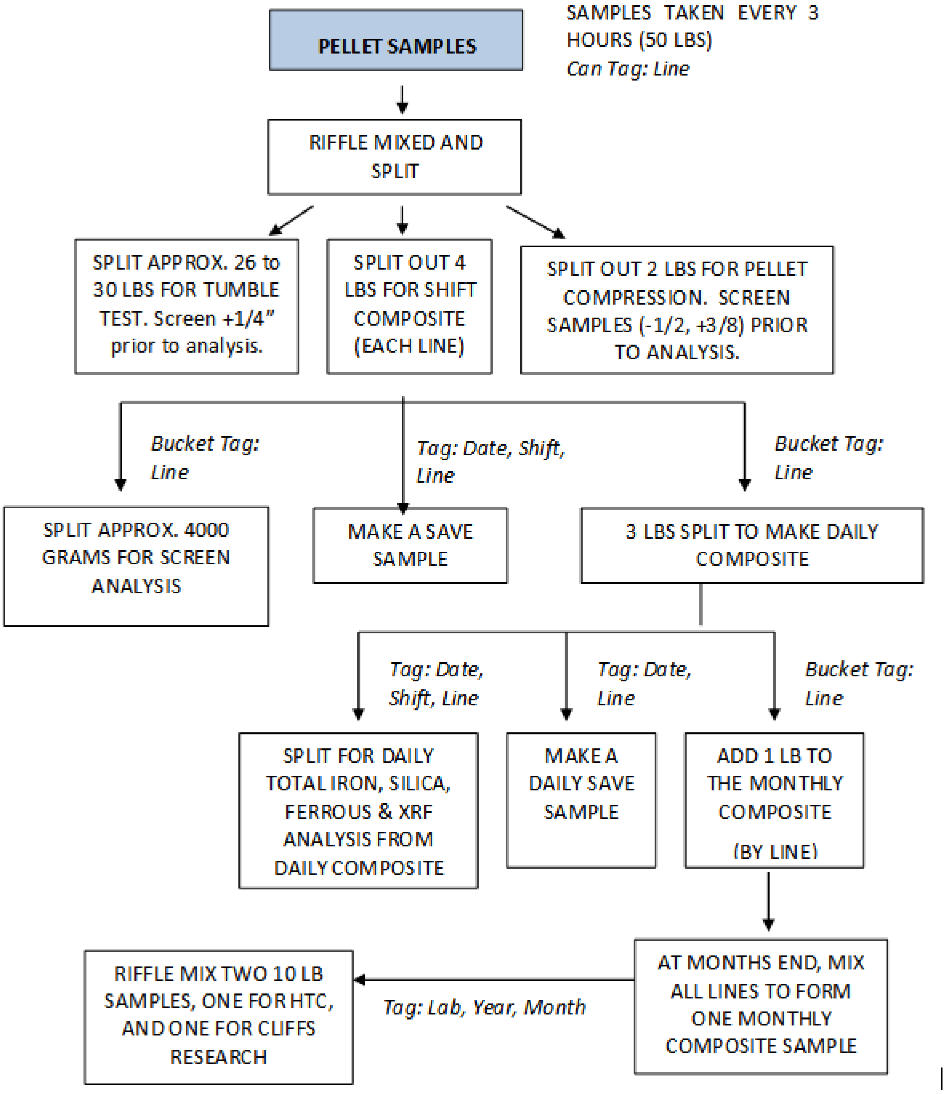


Figure 10-2: Pellet Sample Handling Flowsheet

10.2.3 Material Characterization

10.2.3.1 Ore Quality Specifications

Ore quality specifications are established based on historical testing and experience. The current plant ore specifications are shown in the Table 10-1.

Table 10-1: Plant Ore Quality Specifications
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Specification	Target	Limits
Silica	4.8%	4.4% - 5.4%
DD Weight Recovery	27.79%	25.0%-31.4%
Percent of 1-5/6 ore	75%	52% - 100%
Percent of 1-3/4 ore	15%	0% - 48%
Percent of 1-7 ore	7%	0% - 20%
Liberation Index	11.97 kW/LT	10.0 kW/LT – 12.8 kW/LT
Percent Magnetic Iron	19.3%	19.0% - 23.0%

10.2.3.2 Concentrate Specifications

The key concentrate specification is the silica. HibTac's concentrate silica specification is 3.80% to 4.30%.

10.2.3.3 Pellet Quality Specifications

The 2021 pellet quality specifications are presented in Table 10-2. The specifications are reviewed annually (and modified if needed) to meet the owners' and customers' requirements.

Table 10-2: 2021 Pellet Quality Specifications
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Plant Product (Daily)	Standard	High Compression
% Dry Iron	66.15 + 0.20	66.00 + .30
% Dry SiO_2	4.50 + 0.20	4.50 + .20
% +1/4 in. A.T.	96.0 + 0.8	97.0 + .5
% -28 Mesh A.T.	3.6 + 0.5	2.7 +.5
Average Compression (lb)	470+ 40	560+ 20
% -300 lb Compression	< 15.3	
% Sizing +1/2 in.	< 5.0	< 5.0
% Sizing -1/2 +3/8 in.	93.0 + 2.0	93.0 + 2.0

Boat Cargo (Boat)	Standard	High Compression
% Dry Iron	66.15± 0.20	66.00 ± .30
% Dry SiO_2	4.50 ± 0.20	4.50 ± .20
% +1/4 in. B.T.	≥ 97.0	≥ 96.0
% +1/4 in. A.T.	≥ 95.2	≥ 96.0
% -28 Mesh A.T.	3.8 ± 0.5	2.9 ± .5
Average Compression (lb)	460± 40	≥ 510
% -300 lb. Compression	≤ 15.3	
% Sizing -1/2 in. + 3/8 in.	92.0± 2.0	92.0 ± 2.0
% Moisture	≤ 3.25	≤ 4.0

11.0 MINERAL RESOURCE ESTIMATES

11.1 Summary

Mineral Resource estimates for the HibTac deposit were prepared by Cliffs and audited and accepted by SLR using available data from 1938 to 2019.

The 2021 HibTac Mineral Resource estimate was completed using a conventional block modeling approach. The general workflow included the construction of a geological or stratigraphic model in Vulcan representing the Biwabik IF from drill hole logging and sampling data, which was used to define discrete domains and surfaces representing the upper contact of each unit of non-iron formation and iron formation subunits. Cliffs used the geologic model in Vulcan for resource estimation. Sub-blocked model estimates used inverse distance squared (ID^2) and length-weighted, 10 ft, uncapped composites to estimate relevant analytical variables (Satmagan MagFe, wtrec, kWhr/LT, Sat Ratio, and silica in concentrate) in an omni-directional, single search-pass approach, using hard boundaries between subunits, ellipsoidal search ranges, and search ellipse orientation informed by geology. Average density values are calculated in the block model as a function of Satmagan MagFe and total iron content.

Mineral Resources were classified in accordance with the definitions for Mineral Resources in S-K 1300. Blocks were classified as Measured, Indicated, or Inferred using distance-based and qualitative criterion. Cliffs classifies the Mineral Resources based primarily on drill hole spacing, while classification is influenced by geologic continuity, ranges of economic criteria, and reconciliation. Some post-processing is undertaken to ensure spatial consistency and remove isolated and fringe blocks. The resource area is limited by a polygon and subsequent pit shell based on practical mining limits. A block of mineralized material is classified as Measured if the distance to the nearest drill hole is within 400 ft and estimated with interpolation pass 1. If the nearest drill hole is between 400 ft and 1,200 ft and estimated in pass 2, it is classified as Indicated. All remaining blocks are classified as Inferred; they are considered waste and excluded from the Mineral Resource estimate.

Estimates were validated using standard industry techniques including visual grade comparisons, reviews of block model coding, and statistical reviews of the global accuracy of the estimated variables and evaluation of the local accuracy through the preparation of comparative statistics.

To ensure that all Mineral Resource statements satisfy the “reasonable prospects for eventual economic extraction” requirement, the Mineral Resource estimate for HibTac considered factors significant to technical feasibility and potential economic viability. Mineral Resources were defined and constrained within LOM phase units prepared by Cliffs. Mineral Resources with an effective date of December 31, 2021, exclusive of Mineral Reserves, using a cut-off grade greater than 13% MagFe are presented in Table 11-1.

Table 11-1: Summary of Mineral Resource - December 31, 2021
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Class	Crude Ore Mineral Resources	Crude Ore MagFe	Process Recovery	Wet Pellets	Cliffs Attributed Basis	Cliffs Crude Ore Mineral Resources	Cliffs Wet Pellets
	(MLT)	(%)	(%)	(MLT)	(%)	(MLT)	(MLT)
Measured	10.1	19.2	25.4%	2.6	85.3	8.6	2.2
Indicated	0.6	18.7	25.0%	0.1	85.3	0.5	0.1
Total Measured + Indicated	**10.7**	**19.2**	**25.4%**	**2.7**	**85.3**	**9.1**	**2.3**

Notes:

1. Tonnage is reported in long tons (equivalent to 2,240 lb).
2. Mineral Resources are reported exclusive of Mineral Reserves and have been rounded to the nearest 100,000.
3. Mineral Resource estimates are based on a cut-off grade formula dependent on a few variables and restricted to material greater than 13% MagFe.
4. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
5. Bulk density is calculated based on Satmagan magnetic iron and total iron content.
6. Mineral Resources are 85.3% attributable to Cliffs and 14.7% attributable to U.S. Steel.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

The SLR QP is of the opinion that with consideration of the recommendations summarized in Sections 1 and 23 of this report, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work. Hibbing Taconite has been in operation for many years, and land and mineral control has been long established. There are no other known legal, social, or other matters that would affect the development of the Mineral Resources.

While the estimate of Mineral Resources is based on the QP's judgment that there are reasonable prospects for eventual economic extraction, no assurance can be given that Mineral Resources will eventually convert to Mineral Reserves.

11.2 Resource Database

Cliffs maintains a property-wide drill hole database in acQuire, with exports used to populate Vulcan modeling software. The HibTac Vulcan resource database dated August 28, 2020 includes drill hole collar locations, assay, and lithology data from 2,655 drill holes totaling 560,136 ft of drilling, completed between 1974 and 2019. Of these, only 1,689 drill holes pertain to the resource database and have a total of 330,158 ft of drilling. The minimum depth is 24.0 ft, and the maximum depth is 927.0 ft; the average depth is 195.5 ft. The drilling is on an approximate 400 ft x 400 ft grid. Figure 11-1 shows the location of the drill holes at HibTac.

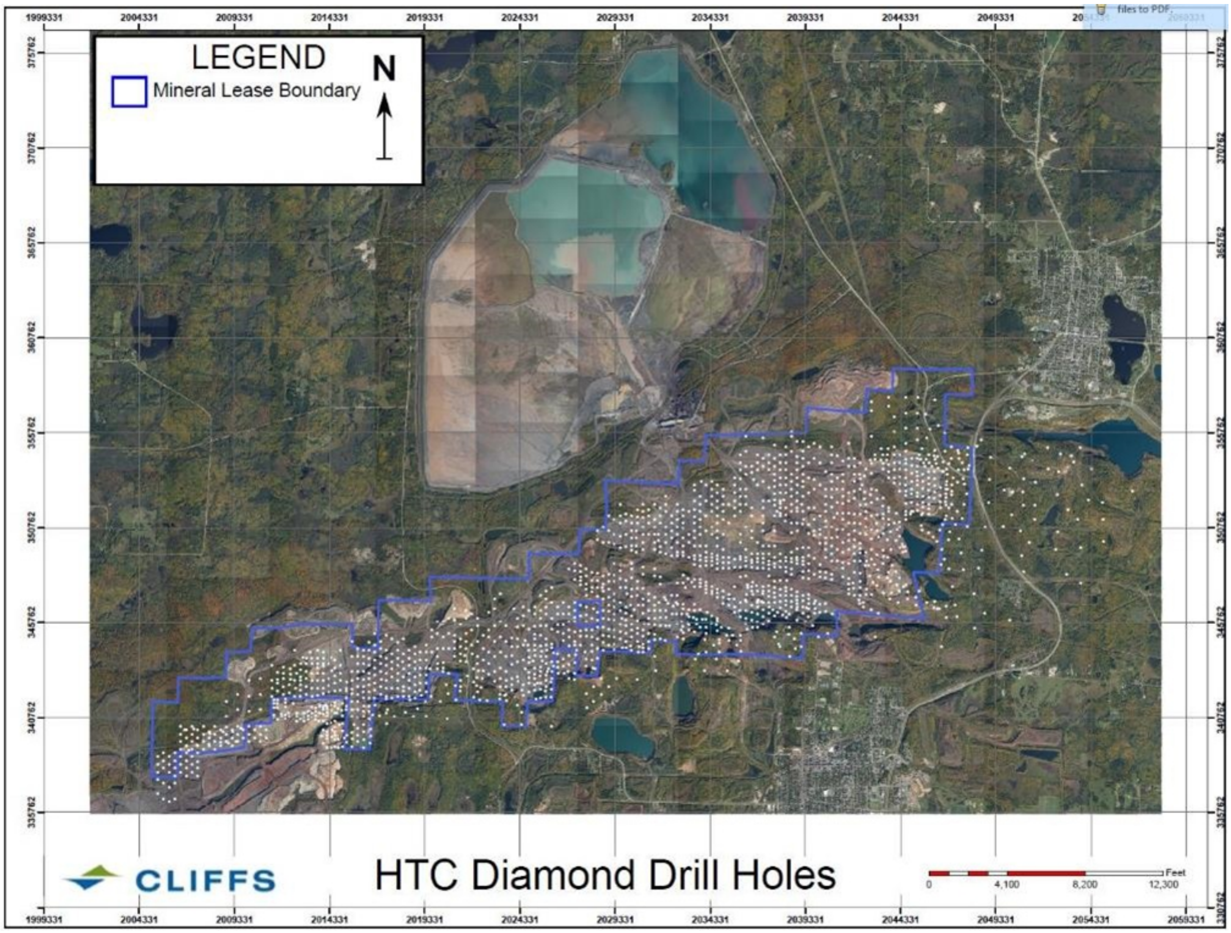


Figure 11-1: Drill Hole Location Map

There are a total 17,405 lithology records and 27,950 assay (samples) records that have values for at least one key economic variable (KEV).Key economic variables include Satmagan MagFe, wtrec, kWhr/LT, Sat Ratio, and silica in concentrate.

11.3 Geological Interpretation

11.3.1 Stratigraphy

The geologic model includes surfaces generated in Vulcan for structural floors of the stratigraphic units. The stratigraphic units in the drill hole database are loaded into the Vulcan software Integrated Stratigraphic Modeler to create Vulcan map files, which are then used to create grid surfaces for the floor of each unit. Table 11-2 shows the stratigraphic units that are modeled in this way. Subunits 1-7, 1-6, 1-5, 1-4, and 1-3 are considered to be ore types. All other subunits are considered to be non-ore types.

Table 11-2: Modeled Stratigraphic Units
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Unit	Member of Biwabik IF	Code	Ore
Stockpiles		504	No
Topographic surface		500	No
UC6	Upper Cherty	311	No
UC5	Upper Cherty		No
UC4	Upper Cherty		No
UC3	Upper Cherty		No
UC2	Upper Cherty		No
UC1	Upper Cherty		No
3-1*	Upper Cherty	311	No
2-1	Lower Slaty	211	No
1-8	Lower Cherty	181	No
1-7	Lower Cherty	172	Yes
		171	Yes
1-6	Lower Cherty	162	Yes
		161	Yes
1-5	Lower Cherty	153	Yes
		152	Yes
		151	Yes
1-4	Lower Cherty	141	Yes
1-3	Lower Cherty	132	Yes
		131	Yes

Unit	Member of Biwabik IF	Code	Ore
8-3	Lower Cherty	831	No
1-2	Lower Cherty	121	No
1-0	Lower Cherty	101	No
Top of Quartzite		1	No

The stratigraphic model is constructed using the integrated stratigraphic modeler package of Vulcan software. The modeling sequence progresses as follows:

- Surfaces are created that are used in defining the rest of the geologic units:
  - Floor of glacial till or topography, and
- Roof, floor, and structural thickness are created for each of the stratigraphic subunits:
  - The structural thickness and floor of the 161 subunit is created, then
  - The structural floor, thickness, and roof are created for each successive subunit overlying and underlying the 161, and
  - The Pokegama Quartzite (code 1) is given a constant thickness of 20 ft.
- Units 131, 151, 161, and 171 are split using grid arithmetic and tested against elevation of the underlying and overlying subunits:
  - 131: The 131 subunit is redefined as the lower 10 ft of the 131 subunit. The remaining upper subunit is defined as the 132 subunit,
  - 151: The 151 subunit is redefined as the lower 10 ft of the 151 unit, the 152 is defined as the 20 ft above the new 151 subunit, and the remaining thickness is defined as the 153 subunit,
  - 161: The 161 unit is redefined as the lower 15 ft of the 161 subunit, and the remainder of the original unit is defined as the 162 subunit, and
  - 171: The 171 subunit is redefined as the lower 10 ft of the original 171 subunit, and the remaining thickness is defined as the 172 subunit.
- Triangulation models are created of the floor grid for each of the units.

Fault zones are treated as vertical, and a fault layer in the Vulcan model effectively creates domain boundaries to the stratigraphic modeling.

The resulting units are listed in Table 11-3 and used in the block model and in coding the composite file for mineralized material estimation.

Table 11-3: Stratigraphic Codes for Block Model and Composites

Unit	Model Code	Ore
Stockpiles	504	No
3-1	311	No
2-1	211	No
1-8	181	No
1-7	172	Yes
	171	Yes
1-6	162	Yes
	161	Yes

Unit	Model Code	Ore
1-5	153	Yes
	152	Yes
	151	Yes
1-4	141	Yes
1-3	132	Yes
	131	Yes
8-3	831	No
1-2	121	No
1-0	101	No
Quartzite	1	No

11.3.2 Oxidation

Secondary oxidation within the deposit is structurally and stratigraphically controlled. Oxidation is found close to structural controls such as joints and faults and is also stratabound within specific geologic subunits. Oxidation zones are modeled using the ratio (Ratio) between Satmagan-measured magnetic iron and the measured total iron in a DT concentrate in the composite database. Ratios of less than 90 are considered to be oxidized waste. In addition, some intervals of poor core recovery that visually appear to be oxidized based on drill logs have been modeled in the oxidation zones despite Ratio values greater than 90. Wireframe solids are created for the oxidized zones for each stratigraphic unit. The solids are used to code the block model and the composite database. Figure 11-2 shows unit 131 with composites and outlines of the oxidized areas.

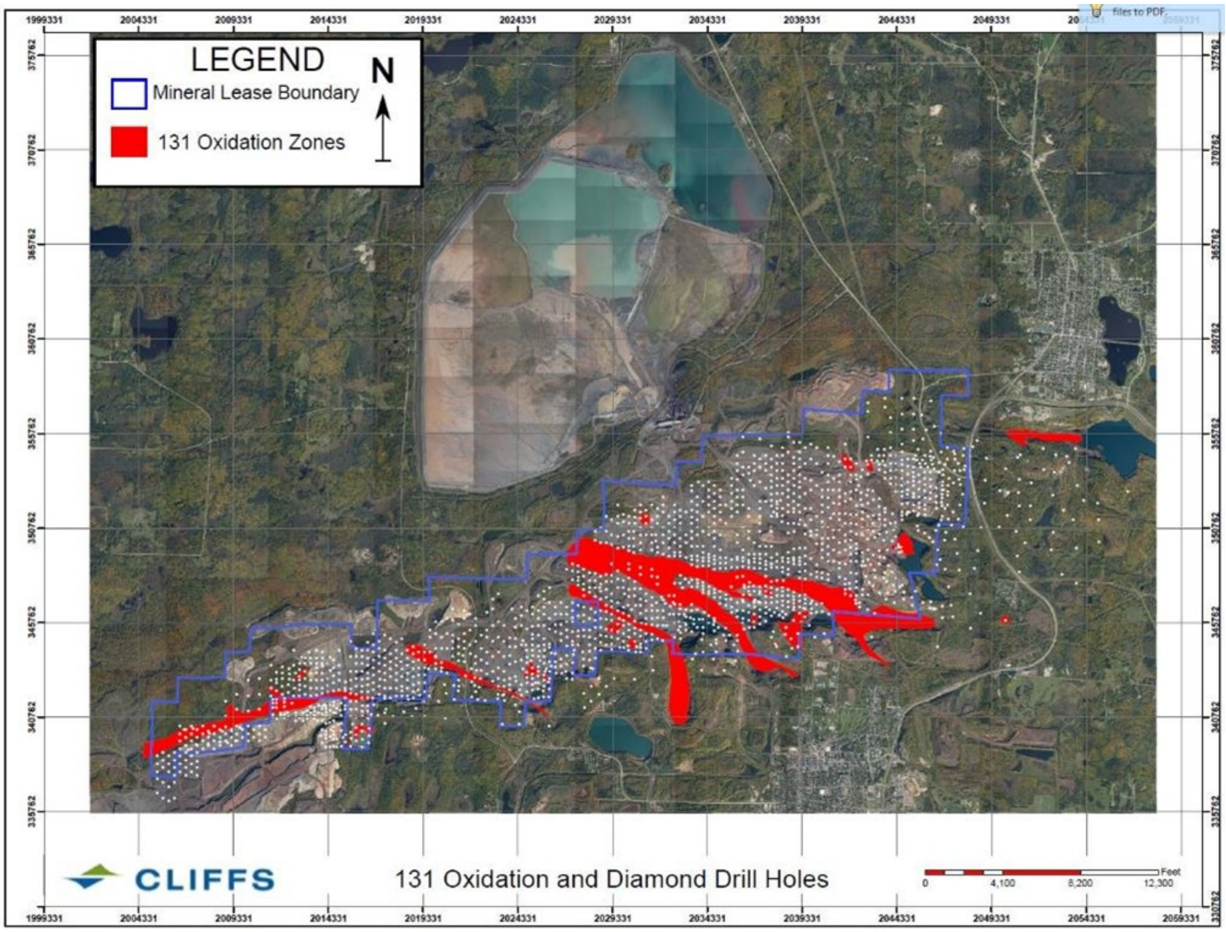


Figure 11-2: Unit 131 Triangulation with Oxidation Zones (Red Outlines) and Diamond Drill Holes

11.4. Resource Assays

The unweighted data presented in Table 11-4 is effective as of August 27, 2020.

Table 11-4: Drilling Statistics
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Variable	Count	Min (%)	Median (%)	Max (%)	Mean (%)	CV
smgfe	18,967	0.10	15.23	56.32	13.62	0.52
wtrec	19,389	0.10	22.70	44.86	20.11	0.50
silica	17,941	0.00	3.00	46.00	4.00	0.67
ciron	18,955	0.10	27.83	59.23	25.80	0.33
iron	18,533	0.10	67.67	98.60	54.94	0.45
satfe	16,431	0.10	65.28	75.37	59.17	0.27
ratio	16,422	0.00	95.00	235.00	87.00	0.25
kw_lt	8,713	1.00	12.35	25.00	12.32	0.52
libwt	8,709	0.10	24.26	82.46	21.54	0.45
libfe	5,609	1.00	NaN	29.99	20.39	0.29
lib325	8,710	0.10	74.20	150.00	69.94	0.45

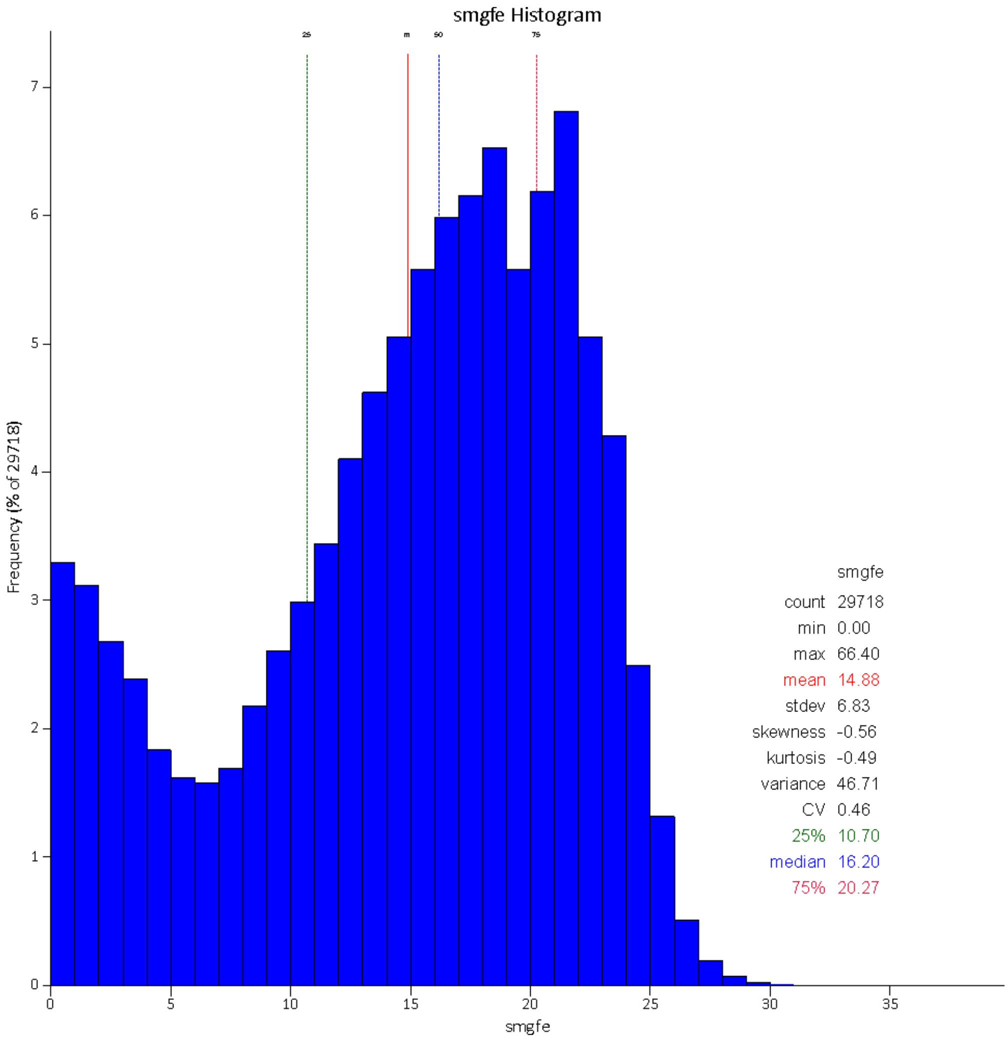


Figure 11-3: Grade Histograms: Hibbing Assay Grade Histogram (MagFe_dt)

11.5. Compositing and Capping

11.5.1 Treatment of High Value Assays

Where the assay distribution is skewed positively or approaches log-normal, erratic high-grade assay values can have a disproportionate effect on the average grade of a deposit. One method of treating these outliers in order to reduce their influence on the average grade is to cut or cap them at a specific grade level. Assessing the influence of outliers involves a number of statistical analytical methods to determine an appropriate capping value including preparation of frequency histograms, probability plots, decile analyses, and capping curves. Using these methodologies, Cliffs examined the selected capping values for each of the KEVs.Capping limits for the KEVs are shown in Table 11-5.

Table 11-5: HibTac Capping Limits for Key Economic Variables
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Variable	Cap Level
smgfe (%)	none
wtrec (%)	none
silica (%)	none
ciron (%)	none
iron (%)	none
satfe (%)	none
ratio	none
kw_lt	25
libwt	100
libfe	30
lib325	150

11.5.2 Compositing

The composite lengths used during interpolation were chosen considering the predominant sampling length, the minimum mining width, style of mineralization, and continuity of grade. Sample lengths range from 0.5 ft to 88.5 ft, with 49% of the samples taken at 10 ft intervals (Figure 11-4). Given this distribution, HibTac chose to composite to 10 ft lengths.

Compositing is performed using Vulcan software. A 10 ft, run-length compositing method is used, with the majority geological unit code recorded and intervals broken by geological domain. There are 39,999 composite intervals in the composite database. The average composite length is 6.72 ft. The smallest composite length is 0.001 ft, and the longest is 10 ft.

The SLR QP is of the opinion that this composite length is appropriate for this style of mineralization.

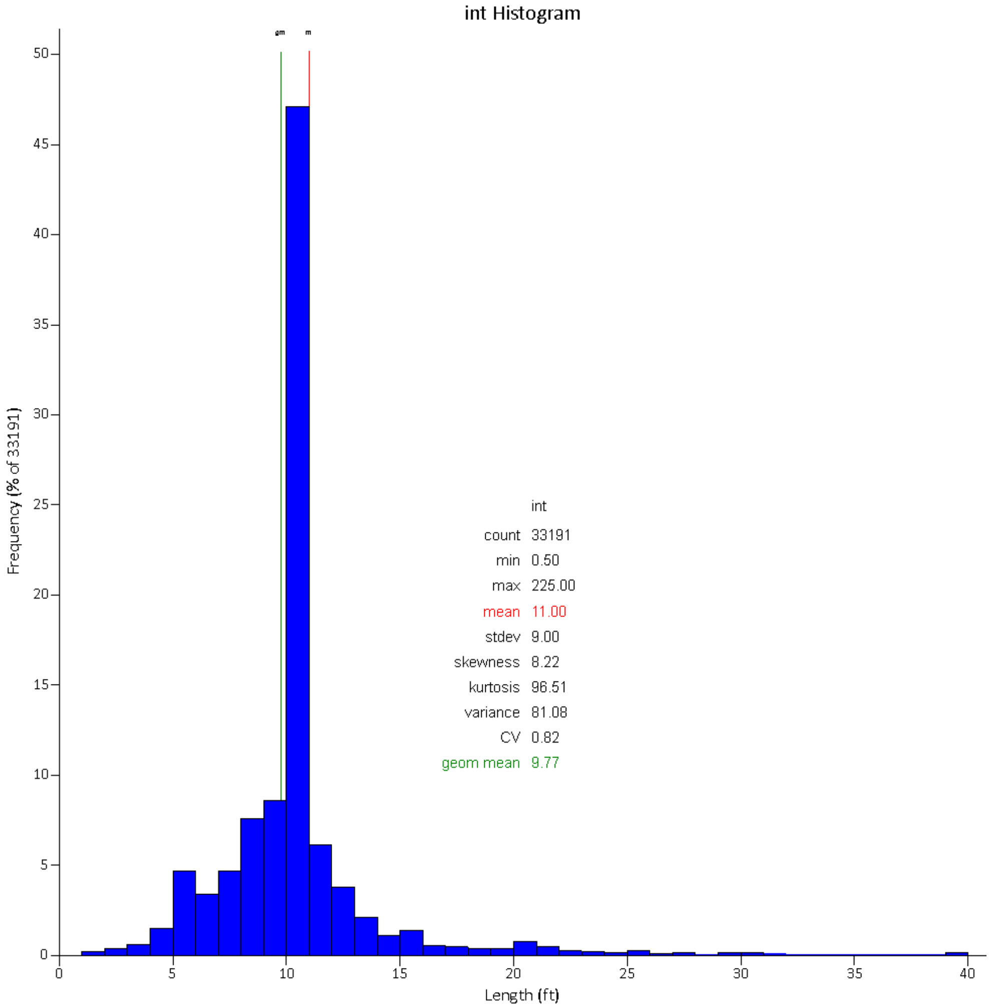


Figure 11-4: HibTac Histogram of Sample Length

11.6 Variography

HibTac does not use kriging in its estimations as the deposit is homogeneous and stratigraphic. HibTac reported that in 2007 a limited variography study on Liberation Index variables was completed by Isobel Clark of Geostokos Limited; however, this study is not material to the Mineral Resource estimate and was not used.

Current estimation practices at HibTac do not incorporate modeled semi-variogram results within the estimation, as all variables are interpolated using an inverse distance weighted (IDW) approach. Cliffs elected to use ID^2 for the estimation of quality variables.

11.7 Block Models

Sub-block and regularized block models were created by Cliffs' geologists and audited by SLR to support the Mineral Resource estimate for the iron deposits at the Property.

11.7.1 Base Sub-blocked Model

A sub-blocked base model (htcmodel2019_Q1_R1.bmf) for HibTac constructed in 2019 using Vulcan software is oriented with an azimuth of 90°, a dip of 0.0°, and a plunge of 0.0° to align with the overall strike of the mineralization within the model. Sub-blocking was used to give a more accurate volume representation of the geologic contacts (wireframes) in the gently dipping ore body using a parent block size of 100 ft by 100 ft in the X (along strike) and Y (across strike) direction and 2,000 ft in the Z (vertical or bench height) direction, honoring modeled geological surfaces. Sub-blocks are 100 ft (X) by 100 ft (Y) by 1 ft (Z). The model fully enclosed the modeled resource wireframes, with the model origin (lower-left corner at lowest elevation) at State Plane MN North NAD27 coordinates 2,004,450E, 33,595N and 0.0 (MASL) elevation. A summary of the block model extents is provided in Table 11-6. Stratigraphic codes as shown previously in Table 6-1 are assigned to the blocks during block model generation.

After the block model is created, the variable OXZONE is given a default value of "non oxidized", and those blocks where the centroid is within the oxide wireframes solid are given a value of "oxidized." The coding is done by stratigraphic unit using wireframes specific to each unit.

SLR considers the HibTac base block model parameters to be acceptable for a Mineral Resource estimate.

Upon completion of a base model by Cliffs' geologists, the block model is delivered to the Cliffs Mine Engineering team for re-blocking and estimation of Mineral Resources and Mineral Reserves.

Table 11-6: Block Model Parameters
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Deposit	Schema	Bearing	Plunge	Dip	Origin			Block Model Length (ft)			Block Dimension (ft)		
		(°)	(°)	(°)	X	Y	Z	X	Y	Z	X	Y	Z
HibTac	Parent	905	0	0	2,004,450	335,950	0	54,600	23,000	2000	100	100	200
	Sub-block										100	100	1

11.7.2 Estimation Methodology

Grade interpolation at HibTac was conducted in Vulcan using ID^2 and hard boundaries, with a one pass omni-directional search radius of 6,000 ft; a minimum of one and maximum of 15 samples were used per estimate within BIF units. The following variables are estimated or assigned into the block model using ID^2 weighting:

- Davis Tube Variables include:
    - ciron: Total Fe % in crude sample
    - smgfe: % magnetic Fe in crude sample;
    - wtrec: weight recovery from Davis Tube test;

  - iron: total Fe % in concentrate;
  - satfe: % magnetic Fe in concentrate;
  - ratio: ratio of satfe to iron;
  - silica: % silica in concentrate;
  - cmgfe: calculated crude magnetic Fe from 10-minute grind DT wtrec and concentrate Fe; and
  - oxidation code
- Liberation Index variables include:
  - libwt: weight recovery at target concentrate silica;
  - lib325: %-325 mesh (grind) at target concentrate silica;
  - kw_lt: “Liberation Index”, relative power to achieve target concentrate silica;
  - ratcal: calculated ratio; and
  - oxidation code

The estimations are conducted as follows:

- The DT variables are estimated in all blocks using only the non-oxidized composites. The variables for the non-ore types are estimated in a single pass per unit. For the ore types, the estimation is conducted for each variable separately.
- The DT variables in the ore type blocks coded as oxidized are estimated using the oxidized composites. The non-ore type blocks are not re-estimated in this pass.
- The Liberation Index variables are estimated in the ore type blocks using only the non-oxidized composites. The non-ore type blocks are not estimated, as there is little Liberation Index data in the non-ore types. The Liberation Index variables for the blocks coded as oxidized are estimated using the oxide composites. The non-ore type blocks are not estimated as there is little or no Liberation Index data in the non-ore types.
- A temporary variable is estimated for the distance (ldist) to the closest composite used in the estimation for non-oxidized blocks. This estimation uses a single composite in the estimation.
- A second temporary variable is estimated for the distance (ddist) to the closest composite used in the estimation for oxidized blocks. This estimation uses a single composite in the estimation.

11.7.3 Resource and Reserve Regularized Block Model

A new mine planning block model for the Mine (htcmodel2019_Q1_R1_lr.bmf) was constructed from the base geologic model (htcmodel2019_Q1_R1.bmf). The mine planning block model was re-blocked (regularized) to 100 ft by 100 ft by 20.0 ft. Scripts within Vulcan are executed that add variables for economic evaluation and mine planning, flag in-pit stockpile backfills, flag the current topography, re-block the model to represent the selective mining unit (SMU), incorporate crude ore loss and dilution impacts, and reinforce cut-off grades.

Iron formation can only be initially considered as “candidate” crude ore if the stratigraphy is one of the geologic subunits (as detailed in Section 6.0). All other geologic subunits are considered to be waste rock.

11.7.4 Post-estimation Script Calculations

After estimation is completed, scripts functions include adding variables, removing negative values, flagging blocks with missing or bad data, calculating ratios, adjusting silica content by geologic layer, depleting resources to the current topographic surface, assigning ore type, and classification.

The empirical silica adjustment is based on reconciliations between the DT silica in the block model and concentrate silica produced by the less efficient plant. Silica_adj is used for ore quality prediction (ore grading) and reconciliations.

Candidate crude ore must satisfy the metallurgical cut-off grades described in Table 11-7 to be considered crude ore blocks:

Table 11-7: Assignment of Ore Types and Metallurgical Cut-off Grades
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Otype2 Code	Description
0	default
1	General waste (material below 131 layer and not mined)
2	surface and in-pit stockpiles
3	-10 (% smgfe) rock stockpile material.
4	+10 (% smgfe) rock stockpile material.
5	Low or lean Taconite (for layers 131, 132, and 141)
6	High Taconite (layers 151, 152, 153, 161, 162)
7	High Taconite (layers 171, 172)
8	Upper Cherty Low Taconite (layers uc1, uc2, uc3, uc4, uc5, uc6)

Otype2 Code	Kw_lt (%)	Silica_adj (%)	Ratio	wtrec (%)	smgfe (%)	Ore Type
5	< 17.0	< 6.5	> 90	≥ 15.0	≥ 13.0	1-3/1-4 ore
6	< 17.0	< 6.5	> 90	≥ 18	≥ 15.0	1-5/1-6 ore
7			> 90	≥ 18	≥ 18.0	1-7 ore

11.7.5 Bulk Density

A density study was performed at HibTac in 2004-2005, comprising more than 1,100 core samples from the deposit. Samples were typically full 10 ft run lengths. Density is reported as a tonnage factor, ft^3/LT, at HibTac. Results of the study indicate that tonnage factor is a function of the iron content of the rock, and that function is now used to assign density to the block model for the Biwabik IF. The tonnage factor of glacial overburden is set at 18.0 ft^3/LT, and the tonnage factor of stockpile material is set at 15.0 ft^3/LT.

Currently, density for the Biwabik units is calculated in the block model as a function of Satmagan magnetic iron and total crude iron content. The equation is:

$$\text{Density } (LT/ft^3) = 1 / (13.05566 - (0.03179 * (smgfe)) - (0.0420424 * (ciron)))$$

11.8 Cut-off Grade

To ensure that all Mineral Resource statements satisfy the “reasonable prospects for eventual economic extraction” requirement, the Mineral Resource estimate for the HibTac deposit considered factors significant to technical feasibility and potential economic viability. Mineral Resources were defined and constrained within LOM phase units, prepared by Cliffs.

11.9 Classification

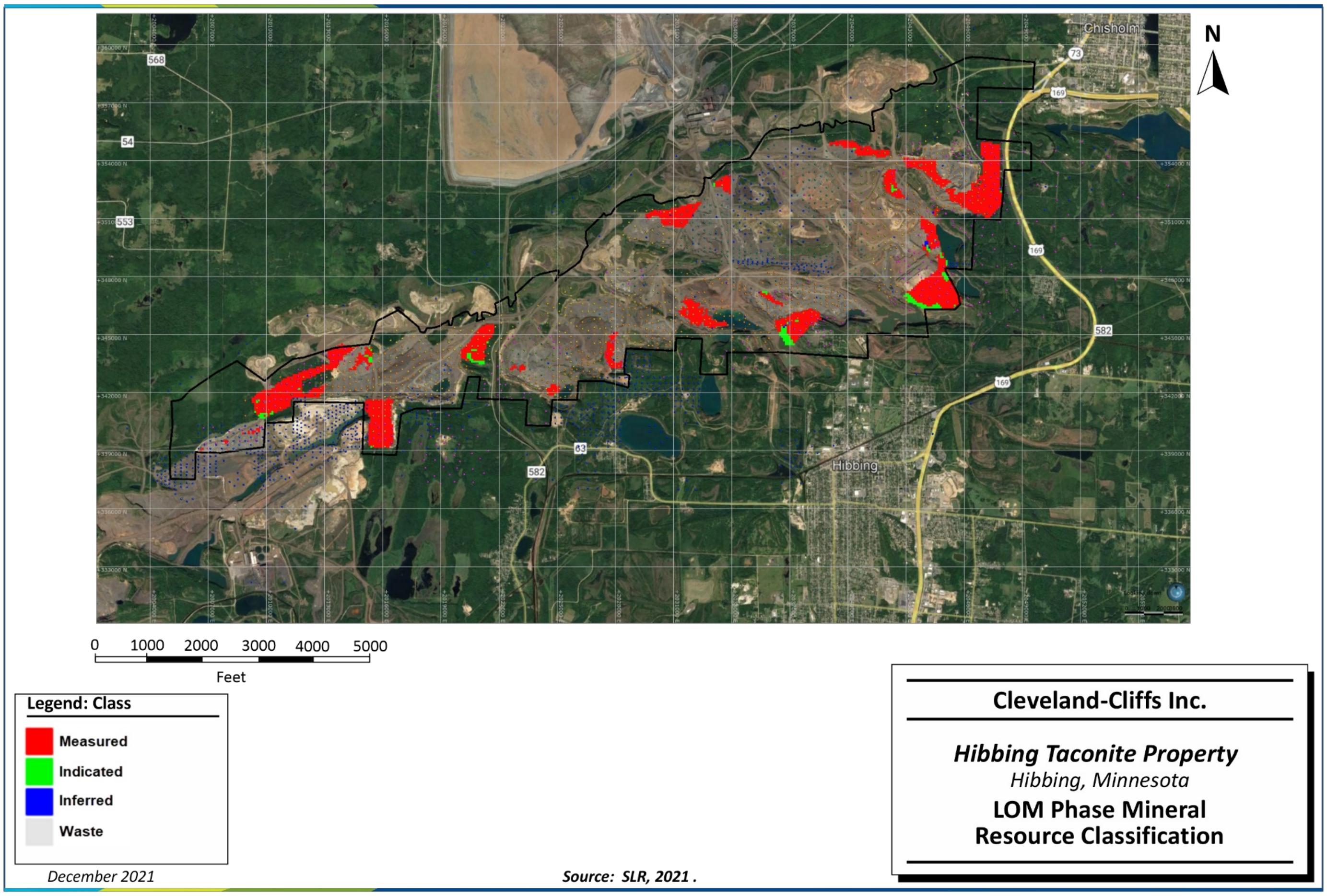
Definitions for resource categories used in this TRS are those defined by SEC in S-K 1300Mineral Resources are classified into Measured, Indicated, and Inferred categories.

Cliffs classifies the Mineral Resources based primarily on drill hole spacing; classifications are influenced by geologic continuity, ranges of economic criteria, and reconciliation. Some post-processing is undertaken to ensure spatial consistency and remove isolated and fringe blocks. The resource area is limited by a polygon and subsequent pit shell based on practical mining limits. A block of ore is classified as Measured if the distance to the nearest drill hole is within 400 ft and estimated with the interpolation pass 1. If the nearest drill hole is between 400 ft and 1,200 ft and estimated in pass 2, it is classified as Indicated. All remaining blocks are classified as Inferred; they are considered waste and excluded from the Mineral Resource estimate. Classification of LOM Mineral Resources inclusive and exclusive of Mineral Reserves is shown in Figure 11-5 and Figure 11-6, respectively.

In addition to numeric-based parameters, the relative confidence of all the data inputs during the assignment of the resource confidence category has been considered, including:

- the reliability of the drilling data,
- reliability or certainty of the geological and grade continuity, geological model interpretation, structural interpretation, and the assay database,
- reliability of inputs to assess reasonable prospects for eventual economic extraction and cut-off grades (e.g., the ability to obtain permits, social license, etc.), and
- legal and land tenure considerations.

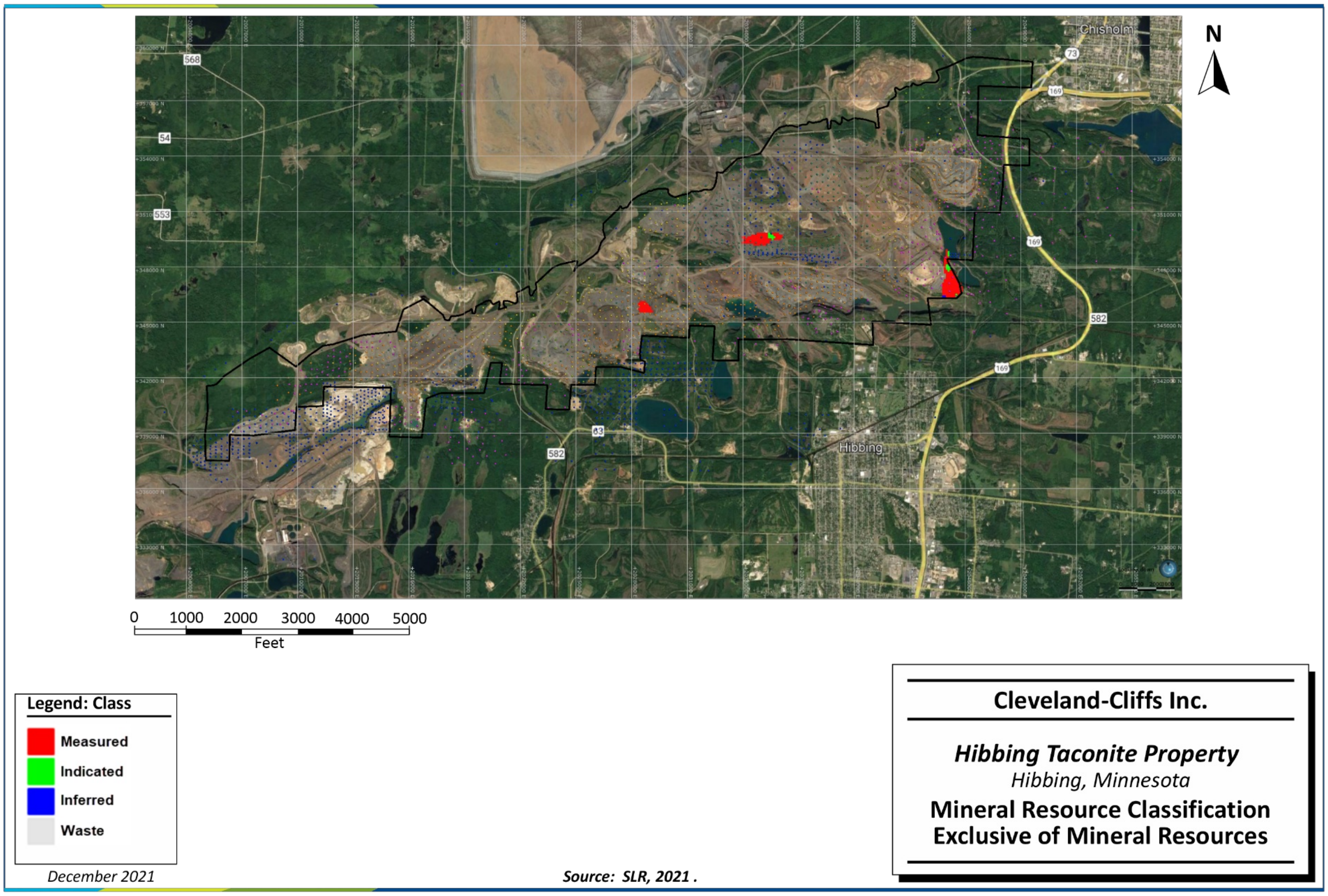
The QP is of the opinion that the classification at HibTac is acceptable for the disclosure of Mineral Resources.



December 2021

Source: SLR, 2021 .

Figure 11-5: LOM Phase Mineral Resource Classification



Source: SLR, 2021 .

Figure 11-6: Mineral Resource Classification Exclusive of Mineral Reserves

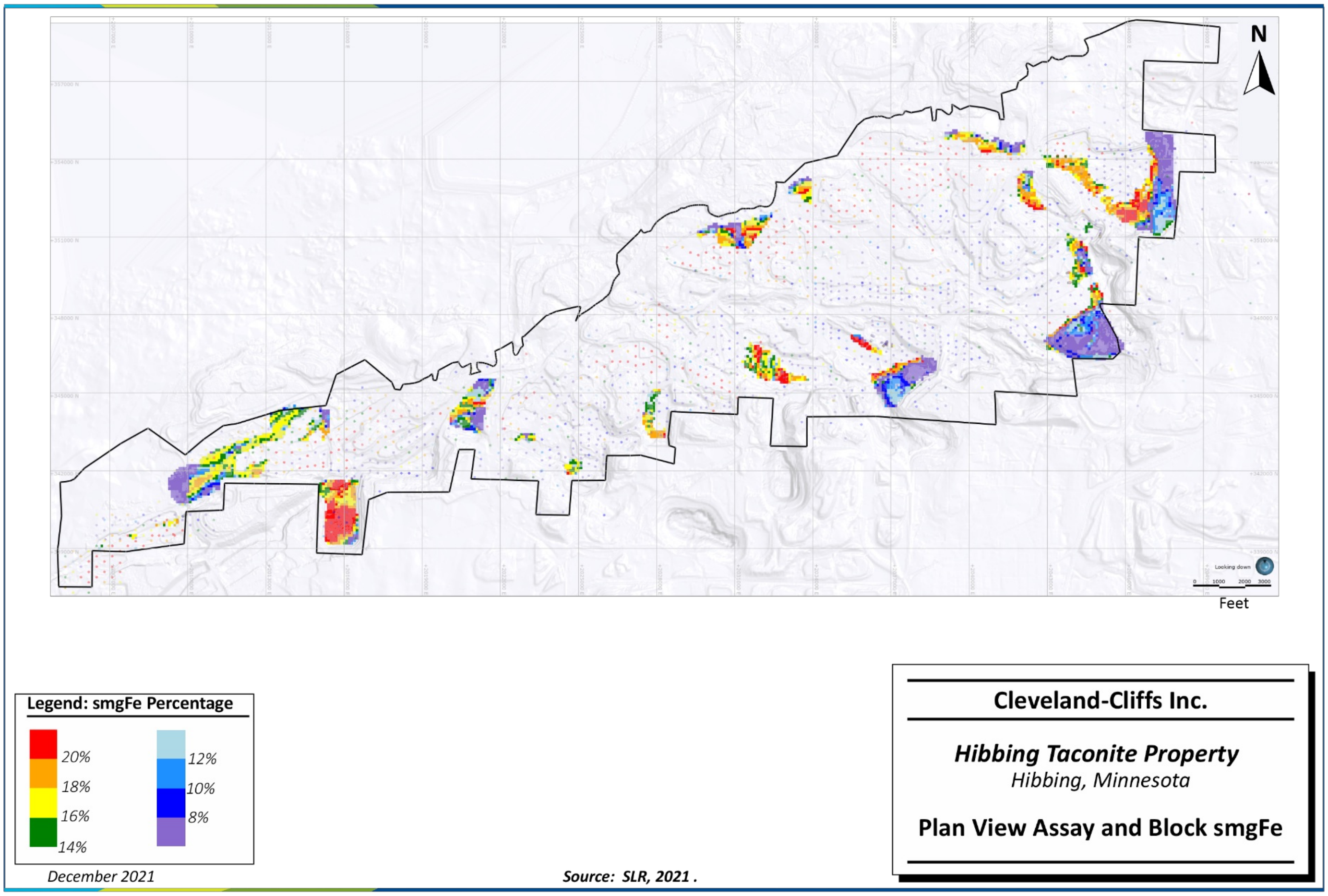
11.10. Block Model Validation

Validation of the Mineral Resource estimate results included visual grade comparisons, reviews of block model coding, and statistical reviews of the global accuracy of the estimated variables and evaluation of the local accuracy through the preparation of comparative statistics.

11.10.1 Visual Inspection

Visual comparisons between the composites and estimated block grades were conducted on vertical sections and plan views. SLR is of the opinion that the estimated block grades reflect the local drill hole composite value and that the trends displayed are as intended. A plan-view comparison is shown in Figure 11-7.

SLR reviewed the smgfe variable relative to blocks, drilled grades, and composites.SLR observed that the block grades exhibited general accord with drilling and sampling and did not appear to smear significantly across sampled grades.



Cleveland-Cliffs Inc.

Hibbing Taconite Property
Hibbing, Minnesota

Plan View Assay and Block smgFe

December 2021

Source: SLR, 2021 .

Figure 11-7: Plan View Assay and Block smgfe

11.10.2. Comparative Statistics Composites vs. Block Grades

Comparative statistics between composite and block data was not reliable due to the clustered nature of the drill data. In place of this, the final estimated value was compared to a NN estimate, as a proxy of the declustered input data. No reconciliation with the short-term model was carried out; however, SLR understands that a comprehensive reconciliation study is currently underway.

The mean grades in composites and blocks compare favorably for the smgfe evaluated in Lower Cherty and Upper Cherty (Table 11-8, Figure 11-8 through Figure 11-10).

Table 11-8: Comparative Statistics of Composites and Blocks for Key Economic Variables
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Data	Domain Field	Domain	Variable	Count	Min (%)	Max (%)	Mean (%)	CV	StDev (%)	% Mean Δ
Block Model	otype2	1	smgfe	162,749	0.47	25.99	8.99	0.41	3.67	15.70%
Composite	otype2	1	smgfe	2,958	0.10	26.53	7.77	0.68	5.27	
Block Model	otype2	3	smgfe	144,719	0.01	10.00	4.60	0.67	3.07	
Composite	otype2	3	smgfe							
Block Model	otype2	4	smgfe	182,657	10.00	27.34	13.85	0.17	2.39	
Composite	otype2	4	smgfe							
Block Model	otype2	5*	smgfe	110,011	13.00	26.95	16.34	0.10	1.58	10.26%
Composite	otype2	5*	smgfe	4,994	0.30	27.12	14.82	0.28	4.21	
Block Model	otype2	6*	smgfe	147,025	15.00	27.36	19.84	0.10	2.01	19.45%
Composite	otype2	6*	smgfe	7,227	0.13	37.69	16.61	0.45	7.55	
Block Model	otype2	7*	smgfe	37,950	15.00	26.49	17.49	0.10	1.70	32.30%
Composite	otype2	7*	smgfe	1,773	0.23	29.00	13.22	0.50	6.60	
Block Model	otype2	8	smgfe	254	13.01	20.78	15.72	0.10	1.62	84.72%
Composite	otype2	8	smgfe	695	0.10	56.32	8.51	0.68	5.79	
Block Model	otype2	1	wtrec	162,749	0.01	34.42	13.52	0.39	5.22	12.85%
Composite	otype2	1	wtrec	2,951	0.10	38.80	11.98	0.65	7.76	
Block Model	otype2	3	wtrec	144,719	0.00	32.73	7.95	0.76	6.07	
Composite	otype2	3	wtrec							
Block Model	otype2	4	wtrec	182,657	2.76	42.19	21.11	0.18	3.78	
Composite	otype2	4	wtrec							
Block Model	otype2	5*	wtrec	110,011	15.09	35.22	22.85	0.10	2.29	12.48%
Composite	otype2	5*	wtrec	5,171	0.50	35.56	20.32	0.35	7.09	
Block Model	otype2	6*	wtrec	147,025	18.04	39.44	28.36	0.10	2.94	14.88%
Composite	otype2	6*	wtrec	7,498	0.60	42.70	24.69	0.41	10.11	
Block Model	otype2	7*	wtrec	37,950	19.06	40.99	25.16	0.11	2.83	21.19%

Data	Domain Field	Domain	Variable	Count	Min (%)	Max (%)	Mean (%)	CV	StDev (%)	% Mean Δ
Composite	otype2	7*	wtrec	1,776	0.40	44.54	20.76	0.44	9.22	
Block Model	otype2	8	wtrec	254	17.49	28.90	22.55	0.12	2.73	62.91%
Composite	otype2	8	wtrec	687	0.13	33.89	13.84	0.61	8.48	
Block Model	otype2	1	silica	162,749	0.00	26.00	7.00	0.41	3.00	16.67%
Composite	otype2	1	silica	2,419	0.00	46.00	6.00	0.73	4.00	
Block Model	otype2	3	silica	143,567	0.00	45.00	6.00	0.40	2.00	
Composite	otype2	3	silica							
Block Model	otype2	4	silica	182,657	0.00	28.00	5.00	0.44	2.00	
Composite	otype2	4	silica							
Block Model	otype2	5*	silica	110,011	1.00	4.00	3.00	0.17	1.00	0.00%
Composite	otype2	5*	silica	4,949	1.00	15.00	3.00	0.36	1.00	
Block Model	otype2	6*	silica	147,025	1.00	4.00	3.00	0.21	1.00	0.00%
Composite	otype2	6*	silica	7,136	1.00	22.00	3.00	0.48	2.00	
Block Model	otype2	7*	silica	37,950	1.00	5.00	3.00	0.16	0.00	-25.00%
Composite	otype2	7*	silica	1,701	1.00	28.00	4.00	0.50	2.00	
Block Model	otype2	8	silica	254	3.00	4.00	4.00	0.05	0.00	-33.33%
Composite	otype2	8	silica	640	1.00	20.00	6.00	0.47	3.00	

*Ore Domains

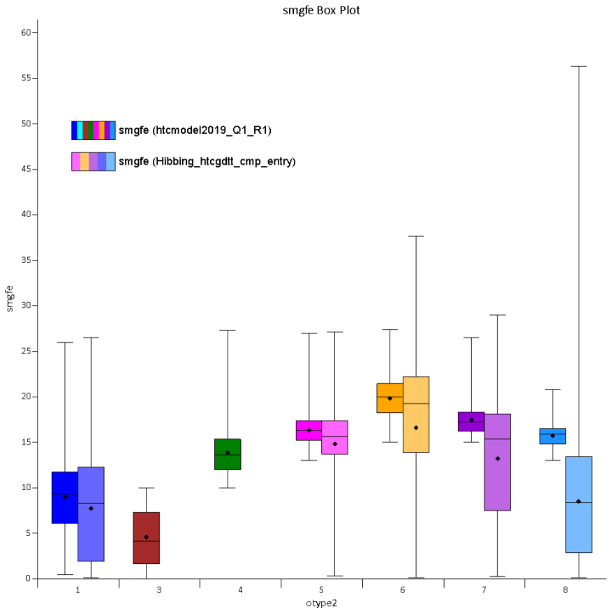


Figure 11-8: Whisker Plots for smgfe Composites and Blocks Otype2 Domains

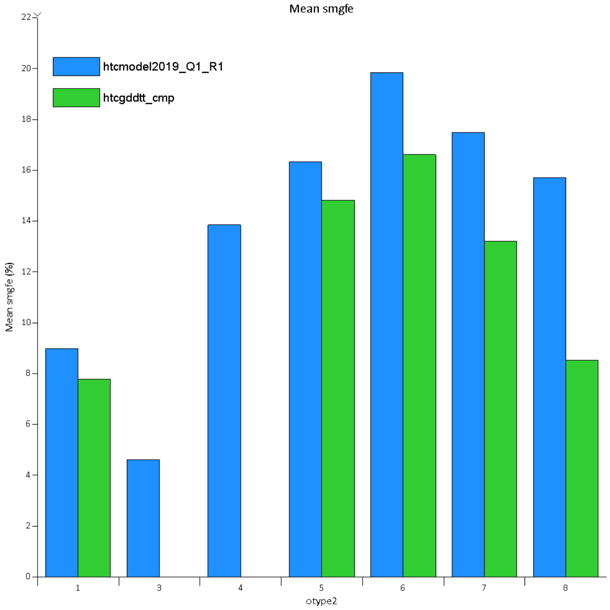


Figure 11-9: Histogram for smgfe Composites and Blocks Otype2 Domains

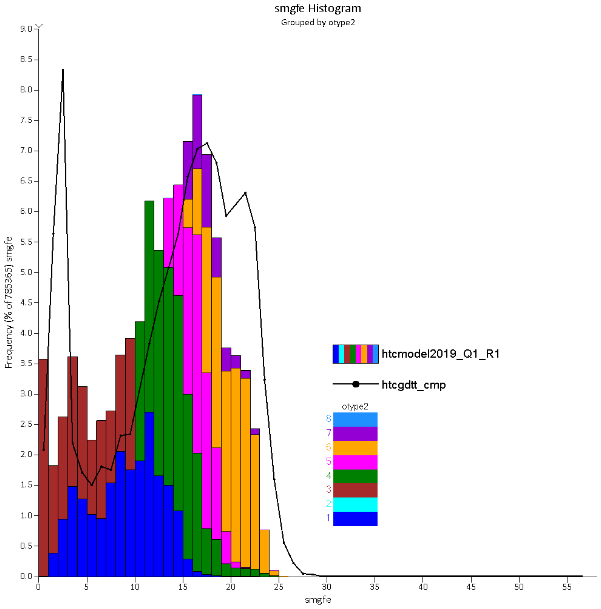


Figure 11-10: Histogram smgfe Composites and Blocks Otype2 Domains

While the industry-standard validation steps are not typically conducted by HibTac personnel, SLR assigned the block grades to the composite file in order to construct scatter plots of block grades versus composite grades for the HibTac base model. Figure 11-11 through Figure 11-13 show scatter plots for magnetite (smgfe), wtrec, and silica, which illustrate that the composite grades and the associated block grades compare reasonably well. As the model process has remained constant through the years, and as HibTac continues to make its production targets, it is reasonable to assume that results would be similar for subsequent Mineral Resource estimations.

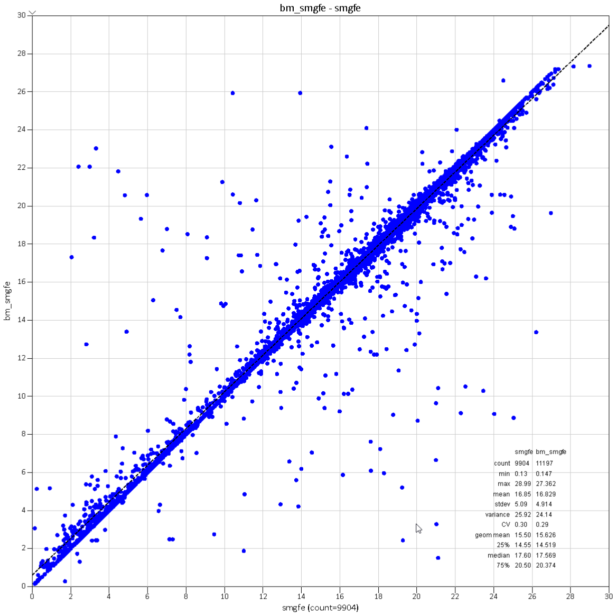


Figure 11-11: Scatter Plot smgfe Grade Composites versus Blocks Otype2 (5, 6, and 7) Domains

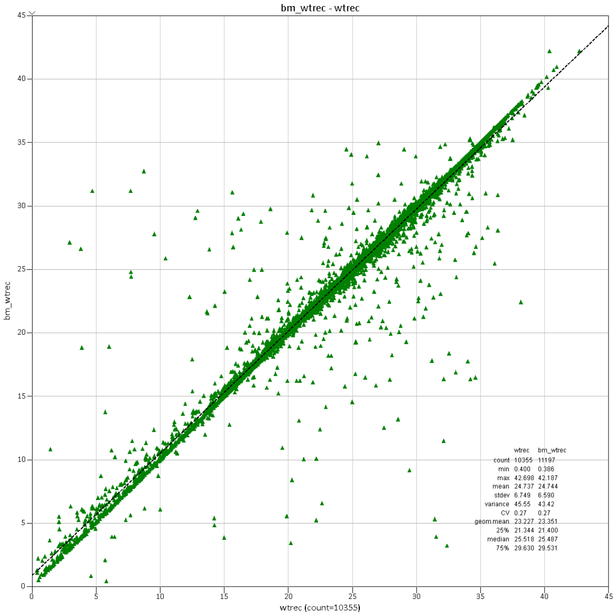
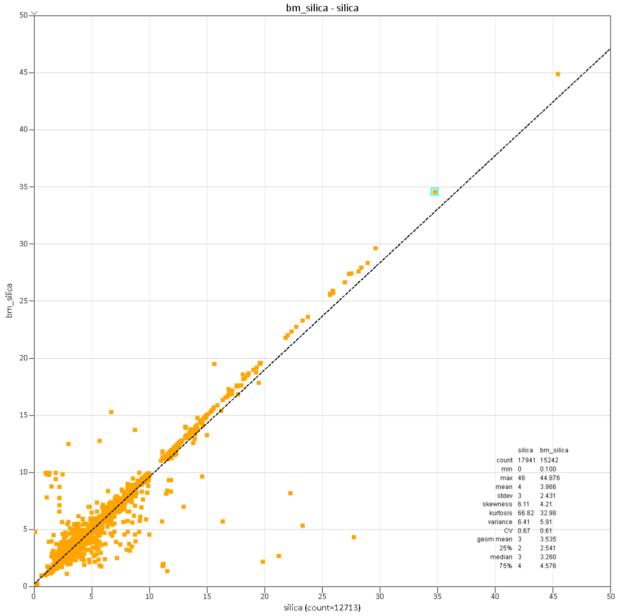


Figure 11-12: Scatter Plot wtrec Grade Composites versus Blocks Otype2 (5, 6, and 7) Domains



	silica	bm_silica
count	17941	15242
min	0	0.100
max	46	44.876
mean	4	3.966
stdev	3	2.431
skewness	6.11	4.21
kurtosis	66.82	32.98
variance	6.41	5.91
CV	0.67	0.61
geom mean	3	3.535
25%	2	2.541
median	3	3.260
75%	4	4.576

Figure 11-13: Scatter Plot Silica Grades Composites versus Blocks Otype2 (5, 6, and 7) Domains

11.11 Model Reconciliation

Reconciliation results, comparing actual production versus model-predicted values of crude ore, for wtrec and silica_adj between 2019 and 2020 are presented in Table 11-9.

Table 11-9: 2019 to 2020 Model Reconciliation
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	2019		2020		2019 & 2020		
	Modeled	Actual	Modeled	Actual	Modeled	Actual	%Δ
Total Tons	55,631,443	59,275,823	47,610,961	45,246,116	103,242,404	104,521,939	1.2%
Total Ore[1]	21,146,962	27,311,896	16,195,498	21,467,572	37,342,460	48,779,468	23.4%
Total Waste	34,484,481	31,963,927	31,415,463	23,778,544	65,899,944	55,742,471	-18.2%
Strip Ratio	1.63	1.17	1.94	1.11	1.76	1.14	
1-7_ore	907,738	1,649,116	641,917	1,275,081	1,549,656	2,924,197	47.0%
1-56_ore	15,060,057	17,723,603	13,607,781	16,467,015	28,667,839	34,190,618	16.2%
1-34_ore	5,179,166	7,939,177	1,945,800	3,725,476	7,124,966	11,664,653	38.9%
stockpile	6,717,987	7,525,975	6,609,613	6,067,949	13,327,600	13,593,924	2.0%
+10_rock[2]	9,940,532	24,437,952	10,915,389	17,710,595	20,855,921	42,148,547	50.5%
-10_rock	17,825,962	0	13,890,461	0	31,716,423	0	
Wtrec (%)	27.28	26.53	27.26	25.79	27.27	26.20	22.72
Smgfe (%)	19.40	18.76	19.60	18.03	19.49	18.44	15.01
silica_adj (%)	4.72	4.78	4.59	4.90	4.66	4.83	5.50
Wet Pellets[3]	5,599,865	7,300,000	4,284,498	5,454,000	9,884,363	12,754,000	22.5

Notes:

1. Excluding approximately 750 kLT of In-pit Crushing and Cobbing (IPCC) material from both the modeled estimate on the voids and actual tonnages
2. Actual production numbers didn't differentiate between +10/-10 waste rock, all was accumulated in the +10 row
3. Actual pellets were taken from the 10-K depletion numbers (2019 adjusted to estimate the removal of the IPCC contribution)

Overall, the block model is slightly conservative and matching well to total tons but under-reporting against actual ore production:

- Total ore under-predicted by 23.4%.
- Waste over-predicted by 18.2%.

11.12 Mineral Resource Statement

The Mineral Resource estimate for HibTac was prepared by Cliffs and audited and accepted by SLR using available data from 1938 to 2019.

To ensure that all Mineral Resource statements satisfy the “reasonable prospects for eventual economic extraction” requirement, the Mineral Resource estimate for the HibTac deposit considered factors significant to technical feasibility and potential economic viability. Mineral Resources were defined and constrained within LOM phase units, prepared by Cliffs.

The Mineral Resource estimate as of December 31, 2021, is presented in Table 11-10.

Table 11-10: Summary of Mineral Resource - December 31, 2021
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Class	Crude Ore Mineral Resources	Crude Ore MagFe	Process Recovery	Wet Pellets	Cliffs Attributed Basis	Cliffs Crude Ore Mineral Resources	Cliffs Wet Pellets
	(MLT)	(%)	(%)	(MLT)	(%)	(MLT)	(MLT)
Measured	10.1	19.2	25.4%	2.6	85.3	8.6	2.2
Indicated	0.6	18.7	25.0%	0.1	85.3	0.5	0.1
Total Measured + Indicated	**10.7**	**19.2**	**25.4%**	**2.7**	**85.3**	**9.1**	**2.3**

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Mineral Resources are reported exclusive of Mineral Reserves and have been rounded to the nearest 100,000.
3. Mineral Resource estimates are based on a cut-off grade formula dependent on a few variables and restricted to material greater than 13% MagFe.
4. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
5. Bulk density is calculated based on Satmagan magnetic iron and total iron content.
6. Mineral Resources are 85.3% attributable to Cliffs and 14.7% attributable to U.S. Steel.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

Resource estimates take account of the minimum block size that can be selectively extracted. Mineral Resources are exclusive of Mineral Reserves and are reported at equal to or greater than 13% MagFe cut-off grade. Mining recovery is typically 100%, although the grade tends to be diluted by 1% MagFe due to geological conditions and mining practices.

The SLR QP is of the opinion that with consideration of the recommendations summarized in Sections 1 and 23 of this report, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work. HibTac has been in operation for many years, and land and mineral control has been long established. There are no other known legal, social, or other matters that would affect the development of the Mineral Resources.

While the estimate of Mineral Resources is based on the QP's judgment that there are reasonable prospects for eventual economic extraction, no assurance can be given that Mineral Resources will eventually convert to Mineral Reserves.

The QP offers the following conclusions with respect to the HibTac Mineral Resource estimates:

- The KEVs in the block models for HibTac compare well with the source data.
- The methodology used to prepare the block model is appropriate and consistent with industry standards.
- Validations compiled by the QP indicate that the block model reflects the underlying support data appropriately.
- The classification at HibTac is acceptable for the disclosure of Mineral Resources.

The QP offers the following recommendations with respect to the HibTac Mineral Resource estimates:

1. Apply a minimum of two holes during the first pass estimation for HibTac in future updates.

2. In future updates, use local drill hole spacing in place of a distance-to-drill hole criterion for block classification.

12.0 MINERAL RESERVE ESTIMATES

Mineral Reserves in this TRS are derived from the current Mineral Resources.The Mineral Reserves are reported as crude ore and are based on open pit mining from the Mine. Crude ore is the unconcentrated ore as it leaves the mine at its natural *in situ* moisture content. The Proven and Probable Mineral Reserves are estimated as of December 31, 2021 and summarized in Table 12-1.

Table 12-1: Summary of HibTac Mineral Reserves – December 31, 2021
Cleveland-Cliffs Inc. – Hibbing Taconite Property

	Crude Ore Mineral Reserves (MLT)	Crude Ore MagFe (%)	Process Recovery (%)	Wet Pellets (MLT)	Cliffs Attributed Basis (%)	Cliffs Crude Ore Mineral Reserves (MLT)	Cliffs Wet Pellets (MLT)
Proven	100.1	18.7	25.4	25.5	85.3	85.4	21.7
Probable	9.1	18.7	25.6	2.3	85.3	7.8	2.0
Proven & Probable	**109.3**	**18.7**	**25.5**	**27.8**	**85.3**	**93.2**	**23.7**

Notes:

1. Tonnage is reported in long tons (equivalent to 2,240 lb) and has been rounded to the nearest 100,000.
2. Mineral Reserves are estimated based on a cut-off grade formula dependent on a few variables and restricted to material greater than 13% MagFe.
3. The Mineral Reserve mining stripping ratio (waste units to crude ore units) is at 1.0.
4. Pellets are reported as a wet standard equivalent containing 66% Fe.
5. Tonnage estimate based on December 31, 2021 production depletion from surveyed topography on June 15, 2021.
6. Mineral Reserve tons are as delivered to the primary crusher; pellets are as loaded onto lake freighters in Superior, Wisconsin.
7. Classification of the Mineral Reserves is in accordance with the S-K 1300 classification system.
8. Mineral Reserves are 85.3% attributable to Cliffs and 14.7% attributable to U.S. Steel.
9. Numbers may not add due to rounding.

SLR is not aware of any risk factors associated with, or changes to, any aspects of the modifying factors such as mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

12.1 Conversion Assumptions, Optimization Parameters, and Methods

Using the mine planning block model for HibTac, pit designs are conducted to convert the Mineral Resources to Mineral Reserves.

Iron formation can only be initially considered as "candidate" crude ore if the stratigraphy is one of the following geologic subunits (as detailed in Section 11.0):

- Low or Lean Taconite (litho codes 131, 132, and 141)
- High Taconite (litho codes 151, 152, 153, 161, and 162)
- High Taconite (litho codes 171 and 172)

All other geologic subunits are waste.

Candidate crude ore must then meet the following additional criteria to be considered crude ore blocks:

- Satisfy the metallurgical cut-off grades as described in section 11.7.4. In summary, candidate crude ore with MagFe lower than 15% (13% for 1-3/1-4 ore) is waste and is stockpiled separately.
- Be classified as a Measured or Indicated Mineral Resource (Inferred Mineral Resources are considered to be waste).
- Not occur within a mining restricted area.
- Generate a net block value greater than the cost of the block as if it were mined as waste.
- A new mine planning block model for the HibTac pit (htcmodel2019_Q1_R1_lr.bmf) was constructed in July 2021 from the geologic model (htcmodel2019_Q1_R1.bmf). Scripts within Vulcan are executed that add variables for mine planning, flag in-pit stockpile backfills, flag the current topography, re-block the model to represent the selective mining unit (SMU), incorporate crude ore loss and dilution impacts, and reinforce cut-off grades. The resulting block models are evaluated using the Chronos scheduling packages in Vulcan.
- A comparison of the actual pellet production to the modeled pellet production (against htcmodel2019_Q1_R1_lr.bmf) for 2019 and 2020 indicates a positive reconciliation. HibTac has been increasing dilution considerably as it nears the end of mine life. This is one of the strategies the site has implemented to extend the mine life, but which is not included in long range planning. This strategy is likely to result in the LOM plan under-predicting pellet production in the long term as confirmed by the 2019 and 2020 results. To incorporate the crude ore loss and mining dilution assumptions into the Mineral Reserve estimate, the mine planning model used an SMU to re-block the model and better reflect mining selectivity. The mine planning model was re-blocked to 100 ft by 100 ft by 20 ft (i.e., half the bench height) to represent the site's operational practice of top-cutting blasts that include the ore/waste transition.

HibTac has a long history of plant recovery, which is used as part of the pit optimization. The following summarizes the empirical relationship for pellet production based on crude ore tons and DT weight recovery:

Wet Pellet Tons = (Crude Ore Tons x (DT Weight Recovery - Discount) / 100 x Recovery Factor) / (1- %Pellet Moisture)

Where:

- Discount = 1.2%;
- Pellet Moisture = 2.0%; and
- Recovery Factor = 0.995.

From 2014 through 2020, the equation has reconciled within 3% of the production years when comparing calculated wet pellet production to actual wet pellet production. Figure 12-1 shows the 2014 through 2020 variance between calculated and actual fluxed pellet production.

All Measured and Indicated Mineral Resources within the final designed pit that meet the above criteria are converted into Mineral Reserves.

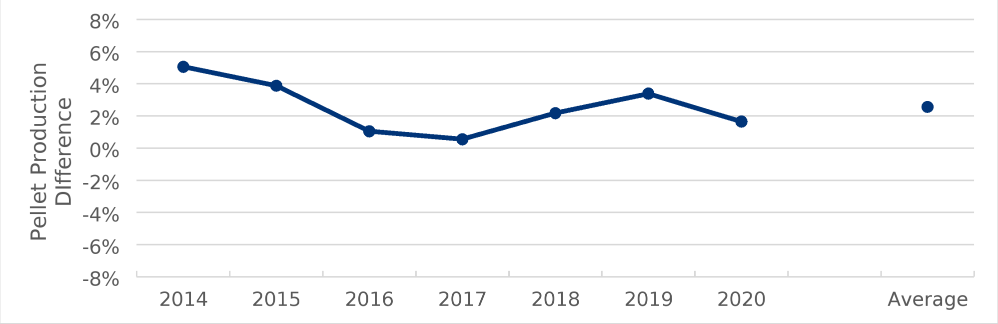


Figure 12-1: 2014–2020 Calculated versus Actual Pellet Production

12.2 Previous Mineral Reserve Estimates

Cliffs acquired the Mine during the 2020 purchase of AMUSA's assets.The SEC-reported Mineral Reserves for the past ten years are listed in Table 12-2. These Mineral Reserves were not prepared under the recently adopted SEC guidelines; however, they followed SEC Guide 7 requirements for public reporting of Mineral Reserves in the United States.

Table 12-2: Previous Mineral Reserves
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Year	Crude Ore		Product	
	Total Proven & Probable (MLT)	Grade (% MagFe)	Process Recovery (%)	Pellets Wet (MWLT)
2011(1)	378	19.8	26.2	99
2012(2)	349	19.8	26.2	91
2013(3)	288	19.0	26.1	75
2014(4)	260	18.9	26.1	68
2015(5)	231	18.8	26.1	60
2016(6)	233	19.5	26.5	62
2017(7)	179	19.6	26.4	47
2018(8)	150	19.7	26.5	40
2019(9)	122	19.7	26.6	32
2020(10)	101	19.7	26.9	27

Source: Cliffs 10-K Filing

12.3 Pit Optimization

HibTac’s Mineral Reserves fully capture all material that is currently identified as mineable. Pit optimizations were not completed.

12.4 Mineral Reserve Cut-off Grade

The Mineral Reserve cut-off grade is governed by metallurgical constraints applied in order to produce a saleable product followed by verification through a break-even cut-off grade calculation. The Mineral Reserves are reported at a 15% crude magnetic iron (13% for 1-3/4 ore; BM variable : smgfe), which is the same cut-off criteria used for Mineral Resources described in Section 11.7.4 for a minimum magnetic iron content. In addition to MagFe, limits on the following also apply:

- Adjusted Silica (silica_adj) less than 6.5%
- Kw_lt (Liberation Index; relative power to achieve target concentrate silica; BM variable: Kwhlt) less than 17%
- Ratio (satfe/iron; measure of oxidation) >= 90%

12.5 Mine Design

The Mine’s final pit designs incorporate several design variables that include geotechnical parameters (e.g., wall angles and bench configurations), equipment size requirements (e.g., mining height and ramp configuration), and physical mining limits (e.g., property boundaries and existing infrastructure). The following summarizes the design variables and final pit results; more detail is provided in the preceding subsections and in Section 13.0.

The final highwall pit slope is designed at an inter-ramp angle (IRA) of 42.5° for *in situ* bedrock and 18.4° for surface overburden. The bench design for bedrock consists of double-stacked, 40 ft-high mining benches with a 65° bench face angle (BFA) and a 50 ft catch bench (CB).There are no ramps designed into the final highwall, as the footwall slope is less than 8% for most of the mining areas and can support the development of haulage ramps.

There are multiple physical mining limits that are applied to the mine plan:

- The crude ore Mineral Reserve boundary resides within controlled mineral lease areas and also within the existing Permit to Mine;
- Mining limits are set at 2,000 ft from the closest buildings in the local communities; and
- Mining limits are set at 200 ft from the centerline of local roads and highways.

The LOM final pit designs are shown in Figure 12-2.

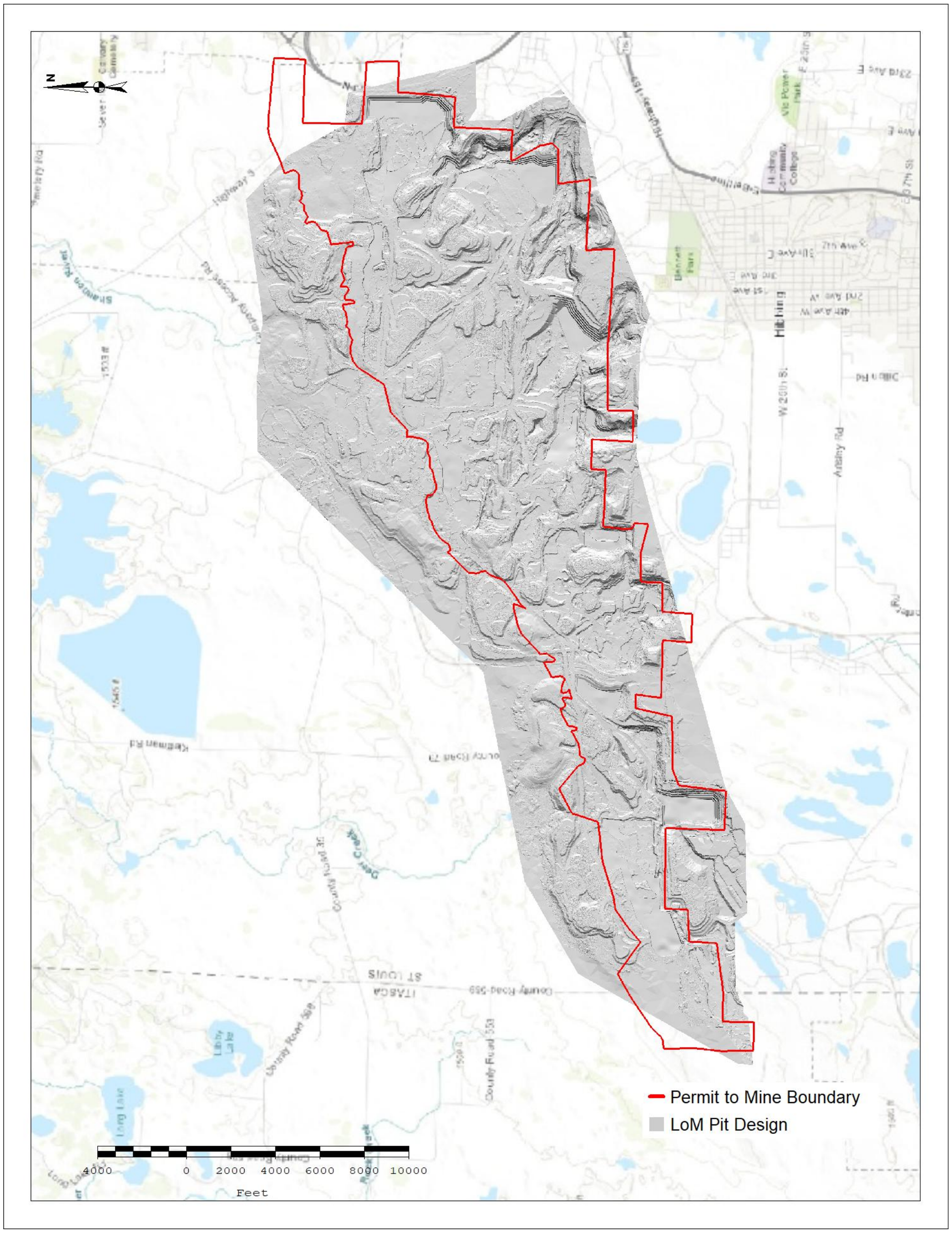


Figure 12-2: Final Pit Plan View

13.0 MINING METHODS

13.1 Mining Methods Overview

HibTac is mined using conventional surface mining methods. The Mine requires large 200-plus ton mining trucks, and some areas of the pit require long hauls. The surface operations include:

- Clearing and grubbing
- Overburden (glacial till) removal
- Drilling and blasting (excluding overburden)
- Loading and haulage

The Mineral Reserve is based on the ongoing annual average ore production of 21.9 MLT from the Group I, II, III, IV, and V pits, producing an average of 5.6 MLT/y of wet pellets for domestic consumption. The HibTac operations have no current expansion plans and are likely to cease operating once the reserves are depleted by 2026.

Mining and processing operations are scheduled 24 hours per day, and the mine production is scheduled to directly feed the processing operations.

The current LOM plan has mining scheduled for five years and mines the known Mineral Reserve.The average stripping ratio is 1.0 waste units to 1.0 crude ore units (1.0 stripping ratio).

There are 20 mining pits/phases with varying dimensions, with a maximum depth of approximately 600 ft attained in two of the pits/phases.

Primary production for all mine pits includes drilling 16.00 in.-diameter rotary blast holes. Production blast hole depth to 40 ft bench heights is drilled. Burden and spacing varies depending on the material being drilled. The holes are filled with explosive and blasted. A combination of front-end loaders (FEL) and electric shovels load the broken material into 240 ton-payload mining trucks for transport from the pit.

The Mine follows strict crude ore blending requirements to ensure that the Plant receives a uniform head grade.Generally, three groupings of geological subunits are mined at one time to obtain the best blend for the Plant. Operationally, blending is done on a shift-by-shift basis. HibTac mines from three to four ore locations for blending. Crude ore is hauled to the crushing facility and either direct tipped to the primary crusher or stockpiled in an area adjacent to the primary crusher. Haul trucks are alternated to blend delivery from the multiple crude ore loading points. The crude ore stockpiles are used as an additional source for blending and production efficiency.

The major pieces of pit equipment include electric shovels, FELs, haul trucks, drills, bulldozers, and graders.Extensive maintenance facilities are available at the mine site to service mine equipment and the rail fleet.

13.2 Pit Geotechnical

13.2.1 Summary

The pits at HibTac are generally shallow, with a maximum pit depth and highwall exposure of approximately 600 ft. The final wall slopes are effectively the IRA, as there are no haul ramps in the final highwall. Haul ramps are incorporated into the pit design footwall and can safely support traffic of the 240 ton payload mining trucks. Slope parameters used for design are summarized in Table 13-1.

The overburden (glacial till) is excavated in 40 ft-high benches with a design BFA of 22°; benches are separated by 20 ft-wide berms and are set-back at least 20 ft from the top of the rock slope in accordance to Standard 6130.2900 of the Minnesota Administrative Rules for Ferrous Metal Mineral Mining. Benches in the rock slopes are created by double benching two, 40 ft benches to create a final 80 ft bench face. See Figure 13-1.

Table 13-1: Geotechnical Parameters
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Parameter	Unit	Final Wall	Backfill	Overburden
IRA	Degrees	42.5	23.4	18.4
BFA	Degrees	65.0	36.0	21.8
BH	ft	40	40	40
CB - Primary	ft	50	50	20
CB - Secondary	ft	0	25	20
Ramp Width - 2 way	ft	150	150	150
Ramp Width - 1 way	ft	90	90	90
Ramp Gradient (Shortest)	%	8	8	8

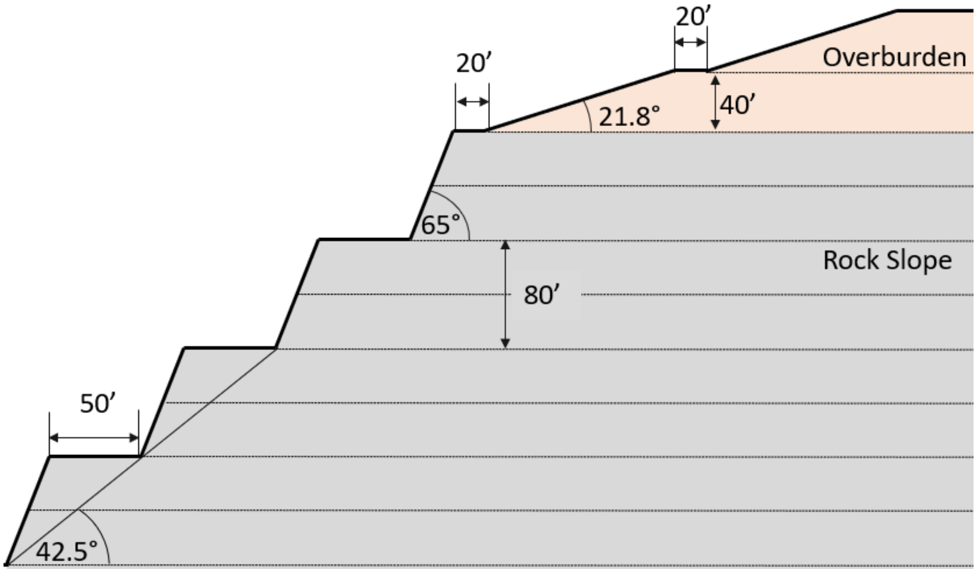


Figure 13-1: Example of Final Pit Wall Geometry

13.2.2 Geotechnical Data

Geotechnical laboratory test data for HibTac is limited with two uniaxial compressive strength (UCS) tests taken for a back analysis of a wedge failure in the Scranton Pit and, more recently, 10 UCS tests, 11 point load tests, and seven Brazilian tensile tests completed for a wall control blasting study by Barr Engineering Co. (Barr) in 2018.

Structural measurements were taken during a field visit for a final pit slope stability study completed by Barr in 2012 (Barr, 2012). The rock mass was observed to be highly fractured; the dominant discontinuities include the shallow-dipping bedding planes dipping between 5° and 15° to the southeast and two to three near-vertical joint sets dipping between 80° and 90°. Further joint orientation data has been collected from Maptek I-Site laser scans, including from the Group IV Kleffman area used for a wall control blasting study completed by Barr in 2018 (Barr, 2018), and from the Group V East, West 1, and West 2 areas, used for a structural geology and rock-fall analysis also completed by Barr in 2019 (Barr, 2019).

13.2.3 Material Strength Parameters

Geotechnical input data for the Barr (2012) study was limited, so stability analysis relied upon engineering judgement and approximations from other similar projects. Mohr-Coulomb strength parameters were estimated for the glacial till. The Hoek-Brown strength criterion was used to estimate the strength of the rock mass. Material properties are summarized in Table 13-2. Two sets of strength parameters are provided, one for the blasting practices observed in 2012 with a blast disturbance factor D of 1.0, and the second with a lower D of 0.7, which assumes improvements through the introduction of wall-control blasting such pre-splitting, smooth-wall blasting, or cushion (buffer) blasting.

Table 13-2: Material Properties Used in Stability Analysis
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Parameter	Overburden	Disturbed Rock	Less Disturbed Rock
Unit Weight, pcf	128	192.4	192.4
Cohesion, psf	-	-	-
Friction Angle, °	32	-	-
Intact Rock Uniaxial Compressive Strength, psf	-	1,800,000	1,800,000
Intact Rock Parameter (mi)	-	19	19
Geological Strength Index (GSI)	-	45	45
Disturbance Factor (D)	-	1.0	0.7

Source: Barr, 2012

13.2.4 Hydrogeology and Pit Water Management

Dewatering is from sump pumping for within the pits. The final highwall design assumes that the piezometric surface is sufficiently far from the pit wall that it does not dictate slope failures.

13.2.5 Stability Assessment

A kinematic assessment for bench-scale failure was conducted by Barr (2012); however, based on the joint orientations, planar and wedge type failures were judged to be limited. Toppling would be associated with slopes where the steeply dipping joints dip into the slope face. Raveling of rock blocks was determined to be the most likely bench-scale failure mechanism, requiring effective excavation and scaling to control rock-fall risk.

Overburden stability was assessed through the Morgenstern-Price method of limit-equilibrium analysis in Geoslope Slope/W software. The factor of safety (FoS) was calculated at 1.57 assuming the groundwater surface was set back from the slope face.

Limit-equilibrium analysis was completed for a proposed rock slope geometry including an 80 ft-high benches, 80° bench face angle and 40 ft berm width, with an IRA of 56°.The resultant FoS of 1.24 is reliant on the application of wall-control blasting techniques, recommendations for which were provided in the Barr (2012) report and later by Barr in 2018, in the Design and Implementation Report for a wall-control blasting study (Barr, 2018).

A structural geology and rock-fall analysis was completed in January 2019 by Barr to gain a better understanding of the Group V area and to determine an appropriate safe bench width design. Rock-fall analysis was undertaken using Rocscience Rocfall 7.0 software. Twelve cases were modeled based on 80 ft bench heights, with benches faces of 75° and 80°, berm widths of 40 ft and 50 ft, and with and without crest loss and talus material along the bench toes. A similar assessment was also made for a 40 ft-high bench. Barr concluded that the batters should be pre-split at 80°, aside from the east wall, which should be battered at 75° due to adverse geological structure. A bench width of 40 ft was proposed, with a 5 ft-high berm placed on the bench to catch rock fall. The resultant IRA would be 56° (Barr, 2019).

The current slope design used for the rock slopes at HibTac includes an IRA of 42.5°, which is significantly less than the Barr 2012 and 2019 proposed IRAs. The adopted BFA is also less, at 65°, as opposed to 75° to 80° proposed by Barr. SLR, therefore, considers the slope parameters used by HibTac to be appropriate, and the geotechnical risk of overall slope instability and rock-fall to be low.

13.2.6 Waste Rock Stockpile Stability

The HibTac waste rock stockpiles were subject to an assessment of stability rating and hazard classification as per a report completed by Golder Associates Inc. (Golder) in April 2019. The report was based on a site visit conducted on July 16, 2018 and involved the inspection and assessment of waste rock stockpiles 2970 and 4082 and overburden stockpiles 5001, 5039, 5014, and 5020. The assessment was completed in accordance with the WSRHC system described in Hawley and Cunning (2017). The system includes the assessment of geographic location, climate and seismicity, foundation conditions, material quality, geometry, mass, stability assessment, construction method, and loading rate. The results indicate the existing stockpiles fall into the low or moderate hazard classification.

Upon completion, surface stockpiles must be graded to an overall slope angle of 2.5H:1V (21.8°), and rock stockpiles must be covered with at least two feet of surface material, in accordance with The Minnesota Administrative Rules, chapter 6130 (MDNR 2008) SLR understands that the stockpiles at HibTac are subject to annual inspections to verify compliance with these standards.

13.3 Open Pit Design

The HibTac pit designs combine current site access, mining width requirements, geotechnical recommendations, and hard mining limits as described previously in Sections 12.0 and 13.0.

Intermediate phase designs, or pushbacks, are included in the LOM planning. The main purpose for phased designs is to balance waste stripping and haulage profiles over the LOM and ensure haulage access is maintained while developing the pit.

Intermediate phase designs are largely driven by the effective mining width and access to the Mineral Reserves. The phase designs incorporate the transition from intermediate, non-reclaimed overburden slopes to final reclamation overburden slopes.

Table 13-3 details the final pit design totals as of the June 15, 2021 surveyed topography. Figure 13-2 presents a plan view of the final pit designs.

Table 13-3: Final Pit Design Totals
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Phase	Crude Ore (MLT)	Grade (% MagFe)	Stripping (MLT)	Total Material (MLT)	Strip Ratio
Agn_xx1	3.9	17.8	0.9	4.8	0.2
Grp1_ph1	4.0	17.6	0.5	4.5	0.1
Grp1_ph2	6.3	19.0	1.0	7.3	0.2
Grp1_ph3	21.0	19.5	31.6	52.6	1.5
Grp3_xx1	2.3	16.7	0.6	2.8	0.3
Grp4_xx1	0.9	15.9	0.3	1.2	0.3
Grp5n_xx1	10.5	16.7	11.5	22.0	1.1
Klef_ph1	5.0	16.8	5.6	10.5	1.1
Mace_xx1	0.2	16.9	0.1	0.3	0.2
Maho_xx1	20.7	19.1	1.6	22.2	0.1
Morris_ph1	0.1	15.8	0.0	0.1	0.4
Su_xx1	3.8	17.4	2.5	6.2	0.7
Su_xx2	1.0	17.1	0.3	1.3	0.3
Su_xx3	2.2	17.5	1.3	3.6	0.6
View_fw1	1.1	18.8	0.2	1.3	0.2
View_ph1	16.6	19.6	19.5	36.1	1.2
Webb_ph2	2.1	17.4	3.2	5.3	1.5
Webb_ph3	19.8	19.4	46.4	66.2	2.3
Win_xx1	3.2	18.0	2.6	5.8	0.8
Webb_ph3r	0.0	0.0	0.4	0.4	
Total	**124.6**	**18.7**	**130.1**	**254.7**	**1.0**

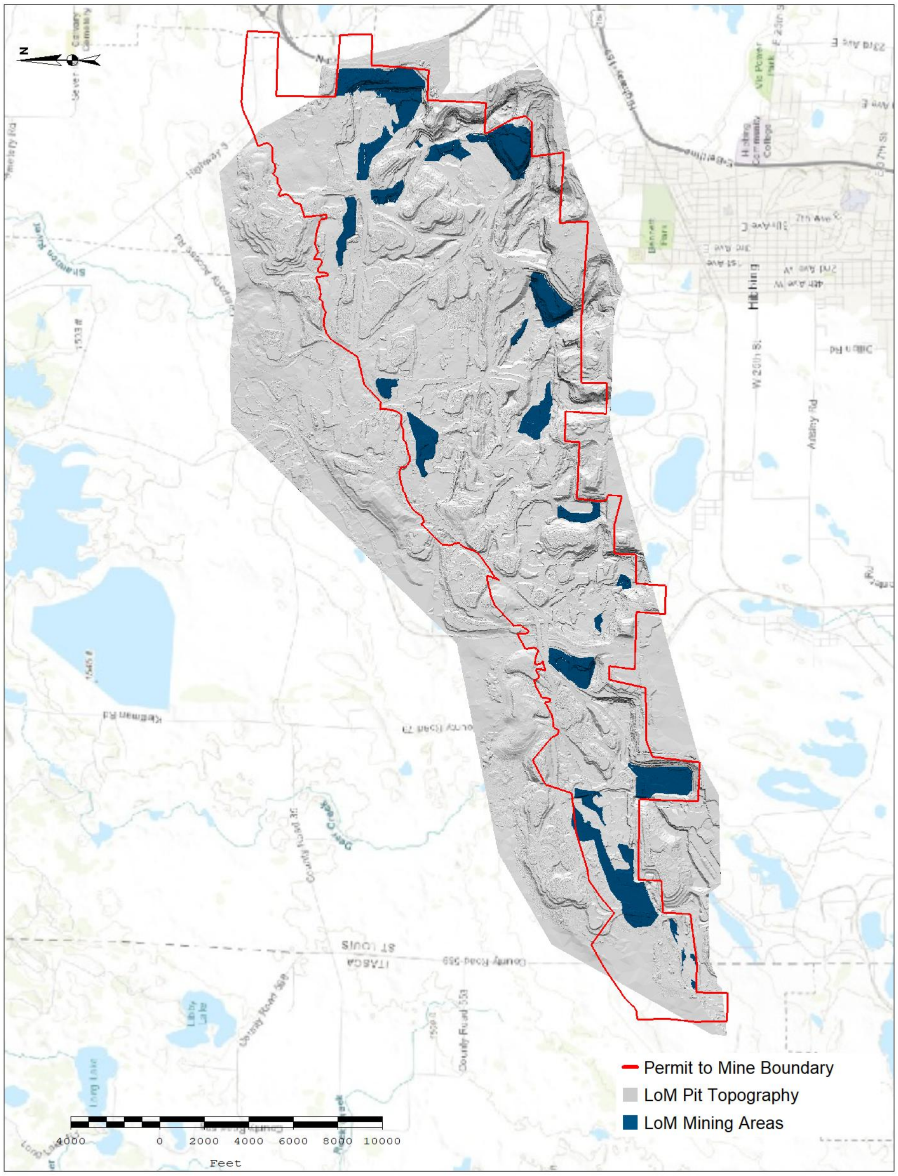


Figure 13-2: Final Pit Plan View

13.4 Production Schedule

13.4.1 Clearing

Before mining operations commence in new undeveloped areas, it is necessary to remove any overburden material. Primary clearing and grubbing equipment includes bulldozers, electric shovels, FELs, and trucks. This equipment has been successfully deployed in historical overburden clearing operations at HibTac.

13.4.2 Grade Control

As described in Section 6.0 of this TRS, the geology is well known with two simplified crude ore types identified at the Mine: high-grade ore (1-5/1-6 ore) and lean ore (1-7 ore, 1-3/1-4 ore). HibTac uses blast hole magnetic susceptibility probing to assist in delivering a consistent blend of ore by more sharply delineating ore/waste boundaries.

Generally, three or four crude ore faces are mined at a time. The short-range (weekly) mine plan provides instruction on the amount of material from each mining location that is to be blended at the crusher. Blending is carried out on a shift-by-shift basis, with mid-shift load counts being conducted to monitor compliance to the planned crude ore blend. If the crushing facility is down for maintenance, then the loads are stockpiled on the ground next to the crusher and picked up later and crushed.

13.4.3 Production Schedule

As shown in Table 13-4, the basis of the production schedule is to:

- Preserve blending of the three crude ore types for as long as possible, particularly to keep 1-3/1-4 ore percentage below 48. SLR notes that since 1-3/1-4 ore is the lowermost mined layer stratigraphically, it is not possible to keep 1-3/1-4 ore contributions below 48% in the last few years of the operation.
- Limit total mined tons per annum in the range of 57 MLT to 60 MLT to balance both stripping requirements and mine equipment fleet utilization in addition to the pellet production.

The production schedule is planned yearly throughout the LOM. Crude ore is mined from several HibTac pit phases concurrently throughout the schedule and is blended at the crusher.

Table 13-4: LOM Mine Production Schedule
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Year	Crude Ore (MLT)	MagFe (%)	Stripping (MLT)	Total Material (MLT)	Strip Ratio	Process Recovery (%)	Concentrate SiO_2 (%)	Wet Pellets (MLT)
2022	25.7	18.2	33.8	59.5	1.3	24.9	4.7	6.4
2023	24.5	18.3	32.5	57.0	1.3	25.3	3.2	6.2
2024	24.0	18.8	33.4	57.4	1.4	25.8	3.1	6.2
2025	20.3	19.5	8.1	28.4	0.4	26.6	3.7	5.4
2026	14.8	19.3	3.7	18.5	0.3	24.9	3.5	3.6
LOM Schedule	**109.3**	**18.7**	**111.5**	**220.8**	**1.0**	**25.5**	**3.5**	**27.8**

Historical (2010 to current) and LOM planned production for HibTac is summarized graphically in Figure 13-3.

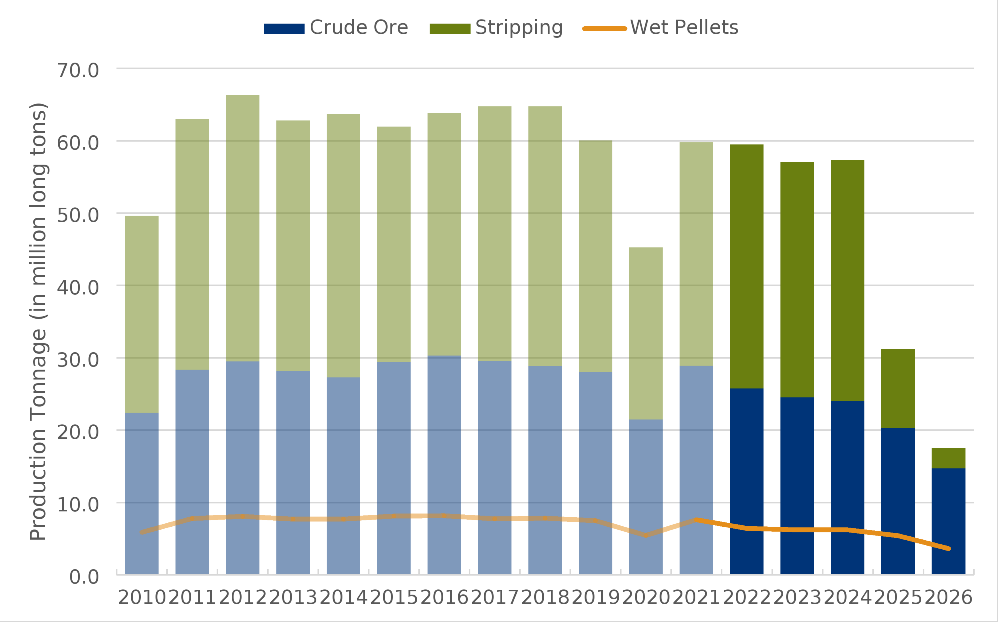


Figure 13-3: Historical and LOM Production

SLR notes that there was a downturn in 2020 due to the COVID-19 pandemic.

13.5 Overburden and Waste Rock Stockpiles

Overburden and waste rock material is stockpiled in designated stockpile areas.

The HibTac LOM plan has more stockpiling capacity than is required, with two waste rock storage facilities located outside of the Permit to Mine boundary.

The overburden and waste rock stockpile design parameters are detailed in Table 13-5.

Table 13-5: Stockpile Parameters
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Parameter	Units	Waste Rock	Overburden
Overall Slope Angle	Degrees	22.8	18.4
BFA	Degrees	36.0	21.8
BH	ft	30	40
Berm Width	ft	30	20
Ramp Width - 2 way	ft	150	150
Ramp Width - 1 way	ft	80	80
Ramp Gradient	%	8-10	8

Rock and overburden stockpiles were designed, and 3D solids generated, to calculate the volume of the stockpiles. Swell factors of approximately 33% for *in situ* rock and 12.5% for overburden were used to calculate the annual stockpile volume requirement.

The designed stockpile volume capacity and total LOM stockpiling requirements for the HibTac pits as of June 15, 2021 are summarized in Table 13-6.

Table 13-6: Pit Stockpile Capacities
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Name	Capacity (million ft^3)	
	Waste Rock	Overburden
Total HibTac Stockpile Capacity	2,467	371
2021 LOM Stockpile Requirements	1,715	268

SLR notes there is sufficient overburden and waste rock stockpile capacity included in the LOM plan.The final stockpile layouts including the pit backfills are shown in Figure 13-4. Final reclamation will involve relocating some of the stockpiled overburden as cover for the remainder of the disturbed area.

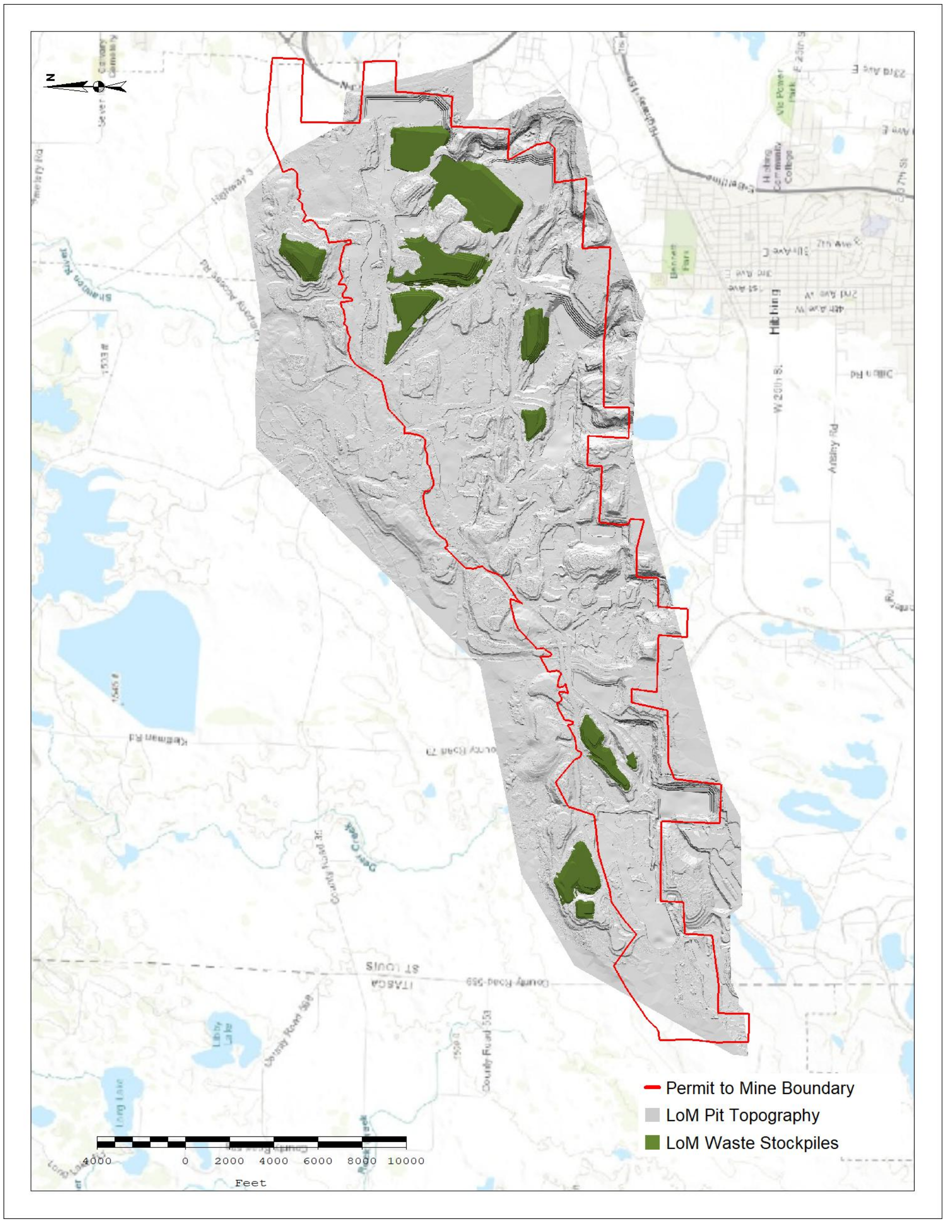


Figure 13-4: Final Waste Rock Stockpile Plan View

13.6 Mining Fleet

The primary mine equipment fleet consists of large drills, electric shovels, and off-road dump trucks. In addition to the primary equipment, there are FELs, bulldozers, graders, water trucks, and backhoes for mining support. Additional equipment is on site for non-productive mining fleet tasks. The current fleet is to be maintained with replacement units as the current equipment reaches its maximum operating hours.

Table 13-7 presents the existing fleet (2022) and planned average major fleet requirements estimated to achieve the LOM plan.

Table 13-7: Major Mining Equipment
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Year	Drills	Shovels	Trucks	Loaders	Bulldozers	Graders
2022	4	6	29	1	10	3
2023	4	5	28	1	9	3
2024	4	5	27	1	9	3
2025	3	3	18	1	6	3
2026	3	3	12	1	6	2
Size/Payload	120,000 lb	38 yd^3	240 ton	37 yd^3	57 yd^3	16 ft
Useful Life (hrs)	90,000	160,000	100,000	60,000	80,000	80,000
Example Unit	P&H 120A	P&H 2800XPC	Komatsu 830E	LeTourneau L1850	CAT-D11	CAT-16M

The primary loading and hauling equipment were selected to provide synergy between mine selectivity of crude ore and the ability to operate in wet and dry conditions. Since crude ore is blended at the primary crusher, the loading units in crude ore do not operate at capacity.

Longer haulage distances will be realized in some of the HibTac pits as they deepen. In general, the major mining equipment requirement scales down with production, towards the end of the LOM plan.

13.7 Mine Manpower

Current mining manpower totals 368 and is summarized as follows:

- Mine operations – 219
- Mine maintenance (excluding mine crusher) – 115
- Mine supervision and technical services – 34

14.0 PROCESSING AND RECOVERY METHODS

14.1 Processing Methods

14.1.1 HibTac Ore Types, Upgrading and Blending

HibTac's concentrator is designed to process approximately 80,000 LT of magnetite ore per day through a standard iron ore process flowsheet that includes primary crushing, autogenous grinding, and magnetic separation.

Three distinct ore types are processed at HibTac and are referred to as blend component 1-7 (lean ore), blend component 1-5/1-6 (high-grade ore) and blend component 1-3/1-4 (low-grade ore). The major characteristics of each ore type are summarized in Table 14-1. Blend component 1-7 is thick bedded and contains relatively high silica in concentrate and Liberation Index (relative grinding energy for magnetite liberation to target concentrate silica) and is limited to 20 wt% of the ore blend to the concentrator. Blend component 1-5/1-6 contains relatively high MagFe that results in high weight recoveries and is the dominant ore type, contributing greater than 60 wt% to the ore blend sent to the concentrator. Blend component 1-3/1-4 is thin bedded with fine laminations and contains relatively low MagFe that results in low weight recoveries, and it is limited to 48 wt% of the daily ore blend in the current LOM.

Table 14-1: Characteristics of Ore Types
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Ore Characteristics	Unit 1-7	Unit 1-5/1-6	Unit 1-3/1-4
MagFe %	17.2	19.7	16.2
Wt % Recovery	24.9	28.8	23.1
SiO_2 %	4.5	4.7	4.6
kWh/LT	14.9	12.7	13.4
Max. Blend %	15	80	30

Source: HibTac

14.1.2 Crushing and Concentrating

The crushing plant consists of two 60 in. x 109 in. Allis Chalmers gyratory crushers that crush run of mine (ROM) ore to minus 10 in., which is then conveyed to the 450,000-ton, crushed-ore stockpile, referred to as the COSP, providing up to five days of crushed ore surge capacity ahead of the concentrator. Crushed ore is reclaimed from the COSP to feed the primary grinding circuit, which consists of nine, 36 ft x 15 ft autogenous grinding (AG) mills, which grind the ore to $-^{3}/_{16}$ in. The discharge from each AG mill is pumped to five, 48 in.-diameter x 10 ft-long, single-drum rougher magnetic separators, which produce a rougher magnetic concentrate. The non-magnetic fraction from the rougher magnetic separators is fed to the hydroseparators. The rougher magnetic concentrate produced from each grinding line is classified in hydrocyclones to produce an 80% passing 44 micron cyclone overflow product that is then advanced to the finisher magnetic separators, which consist of three triple-drum and two double-drum magnetic separators per grinding line. The magnetic rougher cyclone underflow is cycled back to the AG mills for additional grinding. The finisher magnetic product goes directly to the screens. The secondary cyclone underflow is screened at 100 mesh, with the screen undersize advancing to the pellet plant. The screen oversize from all grinding lines is reground in two, 1,250 hp Vertimills operated in closed circuit with cyclones to produce a cyclone overflow of 90% passing 44 microns, which is then subjected to a second stage of finisher magnetic separation. The concentrate from this stage of finisher magnetic separation is advanced to the pellet plant, and the finisher tails go to the main launders and directly to the basin. Final magnetic concentrate averages approximately 66% MagFe and 4.1% SiO_2 at a final grind of 80% passing 44 microns. The final pellet contains 4.5% SiO_2. A simplified concentrator flowsheet is shown in Figure 14-1.

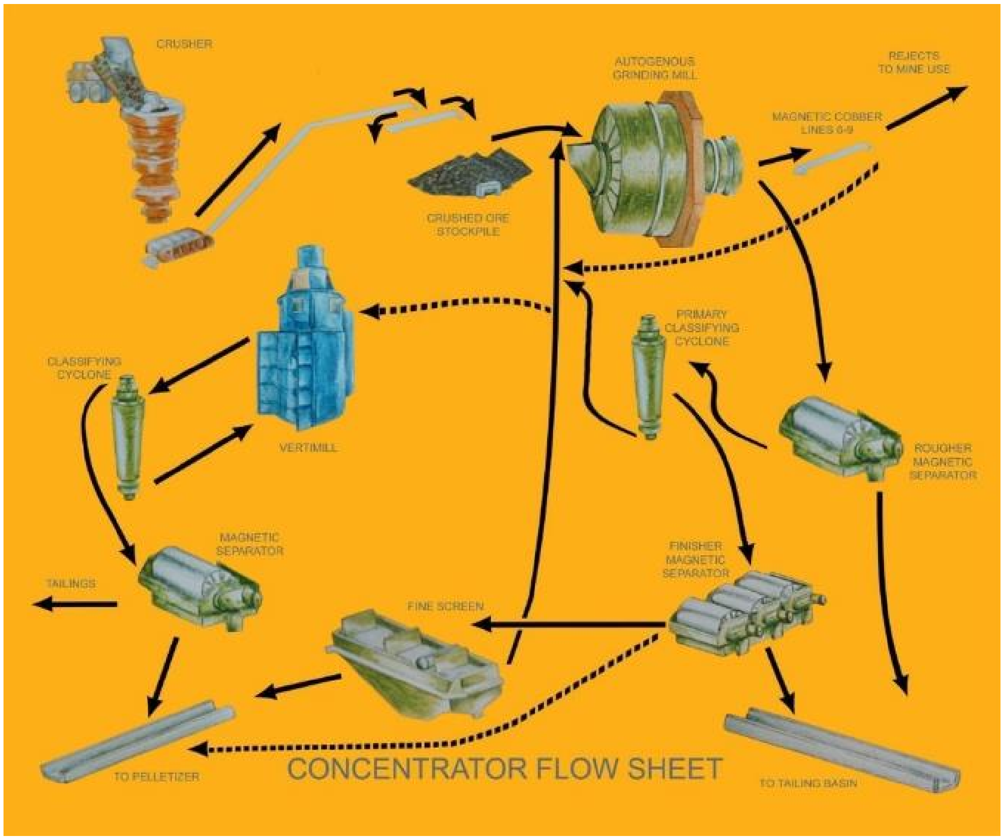


Figure 14-1: Concentrator Process Flow Sheet

14.2 Pellet Plant

Iron concentrate from the concentrator is thickened and then pumped to agitated storage tanks where it is stored prior to filtration to approximately 9.25% moisture at the pellet plant. The filtration circuit consists of two phases. Phase 1 is equipped with three, 9 ft-diameter x 12 disc Eimco vacuum filters and five, 10 ft-diameter x 12 disc North Star vacuum filters and provides filtered concentrate to two of three pelletizing lines. Phase 2 is similar, but is equipped with four North Star disc filters, which provide concentrate to the third pelletizing line. The filtered concentrate is blended with bentonite at approximately 18.5 lb/LT of concentrate and subjected to high-speed mixing prior to advancing to pelletizing to produce standard-compression pellets. When high-compression pellets are required, limestone is added in addition to the bentonite.

Each pelletizing line consists of four 12 ft-diameter x 32 ft-long Sala balling drums, each of which discharge across roll screens, which serve to produce green (unfired) balls that are closely sized at -½ in. + $^3/_8$ in. and contain 9.2% to 9.46% moisture. Roll screen oversize is fed to a shredder and returned to the balling drums along with the roll screen undersize. Green balls with a proper size are then conveyed to a roll feeder in front of each Dravo Traveling Grate indurating furnace. Each of the three indurating furnaces is 13 ft wide by 243 ft long with 243 pallet cars that move through seven different zones supported by 38 windboxes and five process fans. Pellets discharged from the indurating furnaces are the final product and are conveyed to the pellet load-out bins, or to the emergency stockpile. A simplified pellet plant flowsheet is shown in Figure 14-2, and a list of major equipment in the pellet plant is provided in Table 14-3.

Pellet production is monitored by a weightometer on the furnace feed and furnace returns (roll feeder undersize). Actual production is adjusted to actual train shipments once per month. Typical adjustments are in the range of 2,000 LT to 3,000 LT over a total production of 700,000 LT (<0.5% adjustment).

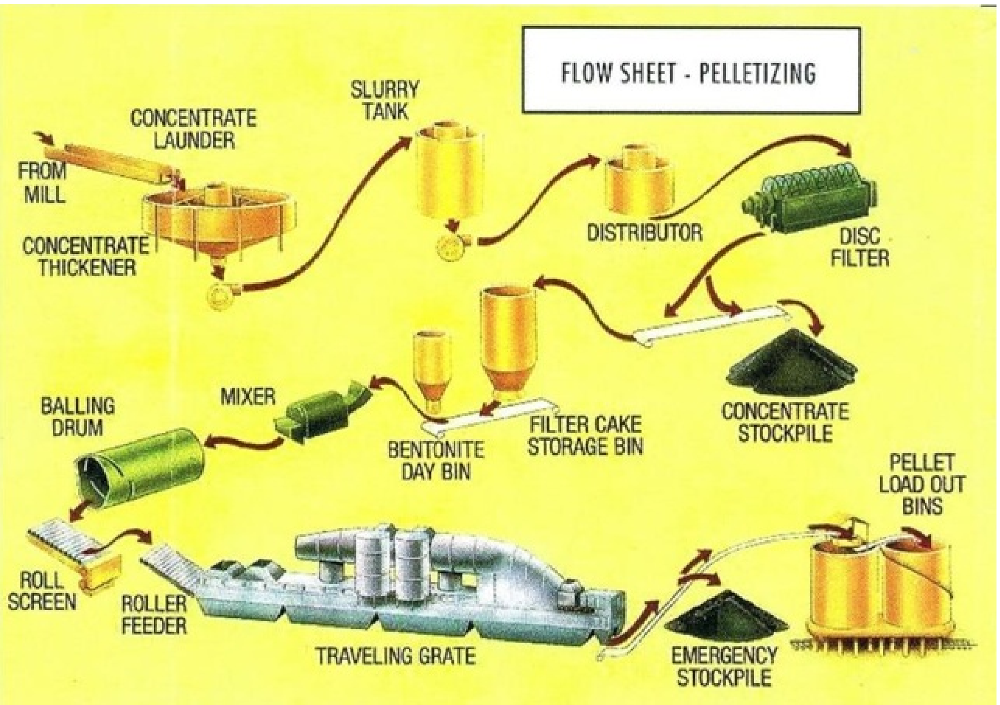


Figure 14-2: Pellet Plant Process Flow Sheet

14.3 Major Process Plant Equipment

Table 14-2 and Table 14-3 provide a list of major processing equipment at HibTac.

Table 14-2: Concentrator Major Equipment List
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Equipment	Type	Quantity	Manufacture	Size	HP
Primary Crusher	Gyratory	2	Allis-Chlamers	60" x 109"	
Grinding Mills	Autogenous	9	Metso/ Koppers	36 ft x 15 ft	12,000
Regrind Mills	Vertimill	2	Metso		1,250
Magnetic Separator - Rougher	Single Drum	45	Eriez	48" x 10 ft	
Magnetic Separator - Finisher	Triple Drum	27	Eriez	36" x 10 ft	
Magnetic Separator - Finisher	Double Drum	18	Eriez	48" x 10 ft	
Tailings Hydroseparator		1	Westec	65 ft	
Tailings Hydroseparator		1	Westec	90 ft	

Source: Hibbing Taconite

Table 14-3: Pellet Plant Major Equipment List
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Equipment	Type	Quantity	Manufacture	Size
Vacuum Filter	Disc	3	Eimco	9 ft x 12 disc
Vacuum Filter	Disc	9	North Star	10 ft x 12 disc
Ball Drums		12	Sala	12 ft x 32 ft
Roll Feeder	Roll	3	Dravo/Abe Mathews	12.8 ft x 16.5 ft
Roll Screens	Roll	12	Dravo/Abe Mathews	8 ft x 21 ft
Indurating Furnace	Traveling Grate	3	Dravo	13 ft x 243 ft
Load-out Bin (West)	Train	1		11,000 ton
Load-out Bin (East)	Train	1		8,500 ton

Source: Hibbing Taconite

14.4 Process Plant Performance

Production performance for HibTac's concentrator and pellet plant is summarized in Table 14-4, which presents crude wet ore tons, dry concentrate tons, and wet pellet tons produced for the period 2015 to 2020. The average ore delivered to the primary crusher was 28,083,000 LT/y with an average magnetic iron grade of 19.2% and silica content of 4.2% for the period. Weight recovery to concentrate averaged 26.4% over this period, and wet pellet production averaged 7,400,200 WLT/y. Pellets averaged 66.1% Fe, 4.5% SiO_2, and 2.1% moisture for the period.

- Ore feed tons to the concentrator are reported as wet tons and are based on the crusher plant weigh scales.
- Ore feed to the process is based on weight percent recovery data reported by the mine, which is derived from the mine production model. No concentrator feed grade assays are obtained. For production forecasting, the concentrator reduces the weight percent recovery reported by the mine by the budgeted discount factor to allow for production losses. In 2015, the discount factor was lowered to 1.0 due to reconciliation.
- Concentrate production is reported by the pellet plant, and is based on dry pellets produced plus ending inventories of filter cake in stockpile and concentrate slurry minus filter cake and concentrate slurry starting inventories.
- Concentrator weight percent recovery is calculated by dividing the concentrate production tons reported by the pellet plant by wet ore tons recorded at the crushing plant. Prior to June 2012, this calculation was based on dry tons of concentrate. Since June 2012, weight percent recovery is based on wet tons of concentrate.
- MagFe recovery is tracked in the concentrator and used as an aid for the operators to monitor concentrator daily performance. It is not used for prediction of concentrator production due to inaccuracies associated with the MagFe recovery calculation (based on assumed feed grade to the concentrator and MagFe analyses on the final tailing).
- Pellet production is monitored on a daily basis by the furnace feed and furnace return weightometers and is adjusted monthly to actual train shipments of pellets. Monthly adjustments are typically in the range of 2,000 LT to 3,000 LT over a total reported pellet production in the range of 700,000 LT (<0.5% adjustment), indicating very good production accounting.

Table 14-4: Summary of Process Plant Production
Cleveland-Cliffs Inc. – Hibbing Taconite Property

	2015	2016	2017	2018	2019	2020
Total ROM (kLT) Primary Crusher Feed	29,846.1	30,731.1	29,928.0	29,492.0	28,395.0	20,106.0
%Fe (mag)	19.7%	19.9%	19.3%	19.5%	18.8%	18.2%
% SiO_2	4.7%	4.9%	5.0%	5.0%	4.8%	4.8%
% Moisture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Feed to Processing Plant (kWLT) Rod Mill Feed	29,846.1	30,731.1	29,928.0	29,345.0	28,395.0	20,106.0
% Mass Yield	26.5%	26.3%	25.9%	26.2%	26.3%	27.3%
Finished Concentrate Production (kWLT)	7,909.2	8,097.0	7,736.6	7,693.0	7,467.8	5,497.8
% MagFe Recovery	97.8%	96.8%	96.9%	97.0%	98.0%	97.2%
Finished Production (kWLT)	7,909.2	8,097.0	7,736.6	7,693.0	7,467.8	5,497.8
Pellet	7,909.2	8,097.0	7,736.6	7,693.0	7,467.8	5,497.8
Tailings/Processing Waste (kWLT)	6,600	6,401	6,042	6,141	6,214	6,199
Tailings Fe% (total)	2.2%	3.2%	3.1%	3.0%	2.0%	2.8%
Product Quality KPIs						
Fe% - Final Product	66.07%	66.06%	66.11%	66.12%	66.06%	66.00%
SiO_2% - Final Product	4.51%	4.52%	4.47%	4.49%	4.50%	4.50%
% Moisture - Final Product	2.1%	2.7%	2.1%	1.9%	2.0%	2.0%
Year End Product Inventory (kWLT)	22.0	38.2	46.5	16.0	42.4	-
Pellet	22.0	38.2	46.5	16.0	42.4	-
Finished Shipments (kWLT)	8,078.0	8,154.8	7,683.1	7,571.0	7,406.0	5,540.2
Pellet	8,078.0	8,154.8	7,683.1	7,571.0	7,406.0	5,540.2

Source: HibTac Annual Operating and Financial Reports

14.5 Pellet Quality

HibTac’s pellet quality specifications for both standard and high-compression pellets are summarized in Table 14-5. Aside from achieving the iron grade specification, considerable effort is devoted to ensuring that the silica specification of 4.5% SiO_2 is consistently achieved.

Table 14-5: Summary of Specifications for Standard and High Compression Pellets
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Criteria	Standard Pellet	High Compression Pellet
% Dry Iron	66.15 +/- 0.20	66.00 +/- 0.30
% Dry SiO_2	4.50 +/- 0.20	4.50 +/- 0.20
%+1/4 in. A.T.	96.0 +/- 0.8	97.0 +/- 0.5
%-28 mesh A.T.	3.6 +/- 0.8	2.7 +/- 0.5
Average compression (lb)	470 +/- 40	560 +/- 20
%-300 lb compression	< 15.3	< 15.3
% Sizing +1/2 in.	<5.0	<5.0
% Sizing -1/2 +3/8 in.	93.0 +/- 2.0	93.0 +/- 2.0
Moisture	<3%	<3%

14.6 Consumable Requirements

Table 14-6 and Table 14-7 present the energy and materials that HibTac used in 2018, 2019, and 2020.

Table 14-6: 2018 to 2020 Energy Usage
Cleveland-Cliffs Inc. – Hibbing Taconite Property

		2018		2019		2020	
Energy Usage	**Units**	**Usage**	**Usage/LT Pellets**	**Usage**	**Usage/LT Pellets**	**Usage**	**Usage/LT Pellets**
Mining	kWh	44,567,127	5.71	41,414,474	5.54	34,429,030	6.31
Crushing	kWh	12,637,215	1.62	13,564,862	1.82	11,558,584	2.12
Processing	kWh	825,300,722	105.82	784,096,898	104.92	615,974,040	112.93
Post Processing	kWh	364,071,974	46.68	348,619,857	46.65	267,484,857	49.04
Maintenance	kWh	2,280,175	0.29	2,447,553	0.33	1,896,556	0.35
General Operations	kWh	922,787	0.12	990,525	0.13	844,025	0.15
Total	kWh	1,249,779,999	160.24	1,191,134,169	159.38	932,187,092	170.90
Natural Gas							
Natural Gas - Process	MBtu	1,961,033	0.25	2,095,335	0.28	1,787,182	0.33
Natural Gas - Heating	MBtu	760,459	0.10	712,255	0.10	637,378	0.12
Fuel							
Diesel Fuel	gals	7,135,684	0.91	7,157,733	0.96	5,317,569	0.97
Gasoline	gals	101,158	0.01	106,146	0.01	82,833	0.02
Total Pellets	WLT	7,799,330		7,473,344		5,454,679	

Table 14-7: 2018 to 2020 Materials Usage
Cleveland-Cliffs Inc. – Hibbing Taconite Property

		2018		2019		2020	
Materials	**Units**	**Usage**	**Usage/LT Pellets**	**Usage**	**Usage/LT Pellets**	**Usage**	**Usage/LT Pellets**
Bentonite	lb	149,711,020	19.20	116,245,206	15.55	89,616,436	16.43
Limestone	lb	45,724,260	5.86	51,430,260	6.88	42,139,660	7.73
Total Pellets	WLT	7,799,330		7,473,344		5,454,679	

14.7 Process Manpower

Current processing manpower totals 260 and is summarized as follows:

- Plant operations – 166
- Plant maintenance – 58
- Mine supervision and technical services – 36

15.0 INFRASTRUCTURE

15.1 Roads

The Mine and Plant are both located on the mine site. Access to the mine site is by US Highway 169/State Highway 73 to County Highway 5, north 2.3 mi to the HibTac access road, and east two miles to the site. The road access to the site is by paved roads that allow easy access for material and the work force. Figure 15-1 shows the general location and basic infrastructure of the site.

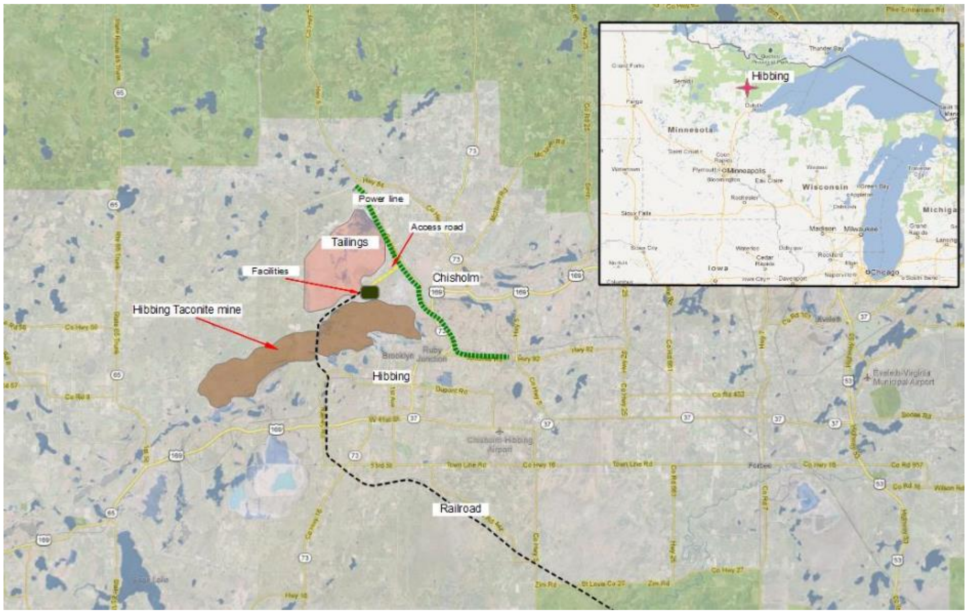


Figure 15-1: General Location Map

15.2 Rail

A railroad system serves the operation and provides both raw materials for the processing of ore and delivery of product to the port facility located in Superior, Wisconsin. The rail system on the mine site consists of an approximately 6.5 mi main line with a loop track that accesses dual taconite pellet storage silos and train load-out facility. The silos each have a capacity of approximately 10,000 LT. The facility and loop track allow loading of unit trains consisting of 184 cars equaling 18,500 LT of pellets per unit train. Unit train loading takes between 2.0 and 2.5 hours. There is an average of two trains per day. The loaded pellet cars are delivered by rail operator BNSF approximately 90 mi south to the Allouez Taconite Facility in Superior, Wisconsin on the western edge of Lake Superior.

A secondary system with two side tracks at the site allows supply trains to provide supplies of bentonite to the Plant. The bentonite is stored in two bentonite silos with a capacity of 3,672 tons each. The site receives 12 to 16 cars of bentonite at 97 tons per car delivered in two deliveries per week. The bentonite is delivered at a rate of approximately 6,250 tons per month (64 cars), which equates to 75,000 tons per year.

15.3 Port Facilities

Taconite pellets from HibTac are transported by rail to the port transshipment location known as the Allouez Taconite Facility. The facility consists of two separate train unloading systems, a stockpile area, reclaimer systems, dock storage silos, and ship loading system. The facility is owned, operated, and managed by BNSF and located in Superior, Wisconsin (Duluth area) on the western tip of Lake Superior. The facility provides unloading, stockpiling, blending, and ship loading capabilities. Figure 15-2 shows the general location of the facility and general layout of the systems.

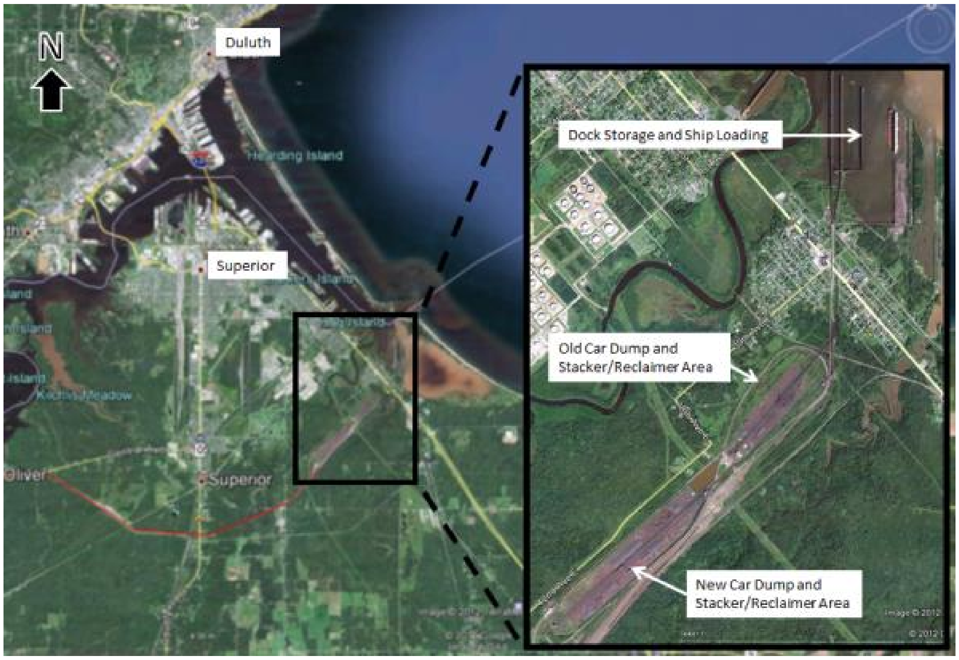


Figure 15-2: Allouez Taconite Facility

The Allouez Taconite Facility receives an average of three trains per day. HibTac provides two taconite pellet unit trains per day. The unit trains consist of 184 cars, rated at just over 100 LT per car, equaling 18,500 LT per train. The trains report to either the new car dump system or the old car dump system that allow taconite pellets to either be stockpiled or delivered directly to the dock storage silos.

The new car dump, placed in service in 1977, is designed to unload three cars at a time. The system has a capacity of 3.3 MLT/y and covers approximately 90 acres. The cars are indexed using a hydraulic positioner, and doors are opened or closed by automatic door machines. The cars are dumped into holding bins below the cars. There are two feeders that feed into the conveyor system that reports to the stacker/reclaimer. A unit train can be unloaded in approximately four hours on the new car dump.

The old car dump, placed in service in 1966, is designed to unload two 35 ft cars or one 42 ft car at one time. The system has a capacity of 1.5 MLT and covers 60 acres. The system has the same configuration as the new system, other than the size and number of cars that can be dumped. It takes approximately six hours to unload a train on the old car dump.

Feeders remove material from the car dump bins onto a conveyor system with over 12 mi of installed belt. The conveyor system for the new dump has a capacity of 6,000 LT per hour (LT/h). The old dump system has a capacity of 2,500 LT/h. Average belt speed is 670 ft per minute making it a 25-minute trip from the new car dump to Dock #5 on the belts that range from 36 in. to 72 in. in width. The pellets can either report directly to Dock #5, which is 3.5 mi from the new car dump, or be stacked out through the stacker reclaimer system.

The stacker/reclaimer system consists of three crawler-mounted bucket wheel reclaimers. Two reclaimers have a capacity of 3,500 LT/h, and the third has a capacity of 2,500 LT/h. The reclaimers stack onto segregated piles for blending or direct the reclaimed taconite onto the belts for transport to the ship loading area.

The ship loading area consists of silos and ship loaders and has a storage capacity of 72,000 LT. There are 36 silos with a capacity of 2,000 LT each. Each silo is 42 ft in diameter and 92 ft high. The silos are loaded by a computerized traveling tripper that is fed from the stacker/reclaimer. The silos are unloaded and ships are loaded at 1,000 LT/h by shuttle conveyors that are 45 ft above water level and are capable of extending 65 ft. Figure 15-3 shows a photograph of the ship loading area and silos.

Figure 15-3: Allouez Taconite Facility Ship Loader and Silos

The facility typically loads two types of ships. The first is a 1,000 ft-long ship with a typical cargo weight of 55,000 LT. The second is an 800 ft ship with typical cargo weight of 25,000 LT to 30,000 LT. These ships can be loaded in four hours.

Blending plans are created by Hibbing Taconite and given to BNSF to execute in order to meet cargo quality specifications. Blending is performed at the time of cargo loading and is accomplished by either blending different stockpiles together or by blending stockpiled material with fresh production from the train.

15.4 Tailings Disposal

The construction of HibTac TSF commenced in 1974, and production began in 1976.From relatively low-grade taconite, the iron ore processing plant, at full capacity, produces approximately 16 MLT/y of tailings that are stored in the TSF situated just north of the Plant (Barr, 2017a).The TSF is located approximately four miles north of the town of Hibbing and three miles east of the town of Chisholm, Minnesota.The HibTac TSF is a paddock dam-type TSF consisting of five cells: West Area 1, 2, and 3 (WA-1, WA-2, and WA-3 with approximately 2,080 acres, 510 acres, and 1,000 acres of impoundment area, respectively), used for tailings deposition; SD-3 Reservoir (approximately 1,340 acres of impoundment area), used as a return water reservoir; and East Area (approximately 830 acres of impoundment area), which is currently not in use, but will be brought into production at a later date.

The tailings basins were permitted as unlined facilities, with the foundation materials and tailings providing a low-permeability material to reduce seepage.

Prior to 2011, total tailings were deposited in the basin via gravity discharge through launders. In 2011, Hibbing Taconite began operating a hydroseparator system, which is used to separate out the coarse-fraction tailings from the total tailings. Approximately 40% of the total tailings are coarse-fraction tailings. The coarse-fraction tailings from the hydroseparator (underflow) are pumped to various locations around the tailings basin using the Main Tailing Pumphouse (MTP).The coarse-fraction tailings are used for hydraulic dam construction, stockpiled for use in mechanical dam construction, or for other mine purposes. All of the interior dams and some of the perimeter dams are planned to be raised by hydraulic methods. If hydraulic dam construction cannot be completed in time to meet dam freeboard requirements, portions of the dams will likely need to be constructed mechanically. The remaining approximately 60% is considered fine-fraction tailings, which are deposited via gravity as slurry and mixed with approximately 120,000 gallons per minute (gpm) of water. Fine-fraction and coarse-fraction tailings are conveyed via gravity at between 25% and 30% solids, respectively (Knight Piésold Limited (KP), 2020). Approximately 120,000 gpm is pumped from the SD-3 Reservoir to the process plant.

The location of the tailings basin is shown on Figure 15-4.

Source: KP, 2020

Figure 15-4: TSF Location

15.4.1 Facility Description

Hibbing Taconite currently maintains approximately 13 mi of perimeter dams that are designed to retain tailings produced during the concentration of iron ore from mining operations and encompasses approximately 6,500 acres. Approximately 4.5 mi of interior dams are used to divide the basin into two tailings disposal cells (West Area and East Area) and a clear-water reservoir (SD-3 Reservoir).The HibTac TSF configuration, which includes the internal and external dams, is shown in Figure 15-5.

Source: Barr, 2021

Figure 15-5: TSF Configuration

The impoundment of tailings and solution provided is by the following eight, earth-fill, engineered dams along the perimeter, which are shown in Figure 15-5, and described below as follows:

- West Perimeter Dam (WPD) is an approximately 8,200 ft-long dam raised using offset upstream construction, with a current maximum height of approximately 35 ft.
- Western Dam South (WDS) is an approximately 12,000 ft-long dam raised using offset upstream construction, with a current maximum dam height of approximately 85 ft.
- Western Dam North (WDN) is an approximately 9,000 ft-long dam raised using offset upstream construction, with a current maximum dam height of approximately 75 ft.
- SD-1 Dam (SD-1) is approximately 2,300 ft long with a current maximum dam height of approximately 140 ft.
- SD-2 Dam (SD-2) is approximately 4,000 ft long with a current maximum dam height of approximately 60 ft.
- SD-3 Dam (SD-3) is approximately 12,000 ft long with a current maximum dam height of approximately 75 ft.
- SD-4 Dam (SD-4) is approximately 4,800 ft long with a current maximum dam height of approximately 65 ft.
- Eastern Dam (ED) is approximately 5,000 ft long with a current maximum dam height of approximately 50 ft.

Active tailings disposal is occurring in the West Area cell, with excess supernatant being allowed to overflow into the SD-3 Reservoir via the WA 3 Reinforced Concrete Spillway. SD-3 is not outfitted with an emergency spillway; however, the dam has been sized to contain tailings, a long-term pond elevation, plus additional dam height to contain the design storm event and wave run-up.

Hibbing Taconite plans to resume tailings deposition in the East Area at a later date, which has been idle since 2011. Historically, the West Area cell was divided into three cells (WA-1, WA-2, and WA-3), which were separated by the WA-1 Interior Dam, WA-2 Interior Dam, and the Interior Dam. The WA-2 Interior Dam is no longer being raised and has been submerged. The WA-1 Interior Dam continues to be raised and is currently used as a haul road. The West Area and East Area are separated by the Interior Dam and the East Area N-S Interior Dam. The WA-3 Interior Dam separates the West Area from the SD-3 Reservoir, and the East Area E-W Interior Dam separates the East Area from the SD-3 Reservoir.

The downstream method was used originally to raise most of the dams before switching to the upstream raise method in the later 1980s. The switch to an upstream raise method caused uplift pressures to develop beneath the upstream sloping clay core for the corners of the perimeter dams. These corner areas became critical for stability. The offset upstream method was then used after uplift pressures were recognized, utilizing staged construction techniques and the use of frozen ground for initial placement of tailings.

15.4.2 Design and Construction

SLR understands that Hibbing Taconite has retained Barr as the Engineer of Record (EOR) for the TSF. Typical EOR services include the design (i.e., volumetrics, stability analysis, water balances, hydrology, seepage cut-off design, etc.), construction and construction monitoring, inspections (i.e., annual dam safety inspections) and instrumentation monitoring data review (i.e., regularly scheduled instrumentation monitoring and interpretation), to verify that the tailings basins are being constructed and operated by Hibbing Taconite as designed and to meet all applicable regulations, guidelines, and standards.

Barr has designed vertical dam raises for SD-1 and WDN, increasing the current crest elevation of 1,600 ft to 1,630 ft, which will result in an ultimate dam height of approximately 170 ft for SD-1. Barr states that the slope stability FoS and the flood storage requirements for SD-1 and WDN meet the minimum specified requirements (Barr, 2021 and Barr, 2020a). KP (2019) noted that this raise will provide enough tailings storage capacity until 2026 based on an annual production of 21.2 MLT.

15.4.3 Audits

The most recent audit was performed by KP in 2019 (KP, 2020). The previous audit was undertaken by SRK in 2015 (SRK, 2015).

SLR understands that an External Peer Review Team (EPRT) was established in 2019 as part of the tailings basin design and operations review.The EPRT is an independent group that is not associated with the day-to-day engineering activities performed by Barr or Hibbing Taconite and works with Barr and Hibbing Taconite to review design, construction, monitoring, and risk management.

15.4.4 Inspections

Regular inspection and monitoring are carried out by Barr, which is currently identified as the EOR for the TSFs, and include dam inspections (Barr, 2020b) and visual inspections, as well as a semi-annual report of all the instrumentation readings, including the piezometer levels.

15.4.5 Reliance on Data

SLR relies on the statements and conclusions of Barr, Hibbing Taconite, and KP, and provides no conclusions or opinions regarding the stability of the listed dams and impoundments.

15.4.6 Recommendations

The HibTac TSF has been operating since 1976, which is currently operating under the requirements of the MDNRDam Safety Unit Upstream tailings dam raises, such as those carried out by Hibbing Taconite at the Property, are typically done in low-seismic zones and can be constructed using the coarse-fraction tailings (sand) material. This type of construction approach, however, requires a comprehensive communication and documentation system, careful water management, monitoring of the dam and foundation performance, and the placement of tailings material to ensure that it meets the design requirements. To address these issues, Hibbing Taconite has retained Barr as the EOR, which is an industry standard for tailings management, as the EOR typically verifies that the tailings storage basin cells are being constructed and operated by Hibbing Taconite as designed and to meet all applicable regulations, guidelines, and standards.

Based on a review of the documentation provided, SLR has the following recommendations:

1. The Operations, Maintenance, and Surveillance (OMS) Manual for the TSF should be updated with the EOR in accordance with Mining Association of Canada (MAC) guidelines and other industry-recognized, standard guidance for tailings facilities.
2. The remediation, or resolution, of items of concern noted in TSF audits or inspection reports should be documented, prioritized, tracked, and closed out in a timely manner.

15.5 Power

Electrical power is supplied to the site by Minnesota Power. The site load is approximately 167 MW. Power is supplied through a loop system with a 115 kV distribution line that runs along the eastern portion and northern portion of the Property. A 230 kV line runs in a north-south direction along the northern half of the western Property boundary. A 115 kV line provides the southern segment of the loop, with the 115 kV line providing power at three substations. A 500-kV high voltage transmission line runs along the eastern and northern areas of the Property. Figure 15-6 shows the electrical distribution.

HibTac is fed by four separate, 75MW 115 kV lines. The main substation has three, 75 MVA transformers with dual secondaries feeding six, 13.8 kV distribution busses for the connected load.

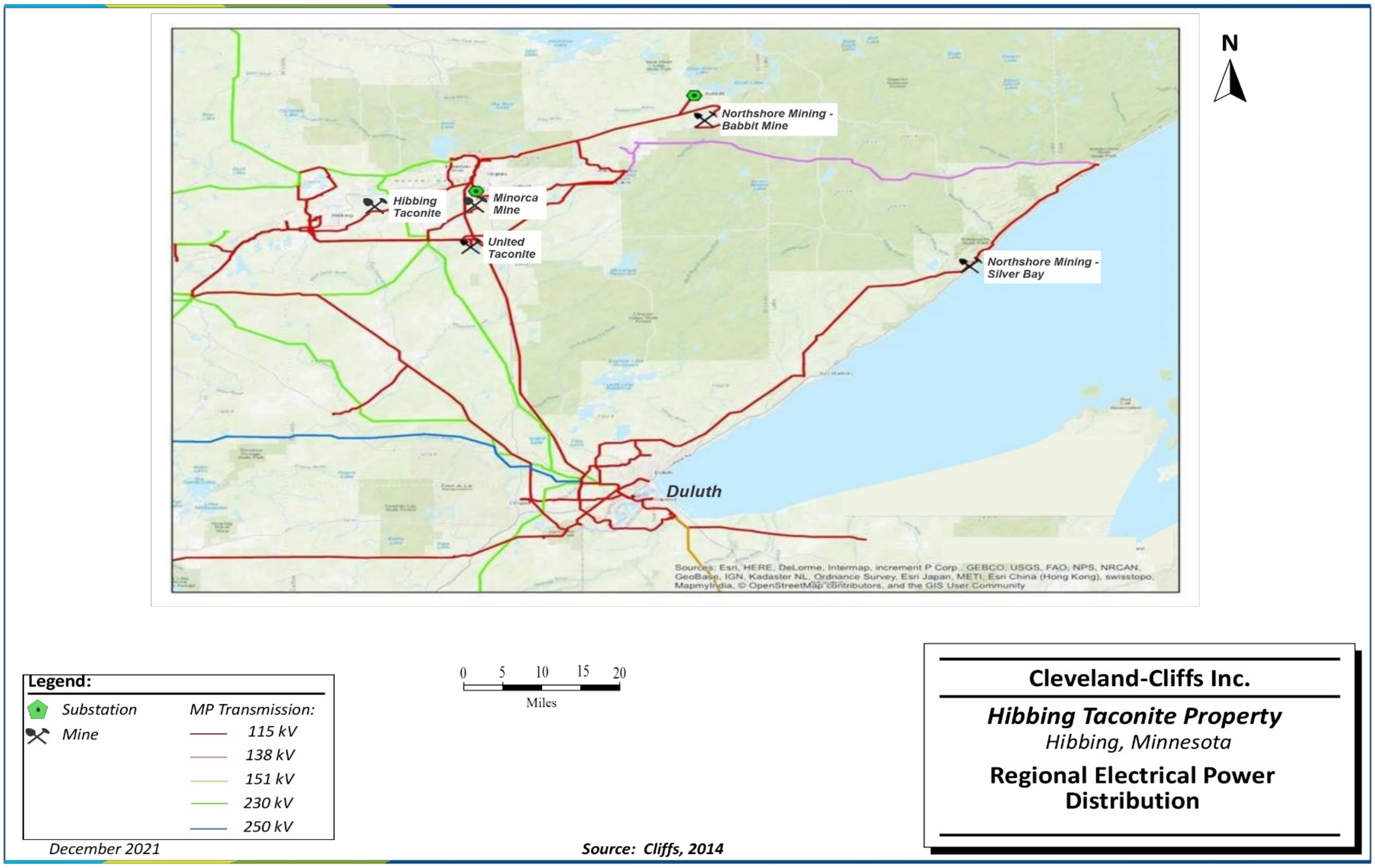
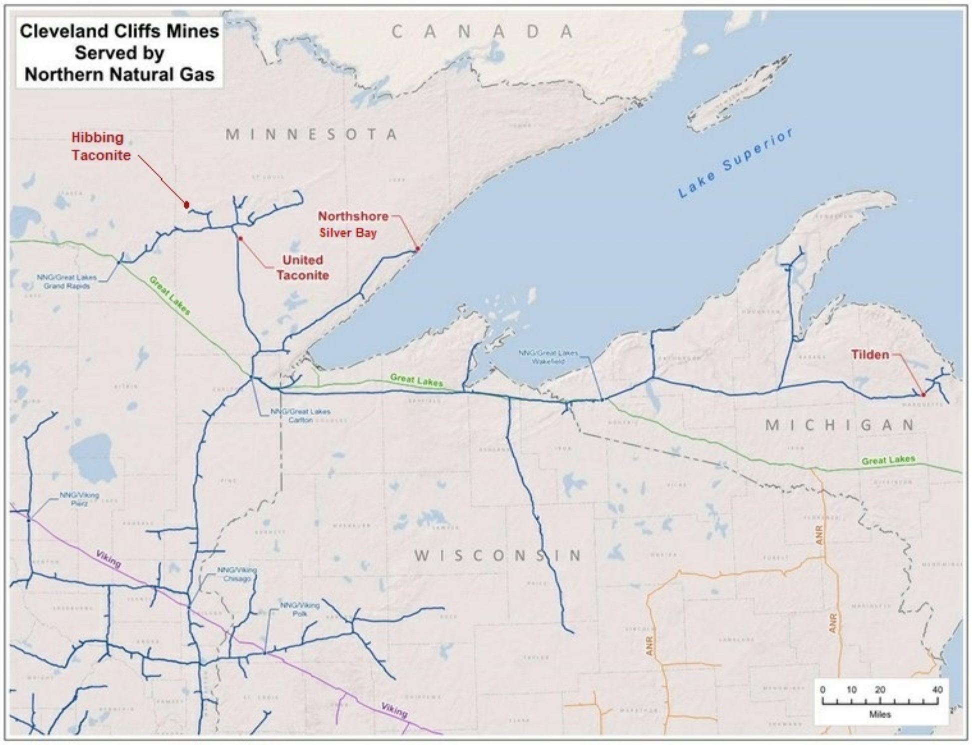


Figure 15-6: Regional Electrical Power Distribution

15.6. Natural Gas

Natural gas fuel is provided by Northern Natural Gas (NNG) to the mine site in a supply pipeline that parallels the entrance road on the eastern side of the Property. NNG primarily provides natural gas from Texas and ships it into the area through a high-pressure natural gas line. Natural gas is used at a rate of 310 MMBtu/LT of pellets (five year average). Gas supply is adequate for planned plant needs. Figure 15-7 shows the regional natural gas distribution.



Source: Northern Natural Gas Company

Figure 15-7: Regional Natural Gas Supply

15.7. Diesel, Gasoline, and Propane

Large diesel equipment is fueled in the field by a contractor. Small diesel and gasoline fueling stations are used for small maintenance equipment and fleet vehicles. Best Oil supplies diesel fuel to all of Cliffs' Minnesota operations, while Thompson Gas supplies propane. There is sufficient fuel supply in the region to meet the requirements of the operation.

15.8. Water Supply

The water for mining and processing operations is provided by makeup water from the Scranton and Morton pits and recycles water from the TSF.The makeup water is provided at approximately 5,000 gpm by pit pumps. The source of makeup water is adjusted based on the mine plan. The reclaim water from the tailings is used for process water at the Plant. The water supply is more than adequate, especially considering that the Mine is a net positive water situation requiring daily discharge of excess water from pit dewatering. Pit dewatering is a substantial effort on this project, and a number of processes are in place to meet targeted needs driven by the mine plan.

15.9. Communications

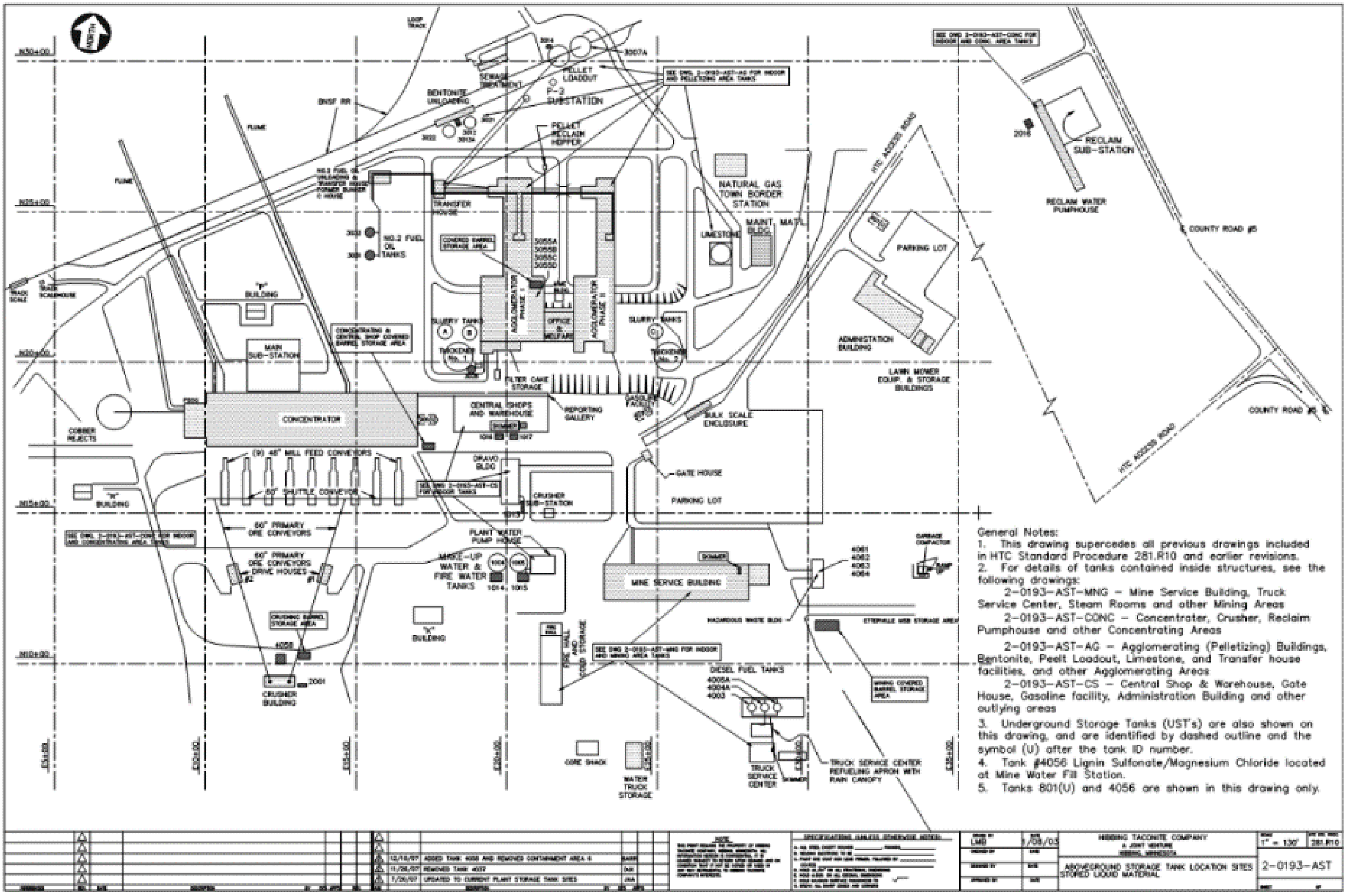
The Property has a substantial communication system in place. The infrastructure includes telephones, cell phones, mine/plant radios, mine/plant paging system (the paging system will soon have the capability to broadcast emergency communications over all radio channels simultaneously), and truck dispatch system. Internet (cable and wireless) is also used at the site.

15.10 Mine Support Facilities

See below under Plant Support facilities.

15.11 Plant Support Facilities

The Plant area includes the following buildings and adjacent sites: administrative building, tire yard, mine service building, truck service center, fire hall, plant water pump house, central shops and warehouse, solid waste transfer station, crusher, drive houses, concentrator, agglomerator, agglomerator thickeners, transfer house, pellet load out and bentonite unloading site, sewage treatment plant, various dry storage buildings, power substations, fuel storage and refueling sites, parking lots, and offices. The analytical laboratory is located in the concentrator. Additional ancillary facilities include explosives storage, a truck scale facility, and a secured guard gate-controlled access to the Plant facilities. The general arrangement of the Plant facilities is illustrated in Figure 15-7.



General Notes:

1. This drawing supercedes all previous drawings included in HTC Standard Procedure 281.R10 and earlier revisions.
2. For details of tanks contained inside structures, see the following drawings:
   2–0193–AST–MNG – Mine Service Building, Truck Service Center, Steam Rooms and other Mining Areas
   2–0193–AST–CONC – Concentrater, Crusher, Reclaim Pumphouse and other Concentrating Areas
   2–0193–AST–AG – Agglomerating (Pelletizing) Buildings, Bentonite, Peelt Loadout, Limestone, and Transfer house facilities, and other Agglomerating Areas
   2–0193–AST–CS – Central Shop & Worehouse, Gate House, Gasoline facility, Administration Building and other outlying areas
3. Underground Storage Tanks (UST's) are also shown on this drawing, and are identified by dashed outline and the symbol (U) after the tank ID number.
4. Tank #4056 Lignin Sulfonate/Magnesium Chloride located at Mine Water Fill Station.
5. Tanks 801(U) and 4056 are shown in this drawing only.

ABOVEGROUND STORAGE TANK LOCATION SITES STORED LIQUID MATERIAL

Figure 15-7: Hibbing Taconite Facilities General Arrangement Drawing

15.11.1 Administration Buildings and Offices

The 20,000 ft^2 administrative facilities provide offices for general management, safety, environmental, accounting, human resources, and administrative staff. Mine engineering and geology offices are located in the mine services building, and process engineering offices are located in the Plant.

15.11.2 Maintenance Shop

The maintenance facilities on-site include a 37,000 ft^2 central shop and warehouse, a 2700 ft^2 maintenance material building, and a 67,500 ft^2 mine services building with four designated bays to service mine trucks and larger production equipment. All facilities are fully stocked with maintenance equipment and tools for maintenance activities, including welding and machining, hydraulic hose supply and repair, electrical testing, tire repair, fuel storage, lubrication and used oil storage, hazardous waste control, and firefighting.

16.0 MARKET STUDIES

16.1 Markets

Note that while iron ore production is listed in long or gross tons (2,240 lb), steel production is normally listed in short tons (2,000 lb) or otherwise noted.

Cliffs is the largest flat-rolled producer in North America. It is also the largest supplier of iron ore pellets in North America. In 2020, Cliffs acquired two major steelmakers, AMUSA and AK Steel (AK), vertically integrating its legacy iron ore business with steel production and emphasis on the automotive end market.

Cliffs owns or co-owns five active iron ore mines in Minnesota and Michigan. Through the two acquisitions and transformation into a vertically integrated business, the iron ore mines are primarily now a critical source of feedstock for Cliffs' downstream primary steelmaking operations. Based on its ownership in these mines, Cliffs' share of annual rated iron ore production capacity is approximately 28.0 million tons, enough to supply its steelmaking operations and not have to rely on outside supply.

In 2021, with underlying strength in demand for steel, the price reached an all time high. It is expected to remain at historically strong levels going forward for the foreseeable future. In 2020, North America consumed 124 million tons of steel, while producing only 101 million tons, which is consistent with the historical trend of North America being a net importer of steel. That trend is expected to continue going forward, as demand is expected to outpace supply in North America. Given the demand, it will likely be necessary for most available steelmaking capacity to be utilized.

On a *pro-forma* basis, in 2019 Cliffs shipped 16.5 million tons of finished, flat-rolled steel. The next three largest producers were Nucor with 12.7 million tons, U.S. Steel with 10.7 million tons, and Steel Dynamics with 7.7 million tons. In 2019, total US flat-rolled shipments in the United States were approximately 60 million tons, so these four companies make up approximately 80% of shipments.

With respect to its blast furnace (BF) capacity, Cliffs' ownership and operation of its iron ore mines is a primary competitive advantage against electric arc furnace (EAF) competitors. With its vertically integrated operating model, Cliffs is able to mine its own iron ore at a relatively stable cost and supply its BF and direct reduced iron (DRI) facilities with pellets in order to produce an end steel or hot briquetted iron (HBI) product, respectively. Flat-rolled EAFs rely heavily on bushelling scrap (offcuts from domestic manufacturing operations and excludes scrap from obsolete used items), which is a variable cost. The supply of prime scrap is inelastic, which has caused the price to rise with the increased demand. S&P Global Platts has stated that the open-market demand for scrap could grow by nearly 9 million tons through 2023 as additional EAF capacity comes online with the impact of the scrap market to continue to tighten as all new steel capacity slated to come online is from EAFs (S&P Global Platts, news release, March 18, 2021).

In addition to its traditional steel product lines, Cliffs-produced steel is found in products that are helping in the reduction of the global emissions and modernization of the national infrastructure. For example, Cliffs' research and development center has been working with automotive manufacturer customers to meet their needs for electric vehicles. Cliffs also offers a variety of carbon and plate products that can be used in windmills, while it is also the sole producer of electrical steel in the United States. Additionally, in Cliffs' opinion, future demand for steel given its low CO_2 emissions positioning will increase relative to other materials such as aluminum or carbon fiber.

Cliffs is uniquely positioned for the present and future due to a diverse portfolio of iron ore, HBI, BFs, and EAFs generating a wide variety of possible strategic options moving forward, especially with iron ore. For instance, Cliffs has the optionality to continue to provide iron ore to its BFs, create more DRI internally, or sell iron ore externally to another BF or DRI facility.

The necessity for virgin iron materials like iron ore in the industry is apparent as EAFs rely on bushelling scrap, or metallics. As of 2020, EAFs accounted for 71% of the market share, a remarkably high percentage among major steelmaking nations. Because scrap cannot be consistently relied upon as feedstock for high-quality steel applications, the industry needs iron ore-based materials that Cliffs provides to continue to make quality steel products.

The US automotive business consumes approximately 17 million tons of steel per year, which is expected to continue around or at this level over time for the foreseeable future. Cliffs iron ore reserves provide a competitive advantage in this industry as well, due to high quality demands, which scrap-based steelmakers have more difficulty supplying. As a result, Cliffs is the largest supplier of steel to the automotive industry in the United States, by a large margin.

Table 16-1 shows the historical pricing for hot rolled coil (HRC) product, Bushelling Scrap feedstock, and IODEX iron ore indexes for the last five years. The table also includes the 2021 pricing for each index, which shows a significant increase that is primarily driven by demand.

Table 16-:1 Five Year Historical Average Pricing
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Indices	2017	2018	2019	2020	2021	5 Yr. Avg.
U.S. HRC ($/short ton)	620	830	603	588	1611	850
Busheling ($/gross ton)	345	390	301	306	562	381
IODEX ($/dry metric ton)	71	69	93	109	160	100

The economic viability of Cliffs' iron ore reserves will in many cases be dictated by the pricing fundamentals for the steel it is generated for, as well as scrap and seaborne iron ore itself.

The importance of the steel industry in North America, and specifically the US, is apparent by the actions of the US federal government by implementing and keeping import restrictions in place. Steel is a product that is a necessity to North America. It is a product that people use every day, often without even knowing. It is important for middle-class job generation and the efficiency of the national supply chain. It is also an industry that supports the country's national security by providing products used for US military forces and national infrastructure. Cliffs expects the US government to continue recognizing the importance of this industry and does not see major declines in the production of steel in North America.

For the foreseeable future, Cliffs expects the prices of all three indexes to remain well above their historical averages, given the increasing scarcity of prime scrap as well as the shift in industry fundamentals both in the US and abroad.

16.2 Contracts

16.2.1 Pellet Sales

Since Cliffs' 2020 acquisition of AK and AMUSA's BF steel making facilities, HibTac pellets are shipped predominantly to Cliffs' steelmaking facilities in the Midwestern USA. For cash flow projections, Cliffs uses a blended three-year trailing average revenue rate based on the dry standard pellet from all Cliffs' mines, calculated from the blended wet pellet revenue average of $98/WLT Free on Board (FOB) Mine as shown in Table 16-2. Pellet prices are negotiated with each customer on long-term contracts based on annual changes in benchmark indexes such as those shown in Table 16-1 and other adjustments for grade and shipping distances.

Table 16-2: Cliffs Consolidated Three-Year Trailing Average Wet Pellet Revenue
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	2017	2018	2019	3YTA
Revenue Rate ($/WLT)	88.02	105.64	99.50	98.00
Total Pellet Sales (MWLT)	18.7	20.6	19.4	19.5

SLR examined annual pricing calculations provided by Cliffs for the period 2017-2019 for external customers, namely AK. The terms appear reasonable. It should be noted that Cliffs has subsequently acquired AK and AMUSA steelmaking facilities in 2020, making the company a vertically integrated, high-value steel enterprise, beginning with the extraction of raw materials through the manufacturing of steel products, including prime scrap, stamping, tooling, and tubing.

For the purposes of this TRS, it is assumed that the internal transfer pellet price for Cliffs' steel mills going forward is the same as the $98/WLT pellet price when these facilities were owned by AK and AMUSA. Based on macroeconomic trends, SLR is of the opinion that Cliffs pellet prices will remain at least at the current three-year trailing average of $98/WLT or above for the next five years.

16.2.2 Operations

Major current suppliers for the HibTac operation include, but are not limited to, the following:

- Electrical Grid Power: Minnesota Power
- Natural Gas: NNG with scheduling by Constellation Energy
- Diesel Fuel: Best Oil
- Propane: Thompson Gas
- Pellet Rail Transport and Two Harbors Port ship loading: BNSF Railway

17.0 ENVIRONMENTAL STUDIES, PERMITTING, AND PLANS, NEGOTIATIONS, OR AGREEMENTS WITH LOCAL INDIVIDUALS OR GROUPS

The SLR review process for the HibTac operation included updating information that was provided by Cliffs.SLR also conducted a site visit at HibTac on April 28, 2021. SLR has not seen nor reviewed environmental studies, management plans, permits, compliance documentation and reports, or monitoring reports. The original and updated information included in this section is based on the information provided by the Cliffs project team.

17.1 Environmental Studies

HibTac has been operating for 45 years, and baseline and other environmental studies have been undertaken as needed to support various approvals and compliance-based reporting over the site's operating history. Currently, additional environmental studies, including collecting new or updated baseline information, are undertaken on an as-required basis to support new permit applications or to comply with specific permit conditions.

Recent environmental studies included an Investigation Plan, which was approved by the Minnesota Pollution Control Agency (MPCA) for the North Hibbing Voluntary Investigation and Clean-up (VIC) site.

17.2 Environmental Requirements

Hibbing Taconite maintains an environmental management system (EMS) that is registered to the international ISO 14001:2015 standard.The ISO standard requires components of leadership commitment, planning, internal and external communication, operations, performance evaluation, and management review. Hibbing Taconite's continued registration to the ISO standard is evaluated annually through internal auditors and every other year through external auditors.

Cliffs maintains a regulatory matrix as part of its EMS, as well as a regulatory tracker. Hibbing Taconite conducts internal auditing of its compliance system on a regular basis, and Cliffs corporate conducts a formal compliance audit on a routine basis.

Impacts to surrounding communities (noise, vibration, etc.) are considered by the EMS, and views of interested parties are part of the ranking process when ranking environmental aspects.

17.2.1 Site Monitoring

HibTac operates through permission granted by multiple permits, which are summarized in Table 17-1. The permits contain requirements for site monitoring including air, water, waste, and land aspects of the HibTac operation. The permit-required data are maintained by the facility, and exceptions to the monitoring obligations, if they occur, are reported to the permitting authority as defined in the individual permit. Monitoring is conducted in compliance with permit requirements, and management plans are developed as needed to outline protocols and mitigation strategies for specific components or activities. Monitoring and management programs currently undertaken in compliance with Hibbing Taconite's existing permits include:

- Air Quality: Management plans including fugitive dust control plans, operation and maintenance plans, and startup, shutdown, and malfunction plans; monitoring of fugitive sources and stacks, visible dust emission monitoring at the tailings facility; and greenhouse gas (GHG) emissions monitoring and reporting.

- Noise and Vibration: Blast management plans including vibration monitoring.
- Surface Water: Routine water quality sampling in receiving waters; quantity of water takings and discharges.
- Groundwater: Routine water quantity of water takings.
- Wetlands: Monitoring of nearby wetlands where the potential for an impact has been identified, including potential indirect impacts, where appropriate.
- Wildlife: Monitoring of endangered species in accordance with specific permit conditions.

There are no specific management plans related to social aspects in place.

With regard to compliance, there are currently no outstanding enforcement actions at the facility.

The State and Federal government conduct regional ecologic monitoring in the vicinity of the facility operations. Two recent examples of such monitoring include:

- EPA conducted its residual risk and technology review (RTR) of the Taconite NESHAP (40 CFR 63). EPA's final rule on July 28, 2020 documents that risks from the taconite iron ore processing source category are acceptable, and the current standards provide a margin of safety to protect public health and prevent an adverse environmental effect.
- The State of Minnesota conducts regional watershed monitoring to assess the overall health of waterbodies throughout the state including water quality and macroinvertebrate and fish population diversity and health. The State may develop watershed management tools for water bodies of concern such as Total Maximum Daily Load (TMDL) plans. HibTac is not currently subject to any TMDL-based load restrictions.

17.2.2 Water

HibTac presently maintains National Pollution Discharge Elimination System (NPDES)/State Disposal System (SDS) permits for the mining area, NPDES/SDS Permit No. MN0001465, and plant site and tailings basin area, NPDES/SDS Permit No. MN0049786. Monitoring is conducted at multiple discharge outfalls and surface water monitoring locations. Reporting for the NPDES/SDS permits includes monthly and annual stormwater reporting and annual chemical dust suppression reporting.

HibTac maintains five water appropriations permits through the water appropriations program that facilitate surface and groundwater use with adequate capacity for the mine and plant sites. Monitoring of the amount of water appropriated or used is conducted and reported monthly.

17.2.3 Hazardous Materials, Hazardous Waste, and Solid Waste Management

HibTac typically generates small quantities of hazardous waste and is a small quantity generator per Minnesota hazardous waste rules and generation quantity and according to the federal Resource Conservation and Recovery Act (RCRA). Hazardous waste management is authorized by permits from the applicable regulatory authorities. See Table 17-1 for a full list of permits. HibTac generates other waste materials typical of any large industrial site and manages those wastes offsite through approved vendors.

17.2.4 Tailings Disposal, Mine Overburden, and Waste Rock Stockpiles

Requirements for tailings disposal are discussed in Section 15.4 of this TRS. This section is only related to the permitting and compliance. Tailings disposal is authorized by permits from the applicable regulatory authorities. See Table 17-1 for a full list of permits.

The tailings basin comprises five areas constructed over the mine life to date covering approximately 6,400 acres. The basin stores approximately 11,800 acre-feet per year of bulk solids while recycling approximately 125,000 gpm of water. The perimeter of the tailings basin is approximately 13 mi in length. A discussion of the tailings system is provided in more detail in Section 15.4.

Because iron ore geochemistry is different from other metallic mineral deposits, acid rock drainage is not a concern with the iron ore bodies and associated tailings in Minnesota. Moreover, EPA itself describes the iron ore mining and beneficiation process as generating wastes that are “earthen in character.” Chemical constituents from iron ore mining include iron oxide, silica, crystalline silica, calcium oxide, and magnesium oxide—none of which are Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substancesThe acid-neutralizing potential of carbonates in iron ore offsets any residual acid rock drainage risks, leading to pit water that naturally stabilizes at a pH of 7.5 to 8.5. Generally, water chemistry has not appeared to be an issue; however, some seeps developed along a portion of the Western Dam North that have distinct coloration, which may be indicative of geochemical/biological activity. The water from these seeps and additional relief wells is pumped back into the tailings basin.

Annual inspections and review of dam performance identified that minimum factors of safety, related to stability and seepage, have been met. Recommendations for corrective actions were made and are currently being implemented.

Requirements for the disposal of mine overburden and non-mineralized or lean waste rock are discussed in section 13.5 of this TRS. Stockpiling of these materials is authorized by permits from the applicable regulatory authorities. See Table 17-1 for a full list of permits.

17.3 Operating Permits and Status

HibTac operates through permission granted by multiple permits, which are summarized in Table 17-1.

While permitting always involves varying degrees of risk due to external factors, Hibbing Taconite has indicated that it has a demonstrated record of obtaining necessary environmental permits without unduly impacting the facility operational plan. HibTac is not aware of any issues that could lead to future operation issues that are not otherwise being actively addressed at this time. The following permit applications are pending with a permitting authority:

MPCA

- Mine Area permit: Major modification to NPDES/SDS Permit #MN0001465 to increase the rate of pit dewatering surface discharge.

MDNR

- Mine area: Substantial modification to the Permit to Mine to add four areas into the pit area and request a variance to work within the right-of-way of Highway 169.

- Basin area: Request for authorization for fill under the Wetland Conservation Act to support buttressing along Western Dam South.

United States Army Corps of Engineers (USACE)

- Basin area: Request for authorization for fill under the Clean Water Action Section 404 to support buttressing along Western Dam South.

Table 17-1: List of Existing Environmental Permits
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Permit No	Description	Type	Jurisdiction	Agency	Status
MN13700061	Air Permit MN13700061	Air	State	MPCA	Active, Administratively Extended
MN0049760	NPDES/SDS Plant and Tailing Basin	NPDES/SDS	State	MPCA	Active, Administratively Extended
MN0001465	NPDES/SDS Mining Area	NPDES/SDS	State	MPCA	Active, Administratively Extended
1990-2196	Water Appropriations Mahoning Ponds	Water	State	DNR	Active
1970-1081	Water Appropriations Process Water	Water	State	DNR	Active, Amendment in progress
2000-2041	Water Appropriations Groundwater	Water	State	DNR	Active
2002-2059	Water Appropriations Stevenson	Water	State	DNR	Active
1968-1558	Water Appropriations Pit Dewatering	Water	State	DNR	Active, Amendment in progress
2008-02566-DWW	404 Wetland Permit	Wetland	Federal	ACOE	Active
2014-00396-DWW	404 Wetland Permit	Wetland	Federal	ACOE	Active
2015-03435-DWW	404 Wetland Permit	Wetland	Federal	ACOE	Active
2019-02609-RQM	404 Wetland Permit	Wetland	Federal	ACOE	Active
NA	MDNR Permit to Mine – Original Permit	Land	State	MNDNR	Active
Dam Safety Permit 2015-2549	MDNR Dam Safety Permit	Dam	State	MNDNR	Active
MND091728683	Hazardous Materials Certificate of Registration	Waste	State	MPCA	Active
WTSF-103	Waste Tire Facility Permit	Waste	State	MPCA	Active
MN1088-100-69	Radiation License	Radiation	State	MDH	Active

Regulatory issues that could have a bearing on Hibbing Taconite's current plans to address any issues related to environmental compliance and permitting are actively monitored and disclosed in Cliffs' 10-K; Part I Environment, which has discussion relevant to:

- Minnesota's Sulfate Wild Rice Water Quality Standard
- Evolving water quality standards for conductivity; Definition of "Waters of the United States" Under the Clean Water Act
- Mercury TMDL and Minnesota Taconite Mercury Reduction Strategy
- Climate Change and GHG Regulation
- Regional Haze FIP Rule
- Conductivity
- Regulation of Discharges to Groundwater

17.4 Mine Closure Requirements

HibTac has approximately five years of remaining mine life and is not required to submit a deactivation plan to the MDNR until at least two years prior to deactivation in accordance with Minnesota Administrative Rule 6130.4100. The post-mining landscape is required to be stable, non-polluting, minimize the need for fencing, be compatible with adjacent land uses and projected land use trends, and be maintenance free to the extent possible. This rule sets time limitations for removing structures or providing provisions for continued use.

Cliffs is also a partner and financial contributor to the Laurentian Vision Partnership, a regional non-profit coalition of industry, state, and community stakeholders that promotes the development of productive post-mining landscapes on the Mesabi Iron Range.

HibTac prepared an asset retirement obligation (ARO) cost for the sites of approximately US$143 million that covers: monitoring and maintenance; reclamation and vegetation; remediation; structure removal; watershed restoration; and long-term water management at the tailings basin, namely post-closure seepage control.

17.4.1 Concurrent Reclamation

HibTac has approximately five years of remaining mine life. Concurrent reclamation activities are underway with good results to date. These activities include seeding as well as natural colonization. Reclamation success is overseen by the MDNR, which expects to see 95% cover after 10 years.

17.5 Social and Community

Cliffs has been investing in the region for over a century, including direct employment and contributions to state, local, and taconite taxes. Taconite taxes contribute to an existing government-administered property tax credit program for people living in the Mesabi Iron Range mining area funded through mining production taxes. SLR is not aware of any formal commitments to local procurement and hiring; however, Cliffs has indicated that it has long-standing relationships with local vendors and also purchases through local and regional services and supplies.

With respect to community agreements, HibTac is located in close proximity to the towns of Hibbing and Chisholm, Minnesota.Cliffs employs a public relations expert who is located in Forbes, Minnesota, only

30 mi away from HibTac, with the goal of responding to residents' complaints in a systematic manner. Hibbing Taconite has an ongoing lease agreement with the City of Hibbing's Public Utilities Department that provides access to Hibbing Taconite-owned property where the city operates a well. In 2017, Hibbing Taconite executed a land swap agreement with the City of Hibbing that was part of a plan to relocate the community's mine overlook and educational center so mining activities could commence at the former location (which was located on the HibTac Property) without significantly impacting the community.

Cliffs' employees make contributions to local United Way chapters through donations that are supported with a matching contribution from the company. Employees also serve as board members and volunteers for the United Way. Another initiative includes agreements with local municipalities or organizations to make Cliffs-owned and leased land that is not utilized for mining available for local community use including trails used for snowmobiling, biking, and ATV use. Cliffs' goal is to work collaboratively with stakeholders to support activities that are of benefit to the communities in which the company operates.

SLR is not able to verify the adequacy of management of social issues and what the general issues raised are, but understands that Cliffs has a positive relationship with stakeholders and that in the event of a complaint, Cliffs works directly with affected community members to develop a mutually acceptable resolution. Public affairs representatives from Cliffs formally engage with the community on an ongoing basis and serve as the face of the company. They sit on boards of community and business organizations at regional and local levels, participate in discussions with government officials, and act as a point of contact within the community. In doing so, they keep stakeholders apprised of critical issues to the operations, understand important topics in the community, and seek to listen to any questions or concerns. Cliffs indicated that this strategy allows it to maintain an ongoing relationship with stakeholders and collaborate with communities to find solutions should any issues arise. Cliffs' Public/Government Affairs maintains a list of stakeholders for Cliffs' iron ore mine operations.

18.0 CAPITAL AND OPERATING COSTS

Cliffs' forecasted capital and operating costs estimates are derived from annual budgets and historical actuals over the long life of the current operation. According to the American Association of Cost Engineers (AACE) International, these estimates would be classified as Class 1 with an accuracy range of -3% to -10% to +3% to +15%.

18.1 Capital Costs

Table 18-1 shows the sustaining capital cost forecast for the five-year period from 2022 to 2026, which totals $27.0 million, or $0.97/WLT pellet. These costs include but are not limited to:

- $21.2 million in mobile equipment additions and replacements
- $2.2 million in environmental upgrades
- $3.7 million in infrastructure and fixed equipment improvements

Table 18-1: LOM Capital Costs
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Type	Values	Total	2022	2023	2024	2025	2026
Sustaining	$ millions	27.0	15.4	7.9	2.4	1.3	0.1
Concurrent Closure	$ millions	29.4	18.8	10.7			
Total	**$ millions**	**56.5**	**34.2**	**18.6**	**2.4**	**1.3**	**0.1**

A final closure reclamation cost of $143 million is estimated, with $48 million spent annually starting in the last year of production in 2026 and the two subsequent years. There is an additional $29 million in concurrent closure during years 2022 to 2023 associated with Hibbing Taconite's decision to move to a more conservative method of TSF design, with the addition of downstream fill to strengthen the dam cross-section.

18.2 Operating Costs

Operating costs for the LOM are based on the 2022 plan. For this period, costs are based on a full run rate of standard pellet production consistent with what is expected for the LOM. After that point in time, however, there are no items identified that should significantly impact operating costs either positively or negatively for the evaluation period. Minor year-to-year variations should be expected based upon maintenance outages and production schedules. Forecasted 2022 and average operating costs over the remaining five years of mine life are shown below in Table 18-2.

Table 18-2: LOM Operating Costs
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Parameter	2022 ($/WLT Pellet)	LOM ($/WLT Pellet)
Mining	22.22	19.87
Processing	35.39	34.57
Site Administration	2.30	2.30
Pellet Transportation and Storage	10.35	10.35
General/Other Costs	8.25	8.20
Operating Cash Cost ($/WLT Pellet)	**78.52**	**75.29**

Processing costs consist of hauling ore from the Mine to the Plant, as well as typical crushing, grinding, concentrating, pelletizing, and tailings basin disposal. Pellet Transportation and Storage costs include rail transport of pellets to Superior, Wisconsin port and ship loading. General/Other costs include production tax and royalty costs, insurance, and other minor costs.

The operation employs a total of 733 salaried and hourly employees as of Q4 2021 consisting of 132 salaried and 601 hourly employees; the majority of the hourly employees are United Steelworkers production and maintenance bargaining unit members.

Table 18-3 summarizes the current workforce levels by department for the Property.

Table 18-3: Workforce Summary
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Category	Salary	Hourly	Total
Mine	**34**	**334**	**368**
Plant	**36**	**224**	**260**
Asset Management	**30**	**43**	**73**
General Staff Organization	**32**	**0**	**32**
Total	**132**	**601**	**733**

19.0 ECONOMIC ANALYSIS

19.1 Economic Criteria

The economic analysis detailed in this section was completed after the mine plan was finalized. The assumptions used in the analysis are current for the time the analysis was completed (Q3 2021), which may be different from the economic assumptions defined in Sections 11 and 12 when calculating the economic pit. For this period, costs are based on a full run rate of pellet production consistent with what is expected for the LOM.

An un-escalated, technical-financial model was prepared on an after-tax discounted cash flow (DCF) basis, the results of which are presented in this section. Key criteria used in the analysis are discussed in detail throughout this TRS. General assumptions used are summarized in Table 19-1.

Cliffs uses a 10% discount rate for DCF analysis incorporating quarterly cost of capital estimates based on Bloomberg data.SLR is of the opinion that a 10% discount/hurdle rate for after-tax cash flow discounting of large iron ore and/or base metal operations is reasonable and appropriate.

Table 19-1: Technical-Economic Assumptions
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	Value
Start Date	December 31, 2021
Mine Life	Five years
Three-Year Trailing Average Revenue	$98/WLT Pellet
Operating Costs	$75.29/WLT Pellet
Sustaining Capital	$27 million
Discount Rate	10.0%
Discounting Basis	End of Period
Inflation	0%
Federal Income Tax	20%
State Income Tax	None – Sales made out of state

The operating cost of $75.29/WLT pellet include royalties and State of Minnesota production taxes.

The production and cost information developed for the Property are detailed in this section. Table 19-2 is a summary of the estimated mine production over the remaining five year mine life. Note that the mining rate values indicate average full production rates and do not include the much lower rates in the last two years of mine life.

Table 19-2: LOM Production Summary
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	Units	Value
Ore	MLT	109.3
Total Material	MLT	220.8
Grade	% MagFe	18.7
Annual Mining Rate	MLT/y	58

Table 19-3 is a summary of the estimated plant production over the remaining five year mine life. Note that the processing and pellet production rate values indicate average full production rates and do not include the much lower rates in the last two years of mine life.

Table 19-3: LOM Plant Production Summary
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Description	Units	Value
ROM Material Milled	MLT	109.3
Annual Processing Rate	MLT/y	24.7
Process Recovery	%	25.5
Total Pellet	MWLT	27.8
Annual Pellet Production Rate	MWLT/y	6.3

19.2 Cash Flow Analysis

The indicative economic analysis results, presented in Table 19-4, indicate an after-tax NPV, using a 10% discount rate, of $269 million at an average blended wet pellet price of $98/WLT. The after-tax IRR is not applicable as the Plant has been in operation for a number of years.Capital identified in the economics is for sustaining operations and TSF buttressing.

Project economic results and estimated cash costs are summarized in Table 19-4 showing annual estimates of mine production and pellet production with associated cash flow.

The economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

Table 19-4: After-Tax Cash Flow Summary
Cleveland-Cliffs Inc. – Hibbing Taconite Property

Mine Life		1	2	3	4	5	6	7
Calendar Years	**Total**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Reserve Base								
Hibbing Taconite Mining Ore Pellet Reserve Tons (millions)	27.8	21.4	15.2	9.0	3.6	(0.0)		
Tonnage Data:								
Hibbing Taconite Mining Total Tons Moved (millions)	220.8	57.3	57.0	57.4	31.2	17.9	-	-
Hibbing Taconite Mining Crude Ore Tons Mined (millions)	109.3	25.6	24.5	24.0	20.3	14.9	-	-
Hibbing Taconite Mining Pellet Production Tons (millions)	27.8	6.4	6.2	6.2	5.4	3.6		
Inputs:								
Hibbing Taconite Mining Pellet Revenue Rate ($/ton)	98	98	98	98	98	98	-	-
Income Statement:								
Hibbing Taconite Mining Gross Revenue ($ in millions)	2,726	627	608	609	529	353	-	-
Mining	553	142	142	142	78	49	-	-
Processing	961	227	214	211	181	129	-	-
Site Administration	64	15	14	14	12	8	-	-
Pellet Transportation and Storage	288	66	64	64	56	37	-	-
General / Other Costs	228	53	51	51	44	30	-	-
Hibbing Taconite Mining Operating Cash Cost ($ in millions)	**2,094**	**503**	**485**	**483**	**371**	**253**	**-**	**-**
Operating Cash Costs ($/LT Pellet)	75.29	78.52	78.27	77.73	68.63	70.20	-	-
Hibbing Taconite Mining Operating Income (excl. Depreciation & Amortization)	**632**	**125**	**122**	**126**	**159**	**100**	**-**	**-**
Federal Income Taxes ($ in millions)	(126)	(25)	(24)	(25)	(32)	(20)	-	-
Depreciation Tax Savings ($ in millions)	13	3	3	3	3	1	-	-
Accretion Tax Savings ($ in millions)	7	1	2	2	2	2	-	-
Hibbing Taconite Mining Income after Taxes ($ in millions)	**526**	**104**	**103**	**105**	**131**	**83**	**-**	**-**

Mine Life		1	2	3	4	5	6	7
Calendar Years	**Total**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Other Cash Inflows & Outflows ($ in millions):								
Sustaining Capital Investments	(27)	(15)	(8)	(2)	(1)	(0)	-	-
Productive Capital Investments	-	-	-	-	-	-	-	-
Mine Closure Costs	(172)	(19)	(11)	-	-	(48)	(48)	(48)
Hibbing Taconite Mining Cash Flow ($ in millions)	**327**	**70**	**84**	**103**	**130**	**35**	**(48)**	**(48)**
Hibbing Taconite Mining Discounted Cash Flow ($ in millions)	**269**	**63**	**69**	**77**	**89**	**22**	**(27)**	**(24)**

19.3 Sensitivity Analysis

Project risks can be identified in both economic and non-economic terms. Key economic risks were examined by running cash flow sensitivities. The operation is nominally most sensitive to market prices (revenues) followed by operating cost as demonstrated in Table 19-5. For each dollar movement in sales price and operating cost, respectively, the after-tax NPV changes by approximately $18 million.

SLR notes that recovery and head grade sensitivity do not vary much in iron ore deposits compared to metal price sensitivity. In addition, sustaining capital expenditures amount to less than 2% of LOM operating costs and, therefore, do not have much impact on the viability of operating mines.

Table 19-5: After-tax NPV at 10.0% Sensitivity Analysis
Cleveland-Cliffs Inc. – Hibbing Taconite Property

		Operating Costs ($/WLT Pellet)					
		90	**85**	**80**	**75**	**70**	**65**
Sales Price ($/WLT Pellet)	**83**	($256)	($168)	($81)	$7	$94	$182
	88	($168)	($81)	$7	$94	$182	$269
	93	($81)	$7	$94	$182	$269	$357
	98	$7	$94	$182	**$269**	$357	$444
	103	$94	$182	$269	$357	$444	$532
	108	$182	$269	$357	$444	$532	$619
	113	$269	$357	$444	$532	$619	$707
	118	$357	$444	$532	$619	$707	$794
	123	$444	$532	$619	$707	$794	$882

20.0 ADJACENT PROPERTIES

There are several iron mines along the Iron Range in Minnesota.The Mineral Resources and Mineral Reserves stated in this TRS are contained entirely within the Hibbing Taconite's mineral leases and information from other operations was not used in this TRS.

21.0 OTHER RELEVANT DATA AND INFORMATION

No additional information or explanation is necessary to make this TRS understandable and not misleading.

22.0 INTERPRETATION AND CONCLUSIONS

The Property has been a successful producer of iron pellets for over 45 years. The update to the Mineral Resource and Mineral Reserve does not materially change any of the assumptions from previous operations. An economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves for a remaining five-year mine life.

SLR offers the following conclusions by area.

22.1 Geology and Mineral Resources

- Above a crude MagFe cut-off grade of 13%, Measured and Indicated Mineral Resources exclusive of Mineral Reserves attributable to Cliffs 85.3% ownership at HibTac are estimated to total 9.1 MLT at an average grade of 19.2% MagFe.
- The HibTac deposit is an example of Lake Superior-type BIF deposits. Both the site and corporate technical teams have a strong understanding of the HibTac geology and mineralization, as well as their processing characteristics.
- Exploration sampling, preparation, analyses, and security processes for both physical samples and digital data are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources.
- QA/QC results for the 2021 verification study are appropriate for the style of mineralization and are sufficient to generate a drill hole assay database that is adequate for Mineral Resource estimation in compliance with international reporting standards. In conjunction with good agreement between planned and actual product produced over more than 45 years, it is SLR's opinion that procedures meet minimum S-K 1300 guidelines.
- The KEV in the block models for HibTac compare well with the source data.
- The methodology used to prepare the block model is appropriate and consistent with industry standards.
- The block model represents an acceptable degree of smoothing at the block scale for prediction of quality variables at HibTac. Visually, blocks and composites in cross-section and plan view compare well.

22.2 Mining and Mineral Reserves

- The HibTac JV has been in production since 1976 and specifically under 100% Cliffs operating management of the JV since 2020.Cliffs conducts its own Mineral Reserve estimations.
- Total Proven and Probable Mineral Reserves are approximately 109 MLT of crude ore at an average grade of 18.7% MagFe.
- Mineral Reserve estimation practices follow industry standards.
- The LOM of HibTac is limited to the next five years, with mining operations ceasing in 2026.
- The geotechnical design parameters used for pit design are reasonable and supported by previous operations.
- The LOM production schedule is reasonable and incorporates large mining areas and open benches.

- An appropriate mining equipment fleet, maintenance facilities, and manpower are in place, with various options for additions and replacements estimated, to meet the LOM production schedule requirements.
- Sufficient storage capacity for waste stockpiles and tailings has been identified to support the production of the Mineral Reserve.

22.3 Mineral Processing

- Three ore types are processed at Hibbing and are referred to as blend components 1-7 (lean ore, <20%), 1-5/1-6 (high-grade ore, >60%), and 1-3/1-4 (low-grade ore, <30%).
- Routine plant samples are collected and analyzed in the HibTac onsite laboratory for process control, product quality monitoring, and reporting to comply with plant and cargo specifications.
- The crushing plant consists of two Allis Chalmers gyratory crushers that crush run of mine (ROM) ore to minus 10 in.The concentrator is based on nine lines of autogenous grinding (AG) mills with two stages (rougher and finisher) of magnetic separation, hydrocyclone classification to close the milling circuits, and hydro-separators for classification of non-magnetic tailings. Finisher magnetic concentrate is screened to obtain final product at 100% passing (P_{100}) 325 mesh. The magnetic concentrate reports to the concentrate thickener, and the non-magnetic fraction reports to the tailings.
- Concentrate is filtered using vacuum disc filters to approximately 9.25% moisture and blended with bentonite prior to pelletizing to produce standard compression pellets, and limestone is added to the mix when producing high-compression pellets.
- Each pelletizing line consists of four Sala balling drums, which discharge across roll screens, producing green (unfired) balls. Sized green balls are conveyed to three 13 ft-wide by 243 ft-long Dravo Traveling Grate indurating furnaces. Pellets discharged from the indurating furnaces are the final product and are conveyed to the pellet load-out bins or to the emergency stockpile.
- Final pellet production is determined by actual train shipments once per month and compared with operating plant measurements. Typical adjustments are in the range of 2,000 LT to 3,000 LT over a total production of 700,000 LT (<0.5% adjustment).
- The ore delivered to the primary crusher from 2015 to 2020 averaged 28,083,000 WLT/y with an average crude magnetic iron grade of 17.7% and concentrate silica content of 4.6%. Weight recovery to concentrate averaged 26.4% over this period, and wet pellet production averaged 7,400,200 WLT/y. Pellet grades averaged 66.1% Fe, 4.5% SiO_2, and 2.1% moisture for the period.

22.4 Infrastructure

- The Property is in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.
- The HibTac TSF has been operating since 1976 and is currently operating under the requirements of the MDNRThe TSF is a paddock dam-type TSF consisting of five cells: West

Area 1, 2, and 3 (WA-1, WA-2, and WA-3 with approximately 2,080 acres, 510 acres, and 1,000 acres of impoundment area, respectively), which are used for tailings deposition; SD-3 Reservoir (approximately 1,340 acres of impoundment area), which is used as a return water reservoir; and East Area (approximately 830 acres of impoundment area), which is currently not in use but will be brought into production at a later date.

22.5 Environment

- Hibbing Taconite maintains the requisite state and federal permits and is in compliance with all permits. Environmental liabilities and permitting are further discussed in Section 17 of this TRS.
- A mine closure plan is not required by the state of Minnesota until at least two years in advance of deactivation of the mining area. HibTac's current mine life is projected at five years; therefore, a detailed closure plan has not been prepared. Cliffs performs annual reviews of changes to HibTac's ARO cost estimate and has calculated ARO legal obligations for closure and reclamation costs.

23.0 RECOMMENDATIONS

23.1 Geology and Mineral Resources

1. Continue to develop and expand the QA/QC program to ensure that the program includes defined limits where follow-up is required, and that results are reviewed and documented in a report including conclusions and recommendations regularly and in a timely manner.
    a. Quality results documented in this report support an initial standard and duplicate submission rate of 5% each.
    b. HibTac should submit a small number of "preparation duplicate" samples to a secondary accredited laboratory to document capability(ies), cost, and time efficiency of alternate provider(s) and confirm that results are comparable to those of the current provider.

23.2 Mining and Mineral Reserves

1. Complete additional permitting work at HibTac to finalize decision on conversion of on-strike Mineral Resources to Mineral Reserves and update mine planning accordingly.

23.3 Mineral Processing

1. While plant operational performance including concentrate and pellet production and pellet quality continue to be consistent year over year, continue to maintain diligence in process-oriented metallurgical testing and in plant maintenance going forward.

23.4 Infrastructure

1. The OMS Manual for the TSF should be updated with the EOR in accordance with MAC guidelines and other industry-recognized, standard guidance for tailings facilities.
2. The remediation, or resolution, of items of concern noted in TSF audits or inspection reports should be documented, prioritized, tracked, and closed out in a timely manner.

23.5 Environment

1. While it is acknowledged that a closure plan and other post-mining plans are not required to be prepared until two years prior to anticipated closure, SLR recommends that a closure plan including costing be completed to prepare the operation for eventual closure in approximately five years.

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25.0 RELIANCE ON INFORMATION PROVIDED BY THE REGISTRANT

This report has been prepared by SLR for Cliffs. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to SLR at the time of preparation of this report,
- Assumptions, conditions, and qualifications as set forth in this report, and
- Data, reports, and other information supplied by Cliffs and other third party sources.

For the purpose of this report, SLR has relied on ownership information provided by Cliffs and verified in an email from Gabriel D. Johnson, Cliffs' Senior Manager – Land Administration, dated January 20, 2022.SLR has not researched property title or mineral rights for HibTac, as we consider it reasonable to rely on Cliffs' legal counsel, who is responsible for maintaining this information.

SLR has relied on Cliffs for guidance on applicable taxes, royalties, and other government levies or interests, applicable to revenue or income from HibTac in the Executive Summary and Section 19. As HibTac has been in operation for over 45 years, Cliffs has considerable experience in this area.

SLR has relied on information provided by Cliffs pertaining to environmental studies, management plans, permits, compliance documentation, and monitoring reports that were verified in an email from Scott A. Gischia, Cliffs' Director – Environmental Compliance, Mining and Pelletizing, dated January 21, 2022.

The Qualified Persons have taken all appropriate steps, in their professional opinion, to ensure that the above information from Cliffs is sound.

Except for the purposes legislated under provincial securities laws, any use of this report by any third party is at that party's sole risk.

26.0 DATE AND SIGNATURE PAGE

This report titled “Technical Report Summary on the Hibbing Taconite Property, Minnesota, USA” with an effective date of December 31, 2021 was prepared and signed by:

(**Signed)** ***SLR International Corporation***

Dated at Lakewood, CO
February 7, 2022 SLR International Corporation

www.slrconsulting.com

EXHIBIT 96.2

Technical Report Summary on the Minorca Property, Minnesota, USA

S-K 1300 Report

Cleveland-Cliffs Inc.

SLR Project No: 138.02467.00001
February 7, 2022
Effective Date: December 31, 2021

Technical Report Summary on the Minorca Property, Minnesota, USA

SLR Project No: 138.02467.00001

Prepared by
SLR International Corporation
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Effective Date – December 31, 2021
Signature Date – February 7, 2022

FINAL

Distribution: 1 copy – Cleveland-Cliffs Inc.
1 copy – SLR International Corporation

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1.0 EXECUTIVE SUMMARY

1.1 Summary

SLR International Corporation (SLR) was retained by Cleveland-Cliffs Inc. (Cliffs) to prepare an independent Technical Report Summary (TRS) on the Minorca Property (Minorca or the Property), located in St. Louis County, Northeastern Minnesota, USAThe operator of the Property, Cleveland-Cliffs Minorca Mine Inc. (CCMMI), is a wholly owned subsidiary of Cliffs.

The purpose of this TRS is to disclose year-end (YE) 2021 Mineral Resource and Mineral Reserve estimates for Minorca.

Cliffs is listed on the New York Stock Exchange (NYSE) and currently reports Mineral Reserves of pelletized ore in SEC filingsThis TRS conforms to the United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300) and Item 601 (b)(96) Technical Report Summary. SLR visited the Property on April 29, 2021.

The Property includes the Laurentian and East Pit mining areas (collectively the Minorca Mine), between Gilbert and Biwabik, Minnesota and a processing facility (the Plant) in Virginia, Minnesota. The Minorca Mine is a complex of large, operating, open-pit iron mines that produces pellets from a magnetite iron ore regionally known as taconite.

The Property commenced operations in 1976 as an asset of Inland Steel Company (Inland Steel)In 1998, ISPAT International (ISPAT) purchased Inland Steel and, in 2004, merged with LNM Holdings and International Steel Group to form Mittal Steel, which in 2007 merged with Arcelor to form ArcelorMittal. The Property has been a wholly owned subsidiary of Cliffs since 2020, when Cliffs purchased the US assets of ArcelorMittal, ArcelorMittal USA (AMUSA).

The open-pit operation at Minorca has a mining rate of approximately 8.6 million long tons (MLT) of ore per year and produces 2.8 MLT of wet flux iron ore pellets, which are shipped by freighter via the Great Lakes to Cliffs' steel mill facilities in the Midwestern USA.

1.1.1 Conclusions

Minorca has been a successful producer of iron pellets for over 44 years. The update to the Mineral Resource and Mineral Reserve does not materially change any of the assumptions from previous operations. An economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves for a 14 year mine life.

SLR offers the following conclusions by area.

1.1.1.1 Geology and Mineral Resources

- Above a crude magnetic iron (MagFe) cut-off grade of 16%, Minorca Measured and Indicated Mineral Resources exclusive of Mineral Reserves are estimated to total 801.5 MLT at an average grade of 22.9% MagFe.
- The East, Central, and Laurentian deposits are examples of Lake Superior-type banded iron formation (BIF) depositsBoth the site and corporate technical teams have a strong

understanding of the Minorca geology, as well as the processing characteristics of the mineralization.

- Exploration sampling, preparation, analyses, and security processes for both physical samples and digital data are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources.
- Cliffs is developing a program of quality assurance and quality control (QA/QC) that includes standards and duplicates and control-chart analysis. A comprehensive QA/QC program did not exist for the previous 44 years of mine operation.QA/QC results for the 2021 verification study are appropriate for the style of mineralization and are sufficient to generate a drill hole assay database that is adequate for Mineral Resource estimation in compliance with international reporting standards. Based on these results, in conjunction with good agreement between planned and actual product produced over more than 40 years, it is SLR's opinion that procedures meet S-K 1300's minimum requirements.
- The key economic variables (KEV) in the block models for Minorca compare well with the source data.Future estimations should also review the cut-off grade used in reporting.
- The methodology used to prepare the block model is appropriate and consistent with industry standards.
- Validations compiled by the Qualified Person (QP) indicate that the block model is reflecting the underlying support data appropriately.
- The classification at Minorca is generally acceptable. In SLR's opinion, however, the extension of classified material beyond drilling limits is slightly aggressive, and some post-processing to remove isolated blocks of different classification is warranted. Classified blocks that extend beyond the drilling limits are generally outside the Resource Pit Shell.
- The block model represents an acceptable degree of smoothing at the block scale for prediction of quality variables at Minorca. Visually, blocks and composites in cross-section and plan view compare well.
- 2021 actual versus model-predicted values of crude ore were accurate to within 10%, with the model values slightly lower than actual total ore processed.

1.1.1.2 Mining and Mineral Reserves

- Minorca has been in production since 1976, and specifically under 100% Cliffs operating management since 2020. Cliffs conducts its own Mineral Reserve estimations.
- Total Proven and Probable Mineral Reserves are estimated at 109.7 MLT of crude ore at an average grade of 23.8% MagFe.
- Mineral Reserve estimation practices follow industry standards.
- The Minorca Mineral Reserve estimate indicates a sustainable project over a 14 year life of mine (LOM).
- The geotechnical design parameters used for pit design are reasonable and supported by previous operations.
- The LOM production schedule is reasonable and incorporates large mining areas and open benches.

- An appropriate mining equipment fleet, maintenance facilities, and manpower are in place, with additions and replacements estimated, to meet the LOM production schedule requirements.
- Sufficient storage capacity for waste stockpiles and tailings has been identified to support the production of the Mineral Reserve.

1.1.1.3 Mineral Processing

- Minorca's product has been wholly consumed by Indiana Harbor #7 blast furnace (IH7) since production began in 1977.In 1987, Minorca began creating flux pellets as opposed to standard pellets. In 1992, Minorca constructed a flotation plant for silica reduction to treat the higher silica, Laurentian Pit ores.
- Minorca performs diamond drilling to characterize the Mineral Resource associated with the mine plan. Blast hole samples are analyzed to validate ore grades and develop blending plans. Minorca also conducts plant sampling for process control and product quality reporting for compliance with Standard Product Parameters (SPPs) established by IH7.
- Ore is blended from the Laurentian and East pits based on MagFe content and silica grade as well as scheduled material movement.
- Crushing, concentrating, and pelletizing processes are conventional. Mined ore is processed in primary, secondary, and tertiary crushers to produce a final product with 100% passing (P_{100}) 5/8 in. that is delivered to the concentrator at a design rate of 1,396 long tons per hour (LT/h).
- The concentrator comprises three lines that include rod milling, primary magnetic separation, ball milling, and secondary magnetic separation closed by cyclones, hydroseparation, and finisher magnetic separation to produce a magnetite concentrate.
- Bentonite and dolomite flux are added to the concentrate, which is agglomerated into balls using balling discs and fired in a straight grate indurating furnace to produce a final, hardened, fluxed pellet product.
- From 2015 to 2020, the Minorca concentrator processed an average of 8.78 MLT per year (MLT/y) of ore with an average MagFe grade of 22.7%. The overall mass recovery to concentrate averaged 32.5% with an overall MagFe recovery of 95.4%. Final product for the period averaged 2.79 MLT/y of flux pellets and 42,200 LT/y of lump product with grades of 62.6% Fe and 4.2% SiO_2.
- The main process water supply for the concentrator is recycled from the tailings thickener. Other sources include the Upland and Minorca tailings basins, the Missabe Mountain Pit, the Sauntry/Enterprise Pit, and the Plant Site settling basin.

1.1.1.4 Infrastructure

- The Property is located in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.
- Cliffs has been operating the Upland Tailings Basin as a disposal site for fine tailings since the mid-1970s and the In-Pit Tailings Basin since 2001, both of which are currently operating under the permit requirements of the Minnesota Department of Natural Resources Dam Safety Unit

1.1.1.5 Environment

- Minorca maintains the requisite state and federal permits and is in compliance with all permits. Environmental liabilities and permitting are further discussed in Section 17.0 of this TRS.

1.1.2 Recommendations

1.1.2.1 Geology and Mineral Resources

1. Continue to develop and expand the QA/QC program to ensure that the program includes clearly defined limits when action or follow-up is required, and that results are reviewed and documented in a report, including conclusions and recommendations, regularly and in a timely manner.
    a. Complete ISO certification for the Minorca laboratory.
    b. Develop a formal QA/QC procedure that includes preparation of a QA/QC campaign report following every annual diamond drilling program.
    c. Continue to submit a small number of “preparation duplicate” samples to a secondary accredited laboratory to document capability(ies), cost, and time efficiency of alternate provider(s) and confirm that results are comparable to those of Minorca’s internal laboratory.
    d. Add sample completion date to all diamond drill hole certificates of analysis returned to the mine geologist.
2. Apply a minimum of two holes during the first pass estimation for Minorca in future updates.
3. In future updates, use local drill hole spacing instead of a distance-to-drill hole criterion for block classification.
4. Prepare model reconciliation over quarterly periods and document methodology, results, and conclusions and recommendations.
5. Continue to update Minorca Mineral Resource estimates with new drilling.

1.1.2.2 Mining and Mineral Reserves

1. Complete additional work at Minorca to support conversion of on-strike Mineral Resources to Mineral Reserves and update mine planning accordingly.
2. Review potential comingling of waste rock stockpiles between the Minorca pits for opportunities to reduce the stockpile footprint created external to the open pits and reduce waste haulage profiles.

1.1.2.3 Mineral Processing

1. Follow the established procedures for sampling and testing to support ore blending and ensure operational consistency and preventive maintenance.

1.1.2.4 Infrastructure

1. Prioritize the completion of an Operations, Maintenance and Surveillance (OMS) Manual for the tailings storage facility (TSF) with the Engineer of Record (EOR) in accordance with Mining

Association of Canada (MAC) guidelines and other industry-recognized standard guidance for tailings facilities.

2. Document, prioritize, track, and close out in a timely manner the remediation, or resolution, of items of concern noted in TSF audits or inspection reports.

1.2 Economic Analysis

1.2.1 Economic Criteria

An un-escalated technical-economic model was prepared on an after-tax, discounted cash flow (DCF) basis, the results of which are presented in this subsection. Key criteria used in the analysis are discussed in detail throughout this TRS. General assumptions used are summarized in Table 1-1 with all physicals reported per wet long ton (WLT) pellet.

Table 1-1: Technical-Economic Assumptions
Cleveland-Cliffs Inc. – Minorca Property

Description	Value
Start Date	December 31, 2021
Mine Life	14 years
Three-Year Trailing Average Revenue	$98/WLT pellet
Operating Costs	$85.53/WLT pellet
Sustaining Capital (after five years)	$4/WLT pellet
Discount Rate	10%
Discounting Basis	End of Period
Inflation	0.0%
Federal Income Tax	20%
State Income Tax	None – Sales made out of state

Table 1-2 presents a summary of the estimated mine production over the 14 year mine life.

Table 1-2: LOM Production Summary
Cleveland-Cliffs Inc. – Minorca Property

Description	Units	Value
Run of Mine (ROM) Crude Ore	MLT	109.7
Total Material	MLT	193.2
Grade	% MagFe	23.8
Annual Mining Rate	MLT/y	16

Table 1-3 presents a summary of the estimated plant production over the 14 year mine life.

Table 1-3: LOM Plant Production Summary
Cleveland-Cliffs Inc. – Minorca Property

Description	Units	Value
ROM Material Milled	MLT	109.7
Annual Processing Rate	MLT/y	8.5
Process Recovery	%	34.2
Total Pellet	MLT	37.4
Annual Pellet Production	MLT/y	2.8

1.2.2 Cash Flow Analysis

The indicative economic analysis results, presented in Table 1-4, indicate an after-tax Net Present Value (NPV), using a 10% discount rate, of $70 million at an average blended wet pellet price of $98/WLT. SLR notes that after-tax Internal Rate of Return (IRR) is not applicable, as the processing facility has been in operation for a number of years. Capital identified in the economics is for sustaining operations and plant rebuilds as necessary.

The economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

Table 1-4: LOM Indicative Economic Results
Cleveland-Cliffs Inc. – Minorca Property

Description	$ Millions	$/WLT Pellet
Three-Year Trailing Revenue ($/WLT Pellet)		98
Pellet Production (MWLT)	37.4	
Gross Revenue	**3,659**	
Mining	631	16.89
Processing	1,701	45.57
Site Administration	82	2.20
Logistics/Dock	403	10.78
General / Other Costs	377	10.10
Total Operating Costs	**3,193**	**85.53**
Operating Income (excl. D&A)	**465**	**12.47**
Federal Income Tax	(93)	(249)
Depreciation Tax Savings	49	1.31
Accretion Tax Savings	4	0.11
Net Income after Taxes	**425**	**11.39**
Capital	210	(5.63)
Closure Costs	29	(0.79)

Description	$ Millions	$/WLT Pellet
Cash Flow	**186**	**4.98**
NPV 10%	**70**	

1.2.3 Sensitivity Analysis

The Minorca operation is nominally most sensitive to market prices (revenues) followed by operating cost. For each dollar movement in sales price and operating cost, respectively, the after tax NPV changes by approximately $18 million.

1.3 Technical Summary

1.3.1 Property Description

The Property is located in St. Louis County, Northeastern Minnesota, USA, on the Mesabi Iron Range, between the towns of Virginia, Gilbert, and Biwabik, Minnesota. The Laurentian Pit is located near the City of Gilbert, Minnesota at latitude 47°30'0"N and longitude 92°26’30"W, East 1 (also termed Lynx) Pit is located at latitude 47°31'30"N and longitude 92°23’30"W, and East 2 (also termed Whiskey) Pit is located just west of the City of Biwabik at latitude 47°32'0"N and longitude 92°22’30"W. The Minorca Plant is located approximately seven miles (mi) to the northeast, near the town of Virginia, Minnesota at latitude 47°33'30"N and longitude 92°31.5'30"W. The Property has the capacity to produce approximately 2.8 MLT of wet flux iron ore pellets annually.

Cliffs controls 16,825 acres of mineral titles and surface rights in the Property through leases and direct ownership through its wholly owned subsidiary CCMMI.

1.3.2 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

The Property is easily accessed via paved roads from Virginia, approximately one mile to the west, or the towns of Gilbert and Biwabik, approximately one mile to the west and east, respectively. A rail line operated by Canadian National Railway (CN) extends from the Minorca processing facility to the port of Two Harbors, Minnesota, a major port city on Lake Superior, which is 75 mi southeast of the Property. Duluth, Minnesota is also 69 mi southeast of Virginia via US Highway 53 and 27 mi southwest of Two Harbors via MN Highway 61Duluth also has a regional airport with several flights daily to major hubs in Minneapolis, Minnesota and Chicago, Illinois.

The climate in northern Minnesota ranges from mild in the summer to winter extremes. The annual average temperature is 36.9°F. The annual average high temperature is 48.6°F, whereas the annual average low temperature is 25.1°F. By month, July is on average the hottest month (77°F), with January being the coldest (-4°F).

The Minorca operation employs 362 personnel who live in the surrounding cities of Virginia, Eveleth, Gilbert, and Hibbing. Personnel also commute from Duluth and the Iron Range. St. Louis County has an estimated population of 200,000 people.

The Property is located in a historically important, iron-producing region of Northeastern Minnesota. All the infrastructure necessary to mine and process significant commercial quantities of iron ore is currently in place. Infrastructure items include high voltage electrical supplies, natural gas pipelines that connect to the North American distribution system, water sources, paved roads and highways, railroads for transporting ROM crude ore and finished products, port facilities that connect to the Great Lakes, and accommodations for employees. Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems.

The Property is at an elevation of approximately 1,700 feet above sea level (fasl). The generally gentle topography in the area is punctuated by hummocky hills and long, gentle moraines, remnants of glacial ingress and egress. The landscape ranges from semi-rugged, lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, to large, flat, poorly drained peatlands. The Minnesota Department of Natural Resources characterizes the area as being within the Laurentian Mixed Forest (LMF) ProvinceIn Minnesota, the LMF is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps.

1.3.3 History

Exploration for high-grade, direct-shipping iron ore (DSO) deposits in the Virginia area began in the 1890s.Focused exploration for beneficiation-grade magnetite deposits, regionally known as taconite deposits, however, did not begin until the 1940s.

The Minorca Mine and Plant began production in 1977 as an asset of Inland Steel, with an initial production rate of 2.56 MLT/y of standard iron ore pellets. Flux pellet production commenced in 1987, and since then, through a multitude of operational improvements, the Plant has increased production to 2.85 MLT/y of pellets. A flotation plant was added in 1992 so that the Plant could utilize the higher silica ore coming from the Laurentian Pit.

In 1998 the Property was purchased by ISPAT, which subsequently became part of a 2005 merger between ISPAT, LNM Holdings, and International Steel Group to form Mittal Steel.In 2007, Mittal Steel merged with Arcelor to form ArcelorMittal. The Property was idled for six months in 2009 to conserve cash for the parent company during the economic downturn of the period. This represented the only time in the history of the Property that the operation was idled for economic reasons.

In 2020, Cliffs purchased the US-based assets of ArcelorMittal and now holds a 100% interest in the Property through its wholly owned subsidiary CCMMI.

1.3.4 Geological Setting, Mineralization, and Deposit

The Minorca deposits are examples of Superior-type BIF deposits, specifically the Biwabik Iron Formation (Biwabik IF), which is interpreted to have been deposited in a shallow, tidal marine setting and is characterized as having four main members (from bottom to top): Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty. Cherty units generally have a sandy granular texture, are thickly bedded, and are composed of silica and iron oxide minerals. Slaty units are fine grained, thinly bedded, and comprised of iron silicates and iron carbonates, with local chert beds, and they are typically uneconomic. The mineral of economic interest at Minorca is magnetite. The nomenclature of the members is not indicative of metamorphic grade; instead, slaty and cherty are colloquial descriptive terms used regionally.

1.3.5 Exploration

Diamond drilling (DD) is the principal method of exploration utilized at Minorca.A combination of historical and current DD core drilled by Cliffs and its predecessors is used in mine planning. Near-mine exploration is conducted on approximately 400 ft centers. In June 2021, Cliffs contracted EDCON-PRJ to fly a high-resolution aeromagnetic survey over its nearby United Taconite operation; the survey extended over the Minorca property and was completed for the purpose of understanding large-scale structural features and BIF oxidation.

1.3.6 Mineral Resource Estimates

Mineral Resource estimates for the Minorca deposit were prepared by Cliffs and audited and accepted by SLR using available data from 1958 to 2021. Mineral Resource estimates are based on 443 DD drill holes totaling 118,809 ft completed since drilling began in 1958.

The 2021 Minorca Mineral Resource estimate was completed using a conventional block modeling approach.The general workflow included the construction of a geological or stratigraphic model representing the Biwabik IF by SLR in Seequent's Leapfrog Geo (Leapfrog Geo) from mapping, drill hole logging, and sampling data, which were used to define discrete domains and surfaces representing the upper contact of each unit of non-iron formation and iron formation subunits. The geologic model was then imported into Maptek's Vulcan™ software (Vulcan) by Cliffs for resource estimation. Sub-blocked model estimates used inverse distance squared (ID^2) and length-weighted, 10 ft uncapped composites to estimate KEVs including magnetic iron, weight recovery, and silica in concentrate in a three-search pass approach, using hard boundaries between subunits, ellipsoidal search ranges, and search ellipse orientation informed by geology. Average density values were assigned by lithological unit.

Mineral Resources were classified in accordance with the definitions for Mineral Resources in S-K 1300. Blocks were classified as Measured, Indicated, or Inferred using distance-based and qualitative criterion. Cliffs classifies the Mineral Resources based primarily on drill hole spacing and influenced by geologic continuity, ranges of economic criteria, and reconciliation. Some post-processing is undertaken to ensure spatial consistency and remove isolated and fringe blocks. The resource area is limited by a polygon and subsequent pit shell based on practical mining limits. A block of ore is classified as Measured if the distance to the nearest drill hole is within 400 ft and estimated with the pass 1 estimate. If the nearest drill hole is between 400 ft and 800 ft and estimated in the pass 2 estimate, it is classified as Indicated. All remaining blocks are classified as Inferred.

Estimates were validated using standard industry techniques including statistical comparisons with composite samples and parallel nearest neighbor (NN) estimates, swath plots, as well as visual reviews in cross-section and plan completed for both deposits. A visual review, comparing blocks to drill holes completed after the block modeling work, was performed to ensure general lithologic and analytical conformance.

To ensure that all Mineral Resource statements satisfy the "reasonable prospects for eventual economic extraction" requirement, Mineral Resources were constrained within an open-pit shell, prepared by Cliffs and based on a US$90/LT pellet value and a wet 62.5% Fe flux pellet. The Minorca Mineral Resource estimate as of December 31, 2021 is summarized in Table 1-5.

Table 1-5: Summary of Minorca Mineral Resources - December 31, 2021
Cleveland-Cliffs Inc. – Minorca Property

Class	Resources	MagFe	Process Recovery	Wet Pellets
	(MLT)	(%)	(%)	(MLT)
Measured	484.3	22.9	32.9	159.3
Indicated	317.2	22.9	32.9	104.4
Total Measured + Indicated	**801.5**	**22.9**	**32.9**	**263.7**
Inferred	30.1	21.1	30.2	9.1

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Mineral Resources are reported exclusive of Mineral Reserves and have been rounded to the nearest 100,000.
3. Mineral Resources are estimated at a cut-off grade of 16% crude MagFe.
4. Mineral Resources are estimated using a pellet value of US$90/LT.
5. Waste within the pit is 986.7 MLT at a stripping ratio of 1.23:1 (waste to crude ore).
6. Saleable product reported as a 62.5% Fe content wet flux pellet, shipped product contains 2% moisture.
7. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
8. Bulk density is assigned based on average readings for each lithology type.
9. Mineral Resources are 100% attributable to Cliffs.
10. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
11. Numbers may not add due to rounding.

Resource estimates take account of the minimum block size that can be selectively extracted. Mineral Resources are exclusive of Mineral Reserves and are reported at a 16% MagFe cut-off grade. Mining recovery is typically 100%, although the grade tends to be diluted by 1% MagFe due to geological conditions and mining practices.

The SLR QP is of the opinion that, with consideration of the recommendations summarized in this section, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work.

1.3.7 Mineral Reserve Estimates

Mineral Reserves in this TRS are derived from the current Mineral Resources.The Mineral Reserves are reported as crude ore and are based on open pit mining from the Laurentian, East 1, and East 2 areas. Crude ore is the unconcentrated ore as it leaves the mine at its natural *in situ* moisture content. The Proven and Probable Mineral Reserves for Minorca are estimated as of December 31, 2021, and summarized in Table 1-6.

Table 1-6: Summary of Minorca Mineral Reserves – December 31, 2021
Cleveland-Cliffs Inc. – Minorca Property

Category	Crude Ore Mineral Reserves (MLT)	Crude Ore MagFe (%)	Process Recovery (%)	Wet Pellets (MLT)
Proven	102.8	23.7	34.0	35.0
Probable	6.8	25.1	36.1	2.5
Proven & Probable	**109.7**	**23.8**	**34.1**	**37.4**

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 pounds and has been rounded to the nearest 100,000.
2. Mineral Reserves are reported at a $90/LT wet flux pellet price free-on-board (FOB) Lake Superior, based on the three-year trailing average of the realized product revenue rate.
3. Mineral Reserves are estimated at a cut-off grade of 16% crude MagFe.
4. Mineral Reserves include mining dilution of 4% and mining extraction losses of 5%.
5. The Mineral Reserve mining stripping ratio (waste units to crude ore units) is at 0.8.
6. Pellets are reported as a 62.5% Fe content wet flux pellet; shipped pellets contain 2.0% moisture.
7. Tonnage estimate based on December 31, 2021 production depletion from surveyed topography on June 28, 2021.
8. Mineral Reserve tons are as delivered to the primary crusher; pellets are as loaded onto lake freighters in Two Harbors, Minnesota.
9. Classification of the Mineral Reserves is in accordance with the S-K 1300 classification system.
10. Mineral Reserves are 100% attributable to Cliffs.
11. Numbers may not add due to rounding.

The three-year (2017 to 2019) trailing average of the realized pellet price is US$98/LT; however, the reserves are evaluated using a pellet price of US$90/LT based on the corporate guidance issued. The pellet value more closely represents the current economic outlook, and the optimization margins still allow for a robust mine-plan. The costs used in this study represent all mining, processing, transportation, and administrative costs including the loading of pellets into lake freighters in Two Harbors, Minnesota.

SLR is not aware of any risk factors associated with, or changes to, any aspects of the modifying factors such as mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

1.3.8 Mining Methods

The Laurentian, East 1, and East 2 areas are mined using conventional surface mining methods. The surface operations include:

- Clearing and grubbing
- Overburden (glacial till) removal
- Drilling and blasting (excluding overburden)
- Loading and haulage

The Mineral Reserve is based on the ongoing, annual-average crude ore production of approximately 8.6 MLT from the Laurentian, East 1, and East 2 pits, producing an average of 2.8 MLT/y of wet flux pellets for domestic consumption.

Mining and processing operations are scheduled 24 hours per day, and the mine production is scheduled to directly feed the processing operations.

The current LOM plan has mining scheduled for 14 years and mines the known Mineral Reserve. The average stripping ratio is 0.8 waste units to 1 crude ore unit (0.8 stripping ratio).

The final Laurentian Pit is approximately 1.2 mi along strike, 0.9 mi wide, and up to 640 ft deep. Crude ore averages approximately 24.4% MagFe. The final East 1 Pit is approximately 0.9 mi along strike, 0.5 mi wide, and up to 310 ft deep. Crude ore within the East 1 Pit averages approximately 22.5% MagFe. The final East 2 Pit is approximately 0.7 mi along strike, 0.4 mi wide, and up to 350 ft deep. The East 2 Pit crude ore contains an average grade of 23.7% MagFe.

Primary production for all mine pits includes drilling a combination of 12.25 in.- and 16.00 in.-diameter rotary blast holes. Production blast hole depth varies as the pit benches transition from the footwall contact to a full 35 ft bench height. Burden and spacing varies depending on the material being drilled.

The holes are filled with explosive and blasted. A combination of front-end loaders and hydraulic shovels load the broken material into a mixed fleet of 200 ton- and 240 ton-payload mining trucks for transport from the pit.

The Mine follows strict crude ore blending requirements to ensure that the Plant receives a uniform head grade.The two most important characteristics of the crude ore are magnetic iron content and predicted concentrate silica. Generally, two ore horizons are mined at one time to obtain a satisfactory crude ore blend for the plant. Crude ore is hauled to the crushing facility and either direct tipped to the primary crusher or stockpiled in an area adjacent to the primary crusher. The crude ore stockpiles are used as an additional source for blending and production efficiency.

The major pieces of pit equipment include diesel hydraulic shovels, front-end loaders, haul trucks, drills, bulldozers, and graders. Extensive maintenance facilities are available at the mine site to service the mine equipment.

Mining manpower is at 178 persons, which includes personnel in mine operations, mine maintenance, and mine supervisions and technical services. Mine manpower will increase proportionately with the future forecast increase in haul trucks to meet the LOM production schedule.

1.3.9 Processing and Recovery Methods

Minorca's product is wholly consumed by IH7 and has been in production since 1977. In 1987, Minorca began producing flux pellets instead of standard pellets. In 1992, Minorca constructed a flotation plant to recover silica from the Laurentian Pit ores. No recent metallurgical testing has taken place at Minorca.

Minorca performs diamond drilling to obtain drill core samples to characterize the Mineral Resource associated with the mine plan. Blast hole samples are analyzed in the same manner to validate projected ore grades and develop blending plans. Minorca also conducts plant sampling for process control and product quality reporting for compliance with Standard Product Parameters (SPPs) established by IH7.

Mined ore is directly dumped into a primary gyratory crusher, which crushes the ROM material to P_{80} 6 in. The crushed material is conveyed to a coarse ore stockpile. The coarse ore is reclaimed and conveyed to the secondary crushing plant, where it is crushed by open-circuit, secondary cone crushers and tertiary cone crushers operating in closed circuit with screens to produce a final product with a P_{100} 5/8 in. The crushed product is conveyed and stacked on the fine ore stockpile. The material is reclaimed from the fine ore stockpile and conveyed to the rod mill feed bin.

The concentrator comprises three lines. Ore is drawn from the feed bin into one rod mill per line for coarse grinding. The rod mill discharge flows through wet cobber magnetic separators. The cobber non-magnetic tailings flow to the tailings spiral classifier and then to the tailings thickener. The cobber magnetic concentrate is pumped to three parallel ball mills, followed by eight rougher magnetic separators, and the circuit is closed by hydrocyclones. Cyclone underflow slurry returns to the ball-mill feed, and cyclone overflow slurry is pumped to the hydroseparators. Hydroseparator underflow slurry is pumped to eight fine screens per line and then to final-stage (finisher) magnetic separation. The screen oversize material is conveyed to the ball-mill feed. The product from finisher magnetic separators is thickened in the acid concentrate thickener and pumped to the acid concentrate storage tank. The acid concentrate is then pumped to the fluxed concentrate storage tank, where bentonite and dolomite (flux) are added to create flux concentrate. A flotation plant was added to the process to treat ore from the Laurentian Pit, which contains silica that is more difficult to liberate using standard grinding and magnetic separation. Silica particles are floated from the concentrate, and the magnetic iron concentrate reports to the cell underflow, which is directed to the concentrate thickener.

The concentrate is pumped from the concentrate thickener underflow to the acid concentrate storage tank and then transferred to the fluxed concentrate storage tank, where it is mixed with flux slurry. The fluxed concentrate is pumped to the concentrate filters in the pelletizing plant. The concentrate is filtered and agglomerated into green balls (balled) using balling discs. The green balls are sized using roller screens and then conveyed through a straight-grate pelletizing furnace to produce the final hardened flux pellet.

1.3.10 Infrastructure

The Property is located in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.

Infrastructure items includes:

- Minorca Mine and concentrator facilities near Virginia, Minnesota.
- Power supplied by Minnesota Power.
- Natural gas supplied by Northern Natural Gas from pipelines that connect into the North American distribution system.
- The Plant uses several water sources for the concentrator, including the clear water pools of the Upland and Minorca In-Pit Tailings Basins (see description below), the Missabe Mountain Pit, the Sauntry/Enterprise Pit, and the Plant Site settling basin.Water can be pumped from the Missabe Mountain Pit into the Sauntry/Enterprise Pit at a rate of 2,000 gpm.Water can be pumped directly to the Plant from the Sauntry/Enterprise (4,000 gpm), Upland Basin (3,800 gpm), the Minorca Basin (5,400 gpm), and the Plant Site Settling Basin (2,800 gpm).
- Paved roads and highways.
- Finished taconite pellets are transported by Canadian National (CN) Railway to the CN port in Two Harbors, Minnesota, approximately 75 mi from the Plant.
- The port is controlled and operated by CN Railway and includes pellet screening, 1.3 MLT of pellet storage and ship loading either directly from rail cars to ship, or from stockpiles to ship. The vessels are 20,000 LT- to 65,000 LT-capacity lakers that transport pellets to steel mills on the Great Lakes.
- Rail yards and workshops are operated by CN Railway.
- Two TSF basins: the Upland Tailings Basin and the Minorca In-pit Tailings Basin.The Upland Tailings Basin is located approximately three miles northeast of the Plant, and the In-pit Tailings Basin is located approximately one mile south-southwest of the Plant.Minorca began using the Upland Tailings Basin as a disposal site for fine tailings in the mid-1970s, and continued to do so until December 2001, at which time Minorca switched to disposing of fine tailings in the Minorca In-pit Tailings Basin. Minorca switched back to the Upland Tailings Basin near the end of 2011, with intermittent disposal into the Minorca In-pit Tailings Basin.
- Accommodations for employees.

- Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems.

1.3.11 Market Studies

Cliffs is the largest producer of iron ore pellets in North America. It is also the largest flat-rolled steel producer in North America. In 2020, Cliffs acquired two major steelmakers, ArcelorMittal USA (AMUSA), and AK Steel (AK), vertically integrating its legacy iron ore business with steel production and emphasis on the automotive end market.

Cliffs owns or co-owns five active iron ore mines in Minnesota and Michigan. Through the two acquisitions and transformation into a vertically integrated business, the iron ore mines are primarily now a critical source of feedstock for Cliffs' downstream primary steelmaking operations. Based on its ownership in these mines, Cliffs' share of annual rated iron ore production capacity is approximately 28.0 million tons, enough to supply its steelmaking operations and not have to rely on outside supply.

The importance of the steel industry in North America and specifically the USA is apparent by the actions of the US federal government in implementing and keeping import restrictions in place. It is important for middle-class job generation and the efficiency of the national supply chain. It is also an industry that supports the nation's national security by providing products used for US military forces and national infrastructure. Cliffs expects the US government to continue recognizing the importance of this industry and does not see major declines in the production of steel in North America.

Minorca flux pellets are shipped to Cliffs' steelmaking facilities in the Midwestern USA.

For cash flow projections, Cliffs uses a blended pellet revenue rate of $98/WLT Free on Board (FOB) Mine based on a three-year trailing average for 2017 to 2019. Based on macroeconomic trends, SLR is of the opinion that Cliffs' pellet prices will remain at least at the current three-year trailing average of $98/WLT or above for the next five years.

1.3.12 Environmental Studies, Permitting and Plans, Negotiations, or Agreements with Local Individuals or Groups

CCMMI indicated that it presently has the requisite operating permits for the operation of the Mine and Plant and estimates the mine life to be 14 years. These permits include county, state, and federal permits related to air quality, surface water quality, water appropriation, hazardous waste generation, and wetlands. Minorca does not anticipate any future permitting to realize the mine life; however, multiple permits require renewal. Environmental monitoring and reporting during operations primarily include water and air quality monitoring.

Closure plans and other post-mining plans are required to be prepared at least two years prior to the anticipated closure; however, Cliffs conducts an in-depth review every three years to ensure that the ARO legal liabilities are accurately estimated based on current laws, regulations, facility conditions, and cost to perform services. These cost estimates are conducted in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 410.

With respect to community agreements, Minorca's mine progression necessitates the drawdown of water levels in the Canton Pit, which is utilized for source water by the city of Biwabik. Minorca entered into a Source Water Change Action Plan with the city of Biwabik (with approval by Minnesota Department of Natural Resources) to transition the city's water source to the Embarrass Pit in

2021/2022. Through this agreement, Minorca has invested in new infrastructure to be owned and operated by the city of Biwabik, so the municipality will experience a seamless transition to its new water source (which is of similar quality to the Canton Pit).

1.3.13 Capital and Operating Cost Estimates

Productive and sustaining capital expenditure estimates for the remaining LOM are presented in Table 1-7. Starting in 2027, a sustaining capital cost of $4/WLT pellet, or $11.2 million annually, is used in the technical-economic model for an additional $78.4 million for the remaining mine life.

Table 1-7: LOM Capital Costs
Cleveland-Cliffs Inc. – Minorca Property

Type	Units	Total	2022	2023	2024	2025	2026	2027	2028-2035
				Capital Costs					
Total Sustaining	$ millions	210.2	28.2	25.5	27.8	27.1	23.2	11.2	67.2
				Pellet Sales					
Pellet Sales	MWLT	37.4	2.8	2.8	2.8	2.8	2.8	2.8	20.6
				Unit Rates					
Total	$/WLT	5.62	10.00	9.11	9.93	9.69	8.28	4.00	3.26

Operating costs are based on a full run rate of flux pellet production consistent with what is expected for the LOM. A LOM average operating cost of $85.47/WLT pellet is estimated over the remaining 14 years of the LOM and is shown in Table 1-8.

Table 1-8: LOM Operating Costs
Cleveland-Cliffs Inc. – Minorca Property

Description	LOM ($/WLT Pellet)
Mining	16.84
Processing	45.56
Site Administration	2.20
Logistics / Dock	10.78
General / Other	10.10
Operating Cash Cost	**85.47**

Cliffs' forecasted capital and operating costs estimates are derived from annual budgets and historical actuals over the long life of the current operation. According to the American Association of Cost

Engineers (AACE) International, these estimates would be classified as Class 1 with an accuracy range of -3% to -10% to +3% to +15%.

2.0 INTRODUCTION

SLR International Corporation (SLR) was retained by Cleveland-Cliffs Inc. (Cliffs) to prepare an independent Technical Report Summary (TRS) on the Minorca Property (Minorca or the Property), located in St. Louis County, Northeastern Minnesota, USA. The operator of the Property, Cleveland-Cliffs Minorca Mine Inc. (CCMMI), is a wholly owned subsidiary of Cliffs.

The purpose of this TRS is to disclose year-end (YE) 2021 Mineral Resource and Mineral Reserve estimates for Minorca.

Cliffs is listed on the New York Stock Exchange (NYSE) and currently reports Mineral Reserves of pelletized ore in SEC filings. This TRS conforms to the United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300) and Item 601 (b)(96) Technical Report Summary. SLR visited the property on April 29, 2021.

The Property includes the Laurentian and East Pit mines (collectively the Minorca Mine), between Gilbert and Biwabik, Minnesota and a processing facility (the Plant) in Virginia, Minnesota. The Minorca Mine is a complex of large, operating, open-pit iron mines that produces pellets from a magnetite iron ore regionally known as taconite.

The Property commenced operations in 1976 as an asset of Inland Steel Company (Inland Steel). In 1998, ISPAT International (ISPAT) purchased Inland Steel and in 2004 merged with LNM Holdings and International Steel Group (LNM) to form Mittal Steel, which in 2007 merged with Arcelor to form ArcelorMittal. The Property has been a wholly owned subsidiary of Cliffs since 2020, when Cliffs purchased the US assets of ArcelorMittal, ArcelorMittal USA (AMUSA).

The open-pit operation at Minorca has a mining rate of approximately 8.6 million long tons (MLT) of ore per year and produces 2.8 MLT of wet flux iron ore pellets, which are shipped by freighter via the Great Lakes to Cliffs' steel mill facilities in the Midwestern USA.

2.1 Site Visits

SLR Qualified Persons (QPs) visited the Property on April 29, 2021. During the site visit, the SLR team all toured the tailings basin, plant laboratory, concentrator and pelletizing facilities, including rail pellet load-out site, and the mine offices and operational areas. The SLR geologist also reviewed drill core logging and sampling procedures, as well as reviewed modeling procedures with the Cliffs mine geologist staff.

2.2 Sources of Information

Technical documents and reports on the Property were obtained from Cliffs' personnel. During the preparation of this TRS, discussions were held with personnel from Cliffs:

- Kurt Gitzlaff, Director - Mine Engineering, Cliffs Technical Group (CTG)
- Michael Orobona, Principal Geologist, CTG
- Michael Koop, Lead Mine Engineer, CTG
- Garret Eliason, Senior Geologist, CTG
- Scott Gischia, Director - Environmental Compliance

- Dean Korri, Director - Basin and Civil Engineering
- Tushar Mondhe, Senior Manager - Operations and Capital Finance
- Eric Krause, Manager – Mine/Crushing
- Bill Ellingson, Senior Engineer – Mine/Crushing
- Adam Sersha, Manager – Concentrator/Pellet Plant
- Jaime Johnson, Manager – Environmental

This TRS was prepared by SLR QPs. The documentation reviewed, and other sources of information, are listed at the end of this report in Section 24.0, References.

2.3 List of Abbreviations

The U.S. System for weights and units has been used throughout this report. Tons are reported in long tons (LT) of 2,240 lb unless otherwise noted. All currency in this report is US dollars (US$ or $) unless otherwise noted.

Abbreviations and acronyms used in this TRS are listed below.

Unit Abbreviation	Definition	Unit Abbreviation	Definition
a	annum	LT/d	long tons per day
A	ampere	LT/h	long tons per hour
acfm	actual cubic feet per minute	M	mega (million); molar
bbl	barrels	Ma	one million years
Btu	British thermal units	MBtu	thousand British thermal units
d	day	MCF	million cubic feet
°F	degree Fahrenheit	MCF/h	million cubic feet per hour
fasl	feet above sea level	mi	mile
ft	foot	min	minute
ft^2	square foot	MLT/y	million long tons per year
ft^3	cubic foot	MPa	megapascal
ft/s	foot per second	mph	miles per hour
g	gram	MVA	megavolt-amperes
G	giga (billion)	MW	megawatt
Ga	one billion years	MWh	megawatt-hour
gal	gallon	MWLT	million wet long tons
gal/d	gallon per day	oz	Troy ounce (31.1035g)
g/cm^3	grams per cubic centimeter	oz/ton	ounce per short ton
g/L	gram per liter	ppb	part per billion
g/y	gallon per year	ppm	part per million
gpm	gallons per minute	psia	pound per square inch absolute
hp	horsepower	psig	pound per square inch gauge
h	hour	rpm	revolutions per minute
Hz	hertz	RL	relative elevation
in.	inch	s	second
in^2	square inch	ton	short ton
J	joule	stpa	short ton per year
k	kilo (thousand)	stpd	short ton per day
kg/m^3	Kilogram per cubic meter	t	metric tonne
kVA	kilovolt-amperes	US$	United States dollar
kW	kilowatt	V	volt
kWh	kilowatt-hour	W	watt
kWLT	thousand wet long tons	wt%	weight percent
L	liter	WLT	Wet long ton
lb	pound	y	year
LT	long or gross ton equivalent to 2,240 pounds	yd^3	cubic yard

Acronym	Definition
AACE	American Association of Cost Engineers
AK	AK Steel
AMUSA	ArcelorMittal USA
ANSI	American National Standards Institute
ARO	asset retirement obligation
ASC	Accounting Standards Codification
ASQ	American Society for Quality
ASTM	American Society for Testing and Materials
BF	blast furnace
BFA	bench face angle
BH	bench height
BIF	banded iron formation
BLS	United States Bureau of Labor Statistics
CBOD5	carbonaceous biochemical oxygen demand, 5 day test
CCD	counter-current decantation
CCP	Conceptual Closure Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Cost and Freight
CN	Canadian National Railway
COA	certificates of analysis
CRIRSCO	Committee for Mineral Reserves International Reporting Standards
D&A	depreciation and amortization
DCF	discounted cash flow
DD	diamond core drilling
DMTT	Davis Magnetic Tube Test
DRI	direct reduced iron
DSO	direct-shipping iron ore
DT	Davis Tube
EAF	electric arc furnace
EAP	Emergency Action Plan
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	environmental management system
EPA	United States Environmental Protection Agency
EPRT	External Peer Review Team
ESOP	Environmental Standard Operating Procedures
EOR	Engineer of Record
FASB	Financial Accounting Standards Board
FEL	front-end loader
FOB	Free on Board
GHG	greenhouse gas
GIM	Geoscientific Information Management

Acronym	Definition
GPS	global positioning system
GSI	Geological Strength Index
GSSI	General Security Services Corporation
HBI	hot-briquetted iron
HRC	hot-rolled coil
ICP	induced couple plasma
ID^2	Inverse distance squared
ID^3	Inverse distance cubed
IF	iron formation
ICFM	inlet air capacity
IIMA	International Iron Metallics Association
IRA	inter-ramp angle
IRR	Internal Rate of Return
ISO	International Standards Organization
KEV	key economic variables
LG	Lerchs-Grossmann
LiDAR	light imaging, detection, and ranging
LMF	Laurentian Mixed Forest
LOM	life of mine
MAC	Mining Association of Canada
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MLT	million long tons
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MR	moving range
MRCC	Midwestern Regional Climate Center
MSHA	Mine Safety and Health Administration
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGO	non-governmental organization
NGVD	National Geodetic Vertical Datum
NNG	Northern Natural Gas
NOAA	National Oceanic and Atmospheric Administration
NOLA	Nuclear On-Line Analyzer
NPDES	National Pollution Discharge Elimination System
NPV	Net Present Value
NRRI	Natural Resources Research Institute
OMS	Operations, Maintenance and Surveillance
PLC	Programmable Logic Controller
PMF	probable maximum flood
QA/QC	quality assurance and quality control
QP	Qualified Person
RC	rotary circulation drilling

Acronym	Definition
RCRA	Resource Conservation and Recovery Act
ROM	run of mine
RQD	Rock Quality Designation
RTR	risk and technology revie
SDS	State Disposal System
SEC	United States Securities and Exchange Commission
SG	specific gravity
SMU	selective mining unit
SQL	Structured Query Language
SPC	statistical process control
TMDL	Total Maximum Daily Load
TRS	Technical Report Summary
TSF	tailings storage facility
TSP	total suspended particulates
UCS	uniaxial compressive strength
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VIMS	vehicle information management system
XRF	x-ray fluorescence

3.0 PROPERTY DESCRIPTION

3.1 Location

The Property is located in St. Louis County, Northeastern Minnesota, USA, on the Mesabi Iron Range, between the towns of Virginia, Gilbert, and Biwabik, Minnesota.The Laurentian Pit is located near the city of Gilbert, Minnesota at latitude 47°30'0"N and longitude 92°26’30"W, East 1 (also termed Lynx) Pit is located at latitude 47°31'30"N and longitude 92°23’30"W, and East 2 (also termed Whiskey) Pit is located just west of the city of Biwabik at latitude 47°32'0"N and longitude 92°22’30"W. The Minorca Plant is located approximately seven miles to the northeast near the town of Virginia, Minnesota at latitude 47°33'30"N and longitude 92°31.5'30"W. Figure 3-1 presents the locations of the Minorca Mine and Plant.

3.2 Land Tenure

The Minorca Property Boundary comprises approximately 16,825 acres in a combination of mineral leases, surface leases, and owned property.

3.2.1 Mineral Rights

The Property consists of approximately 3,135 acres of mineral leases granted by private landowners and the State of Minnesota as summarized in Table 3-1 and illustrated in Figure 3-2. Mineral leases generally include surface mining rights. Where the mineral leases do not include surface mining rights, Minorca controls the surface through ownership or surface leases with the owner of the surface. Approximately 282 acres of owned property is associated with the mineral lease acreage.

Minorca mineral leases expire between 2035 and 2056, with the State of Minnesota mineral leases expiring in 2035.In order to maintain the mineral leases until expiration, Minorca must continue to make minimum prepaid royalty payments each quarter and pay property taxes. When mining occurs, a royalty is due per long ton of crude ore mined, or long ton of pellets produced from the crude ore mined, and is payable to the respective lessors quarterly. Royalty rates per long ton fluctuate based on industry and economic indexes. Minimum prepaid royalty payments may be credited against royalties due when mining occurs. Specific terms and provisions of the mineral leases are confidential.

There are quarterly royalty payments made on the Minorca mine mineral leases to multiple third parties. The details of the royalties are confidential between Minorca and the lessors.

Table 3-1: Mineral Tenures and Rights
Cleveland-Cliffs Inc. – Minorca Property

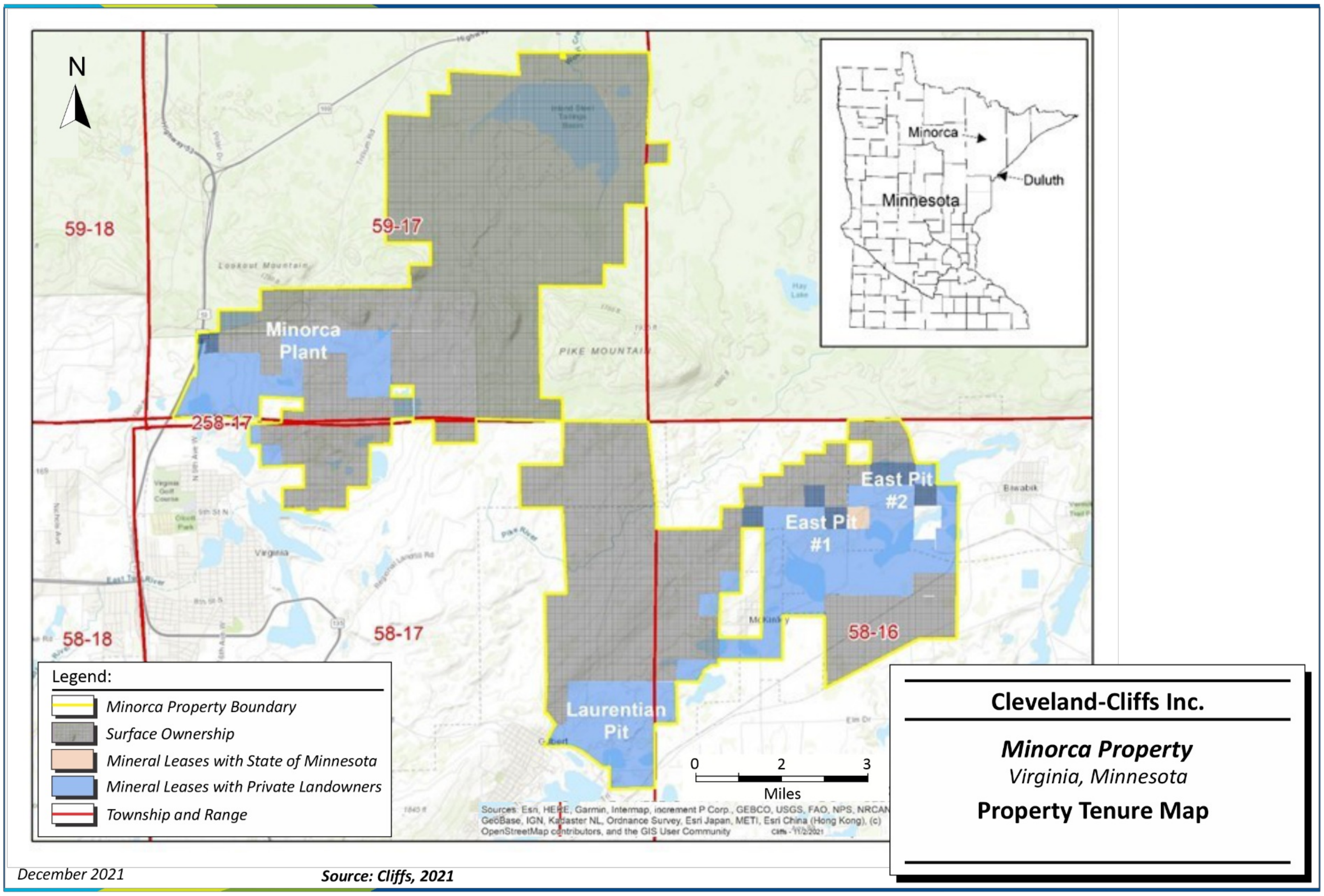
Lease Name	Owners’ Name	Start Date	Expiration Date	Compliance Status
Allen-Ulland Lease	Multiple parties	1/1/1981	1/1/2056	YES
Beckman Lease	Susan Beckman	4/24/2012	12/31/2040	YES
Laurentian - Red Cross	Laurentian LLC and American Red Cross	1/1/1997	12/31/2040	YES
Manthey et al.			12/31/2040	
McClintock-Kirby			5/28/2056	

Lease Name	Owners' Name	Start Date	Expiration Date	Compliance Status
Ordean et al.	Cowen et al.	6/1/1968	6/1/2043	YES
Penobscot et al. Lease	Multiple Owners	1/1/1989	12/31/2041	YES
Rendrag	Rendrag, Inc.; DRM Minerals Corp.; KMK Dunka, Inc.; Optimal Mining, Inc.; Taconite Lessors	7/1/2010	12/31/2040	YES
RGGS 1966			12/19/2041	
RGGS 1994	USX Corporation (now U.S. Steel)	7/1/1994	12/31/2043	YES
RGGS 2005	RGGS Land & Materials Ltd.	10/1/2005	10/1/2035	YES
Sidney Mine Lease	Wilber et al.	10/1/1967	10/1/2042	YES
State T-5090-N	State of Minnesota	11/9/2008	12/31/2035	YES
State T-5104-N	State of Minnesota	1/1/2013	12/31/2035	YES
Wayland Lease	Wayland Land LLC	1/1/2007	12/31/2036	YES
Wiese Lease	Ferdinand J. Wiese Trust	11/7/2011	12/31/2040	YES

3.2.2 Surface Rights

The Property consists of approximately 13,690 acres of owned property (282 acres associated with mineral leases) in and around the Property as illustrated in Figure 3-2. To maintain ownership, the property taxes must be paid to St. Louis County, Minnesota.

Figure 3-1: Property Location Map



December 2021

Source: Cliffs, 2021

Figure 3-2: Property Tenure Map

3.3 Encumbrances

CCMMI grants leases, licenses, and easements for various purposes, including miscellaneous community land uses, utility infrastructure, and other third-party uses that encumber the Property but do not inhibit operations. Certain assets of CCMMI serve as collateral as part of Cliffs' asset-based lending (ABL) facility. Cliffs has outstanding standby letters of credit, which were issued to back certain obligations of CCMMI, including certain permits and certain tailings basin projects. Additionally, CCMMI has and may continue to enter into lease agreements for necessary equipment used in the operations of the mine.

3.4 Royalties

Reference section 3.2 for royalty information. No overriding royalty agreements are in place.

3.5 Other Significant Factors and Risks

No additional significant factors or risks are known.

SLR is not aware of any environmental liabilities on the Property. Cliffs has all required permits to conduct the proposed work on the Property. SLR is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the Property.

4.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

4.1 Accessibility

The Property is easily accessed via paved roads from Virginia, Minnesota, approximately one mile to the west, or the towns of Gilbert and Biwabik, Minnesota, approximately one mile to the west and east, respectively. A rail line operated by Canadian National Railway (CN) extends from the Minorca processing facility to the port of Two Harbors, Minnesota, a major port city on Lake Superior, which is 75 mi southeast of the Property. Duluth, Minnesota is also 69 mi southeast of Virginia via US Highway 53 and 27 mi southwest of Two Harbors via MN Highway 61. Duluth also has a regional airport with several flights daily to major hubs in Minneapolis, Minnesota and Chicago, Illinois. Refer to Section 3.0 of this TRS and Figure 3-2 for the location of roads providing access to the Property.

4.2 Climate

The climate in Northern Minnesota ranges from mild in the summer to winter extremes. The annual average temperature is 36.9°F. The annual average high temperature is 48.6°F, whereas the annual average low temperature is 25.1°F. By month, July is on average the hottest month (77°F), with January being the coldest (-4°F) (National Oceanic and Atmospheric Administration [NOAA], 1991-2020). Table 4-1 lists complete climate data for the area for 1991 to 2020.

Table 4-1: Northern Minnesota Climate Data (1991-2020)
Cleveland-Cliffs Inc. – Minorca Property

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high (°F)	16.9	22.5	35.4	49.5	63.4	72.2	76.7	74.9	65.7	50.8	34.3	21.4	48.6
Daily mean (°F)	6.2	10.5	23.8	37.1	49.5	58.9	63.5	61.6	53	40.2	25.6	12.3	36.9
Average low (°F)	−4.4	−1.4	12.2	24.8	35.7	45.7	50.3	48.3	40.3	29.7	16.9	3.1	25.1
Precipitation (inches)	0.51	0.53	0.91	1.61	2.76	4.36	3.85	3.09	3.06	2.35	1.09	0.64	24.76
Snowfall (inches)	15	7.1	7.8	3.7	0	0	0	0	0	1.2	13.2	12.3	60.3

Source: NOAA, 2021

Precipitation as rain in the Northern Minnesota area ranges from less than one inch in December, January, and February, to approximately three to four inches per month during the summer, averaging approximately 25 in. annually. Annual snowfalls average 60 in. during November through March. Approximately half of the precipitation occurs during the summer months.

The Property is in production year-round.

4.3 Local Resources

Labor is readily available in the Property area. Medical facilities with trauma centers are located in the cities of Virginia, Hibbing, and Duluth, Minnesota. Table 4-2 presents a list of the major population centers and their distance by road to the Property entrance near Virginia.

Table 4-2: Near-by Population Centers
Cleveland-Cliffs Inc. – Minorca Property

City/Town	Medical Center	Population 2010 Census	Mileage to Property
Gilbert, MN	n/a	1,799	10
Eveleth, MN	n/a	3,718	11
Virginia, MN	Level IV	8,712	4
Duluth, MN	Level I and II	85,884	69
Hibbing, MN	Level III	16,361	27

Source: US Census Bureau, Google Maps

The Minorca operation employs 362 personnel as of Q4 2021 who live in the surrounding cities of Virginia, Eveleth, Gilbert, and Hibbing. Personnel also commute from Duluth and the Iron Range. St. Louis County has an estimated population of 200,000 people.

4.4 Infrastructure

The Property is located in a historically important, iron-producing region of Northeastern Minnesota.All infrastructure necessary to mine and process significant commercial quantities of iron ore is currently in place. Infrastructure items include high-voltage electrical supplies, natural gas pipelines that connect to the North American distribution system, water sources, paved roads and highways, railroads for transporting run of mine (ROM) crude ore and finished products, port facilities that connect to the Great Lakes, and accommodations for employees. Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems. Additional information regarding Minorca supporting infrastructure can be found in Section 15.0 of this TRS.

4.5 Physiography

The Property is located in St. Louis County, Northeastern Minnesota at an elevation of approximately 1,700 fasl.The generally gentle topography in the area is characterized by hummocky hills and long, gentle moraines, remnants of glacial ingress and egress. The landscape ranges from semi-rugged, lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, to large, flat, poorly drained peat lands. Topography includes rolling till plains, moraines, and flat outwash plains formed by the Rainy Lobe glacier. The Giants Range, a narrow bedrock ridge rising 200 ft to 400 ft above the surrounding area, is the most striking feature on the Property. Bedrock is locally exposed near terminal moraines, but is generally rare.

The Minnesota Department of Natural Resources (MDNR) characterizes the area as being within the Laurentian Mixed Forest (LMF) Province, which covers over 23 million acres of Northeastern Minnesota. In Minnesota, the LMF is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps. Vegetation is a mixture of deciduous and coniferous trees. White pine-red pine forest and jack pine barrens are common on outwash plains. Aspen-birch forest and mixed hardwood-pine forest are present on moraines and till plains. Wetland vegetation includes conifer bogs, lowland grasses, and swamps. Prior to settlement, the area consisted of forest communities dominated by white pine, red pine, balsam fir, white spruce, and aspen-birch.

Brown glacial sediments form the parent material for much of the soils in the area. Soils are varied and range from medium to coarse textures. Soils are formed in sandy to fine-loamy glacial till and outwash sand. Soils on the Nashwauk Moraine have a loamy cap with dense basal till below at depths of 20 in. to 40 in. These soils are classified as boralfs (cold, well-drained soils developed under forest vegetation) (MDNR, 2011).

5.0 HISTORY

5.1 Prior Ownership

The Property has been owned by several companies since it started operation in 1977. The ownership changes and milestones in the development of the Property are as follows:

- 1974 Construction began on the Minorca taconite plant by Inland Steel.
- 1977 Mining began in the Minorca Pit.
- 1987 Commenced production of flux pellets.
- 1992 Construction of float plant for silica reduction of the new Jones and Laughlin Steel Company (J&L) Reserve (the Laurentian, East, and Central deposits).
- 1992 Mining began in the Laurentian Pit.
- 1998 Minorca was purchased by ISPAT.
- 2005 ISPAT International merged with LNM to form Mittal Steel.
- 2007 Mittal Steel merged with Arcelor to form ArcelorMittal.
- 2008 Mining began in the East Pit.
- 2017 Minorca total production of iron ore pellets reaches 100,000,000 tons.
- 2019 Mining began in the Laurentian Western Pushback.
- 2020 Cliffs purchased the US assets of ArcelorMittal, AMUSA, and now owns Minorca.

5.2 Exploration and Development History

Initial observations of iron-bearing rocks in the Mesabi Iron Range are attributed to Henry H. Eames, the first state geologist of Minnesota, in 1866. Mr. Eames mentioned that “enormous bodies of iron ore occurred” in the northern part of the state (Eames, 1866).

Exploration for high-grade, direct-shipping iron ore (DSO) deposits in the Virginia area began in the 1890s.Test pitting, later diamond core and churn drilling, and dip-needle surveys were used to delineate DSO deposits. The understanding of this work in the immediate Property area is limited, with poor documentation of activities maintained on site. Coincident with early exploration activity, the aerial extent of the unenriched Biwabik Iron Formation (Biwabik IF) sub-crop was delineated, and the magnetite-bearing iron formation was documented. Focused exploration for beneficiation-grade magnetite deposits, regionally known as taconite deposits, however, did not begin until the 1940s. At that time exploration activity consisted largely of diamond core drilling on regular-spaced grids designed to delineate taconite and characterize its weight recovery and metallurgical properties. A brief history of the initial regional exploration can be found in the Field Trip 2 Guidebook (Severson et al., 2016) and references therein.

Exploration activity at the Minorca deposits consisted solely of diamond core drilling campaigns commencing in the late 1950s. Drilling since the 1960s has primarily consisted of infill diamond drilling for operational purposes. Cliffs and Minorca have not evaluated detailed records or results of early, non-drilling prospecting methods used during initial exploration activities such as geophysical surveys, mapping, trenching, and test pits conducted prior to Cliffs’ ownership of Minorca.

Exploration at the Property by previous owners, consisting of primarily diamond drilling, is described in Section 7.0 of this TRS.

5.3 Historical Reserve Estimates

Cliffs acquired the Property during the 2020 purchase of AMUSA.Mineral Reserves reported to the SEC for the past ten years are summarized in Table 5-1. These Mineral Reserves were not prepared under the recently adopted SEC guidelines; however, they followed SEC Guide 7 requirements for public reporting of Mineral Reserves in the US.

In 2019, the Laurentian Pit was expanded, resulting in a significant increase from the previously reported reserves.

The change in Mineral Reserves from 2019 to current is primarily attributable to mining depletion.

Table 5-1: Historical Reserves
Cleveland-Cliffs Inc. – Minorca Property

Year	Crude Ore		Product	
	Total Proven & Probable (MLT)	Grade (% MagFe)	Process Recovery (%)	Flux Pellets Wet (MLT)
2011[1]	156.5	23.1	31.9	49.9
2012[2]	148.6	23.3	32.2	47.8
2013[3]	140.7	23.4	32.3	45.5
2014[4]	131.9	23.4	32.3	42.6
2015[5]	124.0	23.6	32.6	40.4
2016[6]	116.1	23.7	32.7	38
2017[7]	108.3	23.8	32.9	35.6
2018[8]	99.4	23.5	32.5	32.3
2019[9]	127.9	23.7	32.7	41.9
2020[10]	120.0	23.7	32.8	39.3

Notes:

1. As of December 31, 2011; Source: ArcelorMittal 20-F Filing
2. As of December 31, 2012; Source: ArcelorMittal 20-F Filing
3. As of December 31, 2013; Source: ArcelorMittal 20-F Filing
4. As of December 31, 2014; Source: ArcelorMittal 20-F Filing
5. As of December 31, 2015; Source: ArcelorMittal 20-F Filing
6. As of December 31, 2016; Source: ArcelorMittal 20-F Filing
7. As of December 31, 2017; Source: ArcelorMittal 20-F Filing
8. As of December 31, 2018; Source: ArcelorMittal 20-F Filing
9. As of December 31, 2019; Source: ArcelorMittal 20-F Filing
10. As of December 31, 2020; Source: Cleveland-Cliffs Inc. 10-K Filing

5.4 Past Production

Production from the Property is presented in Table 5-2, while production by owner/operator is provided in Table 5-3.

Table 5-2: Historical Production
Cleveland-Cliffs Inc. – Minorca Property

Year	Stripping (kLT)	ROM Ore (kLT)	Process Recovery (%)	Wet Flux Pellet (kWLT)
2000	9,760	8,771	33.3	2,918
2001	10,509	8,346	33.8	2,817
2002	9,096	8,284	34.8	2,886
2003	9,233	8,374	33.6	2,812
2004	8,638	8,653	33.6	2,907
2005	8,867	8,803	31.9	2,806
2006	8,759	8,537	33.9	2,895
2007	7,288	8,548	31.3	2,677
2008	7,879	9,519	29.0	2,765
2009	4,686	5,144	29.2	1,502
2010	7,274	8,968	30.7	2,755
2011	6,772	8,664	32.1	2,782
2012	7,490	8,900	32.2	2,870
2013	7,267	9,003	32.5	2,927
2014	6,132	8,852	31.0	2,744
2015	5,959	8,896	30.8	2,742
2016	4,570	8,844	32.1	2,836
2017	6,465	8,711	32.8	2,853
2018	7,932	8,646	33.2	2,872
2019	7,489	8,392	33.2	2,783
2020	7,293	8,518	33.2	2,824
2021	7,567	8,801	32.4	2,855
Total	**166,925**	**188,174**	**32.3**	**60,828**

Table 5-3: Historical Production by Owner
Cleveland-Cliffs Inc. – Minorca Property

Years	Ownership	Wet Flux Pellets (kWLT)
1976-1999	Inland Steel/ISPAT	NA
2000-2021	AMUSA and Predecessors	60,828
Total through 2021		**60,828**

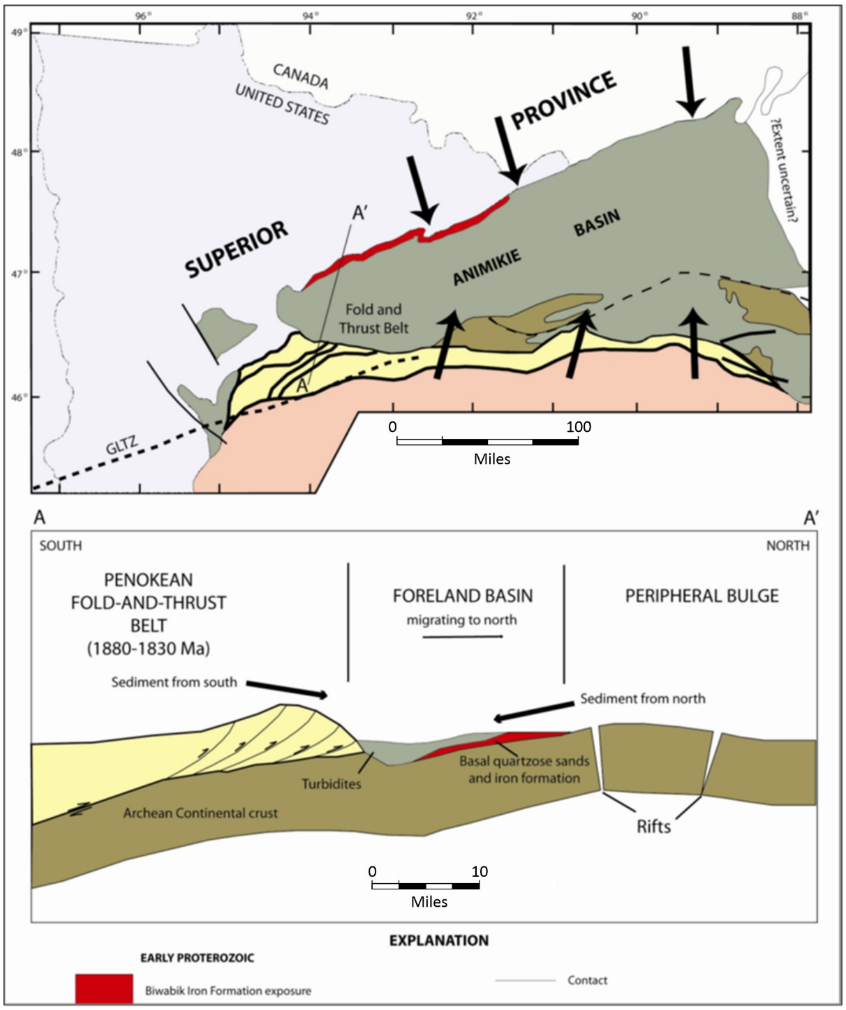
6.0 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

6.1 Regional Geology

Essential aspects of the regional geology in the Lake Superior region have been understood since the early 1900s, and the geologic understanding of the area has remained relatively unchanged over the years.

Iron ores produced within the region range from high-grade, structurally controlled ore bodies amendable to direct shipping to more disseminated, stratigraphically controlled, low-grade iron ores locally termed taconite. Taconite is observed in a sequence of Paleoproterozoic metasedimentary rocks overlying Archean granitic rocks in the Lake Superior region.A fold and thrust belt attributed to the Penokean orogeny (1,880 Ma to 1,830 Ma) developed a northward migrating foreland basin known as the Animikie Basin (Ojakangas, 1994, Figure 6-1).Sedimentary rocks within this basin include the basal Pokegama Quartzite, the overlying Biwabik Iron Formation (Biwabik IF), and argillite and graywacke of the Virginia Formation (Jirsa and Morey, 2003).

The Mesabi Iron Range is a term used to designate the outcrop of the Animikie Group, defining a northeast-trending homocline dipping 5° to 15° to the southeast. The Biwabik IF is sectioned by a number of post-Penokean orogeny, high-angle normal and reverse faults associated with near-vertical reactivated faults in the Archean basement (Morey, 1999). The most notable structural feature of the Biwabik IF is located east of Hibbing, between Virginia and Eveleth, where the paired Virginia syncline and Eveleth anticline result in an S-curve surface trace of the Biwabik IF (Jirsa and Morey, 2003, Figure 6-2).



Cleveland-Cliffs Inc.

Minorca Property

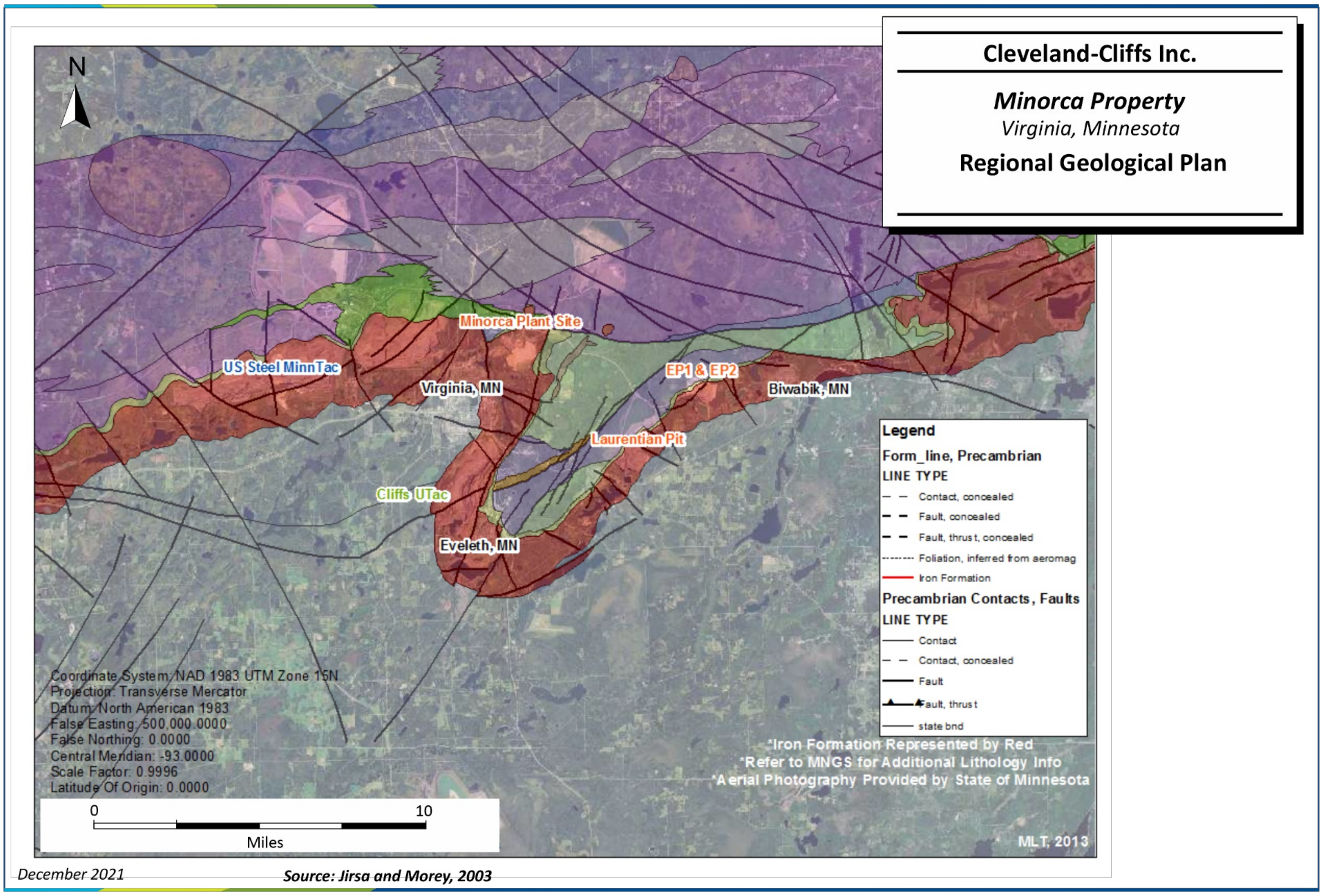
Virginia, Minnesota

Location of the Animikie Basin and Diagrammatic Cross Section Showing Development of the Basin

December 2021

Source: Ojakangas, 1994

Figure 6-1: Location of the Animikie Basin and Diagrammatic Cross-section Showing Development of the Basin



December 2021

Source: Jirsa and Morey, 2003

Figure 6-2: Regional Geological Plan

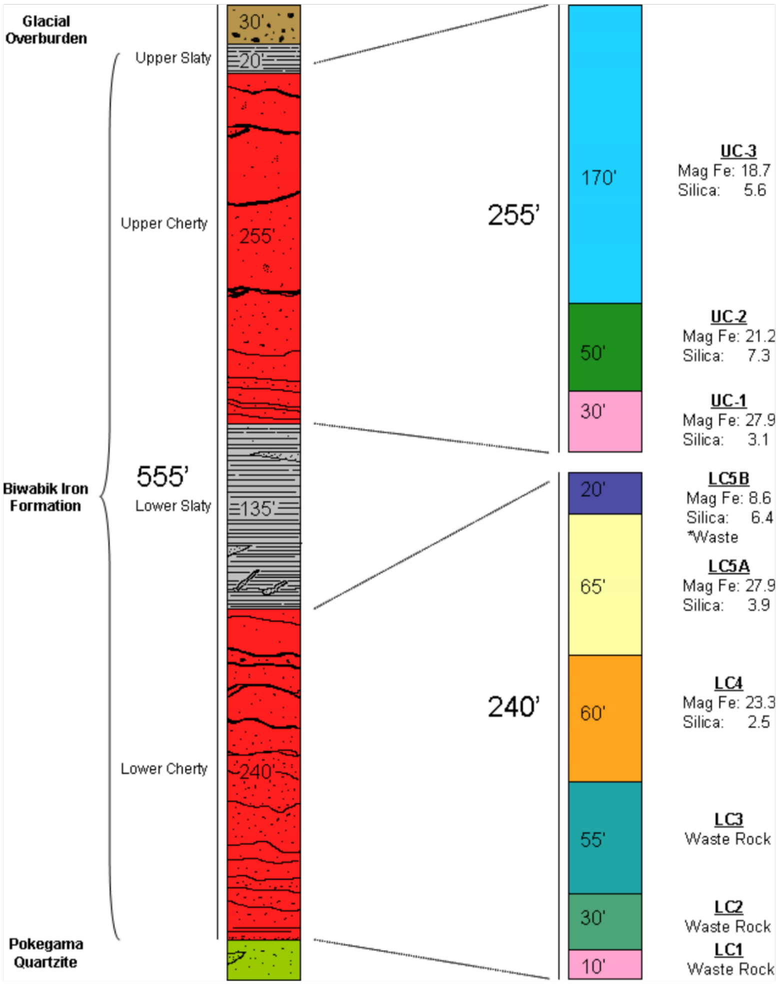
6.2 Local Geology

The Early Proterozoic Biwabik IF is a narrow belt of iron-rich strata varying in width from 1,300 ft to 3.2 mi and extending approximately 125 mi from Grand Rapids eastward past Babbitt, Minnesota.The true thickness varies from approximately 150 ft to 700 ft. The Biwabik IF is interpreted to have been deposited in a shallow, tidal marine setting and is characterized as having four separate lithostratigraphic members (from bottom to top: Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty (Severson, Heine, and Patelke, 2009).“Cherty” members have a sandy, granular texture, are thickly bedded, and are composed of silica and iron oxide minerals. The “slaty” members are fine grained, thinly bedded, and comprise iron silicates and iron carbonates, with local chert beds. The cherty members are representative of deposition in a high-energy environment, whereas the slaty members were probably deposited in a muddy, lower-energy environment below the wave base. Interbedding is ubiquitous, and contacts are generally gradational. The iron content for the cherty members is approximately 31%, while the iron content of the slaty members is approximately 26%. It is important to note that nomenclature of the units is not indicative of metamorphic grade; instead, “slaty” and “cherty” are colloquial descriptive terms used regionally.

The four members of the Biwabik IF are further divided into nine subunits within the Minorca Mine area.Figure 6-3 and Figure 6-4 illustrate the stratigraphy of these subunits and their general descriptions. Nomenclature for these subunits is based on their relative location within the four members. They are subdivided based on geologic characteristics observed in diamond drill core. Many of the contacts between subunits are gradational and do not provide a sharp geologic contact. Geologic contacts are occasionally adjusted to fit assay data once received. A local geology cross-section for each deposit is provided in Figure 6-6, Figure 6-7, Figure 6-8, and Figure 6-9.

Isolated DSO material exists within the lower-grade taconite ores, the origins of which have been debated for many years.Some of the more recent publications suggest a genesis linked to crustal-scale groundwater convection related to igneous activity. Much of the evidence supporting this conclusion comes from the isotopic analysis of leached and replaced silicate and carbonate minerals (Morey, 1999). Within the Biwabik IF, metamorphic processes produced assemblages diagnostic of greenschist facies to the west, increasing in grade to the east. Mineralogy in unaltered taconite is dominated by quartz, magnetite, hematite, siderite, ankerite, talc, chamosite, greenalite, minnesotaite, and stilpnomelane (Perry et al., 1973).

The Minorca deposits are located in the Virginia Horn region, noted for the drastic change in the general northeast trend of the Biwabik IF (Figure 6-2). To the west of Virginia, Minnesota, the Biwabik IF dips approximately 6° to the southeast.To the east of Gilbert, Minnesota, the dip is approximately 12° to the southeast. Still further east, the Biwabik IF is essentially flat lying.Between Virginia and Eveleth, however, the Biwabik IF strikes to the southwest and dips to the northwest. In this area, the Biwabik IF forms the paired Virginia syncline and Eveleth anticline (Jirsa and Morey, 2003). A number of publications suggest that the occurrence of isolated DSO material is related to the structural complexity in this region and the movement of fluids along faults that remobilized and concentrated iron.



Cleveland-Cliffs Inc.

Minorca Property

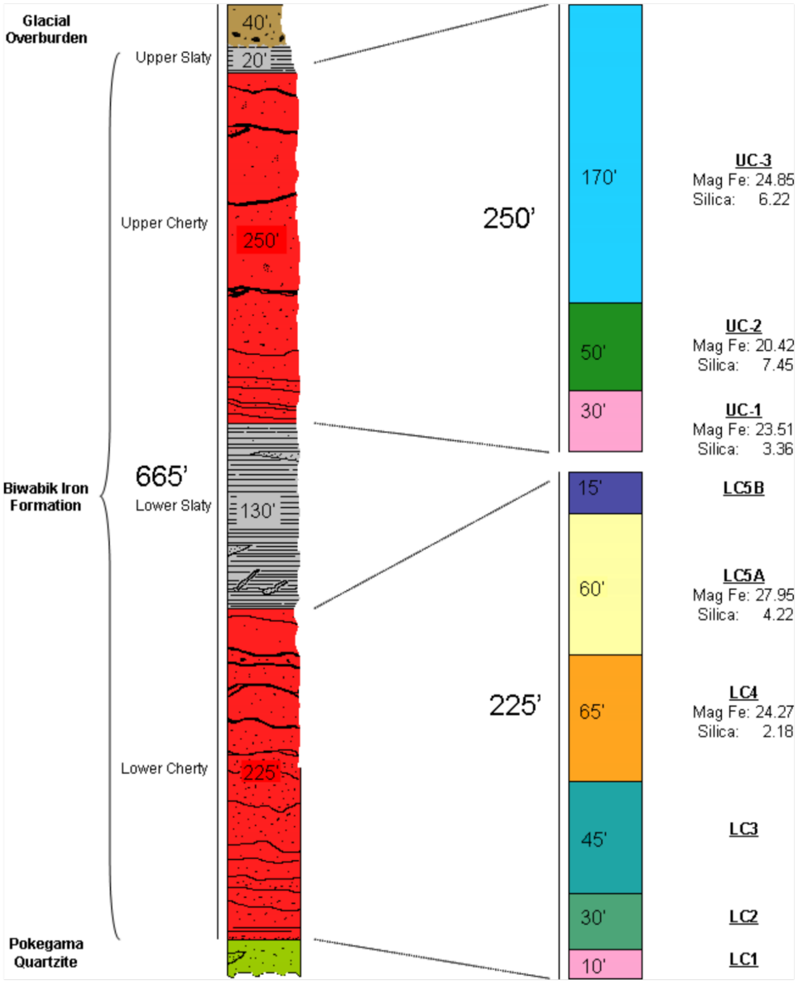
Virginia, Minnesota

Stratigraphic Column - East Pit

December 2021

Source: Cliffs, 2021

Figure 6-3: Stratigraphic Column - East Pit



Cleveland-Cliffs Inc.

Minorca Property

Virginia, Minnesota

Stratigraphic Column - Laurentian Pit

December 2021

Source: Cliffs, 2021

Figure 6-4: Stratigraphic Column - Laurentian Pit

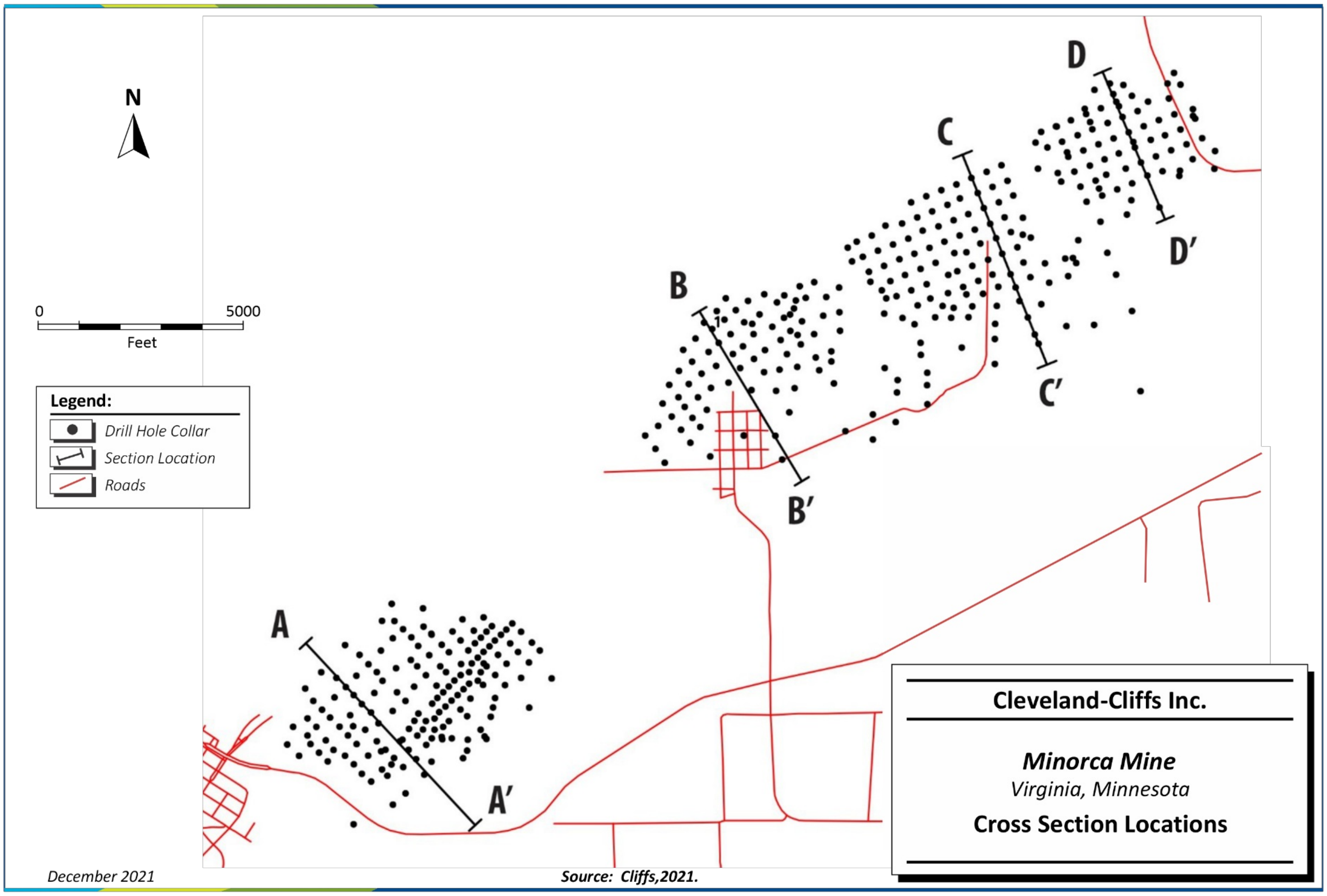


Figure 6-5: Section Plan View

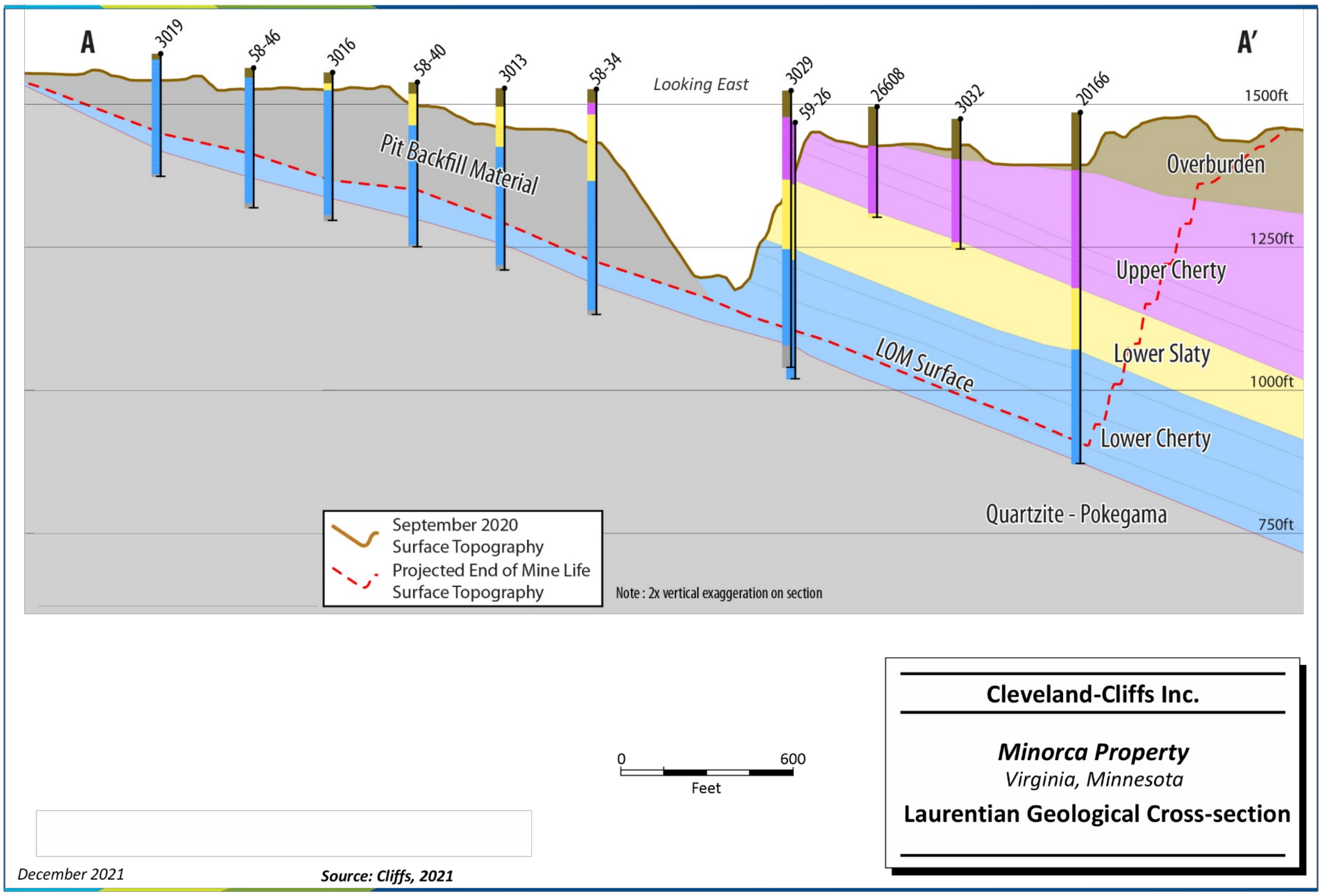
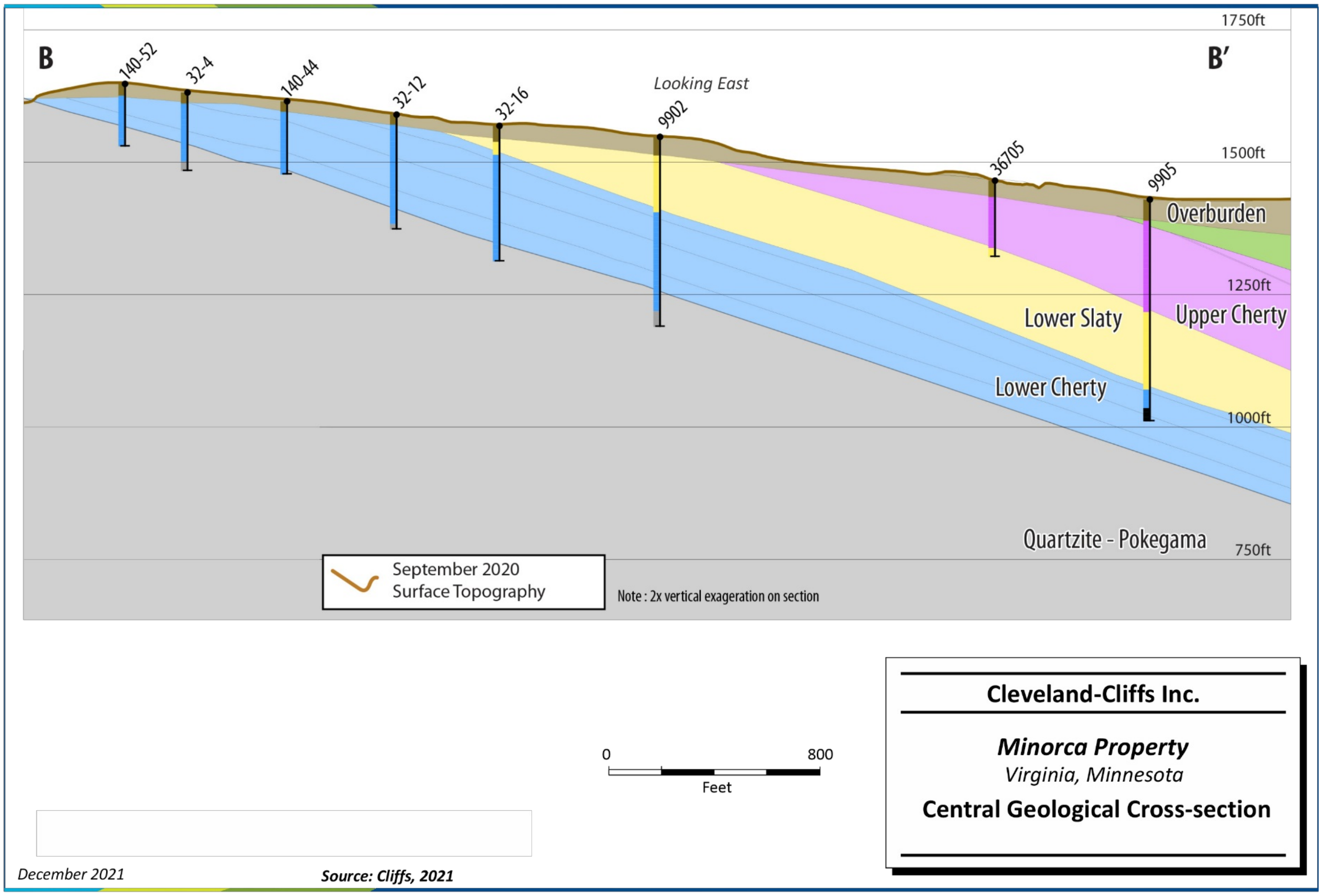


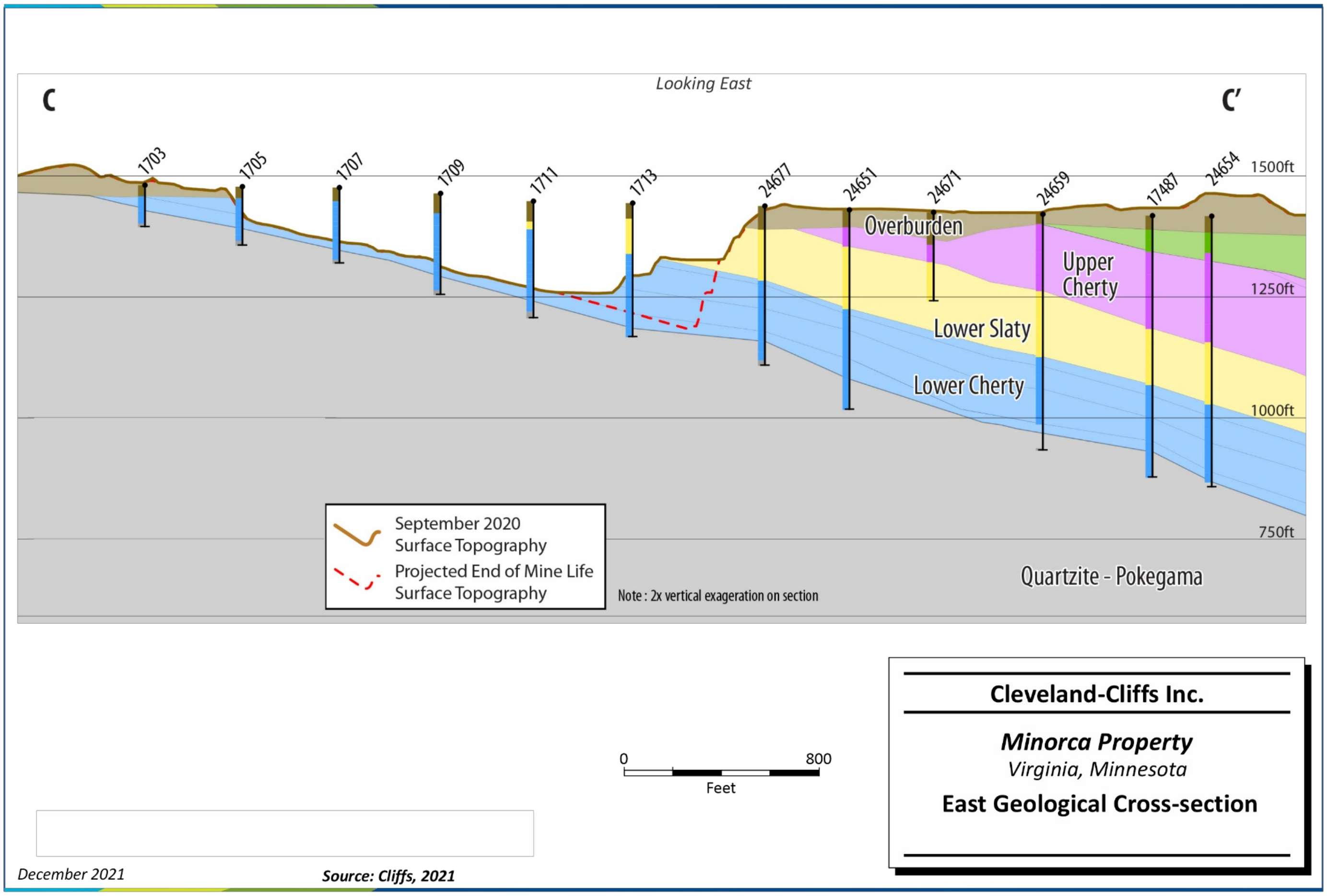
Figure 6-6: Laurentian Geological Cross-section



December 2021

Source: Cliffs, 2021

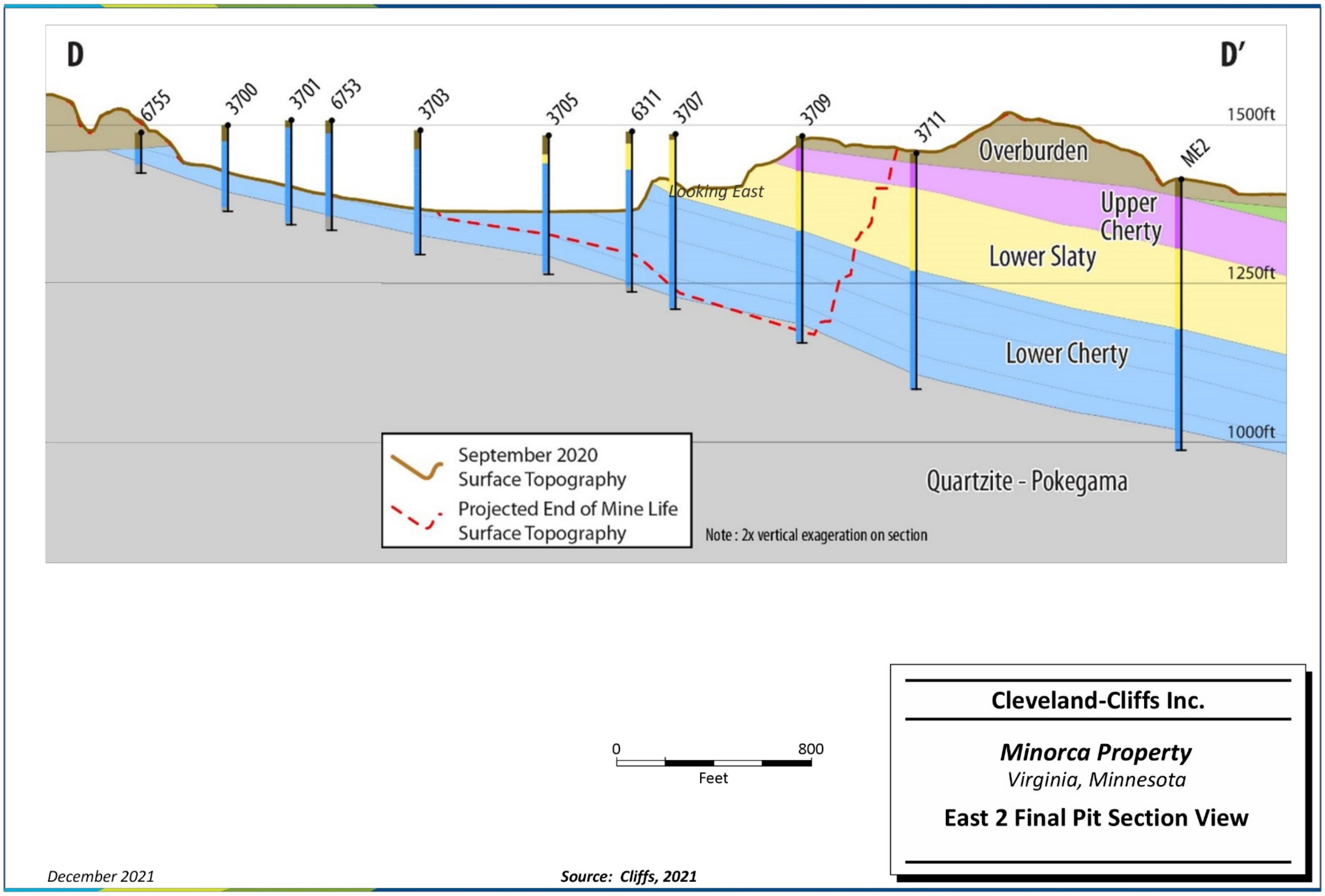
Figure 6-7: Central Geological Cross-section



December 2021

Source: Cliffs, 2021

Figure 6-8: East Geological Cross-section



December 2021

Source: Cliffs, 2021

Figure 6-9: East 2 Final Pit Section View

6.3 Property Geology

The Biwabik IF at Minorca consists primarily of carbonates, iron silicates, fine-grained quartz, and iron oxides.These layers are visually distinct, locally separated into slaty beds and cherty beds. The ratio of slaty to cherty beds and distance between these beds are key indicators used during logging, as well as bedding style, texture, color, and magnetic strength. Slaty beds are dark gray in nature, consisting primarily of magnetite in mineralized zones, and range from one millimeter (0.04 in.) to upwards of two centimeters (0.78 in.) in thickness. Cherty beds range from gray to green in color depending on the ratio of fine-grained quartz (gray color) to iron silicates (green color). These beds vary in thickness to upwards of 10 cm (3.9 in.) and may or may not contain disseminated magnetite. Carbonates typically occur as granular, re-crystallized grains of varying size and commonly occur in late-stage, quartz-carbonate-filled fractures, which run variably (orientation, length, width, continuity) throughout the iron formation. The Upper Slaty and Lower Slaty members are visually distinctive as they are dominated by slaty beds; however, these beds rarely contain any notable iron oxide content.

The Lower Cherty and Upper Cherty members of the Biwabik IF host the economic mineralization at Minorca. These members are subdivided into LC1-LC5B and UC1-UC3.Waste rock units (Lower Slaty and Upper Slaty members) cap the Lower Cherty and Upper Cherty members and are distinctively fissile and weakly magnetic as compared to the ore-bearing units. The Pokegama quartzite, which underlies the Biwabik IF, is not exposed in the pit but is intersected at the base of the iron formation in diamond drilling. The Virginia Formation caps the Biwabik IF and is found predominantly in historical holes drilled south of the current pit extents. Table 6-1 lists the lithological units found at the Mine.

Table 6-1: Table of Lithological Units
Cleveland-Cliffs Inc. – Minorca Property

Lithological Unit Name	Unit Text	Unit Code	Description
Glacial Till	OVB	2	The iron formation is overlain by mostly clayey, reddish-brown glacial till. Thickness in the mining areas varies from 0 ft to 100 ft with an average depth to bedrock of 24 ft.
Upper Slaty	US	11	The Upper Slaty is weathered and thinly bedded. Average thickness is less than 20 ft where it has been intersected by diamond drilling (19.7 ft).
Upper Cherty	UC	6	The Upper Cherty zone is generally gray or dark gray to black in color. It is usually a thinly bedded zone interbedded with green, thicker-bedded, cherty intervals containing a high-angle quartz vein. It has an average thickness of 250 ft. In the East Pit deposit area, this subunit is lean to non-magnetic, with very little of the material meeting ore grade thresholds. Unit Text = UC, Code=6 (note: this code is applied in the East model where the Upper Cherty has not been divided). In the Laurentian Pit, the Upper Cherty member is split into three subunits: UC3, UC2, and UC1 from top to bottom.

Lithological Unit Name	Unit Text	Unit Code	Description
Upper Cherty 3	UC3	8	East of section 7000, in the Laurentian Pit, the UC3 is gray in color, massive, and has a salt-and-pepper to blotchy texture with disseminated magnetite. West of section 7000, it has a reddish color; it is still massive but leaner and less magnetic. Average thickness is 170 ft.
Upper Cherty 2	UC2	7	The UC2 is reddish in color, bedded, with scattered white bands of quartz and carbonates and buff- to green-colored silicates. Average thickness is 50 ft.
Upper Cherty 1	UC1	6	The UC1 is pinkish-gray in color. It is bedded to massive and contains an abundance of pink carbonates. Average thickness is 30 ft.
Lower Slaty	LS	5	The Lower Slaty member averages 130 ft in thickness. It is black to green in color, laminated to thinly bedded, and nodular in places.
Lower Cherty 5B	LC5B	10	Greenish-gray in color, with thin-bedded bands alternating with thick, chert-rich bands. Average thickness is 15 ft.
Lower Cherty 5A	LC5A	4	Gray in color with a bedded to mottled texture in places. The top of the subunit is rich in pink carbonates. Average thickness is 60 ft.
Lower Cherty 4	LC4	3	The LC4 is brownish-gray in color, with wispy bands of magnetite. It has some disseminated magnetite in the chert bands. It contains ovate clasts of carbonate and silicates rimmed with magnetite. Average thickness is 65 ft.
Lower Cherty 3	LC3	530	Pinkish- to reddish-gray color, blotchy texture, primary hematite, green silicates, and straight bedding.
Lower Cherty 2	LC2	1	Reddish-gray color with green silicate bands, primary hematite.
Lower Cherty 1	LC1	1	Reddish-gray color, basal.
Quartzite	QTZ	Q1	Green color, conglomeratic at top, and chloritic.

SLR notes that due to the dip of the Biwabik IF, portions of the units were eroded and do not exist uniformly across the mining area. Thickness of the Upper Slaty member is an average of drilled thickness for the relatively few holes that have intersected the unit. All other member thicknesses are summations of the subunit thicknesses tabulated in Table 6-1. Slaty members (US, LS) are always considered to be waste at Minorca. All other subunits are mined and processed if they meet the cut-off grade criteria (section 11.9).

6.4 Mineralization

The mineral targeted at Minorca is magnetite, bound in rock regionally referred to as taconite. The recoverable magnetic iron in ore ranges from 16% to 30%. Quartz, carbonates, and iron silicates are the common gangue minerals. The deposit is layered and consistent. The Mine targets taconite of the Upper Cherty and Lower Cherty members in its Laurentian Pit. The Upper Cherty ore is higher in concentrate silica and more difficult to process. It needs to be blended with lower concentrate silica ore to make it economic. In the East Pit, only the Lower Cherty ore is processed; the Upper Cherty lithologic subunits do not contain enough magnetic iron in this area.

Common carbonates include ankerite and siderite, which carry a definitive milky white to slightly red appearance. These carbonates occur variably throughout the iron formation and are most apparent at the base of the LC5A subunit and in the UC1 and UC3 subunits. Kutnohorite is present, but requires Scanning Electron Microscopy (SEM) or X-ray diffraction (XRD) to separate it from ankerite. Iron silicates are visibly distinguishable from carbonates, quartz, and iron oxides; however, SEM or XRD is required to discern specific iron silicate minerals from each other. Talc, stilpnomelane, and minnesotaite are the common iron silicates present in the iron formation (Totenhagen et al., 2011).

In the East Pit area, the formation strikes west and dips to the south at approximately 8°. Ore-grade material is found primarily within the Lower Cherty member of the formation. The iron formation along the north edge of the deposit is overlain to the south by the Virginia Formation. At the Laurentian Pit, the formation strikes west and dips to the south at approximately 18°. Ore-grade material is found in both the Lower Cherty and Upper Cherty members of the formation.

The lithology units (as described in Table 6-1) are typically similar between East 1 and East 2 pits of the East Pit and the Laurentian Pit, with the exception being the Upper Cherty member in the East model area. The difference lies primarily in the UC1 and UC2 units, which carry minor visual variations in bedding thickness and color while also containing more inconsistent MagFe grades. Due to this, the Upper Cherty member is currently undivided in the East model, where additional drilling is required to define ore/waste subunits in this member. The Upper Cherty member is primarily outside of the permitted limits of the East deposit.

The Central deposit appears similar to the East deposit based on exploratory drilling and subsequent logging in 2011, 2012, and 2018 as well as modeling in 2013 and 2019. The dip ranges from 10° to approximately 15° as this deposit lies between the Laurentian and East pits. Similar to the East Pit area, the Upper Cherty member in the Central deposit will require further definition through exploratory drilling, logging, and modeling to differentiate ore/waste subunits.

Table 6-2 summarizes the length, depth, dip, and average grades of the three Minorca deposits.

Table 6-2: Deposit Characteristics
Cleveland-Cliffs Inc. – Minorca Property

	Laurentian						East					Central				
	LC4	**LC5A (4)**	**LC5B(10)**	**UC1(6)**	**UC2(7)**	**UC3(8)**	**LC3(530)**	**LC4(3)**	**LC5A(4)**	**LC5B (10)**	**UC(6)**	**LC3(530)**	**LC4(3)**	**LC5A (4)**	**LC5B (10)**	**UC(6)**
Outcrop (YES/NO)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Average Deposit Length – along strike (ft)	7,800	7800	7,800	7,800	7,800	7,800	7,200	7,200	7,200	7,200	7,200	9,600	9,600	9,600	9,600	9,600
Minimum Depth from Surface (ft)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Maximum Depth from Surface (ft)	520	480	450	345	275	110	450	390	340	324	210	330	275	255	255	50
Angle of Dip (°)	11.0	11.0	11.0	11.0	11.0	11.0	8.0	8.0	8.0	8.0	8.0	10.0	10.0	10.0	10.0	10.0
Azimuth (°)	45 SofW	45 SofW	45 SofW	45 SofW	45 SofW	45 SofW	22 SofW	22 SofW	22 SofW	22 SofW	22 SofW	35 SofW	35 SofW	35 SofW	35 SofW	35 SofW
% MagFe	23.6	26.4	15.6	23.4	18.8	18.6	13.3	22.4	21.8	6.9	14.2	8.1	19.0	18.9	5.4	16.0
% SiO_2	2.2	4.7	5.7	3.4	6.9	5.8	4.0	2.8	4.4	6.6	5.2	3.8	3.0	4.4	8.3	5.6

6.5 Deposit Types

6.5.1 Mineral Deposit

The Minorca iron ore deposit is an example of a Lake Superior-type banded iron formation (BIF) deposit. Lake Superior-type BIFs occur globally and are exclusively Precambrian, deposited from approximately 2,400 Ma to 1,800 Ma. Although the genesis of iron formations has been debated over the years, it is certain that they were deposited more or less contemporaneously and in similar marine depositional environments. Some of the most prolific iron districts in the world are hosted in these rocks, such as those found in the Pilbara district of Australia and the Animikie Group of Minnesota. Theories regarding their formation center on the hypothesis that at stages in the Earth's history, the oceans were acidic and contained tremendous amounts of dissolved iron. The conventional explanation for the majority of these deposits is that oxygen-producing life forms such as stromatolites, found fossilized in BIFs, began to produce sufficient oxygen to oxidize the sulfide or free ion forms of iron within seawater. The iron content in seawater rose and fell for over a billion years, and the last of the Precambrian BIFs is thought to have been deposited around 1800 Ma (Guilbert and Park, 1986).

While there are some remaining high-grade iron deposits in the area, the majority of the iron ore is regionally referred to as taconite. Taconite is a type of BIF that is characterized as an iron-bearing sedimentary rock with greater than 15% Fe, where the iron minerals are interbedded with silicates or carbonates. Iron content ($FeO+Fe_2O_3$) in taconites is generally 25% to 30%. Higher-grade DSO ores are believed to have formed from the leaching and dissolution of silica found in the taconites, resulting in smaller zones that can contain greater than 60% iron (Morey, 1999). These high-grade deposits are predominantly related to the high-angle, steeply dipping faults common along the Mesabi Iron Range.

Geological classification of BIFs is based on mineralogy, tectonic setting, and depositional environment. The original facies concept provided for oxide-, silicate-, and carbonate-dominant iron formations that were thought to relate to the environment of deposition (James, 1954), as follows:

- Oxide-rich BIF typically consists of alternating bands of hematite [$Fe_2^{3+}O_3$] with or without magnetite [$Fe^{2+}Fe_2^{3+}O_4$]. Where the iron oxide is dominantly magnetite, siderite [$Fe^{2+}CO_3$] and iron silicate are usually also present.
- Silicate-rich BIF is usually dominated by the minerals greenalite, minnesotaite, and stilpnomelane. Greenalite [$(Fe^{2+},Mg)_6Si_4O_{10}(OH)_8$] and minnesotaite [$(Fe^{2+},Mg)_3Si_4O_{10}(OH)_2$] are ferrous analogues of antigorite and talc respectively, while stilpnomelane [$K_{0.6}(Mg, Fe^{2+}, Fe^{3+})_6Si_8Al(O, OH)_{27} \cdot 2\text{-}4H_2O$] is a complex phyllosilicate.
- Carbonate-rich BIF is usually dominated by the minerals ankerite [$CaFe^{2+}(CO_3)_2$] and siderite, both of which display highly variable compositions. Similar proportions of chert and ankerite (and/or siderite) are typically expressed as thinly bedded or laminated alternating layers (James, 1966).

These classification schemes commonly overlap within Lake Superior-type deposits, defying classification by this method.Almost all of the minerals described in the three classifications can be found in many of the deposits of the Mesabi Iron Range.Lake Superior-type deposits are generally classified based on their size and depositional environments (Guilbert and Park, 1986). These deposits are typically large and are associated with other sedimentary rocks. Deposition of the Lake Superior-type deposits occurred in shallow, marine conditions, with transgressive sequences commonly observed in the regional stratigraphy (Simonson and Hassler, 1996). It is common to observe shallow-marine bedforms and sedimentary depositional textures in these deposits.

7.0 EXPLORATION

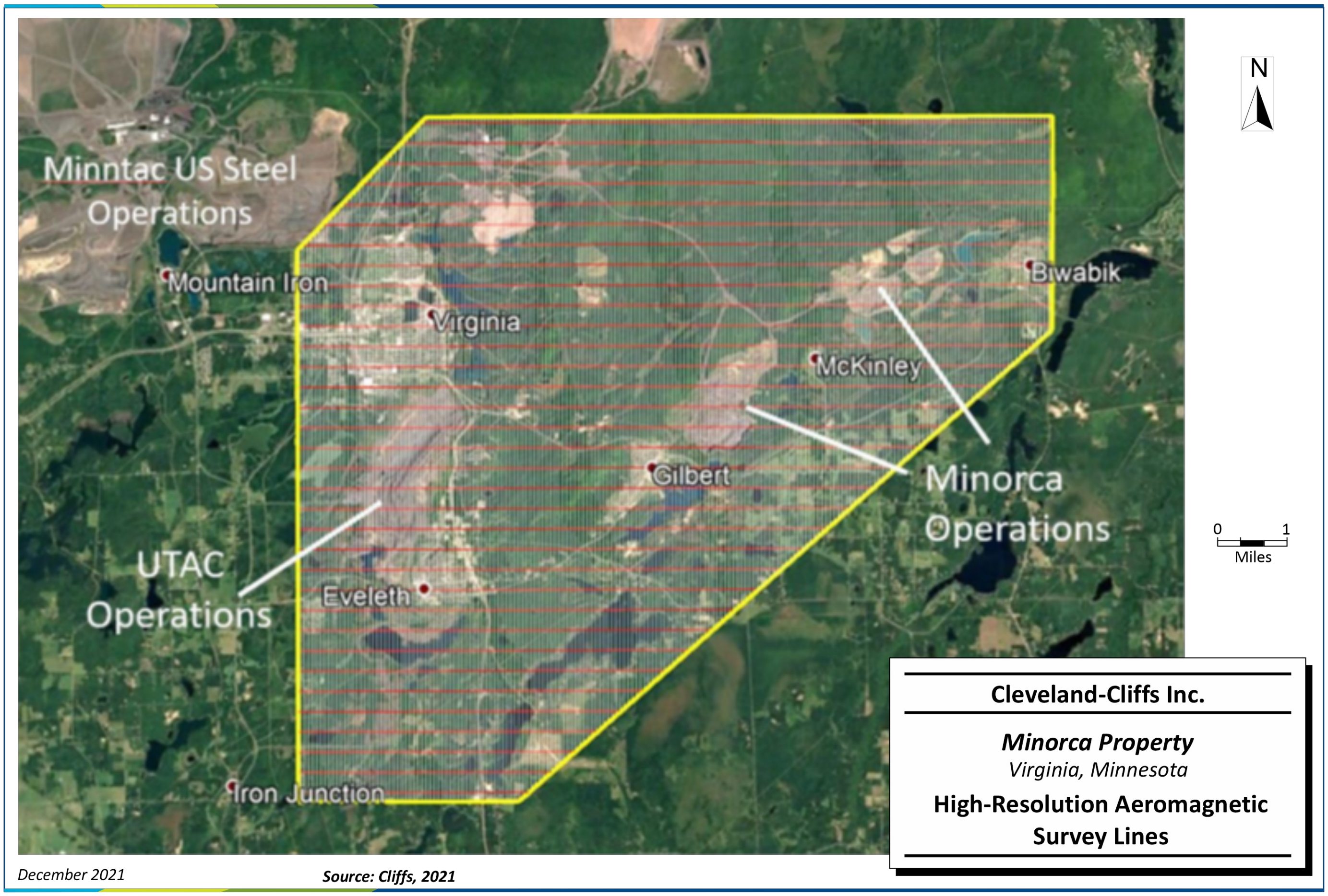
Cliffs does not maintain detailed records or results of early, non-drilling prospecting methods used during initial exploration activities, such as geophysical surveys, mapping, trenching, test pits, and sampling conducted prior to Cliffs' ownership of Minorca. Most exploration work by Cliffs has been and continues to be near-mine diamond core drilling (DD) conducted using a 400 ft x 400 ft grid. Exploration other than drilling included a high-resolution aeromagnetic survey.

7.1 High-Resolution Aeromagnetic Survey

EDCON-PRJ, Inc., of Lakewood, Colorado conducted a fixed-wing aeromagnetic survey over the Virginia Horn area (the Virginia South Survey), in St. Louis County, Minnesota in May 2021 (EDCON-PRJ, 2021) with the purpose of understanding large-scale structural features and oxidation of the BIF. The surveys were undertaken for Cliffs and its subsidiary, United Taconite LLC of Eveleth, Minnesota, under the direction of Mr. Garret Eliason, Project Geologist and Mr. Michael Orobona, Principal Geologist.

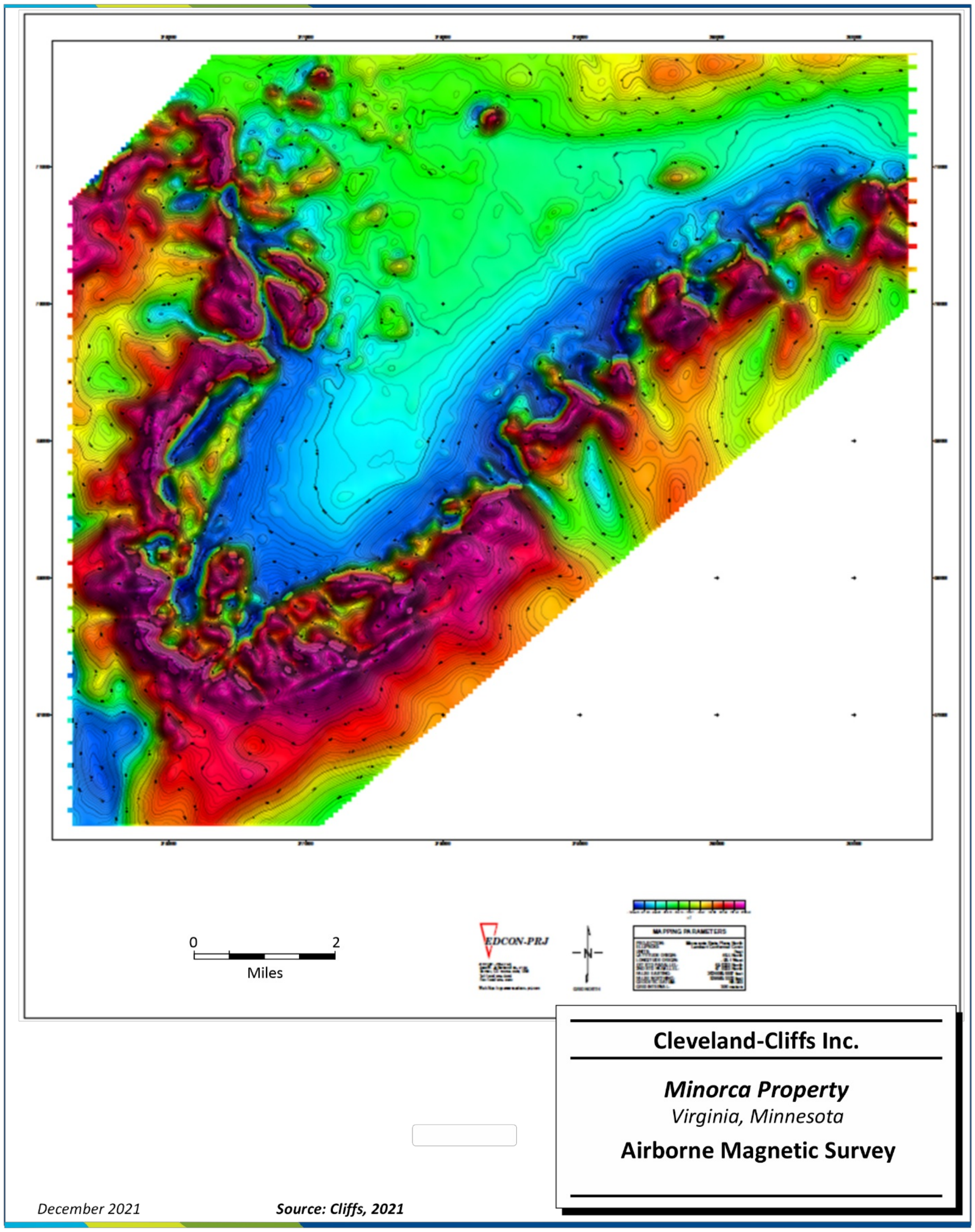
The Virginia South Survey covers232 km^2 (90 mi^2) in St. Louis County, Minnesota. It includes the towns of Eveleth, Virginia, Gilbert, McKinley, and Biwabik. The survey area is centered over the faulted and folded zone of the Biwabik IF known as the Virginia Horn. Current and historical mine workings are scattered throughout the area.

A total of 1,767 line-miles of aeromagnetic data was acquired, flown at 100 m (328 ft) spacings and oriented north-south. The resultant airborne magnetic survey map is shown in Figure 7-1 and Figure 7-2.



Source: Cliffs, 2021

Figure 7-1: High-Resolution Aeromagnetic Survey Lines



December 2021

Source: Cliffs, 2021

Figure 7-2: Airborne Magnetic Survey

7.2 Drilling

7.2.1 Type and Extent

Diamond core drilling is the principal method of exploration utilized at Minorca. Both historical and current DD core drilled by Cliffs and its predecessors (ArcelorMittal and others) are used in mine planning. Information on the annual number of holes and drill footage completed prior to 2006 could not be validated by SLR from the drilling records, and this information has been extracted from the ArcelorMittal Technical Reports completed in 2020 (ArcelorMittal, 2020a, 2020b).

Between the years of 1958 and 1978, it is reported a total of 228 drill holes totaling 62,676 feet of drill core was taken from the J&L Reserve (the Laurentian, East, and Central deposits). These holes were drilled by U.S. Steel, Pickands Mather and Co. (Pickands-Mather), and J&L. All this drilling was tested by the Davis Tube (DT). During this time, 1,131 tons of taconite were removed from a test pit and run through various pilot tests.

Between 1989 and 2006, a total of 118 diamond drill holes totaling 32,104 were completed in the J&L Reserve (the Laurentian, East, and Central deposits). There was no drilling completed between 2007 and 2010.

Additional drilling campaigns across the Property were completed in 2011 (18 holes for 5,282ft), 2012 (15 holes for 4,225 ft), and 2015 (15 holes for 3,083 ft) totaling 12,590 ft of drilling.

In 2016, 10 holes (one in the East Pit and nine in the Laurentian Pit) totaling 2,798 ft were completed. No drilling was completed in 2017.

In 2018, ArcelorMittal completed 30 holes for a total of 5,881 ft of diamond drilling in the Central deposit (26 holes) and Laurentian Pushback area (four holes) just west of the Laurentian Pit, to infill existing drill data. There was no drilling completed in 2019.

Nine diamond drill exploration holes totaling 2,762 ft were completed by Cliffs in 2020 (four holes for 1,257 ft) and 2021 (five holes for 1,505 ft). These exploration holes consist of five holes in the Central area, two holes south of the East 2 Pit, and two holes northeast of the Laurentian Pit.

Future exploration will continue to focus on the Central and East resource areas with possible drilling on the south end of the Laurentian Pushback and south/east sides of the Laurentian Pit.

Exploration holes at Minorca are used to determine lithology, MagFe content, and concentrate SiO_2 content, and identify any offsetting or oxidized structures within the deposit and/or surrounding rock. These lead to factors for determining economic viability based on stripping ratio, cut-off grade, and ability for the plant site to process the ore. Exploration also helps identify areas that will need to be avoided or mined around due to geological or structural anomalies.

As of the effective date of this report, Cliffs and its predecessors have completed 443 DD drill holes totaling 118,809 ft on approximately 400 ft centers (Table 7-1, Table 7-2 and Figure 7-3).

Table 7-1: Drilling Summary Cleveland-Cliffs Inc. – Minorca Property

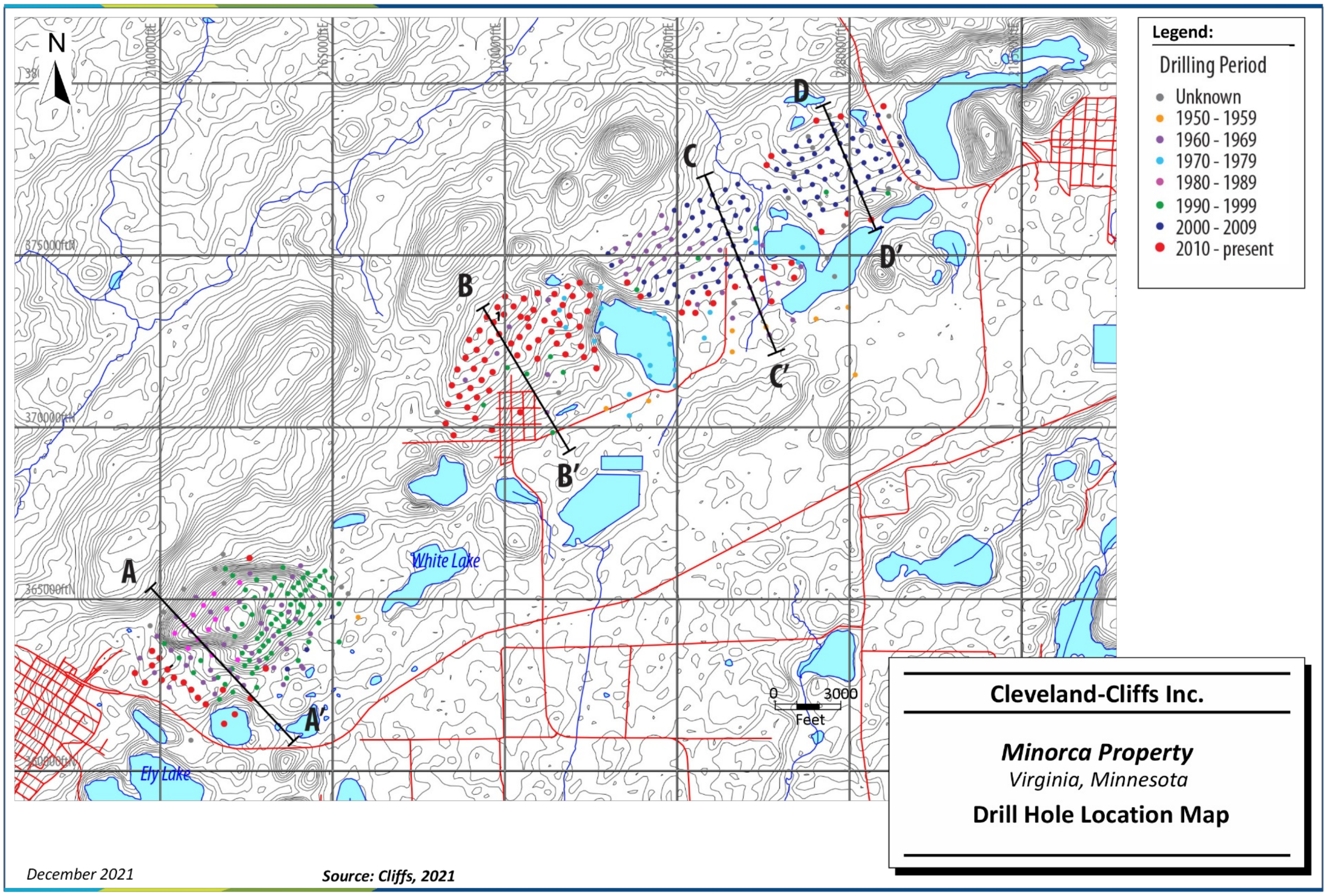
Tenement	Holes	Total Footage
Central	85	19,084
East	197	53,159
Laurentian	161	46,566
Grand Total	**443**	**118,809**

Table 7-2: Yearly Drilling Summary Cleveland-Cliffs Inc. – Minorca Property

Year	Tenement	Holes	Total Footage
1958-1978	Central	19	5,118
	East	154	41,862
	Laurentian	55	15,696
1989	Central	2	494
	Laurentian	13	3,770
1994	Laurentian	15	4,139
1995	Laurentian	21	5,033
1996	Laurentian	24	5,563
1997	Laurentian	2	500
1998	Laurentian	7	4,741
1999	Laurentian	3	1,047
2004	Laurentian	1	144
2006	East	30	6,673
2011	Central	13	3,443
	East	5	1,839
2012	Central	10	2,264
	East	5	1,961
2015	Central	10	1,801
	Laurentian	5	1,282
2016	East	1	59
	Laurentian	9	2,739
2018	Central	26	4,484
	Laurentian	4	1,397
2020	Central	2	491
	East	2	766

Year	Tenement	Holes	Total Footage
2021	Central	3	989
	Laurentian	2	516
Grand Total		**443**	**118,809**

From these holes, 7,239 samples were assayed for MagFe and concentrate silica, which are the main assay data gathered, complementing geologic observations from lithologic logs.



December 2021

Source: Cliffs, 2021

Figure 7-3: Drill Hole Location Map

7.2.2 Procedures

Drilling practices have remained consistent over the history of the Property. The core size has varied over the years but is currently drilled with BTW-sized tools (1.656 in. core diameter).

7.2.2.1 Collar Coordinates and Surveying

DD collar locations are recorded on the original drill logs created at the time of drilling, including easting and northing coordinates in local grid or modified Minnesota State Plane (NAD 27 datum) and elevation of collar in feet above sea level National Geodetic Datum of 1929 (NGVD29). The site maintains a conversion file between local grids and Minnesota State Plane (NAD 27 datum) for incorporation into Vulcan software.

Surveying methods have evolved over the years with advancements in technology, moving from optical methods to electronic distance measurement and to global positioning system (GPS), which is currently in use. SLR is of the opinion that, for the deposit type, all survey methods used for the collar locations would be expected to provide adequate accuracy for the drill hole locations. All drilling follows applicable Minnesota Department of Health (MDH) and MDNR regulations and requirements.

The collar of each completed drill hole is surveyed by the CCMMI operation's surveyor. The collar coordinates (XYZ - preferably Minnesota State Plane Coordinates) are verified by the project geologist. Final survey data are validated in the office by the project geologist and plotted on an appropriate map and incorporated into the acQuire drill hole database.

Currently, the location of the drill hole is set by the geologist, with collars marked and surveyed using a Trimble R10 GNSS receiver and a TC7 data collector. Drill hole locations are staked in the field and marked with a lath. Maps of staked hole locations as well as field tours of hole locations are provided to drilling contractors, who, upon completion of a hole, place the lath into the drill hole, which is subsequently surveyed with a GPS, marking the final location.

Due to the relatively shallow depth and vertical nature of all drill holes, no downhole deviation survey is conducted. Drill holes pierce the generally flat-lying Biwabik IF at near perpendicular angles.

7.2.2.2 Drill Site Reclamation

During Cliffs' ownership of the Property, the majority of exploration drill holes have been inside the Minorca Permit to Mine; therefore, under applicable regulations, no drill site reclamation has been required. For exploratory borings outside the Minorca Permit to Mine, all applicable regulations concerning MDH and Environmental Protection Agency (EPA) regulations including: notification, drilling, abandonment, Storm Water Pollutant Prevention Plan (SWPPP) inspections, and site reclamation are followed.

7.2.2.3 Drill Core Sample Collection

During drilling, core samples are boxed with depths marked in feet using wooden run blocks. The core is transported from the drill site by the mine geologist/engineer or by the drilling company and taken to a core logging facility. The mine geologist confirms procedures for packaging and handling of core in the boxes, such as the inclusion of footage markers at the end of core runs and labeling core boxes with sequential numbering and footage of core included in the box.

Drilling footages are verified visually, as taconite is a very competent rock. Core recovery is generally very good. Core is sometimes lost in zones of intense oxidation, which is very rare.

7.2.2.4 Drill Core Logging

Logging includes rock types (lithologic member and subunit), magnetic characteristics, taconite type, degree of oxidation, mineralogy, textures, alteration, structural information, and a general geologic description. Boundaries of geologic subunits are often gradational (e.g., more slaty than cherty versus more cherty than slaty, thin beds becoming more prevalent than thick beds) and may not provide a sharp geologic contact. As magnetite is the primary mineral of interest, a hand magnet is utilized for core logging and indicates relative magnetic iron content of a sample interval prior to assaying (e.g., slight, moderate, or strong).

Core logging is done by geologic zones, which are separated by visual and physical characteristics, including relative magnetism, to determine subunit stratigraphy. Drilling footages are verified visually by the mine engineer/geologist. Core was photographed in 2006, 2011, 2012, 2015, 2016, and 2020. Sample dispatch records are entered into Microsoft (MS) Excel spreadsheets or manually on paper logs and are currently being imported into an acQuire database and stored digitally onsite. The sample dispatch records are sent with the samples to the Minorca laboratory.

7.2.2.5 Drill Core Sampling

After the core is logged, it is then delivered to the laboratory. All Lower Cherty and Upper Cherty zones are sampled. Lower Slaty waste rock and Pokegama Quartzite are not sampled (unless MagFe is detected during logging by use of hand magnet), as is past practice due to low amounts of MagFe. Drill holes are assayed upon availability and added to the drill hole database at the beginning of modeling.

Minorca exploratory drill holes are assayed on site by the Minorca laboratory. In ore zones, samples for the laboratory are prepared in approximately 10 ft lengths but can range from 7 ft to 13 ft when intervals do not break evenly at 10 ft. Samples for assay do not cross logged subunit contacts, ensuring that Minorca samples are representative of a single stratigraphic zone. Occasionally, drill core may be cut and preserved as a legal requirement or as a reference hole for future use as selected by the engineer/geologist. Reference holes are used as a representation for future logging in determining lithology contacts and or assaying procedures. Preserved half-core is stored in original core boxes, while the other half follows the normal assaying procedure. This stage is done only after logging, sample collection, and core photography. Saved samples and split core are stored in shipping containers (most split core is stored in a repurposed training center/core logging facility to be available as a reference during logging).

Drill core logging and sample interval selection are performed by the project geologist. Digital core logs are stored on a common server and an individual server. Digital assay information is stored in original MS Excel files delivered by the laboratory as well as in a drill hole database.Saved samples are stored in core buildings and/or shipping containers.

Key drilling and sampling information is summarized in Table 7-3.

Table 7-3: Drilling as of April 24, 2021
Cleveland-Cliffs Inc. – Minorca Property

	Diamond Drilling	RC Drilling	Total Drilling
No. of Holes Drilled	443	0	443
Footage Drilled	118,809	0	118,809
Footage Logged	91,280	0	91,280
Number of Samples	7,239	0	7,239
Samples Dispatched			
Samples Analyzed			

7.2.2.6 Sample Storage and Data Security

Drill core is transported directly from the drill rig to the core logging facility at Minorca by either the drilling contractor or Cliffs' personnel.Temporary core storage is located at the secure Minorca logging facility.

Whole core is placed in labeled bags for submission to the site assay laboratory. Selected drill cores have been disposed of from a historical practice of periodically disposing of drill core once cored intervals were mined out. Some archived drill core is consumed during re-assaying programs conducted sporadically for specific local areas of the mine.

Sample preparation and bench-metallurgical analysis of diamond drill core for resource estimation is conducted at the Minorca laboratory, located in St. Louis County, Minnesota.The laboratory is a Minorca-owned facility and is not currently accredited for its quality management system. Each shipment of core samples is accompanied by a sample sheet recording all the sample information and required analyses. The data are stored digitally on Minorca's shared servers. Unused sample materials are saved in envelopes, paper bags, or quart/pint bottles and stored in boxes located in C-tainers at the mine site or in the logging facility. Note that historical samples are preserved in the Old Training center (logging facility) as well as the onsite "Tin Shack" location at Minorca.

Digital copies of drill core analyses received from the site laboratory are stored in a backed-up network drive with restricted permissions, as well as within an acQuire database, which retains daily, weekly, monthly, and yearly backups.

Electronic storage of an as-drilled collar location file for each annual drilling program is accomplished using the database management system acQuire. A hard copy printout of the collar file with geologic logs and other documents relevant to the drill holes is stored in file cabinets at the Minorca Mine Engineering office.

It is the QP's opinion that there are no known drilling, sampling or recovery factors that could materially affect the accuracy and reliability of the results and that the results are suitable for use in the Mineral Resource estimation.

7.3 Hydrogeology and Geotechnical Data

Refer to section 13.2 Pit Geotechnical and section 15.4 Tailings Storage Facility for this information.

8.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

Sampling of iron formation to evaluate the magnetite-bearing taconite ore potential is performed to characterize the metallurgical properties of the material. Therefore, conventional whole rock elemental assaying approaches utilized in evaluating most metallic ore deposits are eschewed in favor of methods designed to qualify and characterize recoverable magnetic concentrate.

Sample preparation and bench-metallurgical analysis of diamond drill core for resource estimation is conducted at the Minorca laboratory, located in St. Louis County, Minnesota. The laboratory is a Minorca-owned facility and is not currently accredited for its quality management system.

The laboratory analysis is performed by Minorca personnel. Laboratory data produced for the Mine for both exploration and production is visually checked daily with any discrepancies or unexpected values followed up on by both plant engineering and mine engineering personnel.

Only DD exploration holes are used for assaying and resource modeling. Blast hole sample results and magnetic susceptibility are used to check ore contacts as well as confirm expected grades during production. Reconciliations are run on current production versus modeled production, which provides insight on the accuracy of the modeled assay data versus actual production.

Reconciliation of actuals with the final model has historically been accurate for the type of formation at Minorca and has instilled a high degree of confidence in Minorca's diamond drill hole density and sampling procedure.

8.1 Sample Preparation and Analysis

8.1.1 Sample Preparation

Drill core samples are put into a jaw crusher and reduced to -3 mesh. Note, only a select few drill holes have been cut or split, based on need by the geologist/engineer as a reference for lithology logs or as a legal requirement outlined in the exploration lease (State of Minnesota). The sample is split, with 1,000 g being put into a roll crusher and reduced to -10 mesh. A buckboard and muller are used to grind a 50 g split of the sample to 100% -270 mesh. The buckboard is a cast iron plate with three steel sides and a smooth upper surface. It measures 18 in. by 24 in. The buckboard and muller pulverization method is used to reduce small amounts of -10 mesh material to -270 mesh under controlled conditions. The sample to be pulverized is poured on a 270 mesh screen, and oversize material is placed on the buckboard. The muller is passed over the sample multiple times, and the ground material is screened on the 270 mesh screen. Material that is +270 mesh is returned to the buckboard and the process is repeated until the entire sample is ground to -270 mesh. The buckboard and muller grinding method provides a more consistent particle size distribution than a pulverizer and requires less time than grinding mills.

8.1.2 Sample Analysis

Samples are analyzed by a Davis Tube analysis and Saturation Magnetization Analyzer (Satmagan) analysis to determine the crude MagFe percent, percent weight recovery (wtrec), and concentrate silica. A flowsheet of sample preparation and analysis is illustrated in Figure 8-1.

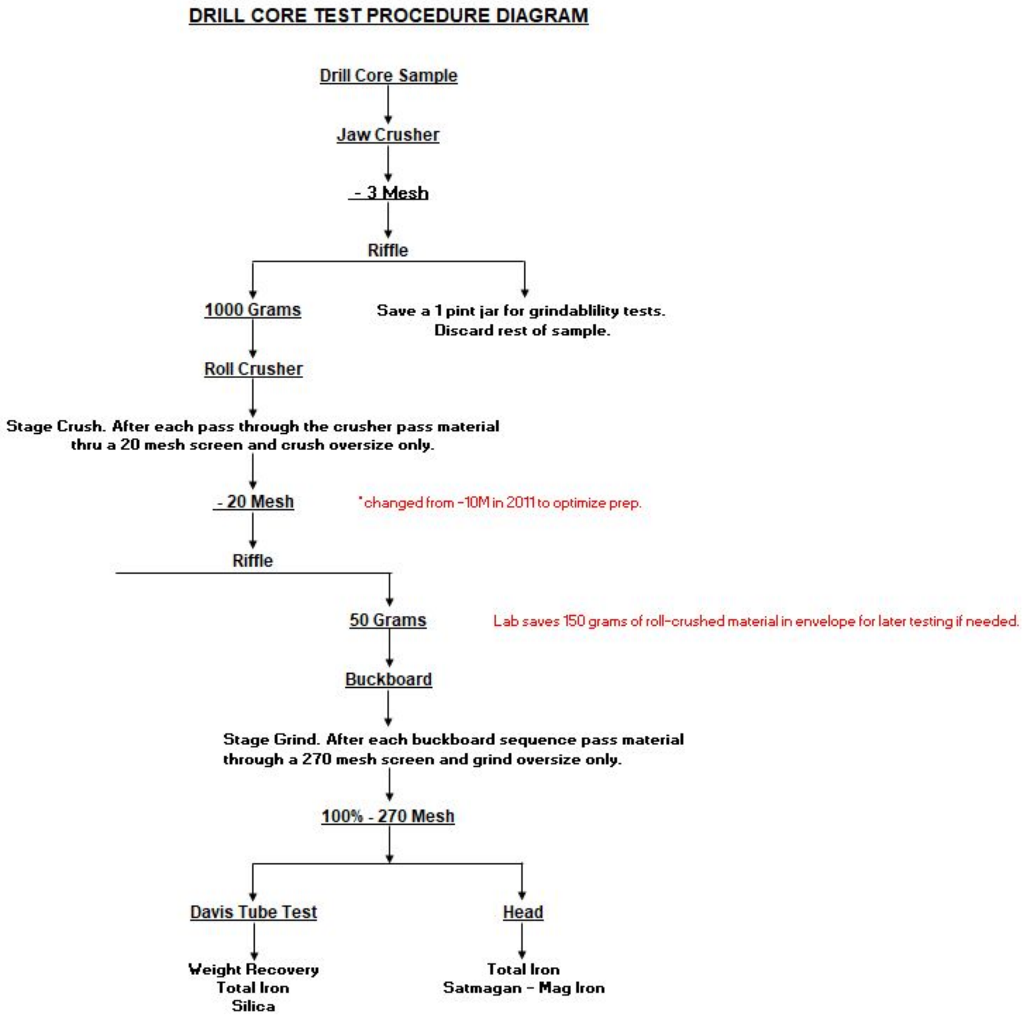


Figure 8-1: Drill Core Test Procedure Workflow

8.1.2.1 Davis Magnetic Tube Separation Method

Davis Tube analysis involves a ground sample suspended in water being moved back and forth along the length of the tube, while a magnet is positioned in a mid-point in the tube. The magnetic material in the sample clings to the side of the tube where the magnet is positioned. This magnetic material is then collected and weighed to determine weight recovery % (as compared to the initial weight of the sample that enters this process). After weighing, the material then goes through a wet chemical process in which silica is digested and separated from the iron oxides. This material is again weighed and compared to the starting weight, which then provides the percent silica in the total sample.

Per Minorca laboratory procedure WI 22-W-010, the magnet is electric and is set at 1.7 A, and the DT motor is set 100 tube strokes per minute for 10 minutes. Separated products of the test include tails and the tube concentrate. The excess head material is analyzed with the Satmagan for magnetic iron (described below).

The DT tails are usually discarded but can be saved for future testing upon request. The concentrate is tested for silica by wet chemistry methods (described below).

A 20 g (0.71 oz) sample (100% passing 270 mesh) is put through the DT magnetic separator. Wash water flow of 0.4 gpm is verified prior to each use. After the sample is run in the Davis Tube, the sample is dried and demagnetized. A weight is taken of the DT concentrate, and silica content of the concentrate is determined by wet chemistry. As 20 g are used in the Davis Tube test, the weight recovery percent fraction is simply the dry weight of the concentrate multiplied by 5.

8.1.2.2 Satmagan Magnetic Iron Determination

A direct measure of the magnetic iron of the crude ore is measured with a Satmagan, which measures the total magnetic force acting on a sample to a precision of 0.1%. Satmagan analysis involves a ground sample being placed into a Satmagan machine to measure the magnetic field of the sample, which is then reported as a percent MagFe in the sample. This machine is calibrated to a standard sample of known MagFe content on a bi-weekly basis by laboratory personnel.

The Satmagan is a magnetic balance, in which the sample is weighed gravitationally and in a magnetic field. The ratio of the two weights is linearly proportional to the amount of magnetic material in the magnetically saturated sample.

Per Minorca laboratory procedure 22-W-011, a minimum of two grams of sample ground to 100% -270 mesh is needed for Satmagan analysis, and the sample to be tested is placed in a plastic testing container. The prepared sample is de-magnetized using the de-magnetization coil (de-mag coil). While the de-mag coil is on, the sample is moved into and out of the magnetic field until the sample is de-magnetized. The sample is placed on the magnetic balance, and the strength of the magnetic field is noted.

Hydrofluoric acid silica determination

Silica values reported are based on ASTM E247-96, Standard Test Method for Determination of Silica in Manganese Ores, Iron Ores, and Related Materials by Gravimetry. Per procedure 22-W-50, samples are first partially digested in hydrochloric acid to dissolve the non-silica components of the sample. The sample is then filtered and rinsed with distilled water. The rinsed sample is then treated with hydrofluoric acid and sulfuric acid to dissolve the silica and remove residual iron, aluminum, and titanium. The silica is desiccated to drive off water, and the weight is recorded.

8.1.2.3 Density

Density measurements on drill core started in 2012 and take place on site in Minorca's logging facility. In 2012, several density measurements were tried. Methods that accounted for porosity, such as wrapping cellophane wrapper around the core to maintain an impermeable core sample, did not work well. The wrapper failed in several instances with several types of wrappers used. Thus, a simple weight wet versus weight dry test was used and is summarized below. This was deemed sufficient, as taconite is relatively impermeable.

Core was selected from 14 drill holes by the mine geologist to be measured for density. The first step is to measure the mass of the sample, then measure the mass of the sample totally submerged in water. Because of water's buoyant force, the sample will weigh substantially less. The difference between those measures is equal to the mass of water displaced. Because water has a density of 1 g/cm³, the mass of the water is also the volume of water displaced and the volume of the sample.

At a minimum, a six-inch hand sample was tested for every assay interval. Waste rock that was not assayed was tested approximately every 20 ft. In order to accurately represent each interval, samples were chosen along the full interval and with the same coloration and apparent composition as the interval.

Density was determined by dividing the "Mass of sample in air" by volume.

$$\textbf{Bulk density} = \frac{\text{Mass of sample in air}}{\text{Mass of sample in air} - \text{mass of sample in water}}$$

$$\textbf{Convert from g/cm}^{3}\textbf{ to Ft}^{3}\textbf{/LT:}\quad \frac{1}{0.02786962527(\text{g/cm3})}$$

$$\textbf{Convert from Ft}^{3}\textbf{/LT to g/cm}^{3}\textbf{:}\quad \left(\frac{1}{(\text{Ft3/LT})}\right) \times \left(\frac{35.881358}{1}\right)$$

It was determined from the data measured and analyzed that the values were very similar to those previously used at Minorca for each subunit. Very little difference was found between core from the East 1 Pit and Central area, which is consistent with those characteristics observed in core logging. Currently, all density values are kept as previously used due to the similarity of values and the small data set available (Table 8-1).

Table 8-1: Minorca Current Density Values
Cleveland-Cliffs Inc. – Minorca Property

Material Type	Tonnage Factor (ft^3/LT)	Density (g/cm^3)	Notes
Ore	10.80	3.32	MagFe > or = 16% regardless of lithological unit
Lean Taconite	11.25	3.19	MagFe > 10% but < 16% regardless of lithological unit
Waste Rock	12.27	2.92	Regardless of lithological unit
Overburden	15.00	2.39	Laurentian deposit (higher content of gravel and cobbles)
Overburden	18.00	1.99	East deposit

8.2 Quality Assurance and Quality Control

Quality assurance (QA) consists of evidence to demonstrate that the assay data has precision and accuracy within generally accepted limits for the sampling and analytical method(s) used in order to have confidence in a resource estimate. Quality control (QC) consists of procedures used to ensure that an adequate level of quality is maintained in the process of collecting, preparing, and assaying the exploration drilling samples. In general, QA/QC programs are designed to prevent or detect contamination and allow assaying (analytical), precision (repeatability), and accuracy to be quantified. In addition, a QA/QC program can disclose the overall sampling-assaying variability of the sampling method itself.

Minorca does not yet have a formal procedure for exploration drill core QA/QC.When SLR audited Minorca's Mineral Resource documentation in winter 2021, it recommended that there be a campaign QA/QC report for every DD hole program and formal documentation of QA/QC procedures.

Minorca has not historically included duplicate samples or reference samples of known value in diamond drilling sample analysis programs. In summer 2021, 50 blind duplicate samples sourced from ore crushed to -½ in., spanning the period of drilling since 2003, were analyzed as a check assay program using Minorca's normal Davis Magnetic Tube Test (DMTT) for ore characterization. Results were compared to original data for the KEVs of crude Satmagan MagFe, concentrate SiO_2, and weight recovery. The coarse reject duplicates were accompanied by 10 blind reference samples (crushed to -¼ in.) that are normally inserted in the nearby UTAC operation DD hole programs.In addition, Lerch Brothers International (Lerch) laboratory conducted a wet chemistry total Fe assay of each DT concentrate generated by the Minorca laboratory for this study. Lerch is accredited with ASQ/ANSI ISO-9001:2015 for its system of quality management. In tandem with the DT weight recovery, the concentrate iron data allowed calculation of magnetic iron for a direct, method-independent comparison with Minorca's crude Satmagan MagFe results.

Results from the duplicate samples and reference samples are presented in the following sections.

It is SLR's opinion that Minorca's sample preparation and analytical QA/QC results from a suite of blind duplicates spanning from 2003-2021 are adequate to validate the drill hole assay database used for Mineral Resource estimation and meet S-K 1300 minimum standards for reporting to the SEC. Sample preparation and analyses follow established, written procedures.

8.2.1 QA/QC Procedure

There is no formal Minorca QA/QC procedure for drill core processing and analysis. For future campaign reports, a formalized procedure should be referenced in the report.

Prior to the 2021 verification QA program, no standards, blanks, or duplicate samples were inserted into the stream of diamond drilling samples and current laboratory quality practices are not directly tied to the resource drilling. The Minorca laboratory has procedures for sample preparation and analysis that are maintained in a company SharePoint site. The laboratory maintains its equipment by routine inspections internally as well as checks by an independent outside laboratory, the Natural Resources Research Institute (NRRI), located in Coleraine, MinnesotaMaintained as part of the University of Minnesota, NRRI is not currently an accredited laboratory.The Satmagan is re-calibrated whenever it does not pass verification with standards. Standards are checked bi-weekly or whenever maintenance is performed, whichever is more frequent. Minorca also has an XRF, re-calibrated when an x-ray tube is replaced; however, XRF data are not used in the resource estimation.

Templates for QA/QC analysis of standards and duplicates to be submitted with future diamond drilling were created in 2021.

8.2.2 Reference Materials (Standards)

Minorca does not have its own crude ore reference “standard” material. The 2021 verification QA program borrowed from a reserve of crude ore UTAC standard samples, which were prepared from ore-grade material collected from the United Taconite Thunderbird North (TBN) mine. A 10 tonne (metric ton of 2,204.6 lb) sample was crushed to -¼ in., homogenized, and then split into approximately 5 kg subsamples by the Coleraine Mineral Research Laboratory of the University of Minnesota. The standard was analyzed according to Minorca’s current crude ore characterization procedure and underwent the same series of preparation, magnetic separation, and chemical assay steps that crude ore samples undergo (DMTT of a 100% -270M prepared sample).

Standard(s) samples submitted in conjunction with DD samples did not exist prior to the 2021 verification QA program. Statistical process control (SPC) charts for individuals mean ($\bar{x}$) and moving range ($\overline{MR}$) were generated for all physical and chemical measurements and calculated variables from the DT crude ore characterization protocol (Figure 8-2 to Figure 8-4).

Data discussed in this TRS include only the 10 blind UTAC standards analyzed in the 2021 QA/QC verification campaignData are currently tracked on spreadsheet stored on the CTG LAN (Orobona, 2021). As the resource QA/QC database expands, results will be e-mailed to the site geologist or shared in a central location.

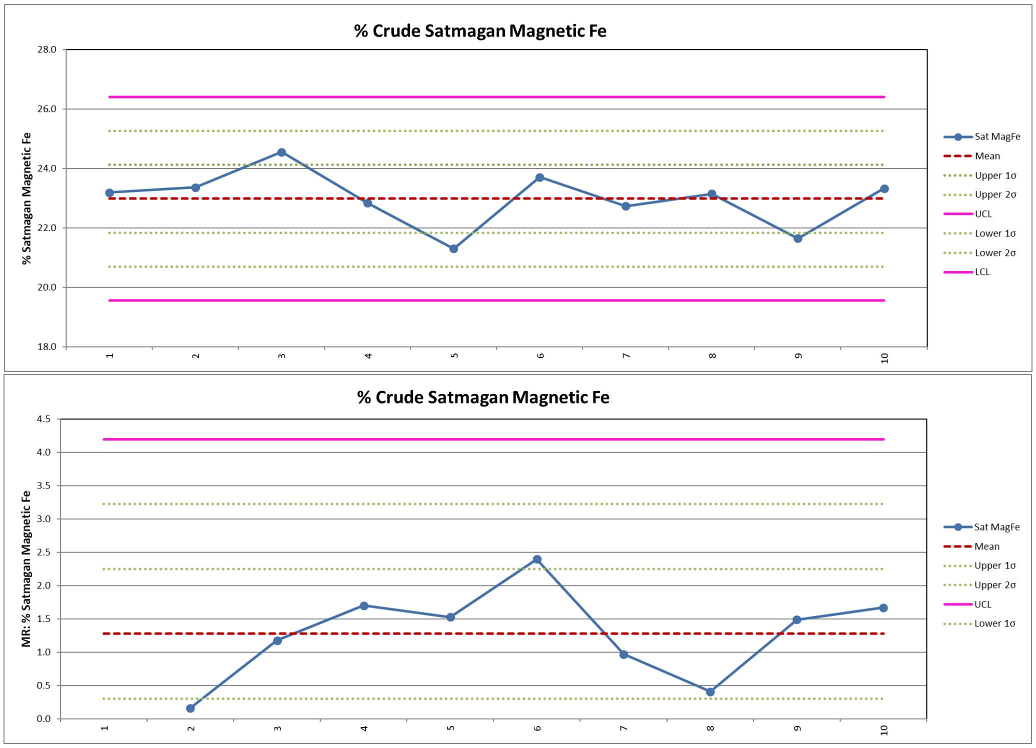
Control limits are based on the common approach for Shewhart control charts. For individuals mean charts, control limits are ± 2.66 * $\text{Mean}_{\text{moving range}}$. For the MR charts, control limits are 3.267 * $\text{Mean}_{\text{moving range}}$. In both cases, 1σ and 2σ are respectively one-third and two-thirds of the difference between the mean(s) and control limits. This approach is commonly used in statistical process control software and narrows control limits relative to three standard deviations (SD) from the mean of the data.

8.2.2.1 Sample Preparation

Screen size analysis was not run on the UTAC standards analyzed in the check assay study, and consistency in sample preparation over time is not known for historical samples. Variations in sample preparation and size distribution of prepared samples can have a material impact on the results of analysis (Orobona, 2015; Orobona, 2016 a-c). The Minorca laboratory should consider generation of its own crude ore standard, specific to diamond drill campaigns, that permits screen analysis following crushing but prior to pulverization to passing -270 mesh.

8.2.2.2 Satmagan Magnetic Iron 2021

Crude % Satmagan MagFe is derived from Satmagan.All data from the 2021 verification study (Figure 8-2) using UTAC standards were in apparent control; however, the dataset is still relatively small for a robust statistical analysis. The average value is 23.0 (standard deviation 0.9). Lerch analysis of this standard has averaged 22.5% crude MagFe (standard deviation 0.5) over the past several years, since the onset of periodic calibration with the Hibbing Taconite laboratory.



Tests for Special Causes - Individuals:

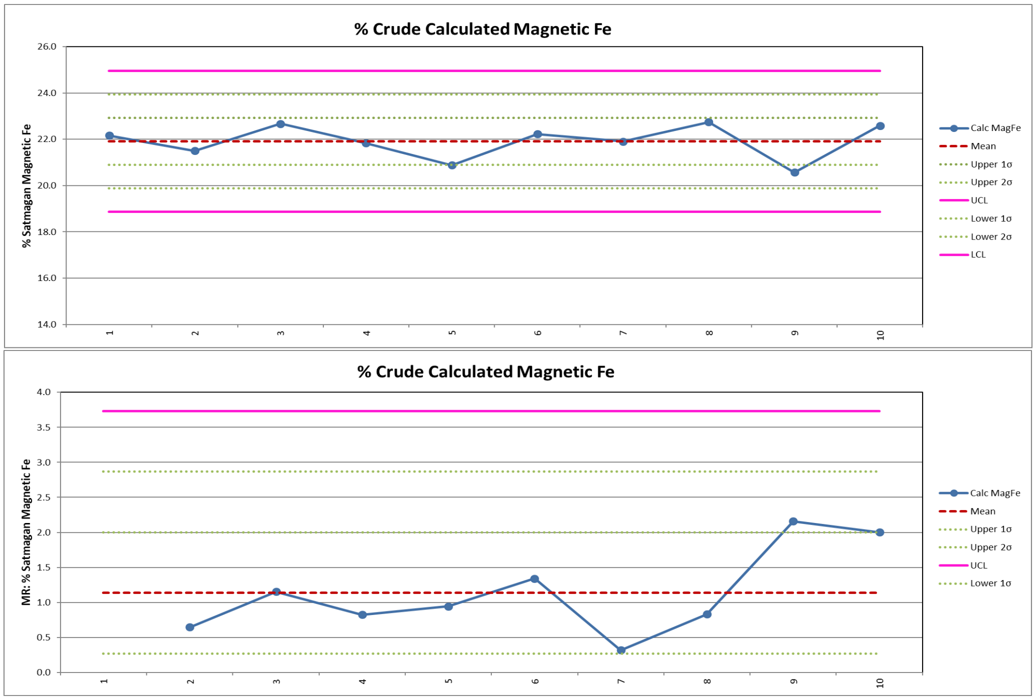
Observation No.	Test 1: 1 point more than 3 Stdev from CL	Test 2: 9 points in a row on same side of CL	Test 3: 6 points in a row all increasing or all decreasing	Test 4: 14 points in a row alternating up and down	Test 5: 2 out of 3 points more than 2 Stdev from CL (same side)	Test 6: 4 out of 5 points more than 1 Stdev from CL (same side)	Test 7: 15 points in a row within 1 Stdev from CL (either side)	Test 8: 8 points in a row more than 1 Stdev from CL (either side)

Figure 8-2: Satmagan Magnetic Iron 2021

8.2.2.3 Calculated Magnetic Iron 2021

Calculated % MagFe is derived from the multiple of % wtrec and DT concentrate total % Fe by wet chemistry, divided by 100. All data from the 2021 (Figure 8-3) verification study using the UTAC standard were in apparent control; however, the dataset is still relatively small for a robust statistical analysis. For the purposes of this study, Lerch conducted the wet chemistry, as its fused bead method of XRF consumes a much smaller sample than the pressed puck method used at Minorca, which requires more sample than is typically recovered by the Davis Tube.

The average value is 21.9 (standard deviation 0.7). Lerch analysis of this standard has averaged 21.7% crude MagFe (standard deviation 0.4) over the past several years.



Tests for Special Causes - Individuals:

Observation No.	Test 1: 1 point more than 3 Stdev from CL	Test 2: 9 points in a row on same side of CL	Test 3: 6 points in a row all increasing or all decreasing	Test 4: 14 points in a row alternating up and down	Test 5: 2 out of 3 points more than 2 Stdev from CL (same side)	Test 6: 4 out of 5 points more than 1 Stdev from CL (same side)	Test 7: 15 points in a row within 1 Stdev from CL (either side)	Test 8: 8 points in a row more than 1 Stdev from CL (either side)

Figure 8-3: Calculated Magnetic Iron 2021

8.2.2.4 Calculated versus Satmagan Magnetic Iron 2021

Figure 8-4 illustrates calculated MagFe versus Satmagan MagFe for the crude samples.Systematic changes in the ratio between values merit investigation but were not observed over the time period covered in this TRS.

Note, historically, the nearby UTAC operation gives the DT (calculated) MagFe priority as long as the Satmagan MagFe/DT MagFe ratio is greater than 0.92; if less than 0.92, UTAC uses the Satmagan MagFe.

Considering the good agreement in standards for calculated MagFe between UTAC and Minorca (Lerch conducted iron analysis for both data sets), the relatively good precision in weight recovery, and relatively poor precision of Satmagan measurements (Figure 8-2), Minorca may wish to consider using a calculated MagFe (except where the ratio is below an established threshold as at UTAC).

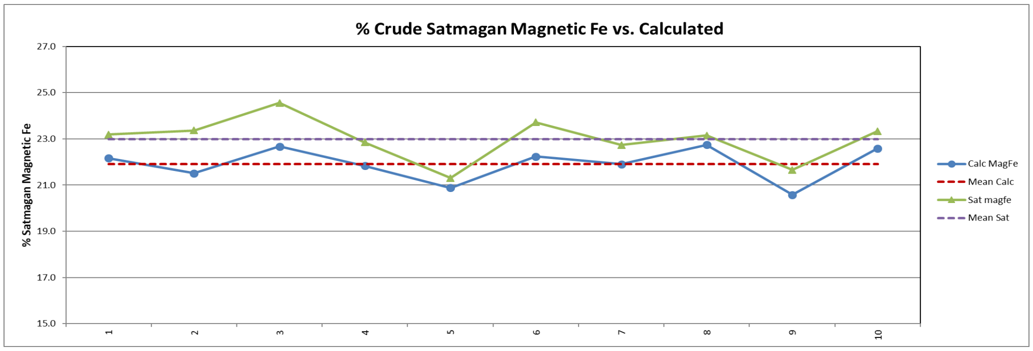


Figure 8-4: Calculated Magnetic Iron versus Satmagan 2021

8.2.3 Duplicates

During 2021, 50 blind, duplicate coarse crush reject samples (-½ in.) from exploration drilling between 2003 and 2021 were analyzed as a verification assay program, and results were compared to original data for the KEVs of Satmagan MagFe, concentrate SiO_2, and weight recovery. All duplicate pairs were selected from 14 DD holes, across the spectrum of ore units. The coarse crush reject duplicates were accompanied by 10 blind reference samples, the results of which are described in section 8.2.2. The 50 duplicate samples and 10 reference samples were submitted to the Minorca laboratory and were subjected to the same processing and analyses as the primary samples to determine the degree of heterogeneity in the coarse-crushed sample material for head grades and the precision of metallurgical results obtained from a split of course-crushed reject. The one additional step was provision of total Fe wet chemistry for the DT concentrates provide by Lerch.

For each analyte or measured/calculated variable, plots generated include x-y (scatter) and a time series of mean relative percent difference. The latter chart normally illustrates variation in precision with time, which is not applicable for such a short timeframe study.

Scatter plots include the standard least squares trendline (the typical regression used by spreadsheet software). A second least squares trendline is generated assuming all error in "X." The reduced major axis (RMA) line assumes that neither axis depends on the other, and is a best-fit regression that should closely trend with the 1:1 line for a sample set in good precision.

Control limits to the mean relative percent difference between duplicate pairs are based on 3SD from the mean of data, where 1σ and 2σ are obviously 1SD and 2SD from the mean of the data. The Shewhart control approach used for the standards is not appropriate, since the QC metrics are not currently set up to track moving range.

Also monitored are Thompson and Howarth plots (Thompson and Howarth, 1978), where the mean of each replicate pair is plotted against the absolute difference between the two analyses. On these plots, lines are drawn for any predefined precision level (e.g., 10% and/or 20%) and percentile (e.g., 90th or 99th), and the overall quality of the replicate analyses at different concentration ranges can be grasped at a glance. Precision within 20% is recommended for Minorca data unless otherwise noted. Pairs that deviate from the general trend should be identified and discussed with the laboratory. Two additional ways to plot the same results include plotting the mean of duplicates against the ratio between duplicates (the Ratio) and the mean of duplicates against the relative standard deviation (RSD). For the case of a duplicate pair, RSD is the square root of the square of the difference divided by two, divided by the duplicate pair mean:

RSD= √ [(x1 - x2)2/2] / (x1 + x2)/2, expressed as a percentage.

An acceptable RSD of 15% is approximately equal to the recommended 20% relative difference acceptance.

Each plot has advantages and disadvantages; using all four provides insight into data quality and analytical precision.

As the duplicate samples were processed in a single batch in mid-2021, in many cases individual duplicate results are several years older than the original sample analysis. The Ratio plots are particularly useful to illustrate the possibility of time-based biases between the original and duplicate data sets.

Data presented in Figure 8-5, Figure 8-6, and Figure 8-7 include only the 50 blind duplicates analyzed in the 2021 QA/QC verification campaign (Orobona, 2021). As the resource QA database expands, results will be e-mailed to the site geologist and shared in a central location.

8.2.3.1 Satmagan Magnetic Fe Preparation Duplicates

For six of the 50 duplicate pairs, the absolute difference is more than 20% of the mean for Satmagan MagFe and, though the RMA is close to the 1:1 line, this demonstrates only adequate precision for the site's principal ore grading variable. For at least two points (those with absolute difference greater than 50% of the pair's mean), the sample analyzed in 2021 was demonstrably different than the original sample, as both original and duplicate samples' Satmagan MagFe were consistent with their respective DT weight recoveries. This flags a risk of errors due to sample handling and archival. For a third sample, the original Satmagan MagFe is not consistent with DT weight recovery, a potential data entry error.

There is no apparent time bias based on the Ratio plot, and it is unclear whether that plot indicates improved precision with grade.

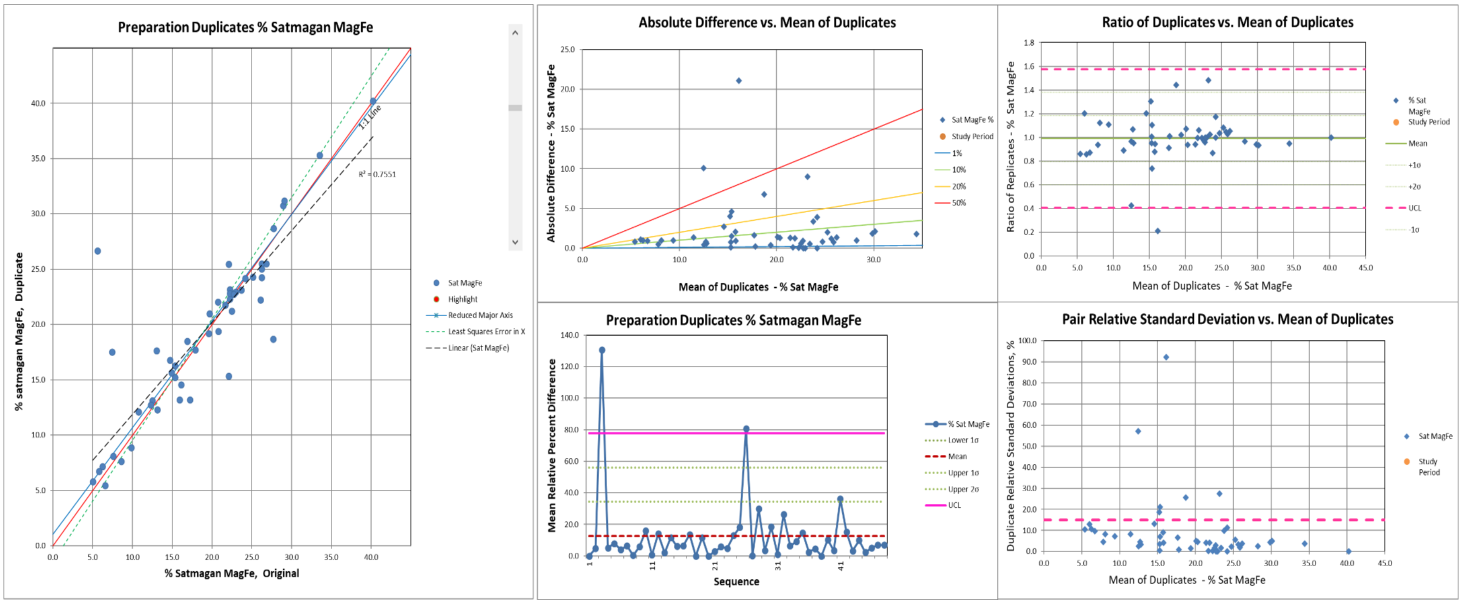


Figure 8-5: Satmagan Magnetic Iron Preparation Duplicates

8.2.3.2 Satmagan Magnetic Iron versus Calculated Magnetic Iron (2021 samples only)

The illustrated samples are not duplicate pairs. Instead, Figure 8-6 is a plot of Satmagan MagFe for the duplicate samples analyzed in 2021 versus magnetic iron calculated from Davis Tube for the same samples. Calculated magnetic iron is a function of:

$$\%\ \text{MagFe}_{\text{calculated}} = \%\ \text{Fe}_{\text{DT Concentrate}} \times \%\ \text{weight recovery}/100$$

SLR notes that Lerch conducted the concentrate Fe analyses for this data set. For all but one of the 50 samples, the absolute difference is less than 20% of the mean for method pairs, the large majority are within 10%, and the RMA is very close to the 1:1 line, demonstrating good agreement between these methods of estimating magnetic iron. There is, however, an apparent high bias in the Satmagan results (39 of 50 samples); exceptions to that do not appear to be a function of material type (geology), geographic location, technician, or date of original sample.

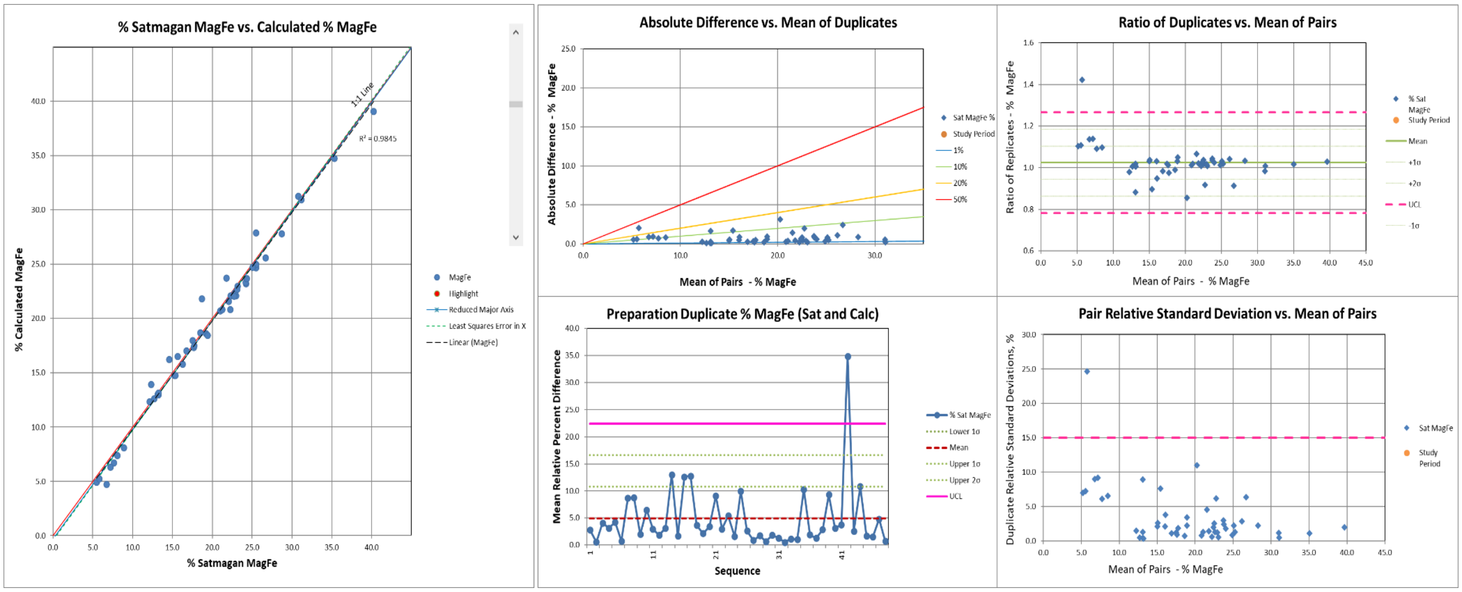


Figure 8-6: Satmagan Magnetic Iron vs. Calculated Magnetic Iron (2021 samples only)

8.2.3.3 Weight Recovery Preparation Duplicates

Weight recovery is the weight proportion of concentrate recovered by the Davis Tube. For all but four duplicate pairs from the 2016-2019 study period (Figure 8-7), the absolute difference is within the recommended 20% of the mean for weight recovery, and the RMA is very close to the 1:1 line, demonstrating good precision considering that at least two of the failures are established to be a result of switched/wrong samples. The apparent bias towards higher duplicate results is largely driven by the fliers and is very unlikely to be time dependent. The Ratio plot appears to indicate increasing precision with increased recovery.

The typically better precision in weight recovery relative to Satmagan MagFe supports using a calculated crude MagFe value (at other Cliffs' sites) unless variation in Satmagan results can be reduced. That no such better precision is observed in these data is an indicator of inhomogeneity between prepared duplicates.

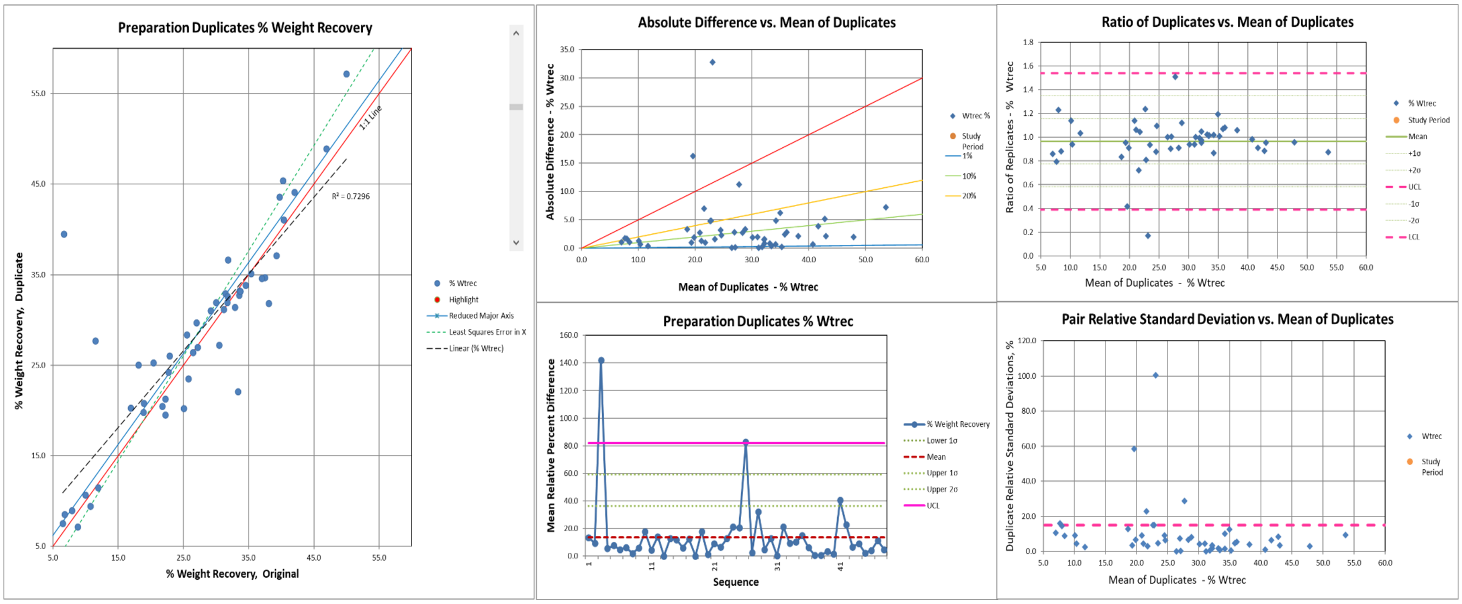


Figure 8-7: Weight Recovery Preparation Duplicates

8.2.4 Blanks

Due to the preponderance of metallurgical testing rather than traditional assays, blanks are not recommended in conjunction with QA/QC procedures, nor are they relevant.

8.2.5 Check Assays

Check assays have been sporadically conducted using Lerch. Other potential external providers include the NRRI laboratory in Coleraine, Minnesota and Midland Research in Marble, Minnesota.

Lerch, accredited with ASQ/ANSI ISO-9001:2015 for their system of quality management, is a small, independent provider that relies on Cliffs' facilities and equipment.

For the 2021 DD holes characterization program, the Minorca laboratory sent a small number of samples to Lerch as checks (Table 8-2 and Figure 8-8). Lerch normally bucks its DT samples to 100% passing 200 mesh for other customers. Minorca usually bucks to 100% -270 mesh; however, Lerch erroneously processed the six samples using their standard -200 mesh process. While Satmagan analyses of the crude should be comparable, samples ground finer (-270 mesh) should have a lower weight recovery and lower concentrate silica grade, so direct comparison of the DT results is not possible. SLR notes, however, that the sample results flag a potential analytical precision improvement opportunity.

Table 8-2: Summary of 2021 Check Assay Program
Cleveland-Cliffs Inc. – Minorca Property

DD	From	To	Wtrec %			% SiO_2			% MagFe			Hypothetical % MagFe		
			Lerch	Minorca	Δ %	Lerch	Minorca	Δ %	Lerch	Minorca	Δ %	Lerch	Minorca	Δ %
75-58	314	327	36.93	34.15	8.15	8.09	5.95	35.97	22.17	22.8	-2.8	24.6	23.2	5.7
84-60	286	296	38.27	46.75	-18.15	5.38	3.69	45.80	27.39	32.11	-14.7	26.2	32.6	-19.6
122-22	92	103	33.00	22.05	49.66	18.04	11.08	62.82	18.17	14.44	25.8	19.6	14.2	37.9
132-22A	49	61.5	56.13	50.10	12.04	3.27	2.61	25.29	40.75	35.91	13.5	39.3	35.3	11.3
132-22B	218	229.5	19.33	10.10	91.42	7.34	6.22	18.01	12.45	6.77	83.9	13.0	6.9	89.1
85-46	66	74	37.73	37.65	0.22	7.12	4.71	51.17	25.38	25.98	-2.3	25.4	26.0	-2.3

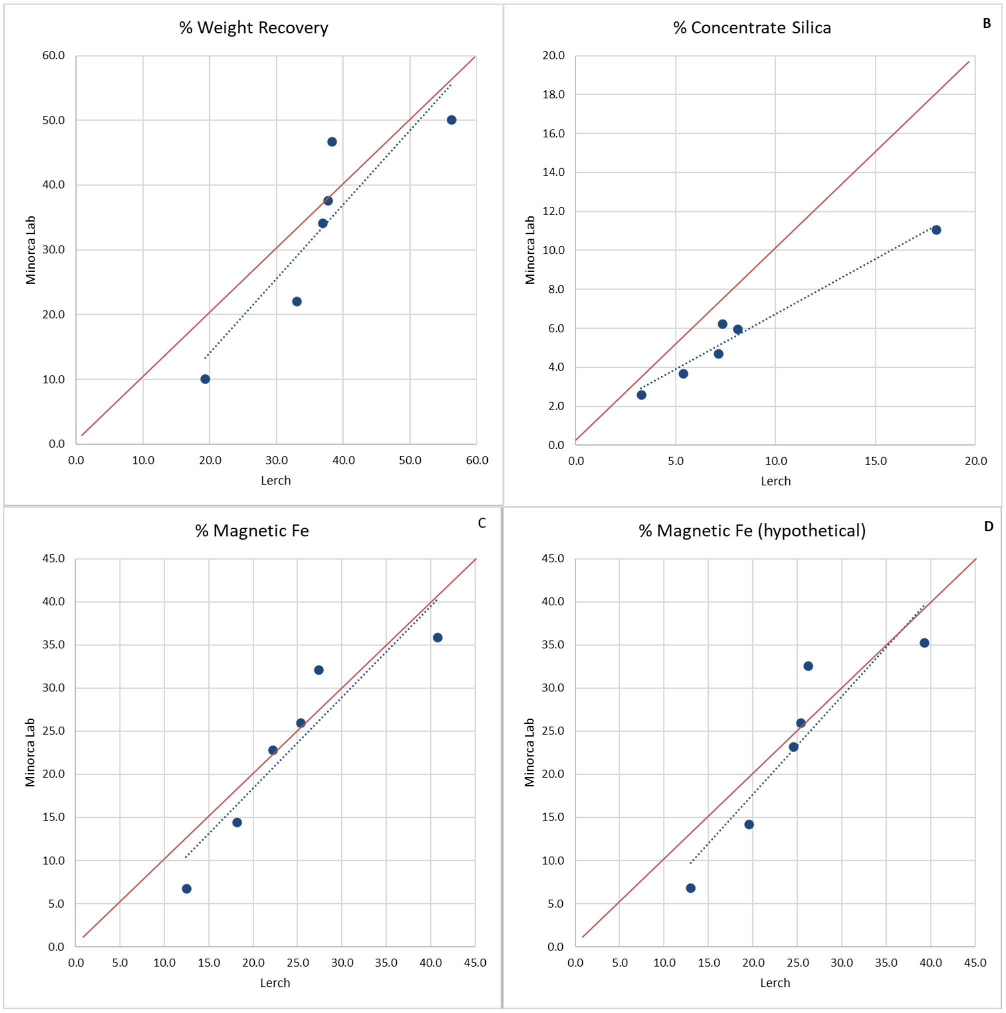


Figure 8-8: Plots of Key Grading Ore Characterization Data for Six Check Samples Processed and Analyzed by Both Lerch and Minorca Laboratories

There is a high degree in difference between the laboratories' weight recovery and silica results for individual sample pairs shown in Table 8-2 and illustrated in Figure 8-9, even if the overall sample sets show a high degree of correlation despite recovery/grade biases expected from differing buckboard %-passing targets. In particular, the least-squares regression trendline for silica on Figure 8-9B demonstrates a higher-silica bias and linear trend diverging from the 1:1 line that reflects the different liberation profile of samples bucked to -200 mesh versus -270 mesh. For five of the six sample pairs, the absolute value of the difference between duplicates is greater than 20% of the mean of the duplicates as shown in section 8.2.3. This is not unexpected with different sample preparation techniques. The variation observed in sample pairs for crude Satmagan MagFe is more problematic. Though sample preparation (grind size) and packing can have some impact on Satmagan results, these should be minor; however, two of the six sample pairs (33%) would be “fails” in terms of RSD or Thompson and Howarth plots. This could be a factor of Satmagan calibration or natural variation in the sample.

As an additional check of the magnetic iron results, and without a concentrate Fe analysis to generate a “calculated magnetic iron” from DT weight recovery, a “hypothetical % crude magnetic iron” was calculated for the Lerch and Minorca samples using assumed concentrate stoichiometry and weight recovery (Table 8-2), where:

$$\%MagFe_{hyp} = ((100\text{-}\%SiO_2) * 0.7236) * \%wtrec / 100$$

This assumes that magnetite is near-perfectly recovered and that the concentrate is composed entirely of magnetite (72.36% Fe) and silica. The hypothetical crude magnetic iron should be independent of the Satmagan results; however, the difference in actual Satmagan results between the laboratories is very similar to the hypothetical difference based on DT recovery (Table 8-2). In addition, for both Lerch and Minorca laboratories, the hypothetical magnetic iron values are very similar to the actual Satmagan values (Table 8-2).

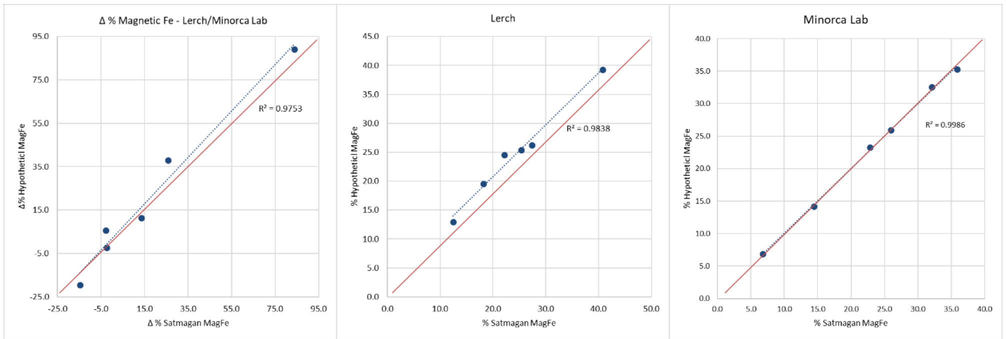


Figure 8-9: Relationship of Satmagan Magnetic Iron and Hypothetical Magnetic Iron (Based On Weight Recovery and Magnetite Stoichiometry) for Minorca and Check Laboratory Samples

In summary, the Satmagan and DT results are internally consistent for each laboratory. This suggests that variation in crude magnetic iron for individual sample pairs is much less a function of the instrumentation than sample heterogeneity (preparation of a replicable sample).

Separately, the Satmagan and DT results illustrates that concentrate silica grade at different grinds (liberation) is not a 1:1 function. There will also be a bias in weight recovery towards decreased recovery with a finer grind; however, the current (bucked to) 100% -270 mesh DT test does not necessarily reflect the actual plant target of 82% passing 325 mesh from the ball mill, nor the -500 mesh sizing of flotation regrind. Therefore, weight recovery and concentrate silica from the DT test give little information concerning relative liberation at varying grinds, and these modeled variables are not used at all for ore grading (weight recovery) or are only used as a general indicator of ores requiring flotation (silica).

8.2.5.1 Comparison with Previous Years

The 2021 QA/QC campaign was the first consistent, formal assessment of exploration drilling data accuracy and precision conducted for Minorca. Future QA/QC campaign reports will detail comparisons with previous years' reports.

8.3 Sample Security

8.3.1 Chain of Custody

The mine geologist transports the drill core in boxes from the drill rig to the secure core logging area. In this area, the core boxes are opened and logged by the geologist, who verifies the driller's footage marks and records observations into MS Excel spreadsheets for each diamond drill hole. Density measurements of core are taken on site at Minorca. The core is securely stored, and then transported to the Minorca laboratory for analysis. In the opinion of the QP no tampering of the drill core occurred in route to the assay laboratory, and the logging and sampling methods were professionally conducted in an unbiased manner.

8.3.2 Laboratory

Samples from the Mine are collected from the logging facility on the Property by the geologist and delivered by the geologist to the onsite Minorca laboratory. Regular internal audits are conducted by the geologist, in which saved samples are rerun by an outside laboratory (Lerch, started in 2011) as a check on the Minorca laboratory.

Samples are physically dropped off by the geologist. The geologist delivers a list of sample intervals to the laboratory supervisor. The laboratory supervisor manages the assaying procedures and submits completed assay values to the geologist. Any issues or questions are addressed by the geologist and laboratory supervisor during these procedures.

8.3.3 Security

Samples are handled by the geologist from field to the laboratory. The core logging building is an isolated building, and minimal personnel have access. Starting in 2011, saved samples have been stored on site in shipping containers. Note that historical samples are preserved in the Old Training center (logging facility) as well as the onsite "Tin Shack" location at Minorca.

8.4 Conclusions

Cliffs is developing a program of QA/QC that includes standards and duplicates and control-chart analysis, a program that did not exist for the previous more than 40 years of mine operation. When SLR audited Minorca's Mineral Resource documentation in early 2021, it recommended that there be a campaign QA/QC report for every DD hole program and formal documentation of QA/QC procedures.

QA/QC results for the 2021 verification study are appropriate for the style of mineralization and are sufficient to generate a drill hole assay database that is adequate for Mineral Resource estimation in accordance with international reporting standards. In conjunction with good agreement between planned and actual product produced over more than 40 years, it is SLR's opinion that procedures meet minimum S-K 1300 guidelines.SLR notes, however, that there are opportunities for significant improvement in both accuracy and precision of concentrate silica and other calculated resource variables. The starting point for improving sample precision is in sample preparation; specifically, the jaw crush to -½ in. may be too coarse based on results from five check samples analyzed for the 2021 assay verification program. For the other Minnesota sites, the archived coarse reject is 100% -¼ in.

Two of the 50 sample pairs (4%) are most likely not duplicates of the same sample, which indicates an opportunity to improve archival/storage and organization of reserved coarse reject.

Minorca's bench characterization (100% -270 mesh DT test) is very simple; however, there is no capability to measure relative liberation characteristics at varying grind or grade targets as at other nearby mines, so two of the three estimated block model variables are not used for direct resource/reserve determination or ore grading.

As Minorca uses an internal laboratory, a mechanism for submission of blind QA/QC samples would help improve transparency for statutory reporting. In addition, ISO or similar accreditation will improve the confidence of external QPs for classifying and signing off on Minorca's Mineral Reserves.

The SLR QP is of the opinion that Minorca's sample preparation and analytical QA/QC results from the 2021 reporting period are acceptable to validate the drill hole assay database used for Mineral Resource estimation and meet S-K 1300 minimum standards for reporting to the SEC.The samples are securely delivered to the assay laboratory, and the logging and sampling methods are professionally conducted in an unbiased manner.

8.5 Recommendations

1. Minorca laboratory should work towards ISO certification.
2. Minorca should develop a formal QA/QC procedure that includes preparation of a similar QA/QC campaign report following every annual diamond drilling program. The procedure should include:
    - Overview
    - Changes from previous years
    - Required insertion rates of standards and duplicates
    - Failure metrics
    - Failure actions
3. QA/QC results documented in this TRS support an initial standard and duplicate submission rate of 5% each.
4. Minorca should continue to submit a small number of "preparation duplicate" samples to a secondary accredited laboratory to confirm that results are comparable to those of Minorca's internal laboratory.
5. Minorca should continue to utilize the crude ore bulk UTAC standard for the present time. A bulk standard sample with different grade and liberation characteristics should be generated so the laboratory provider does not know which standard was provided.
6. If a formal process for ensuring blind duplicates is unfeasible, spot duplicates generated from crushed coarse reject (½ in.) retrieved by a mine engineering employee should be considered for occasional re-submission (three to five per drill campaign).

7. Investigation of opportunities to reduce error in the sample preparation steps ahead of the Davis Tube is recommended as a first action in isolating root causes of relatively poor precision in concentrate silica between separately prepared duplicate samples. In particular, the degree of sample heterogeneity due to the relatively coarse crush (-½ in.) ahead of splitting/sampling should be investigated.
8. Minorca should investigate how the -270 mesh DT test can be supplemented by additional bench characterizations of DD samples, which incorporate predictive variables that better reflect model plant targets (grind/grade) and magnetite liberation in the block models used for mine planning.

9.0 DATA VERIFICATION

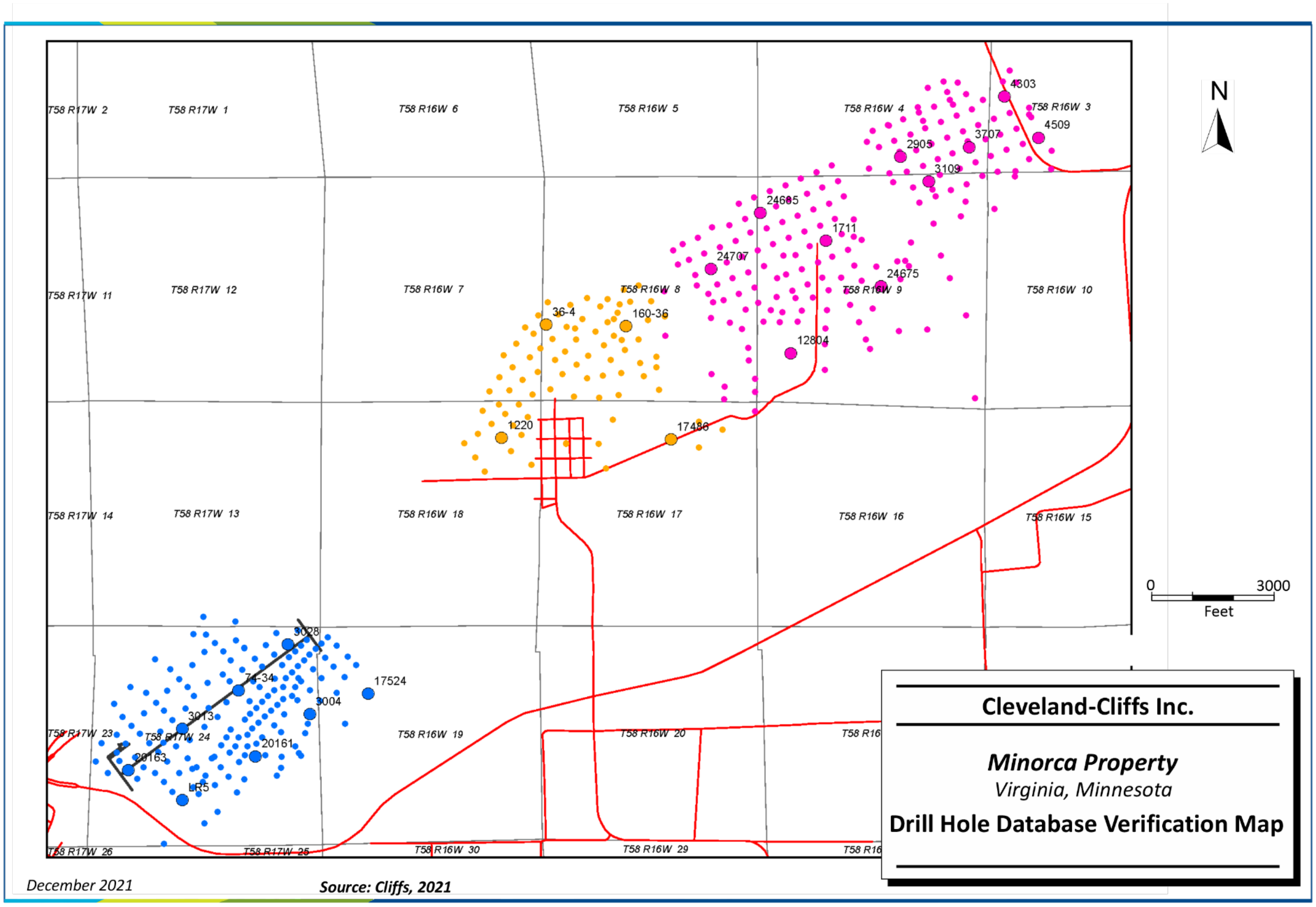
Data verification is the process of confirming that data has been generated with proper procedures, is transcribed accurately from its original source into the project database, and is suitable for use as described in this TRS.

9.1 Procedures

Cliffs performs routine drill hole database verification with every new DD program and new block model build, including:

- Check of unique drill hole IDs and collar coordinates
- Check of assay or lithology points extending past the specified maximum depth of drill hole
- Check of abnormal dips and azimuths of downhole drill hole survey
- Check of negative, overlapping, and missing intervals
- Check of Incorrect lithologic codes and assay values

During 2021, a data verification exercise was performed by Cliffs geologists within the life of mine (LOM) plan area and audited by SLR for accuracy and completeness. Of the 443 holes in the current mine plan, 22 (four in Central, 10 in East, and eight in Laurentian), or approximately 5% of the drill holes, were selected for database verification. Holes were selected to provide spatial coverage of the future mining areas and represent holes from a variety of time periods. Figure 9-1 shows the location of the drill holes selected for verification within the Minorca mining areas. The database values were checked against source documents including collar surveys, geologic logs, and assay certificates. Data verification included collar coordinates, depth intervals of geologic units and assay samples, and results of analyses applied to Mineral Resource estimation and mine planning. The data verification findings are summarized in the following subsections.



Source: Cliffs, 2021

Figure 9-1: Drill Hole Database Verification Map

9.1.1 Receipt of Data from Laboratory

The initial laboratory data is sent to the geologist and operating technology manager. The geologist checks whether or not the observations made during core logging are consistent with the laboratory data, while both the geologist and operating technology manager check for any values that are atypical of the units that were assigned. The data is then entered into the database by the geologist with support from Cliffs' external database manager. Checks are made visually in the mine software to ensure the data has been appropriately populated and no apparent typographical errors are present.

9.1.2 Database

Cliffs maintains a complete set of drill hole data, as well as other exploration data, for the entire project in an acQuire database that is backed up online at regularly scheduled intervals to provide data redundancy. Certification of database integrity is accomplished by both visual and statistical inspections comparing geology, assay values, and survey locations cross-referenced back to laboratory data. Any discrepancies identified are corrected by referring to hard copy assay information.

Blast hole sampling and downhole magnetic susceptibility probing are actively used to verify assay grades and ore/waste contacts of ore patterns before blasting. Any discrepancies are compared back to the model and subsequent diamond drill hole database and interpolation.

Records from the acQuire database including collar, lithology, and assays are then extracted for each target and imported into Maptek's Vulcan™ software (Vulcan) for geologic modeling and resource estimation. Prior to modeling, a secondary validation check using built-in data validation routines in Vulcan is completed.

9.1.2.1 Collar Location

DD collar locations are recorded on the original drill logs created at the time of drilling, including easting and northing coordinates and elevation of the collar in a local mine grid system, subsequently translated/modified to Minnesota State Plane, NAD 27 datumSurveying methods have evolved over the years with advancements in technology, moving from optical methods to electronic distance measurement and to GPS, which is currently in use. All survey methods used for the collar locations would be expected to provide adequate accuracy for the drill hole locations. Current practice includes the electronic storage of an as-drilled collar location file for each annual drilling program and the inclusion of a hard copy printout of the collar file with other documents relevant to the drill holes stored in file cabinets at the Minorca Mine Geology office.

Downhole surveys are not routinely completed to verify the trajectory of the DD hole, because there is immaterial deviation historically in the short, vertical holes drilled at a high angle to the shallow-dipping stratigraphy.

Collar location coordinates for selected drill holes in the database were compared to the original source data. A small number of minor errors due to rounding were observed; however, there are no errors that would impact the Mineral Resource estimate.

9.1.2.2 Lithology

Original classification of the Biwabik IF into the Upper Slaty, Upper Cherty, Lower Slaty, and Lower Cherty members has long been recognized throughout the Mesabi district. Throughout the history of drilling at Minorca, geologists have evolved the classification scheme to further subdivide the original members into smaller subunits, each having continuity across appreciable areas. In preparation for the use of Vulcan software for geologic modeling in 2021, Minorca’s geological staff developed the currently utilized classification of the Biwabik IF that recognizes 14 subunits based on lithologic, metallurgical, and mineralogical characteristics within the local mine area.

All drill logs selected for examination were found to have recorded a geological interpretation based on the classification scheme that was in use at the time of drilling. For the 2021 resource estimate, all holes have been re-classified through re-logging, re-interpretation of original descriptions, or comparison to assay results.

9.1.2.3 Assays

Assays used for modeling crude ore grades and characteristics at Minorca are direct measurements taken from laboratory assays. Metallurgical assay data reviewed in the database were DT magnetic Iron, weight recovery, and concentrate silica. The drill holes examined represented every phase of ownership and analytical technique for drilling from 1960 through 2018.

As laboratory results are not added directly in the Vulcan ISIS database, data verification involved the tracking of results from original raw assay data to the final Vulcan database with the following discrepancies noted (Table 9-1):

Table 9-1: Minorca Database Validation Observations
Cleveland-Cliffs Inc. – Minorca Property

Audit #	Area	Drill ID	Deviations	Validation Observation
1	Central Reserve	1220	11	No core log was found. Incorrect lithology flagging on second interval. Eight assay intervals lengths rounded down to whole numbers.
3	Central Reserve	17486	69	Coordinate locations slightly different. Overburden interval incorrect. Potential missing second interval, needs review. Lower Cherty lithology differs on both core log and report. Silica appears to be re-calculated. Final two sampled intervals MagFe and wtrec are different.
4	Central Reserve	160-36	5	Insignificant difference on northing/easting. Quality data incorrect for one interval.
2	Central Reserve	36-4	10	One lithology potentially misflagged. Assay lengths rounded down to whole number for six intervals.
5	East Pit #1	1711	8	Coordinates were rounded to whole numbers on log, and zone code on report was different for some intervals. This is probably due to the addition of a code and methods used in more recent models
6	East Pit #1	12804	34	Coordinates rounded to whole number on log. Elevation in model incorrect. There are two core logs: appears to be re-logged the next day. Recent notes were added that reorganized the Lower Cherty unit that was used in the model.

Audit #	Area	Drill ID	Deviations	Validation Observation
7	East Pit #1	24675	33	Coordinates rounded on log; elevation rounded in model. Appears the Lower Cherty has been re-defined for the model. MagFe was rounded in the model, and silica appears to be re-calculated.
8	East Pit #1	24685	21	Coordinates rounded on log; elevation rounded in model. Appears the Lower Cherty has been re-defined for the model (possible past logging practices of the LC4). MagFe was rounded in the model, and silica appears to be re-calculated.
9	East Pit #1	24707	20	Coordinates rounded on log; elevation rounded in model. Appears the Lower Cherty has been re-defined for the model. No lithology on the core log. MagFe was rounded in the model, and silica appears to be re-calculated. One incorrect wtrec.
10	East Pit #2	2905	13	Appears an interval was added to the report that does not match the core log. Conflicting data for one interval on report. Zone code is 3, but lithology is LC3; LC zone code should be 530.
11	East Pit #2	3109	5	Coordinates rounded to whole numbers on log and report. Report has incorrect lithology code for one interval (LC5B should be 10). Could reflect change in modeling methods.
12	East Pit #2	3707	8	Coordinates rounded to whole numbers on log and report. One Incorrect value for wtrec. Historically, the database was unable to process weight recoveries over 50%, so 50% was used as a default. Five instances where report has incorrect code for lithology; this is most likely due to a change in modeling methods, where the 530 code and 10 code were added.
13	East Pit #2	4303	8	Coordinates rounded to whole numbers on log and report. Six instances where report has incorrect code for lithology; this is most likely due to a change in modeling methods where the 530 code and 10 code were added.
14	East Pit #2	4509	14	Coordinates rounded to whole numbers on log and report. Two intervals that have a lithology of UC are flagging in the model as LS; this carries over from the core log to the report. Two additional instances where report has incorrect code for lithology; this is most likely due to a change in modeling methods where the 530 code was added
15	Laurentian Pit	3004	See Details	The log and report only have the lithological unis of "Upper Cherty." No subunits are broken out. Open to interpretation based on the historical modeling. Historical lithology has a slightly different split. There is a weight % on the report. Unclear if this is the same as weight recovery. MagFe was calculated later and written on report at an unknown time. Silica in model is factored, as it does not match the report numbers.

Audit #	Area	Drill ID	Deviations	Validation Observation
16	Laurentian Pit	3013	See Details	The log and report only have the lithological units of "Lower Cherty." No subunits are broken out. Open to interpretation based on the historical modeling. Historical lithology has a slightly different split. There is a weight % on the report. Unclear if this is the same as weight recovery. MagFe was calculated later and written on report at an unknown time. Silica in model is factored, as it does not match the report numbers.
17	Laurentian Pit	3028	See Details	The log and report only have the lithological units of "Lower Cherty." No subunits are broken out. Open to interpretation based on the historical modeling. Historical lithology has a slightly different split. There is a weight % on the report. Unclear if this is the same as weight recovery. MagFe was calculated later and written on report at an unknown time. Silica in model is factored, as it does not match the report numbers. Two interval lengths were rounded down resulting in a total of 280 ft of samples vs. 281 ft.
18	Laurentian Pit	17524		Slight difference on state plane coordinates between model and log. One incorrect ending/starting interval. Re-classification of LC ore units, possible site-to-site differences. Silica values have been factored. Eight assay lengths are rounded down.
19	Laurentian Pit	20161	27	State plan northing and easting slightly different. Six interval lengths are rounded down in the assay section. Weight recovery is on the report sheet but not in the model.
20	Laurentian Pit	20163	36	State plan northing and easting slightly different. Elevation out to one extra decimal place. Ten interval lengths are rounded down in the assay section. Weight recovery is on the report sheet but not in the model.
21	Laurentian Pit	74-34	17	Depth incorrect. Two missing intervals at end of hole. One interval in report reads "LOST SMPL." There was a re-classification of two intervals.
22	Laurentian Pit	LR5	14	Bottom five intervals (LC3/LC2) missing from core log sheet. Twelve interval lengths in assay rounded down.

After reviewing the drill hole audit performed by Minorca site Geological Engineer Bill Ellingson, Cliffs and SLR are of the opinion that errors in crude magnetic iron are rare and immaterial. Crude magnetic iron is Minorca’s ore grading and planning variable. Silica and weight recovery are reviewed for blending purposes but are not used for ore/waste determinations or in resource estimation. If, in the future, it was decided to use these other data for planning, Cliffs would first need to document correction factors that have been applied to historical weight recovery and silica data and update accordingly. Differences observed in the drill hole collar coordinates are due to the conversion from local mine grid coordinates to State Plane MN North NAD27 coordinates and have no impact on the resource estimation

9.2 Limitations

Cliffs’ routine database validation is limited to desktop data. The 2021 data verification exercise reviewed a relatively small proportion of drill holes (5.0%) for verification; however, those selected are spatially representative of the LOM plan area and span several decades of project history.

9.3 Conclusions

Minorca has been in near-continuous production for over 40 years. There has been adequate drilling to develop the Mineral Resource models that have been used in the Mineral Reserve models and for historically successful mine planning. The Mineral Resource models have performed well, indicating that the drill hole database contains valid data and is deemed suitable for use in mineralized material estimation.

The SLR QP visited the Minorca Mine on April 29, 2021While at site, the QP reviewed drill core logging and sampling procedures, including chain of custody. The QP spoke with the technical team and found them to have a strong understanding of the mineralization types and their processing characteristics, and how the analytical results are tied to the results. SLR received the project data from Cliffs for independent review as a series of MS Excel spreadsheets, Vulcan software database, and associated digital files (lithologic surfaces, topography surface, and pit shapes) from 443 drill holes totaling 118,809 ft. SLR used the information provided to validate the Mineral Resource interpolation, tons, grade, and classification.No major issues or significant errors have been observed with the data.

The following aspects were reviewed:

- Collar survey information relative to historical logs or paper-recorded logging: note that drill hole casings are typically removed, and most historical collar locations are now mined out, preventing ground truthing of historical drill hole locations.
- A comparison of original lithology logging to the current database, with consideration to the classification system of the Biwabik IF that uses 14 subunits, based on lithological and mineralogical characteristics within the local mine area. Some very minor discrepancies were noted and corrected.
- Metallurgical assay data in the database, with focus on DT MagFe: the QP recommended that a QA/QC program be implemented in conjunction with resource estimation procedures to help validate the 2021 model results. The QA/QC results confirmed and validated assays contained within the Minorca database.

The SLR QP is of the opinion that the database verification procedures for Minorca comply with industry standards and are adequate for the purposes of Mineral Resource estimation.

10.0 MINERAL PROCESSING AND METALLURGICAL TESTING

The Plant commenced production in 1977. In 1987, Minorca began producing flux pellets as opposed to acid pellets. In 1992, Minorca constructed a flotation plant for silica reduction so that the Plant could achieve pellet-feed concentrate silica targets ahead of introducing ore from the Laurentian Pit that has more challenging silica liberation and separation characteristics. No recent metallurgical testing has taken place at Minorca.

Minorca's product is wholly consumed by Indiana Harbor #7 blast furnace (IH7).

10.1 Sampling and Metallurgical Testing

10.1.1 Drill Sample Preparation and Testing

Minorca performs diamond drilling to obtain drill core samples as needed to define the Mineral Resource, and update the mine plan accordingly. In addition, blast hole residues are analyzed in the same manner to validate projected ore gradations and develop blending plans. Drill core and blast hole samples are initially crushed in a jaw and roll crusher, then pulverized to -270 mesh using a buckboard grinding methodology. DT tests are then used to predict MagFe recovery, and wet silica analysis on the DT concentrate is used to forecast silica content used in the blending plans.

10.1.2 Process Plant Metallurgical Sampling and Testing

Minorca also conducts plant sampling for the purposes of process control and product quality reporting for compliance with Standard Product Parameters (SPPs) established by IH7, shown in Table 10-1 along with the lower standard limit (LSL) and the upper standard limit (USL).

Table 10-1: Flux Pellet Standard Product Parameters
Cleveland-Cliffs Inc. – Minorca Property

SPP	Target	LSL	USL
CaO/SiO_2 Ratio (C/S)	1.10	1.00	1.20
Fired Pellet SiO_2 (%)	4.20	3.78	4.62
Contraction	8.00	N/A	10.00
Cold Compressive Strength (lb)	5.00	400	N/A
Pellet Size (BT –¼ in.)	1.00	N/A	2.00
Pellet Size (AT +½ in.)	20.00	8.00	32.00
Pellet Size (AT +$^3/_8$ in. x –½ in.)	60.00	46.00	N/A
Pellet Size (AT –¼ in.)	4.75	N/A	6.00

The plant samples are collected on a routine basis from established sample collection points and according to the schedule provided in Table 10-2. The sample collection locations are identified in Figure 10-1, Figure 10-2, and Figure 10-3.

Table 10-2: Routine Sample Collection and Analysis
Cleveland-Cliffs Inc. – Minorca Property

ID	Description	Type	Location	No.	Freq.	
Drill Core Sampling	Drill Hole Footage Intervals	Solid	Mine	As needed		Resource Mapping/Mine Planning
Blast Hole Samples	Drill/Blast Hole Residue	Solid	Blast Pattern	As needed		Verification of Current Ore Projection
MP-1	Rod Mill Feed	Solid	Rod Mill Feed Belt	1	8 hrs	Sizing/MagFe
MP-2	Rod Mill Discharge	Slurry	Cobber Concentrate Launder	1/Line	8 hrs	Sizing/Chemistry
MP-3	Coarse Tails	Solid	Spiral Classifier	1/Line	8 hrs	MagFe
MP-4	Fine Tails	Slurry	Fine Tails Sump	1	8 hrs	MagFe
MP-5	Raw Concentrate	Slurry	Finisher Drum	1/Line	2 hrs	MagFe
MP-6	NOLA Check - Flot Feed	Slurry	Box by Line 2 Finishers	1	4 hrs	Sizing / Chemistry
MP-7	NOLA Check - Flot Con	Slurry	Box by Line 2 Finishers	1	4 hrs	Sizing / Chemistry
MP-8	Ball Mill Feed	Slurry	Boil Box on Rougher Cell Floor	2	8 AM and 4 PM	Sizing
MP-9	Scavenger Feed	Slurry	Ball Mill Discharge Pump	2	8 AM and 4 PM	Chemistry
MP-10	Scavenger Con	Slurry	Scavenger Dart Valves	2	8 AM and 4 PM	Chemistry
MP-11	Scavenger Froth	Slurry	Scavenger Tails Launder	2	8 AM and 4 PM	Chemistry
MP-12	Total Flot Tails	Slurry	Flot Tails Launder	1	8 hrs	Chemistry
MP-13	Filter Cake	Solid	Disk Filters	2	shift (12 hrs)	Moisture Content / Chemistry
MP-14	Green Balls Disk	Solid	Discharge Lip of Balling Disks	1	shift (12 hrs)	Sizing
MP-15	Green Balls Furnace	Solid	Discharge Lip of Roll Deck	2	shift (12 hrs)	Sizing
MP-16	Fired Pellets - Product	Solid	Indurator Discharge Feeders	6	2 hrs	Pellet Sizing , Chemistry, Physical Quality, Metallurgical Quality
Fluxstone	Ground Fluxstone	Solid	Flux Tank Feed Sump	1	shift (12 hrs)	Sizing / Chemistry

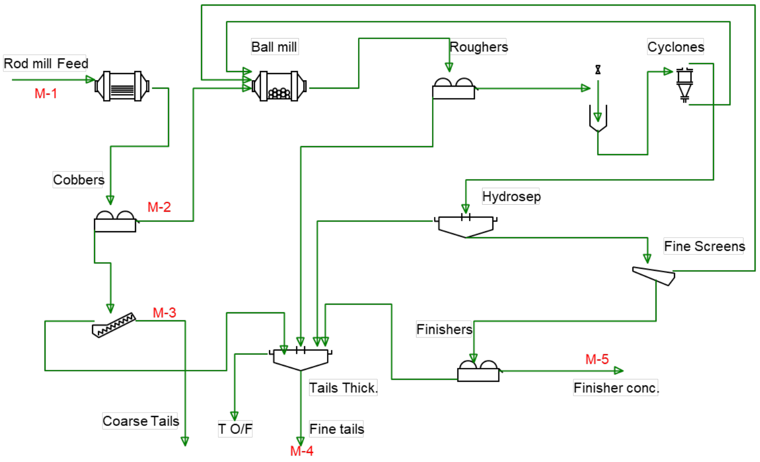


Figure 10-1: Sample Collection Points in Plant Magnetic Separation Circuit

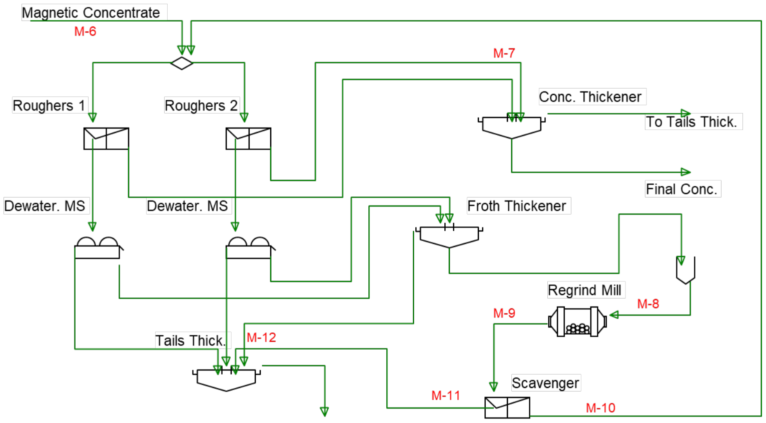


Figure 10-2: Sample Collection Points in Plant Flotation Circuit

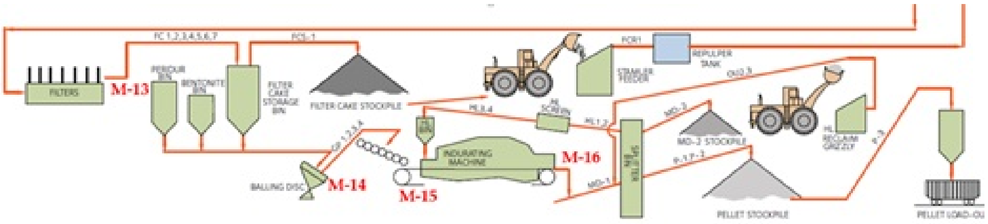


Figure 10-3: Sample Collection Points in Plant Pelletizing Circuit

Sample analysis consists of six primary unit operations with standardized and documented procedures for each. Analytical samples are representatively split from the bulk sample using riffle splitters, drying ovens, sieves, and rolling cloths. Routine analysis includes size structures, chemistry, magnetic iron (ferrous), moisture content, fired pellet tumble strength, cold compression strength (CCS), and metallurgical pellet contraction.

Size Structure: Size structures are conducted using a Gilson stacked screen deck. Monthly checks are conducted to measure screen gap openings and are compared against the ASTM specification for acceptable tolerances. Screens are also changed out annually.

Chemistry: A basic chemistry protocol for all process and product samples consists of SiO_2, Total Fe, CaO, and MgO. Additional chemical analysis is not commonly conducted or requested based on minimum deleterious elements present in Minorca taconite reserves and the requirements for the IH7. Chemical analysis is processed using a PANalytical, Zetium Minerals Edition XRF Spectrometer, Type: PW5400 (4 kW). Reference control standards are processed once every 24 hours, and certified standards are run monthly to validate accuracy.

MagFe: Magnetic iron is measured using Satmagan. Satmagan calibration standards are run every two weeks, and re-calibration is conducted approximately every two weeks to ensure the validity of the values.

Fired Pellet Tumble Strength: Pellet quality includes before tumble sizing, after tumble sizing, and CCS. Pellets are representatively composited and split to produce desired mass quantities for assessment. A tumble drum operating under ASTM standardized conditions is used to produce the after tumble pellets. All fired pellet sizings (before and after tumble) are conducted using the Gilson stacked screen deck.

Cold Compression Strength: An automated compression tester is used that complies with ASTM E-382, Determination of Crushing Strength of Iron Ore Pellets. The unit crushes 100 fired pellets using constant force to measure the peak compression strength, average, and standard deviation. Established pellet standards are used once weekly to validate average compressive strength and standard deviation of the standard, and ultimately the performance and calibration of the CCS automated tester.

Contraction: Fired pellet metallurgical contraction is a specialized test that was developed specifically for the IH7. The intent is to control the reduction and softening behavior in the cohesive zone of the IH7. Fired pellets are tested in a retort tube (reactor) under standardized test procedures and conditions that are well established and documented. It measures the percentage of deformation between 800ºF and 1,100ºF under standardized reducing gas conditions under a known weight. Individual retort reduction tubes are calibrated prior to use. Contraction standard pellets are processed weekly to validate calibration, and results are compared to known values.

The SLR QP is of the opinion that the data derived from the testing activities described above are adequate for the purposes of resource mapping, mine planning, ore quality verification, process control, and total product quality reporting.

10.2 Yield and Recovery

The final pellet product total Fe grade is consistent at 62.5%. Mass yield (ROM to finished product) is typically in the low 30% range. Figure 10-4 displays typical process recovery.

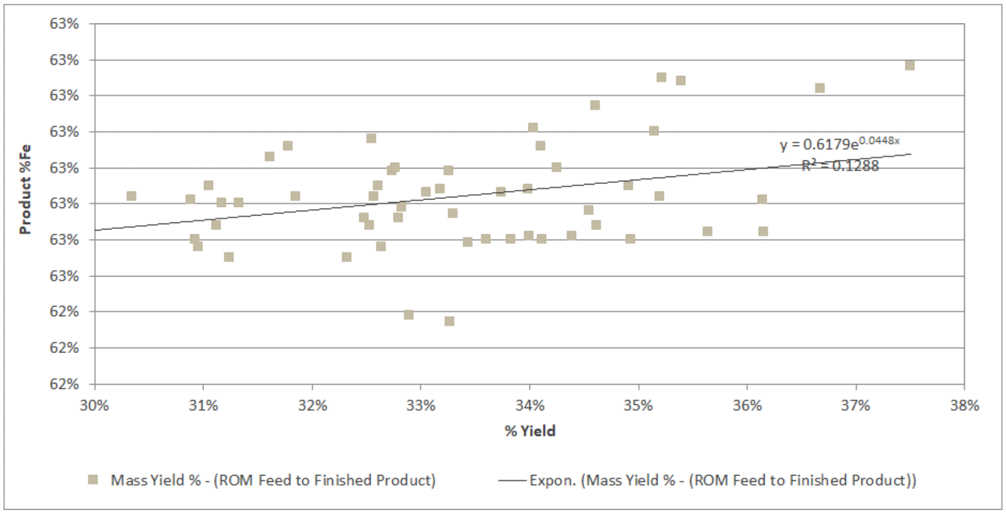


Figure 10-4: Process Recovery versus Grade

10.2.1 Size Fractions, Rock Hardness, and Grindability

Grindability is reported as a 14 Bond Work Index. Grinds are primarily controlled by a target throughput of 80% to 82% passing -325 mesh (0.44 microns).

Table 10-3 shows the geotechnical properties of drill core samples taken from the Biwabik IF similar to those found at Minorca. Note that physical properties will vary in regard to the bedded/banded nature of Lake Superior-type BIFs. The Upper Cherty (UC), Lower Slaty (LS), and Lower Cherty (LC) members contain the common ore/waste units mined at Minorca. The Virginia Formation (Va) overlays the Biwabik IF.

Table 10-3: Example of Geotechnical Properties - Biwabik IF
Cleveland-Cliffs Inc. – Minorca Property

Depth	Geol. Unit	Density	Trial		1		Trial		2		Trial		3		Avg. I	UCS
(ft)		(lbs/ft^3)	Height (in)	Width (in)	P (lbs)	I (lbs/in^2)	Height (in)	Width (in)	P (lbs)	I (lbs/in^2)	Height (in)	Width (in)	P (lbs)	I (lbs/in^2)	(lbs/in^2)	(lbs/in^2)
230.17	Va	164.5	0.49	1.20	984.7	1,308.2	0.72	1.30	1,052.1	887.6	0.56	1.18	442.9	529.4	908.4	16,348.6
318.21	Va	164.5	0.79	1.25	782.3	622.2	0.82	1.30	1,310.6	958.7	0.60	1.28	777.8	796.3	792.4	14,257.2
384.21	Va	172.1	0.59	1.20	1,495.0	1,670.8	0.73	1.30	901.5	748.4	0.54	1.18	1,375.8	1,691.1	1,370.1	24,662.2
532.19	Va	170.6	0.80	1.44	557.5	380.0	0.74	1.36	1,261.2	984.8	0.00	0.00	0.0	0.0	454.9	12,273.1
576.17	US	165.6	0.75	1.26	2,007.5	1,657.8	0.66	1.36	1,674.8	1,466.3	0.00	0.00	0.0	0.0	1,041.4	28,122.8
592.33	US	201.7	0.63	1.43	3,149.6	2,745.6	0.74	1.46	2,122.2	1,538.8	0.70	1.40	3,437.3	2,741.2	2,341.9	42,159.6
609.25	US	195.5	0.71	1.43	1,964.8	1,517.1	0.65	1.41	1,901.9	1,630.2	0.71	1.43	11.03	1,908.7	1,685.3	30,340.4
659.19	UC	235.7	0.69	1.51	3,747.6	2,839.8	0.72	1.47	5,211.1	3,839.1	0.73	1.45	3,187.8	2,349.6	3,009.5	54,168.7
698.25	UC	229.0	0.68	1.49	2,556.1	1,989.9	0.59	1.49	2,646.0	2,365.6	0.70	1.49	3,399.1	2,549.8	2,301.7	41,434.4
732.29	UC	207.7	0.58	1.46	344.0	1,565.0	0.71	1.46	3,691.4	2,771.7	0.71	1.47	3,280.0	2,472.9	2,269.8	40,860.0
759.25	UC	223.3	0.69	1.39	4,228.7	3,496.9	0.61	1.41	4,368.0	3,991.4	0.72	1.37	3,257.5	2,596.2	3,361.5	60,503.9
773.21	UC	199.7	0.61	1.11	2,713.4	3,176.3	0.63	1.12	2,288.6	2,535.3	0.83	1.10	3,039.4	2,628.1	2,779.9	50,039.5
824.17	LS	236.1	0.72	1.24	3,534.0	3,102.4	0.69	1.24	2,875.3	2,646.9	0.70	1.23	2,374.0	2,145.1	2,631.5	47,362.1
918.21	LS	214.8	0.65	1.37	3,005.7	2,648.4	0.60	1.39	3,450.8	3,279.3	0.69	1.36	3,246.2	2,723.8	2,883.8	51,913.3
958.17	LS	213.5	0.71	1.16	3,097.9	2,954.4	0.62	1.21	3,327.2	3,501.2	0.69	1.26	3,563.2	3,212.6	3,222.7	58,010.7
1022.67	LS	188.7	0.65	1.29	3,437.3	3,209.7	0.58	1.31	3,387.9	3,473.7	0.64	1.28	2,203.1	2,107.4	2,930.2	52,743.0
1077.21	LC	180.3	0.61	1.12	2,565.1	2,921.1	0.66	1.18	2,533.6	2,544.0	0.65	1.14	2,066.0	2,179.9	2,548.3	45,862.4
1193.84	LC	196.5	0.64	1.18	2,041.3	2,139.3	0.70	1.13	2,344.8	2,332.2	0.64	1.16	2,583.1	2,722.4	2,398.0	43,166.1
1245.71	LC	199.2	0.67	1.28	2,821.4	2,558.5	0.61	1.29	2,738.2	2,726.7	0.63	1.28	11.08	2,429.4	2,571.5	46,294.6
1281.71	LC	176.5	0.70	1.09	1,861.4	1,931.9	0.67	1.06	2,542.6	2,809.4	0.70	1.04	2,326.8	2,530.9	2,424.1	43,634.6
1341.25	LC	173.4	0.49	1.28	2,034.5	2,545.4	0.69	1.29	2,585.3	2,355.4	0.62	1.25	1,814.2	1,839.1	2,246.6	40,443.8

Source: Carranza-Torres as cited in Arcelor Mittal, 2020a

Note that for samples 5 and 6, due to the size of the half-core sample, it was possible to cut and produce only 2 specimens for testing.

Table 10-4 presents the total quantity of pellets in wet tons and the iron grade of the pellets produced in the Laurentian and East pits by size fraction. Pellets are the sole product of Minorca, thus all recovered material is used as pellet feed.

In the SLR QP's opinion, the data from the test work is suitable for use in this TRS.

Table 10-4: Pellets Produced by Pit and by Size Fraction
Cleveland-Cliffs Inc. – Minorca Property

Area	Total Product		Product >1/4 in		Product <1/4 in >16 mesh		Product <16 mesh >100 mesh		Product <100 mesh	
	Tons (000)	% Fe Grade (total)	Tons (000)	% Fe Grade (total)	Tons (000)	% Fe Grade (total)	Tons (000)	% Fe Grade	Tons (000)	% Fe Grade
Laurentian	18,966	62.50%	18,160	62.50%	806	62.50%	-	-	-	-
East	18,572	62.50%	17,782	62.50%	789	62.50%	-	-	-	-
Total	**37,668**	**62.50%**	**35,943**	**62.50%**	**1,595**	**62.50%**	**-**	**-**	**-**	**-**

Notes:

1. Lump is >1/4 in; sinter feed (fines) between ¼ in and 16 mesh; and concentrate generally between 16 mesh and 100 mesh; pellet feed less than 100 mesh.
2. Tons to be shown as wet tons unless otherwise specified; % total Fe or MagFe to be stated.
3. Due to mining and processing methods used, Minorca only had a size fraction of –¼ in. and +¼ in. %Fe is not tracked separately as it is from the same source.

11.0 MINERAL RESOURCE ESTIMATES

11.1 Summary

Mineral Resource estimates for the Minorca deposit were prepared by Cliffs and audited and accepted by SLR using available data from 1958 to 2021.

The 2021 Minorca Mineral Resource estimate was completed using a conventional block modeling approach. The general workflow included the construction of a geological or stratigraphic model representing the Biwabik IF by SLR in Seequent's Leapfrog Geo (Leapfrog Geo) from mapping, drill hole logging, and sampling data, which were used to define discrete domains and surfaces representing the upper contact of each unit of non-iron formation and iron formation subunits. The geologic model was then imported into Vulcan by Cliffs for resource estimation. Sub-blocked model estimates used inverse distance squared (ID^2) and length-weighted, 10 ft uncapped composites to estimate KEVs including magnetic iron, weight recovery, and silica in concentrate in a three-search pass approach, using hard boundaries between subunits, ellipsoidal search ranges, and search ellipse orientation informed by geology. Average density values were assigned by lithological unit.

Mineral Resources were classified in accordance with the definitions for Mineral Resources in S-K 1300. Blocks were classified as Measured, Indicated, or Inferred using distance-based and qualitative criterion. Cliffs classifies the Mineral Resources based primarily on drill hole spacing and influenced by geologic continuity, ranges of economic criteria, and reconciliation. Some post-processing is undertaken to ensure spatial consistency and remove isolated and fringe blocks. The resource area is limited by a polygon and subsequent pit shell based on practical mining limits. A resource block is classified as Measured if the distance to the nearest drill hole is within 400 ft and estimated with the pass 1 estimate. If the nearest drill hole is between 400 ft and 800 ft and estimated in the pass 2 estimate it is classified as Indicated. All remaining blocks are classified as Inferred. Models were depleted to July 1, 2021.

Estimates were validated using standard industry techniques including statistical comparisons with composite samples and parallel nearest neighbor (NN) estimates, swath plots, as well as visual reviews in cross-section and plan. A visual review comparing blocks to drill holes was completed after the block modeling work was performed to ensure general lithologic and analytical conformance and was peer reviewed prior to finalization. Mineral Resources are exclusive of Mineral Reserves, use a 16% MagFe cut-off grade, and are presented in Table 11-1.

To ensure that all Mineral Resource statements satisfy the "reasonable prospects for eventual economic extraction" requirement, in definition of the Mineral Resources for Minorca, factors significant to technical feasibility and potential economic viability were considered. Mineral Resources were defined and constrained within an open-pit shell, prepared by Cliffs and based on a US$90/LT pellet value and a wet 62.5% Fe flux pellet.

Table 11-1: Summary of Minorca Mineral Resources - December 31, 2021
Cleveland-Cliffs Inc. – Minorca Property

Class	Resources	MagFe	Process Recovery	Pellets
	(MLT)	(%)	(%)	(MLT)
Measured	484.3	22.9	32.9	159.3
Indicated	317.2	22.9	32.9	104.4
Total Measured + Indicated	**801.5**	**22.9**	**32.9**	**263.7**
Inferred	30.1	21.1	30.2	9.1

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Mineral Resources are reported exclusive of Mineral Reserves and have been rounded to the nearest 100,000.
3. Mineral Resources are estimated at a cut-off grade of 16% crude MagFe.
4. Mineral Resources are estimated using a pellet value of US$90/LT.
5. Waste within the pit is 986.7 MLT at a stripping ratio of 1.23:1 (waste to crude ore).
6. Saleable product reported as a 62.5% Fe content wet flux pellet, shipped product contains 2% moisture.
7. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
8. Bulk density is assigned based on average readings for each lithology type.
9. Mineral Resources are 100% attributable to Cliffs.
10. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
11. Numbers may not add due to rounding.

The SLR QP is of the opinion that with consideration of the recommendations summarized in Sections 1.0 and 23.0 of this report, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work. Minorca has been in operation for many years, and land and mineral control has been long established. There are no other known legal, social, or other factors that would affect the development of the Mineral Resources.

While the estimate of Mineral Resources is based on the QP's judgment that there are reasonable prospects for eventual economic extraction, no assurance can be given that Mineral Resources will eventually convert to Mineral Reserves.

11.2 Resource Database

Cliffs maintains a property-wide drill hole database in acQuire, with exports used to populate Vulcan modeling software. The Minorca resource database dated June 15, 2021 includes drill hole collar locations, assay, and lithology data from 443 drill holes totaling 118,809 ft of drilling completed between 1958 and 2021.

Drilling has been completed on an approximate 400 ft by 400 ft grid oriented to the general strike (azimuth) of the deposits (45° – Laurentian, 52° – Central, and 69° – East), with all holes drilled vertically. Drilling depth ranges from 39.0 ft to 946.0 ft with an average depth of 268.2 ft. Figure 7-3 shows the location of the drill holes at Minorca.

There are a total of 8,337 lithology records and 7,239 assay (samples) records that have values for at least one KEV. KEVs include magnetic iron, weight recovery, and silica in concentrate.

11.3 Geological Interpretation

SLR geologists developed geologic models for Minorca in Leapfrog Geo software using topographic surfaces and drill hole lithology logs exported from the acQuire database supplied by Cliffs. Stratigraphic wireframes were created from points assigned to geology contacts determined from the logging results of the drill holes. The stratigraphic units at Minorca are listed in Table 11-2 and illustrated in Figures 6-3 and 6-4.

Table 11-2: Rock Code versus Lithology
Cleveland-Cliffs Inc. – Minorca Property

Rock Code	Lithology
1	FTWL
2	OVB
3	LC4
4	LC5A
5	LS
6	UC1
7	UC2
8	UC3
10	LC5B
11	US
530	LC3

No geologic structures were placed into the model. Faults were not modeled, as most of the major fault systems had been mined for hematite ore prior to mine modeling at Minorca and are between currently operating taconite pits. This is due to the change in permeability and ability of fault systems to focus oxygen and water that facilitates the meteoric oxidation process. The Minnesota State Geological Survey has mapped major fault systems along the Mesabi Iron Range based on aerial geophysical surveys as illustrated Figure 6-1. No intrusions intersect the mineralization.

No major fold structures have been mapped by Minorca staff, and the overall orientation of stratigraphic layers is very consistent. The iron mineralization has minor fold-like structures, although it is unclear whether this is due to compressional stress or is a result of soft sediment deformation. No need has been identified to model fault or fold structures to date due to the continuity of lithology between drill holes. The lack of outcrop between open pits, previous lack of detailed geophysics, and the wide drill hole spacing make it difficult to map and model small-scale structures accurately.

SLR then forwarded the geologic model to Cliffs' geologists for import into Vulcan for development of the block model ahead of resource estimation.

11.4 Resource Assays

Table 11-3 presents the uncapped, unweighted assay statistics for the principal economic variables effective as of May 26, 2021.

Table 11-3: Assay Statistics
Cleveland-Cliffs Inc. – Minorca Property

Variable	Rock Code	Count	Min (%)	Max (%)	Mean (%)	StDev (%)	CV
magfe	1	662	0.14	27.33	8.24	5.29	0.64
	2	3	1.11	12.84	5.25	6.58	1.25
	3	1640	0.30	37.19	22.66	5.23	0.23
	4	1,343	0.44	37.70	23.09	7.09	0.31
	5	467	0.01	26.80	5.33	6.32	1.18
	6	746	0.29	46.64	20.34	8.42	0.41
	7	312	5.53	36.63	18.81	4.53	0.24
	8	536	1.26	37.47	19.52	9.28	0.48
	10	428	0.13	35.78	10.94	7.81	0.71
	11	57	0.07	19.70	5.50	3.96	0.72
	530	856	0.34	32.96	11.53	6.53	0.57
		7,050	**0.01**	**46.64**	**17.38**	**9.19**	**0.53**
silica	1	401	0.65	15.93	5.18	2.31	0.45
	2	0					
	3	1,601	0.39	9.88	2.52	1.15	0.45
	4	1,300	1.05	11.26	4.35	1.37	0.32
	5	139	2.85	21.65	9.46	3.51	0.37
	6	690	0.98	21.69	4.18	2.57	0.61
	7	296	1.45	16.43	7.08	2.32	0.33
	8	476	0.15	15.78	6.04	2.61	0.43
	10	303	2.92	36.67	6.27	2.47	0.39
	11	23	2.55	16.67	7.75	3.85	0.50
	530	699	0.89	13.21	3.26	1.59	0.49
		5,928	**0.15**	**36.67**	**4.27**	**2.49**	**0.58**

Variable	Rock Code	Count	Min (%)	Max (%)	Mean (%)	StDev (%)	CV
wtrec	1	345	0.20	42.45	14.76	8.79	0.60
	2	1	0.45	0.45	0.45		
	3	1,424	0.11	49.20	32.45	6.10	0.19
	4	1,132	0.25	53.15	33.49	9.32	0.28
	5	98	0.25	37.15	17.53	9.38	0.54
	6	477	0.05	61.70	30.08	9.92	0.33
	7	192	10.15	57.95	26.73	6.79	0.25
	8	280	1.85	59.25	30.58	12.96	0.42
	10	278	0.10	51.20	17.83	11.60	0.65
	11	5	6.50	20.91	13.25	5.12	0.39
	530	643	0.10	47.60	17.90	10.00	0.56
		4,875	**0.05**	**61.70**	**27.80**	**11.32**	**0.41**

11.4.1 Treatment of High Value Assays

Raw assays were reviewed using basic statistics, histograms, and probability plots by Cliffs to determine whether value restriction using capping was warranted. No upper value restriction was applied to any variable at Minorca.

11.5 Compositing

The composite lengths used during interpolation were chosen considering the predominant sampling length, the minimum mining width, style of mineralization, and continuity of grade. The raw assay data contains samples having irregular sample lengths, which is mostly due to incorporating historical data with more recent Minorca drill hole data, which limits sample length to approximately 10 ft. Sample lengths range from 1.0 ft to 125 ft, with 40% of the samples taken at 10 ft intervals (Figure 11-1). Given this distribution, and considering the width of the mineralization in addition to past best practice at Minorca that composite length be determined by approximately half the bench height of 17.5 ft, Cliffs chose to composite to 10 ft lengths.

At Minorca, uncapped assays were composited in Vulcan using the run-length algorithm to 10 ft, broken at stratigraphic boundaries. There are 9,335 composite intervals in the composite database. The average composite length is 8.9 ft. The smallest composite length is 0.001 ft, and the longest is 10 ft.

Table 11-4 presents the unweighted statistics of the main grading variables in the composite file.

SLR is of the opinion that this composite length is appropriate for this style of mineralization.

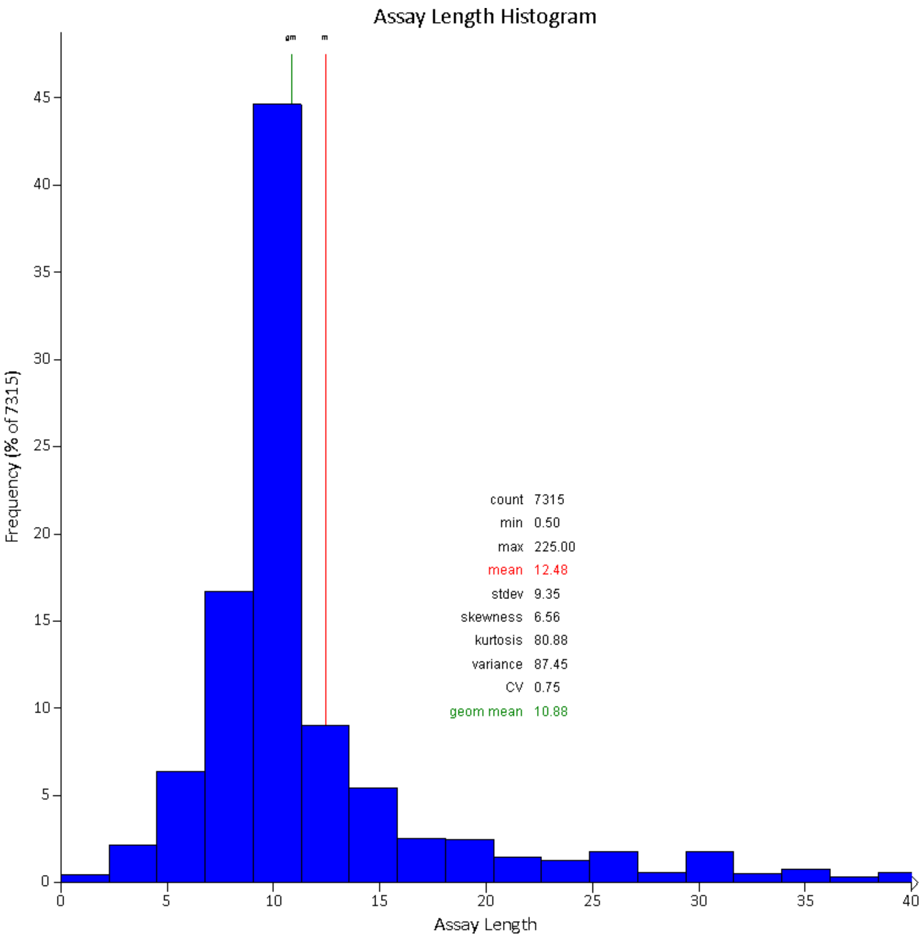


Figure 11-1: Minorca Histogram of Sample Length

Table 11-4: Composite Statistics
Cleveland-Cliffs Inc. – Minorca Property

Variable	Rock Code	Count	Min (%)	Max (%)	Mean (%)	StDev (%)	CV
magfe	1	893	0.14	26.74	8.26	5.06	0.61
	2	22	1.11	29.72	12.11	8.73	0.72
	3	2,013	0.30	36.23	22.25	5.18	0.23
	4	1,622	0.44	37.70	23.02	6.74	0.29
	5	1,053	0.01	29.58	3.42	5.01	1.47
	6	1,019	0.20	46.21	19.08	8.31	0.44
	7	354	5.53	38.36	18.93	4.37	0.23
	8	579	1.85	37.05	19.57	8.66	0.44
	10	575	0.13	35.78	11.48	8.00	0.70
	11	149	0.07	24.95	6.92	5.01	0.72
	530	1,039	0.34	32.06	11.25	6.23	0.55
		9,331	**0.01**	**46.21**	**16.11**	**9.41**	**0.58**
silica	1	576	0.65	15.93	5.30	2.33	0.44
	2	10	2.38	10.41	6.32	3.11	0.49
	3	1,968	0.39	9.88	2.60	1.17	0.45
	4	1,583	1.05	11.26	4.31	1.34	0.31
	5	215	2.85	18.73	8.99	3.26	0.36
	6	949	0.98	20.59	4.39	2.47	0.56
	7	338	1.45	14.30	6.92	2.22	0.32
	8	533	0.15	15.47	5.87	2.49	0.42
	10	440	2.92	36.67	6.23	2.97	0.48
	11	82	2.06	16.67	7.22	3.87	0.54
	530	857	0.89	13.21	3.36	1.62	0.48
		7,564	**0.15**	**36.67**	**4.34**	**2.49**	**0.57**

Variable	Rock Code	Count	Min (%)	Max (%)	Mean (%)	StDev (%)	CV
wtrec	1	476	0.20	39.57	15.19	8.38	0.55
	2	11	0.45	40.00	21.20	14.80	0.70
	3	1,746	0.11	48.78	31.99	6.03	0.19
	4	1,363	0.25	51.71	33.43	8.79	0.26
	5	142	0.25	40.70	17.17	9.80	0.57
	6	648	0.05	57.10	28.97	9.51	0.33
	7	213	10.15	52.93	26.84	6.37	0.24
	8	292	2.49	59.25	30.01	12.24	0.41
	10	389	0.45	51.20	18.63	11.52	0.62
	11	30	3.45	51.45	17.59	12.64	0.72
	530	771	0.10	46.46	17.70	9.60	0.54
		6,081	**0.05**	**59.25**	**27.30**	**11.01**	**0.40**

11.6 Bulk Density

Density is reported as a tonnage factor, ft^3/LT, at Minorca (Table 11-5). Overburden (mix of unconsolidated glacial till) densities vary by pit; a value of 18 ft^3/LT is used in the East and Central models, while 15 ft^3/LT is used in the Laurentian model. The East model value was derived in 2010 by an outside consultant (NTS) by use of shallow test pits, while the Laurentian model value was developed internally by Minorca personnel during the development of the pit. The higher density (15 ft^3/LT) in the Laurentian overburden is due to a thick stratum of boulders and cobbles located at the bottom of the overburden just above the bedrock contact, possibly the remnants of an old riverbed. Because of this thick boulder and cobble layer, Cliffs uses a higher density to account for it. This boulder and cobble strata is not present east of the Laurentian zone. Slaty waste rock units (Upper Slaty and Lower Slaty members of the Biwabik IF) have been assigned a density of 12.27 ft^3/LT; this was developed through mining of the Laurentian and East pits and was confirmed in density testing of 2011 and 2012 drill core from the East and Central deposits. Similarly, an assigned value of 10.8 ft^3/LT was confirmed as adequate for the LC3, 4, 5A, and 5B subunits.

A detailed record or reports that describe how the original density factors were applied are not available. The tonnage factors are believed to be based on a study in the Laurentian Pit completed by a previous geologist. Regular reconciliations of current and modeled production data have not identified the tonnage factors developed in that presumed study as a source of error.

In 2012, a geologist started drill core density sampling using 2011 and 2012 drill core. Only a limited data set was collected due to the small amount of drilling; however, the data supports the current tonnage factors.

Bulk density has not been identified as an issue in past production reconciliations. There have been no observations to indicate a material variance in tonnage estimations from observations in the pit or from logging drill core. It is worth noting that the ore is competent and has very minimal porosity.

Table 11-5: Density Applied
Cleveland-Cliffs Inc. – Minorca Property

Rock Code	Lithology	Area	Tonnage Factor (ft^3/LT)	Tonnage Factor (ft^3/ton)	Density (g/cm^3)	LT/ft^3
1	FTW1	All	12.27	10.96	3.32	0.0815
2	OVB	East	18.00	16.07	1.99	0.0556
		Laurentian	15.00	13.39	2.39	0.0667
3	LC4*	All	10.80	9.64	3.32	0.0926
4	LC5A*	All	10.80	9.64	3.32	0.0926
5	LS	All	12.27	10.96	2.92	0.0815
6	UC1*	All	10.80	9.64	3.32	0.0926
7	UC2*	All	10.80	9.64	3.32	0.0926
8	UC3*	All	10.80	9.64	3.32	0.0926
10	LC5B*	All	10.80	9.64	3.32	0.0926
11	US	All	12.27	10.96	2.92	0.0815
530	LC3*	All	10.80	9.64	3.32	0.0926
	Lean Taconite	All	11.25	10.04	3.19	0.0889
	*Ore Zones	≥16% MagFe	10.80			
		10%>=MagFe<%16	11.25			
		<10%	12.27			

Density is not correlated by grade and is not factored in compositing of the drill hole database. The densities used for ore classification and waste rock classification are uniform across each respective type. The only unique density that is applied outside of ore, waste, and overburden is that of lean taconite. Lean taconite is primarily waste rock with a MagFe content of greater than 10% but less than 16%. Given that this material has a higher MagFe content than waste rock, it has an assigned tonnage factor of 11.25 ft^3/LT (3.19 g/cm^3). According to current lease requirements, the lean taconite is segregated into a separate stockpile for possible future use should it become economically feasible.

11.7 Variography

Current estimation practices at Minorca do not incorporate modeled semi-variogram results within the estimation, as all variables are interpolated using an inverse distance weighted (ID) approach. Cliffs elected to use ID^2 for the estimation of quality variables.

11.8 Block Models

Sub-block and regularized block models were created by Cliffs' geologists and audited by SLR to support the Mineral Resource estimate for the iron deposits at the Property.

11.8.1 Base Sub-blocked Model

A sub-blocked base model (min_2021_base_v7.bmf) for Minorca constructed using the Vulcan 2021 software is oriented with an azimuth of 45°, dip of 0.0°, and a plunge of 0.0° to align with the overall strike of the mineralization within the given model. Sub-blocking was used to give a more accurate volume representation of the geologic contacts (wireframes) in the gently dipping mineralization using a parent block size of 100 ft by 100 ft in the X (along strike) and Y (across strike) directions and 10 ft in the Z (vertical or bench height) direction, honoring modeled geological surfaces. Sub-blocks are 50 ft (X) by 50 ft (Y) by 5 ft (Z). The model fully enclosed the modeled resource wireframes, with the model origin (lower-left corner at lowest elevation) at State Plane MN North NAD27 coordinates 2,164,300E, 355,500N, and 0.0 (fasl) elevation. A summary of the block model extents is provided in Table 11-6.

Table 11-6: Block Model Attributes
Cleveland-Cliffs Inc. – Minorca Property

Deposit	Schema	Bearing	Plunge	Dip	Origin			Block Model Length (ft)			Block Dimension (ft)		
		(°)	(°)	(°)	X	Y	Z	X	Y	Z	X	Y	Z
Minorca	Parent	45	0	0	2,164,300	355,500	0	30,000	10,100	2000	100	100	10
	Sub-block										50	50	5

SLR considers the Minorca base block model parameters to be acceptable for a Mineral Resource estimate.

Upon completion of construction of a base model by Cliffs' geologists, the block model is delivered to the Cliffs mine engineering team for re-blocking and estimation of Mineral Resources and Mineral Reserves.

11.8.2 Estimation Methodology

The following variables are estimated or assigned into the block model:

- MagFe: crude Magnetic Iron % from Satmagan.
- SiO_2: Silica in 100% -270 mesh DT concentrate.
- wtrec: % weight (DT concentrate) recovered from 100% -270 mesh crude sample by a Davis magnetic tube test.
- Stratigraphic units from the modeled surfaces
    - MagFe, SiO_2, and wtrec interpolations used ID^2. The interpolation strategy involved setting up search parameters in a series of three estimation runs for each individual lithology domain with isotropic search ellipsoid geometry oriented into the structural plane of the mineralization (Table 11-7).

SLR considers the Minorca estimation parameters to be acceptable for a Mineral Resource estimate.

Table 11-7: Estimation Method (Search Parameters)
Cleveland-Cliffs Inc. – Minorca Property

General Pass	Bearing (Azimuth) (°)	Plunge (°)	Dip (°)	Ellipsoid Ranges			Number of Samples		Drill Hole Limit	Estimate Type	Discretization		
				Major (ft)	Semi-Major (ft)	Minor (ft)	Min	Max	Max Samples /Hole		X	Y	Z
Pass1	53	0	-10	400	400	50	2	8	2	ID^2	4	4	1
Pass2	53	0	-10	800	800	50	2	8	2	ID^2	4	4	1
Pass3	53	0	-10	1600	1600	50	1	8	N/A	ID^2	4	4	1

11.8.3 Resource and Reserve Regularized Block Model

New mine planning block models for the Laurentian Pit (minorca_2021_mm_laur_v2.bmf) and the East 1 and 2 pits (minorca_2021_mm_east_v2.bmf) were constructed in September 2021 from the base geologic model (min_2021_v7.bmf) created on July 20, 2021. The mine planning block models were re-blocked (regularized) to 50 ft by 50 ft by 17.5 ft (i.e., half the bench height). Scripts within Vulcan are executed that add variables for economic evaluation and mine planning, flag in-pit stockpile backfills, flag the current topography, re-block the model to represent the selective mining unit (SMU), incorporate crude ore loss and dilution impacts, and reinforce cut-off grades. Scripts also assign restrictions to blocks outside of the lease areas, outside Permit to Mine boundaries, and inside infrastructure areas (such as public roads and highways) – assigning blocks as restricted or waste when appropriate. The resulting block models are evaluated using the pit optimization and Chronos scheduling packages in Vulcan.

Iron formation can only be initially considered as "candidate" crude ore if the stratigraphy is one of the following geologic subunits (as detailed in section 6.3):

- Upper Cherty (UC) - uc3, uc2, uc1;
- Lower Cherty (LC) – lc5b, lc5a, lc4, or lc3.

All other geologic subunits are considered to be waste.

Candidate crude ore must then meet the following additional criteria to be considered crude ore blocks:

- Satisfy the pit optimization parameters as described in section 11.9. In summary, candidate crude ore with MagFe lower than 16% is considered to be waste.
- Be classified as a Measured or Indicated Mineral Resource (Inferred Mineral Resources are considered to be waste).
- Not occur within a mining restricted area.
- Generate a net block value greater than the cost of the block as if it were mined as waste.

Pit optimization and pit design were conducted to convert the Mineral Resources to Mineral Reserves. The analysis for the Mineral Reserve estimate includes both crude ore loss and mining dilution in the final reported tonnage and grades.

- Crude ore loss is material that meets all criteria for crude ore but is sent to the waste stockpile. Typically, thin layers of crude ore or individual blocks that are not separable with the current mining equipment are considered as unrecoverable and become crude ore loss. Percent crude ore loss is calculated by the amount of unrecoverable crude ore divided by the original crude ore content.
- Mining dilution is waste material that is mined and delivered as crude ore. Small areas of waste that cannot be separated from crude ore – and when the combined material still satisfies the cut-off criteria – become mining dilution. Percent mining dilution is defined as the diluted waste divided by the final scheduled and mined block of crude ore, which contains the diluted waste.

11.9 Cut-off Grade and Pit Optimization Parameters

Pit optimization results are used as a guide for pit and stockpile designs. Inputs used for the optimization use a cost structure based on 2019 through 2020 actual production and the 2021 annual budget plan. The revenue and cost parameters for the Lerchs-Grossmann (LG) optimization are presented in Table 11-8.

Table 11-8: Pit Optimization Parameters
Cleveland-Cliffs Inc. – Minorca Property

Parameter	Value
Pellet Sale Price	US$90/LT wet flux pellet
In Situ Waste Mining Cost	US$1.70/LT mined
Unconsolidated Waste Mining Cost	US$2.00/LT mined
Crude Ore Mining cost	US$4.20/LT crude ore
Crushing and Concentrating Cost	US$5.80/LT crude ore
Pelletizing and General Cost	US$34.00/LT wet flux pellet
Replacement Capital Cost	US$7.25/LT wet flux pellet
Maximum Overall Pit Slope Angle	49.4° for *in situ* rock and 19.4° for surface overburden

In addition, the Laurentian Pit limits are constrained by the Permit to Mine boundary, availability of wetland credits, and Minnesota State Highway 135; thus, opportunity to expand the pit with higher pellet values is limited. The East 1 and East 2 pits are currently limited by their respective Permit to Mine boundaries.

The Laurentian Pit is geographically separate from the East 1 and East 2 pits, so these areas are optimized independently from one another.

The cut-off grade for Mineral Resources is 16.0% crude MagFe. This cut-off grade has been developed as a measure of maintaining product tonnage with constraints on the delivery of crude to the concentrator since mining began. This cut-off grade is verified through a break-even cut-off grade calculation (Figure 11-2):

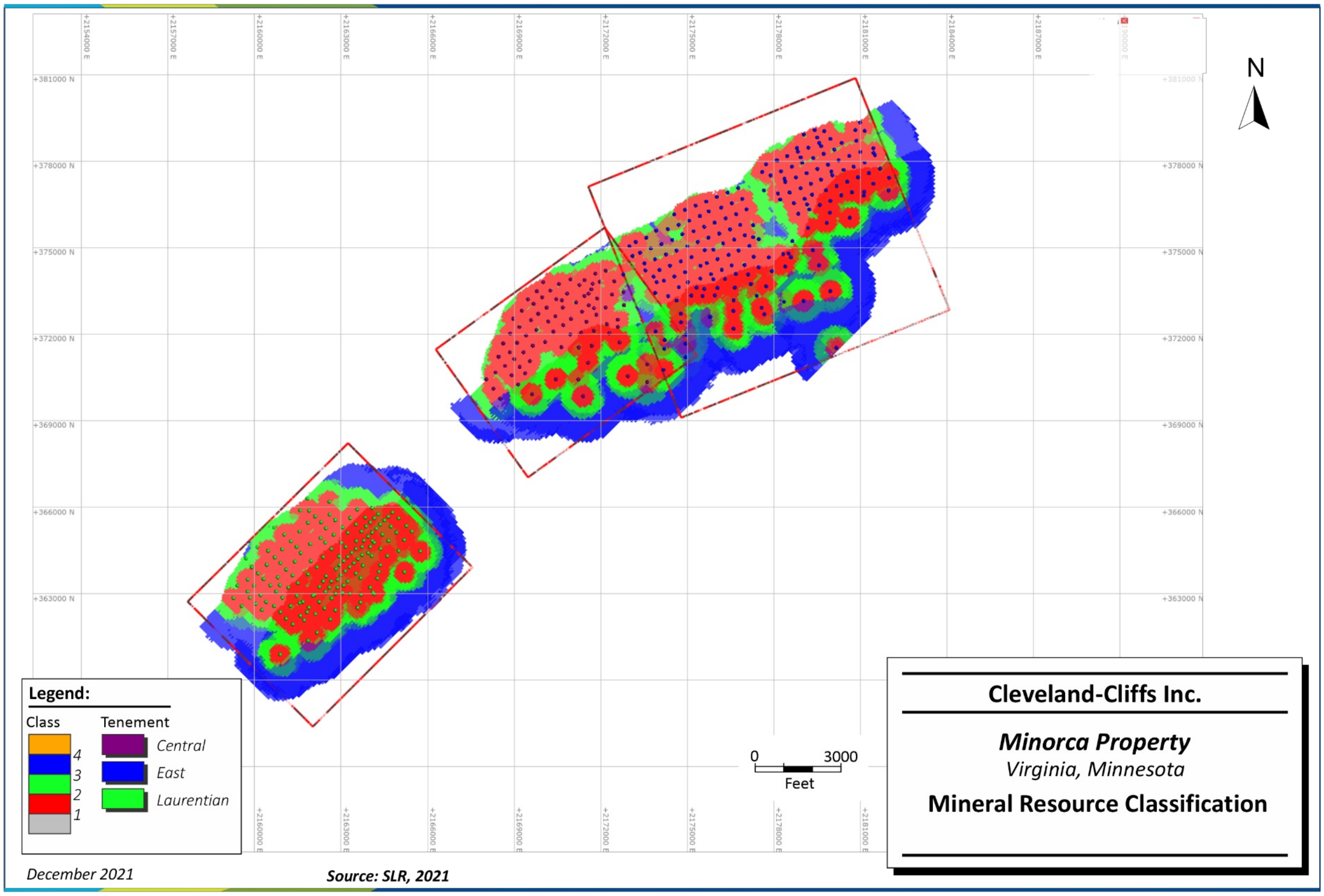
$$\text{Breakeven Cutoff Grade(COG)} = \frac{\sum(\text{Cash Costs \$ / LT ore milled})}{\left(\left(\frac{\text{Revnue Rate}}{\text{Pellet \%Fe}}\right) - \left(\frac{\text{Sales Costs \$ / LT Pellet}}{\text{Pellet \%Fe}}\right)\right) \times \frac{\text{Ore LT x \%MagFe}}{\text{Pellet LT x Pellet \%Fe}}}$$

Figure 11-2: Cut-off Grade Formula

11.10 Classification

Definitions for resource categories used in this report are those defined by SEC in S-K 1300.Mineral Resources are classified into Measured, Indicated, and Inferred categories.

Cliffs classifies the Mineral Resources based primarily on drill hole spacing and influenced by geologic continuity, ranges of economic criteria, and reconciliation. Some post-processing is undertaken to ensure spatial consistency and remove isolated and fringe blocks. The resource area is limited by a polygon and subsequent pit shell based on practical mining limits. A block of ore is classified as Measured if the distance to the nearest drill hole is within 400 ft and estimated with the pass 1 estimate. If the nearest drill hole is between 400 ft and 800 ft and estimated in the pass 2 estimate it is classified as Indicated. All remaining blocks are classified as Inferred. Mineral Resource classification at Minorca is shown in Figure 11-3.



Source: SLR, 2021

Figure 11-3: Mineral Resource Classification

In addition to numeric-based parameters, the relative confidence of all the data inputs during the assignment of the resource confidence category has been considered, including:

- the reliability of the drilling data,
- reliability or certainty of the geological and grade continuity, geological model interpretation, structural interpretation, and the assay database,
- reliability of inputs to assess reasonable prospects for eventual economic extraction and cut-off grades (e.g., ability to obtain permits, social acceptability, etc.), and
- legal and land tenure considerations.

The QP is of the opinion that the classification at Minorca is generally acceptable.The QP notes, however, that the extension of classified material beyond drilling limits is slightly aggressive, and some post-processing to remove isolated blocks of different classification is warranted. The QP recommends transitioning the classification process in future updates to consider local drill hole spacing instead of a distance-to-drill hole criterion. The QP notes that, in general, classified blocks which extend beyond the drilling limits are outside the Resource Grade Shell.

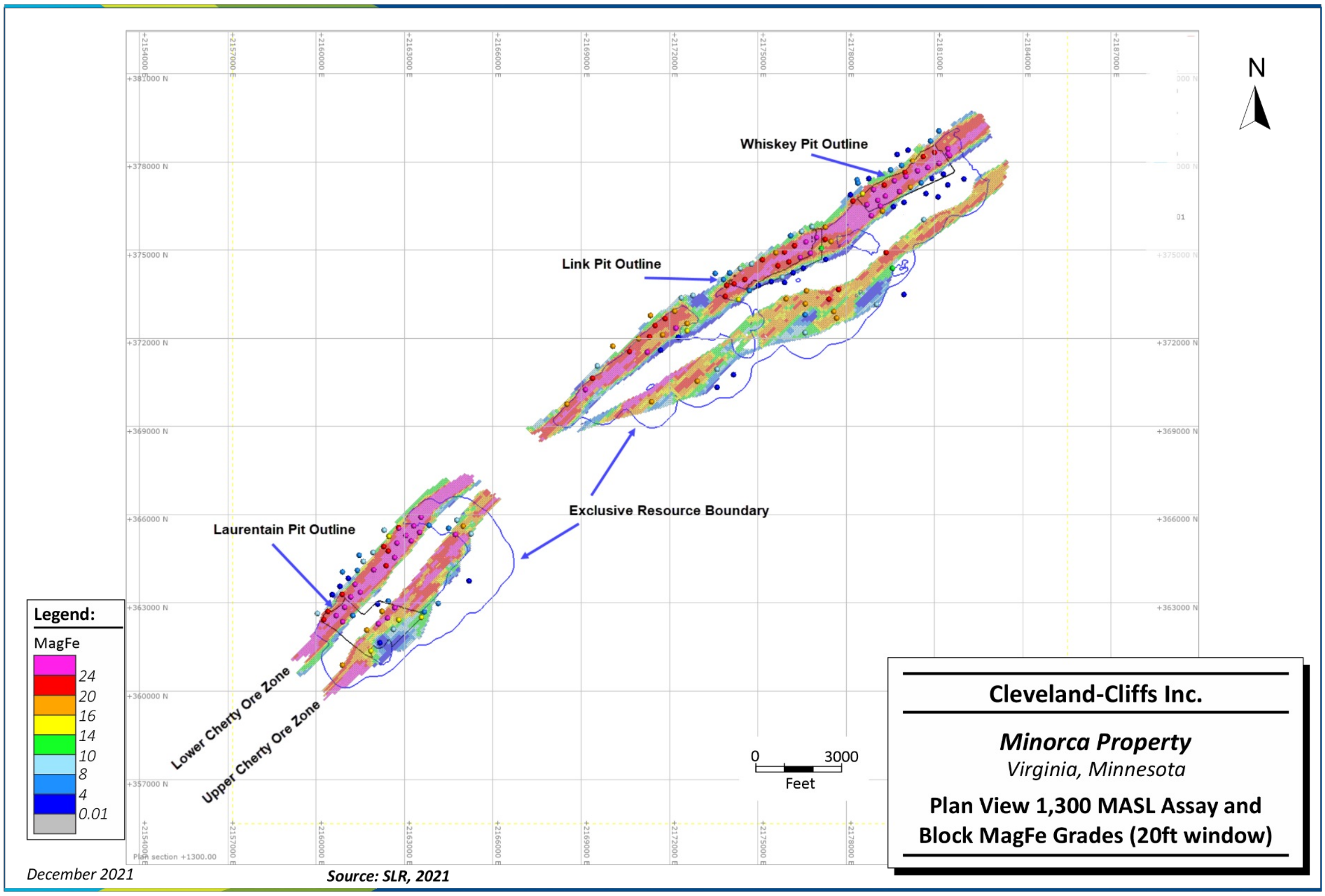
11.11 Model Validation

Blocks were validated using industry-standard techniques including:

- Visual inspection of assays and composites versus block grades (Figure 11-4 to Figure 11-6)
- Comparison between ID^2, NN, and composite means (Table 11-9)
- Swath plots

11.11.1 Visual Inspection

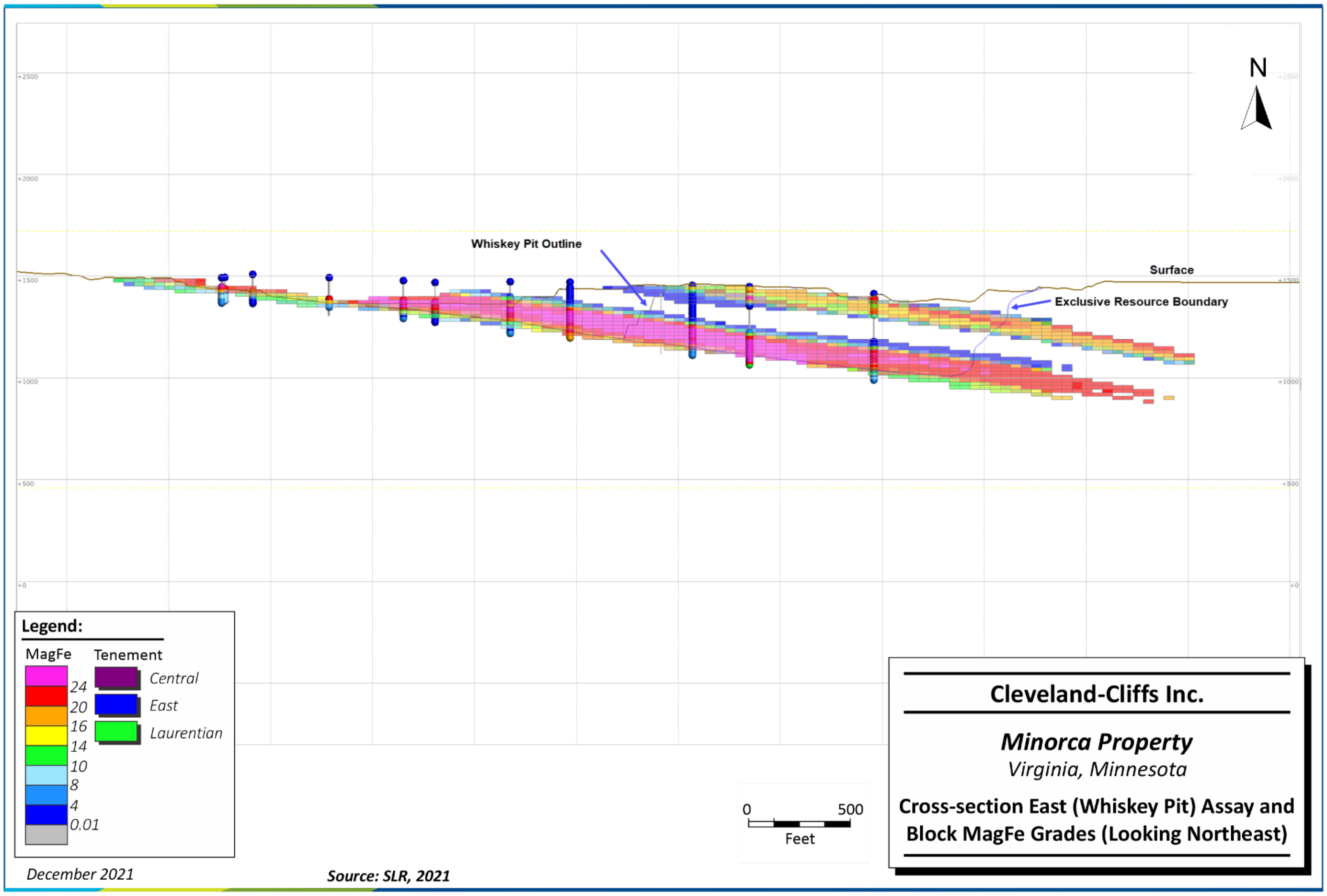
SLR reviewed the MagFe relative to blocks, drilled grades, and composites.SLR observed that the block grades exhibited general accord with drilling and sampling and did not appear to smear significantly across sampled grades.



December 2021

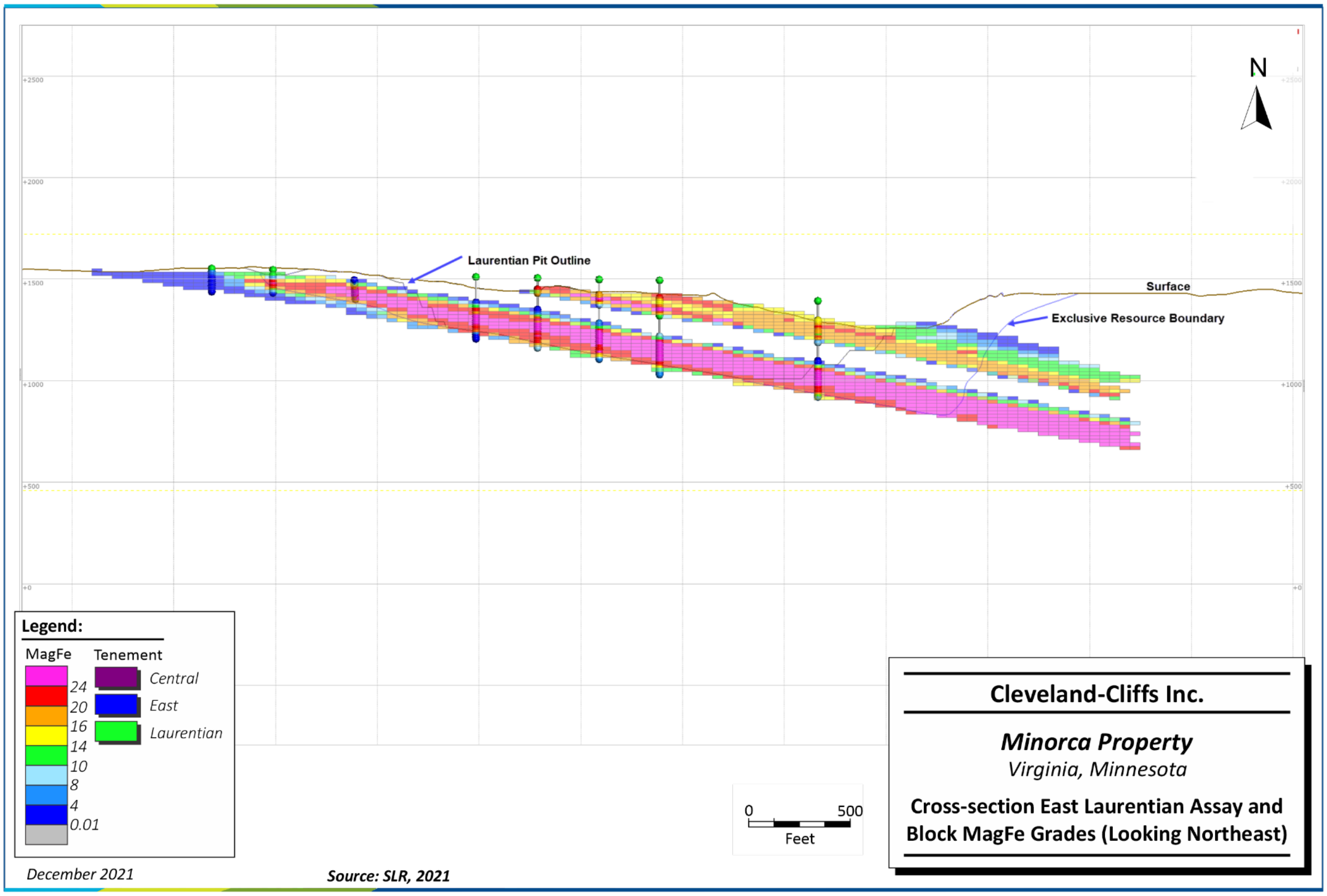
Source: SLR, 2021

Figure 11-4: Plan View 1,300 MASL Assay and Block MagFe Grades (20 ft Window)



Source: SLR, 2021

Figure 11-5: Cross-section East (Whiskey Pit) Assay and Block MagFe Grades (Looking Northeast)



Source: SLR, 2021

Figure 11-6: Cross-section Laurentian Assay and Block MagFe Grades (Looking Northeast)

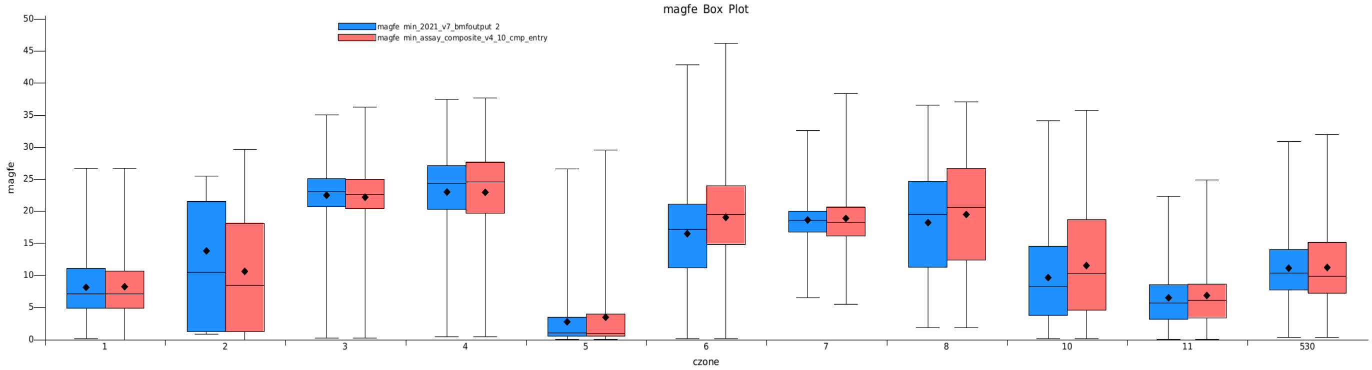
11.11.2 Comparative Statistics Composites vs Block Grades

The mean grades in composites and blocks compare favorably for the MagFe evaluated in the LC and UC. Higher-percent-variance block grade means in the OVB, LS, UC1, and LC5B subunits, which led to an overall -18.4% difference, are observed due to the average of a larger number of low-grade blocks versus the composites (Table 11-9, Figure 11-7).

Table 11-9: Comparative Statistics of Composites and Blocks for Key Economic Variables Base Block Model
Cleveland-Cliffs Inc. – Minorca Property

Data	Variable	Domain Field	Rock Code	Lithology	Count	Min (%)	Max (%)	Mean (%)	StDev (%)	CV	% Mean Δ
Block Model	magfe	czone	1	FTW1	173,402	0.14	26.74	8.22	4.65	0.56	0.21%
Composite	magfe	czone	1	FTW1	872	0.00	26.74	8.24	5.05	0.61	
Block Model	magfe	czone	2	OVB	8	0.88	25.50	13.87	9.83	0.71	-30.12%
Composite	magfe	czone	2	OVB	25	0.00	29.72	10.66	9.10	0.85	
Block Model	magfe	czone	3	LC4*	116,253	0.30	35.08	22.49	4.78	0.21	-1.32%
Composite	magfe	czone	3	LC4*	1,973	0.30	36.23	22.20	5.20	0.23	
Block Model	magfe	czone	4	LC5A*	109,217	0.44	37.47	23.01	6.02	0.26	-0.01%
Composite	magfe	czone	4	LC5A*	1,586	0.44	37.70	23.01	6.71	0.29	
Block Model	magfe	czone	5	LS	129,207	0.02	26.65	2.83	3.72	1.31	18.73%
Composite	magfe	czone	5	LS	1,025	0.01	29.58	3.48	5.06	1.45	
Block Model	magfe	czone	6	UC1*	103,955	0.20	42.88	16.53	7.62	0.46	13.30%
Composite	magfe	czone	6	UC1*	1,014	0.20	46.21	19.06	8.32	0.44	
Block Model	magfe	czone	7	UC2*	17,569	6.52	32.66	18.63	2.46	0.13	1.56%
Composite	magfe	czone	7	UC2*	354	5.53	38.36	18.93	4.37	0.23	
Block Model	magfe	czone	8	UC3*	42,022	1.85	36.54	18.25	7.80	0.43	6.78%
Composite	magfe	czone	8	UC3*	579	1.85	37.05	19.57	8.66	0.44	
Block Model	magfe	czone	10	LC5B*	62,396	0.13	34.13	9.71	6.84	0.70	16.12%
Composite	magfe	czone	10	LC5B*	556	0.13	35.78	11.58	8.05	0.70	
Block Model	magfe	czone	11	US	36,350	0.07	22.35	6.56	4.69	0.72	5.22%
Composite	magfe	czone	11	US	149	0.07	24.95	6.92	5.01	0.72	
Block Model	magfe	czone	530	LC3*	86,281	0.37	30.90	11.16	4.95	0.44	0.95%
Composite	magfe	czone	530	LC3*	1,017	0.34	32.06	11.27	6.24	0.55	
Block Model	**magfe**	**Total**			**876,660**	**0.02**	**42.88**	**13.16**	**8.99**	**0.68**	**18.40%**
Composite	**magfe**	**Total**			**9,163**	**0.00**	**46.21**	**16.13**	**9.39**	**0.58**	

*Ore Domains

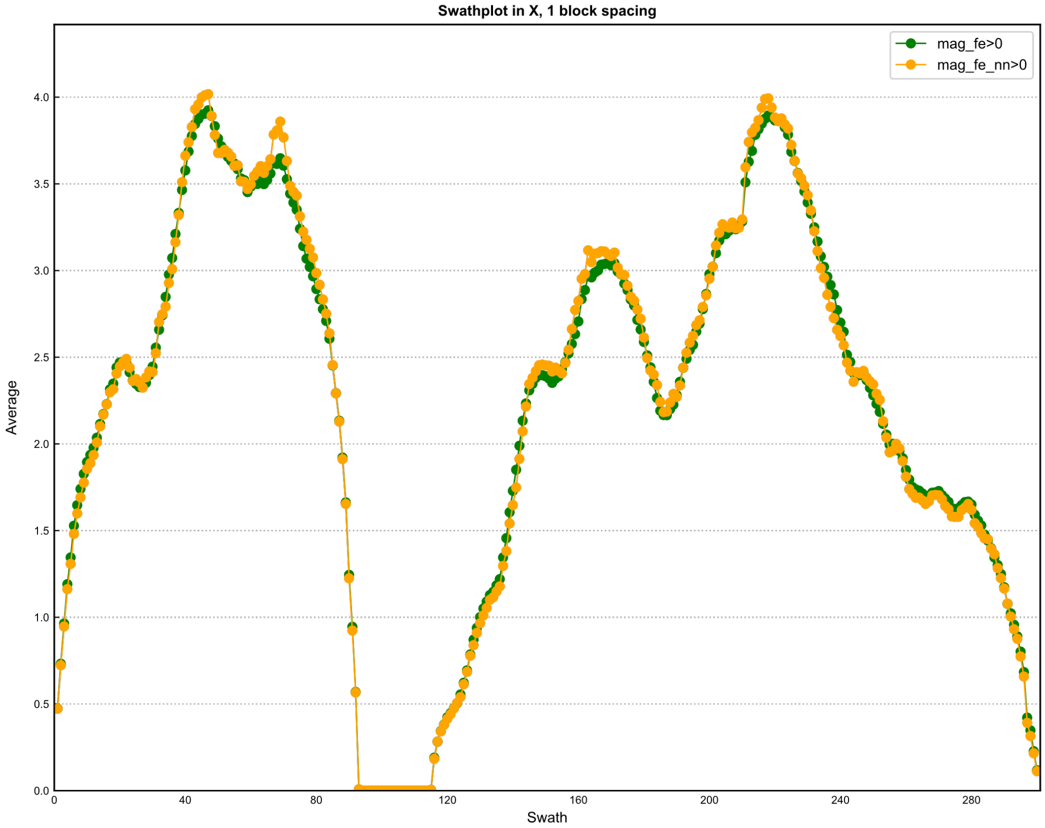


Source: SLR, 2021

Figure 11-7: Whisker Plots for MagFe Composites and Blocks in All Sub Members in Minorca

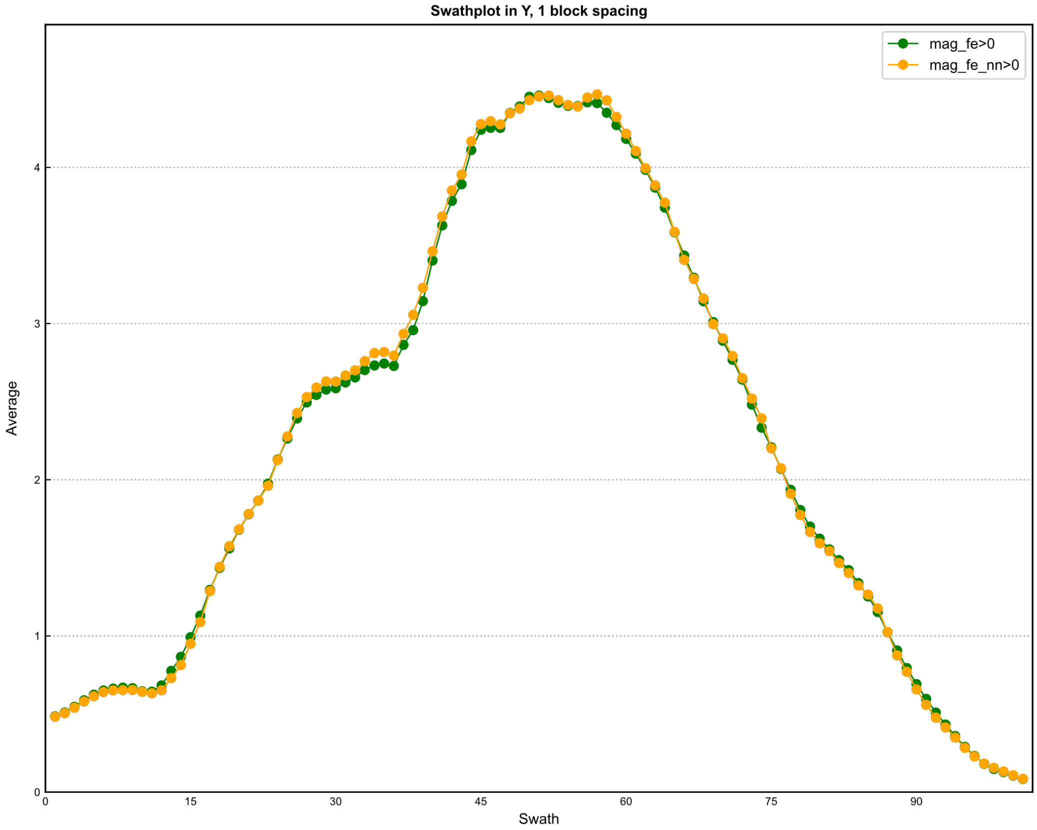
11.11.3 Swath Plots

Swath plots (Figure 11-8, Figure 11-9, and Figure 11-10) demonstrate good correlation, with block grades being somewhat smoothed relative to composite grades, as expected. SLR notes, however, that the variance observed in comparing composites versus block grades is not observed when comparing the ID^2 estimate with an NN estimate in the swath plots, as only one hole was required for estimating block grades. Overall, the statistical evaluation provides acceptable validation of the model results. SLR recommends that future estimates use a minimum of two holes for the pass 1 estimate.



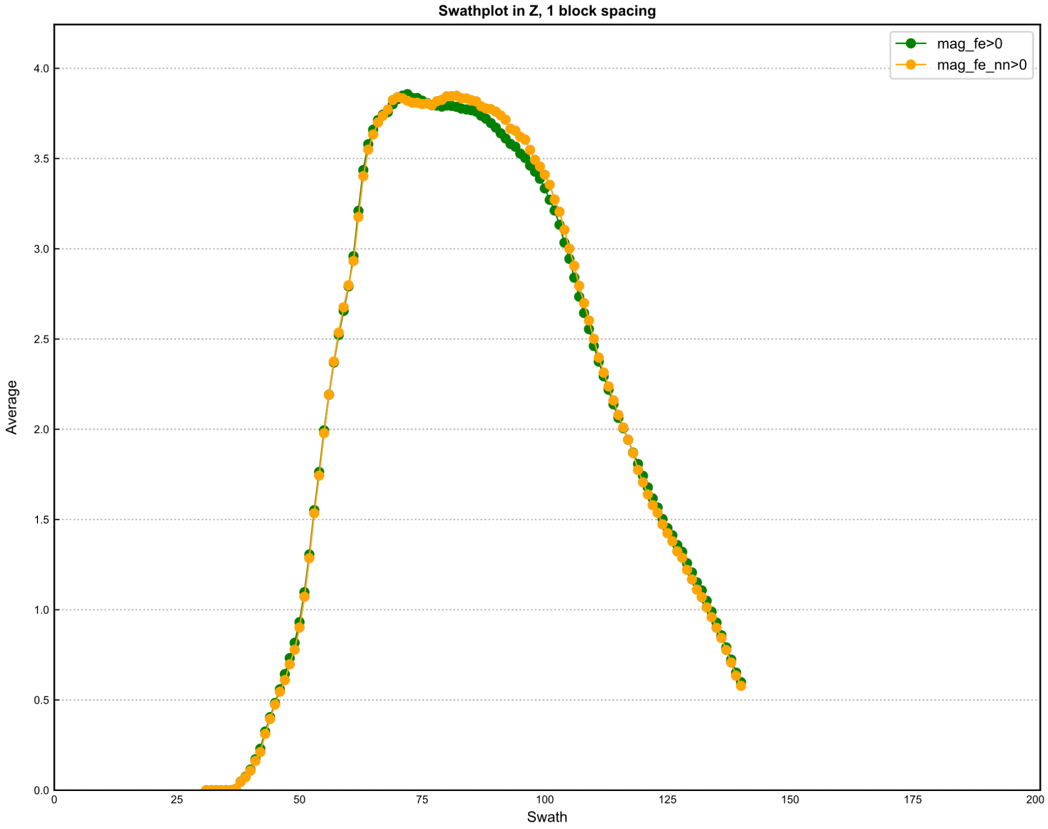
Source: SLR, 2021

Figure 11-8: East-West (X) Swath Plot for MagFe ID^2 versus NN



Source: SLR, 2021

Figure 11-9: North-South (Y) Swath Plot for MagFe ID^2 versus NN



Source: SLR, 2021

Figure 11-10: Vertical (Z) Swath Plot for MagFe ID^2 versus NN

11.12 Model Reconciliation

Reconciliation results comparing actual production results versus model-predicted values of crude ore and pellet production for the third quarter (Q3) of 2021 are presented in Table 11-10. Model values were determined by reporting tons and grade from solids of the actual mined areas for each area. The models used were the budget mine planning block models, which were modified from the geologic model to account for crude ore loss and dilution.

Overall, the block model is slightly conservative but is matching well against actual production:

- Total ore under-predicted by 9.2%.
- Waste over-predicted by 8.0%.
- Total material was within less than 1.0%.

- Crude MagFe and DT concentrate silica were both within less than 1%.

Table 11-10: Q3 2021 Model Reconciliation
Cleveland-Cliffs Inc. – Minorca Property

	Block Model	Actual	Variance	%
Crude Ore (LT)	**1,986,112**	**2,169,126**	**-183,014**	**-9.2%**
MagFe (%)	22.86	22.94	-0.09	-0.4%
Silica (%)	3.02	3.00	0.01	0.4%
Waste (LT)	**2,215,014**	**2,038,213**	**176,801**	**8.0%**
Overburden	1,673,936	1,347,335	326,601	19.5%
Waste Rock	541,078	690,878	-149,800	-27.7%
Total Material Tons	**4,201,126**	**4,207,339**	**-6,213**	**-0.1%**

11.13 Mineral Resource Statement

Mineral Resource estimates for the Minorca deposit were prepared by Cliffs and audited and accepted by SLR using available data from 1958 to 2021.

To ensure that all Mineral Resource statements satisfy the “reasonable prospects for eventual economic extraction” requirement, in definition of the Mineral Resources for Minorca, the mine considered factors significant to technical feasibility and potential economic viability. Mineral Resources were defined and constrained within an open-pit shell, prepared by Cliffs, and based on a US$90/LT pellet value and a wet 62.5% Fe flux pellet.

The Mineral Resource estimate as of December 31, 2021, is presented in Table 11-11.

Table 11-11: Summary of Mineral Resource -December 31, 2021
Cleveland-Cliffs Inc. – Minorca Property

Class	Resources	MagFe	Process Recovery	Pellets
	(MLT)	(%)	(%)	(MLT)
Measured	484.3	22.9	32.9	159.3
Indicated	317.2	22.9	32.9	104.4
Total Measured + Indicated	**801.5**	**22.9**	**32.9**	**263.7**
Inferred	30.1	21.1	30.2	9.1

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Mineral Resources are reported exclusive of Mineral Reserves and have been rounded to the nearest 100,000.
3. Mineral Resources are estimated at a cut-off grade of 16% crude MagFe.
4. Mineral Resources are estimated using a pellet value of US$90/LT.
5. Waste within the pit is 986.7 MLT at a stripping ratio of 1.23:1 (waste to crude ore).
6. Saleable product reported as a 62.5% Fe content wet flux pellet, shipped product contains 2% moisture.
7. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
8. Bulk density is assigned based on average readings for each lithology type.
9. Mineral Resources are 100% attributable to Cliffs.
10. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

11. Numbers may not add due to rounding.

The SLR QP is of the opinion that, with consideration of the recommendations summarized in Sections 1.0 and 23.0 of this report, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work. The Mine has been in operation for many years, and land and mineral control has been long established. There are no other known legal, social, or other factors that would affect the development of the Mineral Resources.

While the estimate of Mineral Resources is based on the QP's judgment that there are reasonable prospects for eventual economic extraction, no assurance can be given that Mineral Resources will eventually convert to Mineral Reserves.

The QP offers the following conclusions with respect to the Minorca Mineral Resource estimates:

- The KEVs in the block models for Minorca compare well with the source data.Future estimation should also review the cut-off grade used in reporting.
- The methodology used to prepare the block model is appropriate and consistent with industry standards.
- Validations compiled by the QP indicate that the block model is reflecting the underlying support data appropriately.
- The classification at Minorca is generally acceptable; however, the extension of classified material beyond drilling limits is slightly aggressive, and some post-processing to remove isolated blocks of different classification is warranted. Classified blocks which extend beyond the drilling limits are generally outside the Resource Pit Shell.
- The block model represents an acceptable degree of smoothing at the block scale for prediction of quality variables at Minorca. Visually, blocks and composites in cross-section and plan view compare well.
- 2021 actual versus model-predicted values of crude ore were accurate to within 10%, with the model values slightly lower than actual total ore processed.

The QP offers the following recommendations with respect to the Minorca Mineral Resource estimates:

- Apply a minimum of two holes during the pass 1 estimation for Minorca in future updates.
- Transition the process of classifying blocks in future updates to consider local drill hole spacing instead of a distance-to-drill hole criterion.
- Prepare model reconciliation over quarterly periods and document methodology, results, and conclusions and recommendations.

12.0 MINERAL RESERVE ESTIMATES

Mineral Reserves in this TRS are derived from the current Mineral Resources. The Mineral Reserves are reported as crude ore and are based on open pit mining from the Laurentian, East 1, and East 2 Pit areas. Crude ore is the unconcentrated ore as it leaves the mine at its natural *in situ* moisture content. The Minorca Proven and Probable Mineral Reserves are estimated as of December 31, 2021, and summarized in Table 12-1.

Table 12-1: Summary of Mineral Reserves – December 31, 2021
Cleveland-Cliffs Inc. – Minorca Property

Category	Crude Ore Mineral Reserves (MLT)	Crude Ore (% MagFe)	Process Recovery (%)	Wet Pellets (MLT)
Proven	102.8	23.7	34.0	35.0
Probable	6.8	25.1	36.1	2.5
Proven & Probable	**109.7**	**23.8**	**34.1**	**37.4**

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 pounds and has been rounded to the nearest 100,000.
2. Mineral Reserves are reported at a $90/LT wet flux pellet price free-on-board (FOB) Lake Superior, based on the three-year trailing average of the realized product revenue rate.
3. Mineral Reserves are estimated at a cut-off grade of 16% crude MagFe.
4. Mineral Reserves include mining dilution of 4% and mining extraction losses of 5%.
5. The Mineral Reserve mining stripping ratio (waste units to crude ore units) is at 0.8.
6. Pellets are reported as a 62.5% Fe content wet flux pellet; shipped pellets contain 2.0% moisture.
7. Tonnage estimate based on December 31, 2021 production depletion from a surveyed topography on June 28, 2021.
8. Mineral Reserve tons are as delivered to the primary crusher; pellets are as loaded onto lake freighters in Two Harbors, Minnesota.
9. Classification of the Mineral Reserves is in accordance with the S-K 1300 classification system.
10. Mineral Reserves are 100% attributable to Cliffs.
11. Numbers may not add due to rounding.

The three-year (2017 to 2019) trailing average of the realized pellet price is US$98/LT; however, the reserves are evaluated using a pellet price of US$90/LT based on the corporate guidance issued. The pellet value more closely represents the current economic outlook, and the optimization margins still allow for a robust mine-plan. The costs used in this study represent all mining, processing, transportation, and administrative costs including the loading of pellets into lake freighters in Two Harbors, Minnesota.

SLR is not aware of any risk factors associated with, or changes to, any aspects of the modifying factors such as mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

12.1 Conversion Assumptions, Optimization Parameters, and Methods

Using the mine planning block model for Minorca, pit optimization and pit designs are conducted to convert the Mineral Resources to Mineral Reserves. At Minorca, this work is carried out at the Mineral Resource estimation stage and is discussed in section 11.8.3.

A reconciliation of the geologic block model to the mining models – which was re-blocked to 50 ft by 50 ft by 17.5 ft (i.e., half the bench height) – demonstrated that Minorca has a modeled average crude ore loss of 5% and an average mining dilution of 4%. The crude MagFe discount – a function of ore dilution –

between the geologic block model and mining models was demonstrated to be 0.9%, which aligned closely to the empirically derived 1.0% discount used historically. With a 0.9% MagFe discount internalized within the mining model, the historically derived MagFe discount in the pellet recovery equation is reduced from 1.0% to 0.1%, so that when combined with the internal mining model factor, the resultant MagFe discount is still 1.0%.

Minorca has a long history of plant recovery, which is used as part of the pit optimization. The following summarizes the empirical relationship for pellet production based on crude ore tons and crude MagFe content:

Wet Concentrate Tons = Crude Ore Tons x (Crude MagFe – MagFe Discount) x Recovery Factor

Wet Flux Pellet Tons = Wet Concentrate Tons x Flux Pellet Conversion Factor

Where:

- MagFe Discount = 0.1%
- Recovery Factor = 1.3
- Historical wet concentrate to wet flux pellet ratio is 1.11

From 2010 through 2020, the equation has reconciled within 3% of the production years when comparing calculated wet flux pellet production to actual wet flux pellet production. Figure 12-1 shows the 2014 through 2020 variance between calculated and actual flux pellet production.

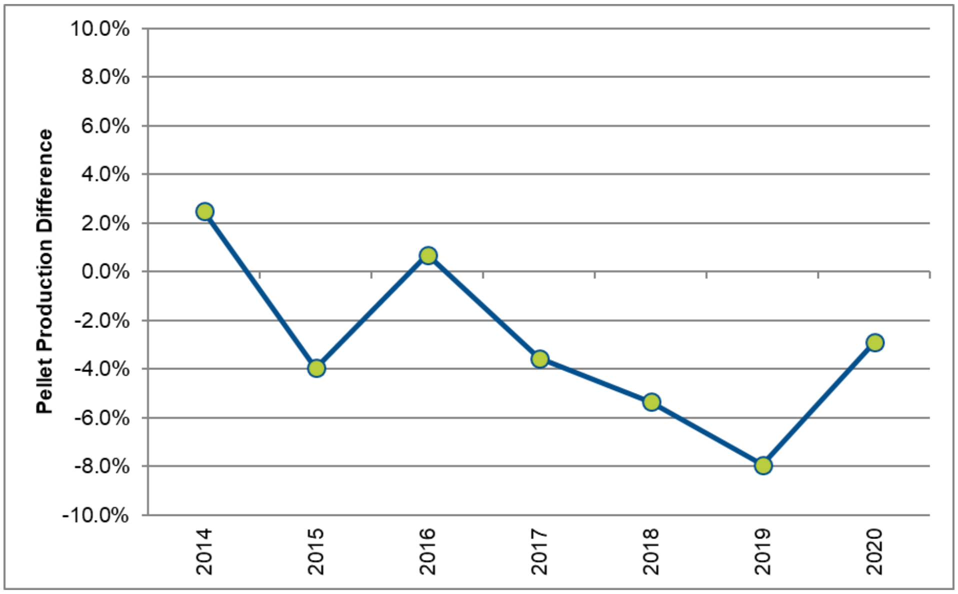


Figure 12-1: 2014–2020 Calculated versus Actual Pellet Production

All Measured and Indicated Mineral Resources within the final designed pit that meet the above criteria are converted into Mineral Reserves. The only additional criterion for Measured Mineral Resources converting into Proven Mineral Reserves is that they must be scheduled within the first 20 years of the mine life. Table 12-2 shows the criteria to convert Mineral Resource classifications to Mineral Reserve classifications.

Table 12-2: Mineral Resource to Mineral Reserve Classification Criteria
Cleveland-Cliffs Inc. – Minorca Property

Mineral Resources	Criteria for Conversion	Mineral Reserves
Measured	Scheduled Within the First 20 Years	Proven
Indicated	As Scheduled	Probable
Inferred	As Scheduled	Waste

12.2 Previous Mineral Reserve Estimates

Cliffs acquired Minorca during the 2020 purchase of AMUSA's assets. The SEC-reported Mineral Reserves for the past ten years are listed in Table 12-3. These Mineral Reserves were not prepared under the recently adopted SEC guidelines; however, they followed SEC Guide 7 requirements for public reporting of Mineral Reserves in the United States.

Table 12-3: Previous Mineral Reserves
Cleveland-Cliffs Inc. – Minorca Property

Year	Crude Ore		Product	
	Total Proven & Probable (MLT)	Grade (% MagFe)	Process Recovery (%)	Flux Pellets Wet (MLT)
2011(1)	156.5	23.1	31.9	49.9
2012(2)	148.6	23.3	32.2	47.8
2013(3)	140.7	23.4	32.3	45.5
2014(4)	131.9	23.4	32.3	42.6
2015(5)	124.0	23.6	32.6	40.4
2016(6)	116.1	23.7	32.7	38.0
2017(7)	108.3	23.8	32.9	35.6
2018(8)	99.4	23.5	32.5	32.3
2019(9)	127.9	23.7	32.7	41.9
2020(10)	120.0	23.7	31.0	37.2

Notes:

1. As of December 31, 2011; Source: ArcelorMittal 20-F Filing
2. As of December 31, 2012; Source: ArcelorMittal 20-F Filing
3. As of December 31, 2013; Source: ArcelorMittal 20-F Filing
4. As of December 31, 2014; Source: ArcelorMittal 20-F Filing
5. As of December 31, 2015; Source: ArcelorMittal 20-F Filing
6. As of December 31, 2016; Source: ArcelorMittal 20-F Filing
7. As of December 31, 2017; Source: ArcelorMittal 20-F Filing
8. As of December 31, 2018; Source: ArcelorMittal 20-F Filing
9. As of December 31, 2019; Source: ArcelorMittal 20-F Filing
10. As of December 31, 2020; Source: Cleveland-Cliffs Inc. 10-K Filing

In 2019, the Laurentian Pit was expanded, resulting in a significant increase from the previously reported reserves.

The change in Mineral Reserves from 2019 to current is primarily attributable to mining depletion.

12.3 Pit Optimization

Pit optimizations were carried out on the Laurentian, East 1, and East 2 pit areas in Vulcan™ using the mine planning block models. Inputs used for the optimization use a bench-based mining cost escalator developed based on cost structure from 2019 through 2020 actual production and the 2021 annual budget plan.

12.3.1 Summary of Pit Optimization Parameters

The pit optimization parameters are summarized as follows:

- Wet flux pellet tons = crude ore tons x (crude MagFe – 0.1%) x 1.3 x 1.11.
- Base case product average price = $90/LT wet flux pellets.
- *In situ* waste mining cost = $1.70/LT mined.
- Unconsolidated waste mining cost = $2.00/LT mined.
- Crude ore mining cost = $4.20/LT crude ore.
- Crushing and concentrating cost = $5.80/LT crude ore.
- Pelletizing and general cost = $34.00/LT wet flux pellet.
- Replacement capital cost = $7.25/LT wet flux pellet.
- Maximum overall pit slope angle = 49.4° for*in situ* rock and 19.4° for surface overburden.

In addition, the Laurentian Pit limits are constrained by the Permit to Mine boundary, availability of wetland credits, and Minnesota State Highway 135; thus, opportunity to expand the pit with higher pellet values is limited. The East 1 and East 2 pits are currently limited by their respective Permit to Mine boundaries.

12.3.2 Pit Optimization Results and Analysis

Pit optimization results are used as a guide for pit and stockpile designs. The Laurentian Pit is geographically separate from the East 1 and East 2 pits, so these areas are optimized independently from one another.

Pit optimizations were run by varying the base-case product price with a block revenue factor. The risk profile and revenue-generating potential of the deposits is evaluated by considering the relationship between crude ore and waste rock and the associated relative discounted cash flows (DCF) generated at each incremental pit (discount rate of 10% utilized for the optimization analysis).

The results from the Laurentian Pit optimization are summarized in Table 12-4, showing the pit shell results from a price range of $72.00/LT to $99.00/LT of wet flux pellets, with pit shell 11 highlighted to indicate the selected pit shell to be used as a guide for final pit design. The pit-by-pit graph showing tonnages and relative DCFs is provided in Figure 12-2.

The results from the East 1 and East 2 optimization are summarized in Table 12-5, showing the pit shell results from a price range of $72.00/LT to $99.00/LT of wet flux pellets, with pit shell 14 highlighted to indicate the selected pit shell to be used as a guide for final pit design. The pit-by-pit graph showing tonnages and relative DCFs is provided in Figure 12-3.

Table 12-4: Laurentian Pit Optimization Results
Cleveland-Cliffs Inc. – Minorca Property

Pit Shell	Revenue Factor	Wet Flux Pellets (MLT)	Total Material Movement (MLT)	Crude Ore (MLT)	Stripping (MLT)	Strip Ratio	Process Recovery (%)	Product Price ($/LT wet flux pellets)
1	0.80	2.8	7.8	7.2	0.6	0.09	39.6	72.00
2	0.81	3.6	10.3	9.3	1.0	0.11	38.9	72.90
3	0.82	4.7	13.9	12.2	1.8	0.14	38.2	73.80
4	0.83	5.9	18.6	15.6	2.9	0.19	37.7	74.70
5	0.84	6.9	22.8	18.6	4.3	0.23	37.3	75.60
6	0.85	8.0	27.6	21.7	5.9	0.27	36.9	76.50
7	0.86	9.4	34.3	25.8	8.5	0.33	36.5	77.40
8	0.87	21.1	97.9	59.4	38.5	0.65	35.6	78.30
9	0.88	26.0	125.2	73.6	51.6	0.70	35.3	79.20
10	0.89	28.0	136.6	79.4	57.2	0.72	35.2	80.10
11	**0.90**	**30.6**	**153.0**	**87.1**	**65.9**	**0.76**	**35.1**	**81.00**
12	0.91	32.0	162.2	91.1	71.2	0.78	35.1	81.90
13	0.92	32.9	168.8	93.7	75.1	0.80	35.1	82.80
14	0.93	33.1	170.2	94.3	75.8	0.80	35.1	83.70
15	0.94	33.8	175.6	96.6	78.9	0.82	35.0	84.60
16	0.95	34.1	177.3	97.3	80.0	0.82	35.0	85.50
17	0.96	34.3	179.2	97.9	81.2	0.83	35.0	86.40
18	0.97	34.4	179.7	98.2	81.4	0.83	35.0	87.30
19	0.98	34.4	180.1	98.5	81.6	0.83	35.0	88.20
20	0.99	34.5	181.0	98.8	82.2	0.83	34.9	89.10
21	1.00	34.6	181.9	99.1	82.9	0.84	34.9	90.00
22	1.01	34.6	182.1	99.1	83.0	0.84	34.9	90.90
23	1.02	34.7	182.4	99.2	83.2	0.84	34.9	91.80
24	1.03	34.7	182.9	99.3	83.5	0.84	34.9	92.70
25	1.04	34.7	183.1	99.4	83.7	0.84	34.9	93.60
26	1.05	34.7	183.2	99.4	83.7	0.84	34.9	94.50
27	1.06	34.7	183.4	99.5	83.9	0.84	34.9	95.40
28	1.07	34.8	183.7	99.6	84.1	0.84	34.9	96.30

Pit Shell	Revenue Factor	Wet Flux Pellets (MLT)	Total Material Movement (MLT)	Crude Ore (MLT)	Stripping (MLT)	Strip Ratio	Process Recovery (%)	Product Price ($/LT wet flux pellets)
29	1.08	34.8	183.7	99.6	84.1	0.84	34.9	97.20
30	1.09	34.8	184.0	99.6	84.4	0.85	34.9	98.10
31	1.10	34.8	184.6	99.7	84.9	0.85	34.9	99.00

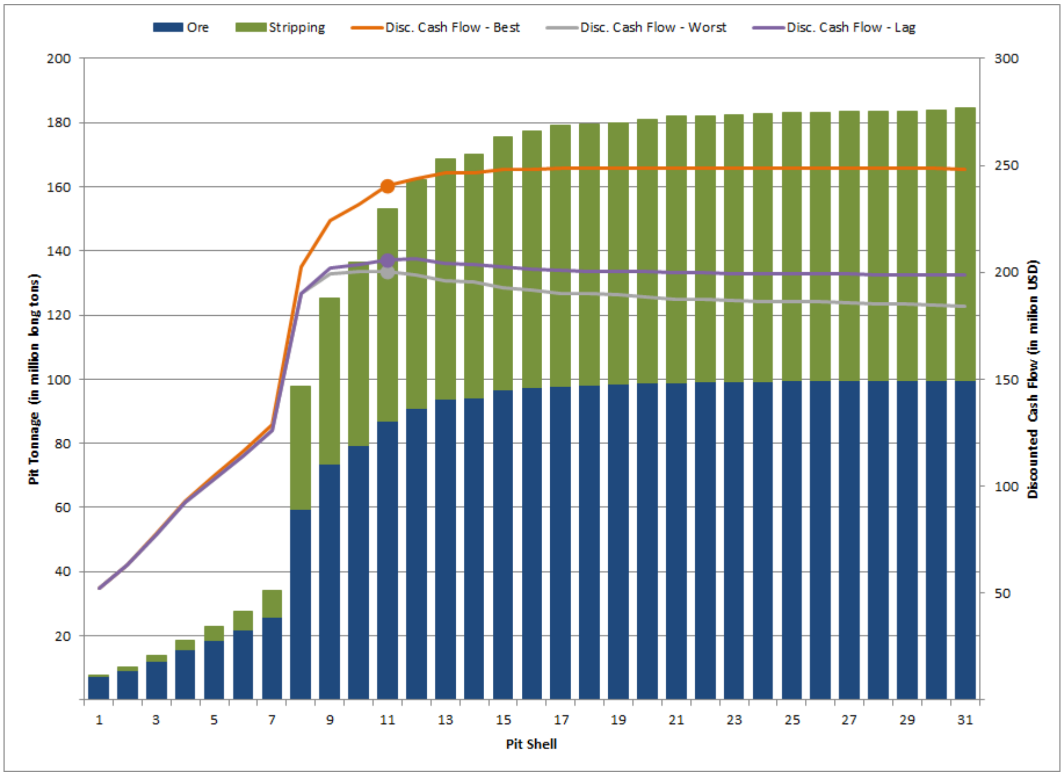


Figure 12-2: Laurentian Pit Optimization Pit-by-Pit Graph

Table 12-5: East 1 and East 2 Pit Optimization Results
Cleveland-Cliffs Inc. – Minorca Property

Pit Shell	Revenue Factor	Wet Flux Pellets (MLT)	Total Material Movement (MLT)	Crude Ore (MLT)	Stripping (MLT)	Strip Ratio	Process Recovery (%)	Product Price ($/LT wet flux pellet)
1	0.80	0.2	0.5	0.5	0.0	0.00	37.5	72.00
2	0.81	0.4	1.1	1.1	0.0	0.02	36.9	72.90
3	0.82	0.7	2.1	2.0	0.1	0.05	36.7	73.80
4	0.83	1.2	3.5	3.3	0.2	0.07	36.3	74.70
5	0.84	1.8	5.4	4.9	0.5	0.10	35.9	75.60
6	0.85	2.9	9.5	8.2	1.2	0.15	35.5	76.50
7	0.86	4.3	14.6	12.2	2.4	0.20	35.3	77.40
8	0.87	6.1	21.7	17.6	4.1	0.23	35.0	78.30
9	0.88	8.0	29.6	23.1	6.4	0.28	34.7	79.20
10	0.89	10.6	41.7	30.9	10.8	0.35	34.5	80.10
11	0.90	12.3	49.9	36.0	13.8	0.38	34.3	81.00
12	0.91	14.0	58.2	41.1	17.1	0.42	34.1	81.90
13	0.92	15.0	63.1	44.4	18.7	0.42	33.9	82.80
14	**0.93**	**15.9**	**68.0**	**47.2**	**20.8**	**0.44**	**33.8**	**83.70**
15	0.94	17.2	75.5	51.2	24.3	0.48	33.6	84.60
16	0.95	17.9	80.0	53.3	26.7	0.50	33.5	85.50
17	0.96	18.8	86.3	56.3	30.1	0.53	33.4	86.40
18	0.97	19.3	89.5	57.9	31.5	0.54	33.3	87.30
19	0.98	19.7	91.5	59.1	32.4	0.55	33.2	88.20
20	0.99	19.8	92.6	59.8	32.8	0.55	33.2	89.10
21	1.00	19.9	93.2	60.2	33.0	0.55	33.1	90.00
22	1.01	20.0	93.8	60.5	33.3	0.55	33.1	90.90
23	1.02	20.1	94.3	60.8	33.5	0.55	33.1	91.80
24	1.03	20.2	95.1	61.2	33.9	0.55	33.0	92.70
25	1.04	20.3	95.4	61.4	34.0	0.55	33.0	93.60
26	1.05	20.3	95.6	61.6	34.1	0.55	33.0	94.50
27	1.06	20.3	95.7	61.6	34.1	0.55	33.0	95.40
28	1.07	20.3	95.8	61.6	34.2	0.55	33.0	96.30
29	1.08	20.3	95.9	61.7	34.2	0.55	33.0	97.20

Pit Shell	Revenue Factor	Wet Flux Pellets (MLT)	Total Material Movement (MLT)	Crude Ore (MLT)	Stripping (MLT)	Strip Ratio	Process Recovery (%)	Product Price ($/LT wet flux pellet)
30	1.09	20.3	95.9	61.7	34.2	0.55	33.0	98.10
31	1.10	20.3	96.0	61.7	34.3	0.56	33.0	99.00

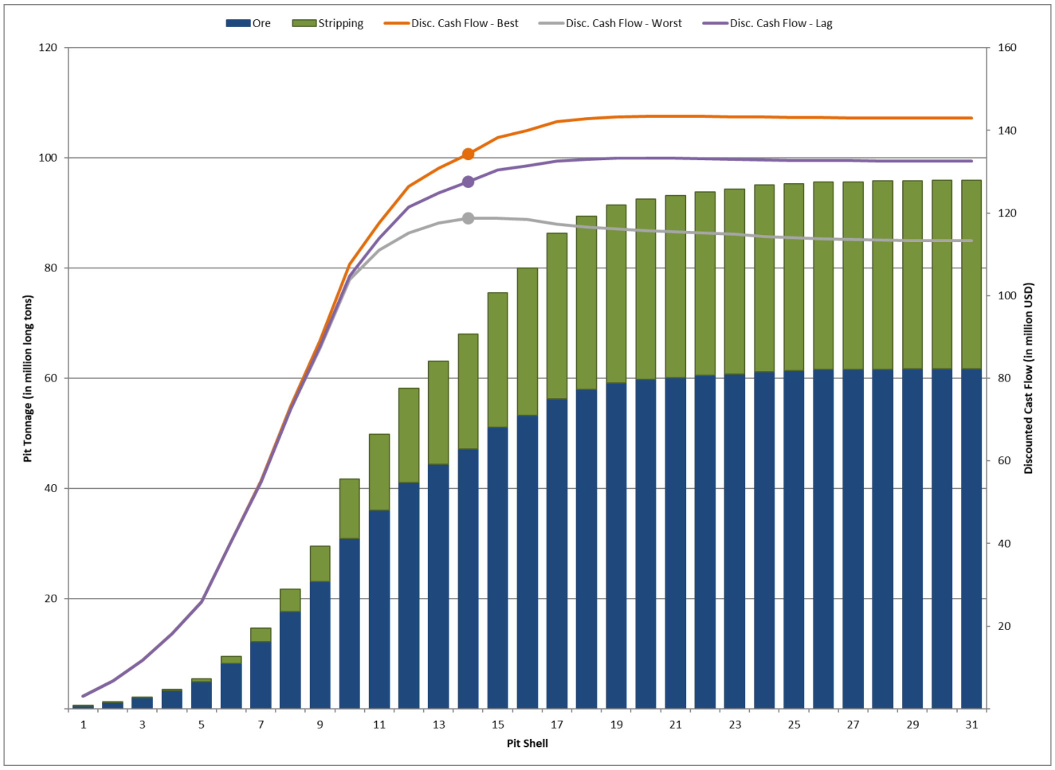


Figure 12-3: East 1 and East 2 Optimization Pit-by-Pit Graph

12.4 Mineral Reserve Cut-off Grade

The Mineral Reserves cut-off grade is governed by metallurgical constraints applied in order to produce a saleable product followed by verification through a break-even cut-off grade calculation. The Mineral Reserves are reported at a 16% MagFe cut-off grade, which is the same cut-off criteria as those used for Mineral Resources, described in section 11.9.

12.5 Mine Design

The Laurentian, East 1, and East 2 final pit designs incorporate several design variables including geotechnical parameters (e.g., wall angles and bench configurations), equipment size requirements (e.g., mining height and ramp configuration), and physical mining limits (e.g., property boundaries and existing infrastructure). The following summarizes the design variables and final pit results; more detail is provided in the preceding subsections and in Section 13.0.

The final highwall pit slope is designed at an inter-ramp angle (IRA) of 49.4° for *in situ* rock and 19.4° for surface overburden. The bench design for rock consists of double-stacked, 35 ft-high mining benches with a 74° bench face angle (BFA) and a 40 ft catch bench (CB). There are no ramps designed into the final highwall, as the footwall slope is less than 8% for most of the mining areas and can support the development of haulage ramps.

There are multiple physical mining limits that are applied to the pit optimization and/or the mine plan:

- The crude ore Mineral Reserve boundary resides within controlled mineral lease areas and also within the existing Permit to Mine.
- Mining limits are set at 500 ft from the closest buildings in the local communities.
- Mining limits are set at 200 ft from the centerline of local roads and highways.

The selected final pit shell results compared to the final pit design are detailed in Table 12-6 and shown in Figure 12-4. Pit design results are reported prior to depletion to be consistent with the pit optimization results.

Table 12-6: Pit Optimization to Pit Design Comparison
Cleveland-Cliffs Inc. – Minorca Property

	Crude Ore (MLT)	Grade (% MagFe)	Stripping (MLT)	Total Material (MLT)	Stripping Ratio
Laurentian					
Pit Shell 11 (RF=0.90)	87	24.4	66	153	0.8
Pit Design	68	24.1	62	130	0.9
East 1, 2					
Pit Shell 14 (RF=0.93)	47	23.5	21	68	0.4
Pit Design	46	23.1	26	71	0.6

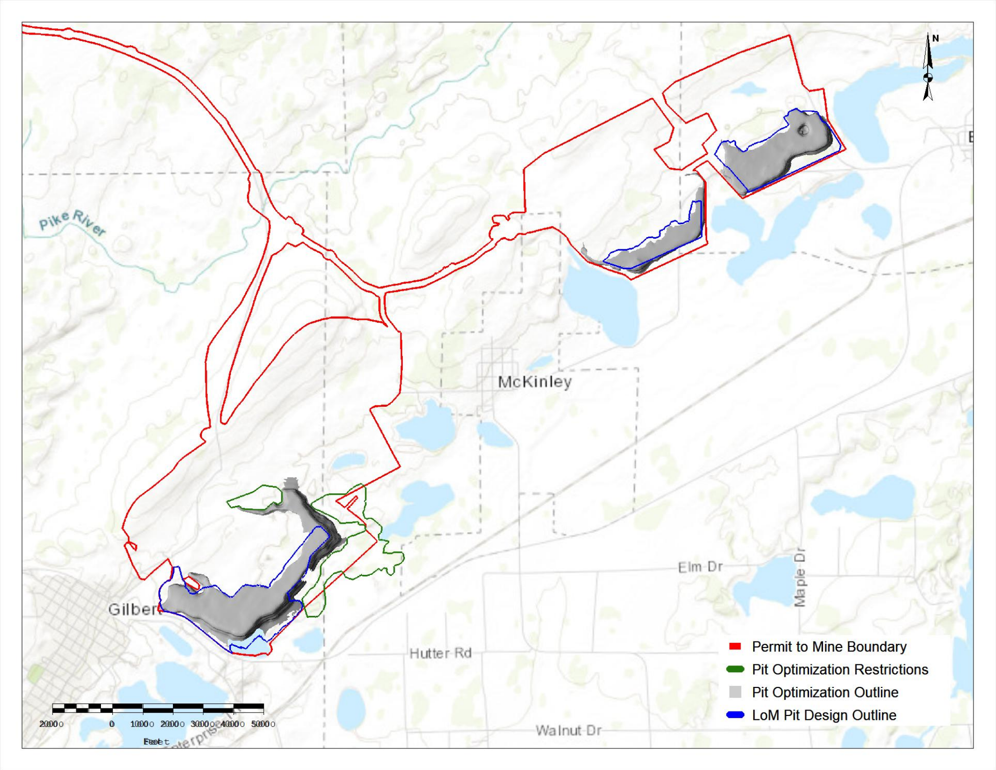


Figure 12-4: Minorca Pit Optimization and Pit Design Limits

In general, the final pit designs are a reasonable representation of the final pit shell guides, with the exception of certain areas due to physical mining limitations applied during mine design work (i.e., the restrictions were not applied during the optimization). Examples of such restrictions include minimum widths for phase development, availability of wetland remediation credits, and relocation of existing pit infrastructure that requires external permits for modification or additional land use agreements.

The eastern portion of the Laurentian Pit displays a noticeable deviation between the pit optimization shell and final pit design. This eastern area was mathematically calculated to be economically viable during the pit optimization, but does not possess adequate mining width, is encumbered by the main pit (White Lake) dewatering line, and cannot be integrated into the current pit haulage network. Based on the spatial limitation and the infrastructure encumbrances, this eastern area of the Laurentian Pit was not incorporated into the final pit design. The eastern area is also constrained to the east and west by non-mitigated wetlands, adding further complications.

When adequate wetland remediation credits are available and the White Lake pipeline has been relocated, this area will be re-evaluated for extraction.

13.0 MINING METHODS

13.1 Mining Methods Overview

The Laurentian, East 1, and East 2 areas are mined using conventional surface mining methods. The surface operations include:

- Clearing and grubbing
- Overburden (glacial till) removal
- Drilling and blasting (excluding overburden)
- Loading and haulage

The Mineral Reserve is based on the ongoing annual average crude ore production of approximately 8.6 MLT from the Laurentian, East 1, and East 2 pits, producing an average of 2.8 MLT of wet flux pellets for domestic consumption.

Mining and processing operations are scheduled 24 hours per day, and the mine production is scheduled to directly feed the processing operations.

The current LOM plan has mining for 14 years and mines the known Mineral Reserve.The average stripping ratio is 0.8 waste units to 1 crude ore unit (0.8 stripping ratio).

The final Laurentian Pit is approximately 1.2 mi long along strike, 0.9 mi wide, and up to 640 ft deep. Crude ore averages approximately 24.4% MagFe. The final East 1 Pit is approximately 0.9 mi along strike, 0.5 mi wide, and up to 310 ft deep. Crude ore within the East 1 Pit averages approximately 22.5% MagFe. The East 2 final pit is approximately 0.7 mi along strike, 0.4 mi wide, and up to 350 ft deep. The East 2 Pit crude ore contains an average of 23.7% MagFe.

Primary production for all mine pits includes drilling a combination of 12.25 in.- and 16.00 in.-diameter rotary blast holes. Production blast hole depth varies as the pit benches transition from the footwall contact to a full 35 ft bench height. Burden and spacing varies depending on the material being drilled. The holes are filled with explosive and blasted. A combination of front-end loaders (FEL) and hydraulic shovels load the broken material into a mixed fleet of 200 ton- and 240 ton-payload mining trucks for transport from the pit.

The Mine follows strict crude ore blending requirements to ensure that the Plant receives a uniform head grade.The two most important characteristics of the crude ore are magnetic iron content and predicted concentrate silica. Generally, two ore zones are mined at one time to obtain a satisfactory crude ore blend for the Plant. Crude ore is hauled to the crushing facility and either direct tipped to the primary crusher or stockpiled in an area adjacent to the primary crusher. The crude ore stockpiles are used as an additional source for blending and production efficiency.

The major pieces of pit equipment include diesel hydraulic shovels, FELs, haul trucks, drills, bulldozers, and graders.Extensive maintenance facilities are available at the mine site to service the mine equipment.

13.2 Pit Geotechnical

13.2.1 Summary

The Laurentian, East 1, and East 2 pits are relatively shallow and, structurally, the in situ crude ore and waste rock is of excellent quality. The deposit dips into the highwall at 8° to 10°, reducing the risk of large-scale slope failures.

Final wall slopes, effectively the IRA as there are no haul ramps in the final highwall, are at 49.4°. The final wall design uses a double bench configuration with a bench height (BH) of 35 ft, totaling 70 ft between each 40 ft CB.

Haulage ramps are also incorporated into the designs. The ramp width is sized at 150 ft, which can safely support two-way traffic of the 200 ton- and 240 ton-payload mining trucks.

The maximum pit depth and vertical highwall exposure is approximately 640 ft for the Laurentian Pit, and 310 ft and 350 ft for the East 1 and East 2 pits, respectively.

Geotechnical and ramp parameters incorporated into the Minorca pit design are summarized in Table 13-1 and illustrated in Figure 13-1.

Table 13-1: Geotechnical Parameters
Cleveland-Cliffs Inc. – Minorca Property

Parameter	Unit	Final Wall	Intermediate Overburden	Final Overburden
IRA	Degrees	49.4	25.8	19.4
BFA	Degrees	74.0	30.0	21.8
BH	ft	35	35	60
CB	ft	40	20	20
Ramp Width - 2 way	ft	150	150	150
Ramp Width - 1 way	ft	90	90	90
Ramp Gradient (Shortest)	%	8	8	8

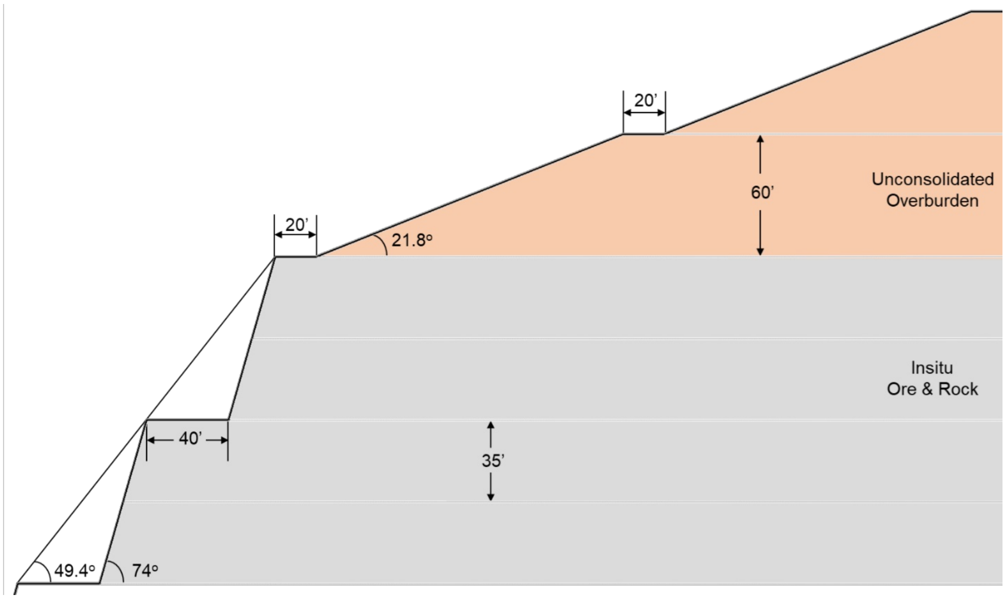


Figure 13-1: Example of Final Pit Wall Geometry

13.2.2 Geotechnical Data and Design Analysis

The surface overburden slopes follow Minnesota Administrative Rules Standard 6130.2900, where the toe of the overburden slope is set-back 20 ft from the crest of the rock slope, bench heights are limited to 60 ft, and the bench face is no steeper than 2.5H:1V (21.8°).

The BH for the rock slopes is determined from double benching the standard 35 ft mining height for Minorca.The bench face angle is what is practically achievable through drilling and blasting the double benched configurations. Bench widths are based on experience and what is considered suitable for effective management of rockfall hazards. The bench width is compliant with the modified Richie criterion for determining bench widths for control of rockfall hazard as developed by Call & Nicholas Inc. (Ryan and Pryor, 2000):

$$\text{Bench Width (ft)} = 0.2 \times \text{Bench Height} + 4.5$$

According to the modified Richie criterion, a bench width of 29 ft would be required for a 70 ft-high bench. The design implemented at Minorca is 11 ft greater at 40 ft.

Considering Minorca is an operational mine, and the slope design parameters have been in use for some time without significant challenges, SLR is of the opinion they are suitable for use in Mineral Reserve estimations. SLR recommends the completion of a geotechnical study for the pit slopes to confirm the existing slope parameters and test the potential for steepening slope angles. This will require collection of relevant data through geotechnical logging, mapping and laboratory testing of rock samples, development of a geotechnical model, and undertaking stability analysis.

13.2.3 Hydrogeology and Pit Water Management

From 2011 through 2020, in-pit dewatering activities have averaged 1.3 billion gallons per year with a permitted maximum of approximately 2.2 billion gallons per year (6.0 million gallons per day limit).

As detailed in section 15.4, the project-wide water balance is relatively stable year over year.

The Laurentian Pit is currently being mined at a depth that is 400 ft (122 m) below the original water table. The pit is dewatered at an average rate of 2,600 gpm by pumps placed into a sump. The sump is located at the lowest level of the pit and is re-established as the pit expands deeper.

In the East Pit mining area, two adjacent natural ore pits can be dewatered at a rate of 3,000 gpm each to lower the water table (combined 6,000 gpm).

The water from these pits is also discharged into the Lake Superior watershed. Minorca is permitted to pump via sump from East 1 (West), East 2 (East), and Laurentian Pit into the natural ore pits. The combined rate of discharge may not exceed 4,161 gpm, and discharge rate must be monitored and reported.

The water being discharged is a combination of groundwater and runoff (precipitation). Currently, no treatment is needed before it is released to the environment. The discharge locations and general flow are illustrated in Figure 13-2.

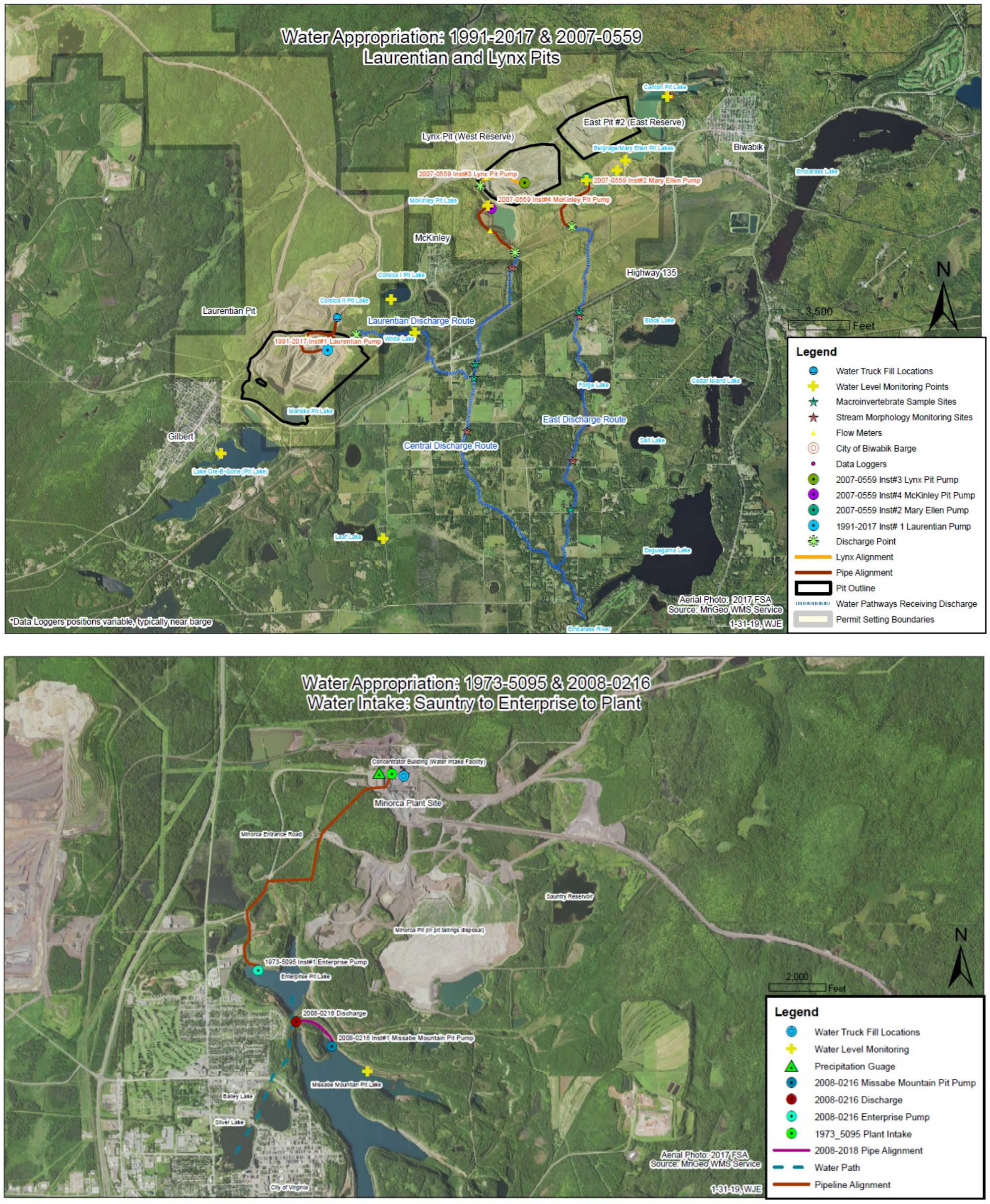


Figure 13-2: Pit Pumping and Discharge Location

13.3 Open Pit Design

The Laurentian, East 1, and East 2 pit designs combine current site access, mining width requirements, geotechnical recommendations, pit optimization results, and hard mining limits as described previously in Sections 12.0 and 13.0. Table 13-2 details the contents of the final pit designs as of June 28, 2021. Figure 13-3 presents a plan view of the final pit designs (waste rock stockpiles are not shown as they include in-pit backfills, which would obscure the final pit design view).

Table 13-2: Final Pit Design LOM Totals
Cleveland-Cliffs Inc. – Minorca Property

Pit	Crude Ore (MLT)	MagFe (%)	Stripping (MLT)	Total Material (MLT)	Strip Ratio
Laurentian	68.2	24.1	61.7	129.9	0.9
East 1	9.2	22.3	1.4	10.6	0.2
East 2	36.5	23.4	24.4	60.9	0.7
Total	**113.9**	**23.7**	**87.5**	**201.4**	**0.8**

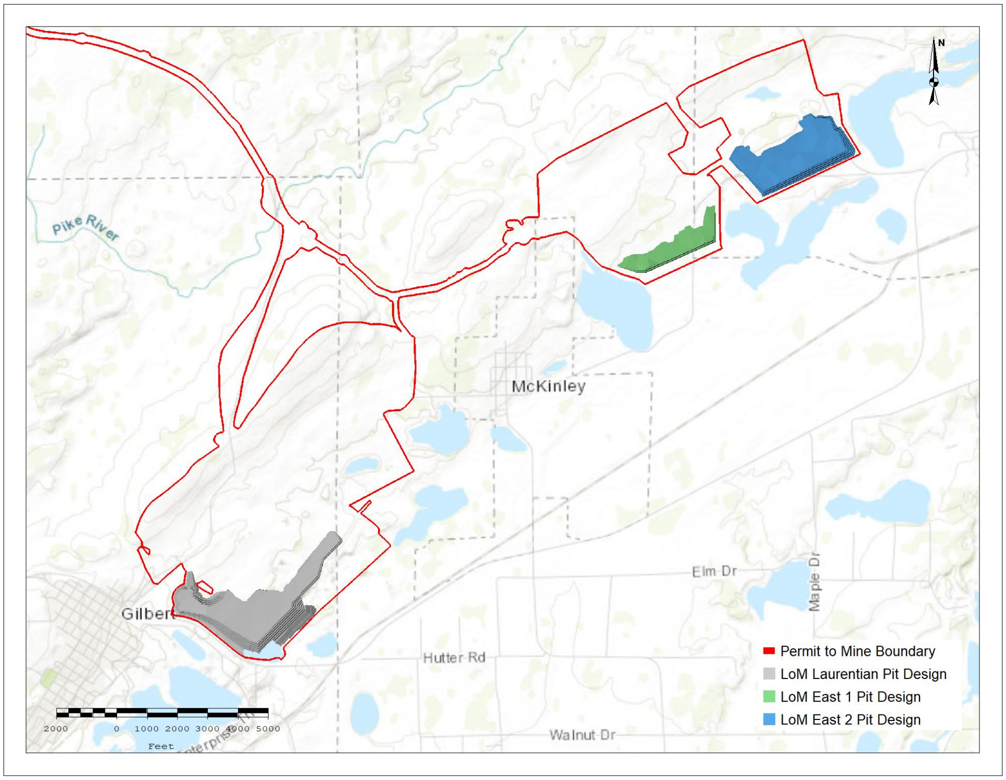


Figure 13-3: Minorca Final Pit Plan View

13.3.1 Pit Phase Design

Intermediate phase designs or pushbacks are included in the LOM planning.The main purpose for phased designs is to balance waste stripping and haulage profiles over the LOM and ensure haulage access is maintained while developing the pit.

Intermediate phase designs are largely driven by the effective mining width and access to critical material inventories, specifically the LC material. The phase designs incorporate the transition from intermediate, non-reclaimed overburden slopes to final reclamation overburden slopes.

13.4 Production Schedule

13.4.1 Clearing

Before mining operations commence in new undeveloped areas, it is necessary to remove any overburden material. The primary clearing and grubbing equipment include bulldozers, hydraulic shovels, FELs, and trucks. This equipment has been successfully deployed in historical overburden clearing operations at Minorca.

13.4.2 Grade Control

As described in Section 6.0, the geology is well known with two primary crude ore members, the UC and LC, each divided into subunits. The potential ore subunits for the UC are uc3, uc2, and uc1; the potential ore subunits for the LC are lc5b, lc5a, lc4, and lc3. Minorca uses blast hole magnetic susceptibility probing in conjunction with blast hole assays for crude MagFe and concentrate silica to assist in delineating ore/waste boundaries as well as transitions between subunits.

Generally, two crude ore faces are mined at a time, with a loading unit mining either one or two subunits. The short-range (weekly) mine plan provides instruction on the amount of material from each mining location that is to be blended at the crusher. Blending is done on a shift-by-shift basis, with mid-shift load counts being conducted to monitor compliance to the planned crude ore blend. If the crushing facility is down for maintenance, then the loads are stockpiled on the ground next to the crusher and picked up later and crushed.

13.4.3 Production Schedule

The basis of the production schedule is to:

- Consistently produce 2.8 MLT/y of wet flux pellets for the LOM.
- Limit crude ore delivery to crusher to 8.7 MLT/y.
- Limit yearly concentrate silica to a maximum of 4.2%. SLR notes that, in general, a target of 3.8% concentrate silica is ensured to reduce the use of the flotation circuit over the LOM.
- Limit the Upper Cherty (UC3, UC2, and UC1) component of the overall ore blend composition to a maximum of 30%.
- Limit total mined tons per year at approximately 18 MLT to balance both stripping requirements and mine equipment fleet utilization.

The production schedule is planned yearly throughout the LOM. Crude ore is mined from the Laurentian, East 1, and East 2 pits concurrently throughout the schedule and blended at the crusher.

Table 13-3 presents the production schedule for Minorca from January 1, 2022 through the end of the mine life.

Table 13-3: LOM Mine Production Schedule
Cleveland-Cliffs Inc. – Minorca Property

Year	Crude Ore (MLT)	MagFe (%)	Stripping (MLT)	Total Material (MLT)	Stripping Ratio	Process Recovery (%)	Concentrate SiO_2 (%)	Wet Pellets (MLT)
2022	8.8	22.4	9.2	18.0	1.0	32.2	3.2	2.8
2023	8.7	22.4	8.8	17.5	1.0	32.2	3.2	2.8
2024	8.3	23.4	7.7	16.0	0.9	33.6	3.1	2.8
2025	8.2	23.8	7.8	16.0	1.0	34.1	3.7	2.8
2026	8.3	23.5	7.7	16.0	0.9	33.7	3.5	2.8
2027	8.5	23.0	7.5	15.9	0.9	33.0	4.2	2.8

Year	Crude Ore (MLT)	MagFe (%)	Stripping (MLT)	Total Material (MLT)	Stripping Ratio	Process Recovery (%)	Concentrate SiO_2 (%)	Wet Pellets (MLT)
2028	8.6	22.7	7.4	15.9	0.9	32.6	4.0	2.8
2029	8.3	23.6	7.7	16.0	0.9	33.9	3.7	2.8
2030	8.1	24.0	6.8	14.9	0.8	34.4	3.4	2.8
2031	7.9	24.8	5.1	12.9	0.6	35.6	3.4	2.8
2032	7.6	25.6	5.2	12.8	0.7	36.8	3.3	2.8
2033	7.4	26.3	1.8	9.2	0.2	37.8	3.3	2.8
2034	7.8	25.0	0.7	8.5	0.1	35.9	3.2	2.8
2035	3.2	22.9	0.2	3.4	0.1	32.0	3.3	1.0
LOM Schedule	**109.7**	**23.8**	**83.4**	**193.1**	**0.8**	**34.1**	**3.5**	**37.4**

Recent past production (2000 to current) and LOM planned production for Minorca is summarized graphically in Figure 13-4.

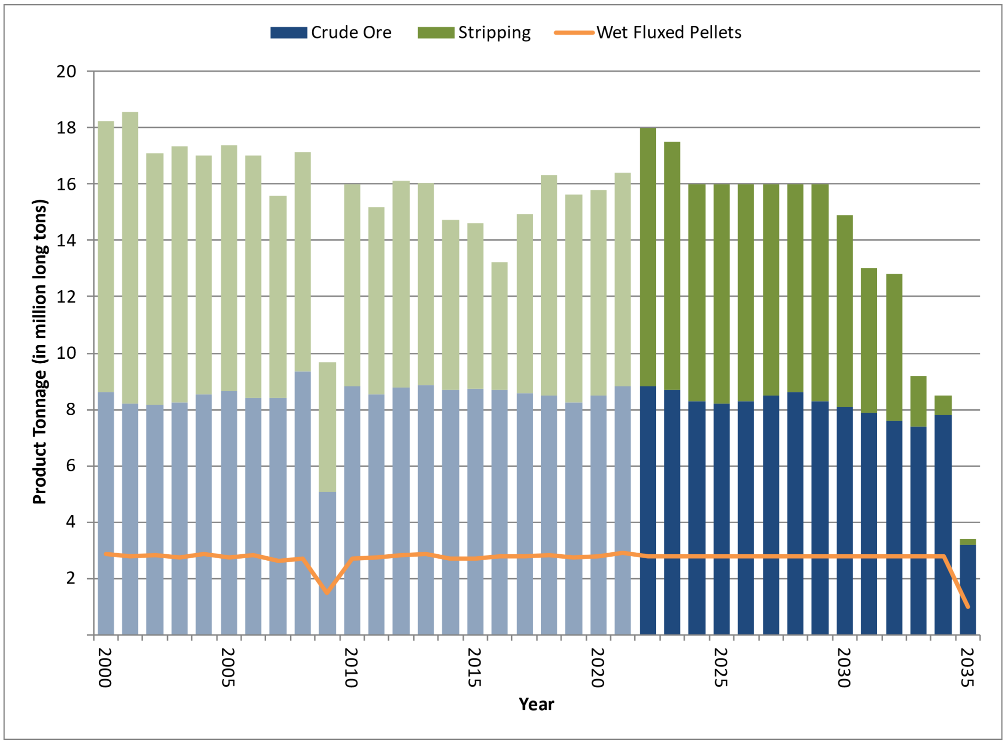


Figure 13-4: Minorca Historical and LOM Production

Of note, a production curtailment occurred during the 2009 operating year due to a downturn in the iron ore market. Other than the 2009 curtailment, production targets have been met every year since 2000.

13.5 Overburden and Waste Rock Stockpiles

Overburden and waste rock material is discretely stockpiled concurrently within designated stockpiles.

Waste material removed from the Laurentian Pit can be placed either external or internal (in-pit) to the mine pit. In-pit waste material placement is the preferred method of storage, but the advancement of the Laurentian in-pit stockpile is limited to final pit footwall exposure along the bottom of the pit. When in-pit stockpiling capacity is unavailable, waste material is placed external to the pit in surrounding stockpiles located to the north and east.

The East 1 and East 2 pits are not permitted for in-pit waste stockpiling. All waste material for these pits is placed externally in stockpiles located to the north of each respective mining pit.

The overburden and waste rock stockpile design parameters follow the requirements outlined in Minnesota Administrative Rules Standard 6130.2700 and are detailed in Table 13-4.

Table 13-4: Minorca Stockpile Parameters
Cleveland-Cliffs Inc. – Minorca Property

Parameter	Units	Waste Rock	Overburden
Overall Slope Angle	Degrees	19.4	17.5
BFA	Degrees	35.0	21.8
BH	ft	30	30
Berm Width	ft	30	20
Ramp Width - 2 way	ft	150	150
Ramp Width - 1 way	ft	90	90
Ramp Gradient	%	8	8

Three-dimensional models of the rock and overburden stockpiles were used to calculate the volume of the stockpile designs. Swell factors of 30% for *in situ* rock and 15% for *in situ* overburden were used to calculate the annual stockpile volume requirement.

The designed stockpile volume capacity and total LOM stockpiling requirements for the Laurentian Pit and East 1 and East 2 pits as on June 28, 2021 are shown in Table 13-5 and Table 13-6, respectively.

Table 13-5: Laurentian Pit Stockpile Capacities
Cleveland-Cliffs Inc. – Minorca Property

Name	Capacity (million ft^3)
Total Laurentian Pit Stockpile Capacity	1,341
2021 LOM Stockpile Requirements	979

Table 13-6: East 1 and East 2 Pit Stockpile Capacities
Cleveland-Cliffs Inc. – Minorca Property

Name	Capacity (million ft^3)
Total East 1 and East 2 Pits Stockpile Capacity	519
2021 LOM Stockpile Requirements	412

SLR notes that there is sufficient overburden and waste rock stockpile capacity included in the LOM plan.The final stockpile layouts including the pit backfills are shown in Figure 13-5. Final reclamation will involve relocating some of the stockpiled overburden as cover for the remainder of the disturbed area.

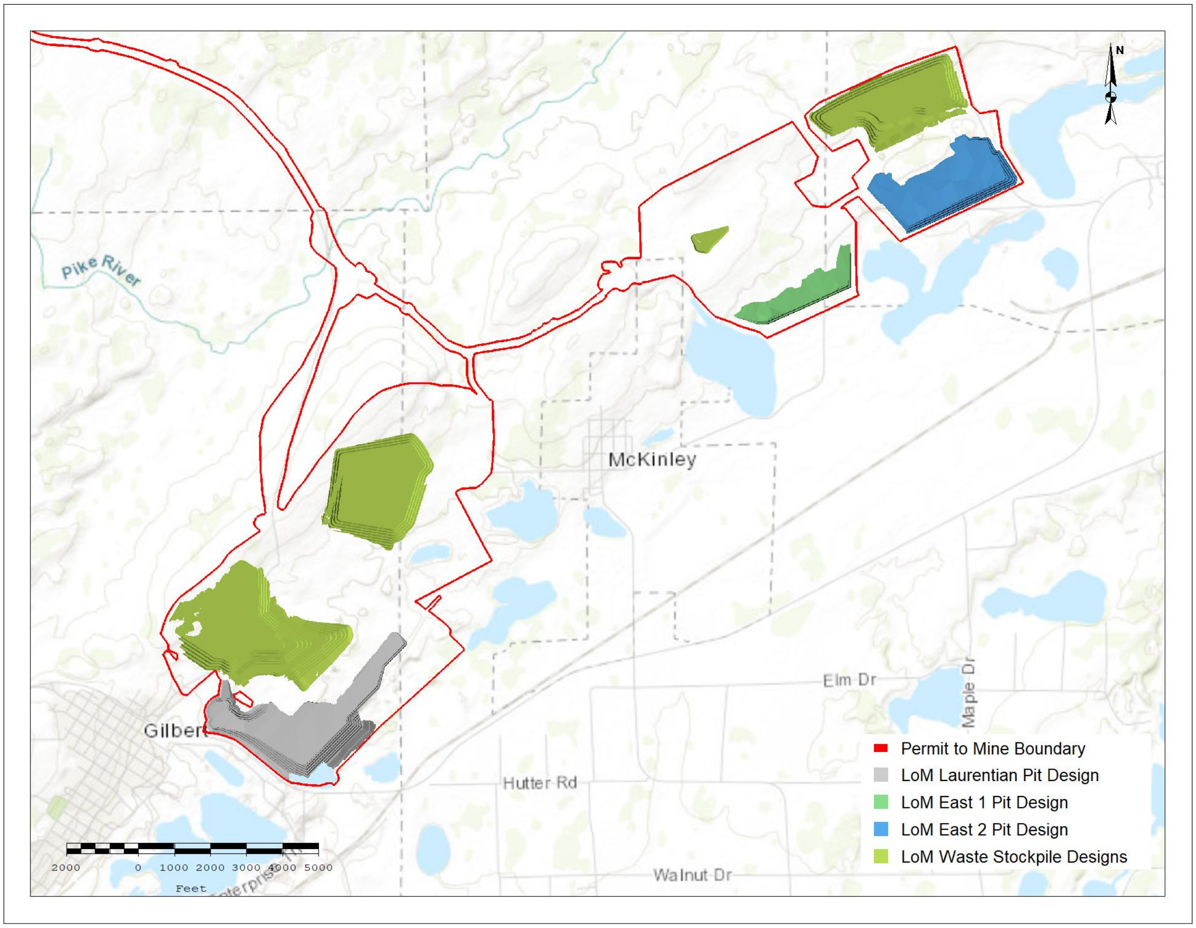


Figure 13-5: Minorca LOM Stockpile Designs

13.6 Mining Fleet

The primary mine equipment fleet consists of large drills, diesel hydraulic shovels, FELs, and off-road dump trucks. In addition to the primary equipment, there are also bulldozers, graders, water trucks, and backhoes for support. Additional equipment is on site for non-productive mining fleet tasks. The current fleet is to be maintained with replacement units as the current equipment reach the stated maximum operating hours.

Table 13-7 presents the planned average major fleet requirements estimated to achieve the LOM plan.

Table 13-7: Major Mining Equipment
Cleveland-Cliffs Inc. – Minorca Property

Year	Drills	Shovels	Trucks	Loaders	Bulldozer	Graders
2022	3	2	13	5	2	3
2023	3	2	13	5	3	3
2024	3	2	13	5	3	3
2025	3	2	13	5	3	3
2026	3	2	13	5	3	3
2027	3	2	13	5	4	3
2028	3	2	13	5	4	4
2029	3	2	13	5	4	3
2030	3	2	13	5	3	3
2031 - 2035	3	2	13	5	3	3
Size/Payload	120,000 lb	26 yd^3	200/240 ton	19 yd^3	29 yd^3	16 ft
Useful Life (hrs)	90,000	90,000	90,000	60,000	65,000	65,000
Example Unit	P&H 120A	Caterpillar 6040FS	Caterpillar 789C/793C	Caterpillar 994H	Caterpillar D10T	Caterpillar 16M

Longer haulage distances will be realized as mining operations in the Laurentian, East 1, and East 2 pits progress downdip. The LOM plan has been scheduled in a sequence, with periods of long haulage distances delivering increased crude ore MagFe grade in conjunction with lower stripping requirements. This will lead to an overall reduction in required total material movement and, as a result, remove the requirement for additional haul trucks.

The primary loading and hauling equipment were selected to provide good synergy between mine selectivity of crude ore grade and the ability to operate in wet and dry conditions. Since crude ore is blended at the primary crusher, the loading units in crude ore do not operate at capacity.

Extensive maintenance facilities are available at the mine site to service the mine equipment.

13.7 Mine Workforce

Minorca manpower is detailed in section 18.2. Current mining manpower is summarized as follows:

- Mine operations – 99

- Mine maintenance – 61
- Mine supervision and technical services – 18

Any additional required mine operations or mine maintenance manpower will be sourced from local communities.

14.0 PROCESSING AND RECOVERY METHODS

14.1 Process Description

A simplified process flowsheet for the Minorca process facilities is presented in Figure 14-1.

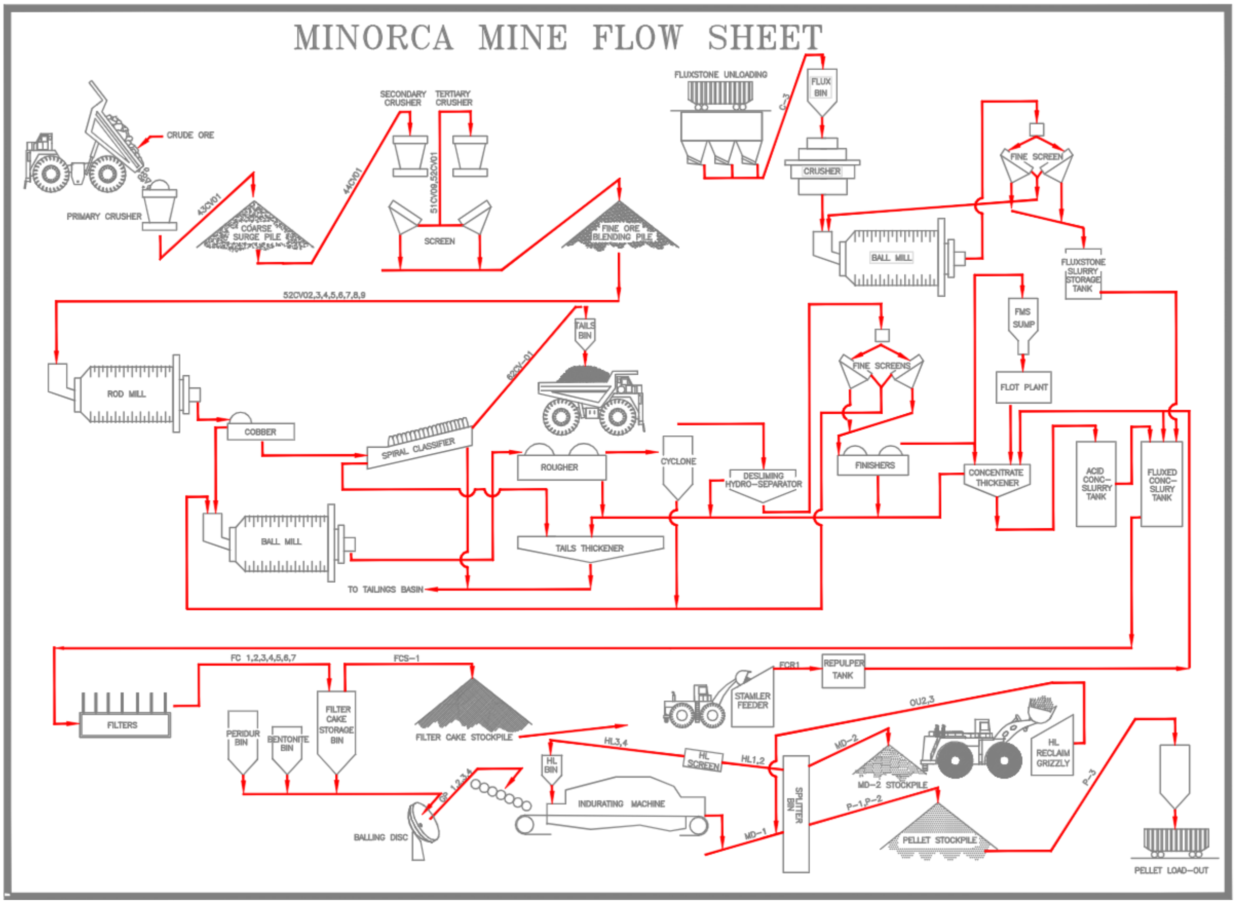


Figure 14-1: Minorca Mine Process Flow Sheet

14.1.1 Crushing

The primary crusher is a 54 in. x 84 in. gyratory crusher, which crushes the ROM material to P_{80} 6 in. The crushed material is conveyed to a coarse ore stockpile. The coarse ore is reclaimed from the stockpile with vibrating feeders and transported by the conveyor system beneath the stockpile into the secondary crushing plant crusher feed bins. Secondary crushing consists of a bank of Symons 7 ft standard cone crushers. The secondary cone crusher discharge is screened on double-deck screens. The screen oversize material is conveyed to the tertiary, 7 ft Symons short-head cone crushers for fine crushing. The crusher discharge is screened. The screen oversize material feeds conveyors that recycle the material to the tertiary crusher, and the screen is product size with a P_{100} $^5/_8$ in. The crushed product is conveyed and stacked on the fine ore stockpile. The material is reclaimed from the fine ore stockpile with a series of 20 vibrating feeders in two parallel reclaim tunnels beneath the stockpile and is conveyed to the rod mill feed bin. Five fixed-speed and five variable-speed feeders are located above each tunnel conveyor. Dual conveyors and the multiplicity of feeders provide considerable potential reclaiming flexibility, as any combination of six operating feeders will supply the 1,396 LT/h design reclaiming rate. Dust control is provided by two baghouse dust collectors.

14.1.2 Concentrator

The concentrator comprises three lines with the following unit operations included in each of the three lines.

- Rod milling – open circuit
- Cobber magnetic separation
- Ball milling – closed circuit
- Rougher magnetic separation
- Cyclone classification
- Cyclone overflow hydroseparation
- Hydroseparator underflow screening
- Finisher magnetic separation
- Finisher magnetic concentrate thickening
- Magnetic concentrate reverse flotation
- Rougher flotation concentrate (underflow) to concentrate thickening
- Rougher flotation tailings (overflow) magnetic separation
- Rougher tailing magnetic separation concentrate regrinding
- Scavenger reverse flotation
- Scavenger concentrate to rougher flotation feed
- Concentrate collection and storage
- Concentrate filtration
- Filter cake conveyed to pellet plant

Minus $^5/_8$ in. nominal size fine ore is drawn from the crushed ore feed bins into three concentrator lines. The fine crushed material draws from the rod mill feed bin into a 15 ft-diameter by 20 ft-long rod mills with 2,500 hp drives. Each line is designed to process 365 LT/h. Rod-mill discharge slurry from each mill is pumped to three cobber magnetic separators operating in parallel.

The cobbers are counter-rotation, wet magnetic separators, which separate the magnetic solids by collecting them on the face of a rotating magnetic drum. The magnetic field is provided by stationary permanent magnets fastened inside the rotating stainless-steel drums. Magnetic particles in the feed adhere to the surface of the drum and discharge when the drum surface rotates out of the magnetic field. The non-magnetic flow of the tank discharges through outlets located below each of the drums.

The non-magnetic material flows to a spiral classifier, which separates coarse and fine material. Spiral classifiers consist of a settling tank and a rotating spiral conveyor. The coarse fraction of the cobber tailings (-6 mesh by +65 mesh) settled in the tank are raked to the top of the inclined tank bottom by the rotating spiral. The rotating motion of the spiral also imparts a squeezing action that helps dewater the tailings. The coarse material is trucked to tailings, and the fine material slurry is pumped to the tailings thickener.

The magnetic material is pumped to a 15 ft-diameter by 20 ft-long ball mill for fine grinding. The target grinding product size is 78% to 83% passing 325 mesh (44 µm). The ball mill discharges into the rougher magnetic separator feed pumpbox, and the slurry is then pumped to eight rougher magnetic separators operating in parallel. The rougher magnetic separators are double-drum, counter-rotation type, wherein the pulp (concentrate) flows in the opposite direction to the drum rotation. As the magnetite particles are attracted towards the drum magnets, counter-current wash water aids in removal of non-magnetic or weakly magnetic particles from the concentrate product. The non-magnetic tailing reports to the tailings thickener, and the magnetic concentrate is pumped to the ball mill hydrocyclone classifiers.

The cyclone overflow, which is nominally 90% -325 mesh (44 µm), flows by gravity to the hydroseparator in the same concentrator line. The cyclone underflow is discharged into the ball-mill feed box for regrinding. Each 20 in.-diameter cyclone with a 3.5 in. apex orifice is made of cast iron with replaceable, molded rubber lining. Since only five of the six cyclones are normally used at one time, most cyclone maintenance can be accomplished during operation.

Each concentrator line has a hydroseparator, which receives the overflow from the corresponding cluster of six cyclones. Before reaching the hydroseparator, the cyclone overflow is channeled through a permanent magnet, which magnetizes the magnet particles in the slurry. This causes the magnetic particles to agglomerate into flocculants that settle much more rapidly than the individual particles. The feed slurry enters the hydroseparator at the central feed well. The magnetic flocculants settle to the bottom of the tank, while the finely divided siliceous material is swept out into the peripheral overflow launder by the rising stream of hydraulic water. Rotating rakes with blades spaced radially across the rake arm plow the settled solids to the center of the tank. Spiral-vane rake blades at the center guide the material through the discharge cone and out to the finisher feed pumps.

The hydroseparator underflow is pumped through a demagnetizing coil to four finisher magnetic separators operating in parallel. This final concentrating step is accomplished by two-drum, counter-current, finisher magnetic separators. Four units are provided for each line and are fed with hydroseparator underflow. Feed is introduced in the feed box at the top and is carried upwards to the first drum by a stream of repulping water introduced below the feed. Magnetic particles are attracted to the revolving drum surface and are carried through the clean water wash. Clean magnetic particles are discharged and processed through the second drum in a similar manner. Tailings flow through the bottom outlets and are laundered to the tailings thickener. The magnetic concentrate is pumped to the concentrate thickener or, if the silica content is higher than the pellet feed specification, to the flotation circuit feed tank.

A flotation plant was added to the process to treat ore from the Laurentian Pit, which contains a higher percentage of silica in magnetically recovered concentrate, requiring flotation to meet the silica targets of pellet feed. The flotation feed pumps pump concentrate slurry to the flotation feed distributor. An amine collector, frother, and water solution is pumped to a spray bar in the distributor, where it is mixed with the concentrate slurry, which then flows into the rougher flotation cells, where it is agitated with air drawn into the cells through the agitator shafts. Silica particles attach to the air bubbles and are floated from the concentrate reporting to the flotation cell overflow (reverse flotation), while the magnetic iron concentrate leaves the flotation circuit through the rougher cell underflow, which goes to the flotation concentrate sump. The material is then pumped to the concentrate thickener.

The rougher flotation overflow tailings are passed through magnetic separators to separate the magnetic iron and fine tails in the material. The magnetic iron flows to the flotation thickener, and the non-magnetic tailings flow to the tailings thickener. The flotation thickener underflow material is pumped to the boil box feeding the flotation regrind ball mill, where it is ground to a P_{80} 500 mesh (25 µm) to liberate the remaining silica from iron particles. The slurry is pumped to a bank of cyclones for classification, with the cyclone underflow returning to the ball mill and the cyclone overflow flowing to the scavenger flotation feed tank and into a bank of scavenger flotation cells. The scavenger flotation cell overflow slurry flows to the tailings thickener, and the scavenger flotation concentrate is pumped to the rougher flotation feed tank.

The magnetic and/or flotation concentrate is pumped from the concentrate thickener underflow to the acid concentrate storage tank. The acid concentrate is then transferred to the fluxed concentrate storage tank, where it is mixed with flux slurry from the flux slurry storage tank.

14.1.3 Flux Plant

The flux plant, located near the flux stockpile, was added to the operation to introduce calcium and magnesium to the pellet composition. Process performance at the IH7 is more effectively and efficiently optimized by infusing calcium and magnesium into the pellets at Minorca ahead of steel making.

The mine receives flux stone via rail car, which is unloaded and conveyed to a storage pile by a series of feeders and conveyors. The system consists of three Syntron Feeders beneath the rail car-unloading hopper, and four conveyors that transport the flux stone to the storage pile. The flux stone is brought into the flux plant system via loader and is required to maintain an operation level (80% to 100%) in a flux slurry storage tank in the concentrator. This slurry is added to the concentrate slurry to accomplish a target calcium to silica ratio (C/S) of 1.10 in the pellet chemistry.

The stone is loaded (by the loader) into a hopper that feeds a conveyor, which enters the pellet building where the flux crusher and ball mill are located. The crusher reduces the flux to less than 5/8 in. size with a gapping of $^{3}/_{8}$ in. This material is passed into the flux ball mill charged with 2 in. grinding balls, which discharges into the screen feed sump feeding a distributor that passes the material over six three-panel vibrating screens (one typically in standby). Oversize particles are recirculated to the ball mill. The undersize material is then pumped into the flux slurry tank via one of the two available screen-undersize pumps.

14.1.4 Pellet Plant

After magnetic separation, the concentrate contains 67.5% magnetite and has a particle size distribution of 88% passing 325 mesh (44 µm). It is stored in the slurry storage tanks at a density of approximately 65% solids.

The concentrate slurry is filtered to approximately 9.3% moisture using disc filters and discharged onto conveyors feeding the agglomeration (balling) discs. The filtered concentrate is then mixed with bentonite at a rate of 20 lb/LT of filter cake using an on-belt Pekay mixer, which delivers the feed onto one of six, 20 ft-diameter balling discs with a variable speed rate of 4 rpm to 8 rpm to produce green balls having a size distribution of at least 90% +¼ in. and -½ in. Each disc contains a ceramic-coated plow to scrape the surface of the disc and prevent build-up. Water sprays are used to add moisture to control the rate of green ball generation. The green balls are discharged over the peripheral lip of the balling disc onto a conveyor for delivery to the indurating area. Bentonite handling includes bentonite unloading, bentonite silo transfer, and a shift-in baghouse and is incorporated in the pellet plant. This full system was supplied by the H.B. Fuller Company.

The green balls are then indurated on a straight-grate furnace (natural gas fed burners) to form fired pellets; moisture is driven out of the pellets in the furnace, and magnetite is converted to hematite. A Dravo straight-grate indurator is used at Minorca, in which green balls from the balling discs are hardened in stages by drying, preheating, firing at high temperature, and then cooling. The furnace splits into six zones: Updraft Drying, Down Draft Drying, Preheating, Firing, First Cooling, and Second Cooling.The fired product discharged from the machine is conveyed to the splitter chute, where the required hearth and side layer is separated and recycled through the furnace. The remaining product is conveyed to the pellet storage pile and/or emergency pellet storage pile. The fired pellets from the storage piles are loaded into rail cars.

14.2 Major Equipment

A list of major equipment is provided in Table 14-1.

Table 14-1: Major Processing Equipment
Cleveland-Cliffs Inc. – Minorca Property

Area	Equipment	Model	In Use	Size	Power
Primary Crushing	Gyratory Crusher	Allis Chalmers	1	54” x 84"	1,000 hp
Secondary Crushing	Standard Cone Crusher	Nordberg	3	7’	350 hp
Secondary Crushing	Double Deck Screen	Tyler	3	6' x 16'	30 hp
Tertiary Crushing	Short Head Cone Crusher	Nordberg	4	7’	350 hp
Tertiary Crushing	Double Deck Screen	Tyler	4	6' x 16'	30 hp
Concentrator	Rod Mill	Nordberg	3	15' x 20'	2,500 hp
Concentrator	Double Drum Cobber Magnetic Separator	Stearns	9	36" x 120"	7.5 hp
Concentrator	Spiral Classifier	Denver	3	78" dia. x 43'4" L	30 hp
Concentrator	Ball Mill	Allis Chalmers	3	16'6" x 36'	3,000 hp
Concentrator	Rougher Magnetic Separators	Stearns	19	36" x 120"	7.5 hp

Area	Equipment	Model	In Use	Size	Power
Concentrator	Cyclones	Krebs	18	20"	350 hp
Concentrator	Finisher Magnetic Separators	Stearns	12	30" x 120"	7.5 hp
Concentrator	Primary Hydro Separator	Eimco	3	43' dia.	10 hp
Concentrator	Finisher Fine Screens	Derrick	24	4' x 8'	1.5 hp
Concentrator	Concentrate Thickener	Eimco	2	52' dia.	3 hp
Concentrator	Tails Thickener	Eimco	1	400' dia.	10 hp
Flotation	Rougher Flotation Cells	Wemco	8	$1000ft^3$	75 hp
Flotation	Flotation Froth Thickener	Eimco	1	40' dia.	10 hp
Scavenger	De-Watering Magnetic Separator	Eriez	2	48" x 120"	7.5 hp
Scavenger	Flot Regrind Mill	Marcy	1	10'8" x 18'	900 hp
Scavenger	Scavenger Flotation Cells	Wemco	3	$500ft^3$	40 hp
Fluxstone	Flux Cone Crusher	Nordberg	1		200 hp
Fluxstone	Flux Ball Mill	Marcy	1	10'8" x 18'	900 hp
Fluxstone	Fine Screens	Derrick	6	4' x 8'	1.5 hp
Filtering	Filters - 10 Disk	Scanmec	7	9' dia.	7.5 hp
Filtering	Vacuum Pumps	Nash	5		700 hp
Filtering	Vacuum Pumps	Somorokis	1		700 hp
Balling	Balling Disks	Dravo	6	19' 9" dia.	125 hp
Balling	Mixers	PeKay	6	16" Wheel	(2) 15 hp
Balling	Tabler Feeders	Sala	6		20 hp
Pelletizer	Indurating Machine	Dravo	1	4 m wide x 76 m long	
Pelletizer	Cooling Air Fan	Westinghouse	1	613,760 cfm	3500 hp
Pelletizer	Windbox Exhaust Fan	Westinghouse	1	458,710 cfm	4500 hp
Pelletizer	Updraft Drying Fan	Westinghouse	1	550,160 cfm	3500 hp
Pelletizer	Windbox Recoup Fan	Westinghouse	1	532,230 cfm	3500 hp
Pelletizer	Hood Exhaust Fan	Westinghouse	1	587,480 cfm	2000 hp

14.3 Plant Performance

Table 14-2 presents the key performance indicators (KPI) for the Plant from 2013 to 2020.From 2015 to 2020, the Minorca concentrator processed an average 8,782,900 LT/y of ore with an average MagFe grade of 22.7%. The overall mass recovery to concentrate averaged 32.5% with an overall MagFe recovery of 95.4%. Final product for the period averaged 2,789,200 LT/y of flux pellets and 42,200 LT/y of lump product with grades of 62.6% Fe and 4.2% SiO_2. Plant performance continues to be very consistent. Primary crusher and grinding mill performance and productivity are primarily dependent on preventative maintenance and operating conditions. The increase in pellet plant productivity in recent years is largely attributed to maintenance.

Table 14-2: Minorca Concentrator Performance 2013–2020
Cleveland-Cliffs Inc. – Minorca Property

	2013	2014	2015	2016	2017	2018	2019	2020
Total ROM (kWLT) Primary Crusher Feed	9,002.7	8,852.5	8,895.6	8,843.9	8,710.8	8,645.7	8,751.8	8,730.9
Laurentian	0.0	0.0	0.0	3,309.8	4,814.6	4,109.2	2,196.3	5,187.2
Central	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East	0.0	0.0	0.0	5,534.2	3,896.2	4,536.5	6,555.5	3,543.8
%Fe (mag)	22.7%	23.2%	20.9%	23.0%	22.6%	22.5%	23.1%	24.0%
% SiO_2	3.7%	3.6%	3.6%	3.7%	3.4%	3.6%	4.9%	3.5%
% Moisture	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Feed to Processing Plant (kWLT) Rod Mill Feed	8,939.0	8,615.7	9,004.4	8,871.4	8,693.5	8,645.7	8,751.8	8,730.9
% Mass Yield	32.7%	31.9%	30.5%	32.0%	32.8%	33.2%	33.2%	33.2%
Finished Concentrate Production (kWLT)	2,926.6	2,744.2	2,742.2	2,836.1	2,852.7	2,872.1	2,715.6	2,897.3
% MagFe Recovery	95.4%	94.6%	94.0%	94.5%	93.9%	96.2%	96.8%	97.4%
Finished Production (kWLT)	2,921.4	2,743.4	2,742.2	2,836.1	2,852.7	2,872.1	2,783.3	2,902.1
Lump	48.9	51.3	49.9	39.0	43.6	39.1	39.0	42.9
Pellet	2,872.5	2,692.1	2,692.3	2,797.1	2,809.1	2,833.0	2,744.4	2,859.3
Tailings/Processing Waste (kWLT)	6,665	6,300	6,600	6,401	6,042	6,141	6,214	6,199
Tailings Fe% (total)	1.6%	1.7%	1.8%	2.0%	1.9%	1.7%	1.6%	1.6%
Year-End Product Inventory (kWLT)	456.3	546.2	382.8	439.6	544.1	623.7	253.0	243.5
Lump	24.1	8.3	20.2	15.6	19.1	34.4	13.7	2.2
Pellet	96.8	211.1	134.4	239.7	267.3	451.7	42.8	19.6
Fines	306.9	216.1	94.8	133.6	235.9	95.6	158.9	108.4
Concentrate	1.9	5.1	50.4	6.5	2.5	2.1	28.4	34.0
Pellet Feed	26.6	105.6	83.0	44.2	19.3	39.9	9.3	79.1
Finished Shipments (kWLT)	2,890.8	2,758.1	2,729.5	2,823.6	2,799.4	2,820.7	2,695.9	2,880.5

	2013	2014	2015	2016	2017	2018	2019	2020
Lump	36.9	67.1	38.1	43.6	40.1	23.8	58.6	40.6
Pellet	2,853.9	2,691.0	2,691.4	2,780.0	2,759.3	2,796.9	2,637.2	2,839.9

14.4 Pellet Quality

Table 14-3 presents the key quality parameters for Minorca flux pellet production from 2013 through 2020. Pellets' grades for the period averaged 62.6% Fe and 4.2% SiO_2. The required range for SiO_2 content of the fired pellets is 3.78% to 4.62%, respectively.

Table 14-3: Flux Pellet Quality
Cleveland-Cliffs Inc. – Minorca Property

Characteristic	2013	2014	2015	2016	2017	2018	2019	2020
Fe% - Final Product	62.72%	62.73%	62.53%	62.74%	62.76%	62.79%	62.50%	62.50%
SiO_2% - Final Product	4.21%	4.23%	4.25%	4.22%	4.21%	4.20%	4.20%	4.20%
Al_2O_3% - Final Product	0.20%	0.18%	0.20%	0.19%	0.17%	0.20%	0.21%	0.22%
P% - Final Product	0.010%	0.009%	0.010%	0.011%	0.009%	0.008%	0.007%	0.007%
% Moisture - Final Product	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%

14.5 Consumable Requirements

Table 14-4 summarizes the energy, water, and product supplies that Minorca used in 2020.

Table 14-4: Energy Usage
Cleveland-Cliffs Inc. – Minorca Property

	Unit	Rate
Energy Usage		
Crusher Power	kWh/LT Pellet	9.09
Concentrator Power	kWh/LT Pellet	67.63
Pellet Plant Power	kWh/LT Pellet	49.51
Indurator Fuel	MMBTU/LT Pellet	0.55
Consumable Usage		
Grinding Balls	lbs/LT Pellet	1.87
Grinding Rods	lbs/LT Pellet	2.95
Fluxstone	LT/LT Pellet	0.12
Flocculent	lbs/LT Pellet	0.05
Flotation Additives	lbs/LT Pellet	0.12
Bentonite	lbs/LT Pellet	24.13
Caustic	gal/LT Pellet	0.011
Make Up Water	gal/LT Pellet	392.95

14.6 Process Workforce

Current processing headcount totals 165 and is summarized as follows:

- Plant operations – 82
- Plant maintenance – 73
- Plant supervision and technical services – 10

15.0 INFRASTRUCTURE

15.1 Roads

The Property is located approximately one mile to the west of the city of Virginia, Minnesota.The towns of Gilbert and Biwabik are approximately one mile to the west and east, respectively (Figure 15-1). The Property is accessed by County, State, and Federal paved and unpaved roads. The Property is also easily accessible from the major regional population center of Duluth, Minnesota, which is located approximately 69 mi to the southwest via US Highway 53.

15.2 Rail

Finished pellets are loaded into rail cars called ore jennies from storage silos with automated feeders located north of the pellet plant. The pellets are transported by CN Railway from the plant site to the CN-operated port facilities in Two Harbors, Minnesota, a distance of 75 mi, as shown in Figure 15-1. The pellets are transported in ore freighters on the Great Lakes from Two Harbors to the Cliffs Indiana Harbor steel mill in East Chicago, Indiana. Alternatively, the pellets are transported by rail directly from the Minorca plant site to the Indiana Harbor.

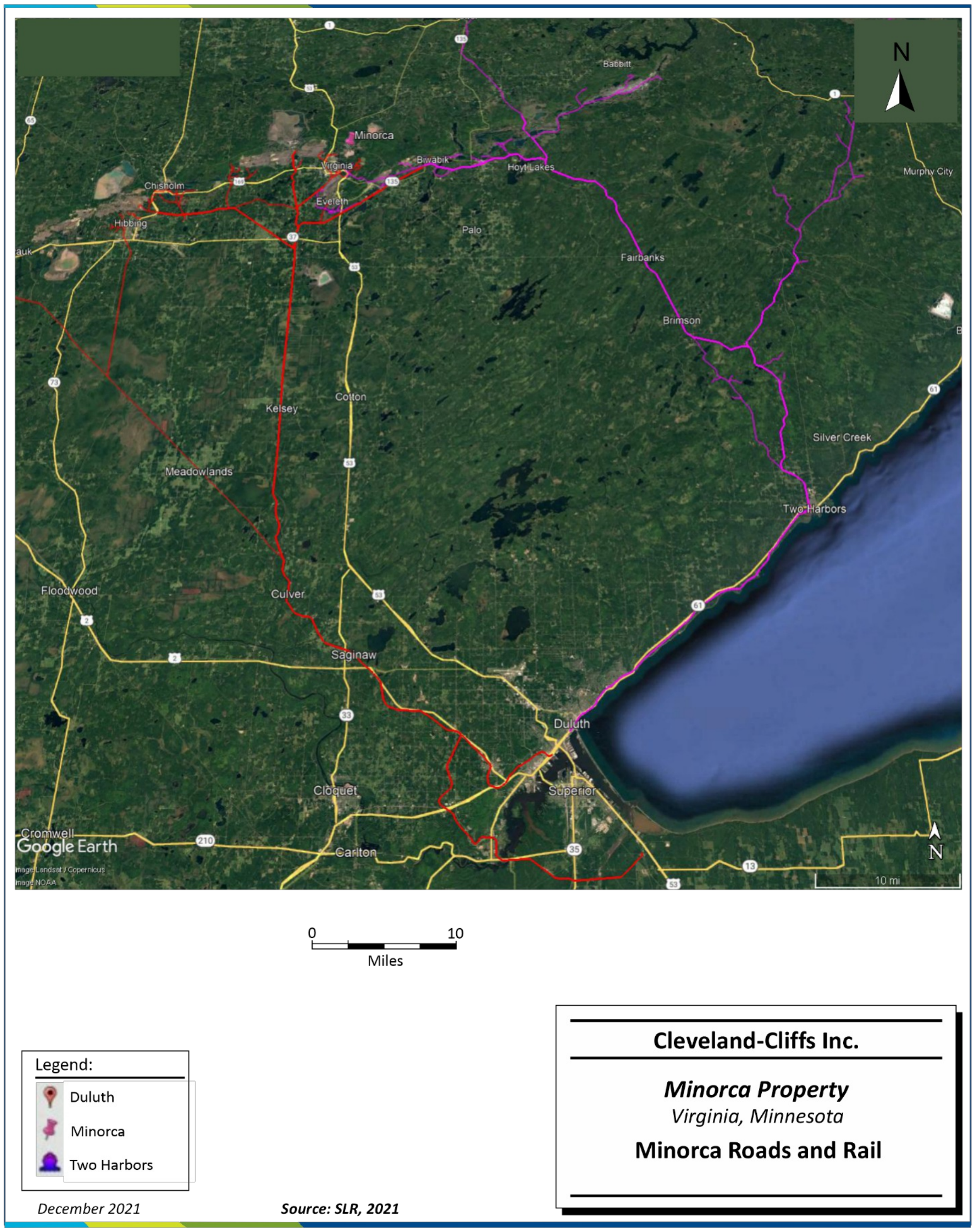
15.3 Port Facilities

Port facilities are located in Two Harbors, Minnesota and are controlled by CN Railway and include pellet storage and ship loading docks. Two Harbors consists of two operating iron ore docks, Dock No. 1 and Dock No. 2, and outside on-ground stockpile storage.

Figure 15-2 shows an aerial view of the two operating docks including Dock No. 1 to the north and Dock No. 2 to the south of Dock No. 1.The third, most southerly dock is not currently in operation. Dock No. 1 is 1,344 ft long and has a total of 224 pockets with capacities of 250 tons each for a total of 56,000 tons. The top of the dock has four parallel rail lines positioned above the ore pockets. The pockets are filled from bottom-discharge ore jennies (rail cars). There are 112 pockets on each side that have gravity discharge chutes, which are lowered to load the ore freighters.

Dock No. 2 is 1,368 ft long and has both rail and conveyor access. The north side of the dock has 114 pockets with capacities of 300 tons each for a total of 34,200 tons. The north side pockets are loaded from rail cars. The south side of the dock is equipped with a tripper conveyor and ship loading system, which is fed from a 2.5 million ton outside storage area. The outside storage comprises long stockpiles managed with a stacker reclaimer system. Ships are loaded using gravity-discharge chutes on the north side and conveyors on the south side.

Ships leaving the port vary in size between 20,000 tons and 65,000 tons per vessel. An aerial view of the overall port facilities is shown in Figure 15-3.

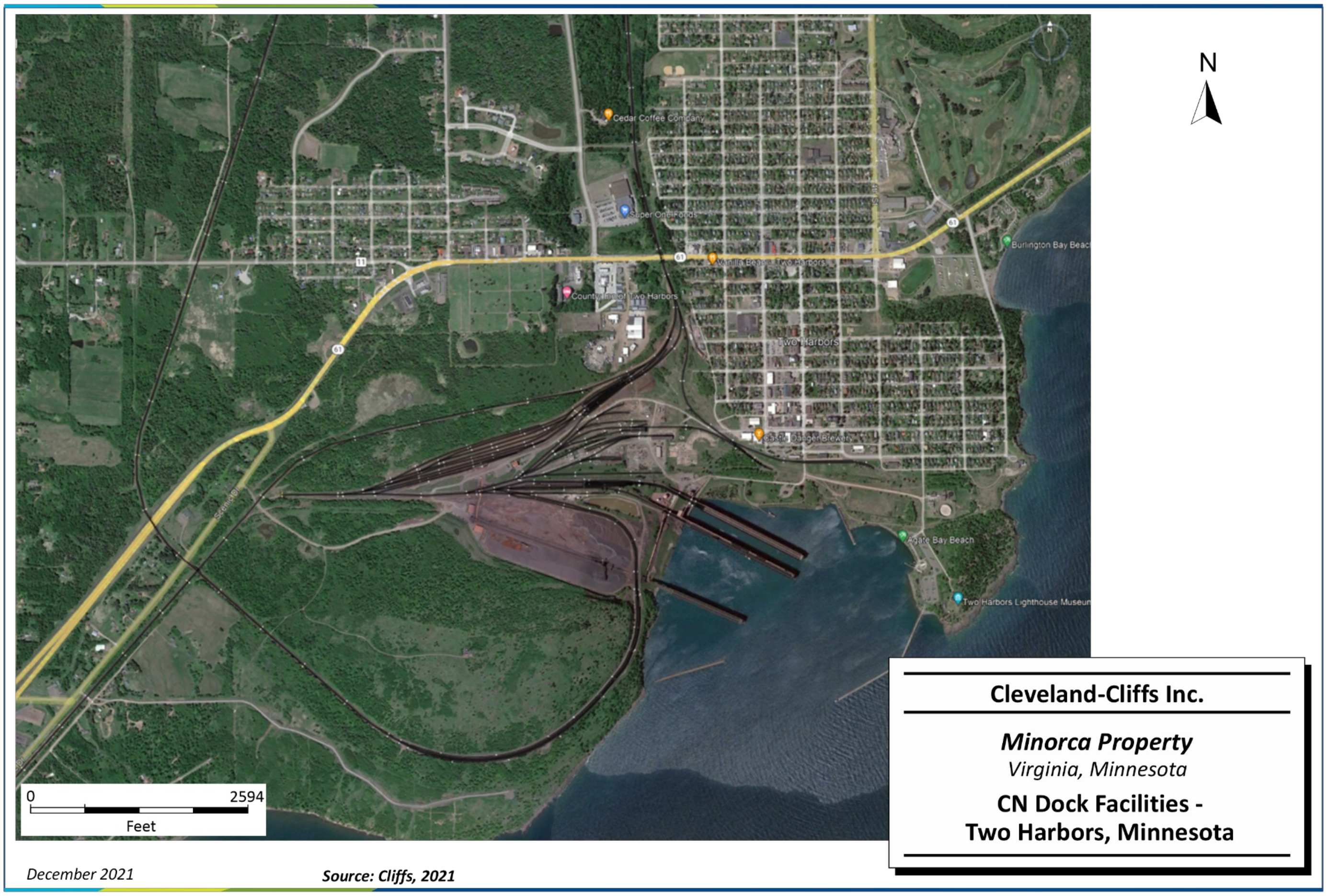


December 2021

Source: SLR, 2021

Figure 15-1: Minorca Roads and Rail

Figure 15-2: Aerial View of the Two CN Operating Docks at Two Harbors, Minnesota



December 2021

Source: Cliffs, 2021

Figure 15-3: CN Dock Facilities – Two Harbors, Minnesota

15.4 Tailings Storage Facility

Minorca's mining operation has two disposal areas for tailings waste: the Upland Tailings Basin (Upland) and the Minorca In-Pit Tailings Basin (In-Pit). The Upland Tailings Basin is located approximately three miles northeast of the plant, and the In-pit is located approximately one mile south-southwest of the Plant. Minorca began using the Upland as a disposal site for fine tailings in the mid-1970s and continued to do so until December 2001, at which time Minorca switched to disposing of fine tailings in the In-pit. Minorca switched back to the Upland near the end of 2011, with intermittent disposal into the Minorca In-pit.

The In-Pit Tailings Basin was permitted as unlined facilities, with the foundation materials and tailings providing a low-permeability material to reduce seepage. The Main Perimeter Dam of the Upland was constructed with a PVC geomembrane on the upstream face.

Two types of tailings are produced and placed within the tailings basins: coarse tailings and fine tailings. The plant total tailings are classified before the fines tailings pumps with a screw classifier. Approximately 26% of the total tailings are coarse tailings, which are trucked to the basin for dam construction material. The remaining approximately 74% are considered fine tailings and are pumped as slurry at a rate of approximately 4,500 gpm at 45% to 50% solids. Minorca produces approximately 6.1 Mt of tailings annually, consisting of 4.5 Mt fine tailings and 1.6 Mt coarse tailings.

The location of the Upland and In-pit Tailings Basins is shown on Figure 15-4.

Source: Knight Piésold, 2020

Figure 15-4: TSF Location

15.4.1 Facility Description

15.4.1.1 Upland Tailings Facility

The Upland Tailings Basin is divided into four cells (from south to north): Cell I, Cell II, Cell IIA, and the Main Basin. The Main Basin is the largest of the four cells, covering approximately 1,420 acres, and occupies the northern half of the basin. The Main Basin Dam is currently approximately 2.9 mi long, has an approximately 50 ft maximum height, and has been raised in a downstream manner.

Cell I and Cell II are located at the southwest portion of the basin, while Cell IIA is located at the southeast portion of the basin, adjacent to eastern side of Cells I and II. Sections of the Cell I North Interior Dam (NID), Cell IIA Interior Dam (ID), and Cell IIA Dike IIA were constructed in an upstream manner, with the dam constructed over tailings placed within the Main Basin. Tailings deposition in Cell I and Cell II were managed separately; however, the dams have been raised (currently at Phase 5 with plans to go to Phase 7), and the tailings are now at an elevation where the Cell I Interior Berm dividing the two will be covered with tailings. Cell I/II will be managed as one basin, with tailings currently being discharged at the southern edge of Cell I. Cell I/II is approximately 3.2 mi long, has a maximum height of approximately 100 ft, and was raised in an upstream and modified centerline methodology using the coarse tailings at slopes that vary from 3H:1V to 5H:1V, with some newer sections of the tailings dam being constructed entirely on coarse tailings and having an overall composite slope of 7.5H:1V when intermediate benches are included. Cell IIA was raised in a downstream and modified centerline methodology using coarse tailings and has a maximum dam height of approximately 80 ft and a dam crest length of approximately 1.5 mi. Tailings are not being deposited in Cell IIA currently; however, long range plans consider construction of a new Cell IIB to the north of Cell IIA and adjacent to Cell II, constructed in an upstream manner over tailings placed within the Main Basin and tailings deposition from the southern end of Cell IIA.

While tailings are currently being deposited in Cell II, the supernatant pool and water level is controlled by a decant structure located at the northwest end, adjacent to the Cell II NID. The decant structure consists of an eight-foot-diameter, pre-cast concrete manhole, a base slab, and trash rack, which is connected to a 42 in. (outer diameter), high-density polyethylene pipe (HDPE) that extends through the embankment and daylights at the downstream toe of Cell II WPD. The decant structure makes it possible to control the elevation of the Cell II pond while minimizing the amount of fine tailings entering the Main Basin.

Reclaim pumps are located in the Main Basin to recycle water for plant operation. An emergency spillway is located on the east abutment of the Main Basin perimeter dam. A siphon is located on the Main Basin perimeter dam to control water level within the Main Basin Pond.

15.4.1.2 Minorca In-Pit Tailings Facility

The Minorca Pit is an exhausted taconite mine located approximately one mile south of the Plant. Containment is provided by post-mining pit topography and four engineered dams, and the In-Pit has an area of approximately 560 acres. The engineered dams were constructed with upstream slopes of 2H:1V and downstream slopes that range from 2H:1V (buttress slopes) to 3H:1V (dam slopes). The In-Pit comprises associated red ore (DSO) pits including the Sullivan, the Higgins, and the Lincoln D pits and was first used for fine tailings disposal in December 2001, when Minorca ceased discharging into Cell IIA within the Upland area. Fine tailings were pumped to the In-Pit via pipeline. Water for plant use was pumped via a floating reclaim barge that was initially located in the Higgins Pit (Barr, 2010).

In order to provide additional containment around the perimeter of the pit, the East and South Rim Dams were constructed and raised in 2008 and 2010 in a centerline manner to a minimum crest elevation of approximately 1,479 ft, with a clay material in the core or on the upstream slope to limit seepage. Two diversion dikes were first constructed in 2004 and 2005 to address water quality issues at the water reclaim barge. Construction of North/South and East/West Diversion Dikes essentially separated the Minorca Pit (including the Sullivan) from the Higgins and Lincoln D. These diversion dikes were constructed to a minimum crest elevation of approximately 1,479 ft using a permeable waste rock to improve the water quality reporting to the Higgins and Lincoln D Pit, and was raised in 2010 in an upstream manner (Barr, 2010). A spillway on the north corner of the North/South Diversion Dike allows flow into the Higgins and Lincoln D Pit, where it is reclaimed and pumped back to the Plant.

The primary flow of tailings was switched back to the Upland at the end of 2011. The In-Pit has been used intermittently for fine tailings disposal since 2011 and is used occasionally for maintenance activities related to the Upland and piping infrastructure. The In-pit is near capacity based on the current design and permit, and design work is in progress to increase storage capacity for an additional two years of storage.

15.4.2 Design and Construction

SLR understands that Cliffs has retained Barr Engineering Co. (Barr) as the Engineer of Record (EOR) for both of the tailings basin areas. Typical EOR services include the design (i.e., volumetrics, stability analysis, water balances, hydrology, seepage cut-off design, etc.), construction and construction monitoring, inspections (i.e., annual dam safety inspections), and instrumentation monitoring data review (i.e., regularly scheduled instrumentation monitoring and interpretation), to verify that the Tailings Basins are being constructed and operated by Cliffs as designed and to meet all applicable regulations, guidelines, and standards.

Barr performed geotechnical investigations for the Upland in 2006, 2010, 2012, 2013, 2014, and 2016 (Barr, 2017), and in 2018, 2019, and 2020 (Cliffs, 2021) consisting of exploratory boreholes, cone penetration tests, field vane shear tests, and installation of piezometers. Barr also performed geotechnical investigations for the In-pit in 2009 (Barr, 2010) and 2018 (Cliffs, 2021) that focused on geotechnical and pore water data pressure. Barr considers the slope stability Factors of Safety and the flood storage requirements to meet the minimum specified requirements for both Cell II of the Upland (Barr, 2015) and In-Pit (Barr, 2010).

In 2020, Minorca performed a geotechnical investigation at the Upland Tailings Basin. The scope of work included but was not limited to standard penetration boreholes, vibratory wire piezometer installation, cone penetrometer testing, and *in situ* vane shear testing. This investigation was completed in order to evaluate the performance of existing dams and evaluate the existing ground conditions for preliminary design of a future tailings basin interior cell. The results and analysis of this investigation is pending final report.

15.4.3 Audits

The most recent audit was performed by Knight Piésold Limited (KP) for the Upland and In-Pit TSFs in 2019 (KP, 2021). The previous audit was undertaken by SRK Consulting (Australia) Pty Ltd (SRK) in 2015 (SRK, 2015).

SLR understands that an External Peer Review Team (EPRT) was established in 2019 as part of the tailings basin design and operations review.The EPRT is an independent group that is not associated with the day-to-day engineering activities performed by Barr or Cliffs, and works with the EOR and Owner to review design, construction, monitoring, and risk management.

15.4.4 Inspections

Regular inspection and monitoring are carried out by Barr, which is currently identified as the EOR for the TSFs, and include dam inspections (Barr, 2021) and piezometer measurements collected by Minorca, inclinometer data collected by Barr, and ancillary information through various site visits and communications with Minorca.

15.4.5 Reliance on Data

SLR relies on the statements and conclusions of Barr, Cliffs, and KP and provides no conclusions or opinions regarding the stability of the listed dams and impoundments.

15.4.6 Recommendations

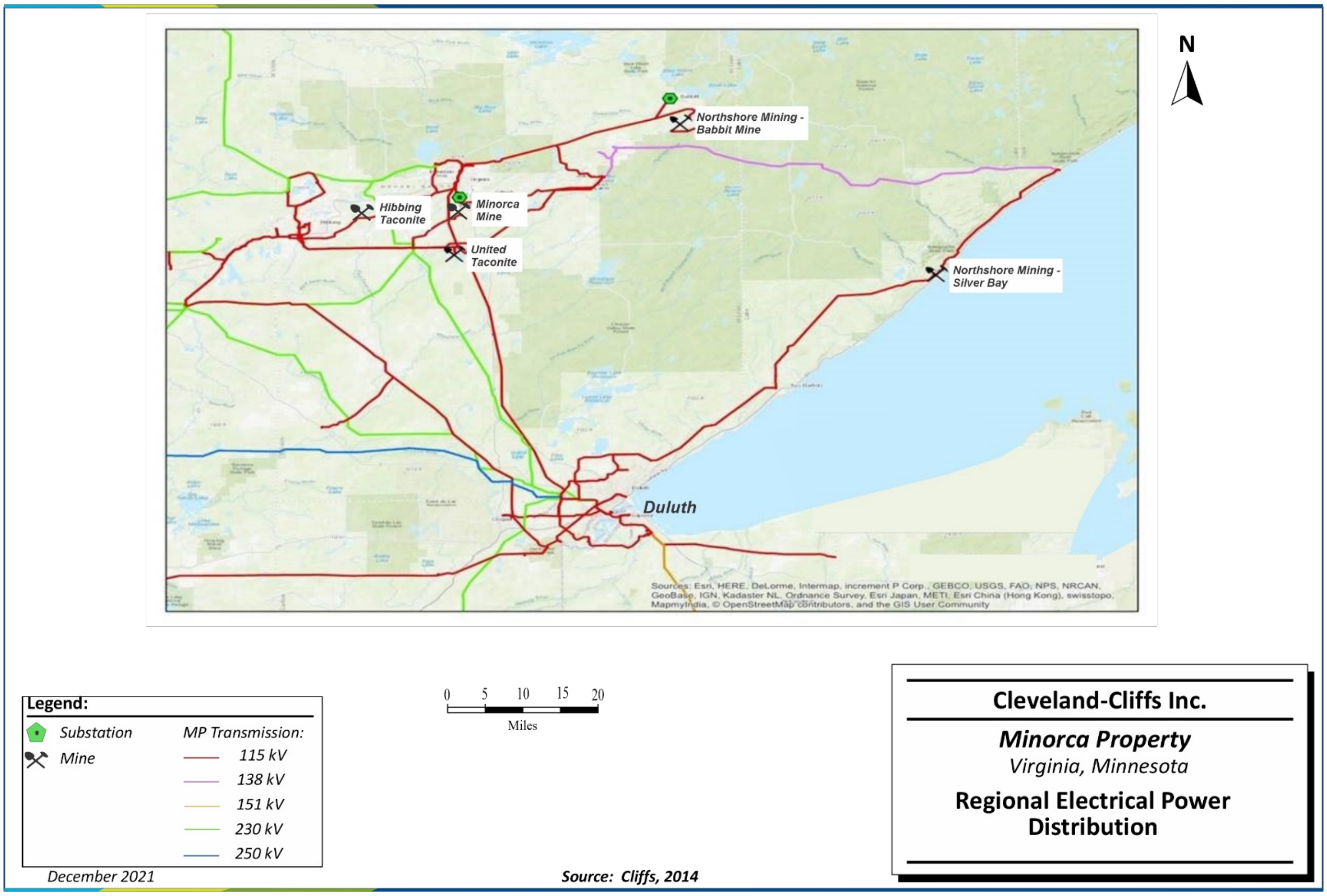
Minorca has been operating the Upland as a disposal site for fine tailings since the mid-1970s and the In-Pit since 2001, both of which are currently operating under the permit requirements of the MDNR Dam Safety Unit.Upstream tailings dam raises, such as those carried out by Cliffs at Minorca, are typically done in low-seismic zones and can be constructed using the coarse-fraction tailings (sand) material. This type of construction approach, however, requires a comprehensive communication and documentation system, careful water management, monitoring of the dam and foundation performance, and the placement of tailings material to ensure that it meets the design requirements. To address these issues, Cliffs has retained Barr as the EOR, with the EOR designation being an industry standard for tailings management, as the EOR typically verifies that the tailings storage basin cells are being constructed and operated by Cliffs as designed and to meet all applicable regulations, guidelines, and standards.

Based on a review of the documentation provided, SLR has the following recommendations:

1. Prioritize the completion of an Operations, Maintenance and Surveillance (OMS) Manual for the TSF with the EOR in accordance with Mining Association of Canada (MAC) guidelines and other industry recognized standard guidance for tailings facilities.
2. Document, prioritize, track, and close out in a timely manner the remediation, or resolution, of items of concern noted in TSF audits or inspection reports.
3. While interim reporting has been developed, an ultimate or LOM TSF design should be developed, in which a conceptual TSF configuration can accommodate the 14 year Mineral Reserve estimate.

15.5 Power

Electricity is supplied by Minnesota Power, a division of ALLETE, Inc., by overhead power lines sourced from the Virginia substation with a backup from Minnesota Power's MinnTac substation; both lines run parallel to the rail tracks north of the Plant site. Minnesota Power supplies the power to the Property through its existing electricity grid, which is interconnected to the grids of neighboring states (Figure 15-5).



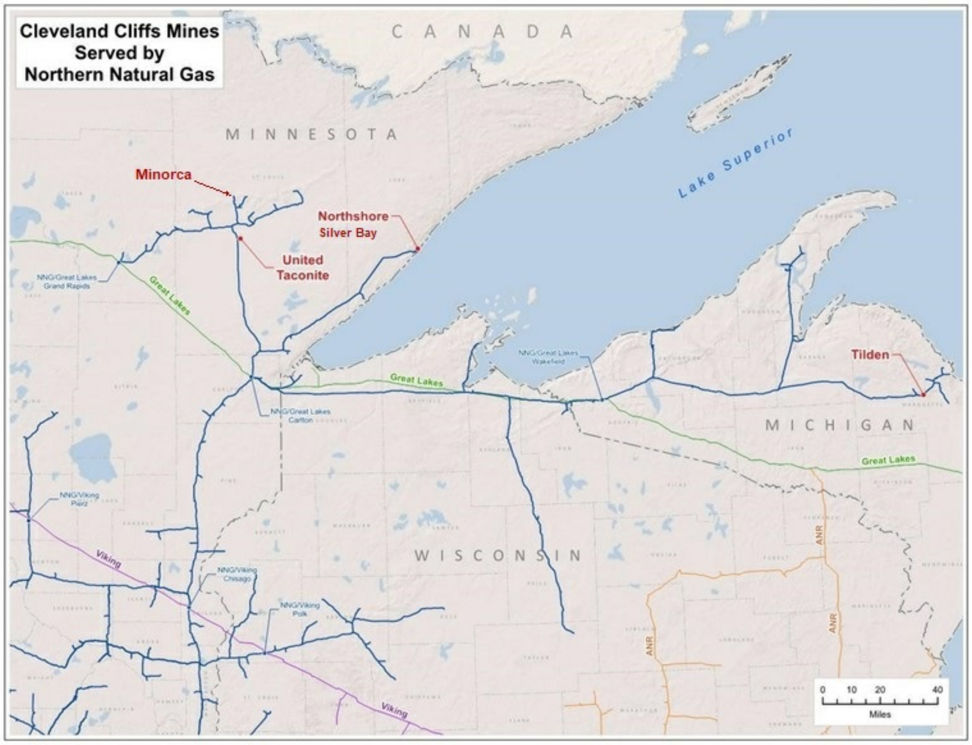
December 2021

Source: Cliffs, 2014

Figure 15-5: Regional Electrical Power Distribution

15.6 Natural Gas

Natural gas is provided by Northern Natural Gas (NNG) and scheduled by Constellation EnergyGas is delivered to the Plant using a high-pressure pipeline that connects into the North American network. Minorca has a long-term contract providing for transport of natural gas on the NNG Pipeline for its Mining and Pelletizing Operations. NNG has an extensive interstate pipeline system that travels through the Midwest and is interconnected to other major interstate pipelines (Figure 15-6). NNG supplies the processing facility via a 10 in. pipeline at 70 psi.



Source: Northern Natural Gas Company

Figure 15-6: Regional Natural Gas Supply

15.7 Diesel, Gasoline, and Propane

Large diesel equipment is fueled in the field by contractor. Small diesel and gasoline fueling stations are used for small maintenance equipment and fleet vehicles. Best Oil supplies diesel fuel to all of Cliffs' Minnesota operations, while Thompson Gas supplies propane. There is sufficient fuel supply in the region to meet the requirements of the operation.

15.8 Communications

Communications at the Plant site include email and telephone (landline and cell phone, for those requiring cell phones). Radio communications are utilized at the Mine and Plant. A Gaitronics intercom system is utilized in the plant facilities.

Wenco mobile dispatch systems are utilized for haul trucks and loading units. The loading units contain a low-precision GPS system to track event locations. Production data as well as vehicle information management system (VIMS) data is delivered back to the Plant site via line-of-site Motorola radios. The data is stored in a Wenco database, managed and maintained by Mine Engineering and Pit Operations staff. A maintenance agreement with Wenco is available for updates and troubleshooting.

15.9 Water Supply

Water to the 2,000 gal, raw potable water feed sump is normally supplied from the Enterprise Reservoir. A backup water supply is provided through a pipe re-routing into the concentrator. An on/off control valve maintains level in this sump. Two-turbine-type vertical pumps are provided to pump water through filters and into a 24,000 gal potable water reservoir. The two filters are backwashed automatically by a timer. Chlorine is added to the water through an ejector and a 7.5 gpm booster pump. The level in the potable water reservoir is maintained through level switches, which operate the raw potable water feed pumps. Potable water is pumped into the 4,000 gal, hydro-pneumatic tank by two vertical turbine pumps, each capable of pumping 200 gpm at 185 ft of total head. The hydro-pneumatic tank is pressurized by plant air through pressure switches and a solenoid valve. Water from the hydro-pneumatic tank is distributed to various parts of the Plant.

A sewage treatment building is located and managed on site. Sanitary wastewater from the Plant is treated by an extended aeration digestion package plant prior to discharge to the Plant site settling basin through monitoring station WS002.The sewage treatment plant is designed to treat average wet-weather flow of 0.017 million gallons per day with a CBOD5 influent strength of 160 ppm.Sewage sludge is removed from the treatment plant and transferred to a publicly owned treatment works (POTW) in accordance with the National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) permit for the facility. This falls under NPDES/SDS Permit No. MN0055964.

15.10 Mine Support Facilities

The mine support facilities (Figure 15-7) located at the Mine include an office building for mine management staff, production engineers, environmental personnel, safety personnel, and other support staff. Truck shops, truck wash, railroad shop, and warehouse buildings are located on the site.

Figure 15-7: Aerial View of Minorca Plant Site

15.11 Plant Support Facilities

The primary buildings at the Plant site include:

- Primary crusher
- Fines crusher
- Concentrator
- Pellet plant
- Service plant (containing offices, truck shop, IT, electrical shop, machine shop)

Compressed air is generated on site. The compressed air systems include a plant air system serving the concentrator, fine crushing plant, auxiliary systems, and the pellet plant. A second portable backup system can supply the primary crushing facility if plant air is lost. The plant air system provides for all other compressed air requirements in both the concentrator and pellet plant. Air is supplied by a single 1,250 hp, 4,600 inlet air capacity (ICFM), 125 psig compressor (63-CP-04). This compressor also supplies the instrument air and the filter snap-blow air.

A cooling water system, separate from the other plant water systems, provides the cooling requirements for the plant air systems.

16.0 MARKET STUDIES

16.1 Markets

Note that while iron ore production is listed in long or gross tons (2,240 lb), steel production is normally listed in short tons (2,000 lb) or otherwise noted.

Cliffs is the largest producer of iron ore pellets in North America. In 2020, Cliffs acquired two major steelmakers, AMUSA, and AK Steel (AK), vertically integrating its legacy iron ore business with steel production and emphasis on the automotive end market.

Cliffs owns or co-owns five active iron ore mines in Minnesota and Michigan. Through the two acquisitions and transformation into a vertically integrated business, the iron ore mines are primarily now a critical source of feedstock for Cliffs' downstream primary steelmaking operations. Based on its ownership in these mines, Cliffs' share of annual rated iron ore production capacity is approximately 28.0 million tons, enough to supply its steelmaking operations and not have to rely on outside supply.

In 2021, with underlying strength in demand for steel, the price reached an all time high. It is expected to remain at historically strong levels going forward for the foreseeable future. In 2020, North America consumed 124 million tons of steel while producing only 101 million tons, which is consistent with the historical trend of North America being a net importer of steel. That trend is expected to continue going forward, as demand is expected to outpace supply in North America. Given the demand, it will likely be necessary for most available steelmaking capacity to be utilized.

On a *pro-forma* basis, in 2019 Cliffs shipped 16.5 million tons of finished, flat-rolled steel. The next three largest producers were Nucor with 12.7 million tons, U.S. Steel with 10.7 million tons, and Steel Dynamics with 7.7 million tons.In 2019, total US flat-rolled shipments in the United States were approximately 60 million tons, so these four companies make up approximately 80% of shipments.

With respect to its blast furnace (BF) capacity, Cliffs' ownership and operation of its iron ore mines is a primary competitive advantage against electric arc furnace (EAF) competitors. With its vertically integrated operating model, Cliffs is able to mine its own iron ore at a relatively stable cost and supply its BF and direct reduced iron (DRI) facilities with pellets in order to produce an end steel or hot-briquetted iron (HBI) product, respectively. Flat-rolled EAFs rely heavily on bushelling scrap (offcuts from domestic manufacturing operations and excludes scrap from obsolete used items), which is a variable cost. The supply of prime scrap is inelastic, which has caused the price to rise with the increased demand. S&P Global Platts has stated the open market demand for scrap could grow by nearly 9 million tons through 2023 as additional EAF capacity comes online, with the impact of the scrap market to continue to tighten as all new steel capacity slated to come online is from EAFs (S&P Global Platts, news release, March 18, 2021).

In addition to its traditional steel product lines, Cliffs-produced steel is found in products that are helping in the reduction of global emissions and modernization of the national infrastructure. For example, Cliffs' research and development center has been working with automotive manufacturer customers to meet their needs for electric vehicles. Cliffs also offers a variety of carbon and plate products that can be used in windmills, while it is also the sole producer of electrical steel in the United States. Additionally, in Cliffs' opinion, future demand for steel given its low CO_2 emissions positioning will increase relative to other materials such as aluminum or carbon fiber.

Cliffs is uniquely positioned for the present and future due to a diverse portfolio of iron ore, HBI, BFs, and EAFs, generating a wide variety of possible strategic options moving forward, especially with iron ore. For instance, Cliffs has the optionality to continue to provide iron ore to its BFs, create more DRI internally, or sell iron ore externally to another BF or DRI facility.

The necessity for virgin iron materials like iron ore in the industry is apparent, as EAFs rely on bushelling scrap or metallics. As of 2020, EAFs accounted for 71% of the market share, a remarkably high percentage among major steelmaking nations. Because scrap cannot be consistently relied upon as feedstock for high-quality steel applications, the industry needs iron ore-based materials that Cliffs provides to continue to make quality steel products.

The US automotive business consumes approximately 17 million tons of steel per year and is expected to consume around or at this level for the foreseeable future. Cliffs' iron ore reserves provide a competitive advantage in this industry as well, due to high quality demands that are more difficult to meet for scrap-based steelmakers. As a result, Cliffs is the largest supplier of steel to the automotive industry in the United States, by a large margin.

Table 16-1 shows the historical pricing for hot-rolled coil (HRC) product, Bushelling Scrap feedstock, and IODEX iron ore indexes for the last five years. The table also includes the 2021 pricing for each index, which shows a significant increase that is primarily driven by demand.

Table 16-1: Five-Year Historical Average Pricing
Cleveland-Cliffs Inc. – Minorca Property

Indexes	2017	2018	2019	2020	2021	5 Yr. Avg.
U.S. HRC ($/short ton)	620	830	603	588	1611	850
Busheling ($/gross ton)	345	390	301	306	562	381
IODEX ($/dry metric ton)	71	69	93	109	160	100

The economic viability of Cliffs' iron ore reserves will in many cases be dictated by the pricing fundamentals for the steel it is generated for, as well as scrap and seaborne iron ore itself.

The importance of the steel industry in North America and specifically the USA, is apparent by the actions of the US federal government by implementing and keeping import restrictions in place. Steel is a product that is a necessity to North America. It is a product that people use every day, often without even knowing. It is important for middle-class job generation and the efficiency of the national supply chain. It is also an industry that supports national security of the US by providing products used for US military forces and national infrastructure. Cliffs expects the US government to continue recognizing the importance of this industry and does not see major declines in the production of steel in North America.

For the foreseeable future, Cliffs expects the prices of all three indexes to remain well above their historical averages, given the increasing scarcity of prime scrap as well as the shift in industry fundamentals both in the US and abroad.

16.2 Contracts

16.2.1 Pellet Sales

Since Cliffs' 2020 acquisition of AK and AMUSA's BF steelmaking facilities, Minorca flux pellets are shipped to Cliffs' steelmaking facilities in the Midwestern USA. Pellet product specifications and Minorca's performance can be found in sections 14.3 and 14.4 of this TRS.

For cash flow projections, Cliffs uses a blended three-year trailing average revenue rate based on the dry standard pellet from all Cliffs' mines, calculated from the blended wet pellet revenue average of $98/WLT Free on Board (FOB) Mine as shown in Table 16-2.Pellet prices are negotiated with each customer on long-term contracts based on annual changes in benchmark indexes, such as those shown in Table 16-1, and other adjustments for grade and shipping distances.

Table 16-2: Cliffs Consolidated Three-Year Trailing Average Wet Pellet Revenue
Cleveland-Cliffs Inc. – Minorca Property

Description	2017	2018	2019	3YTA
Revenue Rate ($/WLT)	88.02	105.64	99.50	98.00
Total Pellet Sales (MWLT)	18.7	20.6	19.4	19.5

SLR examined annual pricing calculations provided by Cliffs for the period 2017-2019 for external customers, namely AK.The terms appear reasonable. It should be noted that Cliffs has subsequently acquired AK and AMUSA steelmaking facilities in 2020, making the company a vertically integrated, high-value steel enterprise, beginning with the extraction of raw materials through the manufacturing of steel products, including prime scrap, stamping, tooling, and tubing.

For the purposes of this TRS, it is assumed that the internal transfer pellet price for Cliffs' steel mills going forward is the same as the $98/WLT pellet price when these facilities were owned by AK and AMUSA.Based on macroeconomic trends, SLR is of the opinion that Cliffs pellet prices will remain at least at the current three-year trailing average of $98/WLT or above for the next five years.

16.2.2 Operations

Minorca is a captive mine whose pellets are shipped wholly to Cliffs' Indiana Harbor complex, which is one of the largest integrated steelmaking facilities in North America and located in East Chicago, Indiana, just 20 mi southeast of Chicago.

Major current suppliers for the Minorca operation include, but are not limited to, the following:

- Electrical Grid Power: Minnesota Power
- Natural Gas: NNG with scheduling by Constellation Energy
- Diesel Fuel: Best Oil
- Propane: Thompson Gas
- Pellet Rail Transport and Two Harbors Port ship loading: CN Railway

17.0 ENVIRONMENTAL STUDIES, PERMITTING, AND PLANS, NEGOTIATIONS, OR AGREEMENTS WITH LOCAL INDIVIDUALS OR GROUPS

The SLR review process for Minorca included updating information that Cliffs had developed as part of its draft 2019 SK-1300 report. SLR also conducted a site visit at Minorca in 2021. SLR has not seen or reviewed environmental studies, management plans, permits, compliance documentation, or monitoring reports. The original and updated information included in this section is based on the information provided by the Cliffs project team.

17.1 Environmental Studies

Minorca has been operating for over 40 years, and baseline and other environmental studies have been undertaken as needed to support various approvals and compliance-based reporting over the site's operating history. Currently, additional environmental studies, including collecting new or updated baseline information, are undertaken on an as-required basis to support new permit applications or to comply with specific permit conditions.

Environmental studies completed during the 2020 reporting year include the following:

- Barr identified, delineated, and mapped wetlands in four study areas in July and August 2020. The study areas are located between the cities of Biwabik, McKinley, Gilbert, and northeast of the City of Virginia, all in St. Louis County, Minnesota. The four study areas include: (1) Upland Tailings Basin – two areas encompassing 129 acres; (2) Laurentian Stockpile – two areas encompassing two acres; (3) Canton Pipeline – two areas separated by the existing permitted East Pit, encompassing 53 acres; and (4) Future Mine Reserve including one 115-acre area adjacent to the Laurentian Pit and one 369-acre area adjacent to the East Pit.
- Barr performed mercury (Hg) emissions determinations on the indurating furnace (EU026) Stacks A-D (SV014-SV017) at Minorca. Testing was completed on June 23 to 24, 2020, to satisfy Minnesota Mercury Rule - Minnesota Rule 7019.3050(E)(5). Each mercury test consisted of three, two-hour test runs as required by ASTM 6784 Ontario Hydro Method. Indurating Furnace Stack A (SV014) and Indurating Furnace Stack C (SV016) were tested simultaneously on June 23, 2020. Indurating Furnace Stack B (SV015) and Indurating Furnace Stack D (SV017) were tested simultaneously on June 24, 2020.
- 2020 monitoring of the Central Stream and East Stream, located downstream of the East Pit Development. The monitoring activities include physical and biological monitoring, comprising the "synoptic survey" that is required by the MDNR Appropriations Permit. All water appropriations permits have been obtained to support the LOM plan schedule. There are no known factors or risks that may affect access, title, or the right or ability to perform work at the Property.

17.2 Environmental Requirements

Minorca maintains an environmental management system (EMS) that is registered to the international ISO 14001:2015 standard. The ISO standard requires components of leadership commitment, planning, internal and external communication, operations, performance evaluation, and management review.

Minorca's continued registration to the ISO standard is evaluated annually through internal auditors and every other year through external auditors.

Cliffs maintains a regulatory matrix as part of its EMS, as well as a regulatory reporting calendar tracker. CCMMI conducts internal auditing of its compliance system on a regular basis, and Cliffs corporate conducts a formal compliance audit on a routine basis.

Impacts to surrounding communities (noise, vibration, etc.) are considered by the EMS, and views of interested parties are part of the ranking process when ranking environmental aspects.

No significant environmental and social issues arose in 2020 that are specific to Minorca. Minor impacts and mitigation methods being employed are discussed below. Mining is currently taking place in the Laurentian Pit, East 1, and East 2 at Minorca. All mining activity is covered by a permit to mine obtained from the MDNR Lands and Minerals division. The mine complies with the conditions of its permit and all rules laid out by the MDNR in Taconite and Iron Ore Mineland Reclamation Rules Chapter 6130. The mining impacts wetlands that Minorca is required to replace. Minorca is currently utilizing a bank of wetlands that was established in the 1990s in Aitkin County to replace the wetlands impacted by current mining operations. A new wetland bank has been developed near Meadowlands, Minnesota, and credits will become available for use over the next several years. The initial deposit of 17.6813 wetland credits was completed on March 25, 2020.

- Laurentian Pit

  The drainage system for the Laurentian Pit is directed to and collected in a sump, which is located at the lowest point of the pit. The sump is sized to adequately settle out sediments before the collected water is pumped out of the pit to discharge location SD003, as described in the NPDES/SDS Permit. The sump is moved as needed to the new lowest point within the Laurentian Pit. Runoff can also potentially enter the pit from the overburden piles, maintenance/spare parts areas, and haul roads. Runoff from the active overburden stockpiles primarily flows southeast into a drainage ditch. Most of the water flows into the Corsica II Pit, while the rest is diverted around the Corsica II Pit and flows to the same lowland that permitted SD003 discharges are released to; this runoff then eventually enters White Lake.

- East Pit

  The drainage system for the East 1 Pit is directed to and collected in a sump, which is located at the lowest point of the pit. The sump is sized to adequately settle out sediments before the collected water is pumped out of the pit to discharge location SD005, as described in the NPDES/SDS Permit. Periodically, the sump and pump are moved as needed to the new lowest point of the East Pit. Runoff from the stockpiles primarily either naturally infiltrates or flows into the pit, where it is captured by the sump and discharged as indicated above.

- Haul Roads

  Berms are constructed out of rock and coarse tailings along haul roads as required by Mine Safety and Health Administration (MSHA) to keep trucks from running off the road. These berms also serve as structural control to direct runoff along the road and direct discharge to selected locations. Gaps in the berms are strategically placed to allow drainage of the haul roads and to divert runoff to areas where impacts of the runoff are minimized. Dry sediment basins are located at breaks within the berm where drainage has the potential to leave the property. In locations where haul road runoff has the potential to impact surface waters, structural best management practices have been followed.

- Plant Site

  Drainage from the areas in and around the pellet plant is directed toward the plant site settling basin. The plant site settling basin provides stormwater treatment by settling solids and serving as a large sedimentation pond. Most of the water reaching the basin is pumped back to the facility for use as process water. Water discharges are governed by the EPA and MPCA.

- Overburden and Soils Storage

  Overburden and soil stockpiles are reclaimed to the standards of the MDNR in Taconite and Iron Ore Mineland Reclamation Rules Chapter 6130. The stockpiles are shaped and seeded to avoid erosion and to create wildlife habitat.

- Processing

  Air emissions from processing are governed by the EPA and MPCA.

- Tailings

  Air emissions from processing and tailings disposal are governed by the EPA and MPCA. Water discharges are governed by the EPA and MPCA.

17.2.1 Site Monitoring

Minorca operates through permission granted by multiple permits, which are summarized in Table 17-1. The permits contain requirements for site monitoring including air, water, waste, and land aspects of the Minorca operation. The permit-required data is maintained by the facility, and exceptions to the monitoring obligations, if they occur, are reported to the permitting authority as defined in the individual permit. Monitoring is conducted in compliance with permit requirements, and management plans are developed as needed to outline protocols and mitigation strategies for specific components or activities. Monitoring and management programs currently undertaken in compliance with Minorca's existing permits include:

- Air Quality: Management plans including fugitive dust control plans, operation and maintenance plans, and startup, shutdown, and malfunction plans; monitoring of fugitive sources and stacks, visible dust emission monitoring at the tailings facility; and greenhouse gas (GHG) emissions monitoring and reporting.
- Noise and Vibration: Blast management plans including vibration monitoring.
- Surface Water: Routine water quality sampling in receiving waters; quantity of water takings and discharges.
- Groundwater: Routine water quality sampling from mine dewatering and at plant wells; quantity of water takings.
- Wetlands: monitoring of nearby wetlands where the potential for an impact has been identified, including potential indirect impacts, where appropriate.
- Wildlife: monitoring of endangered species in accordance with specific permit conditions.
- Infested waters: operating and monitoring plan associated with the mine dewatering permit.

There are no specific management plans related to social aspects in place.

With regard to compliance, there are currently no outstanding enforcement items at the facility.

The State and Federal government conduct regional ecologic monitoring in the vicinity of the facility operations. Two recent examples of such monitoring include:

- EPA conducted its residual risk and technology review (RTR) of the Taconite NESHAP (40 CFR 63). EPA's final rule on July 28, 2020 documents that risks from the taconite iron ore processing source category are acceptable, and the current standards provide a margin of safety to protect public health and prevent an adverse environmental effect.
- The State of Minnesota conducts regional watershed monitoring to assess the overall health of water bodies throughout the state, including water quality and macroinvertebrate and fish population diversity and health. The State may develop watershed management tools for water bodies of concern such as Total Maximum Daily Load (TMDL) plans. Minorca is not currently subject to any TMDL-based load restrictions.

17.2.2 Water

Minorca presently maintains NPDES/SDS permits for the pit, NPDES/SDS Permit No. MN0059633, and plant site and tailings areas, NPDES/SDS Permit No. MN0055964. Monitoring is conducted at multiple discharge outfalls, groundwater monitoring wells, surface water monitoring locations, discharges to the plant site settling basin, influent of tailings slurry to the TSF, return water from the TSF to the clear water pool, and two pit-water monitoring locations. Reporting for the NPDES/SDS permits includes monthly and annual stormwater reporting and annual chemical dust suppression reporting.

Minorca maintains five water appropriations permits through the water appropriations program that facilitate surface and groundwater use with adequate capacity for the Mine and Plant. Monitoring of the amount of water appropriated or used is conducted and reported monthly.

17.2.3 Hazardous Materials, Hazardous Waste, and Solid Waste Management

Minorca typically generates small quantities of hazardous waste and is a small quantity generator per Minnesota hazardous waste rules and generation quantity and according to the federal Resource Conservation and Recovery Act (RCRA). Hazardous waste management is authorized by permits from the applicable regulatory authorities. See Table 17-1 for a full list of permits. Minorca generates other waste materials typical of any large industrial site and manages those wastes offsite through approved vendors.

17.2.4 Tailings Disposal, Mine Overburden, and Waste Rock Materials

Requirements for tailings disposal are discussed in section 15.4 of this TRS. Tailings disposal is authorized by permits from the applicable regulatory authorities. See Table 17-1 for a full list of permits.

Because iron ore geochemistry is different from other metallic mineral deposits, acid rock drainage is not a concern with the iron ore bodies and associated tailings in Minnesota. Moreover, EPA itself describes the iron ore mining and beneficiation process as generating wastes that are "earthen in character." Chemical constituents from iron ore mining include iron oxide, silica, crystalline silica, calcium oxide, and magnesium oxide—none of which are Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances. The acid-neutralizing potential of carbonates in iron ore offsets any residual acid rock drainage risks, leading to pit water that naturally stabilizes at a pH of 7.5 to 8.5.

Regular inspections of dams and waste facilities are not mandated for Minorca; however, Minorca proactively conducts annual inspections of the tailings impoundment with the Engineer of Record.

Requirements for the disposal of mine overburden and non-mineralized or lean rock are discussed in section 13.5 of this TRS. Stockpiling of these materials is authorized by permits from the applicable regulatory authorities. See 17-1 for a full list of permits.

17.3 Operating Permits and Status

The environmental permitting status is summarized in Table 17-1. Currently there are no planned or future environmental permits required for the LOM schedule; however, permit renewal is required for multiple permits that are currently administratively extended to allow for continued operation.

Table 17-1: List of Existing Environmental Permits
Cleveland-Cliffs Inc. – Minorca Property

Permit	Existing Environmental Permits						
	Property ID	Permit Number	Agency	Start Date	Expiration Date	Annual Fees & Taxes ($000)	Compliance Status
Holding Tank Operating Permit	-	#23987	St. Louis County	2/25/2015	10/14/2024	-	YES
Holding Tank Operating Permit	-	#21867	St. Louis County	2/25/2015	10/14/2024	-	YES
Holding Tank Construct and Operating Permit		#37659	St. Louis County	10/21/2020	10/21/2022	-	YES
Hazardous Materials Certificate of Registration	-	060220550422C	US Department of Transportation	7/1/2019	6/30/2021	-	YES
Hazardous Waste Generator License	-	MND000819342	MPCA	7/1/2019	6/30/2021	-	YES
NPDES	-	MN0059633	MPCA	NA	NA	-	YES
NPDES	-	MN0055964	MPCA	NA	NA	-	YES
Title V Air Permit	-	137000362-003	MPCA	NA	NA	-	YES
Section 404 Permit	-	MVP-2005-110-JKA	US Army Corps of Engineer	3/5/2007	12/31/2025	-	YES
Laurentian Pit 4040 Permit	-	96-03995-IP-TWP	US Army Corps of Engineer	5/1/1997	12/31/1999	-	Expired
Laurentian Pushback WCA – Wetland Replacement Plan	-	-	MDNR	4/27/2018	NA	-	YES

Permit	Existing Environmental Permits						
	Property ID	**Permit Number**	**Agency**	**Start Date**	**Expiration Date**	**Annual Fees & Taxes ($000)**	**Compliance Status**
Radiation License	-	MN1088-100-69	MDH	7/11/2017	4/30/2022	-	YES
Water Appropriation Permit	-	1991-2017	MDNR	12/27/2002	NA	-	YES
Water Appropriation Permit	-	2008-0216	MDNR	4/24/2008	NA	-	YES
Water Appropriation Permit	-	1980-2095	MDNR	1/28/1980	NA	-	YES
Water Appropriation Permit	-	1973-5095	MDNR	8/15/1974	NA	-	YES
Water Appropriation Permit	-	2007-0559	MDNR	12/12/2007	NA	-	YES
MDNR Permit to Mine – Original Permit	-	1973-5095	MDNR	5/26/1905	NA		YES
MDNR Dam Safety Permit – Minorca In-Pit	-	2009-0263	MDNR	11/17/2008	12/31/2009	-	Amended in 2010, Permit can expire at expiration date or at when permit design limit is reached.
MDNR Dam Safety Permit – Upland Basin	-	2011-0659	MDNR	9/6/2011	4/12/2023	-	
MDNR Dam Safety Permit – Upland Basin Perimeter Dam Repair	-	2015-0536	MDNR	11/14/2014	11/14/2019*	-	Permit can expire at expiration date or at when permit design limit is reached.

17.4 Mine Closure Plans and Bonds

Minorca's current mine life is projected at 14 years (2035) as indicated in section 13.4 of this TRS. This long life makes preparation of a detailed closure plan difficult to undertake considering the potential variability of planned development. Minnesota Rule 6130.4600 does not require a plan for deactivation of the mine until at least two years in advance of deactivation of a mining area. No plan has yet been required or requested by the State agency. As a matter of good mining practice, Minorca seeks to conduct concurrent reclamation throughout its mining life to minimize risk and costs at closure. Minorca actively reclaims stockpiles that have no further planned use, consistent with the State of Minnesota mining rule requirements.

Cliffs performs an annual review of significant changes to each operations asset retirement obligation (ARO) cost estimates. Additionally, Cliffs conducts an in-depth review every three years to ensure that the ARO legal liabilities are accurately estimated based on current laws, regulations, facility conditions, and cost to perform services. Cost estimates are conducted in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 410.FASB ARO estimates comply with rules set forth by the United States General Accepted Accounting Principles (USGAAP) and the SEC, and those costs are reported as part of Cliffs' SEC disclosures. Cliffs calculated the 2019 ARO legal obligation closure and reclamation costs associated with Minorca closure to be $29.3 million. SLR notes that there are differences between the ARO estimate and the book value calculated by Cliffs due to the long life of the operation.

SLR cannot comment on the adequacy of the closure costing and the closure plan based on currently available information.

17.5 Social and Community

Cliffs has been investing in the region for over a century, including direct employment and contributions to state, local, and taconite taxes. Taconite taxes contribute to an existing government-administered property tax credit program for people living in the Mesabi Iron Range mining area funded through mining production taxes. SLR is not aware of any formal commitments to local procurement and hiring; however, Cliffs has indicated that it has long-standing relationships with local vendors and also purchases through local and regional services and supplies.

Cliffs' employees make contributions to local United Way chapters through donations that are supported with a matching contribution from the company. Employees also serve as board members and volunteers for the United Way. Another initiative includes agreements with local municipalities or organizations to make Cliffs-owned and leased land that is not utilized for mining available for local community use including trails used for snowmobiling, biking, and ATV. Cliffs' goal is to work collaboratively with stakeholders to support activities that are of benefit to the communities in which the company operates.

Minorca's mine progression necessitates the drawdown of water levels in the Canton Pit, which is utilized for source water by the City of Biwabik. Minorca entered into a Source Water Change Action Plan with the City of Biwabik (with approval by MDNR) to transition the city's water source to the Embarrass Pit in 2021/2022. Through this agreement, Minorca has invested in new infrastructure to be owned and operated by the City of Biwabik, so the municipality will experience a seamless transition to its new water source (which is of similar quality to the Canton Pit).

SLR is not able to verify the adequacy of management of social issues and what the general issues raised are but understands that Cliffs has a positive relationship with stakeholders and that in the event of a complaint, Cliffs works directly with affected community members to develop a mutually acceptable resolution. Public affairs representatives from Cliffs formally engage with the community on an ongoing basis and serve as the face of the company. They sit on boards of community and business organizations at regional and local levels, participate in discussions with government officials, and act as a point of contact within the community. In doing so, they keep stakeholders apprised of critical issues to the operations, understand important topics in the community, and seek to listen to any questions or concerns. Cliffs indicated that this strategy allows it to maintain an ongoing relationship with stakeholders and collaborate with communities to find solutions should any issues arise. Cliffs' Public/Government Affairs maintains a list of stakeholders for Cliffs' iron ore mine operations.

18.0 CAPITAL AND OPERATING COSTS

Cliffs' forecasted capital and operating costs estimates are derived from annual budgets and historical actuals over the long life of the current operation. According to the American Association of Cost Engineers (AACE) International, these estimates would be classified as Class 1 with an accuracy range of -3% to -10% to +3% to +15%. All unit rates are reported in WLT pellets.

18.1 Capital Costs

Table 18-1 shows the sustaining capital cost forecast for the five-year period from 2022 to 2026, which totals $131.8 million, or $9.40/LT pellet. These costs include, but are not limited to:

- Mobile and fixed equipment additions and replacements
- Infrastructure and health systems improvements

For the remaining life of the operation starting in 2027, a sustaining capital cost of $4/WLT pellet, or $11.2 million annually, is used in the economic model for an additional $78.4 million for the remaining mine life.

Table 18-1: LOM Capital Costs
Cleveland-Cliffs Inc. – Minorca Property

Type	Units	Total	2022	2023	2024	2025	2026	2027	2028-2035
				Capital Costs					
Total Sustaining	$ millions	210.2	28.2	25.5	27.8	27.1	23.2	11.2	67.2
				Pellet Sales					
Pellet Sales	MWLT	37.4	2.8	2.8	2.8	2.8	2.8	2.8	20.6
				Unit Rates					
Total	$/WLT	5.63	10.00	9.11	9.93	9.69	8.28	4.00	3.28

A final closure reclamation cost of $29.3 million is estimated, with $9.8 million spent annually starting in the last year of production in 2035 and the two subsequent years.

18.2 Operating Costs

Operating costs for the LOM are based on the 2022 plan. For this period, costs are based on a full run rate of flux pellet production consistent with what is expected for the LOM. In the period 2022 to 2026, higher tailings basin costs are estimated at $41 million. After that point in time, however, there are no items identified that should significantly impact operating costs either positively or negatively for the evaluation period. Minor year-to-year variations should be expected based upon maintenance outages and production schedules. Forecasted 2022 and average operating costs over the remaining 14 years of mine life are shown below in Table 18-2.

Table 18-2: LOM Operating Costs
Cleveland-Cliffs Inc. – Minorca Property

Parameter	2022 ($/WLT Pellet)	LOM ($/WLT Pellet)
Mining	20.84	16.89
Processing	48.43	45.57
Site Administration	2.20	2.20
Logistics/Dock	10.78	10.78
General/Other Costs	10.10	10.10
Operating Cash Cost	**92.34**	**85.53**

Processing costs consist of railing ore from the Mine to the Plant, as well as typical crushing, grinding, concentrating, pelletizing, and tailings basin disposal. Logistics/Dock costs include rail transport of pellets to the Two Harbors, Minnesota port and ship loading.General/Other costs include production tax and royalty costs, insurance, and other minor costs.

The operation employs a total of 362 salaried and hourly employees as of Q4 2021, consisting of 50 salaried and 312 hourly employees. The majority of the hourly employees are United Steelworkers production and maintenance bargaining unit members.

Table 18-3 summarizes the current workforce levels by department for the Property.

Table 18-3: Workforce Summary
Cleveland-Cliffs Inc. - Minorca Property

Category	Salary	Hourly	Total
Mine	9	157	166
Plant	10	155	165
General Staff Organization	31	0	31
Total	**50**	**312**	**362**

19.0 ECONOMIC ANALYSIS

19.1 Economic Criteria

The economic analysis detailed in this section was completed after the mine plan was finalized. The assumptions used in the analysis are current for the time the analysis was completed (Q4 2021), which may be different from the economic assumptions defined in Sections 11.0 and 12.0 when calculating the economic pit. For this period, costs are based on a full run rate of flux pellet production, consistent with what is expected for the LOM.

An un-escalated, technical-economic model was prepared on an after-tax DCF basis, the results of which are presented in this section. Key criteria used in the analysis are discussed in detail throughout this TRS. General assumptions used are summarized in Table 19-1.

Cliffs uses a 10% discount rate for DCF analysis incorporating quarterly cost of capital estimates based on Bloomberg data.SLR is of the opinion that a 10% discount/hurdle rate for after-tax cash flow discounting of large iron ore and/or base metal operations is reasonable and appropriate.

Table 19-1: Technical-Economic Assumptions
Cleveland-Cliffs Inc. – Minorca Property

Description	Value
Start Date	December 31, 2021
Mine Life	14 years
Three-Year Trailing Average Revenue	$98/WLT Pellet
Operating Costs	$85.53/WLT Pellet
Sustaining Capital (after five years)	$4/WLT Pellet
Discount Rate	10%
Discounting Basis	End of Period
Inflation	0%
Federal Income Tax Rate	20%
State Income Tax Rate	None – Sales made out of state

The operating cost of $85.47/WLT pellet includes royalties and Minnesota State production taxes.

The production and cost information developed for the Property are detailed in this section. Table 19-2 presents a summary of the estimated mine production over the 14 year mine life.

Table 19-2: LOM Production Summary
Cleveland-Cliffs Inc. – Minorca Property

Description	Units	Value
ROM Crude Ore	MLT	109.7
Total Material	MLT	193.2
Grade	% MagFe	23.8
Annual Mining Rate	MLT/y	16

Table 19-3 presents a summary of the estimated plant production over the 14 year mine life.

Table 19-3: LOM Plant Production Summary
Cleveland-Cliffs Inc. – Minorca Property

Description	Units	Value
ROM Material Milled	MLT	109.7
Annual Processing Rate	MLT/y	8.5
Process Recovery	%	34.2
Total Pellet	MLT	37.3
Annual Pellet Production	MLT/y	2.8

19.2 Cash Flow Analysis

The indicative economic analysis results, presented in Table 19-4, indicate an after-tax Net Present Value (NPV), using a 10% discount rate, of $70 million at an average blended wet pellet price of $98/WLT. The after-tax Internal Rate of Return (IRR) is not applicable as the processing facility has been in operation for a number of years. Capital identified in the economics is for sustaining operations and plant rebuilds as necessary.

Project economic results and estimated cash costs are summarized in Table 19-4. Annual estimates of mine production and pellet production with associated cash flows are provided for years 2022 to 2027 and then by ten-year grouping through to the end of the mine life in 2035 plus two additional years of final reclamation.

The economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

Table 19-4: LOM Indicative Economic Results
Cleveland-Cliffs Inc. – Minorca Property

Mine Life		1	2	3	4	5	6	7-16
Calendar Years	**Total**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028- 2037**
Reserve Base:								
Minorca Mining Ore Pellet Reserve Tons (millions)	37.3	34.5	31.7	28.9	26.1	23.3	20.5	-
Tonnage Data:								
Minorca Mining Total Tons Moved (millions)	193.2	18.0	17.5	16.0	16.0	16.0	16.0	93.7
Minorca Mining Crude Ore Tons Mined (millions)	109.7	8.8	8.7	8.3	8.2	8.3	8.5	58.9
Minorca Mining Pellet Production Tons (millions)	**37.3**	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**	**20.5**
Inputs:								
Minorca Mining Pellet Revenue Rate ($/ton)	98	98	98	98	98	98	98	98
Income Statement:								
Minorca Mining Gross Revenue ($ in millions)	3,659	276	274	274	274	274	274	2,010
Mining	631	59	57	52	52	52	52	306
Processing	1,701	137	141	129	131	125	125	914
Site Administration	82	6	6	6	6	6	6	45
Logistics / Dock	402	30	30	30	30	30	30	221
General / Other Costs	377	28	28	28	28	28	28	207
Minorca Mining Operating Cash Costs ($ in millions)	**3,193**	**260**	**263**	**245**	**248**	**242**	**242**	**1,693**
Operating Cash Costs ($/LT Pellet)	85.53	92.34	93.89	87.68	88.51	86.38	86.45	82.52
Minorca Mining Operating Income (excl. D&A)	**465**	**16**	**11**	**29**	**27**	**33**	**32**	**318**
Federal Income Taxes ($ in millions)	(93)	(3)	(2)	(6)	(5)	(7)	(6)	(64)
Depreciation Tax Savings ($ in millions)	49	4	4	4	4	4	4	27
Accretion Tax Savings ($ in millions)	4	0	0	0	0	0	0	3
Minorca Mining Income after Taxes ($ in millions)	**425**	**17**	**13**	**27**	**25**	**30**	**30**	**284**

Mine Life		1	2	3	4	5	6	7-16
Calendar Years	**Total**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028- 2037**
Other Cash Inflows & Outflows ($ in millions):								
Sustaining Capital Investments	(210)	(28)	(26)	(28)	(27)	(23)	(11)	(67)
Significant All Material Change Capital Additions	-	-	-	-	-	-	-	-
Mine Closure Costs (Incl. Post Closure)	(29)	-	-	-	-	-	-	(29)
Minorca Mining Cash Flow ($ in millions)	**186**	**(11)**	**(12)**	**(1)**	**(2)**	**7**	**19**	**187**
Minorca Mining Discounted Cash Flow ($ in millions)	**70**	**(11)**	**(11)**	**(1)**	**(1)**	**5**	**12**	**78**

19.3 Sensitivity Analysis

Project risks can be identified in both economic and non-economic terms. Key economic risks were examined by running cash flow sensitivities. The operation is nominally most sensitive to market prices (revenues) followed by operating cost as demonstrated in Table 19-5. For each dollar movement in sales price and operating cost, respectively, the after-tax NPV changes by approximately $18 million.

SLR notes that recovery and head grade sensitivity do not vary much in iron ore deposits compared to metal price sensitivity. In addition, sustaining capital expenditures amount to 6.5% of LOM operating costs and, therefore, do not have much impact on the viability of operating mines.

Table 19-5: After-tax NPV at 10% Sensitivity Analysis ($M)
Cleveland-Cliffs Inc. – Minorca Property

		Operating Costs					
		$100	**$95**	**$90**	**$85**	$80	**$75**
Sales Price ($/WLT Pellet)	$83	($462)	($374)	($285)	($196)	($108)	($19)
	$88	($374)	($285)	($196)	($108)	($19)	$70
	$93	($285)	($196)	($108)	($19)	$70	$158
	$98	($196)	($108)	($19)	**$70**	$158	$247
	$103	($108)	($19)	$70	$158	$247	$336
	$108	($19)	$70	$158	$247	$336	$424
	$113	$70	$158	$247	$336	$424	$513
	$118	$158	$247	$336	$424	$513	$602
	$123	$247	$336	$424	$513	$602	$690

20.0 ADJACENT PROPERTIES

There are several iron mines along the Mesabi Iron Range in Minnesota.The Mineral Resource and Mineral Reserves stated in this TRS are contained entirely within the Property’s mineral leases, and information from other operations was not used in this TRS.

21.0 OTHER RELEVANT DATA AND INFORMATION

No additional information or explanation is necessary to make this TRS understandable and not misleading.

22.0 INTERPRETATION AND CONCLUSIONS

Minorca has been a successful producer of iron pellets for over 44 years. The update to the Mineral Resource and Mineral Reserve does not materially change any of the assumptions from previous operations. An economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves for a 14 year mine life.

SLR offers the following conclusions by area.

22.1 Geology and Mineral Resources

- Above a crude MagFe cut-off grade of 16%, Minorca Measured and Indicated Mineral Resources exclusive of Mineral Reserves are estimated to total 801.5 MLT at an average grade of 22.9% MagFe.
- The East, Central, and Laurentian deposits are examples of Lake Superior-type BIF depositsBoth the site and corporate technical teams have a strong understanding of the Minorca geology, as well as the processing characteristics of the mineralization.
- Exploration sampling, preparation, analyses, and security processes for both physical samples and digital data are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources.
- Cliffs is developing a program of QA/QC that includes standards and duplicates and control-chart analysis.A comprehensive QA/QC program did not exist for the previous 44 years of mine operation. QA/QC results for the 2021 verification study are appropriate for the style of mineralization and are sufficient to generate a drill hole assay database that is adequate for Mineral Resource estimation in compliance with international reporting standards. Based on these results, in conjunction with good agreement between planned and actual product produced over more than 40 years, it is SLR’s opinion that procedures meet S-K 1300’s minimum requirements.
- The KEV in the block models for Minorca compare well with the source data.Future estimations should also review the cut-off grade used in reporting.
- The methodology used to prepare the block model is appropriate and consistent with industry standards.
- Validations compiled by the QP indicate that the block model is reflecting the underlying support data appropriately.
- The classification at Minorca is generally acceptable. In SLR’s opinion, however, the extension of classified material beyond drilling limits is slightly aggressive, and some post-processing to remove isolated blocks of different classification is warranted. Classified blocks that extend beyond the drilling limits are generally outside the Resource Pit Shell.
- The block model represents an acceptable degree of smoothing at the block scale for prediction of quality variables at Minorca. Visually, blocks and composites in cross-section and plan view compare well.
- 2021 actual versus model-predicted values of crude ore were accurate to within 10%, with the model values slightly lower than actual total ore processed.

22.2 Mining and Mineral Reserves

- Minorca has been in production since 1976, and specifically under 100% Cliffs operating management since 2020. Cliffs conducts its own Mineral Reserve estimations.
- Total Proven and Probable Mineral Reserves are estimated at 109.7 MLT of crude ore at an average grade of 23.8% MagFe.
- Mineral Reserve estimation practices follow industry standards.
- The Minorca Mineral Reserve estimate indicates a sustainable project over a 14 year LOM.
- The geotechnical design parameters used for pit design are reasonable and supported by previous operations.
- The LOM production schedule is reasonable and incorporates large mining areas and open benches.
- An appropriate mining equipment fleet, maintenance facilities, and manpower are in place, with additions and replacements estimated, to meet the LOM production schedule requirements.
- Sufficient storage capacity for waste stockpiles and tailings has been identified to support the production of the Mineral Reserve.

22.3 Mineral Processing

- Minorca's product has been wholly consumed by IH7 since production began in 1977. In 1987, Minorca began creating flux pellets as opposed to standard pellets. In 1992, Minorca constructed a flotation plant for silica reduction to treat the higher silica, Laurentian Pit ores.
- Minorca performs diamond drilling to characterize the Mineral Resource associated with the mine plan. Blast hole samples are analyzed to validate ore grades and develop blending plans. Minorca also conducts plant sampling for process control and product quality reporting for compliance with SPPs established by IH7.
- Ore is blended from the Laurentian and East pits based on MagFe content and silica grade as well as scheduled material movement.
- Crushing, concentrating, and pelletizing processes are conventional. Mined ore is processed in primary, secondary, and tertiary crushers to produce a final product with P_{100} of 5/8 in. that is delivered to the concentrator at a design rate of 1,396 LT/h.
- The concentrator comprises three lines that include rod milling, primary magnetic separation, ball milling, and secondary magnetic separation closed by cyclones, hydroseparation, and finisher magnetic separation to produce a magnetite concentrate.
- Bentonite and dolomite flux are added to the concentrate, which is agglomerated into balls using balling discs and fired in a straight-grate indurating furnace to produce a final, hardened, fluxed pellet product.
- From 2015 to 2020, the Minorca concentrator processed an average of 8.78 MLT/y of ore with an average MagFe grade of 22.7%. The overall mass recovery to concentrate averaged 32.5% with an overall MagFe recovery of 95.4%. Final product for the period averaged 2.79 MLT/y of flux pellets and 42,200 LT/y of lump product with grades of 62.6% Fe and 4.2% SiO_2.
- The main process water supply for the concentrator is recycled from the tailings thickener. Other sources include the Upland and Minorca tailings basins, the Missabe Mountain Pit, the Sauntry/Enterprise Pit, and the Plant Site settling basin.

22.4 Infrastructure

- The Property is located in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.
- Cliffs has been operating the Upland Tailings Basin as a disposal site for fine tailings since the mid-1970s and the In-Pit Tailings Basin since 2001, both of which are currently operating under the permit requirements of the Minnesota Department of Natural Resources Dam Safety Unit

22.5 Environment

- Minorca maintains the requisite state and federal permits and is in compliance with all permits. Environmental liabilities and permitting are further discussed in Section 17.0 of this TRS.

23.0 RECOMMENDATIONS

23.1 Geology and Mineral Resources

1. Continue to develop and expand the QA/QC program to ensure that the program includes clearly defined limits when action or follow-up is required, and that results are reviewed and documented in a report, including conclusions and recommendations, regularly and in a timely manner.
    e. Complete ISO certification for the Minorca laboratory.
    f. Develop a formal QA/QC procedure that includes preparation of a QA/QC campaign report following every annual diamond drilling program.
    g. Continue to submit a small number of "preparation duplicate" samples to a secondary accredited laboratory to document capability(ies), cost, and time efficiency of alternate provider(s) and confirm that results are comparable to those of Minorca's internal laboratory.
    h. Add sample completion date to all diamond drill hole certificates of analysis returned to the mine geologist.
2. Apply a minimum of two holes during the first pass estimation for Minorca in future updates.
3. In future updates, use local drill hole spacing instead of a distance-to-drill hole criterion for block classification.
4. Prepare model reconciliation over quarterly periods and document methodology, results, and conclusions and recommendations.
5. Continue to update Minorca Mineral Resource estimates with new drilling.

23.2 Mining and Mineral Reserves

1. Complete additional work at Minorca to support conversion of on-strike Mineral Resources to Mineral Reserves and update mine planning accordingly.
2. Review potential comingling of waste rock stockpiles between the Minorca pits for opportunities to reduce the stockpile footprint created external to the open pits and reduce waste haulage profiles.

23.3 Mineral Processing

1. Follow the established procedures for sampling and testing to support ore blending and ensure operational consistency and preventive maintenance.

23.4 Infrastructure

1. Prioritize the completion of an OMS Manual for the TSF with the EOR in accordance with MAC guidelines and other industry-recognized standard guidance for tailings facilities.
2. Document, prioritize, track, and close out in a timely manner the remediation, or resolution, of items of concern noted in TSF audits or inspection reports.

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25.0 RELIANCE ON INFORMATION PROVIDED BY THE REGISTRANT

This report has been prepared by SLR for Cliffs. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to SLR at the time of preparation of this report,
- Assumptions, conditions, and qualifications as set forth in this report, and
- Data, reports, and other information supplied by Cliffs and other third party sources.

For the purpose of this report, SLR has relied on ownership information provided by Cliffs and verified in an email from Gabriel D. Johnson, Cliffs' Senior Manager – Land Administration, dated January 20, 2022.SLR has not researched property title or mineral rights for Minorca as we consider it reasonable to rely on Cliffs' Land Administration personnel who are responsible for maintaining this information.

SLR has relied on Cliffs for guidance on applicable taxes, royalties, and other government levies or interests, applicable to revenue or income from Minorca in the Executive Summary and Section 19.As Minorca has been in operation for almost 50 years, Cliffs has considerable experience in this area.

SLR has relied on information provided by Cliffs pertaining to environmental studies, management plans, permits, compliance documentation, and monitoring reports that were verified in an email from Scott A. Gischia, Cliffs' Director – Environmental Compliance, Mining and Pelletizing, dated January 21, 2022.

The Qualified Persons have taken all appropriate steps, in their professional opinion, to ensure that the above information from Cliffs is sound.

Except for the purposes legislated under provincial securities laws, any use of this report by any third party is at that party's sole risk.

26.0 DATE AND SIGNATURE PAGE

This report titled “Technical Report Summary on the Minorca Property, Minnesota, USA” with an effective date of December 31, 2021 was prepared and signed by:

(Signed) ***SLR International Corporation***

Dated at Lakewood, CO
February 7, 2022 SLR International Corporation

www.slrconsulting.com

EXHIBIT 96.3

Technical Report Summary on the Northshore Property, Minnesota, USA
S-K 1300 Report

Cleveland-Cliffs Inc.

SLR Project No: 138.02467.00001
February 7, 2022
Effective Date: December 31, 2021

Technical Report Summary on the Northshore Property, Minnesota, USA

SLR Project No: 138.02467.00001

Prepared by
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FINAL

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1.0 EXECUTIVE SUMMARY

1.1 Summary

SLR International Corporation (SLR) was retained by Cleveland-Cliffs Inc. (Cliffs) to prepare an independent Technical Report Summary (TRS) for Cliffs' Northshore Property (Northshore or the Property), located in Northeastern Minnesota, USAThe operator of the Property, Northshore Mining Company (NSM), is a wholly owned subsidiary of Cliffs.

The purpose of this TRS is to disclose year-end (YE) 2021 Mineral Resource and Mineral Reserve estimates for Northshore.

Cliffs is listed on the New York Stock Exchange (NYSE) and currently reports Mineral Reserves of pelletized ore in SEC filingsThis TRS conforms to United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300) and Item 601 (b)(96) Technical Report Summary. SLR visited the Property on October 22-23, 2019.

The Property includes the Peter Mitchell Mine (the Mine) in the city Babbitt, Minnesota and the E.W. Davis Works processing facility (E.W. Davis Works or the Plant) in city of Silver Bay, Minnesota. The Mine is a large, operating, open-pit iron mine that produces pellets from a magnetite iron ore regionally known as taconite.

The Property commenced operations in 1952 as an asset of the Reserve Mining Company (Reserve Mining) and continued production until 1986 when Reserve Mining declared bankruptcy. Cyprus Minerals Company (Cyprus) purchased the facilities in 1989 and renamed it Cyprus Northshore Mining Company. Cyprus subsequently sold that company to Cliffs in 1994, and Cliffs renamed it Northshore Mining Company.Northshore Mining Company has been a wholly owned subsidiary of Cliffs since that time.

The open-pit operation has a mining rate of approximately 17 million long tons (MLT) of ore per year and produces 5.0 MLT of iron ore pellets, which are shipped by freighter via the Great Lakes to Cliffs' steel mill facilities in the Midwestern USA.

1.1.1 Conclusions

Northshore has successfully produced iron pellets for over 69 years. The update to the Mineral Resource and Mineral Reserve does not materially change any of the assumptions from previous operations. An economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves for a 48 year mine life.

SLR offers the following conclusions by area.

1.1.1.1 Geology and Mineral Resources

- Above a crude magnetic iron (MagFe) cut-off grade of 15%, Northshore Measured and Indicated Mineral Resources exclusive of Mineral Reserves are estimated to total 1,158 MLT at an average grade of 22.2% MagFe.

- Exploration sampling, preparation, and analyses are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources.
- Work towards a comprehensive quality assurance and quality control (QA/QC) program at Northshore is progressing well, and sample and data security are consistent with industry best practice.
- Results as compiled by Cliffs' personnel and reviewed by the Qualified Person (QP) indicate an acceptable level of accuracy and a good level of repeatability for economic variables at Northshore. The range of acceptability for MagFe (24.6% to 32.2% MagFe), as well as other variables in standard NSMCOS_Block 21 is quite high, and based on more recent results higher precision is achievable.
- Coarse duplicate values for crude MagFe by Saturation Magnetization Analyzer (Satmagan) are generally acceptable.Based on observations from the neighboring United Taconite Property (UTAC) mine, improvements are possible and warranted to reduce variation and improve analytical precision in future drill core analyses.
- The turnaround time for exploration drilling samples at the Silver Bay laboratory is very long, sometimes exceeding twelve months.
- The geological model is fit for purpose and captures the principal geological features of the Biwabik Iron Formation (Biwabik IF) at Northshore. The methodology used to prepare the block model is appropriate, and validations compiled by the QP indicate that the block model is reflecting the underlying support data.
- The classification at Northshore is generally acceptable, but some post-processing to remove isolated blocks of different classification is warranted.
- In both 2019 and 2020, actual versus model-predicted values of crude ore, pellet production, and process recovery were accurate to -0.09% to 4.43%.

1.1.1.2 Mining and Mineral Reserves

- Northshore has been in production since 1952, and specifically under 100% Cliffs operating management since 1994. Cliffs conducts its own Mineral Reserve estimations.
- Total Proven and Probable Mineral Reserves are estimated at 822.4 MLT of crude ore at an average grade of 24.6% MagFe.
- Mineral Reserve estimation practices follow industry standards.
- The Mineral Reserve estimate indicates a sustainable project over a 48 year life of mine (LOM).
- The geotechnical design parameters used for pit design are reasonable and supported by previous operations.
- The LOM production schedule is reasonable and incorporates large mining areas and open benches.
- An appropriate mining equipment fleet, maintenance facilities, and manpower are in place, with additions and replacements estimated, to meet the LOM production schedule requirements.
- Sufficient storage capacity for waste stockpiles and tailings has been identified to support the production of the Mineral Reserve.

1.1.1.3 Mineral Processing

- The E.W. Davis Works in Silver Bay has been in production since the 1950s, so metallurgical sampling and testing is primarily used in support of plant operations and product quality control. A laboratory is located inside the concentrator building where samples from the Mine and Plant are analyzed. The laboratory is ISO-certified to iron industry standard procedures.
- In 2019, Northshore completed an upgrade at the Silver Bay Plant that allows for the production of lower-silica iron pellets that will be used internally or sold to customers for the production of direct reduced iron (DRI) products such as hot briquetted iron (HBI).
- Crude ore is magnetite taconite with a run of mine (ROM) MagFe grade of approximately 25%. The concentrator averages 87.8% MagFe recovery into a concentrate derived from 32.9 weight % of the original crude ore feed.
- Historical concentrate production ranged from 3.1 MLT/y dry to 5.5 MLT/y dry, with a 12-year average of 4.45 MLT/y dry.
- Concentrate is supplied to the pellet plant to produce pellets, which are sold as the main final product. Historical pellet production ranged from 3.1 MLT/y dry to 5.6 MLT/y dry, with a 12-year average of 4.54 MLT/yr dry.
- The operations are consistently run and well maintained.

1.1.1.4 Infrastructure

- The Northshore facilities are in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.
- NSM operates a tailings storage facility (TSF), which encompasses approximately 2,500 acres located approximately seven miles by rail northwest of the Plant, referred to as the Milepost 7 Tailings Basin.

1.1.1.5 Environment

- NSM indicated that it maintains the requisite state and federal permits and is in compliance with all permits. Various permitting applications have been submitted to authorities and are pending authorization. Environmental liabilities and permitting are further discussed in Section 17.

1.1.2 Recommendations

1.1.2.1 Geology and Mineral Resources

1. Continue to develop the QA/QC program to ensure that the program includes clearly defined limits when action or follow up is required, and that results are reviewed and documented in a report including conclusions and recommendations regularly and in a timely manner. Continue to work with the Silver Bay laboratory to improve analytical precision. Support primary laboratory results with a check assay program through a secondary laboratory.
2. Improve the turnaround time for exploration drilling samples at the Silver Bay laboratory.
3. Modify the interpolation strategy to see whether local block to composite conformance can be improved.

4. In future updates, use local drill hole spacing instead of a distance-to-drill hole criterion for block classification.
5. Prepare model reconciliation over quarterly periods and document methodology, results, and conclusions and recommendations.

1.1.2.2 Infrastructure

1. Prioritize the completion of an Operations, Maintenance and Surveillance (OMS) Manual for the TSF with the Engineer of Record (EOR) in accordance with Mining Association of Canada (MAC) guidelines and other industry recognized standard guidance for tailings facilities.
2. Document, prioritize, track, and close out in a timely manner the remediation, or resolution, of items of concern noted in TSF audits or inspection reports.
3. Establish an External Peer Review Team (EPRT) with experience in tailings management facilities similar to other Cliffs properties.

1.2 Economic Analysis

1.2.1 Economic Criteria

An un-escalated technical-economic model was prepared on an after-tax discounted cash flow (DCF) basis, the results of which are presented in this subsection. Key criteria used in the analysis are discussed in detail throughout this TRS. General assumptions used are summarized in Table 1-1 with all pellets reported per wet long ton (WLT) pellet.

Table 1-1: Technical-Economic Assumptions
Cleveland-Cliffs Inc. – Northshore Property

Description	Value
Start Date	December 31, 2021
Mine Life	48 years
Three-Year Trailing Average Revenue	$98/WLT Pellet
Operating Costs	$80.06/WLT Pellet
Sustaining Capital (after six years)	$4/WLT Pellet
Discount Rate	10%
Discounting Basis	End of Period
Inflation	0.0%
Federal Income Tax	20%
State Income Tax	None – Sales made out of state

Table 1-2 is a summary of the estimated mine production over the 48-year mine life.

Table 1-2: LOM Production Summary
Cleveland-Cliffs Inc. – Northshore Property

Description	Units	Value
ROM Crude Ore	MLT	822.4
Total Material	MLT	1,456.2
Grade	% MagFe	24.6
Annual Mining Rate	MLT/y	30.0

Table 1-3 is a summary of the estimated plant production over the 48-year mine life.

Table 1-3: LOM Plant Production Summary
Cleveland-Cliffs Inc. – Northshore Property

Description	Units	Value
ROM Material Milled	MLT	822.4
Annual Processing Rate	MLT/y	17.0
Process Recovery	%	29.4
Standard Pellet	MLT	84.6
Direct Reduced (DR)-Grade Pellet	MLT	157.1
Total Pellet	MLT	241.6
Annual Pellet Production	MLT/y	5.0

1.2.2 Cash Flow Analysis

The indicative economic analysis results, presented in Table 1-4, indicate an after-tax Net Present Value (NPV), using a 10% discount rate, of $619 million at an average blended wet pellet price of $98/WLT. Internal Rate of Return (IRR) is not applicable since the Plant has been in operation for a number of years. Capital identified in the economics is for sustaining operations and plant rebuilds as necessary.

The economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

Table 1-4: LOM Indicative Economic Results
Cleveland-Cliffs Inc. – Northshore Property

Description	$ Millions	$/WLT Pellet
Three-Year Trailing Revenue ($/WLT Pellet)		98
Pellet Production ($/MWLT)	241.6	
Gross Revenue	**23,681**	
Mining	(4,922)	20.37
Processing	(10,289)	42.59
Site Administration	(919)	3.80
General / Other Costs	(3,217)	13.30
Total Operating Costs	**(19,347)**	**80.06**
Operating Income (excl. D&A)	**4,335**	**17.94**
Federal Income Tax	(867)	(3.59)
Depreciation Tax Savings	252	1.04
Accretion Tax Savings	5.0	0.02
Net Income after Taxes	**3,725**	**15.42**
Capital	(1,014)	(4.20)
Closure Costs	(120.0)	(0.50)
Cash Flow	**$2,591**	**10.72**
NPV 10%	**619**	

1.2.3 Sensitivity Analysis

The operation is nominally most sensitive to market prices (revenues) followed by operating cost. For each dollar movement in sales price and operating cost, respectively, the after-tax NPV changes by approximately $38 million.

1.3 Technical Summary

1.3.1 Property Description

The Peter Mitchell Mine is located in St. Louis County in Northeast Minnesota, USA, on the Mesabi Iron Range, near the city of Babbitt, Minnesota. The Mine is located approximately 3.5 mi southeast of Babbitt at latitude 47°40'12.15"N and longitude 91°53'1.28"W.The E.W. Davis Works is approximately 40.5 mi to the southeast and immediately adjacent to the city of Silver Bay in Lake County, Minnesota at latitude 47°17'38.95"N and longitude 91°15'23.38"W. The Mine and Plant have the capacity to produce approximately 5.5 MLT dry or 5.6 MLT of wet iron ore pellets annually.

Cliffs controls 28,041 acres of mineral titles and surface rights in the Property through leases and direct ownership through its wholly owned subsidiary, Northshore Mining Company.

1.3.2 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

The Mine is accessed from Virginia, Minnesota by traveling north on Highway 53 approximately 3.8 mi to Highway 169 and 6.6 mi east on Highway 169 to County Road 21. The city of Babbitt is located approximately 25 mi east on County Road 21 and about 0.5 mi east on County Road 70.The Mine is located approximately five miles by road southeast of Babbitt and approximately 100 mi by road northeast of Duluth, Minnesota. Duluth has a regional airport with several flights daily to major hubs in Minneapolis and Chicago.

The E.W. Davis Works is located in the city of Silver Bay on Highway 61, approximately 55 mi northeast of Duluth.A 47 mi rail line operated by the Cliffs subsidiary Northshore Mining Railroad runs from the Mine south to the Plant.

The climate in Northern Minnesota ranges from mild in the summer to winter extremes.The annual average temperature is 36.9ºF. The annual average high temperature is 48.6°F, whereas the annual average low temperature is 25.1°F. July is on average the hottest month (77°F) with January being the coldest (-4°F).

The operation employs 605 personnel who live in the surrounding cities of Silver Bay, Two Harbors, Babbitt, and Ely.Personnel also commute from Duluth and from the Iron Range. Lake and St. Louis Counties have an estimated combined population of 211,000 people.

The Property is located in a historically important, iron-producing region of Northeastern Minnesota.All infrastructure necessary to mine and process significant commercial quantities of iron ore is currently in place. Infrastructure items include high voltage electrical supplies, natural gas pipelines that connect into the North American distribution system, water sources, paved roads and highways, railroads for transporting ROM crude ore and finished products, port facilities that connect into the Great Lakes, and accommodations for the employees.

The Mine is located at an elevation of approximately 1,600 ft above sea level (fasl). The Plant is located adjacent to Lake Superior at approximately 600 fasl. The topography in the area is characterized by hummocky hills and long, gentle moraines that are remnants of glacial ingress and egress. The landscape ranges from semi-rugged, lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, to large, flat, poorly drained peatlands. The Minnesota Department of Natural Resources characterizes the area as being within the Laurentian Mixed Forest Province (LMF) with broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps.

1.3.3 History

The first documented mineral exploration program in the eastern Mesabi Iron Range could be attributed to Peter Mitchell, who excavated a six-foot-deep pit near the present Peter Mitchell Mine in 1871.

Historically, “direct-ship ore” (DSO) iron mines farther west on the Mesabi Range supplied iron ore to the industrializing US steel makers until those DSO deposits began to exhaust by the end of the Second World War.However, the potential for mining low-grade magnetite deposits, regionally known as taconite deposits, was recognized early in the 20th century. The first owner/operator of the Peter Mitchell Mine was the Mesabi Iron Company from 1922 to 1924, which installed and operated an experimental processing facility from 1916 to 1924.

In 1939, Reserve Mining was organized and acquired a lease from the Mesabi Iron Company. Reserve Mining built large-scale mining facilities in Babbitt and the processing plant in Silver Bay during the mid-1950s, which the company operated at various production rates until declaring bankruptcy in 1986.

Cyprus purchased the facilities in 1989 and renamed it Cyprus Northshore Mining Company. Cyprus subsequently sold that company to Cliffs in 1994 and Cliffs renamed it Northshore Mining Company. Northshore Mining Company, a wholly owned subsidiary of Cliffs, is the current operator of the Mine, Northshore Mining Railroad, and the E.W. Davis Works.

1.3.4 Geological Setting, Mineralization, and Deposit

The Northshore deposit is an example of Superior-type banded iron formation (BIF) deposit, specifically the Biwabik IF, which is interpreted to have been deposited in a shallow, tidal marine setting and is characterized as having four main members (from bottom to top): Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty. "Cherty" lithologies generally have a sandy granular texture, are thickly bedded, and are composed of silica and iron oxide minerals. "Slaty" lithologies are fine grained, thinly bedded, and comprised of iron silicates and iron carbonates, with local chert beds, and are typically uneconomic. The mineral of economic interest at Northshore is magnetite. SLR notes that nomenclature of the members is not indicative of metamorphic grade; instead slaty and cherty are colloquial descriptive terms used regionally.

Mineralization at the Mine is hosted within subunits of the Biwabik IF, near its easternmost extent. In the Mine area, bedding dips from approximately 5° southeast in the west to 35° southeast near the contact with the Duluth Gabbro Complex to the east. Only the Upper Cherty member and much lesser fractions of adjacent members are mined at Northshore. The Upper Cherty member averages 160 ft in thickness, considerably thinner than equivalent stratigraphy of the Biwabik IF in the western Mesabi Range.

Magnetite is the principal economic mineral at the Mine, and it occurs dominantly in thin to thick bands and layers, as medium to coarse disseminated grains, and as grain aggregates. Magnetic iron content ranges from 22% to 30% in the mineralized stratigraphic subunits. Local variation in silicate mineralogy and lithologic textures due to contact metamorphism, where proximal to the Duluth Gabbro Complex, presents unique challenges for grade control relative to deposits hosted in the western Biwabik IF.

1.3.5 Exploration

No exploration work or investigations other than drilling have been conducted or are planned for Northshore. Drilling campaigns have been and are undertaken on a general grid of 250 ft x 250 ft or 250 ft x 500 ft. The drill holes are located on a local mine grid that is based on the strike of the deposit. To date, 4,141 drill holes have been completed over the Property.

1.3.6 Mineral Resource Estimates

Mineral Resource block models for the Northshore deposit were prepared by Cliffs in June 2020 and audited and accepted by SLR. The Mineral Resource block model is based on the following drill hole information:

- 4,085 diamond drill holes totaling 713,129 ft from 1946 to 2019 and containing 113,203 assays.

A stratigraphic model representing the Biwabik IF was constructed in Maptek's Vulcan™ (Vulcan) software through the creation of wireframe surfaces representing the upper contact of each unit. Sub-blocked model estimates, also prepared in Vulcan, used inverse distance squared (ID^2) and length-weighted, five-foot, uncapped composites to estimate relevant analytical variables in two, progressively larger search passes, using hard boundaries between subunits, ellipsoidal search ranges, and orientation informed by geology. Average density values were assigned by lithological unit.

Mineral Resources were classified in accordance with the definitions for Mineral Resources in S-K 1300.Class assignment was based on criteria developed using continuity models (variograms), grade ranges for key economic variables (KEV), and geological understanding, and was accomplished using scripts that reference the distance of a block centroid to a drill hole sample, and distance buffers.

Wireframe and block model validation procedures including statistical comparisons with composite samples and parallel nearest neighbor (NN) estimates, swath plots, as well as visual reviews in cross-section and plan were completed. A visual review comparing the block model to drill holes completed following the block modeling work was performed to ensure general lithologic and analytical conformance.

The limit of Mineral Resources was optimized using a pit shell that considered the 2020 forecast mining cost for Northshore, Northshore lease boundaries, and a US$90/LT pellet value. The Northshore Mineral Resource estimate as of December 31, 2021, is presented in Table 1-5.

Table 1-5: Summary of Northshore Mineral Resources - December 31, 2021
Cleveland-Cliffs Inc. – Northshore Property

	Resource (MLT)	MagFe (%)	Process Recovery (%)	Wet Pellets (MLT)
Measured	766.7	22.1	25.5	195.3
Indicated	390.8	22.4	26.4	103.1
M&I	**1,157.5**	**22.2**	**25.8**	**298.4**
Inferred	13.6	19.8	22.5	3.1

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Tonnage is reported exclusive of Mineral Reserves and has been rounded to the nearest 100,000.
3. Mineral Resources are estimated at a cut-off grade of 15% MagFe.
4. Mineral Resources are estimated using a pellet value of US$90/LT.
5. Process recovery is reported as the percent mass recovery to produce two thirds DR-grade wet pellets containing 67% Fe and 2% silica, and one third standard wet pellets containing 65% Fe; shipped pellets average approximately 2.2% moisture.
6. Tonnage estimate based on depletion from a surveyed topography on December 21, 2020.
7. Resources are crude ore tons as delivered to the primary crusher; pellets are as loaded onto lake freighters at Silver Bay, Minnesota.
8. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
9. Bulk density is assigned based on average readings for each lithology type.
10. Mineral Resources are 100% attributable to Cliffs.
11. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
12. Numbers may not add due to rounding.

The SLR QP is of the opinion that, with consideration of the recommendations summarized in this section, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work.

1.3.7 Mineral Reserve Estimate

Mineral Reserves in this TRS are derived from the Mineral Resources.The Mineral Reserves are reported as crude ore and are based on open pit mining. Crude ore is the unconcentrated ore as it leaves the mine at its natural *in situ* moisture content. The Proven and Probable Mineral Reserves for Northshore are estimated as of December 31, 2021, and summarized in Table 1-6.

Table 1-6: Summary of Northshore Mineral Reserves - December 31, 2021
Cleveland-Cliffs Inc. – Northshore Property

Category	Crude Ore Mineral Reserves (MLT)	Crude Ore MagFe (%)	Process Recovery (%)	Wet Pellets (MLT)
Proven	303.2	25.3	30.3	92.0
Probable	519.2	24.1	28.8	149.6
Proven & Probable	**822.4**	**24.6**	**29.4**	**241.6**

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb and has been rounded to the nearest 100,000.
2. Mineral Reserves are reported at a $90/LT wet standard pellet price freight-on-board (FOB) Lake Superior, based on the three-year trailing average of the realized product revenue rate.
3. Mineral Reserves are estimated at a cut-off grade of 19% MagFe or when mineralization concentrates to less than 63.5% Fe (Conc_Fe) or when the Grindability is less than 30.0.
4. Mineral Reserves include global mining dilution of 3% and mining extraction losses of 2% in addition to 33% mining extraction losses for intermediate crude ore.
5. The Mineral Reserve mining strip ratio (waste units to crude ore units) is at 0.8.
6. Mineral Reserves are Probable if not scheduled within the first 20 years.
7. Process recovery is reported as the percent mass recovery to produce two thirds DR-grade wet pellets containing 67% Fe and 2% Silica, and one third standard wet pellets containing 65% Fe; shipped pellets average approximately 2.2% moisture.
8. Tonnage estimate is based on actual depletion as of December 31, 2021 from a December 21, 2020 topographic survey.
9. Mineral Reserve tons are as delivered to the primary crusher; pellets are as loaded onto lake freighters at Silver Bay, Minnesota.
10. Classification of Mineral Reserves is in accordance with the S-K 1300 classification system.
11. Mineral Reserves are 100% attributable to Cliffs.
12. Numbers may not add due to rounding.

The pellet price used to perform the evaluation of the Mineral Reserves was based on the current mining model three-year trailing average of the realized product revenue rate of US$90.42/LT wet standard pellet. The saleable product (i.e., DR-grade pellets and standard pellets) mix may vary depending on market considerations and internal requirements. Total saleable product is within the range of 230 MLT (assuming all DR-grade pellets) and 271 MLT (assuming all standard pellets). The costs used in this study represent all mining, processing, transportation, and administrative costs, including the loading of pellets into lake freighters at Silver Bay, Minnesota.

SLR is not aware of any risk factors associated with, or changes to, any aspects of the modifying factors such as mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

1.3.8 Mining Methods

The Northshore deposit is mined using conventional surface mining methods. The surface operations include:

- Overburden (glacial till) removal
- Drilling and blasting
- Loading and haulage
- Crushing and rail loading

The Mineral Reserve is based on the ongoing, annual crude ore production of 16 MLT to 18 MLT producing a total of approximately 5.1 MLT of wet pellets for domestic consumption. There are no current plans for expansion at Northshore.

Mining and processing operations are scheduled 24 hours per day, and the mine production is scheduled to directly feed the processing operations.

The current LOM plan has mining scheduled for 48 years and mines the known Mineral Reserve.The average strip ratio is approximately 0.8 waste units to 1 crude ore unit (0.8 strip ratio).

The Northshore final pit is a single pit approximately 10.5 mi along strike and up to 1.2 mi wide. The final pit is relatively shallow at up to 420 ft deep and, structurally, the *in situ* crude ore and rock is of good quality. In 2019, SRK Consulting in Denver, Colorado conducted a geotechnical study to assess the global stability of the final pit wall configuration. SLR is of the opinion that the design parameters used for the final pit design are reasonable.

The mine's operation has a strict crude ore blending requirement to ensure the Plant receives a uniform head grade. The most important blending characteristics of the crude ore are the MagFe, Conc_Fe, and ore hardness (i.e., Grindability). Generally, three crude ore loading points from different subunit groupings (i.e., the Intermediate, High Grade, Footwall Group, and Lower Cherty subunit groupings) are mined at one time to obtain the best blend for the Plant.

Crude ore is hauled to the crushing facility and either direct-tipped to the primary crusher or stockpiled in an area adjacent to the primary crusher. Haul trucks are alternated to blend delivery from the multiple crude ore loading points. The crude ore stockpiles are used as an additional source for blending and production efficiency. Crushed crude ore is conveyed to a silo, where it is loaded into 85-ton rail cars for transport to the Plant located 47 mi southeast of the Mine at Silver Bay, Minnesota. Waste rock is hauled to one of the many waste stockpiles within and around the pit.

The major pieces of pit equipment include electric drills, electric rope shovels, haul trucks, front-end loaders, bulldozers, and graders. Extensive maintenance facilities are available at the mine site to service the mine equipment

1.3.9 Processing and Recovery Methods

The mine and primary and secondary crushing plant are located in Babbitt, Minnesota, and the tertiary and quaternary crushing plant is located in Silver Bay, Minnesota. Crude ore blending is accomplished through the proper selection of the blast sites at the mine and truck deliveries to the primary crusher. Mine haul trucks dump the crude material directly into a primary gyratory crusher. The primary-crushed material falls directly into the four, secondary gyratory crushers, located directly beneath the primary crusher, and is crushed to a nominal four inches. The nominal four-inch material is then loaded into trains and transported 47 mi to Silver Bay, Minnesota, where the tertiary and quaternary crushing plant, the concentrator, and pellet plant are located.

Upon arriving at Silver Bay, the secondary crushed crude material is dumped from the rail cars by automated two-car dumpers and crushed in tertiary and quaternary cone crushers and then passed over double-drum dry cobbers for primary magnetic separation.

The fine crusher product is processed in 17 separate rod mill - ball mill grinding and magnetic separation sections or lines and three partial scavenging sections to produce a final concentrate product. The layouts of all 17 sections are similar, with some minor differences in equipment from one section to another. Two products are made in the concentrator – standard concentrate, which targets a pellet silica content of 4.8%, and DR-grade concentrate, which targets a lower pellet silica content of 2%.

Crushed ore from the quaternary crushing station is treated in double-drum dry cobbers. The cobber concentrate is sent to rod mills by belt conveyors, whereas the cobber tails are hauled by rail and discarded as coarse final tails. The cobber concentrate has a MagFe target of 28.5%.

The magnetic cobber concentrate is fed to the rod mills, which are operated in an open-circuit configuration. The rod mill discharge is treated in rougher, low-intensity drum magnetic separators. The resulting magnetic rougher concentrate is pumped to two parallel ball mills in closed circuit with cyclones to produce a final grind of 90% passing 325 mesh (45 micron). The cyclone overflow is fed to two parallel primary hydroseparators. The primary hydroseparator overflow, composed mainly of silica particles, discharges to the tailings launder. The heavy primary hydroseparator underflow product is pumped to two stages of screens, with the screen undersize reporting to the finisher hydroseparator.

The finisher hydroseparator overflow is discharged to tailings, and the underflow is pumped to two, parallel, double-drum finisher magnetic separators. The finisher magnetic separator tails are discharged to tailings, and the concentrate is pumped to flotation. The flotation concentrate is thickened to a target density in the flotation hydroseparator to produce the final iron concentrate product. The flotation hydroseparator overflow is discharged to tailings, and the concentrate is sent to the concentrate thickener and then to the vacuum disc filtration circuit for final dewatering. Filter cake at 9.5% moisture is transported by belt conveyors to the pellet plant concentrate bins. Standard final concentrate has an iron grade of approximately 68% Fe. DR-grade final concentrate has an iron grade of approximately 70% Fe.

The concentrate is rolled in balling drums to produce green balls.The green pellet roll screens at the discharge of the balling drums are set to produce a green ball product. Travelling-grate furnaces are used for drying, preheating, and firing the pellets.

1.3.10 Infrastructure

The Property is located in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is currently in place.

Infrastructure items include:

- Peter Mitchell Mine facilities in Babbitt, Minnesota.
- E.W. Davis plant facilities in Silver Bay, Minnesota.
- Power supplied by Minnesota Power.
- Natural gas supplied by Northern Natural Gas from pipelines that connect into the North American distribution system.

- Fresh water sourced from Lake Superior.
- Paved roads and highways.
- Cliffs-owned Northshore Mining Railroad comprising unit trains for transporting crushed crude ore from Babbitt to Silver Bay and tailings to the Milepost 7 TSF.
- Rail yards and workshops for maintaining the rail equipment.
- Port facilities, including pellet storage stockpiles, short-term vessel loading bins, and ship loaders for loading 60,000 LT-capacity Lakers that transport pellets to steel mills on the Great Lakes.
- Accommodations for employees.
- Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems.

1.3.11 Market Studies

Cliffs is the largest producer of iron ore pellets in North America.It is also the largest flat-rolled steel producer in North America.In 2020, Cliffs acquired two major steelmakers, ArcelorMittal USA (AMUSA), and AK Steel (AK), vertically integrating its legacy iron ore business with steel production and emphasis on the automotive end market.

Cliffs owns or co-owns five active iron ore mines in Minnesota and Michigan.Through the two acquisitions and transformation into a vertically integrated business, the iron ore mines are primarily now a critical source of feedstock for Cliffs' downstream primary steelmaking operations. Based on its ownership in these mines, Cliffs' share of annual rated iron ore production capacity is approximately 28.0 million tons, enough to supply its steelmaking operations and not have to rely on outside supply.

The importance of the steel industry in North America and specifically the USA is apparent by the actions of the US federal government by implementing and keeping import restrictions in place. It is important for middle-class job generation and the efficiency of the national supply chain. It is also an industry that supports the country's national security by providing products used for US military forces and national infrastructure. Cliffs expects the US government to continue recognizing the importance of this industry and does not see major declines in the production of steel in North America.

Northshore pellets are shipped to Cliffs' steelmaking facilities in the Midwestern USA.

For cash flow projections, Cliffs uses a blended pellet revenue rate of $98/WLT Free on Board (FOB) Mine based on a three-year trailing average for 2017 to 2019. Based on macroeconomic trends, SLR is of the opinion that Cliffs pellet prices will remain at least at the current three-year trailing average of $98/WLT or above for the next five years.

1.3.12 Environmental Studies, Permitting and Plans, Negotiations, or Agreements with Local Individuals or Groups

NSM indicated that it presently has the requisite operating permits for the Mine and Plant and estimates that the mine life will be 48 years. Environmental monitoring during operations includes water- and air-quality monitoring. Closure plans and other post-mining plans are required to be prepared within two years of anticipated closure. Cliffs indicated that it conducts an in-depth review every three years to ensure that the Asset Retirement Obligation (ARO) legal liabilities are accurately estimated based on current laws, regulations, facility conditions, and cost to perform services. These cost estimates are conducted in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 410. In terms of agreements, Cliffs initiatives include agreements with local municipalities or organizations to make Cliffs-owned or leased land that is not utilized for mining available for local community use, including trails used for snowmobiling, biking, and ATV use. SLR is not aware of any formal commitments to local procurement and hiring; however, Cliffs indicated that it has long-standing relationships with local vendors.

1.3.13 Capital and Operating Cost Estimates

Productive and sustaining capital expenditure estimates for the remaining life of the operation are presented in Table 1-7. Starting in 2027, a sustaining capital cost of $4/WLT pellet, or $20.5 million annually, is used in the technical-economic model for an additional $831 million for the remaining mine life.

Table 1-7: LOM Capital Costs
Cleveland-Cliffs Inc. – Northshore Property

Type	Units	Total	2022	2023	2024	2025	2026	2027-2069
Productive	$ millions	25.0	0	0	0	0	0	25.0
Sustaining	$ millions	989	43.8	40.9	35.9	20.4	16.8	830.8
Total	**$ millions**	**1,014**	**43.8**	**40.9**	**35.9**	**20.4**	**16.8**	**855.8**

Operating costs are based on a full run rate with a combination of both standard and low-silica production consistent with what is expected for the LOM. A LOM average operating cost of $80.06/WLT pellet is estimated over the remaining 48 years of the mine life as shown below in Table 1-8.

Table 1-8: LOM Operating Costs
Cleveland-Cliffs Inc. – Northshore Property

Description	LOM ($/WLT Pellet)
Mining	20.37
Processing	42.59
Site Administration	3.80
General / Other	13.30
Operating Cash Cost	80.06

Cliffs-forecasted capital and operating costs estimates are derived from annual budgets and historical actuals over the long life of the current operation. According to the American Association of Cost Engineers (AACE) International, these estimates would be classified as Class 1 with an accuracy range of -3% to -10% to +3% to +15%.

2.0 INTRODUCTION

SLR International Corporation (SLR) was retained by Cleveland-Cliffs Inc. (Cliffs) to prepare an independent Technical Report Summary (TRS) for Cliffs' Northshore Property (Northshore or the Property), located in Northeastern Minnesota, USAThe operator of the Property, Northshore Mining Company (NSM), is a wholly owned subsidiary of Cliffs.

The purpose of this TRS is to disclose year-end (YE) 2021 Mineral Resource and Mineral Reserve estimates for Northshore.

Cliffs is listed on the New York Stock Exchange (NYSE) and currently reports Mineral Reserves of pelletized ore in SEC filingsThis TRS conforms to United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300) and Item 601 (b)(96) Technical Report Summary.

The Property includes the Peter Mitchell Mine (the Mine) in the city of Babbitt, Minnesota and the E.W. Davis Works processing facility (E.W. Davis Works or the Plant) in the city of Silver Bay, Minnesota.The Mine is a large, operating, open-pit iron mine that produces pellets from a magnetite-bearing iron ore regionally known as taconite.

The Property commenced operations in 1952 as an asset of the Reserve Mining Company (Reserve Mining) and continued production until 1986, when Reserve Mining declared bankruptcy. Cyprus Minerals Company (Cyprus) purchased the facilities in 1989 and renamed it Cyprus Northshore Mining Company. Cyprus subsequently sold that company to Cliffs in 1994, and Cliffs renamed it Northshore Mining Company.Northshore Mining Company has been a wholly owned subsidiary of Cliffs since that time.

The open-pit operation has a mining rate of approximately 17 million long tons (MLT) of ore per year and produces 5.0 MLT of iron ore pellets per year, which are shipped by freighter via the Great Lakes to Cliffs' steel mill facilities in the Midwestern USA.

2.1 Site Visits

SLR Qualified Persons (QPs) visited the Property on October 22-23, 2019On the first day, the SLR team all toured the Peter Mitchell mine offices and operational areas, including rail ore load-out site and train maintenance shops. The SLR geologist also visited the core shack and reviewed core logging and sampling procedures as well as reviewed modeling procedures with the Cliffs mine geologist staff. On the second day, the SLR team all toured the tailings basin, Silver Bay laboratory, concentrator, and pelletizing facilities plus the ship pellet load-out site.

2.2 Sources of Information

Technical documents and reports on the Property were obtained from Cliffs personnel. During the preparation of this TRS, discussions were held with personnel from Cliffs:

- Kurt Gitzlaff, Director – Mine Engineering, Cliffs Technology Group (CTG)
- Michael Orobona, Principal Geologist, CTG
- Scott Gischia, Director – Environmental Compliance
- Dean Korri, Director – Basin & Civil Engineering

- Sandy Karnowski, District Manager – Public Affairs
- John Elton, Senior Director – Corporate Accounting & Assistant Controller
- Tushar Mondhe, Senior Manager – Operations and Capital Finance
- Amanda Wills, Mine Geologist
- April Ekholm, Section Manager Quality and Process Improvement
- Michael Jonson, Infrastructure
- Andrea Hayden, Area Manager, Environmental

This TRS was prepared by SLR QPs.The documentation reviewed, and other sources of information, are listed at the end of this report in Section 24.0, References.

2.3 List of Abbreviations

Units of measurement used in this report conform to the Imperial system. All currency in this report is US dollars (US$ or $) unless otherwise noted.

Abbreviations and acronyms used in this TRS are listed below.

Unit Abbreviation	Definition	Unit Abbreviation	Definition
a	annum	LT/d	long tons per day
A	ampere	LT/h	long tons per hour
acfm	actual cubic feet per minute	M	mega (million); molar
bbl	barrels	Ma	one million years
Btu	British thermal units	MBtu	thousand British thermal units
d	day	MCF	million cubic feet
°F	degree Fahrenheit	MCF/h	million cubic feet per hour
fasl	feet above sea level	mi	mile
ft	foot	min	minute
ft^{2}	square foot	MLT/y	million long tons per year
ft^{3}	cubic foot	MPa	megapascal
ft/s	foot per second	mph	miles per hour
g	gram	MVA	megavolt-amperes
G	giga (billion)	MW	megawatt
Ga	one billion years	MWh	megawatt-hour
gal	gallon	MWLT	million wet long tons
gal/d	gallon per day	oz	Troy ounce (31.1035g)
g/L	gram per liter	oz/ton	ounce per short ton
g/y	gallon per year	ppb	part per billion
gpm	gallons per minute	ppm	part per million
hp	horsepower	psia	pound per square inch absolute
h	hour	psig	pound per square inch gauge
Hz	hertz	rpm	revolutions per minute
in.	inch	RL	relative elevation
in^{2}	square inch	s	second
J	joule	ton	short ton
k	kilo (thousand)	stpa	short ton per year
kg/m^{3}	Kilogram per cubic meter	stpd	short ton per day
kVA	kilovolt-amperes	t	metric tonne
kW	kilowatt	US$	United States dollar
kWh	kilowatt-hour	V	volt
kWLT	thousand wet long tons	W	watt
L	liter	wt%	weight percent
lb	pound	WLT	wet long ton
LT	long or gross ton equivalent to 2,240 pounds	y	year
		yd^{3}	cubic yard

Acronym	Definition
AACE	American Association of Cost Engineers
AK	AK Steel
AMUSA	ArcelorMittal USA
ANSI	American National Standards Institute
ARD	acid rock drainage
ARO	asset retirement obligation
ASC	Accounting Standards Codification
ASQ	American Society for Quality
ASTM	American Society for Testing and Materials
BF	blast furnace
BFA	bench face angle
BH	bench height
BIF	banded iron formation
BLS	United States Bureau of Labor Statistics
BOF	Basic Oxygen Furnace
CCD	counter-current decantation
CCP	Conceptual Closure Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Cost and Freight
COA	certificates of analysis
CRIRSCO	Committee for Mineral Reserves International Reporting Standards
D&A	depreciation and amortization
DDH	diamond drillhole
DMO	Department Maintenance Office
DR	direct reduced
DRI	direct reduced iron
DSO	direct shipping iron ore
DT	Davis Tube
EAF	electric arc furnace
EAP	Emergency Action Plan
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	environmental management system
EPA	United States Environmental Protection Agency
EPRT	External Peer Review Team
ESOP	Environmental Standard Operating Procedures
EOR	Engineer of Record
FASB	Financial Accounting Standards Board
FEL	front-end loader
FOB	Free on Board
FoS	factor of safety
GHG	greenhouse gas

GIM	Geoscientific Information Management
GPS	global positioning system
GSI	Geological Strength Index
GSSI	General Security Services Corporation
HBI	hot-briquetted iron
HRC	hot-rolled coil
HTW	horizontal true width
ID^2	inverse distance squared
ID^3	inverse distance cubed
IF	iron formation
IRA	inter-ramp angle
IRR	internal rate of return
ISO	International Standards Organization
KEV	key economic variables
LG	Lerchs-Grossmann
LiDAR	light imaging, detection, and ranging
LMF	Laurentian Mixed Forest
LOM	life of mine
MAC	Mining Association of Canada
MLT	million long tons
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MPUC	Minnesota Public Utilities Commission
MR	moving range
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NGO	non-governmental organization
NNG	Northern Natural Gas
NOAA	National Oceanic and Atmospheric Administration
NOLA	Nuclear On-Line Analyzer
NPDES	National Pollution Discharge Elimination System
NPV	net present value
NSM	Northshore Mining Company
OMS	Operations, Maintenance and Surveillance
OSA	overall slope angle
QA/QC	Quality Assurance/Quality Control
QP	Qualified Person
RC	rotary circulation drilling
RCRA	Resource Conservation and Recovery Act
ROM	run of mine
RQD	rock quality designation
RTR	risk and technology review
SDS	State Disposal System Permit
SEC	United States Securities and Exchange Commission

SG	specific gravity
SMU	selective mining unit
SQL	Structured Query Language
TMDL	total maximum daily load
TRS	Technical Report Summary
TSF	tailings storage facility
TSP	total suspended particulates
UCS	uniaxial compressive strength
USACE	United States Army Corps of Engineers
USGAAP	United States General Accepted Accounting Principles
USGS	United States Geological Survey
USNRC	United States Nuclear Regulatory Commission
WTP	water treatment plant
XRF	x-ray fluorescence

3.0 PROPERTY DESCRIPTION

3.1 Property Location

The Property is located in St. Louis and Lake Counties in Northeastern Minnesota, USA. The Mine is located in St. Louis County, approximately 3.5 mi south of the city of Babbitt, Minnesota at latitude 47°40'12.15"N and longitude 91°53'1.28"W. The E.W. Davis Works is located approximately 40.5 mi to the southeast in Lake County near the city of Silver Bay, Minnesota at latitude 47°17'38.95"N and longitude 91°15'23.38"W. Figure 3-1 shows the location of the Property.

3.2 Land Tenure

3.2.1 Mineral Rights

The Property consists of approximately 10,356 acres of mineral leases granted by a publicly traded royalty trust organized under the laws of the State of New York known as the Mesabi Trust, the State of Minnesota, and other private landowners as illustrated in Figure 3-2. Mineral leases generally include surface mining rights. Land tenure is summarized in Table 3-1.

Northshore owns an approximately 28% interest in the surface and minerals of approximately 8,966 acres, which Northshore leases for mining. Other ownership in these acres is distributed among the Mesabi Trust (20%) and other private landowners (approximately 52%). The 8,966 acres are leased to the Mesabi Trust under a lease commonly known as the Peters Lease. The Mesabi Trust then subleases the Peters Lease to Northshore.

Northshore mineral leases with the Mesabi Trust, including the Peters Lease and another lease commonly known as the Cloquet Lease, expire when Mineral Reserves are exhausted. Northshore mineral leases with the State of Minnesota expire in 2034. Northshore mineral leases with other private landowners expire in 2024.

Cliffs is the sole operator of NSM's Peter Mitchell Mine leases within the permitted boundary. In order to maintain the mineral leases until expiration, NSM must continue to make minimum prepaid royalty payments each quarter and pay property taxes. Royalty payments are due to the Mesabi Trust per long ton of pellets produced or shipped each quarter. The royalty rate paid per long ton of pellets is based on a sliding scale according to the quantity of pellets shipped and is calculated as a percentage of the sale price of pellets. Under mineral leases from the State of Minnesota and other private landowners, a royalty is due per long ton of pellets produced from the crude ore mined when mining occurs and is payable to the respective lessors quarterly. Minimum prepaid royalty payments may be credited against royalties due when mining occurs. Ninety percent (90%) of crude ore must be mined from the Mesabi Trust up to production of 6 MLT of pellets, after which there is no limiting factor on other leases.

Table 3-1: Land Tenure Summary
Cleveland-Cliffs Inc. – Northshore Property

Lease Name	Expiry Date
State 3154-N	12/31/2034
State T-5100-N	12/31/2034
Mesabi Trust – Cloquet Lease	5/1/2040
Gardner Lease	12/31/2075
Mesabi Trust – Peters Lease	When mineral reserves are exhausted

3.2.2 Surface Rights

The Property consists of approximately 28,041 acres (8,966 acres associated with mineral leases) of owned property in and around the Mine and E.W. Davis Works as illustrated in Figure 3-2 and Figure 3-3. To maintain ownership, the property taxes must be paid to St. Louis and Lake Counties, Minnesota. NSM also leases approximately 6,103 acres not associated with mineral leases through surface leases granted by the Mesabi Trust and the State of Minnesota. Additionally, NSM owns easements for the portions of the rail corridor not owned or leased.

December 2021

Source: SLR, 2021

Figure 3-1: Property Location Map

Figure 3-2: Peter Mitchell Mine Title Boundaries

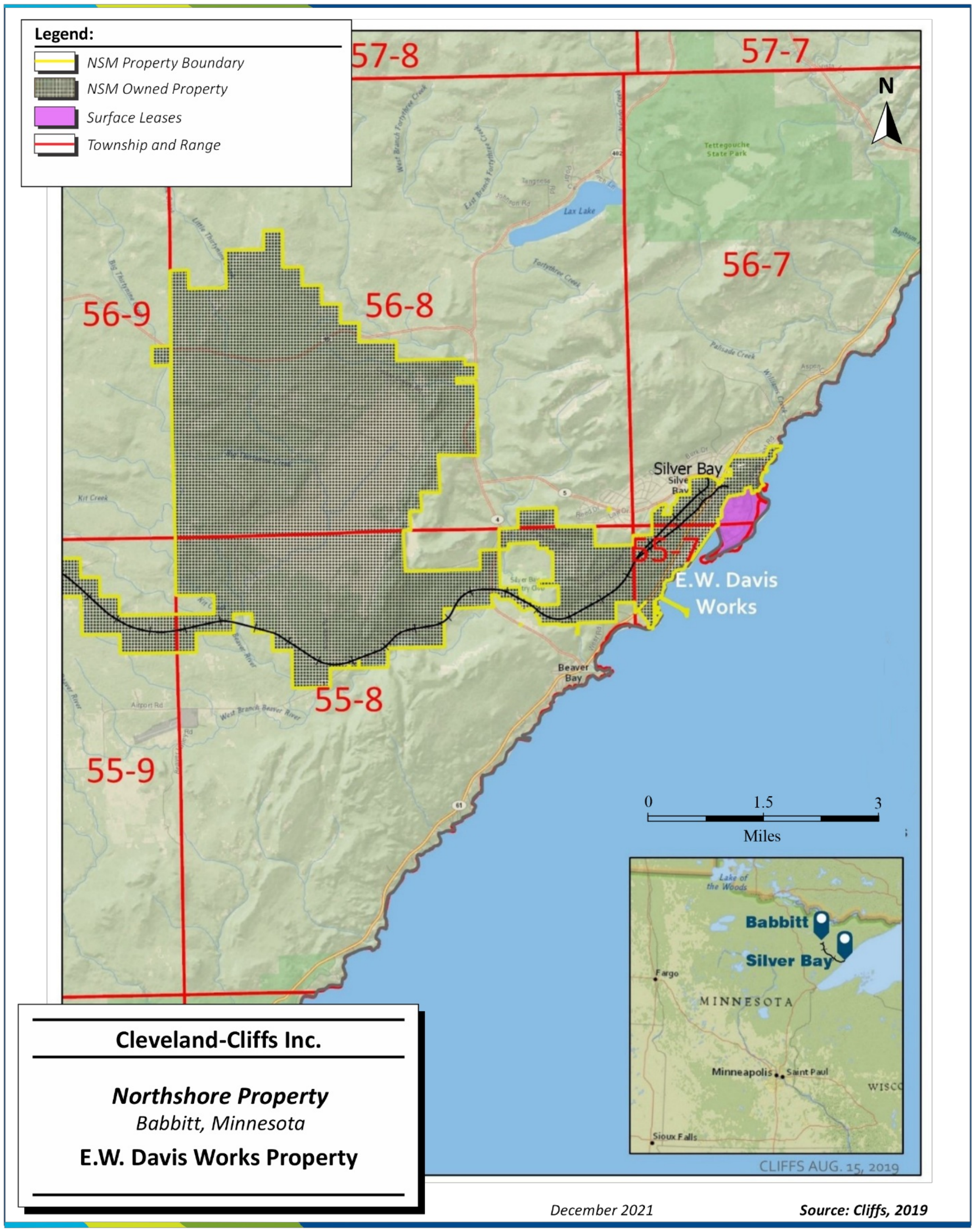


Figure 3-3: E.W. Davis Works Property

3.3 Encumbrances

NSM grants leases, licenses, and easements for various purposes including miscellaneous community land uses, utility infrastructure, and other third party uses that encumber the Property but do not inhibit operations. Certain assets of NSM serve as collateral as part of Cliffs' asset-based lending (ABL) facility. Cliffs has outstanding standby letters of credit, which were issued to back certain obligations of NSM, including certain permits and tailings basin projects. Additionally, NSM has and may continue to enter into lease agreements for necessary equipment used in the operations of the mine.

3.4 Royalties

Reference section 3.2 for royalty information. No overriding royalty agreements are in place.

3.5 Other Significant Factors and Risks

No additional significant factors or risks are known.

SLR is not aware of any environmental liabilities on the Property. Cliffs has all required permits to conduct the proposed work on the Property. SLR is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the Property.

4.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

4.1 Accessibility

The Mine is accessed from Virginia, Minnesota by traveling north on Highway 53 approximately 3.8 mi to Highway 169 and 6.6 mi east on Highway 169 to County Road 21. The city of Babbitt is located approximately 25 mi east on County Road 21 and approximately 0.5 mi east on County Road 70.The Mine is located approximately five miles by road southeast of Babbitt and approximately 100 mi by road northeast of Duluth, Minnesota.Duluth has a regional airport with several flights daily to major hubs in Minneapolis, Minnesota and Chicago, Illinois.

A rail line operated by Cliffs' wholly owned Northshore Mining Railroad runs from the Mine south to the processing plant in Silver Bay.This rail line, originally constructed by Reserve Mining Company in the 1950s, is 47 mi in length. The E.W. Davis Works has a boat-loading facility and a single slip that can accommodate lake boats for loading and is generally open from mid-March through mid-January. The processing plant is located in the city of Silver Bay on Highway 61, approximately 55 mi northeast of Duluth.Refer to section 3.1 of this TRS and Figure 3-1 for the location of roads providing access to the Peter Mitchell Mine and E.W. Davis Works Facility.

4.2 Climate

The climate in Northern Minnesota ranges from mild in the summer to winter extremes.The annual average temperature is 36.9ºF. The annual average high temperature is 48.6°F, whereas the annual average low temperature is 25.1°F. July is on average the hottest month (77°F), with January being the coldest (-4°F) (National Oceanic and Atmospheric Administration [NOAA], 1991-2020).Table 4-1 lists complete climate data for the area for 1991 to 2020.

Table 4-1: Northern Minnesota Climate Data (1991 to 2020)
Cleveland-Cliffs Inc. – Northshore Property

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high (°F)	16.9	22.5	35.4	49.5	63.4	72.2	76.7	74.9	65.7	50.8	34.3	21.4	48.6
Daily mean (°F)	6.2	10.5	23.8	37.1	49.5	58.9	63.5	61.6	53	40.2	25.6	12.3	36.9
Average low (°F)	−4.4	−1.4	12.2	24.8	35.7	45.7	50.3	48.3	40.3	29.7	16.9	3.1	25.1
Precipitation (in.)	0.51	0.53	0.91	1.61	2.76	4.36	3.85	3.09	3.06	2.35	1.09	0.64	24.76
Snowfall (in.)	15	7.1	7.8	3.7	0	0	0	0	0	1.2	13.2	12.3	60.3

Source: NOAA, 2021

Precipitation as rain in Northern Minnesota ranges from less than one inch in December, January, and February, to approximately three to four inches per month during the summer, averaging approximately 25 in. annually. Annual snowfalls average 60 in. during November through March. Approximately half of the precipitation occurs during the summer months.

The Property is in production year-round.

4.3 Local Resources

Labor is readily available in the Property area. Medical facilities with trauma centers are located in the cities of Ely, Two Harbors, Virginia, and Duluth. Table 4-2 is a list of the major population centers and the distance by road to the Mine and the Plant.

Table 4-2: Nearby Population Centers
Cleveland-Cliffs Inc. – Northshore Property

City/Town	Medical Center	Population 2010 Census	Mileage to Mine	Mileage to Plant
Silver Bay, MN	n/a	1,887	58	0
Babbitt, MN	n/a	1,475	6	63
Two Harbors, MN	Level IV	3,745	62	28
Ely, MN	Level IV	3,460	22	69
Virginia, MN	Level IV	8,712	43	75
Duluth, MN	Level I and II	85,884	100	55

Source: US Census Bureau, Google Maps

The operation employs 605 personnel who live in the surrounding cities of Silver Bay, Two Harbors, Babbitt, and Ely. Personnel also commute from Duluth and from the Iron Range. Lake and St. Louis Counties, Minnesota have a combined population of 220,000 people.

4.4 Infrastructure

The Property is located in a historically important, iron-producing region in Northeastern Minnesota.All infrastructure necessary to mine and process significant commercial quantities of iron ore is currently in place. Infrastructure items include high-voltage electrical supplies, natural gas pipelines that connect into the North American distribution system, water sources, paved roads and highways, railroads for transporting run of mine (ROM) crude ore, port facilities that connect into the Great Lakes, and accommodations for the employees. Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems. Additional details regarding Northshore infrastructure are provided in Section 15 of this TRS.

4.5 Physiography

The Mine is located at an elevation of approximately 1,600 ft above sea level (fasl). The Plant is located adjacent to Lake Superior at approximately 600 fasl. The topography in the area is characterized by hummocky hills and long, gentle moraines, remnants of glacial ingress and egress. The landscape ranges from semi-rugged, lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, to large, flat, poorly drained peatlands. Topography includes rolling till plains, moraines, and flat outwash plains formed by the Rainy Lobe glacier. Bedrock is locally exposed near terminal moraines, but is generally rare. There are over 63 bodies of water with surface areas greater than 100 acres in the Nashwauk Uplands Ecological Subsection, which includes the area around Babbitt.

The Minnesota Department of Natural Resources (MDNR) characterizes the area as being within the Laurentian Mixed Forest Province (LMF), which covers over 23 million acres of Northeastern Minnesota.

In Minnesota, the LMF is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps. Vegetation is a mixture of deciduous and coniferous trees. White pine-red pine forest and jack pine barrens are common on outwash plains. Aspen-birch forest and mixed hardwood-pine forest are present on moraines and till plains. Wetland vegetation includes conifer bogs, lowland grasses, and swamps. Prior to settlement, the area consisted of forest communities dominated by white pine, red pine, balsam fir, white spruce, and aspen-birch.

Brown glacial sediments form the parent material for much of the soils in the area. Soils are varied and range from medium to coarse textured. Soils are formed in sandy to fine-loamy glacial till and outwash sand. Upland soils are predominantly well-drained, sandy loam with variation in subsoil textures. The moraine and till plains in the northern half of the area are underlain by sand. Sandy loam till lies to the south. The soils are a combination of boralfs and ochrepts (MDNR, 2011).

5.0 HISTORY

5.1 Prior Ownership

The Peter Mitchell Mine was originally owned by the Mesabi Iron Company from 1922 to 1924, which installed and operated an experimental processing facility near Babbitt from 1916 to 1924. In 1939, Reserve Mining Company was organized and acquired a lease from the Mesabi Iron Company. Reserve Mining Company built large-scale mining facilities in Babbitt, Minnesota and a processing plant in Silver Bay, Minnesota during the mid-1950s, which the company operated at various production rates until declaring bankruptcy in 1986. Cyprus purchased the facilities in 1989 and renamed it Cyprus Northshore Mining Company.Cyprus sold that company to Cliffs in 1994, and Cliffs renamed it Northshore Mining Company. Northshore Mining Company, a wholly owned subsidiary of Cliffs, has secured all mineral and surface rights through mineral and surface leases or direct property ownership and is the current operator of the Mine, Northshore Mining Railroad, and the E.W. Davis Works.

5.2 Exploration and Development History

Initial observations of iron-bearing rocks in the Mesabi Iron Range are attributed to Henry H. Eames, the first state geologist of Minnesota, in 1866He mentioned that “enormous bodies of iron ore occurred” in the northern part of the state (Eames, 1866).

The magnetic nature of the rocks in the eastern Mesabi Iron Range was noted in the Geological and Natural History Survey of Minnesota annual report for 1882 (Winchell, 1883). According to this report, the first mineral exploration in the eastern Mesabi Iron Range could be attributed to Peter Mitchell, who excavated a six-foot-deep pit in the northwest quarter of Section 20, Township 60, and Range 12W in 1871.This site is located near the present Peter Mitchell Mine.

Historically, “direct-ship ore” (DSO) iron mines farther west on the Mesabi Iron Range supplied iron ore to the industrializing US steel makers until those DSO deposits began to exhaust around the end of the Second World War.However, the potential for mining low-grade magnetite deposits, regionally known as “taconite” deposits, was recognized early in the 20th century, with the organization of the Mesabi Syndicate (Mesabi Iron Company) in 1915 and installation of experimental process facilities outside of Babbitt in 1916. The process facilities did not prove to be efficient and were shut down in 1924. Reserve Mining Company conducted experimental work on the beneficiation of the lower-grade taconite in cooperation with the University of Minnesota for a number of years prior to settling on the pelletizing process in the mid-1950s.

Reserve Mining Company drilled 593,675 ft of AQ (1.1 in.) size core in 3,580 drill holes during its tenure on the Property. Site-standard analytical procedures of magnetic iron determination by Saturation Magnetization Analyzer (Satmagan), Concentratability, and Grindability applied to drill core were developed prior to mining and have continued to the present as described in Section 8.0 of this TRS. Cliffs and NSM do not have detailed records or results of early, non-drilling prospecting methods used during initial exploration activities (geophysical surveys, mapping, trenching, test pits, etc.) conducted prior to Cliffs’ ownership of the operation.

5.3 Historical Mineral Reserve Estimates

As Cliffs has been the operator of Northshore since 1994, historical reserves are not relevant and are not included in this TRS. A brief history of Mineral Reserves for Northshore, as reported by Cliffs, is included in section 12.2.

5.4 Past Production

The historical production of the Northshore operation is given in Table 5-1. The production by owner/operator is shown in Table 5-2.

Table 5-1: Historical Production
Cleveland-Cliffs Inc. – Northshore Property

Year	Stripping (kWLT)	Crude Ore (kWLT)	Process Recovery	Wet Std. Pellets (kWLT)	Wet DR-Grade Pellets (kWLT)
1952-1989	253,964	649,665	34.0%	220,952	
1990-1999	3,899	96,245	34.6%	33,332	
2000-2009	73,041	129,778	34.8%	45,186	
2010	10,927	14,823	33.3%	4,929	
2011	11,596	17,216	34.2%	5,886	
2012	8,849	16,078	34.0%	5,465	
2013	7,562	11,685	34.1%	3,990	
2014	11,184	15,100	35.0%	5,278	
2015	7,347	12,200	35.5%	4,326	
2016	5,049	9,568	34.6%	3,307	
2017	8,282	14,558	36.7%	5,347	
2018	8,022	15,385	37.1%	5,712	
2019	9,677	15,681	33.3%	4,242	973
2020	7,379	11,323	33.4%	3,362	420
2021	9,317	16,426	30.5%	1,767	3,243
Total	435,930	1,045,082	34.2%	353,016	4,636

Table 5-2: Historical Production by Owner Cleveland-Cliffs Inc. – Northshore Property

Years	Ownership	Wet Pellets (kWLT)
1922-1924	Mesabi Iron Company	158
1952-1986	Reserve Mining Company	220,795
1990-1994	Cyprus Northshore Mining Company	11,949
1994-Present	Northshore Mining Company	124,751
	Total through 2021	**357,652**

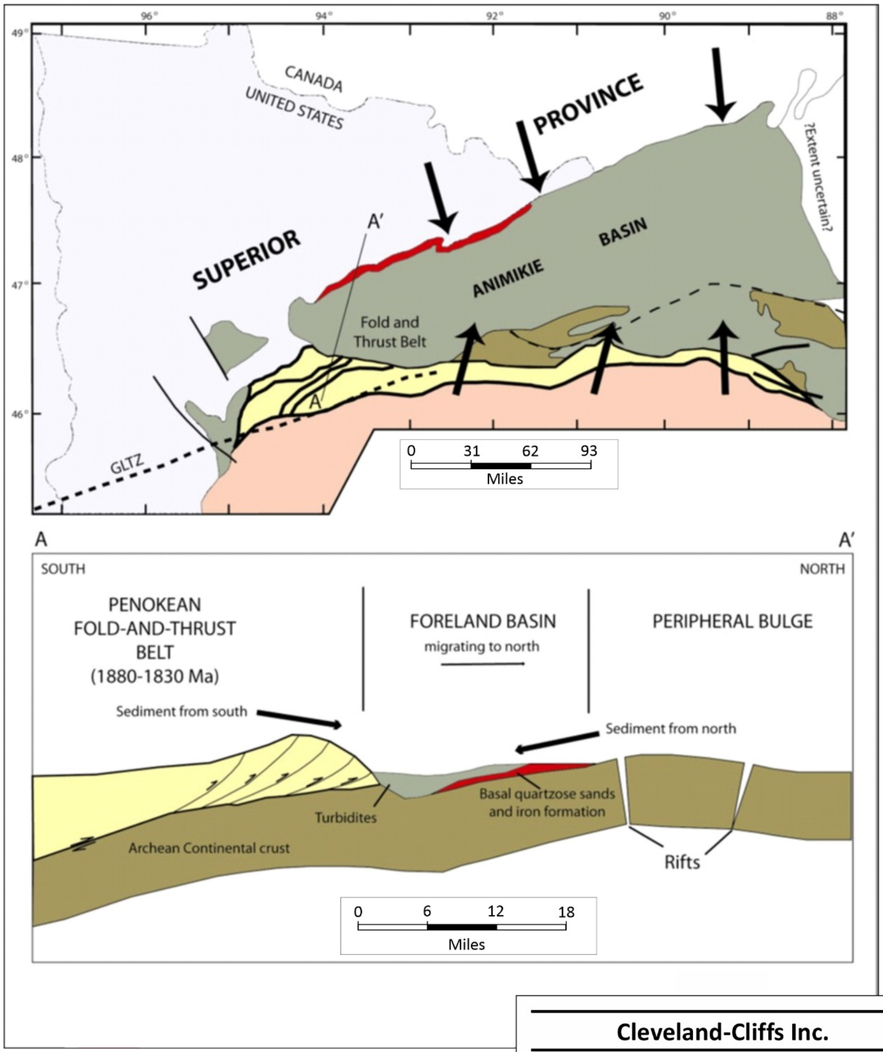
6.0 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

6.1 Regional Geology

Essential aspects of the regional geology in the Lake Superior region have been understood since the early 1900s, and the geologic understanding of the area has remained relatively unchanged over the years.

The Mine is hosted within a Lake Superior-type banded iron formation (BIF) deposit located within the Middle Precambrian Mesabi Iron Range. This range of low-lying hills consists of members of the Animikie Group of sedimentary rocks. Historical hematite and current magnetite mining focused on the Biwabik Iron Formation (Biwabik IF). Originally discovered in 1890, the iron oxide mineralization ranges from high-grade, structurally controlled bodies to more disseminated, stratigraphically controlled, low-grade taconite deposits. Taconite is found in a sequence of sedimentary rocks overlying Archean granitic rocks in the Lake Superior region. A fold and thrust belt known as the Penokean orogeny (1880 Ma to 1830 Ma) developed a northward-migrating foreland basin known as the Animikie Basin (Figure 6-1). Sedimentary rocks within this basin include the Pokegama Quartzite, the Biwabik IF, and argillite and graywacke of the Virginia Formation (Jirsa et al., 2005).

The Mesabi Iron Range is a term used to designate the outcrop of the Animikie Group, defining a northeast-trending homocline dipping 5° to 15° to the southeast. The Biwabik IF is sectioned by several post-Penokean, high-angle normal and reverse faults, which are associated with near-vertical, reactivated faults in the Archean basement (Morey, 1999). The Mesabi Range lies just north of the Neoproterozoic Duluth Gabbro Complex (Duluth Complex or Duluth Gabbro) (Figure 6-2). The Duluth Complex was emplaced around 1,102 Ma and is a mafic sill approximately 10 mi thick, underlying volcanic rocks of the North Shore Group and overlying the Virginia Formation.



Cleveland-Cliffs Inc.

United Taconite Property

Eveleth, Minnesota

Location of the Animikie Basin and Schematic Cross-section Showing Development of the Basin

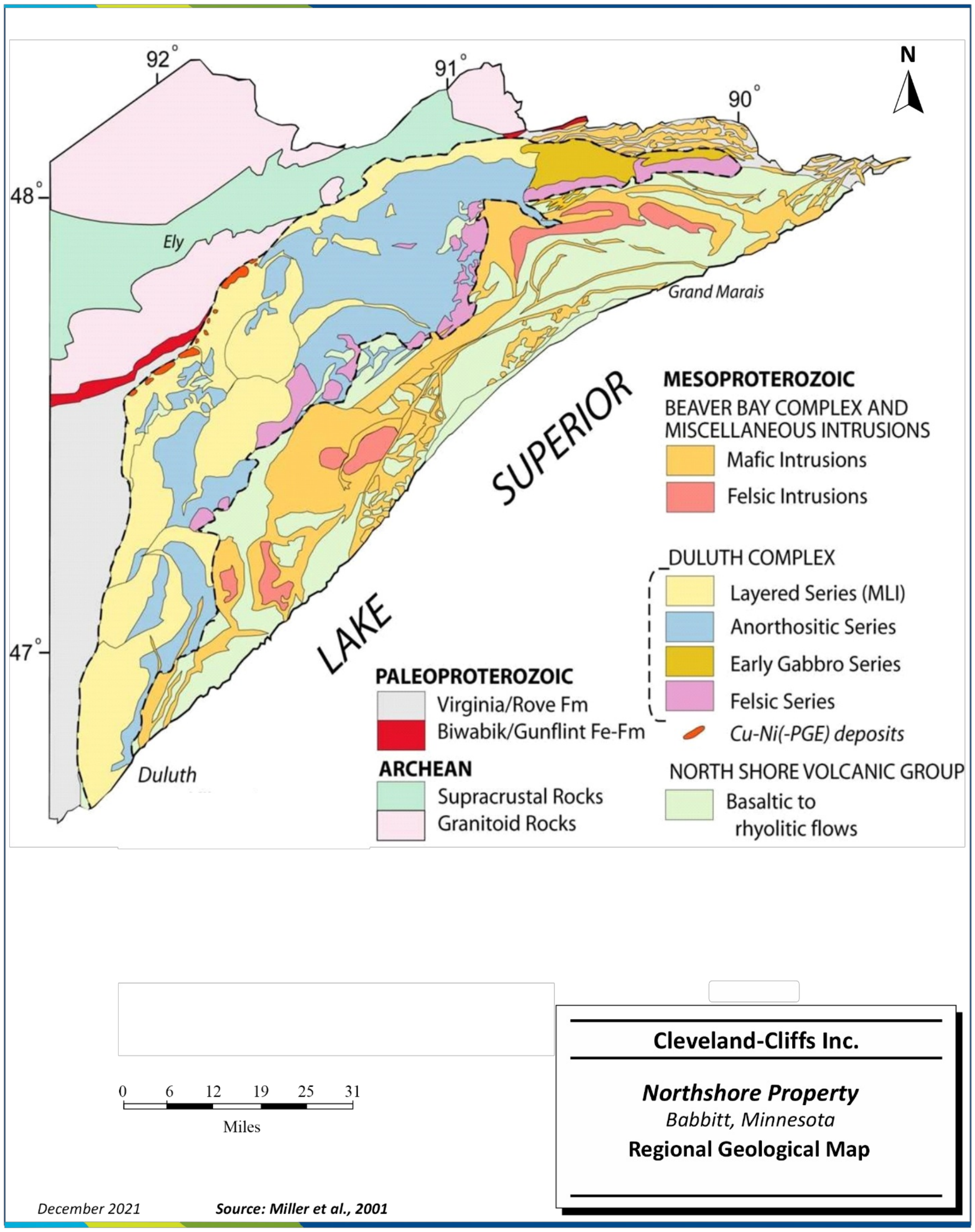
Legend:

EARLY PROTEROZOIC

🟥 Biwabik Iron Formation Exposure

December 2021 ***Source: Ojakangas, 1994***

Figure 6-1: Location of the Animikie Basin and Schematic Cross-section Showing Development of the Basin



Cleveland-Cliffs Inc.

Northshore Property
Babbitt, Minnesota
Regional Geological Map

December 2021 ***Source: Miller et al., 2001***

Figure 6-2: Regional Geological Map

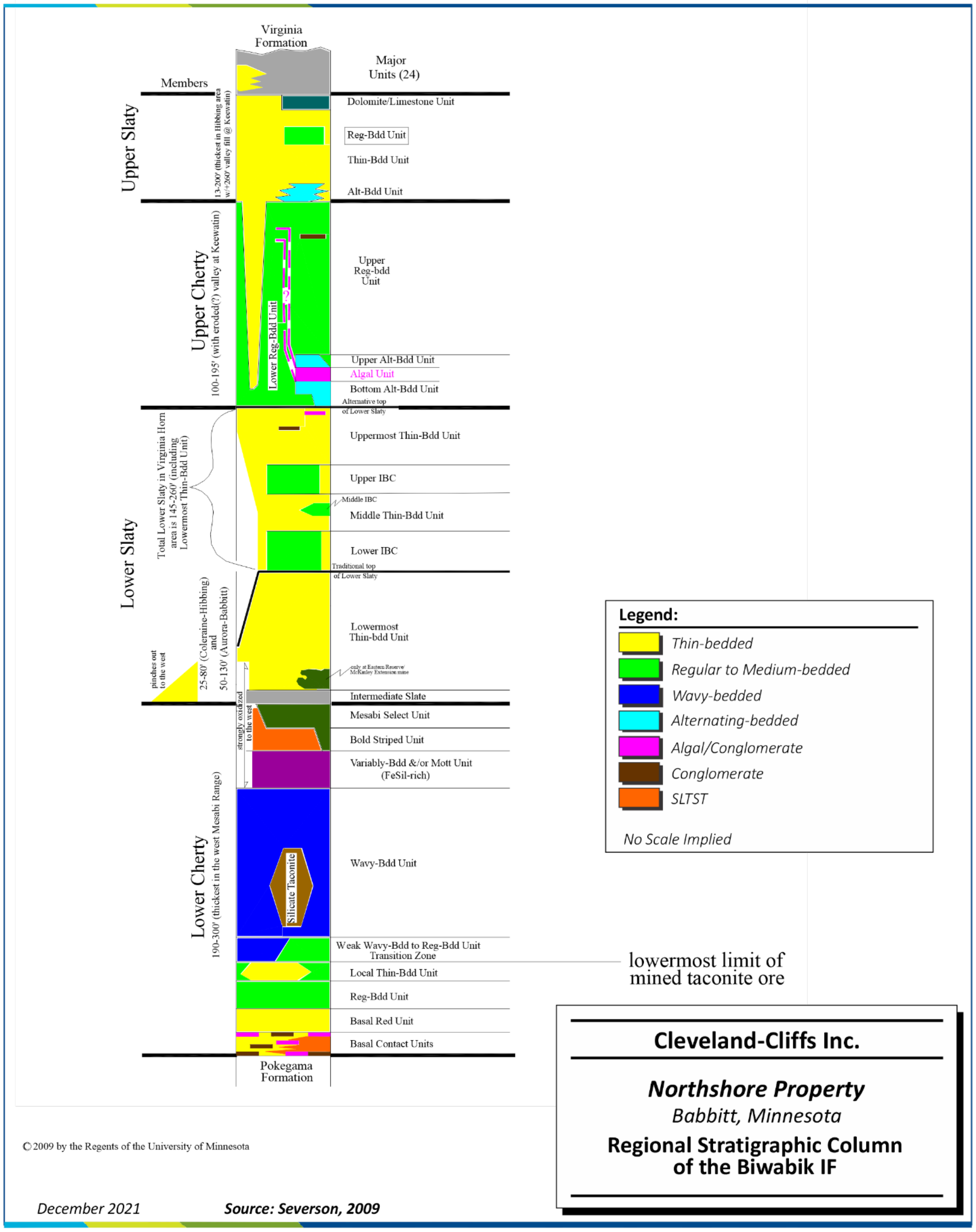
6.2 Local Geology

The Early Proterozoic Biwabik IF is a narrow belt of iron-rich strata varying in width from 1,300 ft to 3.2 mi and extending approximately 125 mi from Grand Rapids eastward to Dunka River, Minnesota.The true thickness varies from approximately 150 ft to 700 ft (Perry et al., 1973). The Biwabik IF is interpreted to have been deposited in a shallow, tidal marine setting and is characterized by bedforms and local fossils that are diagnostic of these environments. It is subdivided into four separate, lithostratigraphic units, from bottom to top: the Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty members (Severson et al., 2009). “Cherty” lithologies have a generally sandy, granular texture, are thickly bedded, and are composed of silica and iron oxide minerals. “Slaty” lithologies are fine grained, thinly bedded, and comprise iron silicates and iron carbonates, with local chert beds. Cherty lithologies are representative of deposition in a high-energy environment, whereas the slaty lithologies were probably deposited in a muddy, lower-energy environment below the wave base. Interbedding is ubiquitous, and contacts are generally gradational. The average crude iron content is approximately 31% and 26% for the cherty and slaty lithologies, respectively. SLR notes that nomenclature of the members is not indicative of metamorphic grade; instead slaty and cherty are colloquial, descriptive terms used regionally.

The four primary members are further broken down locally into informal subunits (also referred to as submembers) based on their location along the Mesabi Iron Range. In the eastern portion of the Biwabik IF, these subunits vary widely based on mineralogy, bedforms, and grain size (Gundersen and Schwartz, 1962).

Higher-grade iron oxide material exists within the lower-grade taconite, the origins of which have been debated for many years. Some of the more recent publications suggest crustal-scale groundwater convection related to igneous activity. Much of the evidence supporting this conclusion comes from the isotopic analysis of leached and replaced silicate and carbonate minerals (Morey, 1999). Within the Biwabik IF, metamorphic processes produced assemblages diagnostic of greenschist facies to the west, increasing in grade to the east. Mineralogy in unaltered taconite is dominated by quartz, magnetite, hematite, siderite, ankerite, talc, chamosite, greenalite, minnesotaite, and stilpnomelane (Perry et al., 1973).

A stratigraphic column of the Biwabik IF is presented in Figure 6-3 and highlights the Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty members as primary units. A stratigraphic column illustrating the local subunits within the four main members of the Biwabik IF is shown in Figure 6-4. These subunits, labeled A through P, are the main units of economic interest and are modeled separately for Mineral Resource and Mineral Reserve estimation. A local geology cross-section is provided in Figure 6-5.



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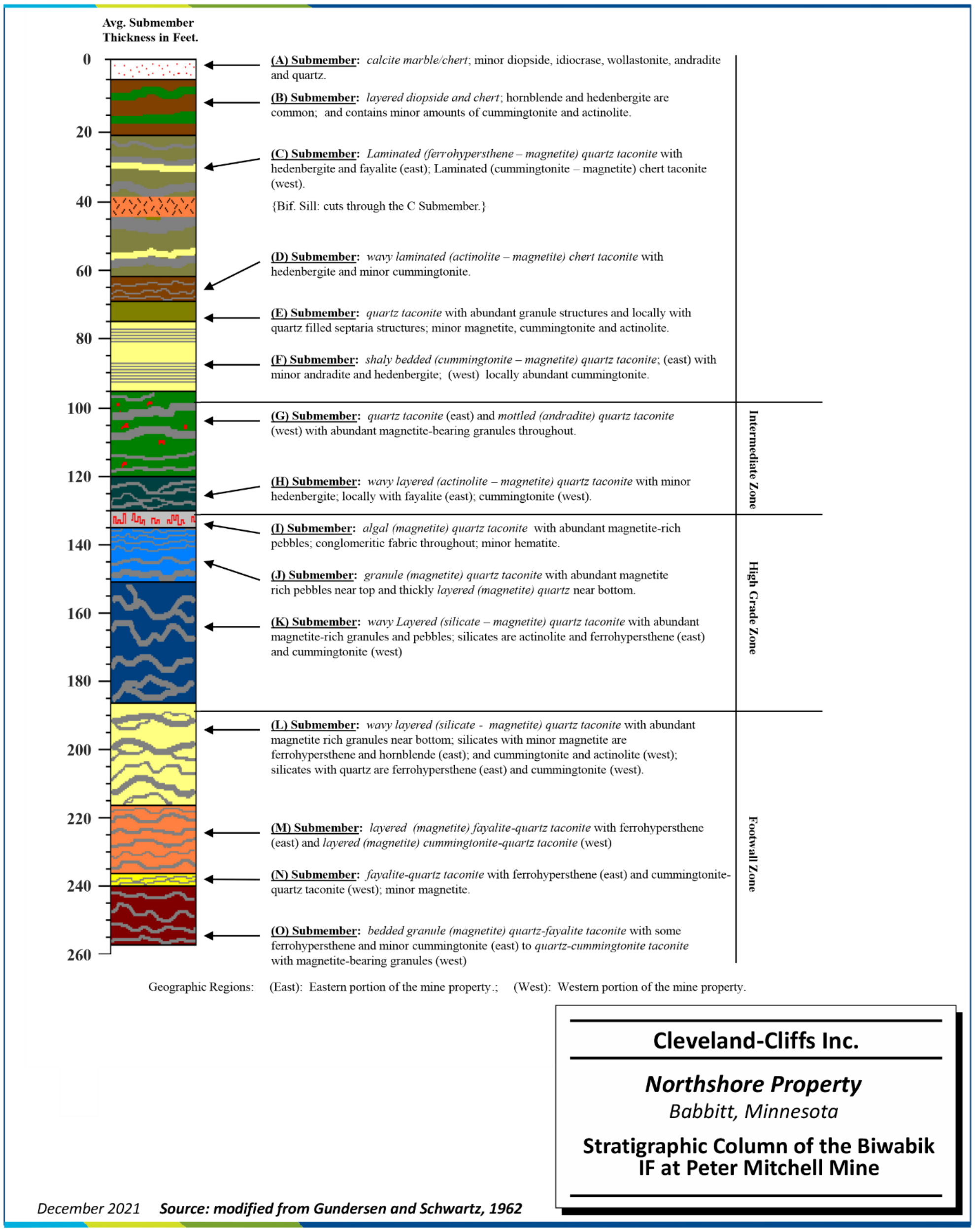
Cleveland-Cliffs Inc.

Northshore Property
Babbitt, Minnesota

Regional Stratigraphic Column of the Biwabik IF

December 2021 ***Source: Severson, 2009***

Figure 6-3: Regional Stratigraphic Column of the Biwabik IF



(A) Submember: *calcite marble/chert*; minor diopside, idiocrase, wollastonite, andradite and quartz.

(B) Submember: *layered diopside and chert*; hornblende and hedenbergite are common; and contains minor amounts of cummingtonite and actinolite.

(C) Submember: *Laminated (ferrohypersthene – magnetite) quartz taconite* with hedenbergite and fayalite (east); Laminated (cummingtonite – magnetite) chert taconite (west).

{Bif. Sill: cuts through the C Submember.}

(D) Submember: *wavy laminated (actinolite – magnetite) chert taconite* with hedenbergite and minor cummingtonite.

(E) Submember: *quartz taconite* with abundant granule structures and locally with quartz filled septaria structures; minor magnetite, cummingtonite and actinolite.

(F) Submember: *shaly bedded (cummingtonite – magnetite) quartz taconite*; (east) with minor andradite and hedenbergite; (west) locally abundant cummingtonite.

(G) Submember: *quartz taconite* (east) and *mottled (andradite) quartz taconite* (west) with abundant magnetite-bearing granules throughout.

(H) Submember: *wavy layered (actinolite – magnetite) quartz taconite* with minor hedenbergite; locally with fayalite (east); cummingtonite (west).

(I) Submember: *algal (magnetite) quartz taconite* with abundant magnetite-rich pebbles; conglomeritic fabric throughout; minor hematite.

(J) Submember: *granule (magnetite) quartz taconite* with abundant magnetite rich pebbles near top and thickly *layered (magnetite) quartz* near bottom.

(K) Submember: *wavy Layered (silicate – magnetite) quartz taconite* with abundant magnetite-rich granules and pebbles; silicates are actinolite and ferrohypersthene (east) and cummingtonite (west)

(L) Submember: *wavy layered (silicate - magnetite) quartz taconite* with abundant magnetite rich granules near bottom; silicates with minor magnetite are ferrohypersthene and hornblende (east); and cummingtonite and actinolite (west); silicates with quartz are ferrohypersthene (east) and cummingtonite (west).

(M) Submember: *layered (magnetite) fayalite-quartz taconite* with ferrohypersthene (east) and *layered (magnetite) cummingtonite-quartz taconite* (west)

(N) Submember: *fayalite-quartz taconite* with ferrohypersthene (east) and cummingtonite-quartz taconite (west); minor magnetite.

(O) Submember: *bedded granule (magnetite) quartz-fayalite taconite* with some ferrohypersthene and minor cummingtonite (east) to *quartz-cummingtonite taconite* with magnetite-bearing granules (west)

Geographic Regions: (East): Eastern portion of the mine property.; (West): Western portion of the mine property.

Cleveland-Cliffs Inc.

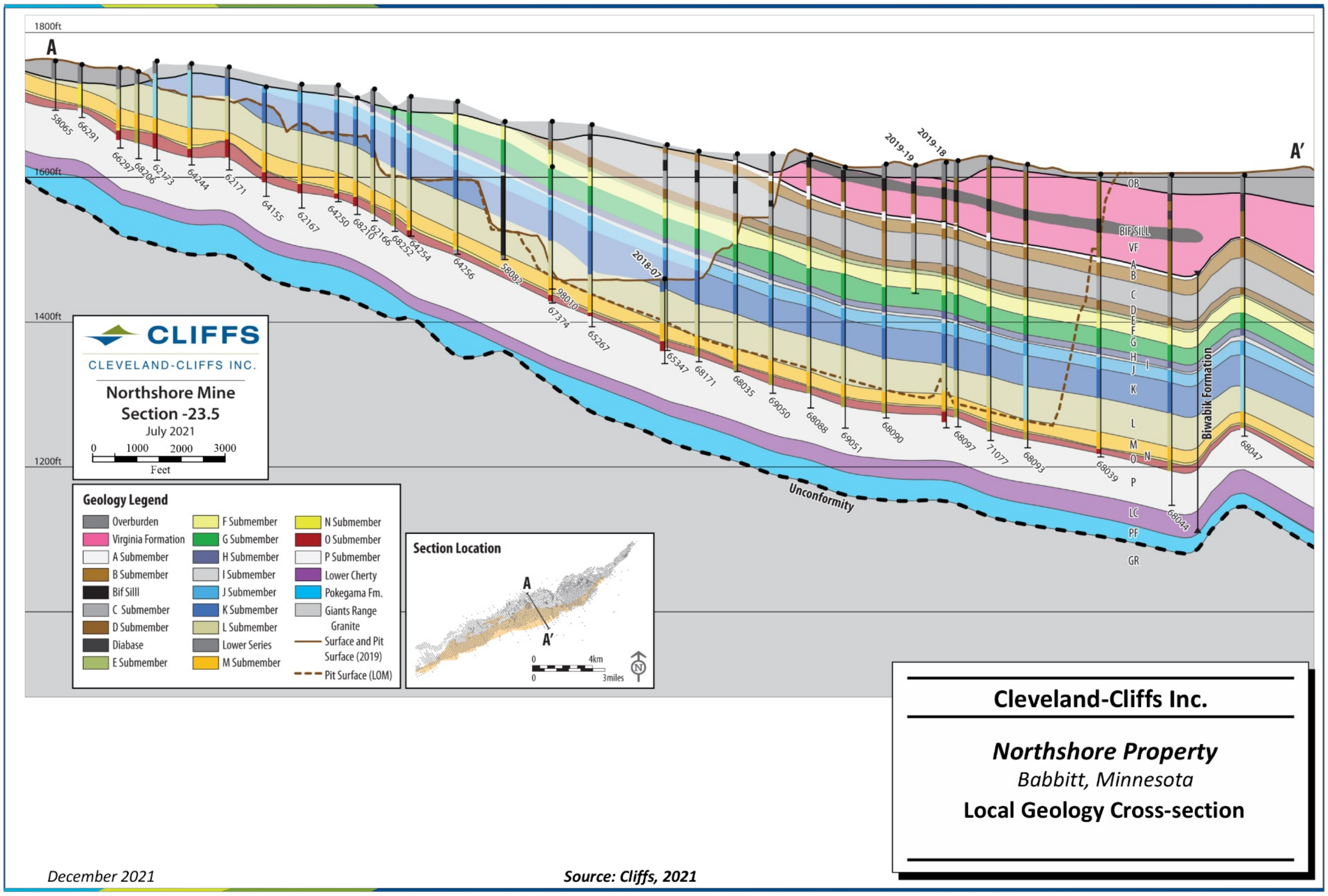
Northshore Property

Babbitt, Minnesota

Stratigraphic Column of the Biwabik IF at Peter Mitchell Mine

December 2021 ***Source: modified from Gundersen and Schwartz, 1962***

Figure 6-4: Stratigraphic Column of the Biwabik IF at Peter Mitchell Mine



Cleveland-Cliffs Inc.

Northshore Property

Babbitt, Minnesota

Local Geology Cross-section

December 2021

Source: Cliffs, 2021

Figure 6-5: Local Geology Cross-section

6.3 Property Geology

Magnetite is the principal economic mineral at the Mine and occurs dominantly in thin to thick bands and layers, as medium- to coarse-grained disseminated grains, and as grain aggregates. Magnetic iron content ranges between 22% and 30% in the mineralized stratigraphic subunits within the deposit at the Mine. Local variation in silicate mineralogy and lithologic textures due to contact metamorphism presents unique challenges for grade control relative to deposits hosted in the western Biwabik IF. These changes affect many aspects of the operation including process metallurgy and hardness. Supergene oxidation of magnetite occurs locally along fracture planes but is generally uncommon.

Several geological structures are important at Northshore:

- The sharp contact between the Biwabik IF and the Duluth Complex identified and modeled from drilling data
- A homocline in the BIF at the contact of the Duluth Complex, striking approximately east-northeast and dipping approximately 7° to the southeast
- Several high-angle normal faults exhibiting variable displacement.

Emplacement of the Duluth Gabbro is responsible for the variable mineralogy observed at Northshore. Regional metamorphism related to this event locally affected the eastern Biwabik IF, resulting in a metamorphic pyroxene- and/or amphibole-dominant gangue mineralogy in place of more common silicate minerals typical of IFs. Minerals in the iron formation at Northshore include magnetite, chert, quartz, hedenbergite, cummingtonite, actinolite, hornblende, fayalite, ferrohypersthene, diopside, and andradite garnet (Gunderson and Schwartz, 1962). Contact metamorphism also resulted in a local coarsening of magnetite grain size and a decrease in the amount of quartz in the gangue mineralogy. It is believed that the silica present in primary quartz was incorporated into the iron silicate minerals found in the iron formation. Metamorphic grade is strongest to the east and decreases westward with distance from the Duluth Complex. Alteration related to metamorphism is observed to be localized along faults, on dike margins, and in fold axes. The Biwabik IF is interpreted to have experienced minor volume loss in the Eastern Mesabi Range due to loss of water and gases during thermal metamorphism (Ojakangas et al., 2009).

Contact metamorphism of the Biwabik IF at the Peter Mitchell Mine distinguishes the mineralogy from that of the rest of the Mesabi Iron Range. Emplacement of the Duluth Complex on the southeastern margin of the district resulted in re-crystallization, which increased mineral grain size and led to production of iron-rich pyroxenes, amphibole minerals, and minor olivine. Devolatilization near the contact also reduced the thickness of the proximal bedded units and altered any hydroxide minerals present. A stratigraphic column from Severson et al. (2009) illustrating the local subunits within the four main members of the Biwabik IF, is shown in Figure 6-3.

6.4 Mineralization

Economic mineralization within the mine is hosted entirely within subunits of the Biwabik IF. In the mine area, bedding dips from approximately 5° southeast in the west to 35° southeast near the contact with the Duluth Complex in the east. The entire stratigraphic sequence of the Biwabik IF is present at Northshore, although only subunits of the Upper Cherty member and lesser fractions of adjacent members are mined. The Upper Cherty member averages approximately 160 ft thick, considerably thinner than equivalent stratigraphy in the western Biwabik IF. Average thicknesses of the four members in the eastern Biwabik IF are listed in Table 6-1.

Table 6-1: Thickness of Biwabik IF Members
Cleveland-Cliffs Inc. – Northshore Property

Member	Average Thickness (ft)	Submembers
Upper Slaty	96	A, B, C, D, E, F, G
Upper Cherty	161	H, I, J, K, L, M, N, O
Lower Slaty	86	P, Q
Lower Cherty	37	R, S, T, U, V

Source: Cliffs, 2018, modified from Gunderson, 1962

Not all of the Biwabik IF is economic at Northshore.The geologic subunits G, H, I, J, K, L, M, N, O, and LC (Lower Cherty), are most likely to meet current metallurgical criteria for economic consideration. Geologic subunits C, D, E, and F may also be considered economic locally. Subunits are distinguished based on their magnetite content, geologic observations, and metallurgical characteristics. Table 6-2 lists average magnetic iron content and other characteristics for the main mineralized subunits.

Table 6-2: Characteristics of Main Mineralized Subunits at the Peter Mitchell Mine
Cleveland-Cliffs Inc. – Northshore Property

Subunit	Avg. Unit Thickness (ft)	Taconite Type (Gunderson. 1962)	Magnetite Texture	MagFe (Avg %)
G	25	Laminated, magnetic-quartz taconite	Granular, banded	23.7
H	10	Wavy layered magnetic-quartz taconite	Banded	21.7
I	5	Algal, magnetite-quartz taconite	Disseminated, banded	21.8
J	15	Layered, granule magnetite-quartz taconite	Banded, disseminated	28.0
K	35	Wavy layered, silicate-magnetite-quartz taconite	Banded	24.4
L	30	Wavy layered, silicate-magnetite-quartz taconite	Banded, disseminated	21.5
M	20	Layered magnetite-silicate-quartz taconite	Banded, disseminated	15.6
N	4	Silicate-quartz taconite	Disseminated	12.1
O	17	Bedded granular magnetite-quartz-silicate taconite	Banded, disseminated	14.3

Source: Cliffs, 2018, modified from Gunderson, 1962

Northshore geologists use a geologic model that relies on interpretation of the metamorphosed Biwabik IF as described in Gundersen and Schwartz (1962). The stratigraphy is further broken down into subunits for mining purposes and is modeled in detail so that specific process mineralogical and density factors may be applied.

6.5 Deposit Types

6.5.1 Mineral Deposit

The Northshore iron deposit is a classic example of the Lake Superior-type BIF depositLake Superior-type BIFs occur worldwide and are exclusively Precambrian in age, deposited from approximately 2,400 Ma to 1,800 Ma. Although the genesis of Superior-type iron formations has been debated over the years, it is certain that they were deposited contemporaneously and in similar marine depositional environments. Some of the most prolific iron districts in the world are hosted in these rocks, such as those found in the Pilbara district of Australia and the Animikie Group of Minnesota. Theories regarding their formation center on the hypothesis that, at stages in the Earth's history, the oceans were acidic and contained tremendous amounts of dissolved iron. The conventional explanation for the majority of these deposits is that oxygen-producing life forms such as stromatolites, found fossilized in BIFs, began to produce sufficient oxygen to oxidize the sulfide or free ion forms of iron within seawater. The iron content in seawater rose and fell for over a billion years, and the last of the Precambrian BIFs is thought to have been deposited around 1,800 Ma (Guilbert and Park, 1986).

The majority of the sedimentary iron deposits in Northeastern Minnesota are regionally referred to as taconite deposits. Taconite is a type of BIF that is characterized as an iron-bearing sedimentary rock with greater than 15% Fe, where the iron minerals are interbedded with silicates or carbonates. Iron content ($FeO+Fe_2O_3$) in taconite is generally 25% to 30%.

Geological classification of BIFs is based on mineralogy, tectonic setting, and depositional environment. The original facies concept provided for oxide-, silicate-, and carbonate-dominant iron formations proposedly related to the environment of deposition (James, 1954), as follows:

- Oxide-rich BIF typically consists of alternating bands of hematite [$Fe_2^{3+}O_3$] with or without magnetite [$Fe^{2+}Fe_2^{3+}O_4$]. Where the iron oxide is dominantly magnetite, siderite [$Fe^{2+}CO_3$] and iron silicate are usually also present.
- Silicate-rich BIF is usually dominated by the minerals greenalite, minnesotaite, and stilpnomelane. Greenalite [$(Fe^{2+}, Mg)_6Si_4O_{10}(OH)_8$] and minnesotaite [$(Fe^{2+},Mg)_3Si_4O_{10}(OH)_2$] are ferrous analogues of antigorite and talc respectively, while stilpnomelane [$K_{0.6}(Mg, Fe^{2+}, Fe^{3+})_6Si_8Al(O, OH)_{27} \cdot 2\text{-}4H_2O$] is a complex phyllosilicate.
- Carbonate-rich BIF is usually dominated by the minerals ankerite [$CaFe^{2+}(CO_3)_2$] and siderite, both of which display highly variable compositions. Similar proportions of chert and ankerite (and/or siderite) are typically expressed as thinly bedded or laminated alternating layers (James, 1966).

These classification schemes commonly overlap within nearby Lake Superior-type deposits, defying classification by this method. Almost all of the minerals described in the three classifications can be found in many of the deposits of the Mesabi Iron Range. Lake Superior-type deposits are generally classified based on their size and depositional environments (Guilbert and Park, 1986). These deposits are typically large (total primary iron oxide content exceeding 10^{13} tons) and are associated with other sedimentary rocks. Deposition of the Lake Superior-type deposits occurred in shallow marine conditions, with transgressive sequences commonly observed in the regional stratigraphy (Simonson and Hassler, 1996). Shallow-marine bedforms and sedimentary depositional textures are common in these deposits, locally with spectacular examples due to the alternating nature of silica and iron-rich laminae.

6.5.2 Geologic Model

Northshore geologists use a geologic model that relies on their interpretation of the Biwabik IF stratigraphy. The textures in the ore as well as the stratigraphy identified in the Mine are consistent with other Superior-type BIFs. The stratigraphy is further broken down into more subunits for mining purposes, and is modeled in detail so that specific process mineralogical and density factors may be applied to the resource model. The geologic model is also based on over 1,600 drill holes with detailed logging and sampling, resulting in a reliable database for interpretation of the geology in three dimensions.

7.0 EXPLORATION

Exploration at the Mine consists predominately of core drilling. Cliffs does not maintain detailed records or results of early, non-drilling prospecting methods used during initial exploration activities, such as geophysical surveys, mapping, trenching, test pits, and sampling, conducted prior to Cliffs' ownership of the operation.

The Mesabi Iron Company test pits were on the furthest up-dip exposures of the Biwabik IF and were fully mined out early in the history of mining. Mesabi Iron Company drilled approximately 160 small-diameter diamond cores on higher-elevation ground in the vicinity of Argo Lake, and Cloquet Lumber Company drilled approximately 43 cores in the western portion of the Property. In both cases, metallurgical analyses were an early version of a Davis Tube, for material ground to -100 mesh (historical hard copy assay certificates). Analyses also included a crude soluble iron assay and a magnetic iron "assay" of unknown derivation. There are no maps to show the exact locations of these historical cores, located only by Section number, and results are not included in current databases or Mineral Resource estimations.

7.1 Exploration

No exploration work or investigations other than drilling have been conducted or are planned for Northshore.

7.2 Drilling

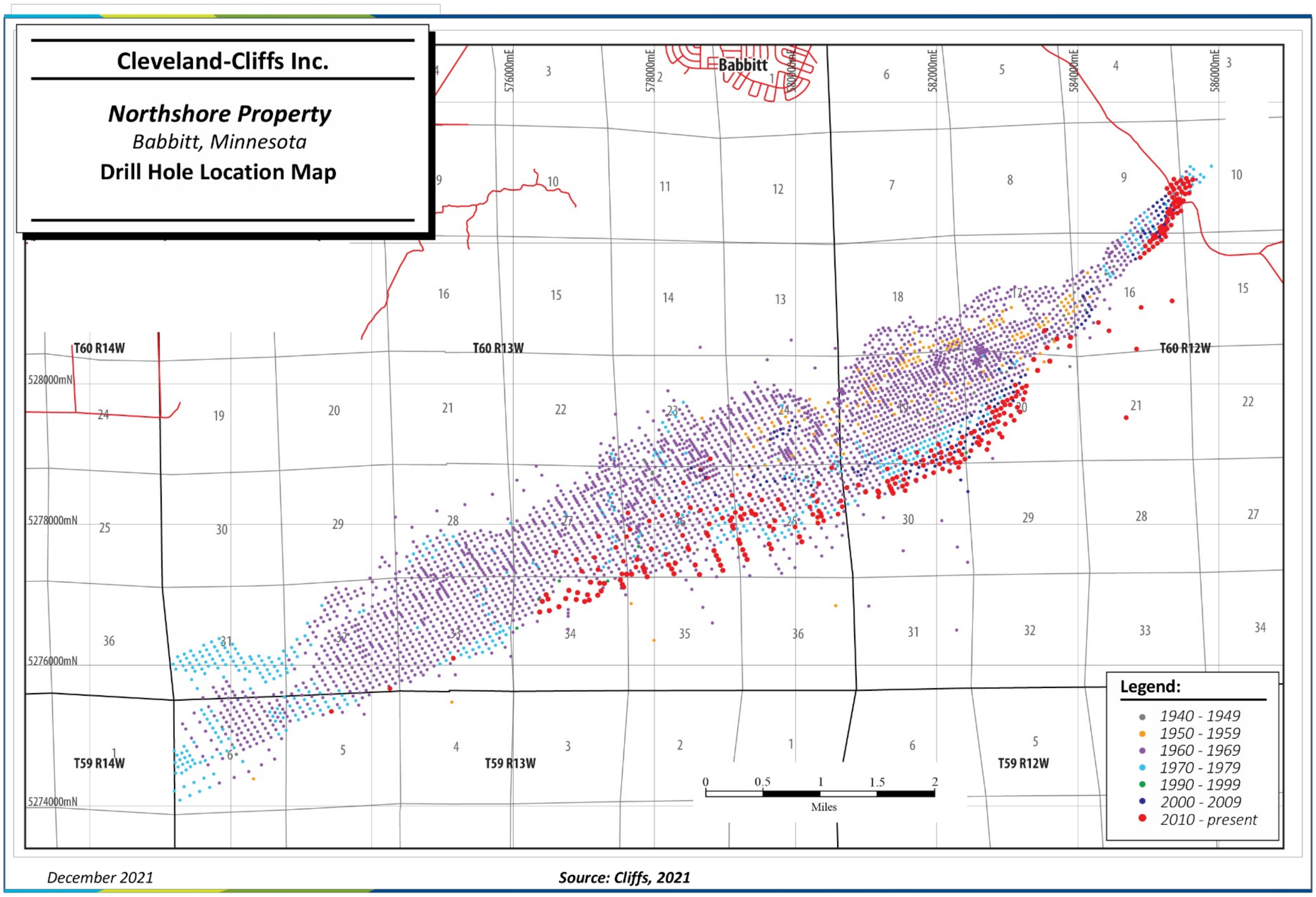
7.2.1 Type and Extent

Table 7-1 presents a summary of drilling on the Property. All holes were completed using diamond drills with BTW (1.656 inch) or BQ (1.432 inch) diameter core. Historical drilling programs were completed with E- or A-size core, approximately 1.1 inch in diameter. Collar locations are shown in Figure 7-1.

Exploration drilling was undertaken on a general grid of 250 ft x 250 ft or 250 ft x 500 ft. The drill holes are located on a local mine grid that is based on the strike of the deposit. The minimum depth is 12.4 ft, and the maximum depth is 1,962.3 ft, with the average depth being 173 ft. Note that no drilling was performed during the 1980s. A total of 56 holes, drilled from mid-2020 to present, have not yet been incorporated into the Mineral Resource estimate.

Table 7-1: Drilling Summary
Cleveland-Cliffs Inc. – Northshore Property

Year	Holes	Total Footage
2021	40	11,868
2020	49	12,472
2019	29	6,572
2018	32	5,838
2017	38	7,761
2014	14	5,311
2013	11	4,358
2012	50	16,895
2011	15	8,126
2010	22	6,003
2000s	130	31,472
1990s	24	4,925
1970s	434	81,180
1960s	3,082	500,584
1950s	136	20,361
1940s	35	5,711
Total	**4,141**	**729,435**



December 2021

Source: Cliffs, 2021

Figure 7-1: Drill Hole Location Map

7.2.2 Procedures

7.2.2.1 Collar Coordinates

Planned drill hole collar locations are located using a digital Global Positioning System (GPS) receiver by a Northshore surveyor.When the drill hole is completed, the location is identified with a wood post of unique color to distinguish it from other posts or markers in the pit or surrounding area. Identifying marks (in permanent marker) indicate the hole ID, year drilled, and sequential number.

The collar of each completed exploration drill hole is surveyed by a Northshore surveyor using a Trimble R8 GNSS receiver and TSC3 data collector.All collar data are recorded using a local mine grid coordinate system. The collar coordinates are verified by the Northshore geologist.

7.2.2.2 Core Sample Collection

The core is transported from the drill site by the Northshore geologist or the drilling company. The Northshore geologist supervises the packaging and handling of core in the boxes and ensures the following:

- The integrity of the core when taken from the core barrels to the core boxes.
- Placement of core in a clean, accurately labeled, unused, waxed core box.
- The cores in the boxes are positioned in the correct direction and sequence as they are transferred from the core barrel to the core boxes, making sure there is no inversion during the transfer process.
- A wooden block is inserted in the core box at the end of each core run, and the wooden block has hole depth at that specific point (in feet) written on it in permanent marker.
- Identification on the boxes is made on the pre-printed templates located on core box tops and on the end panels of the core box tops and bottoms. This information includes the hole number, footage contained in the box (from-to), and the box number.
- Transportation of core to the core shed for logging and sampling.

The indicated depth on both the blocks marking core barrel runs in the boxes and the depths noted on the outside of the core boxes are verified against the same physical measurements in contractor drill reports. Drill rod counts are completed by the drilling contractor and recorded on shift reports to verify drill depth. The final depth of the drill hole is confirmed and registered in the drill report. Hole size and final hole depth are validated by the project geologist.

Geologic data from exploration drill core are currently managed using an acQuire database.

Core is photographed digitally, and images are archived with a hole number and depth for future reference. Core was not photographed prior to 2003.

Geotechnical core measurement includes core recovery and rock quality designation (RQD). Data are recorded on paper forms and later tabulated and uploaded to the acQuire database.

7.2.2.3 Drill Core Logging

Geological logging of the core is carried out by the Northshore geologist, using acQuire for database management. Logging includes rock types (lithologic unit and subunit), structural information, rock texture, color, magnetic characteristics, alteration, mineralogy, geotechnical data, and a general geologic description. Hard copies of all drill logs are stored on site.

7.2.2.4 Drill Core Sampling

Sample intervals are defined by the logging geologist. The sample length is nominally 10 ft for mineralized units but ranges from two feet to 15 ft within a defined geological unit. Sample lengths from the N unit can be as small as two feet, since samples are strictly bound by subunit contacts.

Samples in mineralized material are broken into manageable pieces with a hammer, bagged, and given a sample identity. Core samples are placed in an individual cloth or polyethylene sample bag for each interval at the logging facility in Babbitt, Minnesota.

7.2.2.5 Sample and Data Storage and Security

Samples are transported to the Lerch Brothers Inc's (Lerch) laboratory facility, in Hibbing, Minnesota, by Lerch personnel for sample preparation. Lerch is independent of Cliffs and is accredited to ASQ/ANSI ISO 9001:2015 for its quality management system. Each shipment of core samples is accompanied by a sample sheet with dispatch number recording all the sample information and required analyses. The data are stored digitally on Northshore's shared servers. Samples prepared by Lerch are transported to the internal Northshore laboratory in Silver Bay, Minnesota for metallurgical analysis. The remaining coarse reject and unused sample materials are stored at the Silver Bay laboratory, except for a 500 g, Fee-Holder save sample, which is returned to Babbitt and stored at the mine site.

From 2009 to 2018, half core of one hole for each target section of the annual drilling programs has been typically retained. All other mineralized intervals are completely consumed for testing.

Electronic storage of an as-drilled collar location file for each annual exploration drilling program is accomplished using the database management system acQuire. A hard copy printout of the collar file with other documents relevant to the drill holes is stored in file cabinets at the mine site.

7.2.2.6 Drilling, Sampling, or Recovery Factors

It is the QP's opinion that there are no known drilling, sampling or recovery factors that could materially affect the accuracy and reliability of the results and that the results are suitable for use in the Mineral Resource estimation.

7.3 Hydrogeology and Geotechnical Data

Refer to section 13.2 Pit Geotechnical and section 15.4 Tailings Disposal for this information.

8.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

Sample preparation of potentially mineralized samples is conducted at the Lerch laboratory, located in Hibbing, Minnesota. Lerch is independent of Cliffs and is accredited to ASQ/ANSI ISO 9001:2015 for its quality management system. All mineralized samples are transported to and analyzed at the Silver Bay laboratory in Silver Bay, Minnesota. The Silver Bay laboratory is a Northshore-owned facility and is accredited to ISO-9001:2015 for its quality management system. The sample analysis includes analysis of head samples and production of a magnetic concentrate sample, which then undergoes analysis for various properties.

8.1 Sample Preparation and Analysis

8.1.1 Sample Preparation

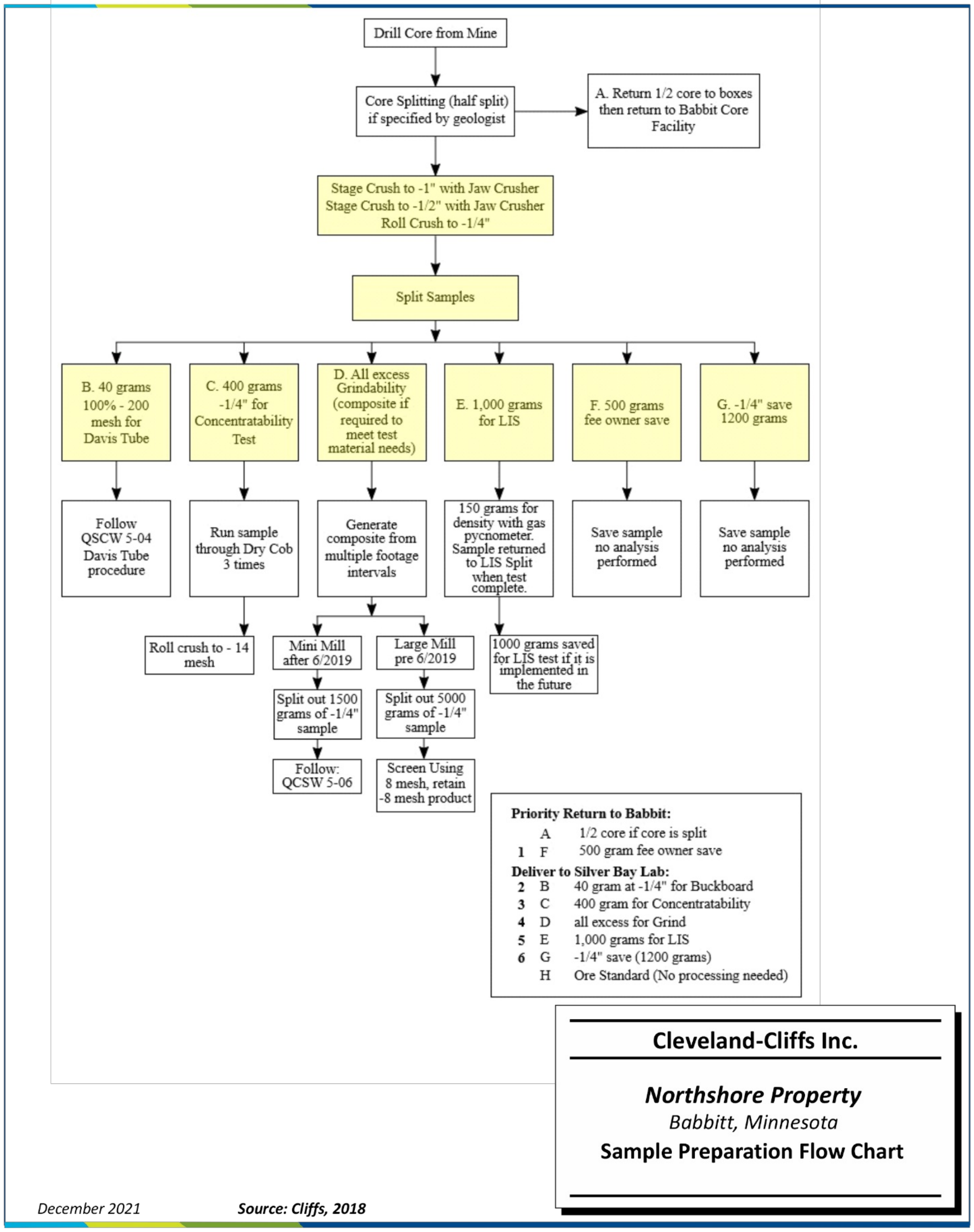
The sample preparation process for diamond drill hole (DDH) samples used for Mineral Resource estimation is shown in Figure 8-1.

At Lerch, each sample is crushed to -0.25 in. in a multi-stage process (LLP-60-02, LLP-60-03, LLP-60-04). The sample is crushed to minus one inch with a jaw crusher and then further reduced to -0.5 in. with a jaw crusher. A roll crusher is used to reduce the sample size to -0.25 in. The crushed sample is split with a riffle splitter into sample sizes as required for the chemical and metallurgical analyses mandated for the core interval (LLP-60-05). Typically, several pounds of coarse reject (locally called "save sample") remain, and each sample is retained in labeled plastic bags. Duplicate samples are split from the remaining coarse reject material.

The crushed sample is split into the following:

- A minimum of approximately 5,000 g is required for the large mill Grindability test or 1,500 g for the mini-mill; samples are composited to reach that weight if required;
- 400 g for Concentratability test;
- 40 g for Standard Davis Tube (DT) test and x-ray fluorescence (XRF) analysis;
- 1,500 g for Liberation Index Procedure and Density testing with gas pycnometer;
- 500 g for Fee Holder sample, if required.

Each subsample is pulverized as outlined in Figure 8-1. Density samples of 150 g at 100% passing -0.25 in. are split from the 1,500 g Liberation Index sample, tested with the gas pycnometer procedure, then returned to the Liberation Index sample split. This particle size allows the maximum sample volume for testing, and particle size is not a factor in results.



December 2021 ***Source: Cliffs, 2018***

Figure 8-1: Sample Preparation Flow Chart

8.1.2 Sample Analysis

Several procedures are performed on drill hole samples by the Silver Bay laboratory. The summary of these methods in Table 8-1 includes the application of the test data.

Table 8-1: Analytical Procedures Summary
Cleveland-Cliffs Inc. – Northshore Property

Parameter	Method	Application
Density	Gas Pycnometer	Mineral Resource and Mine Planning
DT Concentrate Chemistry	XRF total iron and trace	Mine Planning
Magnetic Iron	Satmagan	Mineral Resource and Mine Planning
Grindability	Procedure QCSW 5-03	Mine Planning
Concentratability	Procedure QCSW 5-02	Mineral Resource and Mine Planning
Liberation Index	(Grinding- Liberation Index Study)	Not Used Currently

8.1.2.1 Density

Two methods for testing density have historically been applied for drill core analysis. The gas pycnometer method requires a crushed sample, while the immersion method requires an intact core sample. The gas pycnometer is currently used to measure density. Density sample preparation follows the same procedures as other Northshore samples (Figure 8-1). Both methods are described below.

8.1.2.1.1 Gas Pycnometer

The Gas Pycnometer measures the density of a crushed drill core sample using helium gas. Per Cliffs procedure QCSW 5-07, a prepared sample between 1.41 oz (40 g) and 7.05 oz (200 g) is placed in a container of a known volume and is connected to a supply of helium gas. The container is filled with helium, and gas volumes of the container with and without the drill core sample are documented. The volume of the drill core is equal to the difference in gas volume with the empty container less the container with the drill core sample. The density is calculated using the measured weight and calculated volume.

8.1.2.1.2 Water Immersion

The Water Immersion method measures the volume of a core sample by immersing the sample in water. The density of the sample is calculated using the dry weight divided by the difference in the dry and submerged weight:

Density (sample) = density (water) * (dry weight) / (dry - immersed weight)

Between 2008 and 2011, a total of 955 immersion tests were conducted on whole drill core. During the 2010 drilling campaign, the Silver Bay laboratory began to implement gas pycnometer analyses that had daily calibrations with a certified steel ball standard to account for variations in room temperature and barometric pressure. Gas pycnometer results prior to this period had no such calibrations and are not included in the density database. Density results in the database include 1,425 pycnometer and 645 immersion tests, with 310 samples representing both test types. Outliers of greater than 4.5 specific gravity are not included in the database.

The 310 sample pairs with results from immersion and gas pycnometer methods are compared in a scatter plot in Figure 8-2, and are generally comparable.

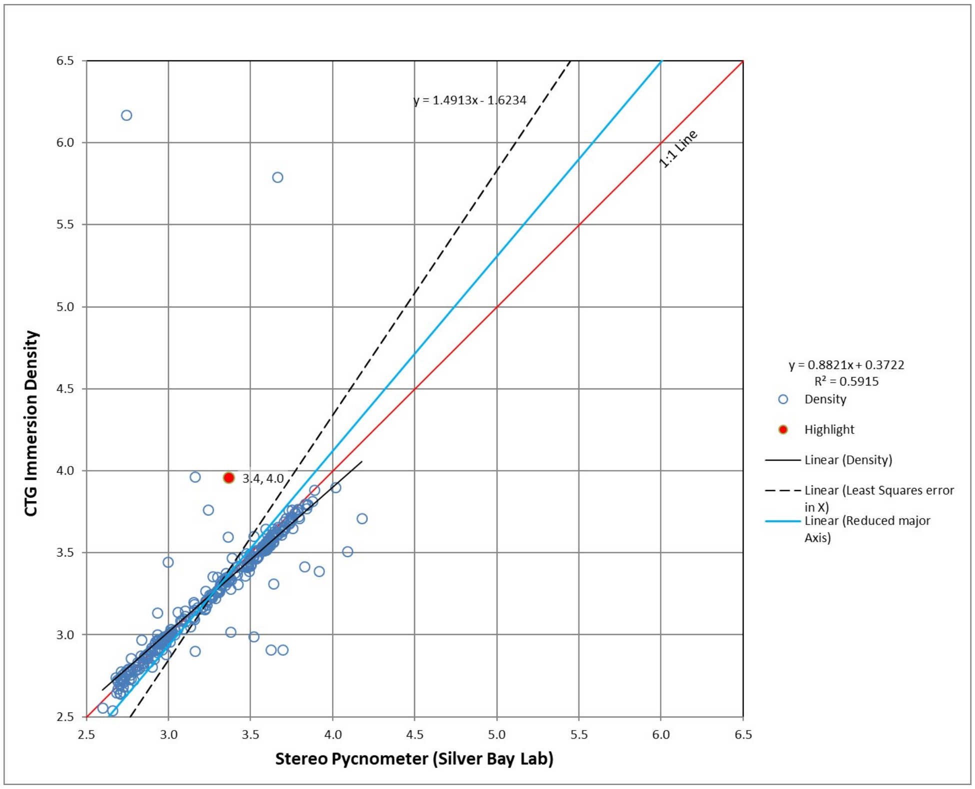


Figure 8-2: Pycnometer vs. Immersion Density Values

8.1.2.2 Davis Tube Magnetic Separation Method

Procedure QCSW 5-04 is followed for measuring magnetic iron using the DT (Eriez Model EDT with a tube diameter of two inches)The magnet is electric, and a setting of 0.8 direct current (DC) amps with a 44 DC voltage is used. The DT test is used to directly measure magnetic iron using instrumentation instead of weight recovery methods. The various products of the test include head material, tails, and concentrate. The excess head material is analyzed with the Satmagan for magnetic iron. The DT tails are saved for future testing upon request. The concentrate is tested for:

- Magnetic iron with a Satmagan instrument
- Total Fe, CaO, MgO, Al_2O_3, SiO_2, Mn, P, Na_2O, K_2O, and TiO_2 with XRF spectrometry

Sample preparation requires using a buckboard and muller to grind the sample to 100% passing –200 mesh. The method involves placing oversized material (+200 mesh) on a cast-iron plate (the buckboard) and passing a muller (heavy weight with handle) over the material until all the material passes the +200 mesh screen.

A 1.05 oz (30 g) sample (100% passing -200 mesh) is then passed through the DT magnetic separator. Wash water of 33.8 fluid oz (1,000 ml) per minute is used for testing. The water flow is verified prior to each use. After the sample is run in the DT, the sample is dried and demagnetized. A weight is taken of the original sample, the DT retained sample, and the DT Tailings sample. The percent magnetic iron is calculated with the following equation:

Percent Magnetic Iron = (B) x (percent weight concentration)

Percent Weight Concentration = (A-C)/(B-C)

Where:

A = Total iron (%) Original sample

B = Total iron (%) Davis Tube sample

C = Total iron (%) Davis Tube tailings sample

8.1.2.3 Satmagan Magnetic Iron Determination

Magnetic iron is measured with a Satmagan using procedure QCSW 5-01.The Satmagan is a magnetic balance in which the sample is weighed gravitationally and in a strong magnetic field. The ratio of the two weights is linearly proportional to the amount of magnetic material in the magnetically saturated sample. Magnetic iron is measured in the crude ore, tails, and pellet samples to determine the efficiency of process equipment to recover iron, and is converted to a percent using a factor. The Satmagan is calibrated daily, and the calibration curve, based on three samples of known value, is used to correct the final reported value. Out-of-specification calibration results in re-calibration as per the manufacturer’s specifications.

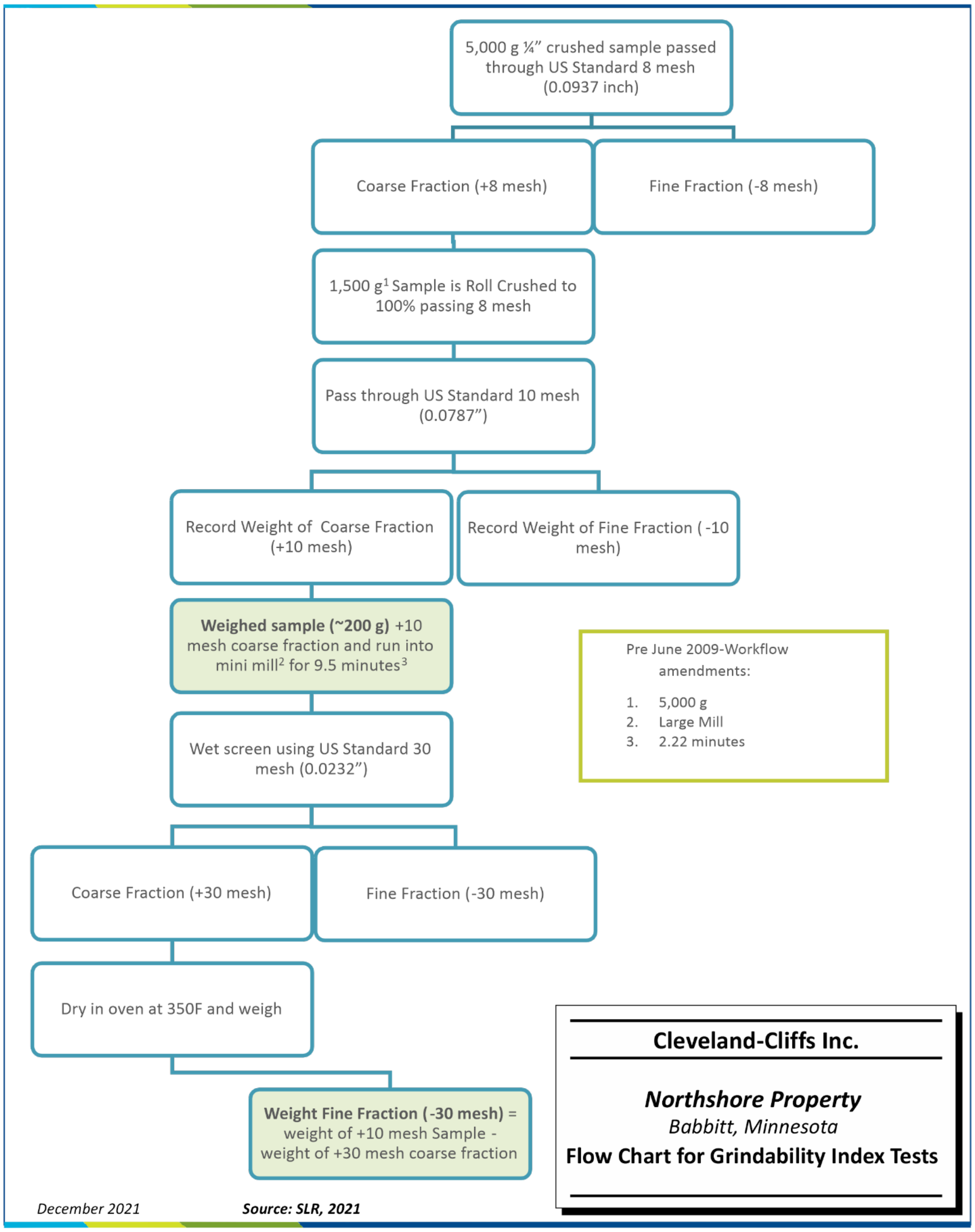
8.1.2.4 X-Ray Fluorescence Spectrometry

The XRF analyzer used at the Silver Bay laboratory is a Malvern Panalytical Axios Max and is utilized for analytical testing of drill core, daily process control and plant recovery monitoring, pellet chemistry control, and vessel cargo analysis for Certificates of Analysis (COA).

Using procedure QCSW 1-01, major oxides analyzed include SiO_2, CaO, MgO, Al_2O_3, Na_2O, K_2O, and TiO_2. The laboratory also reports Mn, P, and S.

8.1.2.5 Grindability

Grindability Index is a measure of the ease of crude ore size reduction in a milling circuit. Low Grindability Index material requires more grinding energy, reduces feed rates, lowers recovery, and produces coarser pelletizer feed. It is measured by grinding a sample and portioning out a particular size fraction. This subsample is placed in a miniature ball mill (mini-mill) for a specific time, then sieved using US standard mesh sizes.The final Grindability value is represented as the percentage of -30 (0.0232 in.) mesh material produced from a minus eight (0.0937 in.) mesh, +10 (0.0232 in.) mesh sample in a timed, mini-mill grind. The process is illustrated in Figure 8-3.



Source: SLR, 2021

Figure 8-3: Flow Chart for Grindability Index Tests

8.1.2.6 Concentratability

Concentratability is the grade of iron concentrate that can be produced from a given sample at a specific grind (88% passing -325 mesh, 70% passing -500 mesh) using hydraulic and magnetic separation. It is based on the historical average weight percent of +325, -325, +500, and -500 mesh (12% at +325 mesh, 18% at +500 (-325) mesh, and 70% at -500 mesh) size fractions in plant concentrate at a target grind size (100% passing 200 mesh).

As described in procedure QC-7 the -0.25 in., 400 g sample is further reduced to -14 mesh by roll crushing. Following demagnetization in a demagnetizing coil, 100 g are split using a riffle splitter and transferred to a six inch by six inch jar (ball) mill with 100 ml of tap water, where the sample is ground for 1,050 revolutions and/or seven minutes on a roller machine. The ground sample is then mixed and put through a DT magnetic separation (procedure QC-8), and the concentrate is demagnetized, then screened at 325 mesh and 500 mesh. The products are weighed and analyzed for total iron using XRF spectrometry.

Concentratability Index = (0.12) x A + (0.18) x B + (0.7) x C

Where:

A = +325 mesh total iron (%) from the timed-grind Davis Tube concentrate;

B = +500 (-325) mesh total iron (%); and

C = -500 mesh total iron (%).

The QP notes that the turnaround time for exploration drilling samples at the Silver Bay laboratory is very long, sometimes exceeding twelve months. The QP recommends working with the laboratory to improve this.

8.2 Sample Security

The diamond drill core is maintained on site at the Mine within the core facility prior to transportation to Lerch for sample preparation. It is secured from unauthorized external access and protects the samples from weather and potential contamination.

Each shipment of core samples is accompanied by a Microsoft Excel spreadsheet that identifies each sample and the method of sample preparation. The remaining coarse reject samples from Lerch are transported to Northshore's internal Silver Bay laboratory where they are assayed and stored, except for a 500 g Fee-Holder save sample, which is returned to Babbitt and stored at the mine site.

Northshore currently utilizes an acQuire database to dispatch exploration sample specifics; the laboratory will query the drill hole number upon arrival of samples, and a form containing drill hole ID, from-to, geology of the interval, analyses and samples required, and any composites (if identified by geologist). Disposition of all sample parts and splits, as well as sample storage information, is recorded.

8.3 Quality Assurance and Quality Control Procedures

Quality assurance (QA) consists of evidence to demonstrate that the assay data has precision and accuracy within generally accepted limits for the sampling and analytical method(s) used in order to have confidence in a Mineral Resource estimate. Quality control (QC) consists of procedures used to ensure that an adequate level of quality is maintained in the process of collecting, preparing, and assaying the exploration drilling samples. In general, quality assurance and quality control (QA/QC) programs are designed to prevent or detect contamination and allow assaying (analytical), precision (repeatability), and accuracy to be quantified. In addition, a QA/QC program can disclose the overall sampling-assaying variability of the sampling method itself.

Northshore is working to develop QA/QC procedures and actions.Historically, exploration drill sample programs have not included QC samples, although from 2009 to 2013 and 2017 to present, at least one of two in-house crude ore grade standards have been included alongside samples representing each diamond drill hole, and results have been analyzed and tracked. Although not formalized, current submission of QA/QC samples generally includes one coarse duplicate and one standard sample per drill hole, representing a submission rate of approximately 5%.

Initiated in 2019 by CTG and capturing data from 2017 to 2019, 59 standard samples and 57 coarse duplicates were submitted alongside 1,269 regular samples for analysis, representing an insertion rate of approximately 5% per QA/QC type.Due to the use of a metallurgical test procedure over traditional assays at Northshore, blanks are not used, nor are they relevant. QA/QC results from this test work are discussed below.

8.3.1 Metallurgical Sample Standards

Two crude ore standards (NSMCOS_Block 21 and NSMCOS_Block 5) were prepared by the Coleraine Mineral Research Laboratory of the University of Minnesota (UofM) using 10 tonnes of ore-grade material collected from the Mine.The material was crushed to -0.25 in., homogenized, and split into five-kilogram subsamples. The standards are not certified, and the process of certification is challenged by the custom nature of the test procedure at Northshore.

Standards were inserted blind (2009-2013, 2017-2019) to the laboratory alongside every group of drill hole samples. Monitoring of standard sample performance for economically relevant variables was undertaken from 2019, including data from 2017, by CTG, in the form of control plots (Figure 8-4), compilation of failure rates (defined by Cliffs as three standard deviations higher or lower than the mean value of the dataset (UCL/LCL)), temporal trends and statistical comparisons, the results and conclusions of which are described in an annual QA/QC report, and which SLR has reviewed and summarized below.

The control plots of standard NSMCOS_Block 21 for variables MagFe and Concentratability are replicated from Orobona (2020) in Figure 8-4 and show that, since 2019, the Silver Bay laboratory has good precision and accuracy, and prior to 2019 has acceptable precision and accuracy. Similarly good results were observed for NSMCOS_Block 5 and for the Grindability variableSLR notes that the range of acceptability for MagFe (24.6% to 32.2% MagFe), as well as for phosphorus and for weight recovery in NSMCOS_Block 21, is quite high, and based on more recent results, higher precision is achievable and an adjustment to failure limits is warranted.

In 2018 and 2019, six different standards exceeded acceptable limits for one (or in one case, two) variables. This failure rate was considered acceptable, and no action was taken.

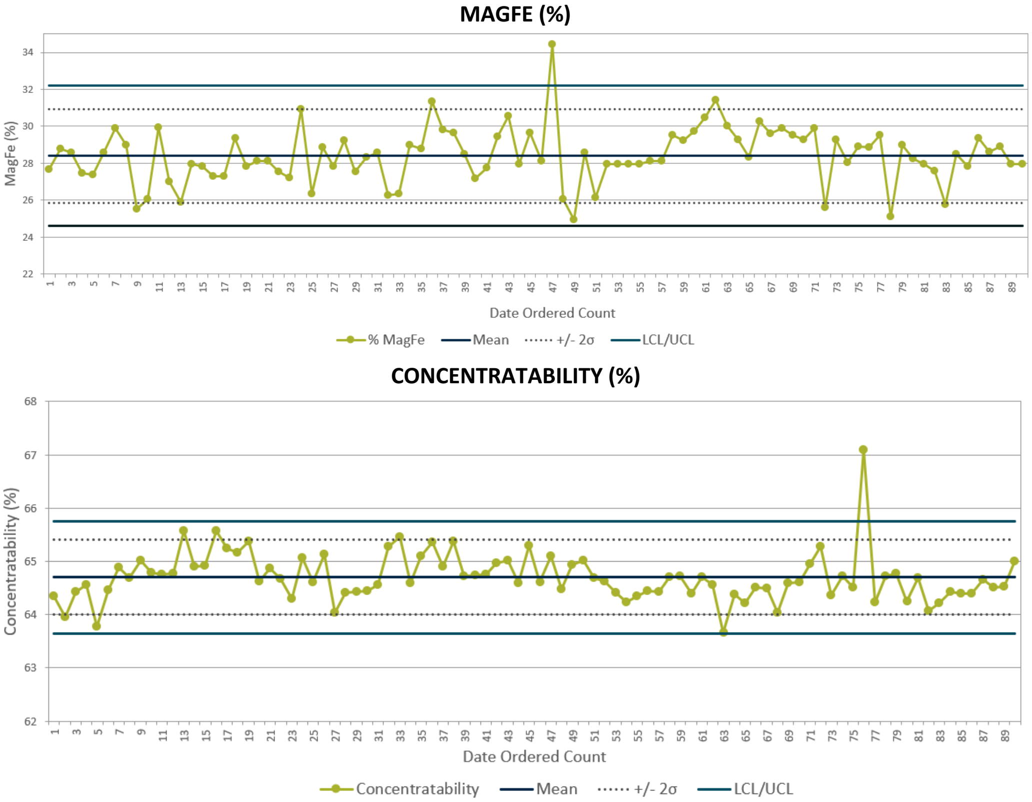


Figure 8-4: Control Plots of MagFe and Concentratability for Standard NSMCOS_Block 21 (2009 – 2019)

8.3.2 Duplicates

Initiated in 2019 by CTG and capturing data from 2017 to 2019, 57 coarse duplicates were submitted alongside 1,269 regular samples for analysis, representing an insertion rate of approximately 5%. Regular and QA/QC samples from the 2020 program are still in progress.The precision target set by Cliffs is nominally 20% of the original sample value.

Monitoring of coarse duplicate sample performance for economically relevant variables is completed by CTG using basic statistical comparisons, scatter plots, relative difference plots, and absolute difference plots (Figure 8-5) by CTG Principal Geologist (Orobona, 2020) and were reviewed by the QP.

The results indicate very good precision for Concentratability, MagFe, and Grindability, which are the principal economic variables of interest at Northshore. Results for phosphorus in concentrate (not shown) were less precise, likely due to the poor accuracy of the XRF at the low value range (0.01% to 0.06%) typical of Northshore, as well as the value being a function of weight recovery, which also showed lower precision. Weight recovery by DT is not a grading variable at Northshore; however, the QP recommends investigating whether precision can be improved with procedural modifications.

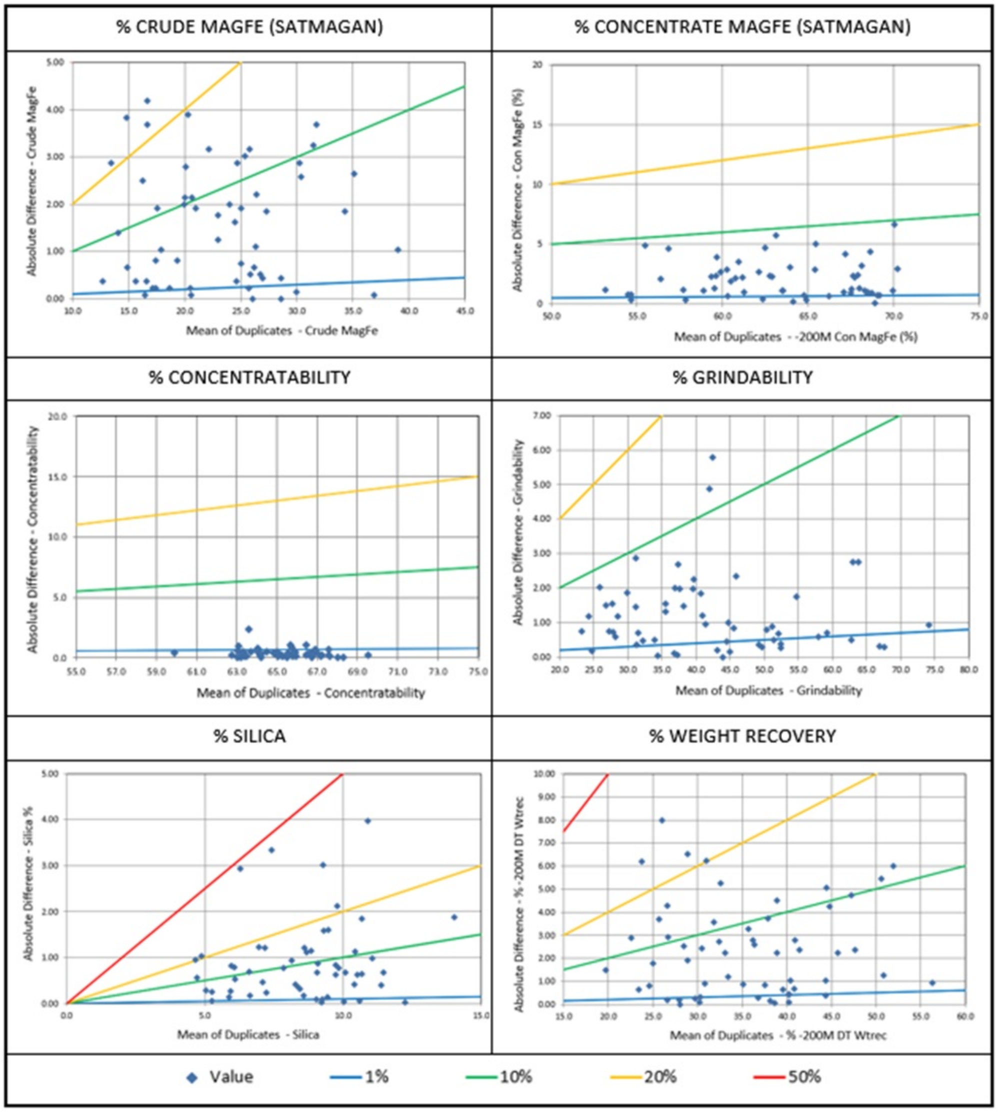


Figure 8-5: Absolute Difference Plots of Selected Coarse Duplicates Sample Variables Representing Drilling from 2017 to 2019

While most duplicate sample pairs for crude MagFe determination by Satmagan are within the 20% relative difference acceptance criteria, the number of failures is high and precision is low relative to similar metrics tracking Lerch's performance for United Taconite (UTAC) drill core (Orobona, 2020). Investigation of sample preparation and Satmagan calibration and operating practice is recommended to reduce variation and improve analytical precision in future drill core analyses, particularly as the lowest precision is seen in-and-around the cut-off grade of Mineral Resources (15%). A scatter plot of duplicate crude MagFe by Satmagan determination is shown in Figure 8-6.

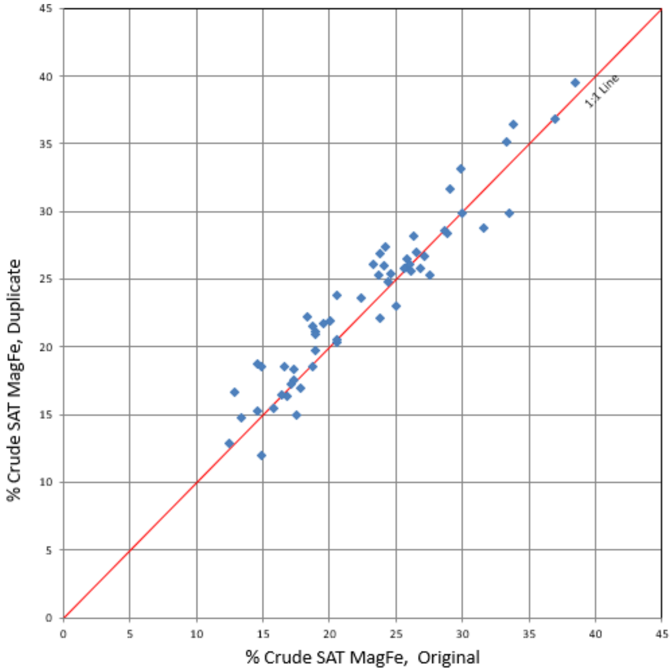


Figure 8-6: Scatter Plot of Original and Duplicate Crude MagFe (Satmagan) Samples Representing Drilling from 2017 to 2019

8.4 Conclusions

The QP makes the following conclusions with respect to the sample collection, preparation, analysis, and security, as well as the QA/QC measures in place at Northshore:

- Exploration sampling, preparation, and analyses are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources.
- Sample and data security are consistent with industry best practice.
- Work towards a comprehensive QA/QC program at Northshore is progressing well.
- Results as compiled by Cliffs' personnel and reviewed by the QP indicate an acceptable level of accuracy and a good level of repeatability for economic variables at Northshore.
- The range of acceptability for MagFe (24.6% to 32.2% MagFe), as well as other variables in standard NSMCOS_Block 21 is quite high, and based on more recent results, higher precision is achievable.
- Coarse duplicate values for crude MagFe by Satmagan are generally acceptable.SLR notes, however, that based on observations from the neighboring UTAC mine, improvements are

possible and warranted to reduce variation and improve analytical precision in future drill core analyses.

- The turnaround time for exploration drilling samples at the Silver Bay laboratory is very long, sometimes exceeding twelve months.

8.5 Recommendations

The QP makes the following recommendations with respect to the sample collection, preparation, analysis, and security, as well as the QA/QC measures in place at Northshore:

1. Consider implementing a check assay program with a secondary laboratory.
2. Adjust failure limits of MagFe in NSMCOS_Block 21 to reflect the higher-precision results observed in 2018 and 2019.
3. Continue to develop the QA/QC program to ensure that the program includes clearly defined limits when action or follow up is required, and that results are reviewed and documented in a report including conclusions and recommendations regularly and in a timely manner.
4. Work with the Silver Bay laboratory to investigate sample preparation, and Satmagan calibration and operating practice to reduce variation and improve analytical precision in future drill core analyses.
5. Improve the turnaround time for exploration drilling samples at the Silver Bay laboratory.

9.0 DATA VERIFICATION

The SLR QP visited the Property on October 22, 2019. While at site, the QP reviewed drill core logging and sampling procedures, including chain of custody. The QP also compared two recent drill holes against lithology logging and analytical results in the database. The QP spoke with the technical team and found them to have a strong understanding of the mineralization types and their processing characteristics, and how the analytical results are tied to the results.

Approximately 4% of the drill holes, representing a temporal and spatial cross-section of holes within the current life of mine (LOM) pit, were selected for database verification. Holes were selected to provide spatial coverage of the future mining areas and represent holes from a variety of time periods. The following aspects were reviewed:

- Collar survey information relative to historical logs or paper-recorded logging. Note that drill hole casings are typically removed, and most historical collar locations are now mined out, preventing ground truthing of historical drill hole locations.
- A comparison of original lithology logging and assay certificates to the current database.

Minor discrepancies in the significant figures and rounding of some variables for some time periods were noted, and some variables related to low-grade samples were not populated or overwritten with a similar variable test result.

The SLR QP is of the opinion that database verification procedures at Northshore comply with industry standards and are adequate for the purposes of Mineral Resource estimation.

10.0 MINERAL PROCESSING AND METALLURGICAL TESTING

10.1 Historical Metallurgical Testing

The Mine, crushing and rail loading facilities in Babbitt, Minnesota, and the E.W. Davis Works in Silver Bay, Minnesota have been in production since the 1950s, so metallurgical sampling and testing is primarily used in support of plant operations and product quality control. A laboratory is located inside the concentrator building. Samples from the Mine and Plant are analyzed there. The laboratory is ISO-certified to iron industry standard procedures.

In 2019, NSM completed an upgrade at the Plant, which allows for the production of up to 3.5 MLT of lower-silica iron pellets annually that will be used internally or sold to customers for the production of direct reduced iron (DRI) products such as hot-briquetted iron (HBI).

10.2 Sampling and Metallurgical Testing

10.2.1 Drill Sample Preparation and Testing

Drill sampling and testing procedures are presented in detail in section 8.1 Sample Preparation and Analysis.

10.3 Process Plant Metallurgical Sampling and Testing

10.3.1 Process Sampling and Quality Control

10.3.1.1 Sample Locations and Routine Sample Analysis

Sampling and testing of materials at each stage of mineral processing is necessary for operational process control and product pellet quality. Table 10-1 is an overview of the routine samples collected and analyzed by the quality control laboratory.

Table 10-1: Routine Samples Analyzed by the Quality Control Laboratory
Cleveland-Cliffs Inc. – Northshore Property

Samples	Testing Frequency					
	Area	Weekly	24hr	12hr	6hr	4hr
006/106 Conveyor	Fine Crusher	Concentratability (3 x per week)	Grindability	Moisture Sizing MagFe		
Dry Cobber Tails	Fine Crusher				MagFe	
Final Concentrate	Concentrator		Trace Metals Total Fe			Sizing Silica
Extractor Tails	Concentrator		Moisture MagFe			

Samples	Testing Frequency					
	Area	Weekly	24hr	12hr	6hr	4hr
Clarifier Underflow	Concentrator		Sizing MagFe			
Furnace Production	Pelletizer		Tumble, Sizing Compressions MagFe Trace Metals		Tumble Sizing Compressions	Tumble Sizing Compressions
160 Conveyor (Product to Yard)	Pelletizer				Tumble Sizing Compression	Tumble Sizing Compression

11.0 MINERAL RESOURCE ESTIMATES

11.1 Summary

A Mineral Resource block model for the Northshore deposit was prepared by Cliffs in June 2020 and audited and accepted by SLR.The Mineral Resource block model is based on the following drill hole information:

- 4,085 diamond drill holes totaling 713,129 ft from 1946 to 2019 and containing 113,203 assays.

A stratigraphic model representing the Biwabik IF was constructed in Maptek's Vulcan™ (Vulcan) software through the creation of wireframe surfaces representing the upper contact of each unit. Sub-blocked model estimates, also prepared in Vulcan, used inverse distance squared (ID^2) and length-weighted, five-foot, uncapped composites to estimate relevant analytical variables in two, progressively larger search passes, using hard boundaries between subunits, ellipsoidal search ranges, and orientation informed by geology. Average density values were assigned by lithological unit.

Mineral Resources were classified in accordance with the definitions for Mineral Resources in S-K 1300.Class assignment was based on criteria developed using continuity models (variograms), grade ranges for key economic variables (KEV), and geological understanding, and was accomplished using scripts that reference the distance of a block centroid to a drill hole sample, and distance buffers.

Wireframe and block model validation procedures including statistical comparisons with composite samples and parallel nearest neighbor (NN) estimates, swath plots, as well as visual reviews in cross-section and plan were completed. A visual review comparing the block model to drill holes completed following the block modeling work was performed to ensure general lithologic and analytical conformance.

The limit of Mineral Resources was optimized using a pit shell that considered the 2020 forecast mining cost for Northshore, Northshore lease boundaries, and a US$90/LT pellet value. The Northshore Mineral Resource estimate as of December 31, 2021, is presented in Table 11-1.

Table 11-1: Summary of Northshore Mineral Resources - December 31, 2021
Cleveland-Cliffs Inc. – Northshore Property

	Resource (MLT)	MagFe (%)	Process Recovery (%)	Wet Pellets (MLT)
Measured	766.7	22.1	25.5	195.3
Indicated	390.8	22.4	26.4	103.1
M&I	**1,157.5**	**22.2**	25.8	298.4
Inferred	13.6	19.8	22.5	3.1

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Tonnage is reported exclusive of Mineral Reserves and has been rounded to the nearest 100,000.
3. Mineral Resources are estimated at a cut-off grade of 15% MagFe.
4. Mineral Resources are estimated using a pellet value of US$90/LT.
5. Process recovery is reported as the percent mass recovery to produce two thirds DR-grade wet pellets containing 67% Fe and 2% silica, and one third standard wet pellets containing 65% Fe; shipped pellets average approximately 2.2% moisture.
6. Tonnage estimate based on depletion from a surveyed topography on December 21, 2020.

7. Resources are crude ore tons as delivered to the primary crusher; pellets are as loaded onto lake freighters at Silver Bay, Minnesota.
8. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
9. Bulk density is assigned based on average readings for each lithology type.
10. Mineral Resources are 100% attributable to Cliffs.
11. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
12. Numbers may not add due to rounding.

The SLR QP is of the opinion that with consideration of the recommendations summarized in Sections 1.0 and 23.0 of this TRS, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work.

11.2 Resource Database

Geologic and/or assay data from a total of 4,085 diamond drill holes totaling 713,129 ft from 1946 to 2019 and containing 113,203 assays have been incorporated into the current Northshore block model. Drilling has been completed on an approximate grid of 250 ft x 250 ft or 250 ft x 500 ft, with all holes drilled vertically. The drill holes are located on a rotated local mine grid in line with the strike of the deposit.

There are 113,203 samples in the database that have values for at least one variable from the list above. Not all variables were analyzed in all the intervals. Specifically, CaO, SiO_2, Mn, P, and Alkali were analyzed only for the drill holes completed from 1999 to present.

Since the database was closed for this resource estimate on June 10, 2020, an additional 56 drill holes totaling 16,306 ft have been completed and are yet to be incorporated into the model. Some assays from the 2020 and 2021 campaign are still pending.

11.3 Geological Interpretation

Cliffs' geologists have developed a geological model for the Northshore deposit by modeling the upper contact of each of the stratigraphic units in the resource area, as well as local intrusions. A stratigraphic cross-section is presented in Figure 11-1. Using Maptek's Vulcan software, lithological logs from drill holes were used to define the top contact surfaces of each stratigraphic unit, using the Integrated Stratigraphic Modeler tool. Surfaces are modified using a post-processing script to account for hole terminations mid-unit (both collar and end of hole), missing units due to pinched or eroded units, weathering or oxidation obscuring unit characteristics, very thin units, and/or lost data. Localized intrusive units such as diabase dikes, the sill in the BIF, and the Duluth Gabbro are separately modeled as bounding surfaces and wireframes that cut the stratigraphic interpretation.

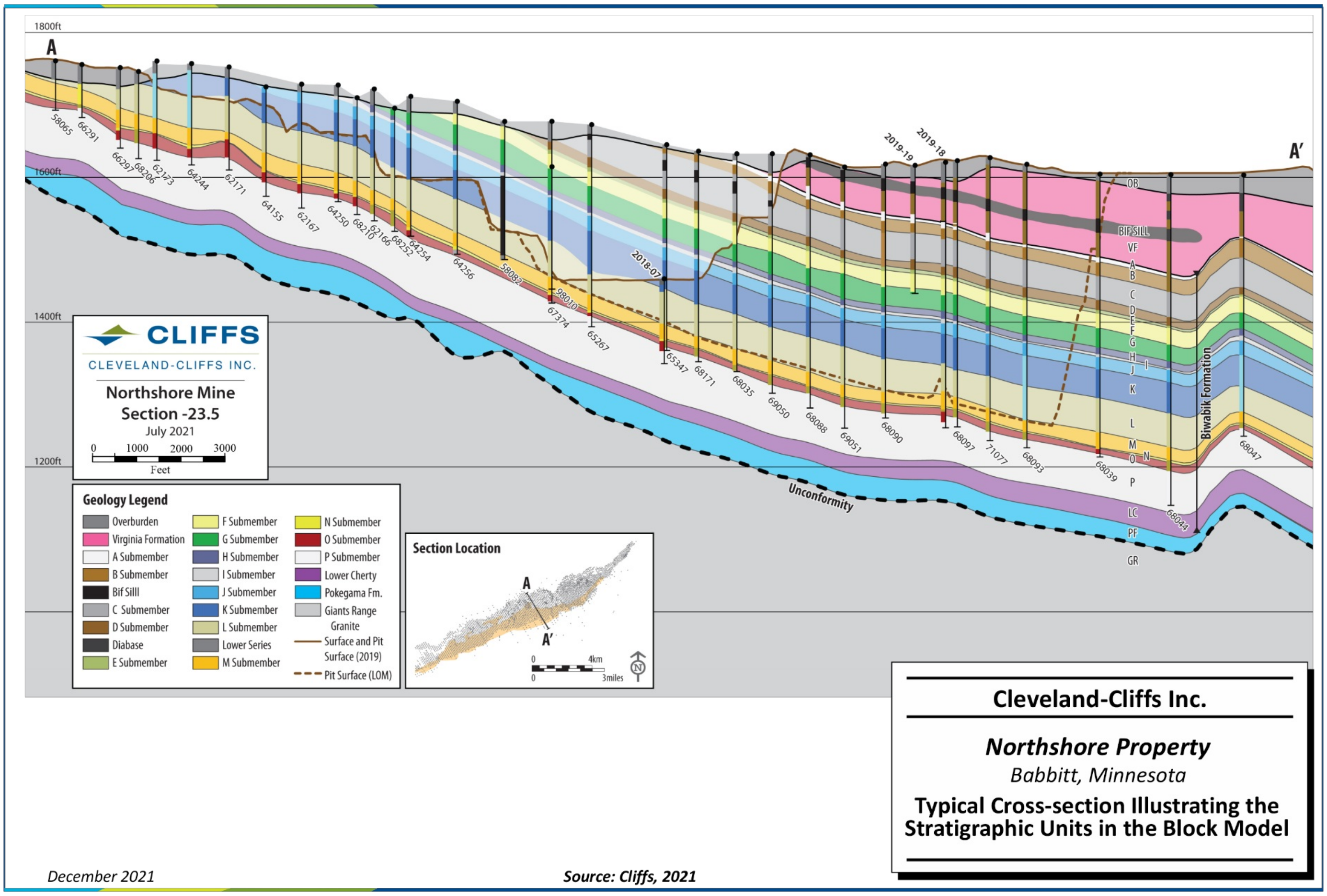
A domain boundary surface, termed the footwall/hanging wall (FWHW) and based on MagFe values in drilling is also modeled to constrain Mineral Resource estimation based on chemical and metallurgical characteristics.

The geological units modeled at Northshore are outlined in Table 11-2. The geologic subunits G, H, I, J, K, L, M, N, O, and LC are most likely to meet current metallurgical criteria for economic consideration as ore. Geologic subunits C, D, E, and F may also be considered ore-bearing very locally.

SLR is of the opinion that the geological model is fit for purpose and captures the principal geological features of the Biwabik IF at NorthshoreA small volume of material is artificially produced at fault boundaries, and SLR recommends defining faults using hard boundaries to prevent this effect in future updates.

Table 11-2: Modeled Stratigraphic Units
Cleveland-Cliffs Inc. – Northshore Property

Unit	Code	Mineralized	Unit	Code	Mineralized
Surface Overburden	OB	No	K	K1, K2, K3	Yes
Duluth Complex	GB	No	L	L1, L2, L3	Yes
VF	VF	No	M	M	Yes
A	A	No	N	N	Yes
B	B	No	O	O	Yes
C	C	No	P	P	No
D	D	No	Q	Q	No
E	E	No	LC	LC	Yes
F	F	No	Pokegama Formation	PF	No
G	G1, G2, G3	Yes	Giants Range Granite	GR	No
H	H	Yes	Diabase	DB	No
I	I	Yes	Footwall Surface	FW	No
J	J	Yes			



Cleveland-Cliffs Inc.

Northshore Property

Babbitt, Minnesota

Typical Cross-section Illustrating the Stratigraphic Units in the Block Model

December 2021

Source: Cliffs, 2021

Figure 11-1: Typical Cross-section Illustrating the Stratigraphic Units in the Block Model

11.4 Resource Assays

Basic statistics of assays within mineralized domains are shown in Table 11-3. In general, the economic variables for each unit show a minor reduction in the number of values, as well as a reduction in coefficient of variation (CV). Mean, maximum, and minimum values compare well.

Table 11-3: Assay Statistics of Mineralized Stratigraphic Domains
Cleveland-Cliffs Inc. – Northshore Property

Unit	Variable	Count	Mean (%)	Minimum (%)	Maximum (%)	CV
G	Grindability	10,906	65.98	23.50	99.50	0.16
	MagFe	12,750	23.70	2.50	41.40	0.16
	Concentratability	11,814	64.44	51.96	70.69	0.03
H	Grindability	3,395	64.44	30.20	99.50	0.17
	MagFe	4,243	21.88	0.88	44.50	0.19
	Concentratability	3,853	64.64	54.26	71.10	0.03
I	Grindability	2,681	61.96	30.20	97.14	0.21
	MagFe	3,367	22.22	5.20	49.09	0.27
	Concentratability	3,083	67.07	54.61	71.57	0.03
J	Grindability	7,238	58.83	26.50	97.14	0.24
	MagFe	9,055	27.96	5.20	48.60	0.20
	Concentratability	8,296	66.18	56.06	71.57	0.03
K	Grindability	21,508	49.28	17.90	95.05	0.28
	MagFe	26,242	24.49	0.20	49.00	0.21
	Concentratability	23,793	66.06	56.03	75.84	0.03
L	Grindability	27,760	43.91	16.50	91.96	0.30
	MagFe	34,553	21.56	0.10	44.74	0.29
	Concentratability	29,807	66.45	53.84	71.31	0.02
M	Grindability	10,013	37.87	16.50	89.00	0.28
	MagFe	14,135	15.59	0.10	43.40	0.35
	Concentratability	9,479	64.83	53.60	71.31	0.03
N	Grindability	2,282	43.21	14.00	87.11	0.26
	MagFe	4,518	12.37	0.10	39.50	0.54
	Concentratability	2,085	66.39	54.51	71.05	0.03

Unit	Variable	Count	Mean (%)	Minimum (%)	Maximum (%)	CV
	Grindability	4,455	44.35	14.00	87.17	0.26
O	MagFe	10,055	14.15	0.10	42.30	0.54
	Concentratability	4,536	66.97	54.38	71.16	0.03
	Grindability	1,110	46.82	33.50	72.00	0.16
LC	MagFe	1,370	21.69	0.20	49.00	0.49
	Concentratability	1,059	66.26	53.58	71.16	0.03

11.5 Compositing and Capping

Exploration drilling is sampled on a nominal 10 ft interval by Northshore geologists, with breaks at stratigraphic contacts. Historical sample intervals were collected on uniform, five-foot intervals prior to Cliffs' purchase of Northshore; therefore, the drill hole database contains a mixture of predominantly five-foot and 10 ft sample intervals.

Compositing is performed in Maptek's Vulcan software. A five-foot run-length compositing method is used with the majority of geological unit codes recorded and intervals broken by geological domain. Within mineralized units, a total of 110,565 composites are generated, ranging from 0.001 ft to 5.5 ft and averaging 4.2 ft in length. No capping is applied to any variable in the composite database.

Table 11-4 shows composite statistics for Concentratability, Grindability, and MagFe (crude).

Table 11-4: Composite Statistics of Mineralized Stratigraphic Domains
Cleveland-Cliffs Inc. – Northshore Property

Unit	Variable	Count	Mean (%)	Minimum (%)	Maximum (%)	CV
	Grindability	8,952	66.00	23.50	99.50	0.16
G	MagFe	10,420	23.70	2.92	40.30	0.14
	Concentratability	9,687	64.44	54.26	70.66	0.03
	Grindability	3,171	64.43	33.70	99.50	0.17
H	MagFe	3,917	21.88	7.40	44.50	0.16
	Concentratability	3,583	64.64	54.61	71.10	0.03
	Grindability	2,158	61.95	30.20	97.14	0.21
I	MagFe	2,693	22.22	5.20	49.09	0.24
	Concentratability	2,482	67.07	59.00	71.32	0.02
	Grindability	7,158	58.83	26.50	97.14	0.24
J	MagFe	8,865	27.96	5.20	46.90	0.18
	Concentratability	8,162	66.18	56.06	71.54	0.03
	Grindability	19,228	49.27	17.90	95.05	0.27
K	MagFe	23,377	24.48	0.20	47.76	0.19
	Concentratability	21,197	66.06	56.03	75.51	0.02

Unit	Variable	Count	Mean (%)	Minimum (%)	Maximum (%)	CV
L	Grindability	25,461	43.91	16.50	91.96	0.30
	MagFe	31,633	21.56	0.46	44.21	0.28
	Concentratability	27,403	66.45	57.36	71.31	0.02
M	Grindability	9,903	37.77	16.50	89.00	0.28
	MagFe	13,617	15.60	0.10	43.40	0.33
	Concentratability	9,477	64.80	53.60	70.88	0.03
N	Grindability	1,815	43.11	14.00	87.11	0.26
	MagFe	3,524	12.37	0.20	39.50	0.52
	Concentratability	1,678	66.38	57.40	71.05	0.03
O	Grindability	4,597	44.09	14.00	87.17	0.26
	MagFe	9,567	14.15	0.10	41.29	0.52
	Concentratability	4,722	66.96	54.38	71.16	0.03
LC	Grindability	1,200	46.92	33.50	72.00	0.15
	MagFe	1,395	21.69	0.22	43.50	0.47
	Concentratability	1,153	66.25	53.58	71.16	0.03

Figure 11-2 highlights the change in interval length distribution within the mineralized units. The QP notes that, although the number of 10 ft samples in the assay database is small, the practice of sample splitting during the compositing process (from one 10 ft assay into two, five-foot composites) may artificially lower the CV of the composite database, and recommends compositing to the current sample length of 10 ft or lowering the current sample size to five feet.

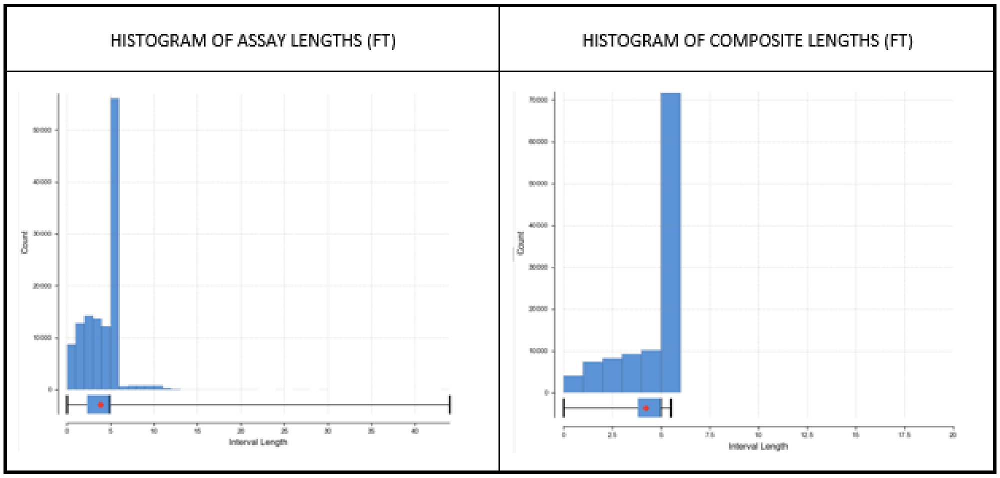
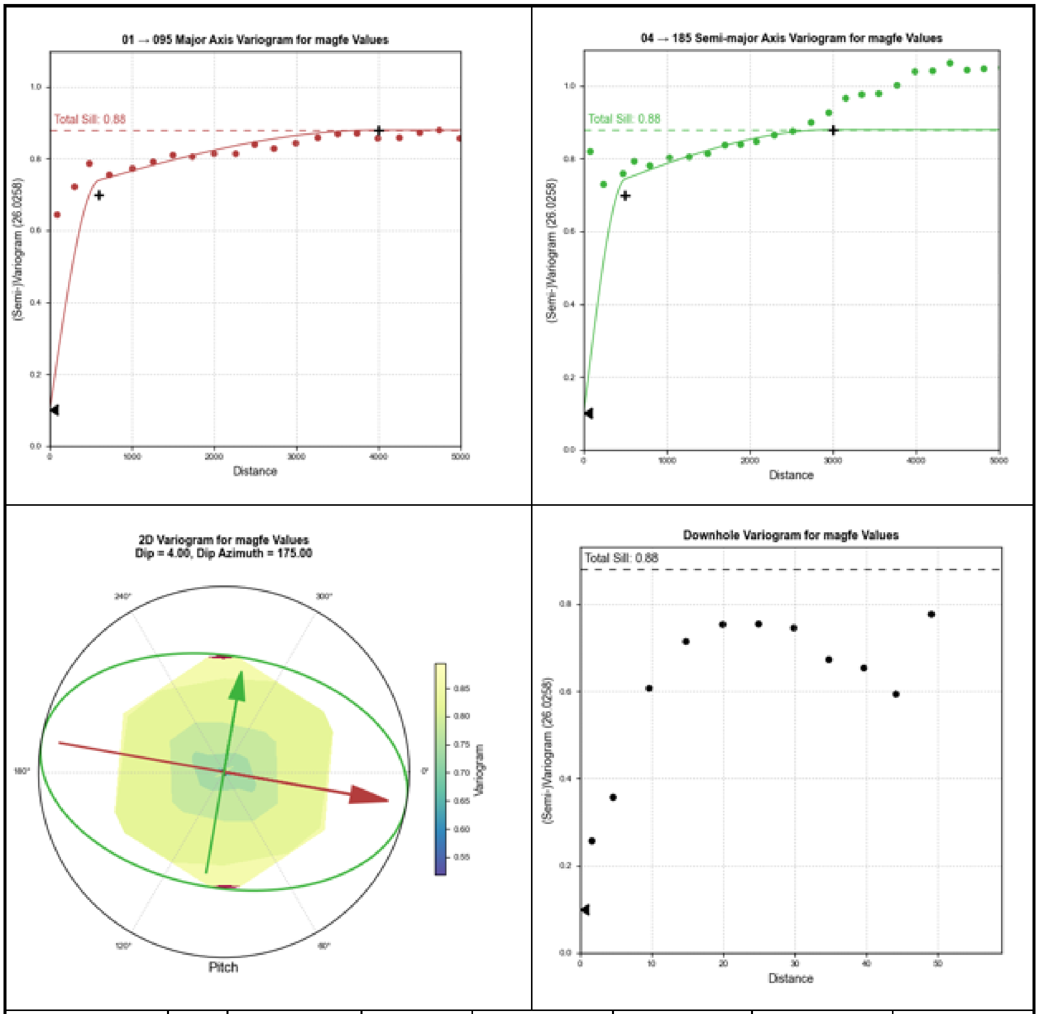


Figure 11-2: Comparison of Assay and Composite Lengths within Mineralized Units

11.6 Trend Analysis

Current estimation practices at Northshore do not incorporate modeled semi-variogram results within the estimation, as all variables are interpolated using an inverse distance squared (ID^2) approach. Trend analysis of selected domains and variables was completed by SLR to confirm grade trends and continuity, and to support classification criteria developed and implemented by Cliffs. An example variogram model of MagFe composites within subunit K is shown in Figure 11-3. The result indicates zonal anisotropy (across strike dimension (down hole) is more variable than either the along strike or down dip orientations), and continuity of up to 4,000 ft along strike. Approximately 80% of the domain variance is captured within a range of 1,500 ft in the principal direction on continuity. SLR recommends completing a robust trend analysis for all economic variables and domains.



			Type	Normalized Sill	Major (ft)	Semi-major (ft)	Minor (ft)
Dip (°)	4	**Nugget**		0.1			
DipAzimuth (°)	175	**Structure 1**	Spherical	0.6	600	500	10
Pitch (°)	10	**Structure 2**	Spherical	0.18	4,000	3,000	200

Figure 11-3: Subunit K MagFe Variogram Model

11.7 Block Model

A sub-blocked model is created in Vulcan with dimension and origin as shown in Table 11-5. Parent blocks are 100 ft by 100 ft in the X and Y direction and 10 ft in the Z direction, honoring modeled geological surfaces. Sub-blocks are 50 ft (X) by 50 ft (Y) by 5 ft (Z).

Table 11-5: Block Model Parameters
Cleveland-Cliffs Inc. – Northshore Property

Parameter	X	Y	Z
Start	-50000	-9000	300
Length	57,000	14,000	1,600
Block Size	100	100	10
Number	570	130	160
Sub-block	50	50	5
Number	1140	280	320

Codes are assigned to the following variables during block model creation:

- Stratigraphic units from the modeled geological surfaces
- FWHW from the modeled surface
- Lease boundaries from wireframe solids
- Air blocks from overburden surface roof

11.8 Estimation Methodology

The following variables are estimated:

- MagFe: Crude iron percent as magnetite (DT pre-1967 and Satmagan 1967-present)
- Conc_fe: “Concentratability,” concentrate total iron percent at "projected plant grind"
- Grindability: Percent passing US standard sieve size 30 mesh after timed grind mill
- Alkali: Sodium oxide percent plus potassium oxide percent from XRF analysis of -200 mesh DT concentrate
- Mn: Manganese percent from XRF analysis of -200 mesh DT concentrate
- P: Phosphorus percent from XRF analysis of -200 mesh DT concentrate
- MgO: Magnesium oxide percent from XRF analysis of -200 mesh DT concentrate
- CaO: Calcium oxide percent from XRF analysis of -200 mesh DT concentrate
- Kwh325: Kilowatt hours per long ton (kWh/LT) at target grind of 88% passing 325 mesh
- Kwh_si: Kilowatt hours per long ton at target silica (7.5% SiO_2 Flot Feed) at target silica content
- Wt325: Weight percent at +325 mesh from Concentratability
- Wt500: Weight percent at -500 mesh from Concentratability
- Fe_325: Total iron percent in the +325 mesh from Concentratability

Estimation parameters are described in Table 11-6.

Table 11-6: Estimation Parameters
Cleveland-Cliffs Inc. – Northshore Property

Domain	ID Power	Pass	Variables	Field Restriction	Orientation	Distance (ft)	Min/Max Comps	Max per DH
C, D, E, F, G1-G3, H, I J	2	1	conc_fe, grind, magfe, kwhr325, fe325, kwh_si, wt_325, wt-500	n/a	090/05	1500/800/60	2/12	2
K1-K3, L1-L3, M, N, O, P	2	1	conc_fe, grind, magfe, kwhr325, fe325, kwh_si, wt_325, wt-500	FW	090/05	1500/800/60	2/12	2
K1-K3, L1-L3, M, N, O, P	2	1	conc_fe, grind, magfe, kwhr325, fe325, kwh_si, wt_325, wt-500	HW	090/05	1500/800/60	2/12	2
K1-K3, M, N, O, P	2	2	conc_fe, grind, magfe	HW	090/05	3,000/1,600/120 or 3,000/2200/400	1/15	2
L1-L3, P	2	2	grind	HW	090/05	5,000/2,200/400	1/15	2
K1-K3, L1-L3, M, N, O, PK1-PK3, P	2	2	conc_fe, grind, magfe	HW	090/05	1,500/800/60	2/12	1
All	3	1	Alkali, Na2O, Mn, P, CaO, MgO	n/a	090/05	3,000/3,000/500	2/12	5
All	3	2	Alkali, Na2O, Mn, P, CaO, MgO	n/a	090/05	3,000/7,500/500	1/15	1

A nearest neighbor (NN) estimate was run in parallel to allow comparison of grade variables. Trace elements were not estimated in stratigraphic unit P. Length weighting is used in all estimation runs. Composites used in the estimations were limited to lengths between one foot and 10,000 ft.

Following estimation, a series of block calculations were performed, which included assigned values for P, Mn, and Alkali where unestimated within and west of Block 34 and LC and material-type designation as shown in Table 11-7. Concentratability is calculated into the block model using the equation shown in section 8.1.2.6.

Table 11-7: Block Model Material Type Designation
Cleveland-Cliffs Inc. – Northshore Property

Subunit	Designation
I, J, K1-3	Good
G1-3, H	Intermediate
A, B, N	Lean

Subunit	Designation
L1-3, M, N, O	Footwall
C	Poor
D, E, F	Bad
P, Q	LowerSlaty
LC	LowerCherty

The QP is of the opinion that the interpolation approach at Northshore is generally acceptable; however, the QP recommends testing the following approaches to investigate if block to composite conformance improves in future updates:

- Replace the existing search orientation and dimensions with a smaller, across-strike dimension and dynamic anisotropy to honor zonal anisotropy observed in variogram models. Test a more circular (less elongated) ellipse and a smaller first pass.
- Adjust the interpolation approach so that all key variables within and proximal to the LOM pit are estimated either by increasing the Y, or the X and Y dimensions of the search ellipse(s) in the second pass or by adding a third pass.
- Modify the composite strategy to limit the creation of very short composite lengths, such as a target length approach, and remove the small length limit on composites during interpolation.

11.8.1 Density

Density is assigned per stratigraphic unit in the Mineral Resource block model based on numerical averages of validated density data for each stratigraphic unit (see section 8.1.2.1). The density values assigned to the block model are shown in Table 11-8.

Table 11-8: Density by Lithology
Cleveland-Cliffs Inc. – Northshore Property

Description	Samples	Specific Gravity	Tonnage Factor (ft^3/LT)	Block Model Density (LT/ft^3)
Overburden	-	1.709	21.01	0.048
Gabbro	33	2.902	12.37	0.081
Virginia Formation	446	2.736	13.12	0.076
A	100	2.754	13.03	0.077
B	99	3.048	11.78	0.085
C	99	3.579	10.03	0.100
C-Sill	86	2.959	12.13	0.082
D	48	3.419	10.50	0.095
E	41	3.137	11.44	0.087
F	83	3.328	10.79	0.093
G	122	3.374	10.64	0.094

Description	Samples	Specific Gravity	Tonnage Factor (ft^3/LT)	Block Model Density (LT/ft^3)
H	49	3.454	10.39	0.096
I	43	3.261	11.01	0.091
J	82	3.654	9.82	0.102
K	162	3.586	10.01	0.100
L	159	3.553	10.10	0.099
M	77	3.645	9.85	0.102
N	42	3.358	10.69	0.094
O	87	3.711	9.67	0.103
P	85	3.620	9.92	0.101

11.9 Cut-Off Grade

The cut-off grade used for the estimation of Mineral Resources is 15.0% MagFe.This cut-off grade has been developed as a measure of maintaining product tonnage with constraints on the delivery of crude to the concentrator. This cut-off grade is verified through a break-even cut-off grade calculation (Figure 11-4).

$$Breakeven\ Cutoff\ Grade = \frac{\sum(Cash\ Costs\ \$/LT\ ore\ milled)}{\left(\left(\frac{Revenue\ Rate}{Pellet\ \%Fe}\right) - \left(\frac{Sale\ Costs\ \$/LT\ pellet}{Pellet\ \%Fe}\right)\right)\cdot\frac{Ore\ LT\cdot\%MagFe}{Pellet\ LT\cdot Pellet\ \%Fe}}$$

Figure 11-4: Cut-Off Grade Formula

Costing is based upon the 2020 forecast mining cost for Northshore as detailed below, Northshore lease boundaries, and a US$90/LT pellet value.

- Cash Costs = $21.43/LT crude ore milled
- Sale Costs = $6.92/ LT dry pellet
- Revenue Rate = $92.27/LT dry pellet
- Pellet % Fe = 65.0%
- Crude Ore Milled = 16,120 LT
- % Mag Fe = 25.4%
- Pellets Produced = 5,480 dry pellets

The 15% MagFe cut-off grade also represents a natural inflection point in the composite data at Northshore, indicating that it mimics the natural deposit characteristics (Figure 11-5).

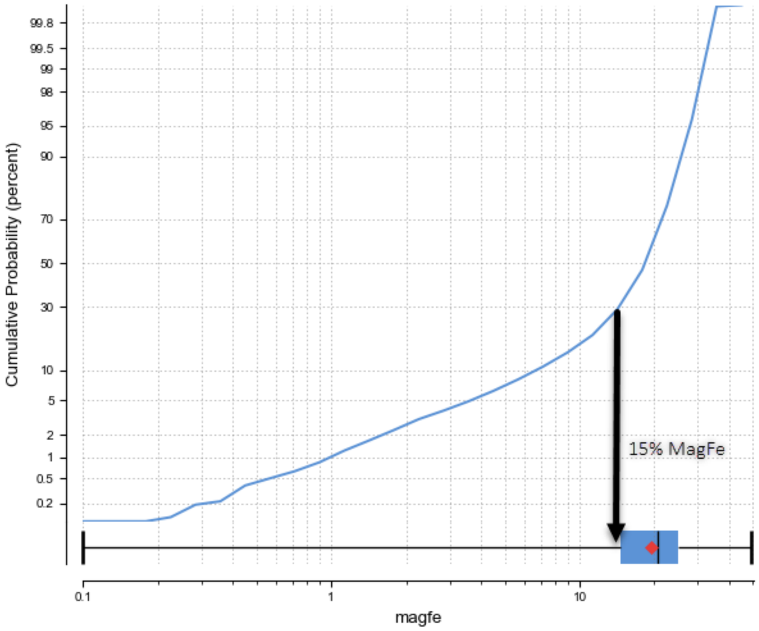


Figure 11-5: Log Probability Plot of MagFe Composite Values at Northshore

11.10 Classification

Definitions for resource categories used in this TRS are those defined by SEC in S-K 1300Mineral Resources are classified into Measured, Indicated, and Inferred categories.

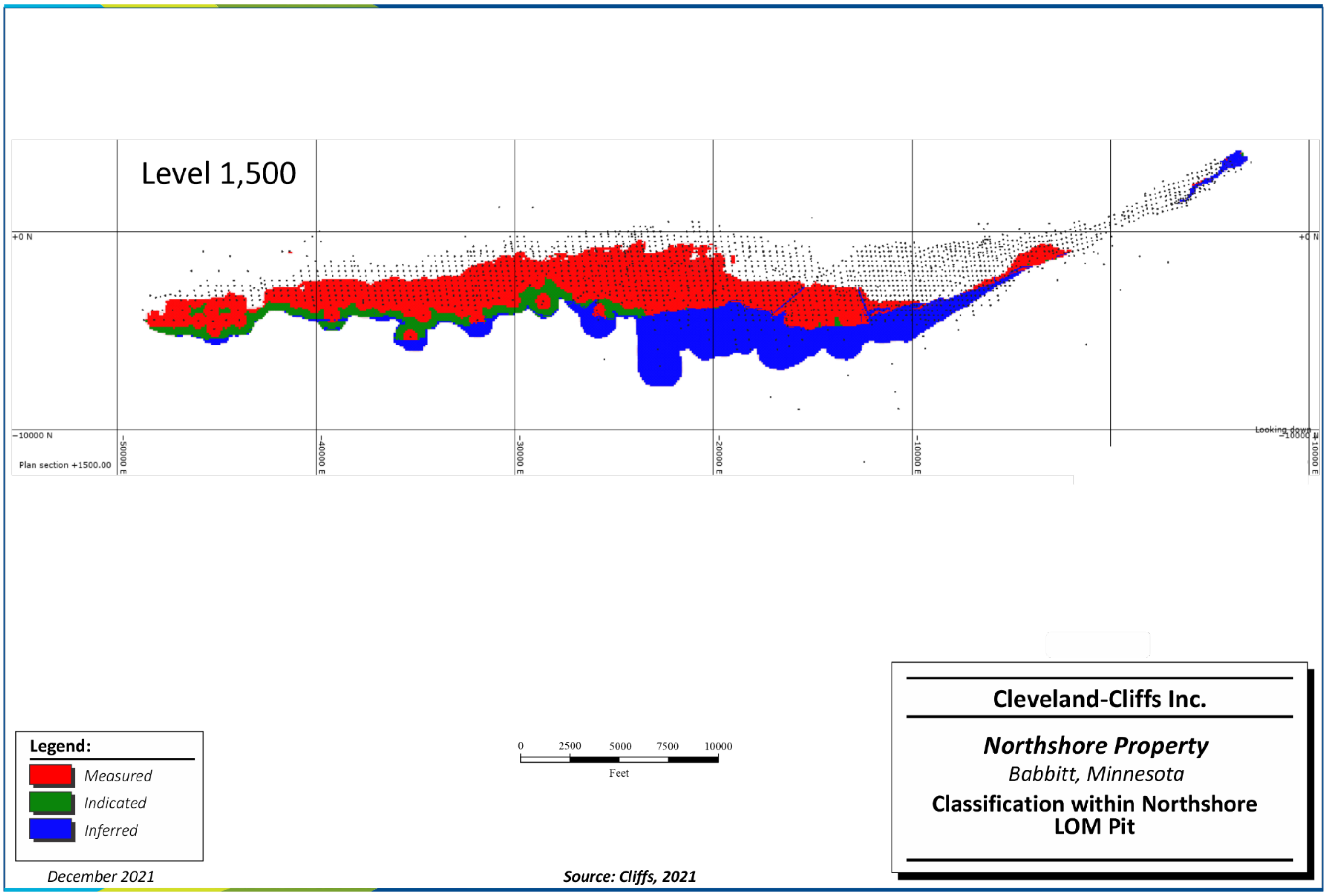
Northshore Mineral Resource classification is based primarily on drill hole spacing and influenced by geologic continuity, ranges of economic criteria, and reconciliation. Classification is limited to a distance-based buffer around existing drill holes. Classification limits referencing drill hole spacing are consistent with neighboring Cliffs' UTAC mine, also hosted within the Biwabik IF, and distance limits are

below continuity ranges resolved in variography completed by SLR. Classification criteria are listed in Table 11-9 and illustrated in Figure 11-6.

Table 11-9: Northshore Classification Criteria
Cleveland-Cliffs Inc. – Northshore Property

Criteria	Measured	Indicated	Inferred
Distance to Drill hole (ft)	< 400	< 800	> 800
Geological Understanding	Very good geology and stratigraphic continuity		
Range in Values	Narrow range in KEV (MagFe, Grindability, Concentratability) and density		
Reconciliation (measured at mill vs. estimated)	F2 within 10%	N/A	N/A

The QP is of the opinion that the classification at Northshore is generally acceptable but notes that some post-processing to remove isolated blocks of different classification is warranted. The QP recommends transitioning the classification process in future updates to consider local drill hole spacing over a distance to drill hole criterion.



Legend:

- 🟥 *Measured*
- 🟩 *Indicated*
- 🟦 *Inferred*

Cleveland-Cliffs Inc.

Northshore Property

Babbitt, Minnesota

Classification within Northshore LOM Pit

December 2021

Source: Cliffs, 2021

Figure 11-6: Classification within Northshore LOM Pit

11.11 Model Validation

Blocks were validated using industry-standard techniques including:

- Visual inspection of assays and composites versus block grades (Figure 11-7 and Figure 11-8)
- Visual comparison of 2020 drill hole logging and analytical results (drilled subsequent to current model) and block grades
- Comparison between ID^2, NN, and composite means for MagFe (Table 11-10), Grindability (Table 11-11), and Concentratability (not shown)
- Swath plots (Figure 11-9)

Basic statistics of MagFe values within the LOM pit are summarized by subunit in Table 11-10, showing good agreement of ID^2 and NN block mean values with composite results. Variability was reduced up to 50%; in general, the deposit has very low CV values, and the variance reduction is acceptable. The subunits where composites are shown to have a lower CV than blocks are those where splitting of longer (10 ft) assays into two, five-foot composites have artificially reduced the CV of the composite dataset.

Table 11-10: MagFe Block and Composite Statistics within LOM Pit
Cleveland-Cliffs Inc. – Northshore

Subunit	Blocks						Composites		
	Count	Min. (%)	Max. (%)	ID^2 Mean (%)	NN Mean (%)	CV (ID^2)	Mean (%)	Max. (%)	CV
g	204,138	7.58	32.66	23.16	23.24	0.10	23.30	39.30	0.15
h	64,961	10.81	33.73	22.60	22.52	0.10	22.14	37.81	0.16
i	37,255	10.66	36.87	22.31	22.61	0.13	22.26	43.30	0.22
j	103,521	14.05	40.72	27.40	27.11	0.12	27.63	45.50	0.18
k	320,331	8.42	37.96	23.54	23.55	0.16	23.83	41.90	0.19
l	237,347	5.51	38.39	24.76	24.76	0.15	24.54	43.30	0.20
m	14,086	4.39	32.85	19.85	20.10	0.17	20.81	34.08	0.20
n	638	5.97	24.70	17.03	17.11	0.27	18.96	29.80	0.24
o	2,105	5.35	36.18	23.54	23.02	0.35	26.11	39.22	0.30
lc	8,570	4.40	39.16	23.92	24.22	0.31	25.22	43.30	0.38

Note: A small number of unestimated blocks have been excluded.

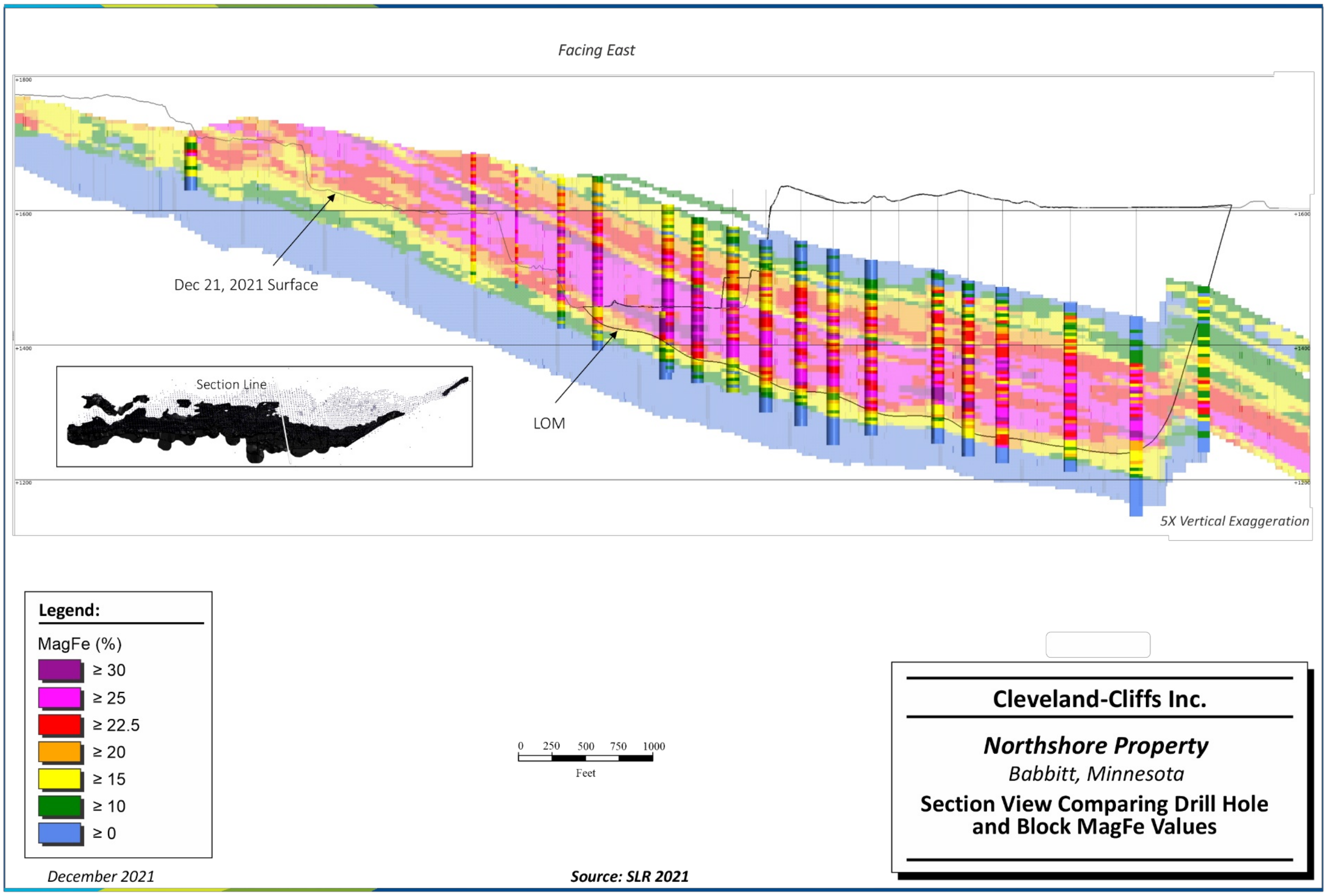
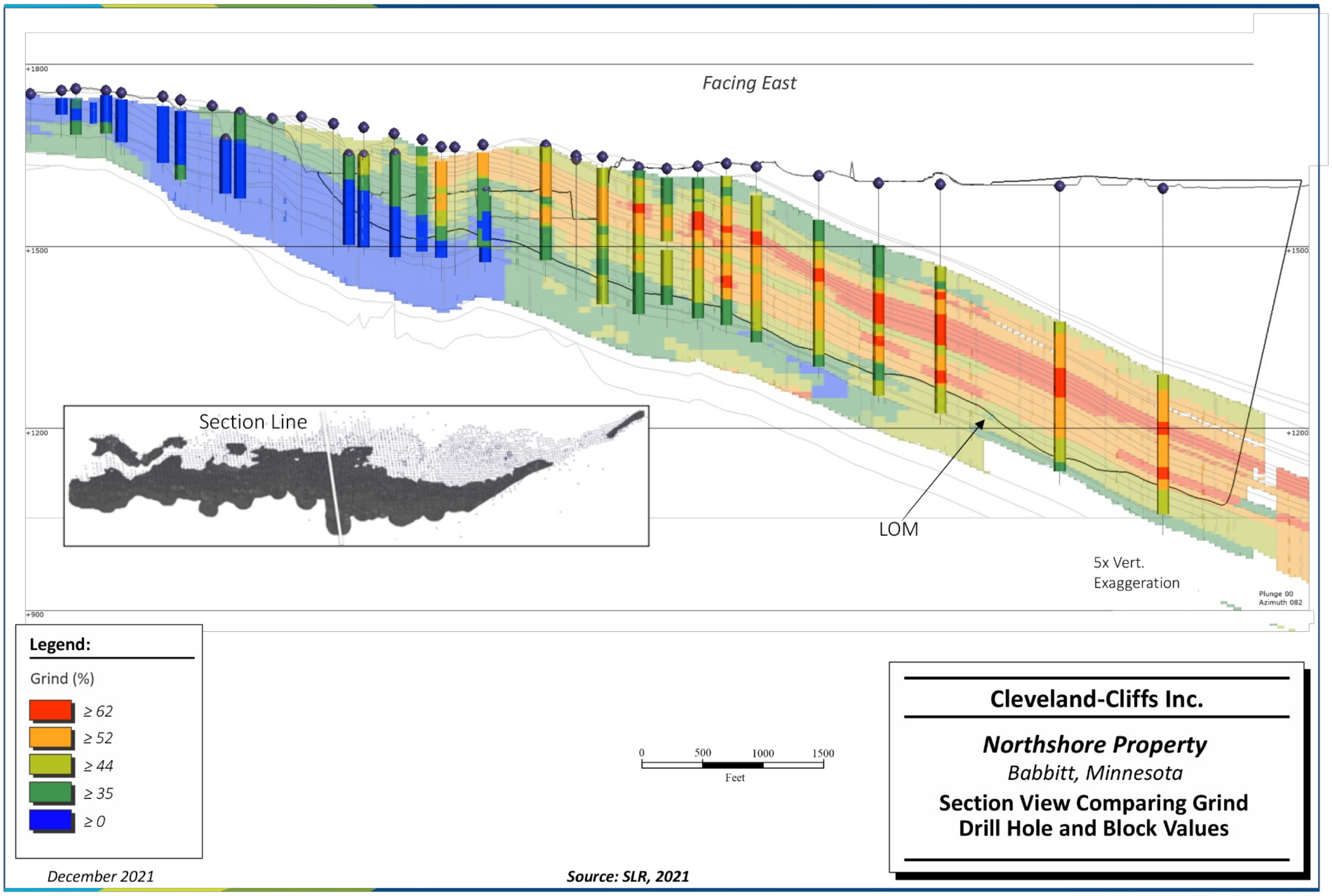


Figure 11-7: Section View Comparing Drill Hole and Block MagFe Values



December 2021

Source: SLR, 2021

Figure 11-8: Section View Comparing Drill Hole and Block Grindability Values

Table 11-11: Block and Composite Grindability Statistics within LOM Pit
Cleveland-Cliffs Inc. – Northshore Property

Subunit	Blocks					Composites				
	Count	Mean (%)	CV	Min. (%)	Max. (%)	Count	Mean (%)	CV	Min. (%)	Max. (%)
g	206,197	65.51	0.13	33.87	92.35	4,011	64.88	0.15	23.50	93.00
h	65,385	63.85	0.11	38.14	95.20	1,418	63.30	0.14	33.70	90.08
i	40,143	61.17	0.15	30.83	94.90	943	61.36	0.18	30.20	93.72
j	103,982	57.26	0.16	29.19	97.14	3,031	57.13	0.20	26.50	96.50
k	320,338	48.51	0.22	25.39	94.30	9,320	47.46	0.24	25.40	91.12
l	237,347	48.88	0.24	25.96	86.66	7,992	47.47	0.26	22.45	91.96
m	14,088	45.33	0.20	27.02	76.77	548	43.29	0.21	26.66	89.00
n	638	54.35	0.18	27.57	69.35	23	56.72	0.15	29.50	79.10
o	2,105	54.53	0.23	26.00	76.85	39	60.87	0.14	48.52	79.10
LC	8,570	45.57	0.09	34.39	60.37	585	45.81	0.12	33.50	61.50

The swath plot in Figure 11-9 shows very good agreement between NN and ID^2 estimates for MagFe in subunit K, except for the northeast extent (circled in blue), which has very few blocks and a poor orientation for swath plot generation. Good conformance was observed for other subunits and key variables.

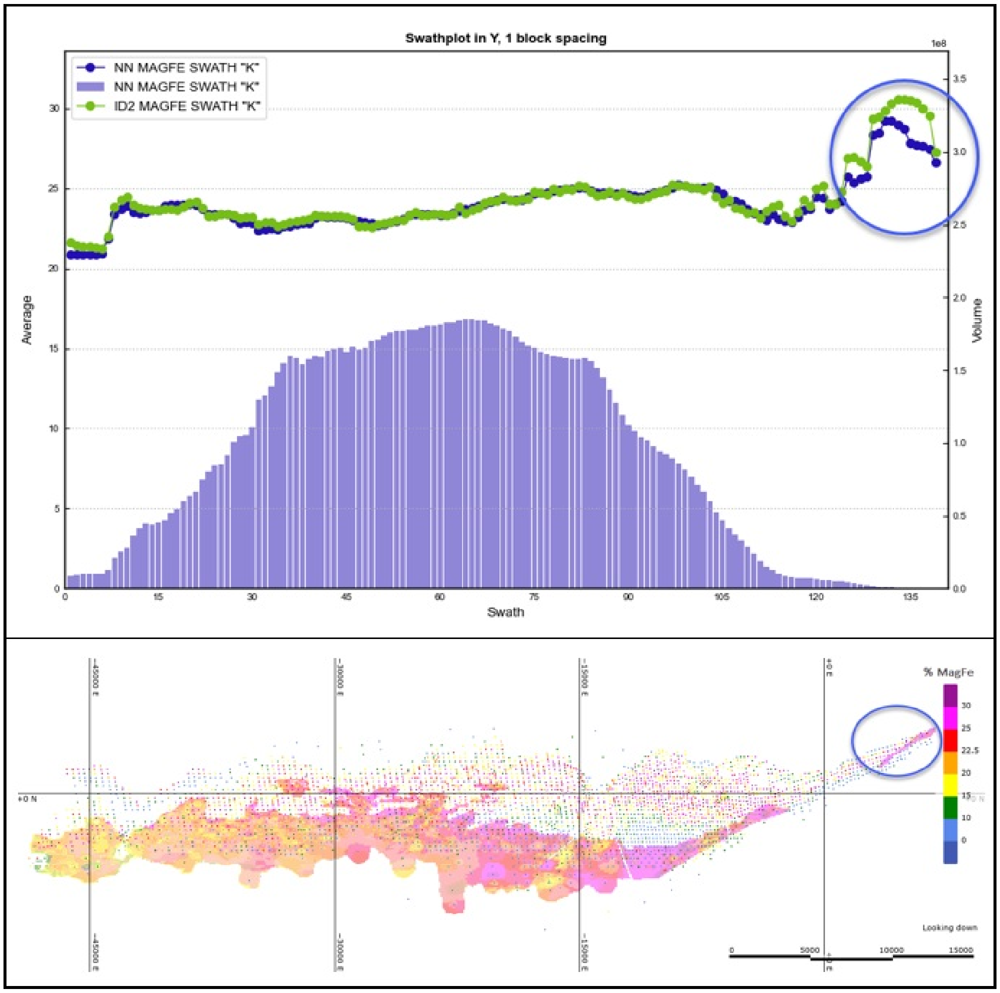


Figure 11-9: Swath Plot (Northings) of MagFe ID^2 and NN Blocks of Subunit K within the LOM Pit

11.12 Model Reconciliation

A reconciliation exercise was completed comparing actual production results versus model-predicted values of crude ore, pellet production, and process recovery for the years 2014 through 2020. The results of this study are summarized in Table 11-12. Model values were determined by creating solids of the actual mined areas for each year and then running those solids through the model to determine tons and grade.

Table 11-12: Model Reconciliation 2014-2020
Cleveland-Cliffs Inc. – Northshore Property

	Variable	Model	Actual	Variance
2014	Crude Ore (MLT)	15.7	15.1	-3.79%
	Pellets Dry (MLT)	5.2	5.1	-1.93%
	Process Recovery	33.5%	34.1%	1.79%
2015	Crude Ore (MLT)	12.0	12.2	1.74%
	Pellets Dry (MLT)	4.2	4.2	0.67%
	Process Recovery	34.8%	34.4%	-1.09%
2016	Crude Ore (MLT)	9.6	9.6	-0.46%
	Pellets Dry (MLT)	3.3	3.2	-3.16%
	Process Recovery	34.1%	33.2%	-2.69%
2017	Crude Ore (MLT)	14.9	14.6	-2.29%
	Pellets Dry (MLT)	5.1	5.2	1.13%
	Process Recovery	34.6%	35.8%	3.34%
2018	Crude Ore (MLT)	15.6	15.5	-0.25%
	Pellets Dry (MLT)	5.3	5.6	4.19%
	Process Recovery	34.1%	35.7%	4.43%
2019	Crude Ore (MLT)	15.6	15.7	0.45%
	Pellets Dry (MLT)	5.1	5.1	0.36%
	Process Recovery	32.6%	32.5%	-0.09%
2020	Crude Ore (MLT)	11.4	11.5	0.10%
	Pellets Dry (MLT)	3.7	3.7	0.10%
	Process Recovery	32.6%	32.6%	0.00%

The QP offers the following conclusions with respect to the Northshore Mineral Resource estimate:

- The geological model is fit for purpose and captures the principal geological features of the Biwabik IF at Northshore.
- The block model's KEV compare well with the source data.
- The methodology used to prepare the block model is appropriate.
- Validations compiled by the QP indicate that the block model is reflecting the underlying support data.
- Although the classification at Northshore is generally acceptable, some post-processing to remove isolated blocks of different classification is warranted.
- Visually, blocks and composites in cross-section and plan view compare well.
- In both 2019 and 2020, actual versus model-predicted values of crude ore, pellet production, and process recovery were accurate to between -0.09% and 4.43%.

The QP offers the following recommendations with respect to the Northshore Mineral Resource estimate:

1. A small volume of material is artificially produced at fault boundaries. Define faults using hard boundaries to prevent this effect in future updates.
2. Test the following approaches to investigate if block-to-composite conformance can be improved in future updates:
    a. Replace the existing search orientation and dimensions with a smaller, across-strike dimension and dynamic anisotropy to honor zonal anisotropy observed in variogram models. Test a more circular (less elongated) ellipse and a smaller first pass.
    b. Adjust the interpolation approach so that all key variables within and proximal to the LOM pit are estimated either by increasing the Y, or the X and Y dimensions of the search ellipse(s) in the second pass or by adding a third pass.
    c. Modify the composite strategy to limit the creation of very short composite lengths, such as a target length approach, and remove the small length limit on composites during interpolation. Composite to the current sample length of 10 ft or lower the current sample size to five feet to avoid splitting samples during the compositing process.
3. Transition the process of classifying blocks in future updates to consider local drill hole spacing over a distance-to-drill-hole criterion.
4. Prepare model reconciliation over quarterly periods and document methodology, results, and conclusions and recommendations.

11.13 Mineral Resource Statement

The Mineral Resource estimate at Northshore was prepared by Cliffs and audited and accepted by SLR using available data from 1946 to 2019.

The limit of Mineral Resources was optimized using pit shells that considered the forecast 2020 mining cost for Northshore, Northshore lease boundaries, and a US$90/LT pellet value. In addition to SLR's review, Cliffs' technical site and corporate teams have reviewed the input data, interpolation design and execution, as well as the resultant deposit block model's KEV.

The Northshore Mineral Resource estimate as of December 31, 2021 is presented in Table 11-13.

Table 11-13: Summary of Northshore Mineral Resources - December 31, 2021
Cleveland-Cliffs Inc. – Northshore Property

	Resource (MLT)	MagFe (%)	Process Recovery (%)	Wet Pellets (MLT)
Measured	766.7	22.1	25.5	195.3
Indicated	390.8	22.4	26.4	103.1
M&I	**1,157.5**	**22.2**	25.8	298.4
Inferred	13.6	19.8	22.5	3.1

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Tonnage is reported exclusive of Mineral Reserves and has been rounded to the nearest 100,000.
3. Mineral Resources are estimated at a cut-off grade of 15% MagFe.
4. Mineral Resources are estimated using a pellet value of US$90/LT.
5. Process recovery is reported as the percent mass recovery to produce two thirds DR-grade wet pellets containing 67% Fe and 2% silica, and one third standard wet pellets containing 65% Fe; shipped pellets average approximately 2.2% moisture.
6. Tonnage estimate based on depletion from a surveyed topography on December 21, 2020.
7. Resources are crude ore tons as delivered to the primary crusher; pellets are as loaded onto lake freighters at Silver Bay, Minnesota.
8. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
9. Bulk density is assigned based on average readings for each lithology type.
10. Mineral Resources are presented on a 100% basis, which includes both the Mesabi Trust lands and Cliffs.
11. Mineral Resources are 100% attributable to Cliffs.
12. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
13. Numbers may not add due to rounding.

The SLR QP is of the opinion that, with consideration of the recommendations summarized in Sections 1.0 and 23.0, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work.

12.0 MINERAL RESERVE ESTIMATES

Mineral Reserves in this TRS are derived from the current Mineral Resources.The Mineral Reserves are reported as crude ore and are based on open pit mining. Crude ore is the unconcentrated ore as it leaves the mine at its natural *in situ* moisture content. The Proven and Probable Mineral Reserves for Northshore are estimated as of December 31, 2021, and summarized in Table 12-1.

Table 12-1: Summary of Northshore Mineral Reserves - December 31, 2021
Cleveland-Cliffs Inc. – Northshore Property

Category	Crude Ore Mineral Reserves (MLT)	Crude Ore MagFe (%)	Process Recovery (%)	Wet Pellets (MLT)
Proven	303.2	25.3	30.3	92.0
Probable	519.2	24.1	28.8	149.6
Proven & Probable	**822.4**	**24.6**	**29.4**	**241.6**

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb and has been rounded to the nearest 100,000.
2. Mineral Reserves are reported at a $90/LT wet standard pellet price freight-on-board (FOB) Lake Superior, based on the three-year trailing average of the realized product revenue rate.
3. Mineral Reserves are estimated at a cut-off grade of 19% MagFe or when mineralization concentrates to less than 63.5% Fe (Conc_Fe) or when the Grindability is less than 30.0.
4. Mineral Reserves include global mining dilution of 3% and mining extraction losses of 2% in addition to 33% mining extraction losses for intermediate crude ore.
5. The Mineral Reserve mining strip ratio (waste units to crude ore units) is at 0.8.
6. Mineral Reserves are Probable if not scheduled within the first 20 years.
7. Process recovery is reported as the percent mass recovery to produce two thirds DR-grade wet pellets containing 67% Fe and 2% silica, and one third standard wet pellets containing 65% Fe; shipped pellets average approximately 2.2% moisture.
8. Tonnage estimate is based on actual depletion as of December 31, 2021 from a December 21, 2020 topographic survey.
9. Mineral Reserve tons are as delivered to the primary crusher; pellets are as loaded onto lake freighters at Silver Bay, Minnesota.
10. Classification of Mineral Reserves is in accordance with the S-K 1300 classification system.
1. Mineral Reserves are 100% attributable to Cliffs.
2. Numbers may not add due to rounding.

The pellet price used to perform the evaluation of the Mineral Reserves was based on the mining model three-year trailing average of the realized product revenue rate of US$90/LT wet standard pellet. The saleable product (i.e., DR-grade pellets and standard pellets) mix may vary depending on market considerations and internal requirements. Total saleable product is within the range of 230 MLT (assuming all DR-grade pellets) and 271 MLT (assuming all standard pellets). The costs used in this study represent all mining, processing, transportation, and administrative costs including the loading of pellets into lake freighters at Silver Bay, Minnesota.

SLR is not aware of any risk factors associated with, or changes to, any aspects of the modifying factors such as mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

12.1 Conversion Assumptions, Optimization Parameters, and Methods

Using the mine planning block model for Northshore, pit optimizations and pit designs are conducted to convert the Mineral Resources to Mineral Reserves.

A new mine planning block model was constructed for Northshore in 2020 that forms the basis for the current Mineral Reserve estimate. The mine planning block model is based on the Mineral Resource block model from the June 2020 geologic model (nsm_model_June2020_1.bmf).

Scripts executed within Vulcan add variables for economic evaluation and mine planning, flag in-pit stockpile backfills, flag the current topography, re-block the model to represent the selective mining unit (SMU), incorporate crude ore loss and dilution impacts, and reinforce cut-off grades. Scripts also assign restrictions to blocks outside of the lease areas, inside the areas of facilities, and inside geologic boundaries – assigning blocks as restricted or waste when appropriate. The resulting block models are evaluated using the pit optimization and Chronos scheduling packages in Vulcan.

Iron formation can only be initially considered as "candidate" crude ore if the stratigraphy comprises one of the following geologic subunits (as detailed in section 6.4):

- Intermediate - G, H;
- High Grade - I, J, K; or
- Footwall Group - L, M, N, O; or
- Lower Cherty - LC

At the eastern end of the final pit limits, the following geologic subunits are also considered candidate crude ore: C, D, E, and F. All other geologic subunits are considered to be waste.

Candidate crude ore must then meet the following additional criteria to be considered crude ore blocks:

- Satisfy the metallurgical cut-off grades; in summary, candidate crude ore with MagFe lower than 19%, or a concentrate iron content (Conc_Fe) lower than 63.5%, or a Grindability index lower than 30.0 is considered to be waste.
- Be classified as a Measured or Indicated Mineral Resource; Inferred Mineral Resources are considered to be waste.
- Not occur within a mining restricted area.
- Generate a net block value greater than the cost of the block as if it were mined as waste.

The mine planning block model is based on 50 ft by 50 ft by 22.5 ft blocks and represents the SMU in relation to cut-off grade and subsequent mining dilution. Where the interpretation of the mineralized rock intersects a block model block centroid, the block within the mineralized shape is recorded. Thus, the flagging of crude ore type in the block model is based on the block centroid.

The current mining methodology along F (waste) and G (crude ore) contact is to mine 200 ft-wide blast patterns that are 20 ft deep. In the pit, the contact of waste and crude ore is clearly visible, so minimal mining dilution is expected along the contact. A base 3% crude ore loss and 2% mining dilution are added to all scheduled mining blocks to account for the contact dilution and any internal mining dilution. For the Intermediate crude ore, an additional ore loss of 33% is factored into the LOM plan. This is based on 10 years of reconciliation from 2010 through 2019 that indicates an approximate 36% Intermediate crude ore loss.

Northshore has a long history of plant recovery data, and empirical relationships are understood for the calculation of pellet production based on crude ore tons, MagFe, Conc_Fe, crude ore hardness (i.e., Grindability), and the amount of High Grade crude ore from subunits I, J, or KA new equation was implemented for the 2020 LOM plan in order to calculate crude ore to pellet for the new product mix that includes approximately two thirds of DR-grade pellets (SLR notes that, prior to this, Northshore only produced standard pellets).

Recovery for DR-grade product is defined by:

DR-grade Recovery (dry LT) = ((MagFe – 4)/24.5 * 0.22272

Recovery for standard grade product is defined by:

STD Recovery (dry LT) = ((MagFe – 4)/24.5) * 0.12077

Recovery for DR-grade and standard grade net product mix used is defined by:

NET Recovery (dry LT) = ((MagFe – 4)/24.5) * 0.34349

Total pellets for the LOM plan are then calculated by:

Dry Pellets (dry LT) – Crude Ore * Net Recovery

Reconciliation of the new recovery equations will begin with the completion of the 2021 mining year. Historical reconciliation is not relevant due to the plant flowsheet changes and the changes to the product mix.

All Measured and Indicated Mineral Resources within the final designed pit that meet the above criteria are converted into Mineral Reserves.The only additional criteria for Measured Mineral Resources converting into Proven Mineral Reserves is that they must be scheduled within the first 20 years of the mine life prior to depletion. Table 12-2 shows the criteria to convert Mineral Resource classifications to Mineral Reserve classifications.

Table 12-2: Mineral Resource to Mineral Reserve Classification Criteria
Cleveland-Cliffs Inc. – Northshore Property

Mineral Resources	Criteria for Conversion	Mineral Reserves
Measured	Scheduled Within the First 20 Years	Proven
Measured	Scheduled After 20 Years	Probable
Indicated	As Scheduled	Probable
Inferred	As Scheduled	Waste

12.2 Previous Mineral Reserve Estimates by Cliffs

The first computer-generated block model for Northshore was built internally by Reserve Mining Company in 1984.Cliffs has periodically updated crude ore Mineral Reserve estimates since its acquisition of the Property in 1994. The SEC-reported Mineral Reserves for the past six LOM updates are shown in Table 12-3. These Mineral Reserves were not prepared under the recently adopted SEC guidelines; however, they followed SEC Guide 7 requirements for public reporting of Mineral Reserves in the United States.

The most recent prior update to the LOM plan and Mineral Reserves was in 2018; the Mineral Reserves in Cliffs' 10-K filings have been updated net of depletion since.

Table 12-3: Previous Cliffs Mineral Reserves
Cleveland-Cliffs Inc. – Northshore Property

	Proven & Probable Crude Ore (MLT)	Process Recovery (%)	Dry Standard Pellets (MLT)
2018(1)	866.3	29.0	250.8
2015(2)	829.8	31.9	264.4
2012(3)	1,075.0	33.9	364.4
2009(4)	1,012.1	31.6	320.2
2007(5)	1,013.9	31.4	318.0
2004(6)	1,015.1	31.7	321.5
2002(7)	1,097.0	30.9	339.0

Notes:

1. As of October 24, 2018
2. As of January 1, 2015; Source: Cliffs_MMMR_TR_NSM_2015
3. As of April 14, 2012; dry; Source: NSM Reserve Estimate 2012
4. As of January 1, 2009; Source: NSM Reserve Estimate 2009
5. As of January 1, 2006; Source: NSM Reserve Estimate 2007
6. As of July 1, 2003; Source: NSM Reserve Estimate 2004
7. As of October 1, 2002; Source: NSM Reserve Estimate 2002

12.3 Pit Optimization

Pit optimizations were carried out for Northshore in Vulcan using the current mine planning block model. Inputs used for the optimization are derived from actual production metrics and first principles estimation for the LOM forecast.

12.3.1 Summary of Pit Optimization Parameters

The pit optimization parameters are summarized as follows:

- Base case product average price = $90/LT wet standard pellets (based on the mine planning model's three-year trailing average of the realized product revenue rate of US$90.42/LT wet standard pellet).
- Crude ore mining cost = $3.22/LT crude ore.
- *In situ* waste mining cost = $2.35/LT mined.
- Unconsolidated waste mining cost = $2.00/LT mined.
- Crude ore haul distance incremental cost = $0.15/LT every 2,000 ft from crusher.
- Crushing and concentrating costs = $7.65/LT crude ore.
- Pelletizing and general cost = $26.36/LT dry pellet.
- Sustaining capital = $3.50/LT dry pellet.
- Maximum overall pit slope angle = 41° for all material.
- Pit restriction = mining lease boundary (the permit to mine boundary is the same as or greater than the mining lease boundary).

12.3.2 Pit Optimization Results and Analysis

Pit optimization results are used as a guide for pit and stockpile designs. Pit optimizations were run by varying the base case product price with a block revenue factor. The risk profile and revenue-generating potential of the deposit is evaluated based on the relationship between crude ore and waste rock and the associated relative discounted cash flows generated at each incremental pit (a discount rate of 10% utilized for the optimization analysis).

The optimization results are summarized in Table 12-4, showing the pit shell results from a price range of $66.60/LT to $99.00/LT of wet standard pellets. Pit shell 15 was chosen for the Mineral Reserve final pit design, which is based on a wet standard pellet price of $79.20/LT.

Table 12-4: Pit Optimization Results
Cleveland-Cliffs Inc. – Northshore Property

Pit Shell	Revenue Factor	Product Price ($/LT wet pellets)	Crude Ore (MLT)	Stripping (MLT)	Total Tons (MLT)	Strip Ratio	Process Recovery (%)	Dry Total Pellets (MLT)
1	0.74	66.60	73	5	78	0.1	32.5	24
2	0.75	67.50	97	8	105	0.1	32.0	31
3	0.76	68.40	125	12	138	0.1	31.5	39
4	0.77	69.30	163	21	184	0.1	31.1	51
5	0.78	70.20	211	35	246	0.2	30.7	65
6	0.79	71.10	275	55	330	0.2	30.2	83
7	0.80	72.00	337	83	420	0.2	30.0	101
8	0.81	72.90	384	102	485	0.3	29.7	114
9	0.82	73.80	451	139	590	0.3	29.5	133
10	0.83	74.70	535	213	748	0.4	29.4	157
11	0.84	75.60	602	272	873	0.5	29.3	176
12	0.85	76.50	658	316	974	0.5	29.2	192
13	0.86	77.40	724	377	1,101	0.5	29.0	210
14	0.87	78.30	809	474	1,283	0.6	29.0	234
15	**0.88**	**79.20**	**880**	**566**	**1,446**	**0.6**	**28.9**	**254**
16	0.89	80.10	931	631	1,561	0.7	28.8	268
17	0.90	81.00	961	671	1,632	0.7	28.8	277
18	0.91	81.90	989	712	1,702	0.7	28.7	284
19	0.92	82.80	1,021	768	1,789	0.8	28.7	293
20	0.93	83.70	1,029	782	1,812	0.8	28.7	296
21	0.94	84.60	1,041	799	1,840	0.8	28.7	299
22	0.95	85.50	1,048	812	1,860	0.8	28.7	301
23	0.96	86.40	1,055	826	1,881	0.8	28.7	302

Pit Shell	Revenue Factor	Product Price ($/LT wet pellets)	Crude Ore (MLT)	Stripping (MLT)	Total Tons (MLT)	Strip Ratio	Process Recovery (%)	Dry Total Pellets (MLT)
24	0.97	87.30	1,060	836	1,896	0.8	28.7	304
25	0.98	88.20	1,063	842	1,905	0.8	28.7	305
26	0.99	89.10	1,068	854	1,923	0.8	28.7	306
27	1.00	90.00	1,072	863	1,935	0.8	28.6	307
28	1.01	90.90	1,076	871	1,947	0.8	28.6	308
29	1.02	91.80	1,078	876	1,953	0.8	28.6	309
30	1.03	92.70	1,079	880	1,959	0.8	28.6	309
31	1.04	93.60	1,080	883	1,963	0.8	28.6	309
32	1.05	94.50	1,081	886	1,968	0.8	28.6	310
33	1.06	95.40	1,083	893	1,976	0.8	28.6	310
34	1.07	96.30	1,086	901	1,987	0.8	28.6	311
35	1.08	97.20	1,087	903	1,990	0.8	28.6	311
36	1.09	98.10	1,087	905	1,992	0.8	28.6	311
37	1.10	99.00	1,087	906	1,993	0.8	28.6	311

Note. Numbers may not add due to rounding.

The optimization pit-by-pit graph (Figure 12-1) presents tonnages and relative discounted cash flow results, along with the selected final pit shell highlighted (revenue factor of 0.88).

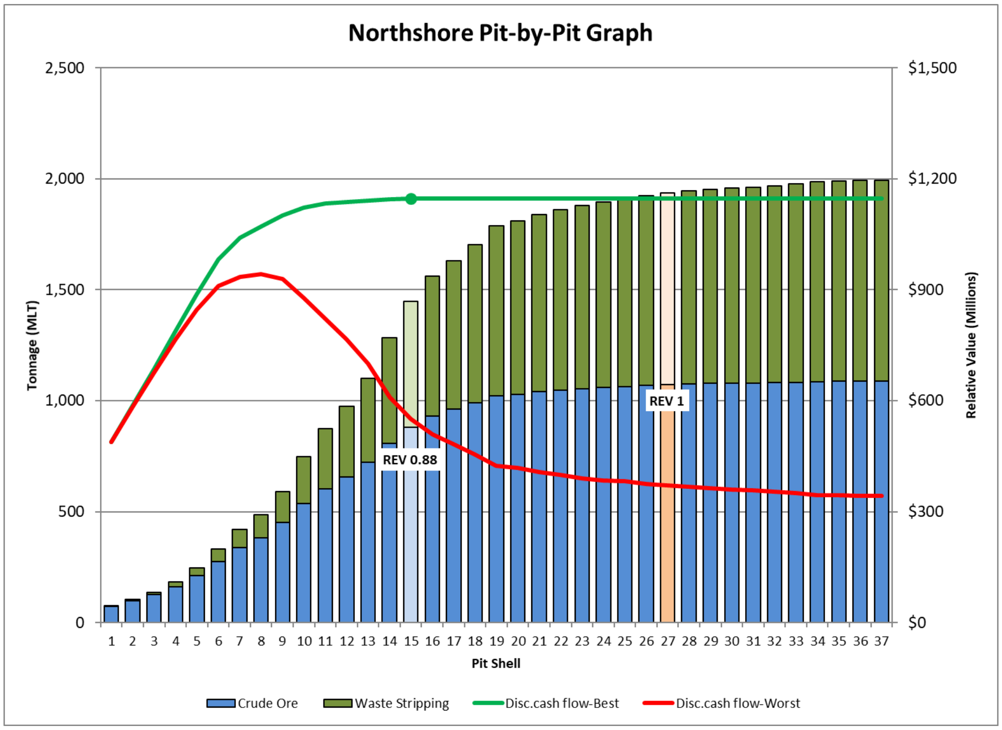


Figure 12-1: Pit Optimization Pit-by-Pit Graph

As observed in Figure 12-1, at higher product prices there is limited opportunity for increased Mineral Reserves.This is because the overall pit size is being restricted by the mining lease boundary, which is limiting further advance of the pit highwall to the south.

12.4 Mineral Reserve Cut-off Grade

The Mineral Reserve cut-off grade is a combination of metallurgical constraints applied in order to produce a saleable product followed by verification through a break-even cut-off grade calculation, as described in section 11.8.1. The Mineral Reserve cut-off requirements for candidate crude ore are a minimum of 19% MagFe, 63.5% Conc_Fe, or Grindability index of 30.0.

12.5 Mine Design

The Northshore final pit design incorporates several design variables including geotechnical parameters (e.g., wall angles and bench configurations), equipment size requirements (e.g., mining height and ramp configuration), and physical mining limits (e.g., property boundaries and existing infrastructure). The following summarizes the design variables and final pit results; more detail is provided in the preceding subsections and in Section 13.0.

The final highwall pit slope is designed at an inter-ramp angle (IRA) of 41°.The bench design consists of 45 ft-high mining benches with a 65° bench face angle (BFA) and alternating 10 ft and 50 ft catch benches (CB). In general, haulage access ramps are developed along the pit footwall slope, which is at less than 8% for the majority of the mining areas.

There are multiple physical mining limits that are applied to the pit optimization and/or the mine plan:

- There is a 600 ft restriction that limits the distance of blasting near the primary crusher.
- The Duluth Gabbro overlies the Biwabik IF in the vicinity of Northshore. The Duluth Gabbro is known to contain elevated levels of sulfide mineralization in some areas. Elevated levels of sulfide minerals in rock present the potential for acid rock drainage and metals leaching when the rock is blasted and stockpiled. Current permits with the MDNR and the Minnesota Pollution Control Agency (MPCA) prohibit the mining and stockpiling of Duluth Gabbro rock by NSM. As a result, a mining limit in the model restricts mining of the Duluth Gabbro.
- Mining limits for crude ore are restricted to within the Northshore-controlled mining leases and owned mineral lands and within the existing Permit to Mine (SLR notes the Permit to Mine boundary limit is shared with or greater in extent than the mineral lease boundary). These leases are with the Mesabi Trust, the State of Minnesota, and Philips-Conoco (formerly Burlington Northern). The Mesabi Trust lease includes the Peters Lease and the Cloquet Lease.

Of additional consideration is the allowance for trespass stripping, which is common among other mines on the Mesabi Range. Trespass stripping allows for mining of waste rock outside of Northshore's current mineral leases (provided it is still within the Permit to Mine boundary), to expose crude ore to the mineral lease boundary.

The selected final pit shell compared to the final pit design is detailed in Table 12-5 and shown in Figure 12-2 along with the physical mining limits. Pit design results are reported prior to depletion, to be consistent with the pit optimization results.

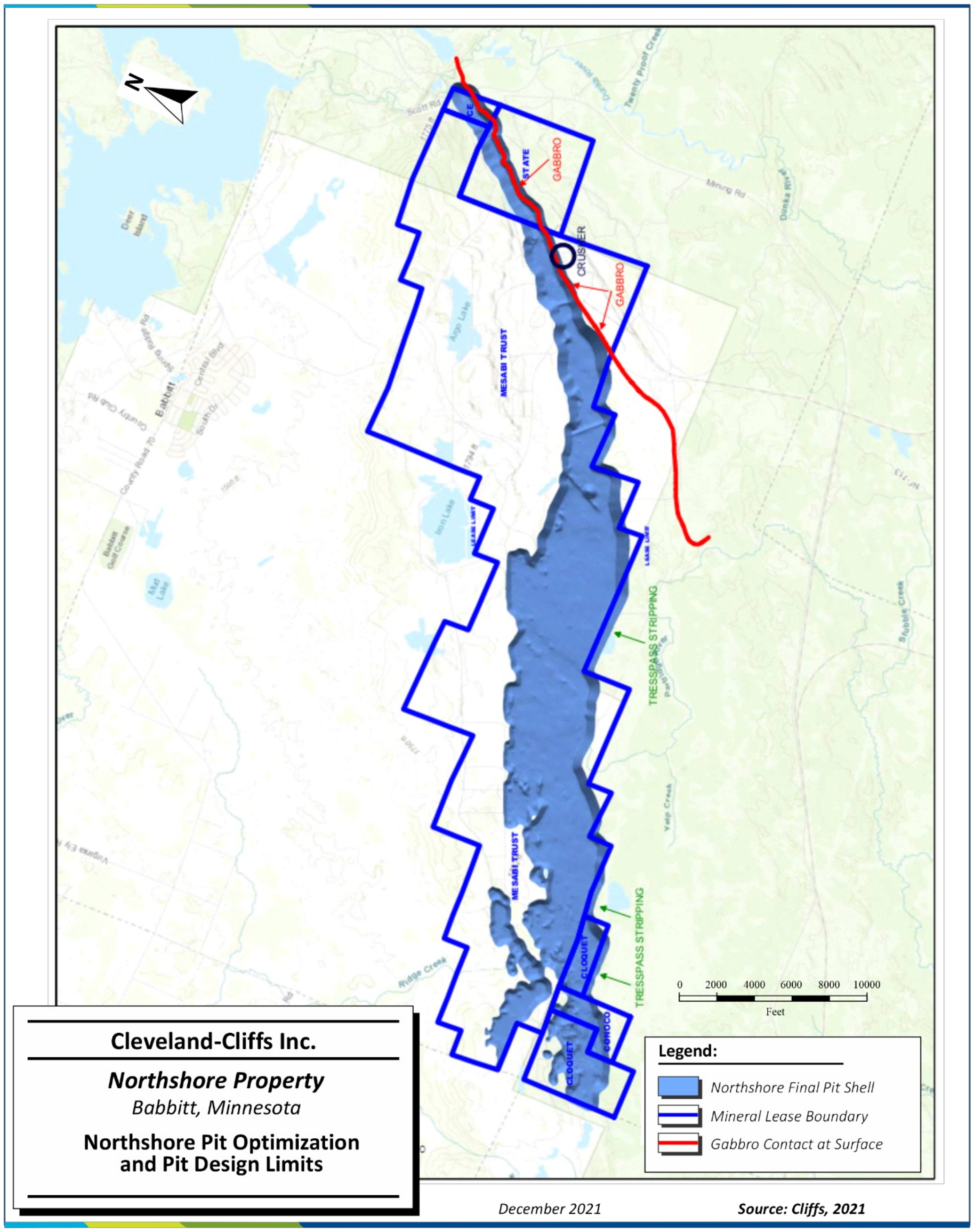
Table 12-5: Pit Optimization to Pit Design Comparison
Cleveland-Cliffs Inc. – Northshore Property

	Crude Ore (MLT)	Crude Ore MagFe (%)	Stripping (MLT)	Total Material (MLT)	Strip Ratio
Pit Optimization	880	24.6	566	1,446	0.6
Pit Design	848	24.6	649	1,497	0.8

Notes:

1. Comparison totals are per the mine planning model prior to depletion.
2. Numbers may not add due to rounding.

With consideration of the mining physical limits noted above applied to the final pit design, the results of the final pit design are a reasonable representation of the final pit shell guide.



Cleveland-Cliffs Inc.

Northshore Property

Babbitt, Minnesota

Northshore Pit Optimization and Pit Design Limits

December 2021

Source: Cliffs, 2021

Figure 12-2: Northshore Pit Optimization and Pit Design Limits

13.0 MINING METHODS

13.1 Mining Methods Overview

The Northshore deposit is mined using conventional surface mining methods. The surface operations include:

- Overburden (glacial till) removal
- Drilling and blasting (excluding overburden)
- Loading and haulage
- Crushing and rail loading

The Mineral Reserve is based on the ongoing annual crude ore production of 16 MLT to 18 MLT producing a total of approximately 5.1 MLT of wet pellets for domestic consumption.

Mining and processing operations are scheduled 24 hours per day, and the mine production is scheduled to directly feed the processing operations.

The current LOM plan has mining scheduled for 48 years and mines the known Mineral Reserve. The average strip ratio is approximately 0.8 waste units to 1 crude ore unit (0.8 strip ratio).

The final Northshore pit is a single pit approximately 10.5 mi along strike, up to 1.2 mi wide, and up to 420 ft deep.

The Mine's operation has a strict crude ore blending requirement to ensure the Plant receives a uniform head grade. The most important blending characteristics of the crude ore are the MagFe, Conc_Fe, and ore hardness (i.e., Grindability). Generally, three crude ore loading points from different subunit groupings (i.e., the Intermediate, High Grade, Footwall Group, and Lower Cherty subunit groupings) are mined at one time to obtain the best blend for the Plant.

Crude ore is hauled to the crushing facility and either direct tipped to the primary crusher or stockpiled in an area adjacent to the primary crusher. Haul trucks are alternated to blend delivery from the multiple crude ore loading points. The crude ore stockpiles are used as an additional source for blending and production efficiency. Crushed crude ore is conveyed to a silo, where it is loaded into 85-ton rail cars for transport to the Plant located 47 mi southeast of the Mine at Silver Bay, Minnesota. Waste rock is hauled to one of the many waste stockpiles within and around the pit.

The major pieces of pit equipment include electric drills, electric rope shovels, haul trucks, front-end loaders (FELs), bulldozers, and graders. Extensive maintenance facilities are available at the mine site to service the mine equipment.

13.2 Pit Geotechnical

13.2.1 Overview

The Northshore final pit is relatively shallow and, structurally, the *in situ* crude ore and rock is of good quality. In 2019, SRK conducted a geotechnical study to assess the global stability of the final pit wall configuration (SRK, 2019). The following paragraphs are key excerpts from the SRK report:

- SRK considers the slopes at Northshore to be properly designed and rock fall hazards to be sufficiently managed in active mining areas.

- The mining practices and slope conditions observed at the site demonstrate that safety and geotechnical stability are integral to the mine plan.

SLR has reviewed the pit photographs in the SRK report and concurs with SRK's overall observations. Although there are signs that some operational practices around scaling could be improved on site with instances of loose material on the bench faces, there is no evidence of geotechnical instability that would prevent development of the final pit design.

Final wall slopes are at 41°, effectively the IRA, where there are no haul ramps in the final walls.The bench height (BH) is 45 ft with alternating CBs of 50 ft and 10 ft widths.

Haulage ramps are incorporated into the pit highwalls and footwalls. Ramp width is sized at 150 ft, which can safely support two-way traffic of the 240 ton-payload mining trucks.

The maximum pit depth and vertical highwall exposure is at approximately 420 ft. Geotechnical parameters incorporated into the Northshore pit design are summarized in Table 13-1 and Figure 13-1.

Table 13-1: Pit Design Geotechnical Parameters
Cleveland-Cliffs Inc. – Northshore Property

Parameter	Unit	Final Wall
IRA	Degrees	41
BFA	Degrees	65
BH	ft	45
CB - Primary	ft	50
CB - Secondary	ft	10
Ramp Width - 2 way	ft	150
Ramp Gradient (Steepest)	%	8

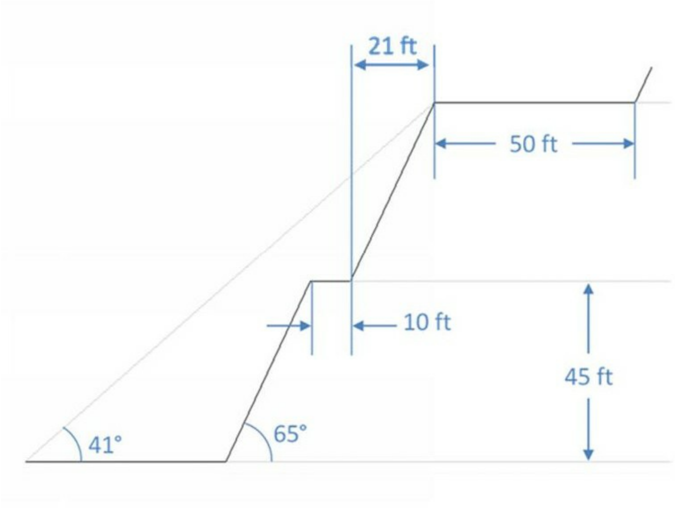


Figure 13-1: Northshore Final Pit Wall Geometry Example

13.2.2 Geotechnical Data

The geotechnical data summary is based on the description from SRK, 2019. Data contained in the Northshore geotechnical database is summarized in Table 13-2.

Table 13-2: Summary of Geotechnical Data
Cleveland-Cliffs Inc. - Northshore Property

Data Type	Sandvik (July 2012)	Barr Eng. (Dec 2012)	Northshore Drilling (June 2019)	Total
Core Recovery & RQD	-	-	37,999ft, 159 drill holes	37,999ft, 159 drill holes
Uniaxial Compressive Strength (UCS) Test	15	15	-	30
Brazilian Tensile Strength (BTS) Test	15	15	-	30
Dynamic Elastic Constant Tests	15	-	-	15
Direct Shear Tests on natural joints	-	3	-	3

SRK recognized that the overall rock mass is typically governed by the frequency, orientation, and frictional strength of the fractures in the rock mass and that the data for these is limited for Northshore.

13.2.3 Material Strength Parameters

The Rock Mass Rating (RMR) system (Bieniawski, 1989) was used for rock mass characterization and estimation of the strength of the rock mass. Rating values were assigned as ranges to provide upper and lower values of RMR as presented in Table 13-3.

Table 13-3: Rock Mass Characterization Using the RMR System Bieniawski, 1989
Cleveland-Cliffs Inc. - Northshore Property

	Low Value	High Value	RMR Rating Low	RMR Rating High
UCS, MPa	100	250+	12	15
RQD, %	53%	73%	9	13
Joint Spacing, m	0.1	0.25	9	11
Joint Condition	Continuous, planar, not highly weathered		19	26
Groundwater	Wet	Damp	7	11
TOTAL RMR'89*			**55**	**75**

*RMR was calculated by spreadsheet. Rating summation in the table do not appear to equate due to rounding of decimal points.

The Geological Strength Index (GSI, Hoek et al., 1992) was used as an alternative method of rock mass classification as it can be input directly into the Hoek-Brown shear strength criterion used for stability analysis. Ratings are based on fracture spacing and joint condition from estimates in the field. GSI ratings for Northshore were estimated between 53 to 78.

Hoek-Brown strength parameters were determined for the Slaty and Cherty rocks using lower bound UCS values and lower GSI values (Table 13-4). Mohr-coulomb strength parameters were estimated for the overburden, dump/fill, and the floor rocks (Table 13-5).

Table 13-4: Hoek-Brown Strength Parameters Used for Stability Modelling
Cleveland-Cliffs Inc. - Northshore Property

Unit	Density (kg/m^3)	GSI	UCS (MPa)	mb	s	a
Slaty	2.70	45	60	1.403	0.002	0.508
Cherty	3.45	53	100	3.173	0.005	0.505

Table 13-5: Mohr-Coulomb Strength Parameters Used for Stability Modelling
Cleveland-Cliffs Inc. - Northshore Property

Material	Density (kg/m^3)	Friction Angle (°)	Cohesion (MPa)
Overburden	2.34	30	0.20
Fill/Dump	2.60	32	0.05
Floor Rock	2.60	35	1.50

13.2.4 Hydrogeology and Pit Water Management

Surface water is abundant as the Mine site is surrounded by natural lakes and wetlands. Water is known to be present within the rock mass; however, inflow of water from the pit walls has not been a significant issue to operations.

Hydrogeological modeling has not been undertaken for the purposes of slope stability analysis. Rather, an apparent worst-case scenario was assumed based on field observations, where the piezometric surface was modeled close to behind the slope face. SLR considers this to be appropriate considering a lack of an alternative model.

Historically, in-pit dewatering activities have averaged 3.4 billion gallons per year with a permitted maximum of 5.5 billion gallons per year.

The maximum in-pit dewatering discharge rate permitted under the current National Pollutant Discharge Elimination System (NPDES) is 51.8 million gallons per day. The individual discharge outfall limits are 15.8, 17.3, and 18.7 million gallons per day at the B101, B104 and B105 combined, and B109 discharge outfalls respectively.

As detailed in section 15.9, the operation is in a net-positive water environment, and there is ample water available to meet the operations demand. Water used for dust control on roads comes from pit sumps.

13.2.5 Stability Assessment

SRK carried out 2D limit-equilibrium analysis on one section cut through the southern highwall of the ultimate Northshore pit (SRK, 2019)The section was chosen for being one of the highest slopes at 380 ft, with a 65 ft-high stockpile at the crest. Groundwater was included in stability analysis as a worse case, near-saturated condition, providing a conservative analysis result with respect to groundwater. Rock mass disturbance due to blasting does not appear to be considered; however, if it were, this would have the effect of lowering the rock mass strength. The resultant Factor of Safety (FoS) of 4.0 is well in excess of the acceptance criteria given of 1.3.

13.3 Open Pit Design

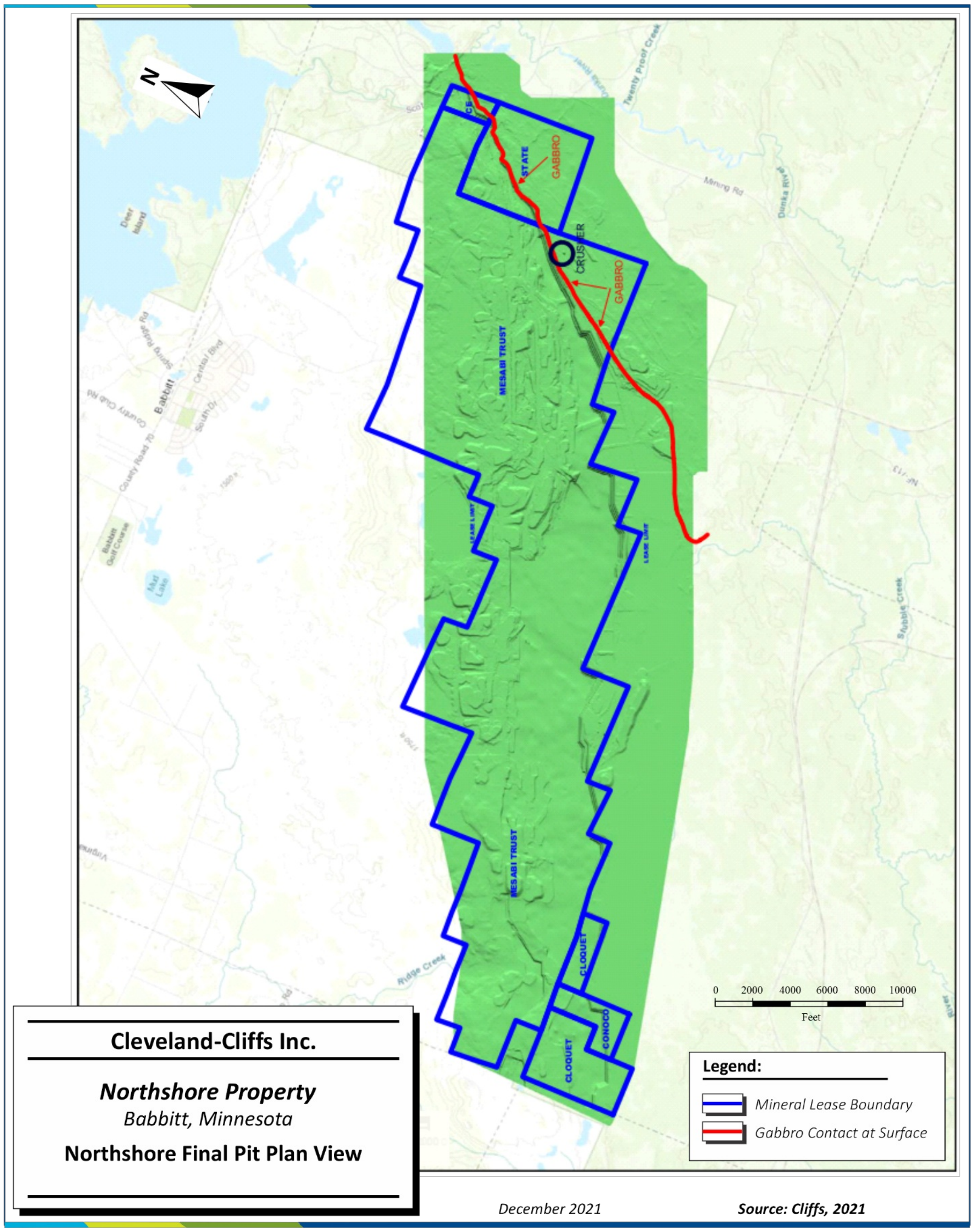
The Northshore pit design combines current site access, mining width requirements, geotechnical parameters, pit optimization results, and hard mining limits as described previously in Sections 12.0 and 13.0.

Table 13-6 summarizes the contents of the final pit design depleted to December 31, 2021. Figure 13-2 presents a plan view of the final pit design (waste rock stockpiles are not shown as they include in-pit backfills, which would obscure the final pit design view). Figure 13-3 presents an example cross-section through the final pit.

Table 13-6: Final Pit Design LOM Total, December 31, 2021
Cleveland-Cliffs Inc. – Northshore Property

Pit	Crude Ore (MLT)	Crude Ore MagFe (%)	Waste Rock Stripping (MLT)	Overburden Stripping (MLT)	Total Stripping (MLT)	Total Material (MLT)	Strip Ratio
Northshore	822.4	24.6	582.9	50.8	633.7	1,456.2	0.8

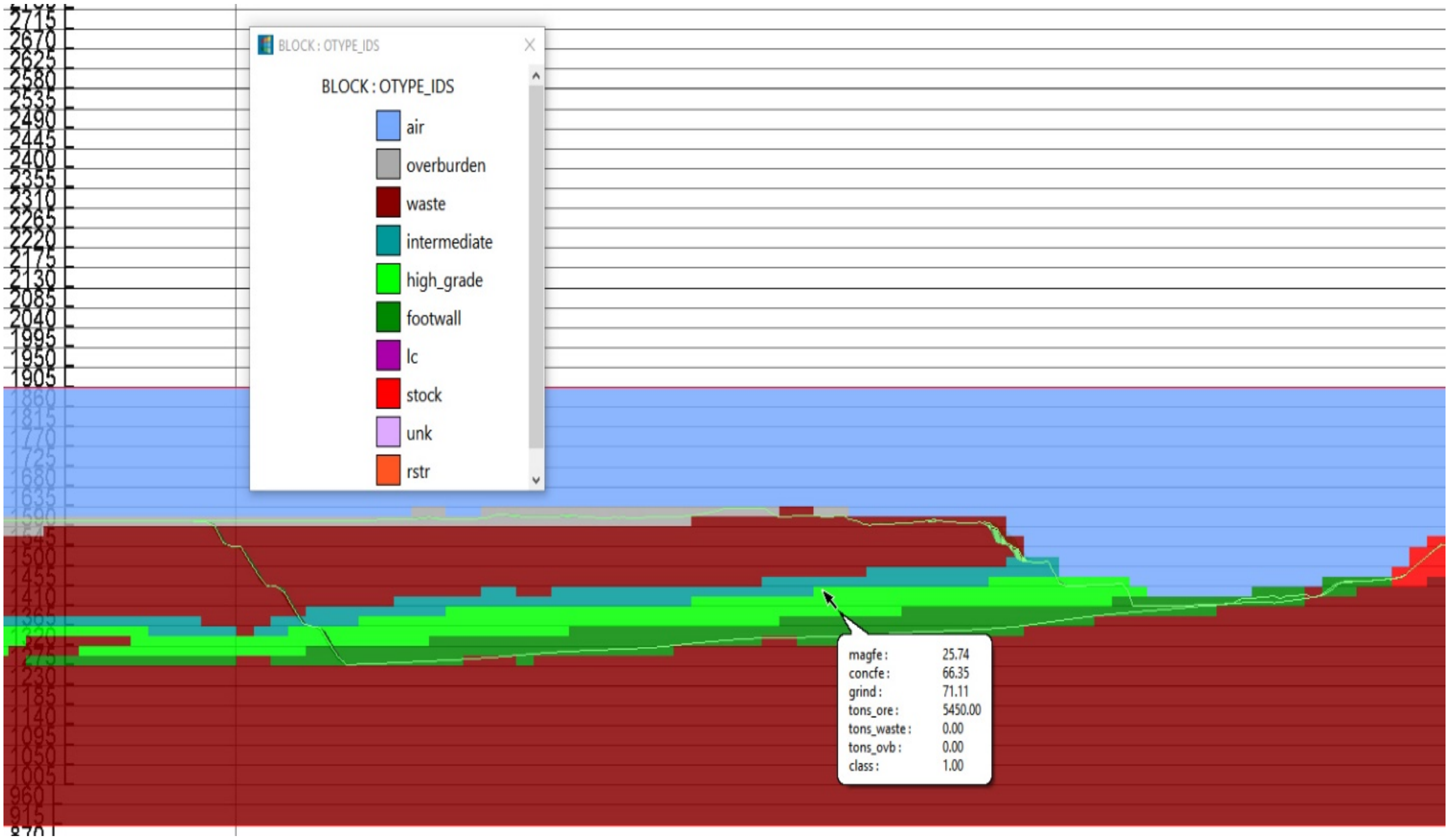
Note. Numbers may not add due to rounding.



December 2021

Source: Cliffs, 2021

Figure 13-2: Northshore Final Pit Plan View



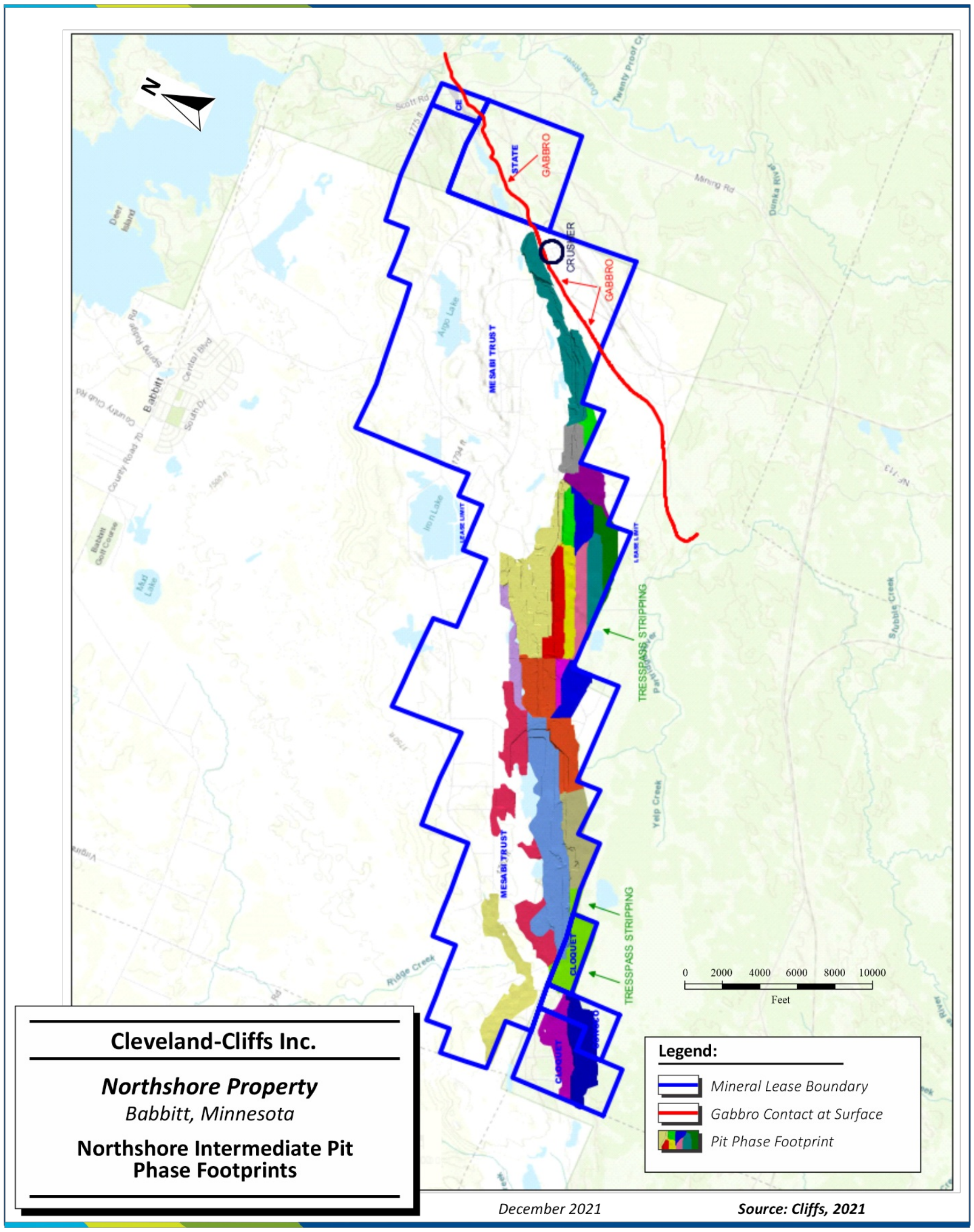
magfe : 25.74
concfe : 66.35
grind : 71.11
tons_ore : 5450.00
tons_waste : 0.00
tons_ovb : 0.00
class : 1.00

Figure 13-3: Example Final Pit Cross-section Looking Southwest

13.3.1 Pit Phase Design

Intermediate pit phase designs or pushbacks are included in the LOM planning. The main purpose for phased designs is to balance waste stripping and haulage profiles over the LOM and ensure haulage access is maintained while developing the pit. Pit optimization results at lower revenue factors are used to help guide the phase development.

Phase designs for the deposit are largely based on the effective mining width of 200 ft, a minimum BH of 20 ft to allow for increased mining selectivity at the ore-waste contact, and access to the Mineral Reserves. The same bench design parameters used in the final pit design are incorporated into the phase pit designs. Figure 13-4 shows the location of the phases within the mining area, where the surface footprint of each phase is represented by a different color.



December 2021

Source: Cliffs, 2021

Figure 13-4: Northshore Intermediate Pit Phase Footprints

13.4 Production Schedule

13.4.1 Clearing

Before mining operations commence in new undeveloped areas, it is necessary to remove any overburden material. The primary clearing and grubbing equipment includes bulldozers, hydraulic shovels, FELs, and trucks.This equipment has been successfully deployed in historical overburden clearing operations at Northshore.

13.4.2 Grade Control

As described in Section 6.0, the geology is well known with four simplified crude ore types identified at Northshore: Intermediate, High Grade, Footwall Group, and Lower Cherty. Northshore uses the resource block model and geologic subunit contact grids as tools for grade control along with the visual differences between waste and crude ore in the pit. Due to the continuity and relative stability of the subunits, these methods have proven to reconcile with the plant and resource model.

A primary loading unit is generally active in each crude ore type at all times to maintain a consistent blend for the Plant. Operationally, blending is done on a shift-by-shift basis. The dispatcher is given instructions each shift for the percentage of truck loads from each loading position. The dispatcher monitors the blend percentages and the MagFe using data from a magnetic coil located on the secondary crusher discharge belt and adjusts the loads and source of the loads as the shift progresses. Mixing of the crude ore delivered to the crushing facility takes place in the crushers, the train loading bin, and in the loading and dumping of rail cars. If the crushing facility is down for maintenance, then the loads are stockpiled on the ground in surge piles near the crusher and picked up later and crushed.

13.4.3 Production Schedule

The basis of the production schedule is to:

- Produce a total of approximately 5.1 MLT/y of wet pellets for the LOM:
    - This production rate was selected as it represents maintaining the current production assumption throughout the LOM;
    - At least 90% of the crude ore used in pellet production must be mined from Mesabi Trust lands (for the first 6.0 MLT of pellets per year).
- Preserve blending of the crude ore types for as long as possible.
- Limit total mined tons per period at approximately 32 MLT to balance the mine fleet utilization.

The production schedule is planned yearly throughout the LOM. Scheduling is by mining blocks within the pit phases, with mining blocks sized at approximately 1 MLT per block during the first 20 years of the production schedule, and larger mining blocks (up to 30 MLT) for the remainder of the production schedule.

Table 13-7 presents the LOM mine production schedule for Northshore.

Table 13-7: LOM Mine Production Schedule
Cleveland-Cliffs Inc. – Northshore Property

Year	Crude Ore (MLT)	Crude Ore MagFe (%)	Stripping (MLT)	Total Tons (MLT)	Strip Ratio	Process Recovery (%)	Wet Pellets (MLT)
2022	17.3	25.2	9.5	26.8	0.6	30.4%	5.3
2023	16.6	25.6	12.9	29.5	0.8	30.9%	5.1
2024	16.9	25.0	12.6	29.5	0.7	30.1%	5.1
2025	16.9	25.0	12.6	29.5	0.8	30.1%	5.1
2026	16.6	25.6	12.9	29.5	0.8	30.9%	5.1
2027	16.4	25.6	14.6	31.0	0.9	30.9%	5.1
2028	16.7	25.6	13.1	29.8	0.8	30.9%	5.2
2029	17.1	25.0	12.4	29.5	0.7	30.1%	5.1
2030 - 2034	82.8	25.4	64.9	147.7	0.8	30.7	25.4
2035 - 2039	83.8	25.3	65.2	149.0	0.8	30.5	25.5
2040 - 2044	85.6	24.6	78.9	164.5	0.9	29.6	25.3
2045 - 2049	86.2	24.7	76.4	162.6	0.9	29.7	25.5
2050 - 2054	87.7	24.1	79.3	167.0	0.9	28.8	25.3
2055 - 2059	88.1	24.0	74.9	163.0	0.9	28.7	25.2
2060 - 2064	87.9	23.9	57.2	145.1	0.7	28.5	25.1
2065 - 2069	85.8	23.3	36.4	122.2	0.4	26.9	23.2
TOTAL	**822.4**	**24.6**	**633.7**	**1,456.2**	**0.8**	**29.4**	**241.6**

Note. Numbers may not add due to rounding.

Recent past production (2015 to current) and LOM planned production for Northshore is summarized graphically in Figure 13-5.

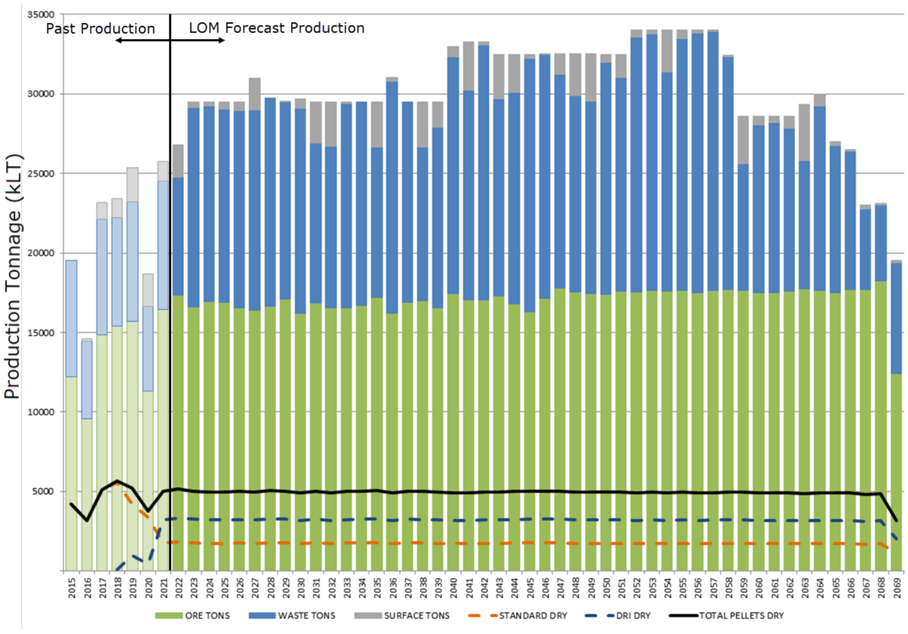


Figure 13-5: Past and Forecast LOM Production

13.5 Overburden and Waste Rock Stockpiles

Overburden and waste-rock material is stockpiled in designated stockpile areas based on where it was mined from and material type.

Northshore meets requirements for stockpiling of waste rock and overburden as required by the MDNR Reclamation Rules (6130.24 and 6130.27).

Waste rock is non-mineralized material or mineralized iron formation material that does not meet the cut-off grade criteria as designated on a per blast basis and is stockpiled in appropriately designated areas. The majority of waste rock is stockpiled within the final pit outline in mined-out areas on the north side of the pit (i.e., the final pit footwall). Stockpiling to the south of the pit is avoided where possible to prevent encumbrance of future potential Mineral Resources lying down-dip of the current pit.

The LOM plan includes a relatively small quantity of Type II Virginia Formation (VF) waste rockVF waste rock is identified for special handling and is stockpiled in contained areas within the final pit outline, as described in Section 17.0.

Overburden stockpiles are designed to the south and outside of the final pit outline to take advantage of shorter hauls. The stockpile designs follow MDNR Reclamation rules for a maximum slope of 2.5 horizontal to 1 vertical after final sloping.

The overburden and waste rock stockpile design parameters are detailed in Table 13-8.

Table 13-8: Stockpile Parameters
Cleveland-Cliffs Inc. – Northshore Property

Parameter	Unit	Waste Rock	Overburden
Overall Slope Angle	degrees	23	19
Batter Angle	degrees	36	36
Bench Height	ft	30	40
Berm Width	ft	30	75
Ramp Width - 2 way	ft	120	120
Ramp Width - 1 way	ft	70	70
Ramp Gradient	%	8	8

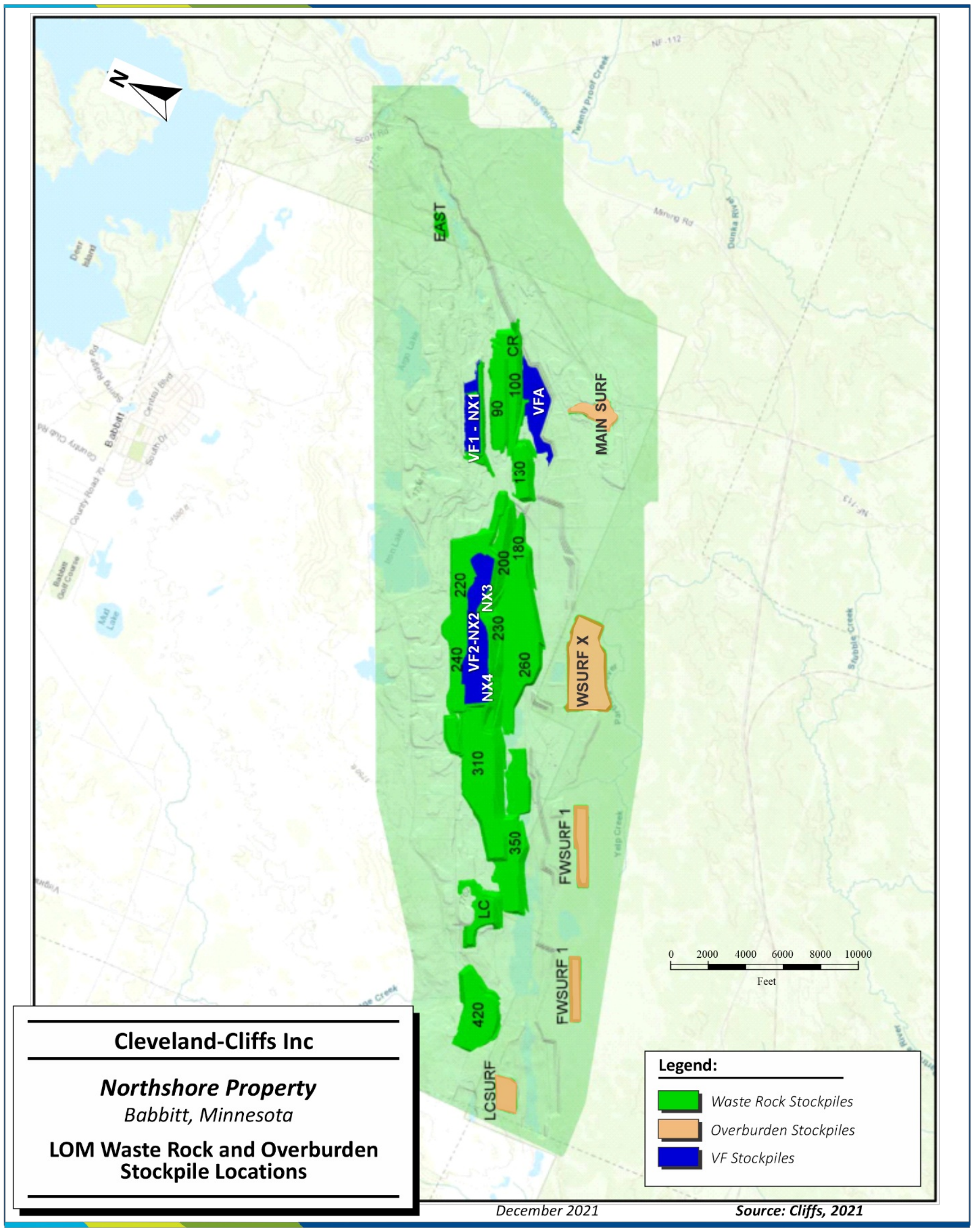
Waste rock and overburden stockpiles were designed and 3D solids were generated to calculate the volume of the stockpiles. Swell factors of 35% for waste rock and 10% for overburden were used to calculate the annual stockpile volume requirement.

Table 13-9 summarizes the volume and capacity for all stockpiles at Northshore along with the LOM stripping quantities based on the current mine planning model (i.e., prior to depletion).

Table 13-9: Waste Rock and Overburden Stockpile Capacities
Cleveland-Cliffs Inc. – Northshore Property

Area	Volume (million ft^3)	Stockpile Capacity (MLT)
WASTE ROCK STOCKPILES		
Design Capacity	10,032	618
LOM Plan Waste Rock		586
OVERBURDEN STOCKPILES		
Design Capacity	1,152	56
LOM Plan Overburden		51

SLR notes that there is sufficient overburden and waste rock stockpile capacity included in the LOM plan.In particular, there is approximately 68 MLT of VF waste rock identified in the LOM plan, while the waste rock stockpiles design capacity considers for up to 82 MLT of VF waste rockFigure 13-6 shows the stockpile designs along with the final pit limits.



December 2021

Source: Cliffs, 2021

Figure 13-6: LOM Waste Rock and Overburden Stockpile Locations

In 2018, Golder Associates Inc. (Golder, 2018) assessed the current stockpiles using guidelines published by Hawley and Cunning (2017) to classify the instability hazard as either very low, low, moderate, high, or very high. All Northshore in-pit stockpiles were classified as being a low instability hazard, while two stockpiles located outside of the pit were rated as moderate (Shaigetz and Cunning, 2019).

13.6 Mining Fleet

The primary mine equipment fleet consists of electric drills, electric cable shovels, and off-road dump trucks. In addition to the primary equipment, there are FELs, bulldozers, graders, water trucks, and backhoes for mining support.Additional equipment is on site for non-productive mining fleet tasks. The current fleet is to be maintained with replacement units as the current equipment reaches its maximum operating hours.

Table 13-10 presents the existing fleet (2022) and planned average major fleet requirements estimated to achieve the LOM plan.

Table 13-10: Major Mining Equipment
Cleveland-Cliffs Inc. – Northshore Property

Year	Drills	Shovels	Trucks	Loaders	Dozers	Graders
2022	5	4	10	1	2	3
2023	6	4	10	1	2	3
2024	6	4	10	1	2	3
2025-2029	6	4	10	1	2	3
2030-2034	6	4	10	1	2	3
2035-2039	6	4	10	1	2	3
2040-2044	6	4	12	2	3	3
2045-2049	6	4	12	2	3	3
2050-2054	6	4	12	2	3	3
2055-2059	6	4	12	2	3	3
2060-2065	5	4	11	1	2	4
2065-2069	4	4	9	1	2	3
Size/Payload	100,000 lb	44 yd^3	240 ton	37 yd^3	57 yd^3	16 ft
Useful Life (hrs)	90,000	120,000	85,000	60,000	65,000	65,000
Example Unit	Sandvik DR412i	P&H 2800 XPC	Komatsu 830E	LeTourneau L1850	CAT D11	CAT 18M

The primary loading and hauling equipment was selected to provide good synergy between mine selectivity of crude ore and the ability to operate in wet and dry conditions. Since crude ore is blended at the primary crusher, the loading units in crude ore do not operate at capacity.

Longer haulage distances will be realized as the Mine expands to the west. During the longer haulage periods, more trucks will be required, as seen during years 2040 through 2065 in Table 13-10.

Extensive maintenance facilities are available at the Mine site to service the mine equipment.

13.7 Mine Workforce

Current mining headcount totals 184 and is summarized as follows:

- Mine operations – 96
- Mine maintenance – 56
- Mine supervision and technical services – 32

Mine operations and mine maintenance manpower will increase proportionately with the increase in haul trucks over the LOM.The additional required manpower will be sourced from local communities.

14.0 PROCESSING AND RECOVERY METHODS

14.1 Crushing and Rail Transport from Babbitt to Silver Bay

The Mine and primary and secondary crushing plant are located in Babbitt, Minnesota and the tertiary and quaternary crushing plant is located in Silver Bay, Minnesota. Mine haul trucks dump the crude ore directly into a 60 in. x 89 in. primary gyratory crusher. The primary crushed crude ore falls directly into the four, secondary 30 in. x 70 in. gyratory crushers located directly beneath the primary crusher, and is crushed to -4 in. The -4 in. material is conveyed into rail car loading bins and then loaded into trains and transported to Silver Bay, Minnesota, where the tertiary and quaternary crushing stations, the concentrator, and the pellet plant are located. Silver Bay is linked to Babbitt by a 47 mi rail track owned by Northshore Mining Railroad, a wholly owned Cliffs subsidiary. Upon arriving at Silver Bay, the secondary crushed crude ore (-4 in.) is dumped from the rail cars by automated, two-car dumpers and transported by belt conveyors to the tertiary-quaternary crushing plant storage silos. The crude ore is drawn from the silos and crushed to -0.75 in. in tertiary and quaternary Nordberg 7 ft shorthead cone crushers and then passed over double-drum dry cobbers for primary magnetic separation. Figure 14-1 illustrates the crushing flowsheet. There are no blending facilities at the concentrator, as crude ore blending is accomplished through the proper selection of the blast sites at the Mine and truck deliveries to the primary crusher.

14.2 Concentrator

The following discussion of the concentrator is illustrated on the flowsheet presented in Figure 14-2. The concentrator building contains 17 complete sections and three partial scavenging sections. All 17 sections are similar as per layout, although there are some minor differences in equipment from one section to another. Two products are made in the concentrator: standard concentrate, which targets a pellet silica of 4.80%, and DR-grade concentrate, which targets a pellet silica of 2.00%. The concentrator flowsheet consists of the following unit operations:

- Rod milling – open circuit
- Cobber magnetic separation
- Ball milling – closed circuit
- Rougher magnetic separation
- Cyclone classification
- Cyclone overflow screening
- Finisher hydroseparation
- Finisher magnetic separation
- Finisher magnetic concentrate
- Primary concentrate reverse flotation (primary and secondary)
- Flotation concentrates hydroseparation
- Flotation concentrate thickening
- Concentrate collection and vacuum filtration
- Filter cake conveyed to pellet plant

Crushed ore (-0.75 in.) from the quaternary crushing station is treated in double-drum, dry cobber magnetic separators. The cobber concentrate is sent to rod mills by belt conveyors, and the cobber tails (approximately 13% of the incoming crude ore) are hauled by rail and discarded as coarse final tails. The cobber concentrate has a MagFe target of 28.5%.

The magnetic cobber concentrate is fed to the rod mills, which are operated in an open circuit configuration. The rod mill discharge is treated in rougher, low-intensity, drum magnetic separators. The resulting magnetic rougher concentrate is pumped to a cluster of 10 cyclones (Cavex Cyclones), which are operated in closed circuit with two parallel ball mills to produce a final grind of 90% passing 325 mesh (45 micron) in the cyclone overflow. The cyclone underflow is returned to the ball mills for additional grinding, with the ball mill discharge combining with the rod mill discharge in the rougher, low-intensity, drum magnetic separators.

The cyclone overflow passes through magnetizing coils that cause magnetite particles to flocculate prior to being fed to two parallel primary hydroseparators. The primary hydroseparator overflow, composed mainly of silica particles, discharges to the tailings launder. The heavy primary hydroseparator underflow product is then pumped through demagnetizing coils and fed to the fine primary and secondary screen station (eight sets of primary screens and eight sets of secondary screens per section). The screen undersize is then passed through magnetizing coils to be flocculated prior to being fed to the finisher hydroseparator. Screen oversize is returned to the rougher concentrate pumps to be re-processed through the cyclones.

The finisher hydroseparator overflow is discharged to the tailings launder, and the dense underflow is pumped to two parallel, double-drum finisher magnetic separators. The finisher magnetic separator tails are discharged to the tailings launder, and the concentrate is pumped to the primary flotation cells. The primary flotation concentrate is thickened to a target density in the flotation hydroseparator after first passing through a magnetizing block to produce the final iron concentrate product, which is pumped to the concentrate collection sump. The flotation hydroseparator overflow is discharged to the tailings launder. The concentrate collected from the sections is sent to the 40 ft concentrate thickener in the filter building for dewatering and then to the vacuum disc filtration circuit for final dewatering. Filter cake at 9.5% moisture is transported by belt conveyors to the pellet plant concentrate bins. Standard final concentrate has an iron grade of approximately 68% Fe and a particle size of 90% passing 325 mesh. DR-grade final concentrate has an iron grade of approximately 70% Fe and a particle size of 93% passing 325 mesh.

During standard concentrate production, the primary flotation cell tails are pumped to the regrind ball mill, first passing through the regrind magnetic separator. The reground product is then pumped to the secondary flotation cells. The secondary flotation concentrate is re-processed in the primary flotation circuit, whereas the secondary flotation tails are sent to the tailings launder. Silica contaminants are floated using cationic amine collectors.

During DR-grade concentrate production, the primary flotation cell tails stream is directed to either the regrind ball mill or to the scavenger sump. Depending on ore quality and process performance, the secondary flotation tails can also be sent to either the tailings launder or the scavenger sump. The primary and secondary flotation tails sent to the scavenger sump are then sent to a scavenger collection sump at the Nuclear On-Line Analyzer (NOLA) stations, where they are then sent to the scavenger building for dewatering and storage.

NSM uses NOLAs to measure the amount of silica in the concentrateDeviations in silica readings or silica concentration can cause large fluctuations in the section performance, resulting in decreased section recovery and throughput. There are four operational NOLAs (1, 2 ,3, and 4) at Northshore, and each NOLA analyzes feed from five sections.The silica content is measured every 20 to 30 minutes for each section. A control loop adjusts the reagent dosing automatically based on silica content. If the silica level is high, the reagent increases. The inverse is true when a low silica value is reported, and the reagent rate decreases, resulting in floating off less silica particles in the flotation circuit.

Soda ash is added to the concentrator process water system to achieve target water hardness, by causing precipitation of any calcium ions, which would otherwise compete with the amine collector for adsorption onto the silica mineral surfaces.

The main reagents used in the concentrator include:

- Amine is one of the two chemicals used to make reagent for use in flotation.
- Frother used in flotation is 2-ethyl hexanol, an aliphatic alcohol.
- Soda ash or sodium carbonate (Na_2CO_3) is a white powder that is used in an aqueous solution in the concentrator grinding circuits to control the water chemistry.
- Cationic polymers are used as flocculants in the clarifiers and in the water treatment plant.

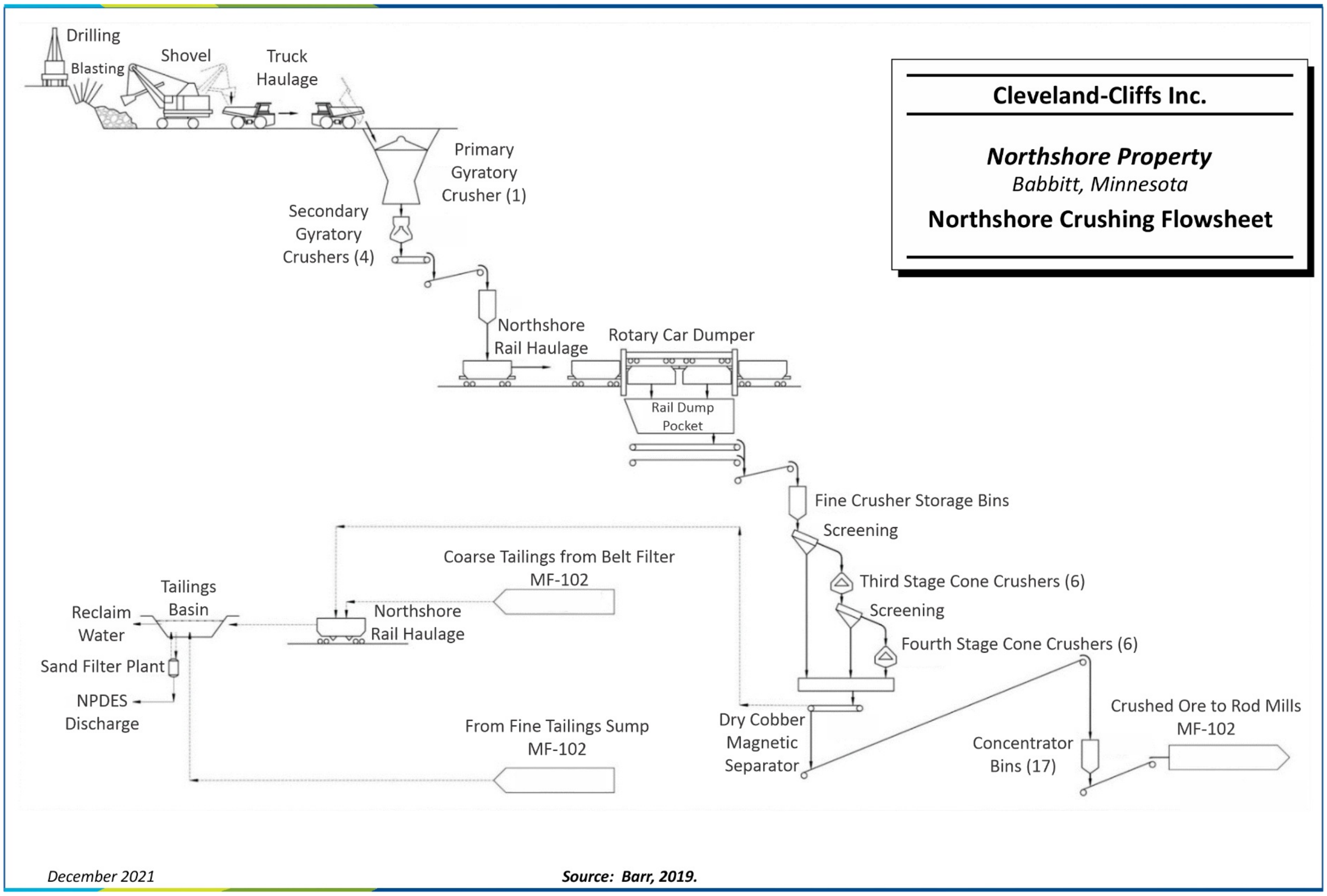
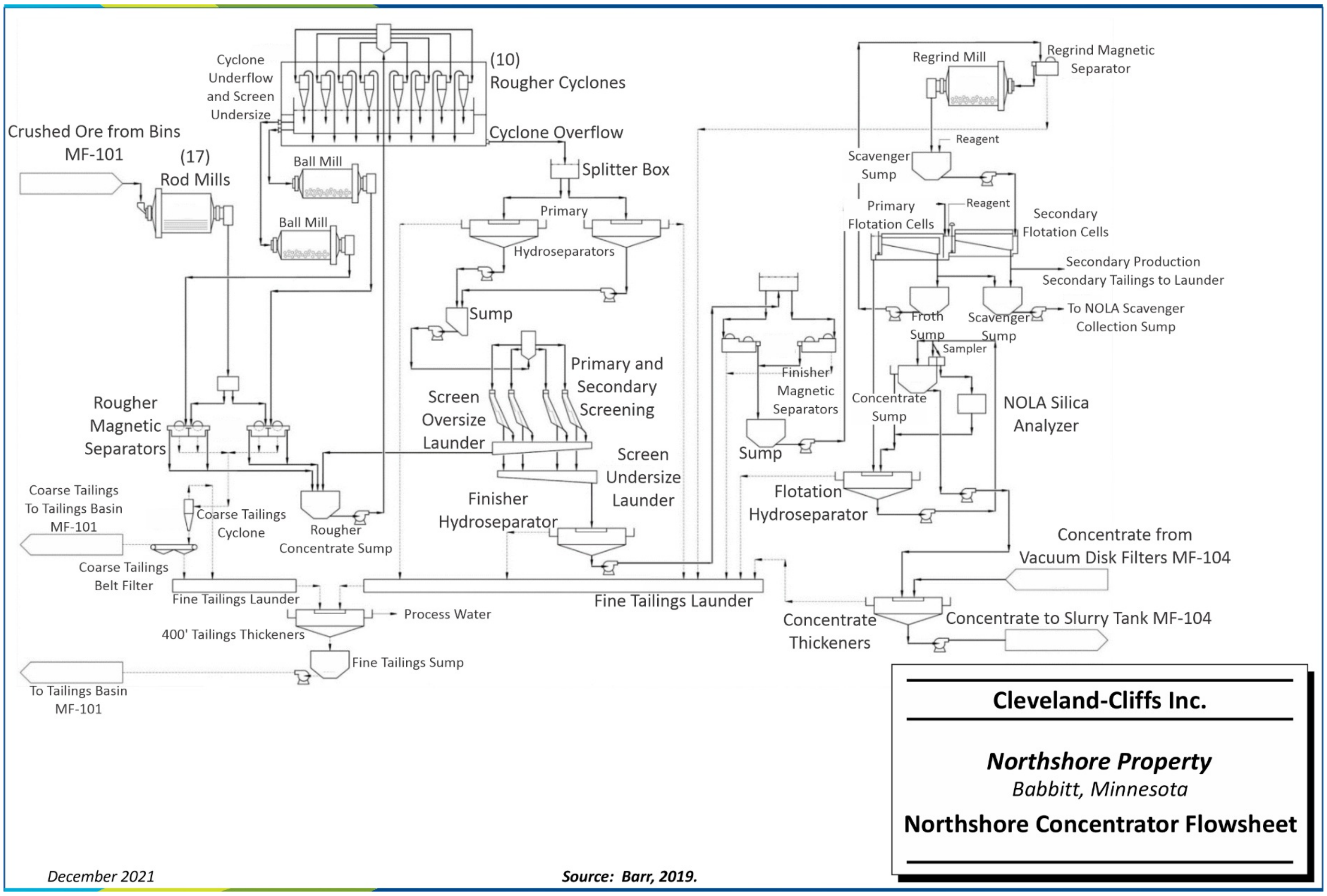


Figure 14-1: Northshore Crushing Flowsheet



Cleveland-Cliffs Inc.

Northshore Property

Babbitt, Minnesota

Northshore Concentrator Flowsheet

December 2021

Source: Barr, 2019.

Figure 14-2: Northshore Concentrator Flowsheet

14.2.1 Scavenging

Economic recovery of iron to make the DR-grade concentrate and pellets requires the diversion, collection, and re-processing of part of the middling slurry stream coming from the primary flotation froth and the secondary flotation froth on each concentrator section producing DR-grade concentrate. Due to a lower silica set-point on the DR-grade sections, the reagent addition rate increases at the section, resulting in increased flotation tails.The two flotation froth streams on each DR-grade section are directed to a sump and pump that transfers the “scavenged material” from each section to the scavenger transfer pumps in each of the four NOLA buildings.The scavenger sumps and pumps in each NOLA then transfer material to the scavenger building.

14.3 Pellet Plant

The pellet plant and yard operations are illustrated in Figure 14-3.

After vacuum disc filtering, the concentrate is transported by belt conveyors to the balling circuit. The following description relates only to the circuits linked to the newer furnaces 11 and 12 at Silver Bay.

The concentrate is rolled in a balling drum to produce green balls at a target size of +3/8 in. to 1/2 in. Target wet strength is required to survive the journey to the furnace as well as support the furnace bed thickness in the early drying zone. The following balling circuit variables determine the quality of the green pellets:

- **Balling drum** speed in revolutions per minute (rpm) - Increasing the drum rotation does the following:
    - Increases the size of the green pellet.
    - Decreases the recycle tons.
- **Bentonite addition** - Adding bentonite does the following:
    - Serves as a binder.
    - Absorbs excess moisture.
    - Decreases the size of the green pellet.
    - Reduces explosions of green pellets in the furnace.
    - Increases silica.
- **Organic binder addition** - Adding organic binder does the following:
    - Serves as a binder.
    - Reduces bentonite addition rates.
    - Pushes the moisture to the surface of the pellet.
    - Increases reducibility of the pellet.
    - Decreases silica.
- **Concentrate grind** does the following:
    - A coarse grind increases ball size.

  - A coarse grind contains less than 89% passing 325 mesh.
  - A fine grind contains more than 92% passing 325 mesh. The feed varies with the grinding requirements to remove undesired silica from the concentrate.
  - Concentrate grind sizes outside the target limits negatively affects filter cake moisture control.
- **Concentrate moisture** - Moisture content of the concentrate feed, or filter cake, should range between 9.4% and 9.6% water.
- **Water sprays** - There are both automatic and manual water sprays in the balling drum to add moisture to the concentrate.
- **Green pellet roll screen** - The roll screen determines green pellet size and the quantity of recycle tons in the balling drums. The gap between rollers is set to meet the customers' sizing requirements.

The balling drums are 30 ft long and inclined in the direction of the green ball movement and discharge onto a roll-type sizing screen. The balling drums are rubber lined and rotate between 5 rpm and 12 rpm. The green pellet roll screen determines the green ball size. The roll screen consists of 51 rollers. The upper 43 rollers are spaced 0.375 in. apart to let undersized material drop onto the recycle belt beneath the rollers. The last eight rollers are spaced 0.5 in. apart to allow +0.375 in. to - 0.5 in. product-sized green pellets to fall onto the belt for feeding to the furnace. Spacer bars are used to check and adjust the spacing of the rollers.

The roll screen oversize is broken up by a pulverizer that breaks up oversize material that passes over the last eight rollers of the roll screen.

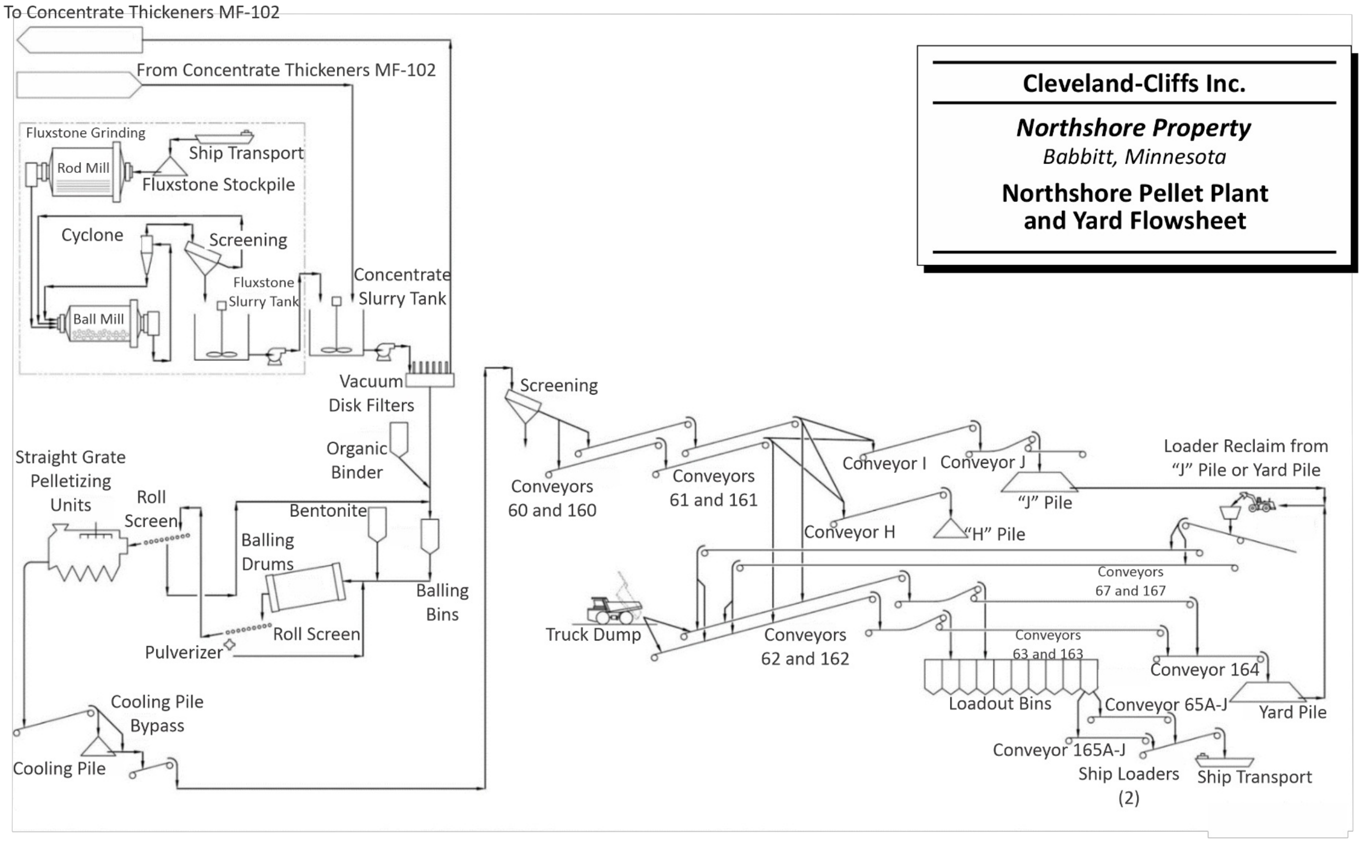
In the filter section, limestone is added at 0.85 wt% during standard production and 0.80% during DR-grade pellet production. Two binders are used at Northshore to assist with making a green pellet: Wyoming bentonite (sodium montmorillonite) and an organic binder.

The pellet plant follows the straight grate technology, using drums for balling and a traveling grate furnace for drying, preheating, and firing the pellets. Natural gas provides a heat supply of approximately 620,000 Btu per ton of pellets. Two 240 LT per hour (LT/h) furnaces and two 105 LT/h furnaces are available. Furnace production rates are dependent upon meeting customer quality targets.

The No. 11 and No. 12 grate furnaces, which consist of approximately 280, 8 ft x 2 ft pallets with 20 in. side plates, are continuous traveling, conveyor-type furnaces that have upper and lower return strands of pallets. The pallets ride on the top and bottom rails and in double rails at the feed and discharge ends of the furnaces. Each pallet has approximately 57 grate bars with air spaces between the bars. The pallets move along the top strand through the furnace zones from the feed end of the furnace.

The upper strand of pallets accepts an 18 in. layer of green balls that are produced in the balling drums. The upper strand of pallets also accepts a hearth layer of fired pellets. The green balls are dried, fired, cooled, and discharged while the pallets ride over twenty-seven 8 ft^2 windboxes. The windboxes are connected by a series of twenty-seven downcomers to the main furnace air ducts, breechings, and six process fans. Each windbox has a dust leg with a dump valve that allows dust, fines, or pellets that infiltrate the system through the grate bars on the pallets to be dumped. Pellet plant process air is cleaned by wet electrostatic precipitators that collect the airborne dust.

The hearth layer of pellets protects the grate bars from excessive heat and ensures good quality pellets in the bottom layer of green balls by providing a more uniform heat transfer.



December 2021

Source: Barr, 2019.

Figure 14-3: Pellet Plant and Yard Flowsheet

14.4 Major Equipment

A list of all major equipment is provided in Table 14-1.

Table 14-1: Major Processing Equipment
Cleveland-Cliffs Inc. – Northshore Property

Area	Equipment	Model	In Use	Size	Power
Coarse Crusher	Gyratory Crusher	Allis Chalmers	1	60" x 90"	1,000 hp
Coarse Crusher	Gyratory Crusher	Allis Chalmers	4	30" x 70"	350 hp
Fine Crusher	Short Head Cone Crusher	Symons	12	7’	
Dry Cobb	Double-Drum Magnetic Separator	Stearns	12	36" x 120"	
Concentrator	Rod Mill	Allis Chalmers	18	10.5'ø x 18'	870 hp
Concentrator	Ball Mill	Allis Chalmers	20	10.5'ø x 18'	1,000 hp
Concentrator	Ball Mill	Allis Chalmers	14	10.5'ø x 16'	800 hp
Concentrator	Regrind Mill	Allis Chalmers	17	8'ø x 12'	350 hp
Concentrator	Rougher Magnetic Separators	Svedala	17	48" x 10'	
Concentrator	Finisher Magnetic Separators	Stearns	40	36" x 8'	
Concentrator	Regrind Magnetic Separators	Stearns	20	36" x 10"	
Concentrator	Primary Hydro Separator	Dorr - Oliver	20	18' ø	
Concentrator	Primary Hydro Separator	Dorr - Oliver	14	16' ø	
Concentrator	Finisher Hydro Separator	Dorr - Oliver	20	16' ø	
Concentrator	Flotation Hydro Separator	Dorr - Oliver	20	16' ø	
Concentrator	Flotation Cells	Denver	80	500ft^3	
Scavenger	De-Watering Magnetic Separator	Eriez	6	48" x 10'	
Filter Building	Filters - 10 Disk	Dorr - Oliver	10	9' ø	
Filter Building	Vacuum Pumps	Nash	20		500 hp
Pelletizer	Cooling Fan (Furnace 11&12)	Westinghouse	2	254,000 acfm	1,750 hp
Pelletizer	Furnace Fan (Furnace 11&12)	Westinghouse	2	335,000 acfm	900 hp
Pelletizer	Waste Gas Fan (Furnace 11&12)	General Electric	2	215,000 acfm	1,750 hp

Area	Equipment	Model	In Use	Size	Power
Pelletizer	Recuperation Fan (Furnace 11&12)	General Electric	2	464,000 acfm	3,000 hp
Pelletizer	Updraft Drying Fan (Furnace 11&12)	Electric Machine	2	447,000 acfm	3,000 hp
Pelletizer	Hood Exhaust Fan (Furnace 11&12)	Westinghouse	2	314,000 acfm	500 hp

14.5 Plant Performance

Table 14-2 shows the production performance of the Plant from 2008 to 2020. Crude ore is magnetite taconite grading approximately 25% MagFe. Concentrate production has ranged from 3.1 MLT dry to 5.5 MLT dry per year (MLT/y), with a 12 year average of 4.45 MLT/y dry. Concentrate is fed to the pellet plant to produce pellets, which are sold as the main final product. Pellet production has ranged from 3.1 MLT/y to 5.6 MLT/y dry, with a 12-year average of 4.54 MLT/y.

Table 14-2: Crude to Pellet Recoveries
Cleveland-Cliffs Inc. – Northshore Property

	Crude Ore Delivered	Rod Mill Feed %Fe	Dry Cobb Recovery	Rod Mill Feed LT	Concentrator Recovery	Concentrate LT	Concentrate % Fe	Pellets Dry LT	Pellet % Fe	Crude to Pellet Recovery
2008	15,882,123	27.7%	83.7%	13,293,337	38.66%	5,139,846	67.85	5,311,267	65.07	33.44%
2009	9,392,021	27.9%	87.6%	8,227,410	36.94%	3,039,489	67.93	3,096,762	65.12	32.97%
2010	14,540,209	28.6%	87.4%	12,708,143	37.39%	4,751,702	67.90	4,619,666	65.01	31.77%
2011	17,342,420	28.8%	86.1%	14,931,824	37.11%	5,540,709	67.90	5,599,674	65.08	32.29%
2012	15,977,322	28.1%	86.8%	13,868,315	36.93%	5,120,937	67.99	5,086,819	65.22	31.84%
2013	11,750,388	28.3%	84.6%	9,940,828	37.17%	3,695,091	67.96	3,773,450	65.06	32.11%
2014	15,222,026	28.7%	85.4%	12,999,610	38.14%	4,958,315	67.90	5,111,579	65.12	33.58%
2015	12,045,587	28.7%	87.1%	10,491,706	37.64%	3,949,373	67.91	4,103,708	65.23	34.07%
2016	9,512,268	28.5%	86.7%	8,247,136	37.21%	3,068,474	67.80	3,118,248	65.11	32.78%
2017	14,503,761	28.5%	90.1%	13,067,889	37.88%	4,950,089	67.88	5,088,295	65.22	35.08%
2018	15,332,354	28.5%	90.3%	13,845,116	38.06%	5,268,850	67.85	5,360,332	65.07	34.96%
2019	15,045,388	28.3%	90.9%	13,670,899	34.46%	4,710,344	68.44	5,056,282	65.50	33.61%
2020	10,632,293	28.9%	90.3%	9,600,961	38.66%	3,711,560	68.04	3,711,942	65.56	34.91%

14.6 Pellet Quality

The customers purchasing NSM pellets monitor the physical and chemical characteristics of the pellets with respect to required specifications. Northshore products must meet these specifications to be accepted as shown in Table 14-3, Table 14-4, and Table 14-5.

Table 14-3: Standard Pellets – Cargo Specification
Cleveland-Cliffs Inc. – Northshore Property

Quality Variable	Cargo Specification		
	Min	Target	Max
Iron	65.00	N/A	N/A
Silica	4.60	4.80	5.00
CaO	0.77	0.85	1.20
P	0.016	0.021	0.025
Na_2O+K_2O	N/A	0.062	0.073
-1/4" BT	N/A	1.90	3.60
+ 1/4 AT	95.3	N/A	N/A
-28 Mesh AT	3.0	N/A	N/A
Compression, Average	400	440	N/A
-300 lb Compression	N/A	15.0	20.0
-1/2" +3/8" Sizing	80.0	86.0	N/A
+1/2" Sizing	N/A	2.8	7.0
Moisture	N/A	2.75	4.30

Note: BT is before tumble testing and AT is after tumble testing.

Table 14-4: DR-Grade Coated Pellets – Cargo Specification
Cleveland-Cliffs Inc. – Northshore Property

Quality Variable	Cargo Specification		
	Min	Target	Max
Iron	67.10	67.35	N/A
Silica	1.75	2.00	2.25
CaO	N/A	0.80	N/A
P	N/A	0.016	N/A
Na2O+K2O	N/A	0.040	0.070
+ 1/4 AT	95.0	N/A	N/A
Compression, Average	450	500	N/A
-300 lb Compression	N/A	N/A	N/A
-1/2" +3/8" Sizing	80.0	85.0	N/A
+1/2" Sizing	N/A	7.5	N/A
Moisture	N/A	2.5	4.20

Table 14-5: DR-Grade Uncoated Pellets – Cargo Specification
Cleveland-Cliffs Inc. – Northshore Property

Quality Variable	Cargo Specification		
	Min	Target	Max
Iron	67.10	67.35	N/A
Silica	1.75	2.00	2.25
CaO*	N/A	0.80	N/A
P	N/A	0.016	N/A
Na2O+K2O	N/A	0.040	0.070
+ 1/4 AT*	95.0	N/A	N/A
Compression, Average	450	500	N/A
-300 lb Compression	N/A	N/A	N/A
-1/2" +3/8" Sizing	80.0	85.0	N/A
+1/2" Sizing	N/A	7.5	N/A
Moisture	N/A	2.5	4.20

SLR has reviewed yearly performance data for NSM standard and DR-grade pellet production since 2014 and notes that Cliffs has achieved these specifications on a consistent basis during that period.

14.7 Consumable Requirements

Current requirements for energy and process consumables are shown in Table 14-6 and Table 14-7.

Table 14-6: Energy Usage Per Long Ton of Pellets
Cleveland-Cliffs Inc. – Northshore Property

Energy Usage	Unit	Usage
Natural Gas	MBTU/LT	620
Total Electrical Power	kWh/LT	132.38
Pit	kWh/LT	8.43
Crusher	kWh/LT	9.79
Concentrator	kWh/LT	72.68
Pellet Plant	kWh/LT	40.88
General Operating	kWh/LT	0.60
Total Water Consumption	gal/LT	72.81
Process Makeup	gal/LT	65.45
Dust Control	gal/LT	7.36

Table 14-7: Consumable Usage
Cleveland-Cliffs Inc. – Northshore Property

Consumables	Unit	Usage
Concentrator		
Grinding Balls and Rods	lb/LT Pellet	4.48
Diamine	lb/LT Pellet	0.144
Flocculant	lb/LT Pellet	0.027
Soda Ash	lb/LT Pellet	1.556
Frother	lb/LT Pellet	0.027
Pelletizer		
Bentonite	lb/LT Pellet	9.0
Organic	lb/LT Pellet	0.50
Fluxstone	lb/LT Pellet	26.93

14.8 Process Workforce

Current processing headcount totals 269 and is summarized as follows:

- Plant operations – 139
- Plant maintenance – 90
- Plant supervision and technical services – 40

15.0 INFRASTRUCTURE

15.1 Roads

The Mine is located approximately four miles southeast of the city of Babbitt, Minnesota. The Mine is accessed from St. Louis County Road 112 (Figure 15-1).

The Plant is located 47 mi to the southeast and immediately adjacent to the city of Silver Bay, Minnesota in Lake County. The facility is accessed from MN Highway 61.

Both sites are accessed by County, State, and Federal paved and unpaved roads. Both sites are easily accessible from the major regional population center of Duluth, Minnesota, which is located approximately 50 mi to the southwest.

15.2 Rail

Crushed crude ore is transported via rail from the Mine site near Babbitt to the Plant at Silver Bay. Tailings produced at the processing plant are backhauled on the same railroad to the Milepost 7 Tailings Basin. These Northshore Mining Railroad operations are operated by the wholly owned Cliffs subsidiary, Northshore Mining Company.

ROM crude ore is crushed to minus four inches at the mine site and stored in 7,500 LT-capacity loading bins. From the loading bins, rail cars are loaded by pulling the train under the loading bins. A crushed crude ore stockpile is maintained after the loading bins at the mine to provide blended crude ore to the processing plant as necessary. The crushed crude ore stockpile is utilized when trains cannot be loaded due to scheduled maintenance or in cases of unscheduled downtimes to the crushing or load-out facilities at the mine. The stockpile is built by loading Caterpillar 777-sized trucks from the loading bins and hauling the crushed crude ore to the stockpile. Material is reclaimed from the stockpile by Caterpillar 992 loaders and loaded directly into crude ore cars.

Unit trains move an average of 50,000 LT/d of crude ore and 10,000 stpd of dry tailings.

The unit trains use open-top rotary dumping cars that discharge their load into the fine crusher bins. The rotary car dump was replaced in 2010 and allows for two cars to be discharged without uncoupling the train. Material in this bin is fed into the beneficiation circuit for upgrading to pellet specifications.

Seventeen diesel locomotives are used in the system, with two rated at 1,200 hp, two at 2,000 hp, and the remainder at 3,000 hp. Each train is made up of 156 cars rated at 80 LT each for a train capacity of 12,480 LT. Rolling stock includes 674 open-top rotary dump cars, 37 side-dump tailings cars with a capacity of 80 LT, flat bed cars, and bottom-dump cars.

The track system includes:

- 47 mi of mainline track, 22.2 mi of which is single track with the remainder being double track, from Babbitt to Silver Bay
- Upper and Lower Silver Bay Yard
- Babbitt Yard and workshops
- Northshore Junction
- Milepost 7 Tailings Siding

Dry tailings from the concentrator are loaded in 80 LT side-dump cars at Silver Bay and hauled to the Milepost 7 Tailings Basin.Their load is discharged at this site for permanent storage.

Maintenance of the rail line and rolling stock is done by NSM personnel in workshops located at the Mine site in Babbitt.Locomotive fueling is performed by contractors at the Babbitt and Silver Bay Yards; no fueling stations are located at either Northshore yard.

An overall diagram of the rail system is shown in Figure 15-2.

Figure 15-1: Northshore Roads and Rail

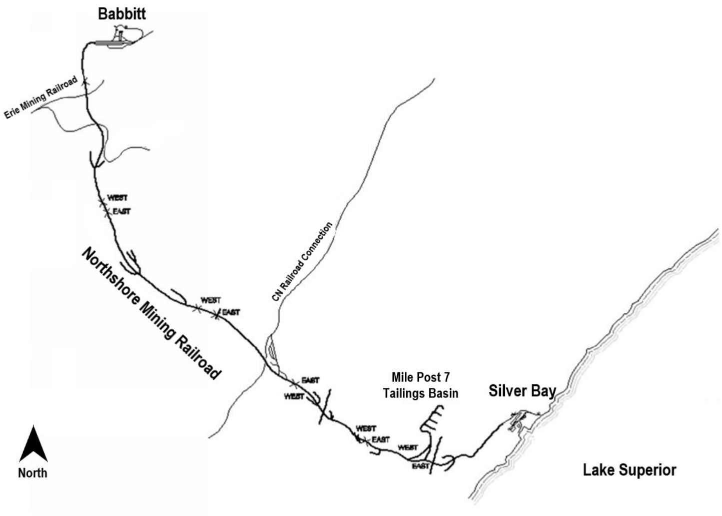


Figure 15-2: Northshore Mining Railroad

15.3 Port Facilities

The port serves two primary purposes: to load ships with iron pellets, and to receive limestone. The facility includes the following:

- 3,500,000 LT and 490,000 LT pellet stockpiles
- Caterpillar 992 FEL for reclaiming from stockpile
- 50,000 LT short-term boat loading bins and belt feeders
- Two parallel, 4,000 LT/h boat loaders
- Automatic sample collection equipment
- 3,000 ft-long berth that can accommodate one self-unloading stone boat and one pellet boat docked at the same time
- Normal boat capacity of 25,000 LT to 60,000 LT
- 60,000 LT vessel loaded in 10 hours

The channel was dredged in 2018 to maintain access for larger 1,000 ft (60,000 LT capacity) boats. The normal shipping season is from mid- to late March through early to mid-January with United States Coast Guard icebreakers used during heavy ice conditions.

Off-loading at the port is completed by self-unloading vessels only. No unloading equipment is present at the port. The facility has staff of 26 people working around the clock year round. During the non-shipping season, staff continues operating pellet stockpile conveyors and performing maintenance. A photograph of the port facility is shown in Figure 15-3.

Figure 15-3: Silver Bay Port Facility

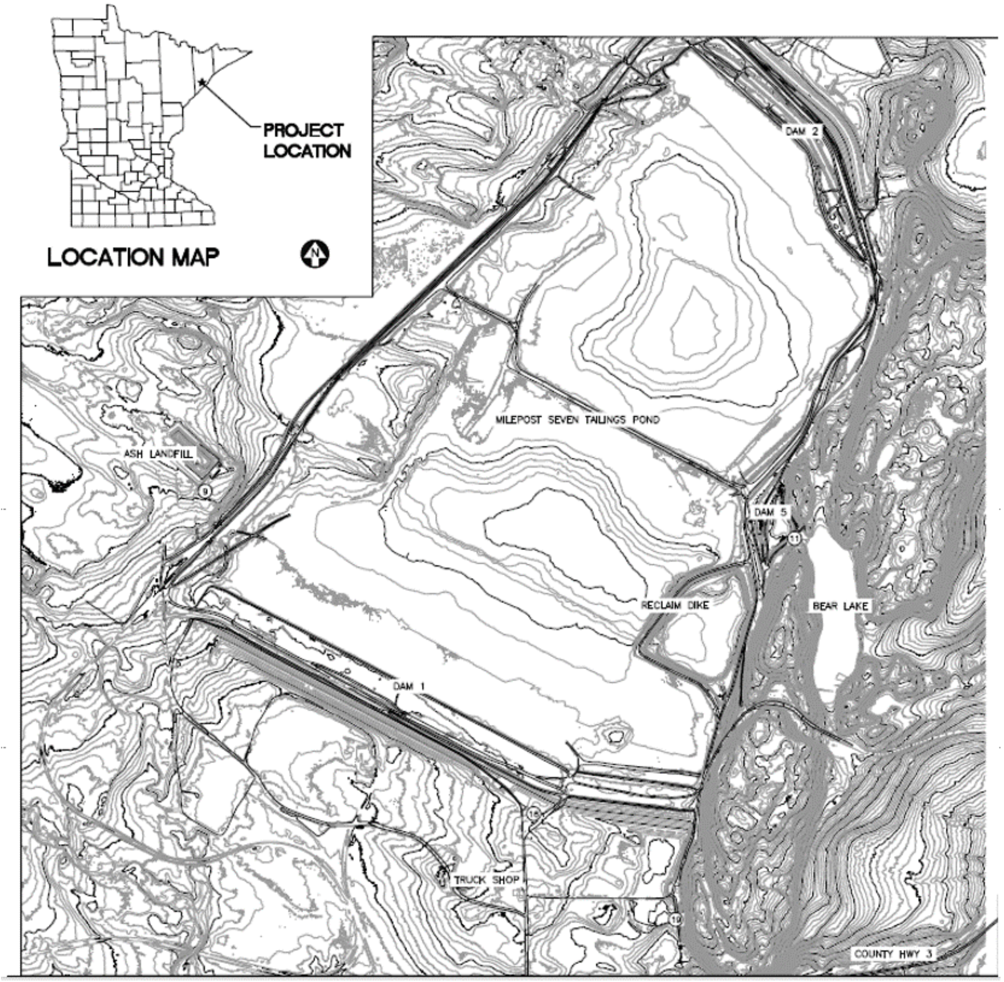
15.4 Tailings Disposal

NSM operates a tailings storage facility (TSF), which encompasses approximately 2,500 acres located approximately seven miles by rail northwest of the Plant, referred to as the Milepost 7 Tailings Basin. The TSF is unlined and is comprised of three perimeter dams (Dams 1, 2, and 5) with natural ground abutments and one interior dam that forms the reclaim water pond (Reclaim Dam). The tailings basin currently encompasses nearly 2,100 acres of land and a 3,500 acre watershed.

The tailings basins were permitted as unlined facilities, with the foundation materials and tailings providing a low-permeability material to reduce seepage.

NSM generates two tailings streams. The first is plant aggregate, which is a portion of the tailings stream produced from the concentrating process, defined as the combined dry cobb aggregate (approximately 60% to 80% of the tailings) and filter sands (approximately 20% to 40%) classified as poorly graded gravel with sand. The plant aggregate is hauled by rail from the Plant, approximately seven miles to the basin, and used to construct the containment dams (Dams 1, 2, and 5) and other structures. The second product is the fine-fraction tailings, which is defined by Northshore as the -200 mesh (75 micron-size) product of the concentrating process. The fine-fraction tailings are pumped to the TSF in a slurry at a rate of approximately 8,500 gpm at 35% solids and are discharged upstream of Dams 1 and 2 to create beaches to provide a seal for limiting seepage through the dams. Water that is retained by Dam 2 (North Pond) is allowed to flow in a culvert connected to water retained by Dam 1 (South Pond). From the South Pond, water overflows a weir into the Reclaim Pond, where water is pumped back to the mill for re-use or treated and discharged to the Beaver River. The water treatment plant reduces the volume of free water accumulating in the basin, minimizes the pond level rises, and limits the need to raise the dams.

The TSF configuration is presented in Figure 15-4, and the facilities are discussed in the following sections.



Source: Barr, 2019

Figure 15-4: Tailings Storage Facility Layout

15.4.1 Facility Description

15.4.1.1 Dam 1

Dam 1 is located on the southern end of the Milepost 7 Tailings Basin. The dam is currently approximately 10,000 ft long and 110 ft high.

The general stratigraphy of native soils beneath the dam consists of lacustrine clay deposits that are 10 ft to 20 ft thick and glacial till of varying thickness, with bedrock below the till. The dam was initially constructed as a sand and gravel starter dam with an upstream clay face.

The original intent was to raise the dam using downstream construction methods; however, as a result of closure activities in the 1980s, regulators required operation and construction under the Consensus Closure Plan when the Plant restarted in the 1990s and during operation until 1996.This arrangement required placement of plant aggregate and filters over the fine tailings beach out to a distance approximately 1,400 ft upstream of the starter dam. In 1997, the dam was raised by placing plant aggregate over the plant aggregate and filters placed per the Closure Consensus Plan.As part of the construction of this raise, the centerline was modified with a one-time offset in the upstream direction approximately 800 ft with fine tailings discharged upstream, creating a beach. In about 2003, dam construction continued following an upstream centerline method, including a filter berm with plant aggregate backing material to create the dam body and fine tailings are discharged upstream from the shoulder, creating a beach. The area downstream of the filter berm is constructed with plant aggregate and filter tailings overlying fine-fraction tailings. Fine-fraction tailings previously deposited by pipeline from near the original starter dam occur from near the old dam crest and extend into the basin. The plant aggregate zones are generally approximately 50 ft to 60 ft thick, and the fine-fraction tailings are generally approximately 40 ft to 55 ft thick. Future raises are also presently planned to continue to use an upstream centerline method, and the downstream slope for Dam 1 (above an approximate elevation of 1,200 ft) will continue to be 6H:1V. The ultimate height of the dam will be approximately 180 ft based on an ultimate crest elevation of 1,315 ft.

Seepage collection ditches are present to control seepage for Dam 1. The seepage is routed to the ends of the dam, where it flows over weirs into ditches leading into one of the two seepage collection ponds downstream of the dam.

15.4.1.2 Dam 2

Dam 2 is located on the northern end of the Milepost 7 Tailing Basin. The dam is currently approximately 5,700 ft long and 85 ft high.

At Dam 2, the glacial till cut-off was constructed as a central core in the starter dam. The fill material placed on natural ground to the existing dam elevation consists of plant aggregate, which extends upstream of the starter dam for approximately 500 ft to 600 ft. After completion of the plant aggregate placement, fine-fraction tailings were discharged into the basin creating beaches. Similar to Dam 1, Dam 2 was originally planned to be raised using downstream construction methods, but following Plant restart until about 1996, plant aggregate and filters were placed over the beach for a distance of approximately 1,400 ft upstream of the Dam 2 starter dam per the Consensus Closure Plan.An upstream centerline method used for Dam 1 was also used for Dam 2 beginning in about 1997 and continuing in 2003, with a filter berm constructed approximately 800 ft upstream of the starter dam. The area downstream of the filter berm is raised using only plant aggregate. Future raises are also presently planned to continue to use an upstream centerline method, and the downstream dam slope for Dam 2 (above an approximate elevation of 1,200 ft) will continue to be 6H:1V. The ultimate height of the dam will be approximately 155 ft based on an ultimate crest elevation 1,315 ft.

A peat deposit overlying the lacustrine clay and glacial till exists in the approximate middle portion of the dam cross section. The peat has been compressed from its original 10 ft thickness to a thickness of approximately three to five feet. Previous investigations identify an alluvial channel cut into the glacial till in the center of the dam site near the middle of the dam cross section. A toe berm consisting of plant aggregate was constructed in 1997 along the downstream toe of Dam 2 in the area of the lowest natural ground and where the dam section will be highest. The toe berm increased the dam's stability by providing a means for drainage of seepage and additional weight along the toe of the dam.

A seepage cut-off was constructed in the northeastern corner of Dam 2 in May 2012. The seepage cut-off was constructed beyond the eastern extent of the clay core to significantly reduce the amount of seepage flowing along the hillside, through more permeable plant aggregate zones located in this area of the dam. The first stage consisted of a soil-cement-bentonite cut-off to an elevation 1,216 ft, with the second stage consisting of compacted clay till to a present surface elevation of 1,240 ft. The cut-off will be extended vertically with glacial till as part of subsequent dam raises to the ultimate dam height.

15.4.1.3 Dam 5

Dam 5 is located on the east side of the Milepost 7 Tailing Basin and north of the Reclaim Pond. This dam was originally constructed as two dams, Dam 5A and Dam 5B, although the dams were joined as they were raised. The dam is constructed over a layer of clay on the south end, a rock knob in the middle, and a rock foundation on the north end. The northern rock foundation was improved using blanket grouting during initial construction while the middle rock knob was covered by filter tailings as the dams were raised. A central glacial till cut-off was used in the initial design and has continued to be incorporated into recent raises. Dam construction originally employed the downstream method using a downstream sloping glacial till cut-off. Dam 5 construction was changed to the centerline method in 2004, and the cut-off was changed to a wider, vertical glacial till cut-off in 2005. Filter tailings have been placed over the downstream portion of the clay foundation, and a plant aggregate drain has been constructed above the filter tailings along the entire downstream portion of the dam. A buttress was added along the toe of the dam starting in 2013 and is raised and extended with each dam raise.

Future raises are also presently planned to continue to use the centerline method, and the downstream dam slope for Dam 5 will continue to be 6H:1V. The ultimate height of the dam will be approximately 125 ft based on an ultimate crest elevation of 1,315 ft.

15.4.1.4 Reclaim Dam

The Reclaim Dam separates the South Pond from the Reclaim Pond. The Reclaim Pond supports two floating pump stations that supply water for Plant operations and to the water treatment plant. The water flows into the Reclaim Pond over a steel decant structure (weir) and into pipes that discharge in the Reclaim Pond. A chemical treatment system is housed within the decant structure that is used to treat the water by adding a flocculant as it enters the pond to reduce the total suspended solids. The Reclaim Dam, reportedly built over a former haul road and splitter dike, is constructed of plant aggregate, and uses the centerline construction method.

The Reclaim Dam is raised as the water level rises in the basin to maintain freeboard. The dam is at a crest elevation of 1,235 ft with a 4H:1V downstream slope.

15.4.2 Design and Construction

SLR understands that NSM has retained Barr Engineering Co. (Barr) as the Engineer of Record (EOR) for the Milepost 7 Tailings Basin. Typical EOR services include the design (i.e., volumetrics, stability analysis, water balances, hydrology, seepage cut-off design, etc.), construction and construction monitoring, inspections (i.e., annual dam safety inspections), and instrumentation monitoring data review (i.e., regularly scheduled instrumentation monitoring and interpretation), to verify that the tailings basins are being constructed and operated by Cliffs as designed and to meet all applicable regulations, guidelines, and standards.

Barr noted the slope stability FoS, and the flood storage requirements, meeting MDNR requirements for the currently designed Dam 1 crest elevation of 1,245 ft (Barr, 2013) and Dam 2 crest elevation of 1,248 ft (Barr, 2016). Barr was able to calculate acceptable slope stability FOS values for Dam 5 at a crest elevation of 1,265 ft (Barr, 2020a) with the construction of a buttress. SLR understands that Barr is developing a design report for Dam 5 to allow for an additional five foot raise, which will result in a crest elevation of 1,270 ft to accommodate additional room required for railroad construction and to account for a favorable construction season. A design report for the Reclaim Dam was not presented; however, SLR understands one is being prepared to summarize the findings.

During the ongoing construction of the tailings dams, field instrumentation (such as piezometers and inclinometers) is monitored bi-annually, and there is a transition in progress to an automated system that records data more frequently, with the data reported to a web-based data visualization and instrumentation monitoring database. Action levels to monitor the performance of the dams are being developed.

15.4.3 Audits

Third-party audits have been performed on the TSF by Golder Associates Inc. (Golder) in 2008 (Golder, 2008) and by AECOM in 2012 (AECOM, 2012). SLR understands that Cliffs plans to perform an external audit for the Milepost 7 Tailings Basin in 2022.

15.4.4 Inspections

Instruments have been installed within Dams 1, 2, 5, Reclaim Dam, and seepage recovery dams including settlement plates, inclinometers, seepage weirs, piezometers, and a weather station. The monitoring instruments are used to measure the performance of the dams and their foundations as the dams are raised and the elevation of adjacent ponds increases. The most recent annual dam inspection performed by Barr (Barr, 2020b) did not identify any conditions immediately affecting the integrity of the basin, and Barr noted that each of the dams appeared to be in acceptable condition for continued use.

15.4.5 Reliance on Data

SLR relies on the statements and conclusions of Barr and Cliffs and provides no conclusions or opinions regarding the stability or performance of the listed dams and impoundments.

15.4.6 Recommendations

Cliffs has been operating the Northshore Tailings Basin since 1980, which is currently operating under the permit requirements of the Minnesota Department of Natural Resources. Dam raises following similar methods to those being carried out by Cliffs at Northshore are typically done in low seismic zones and can be constructed using the coarse-fraction tailings (plant aggregate) material. This type of construction approach, however, requires comprehensive communication and documentation system, careful water management, monitoring of the dam and foundation performance, and the placement of tailings material to ensure that it meets the design requirements. To address these issues, Cliffs has retained Barr as the EOR, with the EOR designation being an industry standard for tailings management, as the EOR typically verifies that the Tailings Storage Basin Cells are being constructed and operated by Cliffs as designed and to meet all applicable regulations, guidelines, and standards.

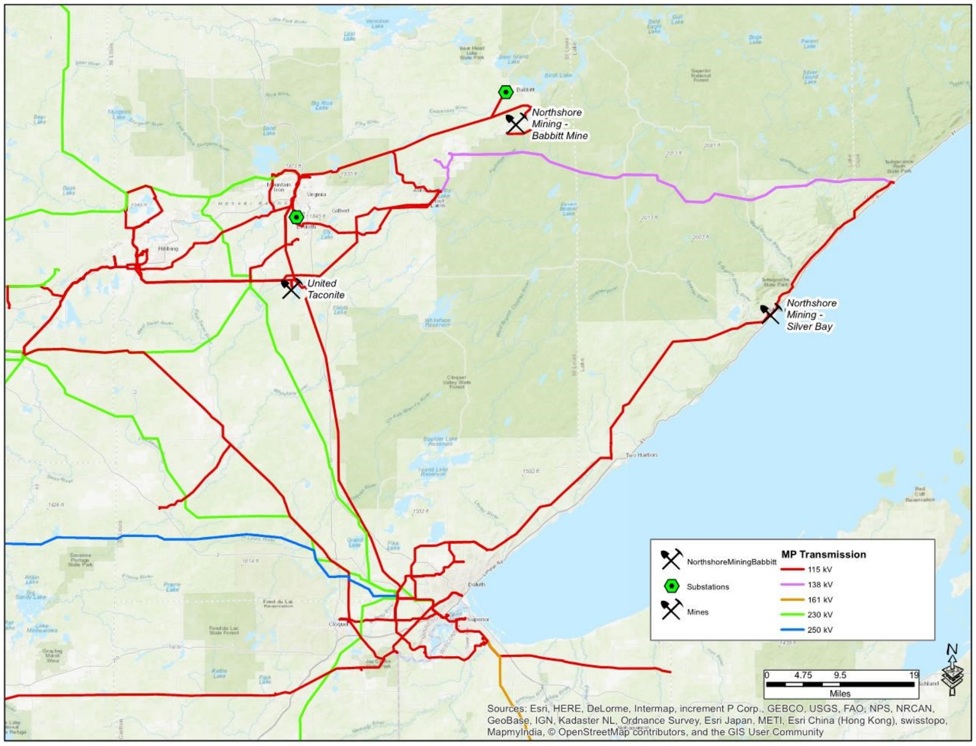
Based on a review of the documentation provided, SLR has the following recommendations:

1. Prioritize the completion of an Operations, Maintenance and Surveillance (OMS) Manual for the TSF with the EOR in accordance with Mining Association of Canada (MAC) guidelines and other industry recognized standard guidance for tailings facilities.
2. Document, prioritize, track, and close out in a timely manner the remediation, or resolution, of items of concern noted in TSF audits or inspection reports.
3. Establish an External Peer Review Team (EPRT) with experience in tailings management facilities similar to other Cliffs properties .

15.5 Power

Minnesota Power, a division of ALLETE, Inc., supplies electric power to both the Mine and Plant locations. In 2016, a new 10-year agreement with Minnesota Power was executed that included the Mine in Babbitt. This agreement was finalized in May 2016 and was approved by Minnesota Public Utilities Commission (MPUC) in November 2016Silver Bay Power, Cliffs' wholly owned subsidiary with a 115 MW power plant, previously provided power to the Plant in Silver Bay. As of September 2019, Silver Bay Power began purchasing 100% of the electricity requirements for the Plant from Minnesota Power and will continue to do so through 2031. Silver Bay Power Company idled both generating units and is maintaining the units and permits to allow start-up if needed. This could include extenuating circumstances on the regional electrical grid or at the end of 2031 when the power purchase agreement ends. Minnesota Power will supply the power to the Plant and the Mine through its existing electricity grid, which is interconnected to the grids of neighboring states (Figure 15-5). A maintenance program is in place to clean, inspect, and repair the power distribution system on a regular basis. All areas are serviced on a three-year rotating schedule.

Heating steam previously supplied by Silver Bay Power is now produced by a new boiler house constructed and commissioned in 2018. The new facility, constructed adjacent to the powerhouse, is comprised of three natural gas-fired steam boilers, each rated at 69,000 lb/h. Typical plant steam load is 100,000 lb/h during the winter.



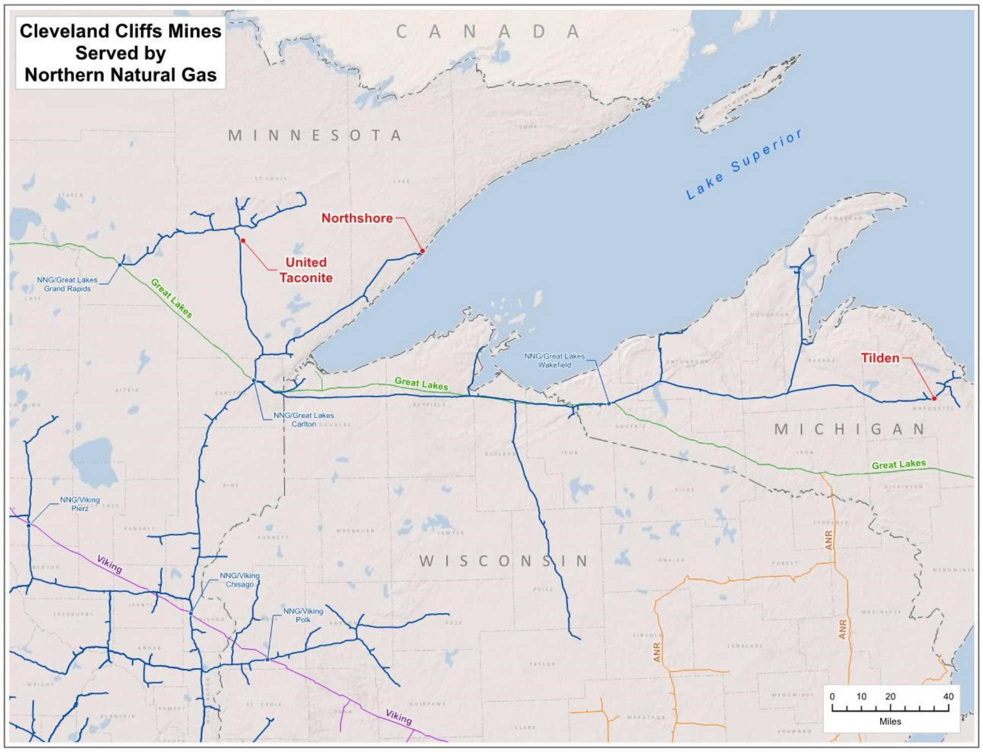
Source: Minnesota Power Company

Figure 15-5: Regional Electrical Power Distribution

15.6 Natural Gas

Natural gas is provided by Northern Natural Gas (NNG) and scheduled by Constellation Energy. Gas is delivered to the Plant using a high-pressure pipeline that connects into the North American network. Cliffs has a long-term contract providing for the transport of natural gas on the NNG pipeline for its mining and pelletizing operations. NNG has an extensive interstate pipeline system that travels through the Midwest and is interconnected to other major interstate pipelines (Figure 15-6). Northshore has the capability to burn both natural gas and oil.

NNG supplies the Plant via a 20 in. pipeline.The pipeline was designed and constructed for a flow capacity of 3,215 MCF/h to supply the processing facility and powerhouse.



Source: Northern Natural Gas Company

Figure 15-6: Regional Natural Gas Supply

15.7 Diesel, Gasoline, and Propane

Large diesel equipment is fueled in the field by a contractor. Small diesel and gasoline fueling stations are used for small maintenance equipment and fleet vehicles. Best Oil supplies diesel fuel to all of Cliffs' Minnesota operations, while Thompson Gas supplies propane. There is sufficient fuel supply in the region to meet the requirements of the operation.

15.8 Communications

Each site has fiber-optic connections into the Century Link public phone system. Radios are used at both the Mine and Plant for communications between equipment dispatchers and foremen to direct activities and help maintain a safe working environment.

The Plant process is controlled and monitored with an up-to-date Honeywell Experion interface and Honeywell C300 and UOC controllersAllen Bradley Controllogix PLCs are used in field locations.

Data backup is performed daily with copies of files created in separate locations. The Mine site and the Plant site are connected via fiber-optic cable owned by NSM to allow continuous communications. The overhead lines run parallel to the railroad corridor connecting Silver Bay and Babbitt locations.

15.9 Water Supply

Water for the Mine comes from groundwater wells for a potable water source and fire protection of the facilities. Water used for dust control on roads comes from pit sumps.

The process water for the Plant is returned from the Milepost 7 Tailings Basin, with makeup water coming from Lake Superior. Permits allow Northshore to withdraw a total of 50 billion gal/y from Lake Superior for combined use; this limit has not been reached. Potable water is supplied by the city of Silver Bay.

The operation is in a net-positive water environment, and there is ample water available to meet the operations demand.

The tailings basin treats and releases water through a multi-media, filter water treatment plant that has a maximum design discharge rate of 7.5 million gal/d and an average design discharge rate of 6.0 million gal/d. Permits allow Northshore to discharge 8.7 million gal/d.

15.10 Peter Mitchell Mine Support Facilities

The mine support facilities (Figure 15-7) located at the Mine include an office building for mine management staff, production engineers, environmental personnel, safety personnel, and other support staff.

Truck shops, truck wash, railroad shop, and warehouse buildings are located on the site. There are four bays used for the maintenance of large production equipment including trucks.

Explosive delivery and handling is performed by contractors. There is no storage of explosives at the site.

Security is provided by General Security Services Corporation (GSSC) and is managed by the Northshore Safety department. Hazardous waste disposal is contracted to OSI Environmental, Inc. and is managed by the Northshore Environmental department.

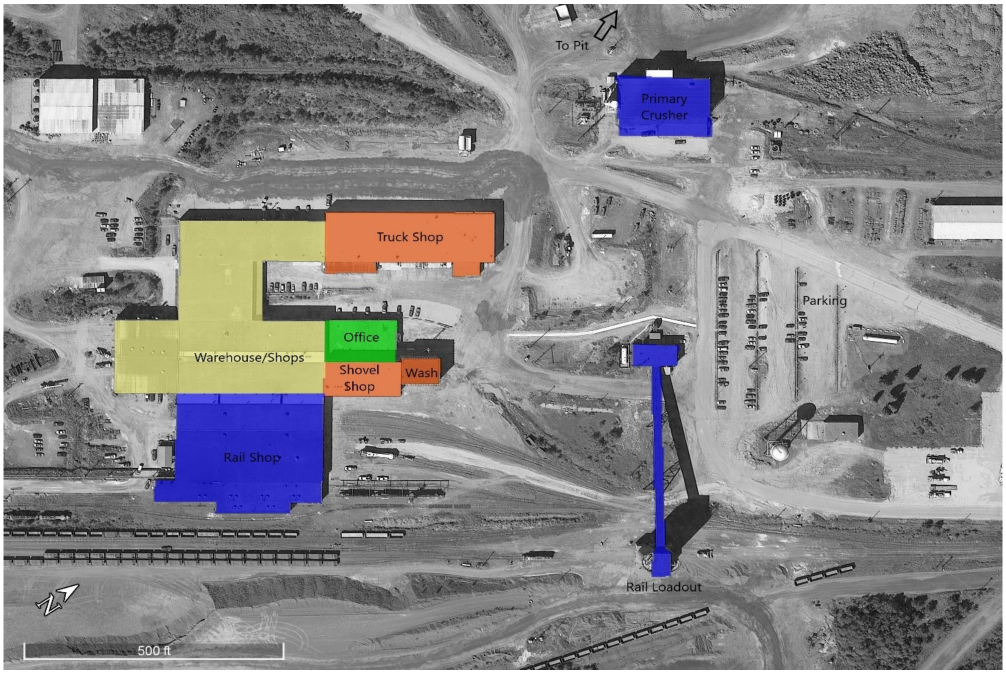


Figure 15-7: Peter Mitchell Mine Facilities

15.11 Silver Bay Plant Facilities

Figure 15-8 shows a general layout of the Plant facilities.

The General Office Building and the Department Maintenance Office (DMO) building house administration, management, engineering, and other support staff. Additional salaried staff offices, locker rooms, and employee parking lots are located at the fine crusher, concentrator, truck shop, warehouse, pellet plant, and powerhouse. Several service buildings are located in Silver Bay: Hazardous Waste building, Truck Shop, Belt Shop, Stores/Repair Building, and additional auxiliary sheds and storage buildings. A laboratory is located inside the concentrator building. Samples from the Mine and Plant are analyzed here. The laboratory is ISO-certified to iron industry standard procedures.Several support facilities are distributed throughout the Plant site in Silver Bay.

The plant utility systems (water, sewer, gas, compressed air, heating steam, etc.) interconnect all areas and departments. All systems on the Plant property are owned and operated by NSM. The potable water and sanitary sewer are connected to the public systems, owned and operated by the city of Silver Bay.

Security is provided by GSSC and is managed by the Northshore Safety department. Hazardous waste disposal is contracted to OSI Environmental, Inc. and is managed by the Northshore Environmental department.

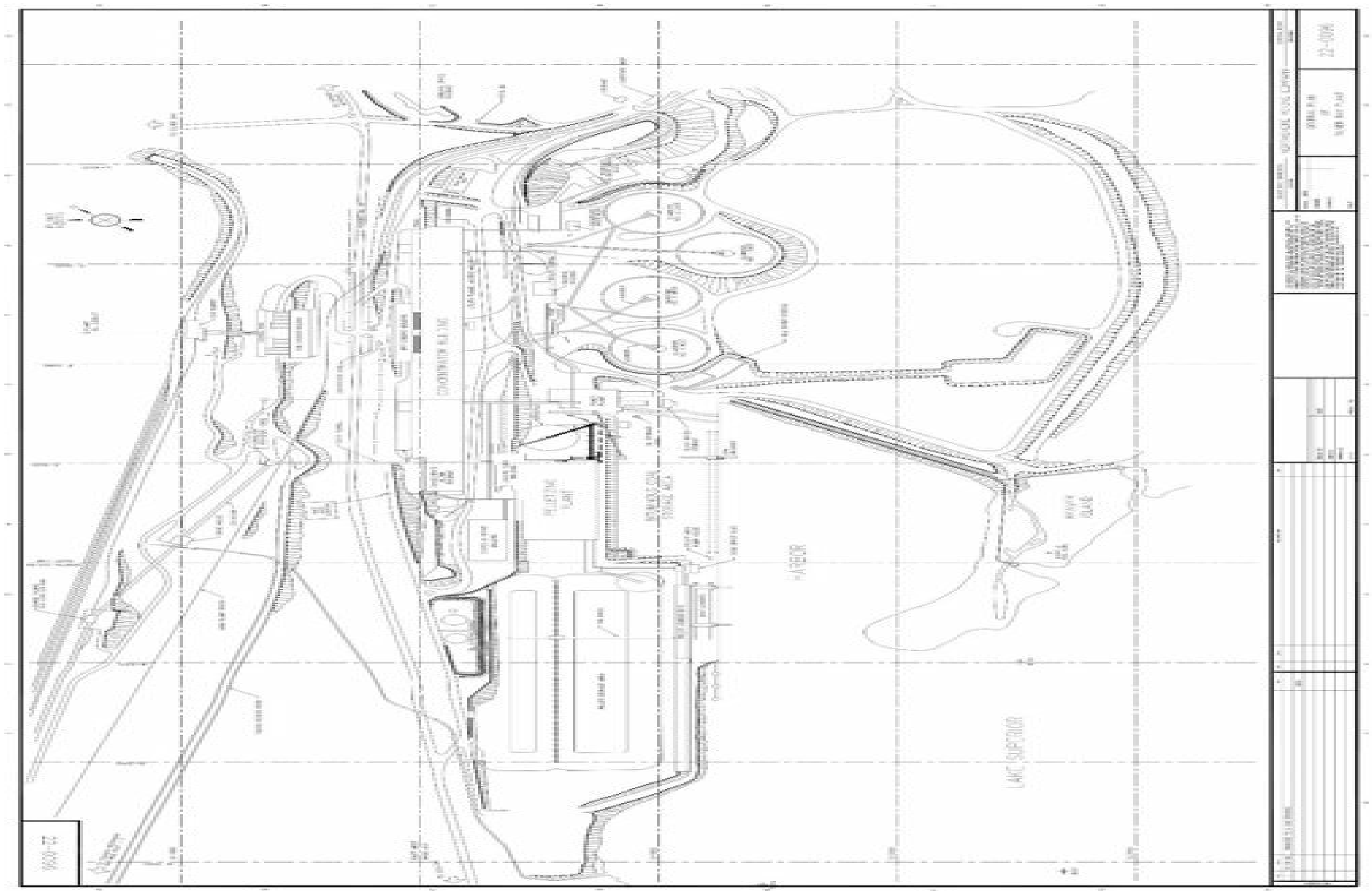


Figure 15-8: Silver Bay Plant Facilities

16.0 MARKET STUDIES

16.1 Markets

Note that while iron ore production is listed in long or gross tons (2,240 lb), steel production is normally listed in short tons (2,000 lb) or otherwise noted.

Cliffs is the largest producer of iron ore pellets in North America. It is also the largest flat-rolled steel producer in North America. In 2020, Cliffs acquired two major steelmakers, ArcelorMittal USA (AMUSA), and AK Steel (AK), vertically integrating its legacy iron ore business with steel production and emphasis on the automotive end market.

Cliffs owns or co-owns five active iron ore mines in Minnesota and Michigan. Through the two acquisitions and transformation into a vertically integrated business, the iron ore mines are primarily now a critical source of feedstock for Cliffs' downstream, primary steelmaking operations. Based on its ownership in these mines, Cliffs' share of annual rated iron ore production capacity is approximately 28.0 million tons, enough to supply its steelmaking operations and not have to rely on outside supply.

In 2021, with underlying strength in demand for steel, the price reached an all time high. It is expected to remain at historically strong levels going forward for the foreseeable future. In 2020, North America consumed 124 million tons of steel while producing only 101 million tons, which is consistent with the historical trend of North America being a net importer of steel. That trend is expected to continue going forward, as demand is expected to outpace supply in North America. Given the demand, it will likely be necessary for most available steelmaking capacity to be utilized.

On a *pro forma* basis, in 2019 Cliffs shipped 16.5 million tons of finished flat-rolled steel. The next three largest producers were Nucor with 12.7 million tons, U.S. Steel with 10.7 million tons, and Steel Dynamics with 7.7 million tons. In 2019, total US flat-rolled shipments in the United States were approximately 60 million short tons, so these four companies make up approximately 80% of shipments.

With respect to its blast furnace (BF) capacity, Cliffs' ownership and operation of its iron ore mines is a primary competitive advantage against electric arc furnace (EAF) competitors. With its vertically integrated operating model, Cliffs is able to mine its own iron ore at a relatively stable cost and supply its BF and DRI facilities with pellets in order to produce an end steel or HBI product, respectivelyFlat-rolled EAFs rely heavily on bushelling scrap (offcuts from domestic manufacturing operations and excludes scrap from obsolete used items), which is a variable cost. The supply of prime scrap is inelastic, which has caused the price to rise with the increased demand. S&P Global Platts has stated the open-market demand for scrap could grow by nearly 9 million tons through 2023 as additional EAF capacity comes online, with the impact of the scrap market to continue to tighten as all new steel capacity slated to come online is from EAFs (S&P Global Platts, news release, March 18, 2021).

In addition to its traditional steel product lines, Cliffs-produced steel is found in products that are helping in the reduction of the global emissions and modernization of the national infrastructure. For example, Cliffs' research and development center has been working with automotive manufacturer customers to meet their needs for electric vehicles. Cliffs also offers a variety of carbon and plate products that can be used in windmills, while it is also the sole producer of electrical steel in the United States. Additionally, in Cliffs' opinion, future demand for steel given its low CO_2 emissions positioning will increase relative to other materials such as aluminum or carbon fiber.

Cliffs is uniquely positioned for the present and future due to a diverse portfolio of iron ore, HBI, BFs, and EAFs generating a wide variety of possible strategic options moving forward, especially with iron ore. For instance, Cliffs has the optionality to continue to provide iron ore to its BFs, create more DRI internally, or sell iron ore externally to another BF or DRI facility.

The necessity for virgin iron materials like iron ore in the industry is apparent, as EAFs rely on bushelling scrap or metallics. As of 2020, EAFs accounted for 71% of the market share, a remarkably high percentage among major steelmaking nations. Because scrap cannot be consistently relied upon as feedstock for high-quality steel applications, the industry needs iron ore-based materials like those provided by Cliffs to continue to make quality steel products.

The US automotive business consumes approximately 17 million tons of steel per year and is expected to consume around or at this level for the foreseeable future. Cliffs' iron ore reserves provide a competitive advantage in this industry as well, due to high quality demands that are more difficult to meet for scrap-based steelmakers. As a result, Cliffs is the largest supplier of steel to the automotive industry in the United States by a large margin.

Table 16-1 shows the historical pricing for hot rolled coil (HRC) product, Bushelling Scrap feedstock, and IODEX iron ore indexes for the last five years. The table includes the 2021 pricing for each index, which shows a significant increase that is primarily driven by demand.

Table 16-1: Five Year Historical Average Pricing
Cleveland-Cliffs Inc. – Northshore Property

Indices	2017	2018	2019	2020	2021	5 Yr. Avg.
U.S. HRC ($/short ton)	620	830	603	588	1611	850
Busheling ($/gross ton)	345	390	301	306	562	381
IODEX ($/dry metric ton)	71	69	93	109	160	100

The economic viability of Cliffs' iron ore reserves will in many cases be dictated by the pricing fundamentals for steel, as well as scrap and seaborne iron ore itself.

The importance of the steel industry in North America, and specifically the USA, is apparent by the actions of the US federal government by implementing and keeping import restrictions in place. Steel is a product that is a necessity to North America. It is a product that people use every day, often without even knowing. It is important for middle-class job generation and the efficiency of the national supply chain. It is also an industry that supports the country's national security by providing products used for US military forces and national infrastructure. Cliffs expects the US government to continue recognizing the importance of this industry and does not see major declines in the production of steel in North America.

For the foreseeable future, Cliffs expects the prices of all three indexes to remain well above their historical averages, given the increasing scarcity of prime scrap as well as the shift in industry fundamentals both in the US and abroad.

16.2 Contracts

16.2.1 Pellet Sales

Since Cliffs' 2020 acquisition of AK and AMUSA's BF steel making facilities, Northshore pellets are shipped predominantly to Cliffs' steelmaking facilities in the Midwestern USA.

For cash flow projections, Cliffs uses a blended three-year trailing average revenue rate based on the dry standard pellet from all Cliffs mines, calculated from the blended wet pellet revenue average of $98/WLT Free on Board (FOB) Mine as shown in Table 16-2.Pellet prices are negotiated with each customer on long-term contracts based on annual changes in benchmark indexes such as those shown in Table 16-1 and other adjustments for grade and shipping distances.

Table 16-2: Cliffs Consolidated Three-Year Trailing Average Wet Pellet Revenue
Cleveland-Cliffs Inc. – Northshore Property

Description	2017	2018	2019	3YTA
Revenue Rate ($/WLT)	88.02	105.64	99.50	98.00
Total Pellet Sales (MWLT)	18.7	20.6	19.4	19.5

SLR examined annual pricing calculations provided by Cliffs for the period from 2017 to 2019 for external customers, namely AK.The terms appear reasonable. It should be noted that Cliffs has subsequently acquired AK and AMUSA steelmaking facilities in 2020, making the company a vertically integrated, high-value steel enterprise, beginning with the extraction of raw materials through the manufacturing of steel products, including prime scrap, stamping, tooling and tubing.

For the purposes of this TRS, it is assumed that the internal transfer pellet price for Cliffs' steel mills going forward is the same as the $98/WLT pellet price when these facilities were owned by AK and AMUSA.Based on macroeconomic trends, SLR is of the opinion that Cliffs pellet prices will remain at least at the current three-year trailing average of $98/WLT or above for the next five years.

16.2.2 Operations

Major current suppliers for the Northshore operation include, but are not limited to, the following:

- Electrical Grid Power: Minnesota Power
- Natural Gas: NNG with scheduling by Constellation Energy
- Diesel Fuel: Best Oil
- Propane: Thompson Gas
- Pellet Rail Transport to Silver Bay: Northshore Mining Railroad, Cliffs' wholly owned subsidiary

17.0 ENVIRONMENTAL STUDIES, PERMITTING, AND PLANS, NEGOTIATIONS, OR AGREEMENTS WITH LOCAL INDIVIDUALS OR GROUPS

The SLR review process for Northshore included updating information that Cliffs had developed as part of its draft 2019 SK-1300 reportSLR also conducted a site visit at Northshore in 2019. SLR has not seen nor reviewed environmental studies, management plans, permits, or monitoring reports. The original and updated information included in this section is based on the information provided by the Cliffs project team.

17.1 Environmental Studies

Northshore has conducted several environmental impact assessments for specific projects over time that have supported different aspects of its current operation. Each of those studies culminated in a determination by the relevant state and/or federal authorities to grant permits to construct and operate NSM's facilities. The relevant historical studies are listed below. There are no environmental impact studies in process at this time.

- 1976 Environmental Impact Statement (State) for an on-land tailings disposal plan
- 1977 Environmental Impact Statement (Federal) for an on-land tailings disposal plan
- 1976 Environmental Impact Statement (State) for an on-land tailings disposal plan
- 2005 Environmental Assessment Worksheet (State) for reactivation of pelletizing Furnace #5
- 2013 Environmental Assessment Worksheet (State) for development of the Gilmore Creek stream mitigation site
- 2014 Environmental Assessment Worksheet (State) for mining and storage of Virginia Formation overburden rock
- 2017 Environmental Review Needs Determination (State) for an on-land tailings disposal plan.
- 2021 Environmental Review Needs Determination (State) for an on-land tailings disposal plan

Northshore has been operating for over 65 years, and baseline and other environmental studies have been undertaken as needed to support various approvals over the site's operating history. Currently, additional environmental studies, including collecting new or updated baseline information, are undertaken on an as-required basis to support new permit applications or to comply with specific permit conditions.

Northshore operates and reports on two "test plots" being used as a control for an engineered stockpile cover in Babbitt, for material referred to as "Type II Virginia Formation". It is a requirement under the State Permit to Mine.

17.2 Environmental Requirements

NSM maintains an environmental management system (EMS) that is registered to the international ISO 14001:2015 standardThe ISO standard requires components of leadership commitment, planning, internal and external communication, operations, performance evaluation, and management review. NSM's continued registration to the ISO standard is evaluated every two years through external auditors.

Nearly all NSM's permits require self-reporting at a regular interval (i.e., water compliance is monthly, solid waste is annually, air either quarterly, semi-annually or annually, depending on the permit requirements). Cliffs also reports internal corporate metrics that are tallied monthly. Compliance audits are conducted through a third-party consultant every three years.

Cliffs tracks and records external complaints/compliments in an internal log that is audited during the ISO 14001 audits.

17.2.1 Site Monitoring

Northshore operates through permission granted by multiple permits, which are summarized in Table 17-1. The permits contain requirements for site monitoring including air, water, waste, and land aspects of the Property. The permit-required data are maintained by the facility, and exceptions to the monitoring obligations are reportable to the permitting authority. Monitoring is conducted in compliance with permit requirements, and management plans are developed as needed to outline protocols and mitigation strategies for specific components or activities. Monitoring and management programs currently undertaken in compliance with NSM's existing permits include:

- Air Quality: Management plans including fugitive dust control plans, operation and maintenance plans, and malfunction plans; monitoring of fugitive sources and stacks, visible dust emission monitoring at the TSF; and greenhouse gas (GHG) emissions monitoring and reporting.
- Noise and Vibration: Blast management plans including vibration monitoring.
- Surface Water: Routine water quality sampling in receiving waters; quantity of water takings and discharges.
- Groundwater: Routine water quality sampling at mine and plant monitoring wells; quantity of water takings; monitoring discharge seepage around the tailings basin.
- Wetlands: monitoring of nearby wetlands where a potential impact has been identified, including related to drawdown and/or discharge activities.
- Wildlife: monitoring of endangered species in accordance with specific permit conditions.
- Solid Waste: Industrial Solid Waste Management Plan, Closure and Post-closure Care Plan, Operations and Maintenance Plan, and Sampling and Analysis Plan for the ash landfill near the Milepost 7 Tailings Basin.
- Mineland Reclamation: Type II Virginia Formation Stockpile Plan for the management of higher sulfur-containing material.

There are no specific management plans related to social aspects in place.

There have been a series of engineering stack tests over the past three years that have resulted in emissions above the permitted limits. All exceedances are reported as required to the MPCA in the semi-annual deviations reports.SLR understands that all exceedances undergo a thorough root cause analysis to identify corrective actions that are then implemented. These events are also reported in the internal corporate environmental metrics and are reported up through the senior management within Cliffs.

The State and Federal government conduct regional ecologic monitoring in the vicinity of the Northshore operations. Two recent examples of such monitoring include:

- U.S. Environmental Protection Agency (EPA) conducted its residual risk and technology review (RTR) of the Taconite NESHAP (40 CFR 63). EPA's final rule (July 28, 2020) documents that risks from the Taconite Iron Ore Processing source category are acceptable, and the current standards provide a margin of safety to protect public health and prevent an adverse environmental effect.
- The State of Minnesota conducts regional watershed monitoring to assess the overall health of waterbodies throughout the state including water quality and macroinvertebrate and fish population diversity and health. The State may develop watershed management tools for waterbodies of concern such as Total Maximum Daily Load (TMDL) plans. Northshore is not currently subject to any TMDL-based load restrictions.

17.2.2 Water

Northshore presently maintains NPDES/State Disposal System (SDS) permits for both the Mine in Babbitt, Minnesota and the Plant in Silver Bay, Minnesota. The following are permitted under NPDES Permit MN0046981 in Babbitt: twelve mine pit dewatering outfalls, four sanitary outfalls, and four outfalls from the crushers and associated shops. The Milepost 7 water treatment plant (WTP) and Silver Bay Power's non-contact cooling water are regulated under NPDES Permit MN0055301 and discharge to the Beaver River and Lake Superior, respectively. The following are permitted under NPDES Permit MN0055301 in Silver Bay: twelve groundwater wells, ten surface water discharge stations, seven surface water stations, and twelve waste stream stations. These discharge outfalls have provided adequate permitted capacity to move water as necessary to support the mining process.

NSM submits Discharge Monitoring Reports for several parameters (separate for each parameter) for both the Mine and Plant on a monthly basis as per the NPDES permits. It also conducts additional monitoring in Babbitt while it manages Type II Virginia Formation material.

Northshore maintains five water appropriations permits for both surface and groundwater with excess capacity for the Mine and Plant sites.

Northshore's current LOM is projected at 48 years as referenced in section 13.4 of this TRS. This long life makes preparation of a detailed closure plan difficult to undertake, as the final configuration of the Mine and Plant facilities are not established. Minnesota Rule 6130.4600 does not require a plan for deactivation of the mine until at least two years in advance of deactivation of a mining area. No plan has yet been required or requested by the State agency with the exception of a Closure Plan for the Milepost 7 Tailings Basin, which is incorporated into the Five-Year Operations Plan for the basin. That plan requires operation of the existing water treatment facility to reduce the basin pond levels and operate until such time that direct release of water can occur as necessary. Cliffs currently has a post-closure care plan for the ash landfill near the Milepost 7 Tailings Basin, but the landfill is still active.

17.2.3 Hazardous Materials, Hazardous Waste, and Solids Waste Management

The Mine qualifies as a Small Quantity Generator status according to the federal Resource Conservation and Recovery Act (RCRA). At the E.W. Davis Works, waste generation from maintenance projects dictates the generator status. Because generator status is determined month-by-month, the facility fluctuates between a Large Quantity Generator and a Small Quantity Generator status. Hazardous waste management is authorized by permits from the applicable regulatory authorities (see Table 17-1 for a full list of permits). NSM manages coal ash from the onsite power plant at its industrial landfill permitted through the State of Minnesota. Northshore generates other waste materials typical of any large industrial site and manages those wastes offsite through approved vendors.

17.2.4 Tailings Disposal

Requirements for tailings disposal are discussed in section 15.4 of this TRS. Tailings disposal is authorized by permits from the applicable regulatory authorities (see Table 17-1 for a full list of permits).

Because iron ore geology is different from some other mineral deposits, acid rock drainage (ARD) is not a concern with the iron ore mines and associated tailings in Minnesota. Moreover, EPA itself describes the iron ore mining and beneficiation process as generating wastes that are "earthen in character." Chemical constituents from iron ore mining include iron oxide, silica, crystalline silica, calcium oxide, and magnesium oxide — none of which are Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances. The acid-neutralizing potential of carbonates in iron ore offsets any residual ARD risks, leading to pit water that naturally stabilizes at a pH of 7.5 to 8.5.

Over 20 years of monitoring of the effluent from the tailings basin has not indicated any cause for concern of ARD or metals leaching. NSM continues to monitor its effluent from the basin going forward as prescribed under its applicable permits.

17.2.5 Mine Overburden and Waste Rock Materials

Requirements for the disposal of mine overburden and non-mineralized or lean rock are discussed in section 13.5 of this report. Stockpiling of these materials is authorized by permits from the applicable regulatory authorities (see Table 17-1 for a full list of permits).

Northshore's pit has localized regions of Virginia Formation that overlie the iron formation. Virginia Formation can have elevated levels of sulfur, giving rise for the potential for ARD as this layer is stripped. A plan for identification, extraction, material management, and monitoring has been approved by the Minnesota DNR and provides reasonable safeguards to continue to remove the Virginia Formation material without undue risk of ARD. This plan is required by and covered under the Permit to Mine through the MDNR and the NPDES Permit for Babbitt through the MPCA.

The MDNR conducts annual reclamation inspections at Babbitt and Silver Bay. For the Type II Virginia Formation Stockpile, inspections will be carried out in accordance with the Type II Virginia Formation Stockpile Plan.

17.3 Operating Permits and Status

NSM operates through permission granted by multiple permits, which are summarized in Table 17-1. Northshore is operating under a Schedule of Compliance issued by the MPCA in 2015 that establishes milestones and obligations relative to fluoride and amphibole mineral particle concentrations in the WTP discharge. There was one amphibole exceedance; however, Cliffs believes that it is due to a laboratory error. Cliffs indicated that Northshore is operating in compliance with the terms of the Schedule of Compliance.

While permitting always involves varying degrees of risk due to external factors, Cliffs has indicated that it has a demonstrated record of obtaining necessary environmental permits without unduly impacting the facility operational plan.

The following permit applications are pending with a permitting authority:

- MDNR: Wetlands Conservation Act approval to impact wetlands associated with the progression of the mine pit.
- MDNR: Permit to Mine Amendment to update the Milepost 7 Permit to Mine boundary, incorporate clay borrow areas.

It is understood that all required permits are in place.

Table 17-1: List of Major Permits and Licenses
Cleveland-Cliffs Inc. – Northshore Property

Permit No	Description	Type	Jurisdiction	Agency	Status
SNM-1562	Radiation Sources	Radiation Sources	Federal	USNRC	Active
22-13759-01	Radiation Sources	Radiation Sources	Federal	USNRC	Active
-	Western Mine Progression	Wetlands	State	MDNR	Active
2005-2628-TWP	Milepost 7 Wetlands Filling Permit	Wetlands	Federal	USACE	Active
2005-01560-TWP	Expansion of Mine Main and East Pits	Wetlands	Federal	USACE	Active
2014-01685-DWW	Southern Pit Progression	Wetlands	Federal	USACE	Active
2007-00841-TWP	Bear Lake Outlet	Wetlands	Federal	USACE	Active
2010-04573-DWW	East End Progression/Gilmore Creek	Wetlands	Federal	USACE	Active
2107-02604-KAL	Babbitt RR Yard	Wetlands	Federal	USACE	Active
---	Expansion of Mine Main and East Pits: WCA Notice of Decision	Wetlands	State	MDNR	Active
---	Southern Pit Progression: WCA Notice of Decision	Wetlands	State	MDNR	Active
---	Bear Lake Outlet: WCA Notice of Decision	Wetlands	State	MDNR	Active
---	East End Progression/Gilmore Creek: WCA Notice of Decision	Wetlands	State	MDNR	Active

Permit No	Description	Type	Jurisdiction	Agency	Status
---	Babbitt RR Yard: WCA Notice of Decision	Wetlands	State	MDNR	Active
---	West Ridge Railroad Relocation and Tailings Basin Progression: WCA Notice of Decision	Wetlands	State	MDNR	Active
PWSID 5690080	MDH Non-Community Non-Transient Public Water Supply	Potable Water Plant	State	MDH	Active
various	Wells	Wells	State	MDH	Active
1979-2120	Harbor Dredging	Public Waters Work Permit	State	MDNR	Active
MP7 Op	Milepost 7 Five-Year Operations Plan	Plan	State	MDNR	Active
MP7 Master	Milepost 7 Master Permit	Tailings Basin Master Permit	State	MDNR	Active
Mine Permit	Permit to Mine	Mining	State	MDNR	Active
852065	Water Appropriations - Babbitt Potable Water	Water Appropriation	State	MDNR	Active
822097	Water Appropriations - Mine Dewatering	Water Appropriation	State	MDNR	Active
762052	Water Appropriations - Milepost 7 WTP	Water Appropriation	State	MDNR	Active
912189	Water Appropriations - Pellet Cooling Water	Water Appropriation	State	MDNR	Active
470012	Water Appropriations - PH Non-Contact Cooling	Water Appropriation	State	MDNR	Active
various	Aboveground Storage Tank Permit	Tanks	State	MPCA	Active
MNS000102392	Hazardous Waste Generator - Babbitt	Hazardous Waste	State	MPCA	Active

Permit No	Description	Type	Jurisdiction	Agency	Status
MND006449649	Hazardous Waste Generator - Silver Bay	Hazardous Waste	State	MPCA	Active
SW-409	Industrial Landfill (IL001) at Milepost 7	Landfill	State	MPCA	Active
MN0055301-2005	NPDES/SDS E.W. Davis Works, Milepost 7 and Silver Bay Power	NPDES	State	MPCA	Active, Administratively Extended
MN0046981	NPDES/SDS: Peter Mitchell Mine	NPDES	State	MPCA	Active, Administratively Extended
13700032	Title V Air Permit - Babbitt	Air	State	MPCA	Active, Administratively Extended
7500003	Title V Air Permit - Silver Bay	Air	State	MPCA	Active, Administratively Extended

Notes:

MDH: Minnesota Department of Health
MDNR: Minnesota Department of Natural Resources
MPCA: Minnesota Pollution Control Agency
USACE: United States Army Corps of Engineers
USNRC: United States Nuclear Regulatory Commission
WCA: Wetland Conservation Act

Regulatory issues that could have a bearing on NSM's current plans to address any issues related to environmental compliance and permitting are actively monitored and disclosed in Cliffs' 10-K. Please refer to Part I – Environment of that document for discussion relevant to:

- Minnesota's Withdrawal of Proposed Amendments to the Sulfate Wild Rice Water Quality Standard
- Evolving water quality standards for conductivity
- Definition of "Waters of the United States" Under the Clean Water Act
- Mercury TMDL and Minnesota Taconite Mercury Reduction Strategy
- Climate Change and GHG Regulation
- Regional Haze Federal Implementation Plan Rule
- NO_2 and SO_2 National Ambient Air Quality Standards (NAAQS)
- CERCLA 108(b)
- Regulation of Discharges to Groundwater

17.4 Mine Closure Plans and Bonds

Northshore's current mine life is projected at 48 years as outlined in section 13.4 of this TRS. This long life makes preparation of a detailed closure plan difficult to undertake as the final configurations of the

Mine and Plant facilities are not established. Minnesota Rule 6130.4600 does not require a plan for deactivation of the mine until at least two years in advance of deactivation of a mining area. No plan has yet been required or requested by the State agency with the exception of a Closure Plan for the Milepost 7 Tailings Basin, which is incorporated into the current Five-Year Operations Plan for the basin. As a matter of good mining practice, NSM seeks to conduct progressive reclamation throughout its mining life to minimize risk and costs at closure. NSM actively reclaims the outer surfaces of the tailings basin dams and develops in-pit stockpiles to reduce new stockpile footprints consistent with the State of Minnesota mining rule requirements.

Cliffs performs an annual review of significant changes to each operation's Asset Retirement Obligation (ARO) cost estimates. Additionally, Cliffs conducts an in-depth review every three years to ensure that the ARO legal liabilities are accurately estimated based on current laws, regulations, facility conditions, and cost to perform services. The cost estimates are conducted in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 410. FASB ARO estimates comply with rules set forth by the United States General Accepted Accounting Principles (US GAAP) and the SEC, and those costs are reported as part of Cliffs' SEC disclosures. Arcadis calculated the 2020 ARO legal obligation closure and reclamation costs associated with project deactivation to be $113.4 million (Arcadis, 2020). The total ARO liability for Cliffs is $120 million; to calculate the total ARO liability, Cliffs deducts Arcadis' specified contingency value and adds Cliffs accounting policy contingency at 15% and Cliffs accounting policy market risk at 4%. SLR notes that there are differences between the ARO estimate and the book value calculated by Cliffs due to the long life of the operation.

While a formal, site-wide closure plan has not been established, NSM worked with a third party to develop a site-specific estimate of actual closure and reclamation cost, which considers likely approaches and techniques to close the facility. Cliffs indicated that from a water management perspective, the closure concept includes closure of the tailings basin consistent with Cliffs' closure forecast described in the Milepost 7 Five-Year Operations Plan, which anticipates a gradual reduction of water levels in the basin coupled with reclamation of the tailings surfaces as they are dewatered. Mine pits will be allowed to naturally refill with groundwater, which will eventually reach an elevation with a natural outfall toward the east and into the Dunka River.

SLR cannot comment on adequacy of the closure costing and the closure plan based on currently available information.

17.4.1 Post-Performance or Reclamations Bonds

Current requirements for performance or reclamation bonds are:

- Performance Bond: Assurance of Closure/Post Closure Care for Industrial Solid Waste Landfill, $3,630,143.00
- Performance Bond: Assurance of Performance of Gilmore Creek Stream Mitigation, $200,000.00
- Performance Bond: Assurance of Performance of waste tire management, $30,000.00
- Performance Bond: Assurance of Closure/Post Closure Care for Type II Virginia Formation stockpile rock management, $12,630,264
- Letter of Credit: Assurance of Closure/Post Closure Care for tailings basin, $4,000,000.00

- Letter of Credit: Assurance of Closure/Post Closure Care for Type II Virginia Formation stockpile rock management, $3,157,565.80

17.5 Social and Community

Cliffs has been investing in the region for over a century, including direct employment and contributions to state, local, and taconite taxes. Taconite taxes contribute to an existing government-administered property tax credit program for people living in the Mesabi Iron Range mining region funded through mining production taxes. SLR is not aware of any formal commitments to local procurement and hiring; however, Cliffs has indicated that it has long-standing relationships with local vendors and also purchases through local and regional services and suppliers.

Cliffs employees make contributions to local United Way chapters through donations that are matched with a company contribution. Cliffs employees are also board members and volunteers for the United Way. Another initiative includes agreements with local municipalities or organizations to make Cliffs-owned or leased land that is not utilized for mining available for local community use including trails used for snowmobiling, biking, and ATV use. There is also a lease agreement in place for a local marina with Silver Bay and MDNR for Black Beach, a popular tourist area. Cliffs also leases property to the city of Silver Bay that provides a publicly accessible overlook of the city and taconite plant operation and installed signage with information about Northshore and tourist attractions in the city.

SLR is not able to verify adequacy of management of social issues and what the general issues raised are; however, it understands that Cliffs has a positive relationship with stakeholders and that, in the event of a complaint, Cliffs works directly with affected community members to develop a mutually acceptable resolution of the issue. Public Affairs representatives from Cliffs formally engage with the community on an ongoing basis and serve as the face of the company. They sit on boards of community and business organizations at regional and local levels, participate in discussions with government officials, and act as a point of contact within the community. In doing so, they keep stakeholders apprised of critical issues to the operations, understand important topics in the community, and seek to listen to any questions or concerns. Cliffs indicated that this strategy allows it to maintain an ongoing relationship with stakeholders and collaborate with communities to find solutions should any issues arise. Cliffs' Public/Government Affairs maintains a list of stakeholders for Cliffs' iron ore mine operations.

18.0 CAPITAL AND OPERATING COSTS

Cliffs' forecasted capital and operating costs estimates are derived from annual budgets and historical actuals over the long life of the current operation. According to the American Association of Cost Engineers (AACE) International, these estimates would be classified as Class 1 with an accuracy range of -3% to -10% to +3% to +15%. All unit rates are reported in WLT pellets.

18.1 Capital Costs

Capital costs were derived from current levels and work of similar scope based on the Q2 2021 forecast. Table 18-1 shows the sustaining capital cost forecast for the five-year period from 2022 to 2026, which totals $197.6 million, or $6.17/WLT pellet. These costs include but are not limited to:

- Mobile equipment additions and replacements
- Infrastructure and fixed equipment improvements

For the remaining life of the operation starting in 2027, a sustaining capital cost of $4/WLT pellet, or $20.3 million annually, is used in the economic model for an additional $830.8 million for the remaining mine life. A further $25 million in "Other" additional mine fleet purchases (grader, haul trucks, loader, dozer, and drill) are to be added at regular intervals during the remaining mine life.

Table 18-1: LOM Capital Costs
Cleveland-Cliffs Inc. – Northshore Property

Type	Values	Total	2022	2023	2024	2025	2026	2027-2069
			Capital Costs					
Productive/Other	$ millions	25.0	0	0	0	0	0	25.0
Sustaining	$ millions	989	43.8	40.9	35.9	20.4	16.8	830.8
Total	**$ millions**	**1,014**	**43.8**	**40.9**	**35.9**	**20.4**	**16.8**	**855.8**
			Pellet Sales					
Pellet Sales	**MWLT**	**241.6**	**5.3**	**5.4**	**5.4**	**5.4**	**5.4**	**214.9**
			Unit Rates					
Productive/Other	$/WLT	0.10	0	0	0	0	0	0.12
Sustaining	$/WLT	4.09	8.24	7.64	6.71	3.81	3.14	3.85
Total	**$/WLT**	**4.20**	**8.24**	**7.64**	**6.71**	**3.81**	**3.14**	**3.96**

A final closure reclamation cost of $120 million is estimated, with $40 million spent annually starting in the last year of production in 2069 and the two subsequent years.

18.2 Operating Costs

Operating costs for the LOM are based on the 2022 plan. For this period, costs are based on a full run rate with a combination of both standard and low-silica production consistent with what is expected for the LOM. At this point in time there are no items identified that should significantly impact operating costs either positively or negatively for the evaluation period. Minor year-to-year variations should be expected based upon maintenance outages and production schedules. Forecasted 2021 and average operating costs over the remaining 48 years of mine life are shown below in Table 18-2.

Table 18-2: LOM Operating Costs
Cleveland-Cliffs Inc. – Northshore Property

Parameter	2022 ($/WLT Pellet)	LOM ($/WLT Pellet)
Mining	16.38	20.37
Processing	40.21	42.59
Site Administration	3.51	3.80
General/Other Costs	11.07	13.30
Operating Cash Cost ($/WLT Pellet)	**71.17**	**80.06**

Processing costs consist of railing ore from the Mine to the Plant, as well as typical crushing, grinding, concentrating, pelletizing, and ship loading activities and tailings basin disposal. General/Other costs include production tax and royalty costs, insurance, corporate cost allocations, and other minor costs.

The operation employs a total of 605 salaried and hourly employees per the 2022 budget as of consisting of 152 salaried and 453 hourly employees, which are non-union.

Table 18-3 summarizes the current workforce levels by department for the Property.

Table 18-3: Workforce Summary
Cleveland-Cliffs Inc. - Northshore Property

Category	Salary	Hourly	Total
Mine	32	152	184
Railroad	12	72	84
Silver Bay Plant	40	229	269
Asset Management	33	0	33
General Staff Organization	35	0	35
Total	**152**	**453**	**605**

19.0 ECONOMIC ANALYSIS

19.1 Economic Criteria

The economic analysis detailed in this section is based on the current mine plan. The assumptions used in the analysis are current at the time the analysis was completed (Q2 2021), which may be different from the economic assumptions defined in Sections 11.0 and 12.0 when calculating the economic pit. For this period, costs are based on a full run rate with a combination of both standard and low-silica pellet production, consistent with what is expected for the LOM.

An un-escalated technical-economic model was prepared on an after-tax DCF basis, the results of which are presented in this section.Key criteria used in the analysis are discussed in detail throughout this TRS. General assumptions used are summarized in Table 19-1.

Cliffs uses a 10% discount rate for DCF analysis incorporating quarterly cost of capital estimates based on Bloomberg data.SLR is of the opinion that a 10% discount/hurdle rate for after-tax cash flow discounting of large iron ore and/or base metal operations is reasonable and appropriate.

Table 19-1: Technical-Economic Assumptions
Cleveland-Cliffs Inc. – Northshore Property

Description	Value
Start Date	December 31, 2021
Mine Life	48 years
Three-Year Trailing Average Revenue	$98/WLT Pellet
Operating Costs	$80.06/WLT Pellet
Sustaining Capital (after six years)	$4/WLT Pellet
Discount Rate	10%
Discounting Basis	End of Period
Inflation	0%
Federal Income Tax Rate	20%
State Income Tax Rate	None – Sales made out of state

The operating cost of $80.06/WLT pellet includes royalties and State of Minnesota production taxes.

The production and cost information developed for the Property are detailed in this section. Table 19-2 is a summary of the estimated mine production over the 48-year mine life.

Table 19-2: LOM Production Summary
Cleveland-Cliffs Inc. – Northshore Property

Description	Units	Value
ROM Crude Ore	MLT	822.4
Total Material	MLT	1,456.2
MagFe Grade	%	24.6
Annual Mining Rate	MLT/y	30.0

Table 19-3 is a summary of the estimated plant production over the 48-year mine life.

Table 19-3: LOM Plant Production Summary
Cleveland-Cliffs Inc. – Northshore Property

Description	Units	Value
ROM Material Milled	MLT	822.4
Annual Processing Rate	MLT/y	17.0
Process Recovery	%	29.4
Standard Pellet	MLT	80.5
DR-Grade Pellet	MLT	161.1
Total Pellet	MLT	241.6
Annual Pellet Production	MLT/y	5.0

19.2 Cash Flow Analysis

The indicative economic analysis results, presented in Table 19-4, indicate an after-tax NPV, using a 10% discount rate, of $619 million at an average blended wet pellet price of $98/WLT. The after-tax IRR is not applicable since the Plant has been in operation for a number of years. Capital identified in the economics is for sustaining operations and plant rebuilds as necessary.

Project economic results and estimated cash costs are summarized in Table 19-4. Annual estimates of mine production and pellet production with associated cash flows are provided for years 2022 to 2026 and then by ten year groupings through to the end of the mine life.

The economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

Table 19-4: Life of Mine Indicative Economic Results
Cleveland-Cliffs Inc. – Northshore Property

Mine Life		1	2	3	4	5	6-15	16-25	26-35	36-45	46-48
Calendar Years	**Total**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027-2036**	**2037-2046**	**2047-2056**	**2057-2066**	**2067- 2069**
Reserve Base:											
Northshore Ore Pellet Reserve Tons (millions)	241.6	236.3	231.0	225.6	220.3	214.9	164.0	113.0	62.4	12.2	(0.0)
Tonnage Data:											
Northshore Total Tons Moved (millions)	1,456.2	26.1	30.9	30.1	29.9	29.4	298.4	318.0	332.6	293.7	67.0
Northshore Crude Ore Tons Mined (millions)	822.4	17.0	17.3	17.9	17.7	16.4	166.3	169.4	175.7	176.0	48.7
Northshore Pellet Production Tons (millions)	241.6	5.3	5.4	5.4	5.4	5.4	51.0	50.9	50.6	50.2	12.2
Inputs:											
Northshore Pellet Revenue Rate ($/ton)	98	98	98	98	98	98	98	98	98	98	98
Income Statement:											
Northshore Gross Revenue ($ in millions)	23,681	521	524	524	524	524	4,996	4,989	4,960	4,924	1,195
Mining	4,922	93	97	98	99	100	1,012	1,078	1,128	996	223
Processing	10,288	219	218	220	222	224	2,156	2,163	2,170	2,158	539
Site Administration	919	19	18	19	19	19	192	192	192	192	58
General/Other Costs	3,218	65	67	67	67	67	671	671	671	671	201
Northshore Operating Cash Cost ($ in millions)	**19,347**	**395**	**400**	**403**	**407**	**409**	**4,031**	**4,103**	**4,160**	**4,017**	**1,020**
Operating Cash Costs ($/LT Pellet)	80.06	74.39	74.77	75.41	76.13	76.50	79.07	80.60	82.20	79.95	83.71
Northshore Operating Income (excl. D&A)	**4,335**	**125**	**124**	**121**	**117**	**115**	**965**	**886**	**800**	**907**	**174**
Federal Income Taxes ($ in millions)	(867)	(25)	(25)	(24)	(23)	(23)	(193)	(177)	(160)	(181)	(35)
Depreciation Tax Savings ($ in millions)	252	4	5	5	5	6	54	54	53	53	13
Accretion Tax Savings ($ in millions)	5	0	0	0	0	0	0	0	1	3	0
Northshore Income after Taxes ($ in millions)	**3,725**	**105**	**104**	**102**	**99**	**98**	**826**	**763**	**694**	**781**	**153**

Mine Life		1	2	3	4	5	6-15	16-25	26-35	36-45	46-48
Calendar Years	**Total**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027- 2036**	**2037- 2046**	**2047- 2056**	**2057- 2066**	**2067- 2069**
Other Cash Inflows & Outflows ($ in millions):											
Sustaining Capital Investments	(989)	(44)	(41)	(36)	(20)	(17)	(204)	(204)	(202)	(201)	(20)
Significant All Material Change Capital Additions	(25)	-	-	-	-	-	(1)	(24)	-	-	-
Mine Closure Costs (Incl. Post Closure)	(120)	-	-	-	-	-	-	-	-	-	(120)
Northshore Cash Flow ($ in millions)	**2,592**	**61**	**63**	**66**	**79**	**81**	**621**	**536**	**492**	**580**	**13**
Northshore Discounted Cash Flow ($ in millions)	**619**	**55**	**52**	**50**	**54**	**50**	**237**	**80**	**28**	**12**	**0**

19.3 Sensitivity Analysis

Project risks can be identified in both economic and non-economic terms. Key economic risks were examined by running cash flow sensitivities. The operation is nominally most sensitive to market prices (revenues) followed by operating cost as shown in Table 19-5. For each dollar movement in sales price and operating cost, respectively, the after tax NPV changes by approximately $38 million.

It is noted that recovery and head grade sensitivity do not vary much in iron ore deposits compared to metal price sensitivity. In addition, sustaining capital expenditures amount to 5% of LOM operating costs and, therefore, do not have much impact on the viability of operating mines.

Table 19-5: After-tax NPV at 10% Sensitivity Analysis
Cleveland-Cliffs Inc. – Northshore Property

		Operating Costs ($/WLT Pellet)					
		$95	$90	$85	**$80**	$75	$70
	$83	($517)	($328)	($138)	$51	$241	$430
	$88	($328)	($138)	$51	$241	$430	$619
	$93	($138)	$51	$241	$430	$619	$809
Sales Price ($/WLT Pellet)	**$98**	$51	$241	$430	**$619**	$809	$998
	$103	$241	$430	$619	$809	$998	$1,188
	$108	$430	$619	$809	$998	$1,188	$1,377
	$113	$619	$809	$998	$1,188	$1,377	$1,566
	$118	$809	$998	$1,188	$1,377	$1,566	$1,756
	$123	$998	$1,188	$1,377	$1,566	$1,756	$1,945

20.0 ADJACENT PROPERTIES

There are several iron ore mines along the Mesabi Iron Range in Minnesota.The Mineral Resource and Mineral Reserves stated in this TRS are contained entirely within NSM’s mineral leases, and information from other operations was not used in this TRS.

21.0 OTHER RELEVANT DATA AND INFORMATION

No additional information or explanation is necessary to make this Technical Report understandable and not misleading.

22.0 INTERPRETATION AND CONCLUSIONS

Northshore has successfully produced iron pellets for over 69 years. The update to the Mineral Resource and Mineral Reserve does not materially change any of the assumptions from previous operations. An economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves for a 48 year mine life.

SLR offers the following conclusions by area.

22.1 Geology and Mineral Resources

- Above a crude MagFe cut-off grade of 15%, Northshore Measured and Indicated Mineral Resources exclusive of Mineral Reserves are estimated to total 1,158 MLT at an average grade of 22.2% MagFe.
- Exploration sampling, preparation, and analyses are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources.
- Work towards a comprehensive QA/QC program at Northshore is progressing well, and sample and data security are consistent with industry best practice.
- Results as compiled by Cliffs' personnel and reviewed by the QP indicate an acceptable level of accuracy and a good level of repeatability for economic variables at Northshore. The range of acceptability for MagFe (24.6% to 32.2% MagFe), as well as other variables in standard NSMCOS_Block 21 is quite high and based on more recent results higher precision is achievable.
- Coarse duplicate values for crude MagFe by Satmagan are generally acceptable.Based on observations from the neighboring UTAC mine, improvements are possible and warranted to reduce variation and improve analytical precision in future drill core analyses.
- The turnaround time for exploration drilling samples at the Silver Bay laboratory is very long, sometimes exceeding twelve months.
- The geological model is fit for purpose and captures the principal geological features of the Biwabik IF at Northshore.The methodology used to prepare the block model is appropriate, and validations compiled by the QP indicate that the block model is reflecting the underlying support data.
- The classification at Northshore is generally acceptable, but some post-processing to remove isolated blocks of different classification is warranted.
- In both 2019 and 2020, actual versus model-predicted values of crude ore, pellet production, and process recovery were accurate to -0.09% to 4.43%.

22.2 Mining and Mineral Reserves

- Northshore has been in production since 1952, and specifically under 100% Cliffs operating management since 1994. Cliffs conducts its own Mineral Reserve estimations.
- Total Proven and Probable Mineral Reserves are estimated at 822.4 MLT of crude ore at an average grade of 24.6% MagFe.
- Mineral Reserve estimation practices follow industry standards.
- The Mineral Reserve estimate indicates a sustainable project over a 48 year LOM.

- The geotechnical design parameters used for pit design are reasonable and supported by previous operations.
- The LOM production schedule is reasonable and incorporates large mining areas and open benches.
- An appropriate mining equipment fleet, maintenance facilities, and manpower are in place, with additions and replacements estimated, to meet the LOM production schedule requirements.
- Sufficient storage capacity for waste stockpiles and tailings has been identified to support the production of the Mineral Reserve.

22.3 Mineral Processing

- The E.W. Davis Works in Silver Bay has been in production since the 1950s, so metallurgical sampling and testing is primarily used in support of plant operations and product quality control. A laboratory is located inside the concentrator building where samples from the Mine and Plant are analyzed. The laboratory is ISO-certified to iron industry standard procedures.
- In 2019, Northshore completed an upgrade at the Silver Bay Plant that allows for the production of lower silica iron pellets that will be used internally or sold to customers for the production of DRI products such as HBI.
- Crude ore is magnetite taconite with a ROM MagFe grade of approximately 25%. The concentrator averages 87.8% MagFe recovery into a concentrate derived from 32.9 weight % of the original crude ore feed.
- Historical concentrate production ranged from 3.1 MLT/y dry to 5.5 MLT/y dry, with a 12-year average of 4.45 MLT/y dry.
- Concentrate is supplied to the pellet plant to produce pellets, which are sold as the main final product. Historical pellet production ranged from 3.1 MLT/y dry to 5.6 MLT/y dry, with a 12-year average of 4.54 MLT/yr dry.
- The operations are consistently run and well maintained.

22.4 Infrastructure

- The Northshore facilities are in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.
- NSM operates a TSF, which encompasses approximately 2,500 acres located approximately seven miles by rail northwest of the Plant, referred to as the Milepost 7 Tailings Basin.

22.5 Environment

- NSM indicated that it maintains the requisite state and federal permits and is in compliance with all permits. Various permitting applications have been submitted to authorities and are pending authorization. Environmental liabilities and permitting are further discussed in Section 17.

23.0 RECOMMENDATIONS

23.1 Geology and Mineral Resources

1. Continue to develop the QA/QC program to ensure that the program includes clearly defined limits when action or follow up is required, and that results are reviewed and documented in a report including conclusions and recommendations regularly and in a timely manner. Continue to work with the Silver Bay laboratory to improve analytical precision. Support primary laboratory results with a check assay program through a secondary laboratory.
2. Improve the turnaround time for exploration drilling samples at the Silver Bay laboratory.
3. Modify the interpolation strategy to see whether local block to composite conformance can be improved.
4. In future updates, use local drill hole spacing instead of a distance-to-drill hole criterion for block classification.
5. Prepare model reconciliation over quarterly periods and document methodology, results, and conclusions and recommendations.

23.2 Infrastructure

1. Prioritize the completion of an OMS Manual for the TSF with the EOR in accordance with MAC guidelines and other industry recognized, standard guidance for tailings facilities.
2. Document, prioritize, track, and close out in a timely manner the remediation, or resolution, of items of concern noted in TSF audits or inspection reports.
3. Establish an EPRT with experience in tailings management facilities similar to other Cliffs properties.

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25.0 RELIANCE ON INFORMATION PROVIDED BY THE REGISTRANT

This report has been prepared by SLR for Cliffs. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to SLR at the time of preparation of this report,
- Assumptions, conditions, and qualifications as set forth in this report, and
- Data, reports, and other information supplied by Cliffs and other third party sources.

For the purpose of this report, SLR has relied on ownership information provided by Cliffs and verified in an email from Gabriel D. Johnson, Cliffs' Senior Manager – Land Administration dated January 20, 2022. SLR has not researched property title or mineral rights for Northshore as we consider it reasonable to rely on Cliffs' Land Administration personnel who are responsible for maintaining this information.

SLR has relied on Cliffs for guidance on applicable taxes, royalties, and other government levies or interests, applicable to revenue or income from the Northshore Property in the Executive Summary and Section 19.0.As the Northshore Property has been in operation for over 70 years, Cliffs has considerable experience in this area.

SLR has relied on information provided by Cliffs pertaining to environmental studies, management plans, permits, compliance documentation, and monitoring reports that were verified in an email from Scott A. Gischia, Cliffs' Director – Environmental Compliance, Mining and Pelletizing, dated January 21, 2022.

The Qualified Persons have taken all appropriate steps, in their professional opinion, to ensure that the above information from Cliffs is sound.

Except for the purposes legislated under applicable securities laws, any use of this report by any third party is at that party's sole risk.

26.0 DATE AND SIGNATURE PAGE

This report titled “Technical Report Summary on the Northshore Property, Minnesota, USA” with an effective date of December 31, 2021 was prepared and signed by:

Signed *SLR International Corporation*

Dated at Lakewood, CO
February 7, 2022 SLR International Corporation

www.slrconsulting.com

EXHIBIT 96.4

Technical Report Summary on the United Taconite Property, Minnesota, USA

S-K 1300 Report

Cleveland-Cliffs Inc.

SLR Project No: 138.02467.00001
February 7, 2022
Effective Date: December 31, 2021

Technical Report Summary on the United Taconite Property, Minnesota, USA

SLR Project No: 138.02467.00001

Prepared by
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Effective Date – December 31, 2021
Signature Date - February 7, 2022

FINAL

Distribution: 1 copy – Cleveland-Cliffs Inc.
1 copy – SLR International Corporation

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1.0 EXECUTIVE SUMMARY

1.1 Summary

SLR International Corporation (SLR) was retained by Cleveland-Cliffs Inc. (Cliffs) to prepare an independent Technical Report Summary (TRS) for the United Taconite Property (UTAC or the Property), located in Northeastern Minnesota, USA. The operator of the Property, United Taconite LLC (United Taconite), is a wholly owned subsidiary of Cliffs.

The purpose of this TRS is to disclose year-end (YE) 2021 Mineral Resource and Mineral Reserve estimates for UTAC.

Cliffs is listed on the New York Stock Exchange (NYSE) and currently reports Mineral Reserves of pelletized ore in SEC filings. This TRS conforms to the United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300) and Item 601 (b)(96) Technical Report Summary. SLR visited the Property on October 21, 2019.

The Property includes the Thunderbird Mine North (TBN) and Thunderbird Mine South (TBS), collectively the Thunderbird Mine, in Eveleth, Minnesota and the Fairlane processing facility (Fairlane Facility or the Plant) in Forbes, Minnesota. The Thunderbird Mine is a large, operating, open-pit iron mine that produces pellets from a magnetite iron ore regionally known as taconite.

The Property commenced operations as an asset of Eveleth Taconite Company in 1965 before it was purchased by United Taconite (70% Cliffs and 30% Laiwu Steel (Laiwu)) in December 2003. The Property has been a wholly owned subsidiary of Cliffs since 2008.

The open-pit operation has a mining rate of approximately 15 million long tons (MLT) of ore per year and produces 5.3 MLT of iron ore pellets, which are shipped by freighter via the Great Lakes to Cliffs' steel mill facilities in the Midwestern USA.

1.1.1 Conclusions

The Property has been a successful producer of iron pellets for over 55 years. The update to the Mineral Resource and Mineral Reserve does not materially change any of the assumptions from previous operations. The addition of TBS in the Mineral Reserve in this update is due to the timing of the earliest that United Taconite could resume mining in that area. In the updated mine plan, the earliest economic case for mining TBS falls within a 10-year window. The site preparation work, including additional exploration drilling, is initially estimated to take upwards of five years before mining can commence.

An economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves for a 51-year mine life.

SLR offers the following conclusions by area.

1.1.1.1 Geology and Mineral Resources

- The TBN and TBS deposits (Thunderbird deposits) are examples of Lake Superior-type banded iron formation (BIF) deposits. Above a crude magnetic iron (MagFe) cut-off grade of 17%, Measured and Indicated Mineral Resources exclusive of Mineral Reserves at UTAC are estimated to total 730.4 MLT at an average grade of 22.3% MagFe.

- In both 2019 and 2020, actual versus model-predicted values of crude ore, pellet production, and weight recovery or process recovery were accurate to between 1.5% and 7.0%, depending on the year and variable.
- Exploration sampling, preparation, analyses, and security processes for both physical samples and digital data are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources. The quality assurance and quality control (QA/QC) program is well developed, long standing, and results are monitored and enacted on where warranted.
- Block model key economic variables (KEV) for TBN and TBS compare well to the source data, and the methodology used to prepare the block models is appropriate and consistent with industry standards. Although the UTAC classification is generally acceptable, some post-processing to remove isolated blocks of different classification is warranted.
- Some uncertainty is present in the TBS model, where mining has not occurred since 1991, and most supporting drill hole data is historical or uses an older analytical technique than is currently in place at UTAC. To address this, all Mineral Resources at TBS are limited to Indicated and Inferred.

1.1.1.2 Mining and Mineral Reserves

- UTAC has been in production since 1965, and specifically under 100% Cliffs operating management since 2008. Cliffs conducts its own Mineral Reserve estimations.
- Total Proven and Probable Mineral Reserves are estimated at 774.6 MLT of crude ore at an average grade of 22.3% MagFe.
- Mineral Reserve estimation practices follow industry standards.
- The UTAC Mineral Reserve estimate indicates a sustainable project over a 51-year life of mine (LOM).
- The geotechnical design parameters used for pit design are reasonable and supported by previous operations.
- The LOM production schedule is reasonable and incorporates large mining areas and open benches.
- An appropriate mining equipment fleet, maintenance facilities, and workforce are in place, with additions and replacements estimated, to meet the LOM production schedule requirements.
- Sufficient storage capacity for waste stockpiles and tailings has been identified to support the production of the Mineral Reserve.

1.1.1.3 Mineral Processing

- As the Fairlane Facility has been in production since the 1960s, metallurgical sampling and testing is primarily used in support of plant operations and product quality control.
- The Fairlane Facility conducts routine monitoring of tailings, MagFe grades, concentrate iron grades, and final product iron grades. Low-intensity magnetic separating methods are employed to produce both a standard and high-flux, blast furnace-grade pellet, both of which are well received by customers.

1.1.1.4 Infrastructure

- The Property is in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.
- The site currently contains two tailings basin storage cells: Tailings Cell No. 1, which operated from 1965 through 1999, and Tailings Cell No. 2, which has been in operations since 1999.

1.1.1.5 Environment

- United Taconite indicated that it maintains the requisite state and federal permits and is in compliance with all permits. Various permitting applications have been submitted to authorities and are pending authorization. Environmental liabilities and permitting are further discussed in Section 17.0 of this TRS.

1.1.2 Recommendations

1.1.2.1 Geology and Mineral Resources

1. Prepare model reconciliation over quarterly and annual periods, and document methodology, results, conclusions, and recommendations.
2. Compare and analyze the pre-2005 data within the context of the current standard Liberation Index Study (LIS) test procedures in place at the Thunderbird Mine, as well as confirm previous results. Consider a small program of twinning historical drill holes at both TBN and TBS to confirm results and logging.
3. Apply the interpolation methodology developed for TBN to TBS in future updates, and transition the process of classifying blocks in future updates to consider local drill hole spacing over a distance to drill hole criterion.
4. Consider whether it is appropriate to develop an additional in-house standard – with higher grades of concentrate silica (8% consio2 to 10% consio2) and lower magnetic iron content – to the existing QA/QC program to assess the accuracy of ore and waste in high concentrate silica contents.
5. Consider implementing a check assay program with a secondary laboratory.
6. Continue to develop the QA/QC program to ensure that the program includes clearly defined limits when action or follow up are required, and that results are reviewed and documented in a report including conclusions and recommendations, regularly and in a timely manner.
7. Update both TBN and TBS Mineral Resource estimates to incorporate new drilling.

1.1.2.2 Mining and Mineral Reserves

1. Review potential comingling of waste rock stockpiles between the TBN and TBS for opportunities to reduce the stockpile footprint created external to the open pits and reduce waste haulage profiles.

1.1.2.3 Mineral Processing

1. Plant operational performance including concentrate and pellet production and pellet quality continue to be consistent year over year. It is important to maintain diligence in process-oriented metallurgical testing and in plant maintenance going forward.

1.1.2.4 Infrastructure

1. Prioritize the completion of an Operations, Maintenance and Surveillance (OMS) Manual for the tailings storage facility (TSF) with the Engineer of Record (EOR) in accordance with Mining Association of Canada (MAC) guidelines and other industry-recognized, standard guidance for tailings facilities.
2. Document, prioritize, track, and close out in a timely manner the remediation, or resolution, of items of concern noted in TSF audits or inspection reports.
3. Establish an External Peer Review Team (EPRT) with experience in tailings management facilities similar to other Cliffs properties.

1.2 Economic Analysis

1.2.1 Economic Criteria

An un-escalated technical-economic model was prepared on an after-tax discounted cash flow (DCF) basis, the results of which are presented in this subsection. Key criteria used in the analysis are discussed in detail throughout this TRS. General assumptions used are summarized in Table 1-1 with all pellets reported per wet long ton (WLT) pellet.

Table 1-1: Technical-Economic Assumptions
Cleveland-Cliffs Inc. – United Taconite Property

Description	Value
Start Date	December 31, 2021
Mine Life	51 years
Three-Year Trailing Average Revenue	$98/WLT pellet
Operating Costs	$74.80/WLT pellet
Sustaining Capital (after six years)	$4/WLT pellet
Discount Rate	10%
Discounting Basis	End of Period
Inflation	0.0%
Federal Income Tax	20%
State Income Tax	None – Sales made out of state

Table 1-2 presents a summary of the estimated mine production over the 51-year mine life.

Table 1-2: LOM Production Summary
Cleveland-Cliffs Inc. – United Taconite Property

Description	Units	Value
Run of Mine (ROM) Crude Ore	MLT	774.6
Total Material	MLT	1,633.9
Grade	% MagFe	22.3
Annual Mining Rate	MLT/y	38.0

Table 1-3 presents a summary of the estimated plant production over the 51-year mine life.

Table 1-3: LOM Plant Production Summary
Cleveland-Cliffs Inc. – United Taconite Property

Description	Units	Value
ROM Material Milled	MLT	774.6
Annual Processing Rate	MLT/y	15.5
Process Recovery	%	33.3
Standard Pellet	MLT	156.6
Mustang Flux Pellet	MLT	101.0
Total Pellet	MLT	257.6
Annual Pellet Production	MLT/y	5.1

1.2.2 Cash Flow Analysis

The indicative economic analysis results, presented in Table 1-4, indicate an after-tax Net Present Value (NPV), using a 10% discount rate of $591 million at an average blended wet pellet price of $98/WLT. SLR notes that after-tax Internal Rate of Return (IRR) is not applicable as the Fairlane Facility has been in operation for a number of years. Capital identified in the economics is for sustaining operations and plant rebuilds as necessary.

The economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

Table 1-4: LOM Indicative Economic Results
Cleveland-Cliffs Inc. – United Taconite Property

Description	$ Millions	$/WLT Pellet
Three-Year Trailing Revenue ($/WLT Pellet)		98
Pellet Production (MWLT)	257.6	
Gross Revenue	**25,247**	
Mining	(3,990)	15.49
Processing	(9,689)	37.62

Description	$ Millions	$/WLT Pellet
Site Administration	(552)	2.14
Pellet Transportation and Storage	(2,644)	10.26
General / Other Costs	(2,394)	9.29
Total Operating Costs	**(19,270)**	**74.80**
Operating Income (excl. D&A)	**5,977**	**23.20**
Federal Income Tax	(1,195)	(4.63)
Depreciation Tax Savings	233	0.90
Accretion Tax Savings	41	0.16
Net Income after Taxes	**5,046**	**19.59**
Capital	(1,150)	(4.46)
Closure Costs	(74.0)	(0.29)
Cash Flow	**3,831**	**14.87**
NPV 10%	**591**	

1.2.3 Sensitivity Analysis

The UTAC operation is nominally most sensitive to market prices (revenues) followed by operating cost. For each dollar movement in sales price and operating cost, respectively, the after-tax NPV changes by approximately $41 million.

1.3 Technical Summary

1.3.1 Property Description

The Thunderbird Mine is located in St. Louis County, in Northeastern Minnesota, USA, on the Mesabi Iron Range, immediately northwest of the city of Eveleth, Minnesota. The Mine and offices are located just north of Eveleth at latitude 47°29'1.62" N, longitude 92°32'23.69" W. The Fairlane Facility is located approximately eight miles to the southeast near the unincorporated community of Forbes, Minnesota, at latitude 47°20'54.92" N, longitude 92°35'1.03" W. The Thunderbird Mine and Fairlane Facility have the capacity to produce approximately 5.3 MLT of iron ore pellets annually.

Cliffs owns 100% interest in the Property through mineral and surface leases held by its wholly owned subsidiary, United Taconite. This includes 4,908 acres of mineral rights and 14,344 acres of surface rights.

1.3.2 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

The Thunderbird Mine is easily accessed via paved roads from Eveleth, approximately one mile to the south, or the city of Virginia, approximately five miles to the north. Duluth, a major port city on Lake Superior, is 59 mi south of the Thunderbird Mine via US Highway 53Duluth has a regional airport with several flights daily to major hubs in Minneapolis and Chicago.

The Fairlane Facility is accessed via county-maintained paved roads from Eveleth and is located just outside of Forbes. A rail line operated by Canadian National Railway (CN) extends from the Thunderbird Mine to the Fairlane Facility and from the Fairlane Facility to the port in Duluth.

The climate in Northern Minnesota ranges from mild in the summer to winter extremes. The annual average temperature is 36.9°F. The annual average high temperature is 48.6°F, whereas the annual average low temperature is 25.1°F. By month, July is on average the hottest month (77°F), and January is the coldest (-4°F).

The operation employs 549 personnel who live in the surrounding cities of Virginia, Eveleth, Gilbert, and Hibbing. Personnel also commute from Duluth and the Iron Range. St. Louis County has an estimated population of 200,000 people.

The Property is located in a historically important, iron-producing region of Northeastern Minnesota. All the infrastructure necessary to mine and process significant commercial quantities of iron ore currently exists. Infrastructure items include high voltage electrical supplies, natural gas pipelines that connect to the North American distribution system, water sources, paved roads and highways, railroads for transporting ROM crude ore and finished products, port facilities that connect to the Great Lakes, and accommodations for employees. Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems.

The Property is located at an elevation of approximately 1,700 feet above sea level (fasl). The generally gentle topography in the area is punctuated by hummocky hills and long, gentle moraines, remnants of glacial ingress and egress. The landscape ranges from semi-rugged, lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, to large, flat, poorly drained peatlands. The Minnesota Department of Natural Resources characterizes the area as being within the Laurentian Mixed Forest Province (LMF). In Minnesota, the LMF is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps.

1.3.3 History

Exploration for high-grade, direct-shipping iron ore (DSO) deposits in the Eveleth area began in the 1890s. Focused exploration for beneficiation-grade magnetite deposits, regionally known as taconite deposits, however, did not begin until the 1940s. Exploration activity at the Thunderbird deposits consisted solely of diamond core drilling campaigns commencing in the early 1950s.

The TBN mine and Fairlane Facility began production in November 1965, with an initial production rate of 1.6 MLT of iron ore pellets per year. UTAC was originally owned and operated by the Eveleth Taconite Co. (Eveleth Taconite), and developed through a joint effort between Oglebay Norton and the Ford Motor Co.

In 1977, with the addition of three concentrating lines, a second pelletizing line, and the opening of the adjacent TBS mine, annual production capacity was increased to 6.0 MLT of iron ore pellets per year. This expansion was funded by a joint venture agreement between Oglebay Norton and its partners Armco Steel, Steel Corporation of Canada, and Dominion Foundries and Steel Co., operating as Eveleth Expansion Co. (Eveleth Expansion). From 1977 to 1996 the two entities (Eveleth Taconite and Eveleth Expansion) operated as a single entity known as Eveleth Mines. In 1996, ownership was transferred to Eveleth Mines, LLC held by Rouge Steel, AK Steel, and Stelco and operated as EVTAC Mining.

In 1991 the TBS mine was idled, and in May 1999 Eveleth Mines closed the Line 1 concentrating and pelletizing line, reducing production to 4.2 MLT of iron ore pellets per year. The remaining operations were idled in May 2003. The idled UTAC operations were purchased and re-opened by United Taconite (70% Cliffs and 30% Laiwu Steel (Laiwu)) in December 2003.Subsequently, refurbishment and reactivation of Line 1 in December 2004 increased the annual production to 6.0 MLT of iron ore pellets per year. In 2008, Cliffs purchased Laiwu's 30% share, and Cliffs now holds a 100% interest in UTAC through its wholly owned subsidiary United Taconite.

1.3.4 Geological Setting, Mineralization, and Deposit

The Thunderbird deposits are examples of Superior-type BIF deposits, specifically the Biwabik Iron Formation (Biwabik IF), which is interpreted to have been deposited in a shallow, tidal marine setting and is characterized as having four main members (from bottom to top): Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty. Cherty units generally have a sandy, granular texture, are thickly bedded, and are composed of silica and iron oxide minerals. Slaty units are fine grained, thinly bedded, and comprised of iron silicates and iron carbonates, with local chert beds, and are typically uneconomic. The mineral of economic interest at UTAC is magnetite. The nomenclature of the members is not indicative of metamorphic grade; instead slaty and cherty are colloquial descriptive terms used regionally.

1.3.5 Exploration

Exploration consists predominantly of diamond core drilling of the iron formations known to host locally economic mineralization. Near-mine exploration drilling is conducted on a 300 ft x 300 ft grid. In June 2021, Cliffs contracted EDCON-PRJ to fly a high-resolution aeromagnetic survey over the TBS deposit, alongside other Cliffs-held assets with the purpose of understanding large-scale structural features and BIF oxidation.

1.3.6 Mineral Resource Estimates

Mineral Resource estimates for the Thunderbird deposits were prepared by Cliffs and audited and accepted by SLR using available data from 1952 to 2018. Mineral Resource estimates are based on the following drill hole information for each deposit:

- TBN: 673 diamond drill holes totaling 218,172 ft from 1952 to 2018 (620 drill holes with assays).
- TBS: 243 drill holes with a total of 77,768 ft from 1952 to 2010.

For the Thunderbird deposits, a stratigraphic model representing the Biwabik IF was constructed in Maptek's Vulcan™ (Vulcan) software through the creation of wireframe surfaces representing the upper contact of each unit. Sub-blocked model estimates, also prepared in Vulcan, used inverse distance squared (ID^2) and length-weighted, 10 ft uncapped composites (TBN) or assays (TBS) to estimate relevant analytical variables in a single search pass approach, using hard boundaries between subunits, ellipsoidal search ranges informed by variogram results, and search ellipse orientation informed by geology at TBS and geology and dynamic anisotropy at TBN. Average density values were assigned by lithological unit.

Mineral Resources were classified in accordance with the definitions for Mineral Resources in S-K 1300.Class assignment was based on criteria developed using continuity models (variograms), grade ranges for key economic variables (KEV), and geological understanding, and was accomplished using scripts that reference the distance of block centroid to a drill hole sample, and the number of drill holes and samples used to estimate a block, with some post processing to remove isolated and fringe blocks. All blocks at TBS were limited to a classification of Indicated or Inferred.

Wireframe and block model validation procedures including statistical comparisons with composite samples and parallel nearest neighbor (NN) estimates, swath plots, as well as visual reviews in cross-section and plan were completed for the Thunderbird deposits. A visual review, comparing blocks to drill holes completed after the block modeling work, was performed for the Thunderbird deposits to ensure general lithologic and analytical conformance.

The limit of Mineral Resources was optimized using pit shells that considered actual mining costs incurred in 2018 and a US$90/LT pellet value.In addition to SLR's review, Cliffs' technical site and corporate teams, and external consultants SRK Consultants (Ronald, 2019) have reviewed the input data, interpolation design and execution, as well as the resultant block model's KEV.

The Mineral Resource estimate as of December 31, 2021 is presented in Table 1-5.

Table 1-5: Summary of UTAC Mineral Resources - December 31, 2021
Cleveland-Cliffs Inc. – United Taconite Property

Category	Resources (MLT)	Grade (% MagFe)	Process Recovery (%)	Wet Pellets (MLT)
Measured	91.8	23.6	35.4	32.5
Indicated	638.6	22.2	31.2	199.2
Total M + I	**730.4**	**22.3**	**31.7**	**231.8**
Inferred	25.9	21.5	31.1	8.0

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Tonnage is reported exclusive of Mineral Reserves and has been rounded to the nearest 100,000.
3. Mineral Resources are estimated at a cut-off grade of 17% MagFe.
4. Mineral Resources are estimated using a pellet value of US$90/LT.
5. Pellets are reported as wet standard/flux mix, shipped pellets contain 2% moisture.
6. Tonnage estimate based on actual depletion from a surveyed topography on May 11, 2019.
7. Resources are crude ore tons as delivered to the primary crusher; pellets are as loaded onto lake freighters in Duluth.
8. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
9. Bulk density is assigned based on average readings for each lithology type.
10. Mineral Resources are 100% attributable to Cliffs.
11. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
12. Numbers may not add due to rounding.

The SLR QP is of the opinion that with consideration of the recommendations summarized in Sections 1.0 and 23.0 of this TRS, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work.

1.3.7 Mineral Reserve Estimate

Mineral Reserves in this TRS are derived from the current Mineral Resources.The Mineral Reserves are reported as crude ore and are based on open pit mining from the Thunderbird Mine. Crude ore is the unconcentrated ore as it leaves the Thunderbird Mine at its natural*in situ* moisture content. The UTAC Proven and Probable Mineral Reserves are estimated as of December 31, 2021, and summarized in Table 1-6.

Table 1-6: Summary of UTAC Mineral Reserves – December 31, 2021
Cleveland-Cliffs Inc. – United Taconite Property

Category	Crude Ore Mineral Reserves (MLT)	Crude Ore (% MagFe)	Process Recovery (%)	Wet Pellets (MLT)
Proven	143.1	23.1	34.7	49.6
Probable	631.5	22.1	32.9	208.0
Proven & Probable	**774.6**	**22.3**	**33.3**	**257.6**

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb and has been rounded to the nearest 100,000.
2. Mineral Reserves are reported at a $90/LT wet standard pellet price freight-on-board (FOB) Lake Superior, based on the three-year trailing average of the realized product revenue rate.
3. Mineral Reserves are estimated at a cut-off grade of 17% MagFe and restricted to material with less than 10% concentrate silica.
4. Mineral Reserves include mining dilution of 16% and mining extraction losses of 14%.
5. The Mineral Reserve mining strip ratio (waste units to crude ore units) is at 1.1.
6. Mineral Reserves are Probable if not scheduled within the first 20 years.
7. Pellets are reported as wet standard/flux mix; shipped pellets contain approximately 2.0% moisture.
8. Tonnage estimate is based on actual depletion as of December 31, 2021 from a surveyed topography on May 11, 2019.
9. Mineral Reserve tons are as delivered to the primary crusher; pellets are as loaded onto lake freighters in Duluth, Minnesota.
10. Classification of the Mineral Reserves is in accordance with the S-K 1300 classification system.
11. Mineral Reserves are 100% attributable to Cliffs.
12. Numbers may not add due to rounding.

The pellet price used to perform the evaluation of the Mineral Reserves was based on the current mining model's three-year (2016 to 2019) trailing average of the realized product revenue rate of US$90.42/LT wet standard pellet. The costs used in this study represent all mining, processing, transportation, and administrative costs including the loading of pellets into lake freighters in Duluth, Minnesota.

SLR is not aware of any risk factors associated with, or changes to, any aspects of the modifying factors such as mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

1.3.8 Mining Methods

The TBN and TBS are mined using conventional surface mining methods. The surface operations include:

- Overburden (glacial till) removal
- Drilling and blasting
- Loading and haulage
- Crushing and rail loading

The Mineral Reserve is based on the ongoing annual average crude ore production of approximately 15.4 MLT per year (MLT/y) from TBN and TBS, producing an average of 5.1 MLT/y of wet pellets for domestic consumption. Pellet production is based on producing approximately 3.1 MLT/y of wet standard pellets and 2.0 MLT/y of high-flux Mustang pellets. Market conditions and annual pellet nominations can change the flux/standard product mix, which will change the overall production in any given year.

Mining and processing operations are scheduled 24 hours per day, and the mine production is scheduled to directly feed the processing operations.

The current LOM plan has mining for 51 years and mines the known Mineral Reserve at a 1.1 strip ratio.

The final TBN pit is approximately 4.1 mi long along strike, 0.9 mi wide, and up to 700 ft deep. Primary production includes drilling 12.25 in.-diameter rotary blast holes. Production blast hole depth varies, as the pit is transitioning from 35 ft bench heights to 40 ft bench heights. Burden and spacing varies depending on the material being drilled. The holes are filled with explosive and blasted. Hydraulic shovels load the broken material into 240 ton payload mining trucks for transport from the pit.

The TBS pit is a currently inactive pit adjacent to the TBN pit. TBS operated for 16 years (from 1976 through 1991), producing 106 MLT of crude ore and 32.6 MLT of pellets. The final pit design for TBS is approximately 2.0 mi long, 1.3 mi wide, and up to 640 ft deep. The LOM plan assumes reopening of the TBS pit in 2030, which allows time for additional investigation work, dewatering, and re-establishing access for production traffic.

Both the TBN and TBS pits are relatively shallow and, structurally, the *in situ* crude ore and rock is of excellent quality. A final wall study was conducted in 2012 by Barr Engineering Co. (Barr, 2012), and a geotechnical review of the pit and final wall assumptions was conducted in 2019 by SRK (SRK, 2019). SLR is of the opinion that the design parameters used for the final pit design are reasonable.

The Thunderbird Mine requires strict crude ore blending requirements to ensure that the Fairlane Facility receives a uniform head grade. The two most important characteristics of the crude ore are magnetic iron content and predicted concentrate silica. Generally, three to four mining areas are mined at one time to obtain the best crude ore blend for the Fairlane Facility. Crude ore is hauled to the crushing facility and either direct tipped to the primary crusher or stockpiled in an area adjacent to the primary crusher. Haul trucks are alternated to blend delivery from the multiple crude ore loading points. The crude ore stockpiles are used as an additional source for blending and production efficiency.

The primary mine equipment fleet consists of large drills, diesel hydraulic shovels, and off-road dump trucks. In addition to the primary equipment, there are front end loaders (FELs), bulldozers, graders, water trucks, and backhoes for support. Additional equipment is on site for non-productive mining fleet tasks. Extensive maintenance facilities are available at the mine site to service the mine equipment. The current fleet is to be maintained with replacement units as the current equipment reaches its maximum operating hours.

Mining manpower is at 189 persons, which includes personnel in mine operations, mine maintenance, mine supervision, and technical services. Mine manpower will increase proportionately with future forecast increases in haul trucks to meet the LOM production schedule.

1.3.9 Processing and Recovery Methods

Crude material is magnetite taconite with a ROM magnetic iron (ROM MagFe) feed grade of approximately 23% Fe. Magnetite concentrate production has ranged from 1.8 MWLT/y to 5.9 MWLT/y, with a 10-year average of 4.9 MWLT/y. Concentrate is fed to the pellet plant to produce final product pellets. Pellet production has ranged from 1.5 MWLT/y to 5.3 MWLT/y, with a 10-year average of 4.6

MWLT/y. Sinter feed (pellet fines) are produced as a sub-product at a rate of 150,000 WLT/y. Concentrate and pellet production is reported as wet long tons at 8.75% and 2.00% moisture respectively.

Crude material is blended at the Thunderbird Mine and hauled to the primary crushing station where it is direct dumped into the primary gyratory crusher, followed by secondary crushing in three secondary gyratory crushers located directly beneath the primary crusher. The 80% passing (P_{80}) four-inch product-size material is conveyed to a 20,000 LT conical surge pile. Crude material is reclaimed from the surge pile to rail car loading silos and hauled by train to the Fairlane Facility, eight miles away. The average feed rate of the primary crushing station is 3,200 LT per hour (LT/h). Two additional stages of crushing are provided at the Fairlane Facility consisting of Nordberg 7 ft shorthead crushers followed by screens producing a P_{80} 0.5 in. product. The average throughput is 50,000 LT per day. The fine crusher product is processed in five separate rod mill – ball mill grinding and magnetic separation lines to produce final magnetite concentrate with a particle size distribution of 76% to 86% passing 325 mesh.

Concentrate slurry is dewatered with vacuum disc filters. Additives including bentonite, organic reagents, and limestone are used as binders. Concentrate is agglomerated into green balls in balling drums, screened on roller screens, and fed to the induration machines. Average final product induration rates in the two lines are 250 LT/h and 560 LT/h, respectively. Production tonnages are approximately 20% less when making the flux-grade product. The pellet indurating stages include a straight grate for drying and preheating followed by a rotary kiln to fire and indurate the pellets. Partial oxidation of the magnetite to hematite in the preheat zone provides some of the heat required in the processing of the pellets.

The partially oxidized, preheated pellets enter the rotary kiln and are rolled for even heat hardening of the balls to reach strength for shipping. Pellets leaving the kiln pass through an annular cooler. Cooled pellets are sampled, treated for dust suppression, conveyed to three pellet storage silos, and later loaded out to trains and shipped by rail to Duluth for loading into lake vessels. Alternatively, pellets can be directly shipped by rail to customers. During Mustang flux pellet production, fluxstone is mixed with the concentrate prior to the filters.

1.3.10 Infrastructure

The Property is in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.

Infrastructure items include:

- Thunderbird Mine and Fairlane Concentrator facilities near Eveleth, Minnesota.
- Power supplied by Minnesota Power. For the 80 MW power demand under full rate, there is a capacity of 100 MVA.The operating load at the Thunderbird Mine and Fairlane Facility is 3.9 MW and 75 MW, respectively.
- Natural gas supplied by Northern Natural Gas from pipelines that connect into the North American distribution system.
- Water supply for the sites consists of a combination of potable water from the local utility, groundwater wells, the St. Louis River, and mine pits.
- Paved roads and highways.

- Cliffs has a contract with CN rail for operations and maintenance of the rail line between the Thunderbird Mine and the Fairlane plant, approximately eight miles. Unit trains are used for transporting crushed crude ore from the crushed ore stockpile at the Mine to the concentrator.
- Finished taconite pellets are transported by CN Rail to the CN port in Duluth, Minnesota, approximately 62 mi from the Fairlane facilities.
- The port is controlled and operated by CN Rail and includes pellet screening, 1.3 MLT of pellet storage, and ship loading either directly from rail cars to ship, or from stockpiles to ship. The vessels are 20,000 LT- to 60,000 LT-capacity Lakers that transport pellets to steel mills on the Great Lakes.
- Rail yards and workshops are operated by CN Rail.
- Tailings storage facility (TSF)
- Accommodations for employees.
- Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems.

1.3.11 Market Studies

Cliffs is the largest producer of iron ore pellets in North America.It is also the largest flat-rolled steel producer in North America.In 2020, Cliffs acquired two major steelmakers, ArcelorMittal USA (AMUSA), and AK Steel (AK), vertically integrating its legacy iron ore business with steel production and emphasis on the automotive end market.

Cliffs owns or co-owns five active iron ore mines in Minnesota and Michigan.Through the two acquisitions and transformation into a vertically integrated business, the iron ore mines are primarily now a critical source of feedstock for Cliffs' downstream, primary steelmaking operations. Based on its ownership in these mines, Cliffs' share of annual rated iron ore production capacity is approximately 28.0 million tons, enough to supply its steelmaking operations and not have to rely on outside supply.

The importance of the steel industry in North America and specifically the USA is apparent by the actions of the US federal government in implementing and keeping import restrictions in place. It is important for middle-class job generation and the efficiency of the national supply chain. It is also an industry that supports the country's national security by providing products used for US military forces and national infrastructure. Cliffs expects the US government to continue recognizing the importance of this industry and does not see major declines in the production of steel in North America.

United Taconite pellets are shipped to Cliffs' steelmaking facilities in the Midwestern USA.

For cash flow projections, Cliffs uses a blended pellet revenue rate of $98/WLT Free on Board (FOB) Mine based on a three-year trailing average for 2017 to 2019. Based on macroeconomic trends, SLR is of the opinion that Cliffs pellet prices will remain at least at the current three-year trailing average of $98/WLT or above for the next five years.

1.3.12 Environmental Studies, Permitting and Plans, Negotiations, or Agreements with Local Individuals or Groups

United Taconite indicated that it presently has the requisite operating permits for the Thunderbird Mine and Fairlane Facility and estimates the mine life to be 51 years. Environmental monitoring during operations includes water and air quality monitoring. Closure plans and other post-mining plans are required to be prepared at least two years prior to the anticipated closure. Cliffs conducts an in-depth review every three years to ensure that the asset retirement obligation legal liabilities are accurately estimated based on current laws, regulations, facility conditions, and cost to perform services. These cost estimates are conducted in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 410. With respect to community agreements, Cliffs initiatives include agreements with local municipalities or organizations to make Cliffs-owned and leased land that is not utilized for mining available for local community use including trails used for snowmobiling, biking, and ATV use. SLR is not aware of any formal commitments to local procurement and hiring; however, Cliffs indicated that it has long-standing relationships with local vendors.

1.3.13 Capital and Operating Cost Estimates

Productive and sustaining capital expenditure estimates for the remaining LOM are presented in Table 1-7. Starting in 2027, a sustaining capital cost of $4/WLT pellet or $20.5 million annually is used in the technical-economic model for an additional $902 million for the remaining mine life.

Table 1-7: LOM Capital Costs
Cleveland-Cliffs Inc. – United Taconite Property

Type	Values	Total	2022	2023	2024	2025	2026	2027-2071
Productive	$ millions	65.3	11.2	12.6	28.5	7.1	6.0	0
Sustaining	$ millions	1,084.8	35.8	39.0	25.0	51.4	31.6	902.0
Total	**$ millions**	**1,150.1**	**47.0**	**51.6**	**53.5**	**58.4**	**37.5**	**902.0**

Operating costs are based on a full run rate with a combination of both standard and flux production consistent with what is expected for the LOM. A LOM average operating cost of $74.80/WLT pellet is estimated over the remaining 51 years of the LOM and is shown in Table 1-8.

Table 1-8: LOM Operating Costs
Cleveland-Cliffs Inc. – United Taconite Property

Description	($/WLT Pellet)
Mining	15.49
Processing	37.62
Site Administration	2.14
Pellet Transportation and Storage	10.26
General/Other	9.29
Operating Cash Cost	**74.80**

Cliffs' forecasted capital and operating costs estimates are derived from annual budgets and historical actuals over the long life of the current operation. According to the American Association of Cost Engineers (AACE) International, these estimates would be classified as Class 1 with an accuracy range of -3% to -10% to +3% to +15%.

2.0 INTRODUCTION

SLR International Corporation (SLR) was retained by Cleveland-Cliffs Inc. (Cliffs) to prepare an independent Technical Report Summary (TRS) on the United Taconite Property (UTAC or the Property), located in Northeastern Minnesota, USA. The operator of the Property, United Taconite LLC (United Taconite), is a wholly owned subsidiary of Cliffs.

The purpose of this TRS is to disclose year-end (YE) 2021 Mineral Resource and Mineral Reserve estimates for UTAC.

Cliffs is listed on the New York Stock Exchange (NYSE) and currently reports Mineral Reserves of pelletized ore in SEC 10-K filings. This TRS conforms to the United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300) and Item 601 (b)(96) Technical Report Summary.

The Property includes the Thunderbird Mine North (TBN) and Thunderbird Mine South (TBS), collectively the Thunderbird Mine, in Eveleth, Minnesota and the Fairlane processing facility (Fairlane Facility or the Plant) in Forbes, Minnesota. The Thunderbird Mine is a large, operating, open-pit iron mine that produces pellets from a magnetite-bearing iron ore regionally known as taconite.

The Property commenced operations as an asset of Eveleth Taconite Company in 1965 before it was purchased by United Taconite (70% Cliffs and 30% Laiwu Steel (Laiwu)) in December 2003. The Property has been a wholly owned subsidiary of Cliffs since 2008.

The open-pit operation has a mining rate of approximately 15 million long tons (MLT) of ore per year and produces 5.3 MLT of iron ore pellets, which are shipped by freighter via the Great Lakes to Cliffs' steel mill facilities in the Midwestern USA.

2.1 Site Visits

SLR Qualified Persons (QPs) visited the Property on October 21, 2019. During the site visit, the SLR team all toured the tailings basin, Fairlane Facility laboratory, concentrator and pelletizing facilities plus rail pellet load-out site, and the Thunderbird North mine offices and operational areas. The SLR geologist also visited the core shack and reviewed core logging and sampling procedures as well as reviewed modeling procedures with the Cliffs' mine geologist staff.

2.2 Sources of Information

Technical documents and reports on the UTAC operation were obtained from Cliffs personnel. During the preparation of this TRS, discussions were held with the following Cliffs personnel:

- Kurt Gitzlaff, Director - Mine Engineering, Cliffs Technology Group (CTG)
- Michael Orobona, Principal Geologist, CTG
- Adam Schaum, Lead Mine Engineer, CTG
- Scott Gischia, Director - Environmental Compliance
- Dean Korri, Director - Basin & Civil Engineering
- Sandy Karnowski, District Manager - Public Affairs
- John Elton, Senior Director - Corporate Accounting & Assistant Controller

- Tushar Mondhe, Senior Manager - Operations and Capital Finance
- Candice Maxwell, Environmental Manager

This TRS was prepared by SLR QPs.The documentation reviewed, and other sources of information, are listed at the end of this TRS in Section 24.0, References.

2.3 List of Abbreviations

The U.S. System for weights and units has been used throughout this report. Tons are reported in long tons (LT) of 2,240 lb unless otherwise noted. All currency in this TRS is US dollars (US$) unless otherwise noted.

Abbreviations and acronyms used in this TRS are listed below.

Unit Abbreviation	Definition	Unit Abbreviation	Definition
a	annum	LT/d	long tons per day
A	ampere	LT/h	long tons per hour
acfm	actual cubic feet per minute	M	mega (million); molar
bbl	barrels	Ma	one million years
Btu	British thermal units	MBtu	thousand British thermal units
d	day	MCF	million cubic feet
°F	degree Fahrenheit	MCF/h	million cubic feet per hour
fasl	feet above sea level	mi	mile
ft	foot	min	minute
ft^2	square foot	MLT/y	million long tons per year
ft^3	cubic foot	MPa	megapascal
ft/s	foot per second	mph	miles per hour
g	gram	MVA	megavolt-amperes
G	giga (billion)	MW	megawatt
Ga	one billion years	MWh	megawatt-hour
gal	gallon	MWLT	million wet long tons
gal/d	gallon per day	oz	Troy ounce (31.1035g)
g/L	gram per liter	oz/ton	ounce per short ton
g/y	gallon per year	ppb	part per billion
gpm	gallons per minute	ppm	part per million
hp	horsepower	psia	pound per square inch absolute
h	hour	psig	pound per square inch gauge
Hz	hertz	rpm	revolutions per minute
in.	inch	RL	relative elevation
in^2	square inch	s	second
J	joule	ton	short ton
k	kilo (thousand)	stpa	short ton per year
kg/m^3	Kilogram per cubic meter	stpd	short ton per day
kVA	kilovolt-amperes	t	metric tonne
kW	kilowatt	US$	United States dollar
kWh	kilowatt-hour	V	volt
kWLT	thousand wet long tons	W	watt
L	liter	wt%	weight percent
lb	pound	WLT	wet long ton
LT	long or gross ton equivalent to 2,240 pounds	y	year
		yd^3	cubic yard

Acronym	Definition
AACE	American Association of Cost Engineers
AK	AK Steel
AMUSA	ArcelorMittal USA
ANSI	American National Standards Institute
ARO	asset retirement obligation
ASC	Accounting Standards Codification
ASQ	American Society for Quality
ASTM	American Society for Testing and Materials
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
BF	blast furnace
BFA	bench face angle
BH	bench height
BIF	banded iron formation
BLS	United States Bureau of Labor Statistics
CCD	counter-current decantation
CCP	Conceptual Closure Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Cost and Freight
CN	Canadian National Railroad
COA	certificates of analysis
CRIRSCO	Committee for Mineral Reserves International Reporting Standards
D&A	depreciation and amortization
DDH	diamond drill hole
DMO	Department Maintenance Office
DRI	direct reduced iron
DSO	direct-shipping iron ore
EAF	electric arc furnace
EAP	Emergency Action Plan
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	environmental management system
EPA	United States Environmental Protection Agency
ESOP	Environmental Standard Operating Procedures
EOR	Engineer of Record
FASB	Financial Accounting Standards Board
FOB	Free on Board
GHG	greenhouse gas
GIM	Geoscientific Information Management
GPS	global positioning system
GSI	Geological Strength Index
GSSI	General Security Services Corporation
HBI	Hot briquetted iron

Acronym	Definition
HRC	hot-rolled coil
ID^2	Inverse distance squared
ID^3	Inverse distance cubed
IF	iron formation
IRA	inter-ramp angle
IRR	internal rate of return
ISO	International Standards Organization
KEV	key economic variables
LG	Lerchs-Grossmann
LiDAR	light imaging, detection, and ranging
LMF	Laurentian Mixed Forest
LOM	life of mine
MAC	Mining Association of Canada
MDH	Minnesota Department of Health
MLT	million long tons
MDNR	Minnesota Department of Natural Resources
MR	moving range
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NGO	non-governmental organization
NNG	Northern Natural Gas
NOAA	National Oceanic and Atmospheric Administration
NOLA	Nuclear On-Line Analyzer
NPDES	National Pollution Discharge Elimination System
NPV	net present value
OMS	Operations, Maintenance and Surveillance
OSA	overall slope angle
PMF	probable maximum flood
QA/QC	quality assurance/quality control
QP	Qualified Person
RC	rotary circulation drilling
RCRA	Resource Conservation and Recovery Act
ROM	run of mine
RQD	rock quality designation
RTR	risk and technology review
SDS	State Disposal System Permit
SEC	United States Securities and Exchange Commission
SG	specific gravity
SMU	selective mining unit
SQL	Structured Query Language
TMDL	total maximum daily load
TRS	Technical Report Summary
TSF	tailings storage facility

Acronym	Definition
TSP	total suspended particulates
UCS	uniaxial compressive strength
USCG	United States Coast Guard
USGAAP	United States General Accepted Accounting Principles
USGS	United States Geological Survey
XRF	x-ray fluorescence

3.0 PROPERTY DESCRIPTION

3.1 Property Location

The Property is located in St. Louis County, Northeastern Minnesota, USA, on the Mesabi Iron Range, immediately northwest of the city of Eveleth, Minnesota. The Thunderbird Mine and offices are located just north of Eveleth at latitude 47°29’1.62” N, longitude 92°32’23.69” W. The Fairlane Facility is located approximately eight miles to the southeast near the unincorporated community of Forbes, Minnesota, at latitude 47°20’54.92” N, longitude 92°35’1.03” W. Figure 3-1 presents the location of the Thunderbird Mine and the Fairlane Facility.

3.2 Land Tenure

3.2.1 Mineral Rights

The Property consists of approximately 4,908 acres of mineral leases granted by private landowners and the State of Minnesota as illustrated in Figure 3-2 and Table 3-1. Mineral leases generally include surface mining rights. Where the mineral leases do not include surface mining rights, United Taconite controls the surface through ownership or surface leases with the owner of the surface. Approximately 703 acres of owned property is associated with the mineral lease acreage.

United Taconite mineral leases expire between 2037 and 2066, with the exception of the State of Minnesota mineral lease, which expires in 2027. United Taconite must continue to make minimum prepaid royalty payments each quarter and pay property taxes in order to maintain the mineral leases until expiration. When mining occurs, a royalty is due per long ton of crude ore mined, or long ton of pellets produced from the crude ore mined. Royalty rates per long ton fluctuate based on industry and economic indexes. Minimum prepaid royalty payments may be credited against royalties due when mining occurs. Specific terms and provisions of the mineral leases are confidential.

Table 3-1: Land Tenure Summary
Cleveland-Cliffs Inc. – United Taconite Property

Lease Name	Expiration Date
State T-5080-N	2/28/2027
Whiteside 1962	2/26/2037
Alworth 1962	7/31/2037
RFMD&F 1962	7/31/2037
RGGS 1964	1/1/2039
RFMD&F 1964	3/16/2039
Higgins 1966	9/29/2041
Virginia 1966	11/1/2041
Alworth 1969	7/1/2044
RFMD&F 1969	8/1/2044
RFMD&F 1972	1/1/2045

Lease Name	Expiration Date
Skubic	12/10/2057
RGGS 1974	12/31/2065
RGGS Auburn	12/31/2065
RGGS Boundary	12/31/2065

In order to maintain the mineral leases until expiration, UTAC must continue to make minimum prepaid royalty payments each quarter and pay property taxes. When mining occurs, a royalty is due per long ton of crude ore mined, or long ton of pellets produced from the crude ore mined, and payable to the respective lessors quarterly. Royalty rates per long ton fluctuate based on industry and economic indexes. Minimum prepaid royalty payments may be credited against royalties due when mining occurs. Specific terms and provisions of the mineral leases are confidential.

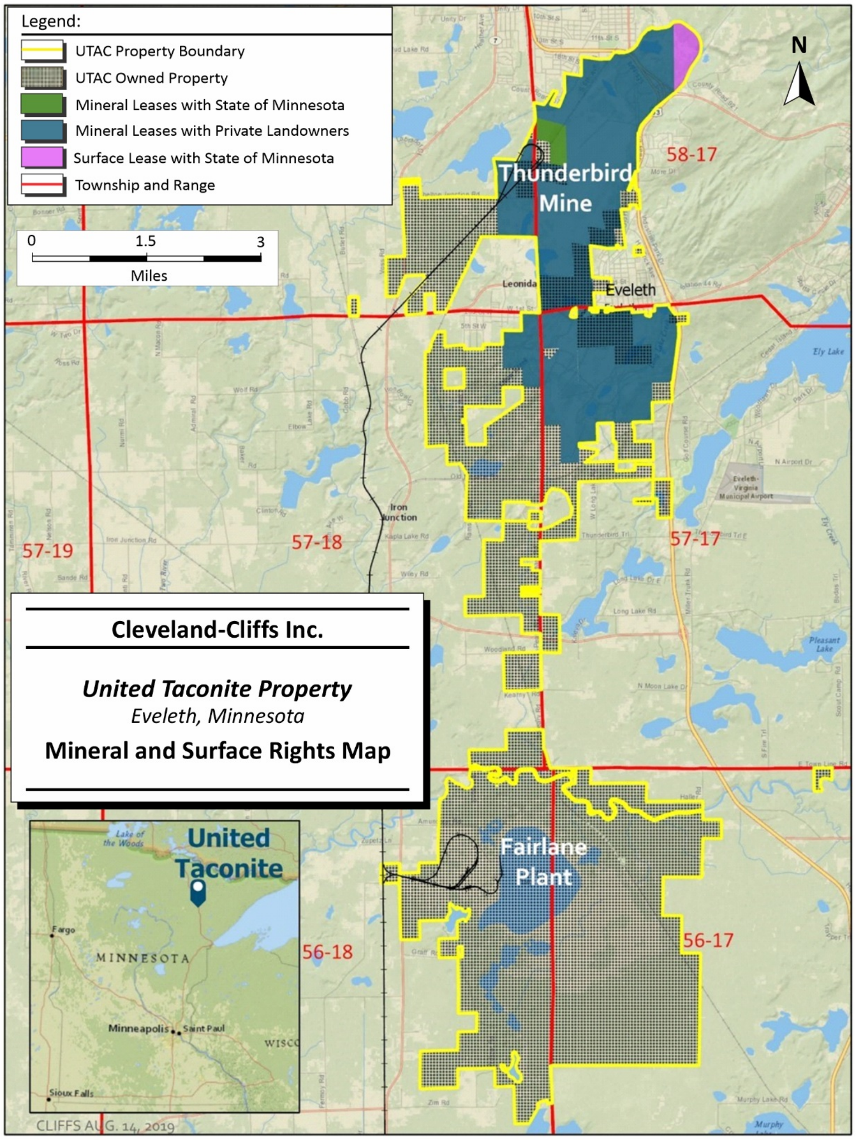
3.2.2 Surface Rights

The Property consists of approximately 14,199 acres of owned property (703 acres associated with mineral leases) in and around the Thunderbird Mine and Fairlane Facility as illustrated in Figure 3-2. United Taconite also leases approximately 145 acres not associated with mineral leases through a surface lease granted by the State of Minnesota. Property taxes must be paid to St. Louis County, Minnesota to maintain ownership.

December 2021

Source: SLR, 2021

Figure 3-1: Property Location Map



December 2021 ***Source: Cliffs, 2019***

Figure 3-2: Mineral and Surface Rights Map

3.3 Encumbrances

United Taconite grants leases, licenses, and easements for various purposes including miscellaneous community land uses, utility infrastructure, and other third-party uses that encumber the Property but do not inhibit operations. Certain assets of United Taconite serve as collateral as part of Cliffs' asset-based lending (ABL) facility. Cliffs has outstanding standby letters of credit, which were issued to back certain obligations of United Taconite, including certain permits and tailings basin projects. Additionally, United Taconite has and may continue to enter into lease agreements for necessary equipment used in the operations of the mine.

3.4 Royalties

Reference section 3.2 of this TRS for royalty information. No overriding royalty agreements are in place.

3.5 Other Significant Factors and Risks

No additional significant factors or risks are known.

SLR is not aware of any environmental liabilities on the Property. Cliffs has all required permits to conduct the proposed work on the Property. SLR is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the Property.

4.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

4.1 Accessibility

The Thunderbird Mine is easily accessed via paved roads from Eveleth, Minnesota approximately one mile to the south, or the city of Virginia, approximately five miles to the north. Duluth, a major port city on Lake Superior, is 59 mi south of the Thunderbird Mine via US Highway 53Duluth has a regional airport with several flights daily to major hubs in Minneapolis and Chicago.

The Fairlane Facility is accessed via county-maintained paved roads from Eveleth and is located just outside of Forbes. A rail line operated by Canadian National Railway (CN) extends from the Thunderbird Mine to the Fairlane Facility and from the Fairlane Facility to the port in Duluth.Refer to section 3.1 of this TRS and Figure 3-1 for the location of roads providing access to the Thunderbird Mine and Fairlane Facility.

4.2 Climate

The climate in Northern Minnesota ranges from mild in the summer to winter extremes.The annual average temperature is 36.9°F. The annual average high temperature is 48.6°F, whereas the annual average low temperature is 25.1°F. By month, July is on average the hottest month (77°F), and January is the coldest (-4°F) (National Oceanic and Atmospheric Administration [NOAA], 1991-2020)Table 4-1 presents complete climate data for the area for 1991 to 2020.

Table 4-1: Northern Minnesota Climate Data (1991 to 2020)
Cleveland-Cliffs Inc. – United Taconite Property

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high (°F)	16.9	22.5	35.4	49.5	63.4	72.2	76.7	74.9	65.7	50.8	34.3	21.4	48.6
Daily mean (°F)	6.2	10.5	23.8	37.1	49.5	58.9	63.5	61.6	53	40.2	25.6	12.3	36.9
Average low (°F)	−4.4	−1.4	12.2	24.8	35.7	45.7	50.3	48.3	40.3	29.7	16.9	3.1	25.1
Precipitation (in.)	0.51	0.53	0.91	1.61	2.76	4.36	3.85	3.09	3.06	2.35	1.09	0.64	24.76
Snowfall (in.)	15	7.1	7.8	3.7	0	0	0	0	0	1.2	13.2	12.3	60.3

Source: NOAA, 2021

Precipitation as rain in Northern Minnesota ranges from less than one inch in December, January, and February, to approximately three inches to four inches per month during the summer, averaging approximately 25 in. annually. Annual snowfalls average 60 in. during November through March. Approximately half of the precipitation occurs during the summer months.

The Property is in production year-round.

4.3 Local Resources

Labor is readily available in the project area. Medical facilities with trauma centers are located in the cities of Virginia, Hibbing, and Duluth, Minnesota. Table 4-2 presents a list of the major population centers and their distance by road to the Thunderbird Mine and Fairlane Facility.

Table 4-2: Nearby Population Centers
Cleveland-Cliffs Inc. – United Taconite Property

City/Town	Medical Center	Population 2010 Census	Miles to Thunderbird Mine	Miles to Fairlane Facility
Gilbert, MN	N/A	1,799	5	14
Eveleth, MN	N/A	3,718	1	12
Virginia, MN	Level IV	8,712	5	17
Duluth, MN	Level I and II	85,884	59	56
Hibbing, MN	Level III	16,361	28	23

Source: U.S. Census Bureau, Google Maps

The UTAC operation employs 549 personnel who live in the surrounding cities of Virginia, Eveleth, Gilbert, and Hibbing.Personnel also commute from Duluth and the Iron Range. St. Louis County has an estimated population of 220,000 people.

4.4 Infrastructure

The Property is located in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore currently exists. Infrastructure items include high-voltage electrical supplies, natural gas pipelines that connect to the North American distribution system, water sources, paved roads and highways, railroads for transporting run of mine (ROM) crude ore and finished products, port facilities that connect to the Great Lakes, and accommodations for employees. Local and State infrastructure also includes hospitals, schools, airports, equipment suppliers, fuel suppliers, commercial laboratories, and communication systems. Additional information regarding UTAC supporting infrastructure can be found in Section 15.0 of this TRS.

4.5 Physiography

The Thunderbird Mine and Fairlane Facility are located in St. Louis County, Northeastern Minnesota at an elevation of approximately 1,700 fasl.The generally gentle topography in the area is punctuated by hummocky hills and long gentle moraines, remnants of glacial ingress and egress. The landscape ranges from semi-rugged, lake-dotted terrain with thin glacial deposits over bedrock, to hummocky or undulating plains with deep glacial drift, to large, flat, poorly drained peatlands. Topography includes rolling till plains, moraines and flat outwash plains formed by the Rainy Lobe glacier. Most striking is the Giants Range, a narrow bedrock ridge rising 200 ft to 400 ft above the surrounding area. Bedrock is locally exposed near terminal moraines but is generally rare. There are over 63 bodies of water with areas greater than 100 acres in the Nashwauk Uplands Ecological Subsection, which includes the area around Eveleth, Minnesota.

The Minnesota Department of Natural Resources characterizes the area as being within the Laurentian Mixed Forest Province (LMF), which covers over 23 million acres of Northeastern Minnesota. In Minnesota, the LMF is characterized by broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps. Vegetation is a mixture of deciduous and coniferous trees. White pine-red pine forest and jack pine barrens are common on outwash plains. Aspen-birch forest and mixed hardwood-pine forest are present on moraines and till plains. Wetland vegetation includes conifer bogs, lowland grasses, and swamps. Prior to settlement, the area consisted of forest communities dominated by white pine, red pine, balsam fir, white spruce, and aspen-birch.

Brown glacial sediments form the parent material for much of the soils in the area. Soils are varied and range from medium to coarse textures. Soils are formed in sandy to fine-loamy glacial till and outwash sand. Soils on the Nashwauk Moraine have a loamy cap with dense basal till below at depths of 20 in. to 40 in. These soils are classified as boralfs (cold, well-drained soils developed under forest vegetation) (Minnesota Department of Natural Resources, 2011).

5.0 HISTORY

5.1 Prior Ownership

UTAC was originally owned and operated by the Eveleth Taconite Co. (Eveleth Taconite), and developed through a joint effort between Oglebay Norton and the Ford Motor Co. Expansion in the 1970s was funded by a joint venture agreement between Oglebay Norton and its partners Armco Steel, Steel Corporation of Canada, and Dominion Foundries and Steel Co., operating as Eveleth Expansion Co. (Eveleth Expansion)From 1977 to 1996, the two entities (Eveleth Taconite and Eveleth Expansion) operated as a single entity known as Eveleth Mines. In 1996, ownership was transferred to Eveleth Mines, LLC held by Rouge Steel, AK Steel and Stelco, and operated as EVTAC Mining.In May 2003, the Property was idled and subsequently purchased and reopened by United Taconite (70% Cliffs and 30% Laiwu) in December, 2003. Cliffs purchased Laiwu's 30% share in 2008, and Cliffs now holds a 100% interest in UTAC through its wholly owned subsidiary United Taconite.

5.2 Exploration and Development History

Initial observations of iron-bearing rocks in the Mesabi Iron Range are attributed to Henry H. Eames, the first state geologist of Minnesota, in 1866. Mr. Eames mentioned that "enormous bodies of iron ore occurred" in the northern part of the state (Eames, 1866).

Exploration for high-grade, direct-shipping iron ore (DSO) deposits in the Eveleth area began in the 1890s.Test pitting, later diamond core and churn drilling, and dip-needle surveys were used to delineate DSO deposits. The understanding of this work in the immediate Property area is limited with poor documentation of activities maintained on site. Coincident with early exploration activity, the areal extent of the unenriched Biwabik Iron Formation (Biwabik IF) sub-crop was delineated, and the magnetite-bearing iron formation was documented. Focused exploration for beneficiation-grade magnetite deposits, regionally known as taconite deposits, however, did not begin until the 1940s. At that time exploration activity consisted largely of diamond core drilling on regular-spaced grids designed to delineate taconite and characterize its weight recovery and metallurgical properties. A brief history of the initial exploration can be found in the Field Trip 2 Guidebook (Severson et al., 2016) and references therein.

Exploration activity at the TBN and TBS deposits (Thunderbird deposits) consisted solely of diamond core drilling campaigns commencing in the early 1950s. Drilling since the 1950s has primarily consisted of infill diamond drilling for operational purposes. Cliffs and United Taconite have not evaluated detailed records or results of early, non-drilling prospecting methods used during initial exploration activities such as geophysical surveys, mapping, trenching, and test pits conducted prior to Cliffs' ownership of UTAC.

5.3 Historical Reserve Estimates

As Cliffs has been the operator of United Taconite since 2003, historical reserves are not relevant and are not included here. A brief history of UTAC Mineral Reserves, as reported by Cliffs, is included in section 12.2 of this TRS.

5.4 Past Production

The TBN mine and Fairlane Facility began production in November 1965, with an initial production rate of 1.6 MWLT per year (MWLT/y) of iron ore pellets. In 1977, with the addition of three concentrating lines, a second pelletizing line, and the opening of the adjacent TBS mine, annual production capacity was increased to 6.0 MWLT/y of iron ore pellets. In 1991 the TBS mine was idled, and in May 1999 Eveleth Mines closed the Line 1 concentrating and pelletizing, reducing production to 4.2 MWLT/y of iron ore pellets. The remaining EVTAC operations were idled in May 2003.

The idled EVTAC operations were purchased and re-opened by United Taconite (70% Cliffs and 30% Laiwu) in December 2003.Subsequently, refurbishment and reactivation of Line 1 in December 2004 increased the annual production to 6.0 MWLT/y of iron ore pellets. In 2008, Cliffs purchased Laiwu's 30% share, and now holds a 100% interest in UTAC through its wholly owned subsidiary United Taconite.

UTAC historical production is presented in Table 5-1, while production by owner/operator is provided in Table 5-2.

Table 5-1: Historical Production
Cleveland-Cliffs Inc. – United Taconite Property

Year	Stripping (kWLT)	Crude Ore Crushed (kWLT)	Process Recovery[1]	Wet Std. Pellet (kWLT)	Wet Flux Pellet (kWLT)
1965-1979	67,172	108,996	32.1%	34,997	-
1980-1989	95,185	131,151	32.4%	42,542	-
1990-1999	94,419	141,287	31.2%	44,146	-
2000-2009	103,081	127,260	32.6%	41,450	-
2010	15,038	15,233	33.6%	5,112	-
2011	16,813	15,592	33.0%	5,150	-
2012	17,327	15,735	34.0%	5,355	-
2013	17,607	15,124	34.4%	5,204	-
2014	17,460	14,342	34.5%	4,944	-
2015	10,736	8,297	37.1%	3,078	-
2016	4,679	5,061	31.5%	1,548	-
2017	15,073	13,710	33.7%	3,314	1,516
2018	16,633	14,543	33.9%	3,163	2,056
2019	22,595	15,916	31.9%	3,326	1,921
2020	20,870	15,220	33.8%	3,582	1,715
2021	22,422	15,143	35.2%	3,725	1,599
Total	557,110	672,610	32.6%	210,636	8,807

Note:

1. Process recovery is calculated by dividing wet standard pellets by crude ore crushed for the period. Fluxstone added (approximately 14%) to produce wet flux pellets is removed to calculate a standard equivalent pellet.

Table 5-2: Historical Production by Owner
Cleveland-Cliffs Inc. – United Taconite Property

Years	Ownership	Wet Pellets (kWLT)
1965-2003	Eveleth Taconite Co.	135,557
2004-Present	United Taconite LLC	78,562
Total through 2021		219,443

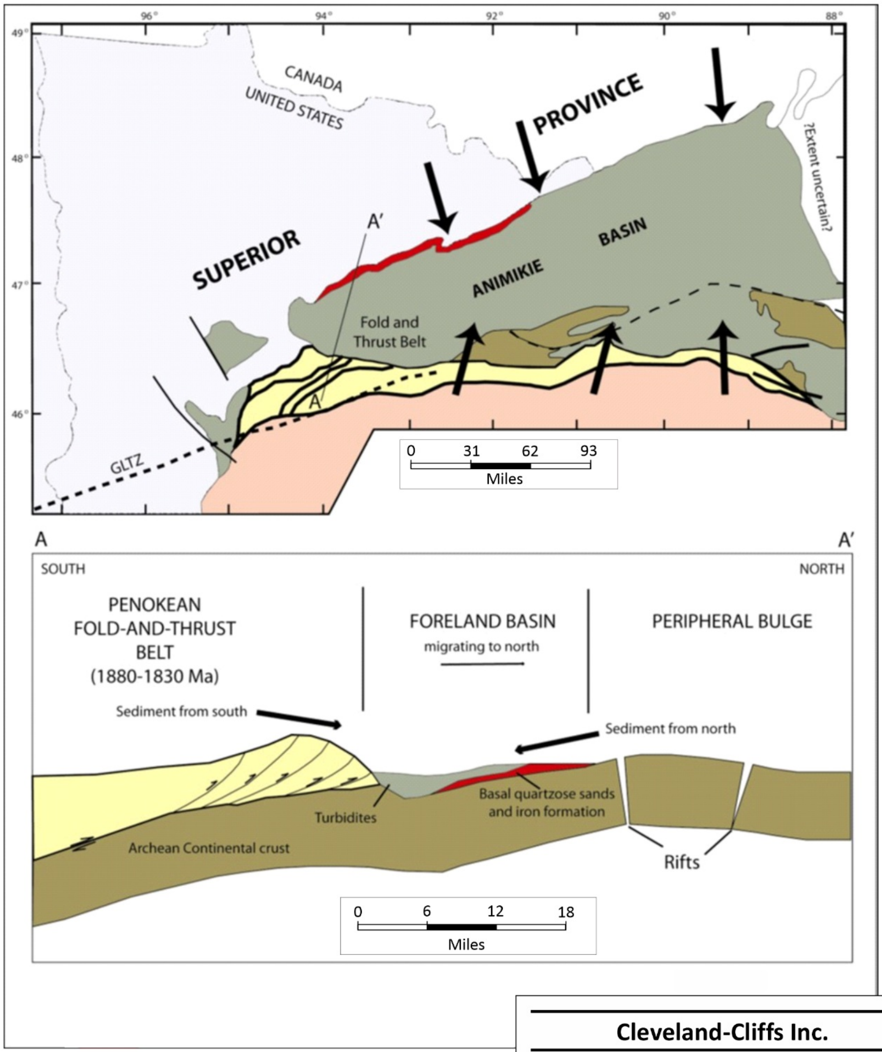
6.0 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

6.1 Regional Geology

Essential aspects of the regional geology in the Lake Superior region have been understood since the early 1900s, and the geologic understanding of the area has remained relatively unchanged over the years.

Iron ores produced within the region range from high-grade, structurally controlled ore bodies amendable to direct shipping to more disseminated, stratigraphically controlled, low-grade iron ores regionally termed taconite. Taconite is observed in a sequence of Paleoproterozoic metasedimentary rocks overlying Archean granitic rocks in the Lake Superior region.A fold and thrust belt attributed to the Penokean orogeny (1,880 Ma to 1,830 Ma) developed a northward migrating foreland basin known as the Animikie Basin (Ojakangas, 1994, Figure 6-1).Sedimentary rocks within this basin include the basal Pokegama Quartzite (POK), the overlying Biwabik IF, and argillite and graywacke of the Virginia Formation (Jirsa & Morey, 2003).

The Mesabi Iron Range is a term used to reference the outcrop of the Animikie group, and is defined as a northeast-trending and southeast-dipping homocline, dipping 8° to 12° to the west or northwest in TBN and 5° to 7° to the south or southwest in TBS.The Biwabik IF is sectioned by a number of post-Penokean orogeny, high-angle normal and reverse faults associated with near-vertical, reactivated faults in the Archean basement (Morey, 1999). The most notable structural feature of the Biwabik IF is located east of Hibbing, between Virginia and Eveleth, where the paired Virginia syncline and Eveleth anticline result in an S-curve surface trace of the Biwabik IF (Jirsa and Morey, 2003, Figure 6-2).



Legend:

EARLY PROTEROZOIC

🟥 Biwabik Iron Formation Exposure

December 2021 ***Source: Ojakangas, 1994***

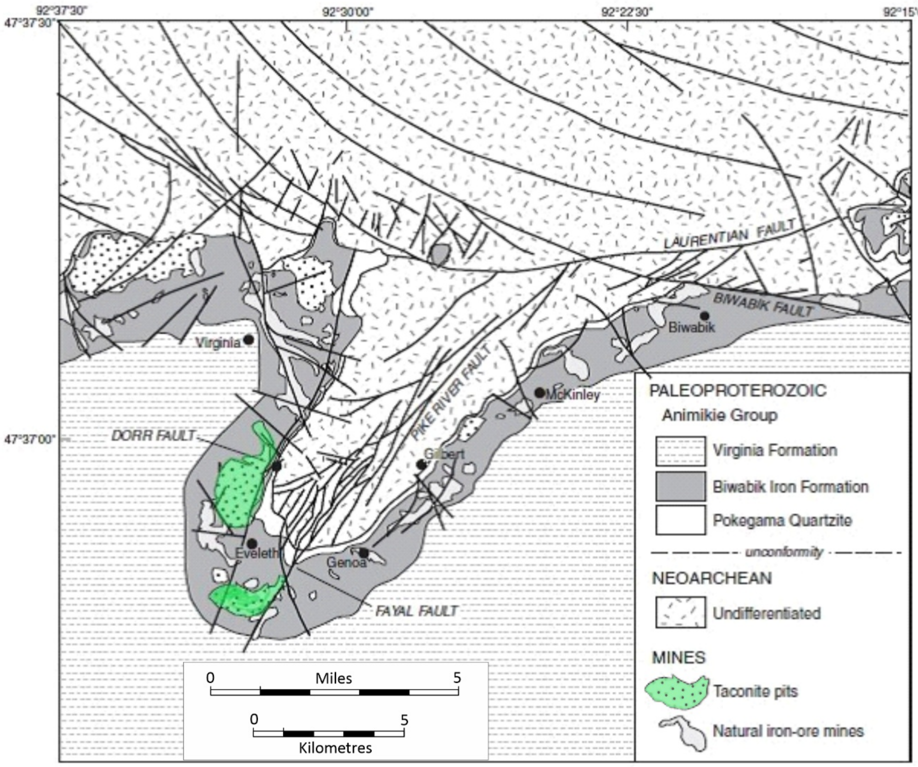
Cleveland-Cliffs Inc.

United Taconite Property

Eveleth, Minnesota

Location of the Animikie Basin and Schematic Cross-section Showing Development of the Basin

Figure 6-1: Location of the Animikie Basin and Schematic Cross-section Showing Development of the Basin



Cleveland-Cliffs Inc.

United Taconite Property
Eveleth, Minnesota
Regional Geological Map

December 2021 ***Source: Modified from Jirsa and Morey, 2003***

Note. UTAC pits in green

Figure 6-2: Regional Geological Map

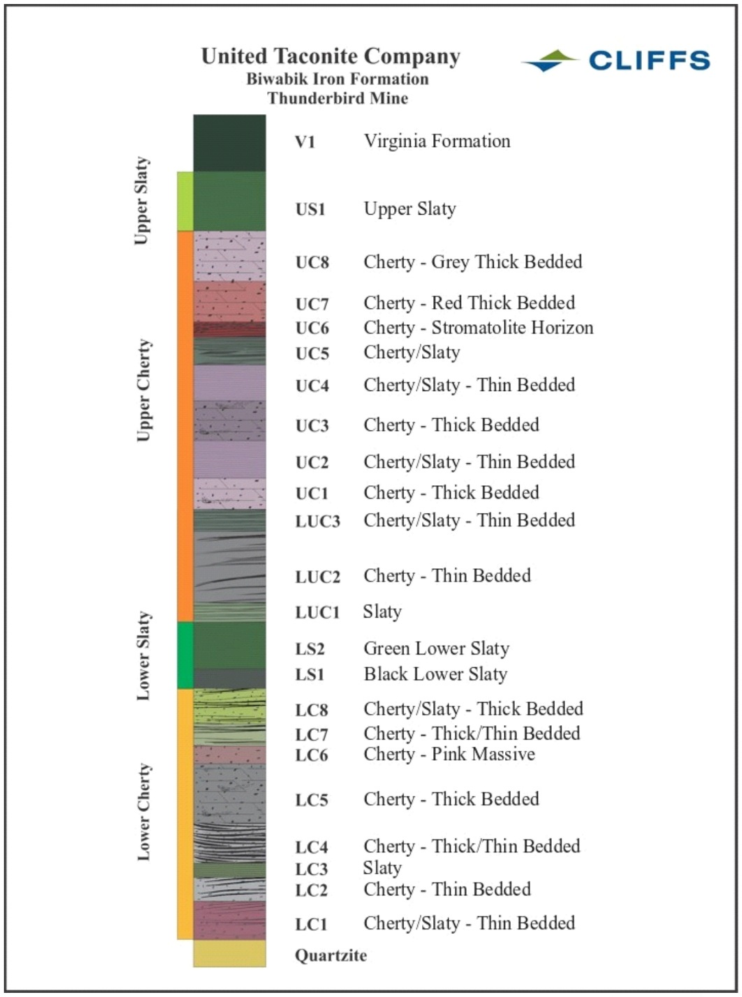
6.2 Local Geology

The Early Proterozoic Biwabik IF is a narrow belt of iron-rich strata varying in width from 0.25 mi to 3.2 mi and extending approximately 125 mi from Grand Rapids eastward past Babbitt, Minnesota.The true thickness varies from approximately 150 ft to 700 ft. The Biwabik IF is interpreted to have been deposited in a shallow, tidal marine setting and is characterized as having four members (from bottom to top): Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty (Severson, Heine, and Patelke, 2009).“Cherty” members have a sandy granular texture, are typically thickly bedded, and are composed of silica and iron oxide minerals. “Slaty” members are fine grained, thinly bedded, and comprised of iron silicates and iron carbonates, with local chert beds, and are typically uneconomic. The cherty units are representative of deposition in a high-energy environment, whereas the slaty units were probably deposited in a muddy, lower-energy environment below the wave base. Interbedding is ubiquitous, and contacts are generally gradational. The iron content for the cherty units is approximately 31%, while iron content of the slaty units is approximately 26%. SLR notes that nomenclature of the members is not indicative of metamorphic grade; instead, slaty and cherty are colloquial, descriptive terms used regionally.

The four members of the Biwabik IF are further divided into 22 subunits within the Thunderbird Mine area.Figure 6-3 illustrates the stratigraphy of these subunits and their general descriptions. Nomenclature for these subunits is based on their relative location within the four members. They are subdivided based on geologic characteristics observed in diamond drill core. Many of the contacts between subunits are gradational and do not provide a sharp geologic contact. Geologic contacts are occasionally adjusted to fit assay data once received.

Isolated DSO material exists within the lower-grade taconite ores, the origins of which have been debated for many years.Some of the more recent publications suggest a genesis linked to crustal-scale groundwater convection related to igneous activity. Much of the evidence supporting this conclusion comes from the isotopic analysis of leached and replaced silicate and carbonate minerals (Morey, 1999). Within the Biwabik IF, metamorphic processes produced assemblages diagnostic of greenschist facies to the west, increasing in metamorphic grade to the east. Mineralogy in unaltered taconite is dominated by quartz, magnetite, hematite, siderite, ankerite, talc, chamosite, greenalite, minnesotaite, and stilpnomelane (Perry, et al., 1973).

The Thunderbird deposits are located in the Virginia Horn region, noted for the drastic change in the general northeast trend of the Biwabik IF (Figure 6-2). To the west of Virginia, Minnesota, the Biwabik IF dips approximately 6° to the southeast.To the east of Gilbert, Minnesota, the dip is approximately 12° to the southeast. Still further east, the Biwabik IF is essentially flat lying.Between Virginia and Eveleth, however, the Biwabik IF strikes to the southwest and dips to the northwest. In this area, the Biwabik IF forms the paired Virginia syncline and Eveleth anticline (Jirsa and Morey, 2003). A number of publications suggest that the occurrence of isolated DSO material is related to the structural complexity in this region and the movement of fluids along faults that remobilized and concentrated iron.



Cleveland-Cliffs Inc.

United Taconite Property
Eveleth, Minnesota
Stratigraphic Column

December 2021

Source: Cliffs, 2019

Figure 6-3: Stratigraphic Column

6.3 Property Geology

The iron ore deposit exploited on the Property was originally subdivided into two areas, TBN and TBSUnited Taconite still retains the Thunderbird nomenclature in a number of publications and unpublished company reports. The following geological interpretation is based on the observations of mine geologists at the Thunderbird deposits since 1960.

6.3.1 Surficial Geology

The Thunderbird deposits are overlain by Pleistocene glacial till, outwash, and lacustrine sediment.Overburden thicknesses average approximately 50 ft; however, thicknesses up to 199 ft have been drilled at TBS. Glacial sediment is generally thinnest on the northern portion of the Property and thickens to the south and west.

6.3.2 Bedrock Geology

Current mining operations exploit stratigraphic units of the Upper Cherty (44% of total mining) and Lower Cherty (56%) members.Mineable crude ore intercepts are generally identified by their thickness, crude ore magnetic iron content (MagFe), and concentrate silica content. Each unit and subunit is described based on extensive historical drilling and mining. When unoxidized, each subunit has recognizable physical and chemical characteristics.

The subunits are described by Larson (2010) as follows.

6.3.2.1 Lower Cherty

The Lower Cherty member is approximately 200 ft to 250 ft thick in the Thunderbird deposits and is subdivided into eight subunits:

LC-1 is a pink-green-gray, heterogeneous subunit comprised of interbedded, thin-bedded slaty and thin-bedded cherty carbonate-silicate (minnesotaite-talc-stilpnomelane) iron formation. LC-1 comprises the basal 46 ft of the iron formation. LC-1 is defined as the footwall of the Biwabik IF. LC-1 is, in general, poorly described, as the majority of exploration and development drilling terminates in the upper few feet of this subunit.

LC-2 is a gray, thin-bedded, cherty carbonate-silicate (minnesotaite-talc)-magnetite iron formation. Magnetite occurs as disseminated and diffuse idiomorphic granules and as replacement of thin slaty laminae. Magnetite (slaty) laminae often have thin stringers of white talc. LC-2 averages 20 ft in thickness but varies across the extent of the Thunderbird deposits. A notable feature of LC-2 is the presence of wispy laminae of magnetite, likely a later diagenetic overprint of early burial stylolites.

LC-3 is composed of interbedded, greenish-gray, thin-bedded cherty- and green, medium-laminated slaty iron formation. LC-3 is weakly magnetic, with the cherty beds conspicuously low in magnetite. LC-3 averages 23 ft in thickness but varies across the Thunderbird deposits. In the western extent of the Thunderbird deposits, LC-3 is up to 30 ft thick and predominantly composed of slaty iron formation. In the northern extent of the TBN deposit, LC-3 thins to less than 10 ft and is composed predominantly of alternating thin beds of slaty material and nonmagnetic, granular chert. Within the LC-3 subunit, ubiquitous bedding-parallel quartz-carbonate veins up to one inch thick are conspicuous in mine exposures. The top and bottom of the LC-3 subunit is defined by the first and last appearance of green, nonmagnetic slaty iron formation containing thin-bedded, nonmagnetic, granular chert.

LC-4 is composed of gray, medium-bedded, cherty carbonate (ankerite)-silicate (minnesotaite-talc)-magnetite iron formation with minor, irregular thin beds of slaty (magnetite) iron formation. Magnetite occurs as disseminated idiomorphic granules, patchy halos cored by coarse slaty intraclasts, and replacement of thin slaty laminae. LC-4 averages 50 ft to 60 ft thickness.

LC-5 is composed of pink-gray, medium- to thick-bedded cherty oxide-chert-carbonate (ankerite) iron formation. Magnetite occurs as disseminated grains and in mottles. LC-5 averages 50 ft to 60 ft in thickness. LC-5 contains a small but variable amount of “primary” (i.e., pre-supergene oxidation) hematite. LC-5 has appreciably more matrix chert than the underlying LC-4 subunit.

LC-6 is a pink, massive, thick-bedded, cherty oxide-chert-carbonate (kutnohorite) iron formation, averaging six feet in thickness. LC-6 is composed principally of coarse-grained intraclasts, reflecting a relatively high-energy depositional environment. LC-6 contains an appreciable content of “primary” hematite and has relatively low magnetite recovery. The base of the LC-6 subunit is defined by the appearance of discreet, thin- to medium-laminated shaly material within the coarsening LC-5 succession. The top of the LC-6 subunit is defined by the abrupt transition to green, thin- to medium-bedded slaty and cherty iron formation of the LC-7 subunit.

LC-7 is composed of interbedded, thick, irregular, magnetite-carbonate-silicate slaty and green, thin- to medium-bedded cherty carbonate (siderite)-silicate (greenalite) iron formation. LC-7 averages 13 ft in thickness. LC-7 is notable in that magnetite occurs predominantly in the thick, slaty laminae. Green LC-7 sharply overlies the pink LC-6, and the contact is a highly visible stratigraphic marker throughout the Virginia Horn area.The transition from thick-bedded, coarse-grained to thin-bedded, fine-grained iron formation, as well as the contrasting mineralogical assemblages at the LC-6/LC-7 contact, suggests an abrupt transition in the depositional environment. The top of the LC-7 subunit is defined by the last occurrence of magnetite-bearing slaty iron formation in the Lower Cherty succession.

LC-8 is visually similar to LC-7, consisting of interbedded green, medium- to thick-laminar massive slaty and greenish-gray, thin-bedded, granular cherty carbonate (siderite)-silicate (greenalite) iron formation. However, LC-8 contains little or no magnetite. LC-8 averages a thickness of 19 ft. The base of the LC-8 subunit is defined by the top of the last magnetic slaty layer in the Lower Cherty succession. The top of the LC-8 subunit is defined by the last occurrence of thin-bedded, granular cherts, and the last occurrence of exclusively green slaty material.

6.3.2.2 Lower Slaty

The Lower Slaty member averages 50 ft to 60 ft thick, comprising the nonmagnetic rock between the Lower Cherty and Upper Cherty member subunits.

LS-1 is composed of predominantly black, massive to thinly laminated, slaty carbonate (siderite)-silicate (stilpnomelane-minnesotaite)-sulfide iron formation. LS-1 averages 23 ft in total thickness and is divisible into a lower half composed of thick-bedded, massive, intraformational debris flow breccias and an upper half composed of thinly laminated, planar-bedded slaty iron formation. Locally, thin- to medium-bedded, black flinty chert is present in the lower portion. Such flinty cherts typically occur in pod-like bodies extending a few hundred feet on strike.

The upper portion of LS-1 has undergone extensive bedding-parallel deformation, with the entire subunit serving as a low-angle fault plane.Small-scale folds are common, as are bedding-parallel, syntectonic quartz-carbonate (ankerite-siderite) veins. The thinly laminated, planar-bedded slaty iron formation in the upper portion, referred to as the “intermediate slate,” is a district-scale marker interval. LS-1 is notable in that it contains a relatively high percentage of aluminum oxide (approximately 1.8% Al_2O_3) and other elements indicative of clastic input, suggesting the basin experienced either an influx of clastic detritus, or a sharp reduction in the rate of iron formation deposition. The top of the LS-1 subunit is defined by an interval of fissile shale, approximately one foot thick, containing abundant 0.04 in. to 0.1 in lenticular concretions.

LS-2 is composed of a green to greenish-gray, well-cemented, very thinly laminated, slaty carbonate-silicate (minnesotaite) iron formation. LS-2 averages 26 ft in thickness. The top of the LS-2 subunit is defined by the appearance of significant magnetic slaty iron formation. The base of the LS-2 subunit is defined by the first well-cemented shale in the Lower Slaty succession.

6.3.2.3 Upper Cherty

The Upper Cherty member comprises several taconite subunits situated above the Lower Slaty subunits.The Upper Cherty unit is approximately 350 ft thick. The lowermost 100 ft of the Upper Cherty units as defined at TBN consists of alternating beds of slaty- and cherty-iron formation dominant intervals. The Upper Cherty unit is subdivided into 11 subunits at the Thunderbird deposits.

LUC-1 is composed of gray, laminar, thin-bedded slaty chert-silicate (stilpnomelane)-magnetite iron formation. LUC-1 averages 22 ft in thickness and is notable for producing a high-silica magnetic concentrate (up to approximately 10% SiO_2). LUC-1, in common with the other slaty iron formation in the Upper Cherty unit, has a relatively high Al_2O_3 content (approximately 0.5% Al_2O_3).

LUC-2 is a heterogeneous subunit, composed variously of green-gray, thin-bedded, slaty iron formation; interbedded, green-gray, thin-bedded slaty iron formation and thin-bedded cherty iron formation; and gray, thick-bedded, chert-magnetite iron formation. LUC-2, as a whole, varies from five feet to 40 ft in thickness. Thin-bedded, granular cherty intervals predominate over thin- to medium-laminated shales. The abundance and frequency of cherty intervals generally increases up-section within the subunit. Locally, pink, massive- to thick-bedded, coarse-grained, granular chert bodies up to 20 ft thick are present within the LUC-2 subunit. These beds are characterized by significantly higher weight recovery and significantly lower concentrate silica grades than the subunit as a whole. The base of the LUC-2 subunit is defined by the common appearance of thin-bedded, granular chert. Coincident with this transition, bedding in the shaly iron formation changes from predominantly planar to wavy. The top of the LUC-2 subunit is defined by a relatively abrupt decrease in the frequency and abundance of thin-bedded granular chert.

LUC-3 is composed of dark, reddish-brown, thin, planar-bedded, slaty chert-silicate iron formation. LUC-3 averages 27 ft in thickness; however, thickness over the subunit varies from seven feet to 72 ft. Increasing up-section, nodules and beds of chert are increasingly abundant, and the LUC-3 subunit hosts a one-foot- to two-feet-thick interval containing thin-bedded, flinty chert. The variable thickness of LUC-3 is due to erosion and removal of a portion of the subunit prior to the deposition of the overlying UC-1 subunit. LUC-3 at TBS is correlative with the LUC-3 and UC-2 subunits at the TBN deposit.

UC-1 is composed of pinkish-gray, thick-bedded, cherty oxide-chert-silicate iron formation. UC-1 is notable in that it contains appreciable “primary” hematite content. This hematite is intimately intergrown with magnetite and, so, is recovered in the Fairlane Facility concentrator circuit. The UC1 is interpreted as a channel deposit that cuts into the underlying subunits and is not continuous across the

Thunderbird Mine area. As a result, the UC-1 subunit's thickness is variable, and the underlying subunit may be thinned out or missing.

UC-2 is a dark, reddish-brown, thin-bedded, slaty silicate iron formation, averaging 33 ft in thickness, but ranging from 11 ft to 60 ft thick. The UC-2 subunit typically has a low magnetic iron (<17% MagFe).

UC-3 is composed of gray, thick-bedded, cherty oxide-silicate iron formation, with a conspicuous increase in magnetite content from bottom to top. UC-3 is further subdivided into UC-3 and UC-3A based on magnetite content, and these subdivisions are modeled separately. Concentrate silica values in the overall UC-3 subunit are neutral (4% to 6%), making this a desirable blend component when available. The overall UC-3 subunit is interpreted as a channel deposit that cuts into the underlying subunits and is not continuous across the Thunderbird Mine area. As a result, UC-3 subunit's thickness is variable, and the underlying subunit may be thinned out or missing.

UC-4 is a dark, reddish-brown, thin-bedded, slaty silicate iron formation, averaging 25 ft in thickness. UC-4 typically has a relatively low magnetic iron (<17% MagFe). The top of the UC-4 subunit is marked by a black, thin-bedded, nonmagnetic, slaty silicate iron formation, averaging eight feet in thickness, but ranging from one foot to 18 ft thick. This black, slaty top of the subunit at TBN is an important marker interval, correlative with the Upper Cherty Marker Slate subunit (Ucms) at TBS (described below).

UC-5 consists of interbedded and alternating reddish-brown, thin-bedded, slaty silicate iron formation and thin-bedded, cherty iron formation. UC-5 averages 28 ft in thickness but ranges from five feet to 52 ft thick. The thin cherty beds commonly contain abundant, coarse-grained jasper intraclasts.

UC-6 is composed of red, medium- to thick-bedded, coarse-grained intraclast conglomerates. Clasts in the conglomerate are composed predominantly of re-sedimented cherty algal stromatolites (spherical oncolites). The conglomeratic matrix is composed predominantly of manganiferous carbonate. The top and bottom of the UC-6 subunit are defined by the first and last appearances of coarse-grained oncolite breccia within the Upper Cherty succession.

UC-7 is composed of gray to red, thick-bedded, oolitic, cherty oxide-chert-carbonate iron formation. The subunit consists of a lower, red (hematitic), oolitic cherty iron formation and an upper, gray, magnetite-bearing, oolitic chert-carbonate (ankerite) cherty iron formation. The lower portion of the subunit averages 29 ft in thickness. The upper portion of the subunit averages 46 ft in thickness and contains abundant coarse poikiloblasts of ankerite. In some instances these are weathered away, leaving vugs in the oolitic chert.

UC-8 consists of interbedded, green-red, thin-bedded, slaty silicate iron formation and thin-bedded cherty iron formation. UC-8 averages 32 ft in thickness. UC-8 is known only from (commonly) oxidized drill hole intercepts. The thin, cherty beds commonly contain abundant, coarse-grained jasper intraclasts. The contact between UC-8 and the overlying US-1 is poorly defined.

6.3.2.3.1 Upper Cherty at TBS

The Ucm series occurs at TBS and is defined in place of the UC2 to UC5 stratigraphy used at TBN.

Ucml – The "middle lower" subunit consists of dark reddish-brown, thin-bedded, slaty silicate iron formation, averaging 33 ft in thickness, but ranging from 11 ft to 60 ft thick.

Ucms – The "Marker Slate" is a black, thin-bedded, nonmagnetic slaty silicate iron formation subunit, averaging eight feet in thickness, but ranging from one foot to 18 ft thick. The Ucms subunit is an important marker interval, and is correlative with the top of the UC-4 subunit at the TBN deposit.

Ucmu – The "Middle Upper" subunit consists of interbedded, reddish-brown, thin-bedded, slaty silicate iron formation and thin-bedded, cherty iron formation averaging 28 ft in thickness but ranging from five feet to 52 ft thick. The thin cherty beds commonly contain abundant coarse-grained jasper intraclasts.

6.3.2.4 Upper Slaty

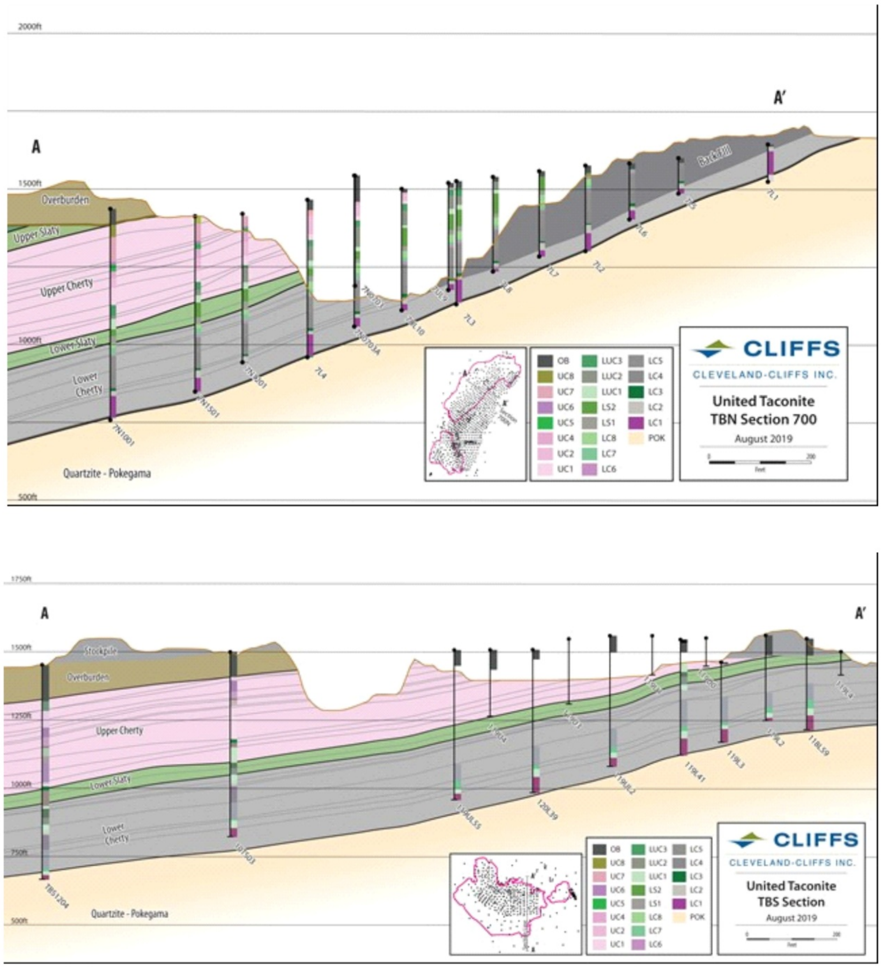
The Upper Slaty unit in the vicinity of the Thunderbird deposits is only known from oxidized intercepts in limited drill holes and is not exposed in outcrops. The Upper Slaty unit is comprised predominantly of reddish-brown, thin-bedded, slaty iron formation and is approximately 50 ft thick.

6.4 Mineralization

Magnetite-bearing taconite is currently the principal iron-bearing rock of economic interest on the property. In line with other Superior-type iron formations, magnetite-bearing intervals within the Biwabik IF occur as laterally extensive, stratiform intervals. Economically mineable magnetite occurs exclusively within granular iron-formation (cherty) units of the Biwabik IF.

Magnetite formed during diagenesis of precursor iron hydroxides, carbonates, and silicates in the primary iron-formation chemical sediment. Reduction of ferric iron and subsequent ferrous iron mobility within the sedimentary package played a key role in magnetite formation. Units with high primary permeability and porosity display a predilection to formation of magnetite. The high total iron content of the highest magnetite content ores suggests that ferrous iron mobility locally enriched the iron content of the primary iron-formation chemical sediment (Larson, 2010).

Figure 6-4 presents geologic cross-sections for TBN and TBS.



Cleveland-Cliffs Inc.

United Taconite Property
Eveleth, Minnesota

TBN and TBS Geologic Cross-sections

December 2021 **Source: Cliffs, 2019**

Figure 6-4: TBN and TBS Geologic Cross-sections

In the Thunderbird deposits, the four members of the Biwabik IF comprise a total thickness of over 600 ft. Average thicknesses of the four members at the Thunderbird deposits are presented in Table 6-1.

Table 6-1: Relative Thicknesses of the Four Members of the Biwabik IF at the Thunderbird Deposits
Cleveland-Cliffs Inc. – United Taconite Property

Unit	TBN Thickness (ft)	TBS Thickness (ft)
Upper Slaty	63	58
Upper Cherty	307	329
Lower Slaty	50	46
Lower Cherty	213	230

SLR notes that due to the dip of the Biwabik IF, portions of the units were eroded and do not exist uniformly across the mining area. Thickness of the Upper Slaty member is an average of drilled thickness for the relatively few holes that have intersected the unit. All other member thicknesses are summations of the subunit thicknesses tabulated in Table 6-2 and Table 6-3. Slaty subunits (US-1, LS-2, and LS-1) are always considered to be waste at TBN and TBS. All other subunits are mined and processed if they meet cut-off grade (section 11.8). Within the currently operating TBN pit, exposed LC-1 does not meet cut-off grade, and UC-8 is not encountered. There is no mining currently occurring in the TBS pit. The average thickness and magnetic iron content of the subunits at the Thunderbird deposits are presented in Table 6-2 and Table 6-3.

Table 6-2: Relative Thicknesses and Iron Content of Subunits of the Biwabik IF at the TBN Deposit
Cleveland-Cliffs Inc. – United Taconite Property

Subunits of the Biwabik IF	Average Thickness (ft)	Average Magnetic Iron Content
US-1	63	9.1%
UC-8	22	13.1%
UC-7	36	14.4%
UC-6	11	8.6%
UC-5	15	15.5%
UC-4	19	14.3%
UC-3	37	13.7%
UC-3a	42	24.4%
UC-2	31	15.5%
UC-1	22	16.9%
LUC-3	16	17.8%
LUC-2	39	22.2%
LUC-1	17	17.8%

Subunits of the Biwabik IF	Average Thickness (ft)	Average Magnetic Iron Content
LS-2	35	7.2%
LS-1	15	0.9%
LC-8	20	5.5%
LC-7	13	17.4%
LC-6	7	19.8%
LC-5	49	24.4%
LC-4	48	24.5%
LC-3	11	14.1%
LC-2	16	20.9%
LC-1	59	11.6%

Table 6-3: Relative Thicknesses and Iron Content of Subunits of the Biwabik IF at the TBS Deposit
Cleveland-Cliffs Inc. – United Taconite Property

Subunits of the Biwabik IF	Average Thickness (ft)	Average Magnetic Iron Content
US-1	58	5.8%
UC-8	28	16.1%
UC-7u	41	18.9%
UC-7l	31	17.5%
UC-6	9	11.2%
UC-Mu	26	13.2%
UC-Ms	8	15.2%
UC-Ml	30	18.1%
UC-1	66	23.0%
LUC-3	27	17.2%
LUC-2	42	21.1%
LUC-1	21	15.0%
LS-2	24	7.6%
LS-1	22	0.8%
LC-8	19	5.7%
LC-7	13	14.9%
LC-6	6	18.7%
LC-5	58	20.7%
LC-4	58	22.5%

Subunits of the Biwabik IF	Average Thickness (ft)	Average Magnetic Iron Content
LC-3	23	8.1%
LC-2	18	18.3%
LC-1	13	10.5%

6.5 Deposit Types

6.5.1 Mineral Deposit

The TBN and TBS deposits are examples of Lake Superior-type banded iron formation (BIF) deposits. Lake Superior-type BIFs occur globally and are exclusively Precambrian, deposited from approximately 2,400 Ma to 1,800 Ma. Although the genesis of iron formations has been debated over the years, it is certain that they were deposited relatively contemporaneously and in similar marine depositional environments. Some of the most prolific iron districts in the world are hosted in these rocks, such as those found in the Pilbara district of Australia and the Animikie Group of Minnesota. Theories regarding their formation center on the hypothesis that at stages in the Earth's history the oceans were acidic and contained tremendous amounts of dissolved iron. The conventional explanation for the majority of these iron deposits is that oxygen-producing life forms such as stromatolites, found fossilized in BIFs, began to produce sufficient oxygen to oxidize the sulfide or free ion forms of iron within seawater. The iron content in seawater rose and fell for over a billion years, and the last of the Precambrian BIFs is thought to have been deposited around 1,800 Ma (Guilbert and Park, 1986).

While there are some remaining high-grade iron deposits in the area, the majority of the iron ore is regionally referred to as taconite. Taconite is a type of BIF that is characterized as an iron-bearing sedimentary rock with greater than 15% Fe, where the iron minerals are interbedded with silicates or carbonates. Iron content (FeO + Fe_2O_3) in taconite is generally 25% to 30%. Higher-grade DSO deposits are believed to have formed from the leaching and dissolution of silica found in the taconites, resulting in smaller zones that can contain greater than 60% Fe (Morey, 1999). These high-grade ore bodies are predominantly related to the high-angle, steeply dipping faults common along the Mesabi Iron Range.

Geological classification of BIFs is made on the basis of mineralogy, tectonic setting, and depositional environment. The original facies concept provided for oxide-, silicate-, and carbonate-dominant iron formations that are thought to pertain to the environment of deposition listed below (James, 1954).

- Oxide-rich BIF typically consists of alternating bands of hematite [$Fe_2^{3+}O_3$] with or without magnetite [$Fe^{2+}Fe_2^{3+}O_4$]. Where the iron oxide is dominantly magnetite, siderite [$Fe^{2+}CO_3$] and iron silicate are usually also present.
- Silicate-rich BIF is usually dominated by the minerals greenalite, minnesotaite, and stilpnomelane. Greenalite [$(Fe^{2+},Mg)_6Si_4O_{10}(OH)_8$] and minnesotaite [$(Fe^{2+},Mg)_3Si_4O_{10}(OH)_2$] are ferrous analogs of antigorite and talc, respectively, while stilpnomelane [$K(Fe^{2+}Mg,Fe^{3+})_8(Si,Al)12(O,OH)_{27}\bullet n(H_2O)$] is a complex phyllosilicate.
- Carbonate-rich BIF is usually dominated by the minerals ankerite [$CaFe^{2+}(CO_3)_2$] and siderite, both of which display highly variable compositions. Similar proportions of chert and ankerite (and/or siderite) are typically expressed as thinly bedded or laminated alternating layers (James, 1966).

These classification schemes commonly overlap within Lake Superior-type deposits, defying classification by this method. Nearly all of the minerals described in the three classifications can be found in many of the deposits of the Mesabi Iron Range. Lake Superior-type deposits are generally classified based on their size and depositional environments (Guilbert and Park, 1986). These deposits are typically large and are associated with other sedimentary rocks. Deposition of the Lake Superior-type deposits occurred in shallow marine conditions, with transgressive sequences commonly observed in the regional stratigraphy (Simonson and Hassler, 1996). It is common to observe shallow marine bedforms and sedimentary depositional textures in these deposits.

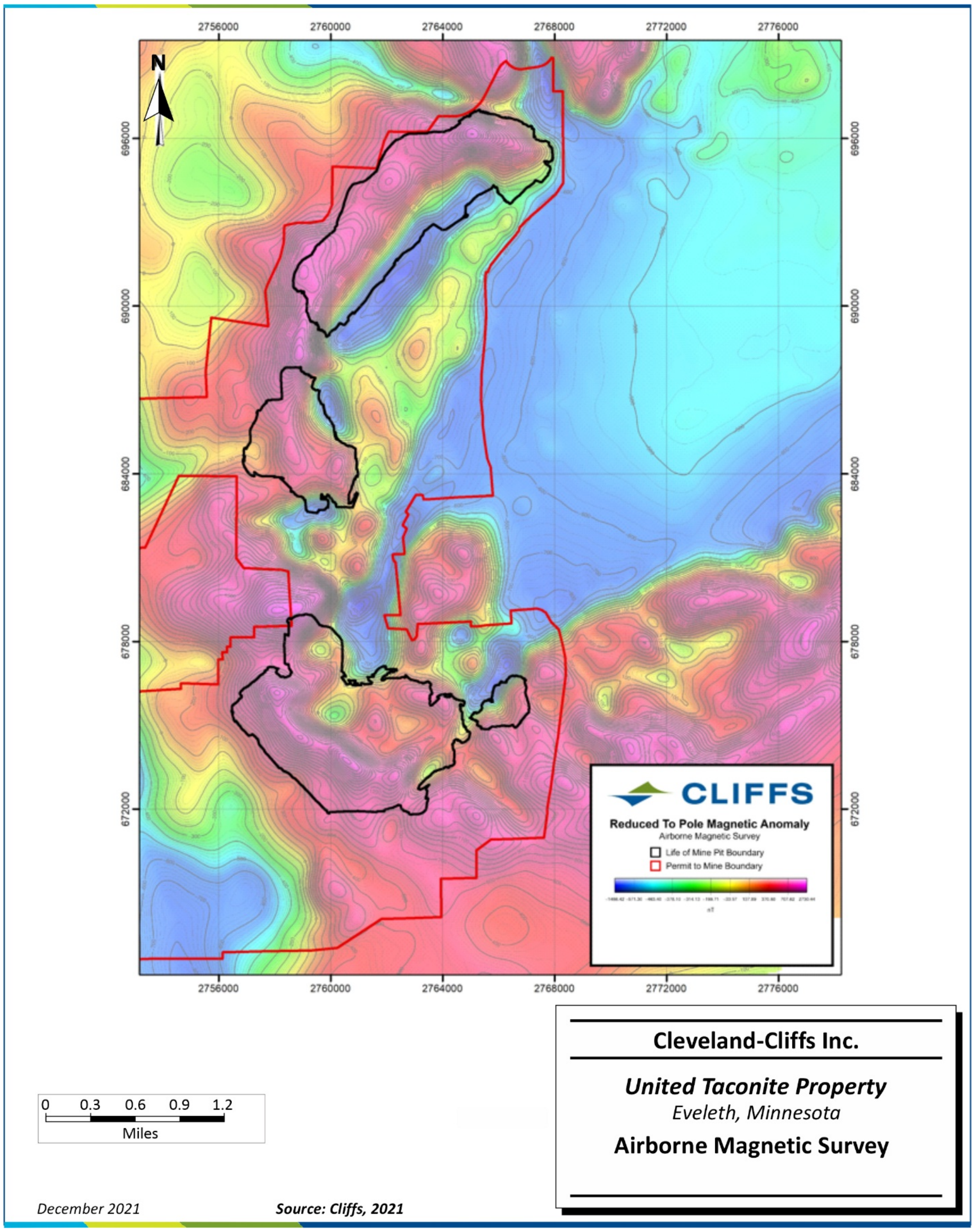
7.0 EXPLORATION

7.1 Exploration

Cliffs does not maintain detailed records or results of early, non-drilling prospecting methods used during initial exploration activities, such as geophysical surveys, mapping, trenching, test pits, and sampling conducted prior to Cliffs' ownership of UTAC. Most exploration work by Cliffs has been and continues to be near-mine diamond core drilling conducted using a 300 ft x 300 ft grid. In May 2021, Cliffs contracted EDCON-PRJ to fly a high-resolution, fixed-wing aeromagnetic survey over the Virginia Horn area, which included the TBS deposit, among other adjacent Cliffs-held assets, with the purpose of understanding large-scale structural features and oxidation of the BIF.

The survey covers an area of 90 mi^2 in St. Louis County Minnesota.It includes the towns of Eveleth, Virginia, Gilbert, McKinley, and Biwabik.The survey area is centered over the faulted and folded zone of the Biwabik IF known as the Virginia Horn.Current and historical mine workings are scattered throughout the area.

A total of 1,767 line-miles of aeromagnetic data was acquired, flown at 328 ft (100 m) spacings and oriented north-south. The resultant airborne magnetic survey map is shown in Figure 7-1.



Source: Cliffs, 2021

Figure 7-1: Airborne Magnetic Survey

7.2 Drilling

7.2.1 Type and Extent

Table 7-1 presents a summary of drilling on the Property. All holes were completed using diamond drills. Collar locations at TBN and TBS are shown in Figure 7-2 and Figure 7-3, respectively.

Table 7-1: Drilling Summary
Cleveland-Cliffs Inc. – United Taconite Property

Year	TBN		TBS	
	Holes	Footage	Holes	Footage
2021[1]	21	7,807	21	7,805
2020	19	6,579	-	-
2019	20	5,341	-	-
2018	19	5,399	-	-
2017	25	3,767	-	-
2016	18	4,218	-	-
2015	7	3,436	-	-
2014	-	-	-	-
2013	1	508	-	-
2012	7	2,969	5	3,937
2011	9	5,347	1	737
2010	5	2,880	5	2,935
2009	12	6,088	-	-
2008	15	5,666	-	-
2007	6	2,760	-	-
2006	-	-	-	-
2005	1	149	8	2,227
1952-2004[2]	548	174,988	224	67,933
TOTAL	733	237,902	264	85,574

Note:

1. January to September 2021
2. Historical drilling prior to Cliffs ownership

7.2.2 Procedures

Drilling practices have remained consistent over the history of the Property. The core size has varied over the years but is currently drilled with BTW-sized tools (1.656 in. core diameter).

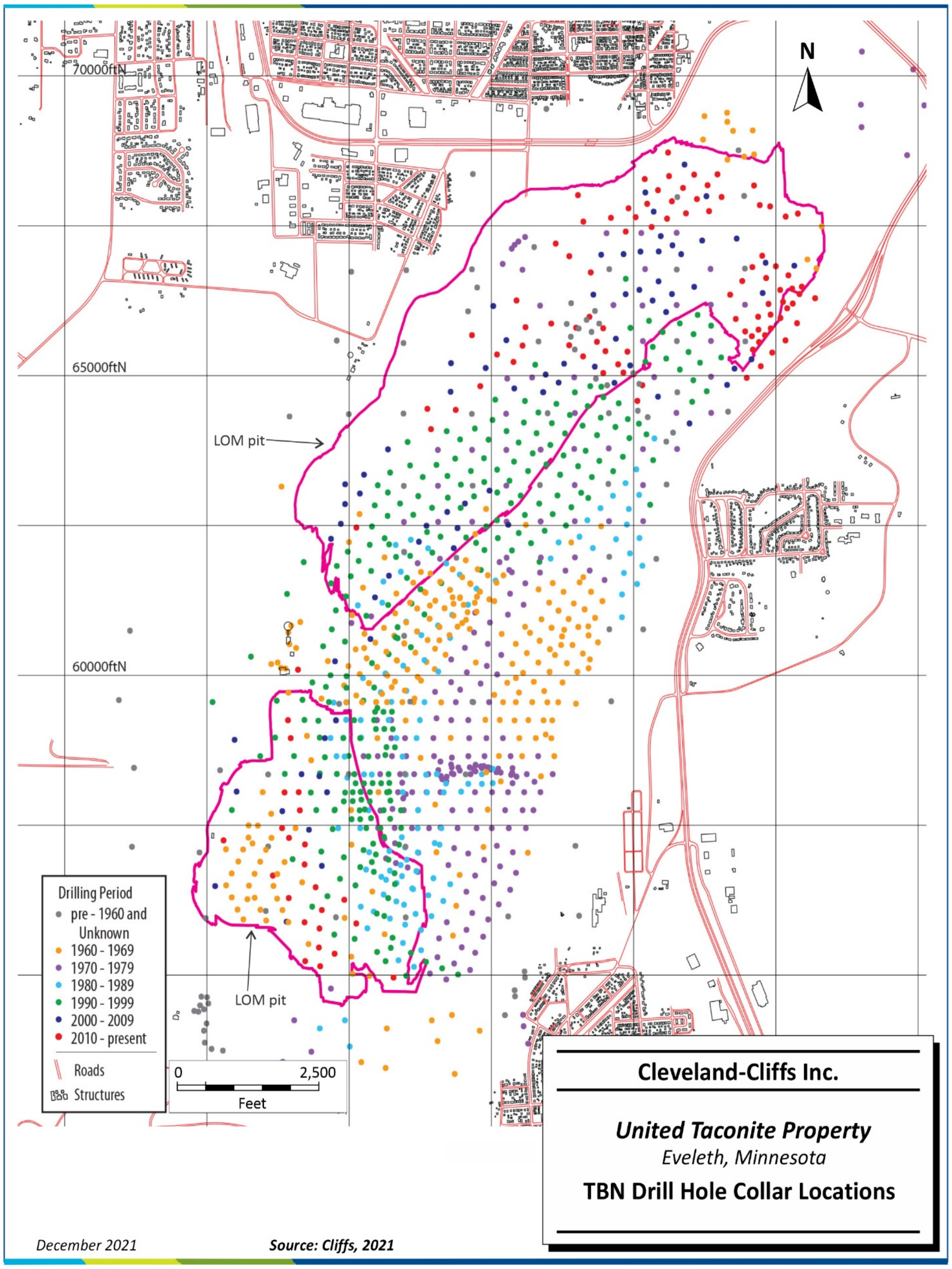
7.2.2.1 Collar Surveying

Diamond drill hole (DDH) collar locations are recorded on the original drill logs created at the time of drilling, including easting and northing coordinates in local grid (modified Minnesota State Plane, NAD 27 datum) and elevation of collar in feet above sea level National Geodetic Datum of 1929 (NGVD29).

Surveying methods have evolved over the years with advancements in technology, moving from optical methods to electronic distance measurement and to global positioning system (GPS), which is currently in use. SLR is of the opinion that, for the deposit type, all survey methods used for the collar locations would be expected to provide adequate accuracy for the drill hole locations. All drilling follows applicable Minnesota Department of Health and Minnesota Department of Natural Resources (MDNR) regulations and requirements.

Currently, the location of the drill hole is set by the geologist, with collars marked and surveyed using a Trimble R10 GNSS receiver and a TC3 data collector. Drill collars are planned using Vulcan™ (Vulcan) software, and final collar data are stored digitally, in an acQuire database. Drill hole locations are staked in the field and marked with a lath. Maps of staked hole locations as well as field tours of hole locations are provided to drilling contractors, who, upon completion of a hole, place the lath into the drill hole, which is subsequently surveyed with a GPS, marking the final location.

Due to the relatively shallow depth and vertical nature of all drill holes, no downhole deviation survey is conducted. Drill holes pierce the generally flat-lying Biwabik IF at near perpendicular angles.



December 2021

Source: Cliffs, 2021

Figure 7-2: TBN Drill Hole Collar Locations

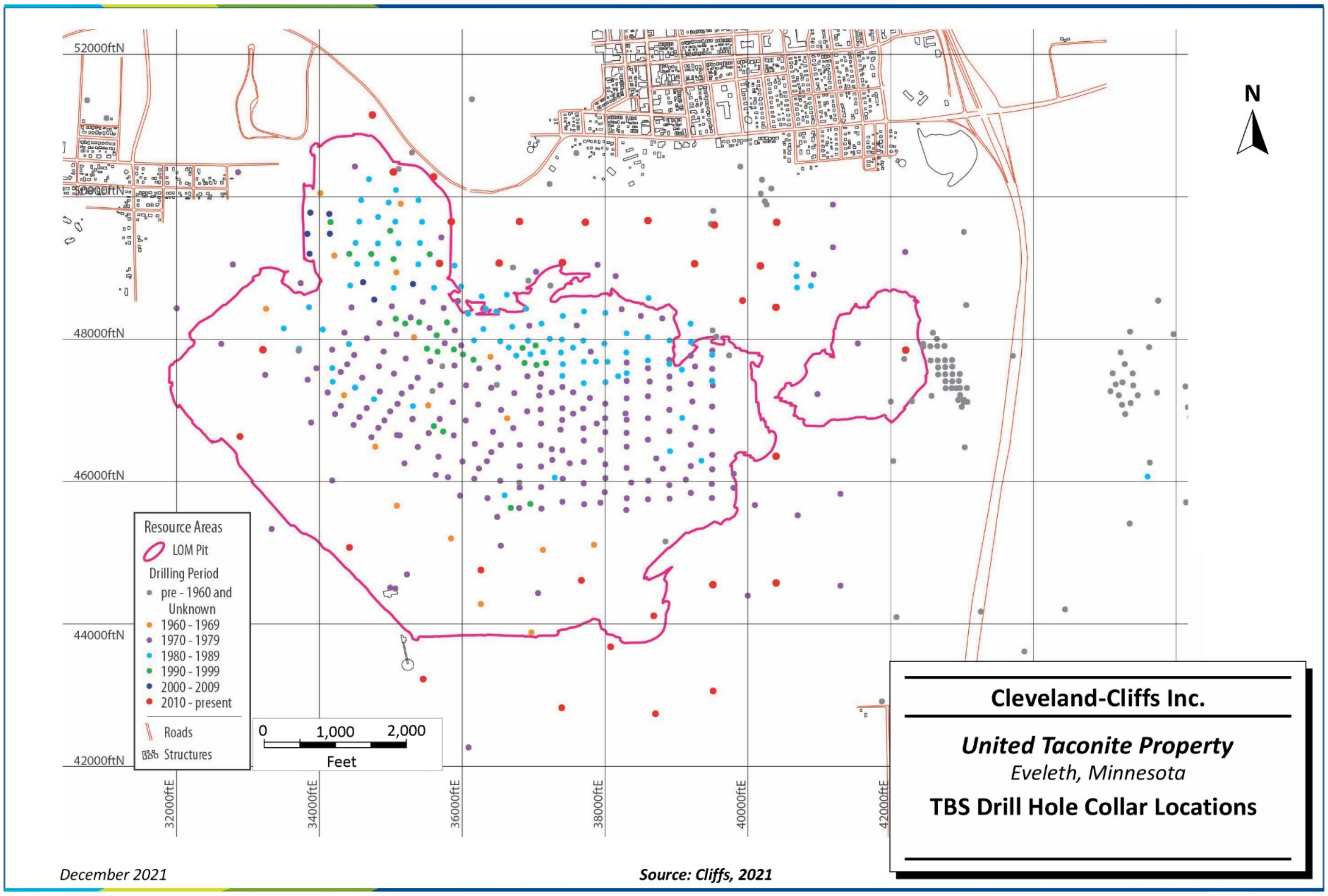


Figure 7-3: TBS Drill Hole Collar Locations

7.2.2.2 Drill Site Reclamation

During Cliffs' ownership of the Property, there have been no exploration drill holes completed outside of United Taconite's Permit to Mine boundary; therefore, under applicable regulations, no drill site reclamation has been required.

7.2.2.3 Drill Core Sample Collection

All drilling follows Minnesota department of Health (MDH) and any MDNR regulations and requirements.

During drilling, core samples are boxed with depths marked in feet using wooden run blocks. The core is transported from the drill site by the mine geologist or by the drilling company. The mine geologist confirms procedures for packaging and handling of core in the boxes, including the inclusion of footage markers at the end of core runs, labeling core boxes with sequential numbering and footage of core included in the box.

Drilling footages are verified visually. Core recovery is generally very good. Core is sometimes lost in zones of intense oxidation.

7.2.2.4 Drill Core Logging

Logging includes rock types (lithologic unit and subunit), magnetic characteristics, degree of oxidation, mineralogy, textures, structural information, and a general geologic description. Boundaries of geological subunits are often gradational (e.g., more slaty than cherty versus more cherty than slaty, thin beds becoming more prevalent than thick beds) and may not provide a sharp geologic contact. As magnetite is the primary mineral of interest, a hand magnet is utilized while core logging and indicates relative magnetic iron content of a sample interval prior to assaying (e.g., slight, moderate, good).

Core is photographed digitally, and images are archived with a drill hole number and box number to a network drive for future reference. Core was not photographed prior to 2004.

Geological logging of the drill core is completed by mine geologists, manually on paper logs prior to import into an acQuire database.

7.2.2.5 Drill Core Sampling

The sample length is ideally 10 ft, but can range from two to fifteen feet within a defined geological subunit. Samples are labeled and bagged for delivery to the contracted, independent analytical laboratory. Sample tags, reflecting the hole number and from/to sample interval, are placed inside the sample bag. Additionally, sample information is labeled on the outside of the bag. The unique sample ID includes the drill hole ID and depth interval. An example of a sample ID from drill hole 22N1901 is "22N1901_151_158".

The following methods have been utilized at TBN and TBS:

7.2.2.5.1 1960 to Present Sampling Method - TBN

The current practice is to sample and assay whole recovered drill core from the iron formation subunits that can potentially be converted to a Mineral Resource. Intervals are typically sampled at approximately 10 ft lengths; however, intervals deemed as waste by the logging geologist are occasionally sampled at approximately 20 ft intervals. These waste intervals are determined by either the classified subunit or by lack of strong attraction of a hand magnet to the drill core intervals. Assay intervals do not cross lithologic contacts. Split core and/or excess material is saved for future use when available.

7.2.2.5.2 1966 to 1991 Sampling Method - TBS

During the 1966 to 1967 and 1973 to 1991 drilling programs, waste rock units and intervals with significant oxidation and magnetite destruction were frequently not sampled, nor assayed. Potentially economic-grade intersections were sampled at approximately 10 ft intervals. Sampling intervals were selected to respect recognized lithologic contacts. Split core and/or excess material was saved for future use when available.

7.2.2.5.3 2005 to Present Sampling Method - TBS

The current practice is to sample and assay all iron formation material. Subunits with Mineral Resource potential are sampled at approximately 10 ft intervals. Waste units are sampled at approximately 20 ft intervals. Assay intervals are selected with respect to lithologic contacts. Split core and/or excess material is saved for future use when available.

7.2.2.6 Sample Storage and Data Security

Drill core is transported directly from the drill rig to the core logging facility at TBN by either the drilling contractor or Cliffs' personnel.Temporary core storage is located at the TBN logging facility.

Whole core is placed in labeled bags for submission to the assay laboratory. Selected drill cores have been disposed of from a historical practice of periodically disposing of drill core once cored intervals were mined out. Some archived drill core is consumed during re-assaying programs conducted sporadically for specific local areas of the mine.

Core samples are currently prepared and analyzed at the independently owned Lerch Brothers Inc (Lerch) facilities in Hibbing, Minnesota, where they are transported by United Taconite operations personnel. Lerch is accredited with ASQ/ANSI ISO-9001:2015 for their system of quality management. Each shipment of core samples is accompanied by a sample sheet with dispatch number recording all the sample information and required analyses. The data are stored digitally on United Taconite's shared servers. Unused sample materials are saved and stored in barrels at Lerch's facilities in Hibbing, Minnesota.

Digital copies of drill core analyses received from Lerch are stored in a backed-up network drive with restricted permissions, as well as within an acQuire database, which retains daily, weekly, monthly, and yearly backups.

Electronic storage of an as-drilled collar location file for each annual drilling program is accomplished using the database management system acQuire. A hard copy printout of the collar file with other documents relevant to the drill holes is stored in file cabinets at the UTAC Mine Geology office.

Exceptions to the above are the original coordinates recorded on U.S. Steel DDH logs, with easting and northing coordinates in a U.S. Steel local grid and elevations using Lake Superior datum. A list of U.S. Steel DDH with locations in transformed coordinates (hard copy) was completed historically by previous mine engineering personnel. While there is no reference to the parameters of the conversion, these coordinates are used for locations of U.S. Steel drill holes and provide geologic contacts in reasonable locations based on surrounding holes drilled by United Taconite or its predecessors. Most of these drill holes are within mined-out areas, and site confirmation of collar location is not possible.

It is the QP's opinion that there are no known drilling, sampling or recovery factors that could materially affect the accuracy and reliability of the results and that the results are suitable for use in the Mineral Resource estimation.

7.3 Hydrogeology and Geotechnical Data

Refer to section 13.2 Pit Geotechnical and section 15.4 Tailings Disposal for this information.

8.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

8.1 Sample Preparation and Analysis

Sampling of iron formation to evaluate the magnetite-bearing taconite ore potential is performed to characterize the metallurgical properties of the material. Therefore, conventional whole-rock elemental assaying approaches utilized in evaluating most metallic ore deposits are eschewed in favor of methods designed to qualify and characterize recoverable magnetic concentrate.

8.1.1 1963 to 2001 Assaying (In-House Fairlane Facility Laboratory) - TBN and TBS

Fairlane Facility laboratory (Fairlane Laboratory) samples were prepared by splitting the sample into three splits and grinding each split for successively longer intervals in a bench-top ball mill. The percent passing 325 mesh was calculated for each split. A Davis Tube (DT) concentrate was prepared from each timed grind sample, and weight recovery, concentrate total iron, and concentrate silica were measured for each concentrate. Grind-grade relationships for weight recovery, total iron, and concentrate silica were generated, and the values corresponding to a grind of 82% passing 325 mesh were calculated; these calculated values are used to populate the assay database.

No crude ore standards or field or preparation duplicates were analyzed and reported by the Fairlane Laboratory.

8.1.2 1952 to 1976 U.S. Steel

U.S. Steel provided United Taconite's predecessors with assay information and some saved samples on numerous drill holes, primarily in the north portion of TBN. These holes were drilled and assayed by U.S. Steel on lands they owned and later leased to United Taconite and its predecessors. U.S. Steel's procedures differed from those used by the Fairlane Laboratory. U.S. Steel core was analyzed on the basis of 95% passing 270 mesh, whereas the Fairlane Laboratory analyzed core to 82% passing 325 mesh. The Fairlane Laboratory re-analyzed saved samples from 18 diamond drill holes in the 1990s, and the results were used to determine factors for the adjustment of concentrate silica and total iron in samples that were not re-analyzed. These factors for grading variables are subunit-dependent. Upon review of these adjusted values, they fall within reasonable ranges of values expected for the sampled subunit.

8.1.3 1966 to 1967 Assaying (Caddy Orelab) - TBS

Caddy Orelab samples were prepared by grinding a single head sample to 100% passing -200 mesh, screening the sample into +325 and -325 mesh fractions, and obtaining a DT magnetic concentrate for each fraction. Each concentrate was analyzed for weight percent total iron and concentrate silica; weight recovery (as a fraction of the total sample) was calculated. Total sample weight recovery, concentrate total iron, and concentrate silica were calculated by weighting the results of the two DT concentrates.

Ninety-eight samples originally assayed by Caddy Orelab were re-assayed by the Fairlane Laboratory in 1988. Caddy Orelab and Fairlane Laboratory magnetic iron analyses were similar; however, concentrate silica assays differed slightly but systematically. A correction factor was calculated in 2010 for converting Caddy Orelab concentrate silica assays to equivalent Fairlane Laboratory silica assays.

8.1.4 1973 to 1974 Assaying (Pittsburgh Pacific Orelab) - TBS

Pittsburgh Pacific Orelab samples were prepared by grinding a single head sample for a specified period of time ranging from eight to 22 minutes; grind times were selected to achieve approximately 90% to 95% passing 325 mesh. The percent passing 325 mesh was calculated for the sample, and a DT concentrate was obtained. Weight recovery, concentrate total iron, and concentrate silica were measured for the single concentrate.

Seventy-seven samples originally assayed by the Pittsburgh Pacific Orelab were re-assayed by the Fairlane Laboratory in 1988.Pittsburgh Pacific and Fairlane Laboratory magnetic iron analyses were very similar; however, concentrate silica assays differed materially, but systematically. A correction factor was calculated for converting Pittsburgh Pacific Orelab concentrate silica assays to equivalent Fairlane Laboratory silica assays.This correction factor was applied in 2010 to the remaining 815 Pittsburgh Pacific Orelab concentrate silica assays used in the current Mineral Resource estimate.

8.1.5 2005 to Present Assaying (Lerch Brothers Inc) - TBN and TBS

Drill core samples are currently analyzed at Lerch, an independent laboratory located in Hibbing, Minnesota.Lerch is accredited with ASQ/ANSI ISO-9001:2015 for its system of quality management. Samples are assayed using different methods depending on whether they are judged to possibly meet magnetite-bearing taconite crude ore grade criteria (≥17% magnetic iron and ≤10% concentrate silica) or are deemed not of economic interest. Potential non-economic versus crude ore sample determinations are made by either the classified subunit of core intervals, or by response of a hand magnet to the intervals of the drill core.

8.1.5.1 Liberation Index Study

Potential crude ore grade samples are prepared according to Lerch Lab Procedures (LLP) for Liberation Index Study (LIS)Crude samples are stage crushed to -0.25 in. using jaw and roll crushers (LLP-60-02, LLP-60-03, and LLP-60-04). A subsample of approximately 1,400 g is split out (LLP-60-05) and further reduced to -20 mesh (LLP-60-06) using a roll crusher and pulverizer. The -20 mesh sample is separated through a 325-mesh screen, and the oversize and undersize fraction weights are recorded, and the sample is recombined (LLP-60-08).

After the sample is recombined and following LLP-60-09, three 200 g (0.44 lb) subsamples are split from the sample.The individual 200 g subsamples are charged separately into four-inch by six-inch grinding ball mills along with 100 mL (0.0264 Gal) of water, seventy-seven 25/32 in. balls (2,300 g to 2,450 g), and one hundred and seventeen 17/32 in. balls (1,100 g to 1,160 g). The three subsamples are ground for different lengths of time: the first for six minutes, the second for 10 minutes, and the third for 14 minutes. The grinding mills are calibrated to run at 96 revolutions per minute. After the end of each timed grind, the mill charge is screened through a #4 mesh screen to recover the grinding balls. If greater than 82% -325 mesh is not achieved by the 14 minute grind, a fourth 200 g subsample is ground at the same mill specifications for 17 minutes.

Each ground subsample is wet screened through a 325 mesh screen, dried, and weighed to determine the percent passing 325 mesh. Subsamples are split from the 10-minute grind for Saturation Magnetization Analyzer (Satmagan) magnetite determination (LLP-60-12) (LLP-30-02)A 15 g (0.359 oz) split is obtained from each subsample for DT magnetic separation testing (LLP-60-11). Each DT concentrate is weighed and assayed for total iron (LLP-30-02) and silica (LLP-30-05).Weight recovery is calculated as the ratio of recovered DT concentrate to DT head sample weight.

The percent passing 325 mesh for each timed grind is calculated from the post-grinding screen results. For each principal assay parameter (weight recovery, DT concentrate iron, and DT concentrate silica). A linear regression is calculated for the three (or four) data points, and the grade value corresponding to 82% -325 mesh is determined. DT magnetic iron is calculated as the product of the percent weight recovery and percent concentrate iron at 82% -325 mesh and represents the magnetic iron of the crude ore. This process is shown in Figure 8-1.

8.1.6 Davis Tube Magnetic Separation Method

Procedure LLP-60-11 is followed for measuring magnetic iron using the DT (Eriez Model EDT with a 1.5 in. inner diameter). The magnet is electric and is set at 100% strength with 115 V DC. The DT test is used to calculate magnetic iron using wet chemistry methods instead of instrumentation. The various products of the test include head material, tails, and concentrate. The excess head material is analyzed with the Satmagan for magnetic iron. The DT tails are usually discarded but can be saved for future testing upon request. The concentrate is tested for:

- Total Fe
- Silica

Sample preparation is described in section 8.1.

A 15 g (0.529 oz) sample (100% passing 200 mesh) is put through the DT magnetic separator. Wash water of 19 psig is used for testing. The water flow is verified prior to each use. After the sample is run in the DT, the sample is dried and demagnetized. A weight is taken of the DT-retained sample, and a total iron of the concentrate is determined by wet chemistry. The DT magnetic iron is calculated using the following equation:

$$\text{Davis Tube magnetic iron} = (A) \div (100) \times (B)$$

Where:

A = % Davis Tube weight recovery = (Weight of concentrate recovered ÷ Starting weight x 100)

B = Total concentrate iron

8.1.7 Satmagan Magnetic Iron Determination

A direct measure of the magnetic iron of the crude ore is measured with a Satmagan, which measures the total magnetic force acting on a sample to a precision of 0.1%. The Satmagan magnetic iron measurement is used as a check on the DT magnetic iron, which can provide overestimates in oxidized samples. The Satmagan magnetic iron value is used in modeling only where it is less than 93% of the DT produced value.

The Satmagan is a magnetic balance in which the sample is weighed gravitationally and in a magnetic field. The ratio of the two weights is linearly proportional to the amount of magnetic material in the magnetically saturated sample. Magnetic iron is measured in the potential crude ore samples only.

Samples are prepared for Satmagan analysis per Lerch procedure LLP-60-11.A minimum of two grams of sample ground to 100% -200 mesh is needed for Satmagan analysis. Any oversize material is further processed with a mortar and pestle, and the sample to be tested is placed in a plastic testing container. Per LLP-60-12, the prepared sample is demagnetized using the demagnetization coil (demag coil). While the demag coil is on, the sample is moved into and out of the magnetic field until the sample is demagnetized. A blank sample is run on the Satmagan on a daily basis to ensure the device is zeroed.The sample is placed on the magnetic balance, and the strength of the magnetic field is noted.

The Satmagan calibration is verified daily by Lerch laboratory technicians using two Hibbing Taconite Company magnetic iron standards with a known magnetic iron content to ensure the machine is operating within specification. The machine is re-calibrated every six months, or as necessary, using 17 Hibbing Taconite standards. The labeled standards have a known weight percent magnetic iron, and each of the 17 standards are measured once. The results are plotted, and the equation used to calculate a calibration curve. The explanation of the calibration procedures is supplied in the user's manual for the Satmagan instrument. If the results of verification standards are not within specifications, the Satmagan is re-calibrated.

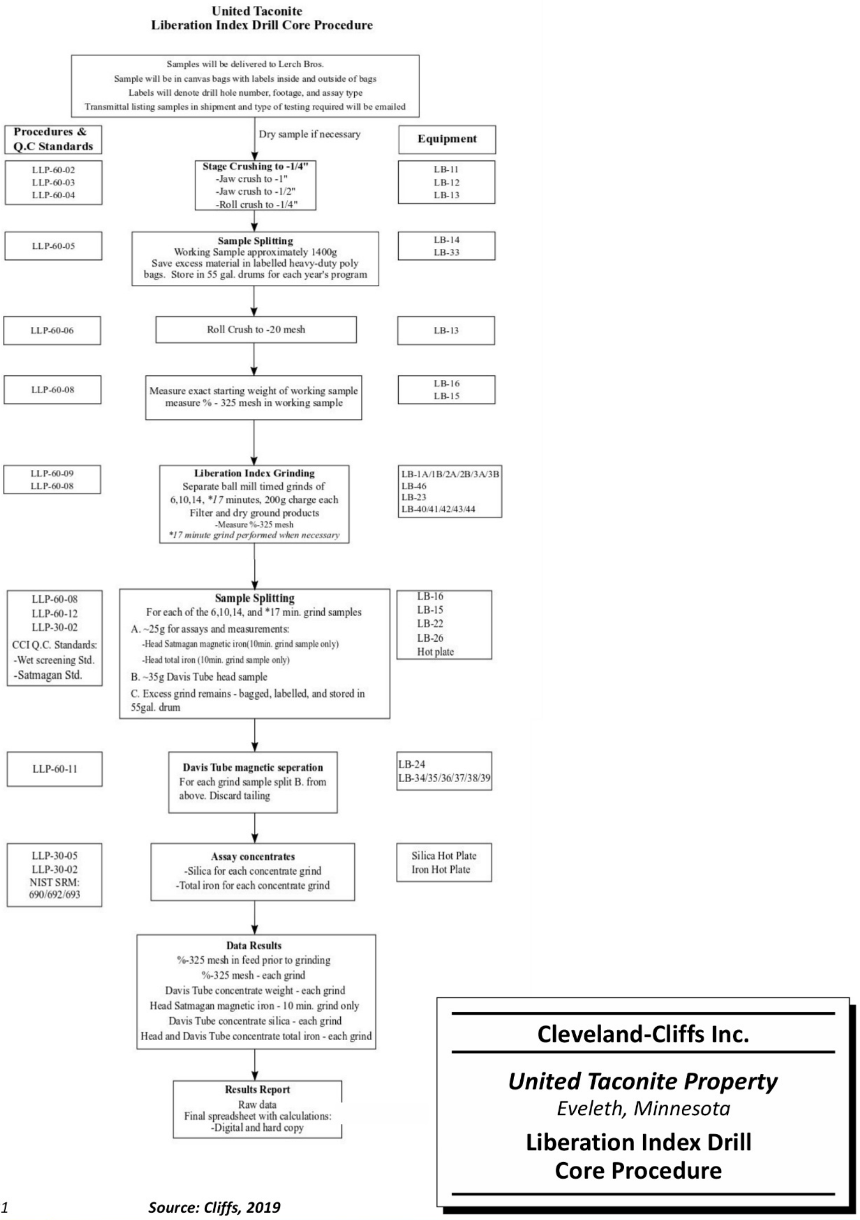
8.1.8 Total Iron Determination Using Dichromate Titration

Total Iron (Titanium Trichloride) Titration is based on ASTM E246-10, Standard Test Method for Determination of Iron in Iron Ores and Related Materials by Dichromate Titrimetry; and Test Method– B - Iron by the Stannous Chloride Reduction Dichromate Titration Method (Modified).

Per procedure LLP-30-02, in the titrimetric method, iron oxide samples are digested in hydrochloric acid and reduced to $Fe^{+}2$ by $SnCl_2$ in a nearly boiling solution. After cooling, Fe^{2+} is titrated with a potassium dichromate solution of known concentration. When all Fe^{2+} is consumed by potassium dichromate, violet color indicates the titration endpoint in the presence of the indicator sodium diphenylamine sulfonate. The percent total iron is a direct reading off the titrating solution burette. The value is corrected against percent total iron based on the analyses of three total iron standards analyzed each shift.

8.1.9 Hydrofluoric Acid Silica Determination

Silica values reported are based on ASTM E247-96, Standard Test Method for Determination of Silica in Manganese Ores, Iron Ores, and Related Materials by Gravimetry. Per procedure LLP-30-05, samples are first partially digested in Hydrochloric Acid to dissolve the non-silica components of the sample. The sample is then filtered and rinsed with more hydrochloric acid. The rinsed sample is then treated with hydrofluoric acid and sulfuric acid to dissolve the silica and remove residual iron, aluminum, and titanium. The silica is desiccated to drive off water, and the weight is recorded.



December 2021 ***Source: Cliffs, 2019***

Figure 8-1: Liberation Index Drill Core Procedure

8.1.10 Davis Tube Drill Core Procedure

Samples designated by the logging geologist to have magnetic iron contents significantly below 17%, or concentrate silica contents significantly above 10%, are assayed using the single-sample DT assay method. The DT method provides the same primary data as the LIS method at a greatly reduced cost. The single sample analysis does not provide the ability to target a specific grind and therefore has the potential to have more variation in the results than would be expected from the LIS method.The potential variation of the DT method limits the use of this testing method to only samples expected to be below economic cut-off grades.

The samples are initially reduced using stage crushing with jaw and rolls crushers to -0.25 in. (LLP-60-02, LLP-60-03, LLP-60-04)From a working sample of 800 g, a 50 g sample is split out for further size reduction (LLP-60-05). Using a pulverizer, the 50 g subsample is ground to 100% passing 20 mesh (LLP-60-07). Using a buckboard and muller (LLP-60-10), the subsample is processed to 100% passing 200 mesh.Subsamples are split from the 100% passing 200 mesh sample for Satmagan magnetic iron analysis (LLP-60-12) and crude ore total soluble iron assay (LLP-30-02).A 15 g (0.529 oz) split is measured and utilized for the DT magnetic separation (LLP-60-11).Each DT concentrate is weighed, and total iron (LLP-30-02) and silica (LLP-30-05) assays are performed. Weight recovery is calculated as the ratio of recovered DT concentrate to DT head sample weight.

Sample preparation requires using a buckboard and muller to grind the sample to 100% -200 mesh. The buckboard is a cast iron plate with three steel sides and a smooth upper surface. It measures 18 in. by 24 in. The buckboard and muller pulverization method is used to reduce small amounts of -20 mesh material to -200 mesh under controlled conditions. The sample to be pulverized is poured on a 200 mesh screen, and oversize material is placed on the buckboard. The muller is passed over the sample 15 times, and the ground material is screened on the 200 mesh screen. Material that is +200 mesh is returned to the buckboard, and the process is repeated until the entire sample is ground to -200 mesh. The buckboard and muller grinding method provides a more consistent particle size distribution than a pulverizer and requires less time than grinding mills. Figure 8-2 presents the United Taconite DT drill core procedure.

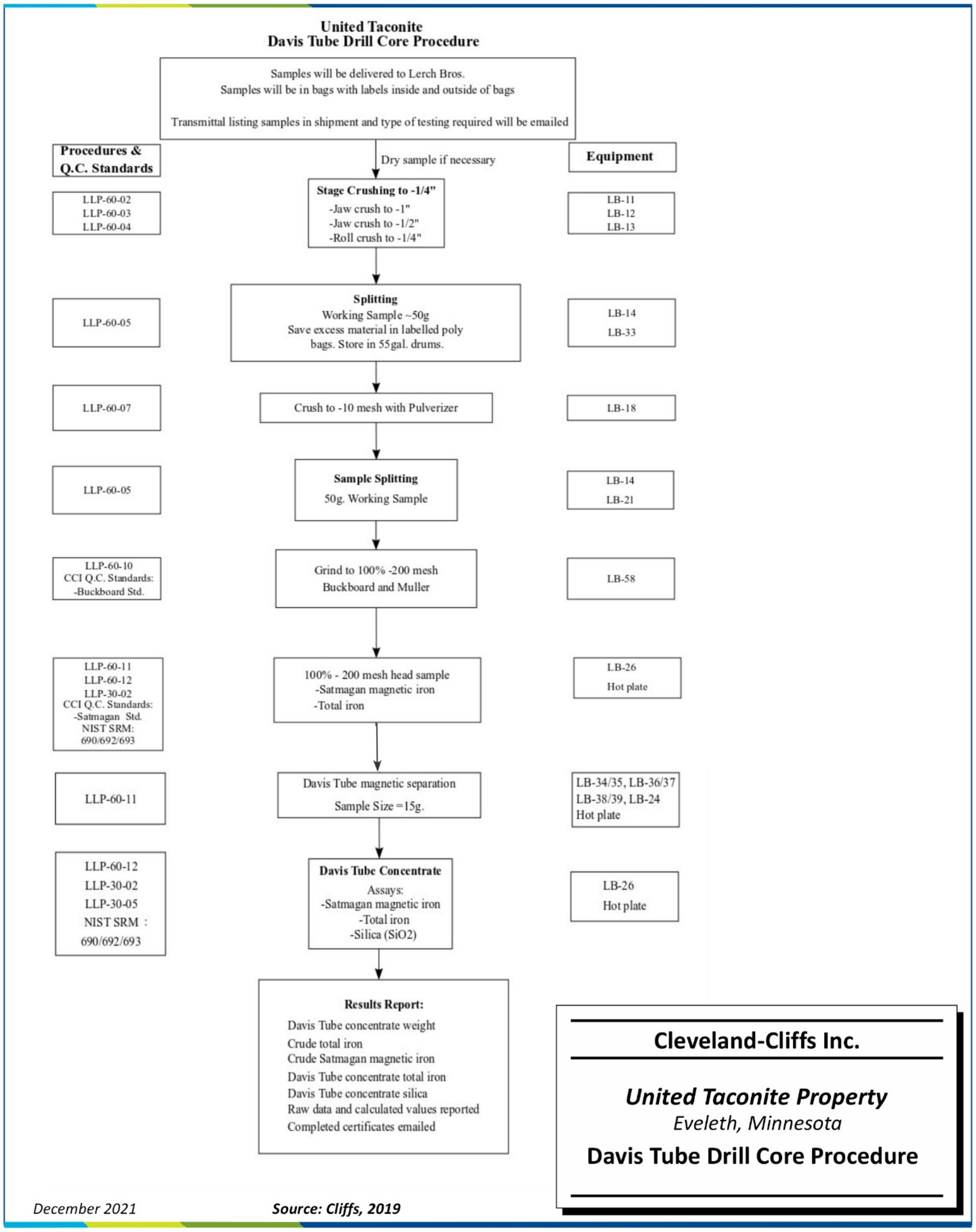


Figure 8-2: Davis Tube Drill Core Procedure

8.1.11 Density

A water immersion method has been used by United Taconite to determine the density of drill core samples in order to obtain individual density factors for each subunit. The procedure used by United Taconite weighs the entire core sample interval suspended from a spring scale in air and while immersed in water. The density of the sample is calculated with the difference of the submerged weight of the sample and the dry weight of the sample. The density is calculated using the dry weight divided by the difference in the dry and suspended weight:

*Density (sample) = density (water) * (dry weight) / (dry - immersed weight)*

In the QP's opinion, the sample preparation, analysis, and security procedures at UTAC are adequate for use in the estimation of Mineral Resources.

8.2 Quality Assurance and Quality Control Procedures

Quality assurance (QA) consists of evidence to demonstrate that the assay data has precision and accuracy within generally accepted limits for the sampling and analytical method(s) used in order to have confidence in a resource estimate. Quality control (QC) consists of procedures used to ensure that an adequate level of quality is maintained in the process of collecting, preparing, and assaying the exploration drilling samples. In general, quality assurance and quality control (QA/QC) programs are designed to prevent or detect contamination and allow assaying (analytical), precision (repeatability), and accuracy to be quantified. In addition, a QA/QC program can disclose the overall sampling-assaying variability of the sampling method itself.

Prior to the 2010 drilling program, no standards, blanks, or duplicate samples were inserted into the sample stream at TBS.Similarly, prior to the 2008 drilling program, no standards, blanks, or duplicate samples were inserted into the sample stream at TBN.Beginning with the 2008 drilling program at TBN and the 2011 drilling program at TBS, duplicate samples were inserted into the sample streamA custom standard was developed and has been included as part of the QA/QC program at UTAC since 2009 at TBN and 2010 at TBS, excluding 2011 through 2015Due to the use of a metallurgical test procedure over traditional assays at UTAC, blanks are not used, nor are they relevant.

8.2.1 Reference Materials (Standards)

A crude ore standard (UTACCOS) was prepared from a ten-tonne (222,046 lb) sample of ore grade material collected from the TBN mineThe sample was crushed to -0.25 in., homogenized, and split into five-kilogram subsamples by the Coleraine Mineral Research Laboratory of the University of Minnesota. The standard is not certified, and the process of certification is challenged by the custom nature of the test procedure at UTAC.

Control charts of standard results from 2009 to 2018 for crude magnetic iron, sample weight recovery, concentrate silica, and grind time were prepared by Cliffs' Principal Geologist and are shown in Figure 8-3.Failures are defined as samples beyond three standard deviations (3SD) of the dataset: upper control limit (UCL; + 3SD) and lower control limit (LCL; -3SD).

In general, failures are rare, and the results show reasonable precision, with improved precision in both DT concentrate silica (consio2) and grind from sample 55, corresponding to autumn of 2016 when, prompted by learnings at neighboring Cliffs mines as well as a careful review of QA/QC results collected to that date, Cliffs implemented a series of process improvements, including measures to monitor wear in milling equipment and size distribution of samples (sample preparation) ahead of milling, and calibration improvements in Satmagan (MagFe) measurements.

Figure 8-3: Standard Control Charts of Selected Variables (2009 to 2018)

8.2.2 Duplicate Samples

Beginning with the 2007 TBN drilling program, a program of assaying duplicate samples was incorporated into the standard United Taconite work program. Preparation duplicate samples consist of paired assays split from the -10 mesh material and then processed and assayed in the same sample batch. Concentrate duplicate samples are simple re-assays of iron and silica wet chemistry of DT concentrates from timed grinds. To date, all duplicate sample pairs were assayed by Lerch in Hibbing, Minnesota.

8.2.3 Preparation Duplicates

Preparation duplicate samples were analyzed using basic statistical comparisons, scatter plots, relative difference plots, and absolute difference plots (Figure 8-4) by Cliffs' Principal Geologist and reviewed by the QP.In general, precision of weight recovery and crude magnetic iron assays is very good at all value ranges; however, the grind and silica in concentrate duplicate pairs, which are both measured following recovery of concentrate, show decreased precision. Precision of % SiO_2 in DT concentrate was also observed to decrease with higher values. This suggests the key analytical flowsheet variable controlling the accuracy of the SiO_2 analysis is the reduction to -10 mesh and liberation grinding of the sample.

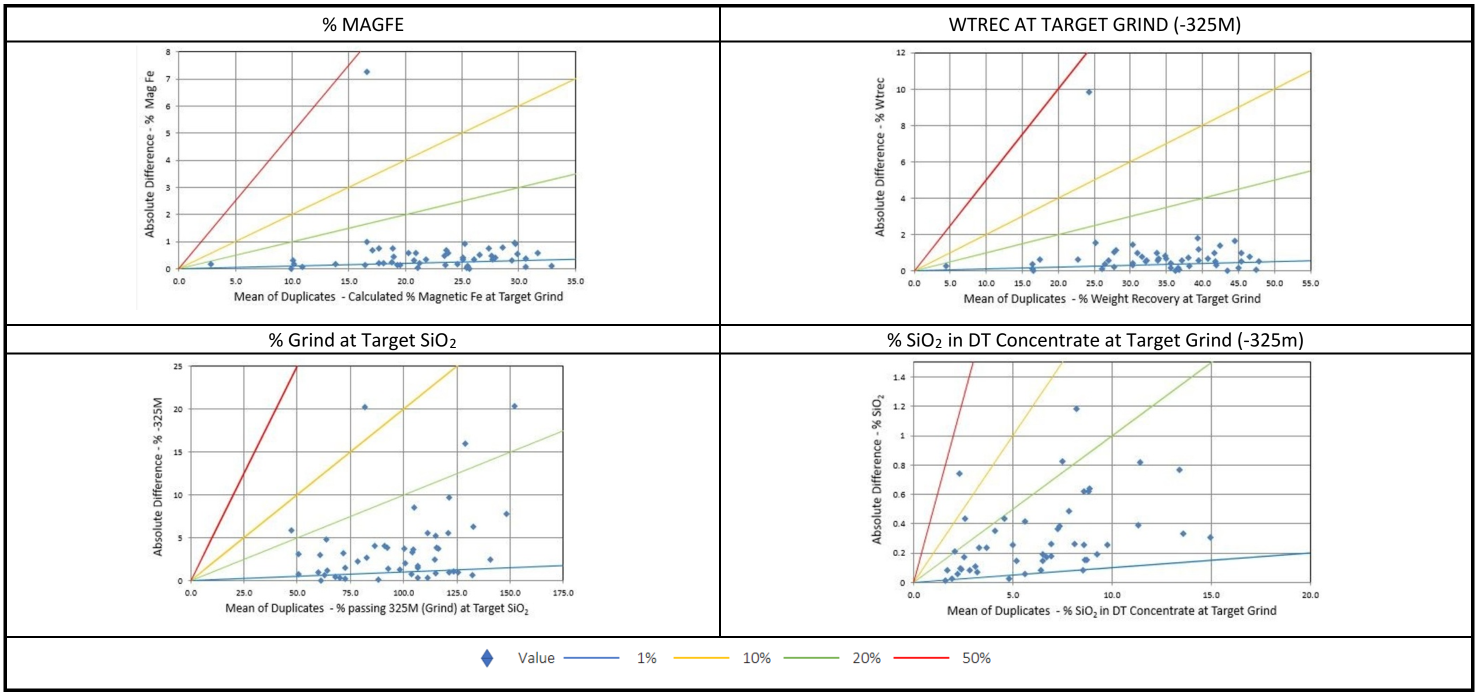


Figure 8-4: Absolute Difference Plots of Preparation Duplicates Results for Samples Analyzed (2007 to 2018)

The grade-precision relationship of these key variables indicates that greater confidence can be placed in potential crude ore grade assay values than potential waste rock grade assay values.

8.2.4 Concentrate Duplicates

A similar compilation of comparative statistics for concentrate duplicates following a 10-minute LIS grind was compiled by Cliffs and reviewed by SLR for consio2 and iron in concentrate (confe). Like with the preparation duplicates, the precision of consio2 duplicate sample pairs decreases with increasing values, although overall precision was markedly improved as compared to the preparation duplicates. Precision of the confe samples was very high. Scatter plots of results are shown in Figure 8-5.

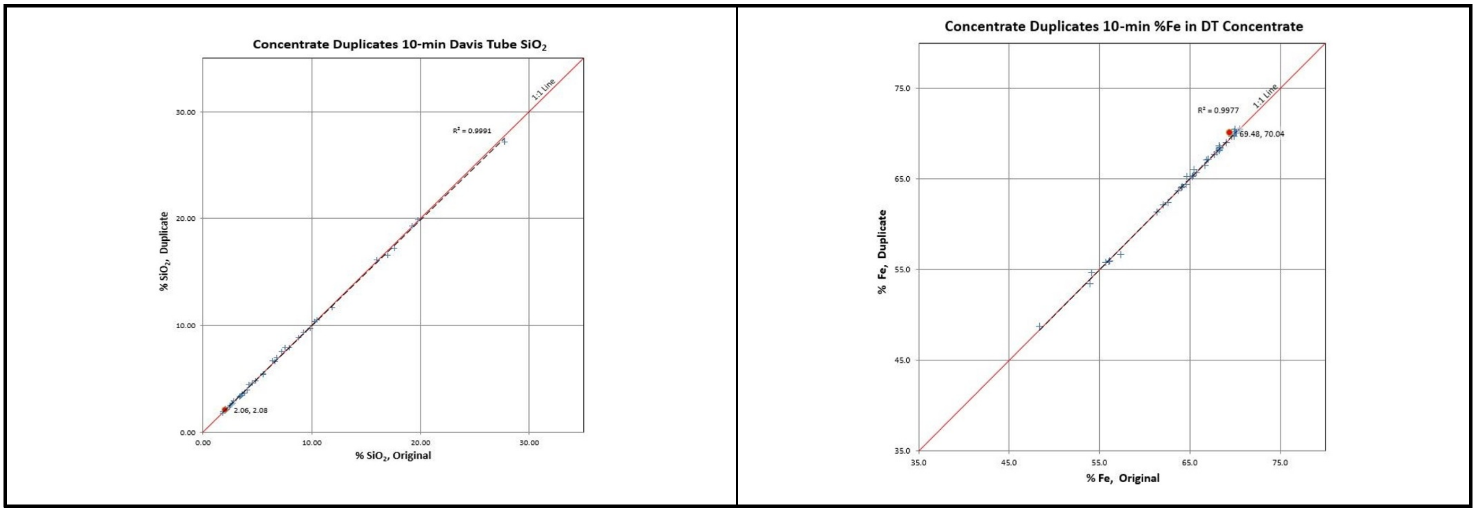


Figure 8-5: Scatter Plots of Paired Concentrate Duplicate Samples (2007 to 2018)

8.3 Conclusions

The QP makes the following conclusions with respect to the sample collection, preparation, analysis, and security, as well as the QA/QC measures in place at UTAC:

- Exploration sampling, preparation, and analyses are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources.
- Sample and data security are consistent with industry best practice.
- The QA/QC program at UTAC is well developed, long standing, and involves the use of a single crude material standard (UTACCOS) developed from on-site material, as well as regularly inserted coarse and concentrate duplicate samples. Results are monitored, and enacted on where warranted. Results as compiled by Cliffs personnel and reviewed by the QP indicate a good level of accuracy for magnetic iron, silica in concentrate, and weight recovery at the grade of the crude material standard and a good level of repeatability in both the coarse and fine preparation stages.

8.4 Recommendations

The QP makes the following recommendations with respect to the sample collection, preparation, analysis, and security, as well as the QA/QC measures in place at UTAC:

1. Consider whether it is appropriate to develop an additional in-house standard with higher grades of concentrated silica (approximately 8% to 10% consio2) and lower magnetic iron content to add to the existing QA/QC program to assess the accuracy of ore and waste delineation based on consio2 content.
2. Consider implementing a check assay program with a secondary laboratory.

9.0 DATA VERIFICATION

The SLR QP visited the Property on October 21, 2019. While at site, the QP reviewed drill core logging and sampling procedures, including chain of custody. The QP also compared two recent drill holes against lithology logging and analytical results in the database.

Approximately 5% of the drill holes within the current LOM pit were selected for database verification. Holes were selected to provide spatial coverage of the future mining areas and represent holes from a variety of time periods. The following aspects were reviewed:

- Collar survey information relative to historical logs or paper-recorded logging. Note that drill hole casings are typically removed, and most historical collar locations are now mined out, preventing ground truthing of historical drill hole locations.
- A comparison of original lithology logging to the current database, with consideration of the 2004 classification system of the Biwabik IF that uses 22 subunits, based on lithologic, metallurgical, and mineralogical characteristics within the local mine area. Pre-2004 holes were converted during the initial 2004 classification scheme integration, and their original logs were compared against the final recorded digital log. Conversion considered stratigraphy, analytical results, lithology description, and historical classification scheme descriptors. Some very minor discrepancies were noted and corrected.
- Metallurgical assay data in the database with focus on DT MagFe, weight recovery (wtrec), and consio2. Analytical results were compared considering:
    - Calculation of grind-grade relationships at targeted plant grinds (82% -325 mesh),
    - Ownership phase and procedural differences in historical drill holes (including adjustment factors),
    - Tracking of results from assay certificates, through potential re-assays and updated calculations and factoring.

Some minor discrepancies were identified and corrected.

The SLR QP is of the opinion that database verification procedures at UTAC comply with industry standards and are adequate for the purposes of Mineral Resource estimation.

10.0 MINERAL PROCESSING AND METALLURGICAL TESTING

10.1 Historical Metallurgical Testing

As the Fairlane Facility has been in production since the 1960s, metallurgical sampling and testing is primarily used in support of plant operations and product quality control.

10.2 Sampling and Metallurgical Testing

10.2.1 Drill Sample Preparation and Testing

Drill sampling and testing procedures are presented in detail in section 8.1 of this TRS.

10.2.2 Process Sampling and Quality Control

10.2.2.1 Concentrator Sampling and Analysis

The following is a summary of the routine samples collected and analyzed by the Fairlane Laboratory for process control. Rod mill feed is sampled as a 24-hour composite every day by the line attendants. This is a three-cut composite sampled every eight hours from all five mill lines. It is taken at the point where the rod mill feed conveyor discharges into the rod mill feed chute and is taken with a purse-style cutter. The total 24-hour sample is roughly enough to fill up a three-gallon pail. This sample is analyzed for particle size, then ground down, and a liberation index, DT silica, and MagFe analysis is performed.

The finisher concentrate is sampled once per eight-hour shift. It is taken from a sample valve on the main line that goes from the concentrator to the pellet plant. Each eight-hour shift sample fills up a 20 in. plastic bottle. The sample is submitted for a complete chemical analysis including iron, silica, CaO, MgO, and all relevant trace elements. It is also analyzed for particle size.

10.2.2.2 Pellet Plant Sampling and Analysis

Pellets are sampled every two hours from each of the two pelletizing lines. Chemical analyses are performed on the Line 2 sample every two hours (it is assumed that the chemistry is the same on Line 1). The 12 samples are composited for each line for each day, and a full screen analysis is performed, followed by a tumble test, which measures pellet degradation due to impact breakage and abrasion, and another size analysis following the tumble test. Compressive strength tests are performed on each two-hour sample for both lines. Some pellets from each 24-hour composite are saved for a weekly composite, and metallurgical tests are run on them (LTD, dR40). The LTD is a measure of "Low Temperature Degradation."It is an indication of how well the pellets will stand up to the early conditions in a blast furnace. The dR40 test is a measure of the pellet's ability to convert from iron oxide to iron, or a measure of how fast the pellets will convert to molten iron in the blast furnace. The pellet samples are taken with an automatic sampler – the laboratory employee presses a button, and the sampler passes through the stream of pellets as it comes off a belt. Each sample is approximately 25 lb.

Besides grab sampling, the Fairlane Facility utilizes automatic pellet samplers on each line that sample the pellets every two hours. The concentrator also has a Nuclear On-Line Analyzer (NOLA) for continuous silica assaysThe sample for NOLA is taken from the final concentrate on each line.Silica grade is controlled at 5.30% nominally and is directly proportional to particle size. If the silica grade is above the target value, throughput is decreased to produce a finer grind and lower silica grade.

Conversely, if silica grade is below 5.30%, throughput is increased to produce a coarser grind and consequently to bring silica grade to the target value.

10.2.2.3 Pellet Quality Control Procedures

Figure 10-1 provides a schematic outline of the quality control procedures that are in place at UTAC.

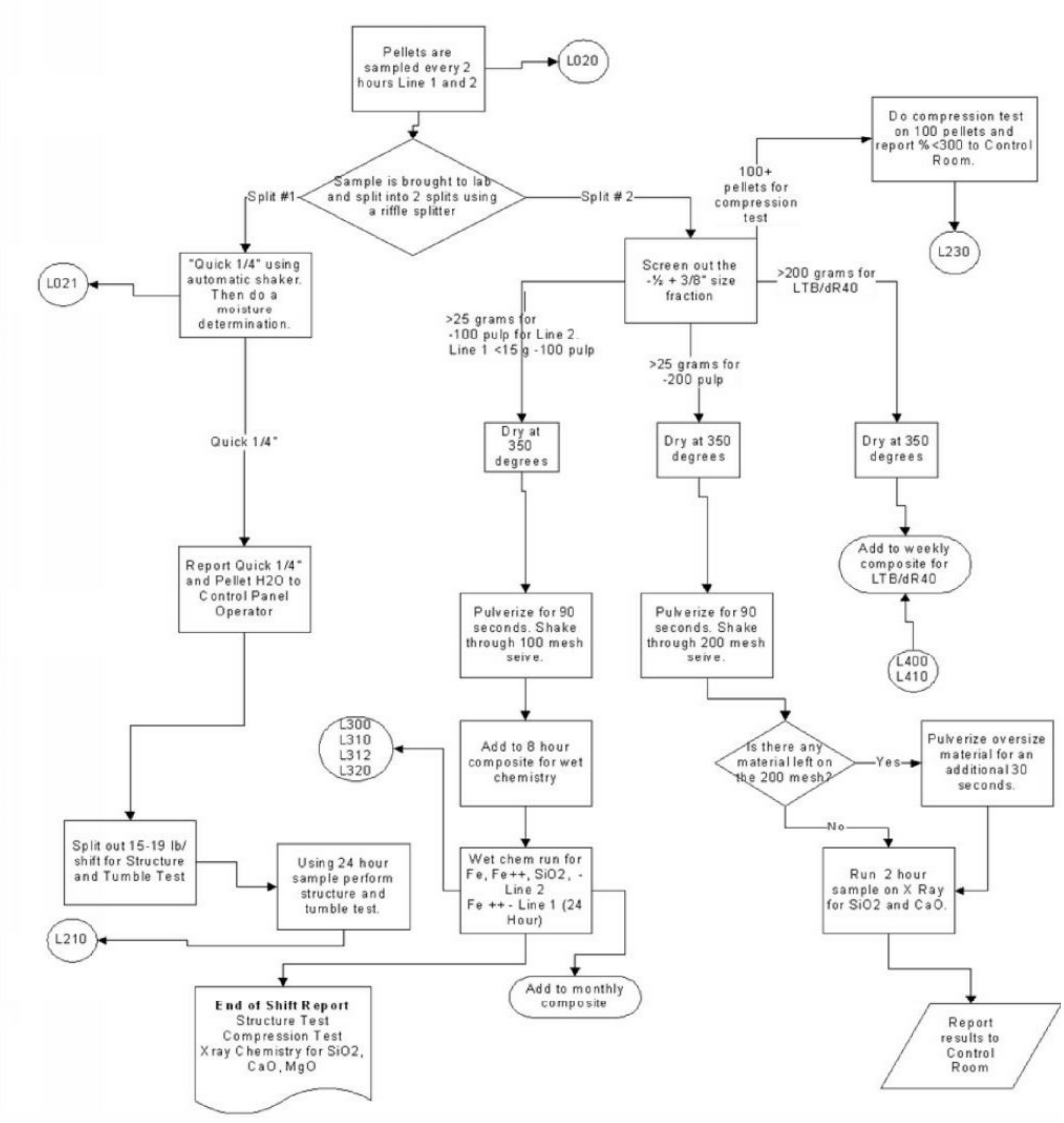


Figure 10-1: Quality Standard Procedure for Pellets

11.0 MINERAL RESOURCE ESTIMATES

11.1 Summary

Mineral Resource block models for the Thunderbird deposits were prepared by Cliffs in 2016 (TBS) and 2018 (TBN) and audited and accepted by SLR using available data from 1952 to 2020. Mineral Resource block models are based on the following drill hole information for each deposit:

- TBN: 673 diamond drill holes totaling 218,172 ft from 1952 to 2018 (620 drill holes with assays).
- TBS: 243 drill holes with a total of 77,768 ft from 1952 to 2010.

For the Thunderbird deposits, a stratigraphic model representing the Biwabik IF was constructed in Maptek's Vulcan software through the creation of wireframe surfaces representing the upper contact of each unit. Sub-blocked model estimates, also prepared in Vulcan, used inverse distance squared (ID^2) and length-weighted, 10 ft uncapped composites (TBN) or assays (TBS) to estimate relevant analytical variables in a single search pass approach, using hard boundaries between subunits, ellipsoidal search ranges informed by variogram results, and search ellipse orientation informed by geology at TBS and geology and dynamic anisotropy at TBN. Average density values were assigned by lithological unit.

Mineral Resources were classified in accordance with the definitions for Mineral Resources in S-K 1300.Class assignment was based on criteria developed using continuity models (variograms), grade ranges for key economic variables (KEV), and geological understanding, and was accomplished using scripts that reference the distance of block centroid to a drill hole sample, and the number of drill holes and samples used to estimate a block, with some post processing to remove isolated and fringe blocks. All blocks at TBS were limited to a classification of Indicated or Inferred.

Wireframe and block model validation procedures including statistical comparisons with composite samples and parallel nearest neighbor (NN) estimates, swath plots, as well as visual reviews in cross-section and plan were completed for the Thunderbird deposits. A visual review, comparing blocks to drill holes, was completed after the block modeling work was performed for the Thunderbird deposits to ensure general lithologic and analytical conformance.

The limit of Mineral Resources was optimized using pit shells that considered actual mining costs incurred in 2018 and a US$90/LT pellet value.In addition to SLR's review, Cliffs' technical site and corporate teams and external consultants SRK Consultants (Ronald, 2019) have reviewed the input data, interpolation design and execution, as well as the resultant block model's KEV.

The UTAC Mineral Resource estimate as of December 31, 2021, is presented in Table 11-1.

Table 11-1: Summary of UTAC Mineral Resources – December 31, 2021
Cleveland-Cliffs Inc. – United Taconite Property

Class	Resources (MLT)	Grade (% MagFe)	Process Recovery (%)	Wet Pellets (MLT)
		TBN		
Measured	91.8	23.6	35.4	32.5
Indicated	87.2	23.0	35.1	30.6
Total M + I	**179.0**	**23.3**	**35.3**	**63.1**
Inferred	1.3	20.9	32.6	0.4
		TBS		
Measured	-	-	-	-
Indicated	551.4	22.0	30.6	168.7
Total M + I	**551.4**	**22.0**	**30.6**	**168.7**
Inferred	24.6	21.6	31.0	7.6
		Combined TBN + TBS		
Measured	91.8	23.6	35.4	32.5
Indicated	638.6	22.2	31.2	199.2
Total M + I	**730.4**	**22.3**	**31.7**	**231.8**
Inferred	25.9	21.5	31.1	8.0

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb.
2. Tonnage is reported exclusive of Mineral Reserves and has been rounded to the nearest 100,000.
3. Mineral Resources are estimated at a cut-off grade of 17% MagFe.
4. Mineral Resources are estimated using a pellet value of US$90/LT.
5. Pellets are reported as wet standard/flux mix; shipped pellets contain 2% moisture.
6. Tonnage estimate based on actual depletion as of December 31, 2021 from a surveyed topography on May 11, 2019.
7. Resources are crude ore tons as delivered to the primary crusher, pellets are as loaded onto lake freighters in Duluth.
8. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.
9. Bulk density is assigned based on average readings for each lithology type.
10. Mineral Resources are 100% attributable to Cliffs.
11. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
12. Numbers may not add due to rounding.

The SLR QP is of the opinion that with consideration of the recommendations summarized in Sections 1.0 and 23.0 of this TRS, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work.

11.2 Resource Database

Geologic and/or assay data from a total of 673 diamond drill holes totaling 218,172 ft are incorporated into the current TBN geologic block model.The TBS Mineral Resource database consists of geologic and/or assay data from 243 drill holes with a total of 77,768 ft and is unchanged from the 2016 model update.

Drilling at both TBN and TBS has been completed on an approximate 300 ft x 300 ft grid.The drill holes are located on a non-rotated local mine grid. Not all variables have been analyzed in the intervals, and several historical drill holes, missing downhole information for both lithology and analytical tables, have been ignored.

Since the block models were completed in 2018 (TBN) and 2016 (TBS), additional drilling campaigns were undertaken by Cliffs, and at the time of writing, were ongoing with analytical results pending. Additionally, ten holes at TBS, totaling 7,436 ft drilled in 2010 through 2012, as well as some historical holes north of TBN were not yet incorporated into the model. The QP has reviewed the available lithology and analytical results related to drill holes that have not been used for the resource estimate and found them to have general conformance with the Thunderbird deposit block models and is of the opinion that the exclusion of this data will not have a significant impact on the resource block model. Nevertheless, the QP recommends updating the Mineral Resource estimates to include this information once the 2021 drilling program is complete.

11.3 Geological Interpretation

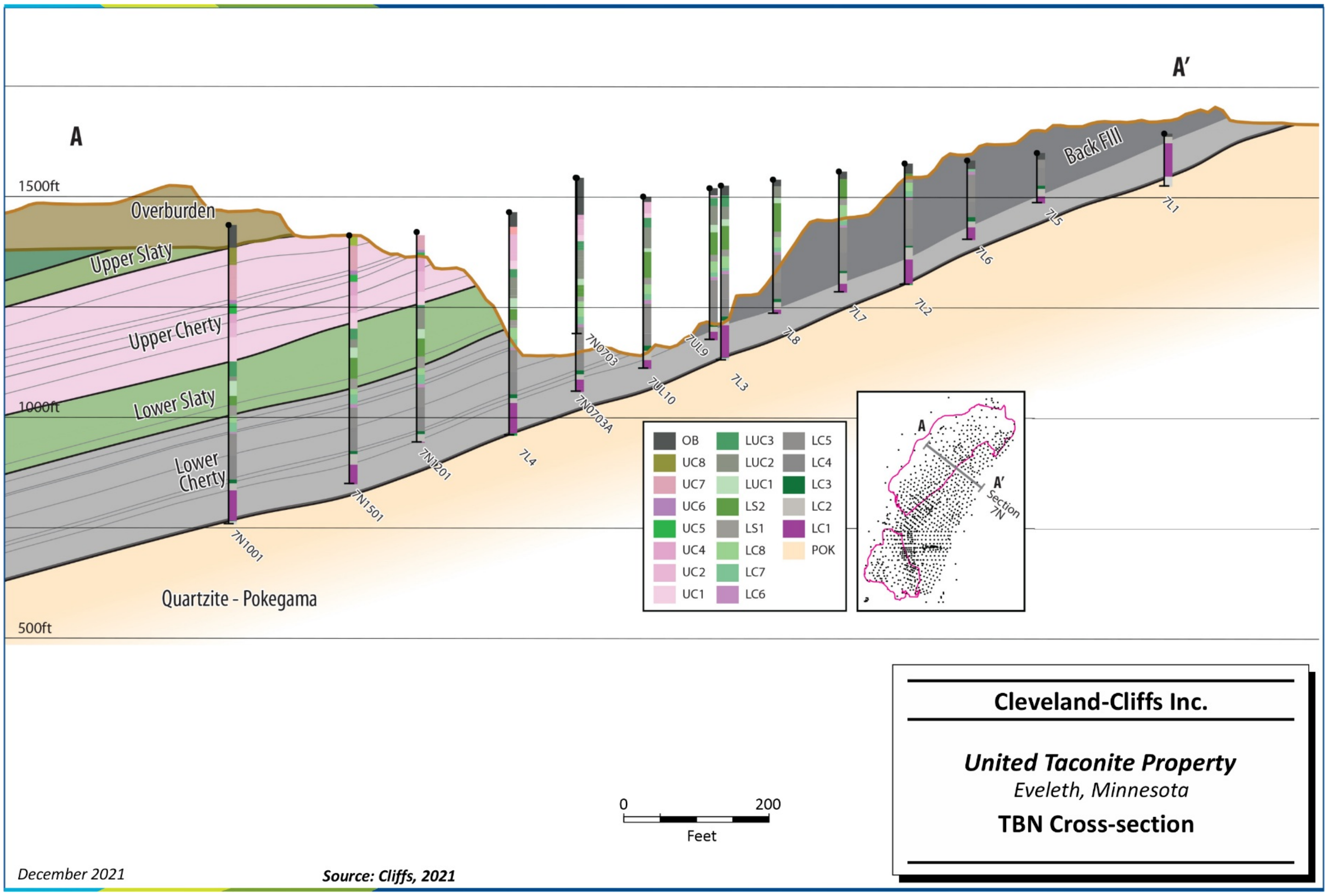
Cliffs' geologists have developed geological models for the Thunderbird deposits by modeling the upper contact of each of the stratigraphic subunits in the resource area. Stratigraphic cross-sections are presented in Figure 11-1 (TBN) and Figure 11-2 (TBS)Using Maptek's Vulcan software, lithological logs from drill holes were used to define the top contact surfaces of each stratigraphic subunit, using the Integrated Stratigraphic Modeler tool. Surfaces are modified using a post-processing script to account for hole terminations mid-unit (both collar and end of hole), missing units due to pinched or eroded subunits, weathering or oxidation obscuring subunit characteristics, very thin subunits, and/or lost data.

The stratigraphic subunits at TBN include:

- Lower Cherty: LC1 through LC8
- Lower Slaty: LS1 and LS2
- Lower Upper Cherty: LUC1 through LUC3
- Upper Cherty: UC1 through UC8
- Upper Slaty: US1

The subunits at TBS are:

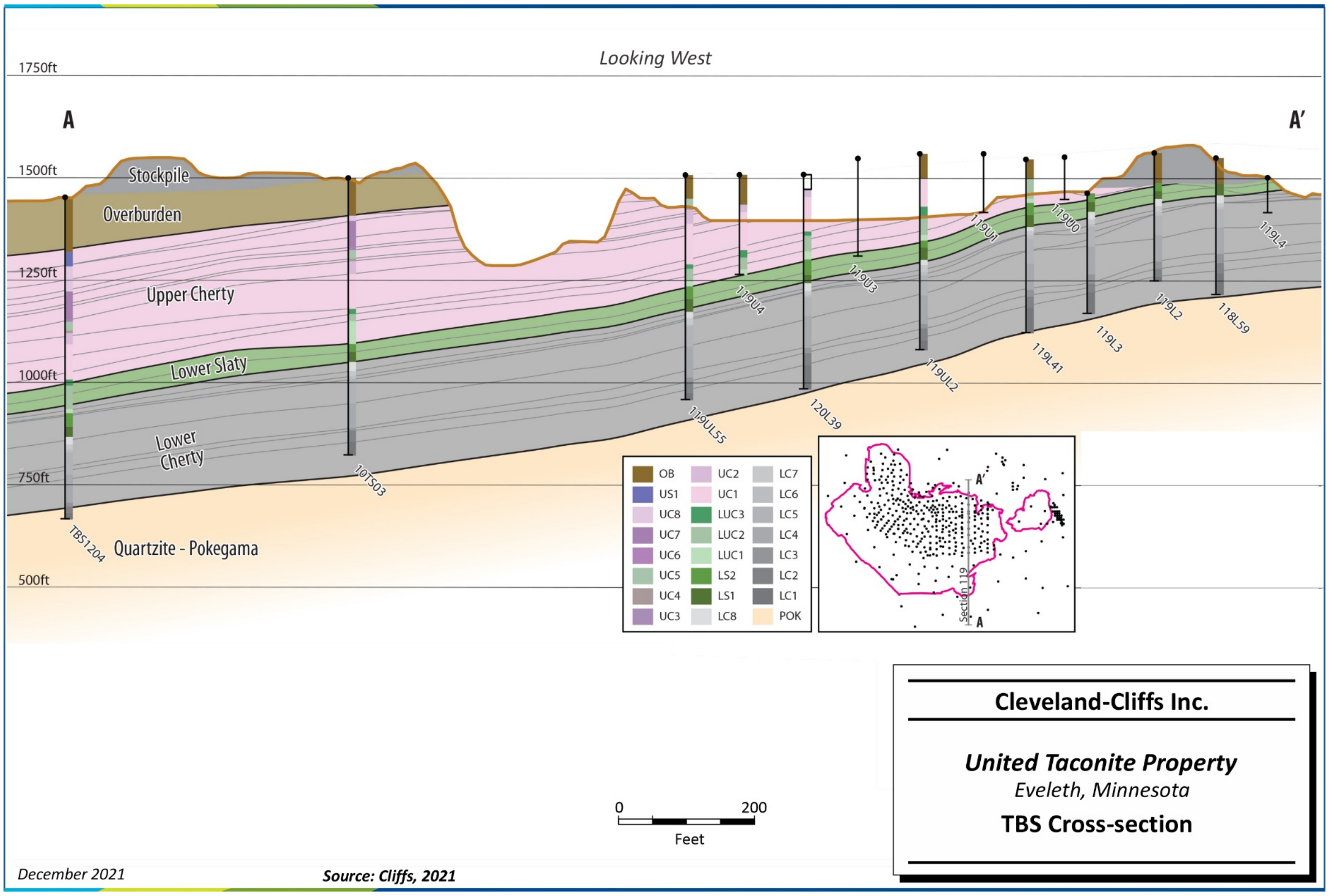
- Lower Cherty: LC1 through LC8
- Lower Slaty: LS1 and LS2
- Lower Upper Cherty: LUC1 through LUC3
- Upper Cherty: UC1 through UC8
- Upper Slaty: US1



December 2021

Source: Cliffs, 2021

Figure 11-1: TBN Cross-section



December 2021

Source: Cliffs, 2021

Figure 11-2: TBS Cross-section

11.4 Compositing and Capping

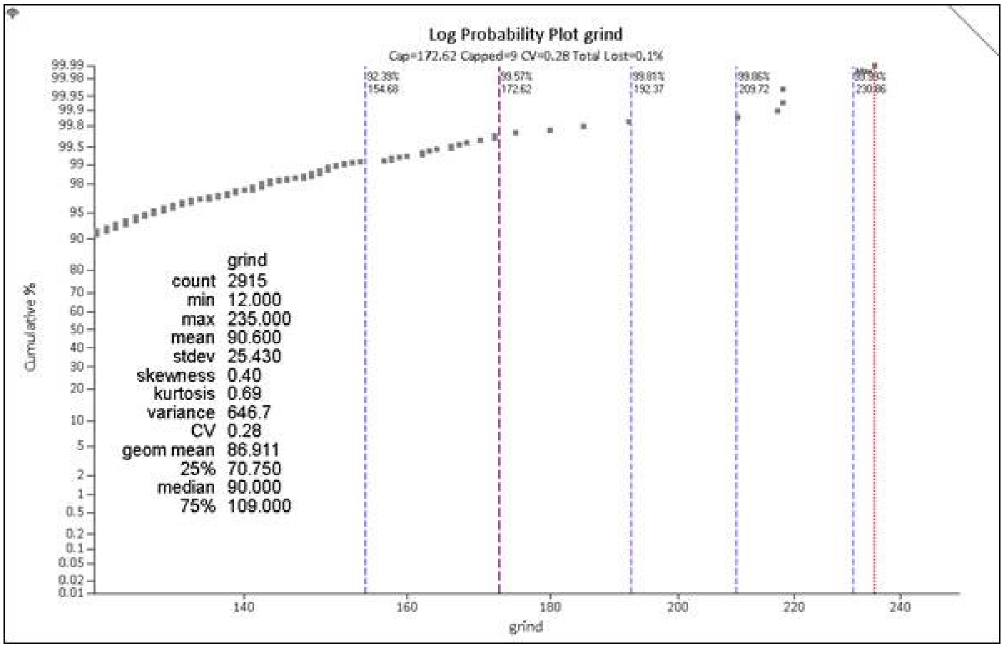
11.4.1 Treatment of High Value Assays

Raw assays were reviewed by Cliffs and SRK (Ronald, 2019) using basic statistics, histograms, and probability plots to determine whether value restriction using capping was warranted. Final capping limits are presented in Table 11-2, and a log probability chart of grind assay values is presented in Figure 11-3.

No upper value restriction was applied at TBS. The QP recommends reviewing treatment of high value assays at TBS in subsequent updates.

Table 11-2: TBN Capping Limits for Key Economic and Selected Minor Variables
Cleveland-Cliffs Inc. – United Taconite Property

Variable	Upper Limit	Justification
MagFe (%)	none	No capping is applied for MagFe based upon capping analysis. While there is outlier data, the limited number does not detrimentally affect the population.
wtrec (%)	none	No capping is applied for wtrec based upon capping analysis. While there is outlier data, the limited number does not detrimentally affect the population.
consio2 (%)	none	No capping is applied for consio2 based upon capping analysis. While there is outlier data, the limited number does not detrimentally affect the population.
grind (%)	172	An upper cap of 172 is used for grind based upon: 1) 166 statistically calculated outliers, 2) A log probability plot indicating disintegration at 172, and 3) the variable being a percentage, so theoretical values greater than 150 are extremely rare.
confe (%)	72.4	An upper cap of 72.4 % Fe is used, as the theoretical limit of iron content in pure magnetite is 72.36% confe.



Source: Ronald, 2019.

Figure 11-3: Log Probability Plot of Grind Analytical Results

Table 11-3 (TBN) and Table 11-4 (TBS) present the capped, length-weighted assay statistics for the KEV.

Table 11-3: TBN Assay Statistics
Cleveland-Cliffs Inc. – United Taconite Property

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	Std Dev (%)	CV
	wtrec	107	0.82	36.93	21.13	8.18	0.39
UC8	MagFe	108	0.56	23.85	13.07	5.40	0.41
	consio2	85	2.06	15.60	6.58	2.79	0.42
	wtrec	315	1.40	40.70	23.28	8.82	0.38
UC7	MagFe	323	0.89	27.60	14.41	6.56	0.45
	consio2	262	2.30	13.40	6.72	2.13	0.32
	wtrec	109	0.69	45.90	13.94	6.65	0.48
UC6	MagFe	112	0.59	31.30	8.62	4.63	0.54
	consio2	95	2.10	19.80	7.41	3.81	0.51

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	Std Dev (%)	CV
	wtrec	192	3.67	46.70	25.49	7.71	0.30
UC5	MagFe	199	2.03	31.70	15.46	5.85	0.38
	consio2	169	1.80	21.50	7.34	3.64	0.50
	wtrec	321	0.60	46.20	23.76	9.21	0.39
UC4	MagFe	324	0.40	32.10	14.32	6.28	0.44
	consio2	291	2.10	26.10	10.27	4.75	0.46
	wtrec	532	3.87	61.20	35.96	9.57	0.27
UC3A	MagFe	532	1.10	42.80	24.43	6.95	0.28
	consio2	517	1.70	20.10	4.07	1.68	0.41
	wtrec	423	0.70	50.73	20.96	8.46	0.40
UC3	MagFe	425	0.50	34.83	13.66	5.90	0.43
	consio2	414	1.90	17.00	6.50	2.52	0.39
	wtrec	698	1.70	44.40	24.45	6.57	0.27
UC2	MagFe	703	0.89	29.50	15.51	4.59	0.30
	consio2	662	2.30	17.60	8.34	2.35	0.28
	wtrec	455	2.20	45.20	26.07	7.22	0.28
UC1	MagFe	455	1.50	29.10	16.85	5.06	0.30
	consio2	440	1.80	16.10	6.98	2.20	0.31
	wtrec	524	4.00	48.60	27.84	6.74	0.24
LUC3	MagFe	525	2.50	33.10	17.83	4.55	0.26
	consio2	507	1.90	20.16	8.26	2.83	0.34
	wtrec	1665	0.24	62.80	32.83	9.32	0.28
LUC2	MagFe	1680	0.16	43.39	22.18	6.49	0.29
	consio2	1636	1.60	20.00	4.89	2.32	0.48
	wtrec	686	0.17	49.13	28.69	8.30	0.29
LUC1	MagFe	695	0.31	33.48	17.81	5.46	0.31
	consio2	669	1.80	25.24	11.58	3.53	0.31
	wtrec	629	0.03	37.70	8.59	7.35	0.86
LC8	MagFe	608	0.08	25.61	5.54	4.60	0.83
	consio2	548	2.70	28.20	8.77	2.97	0.34
	wtrec	564	0.40	45.40	28.08	6.75	0.24
LC7	MagFe	583	0.20	30.40	17.42	4.58	0.26
	consio2	570	2.70	14.20	6.61	1.78	0.27

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	Std Dev (%)	CV
LC6	wtrec	359	4.00	45.70	31.40	8.37	0.27
	MagFe	368	2.01	30.40	19.84	5.76	0.29
	consio2	358	2.70	20.47	7.87	2.64	0.34
LC5	wtrec	2216	0.30	59.64	37.63	8.06	0.21
	MagFe	2255	0.21	40.21	24.43	5.63	0.23
	consio2	2191	1.16	19.43	6.20	2.12	0.34
LC4	wtrec	2352	1.67	49.38	35.57	4.63	0.13
	MagFe	2391	1.22	34.69	24.54	3.66	0.15
	consio2	2324	0.70	11.10	2.25	0.97	0.43
LC3	wtrec	596	1.35	44.42	20.98	8.02	0.38
	MagFe	606	0.87	31.27	14.11	5.77	0.41
	consio2	586	1.58	9.50	3.77	1.13	0.30
LC2	wtrec	708	1.90	45.70	30.38	4.86	0.16
	MagFe	723	1.33	29.20	20.88	3.92	0.19
	consio2	694	1.20	9.60	2.64	0.75	0.28
LC1	wtrec	1115	0.60	39.87	17.34	4.89	0.28
	MagFe	1170	0.30	25.20	11.57	3.58	0.31
	consio2	1028	1.30	22.50	4.32	2.94	0.68

Table 11-4: TBS Assay Statistics
Cleveland-Cliffs Inc. – United Taconite Property

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	St Dev (%)	CV
UC8	MagFe	43	0.01	29.19	16.14	6.99	0.43
	wtrec	43	0.01	43.05	24.27	10.27	0.42
	consio2	40	3.00	12.20	5.80	2.12	0.37
UC7u	MagFe	68	7.08	28.97	18.91	4.61	0.24
	wtrec	68	10.17	42.10	28.62	6.87	0.24
	consio2	66	2.51	11.70	6.68	2.29	0.34
UC7l	MagFe	108	0.01	33.07	17.52	7.37	0.42
	wtrec	109	0.01	47.78	26.06	10.86	0.42
	consio2	100	1.10	15.00	5.08	2.51	0.49

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	St Dev (%)	CV
UC6	MagFe	43	0.01	20.95	11.23	5.39	0.48
	wtrec	44	0.01	31.50	17.27	8.46	0.49
	consio2	41	2.40	16.86	6.63	3.64	0.55
UCmu	MagFe	176	0.01	22.80	13.15	4.24	0.32
	wtrec	176	0.01	38.80	20.79	6.79	0.33
	consio2	167	1.40	22.20	7.53	4.24	0.56
UCms	MagFe	103	3.01	29.66	15.24	4.24	0.28
	wtrec	103	8.80	48.01	25.56	6.66	0.26
	consio2	101	1.80	34.80	11.88	6.49	0.55
UCml	MagFe	323	0.01	36.20	18.05	5.85	0.32
	wtrec	323	0.01	50.20	27.86	7.98	0.29
	consio2	317	1.20	26.63	8.23	4.89	0.59
UC1	MagFe	1008	0.01	36.83	22.97	6.33	0.28
	wtrec	1009	0.01	50.90	33.36	8.82	0.26
	consio2	988	1.10	18.70	3.45	2.25	0.65
LUC3	MagFe	560	0.01	32.18	17.15	5.66	0.33
	wtrec	564	0.01	47.00	25.93	8.29	0.32
	consio2	547	1.50	23.90	7.20	3.99	0.55
LUC2	MagFe	681	0.01	32.32	21.05	5.34	0.25
	wtrec	685	0.01	46.70	31.17	7.74	0.25
	consio2	665	1.50	32.20	5.64	3.43	0.61
LUC1	MagFe	362	0.01	28.14	15.04	6.25	0.42
	wtrec	363	0.01	43.60	24.28	8.73	0.36
	consio2	356	1.40	33.10	12.22	5.68	0.47
LC8	MagFe	65	0.01	26.23	5.74	6.05	1.05
	wtrec	75	0.01	41.40	8.01	9.48	1.18
	consio2	54	2.10	13.00	7.25	2.46	0.34
LC7	MagFe	76	0.01	29.32	14.90	8.35	0.56
	wtrec	77	0.01	46.70	22.66	12.77	0.56
	consio2	68	2.30	9.90	6.28	1.61	0.26
LC6	MagFe	46	3.84	31.50	18.73	8.20	0.44
	wtrec	47	0.79	47.10	27.67	12.72	0.46
	consio2	43	2.00	12.60	5.89	2.43	0.41

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	St Dev (%)	CV
LC5	MagFe	467	0.01	34.51	20.67	6.26	0.3
	wtrec	468	0.01	50.90	30.75	9.53	0.31
	consio2	445	1.60	12.60	5.14	2.19	0.43
LC4	MagFe	537	1.97	30.80	22.53	4.33	0.19
	wtrec	537	4.10	43.92	32.27	5.99	0.19
	consio2	514	0.90	15.25	2.42	1.36	0.56
LC3	MagFe	137	0.01	26.78	8.13	5.72	0.70
	wtrec	148	0.01	37.94	11.69	8.52	0.73
	consio2	116	1.60	11.50	5.37	1.78	0.33
LC2	MagFe	164	0.01	25.63	18.29	4.47	0.24
	wtrec	164	0.01	37.00	26.37	6.29	0.24
	consio2	153	1.20	9.50	3.55	1.48	0.42
LC1	MagFe	205	0.01	21.89	10.53	5.05	0.48
	wtrec	204	0.01	31.13	15.99	7.29	0.46
	consio2	163	2.00	26.40	6.42	4.43	0.69

11.4.2 Compositing

At TBN, capped assays were composited to 10 ft and broken at stratigraphic boundaries using the Vulcan run length algorithm.A total of 23,034 composites within BIF subunits were created, ranging in length from less than 0.1 ft to 12 ft, and averaging 8.9 ft.

At TBS, no compositing was completed; however, assays were processed through the straight compositing algorithm in Vulcan to flag values by modeled unit. At TBS there are 4,609 composites within BIF subunits, ranging in length from less than 0.1 ft to 85.4 ft, and averaging 7.8 ft.

Table 11-5 and Table 11-6 present the statistics of the main grading variables in the composite file.

Table 11-5: TBN Composite Statistics
Cleveland-Cliffs Inc. – United Taconite Property

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	St Dev (%)	CV
UC8	wtrec	178	0.82	36.25	20.24	7.87	0.39
	MagFe	179	0.56	22.28	12.53	5.25	0.42
	consio2	123	2.50	15.60	6.69	2.67	0.40
UC7	wtrec	431	1.20	43.22	22.10	8.82	0.40
	MagFe	441	0.82	29.43	13.71	6.47	0.47
	consio2	324	2.20	13.25	6.58	2.07	0.32

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	St Dev (%)	CV
UC6	wtrec	170	0.69	46.19	14.60	6.56	0.45
	MagFe	175	0.59	31.45	9.02	4.59	0.51
	consio2	142	1.80	19.80	7.55	3.84	0.51
UC5	wtrec	273	3.67	44.51	24.93	7.50	0.30
	MagFe	281	2.00	30.46	15.33	5.68	0.37
	consio2	227	2.20	21.50	7.27	3.52	0.48
UC4	wtrec	463	0.60	46.20	22.97	9.39	0.41
	MagFe	468	0.40	32.15	14.03	6.39	0.46
	consio2	389	2.10	26.10	9.93	4.55	0.46
UC3A	wtrec	0	0	0	0	0	0
	MagFe	0	0	0	0	0	0
	consio2	0	0	0	0	0	0
UC3	wtrec	522	0.70	50.73	20.77	8.20	0.40
	MagFe	525	0.50	34.83	13.53	5.71	0.42
	consio2	488	1.90	16.60	6.62	2.41	0.36
UC2	wtrec	855	1.20	43.88	24.11	6.56	0.27
	MagFe	862	0.70	29.10	15.34	4.58	0.30
	consio2	773	2.79	17.60	8.30	2.20	0.27
UC1	wtrec	588	1.20	42.93	25.51	7.09	0.28
	MagFe	588	0.70	29.10	16.53	4.92	0.30
	consio2	551	1.80	14.20	7.08	2.07	0.29
LUC3	wtrec	658	4.00	46.00	27.67	6.51	0.24
	MagFe	660	2.50	31.70	17.83	4.43	0.25
	consio2	614	1.91	19.08	8.03	2.72	0.34
LUC2	wtrec	1855	0.24	60.24	32.68	8.21	0.25
	MagFe	1875	0.16	41.69	22.08	5.72	0.26
	consio2	1775	1.60	20.00	4.99	2.26	0.45
LUC1	wtrec	833	0.17	49.13	27.65	8.49	0.31
	MagFe	844	0.31	33.48	17.22	5.50	0.32
	consio2	773	2.08	25.24	11.79	3.44	0.29
LC8	wtrec	961	0.03	36.05	8.47	6.82	0.80
	MagFe	942	0.10	24.49	5.44	4.25	0.78
	consio2	838	2.70	38.59	9.09	3.17	0.35

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	St Dev (%)	CV
LC7	wtrec	727	0.40	45.40	28.05	6.89	0.25
	MagFe	748	0.20	30.40	17.49	4.61	0.26
	consio2	706	2.70	15.70	6.70	1.83	0.27
LC6	wtrec	456	4.30	45.70	31.07	8.52	0.27
	MagFe	465	2.01	30.40	19.71	5.76	0.29
	consio2	436	2.70	20.47	7.82	2.53	0.32
LC5	wtrec	2593	0.30	59.64	37.02	8.19	0.22
	MagFe	2633	0.21	40.21	24.12	5.67	0.23
	consio2	2486	1.70	17.17	6.13	2.04	0.33
LC4	wtrec	2666	3.21	49.20	35.33	4.60	0.13
	MagFe	2706	1.50	34.69	24.38	3.67	0.15
	consio2	2543	0.70	10.71	2.26	0.93	0.41
LC3	wtrec	764	1.35	44.42	21.45	8.24	0.38
	MagFe	775	0.87	31.27	14.48	5.95	0.41
	consio2	712	1.50	9.50	3.76	1.17	0.31
LC2	wtrec	903	1.80	41.30	29.86	4.83	0.16
	MagFe	928	1.24	29.20	20.51	3.96	0.19
	consio2	861	1.20	7.45	2.64	0.70	0.26
LC1	wtrec	1603	0.60	39.87	16.92	4.80	0.28
	MagFe	1671	0.30	25.20	11.26	3.47	0.31
	consio2	1374	1.30	20.48	4.75	3.08	0.65

Table 11-6: TBS Composite Statistics
Cleveland-Cliffs Inc. – United Taconite Property

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	St Dev (%)	CV
UC8	MagFe	64	7.25	29.19	18.62	5.94	0.32
	wtrec	64	10.93	43.05	27.76	8.60	0.31
	consio2	64	2.70	12.20	5.70	2.02	0.35
UC7u	MagFe	102	7.08	28.97	19.25	4.68	0.24
	wtrec	103	4.55	42.82	28.91	7.24	0.25
	consio2	102	2.51	11.70	6.42	2.28	0.36

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	St Dev (%)	CV
UC7l	MagFe	149	2.68	33.07	17.28	6.68	0.39
	wtrec	152	4.55	47.78	25.54	9.99	0.39
	consio2	148	1.10	16.86	5.36	2.66	0.50
UC6	MagFe	115	2.68	23.49	12.28	4.77	0.39
	wtrec	116	4.00	35.50	18.58	7.08	0.38
	consio2	115	1.30	17.80	5.44	3.12	0.57
UCmu	MagFe	258	1.42	29.66	13.46	3.97	0.30
	wtrec	258	2.10	48.01	21.73	6.74	0.31
	consio2	255	1.40	34.80	8.65	5.48	0.63
UCms	MagFe	223	3.01	33.25	15.57	4.45	0.29
	wtrec	223	5.40	48.01	25.50	6.63	0.26
	consio2	221	1.20	34.80	10.94	5.68	0.52
UCml	MagFe	460	0.10	35.96	18.76	6.07	0.32
	wtrec	460	0.20	50.53	28.82	8.14	0.28
	consio2	458	1.20	26.63	7.82	5.03	0.64
UC1	MagFe	1180	0.10	36.83	22.29	6.43	0.29
	wtrec	1183	0.20	50.90	32.46	8.95	0.28
	consio2	1166	1.10	21.70	3.87	2.68	0.69
LUC3	MagFe	770	0.10	32.18	17.77	5.78	0.33
	wtrec	774	0.20	47.00	26.75	8.35	0.31
	consio2	762	1.50	32.20	6.74	3.98	0.59
LUC2	MagFe	894	0.10	32.32	20.31	5.62	0.28
	wtrec	900	0.10	46.70	30.22	8.13	0.27
	consio2	884	1.40	32.20	6.16	3.80	0.62
LUC1	MagFe	532	0.10	29.27	15.55	6.80	0.44
	wtrec	534	0.10	42.50	24.74	9.48	0.38
	consio2	527	1.40	33.10	11.47	5.72	0.50
LC8	MagFe	120	0.06	28.89	6.93	7.16	1.03
	wtrec	134	0.05	43.60	9.88	11.02	1.12
	consio2	112	2.10	17.00	7.46	2.63	0.35
LC7	MagFe	163	0.06	31.08	14.44	8.54	0.59
	wtrec	166	0.10	46.70	21.75	12.98	0.60
	consio2	155	2.00	13.00	6.46	1.93	0.30

Unit	Variable	Count	Minimum (%)	Maximum (%)	Mean (%)	St Dev (%)	CV
lC6	MagFe	132	0.06	32.06	18.14	8.15	0.45
	wtrec	134	0.10	47.30	27.08	12.48	0.46
	consio2	128	2.00	12.60	6.22	2.05	0.33
LC5	MagFe	537	1.23	34.51	20.55	6.30	0.31
	wtrec	540	0.30	50.90	30.41	9.67	0.32
	consio2	528	1.30	12.60	4.97	2.23	0.45
LC4	MagFe	616	0.35	30.80	21.56	5.36	0.25
	wtrec	616	0.50	43.92	30.97	7.44	0.24
	consio2	604	0.90	15.25	2.70	1.52	0.56
LC3	MagFe	211	0.35	26.78	13.39	6.97	0.52
	wtrec	222	0.08	38.27	19.01	10.28	0.54
	consio2	202	1.20	11.50	4.80	1.91	0.40
LC2	MagFe	236	0.45	25.63	16.19	5.51	0.34
	wtrec	238	0.42	37.00	23.42	7.81	0.33
	consio2	231	1.20	11.50	4.13	1.86	0.45
LC1	MagFe	207	0.45	24.96	13.17	4.14	0.31
	wtrec	207	0.80	35.08	19.68	5.45	0.28
	consio2	205	1.40	23.70	5.94	4.20	0.71

11.5 Variography

Trend analysis was completed by Cliffs and SRK (Ronald, 2019) at TBN to inform the search strategy and classification for KEV within each subunit, as well as to understand principal continuity trends. Outcomes of the Ronald (2019) study indicated variable nugget effects for MagFe, wtrec, and consio2 across the ore-bearing domains with most being considered low to moderate nugget values (20% to 40% of sill).

Predominant anisotropy is aligned with the geological strike of the lithostratigraphy at TBN with a mean directionality of 030° azimuth and a 5° dip to the northwest. The preferred modeled directional semi-variograms were observed to be isotropic in the X and Y directions (horizontal) with a separate direction for Z (vertical), as expected for variable thickness units. Overall, most variables in ore-bearing zones displayed long ranges, typically approximately 1,000 ft.

Current estimation practices at UTAC do not incorporate modeled semi-variogram results within the estimation, as all variables are interpolated using an inverse distance weighted (IDW) approach. Anisotropy and modeled semi-variogram parameters were used to optimize search neighborhoods during IDW estimates.

11.6 Block Models

Sub-blocked models are created in Vulcan for the Thunderbird deposits with dimensions and origins as presented in Table 11-7. The TBN model was built in 2018, and the TBS model was created in 2016.All blocks are 50 ft by 50 ft in the X and Y directions, and the vertical dimension (Z) is variable depending on the thickness of the stratigraphic unit. The Thunderbird deposit block models incorporate vertical Z-axis sub-blocking to one foot, to better respect geologic contacts in the gently dipping orebody. The QP is of the opinion that the block model extents and the block dimensions are reasonable.

Table 11-7: Block Model Parameters
Cleveland-Cliffs Inc. – United Taconite Property

Parameter	TBN			TBS		
	X	Y	Z	X	Y	Z
Origin	30,700	52,000	20	30,725	38,925	620
Length (ft)	12,900	17,500	2000	12,850	13,100	1,240
Block Size (ft)	100	100	20	50	50	40
Number	129	175	50	257	262	31
Sub-block (ft)	50	50	2	50	50	1
Number	258	350	2000	257	262	1240

Codes are assigned to the following variables during block model creation:

- Stratigraphic units from the modeled surfaces
- Stockpiles/backfill
- Lease boundaries from triangulation solids
- Air blocks from overburden roof surface

11.7 Search Strategy and Grade Interpolation Parameters

ID^2 weighting is employed at TBN to estimate the following variables:

- MagFe: Magnetic Iron % from Davis test tube concentrate or Satmagan
- Consio2: concentrate calculated at 82% -325 mesh
- wtrec: Weight recovery calculated at 82% -325 mesh
- confe: Total iron in concentrate
- Al_2O_3: Total Al_2O_3 in concentrate
- CaO: Total CaO in concentrate
- CO_2: Total CO_2 in concentrate
- Grindability
- K_2O: Total K_2O in concentrate
- Kwh_lt: kWh/LT calculated at 82% -325 mesh.
- MgO: Total MgO in concentrate
- Mn: Total Mn in concentrate

- P: Total P in concentrate

The search neighborhood criteria used at TBN is based on recommendations from the SRK study (Ronald, 2019) and includes use of Vulcan tetra modeling, which modifies the search ellipsoid anisotropy based upon geological wireframe orientations. Search ellipsoids are based on variogram results and range in size from 500 ft x 500 ft x 20 ft to 2,000 ft x 2,000 ft x 20 ft, are variable and domain dependent, and use hard boundaries between each subunit. Blocks were estimated using a minimum of three to four composites, and a maximum or 12, 16, 20, or 24 composites, and were limited to two, three, or four composites per drill hole, depending on the variable and domain. Composite samples were length-weighted during estimation to reduce the impact of short composites.

At TBS, ID^2 is employed in a single search ellipse oriented 000°/000°/90° of dimensions 1,000 ft x 1,000 ft x ¼ height of subunit. Using hard boundaries, a minimum of one and maximum of 10 samples are used to estimate KEV such as MagFe, consio2, wtrec, crudefe, and confe.While the QP finds this approach acceptable for Indicated Mineral Resources, they recommend updating the interpolation approach at TBS to align with the more robust processes at TBN.

11.7.1 Bulk Density

Results from a density study on 391 samples of TBN drill core completed in 2007, via the water immersion method described in section 8.1.11, have been applied to Thunderbird deposit models. Density is assigned based on the average value for each stratigraphic subunit (Table 11-8). Bulk densities for TBS subunits are taken from values for correlative subunits in the TBN deposit given the lateral continuity of the Biwabik IF in the Virginia Horn area and the similarity between the grade characteristics of crude ore and rock units at the Thunderbird deposits. In addition to the unit densities presented in Table 11-8, default densities are assigned for DSO at 0.085 WLT/ft^3, overburden (0.055 WLT/ft^3), and the underlying quartzite (0.072 W LT/ft^3).

Table 11-8: Density by Lithology
Cleveland-Cliffs Inc. – United Taconite Property

Geologic Unit	Specific Gravity	Cubic Feet per LT (ft^3/LT)	LT per Cubic Foot (LT/ft^3)
US1	3.21	11.19	0.0894
UC8	3.39	10.62	0.0942
UC7	3.39	10.61	0.0943
UC6	3.41	10.54	0.0949
UC5	3.29	10.91	0.0917
UC4	3.14	11.54	0.0867
UC3A	3.41	10.55	0.0948
UC3	3.45	10.41	0.0961
UC2	3.47	10.86	0.0921
UC1	3.39	10.62	0.0942
LUC3	3.27	10.99	0.0910

Geologic Unit	Specific Gravity	Cubic Feet per LT (ft^3/LT)	LT per Cubic Foot (LT/ft^3)
LUC2	3.38	10.64	0.0940
LUC1	3.27	10.98	0.0911
LS2	3.13	11.47	0.0872
LS1	3.01	11.92	0.0839
LC8	3.15	11.42	0.0876
LC7	3.32	10.82	0.0924
LC6	3.35	10.71	0.0934
LC5	3.44	10.45	0.0957
LC4	3.43	10.47	0.0955
LC3	3.28	10.95	0.0913
LC2	3.33	10.78	0.0928
LC1	3.32	10.82	0.0924

11.8 Cut-off Grade

The cut-off grade used for the estimation of Mineral Resources is 17.0% MagFe.This cut-off grade has been developed as a measure of maintaining product tonnage with constraints on the delivery of crude to the concentrator. This cut-off grade is verified through a break-even cut-off grade calculation (Figure 11-4):

$$Breakeven\ Cutoff\ Grade = \frac{\sum(Cash\ Costs\ \$/LT\ ore\ milled)}{\left(\left(\frac{Revenue\ Rate}{Pellet\ \%Fe}\right) - \left(\frac{Sale\ Costs\ \ \$/LT\ pellet}{Pellet\ \%Fe}\right)\right) \cdot \frac{Ore\ LT \cdot \%MagFe}{Pellet\ LT \cdot Pellet\ \%Fe}}$$

Figure 11-4: Cut-Off Grade Formula

Actual realized costing and recoveries from 2018 were used with the three-year trailing average product revenue rate:

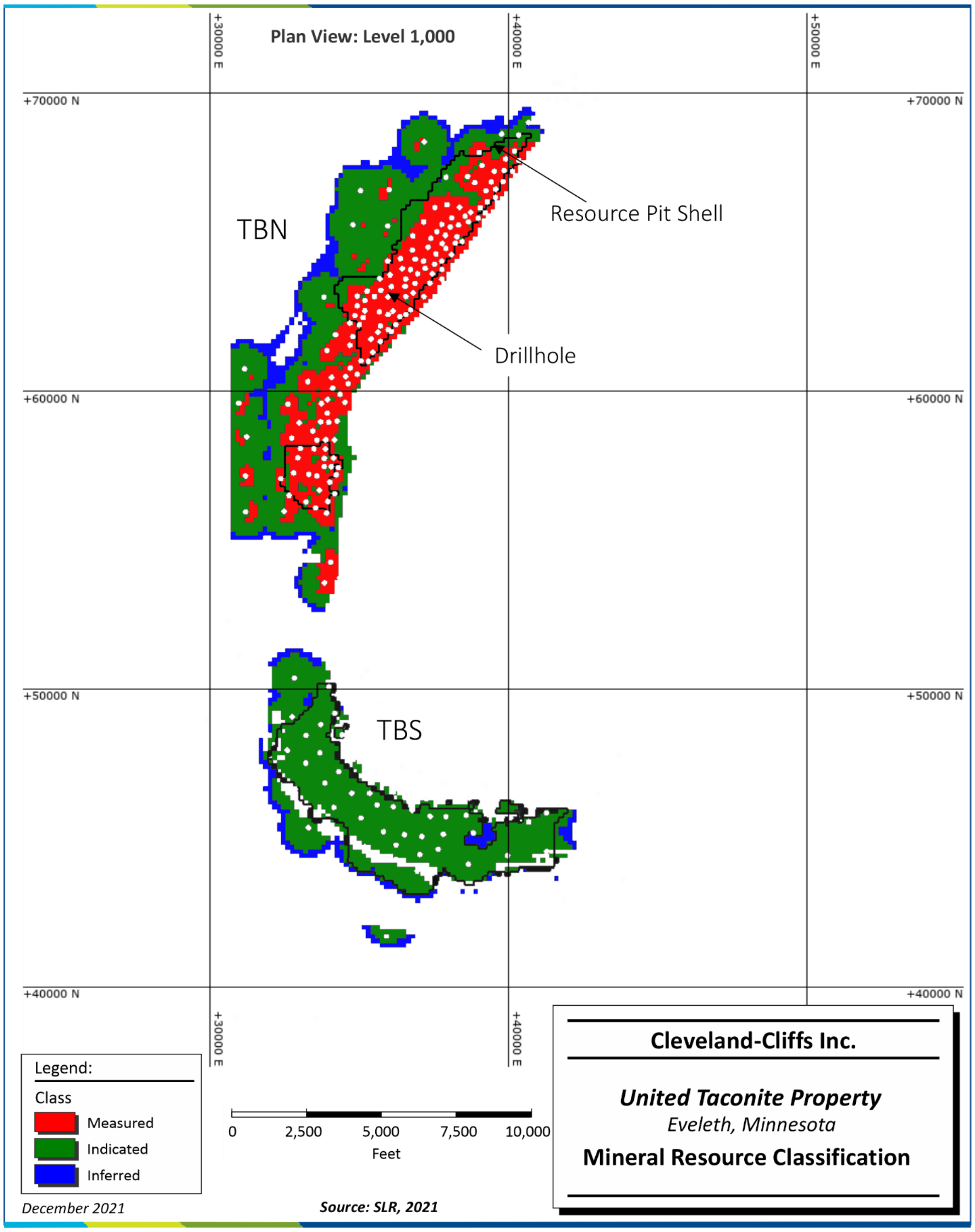
- Cash Costs = US$21.84/LT crude ore milled
- Revenue Rate = US$92.27/LT dry pellets
- Pellet %Fe = 65.4%
- Sale Costs = US$4.01/LT dry pellets
- Crude Ore Milled = 14,561 LT
- MagFe = 23.3%
- Pellets Produced = 5,203 LT dry pellets

The calculated break-even cut-off grade for crude ore and waste determination using the formula in Figure 11-4 and the assumptions listed above is approximately 17.0% MagFe.

11.9 Classification

Definitions for resource categories used in this TRS are those defined by SEC in S-K 1300Mineral Resources are classified into Measured, Indicated, and Inferred categories.

UTAC Mineral Resource classification is based primarily on drill hole spacing and influenced by geologic continuity, ranges of economic criteria, and reconciliation. Some post processing is undertaken to ensure spatial consistency and remove isolated and fringe blocks. Limits of drill hole spacing are derived from variogram models, most of which have a range of continuity from 800 ft to 1,200 ft. Classification criteria are listed in Table 11-9 and illustrated in Figure 11-5.



December 2021

Source: SLR, 2021

Figure 11-5: Mineral Resource Classification

Table 11-9: TBN and TBS Classification Criteria
Cleveland-Cliffs Inc. – United Taconite Property

Criteria	Measured	Indicated	Inferred
Distance to Drill hole (ft)	< 400	< 800	> 800
Geological Understanding	Very good geology and stratigraphic continuity		
Range in Values	Narrow range in KEV (MagFe, grindability, consio2) and density		
Interpolation Constraints	Block values based on a minimum of 3 samples and two drill holes	N/A	N/A
Reconciliation (measured at mill vs. estimated)	F2 within 10%	N/A	N/A

Some uncertainty is present in the TBS model, where mining has not occurred since 1991 and most supporting drill hole data is historical or uses an older analytical technique than is currently in place at site (LIS, section 8.1.5.1).To address this, Cliffs has limited all Mineral Resources at TBS to Indicated and Inferred.

As Cliffs prepares to update the TBS block model in 2022 to incorporate approximately 35 new drill holes totaling approximately 12,500 ft from an ongoing 2021 drilling campaign over the TBS deposit, an additional 1,300 samples have been collected from 65 pre-2005 drill holes, which were analyzed before the current LIS procedure was initiated.Following receipt of these tests, Cliffs will undertake the task of comparing and analyzing the pre-2005 data within the context of the current, standard LIS test procedures in place for the Thunderbird deposits, as well as confirm previous results. The QP strongly supports this initiative.

The QP is of the opinion that the classification at UTAC is generally acceptable, although some post-processing to remove isolated blocks of different classification is warranted. The QP recommends transitioning the classification process in future updates to consider local drill hole spacing over a distance to drill hole criterion.

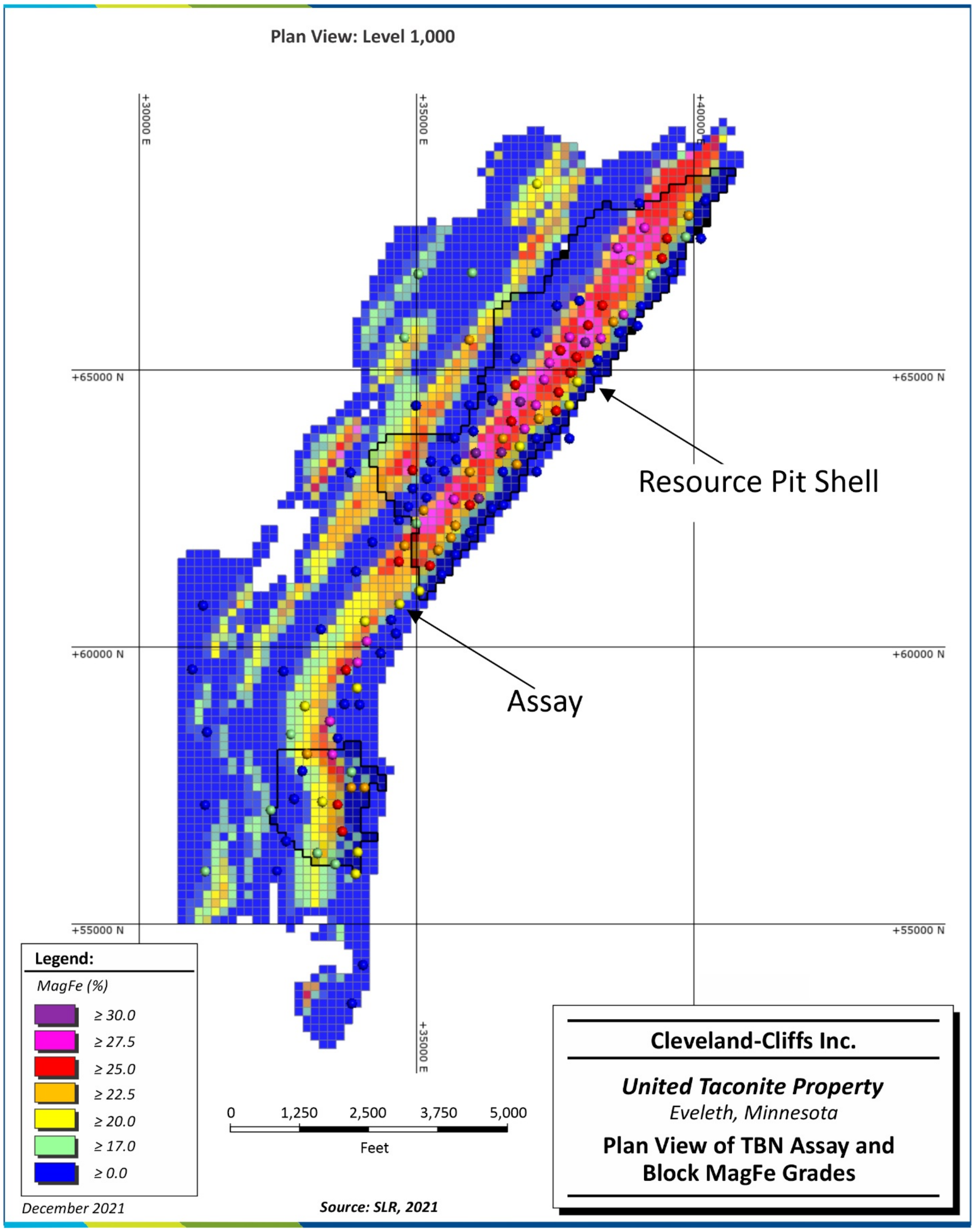
11.10 Model Validation

Blocks were validated using industry-standard techniques including:

- Visual inspection of assays and composites versus block grades (Figure 11-6 to Figure 11-9)
- Visual comparison of 2019 and 2020 drill hole analytical results (drilled subsequent to current model) and block grades
- Comparison between ID^2, NN, and composite means (Table 11-10 and Figure 11-10)
- Swath plots

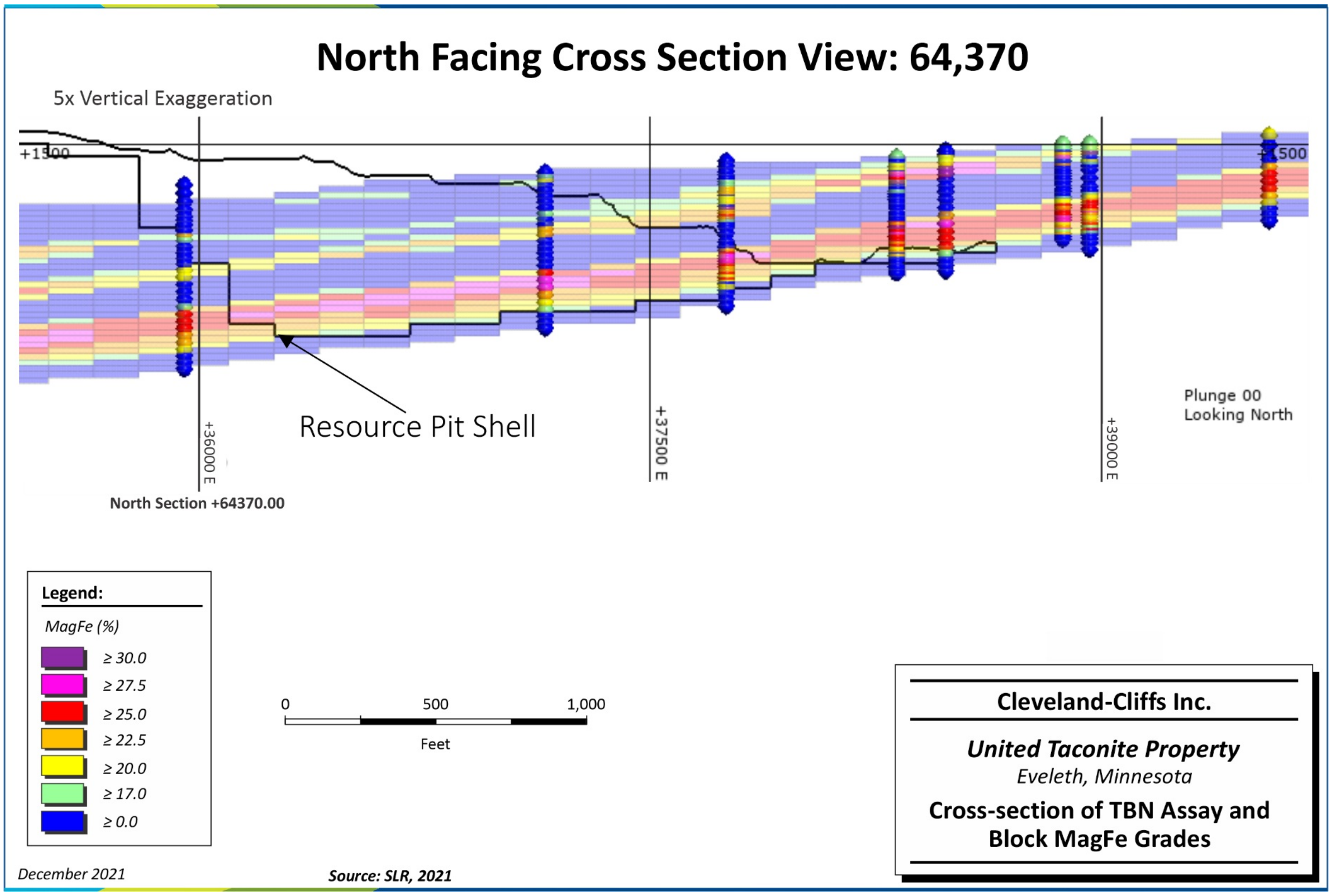
SLR reviewed the MagFe and consio2 grades and proportions relative to blocks, drilled grades, and composites.SLR observed that the block grades exhibited general spatial agreement with drilling and sampling and did not appear to smear significantly across sampled grades.

Swath plots generally demonstrated good correlation, with block grades being somewhat smoothed relative to composite grades, as expected.



Source: SLR, 2021

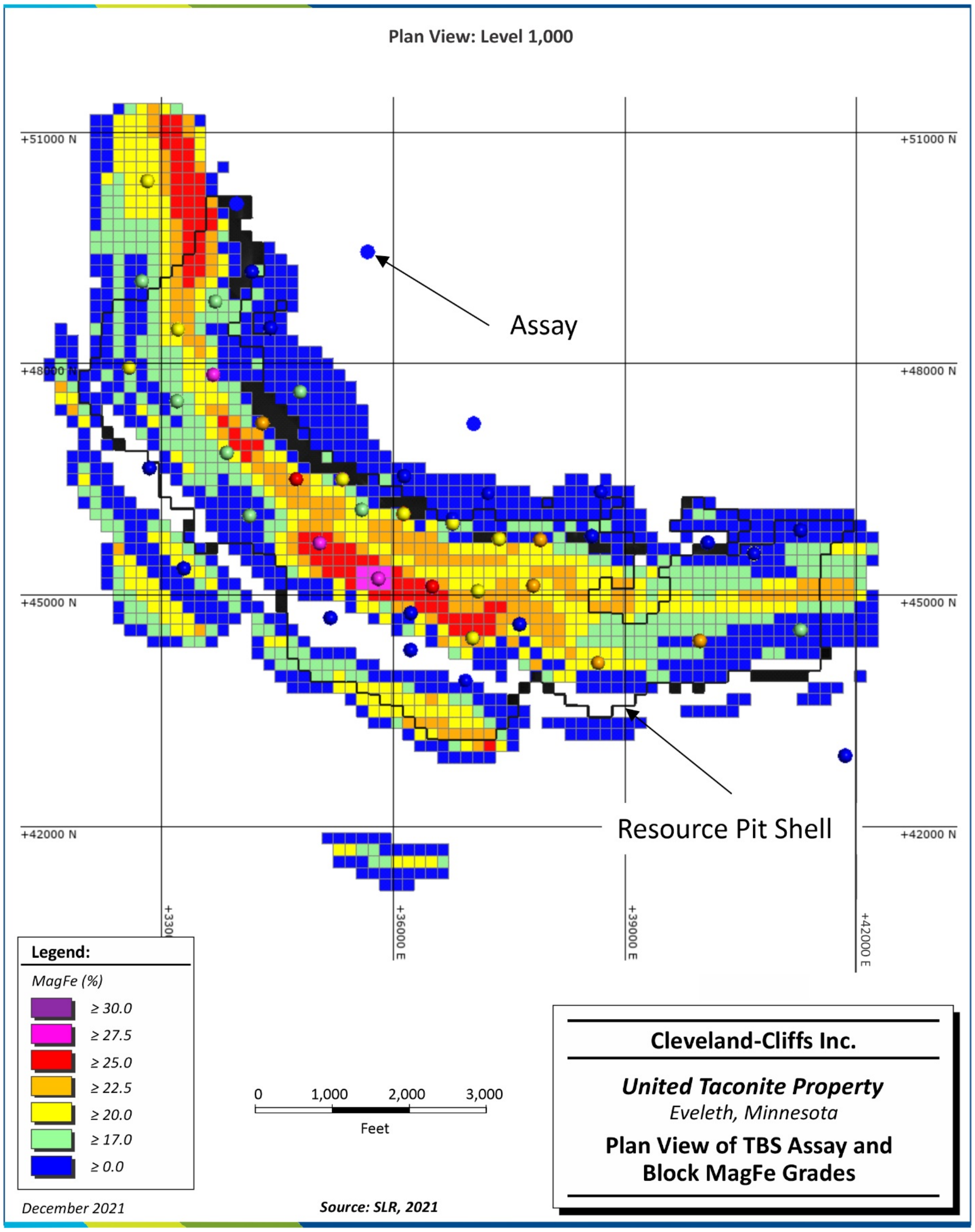
Figure 11-6: Plan View of TBN Assay and Block MagFe Grades



December 2021

Source: SLR, 2021

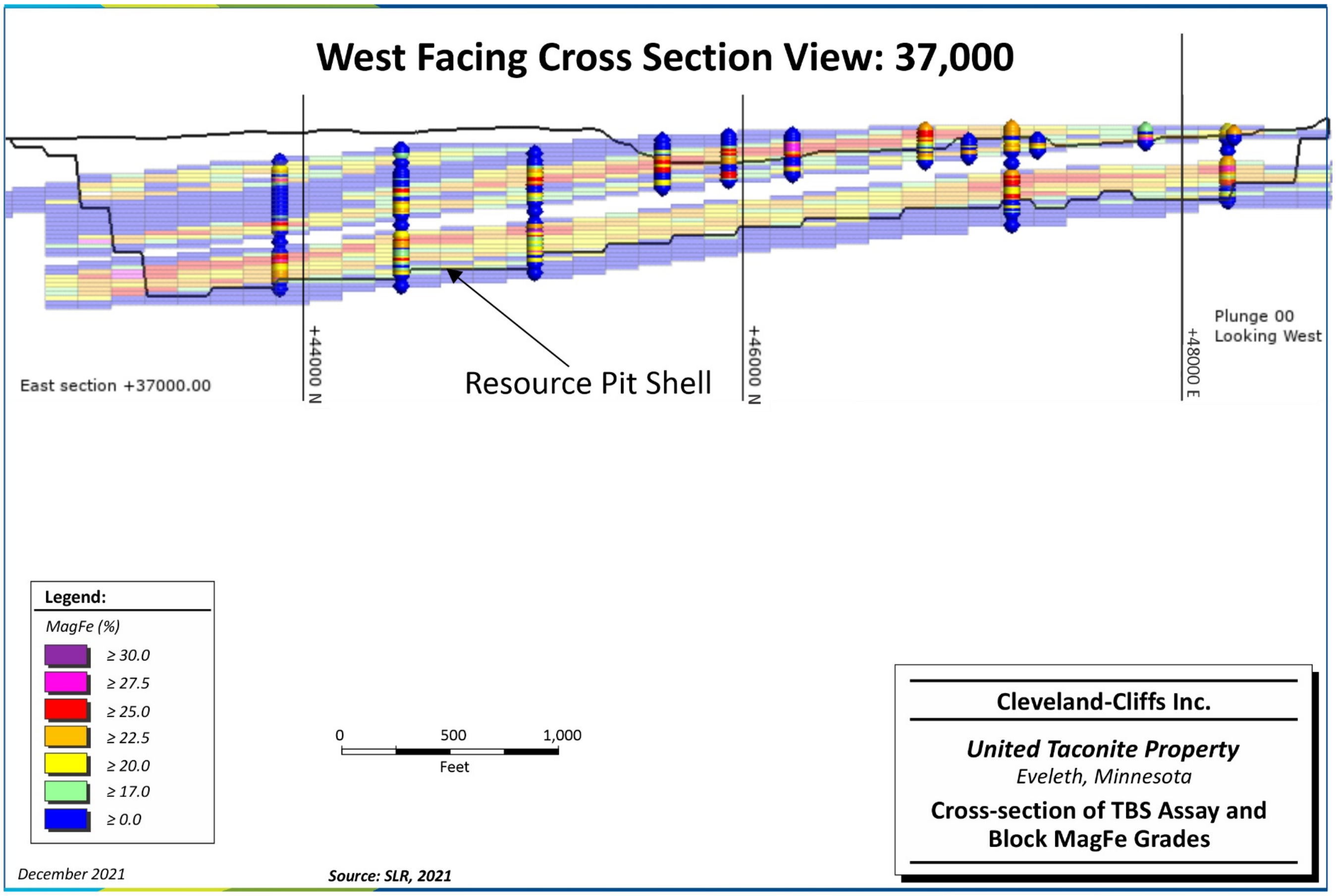
Figure 11-7: Cross-section of TBN Assay and Block MagFe Grades



December 2021

Source: SLR, 2021

Figure 11-8: Plan View of TBS Assay and Block MagFe Grades



Source: SLR, 2021

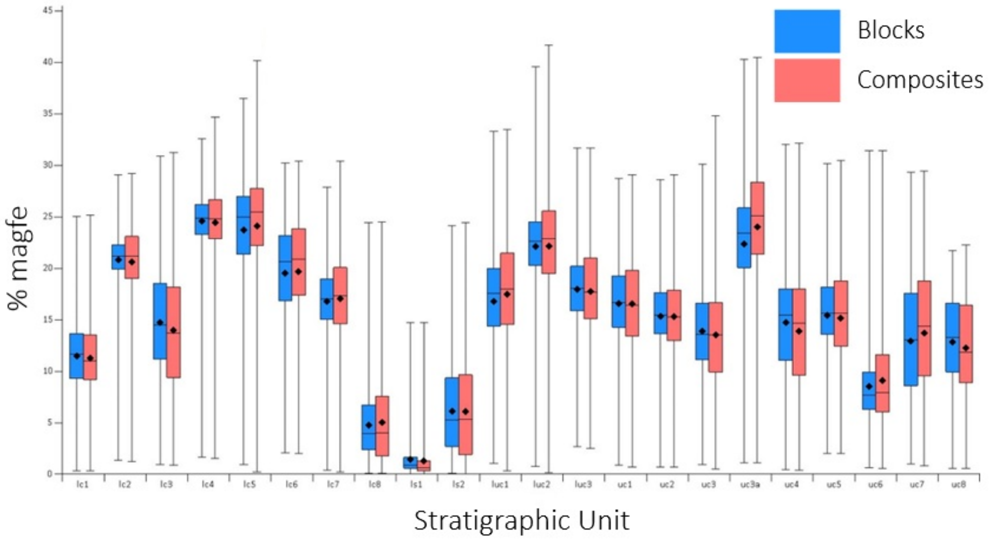
Figure 11-9: Cross-section of TBS Assay and Block MagFe Grades

Table 11-10: TBN Comparative Statistics of Composites and Blocks for Key Economic Variables
Cleveland-Cliffs Inc. – United Taconite Property

Variable	Data	Count	Min (%)	Max (%)	Mean (%)	% Variance
MagFe	Block Model	1,006,367	0.033	40.33	14.6	-14.9%
MagFe	Composites	20,507	0.02	41.69	17.15	
grind	Block Model	2,082,576	17.19	171.7	103.8	8.9%
grind	Composites	4,562	12	267.6	95.3	
confe	Block Model	1,039,071	31.31	72.32	65.15	-1.0%
confe	Composites	19,892	30.83	77.66	65.81	

Source: Ronald (2019)

The mean grades in composites and blocks compare favorably for the KEV evaluated in the LS and UC unitsHigher-percent-variance block grade means in the LUC and LC subunits, which led to an overall -15% difference, is observed due to the average of a larger number of low-grade blocks versus the composites (clustering). This variance is not observed in comparing the ID^2 estimate with a NN estimate. Overall, the statistical evaluation provides acceptable validation of the model results.



Adapted from Ronald (2019)

Figure 11-10: Whisker Plots for MagFe Composites and Blocks in All TBN Subunits

11.11 Model Reconciliation

Reconciliation results, comparing actual production results versus model-predicted values of crude ore, pellet production, and wtrec or process recovery for both 2019 and 2020 are presented in Table 11-11. Model values were determined by reporting tons and grade from solids of the actual mined areas for each year. The models used were the budget mine planning block models, which were modified from the geologic model to account for crude ore loss and dilution.

Table 11-11: 2019 to 2020 Model Reconciliation
Cleveland-Cliffs Inc. – United Taconite Property

Year	Variable	Model	Actual	Variance
2019	Crude Ore (MLT)	15.4	15.1	-2.0%
	Pellets Dry (MLT)	5.2	5.0	-4.0%
	Weight Recovery	34.6%	33.6%	-3.0%
2020	Crude Ore (MLT)	14.6	15.7	7.0%
	Pellets Dry (MLT)	4.8	4.9	2.0%
	Weight Recovery	34.0%	33.5%	-1.5%

The QP offers the following conclusions with respect to the UTAC Mineral Resource estimates:

- The block model's KEV for TBN and TBS compare well with the source data in most areas, with zones of possible conservative estimation in the LUC and LC stratigraphic zones.
- The methodology used to prepare the block model is appropriate and consistent with industry standards.
- Validations compiled by Ronald (2019) and the QP indicate that the block model is reflecting the underlying support data appropriately.
- The classification at UTAC is generally acceptable; however, the extension of classified material beyond drilling limits is slightly aggressive, and some post-processing to remove isolated blocks of different classification is warranted. Classified blocks which extend beyond the drilling limits are generally outside the Resource Pit Shell.
- Some uncertainty is present in the TBS model, where mining has not occurred since 1991, and most supporting drill hole data is historical or uses an older analytical technique than is currently in place at site. To address this, Cliffs has limited all Mineral Resources at TBS to Indicated and Inferred.
- The block model represents an acceptable degree of smoothing at the block scale for prediction of quality variables at TBS.Visually, blocks and composites in cross-section and plan view compare well.
- In both 2019 and 2020, actual versus model-predicted values of crude ore, pellet production, and wtrec or process recovery were accurate to between 1.5% to 7.0%, depending on the year and variable.

The QP offers the following recommendations with respect to the UTAC Mineral Resource estimates:

1. Apply the interpolation methodology developed for TBN to TBS in future updates.

2. Transition the process of classifying blocks in future updates to consider local drill hole spacing over a distance-to-drill-hole criterion.
3. Prepare model reconciliation over quarterly periods and document methodology, results, and conclusions and recommendations.

11.12 Mineral Resource Statement

Mineral Resource estimates for the Thunderbird deposits were prepared by Cliffs and audited and accepted by SLR using available data from 1952 to 2018.

The limit of Mineral Resources was optimized using pit shells that considered actual mining costs incurred in 2018 and a US$90/LT pellet value.In addition to SLR's review, Cliffs' technical site and corporate teams, and external consultants SRK (Ronald, 2019) have reviewed the input data, interpolation design and execution, as well as the resultant Thunderbird deposit block model's KEV.

The UTAC Mineral Resource estimate as of December 31, 2021 is presented in Table 11-12.

Table 11-12: Summary of UTAC Mineral Resources – December 31, 2021
Cleveland-Cliffs Inc. – United Taconite Property

Class	Resources (MLT)	Grade (% MagFe)	Process Recovery (%)	Pellets (MLT wet)
		TBN		
Measured	91.8	23.6	35.4	32.5
Indicated	87.2	23.0	35.1	30.6
Total M + I	**179.0**	**23.3**	**35.3**	**63.1**
Inferred	1.3	20.9	32.6	0.4
		TBS		
Measured	-	-	-	-
Indicated	551.4	22.0	30.6	168.7
Total M + I	**551.4**	**22.0**	**30.6**	**168.7**
Inferred	24.6	21.6	31.0	7.6
		Combined TBN + TBS		
Measured	91.8	23.6	35.4	32.5
Indicated	638.6	22.2	31.2	199.2
Total M + I	**730.4**	**22.3**	**31.7**	**231.8**
Inferred	25.9	21.5	31.1	8.0

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 pounds.
2. Tonnage is reported exclusive of Mineral Reserves and has been rounded to the nearest 100,000.
3. Mineral Resources are estimated at a cut-off grade of 17% MagFe.
4. Mineral Resources are estimated using a pellet value of US$90/LT.
5. Pellets are reported as wet standard/flux mix; shipped pellets contain 2% moisture.
6. Tonnage estimate based on actual depletion on December 31, 2021 from a surveyed topography on May 11, 2019.
7. Resources are crude ore tons as delivered to the primary crusher, pellets are as loaded onto lake freighters in Duluth.
8. Classification of Mineral Resources is in accordance with the S-K 1300 classification system.

9. Bulk density is assigned based on average readings for each lithology type.
10. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
11. Numbers may not add due to rounding.

A portion of the UTAC Mineral Resource is located in proximity to towns, roads, and other infrastructure, which may impact utilization.A 500 ft boundary to nearby residential and community buildings restricts the defined Mineral Resources.

The SLR QP is of the opinion that with consideration of the recommendations summarized in Sections 1.0 and 23.0 of this TRS, any issues relating to all relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work.

11.12.1 Mineral Resource Sensitivity

Mineral Resource sensitivity is represented using grade tonnage curves in Figure 11-11 (TBN) and Figure 11-12 (TBS) and have been prepared considering inclusive Mineral Resources.

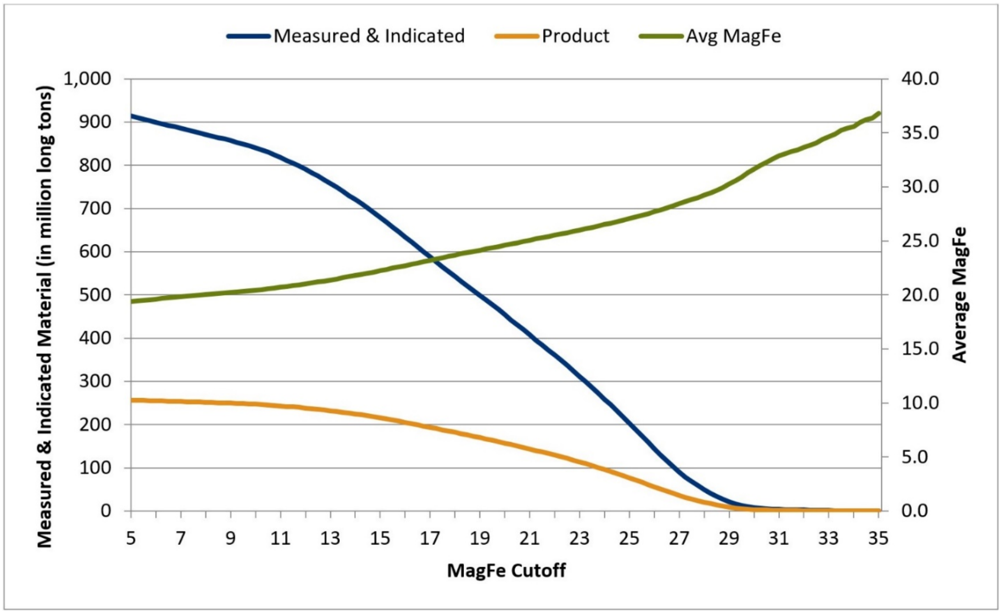


Figure 11-11: TBN Grade Tonnage Curve (Measured and Indicated)

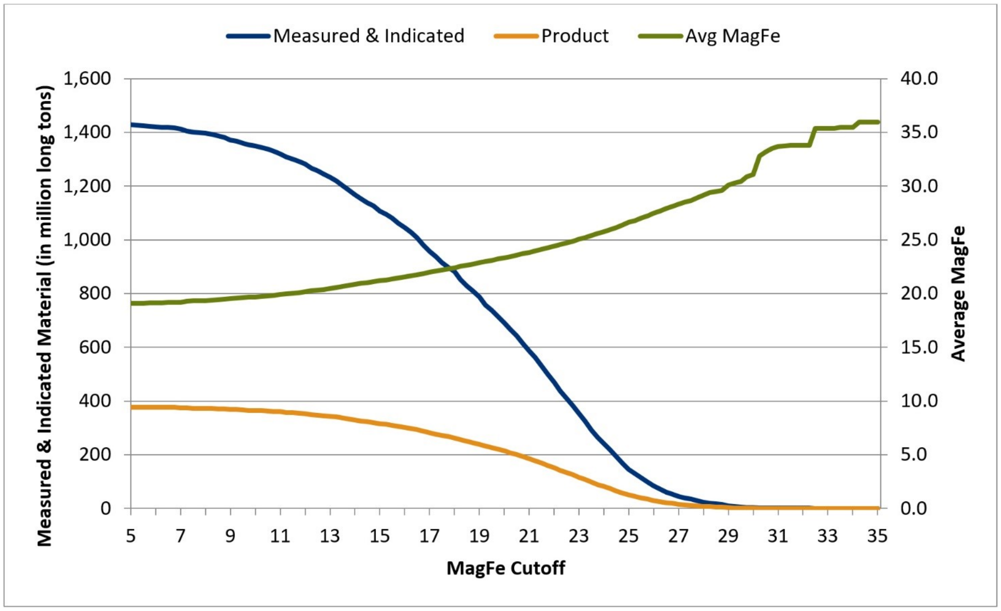


Figure 11-12: TBS Grade Tonnage Curve (Indicated)

12.0 MINERAL RESERVE ESTIMATES

Mineral Reserves in this TRS are derived from the current Mineral Resources. The Mineral Reserves are reported as crude ore and are based on open pit mining from the Thunderbird Mine. Crude ore is the unconcentrated ore as it leaves the Thunderbird Mine at its natural *in situ* moisture content. The UTAC Proven and Probable Mineral Reserves are estimated as of December 31, 2021, and summarized in Table 12-1.

Table 12-1: Summary of UTAC Mineral Reserves - December 31, 2021
Cleveland-Cliffs Inc. – United Taconite Property

Category	Crude Ore Mineral Reserves (MLT)	Crude Ore (% MagFe)	Process Recovery (%)	Wet Pellets (MLT)
		TBN		
Proven	143.1	23.1	34.7	49.6
Probable	225.6	23.3	34.9	78.8
Proven & Probable	368.7	23.2	34.8	121.2
		TBS		
Proven	-	-	-	-
Probable	405.9	22.0	31.8	129.3
Proven & Probable	405.9	22.0	31.8	129.3
		TBN + TBS		
Proven	**143.1**	**23.1**	**34.7**	**49.6**
Probable	**631.5**	**22.1**	**32.9**	**208.0**
Proven & Probable	**774.6**	**22.3**	**33.3**	**257.6**

Notes:

1. Tonnage is reported in long tons equivalent to 2,240 lb and has been rounded to the nearest 100,000.
2. Mineral Reserves are reported at a $90/LT wet standard pellet price freight-on-board (FOB) Lake Superior, based on the three-year trailing average of the realized product revenue rate.
3. Mineral Reserves are estimated at a cut-off grade of 17% MagFe and restricted to material with less than 10% concentrate silica.
4. Mineral Reserves include mining dilution of 16% and mining extraction losses of 14%.
5. The Mineral Reserve mining strip ratio (waste units to crude ore units) is at 1.1.
6. Mineral Reserves are Probable if not scheduled within the first 20 years.
7. Pellets are reported as wet standard/flux mix; shipped pellets contain approximately 2.0% moisture.
8. Tonnage estimate based on actual depletion as of December 31, 2021 from a surveyed topography on May 11, 2019.
9. Mineral Reserve tons are as delivered to the primary crusher; pellets are as loaded onto lake freighters in Duluth, Minnesota.
10. Classification of the Mineral Reserves is in accordance with the S-K 1300 classification system.
11. Mineral Reserves are 100% attributable to Cliffs.
12. Numbers may not add due to rounding.

The pellet price used to perform the evaluation of the Mineral Reserves was based on the current mining model's three-year (2016 to 2019) trailing average of the realized product revenue rate of US$90.42/LT wet standard pellet. The costs used in this study represent all mining, processing, transportation, and administrative costs including the loading of pellets into lake freighters in Duluth, Minnesota.

SLR is not aware of any risk factors associated with, or changes to, any aspects of the modifying factors such as mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

12.1 Conversion Assumptions, Optimization Parameters, and Methods

Using the mine planning block model for TBN and TBS, pit optimizations and pit designs are conducted to convert the Mineral Resources to Mineral Reserves.

New mine planning block models were constructed for TBN and TBS in July 2019 and form the basis for the current Mineral Reserve estimateThe mine planning block models are based on the Mineral Resource block models. TBN is based on the July 17, 2019 geologic model (geo_07172019B_all_blocks.bmf), while the TBS geologic model has remained unchanged since 2016 (tbs_2016.bmf, dated May 9, 2016).

Scripts within Vulcan are executed that add variables for economic evaluation and mine planning, flag in-pit stockpile backfills, flag the current topography, re-block the model to represent the selective mining unit (SMU), incorporate crude ore loss and dilution impacts, and reinforce cut-off grades. Scripts also assign restrictions to blocks outside of the lease areas, inside facilities areas, and inside geologic boundaries – assigning blocks as restricted or waste when appropriate. The resulting block models are evaluated using the pit optimization and Chronos scheduling packages in Vulcan.

Iron formation can only be initially considered as “candidate” crude ore if the stratigraphy is one of the following geologic subunits (as detailed in Section 6.0):

- UC - uc8, uc7, uc6, uc5, uc4, uc3a, uc3, uc2, uc1, luc3, luc2
- TLC - lc6, lc5
- BLC - lc4, lc3, lc2, or lc1

The geologic subunits luc1 and lc7 contain mineralization that meets the cut-off criteria as well; however, there is contamination due to the adjacent lower slaty subunit, and thus luc1 and lc7 are considered to be waste. All other geologic subunits are considered to be waste.

Candidate crude ore must then meet the following additional criteria to be considered crude ore blocks:

- Satisfy the metallurgical cut-off grades as described in section 11.8; in summary, candidate crude ore with MagFe lower than 17% or concentrate silica greater than or equal to 10% is considered to be waste.
- Be classified as a Measured or Indicated Mineral Resource (Inferred Mineral Resources are considered to be waste).
- Not occur within a mining-restricted area.
- Generate a net block value greater than the cost of the block as if it were mined as waste.

The analysis for the Mineral Reserve estimate includes both crude ore loss and mining dilution in the final reported tonnage and grades.

- Crude ore loss is material that meets all criteria for crude ore but is sent to the waste stockpile. Typically, thin layers of crude ore or individual blocks that are not separable with the current mining equipment are considered as unrecoverable and become crude ore loss. Percent crude ore loss is calculated by the amount of unrecoverable crude ore divided by the original crude ore content.

- Mining dilution is waste material that is mined and delivered as crude ore. Small areas of waste that cannot be separated from crude ore – and when the combined material still satisfies the cut-off criteria – become mining dilution. Percent mining dilution is defined as the diluted waste divided by the final scheduled and mined block of crude ore, which contains the diluted waste.

A reconciliation of the geologic block model to graded blast patterns from 2017 through 2018 blasted material demonstrated that UTAC has an average crude ore loss of 13% and an average mining dilution of 15%. To incorporate the crude ore loss and mining dilution assumptions into the Mineral Reserve estimate, the mine planning model used a SMU to re-block the model and better reflect mining selectivity. The mine planning model was re-blocked to 150 ft by 150 ft by 20 ft and 17.5 ft (i.e., half the bench height). The resultant mine planning model includes a crude ore loss of 14% and mining dilution of 16%.

UTAC has a long history of plant recovery, which is used as part of the pit optimization. The following summarizes the empirical relationship for pellet production based on crude ore tons and DT weight recovery:

Dry Standard Concentrate tons = crude ore tons x (DT Weight Recovery - 1.35)

Wet Standard Concentrate tons = (Dry Standard Concentrate Tons) / (1 - Concentrate Moisture)

Wet Standard Pellet tons = Wet Standard Concentrate tons / 1.09

Where:

- Concentrate moisture = 8.75
- Pellet Moisture = 2.0%
- Historical wet standard concentrate to dry standard pellet ratio is 1.09.

From 2010 through 2018, the equation has reconciled within 2% of the production years when comparing calculated dry standard concentrate production to actual dry standard concentrate production. Figure 12-1 shows the variance of calculated versus actual concentrate.

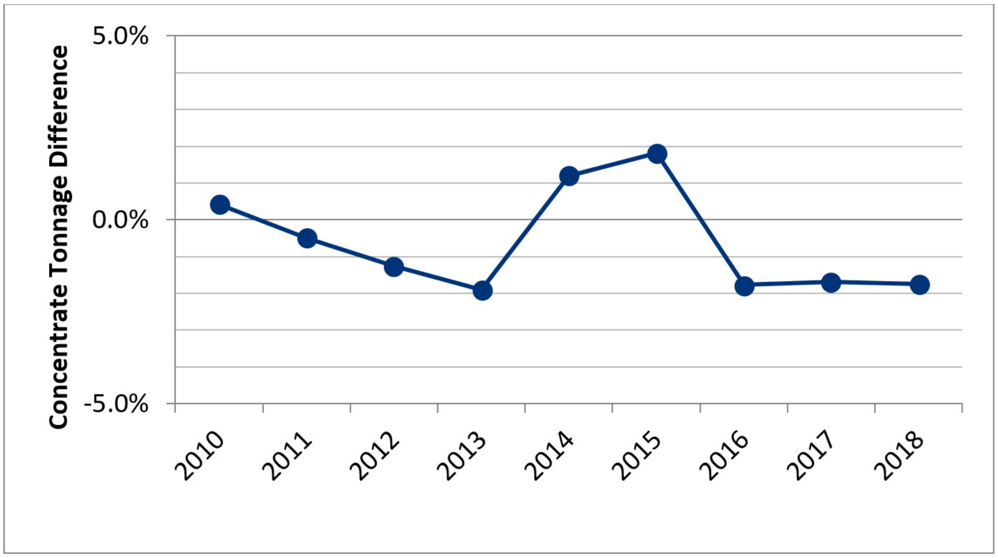


Figure 12-1: Concentrate Recovery

All Measured and Indicated Mineral Resources within the final designed pit that meet the above criteria are converted into Mineral Reserves.The only additional criteria for Measured Mineral Resources converting into Proven Mineral Reserves is that they must be scheduled within the first 20 years of the mine life prior to depletion. Table 12-2 shows the criteria to convert Mineral Resource classifications to Mineral Reserve classifications.

Table 12-2: Mineral Resource to Mineral Reserve Classification Criteria
Cleveland-Cliffs Inc. – United Taconite Property

Mineral Resources	Criteria for Conversion	Mineral Reserves
Measured	Scheduled Within the First 20 Years	Proven
Measured	Scheduled After 20 Years	Probable
Indicated	As Scheduled	Probable
Inferred	As Scheduled	Waste

12.2 Previous Mineral Reserve Estimates by Cliffs

Cliffs has periodically updated the UTAC Mineral Reserve estimates since its acquisition of the Property in 2003.The SEC-reported Mineral Reserves for the past five updates are shown in Table 12-3. Prior to 2019, these Mineral Reserves were not prepared under the recently adopted SEC guidelines; however, they followed SEC Guide 7 requirements for public reporting of Mineral Reserves in the United States.

The most recent prior update to the LOM plan and Mineral Reserves was in 2019; the Mineral Reserves in Cliffs' 10-K filings have been updated net of depletion since.

Table 12-3: Previous Cliffs UTAC Mineral Reserve Estimates
Cleveland-Cliffs Inc. – United Taconite Property

	Proven & Probable Crude Ore (MLT)	Process Recovery (%)	Dry Standard Equivalent Pellets (MLT)
2020[1]	789.1	31.4	248.2
2019[1]	805.0	31.8	253.3
2019[2]	814.8	31.5	256.5
2016[3]	847.9	31.9	270.8
2013[4]	504.1	33.6	169.2
2010[5]	425.6	32.6	138.8
2008[6]	486.0	30.6	148.9
2005[7]	420.7	30.9	130.0

Notes:

1. As of December 31 of respective year; updated via depletion
2. As of May 11, 2019; Source: Cliffs UTAC 2019 MRR TR
3. As of January 1, 2016; Source: Cliffs_MMMR_TR_UTAC 2016 FINAL
4. As of January 10, 2013; Source: Cliffs 2013 Reserve Base Analysis
5. As of July 1, 2010; Source: Cliffs 2010 Reserve Base Analysis
6. As of January 1, 2008; Source: Cliffs 2008 Reserve Base Analysis
7. As of January 1, 2005; Source: Cliffs 2005 Reserve Base Analysis

In 2016, the TBS pit was added to the reportable Mineral Reserves for the first time, resulting in a significant increase from the previously reported reserves.

The change in Mineral Reserves from 2016 to date is primarily attributable to mining depletion.

12.3 Pit Optimization

Pit optimizations were carried out on both the TBN and TBS pit areas in Vulcan using the current mine planning block modelInputs used for the optimization use a cost structure based on 2018 actual production and the 2019 five-year plan.

12.3.1 Summary of Pit Optimization Parameters

The pit optimization parameters are summarized as follows:

- Dry standard concentrate tons = crude ore tons x (DT weight recovery - 1.35).
- Product moisture = 2.0%.
- Base case product average price = $90/LT standard pellets (based on the mine planning model's three-year trailing average of the realized product revenue rate of US$90.42/LT wet standard pellet).
- *In situ* waste mining cost = $1.69/LT mined.
- Unconsolidated waste mining cost = $1.41/LT mined.
- Crude ore mining cost (includes primary crushing and transportation to the mill) = $3.72/LT crude ore.

- Fine crushing and concentrating cost = $7.50/LT crude ore.
- Pelletizing and general cost = $30.64/LT dry pellet.
- Replacement capital cost = $4.75/LT dry pellet.
- Product mix (percent fluxed) at 39% (2018 actual).
- Maximum overall pit slope angle = 49° for *in situ* rock and 18° for surface overburden.

In addition, the TBN pit limits are constrained by the local community, thus opportunity to expand the pit with higher pellet values is limited. The TBS is currently limited by the extent of down-dip exploration.

The TBN and TBS pits are physically unconnected with each other and are optimized independently from one another.

12.3.2 Pit Optimization Results and Analysis

Pit optimization results are used as a guide for pit and stockpile designs. Pit optimizations were run by varying the base case product price with a block revenue factor. The risk profile and revenue-generating potential of the deposits is evaluated by looking at the relationship between crude ore and waste rock and the associated relative discounted cash flows (DCF) generated at each incremental pit (a discount rate of 10% utilized for the optimization analysis).

The results from the TBN optimization are summarized in Table 12-4, listing the pit shell results from a price range of $66.60/LT to $93.60/LT of standard pellets, with pit shell 24 highlighted to indicate the selected pit shell to be used as a guide for final pit design. A pit-by-pit graph showing tonnages and relative DCFs is provided in Figure 12-2.

The results from the TBS optimization are summarized in Table 12-5, listing the pit shell results from a price range of $70.20/LT to $97.20/LT of standard pellets, with pit shell 21 highlighted to indicate the selected pit shell to be used as a guide for final pit design. A pit-by-pit graph showing tonnages and relative DCF is provided in Figure 12-3.

Table 12-4: TBN Pit Optimization Results
Cleveland-Cliffs Inc. – United Taconite Property

Pit Shell	Revenue Factor	Product Price ($/WLT pellets)	Crude Ore (MLT)	Stripping (MLT)	Total Tons (MLT)	Strip Ratio	Process Recovery (%)	Dry Pellets (MLT)
10	0.74	66.60	19	6	25	0.3	37.1	7
11	0.75	67.50	30	10	40	0.3	36.6	11
12	0.76	68.40	41	16	56	0.4	36.2	15
13	0.77	69.30	51	22	73	0.4	35.8	18
14	0.78	70.20	69	33	102	0.5	35.3	24
15	0.79	71.10	91	50	141	0.5	34.9	32
16	0.80	72.00	154	107	260	0.7	34.4	53
17	0.81	72.90	186	144	331	0.8	34.3	64

Pit Shell	Revenue Factor	Product Price ($/WLT pellets)	Crude Ore (MLT)	Stripping (MLT)	Total Tons (MLT)	Strip Ratio	Process Recovery (%)	Dry Pellets (MLT)
18	0.82	73.80	224	192	416	0.9	34.1	76
19	0.83	74.70	267	257	524	1.0	33.9	91
20	0.84	75.60	345	399	744	1.2	33.8	117
21	**0.85**	**76.50**	**391**	**470**	**861**	**1.2**	**33.5**	**131**
22	0.86	77.40	426	522	948	1.2	33.3	142
23	0.87	78.30	445	548	993	1.2	33.2	148
24	0.88	79.20	460	568	1,028	1.2	33.1	152
25	0.89	80.10	474	592	1,065	1.2	33.0	156
26	0.90	81.00	489	620	1,108	1.3	32.9	161
27	0.91	81.90	493	627	1,120	1.3	32.8	162
28	0.92	82.80	505	650	1,154	1.3	32.7	165
29	0.93	83.70	508	656	1,164	1.3	32.7	166
30	0.94	84.60	510	659	1,169	1.3	32.7	167
31	0.95	85.50	515	666	1,181	1.3	32.6	168
32	0.96	86.40	516	669	1,185	1.3	32.6	168
33	0.97	87.30	521	679	1,200	1.3	32.5	169
34	0.98	88.20	521	682	1,204	1.3	32.5	170
35	0.99	89.10	522	683	1,204	1.3	32.5	170
36	1.00	90.00	522	684	1,207	1.3	32.5	170
37	1.01	90.90	531	714	1,244	1.3	32.5	172
38	1.02	91.80	531	715	1,246	1.3	32.5	172
39	1.03	92.70	531	715	1,246	1.3	32.5	172
40	1.04	93.60	532	719	1,250	1.4	32.5	173

Note. Numbers may not add due to rounding.

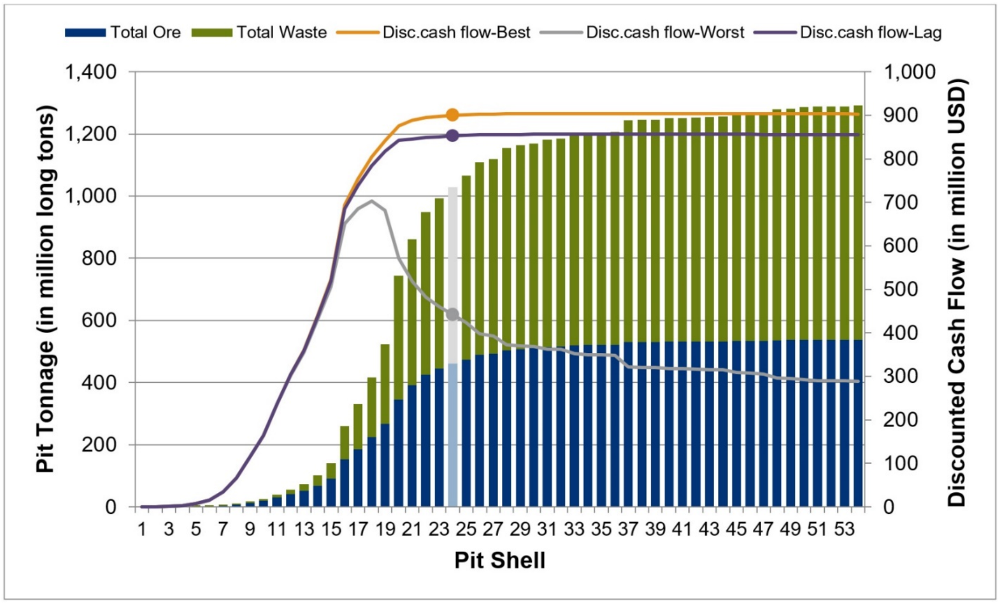


Figure 12-2: TBN Pit Optimization Pit-by-Pit Graph

Table 12-5: TBS Pit Optimization Results
Cleveland-Cliffs Inc. – United Taconite Property

Pit Shell	Revenue Factor	Product Price ($/WLT pellets)	Crude Ore (MLT)	Stripping (MLT)	Total Tons (MLT)	Strip Ratio	Process Recovery (%)	Dry Pellets (MLT)
10	0.78	70.20	27	10	38	0.4	33.7	9
11	0.79	71.10	43	22	65	0.5	33.5	14
12	0.80	72.00	63	34	97	0.5	33.1	21
13	0.81	72.90	88	52	140	0.6	32.7	29
14	0.82	73.80	126	85	211	0.7	32.3	41
15	0.83	74.70	198	150	348	0.8	31.7	63
16	0.84	75.60	297	239	536	0.8	31.2	93
17	0.85	76.50	368	305	673	0.8	30.9	114
18	0.86	77.40	443	380	824	0.9	30.6	136
19	0.87	78.30	525	480	1,005	0.9	30.4	160
20	0.88	79.20	593	566	1,158	1.0	30.2	179
21	0.89	80.10	657	650	1,307	1.0	30.0	197
22	0.90	81.00	709	715	1,424	1.0	29.9	212

Pit Shell	Revenue Factor	Product Price ($/WLT pellets)	Crude Ore (MLT)	Stripping (MLT)	Total Tons (MLT)	Strip Ratio	Process Recovery (%)	Dry Pellets (MLT)
23	0.91	81.90	755	781	1,536	1.0	29.7	224
24	0.92	82.80	770	804	1,574	1.0	29.7	229
25	0.93	83.70	796	849	1,645	1.1	29.6	236
26	0.94	84.60	820	902	1,722	1.1	29.6	243
27	0.95	85.50	836	930	1,766	1.1	29.5	247
28	0.96	86.40	847	951	1,799	1.1	29.5	250
29	0.97	87.30	862	976	1,838	1.1	29.4	254
30	0.98	88.20	874	1,002	1,876	1.1	29.4	257
31	0.99	89.10	878	1,011	1,889	1.2	29.4	258
32	1.00	90.00	883	1,020	1,903	1.2	29.3	259
33	1.01	90.90	890	1,040	1,929	1.2	29.3	261
34	1.02	91.80	893	1,048	1,941	1.2	29.3	262
35	1.03	92.70	895	1,052	1,946	1.2	29.3	262
36	1.04	93.60	897	1,057	1,954	1.2	29.3	263
37	1.05	94.50	899	1,062	1,961	1.2	29.3	263
38	1.06	95.40	900	1,065	1,965	1.2	29.3	263
39	1.07	96.30	902	1,071	1,973	1.2	29.3	264
40	1.08	97.20	904	1,077	1,981	1.2	29.3	264

Note. Numbers may not add due to rounding.

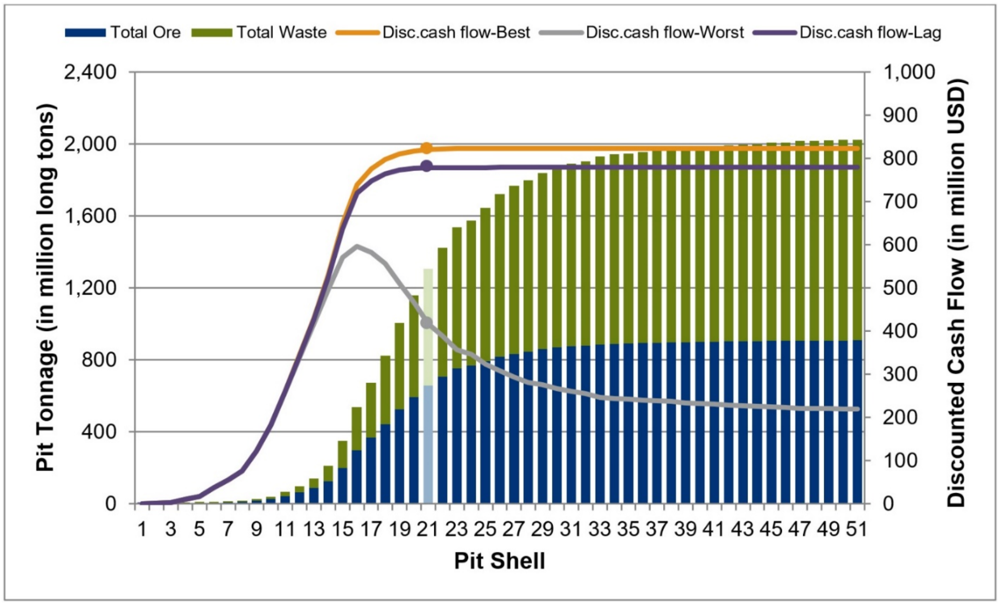


Figure 12-3: TBS Pit Optimization Pit-by-Pit Graph

12.4 Mineral Reserve Cut-off Grade

The Mineral Reserves cut-off grade is governed by metallurgical constraints applied in order to produce a saleable product followed by verification through a break-even cut-off grade calculation. The Mineral Reserves are reported at a 17% MagFe cut-off grade, which is the same as the Mineral Resource cut-off grade described in section 11.8 for a minimum magnetic iron content. In addition to MagFe, an upper limit on concentrate silica of less than or equal to 10% is applied. The silica cut-off grade is applied to ensure the Mineral Reserve can be blended to deliver pellets according to customer specifications.

12.5 Mine Design

The TBN and TBS final pit designs incorporate several design variables including geotechnical parameters (e.g., wall angles and bench configurations), equipment size requirements (e.g., mining height and ramp configuration), and physical mining limits (e.g., property boundaries and existing infrastructure). The following summarizes the design variables and final pit results; more detail is provided in the preceding subsections and in Section 13.0.

The final highwall pit slope is designed at an inter-ramp angle (IRA) of 49° for *in situ* rock and 18° for surface overburden. The bench design for rock consists of 40 ft-high mining benches with a 70° bench face angle (BFA) and alternating 10 ft and 30 ft catch benches (CB). There are no ramps designed into the final highwall, as the footwall slope is less than 8% for the majority of the mining areas and can support the development of haulage ramps.

There are multiple physical mining limits that are applied to the pit optimization and/or the mine plan:

- The crude ore Mineral Reserve boundary resides within controlled mineral lease areas and also within the existing permit to mine.
- Mining limits were restricted to a distance of no closer than 500 ft from the primary crushing structure.
- Mining limits are set at 500 ft from the closest buildings in the local communities.
- Restrictions to mining limits where additional subsurface investigation and study is planned.

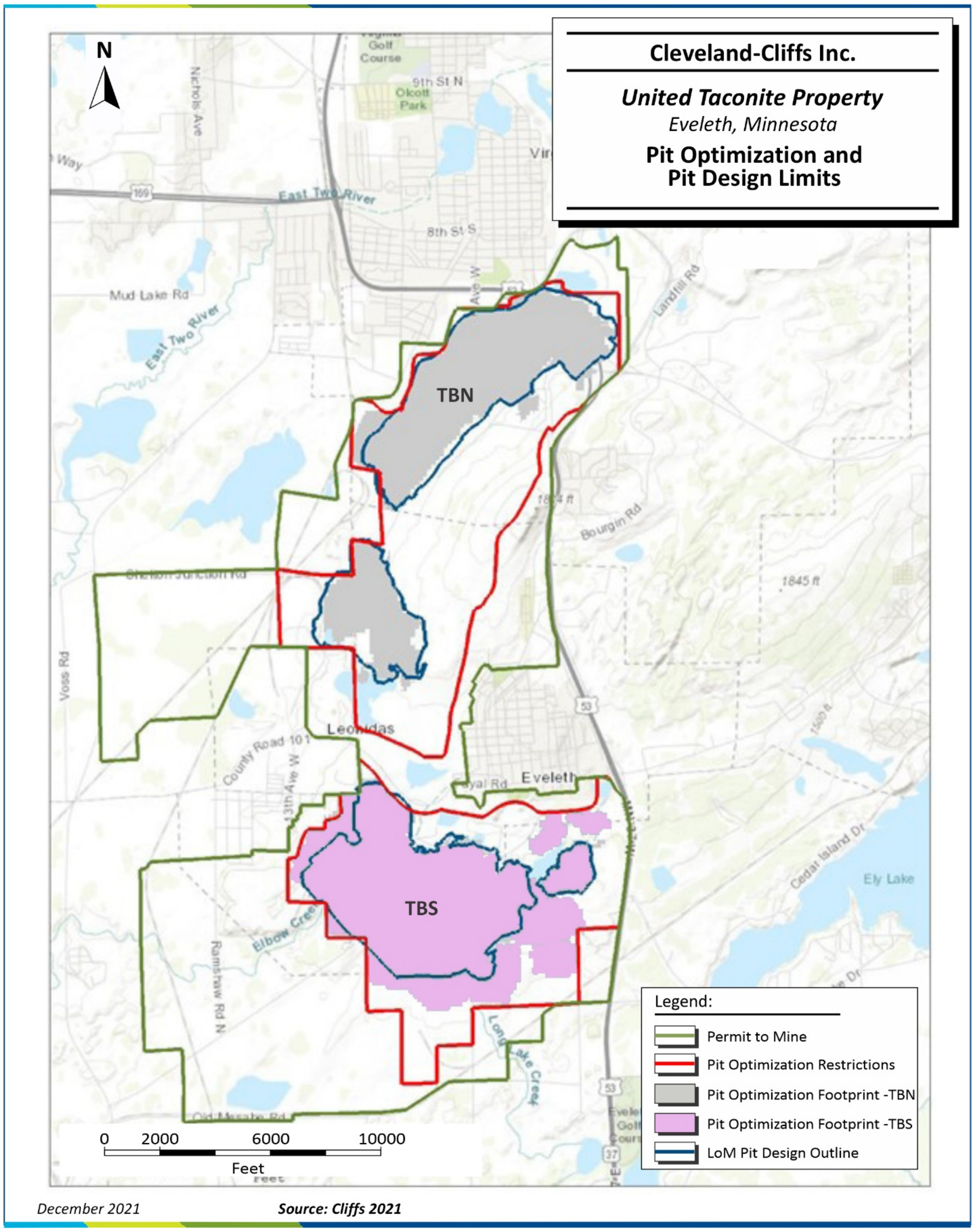
The selected final pit shells compared to the final pit designs are detailed in Table 12-6 and shown in Figure 12-4. Pit design results are reported prior to depletion, to be consistent with the pit optimization results.

Table 12-6: Pit Optimization to Pit Design Comparison
Cleveland-Cliffs Inc. – United Taconite Property

	Crude Ore (MLT)	Grade (% MagFe)	Stripping (MLT)	Total Material (MLT)	Stripping Ratio
TBN					
Pit Shell 24	460	23.4	568	1,028	1.2
Pit Design	409	23.2	522	931	1.3
TBS					
Pit Shell 21	657	22.0	650	1,307	1.0
Pit Design	406	22.0	396	802	1.0

Note:

1. Comparison totals are per the mine planning model prior to depletion.
2. Numbers may not add due to rounding.



December 2021

Source: Cliffs 2021

Figure 12-4: Pit Optimization and Pit Design Limits

In general, the final pit designs are a reasonable representation of the final pit shell guides, with the exception of certain areas due to physical mining limits applied during the mine design work (i.e., where the restrictions were not applied during the optimization). In particular, at the TBS, along strike to the northwest and southeast, the final pit design is limited relative to the pit shell guide. In these areas, Cliffs plans to complete additional subsurface investigation and study prior to a decision to include in the Mineral Reserves.

13.0 MINING METHODS

13.1 Mining Methods Overview

The TBN and TBS are mined using conventional surface mining methods. The surface operations include:

- Overburden (glacial till) removal.
- Drilling and blasting (excluding overburden).
- Loading and haulage.
- Crushing and rail loading.

The Mineral Reserve is based on the ongoing annual average crude ore production of approximately 15.4 MLT/y from TBN and TBS, producing an average of 5.1 MLT/y of wet pellets for domestic consumption. Pellet production is based on producing approximately 3.1 MLT/y of wet standard pellets and 2.0 MLT/y of high-flux pellets (branded as Mustang pellets). Market conditions and annual pellet nominations can change the flux/standard product mix, which will change the overall production in any given year.

Mining and processing operations are scheduled 24 hours per day, and the mine production is scheduled to directly feed the processing operations.

The current LOM plan has mining for 51 years and mines the known Mineral Reserve.The average strip ratio is 1.1 waste units to 1 crude ore unit (1.1 strip ratio).

The final TBN pit is approximately 4.1 mi long along strike, 0.9 mi wide, and up to 700 ft deep.Primary production includes drilling 12.25 in.-diameter rotary blast holes. Production blast hole depth varies as the pit is transitioning from 35 ft bench heights (BH) to 40 ft BH.Burden and spacing varies depending on the material being drilled. The holes are filled with explosive and blasted. Hydraulic shovels load the broken material into 240 ton payload mining trucks for transport from the pit.

The TBS pit is a currently inactive pit adjacent to the TBN pit.TBS operated for 17 years (from 1976 through 1991), producing 106 MLT of crude ore and 32.6 MLT of pellets. Eveleth Taconite, the previous operator prior to Cliffs acquiring the property, stopped mining in TBS to consolidate mining operations and reduce stripping lead times. The final pit design for TBS is approximately 2.0 mi long, 1.3 mi wide, and up to 640 ft deep.The LOM plan assumes reopening the TBS pit in 2030, which includes time for additional investigation work, dewatering, and re-establishing access for production traffic.

The Thunderbird Mine requires strict crude ore blending requirements to ensure that the Fairlane Facility receives a uniform head grade. The two most important characteristics of the crude ore are magnetic iron content and predicted concentrate silica. Generally, three to four mining areas are mined at one time to obtain the best crude ore blend for the Fairlane Facility. Crude ore is hauled to the crushing facility and either direct tipped to the primary crusher or stockpiled in an area adjacent to the primary crusher. Haul trucks are alternated to blend delivery from the multiple crude ore loading points. The crude ore stockpiles are used as an additional source for blending and production efficiency.

The major pieces of pit equipment include diesel hydraulic shovels, front end loaders (FELs), haul trucks, drills, bulldozers, and graders.Extensive maintenance facilities are available at the mine site to service the mine equipment.

13.2 Pit Geotechnical

13.2.1 Summary

Both the TBN and TBS pits are relatively shallow and, structurally, the *in situ* crude ore and rock are of good quality. A final wall study was conducted in 2012 by Barr Engineering Co. (Barr, 2012), and a geotechnical review of the pit and final wall assumptions was conducted in 2019 by SRK (SRK, 2019). Geotechnical and ramp parameters incorporated into the UTAC pit design are summarized in Table 13-1 and Figure 13-1. SLR is of the opinion that the design parameters are reasonable.

Table 13-1: Geotechnical Parameters
Cleveland-Cliffs Inc. – United Taconite Property

Parameter	Unit	Final Wall	Intermediate Walls		Unconsolidated Fill	Overburden
IRA	Degrees	49	38	35	32	18
BFA	Degrees	70	70	70	36	22
BH	ft	40	40	35	40	40
CB - Primary	ft	30	50	50	10	20
CB - Secondary	ft	10	25	25	10	20
Ramp Width - 2 way	ft	150	150	150	150	150
Ramp Width - 1 way	ft	90	90	90	90	90
Ramp Gradient (Shortest)	%	8	8	8	8	8

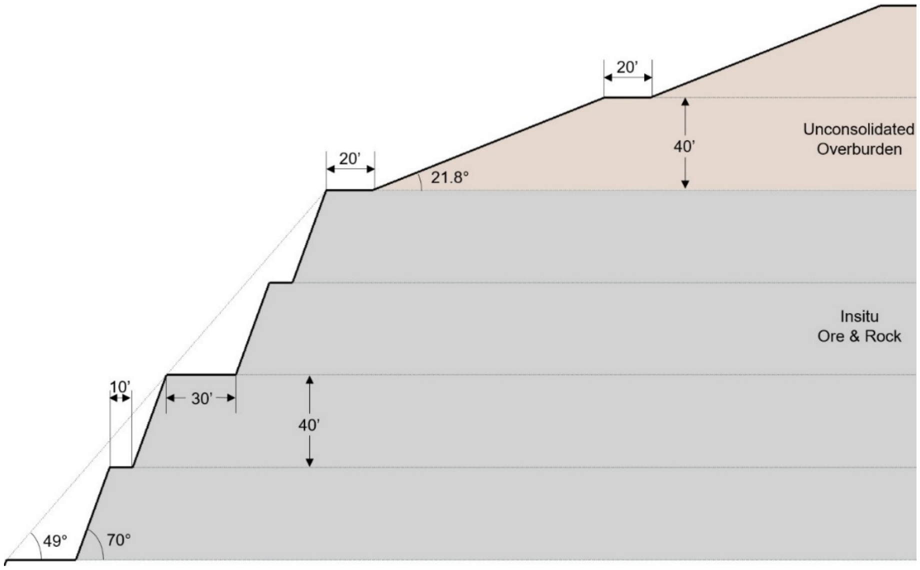


Figure 13-1: Example of Final Pit Wall Geometry

The maximum pit depth and vertical highwall exposure for TBN and TBS is at approximately 700 ft and 640 ft respectively.The final wall slopes are effectively the IRA as there are no haul ramps in the final highwall. Haul ramps are incorporated into the pit design footwall and can safely support traffic of the 240 ton payload mining trucks.

13.2.2 Geotechnical Data

Available data for use in developing the geotechnical model includes core recovery and rock quality designation (RQD) data from the UTAC drill hole database, laboratory testing completed by Orica in July 2012 (Orica, 2012), and fracture orientation measurements (Barr, 2012). A summary of the data is presented in Table 13-2.

Table 13-2: Summary of Available Geotechnical Data
Cleveland-Cliffs Inc. – United Taconite Property

Data Type	Upper Cherty	Lower Cherty	Total
Core Recovery & RQD	-	-	37 drill holes
Ultrasonic Velocity (UV) Measurements	5	5	10
Brazilian Tensile Strength (BTS)	5	5	10
Uniaxial Compressive Strength (UCS)	5	5	10
Triaxial Compressive Strength (TCS)	16	19	35
Unconfined Cyclic Loading	5	5	10
Dynamic Tensile Strength	7	8	15
Fracture Orientation Measurements	-	-	53

The main purpose for laboratory testing was for a blasting study. Test work was focused on the ore-bearing Upper and Lower Cherty formations; the Lower Slaty floor rocks were not tested.

13.2.3 Material Strength Parameters

The most recent interpretation of material shear strength parameters was included in SRK (2019).The Rock Mass Rating (RMR) system, Bieniawski (1989), was used for rock mass characterization and estimation of the strength of the rock mass based on field observations. Rating values were assigned as ranges to provide upper and lower values of RMR as presented in Table 13-3.

Table 13-3: Rock Mass Characterization
Cleveland-Cliffs Inc. – United Taconite Property

	Low Value	High Value	RMR Rating Low	RMR Rating High
UCS, MPa	100	250+	12	15
RQD, %	53%	73%	9	13
Joint Spacing, m	0.1	0.25	9	11
Joint Condition	Continuous, planar, not highly weathered		19	26
Groundwater	Wet	Damp	7	11
TOTAL RMR89			55	75

Source: SRK, 2019

The Geological Strength Index (GSI) (Hoek et al., 1992) was used as an alternative method of rock mass classification, as it can be input directly into the Hoek-Brown shear strength criterion used for stability analysis. Ratings are based on fracture spacing and joint condition from estimates in the field. GSI ratings for UTAC were estimated between 53 to 78.

Hoek-Brown strength parameters were determined for the Slaty and Cherty rocks using lower bound UCS values, and lower GSI values (Table 13-4). Mohr-coulomb strength parameters were estimated for the overburden, dump/fill, and the floor rocks (Table 13-5). The Auburn fault that crosses the northeast of the pit has not been considered in geotechnical analysis, although the impact of this structure on the reserves is not expected to be a concern on account of the limited extent along the pit wall.

Table 13-4: Hoek-Brown Strength Parameters Used in Stability Analysis
Cleveland-Cliffs Inc. – United Taconite Property

Unit	Density (kg/m^3)	GSI	UCS (MPa)	mb	s	a
Slaty	2.70	45	60	1.403	0.002	0.508
Cherty	3.45	53	100	3.173	0.005	0.505

Table 13-5: Mohr-Coulomb Strength Parameters Used in Stability Analysis
Cleveland-Cliffs Inc. – United Taconite Property

Material	Density (kg/m^3)	Friction Angle (°)	Cohesion (MPa)
Overburden	2.34	30	0.20
Fill/Dump	2.60	32	0.05
Floor rock	2.60	35	1.50

13.2.4 Hydrogeology and Pit Water Management

Surface water is abundant as the Property is surrounded by natural lakes and wetlands. Water is known to be present within the rock mass; however, inflow of water from the pit walls has not been a significant problem to operations.

Hydrogeological modeling has not been undertaken for the purposes of slope stability analysis. Rather, an apparent worst-case scenario was assumed based on field observations, where the piezometric surface was modeled close to behind the slope face. SLR considers this to be appropriate considering a lack of an alternative model.

Historically, in-pit dewatering activities have averaged 1.7 billion gallons per year with a permitted maximum of 6.1 billion gallons per year.

The maximum in-pit dewatering discharge rate permitted under the current National Pollutant Discharge Elimination System (NPDES) is 13.0 million gallons per day and 5.8 million gallons per day at selected discharge outfalls.

As detailed in section 15.9, the project-wide water balance is relatively stable year over year.

The TBS historical pit is currently flooded.The mine planning includes the dewatering of the TBS historical workings in order to restart crude ore mining operations in 2030.

13.2.5 Stability Assessment

Kinematic analysis for bench geometry design was not included in SRK (2019), but was considered in the earlier Barr assessment of 2012.According to the analysis, the majority of the final pit walls are orientated favorably to the sub-horizontal bedding and sub-vertical jointing. Toppling and raveling of individual blocks was identified as the most common failure type, with blasting being a key consideration for maintaining a stable bench.

Overall slope stability for the ultimate pit was assessed by SRK, 2019, using the 2D limit-equilibrium software Slide Version 6 from Rocscience Inc.The Factor of Safety (FoS) for the slope was calculated using Spencer's method of slices. Groundwater was incorporated into the assessment as a piezometric line close to the slope face, based upon site observations of seepage.

The analysis was performed on one of the highest slopes in the west wall with a pit slope height of approximately 520 ft plus the addition of a 170 ft-high dump situated at the slope crest. The calculated FoS of 3.0 is in excess of the typical 1.30 acceptance criteria.

13.3 Open Pit Design

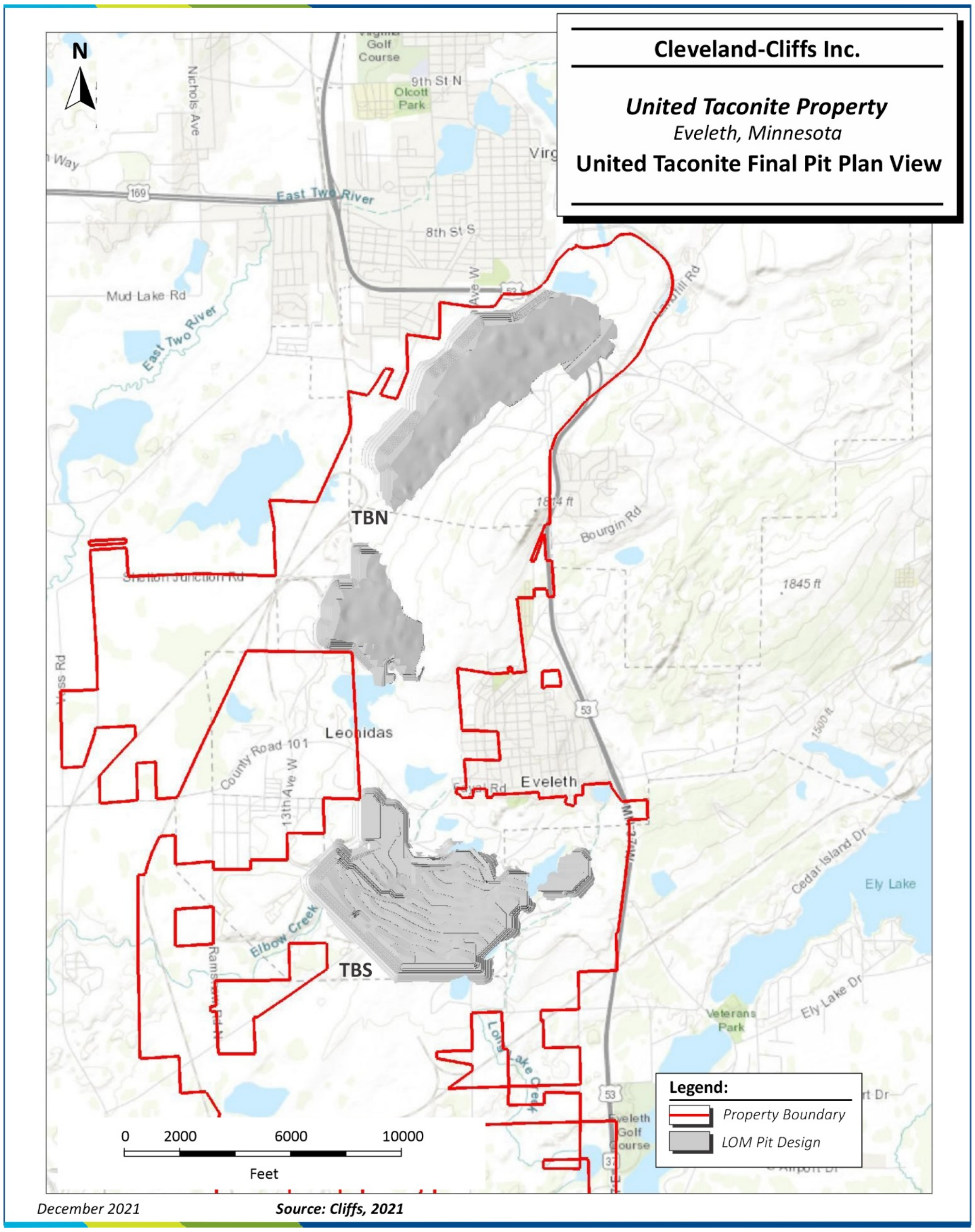
The Thunderbird Mine pit designs combine current site access, mining width requirements, geotechnical recommendations, pit optimization results, and hard mining limits as described previously in Sections 12.0 and 13.0. Table 13-6 details the final pit design totals updated for mining depletion (SLR notes that there has been no mining depletion at TBS). Figure 13-2 presents a plan view of the final pit designs (waste rock stockpiles are not shown as they include in-pit backfills, which would obscure the final pit design view).

Figure 13-3 and Figure 13-4 present an example cross-section through the TBN and TBS final pits respectively.

Table 13-6: Final Pit Design Totals Depleted to December 31, 2021
Cleveland-Cliffs Inc. – United Taconite Property

Pit	Crude Ore (MLT)	Grade (% MagFe)	Stripping In-Situ (MLT)	Stripping Unconsolidated (MLT)	Total Stripping (MLT)	Total Material (MLT)	Strip Ratio
TBN	368.7	23.2	402.1	60.9	463.0	831.7	1.3
TBS	405.9	22.0	344.1	52.2	396.3	802.2	1.0
Total	**774.6**	**22.3**	**746.2**	**113.1**	**859.3**	**1,633.9**	**1.1**

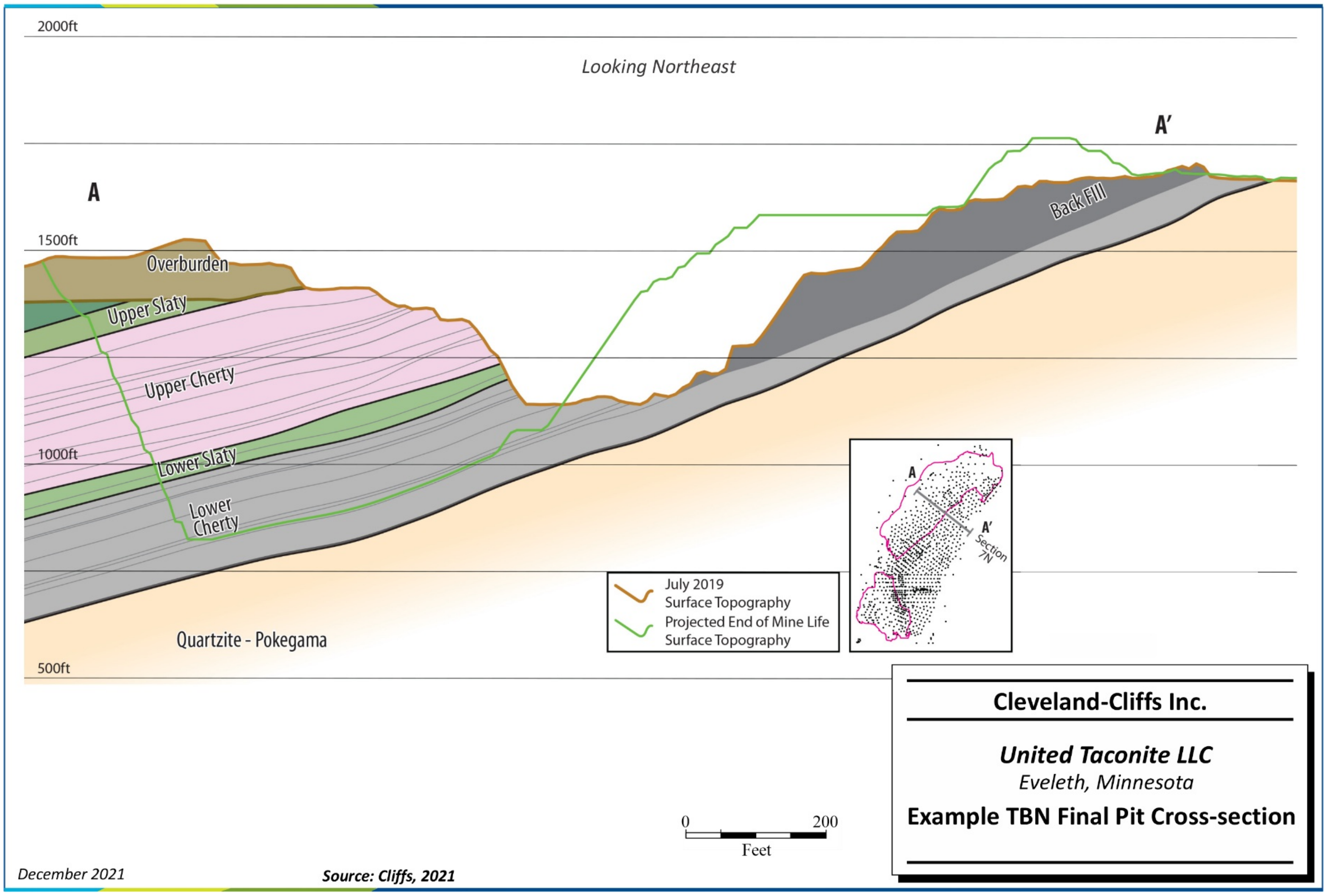
Note. Numbers may not add due to rounding.



December 2021

Source: Cliffs, 2021

Figure 13-2: Final Pit Plan View



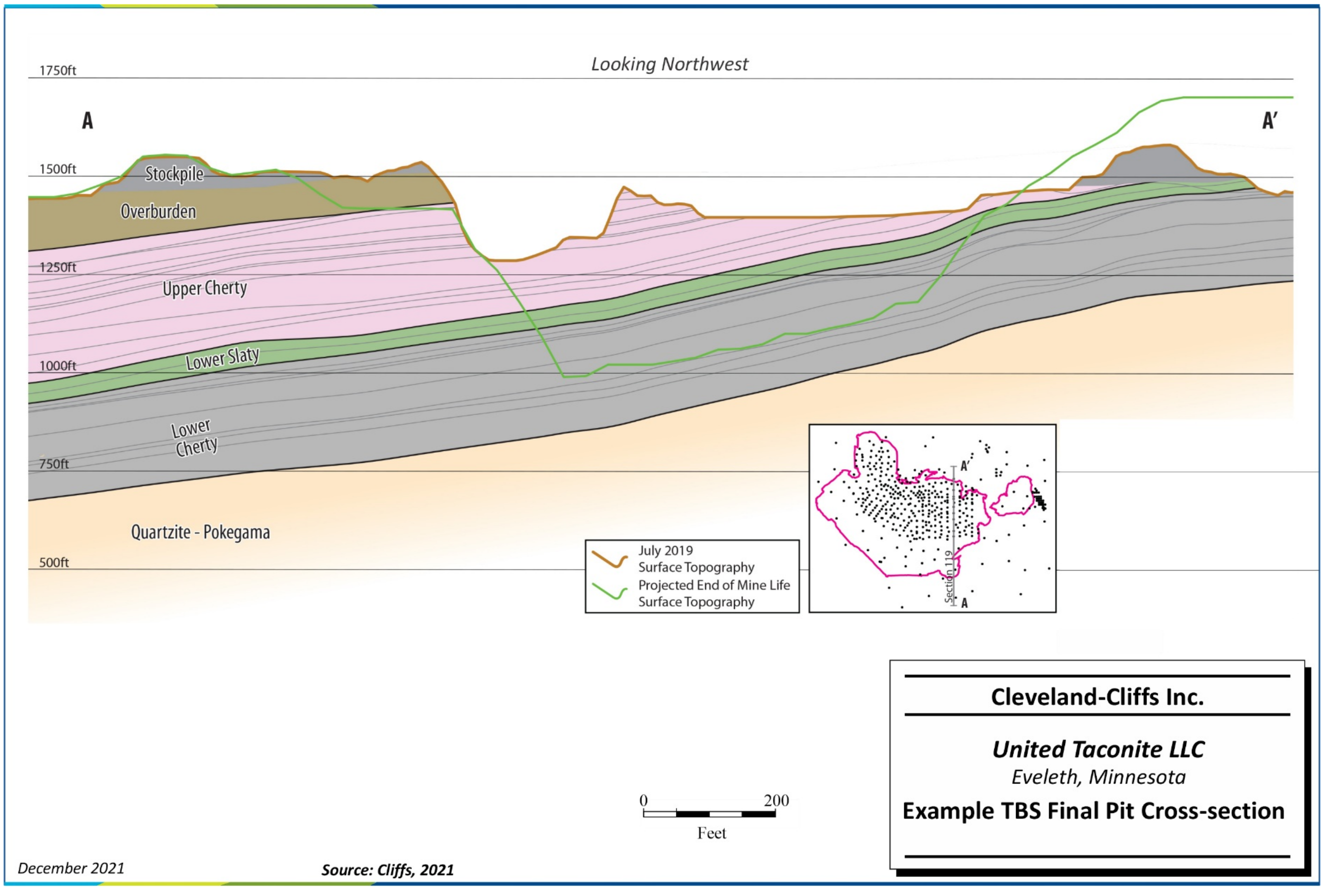
Cleveland-Cliffs Inc.

United Taconite LLC
Eveleth, Minnesota
Example TBN Final Pit Cross-section

December 2021

Source: Cliffs, 2021

Figure 13-3: Example TBN Final Pit Cross-section



December 2021

Source: Cliffs, 2021

Figure 13-4: Example TBS Final Pit Cross-section

13.3.1 Pit Phase Design

Intermediate phase designs or pushbacks are included in the LOM planning. The main purpose for phased designs is to balance waste stripping and haulage profiles over the LOM and ensure haulage access is maintained while developing the pit.

Intermediate phase designs are largely driven by the effective mining width and access to the Mineral Reserves. The phase designs incorporate the transition from the current 35 ft BH to the final 40 ft BH. Phase pit design parameters (Table 13-1) use increased CB width to account for shallower BFAs as a result of not drilling and cleaning intermediate benches to the final BFA.

Within TBN, a previously mined out and backfilled area known as the Auburn pit will require a modified wall design to incorporate a wall containing both unconsolidated fill and *in situ* rock. The walls of the Auburn pit will align to an overall wall angle of 31°. In the unconsolidated fill, this is accomplished by the 36° angle of repose and 10 ft CB every bench. In the *in situ* rock, this is accomplished by the 70° BFA and 45 ft CB every bench. These configurations will allow for a uniform toe across the bench.

13.4 Production Schedule

13.4.1 Clearing

Before mining operations commence in new undeveloped areas, it is necessary to remove any overburden material. Primary clearing and grubbing equipment include bulldozers, hydraulic shovels, FELs, and trucks. This equipment has been successfully deployed in historical overburden clearing operations at UTAC.

13.4.2 Grade Control

As described in Sections 5.0 and 6.0, the geology is well known with three simplified crude ore types identified at the Thunderbird Mine (UC, TLC, and BLC). United Taconite does not apply an intermediate check on material type or grades between the exploration drilling and mining.

A primary loading unit is generally active in each crude ore type at all times to maintain a consistent blend for the Fairlane Facility. Blending is based on a 6,000 LT running average but can be expanded to an hour-by-hour basis. The dispatcher is provided instructions from the short-range (weekly) mine plan, which details the amount of material from each mining location that is to be blended at the crusher. If the crushing facility is down for maintenance, then the loads are stockpiled on the ground next to the crusher and picked up at a later time and crushed.

13.4.3 Production Schedule

The basis of the production schedule is to:

- Produce a total of approximately 5.1 MLT/y wet pellets for the LOM.
    - This production rate was selected as it represents maintaining the current production assumption throughout the LOM.
- Limit yearly concentrate silica to a maximum of 5.2%.

- Preserve blending of the three crude ore types for as long as possible (SLR notes that UC crude ore availability diminishes in the last ten years of the schedule, as it is the uppermost layer stratigraphically and is thus depleted first).
- Limit total mined tons per period at approximately 38 MLT to balance the mine fleet utilization.

The production schedule is planned yearly throughout the LOM. Crude ore is mined exclusively from the TBN pit until 2030, when crude ore mining in the TBS pit begins. From 2030 until the end of the mine life, both TBN and TBS pits are mined and blended together.

Table 13-7 presents the LOM production schedule for UTAC.

Table 13-7: LOM Mine Production Schedule
Cleveland-Cliffs Inc. – United Taconite Property

Year	Crude Ore (MLT)	Grade (% MagFe)	Stripping (MLT)	Total Material (MLT)	Strip Ratio	Process Recovery (%)	Wet Pellets (MLT)
2022	15.2	21.8	22.9	38.1	1.5	33.6	5.1
2023	15.3	22.4	22.7	38.0	1.5	33.3	5.1
2024	14.3	24.2	23.7	38.0	1.7	36.4	5.2
2025	14.6	23.7	23.4	38.0	1.6	35.6	5.2
2026	15.2	22.4	22.8	38.0	1.5	33.6	5.1
2027	15.2	22.5	22.8	38.0	1.5	33.6	5.1
2028	14.7	23.3	23.3	38.0	1.6	35.4	5.2
2029	15.0	22.9	23.0	38.0	1.5	34.7	5.2
2030-2034	76.9	22.7	103.1	180.0	1.3	33.3	25.6
2035-2039	78.2	22.4	99.8	178.0	1.3	32.7	25.6
2040-2044	77.9	22.3	97.1	175.0	1.2	32.9	25.6
2045-2049	78.1	22.3	96.9	175.0	1.2	32.8	25.6
2050-2054	81.7	21.5	93.3	175.0	1.1	31.3	25.6
2055-2059	80.1	21.9	84.4	164.5	1.1	32.0	25.6
2060-2064	75.4	23.0	62.9	138.3	0.8	34.1	25.7
2065-2072	106.8	23.8	37.2	142.8	0.3	34.7	37.1
LOM Total	**774.6**	**22.3**	**859.3**	**1,633.9**	**1.1**	**33.3**	**257.6**

Note. Numbers may not add due to rounding.

Recent past production (2010 to current) and LOM planned production for UTAC is summarized graphically in Figure 13-5.

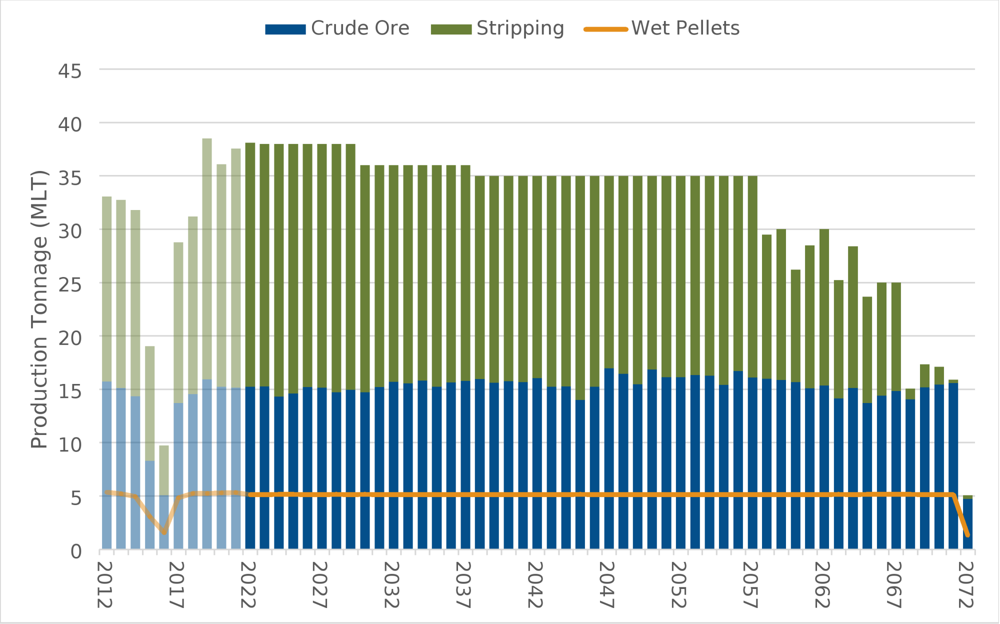


Figure 13-5: Past and Forecast LOM Production

SLR notes that the significant decrease in production during the 2015 and 2016 operating years was due to a downturn in the global iron ore market. As a result, production was temporarily idled during the second half of 2015 and first half of 2016. Production targets have been met since the restart of operations.

13.5 Overburden and Waste Rock Stockpiles

Overburden and waste rock material is stockpiled in designated stockpile areas.

UTAC, specifically the TBN pit, is unique among the other mines on the Mesabi Range in that the footprint is constrained by local communities. For this reason, nearly all of the waste rock and overburden will be stockpiled within the final pit footprint. This requires designing and sequencing the waste rock stockpiles to progress as the mining progresses and exposes the final pit footwall.

TBS has more stockpiling capacity outside of the pit area; however, the majority is on the pit hanging-wall side and may encumber potential mineralization down-dip. Thus, utilization of the pit hanging wall for waste rock stockpiling in the TBS is minimized and will only be utilized when the pit first reopens and there is insufficient final pit footwall space for backfilling.

There is currently no assumed commingling of the waste rock stockpiles between the TBN and TBS; however, the opportunity exists to potentially reduce the footprint of stockpiles outside of the backfilled pits and to reduce waste haulage distances.

The overburden and waste rock stockpile design parameters are detailed in Table 13-8.

Table 13-8: Stockpile Parameters
Cleveland-Cliffs Inc. – United Taconite Property

Parameter	Units	Waste Rock	Overburden
Overall Slope Angle	Degrees	18.2	17.5
BFA	Degrees	36.0	21.8
BH	ft	30	30
Primary Berm Width	ft	70	20
Secondary Berm Width	ft	30	20
Ramp Width - 2 way	ft	150	150
Ramp Width - 1 way	ft	80	80
Ramp Gradient	%	8-10	8

Rock and overburden stockpiles were designed, and 3D solids generated to calculate the volume of the stockpiles. Swell factors of 50% for *in situ* rock and 10% for overburden were used to calculate the annual stockpile volume requirement.

United Taconite assumes that for overburden stockpiling, some waste rock will be included to support the stockpile development. The stockpile task for the LOM assumes that *in situ* rock will be included with overburden at a 1:3 ratio.

Table 13-9 and Table 13-10 summarizes the volume capacity along with the LOM stripping volumes for both the TBN and TBS pits, respectively, from the current July 2019 mine planning model (i.e., prior to depletion).

Table 13-9: TBN Waste Rock and Overburden Stockpile Capacities
Cleveland-Cliffs Inc. – United Taconite Property

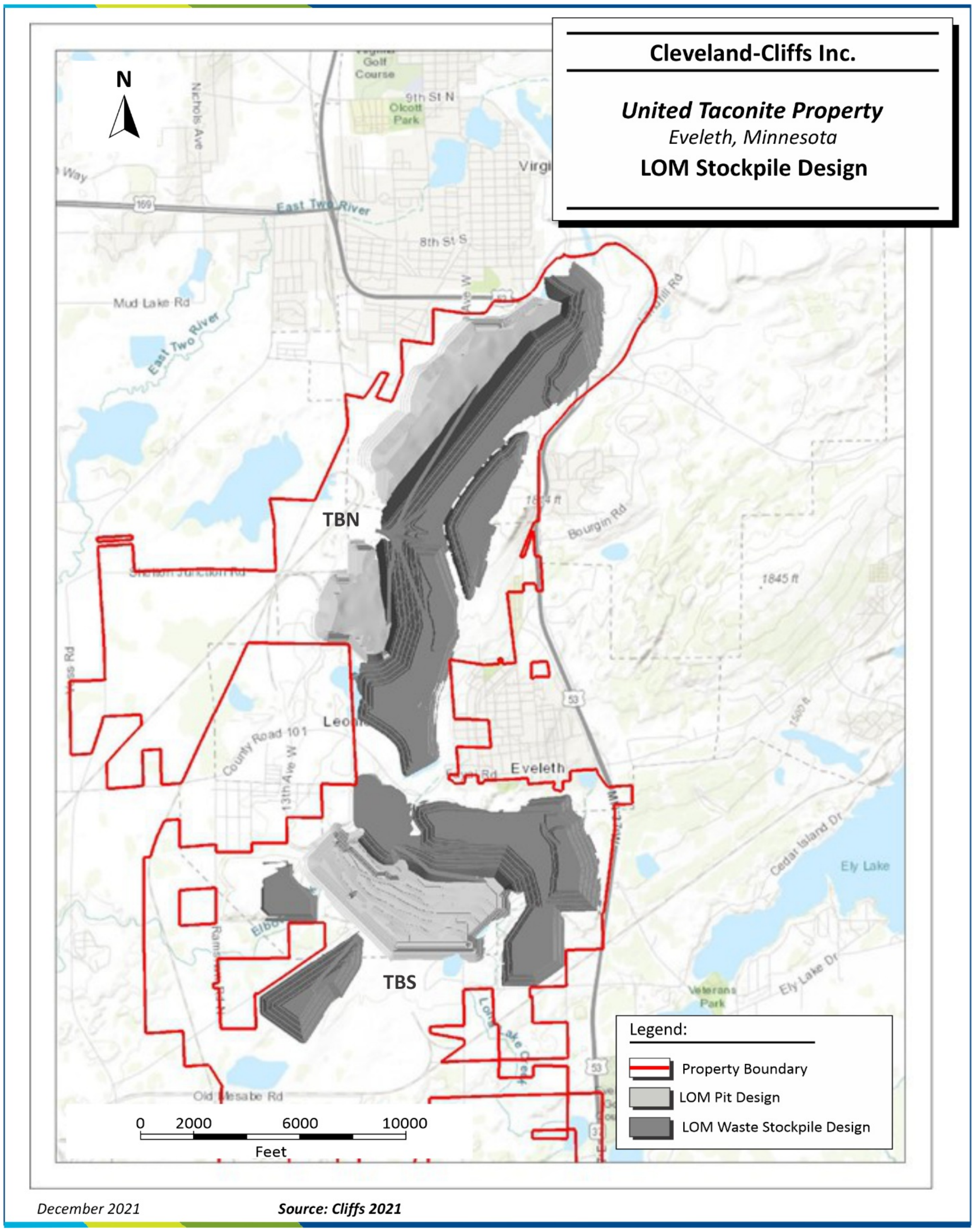
Name	Capacity (million ft^3)	
	Waste Rock	Overburden
Total TBN Stockpile Capacity	8,185	834
2019 LOM Stockpile Requirements	8,015	781

Table 13-10: TBS Waste Rock and Overburden Stockpile Capacities
Cleveland-Cliffs Inc. – United Taconite Property

Name	Capacity (million ft^3)	
	Waste Rock	Overburden
Total TBS Stockpile Capacity	5,389	1,400
2019 LOM Stockpile Requirements	5,386	1,393

SLR notes there is sufficient overburden and waste rock stockpile capacity included in the LOM plan.The final stockpile layouts including the pit backfills are shown in Figure 13-6. Final reclamation will involve relocating some of the stockpiled overburden as cover for the remainder of the disturbed area.

In 2018, Golder Associates Inc. (Golder) assessed the current stockpiles following guidelines published by Hawley and Cunning (Hawley, 2017) to classify the instability hazard as either very low, low, moderate, high, or very high. All stockpiles evaluated were classified as being a low instability hazard (Shaigetz and Cunning, 2019).



December 2021

Source: Cliffs 2021

Figure 13-6: LOM Stockpile Design

13.6 Mining Fleet

The primary mine equipment fleet consists of large drills, diesel hydraulic shovels, and off-road dump trucks. In addition to the primary equipment, there are FELs, bulldozers, graders, water trucks, and backhoes for mining support. Additional equipment is on site for non-productive mining fleet tasks. The current fleet is to be maintained with replacement units as the current equipment reaches its maximum operating hours.

Table 13-11 presents the existing fleet (2022) and planned average major fleet requirements estimated to achieve the LOM plan.

Table 13-11: Major Mining Equipment
Cleveland-Cliffs Inc. – United Taconite Property

Year	Drills	Shovels	Trucks	Loaders	Bulldozers	Graders
2022	4	5	14	1	5	2
2023	3	5	14	1	5	2
2024	3	5	14	1	5	2
2025-2029	3	5	15	1	5	2
2030-2034	3	5	16	1	5	3
2035-2039	3	5	22	1	4	3
2040-2044	3	5	19	1	4	3
2045-2049	3	5	19	1	4	3
2050-2054	3	5	19	1	4	3
2055-2059	3	5	19	1	4	3
2060-2064	3	5	15	1	3	3
2065-2072	2	4	11	1	3	3
Size/Payload	120,000 lb	38 yd^3	240 ton	37 yd^3	57 yd^3	16 ft
Useful Life (hrs)	90,000	90,000	90,000	60,000	65,000	65,000
Example Unit	P&H 120A	Hitachi EX5600	Komatsu 830E	LeTourneau L1850	CAT-D11	CAT-16M

The primary loading and hauling equipment were selected to provide good synergy between mine selectivity of crude ore and the ability to operate in wet and dry conditions. Since crude ore is blended at the primary crusher, the loading units in crude ore do not operate at capacity.

Longer haulage distances will be realized as the Thunderbird Mine expands deeper and to the south and north. During the longer haulage periods, more trucks will be required, as seen during years 2025 through 2039 in Table 13-11.

Extensive maintenance facilities are available at the Thunderbird Mine site to service the mine equipment.

13.7 Mine Workforce

Current mining manpower is summarized as follows:

- Mine operations – 114
- Mine maintenance (excluding mine crusher) – 50
- Mine supervision and technical services – 25

Mine operations and mine maintenance manpower will increase proportionately with the increase in haul trucks over the LOM (see Table 13-11). The additional required manpower will be sourced from local communities.

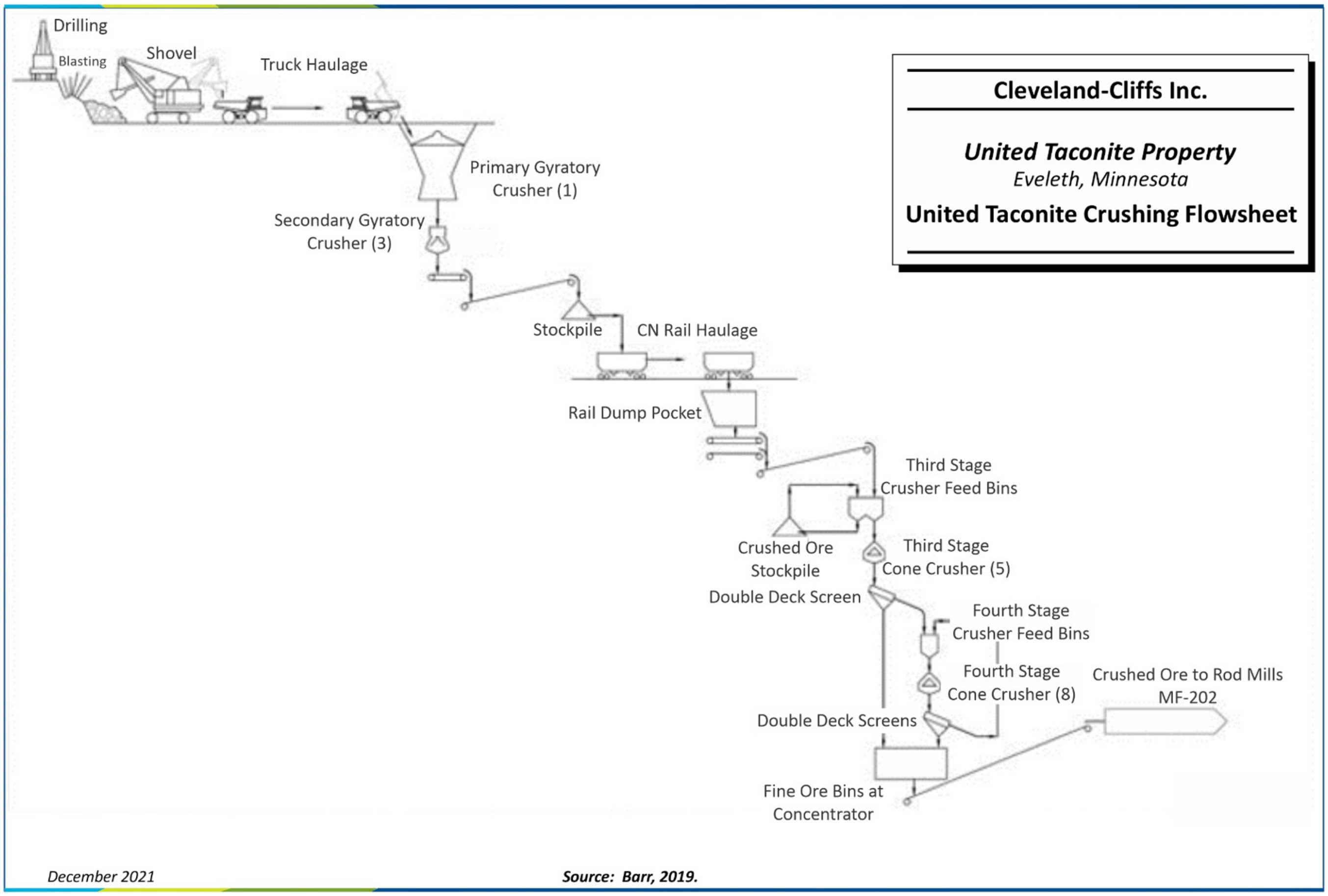
14.0 PROCESSING AND RECOVERY METHODS

14.1 Processing Methods

14.1.1 Crushing

Crude ore is blended at the Thunderbird Mine and hauled to the primary crushing station, where it is dumped by 240 ton haul trucks into the 60 in. x 89 in. primary gyratory crusher, followed by secondary crushing in three, 30 in. x 70 in. secondary gyratory crushers located directly beneath the primary crusher. The P_{80} 4 in. product-size material is conveyed to a 20,000 LT, conical surge pile. The surge pile is covered to avoid handling difficulties during extremely cold weather. Crushed ore is reclaimed from the surge pile by apron feeders and a conveyor located in a tunnel beneath the pile and conveyed to rail car loading silos. The material is loaded into rail cars and transported by train to the Fairlane Facility, eight miles away. The average feed rate of the primary crushing station is 3,200 LT/h.

Two additional stages of crushing are provided at the Fairlane Facility. The third stage consists of five Nordberg, seven-foot shorthead crushers operating in parallel and open circuit followed by screens producing a P_{80} one inch (25.4 mm) product. The P_{100} 0.5 in. (12.7 mm) screen undersize material from the third stage is combined with the screen undersize from the fourth stage to make up the final crusher product to the concentrator. Third-stage screen oversize material feeds the fourth stage of crushing, which comprises eight Nordberg, seven-foot shorthead crushers operating in parallel and in closed circuit with screens, producing the final 85% to 90% passing 0.5 in. product. The average throughput is 50,000 LT/d. Specific power consumption is 3.1 kWh/LT. Figure 14-1 is a flowsheet of the UTAC crushing process.



Source: Barr, 2019.

Figure 14-1: Crushing Flowsheet

14.1.2 Concentrator

The Fairlane Facility concentrator flowsheet is provided in Figure 14-2. The fine crusher product is processed in five separate rod mill – ball mill grinding and magnetic separation lines to produce final concentrate with a particle size distribution of 90% passing 325 mesh. Each line consists of:

- Rod milling – open circuit
- Cobber magnetic separation
- Ball milling – closed circuit
- Rougher magnetic separation
- Cyclone classification
- Hydroseparation
- Finisher magnetic separation
- Magnetic concentrate screening
- Regrinding of screen oversize
- Screen undersize to pellet plant

14.1.2.1 Lines 1 and 2

Grinding lines 1 and 2 have average feed rates of 345 LT/h at 90% operational availability. The two rod mills in lines 1 and 2 are 14 ft-diameter x 20 ft EGL (equivalent grinding length), Nordberg overflow mills operated in open circuit with 2,000 hp motors. The rod mill discharge flows through two, 4 ft x 10 ft, 1,200 Gauss (Gs) cobber magnetic separators per line. Cobber tailings are final tailings, and cobber magnetic concentrate is advanced to the ball mills. Approximately 35% of cobber feed mass is discarded as tailings. Tailings are treated in spiral classifiers (66 in. diameter and 84 in. diameter). The spiral classifier underflow is discharged as coarse tailings, and the spiral classifier overflow is treated in two, 40 ft-diameter hydroseparators. The overflow of the hydroseparators is further treated in the tailings thickener, which is 300 ft in diameter. The underflow of the hydroseparators is sent directly to the tailings pond.

Four ball mills (14 ft diameter x 22 ft EGL) are operated in closed-circuit with 26 in.-diameter cyclones. Each ball mill discharges across rougher magnetic separators. Rougher tailings are final tailings and are discarded to the tailings hydroseparators. Magnetic rougher concentrate is pumped to the ball mill cyclone, with the underflow returning to the ball mills for additional grinding. The cyclone overflow is advanced to the concentrate hydroseparators, where the heavy mineral underflow product is sent to the finisher magnetic separators. The hydroseparator overflow (light fraction) is discarded as tails to the tailings thickener.

The finisher concentrate is classified with Derrick screens. Derrick screen oversize is reground, and Derrick screen undersize is sent to the pellet plant for filtering and agglomeration. Finisher tailings are sent to the tailings thickener. The final concentrate particle size is 76% to 86% passing 325 mesh.

14.1.2.2 Lines 3, 4 and 5

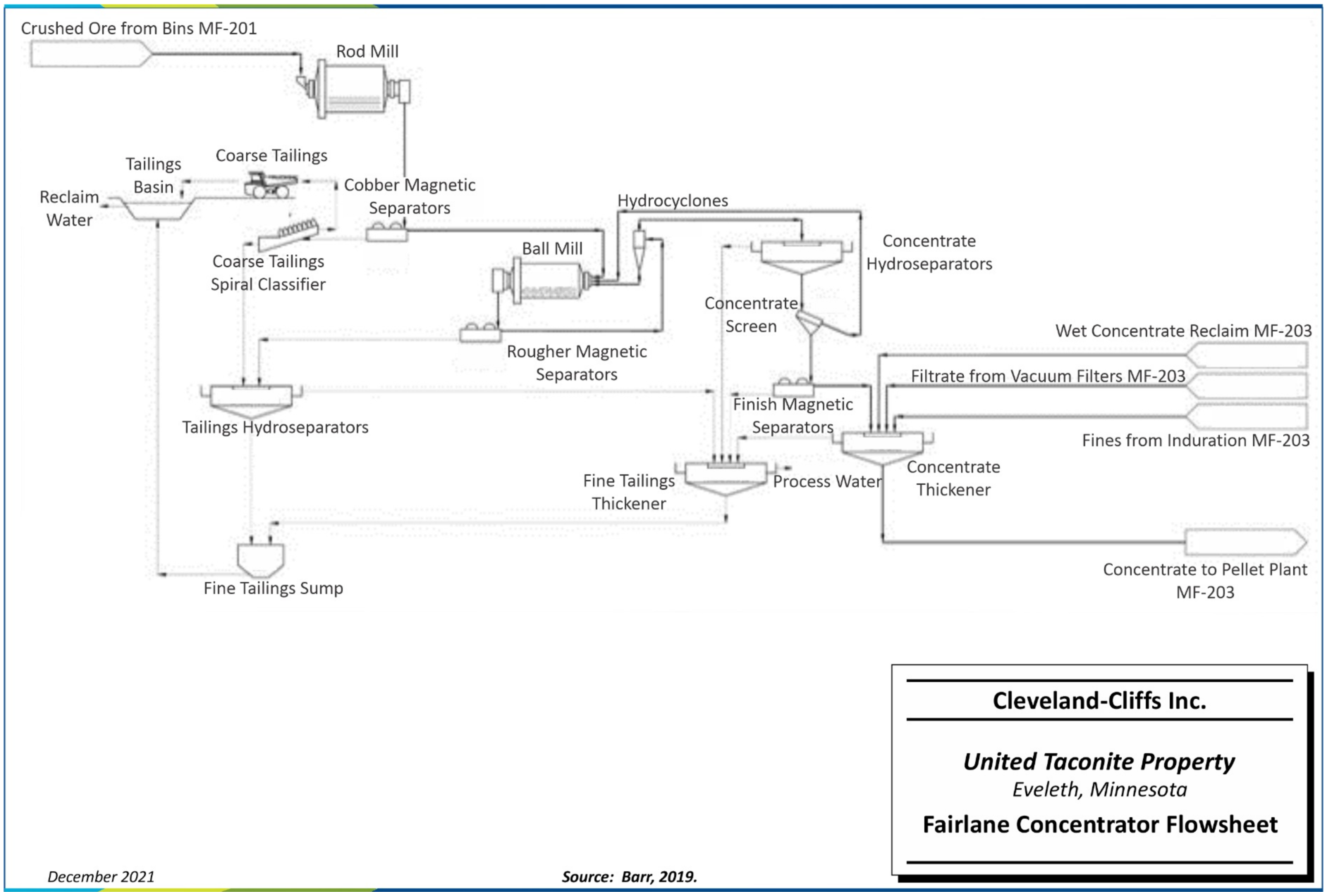
The flowsheet for Lines 3, 4, and 5 is similar to lines 1 and 2, with higher average feed rates of 435 LT/h per line at 90% operational availability. The three, 15 ft-diameter x 21 ft EGL rod mills are operated in open circuit and discharge through two 4 ft x 10 ft, 1,200 Gs cobber magnetic separators per line. Cobber tailings are final tailings. The cobber concentrate is advanced to the ball mill grinding circuit, which consists of three, 17 ft-diameter x 42 ft EGL ball mills (one per line) operated in closed circuit with cyclones and screens. The ball mills discharge to twelve, 4 ft by 10 ft rougher magnetic separators (four per line). Rougher tailings are final tailings and are discarded to the tailings hydroseparators. Magnetic rougher concentrate is pumped to the ball mill cyclones with the underflow returning to the ball mills for additional grinding. The cyclone overflow is advanced to the concentrate hydroseparators, where the heavy mineral underflow product is sent to the Rapifine screens. Screen oversize is reground in the ball mill, and screen undersize is sent to the finisher magnetic separators. The hydroseparator overflow (light fraction) is discarded to the tailings thickener.

The finisher concentrate is sometimes classified with Derrick screens when the silica is high. Derrick screen oversize is reground, and Derrick screen undersize is sent to the pellet plant for filtration and agglomeration. Finisher tailings are sent to the tailings thickener. The final concentrate particle size is 76% to 86% passing 325 mesh.

A recently completed upgrade to Line 5 replaced the Rapifine and Derrick screens before the finishers with one stage of screening using a newer Derrick Stacksizer.

14.1.2.3 Fluxstone Grinding Circuit

Fluxstone, a 50%/50% mixture of limestone and dolomite, is ground using a 14 ft-diameter x 20 ft EGL Nordberg overflow ball mill when Mustang flux pellets are being produced. Fluxstone is conveyed into the concentrator and fed into the ball mill. The discharge from the Fluxstone mill feeds two five-deck Derrick Stacksizer screens. The screen oversize returns to the mill for further grinding. The screen undersize is sent to the regrind thickener, where the material is thickened, then pumped to the pellet plant's fluxstone slurry tank, where it is then metered into the concentrate to make the appropriate calcium to silica ratio.



Cleveland-Cliffs Inc.

United Taconite Property
Eveleth, Minnesota
Fairlane Concentrator Flowsheet

December 2021

Source: Barr, 2019.

Figure 14-2: Fairlane Facility Concentrator Flowsheet

14.2 Pellet Plant

The pellet plant comprises the following sections:

- Filtering
- Binder and chemical reagent preparation and addition
- Balling (concentrate agglomeration)
- Indurating machine (Grate, Kiln, and Cooler)
- Product handling
- Fuel handling and combustion

Three, 45 ft-diameter concentrate thickeners are used to thicken the magnetite concentrate from 45% to 65% solids prior to filtration. At the filtering section, concentrate slurry is dewatered to approximately 9.6% moisture content with eight vacuum disc filters, with vacuum provided by two-stage, positive displacement, rotary vacuum pumps.

Additives including bentonite, organic reagents, and limestone are used as binders. Selected reagents used in the Fairlane Facility are soda ash and caustic soda, among others.

During standard-grade pellet production, ground limestone is received by truck and pneumatically conveyed to storage bins. Limestone is mixed with water to form a 45% solids slurry, which is pumped with variable speed, positive displacement pumps to the filter feed distributor, where it is mixed with the concentrate slurry. The fluxstone – concentrate mixture depends on the desired pellet quality, along with customer specifications. During flux pellet production, a 50%/50% mixture of limestone and dolomite is delivered by rail and ground in the concentrator, then added to the concentrate slurry tank to make the desired calcium specification in the pellet. Organic binders (binder mixed with soda ash) are transported to the Fairlane Facility by 20-ton trucks, then are pneumatically conveyed to a storage silo and transferred to feeder silos. Binders are then mixed with the concentrate filter cake during transportation to the cake storage silos.

Green ball preparation is carried out in balling drums. A variable-speed cutter is used to control drum lining thickness and texture. Line 1 is equipped with five drums (10 ft diameter x 32 ft long at 12 rpm, average feed rate 50 LT/h to 70 LT/h), whereas Line 2 is equipped with seven drums (10 ft diameter x 32 ft at 10.8 rpm, average feed rate 80 LT/h to 100 LT/h). At the drum discharge, green balls are screened on roll screens. The gap of the rolls can vary to control the product size. Oversize and undersize balls return to the balling drum. Balls are further screened at the roll feeder at the feed end of the indurating machine. The roll feeder undersize returns to the cake storage silos.

During standard-grade pellet production, pellet plant indurating Line 1 is fed at 320 LT/h, and Line 2 is fed at 680 LT/h (typical values – these fluctuate based on operating conditions and crude ore blends). Average product rates for final product are 250 LT/h and 560 LT/h, respectively. Production tonnages are approximately 20% less when making the flux-grade product.

The pellet indurating machine is based on Grate Kiln Technology and has a grate for drying and preheating the pellets and a rotary kiln to fire and indurate the pellets. The drying section is comprised of two down-draft zones. The first zone receives gas at 650°F. The second zone utilizes gas at 1,000°F to 1,200°F. Balls are heated up to 1,800°F to 1,900°F by the end of the preheat section. Partial oxidation of the magnetite to hematite in the preheat zone provides exothermic heat required in the processing of the pellets.

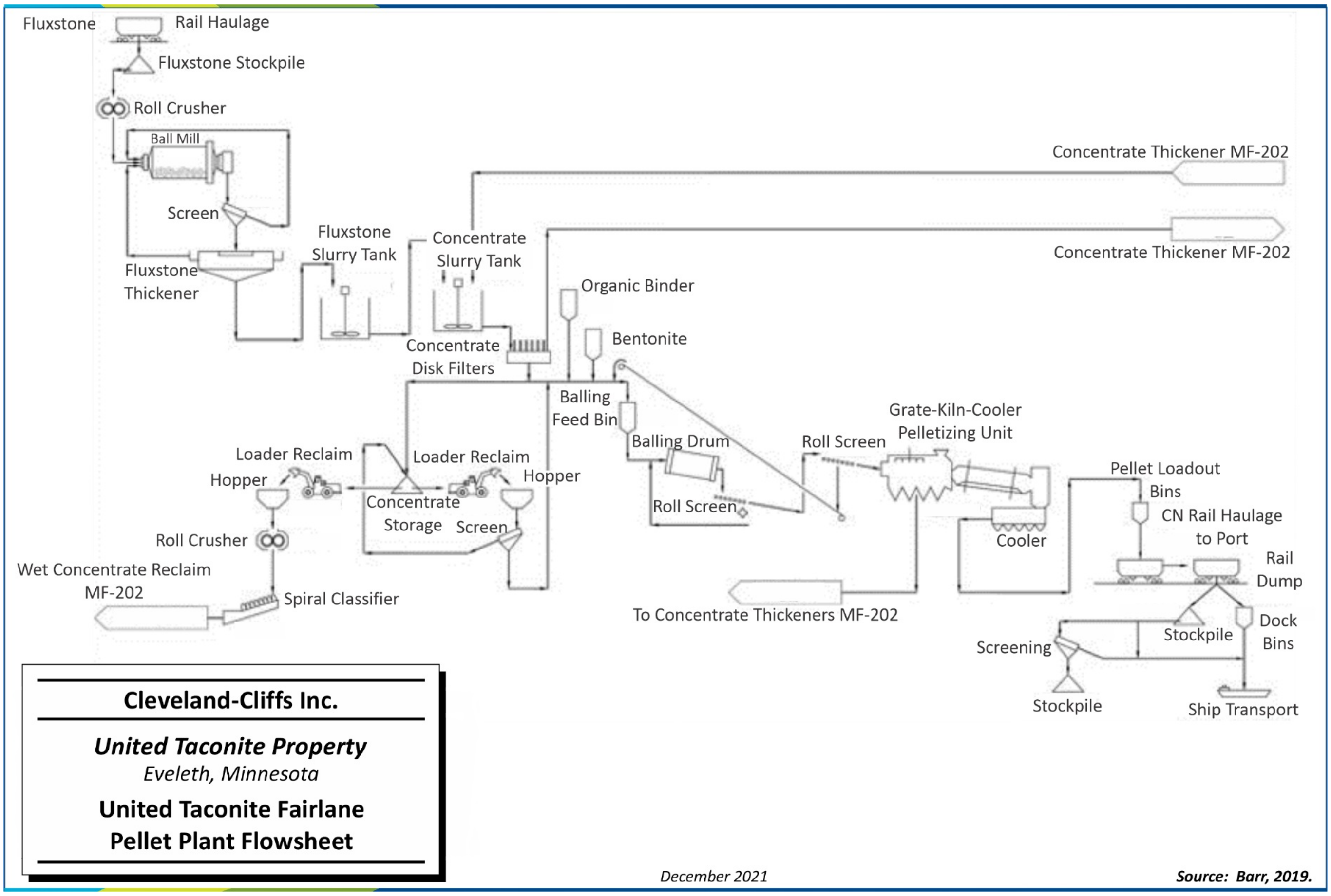
The partially oxidized, preheated pellets enter the rotary kiln and are rolled for even heat hardening of the balls to reach strength for shipping. Gases enter the kiln at a temperature of 2,400°F. Burners can use natural gas or coal.

Pellets leaving the kiln pass through an annular cooler, where they are subjected to primary and secondary cooling using a 36 in. bed depth. The process of oxidation of the magnetite into hematite is completed in the primary cooling zone.

Cooled pellets are sampled, treated for dust suppression, and conveyed to three pellet storage silos and later loaded into trains and shipped by rail to Duluth for loading into lake vessels. Alternatively, pellets can be directly shipped by rail to customers.

During Mustang flux pellet production, the grate operates with 12 preheat burners on Line 2 and eight preheat burners on Line 1 to add the necessary heat for the calcination reaction to take place. Fluxstone is mixed with the concentrate at a target 14% by weight prior to filtration. A small amount of bentonite can be added as needed to help with green-pellet strength.

Figure 14-3 presents the Fairlane Facility pellet plant flowsheet showing the pelletizing operations including the fluxstone grinding process for Mustang pellet production.



Cleveland-Cliffs Inc.

United Taconite Property
Eveleth, Minnesota

United Taconite Fairlane Pellet Plant Flowsheet

December 2021

Source: Barr, 2019.

Figure 14-3: Fairlane Facility Pellet Plant Flowsheet

14.3 Major Process Plant Equipment

Table 14-1 is a list of major processing equipment at UTAC.

Table 14-1: Process Plant Equipment
Cleveland-Cliffs Inc. – United Taconite Property

Area	Equipment	Model	In Use	Size
Coarse Crusher	Primary Crusher	Metso	1	60”
Coarse Crusher	Secondary Crusher	Metso	3	30”
Fine Crusher	3rd Stage Crusher	Nordberg	5	7’
Fine Crusher	4th Stage Crusher	Nordberg	8	7’
Concentrator	Rod Mill (Lines 1 & 2)	Nordberg	2	14’ x 20’
Concentrator	Rod Mill (Lines 3, 4, & 5)	Nordberg	3	15’ x 20’6”
Concentrator	Ball Mill (Lines 1 & 2)	Nordberg	4	14’ x 22’
Concentrator	Ball Mill (Lines 3, 4, & 5)	Nordberg	3	17’ x 41’6”
Concentrator	Flux Mill	Nordberg	1	14’ x 22’
Concentrator	Cobber Magnetic Separators	Svedala	10	4’ x 10’
Concentrator	Rougher Magnetic Separators	Svedala	20	4’ x 10’
Concentrator	Finishers	Svedala	15	4’ x 10’
Concentrator	Con Hydros (Lines 1 and 2)	Dorr Oliver	4	36’
Concentrator	Con Hydros (Lines 3, 4, & 5)	Dorr Oliver	3	48’
Concentrator	Tails Hydros (Lines 1 and 2)	Dorr Oliver	4	36’
Concentrator	Tails Hydros (Lines 3, 4, & 5)	Dorr Oliver	3	48’
Concentrator	Tailings Thickeners	Dorr Oliver	3	300’
Pellet Plant	Vacuum Disk Filters	Northstar	8	9’ 10”
Pellet Plant	Vacuum Pumps	Roots	7	
Pellet Plant	Balling Drums (Unit 1)	Allis Chalmers	5	5’9” x 30’11”
Pellet Plant	Balling Drums (Unit 2)	Allis Chalmers	7	10’1” x 30’11”
Pellet Plant	Furnace Fans	Green Fuel	4	94”
Pellet Plant	Furnace Fans	Robinson	2	117”x24”
Pellet Plant	Furnace Fans	Robinson	2	116”x22”
Pellet Plant	Furnace Fans	Barron 110	1	Type R5613
Pellet Plant	Furnace Fans	Robinson	2	106”x28”
Pellet Plant	Line 1 Grate	Allis Chalmers	1	12-2x112-7
Pellet Plant	Line 2 Grate	Allis Chalmers	1	18-7x130-8
Pellet Plant	Line 1 Kiln	Allis Chalmers	1	18-6x120
Pellet Plant	Line 2 Kiln	Allis Chalmers	1	22-6x130

14.4 Process Plant Performance

Table 14-2 shows the production performance of the Fairlane Facility for the past 10 years. Crude ore is magnetite-bearing taconite, and the ROM grade is approximately 32% Fe. Concentrate production has ranged from 1.8 MWLT/y to 5.9 MWLT/y, with a 10-year average of 4.9 MWLT/y. Concentrate is fed to the pellet plant to produce pellets, which are sold as the main final product. Pellet production has ranged from 1.5 MWLT/y to 5.3 MWLT/y, with a 10-year average of 4.6 MWLT/y. Pellet fines are produced as a subproduct at a rate of 150,000 WLT/y. Concentrate and pellet production is reported as wet long tons at 8.75% and 2.00% moisture respectively.

Table 14-2: 10 Year Production for the Fairlane Facility (Standard Pellets)
Cleveland-Cliffs Inc. – United Taconite Property

Year	Crude Ore Milled (kWLT)	Mill Feed Total (% Fe)	Concentrate (kWLT)	Conc. (% Fe)	Wet Pellets (kWLT)	Pellet (% Fe)	Crude To Pellet Weight Recovery (%)
2009	11,502	32.31	3,996	66.90	3,819	65.13	33.20
2010	15,348	32.36	5,299	67.05	5,112	65.35	33.31
2011	15,522	32.54	5,533	66.99	5,150	65.30	33.18
2012	15,746	32.15	5,646	67.03	5,355	65.32	34.01
2013	15,151	32.24	5,602	66.93	5,204	65.35	34.34
2014	14,333	32.12	5,232	67.00	4,944	65.32	34.50
2015	8,345	31.41	3,189	66.87	3,078	65.16	36.88
2016	5,037	31.83	1,816	67.31	1,548	65.33	30.74
2017	13,689	31.98	5,246	66.95	4,829	65.25	35.28
2018	14,589	32.20	5,827	66.78	5,219	65.22	35.77
2019	15,113	32.27	5,876	66.95	5,297	65.23	35.05
2020	15,703	31.66	5,855	66.83	5,247	65.33	33.41

14.5 Pellet Quality

The customers purchasing UTAC pellets monitor the physical and chemical characteristics of the pellets with respect to required specifications. United Taconite products must meet these specifications to be accepted as shown in Table 14-3 and Table 14-4. SLR has reviewed yearly performance data for UTAC standard and flux pellet production since 2014 and noted that Cliffs has achieved these specifications on a consistent basis during that period.

Table 14-3: Standard Pellets – Cargo Specifications
Cleveland-Cliffs Inc. – United Taconite Property

	Cargo Specification		
Quality Variable	**Min**	**Target**	**Max**
Iron (%)	64.7	65.3	N/A
Silica (%)	4.80	5.30	5.85
CaO (%)	0.68	0.80	0.90
H_2O (%)	N/A	2.5	4.2
+1/4” BT (%)	96.5	98.5	N/A
+1/2” BT (%)	N/A	6.5	13.0
3/8” x ½”	78.0	83.6	N/A
+1/4” AT	96.4	97.3	N/A
Compression (lb/pellet)	550	610	N/A
%-300 lb/pellet Compression	N/A	3.4	6.7
LTB (+1/4”) (%)	86.0	91.0	N/A
dR40	0.90	1.00	N/A

Table 14-4: Flux (Mustang) Pellets – Cargo Specification
Cleveland-Cliffs Inc. – United Taconite Property

	Cargo Specifications		
Quality Variable	**Min**	**Target**	**Max**
Iron (%)	N/A	60.75	N/A
Silica (%)	4.80	5.10	5.40
CaO (%)	5.42	5.87	6.33
H_2O (%)	N/A	2.50	4.20
+1/4” BT	96.1	98.0	N/A
+1/2” BT	N/A	2.2	5.7
3/8” x ½”	78.0	84.2	N/A
+1/4” AT	95.1	97.0	N/A
Compression lb/pellet	442	500	N/A
%-300 lb/pellet Compression	N/A	7.5	11.9
LTB (+1/4”) (%)	N/A	92.5	N/A
dR40	1.32	1.62	1.92

14.6 Consumable Requirements

Table 14-5 and Table 14-6 show the energy, water, and product supplies that United Taconite used in 2018 to 2020:

Table 14-5: 2018 to 2020 Energy Usage
Cleveland-Cliffs Inc. – United Taconite Property

Energy Usage	Unit	2018		2019		2020	
		Usage	Usage Per LT Pellets	Usage	Usage Per LT Pellets	Usage	Usage Per LT Pellets
Fines Crusher Power Usage	kWh	43,580,969	8.35	45,489,099	8.59	46,632,320	8.89
Concentrator Power Usage	kWh	344,022,966	65.92	352,860,001	66.62	366,285,059	69.81
Pellet Plant Power Usage	kWh	171,975,902	32.95	172,849,903	32.63	171,439,485	32.67
Pellet Line #1 Fuel Usage	MMBtu	1,327,316	0.728	1,293,802	0.678	1,380,596	0.769
Pellet Line #2 Fuel Usage	MMBtu	2,228,390	0.656	2,254,342	0.666	2,304,876	0.668

Table 14-6: 2018 to 2020 Consumable Usage
Cleveland-Cliffs Inc. – United Taconite Property

Consumable Usage	Unit	2018		2019		2020	
		Usage	Usage Per LT Pellets	Usage	Usage Per LT Pellets	Usage	Usage Per LT Pellets
Grinding Balls	lb	9,366,102	1.79	9,110,979	1.72	9,602,613	1.83
Grinding Rods	lb	12,953,792	2.48	12,607,036	2.38	13,088,003	2.49
Fluxstone	LT	291,760	0.06	244,487	0.05	279,707	0.05
Flocculent (for tails)	lb	123,750	0.02	90,750	0.02	67,650	0.01
Ground Limestone	lb	42,002,780	8.05	65,680,390	12.40	59,615,570	11.36
Organic Binder / Soda Ash	lb	4,354,905	0.83	4,340,592	0.82	4,052,106	0.77
Bentonite	lb	11,878,733	2.28	11,484,407	2.17	10,165,443	1.94
Caustic Soda	lb	2,383,990	0.46	2,849,840	0.54	3,241,660	0.62
Make-Up Water (St. Louis River)	gal	2,638,496,137	511.24	2,811,945,927	530.89	2,638,496,137	502.87

14.7 Process Workforce

Current processing headcount totals 302 and is summarized as follows:

- Plant operations – 140
- Plant maintenance – 104
- Plant supervision and technical services – 58

15.0 INFRASTRUCTURE

15.1 Roads

The mine site is easily accessed over paved roads from the city of Eveleth, approximately one mile to the south of the Thunderbird Mine (Figure 15-1).

The Fairlane Facility is accessed along County-maintained, paved roads from the city of Eveleth, approximately 12 mi to the north of the Fairlane Facility, and is located just outside of the small town of Forbes, Minnesota.

Both sites are accessed by County, State, and Federal paved and unpaved roads. Both sites are easily accessible from the major regional population center of Duluth, Minnesota, which is located approximately 50 mi to 60 mi to the southeast.

15.2 Rail

ROM crude ore is crushed to minus four inches at the mine site and reports to a 10,000 LT-capacity, crushed crude ore stockpile that is covered. Crushed crude ore is transported via rail from this stockpile at the Thunderbird Mine site to the Fairlane Facility, a distance of eight miles, by the CN railroad (Figure 15-1).

A contract is maintained between United Taconite and CN, which outlines crude ore and pellet transportation rates and terms. This contract is reviewed and renewed annually between United Taconite and CN. Maintenance of the rail line and rolling stock is performed by CN personnel on site or in workshops located at either Keenan or Proctor yards. Locomotive fueling is performed by CN at similar locations. No fueling stations are located at the Thunderbird Mine.

Normal train operations include six unit trains per day for six days, or a total of 36 unit trains per week. Each train has 118 crude ore cars, each holding 77 LT, for a total train capacity of 9,086 LT. Two locomotives are used and can be up to 4,000 hp, depending on availability. Trains are loaded at the mine site by pulling the cars underneath the stockpile. Operations are conducted year-round on a 24-hour basis.

Both the Thunderbird Mine site and Fairlane Facility site have loop track configurations, which facilitate the operation of the trains.

Finished taconite pellets are shipped on CN railroad. Pellet operations include 10 to 11 trains per week, each with 140 cars holding up to 80 WLT, or 11,200 WLT per train.

With the startup of Mustang flux pellet production in 2017, a new rail spur was installed that allows for trains of fluxstone (50%/50% mix of limestone and dolomite) to be dropped off by CN. A switching contractor then moves the trains up the new spur to a fluxstone unloading and storage facility, then returns the trains back to the site entrance for pickup by the CN. Approximately 3,000 tons of fluxstone are delivered each day to meet production requirements during Mustang pellet production.

Figure 15-1: United Taconite Roads and Rail

15.3 Port Facilities

Port facilities are located in Duluth, Minnesota and are controlled by CN railroad and include pellet storage and ship loading. Pellets are delivered by rail after a 62 mi trip along CN-owned rail from the Fairlane Facility. Screening of pellets is performed by an independent contractor. Ships leaving the port vary in size between 20,000 tons and 65,000 tons per vessel. CN port allows for 1.3 million tons of pellet storage. Material handling options include direct from rail to vessel loading or storage reclaim to vessel loading. An aerial view of the port facilities is shown in Figure 15-2.

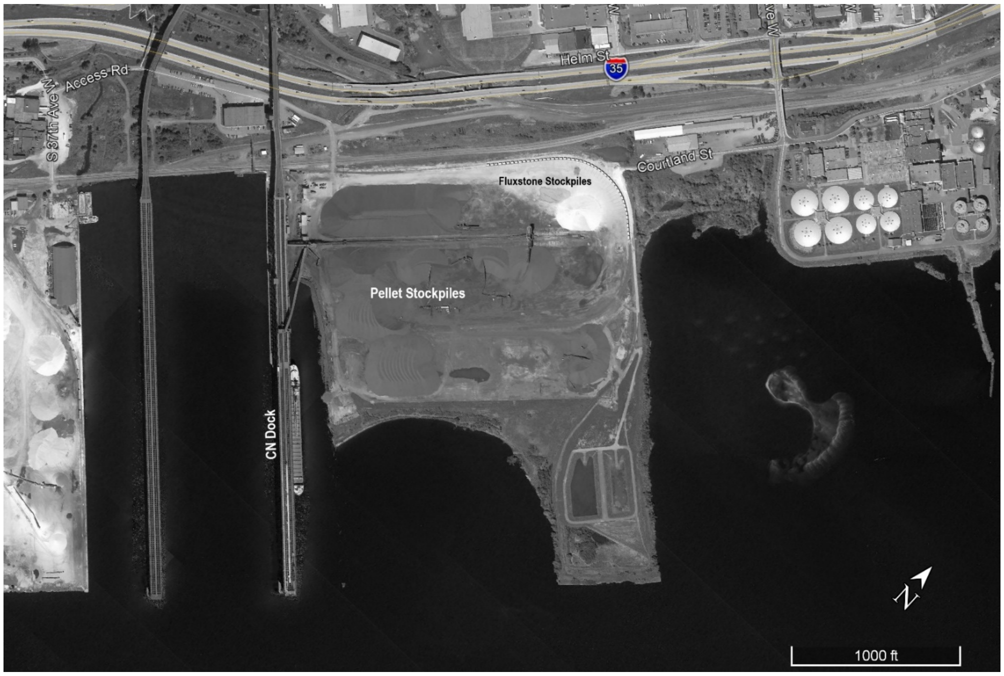


Figure 15-2: CN Dock Facilities - Duluth, MN

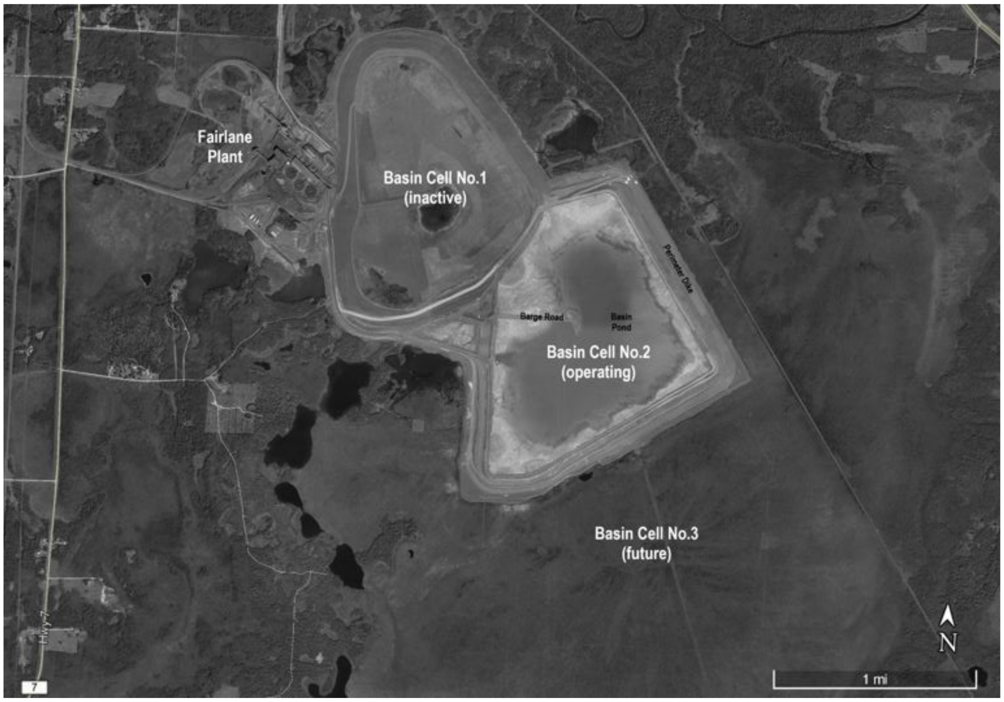
15.4 Tailings Disposal

United Taconite operates an iron ore mine and concentrating/pelletizing plant in Northern Minnesota. The site currently contains two tailings basin storage cells, which are Tailings Cell No. 1 and Tailings Cell No. 2. The dams forming the cells have been constructed over the life of the facility using coarse-fraction tailings starting in 1965. In 1999, tailings deposition in Tailings Cell No. 2 commenced and Tailings Cell No. 1 was closed in 2000. United Taconite is in the process of planning for construction of a new cell (Tailings Cell No. 3), which will be located south of the existing Tailings Cell No. 2.

The tailings cells were permitted as unlined facilities, with the foundation materials and tailings providing a low-permeability material to reduce seepage.

Two types of tailings are produced and placed within Tailings Cell No. 2: coarse-fraction tailings and fine-fraction tailings. The Fairlane Facility total tailings are classified before the fines-fraction tailings pump with a screw classifier. Approximately 25% of the total tailings are coarse-fraction tailings and trucked to the basin for dam construction material using 150-ton haul trucks. The remaining 75% are considered fine-fraction tailings and are pumped as slurry at a rate of approximately 11,000 gpm at 35% solids. The fine-fraction tailings are discharged around the basin perimeter, creating a low point or tailings pond, in the center of the basin. Two floating barge pumps operate in the tailings pond and are accessed via a barge access road constructed over fine-fraction tailings. The barges convey makeup water back to the Fairlane Facility.

The tailings storage basin layout is presented in Figure 15-3.



Source: Cliffs

Figure 15-3: Tailings Storage Basin Cells

15.4.1 Facility Description

15.4.1.1 Tailings Cell No. 1

Tailings were placed in Tailings Cell No. 1 from 1965 through 2000, and the facility was reclaimed.

The perimeter dam crest is approximately 3.6 mi long, and the dam has a maximum height of approximately 165 ft.

15.4.1.2 Tailings Cell No. 2

Construction of Tailings Cell No. 2 began in 1982, with tailings deposition commencing in 1999.

Foundation conditions for Tailings Cell No. 2 consists of granular basal till, lower lacustrine deposits, clayey glacial till, upper lacustrine deposits, end moraine deposits, and peat. The geotechnical model used in the stability analysis consisted of tailings, compressed peat, lacustrine clays, and glacial tills. A staged construction method was used to consolidate the peat layer and lacustrine soils that the embankment was founded on, increasing the shear strength of both materials.

Tailings Cell No. 2 has been, and continues to be, raised using coarse-fraction tailings hauled and placed at an interim slope of approximately 2 horizontal to 1 vertical (2H:1V) downstream slope, which is steeper than the 3H:1V design slopes, using heavy construction equipment to compact and construct the perimeter dike, with fine-fraction tailings being hydraulically discharged from the perimeter of the dike using variable discharge points. This results in a basin pond in the center of the basin, which serves as process makeup water source. Reclaimed process water is pumped to the mill from a floating barge pump deck. The facility was designed to contain the runoff from the six-hour Probable Maximum Precipitation (PMP event), and was not designed with a decant structure or spillway to release excess water from the basin.

The Tailings Cell No. 2 dam was constructed to a crest elevation of approximately 1,480 ft (Barr, 2020), which is a maximum height of 140 ft, and a perimeter dam crest length of approximately 3.8 mi. While SLR understands that the dam has been raised approximately 10 ft since Barr issued its 2020 report, the dam will have an ultimate dam height of approximately 220 ft.

15.4.1.3 Tailings Cell No. 3

Tailings Cell No. 3 will be adjacent to and in an area south of Tailings Cell No. 2. Tailings Cell No. 3 has not been constructed; however, SLR understands that the starter embankment construction is scheduled to commence in 2024.

Foundation conditions are expected to be similar to Tailings Cell No. 2, with thicker layers of peat. Based on the D’Appolonia design (D’Appolonia, 1980), the dam will have an ultimate height of approximately 145 ft.

15.4.2 Design and Construction

SLR was not provided with reports for the design, operations, and closure of Tailings Cell No. 1.SLR notes, however, that this cell was operated by the previous owner Eveleth Taconite, prior to the 2003 acquisition by Cliffs (Golder, 2008).

During operation of Tailings Cell No. 1, Eveleth Taconite retained D’Appolonia Engineers Inc (D’Appolonia) to design Tailings Cells No. 2 and 3. D’Appolonia (1980) designed Tailings Cells No. 2 and No. 3 to a crest elevation of 1,505. GEI Consultants, Inc. (GEI, 2013) noted that improved iron recovery resulted in less coarse material being produced for dam construction, which resulted in not having sufficient coarse fraction tailings material to construct the Tailings Cell No. 3 dam while Tailings Cell No. 2 was being constructed to a crest elevation of 1,505. Therefore, GEI designed a vertical raise for Tailings Cell No. 2, increasing the Tailings Cell No. 2 crest elevation from 1,505 ft to 1,560 ft, and shifting from modified centerline construction to upstream construction above an elevation of 1,505 ft (GEI, 2013).

GEI issued the vertical expansion design of Tailings Cell No. 2 (EI, 2013), and Gale-Tec Engineering (Gale-Tec) was considered the Engineer of Record (EOR) until June 2020.SLR understands that Cliffs has retained Barr to be the EOR for the Tailings Cells.Typical EOR services include the design (i.e., volumetrics, stability analysis, water balances, hydrology, seepage cut-off design, etc.), construction and construction monitoring, inspections (i.e., annual dam safety inspections) and instrumentation monitoring data review (i.e., regularly scheduled instrumentation monitoring and interpretation), to verify that the Tailings Storage Basin Cells are being constructed and operated by Cliffs as designed and to meet all applicable regulations, guidelines, and standards.

GEI (2013) referenced the slope stability FoS for Tailings Cell No. 2 with 3H:1V downstream slopes, and the flood storage requirements, meeting MDNR requirements for the currently designed Tailings Cell No. 2 crest elevation of 1,560 ft. SLR understands that Tailings Cell No. 2 downstream slopes have been, and are currently being, constructed at 2H:1V, which are steeper than noted in the GEI design report.

During the ongoing construction of the tailings dams, field instrumentation (such as piezometers and inclinometers) is monitored quarterly or more frequently, and action levels to monitor the performance have yet to be developed

SLR understands that Barr will be reviewing and validating Tailings Cell No. 3 (D'Appolonia, 1980) prior to construction commencing in 2024, which reflects operational information gained from Tailings Cell No. 2 and geotechnical information from more recent field programs.

15.4.3 Audits

Third-party audits have been performed on the Tailings Storage Basin Cells by Golder in 2007 and by AECOM in 2012SLR understands that Cliffs plans to perform a third-party audit for the Tailings Storage Basin Cells in 2022.

15.4.4 Inspections

Barr performed the most recent annual dam safety inspection (Barr, 2021). The inspection generally included visual observation of the crest and downstream toe of the Tailings Cell No. 1 and Tailings Cell No. 2 dams, as well as the crest of the abutment dam between the two tailings cells. No immediate concerns were identified during the inspection.

SLR has not been provided with any monitoring inspection reports.

15.4.5 Reliance on Data

SLR relies on the statements and conclusions of GEI, Barr, and Cliffs and provides no conclusions or opinions regarding the stability or performance of the listed dams and impoundments.

15.4.6 Recommendations

Cliffs has been operating the UTAC Tailings Cells since 1965, which is currently operating under the permit requirements of the Minnesota Department of Natural Resources Dam Safety Unit.United Taconite currently deposits tailings into a centerline-constructed dam perimeter. Upstream tailings dam raises, such as those to be carried out by Cliffs at UTAC for the No. 2 vertical expansion, are typically done in low-seismic zones and can be constructed using the coarse-fraction tailings (sand) material. This type of construction approach, however, requires comprehensive communication and documentation system, careful water management, monitoring of the dam and foundation performance, and the placement of tailings material to ensure that it meets the design requirements. To address these issues, Cliffs has retained Barr as the EOR, with the EOR designation being an industry standard for tailings management, as the EOR typically verifies that the Tailings Storage Basin Cells are being constructed and operated by Cliffs as designed and to meet all applicable regulations, guidelines, and standards.

Based on a review of the documentation provided, SLR has the following recommendations:

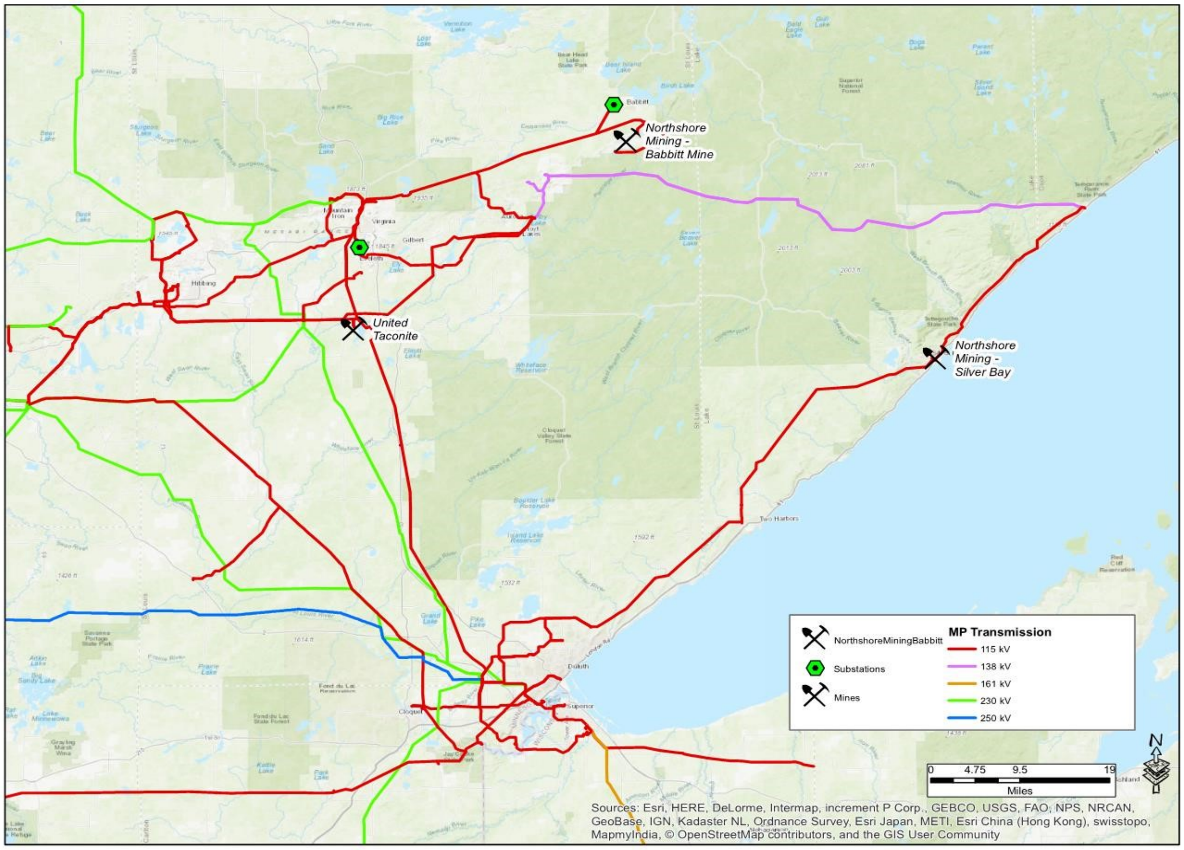
1. Prioritize the completion of an Operations, Maintenance and Surveillance (OMS) Manual for the TSF with the EOR in accordance with Mining Association of Canada (MAC) guidelines and other industry-recognized standard guidance for tailings facilities.
2. Document, prioritize, track, and close out in a timely manner the remediation, or resolution, of items of concern noted in TSF audits or inspection reports.
3. Establish an External Peer Review Team (EPRT) with experience in tailings management facilities similar to other Cliffs properties,
4. Considering the relatively recent transition from Gale-Tec to Barr as the EOR, Barr should confirm its scope and the schedule in which the review of the previous designs (D'Appolonia, 1980 and GEI, 2013) and transition of responsibility is to be completed.
5. Perform a stability analysis that represents the current and planned operational configuration used for construction of the tailings cells dams, using a consistent set of material parameters that are based on site-specific conditions. While it is not uncommon for a TSF to be designed with steeper side slopes during operations and shallower slopes at closure, a design needs to be presented for both conditions that clearly states the operational parameters, demonstrates that the facility is stable, and meets the design requirements.

15.5 Power

Power is supplied by Minnesota Power, a division of ALLETE, Inc.Two independent, 115 kV lines feed the Fairlane Facility substation. Substation transformers through the power distribution systems are owned by United Taconite. The TBN pit is fed from one dedicated, 115 kV line.For the 80 MW power demand under full rate, there is a capacity of 100 MVA.The operating load at the Thunderbird Mine and Fairlane Facility is 3.9 MW and 75 MW, respectively. Minnesota Power supplies the power to the Thunderbird Mine and Fairlane Facility through its existing electricity grid, which is interconnected to the grids of neighboring states (Figure 15-4).

In May 2016, Cliffs executed a new ten-year agreement with Minnesota Power for its UTAC and Northshore Babbitt Mine facilities. The agreement was approved by the Minnesota Public Utilities Commission (MPUC) in November 2016. The contract is based on monthly electrical energy and demand.

Two standby, diesel-driven generators rated at 1,050 kW keep vital equipment running in the case of a power loss.



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

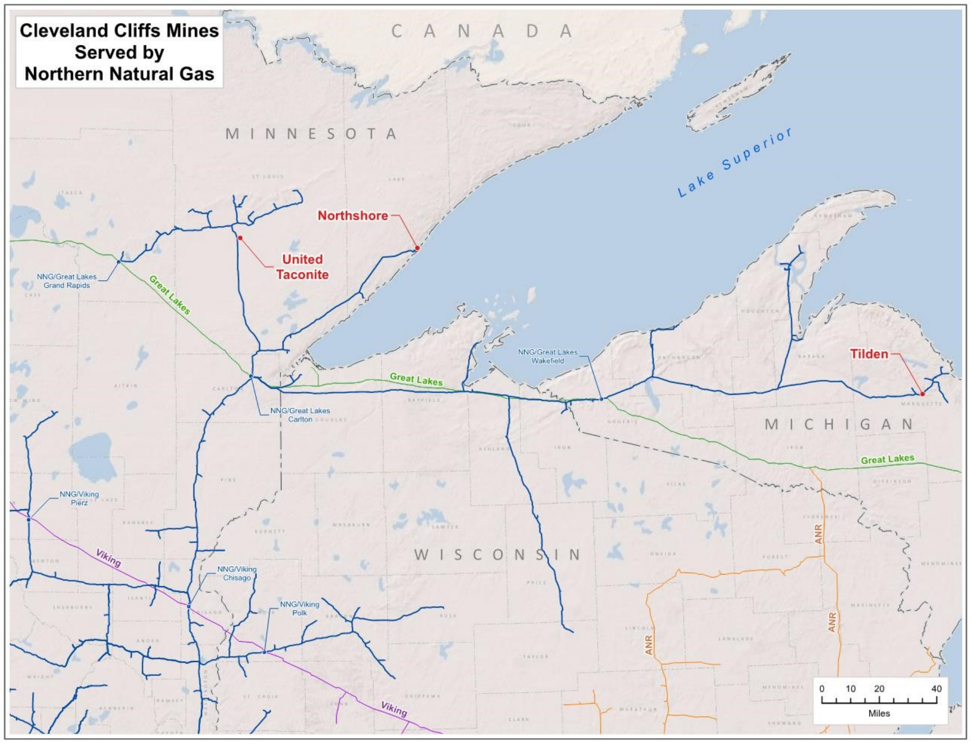
Source: Minnesota Power Company

Figure 15-4: Regional Electrical Power Distribution

15.6 Natural Gas

Natural gas is provided by Northern Natural Gas (NNG) and scheduled by Constellation EnergyGas is delivered to the processing plant using a high-pressure pipeline that connects into the North American network. Cliffs has a long-term contract providing for transport of natural gas on the NNG Pipeline for its mining and pelletizing operations. NNG has an extensive interstate pipeline system that travels through the Midwest and is interconnected to other major interstate pipelines (Figure 15-5).

NNG supplies the Fairlane Facility via a 10 in. pipeline at 70 psi. The line was designed and constructed for a flow capacity of 1,385 MCF/h supplying the Fairlane Facility.



Source: Northern Natural Gas Company

Figure 15-5: Regional Natural Gas Supply

15.7 Diesel, Gasoline, and Propane

The Thunderbird Mine has two, 20,000 gal, above-ground diesel fuel tanks. The Fairlane Facility has a single 20,000 gal, above-ground diesel fuel tank and one 10,000 gal, underground gasoline storage tank. Best Oil supplies diesel fuel to all of Cliffs' Minnesota operations, while Thompson Gas supplies propane. Small diesel and gasoline fueling stations are used for small maintenance equipment and fleet vehicles. There is sufficient fuel supply in the region to meet the requirements of the operation.

15.8 Communications

Each site has fiber optic connections into the Paul Bunyan Network. Radios are used at both the Thunderbird Mine and Fairlane Facility for communications between equipment dispatchers and foremen to direct activities and help maintain a safe working environment. Network files are backed up using EMC2 Data Domain Storage DeviceA full backup is performed once a week, and differential backups are performed throughout the week.

15.9 Water Supply

Water supply for the sites consists of a combination of potable water from the local utility, groundwater wells, river, and mine pits.

Makeup water sourced from the St. Louis River with a permitted maximum of 4.01 billion gallons per year.

Groundwater is extracted for the sole purpose of potable water with a permitted maximum of 13.5 million gallons per year.

In-pit dewatering activities have a permitted maximum of 6.1 billion gallons per year. Maximum in-pit dewatering discharge rates permitted under the current NPDES is 13.0 million gallons per day and 5.8 million gallons per day at selected discharge outfalls.

Septic and sanitary waste for the sites is provided by a combination of connection with local utility, onsite wastewater treatment facility, septic drain field systems, and septic holding tanks.

The project-wide water balance is relatively stable year over year. UTAC is operating well within permitted discharge and water intake limits and has the flexibility to manage unusually dry or wet conditions.

15.10 Thunderbird Mine Support Facilities

Mine operations, maintenance, engineering, geology, and safety departments are all located in Eveleth at the Thunderbird Mine offices (Figure 15-6).

A truck shop and warehouse buildings are located on the site. The truck shop has a total of 17 bays used for the maintenance of production trucks, excavators (shovels), and a large production loader.

Explosive delivery and handling is performed by contractors. There is no storage of bulk explosives at the site, just primers.

Security is provided by General Security Services Corporation (GSSC) and is managed by the United Taconite Safety department.Hazardous waste disposal is contracted to OSI Environmental, Inc. (OSI) and is managed by the United Taconite Environmental department.

Workshops and warehouses for maintenance and spare parts storage are on site and include:

- Welding and machine tools
- Hydraulic hose supply and tools
- Electrical testing equipment
- Tire storage and changing tools
- Diesel fuel and oil storage and transfer equipment
- Hazardous waste storage and transfer location
- Firefighting equipment

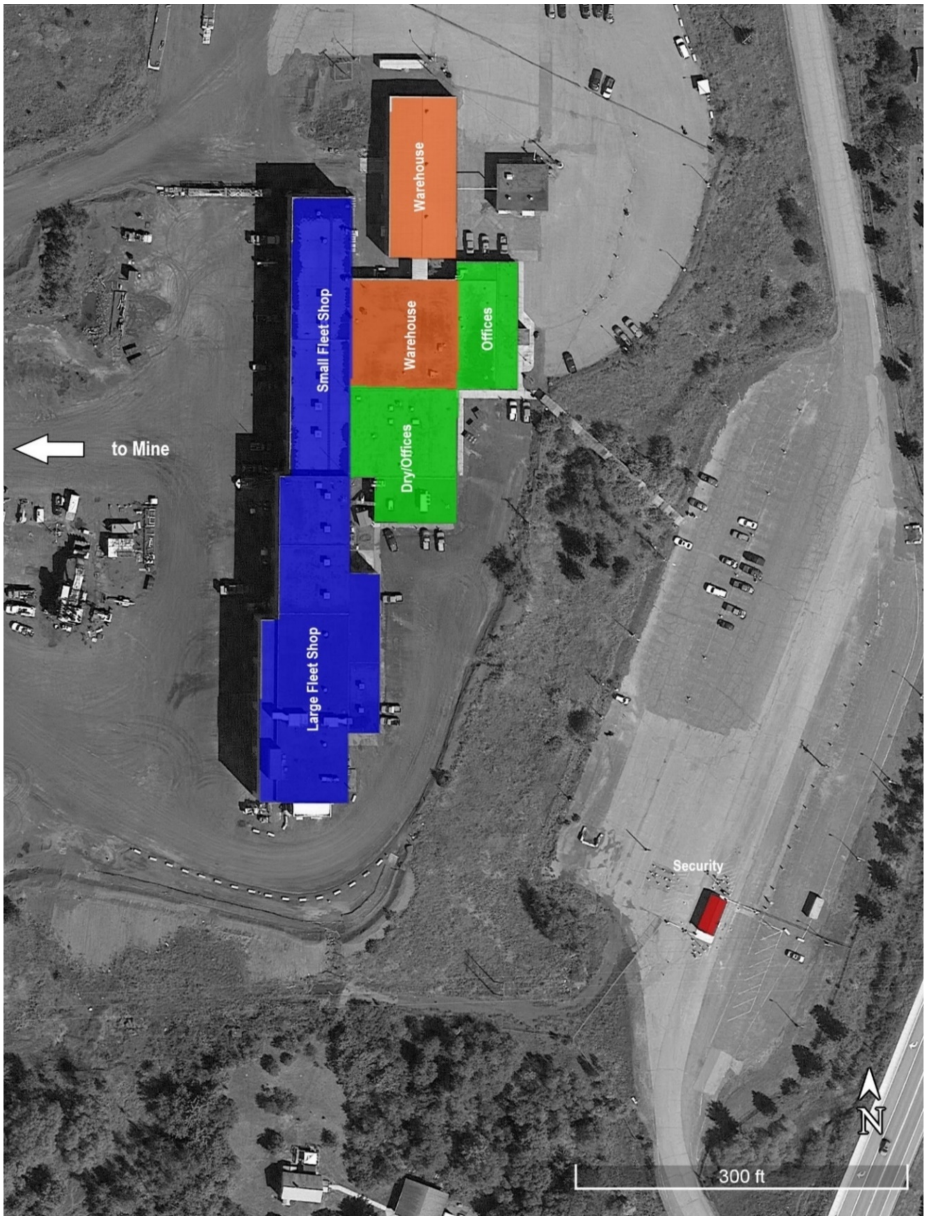


Figure 15-6: Mine Support Facilities

15.11 Fairlane Plant Support Facilities

The administration facilities are located at Forbes, Minnesota, one mile north of the Fairlane Facility site. They include an office building that houses the management and financial staff, environmental personnel, human resources, safety personnel, and other support staff (Figure 15-7).

Plant operations, maintenance, process, reliability, project engineering, and plant safety departments are all housed in the office complex adjacent to the Fairlane Facility. A laboratory is located inside the concentrator building. Samples from the processing facility are analyzed there. The laboratory is ISO-certified to iron industry standard procedures.

Security is provided by GSSC and is managed by the United Taconite Safety department. Hazardous waste disposal is contracted to OSI and is managed by the United Taconite Environmental department.

Workshops and warehouses for maintenance and spare parts storage are on site and include:

- Administration offices
- Four-bay, enclosed mobile equipment shop with 20-ton crane
- Welding and machine tools
- Hydraulic hose supply and tools
- Electrical repair and testing equipment
- Tire storage and changing tools
- Diesel fuel storage and transfer equipment
- Storage for used oil
- Hazardous waste storage and transfer location
- Firefighting equipment
- Parking

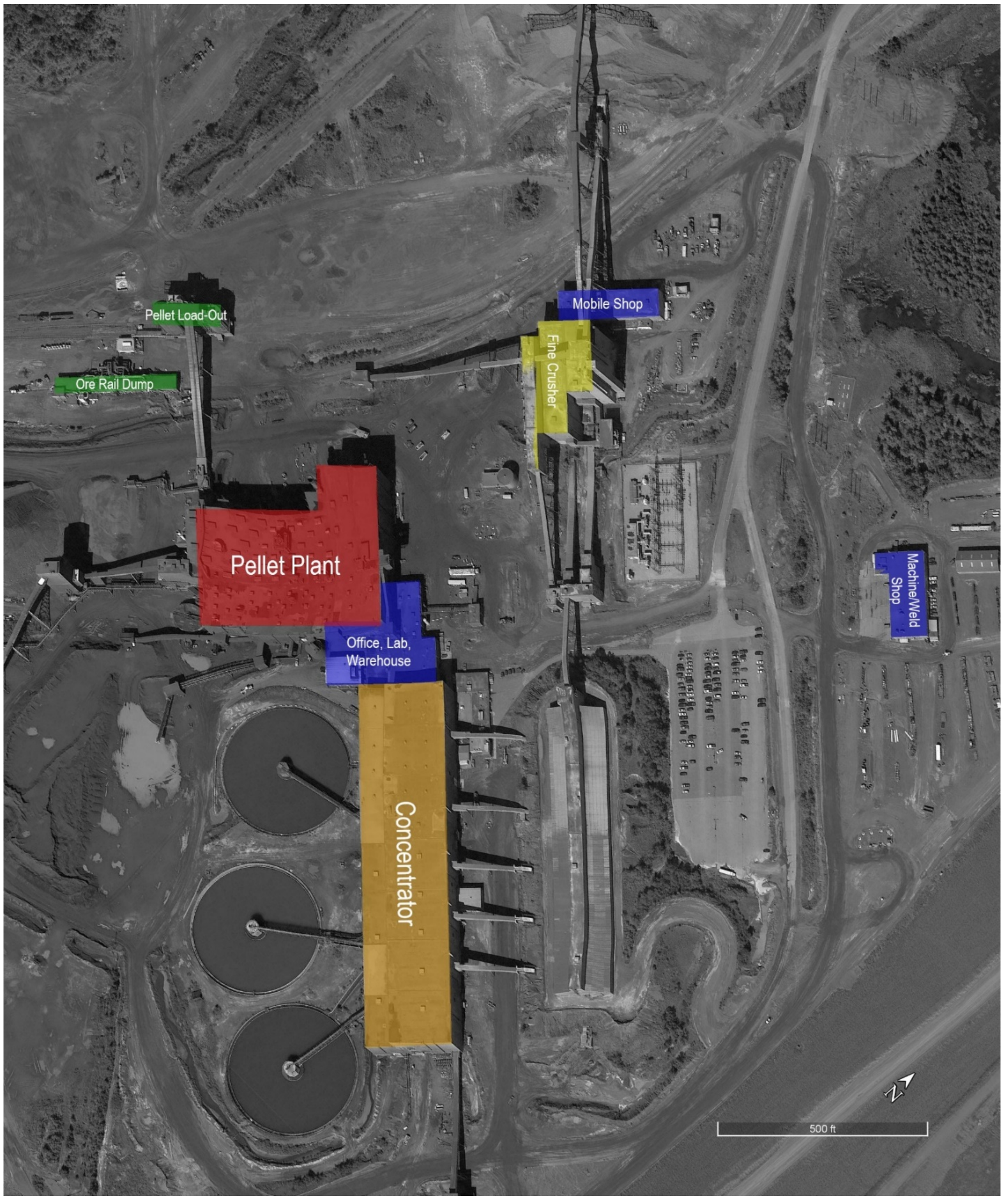


Figure 15-7: Fairlane Plant Facilities

16.0 MARKET STUDIES

16.1 Markets

Note that while iron ore production is listed in long or gross tons (2,240 lb), steel production is normally listed in short tons (2,000 lb) or otherwise noted.

Cliffs is the largest producer of iron ore pellets in North America. It is also the largest flat-rolled steel producer in North America. In 2020, Cliffs acquired two major steelmakers, ArcelorMittal USA (AMUSA), and AK Steel (AK), vertically integrating its legacy iron ore business with steel production and emphasis on the automotive end market.

Cliffs owns or co-owns five active iron ore mines in Minnesota and Michigan. Through the two acquisitions and transformation into a vertically integrated business, the iron ore mines are primarily now a critical source of feedstock for Cliffs' downstream primary steelmaking operations. Based on its ownership in these mines, Cliffs' share of annual rated iron ore production capacity is approximately 28 million tons, enough to supply its steelmaking operations and not have to rely on outside supply.

In 2021, with underlying strength in demand for steel, the price reached an all time high. It is expected to remain at historically strong levels going forward for the foreseeable future. In 2020, North America consumed 124 million tons of steel while producing only 101 million tons, which is consistent with the historical trend of North America being a net importer of steel. That trend is expected to continue going forward, as demand is expected to outpace supply in North America. Given the demand, it will likely be necessary for most available steelmaking capacity to be utilized.

On a *pro-forma* basis, in 2019 Cliffs shipped 16.5 million tons of finished, flat-rolled steel. The next three largest producers were Nucor with 12.7 million tons, U.S. Steel with 10.7 million tons, and Steel Dynamics with 7.7 million tons. In 2019, total US flat-rolled shipments in the United States were approximately 60 million tons, so these four companies make up approximately 80% of shipments.

With respect to its BF capacity, Cliffs' ownership and operation of its iron ore mines is a primary competitive advantage against electric arc furnace (EAF) competitors. With its vertically integrated operating model, Cliffs is able to mine its own iron ore at a relatively stable cost and supply its BF and direct reduced iron (DRI) facilities with pellets in order to produce an end steel or hot briquetted iron (HBI) product, respectively. Flat-rolled EAFs rely heavily on bushelling scrap (offcuts from domestic manufacturing operations and excludes scrap from obsolete used items), which is a variable cost. The supply of prime scrap is inelastic, which has caused the price to rise with the increased demand. S&P Global has stated that the open-market demand for scrap could grow by nearly 9 million tons through 2023 as additional EAF capacity comes online, with the impact of the scrap market to continue to tighten as all new steel capacity slated to come online is from EAFs (S&P Global Platts, news release, March 18, 2021).

In addition to its traditional steel product lines, Cliffs-produced steel is found in products that are helping in the reduction of the global emissions and modernization of the national infrastructure. For example, Cliffs' research and development center has been working with automotive manufacturer customers to meet their needs for electric vehicles. Cliffs also offers a variety of carbon and plate products that can be used in windmills, while it is also the sole producer of electrical steel in the United States. Additionally, in Cliffs' opinion, future demand for steel given its low CO_2 emissions positioning will increase relative to other materials such as aluminum or carbon fiber.

Cliffs is uniquely positioned for the present and future due to a diverse portfolio of iron ore, HBI, BFs, and EAFs generating a wide variety of possible strategic options moving forward, especially with iron ore. For instance, Cliffs has the optionality to continue to provide iron ore to its BFs, create more DRI internally, or sell iron ore externally to another BF or DRI facility.

The necessity for virgin iron materials, like iron ore, in the industry is apparent as EAFs rely on bushelling scrap or metallics. As of 2020, EAFs accounted for 71% of the market share, a remarkably high percentage among major steelmaking nations. Because scrap cannot be consistently relied upon as feedstock for high-quality steel applications, the industry needs iron ore-based materials like those provided by Cliffs to continue to make quality steel products.

The US automotive business consumes approximately 17 million tons of steel per year and is expected to consume around or at this level for the foreseeable future. Cliffs' iron ore reserves provide a competitive advantage in this industry as well, due to high quality demands that are more difficult to meet for scrap-based steelmakers. As a result, Cliffs is the largest supplier of steel to the automotive industry in the United States, by a large margin.

Table 16-1 shows the historical pricing for hot rolled coil (HRC) product, Bushelling Scrap feedstock, and IODEX iron ore indexes for the last five years. The table includes the 2021 pricing for each index, which shows a significant increase that is primarily driven by demand.

Table 16-1: Five-Year Historical Average Pricing
Cleveland-Cliffs Inc. – United Taconite Property

Indices	2017	2018	2019	2020	2021	5 Yr. Avg.
U.S. HRC ($/short ton)	620	830	603	588	1611	850
Busheling ($/gross ton)	345	390	301	306	562	381
IODEX ($/dry metric ton)	71	69	93	109	160	100

The economic viability of Cliffs' iron ore reserves will in many cases be dictated by the pricing fundamentals for the steel it is generated for, as well as scrap and seaborne iron ore itself.

The importance of the steel industry in North America, and specifically the USA, is apparent by the actions of the US federal government by implementing and keeping import restrictions in place. Steel is a product that is a necessity to North America. It is a product that people use every day, often without even knowing. It is important for middle-class job generation and the efficiency of the national supply chain. It is also an industry that supports the country's national security by providing products used for US military forces and national infrastructure. Cliffs expects the US government to continue recognizing the importance of this industry and does not see major declines in the production of steel in North America.

For the foreseeable future, Cliffs expects the prices of all three indexes to remain well above their historical averages, given the increasing scarcity of prime scrap as well as the shift in industry fundamentals both in the US and abroad.

16.2 Contracts

16.2.1 Pellet Sales

Since Cliffs' 2020 acquisition of AK and AMUSA's steelmaking facilities, UTAC pellets are shipped to Cliffs' Midwestern US steel mills.

For cash flow projections, Cliffs uses a blended three-year trailing average revenue rate based on the dry standard pellet from all Cliffs mines, calculated from the blended wet pellet revenue average of $98/WLT Free on Board (FOB) Mine as shown in Table 16-2.Pellet prices are negotiated with each customer on long-term contracts based on annual changes in benchmark indexes such as those shown in Table 16-1 and other adjustments for grade and shipping distances.

Table 16-2: Cliffs Consolidated Three-Year Trailing Average Wet Pellet Revenue
Cleveland-Cliffs Inc. – United Taconite Property

Description	2017	2018	2019	3YTA
Revenue Rate ($/WLT)	88.02	105.64	99.50	98.00
Total Pellet Sales (MWLT)	18.7	20.6	19.4	19.5

SLR examined annual pricing calculations provided by Cliffs for the period from 2017 to 2019 for external customers, namely AK.The terms appear reasonable. It should be noted that Cliffs has subsequently acquired AK and AMUSA steelmaking facilities in 2020, making the company a vertically integrated, high-value steel enterprise, beginning with the extraction of raw materials through the manufacturing of steel products, including prime scrap, stamping, tooling, and tubing.

For the purposes of this TRS, it is assumed that the internal transfer pellet price for Cliffs' steel mills going forward is the same as the $98/WLT pellet price when these facilities were owned by AK and AMUSA.Based on macroeconomic trends, SLR is of the opinion that Cliffs pellet prices will remain at least at the current three-year trailing average of $98/WLT or above for the next five years.

16.2.2 Operations

Major current suppliers for the United Taconite operation include, but not limited to, the following:

- Electrical Grid Power: Minnesota Power
- Natural Gas: NNG with scheduling by Constellation Energy
- Diesel Fuel: Best Oil
- Propane: Thompson Gas
- Pellet Rail Transport and Duluth Port Ship loading: CN Railway

17.0 ENVIRONMENTAL STUDIES, PERMITTING, AND PLANS, NEGOTIATIONS, OR AGREEMENTS WITH LOCAL INDIVIDUALS OR GROUPS

The SLR review process for UTAC included updating information that Cliffs had developed as part of its draft 2019 SK-1300 report.SLR also conducted a site visit at UTAC in 2019. SLR has not had sight of or reviewed environmental studies, management plans, permits, or monitoring reports. The original and updated information included in this section is based on the information provided by the Cliffs project team.

17.1 Environmental Studies

United Taconite conducted several environmental assessments for specific projects over time that have supported different aspects of its current operation. Each of those studies culminated in a determination by the relevant state and/or federal authorities to grant permits to construct and operate UTAC's facilities. The relevant historical studies are listed below. There are no environmental impact studies (EIS) in progress at this time.

- 1975 Draft and 1976 Final Environmental Impact Statement (State) for a facility expansion project
- 1980 Supplemental Environmental Impact Statement (State) related to the 1976 EIS for a facility expansion project
- 1981 Environmental Report (Federal) supplementing information supportive of a wetland application associated with a tailings disposal plan
- 1987 Environmental Assessment Worksheet (State) for a northern mine extension
- 2021 Environmental Review Needs Determination (State) concluding that no EIS is required for Tailings Cell No. 3 construction

United Taconite has been operating for over 50 years, and baseline and other environmental studies have been undertaken as required to support various approvals over the site's operating history. Currently, additional environmental studies, including collecting new or updated baseline information, are undertaken on an as-required basis to support new permit applications or to comply with specific permit conditions. Baseline wetland monitoring is currently underway as part of forthcoming wetland permits being applied for Cell 3 construction.

17.2 Environmental Requirements

United Taconite maintains an environmental management system (EMS) that is registered to the international ISO 14001:2015 standard.The ISO standard requires components of leadership commitment, planning, internal and external communication, operations, performance evaluation, and management review. United Taconite's continued registration to the ISO standard is evaluated annually through internal auditors and every other year through external auditors.

Cliffs maintains a regulatory matrix as part of its EMS, as well as a regulatory reporting calendar tracker. United Taconite conducts internal auditing of its compliance system on a regular basis, and Cliffs corporate conducts a formal compliance audit on a routine basis.

Impacts to surrounding communities (noise, vibration, etc.) are considered by the EMS, and views of interested parties are part of the ranking process when ranking environmental aspects.

17.2.1 Site Monitoring

United Taconite operates through permission granted by multiple permits, which are summarized in Table 17-1. The permits contain requirements for site monitoring including air, water, waste, and land aspects of the UTAC operation. The permit-required data are maintained by the facility, and exceptions to the monitoring obligations, if they occur, are reported to the permitting authority. Monitoring is conducted in compliance with permit requirements, and management plans are developed as needed to outline protocols and mitigation strategies for specific components or activities. Monitoring and management programs currently undertaken in compliance with United Taconite's existing permits include:

- Air Quality: Management plans including fugitive dust control plans, operation and maintenance plans, and startup, shutdown, and malfunction plans; monitoring of fugitive sources and stacks, visible dust emission monitoring at the tailings facility; and greenhouse gas (GHG) emissions monitoring and reporting.
- Noise and Vibration: Blast management plans including vibration monitoring.
- Surface Water: Routine water quality sampling in receiving waters; quantity of water takings and discharges.
- Groundwater: Routine water quality sampling from mine dewatering and at plant wells; quantity of water takings.
- Wetlands: monitoring of nearby wetlands where the potential for an impact has been identified, including potential indirect impacts, where appropriate.
- Wildlife: monitoring of endangered species in accordance with specific permit conditions.
- Infested waters operating and monitoring plan associated with the mine dewatering permit.

There are no specific management plans related to social aspects in place.

In terms of compliance, there are currently no outstanding enforcement items at the facility.

The State and Federal government conduct regional ecologic monitoring in the vicinity of the facility operations. Two recent examples of such monitoring include:

- U.S. Environmental Protection Agency (EPA) conducted its residual risk and technology review (RTR) of the Taconite NESHAP (40 CFR 63). EPA's final rule on July 28, 2020 documents that risks from the Taconite Iron Ore Processing source category are acceptable, and the current standards provide a margin of safety to protect public health and prevent an adverse environmental effect.
- The State of Minnesota conducts regional watershed monitoring to assess the overall health of waterbodies throughout the state including water quality and macroinvertebrate and fish population diversity and health. The State may develop watershed management tools for water bodies of concern such as Total Maximum Daily Load (TMDL) plans. United Taconite is not currently subject to any TMDL-based load restrictions.

17.2.2 Water

United Taconite presently maintains NPDES/ State Disposal System (SDS) permits for both the Thunderbird Mine in Eveleth, Minnesota and the Fairlane Facility in Forbes, Minnesota. It is understood that the following are permitted under the mine NPDES Permit: six mine pit dewatering outfalls, two outfalls from the crushers, and one stormwater outfall from the shops area. The following are permitted under the processing plant NPDES Permit: three surface discharge seeps from the tailings basin. All discharges are part of the St. Louis River/Lake Superior watershed.These discharge outfalls have provided adequate permitted capacity to move water as necessary to support the mining process.

United Taconite maintains ten permits through the water appropriations program that facilitate surface and groundwater use with adequate capacity for the mine and plant sites.

Monthly discharge monitoring reports are submitted under the NPDES/SDS programStormwater inspections are conducted quarterly per the mine and plant SWPPPs.

UTAC’s current mine life is projected at 51 years as referenced in section 19.1 of this TRS. This long life makes preparation of a detailed closure plan difficult to undertake, as the final configurations of the Thunderbird Mine and Fairlane Facility are not established. Minnesota Rule 6130.4600 does not require a plan for deactivation of the mine until at least two years in advance of deactivation of a mining area. No plan has yet been required or requested by the State agency, with the exception of a data collection plan that is intended to collect data over the coming years of operation to inform an eventual closure plan. See also discussion in 17.4.

17.2.3 Hazardous Materials, Hazardous Waste, and Solid Waste Management

United Taconite typically generates small quantities of hazardous waste, the Fairlane Facility is a small quantity generator and the Thunderbird Mine is a very small quantity generator, per Minnesota hazardous waste rules and generation quantity and according to the federal Resource Conservation and Recovery Act (RCRA).Hazardous waste management is authorized by permits from the applicable regulatory authorities. See Table 17-1 for a full list of permits. United Taconite generates other waste materials typical of any large industrial site and manages those wastes offsite through approved vendors.

17.2.4 Tailings Disposal, Mine Overburden, and Waste Rock Stockpiles

Requirements for tailings disposal are discussed in section 15.4 of this TRS. Tailings disposal is authorized by permits from the applicable regulatory authorities. See Table 17-1 for a full list of permits.

Because iron ore geology is different from some other mineralized ore bodies, acid-rock drainage is not a concern with the iron ore bodies and associated tailings in Minnesota. Moreover, EPA itself describes the iron ore mining and beneficiation process as generating wastes that are “earthen in character.” Chemical constituents from iron ore mining include iron oxide, silica, crystalline silica, calcium oxide, and magnesium oxide — none of which are Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substancesThe acid-neutralizing potential of carbonates in iron ore offsets any residual acid rock drainage risks, leading to pit water that naturally stabilizes at a pH of 7.5-8.5.

Over 20 years of monitoring of the effluent from the tailings basins from the limited surface discharges identified in the NPDES/SDS permit has not indicated any cause for concern of acid rock drainage or metals leaching. United Taconite continues to monitor any effluent from these basins going forward as prescribed under its applicable permits.

Regular inspections of dams and waste facilities are not mandated for UTAC; however, United Taconite proactively conducts annual inspections of the tailings impoundment with the Engineer of Record.

Requirements for the disposal of mine overburden and non-mineralized or lean rock are discussed in section 13.5 of this TRS. Stockpiling of these materials is authorized by permits from the applicable regulatory authorities. See Table 17-1 for a full list of permits.

17.3 Operating Permits and Status

UTAC operates through permission granted by multiple permits, which are summarized in Table 17-1.

Termination has been requested for the “Storage for Liquid Substances at a Major AST Facility” permit as the 1,000,000 gal storage tank has been removed, thereby dropping the facility below the threshold for requiring a major AST permit.

The temporary permit for Temporary Pumping for Seppi Building is applied for on an as-needed basis and is currently not active.

While permitting always involves varying degrees of risk due to external factors, United Taconite has indicated that it has a demonstrated record of obtaining necessary environmental permits without unduly impacting the facility operational plan. United Taconite is not aware of any issues that could lead to future operation issues that are not otherwise being actively addressed at this time, i.e., active permitting work associated with Tailings Cell No. 3.

The following permit applications are pending with a permitting authority:

Minnesota Pollution Control Agency

- Fairlane Facility air permit: Minor modification for emergency generator; minor modification for fluxstone trucking; major modification to incorporate stack cap emission estimation methodology; and minor modification for sinter reclaim.
- Thunderbird Mine air permit: Minor modification for portable heaters and generator; and Minor modification for pollution control equipment replacement.
- Fairlane Facility water quality permit: Updated reissuance application to support Tailings Cell No. 3.

Minnesota Department of Natural Resources

- Wetland Conservation Act application to support Tailings Cell No. 3, United States Army Corps of Engineers
- Modification of already-issued permit for wetland impacts related to Tailings Cell No. 3.

It is understood that all required permits are in place.

Table 17-1: List of Major Permits and Licenses
Cleveland-Cliffs Inc. – United Taconite Property

Permit No	Description	Type	Jurisdiction	Agency	Status
13700113	Title V Air Emissions Permit # 13700113-007 (Fairlane Facility)	Air	State	MPCA	Active, Administratively Extended
13700011	Title V Air Emissions Permit # 13700011-001 (Thunderbird Mine)	Air	State	MPCA	Active, Administratively Extended
MN0052116	NPDES / SDS Permit MN0052116 (Fairlane Facility)	NPDES/SDS	State	MPCA	Active, Administratively Extended
MN0044946	NPDES / SDS Permit MN0044946 (Thunderbird Mine)	NPDES/SDS	State	MPCA	Active, Administratively Extended
MNT280011073	Hazardous Waste Generator License MNT280011073 (Fairlane Facility) (SQG)	Hazardous Waste	State	MPCA	Active
MND071507644	Hazardous Waste Generator License MND071507644 (Thunderbird Mine) (SQG)	Hazardous Waste	State	MPCA	Active
WTSF-113	Waste Tire Storage Facility Permit WTSF-113	Waste Tire	State	MPCA	Active
63-0691	# 63-0691 - St. Louis River Make-up Water (Dam)	Water Appropriation	State	MDNR	Active
63-1089	# 63-1089 - General Office Well	Water Appropriation	State	MDNR	Active
75-2130	# 75-2130 - South Crusher Wells	Water Appropriation	State	MDNR	Active
75-2137	# 75-2137 - Mine Dewatering	Water Appropriation	State	MDNR	Active
81-2043	# 81-2043 - Fairlane Concentrator Wells	Water Appropriation	State	MDNR	Active
81-2044	# 81-2044 - Fairlane Crude Pocket Well	Water Appropriation	State	MDNR	Active
81-2045	# 81-2045 - Fairlane Shops Well	Water Appropriation	State	MDNR	Active
81-2046	# 81-2046 - Fairlane Fuel Handling Wells	Water Appropriation	State	MDNR	Active
75-2131	# 75-2131 - Snowden Creek Diversion (consolidated 03/11/2005)	Protected Waters Permit	State	MDNR	Active
75-2141	# 75-2141 - Snowden Creek Diversion, SE1/4, NW1/4, S6, T57, R17 (consolidated with 75-2131)	Protected Waters Permit	State	MDNR	Active
77-2119	# 77-2119 - 72" x 60' culvert, Long Lk. Crk, S5, T57, R17	Protected Waters Permit	State	MDNR	Active

Permit No	Description	Type	Jurisdiction	Agency	Status
78-2123	# 78-2123 - 60” x 100’ culvert, Snowden Crk, SE1/4, NW1/4, S6, T57, R17 (consolidated with 75-2131)	Protected Waters Permit	State	MDNR	Active
78-2065	# 78-2065 - Stream # 1 Diversion, S7 & 18, T57, R17	Protected Waters Permit	State	MDNR	Active
78-2165 & 78-2165A	# 78-2165A - Long Lk. Crk. Channelization, NE1/4, S36, T57, R17	Protected Waters Permit	State	MDNR	Active
88-2129	# 88-2129 - Snowden Crk. Diversion, SE1/4, NW1/4, S6, T57, R17 (consolidated with 75-2131)	Protected Waters Permit	State	MDNR	Active
96-2105	# 96-2105	Protected Waters Permit	State	MDNR	Active
81-2146	# 81-2146 - Tailings Dam Permit (Basins #2 & #3)	Reclamation/Operating Permit	State	MDNR	Active
---	Permit to Mine: Issued to Eveleth Taconite and Eveleth Expansion. Including all amendments, assignments, and/or modifications	Reclamation/ Operating Permit	State	MDNR	Active
various	Wells	Wells	State	MDH	Active
various	ISTS Certificates of Compliance	Individual Sewage Treatment System	County	St. Louis County	Active
various	Sewage Treatment Construction Permits	Sewage Treatment Construction Permits	County	St. Louis County Health Department	Active
88-322	Act of Congress P.L. 88-322 - Construction of St. Louis River Dam	Dam	Federal	US ACE	Active
81-172-13	Section 404 Permit # 81-172-13 (Basin 2 & 3 - requires Basin 1 wetland test plots)	Wetlands	Federal	US ACE	Active
91-154-02	Section 404 Permit # 91-154-02	Wetlands	Federal	US ACE	Active
01-06285	Section 404 Permit # 01-06285-TWP	Wetlands	Federal	US ACE	Active
2006-4341	Section 404 Permit # 2006-4341-TWP	Wetlands	Federal	US ACE	Active
2014-00462	Section 404 Permit # 2014-00462-DWW (Superhighway Ditch)	Wetlands	Federal	US ACE	Active
2017-01089	Section 404 Permit # 2017-01089-DWW (Hwy 53)	Wetlands	Federal	US ACE	Active
22-11072-03	NRC Material License # 22-11072-03 Amendment 15	Radiation Sources	Federal	US NRC	Active
3-MN-137-33-6C-00329	Explosives Permit # 3-MN-137-33-6C-00329	Explosives Permit	Federal	US ATF	Active

Notes:

1. MDH: Minnesota Department of Health
2. MDNR: Minnesota Department of Natural Resources MPCA: Minnesota Pollution Control Agency
3. US ACE: United States Army Corps of Engineers
4. US NRC: United States Nuclear Regulatory Commission

Regulatory issues that could have a bearing on United Taconite's current plans to address any issues related to environmental compliance and permitting are actively monitored and disclosed in Cliffs' 10-K: Part I Environment, which has discussion relevant to:

- Minnesota's Sulfate Wild Rice Water Quality Standard
- Evolving water quality standards for conductivity; Definition of "Waters of the United States" Under the Clean Water Act
- Mercury Total Maximum Daily Load (TMDL) and Minnesota Taconite Mercury Reduction Strategy
- Climate Change and GHG Regulation
- Regional Haze FIP Rule
- Conductivity
- Regulation of Discharges to Groundwater

17.4 Mine Closure Plans and Bonds

UTAC's current mine life is projected at 51 years as referenced in section 13.4 of this TRS. This long life makes preparation of a detailed closure plan difficult to undertake, as the final configuration of the Thunderbird Mine and Fairlane Facility are not yet established. Minnesota Rule 6130.4600 does not require a plan for deactivation of the mine until at least two years in advance of deactivation of a mining area. No plan has yet been required or requested by the State agency with the exception of a data collection plan that is intended to collect data over the coming years of operation to inform an eventual closure plan. As a matter of good mining practice, United Taconite seeks to conduct progressive reclamation throughout its mining life to minimize risk and costs at closure. United Taconite actively reclaims stockpiles that have no further planned use, consistent with the State of Minnesota mining rule requirements.

Cliffs performs an annual review of significant changes to each operation's Asset Retirement Obligation (ARO) cost estimates.Additionally, Cliffs conducts an in-depth review every three years to ensure that the ARO legal liabilities are accurately estimated based on current laws, regulations, facility conditions, and cost to perform services. Cost estimates are conducted in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 410.FASB ARO estimates comply with rules set forth by the United States General Accepted Accounting Principles (US GAAP) and the SEC, and those costs are reported as part of Cliffs' SEC disclosures.Arcadis calculated the 2020 ARO legal obligation closure and reclamation costs associated with project deactivation to be $69.8 million (Arcadis, 2020). The total ARO liability for Cliffs is $74 million; to calculate the total ARO liability, Cliffs deducts Arcadis' specified contingency value and adds Cliffs' accounting policy contingency at 15% and Cliffs' accounting policy market risk at 4%. SLR notes that there are differences between the ARO estimate and the book value calculated by Cliffs due to the long life of the operation.

While a formal closure plan has not been established, United Taconite worked with a third party to develop a site-specific estimate of actual closure and reclamation costs that considers likely approaches and techniques to close the facility. Cliffs indicated that from a water management perspective, the CCP includes closure of the active cell of the tailings basin similar to the currently closed Tailings Cell No. 1, with no outlet required, and allowing the Thunderbird Mine pits to naturally refill with groundwater. No outfall is anticipated on the Property at this time.

SLR cannot comment on adequacy of the closure costing and the CCP based on currently available information.

17.4.1 Post-Performance or Reclamations Bonds

Current requirements for performance or reclamation bonds are:

- Performance Bond: Assurance of performance under the Water Supply Contingency Plan with Cliffs' Minorca Mine, associated with the pumping of the Rouchleau Pit. $25,000.00
- Performance Bond: Assurance of reclamation in the areas of the Auburn pit and Highway 53 corridor. $90,759.63
- Letter of Credit: Assurance of reclamation in the areas of the Auburn pit and Highway 53 corridor. $22,689.91

17.5 Social and Community

Cliffs has been investing in the region for over a century, including direct employment and contributions to state, local, and taconite taxes. Taconite taxes contribute to an existing government-administered property tax credit program for people living in the Mesabi Iron Range mining area funded through mining production taxes. SLR is not aware of any formal commitments to local procurement and hiring; however, Cliffs has indicated that it has long-standing relationships with local vendors and also purchases through local and regional services and supplies.

Cliffs' employees make contributions to local United Way chapters through donations that are supported with a matching contribution from the company. Employees also serve as board members and volunteers for the United Way. Another initiative includes agreements with local municipalities or organizations to make Cliffs-owned and leased land that is not utilized for mining available for local community use including trails used for snowmobiling, biking, and ATV use. Cliffs' goal is to work collaboratively with stakeholders to support activities that are of benefit to the communities in which the company operates.

Regarding UTAC expansions and impacts to communities, no moves/buy-outs are required, and there are no new issues that are not being actively managed by Cliffs' operating practices.

SLR is not able to verify adequacy of management of social issues and what the general issues raised are but understands that Cliffs has a positive relationship with stakeholders and that in the event of a complaint, Cliffs works directly with affected community members to develop a mutually acceptable resolution. Public affairs representatives from Cliffs formally engage with the community on an ongoing basis and serve as the face of the company. They sit on boards of community and business organizations at regional and local levels, participate in discussions with government officials, and act as a point of contact within the community. In doing so, they keep stakeholders apprised of critical issues to the operations, understand important topics in the community, and seek to listen to any questions or concerns. Cliffs indicated that this strategy allows it to maintain an ongoing relationship with stakeholders and collaborate with communities to find solutions should any issues arise. Cliffs' Public/Government Affairs maintains a list of stakeholders for Cliffs iron ore mine operations.

18.0 CAPITAL AND OPERATING COSTS

Cliffs' forecasted capital and operating costs estimates are derived from annual budgets and historical actuals over the long life of the current operation. According to the American Association of Cost Engineers (AACE) International, these estimates would be classified as Class 1 with an accuracy range of -3% to -10% to +3% to +15%. All unit rates are reported in WLT pellets.

18.1 Capital Costs

Capital costs were derived from current levels and work of similar scope based on the Q2 2021 forecast. Table 18-1 shows the productive and sustaining capital cost forecast for the five-year period from 2022 to 2026, which totals $248.1 million, or $9.60/WLT pellet. This unit rate is higher compared to previous years, where UTAC's sustaining and productive capital costs less expansion-related projects averaged between $3.00/WLT and $4/WLT pellet. The reasons for the higher expenditures include but are not limited to:

- Productive capital
    - $15 million in mill screen replacement and pellet plant and plant automation in 2024
- Sustaining capital:
    - $40 million in mobile equipment additions and replacements in 2022-2023 and 2025
    - $16 million in environmental upgrades in 2022-2023
    - $30 million in infrastructure and fixed equipment improvements in 2024-2025

For the remaining LOM starting in 2027, a sustaining capital cost of $4/WLT pellet, or $20.5 million annually, is used in the economic model for an additional $902 million for the remaining mine life.

Table 18-1: LOM Capital Costs
Cleveland-Cliffs Inc. – United Taconite Property

Type	Values	Total	2022	2023	2024	2025	2026	2027-2072
Capital Costs								
Productive	$ millions	65.3	11.2	12.6	28.5	7.1	6.0	0.0
Sustaining	$ millions	1,084.8	35.8	39.0	25.0	51.4	31.6	902.0
Total	$ millions	1,150.1	47.0	51.6	53.5	58.4	37.5	902.0
Pellet Sales								
Pellet Sales	MWLT	257.6	5.1	5.2	5.2	5.2	5.2	231.8
Unit Rates								
Productive	$/LT	0.25	2.22	2.42	5.48	1.36	1.14	0.0
Sustaining	$/LT	4.21	7.09	7.51	4.82	9.88	6.08	4.00
Total	$/LT	4.46	9.31	9.93	10.30	11.24	7.22	4.00

A final closure reclamation cost of $74 million is estimated, with $24.7 million spent annually starting in the last year of production in 2072 and the two subsequent years.

18.2 Operating Costs

Operating costs for the LOM are based on the 2022 plan. For this period, costs are based on a full run rate with a combination of both standard and flux production consistent with what is expected for the life of the mine. At this point in time, there are no items identified that should significantly impact operating costs either positively or negatively for the evaluation period. Minor year-to-year variations should be expected based upon maintenance outages and production schedules. Forecasted 2021 and LOM average operating costs over the remaining 51 years of the LOM are shown below in Table 18-2.

Table 18-2: LOM Operating Costs
Cleveland-Cliffs Inc. – United Taconite Property

Parameter	2021 ($/WLT Pellet)	LOM ($/WLT Pellet)
Mining	18.69	15.49
Processing	37.58	37.62
Site Administration	2.13	2.14
Pellet Transportation and Storage	8.17	10.26
General/Other Costs	8.91	9.29
Operating Cash Cost ($/WLT Pellet)	**75.48**	**74.80**

Processing costs consist of railing ore from the Mine to the Plant, as well as typical crushing, grinding, concentrating, and pelletizing activities along with tailings basin disposal and shop allocations. Pellet Transportation and Storage costs include cost to rail pellets from the Property to Duluth port plus shiploading. General/Other costs include production tax and royalty costs, insurance, corporate cost allocations, and other minor costs.

The operation employs a total of 549 salaried and hourly employees as of Q4 2021, consisting of 111 salaried and 438 hourly employees, of which the majority of the hourly employees are United Steelworkers production and maintenance bargaining unit members.

Table 18-3 summarizes the current workforce levels by department for the Property.

Table 18-3: Workforce Summary
Cleveland-Cliffs Inc. – United Taconite Property

Category	Salary	Hourly	Total
Mine	24	173	197
Plant	58	244	302
Asset Management	0	11	11
General Staff Organization	29	10	39
Total	**111**	**438**	**549**

19.0 ECONOMIC ANALYSIS

19.1 Economic Criteria

The economic analysis detailed in this section was completed after the mine plan was finalized. The assumptions used in the analysis were current at the time the analysis was completed, which may be different from the economic assumptions defined in Sections 11.0 and 12.0 when calculating the economic pit. For this period, costs are based on a full run rate with a mix of both standard and high-flux (Mustang) pellet production, consistent with what is expected for the LOM.

An un-escalated technical-economic model was prepared on an after-tax DCF basis, the results of which are presented in this section.Key criteria used in the analysis are discussed in detail throughout this TRS. General assumptions used are summarized in Table 19-1.

Cliffs uses a 10% discount rate for DCF analysis incorporating quarterly cost of capital estimates based on Bloomberg data.SLR is of the opinion that a 10% discount/hurdle rate for after-tax cash flow discounting of large iron ore and/or base metal operations is reasonable and appropriate.

Table 19-1: Technical-Economic Assumptions
Cleveland-Cliffs Inc. – United Taconite Property

Description	Value
Start Date	December 31, 2021
Mine Life	51 years
Three-Year Trailing Average Revenue	$98/WLT Pellet
Operating Costs	$74.80/WLT Pellet
Sustaining Capital (after six years)	$4/WLT Pellet
Discount Rate	10%
Discounting Basis	End of Period
Inflation	0%
Federal Income Tax Rate	20%
State Income Tax Rate	None – Sales made out of state

The operating cost of $74.80/WLT pellet include royalties and Minnesota State production taxes.

The production and cost information developed for the Property are detailed in this section. Table 19-2 presents a summary of the estimated mine production over the 51-year mine life.

Table 19-2: LOM Production Summary
Cleveland-Cliffs Inc. – United Taconite Property

Description	Units	Value
Run of Mine (ROM) Crude Ore	MLT	774.6
Total Material	MLT	1,633.9
Grade	% MagFe	22.3
Annual Mining Rate	MLT/y	38.0

Table 19-3 presents a summary of the estimated plant production over the 51-year mine life.

Table 19-3: LOM Plant Production Summary
Cleveland-Cliffs Inc. – United Taconite Property

Description	Units	Value
ROM Material Milled	MLT	774.6
Annual Processing Rate	MLT/y	15.5
Process Recovery	%	33.3
Standard Pellet	MLT	156.6
Mustang Flux Pellet	MLT	101.0
Total Pellet	MLT	257.6
Annual Pellet Production	MLT/y	5.1

19.2 Cash Flow Analysis

The indicative economic analysis results, presented in Table 19-4, indicate an after-tax NPV, using a 10% discount rate, of $591 million at an average blended wet pellet price of $98/WLT. The after-tax IRR is not applicable, as the Fairlane Facility has been in operation for a number of years.Capital identified in the economics is for sustaining operations and plant rebuilds as necessary.

Project economic results and estimated cash costs are summarized in Table 19-4. Annual estimates of mine production and pellet production with associated cash flows are provided for years 2022 to 2026 and then by ten-year groupings through to the end of the mine life.

The economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

Table 19-4: LOM Indicative Economic Results
Cleveland-Cliffs Inc. – United Taconite Property

Mine Life		1	2	3	4	5	6-15	16-25	26-35	36-45	46-51
Calendar Years	**Total**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027-2036**	**2037-2046**	**2047-2056**	**2057-2066**	**2067-2072**
Reserve Base:											
United Taconite Mining Ore Pellet Reserve Tons (millions)	257.6	252.5	247.3	242.1	237.0	231.8	180.5	129.2	78.1	26.8	(0.0)
Tonnage Data:											
United Taconite Mining Total Tons Moved (millions)	1,645.5	38.2	40.0	41.1	41.1	41.2	366.0	351.0	350.0	281.4	95.5
United Taconite Mining Crude Ore Tons Mined (millions)	778.8	15.3	15.6	15.6	15.6	15.6	152.6	154.5	162.7	151.4	79.8
United Taconite Mining Pellet Production Tons (millions)	**257.6**	**5.1**	**5.2**	**5.2**	**5.2**	**5.2**	**51.3**	**51.3**	**51.1**	**51.3**	**26.8**
Inputs:											
United Taconite Mining Pellet Revenue Rate ($/ton)	98	98	98	98	98	98	98	98	98	98	98
Income Statement:											
United Taconite Mining Gross Revenue ($ in millions)	25,247	495	509	509	509	509	5,025	5,023	5,012	5,027	2,628
Mining	3,990	100	106	101	102	99	883	846	844	679	230
Processing	9,689	200	201	201	195	194	1,908	1,921	1,976	1,900	995
Site Administration	552	11	11	11	11	11	110	110	110	110	57
Pellet Transportation and Storage	2,644	43	48	50	52	54	531	531	529	531	276
General / Other Costs	2,394	47	45	46	46	48	474	477	488	472	252
United Taconite Mining Operating Cash Costs ($ in millions)	**19,270**	**401**	**410**	**409**	**406**	**407**	**3,905**	**3,884**	**3,947**	**3,692**	**1,809**
Operating Cash Costs ($/LT Pellet)	74.80	79.32	78.84	78.62	78.22	78.30	76.16	75.79	77.18	71.97	67.46
United Taconite Mining Operating Income (excl. D&A)	**5,977**	**94**	**100**	**101**	**103**	**102**	**1,120**	**1,138**	**1,065**	**1,335**	**819**

Mine Life		1	2	3	4	5	6-15	16-25	26-35	36-45	46-51
Calendar Years	**Total**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027- 2036**	**2037- 2046**	**2047- 2056**	**2057- 2066**	**2067- 2072**
Federal Income Taxes ($ in millions)	(1,195)	(19)	(20)	(20)	(21)	(20)	(224)	(228)	(213)	(267)	(164)
Depreciation Tax Savings ($ in millions)	233	4	4	4	5	6	59	41	41	41	29
Accretion Tax Savings ($ in millions)	41	0	0	0	0	0	1	3	6	13	18
United Taconite Mining Income after Taxes ($ in millions)	**5,055**	**79**	**84**	**85**	**87**	**88**	**956**	**954**	**898**	**1,122**	**702**
Other Cash Inflows & Outflows ($ in millions):											
Sustaining Capital Investments	(1,085)	(36)	(39)	(25)	(51)	(32)	(205)	(205)	(205)	(205)	(82)
Productive Capital Investments	(65)	(11)	(13)	(29)	(7)	(6)	-	-	-	-	-
Mine Closure Costs (Incl. Post Closure)	(74)	-	-	-	-	-	-	-	-	-	(74)
United Taconite Mining Cash Flow ($ in millions)	**3,831**	**32**	**32**	**31**	**29**	**50**	**751**	**749**	**694**	**916**	**545**
United Taconite Mining Discounted Cash Flow ($ in millions)	**591**	**29**	**26**	**23**	**20**	**31**	**288**	**109**	**39**	**19**	**6**

19.3 Sensitivity Analysis

Project risks can be identified in both economic and non-economic terms. Key economic risks were examined by running cash flow sensitivities. The operation is nominally most sensitive to market prices (revenues) followed by operating cost as demonstrated in Table 19-5. For each dollar movement in sales price and operating cost, respectively, the after-tax NPV changes by approximately $41 million.

SLR notes that recovery and head grade sensitivity do not vary much in iron ore deposits compared to metal price sensitivity. In addition, sustaining capital expenditures amount to 5% of LOM operating costs and, therefore, do not have much impact on the viability of operating mines.

Table 19-5: After-tax NPV at 10% Sensitivity Analysis
Cleveland-Cliffs Inc. – United Taconite Property

		Operating Costs ($/WLT Pellet)					
		$90	**$85**	**$80**	**$75**	**$70**	**$65**
Sales Price ($/WLT Pellet)	**$83**	($632)	($428)	($225)	($21)	$183	$387
	$88	($428)	($225)	($21)	$183	$387	$591
	$93	($225)	($21)	$183	$387	$591	$795
	$98	($21)	$183	$387	**$591**	$795	$999
	$103	$183	$387	$591	$795	$999	$1,203
	$108	$387	$591	$795	$999	$1,203	$1,407
	$113	$591	$795	$999	$1,203	$1,407	$1,611
	$118	$795	$999	$1,203	$1,407	$1,611	$1,814
	$123	$999	$1,203	$1,407	$1,611	$1,814	$2,018

20.0 ADJACENT PROPERTIES

There are several iron mines along the Mesabi Iron Range in Minnesota.The Mineral Resource and Mineral Reserves stated in this TRS are contained entirely within United Taconite's mineral leases, and information from other operations was not used in this TRS.

21.0 OTHER RELEVANT DATA AND INFORMATION

There is no other relevant data or information that is not discussed in this TRS.

22.0 INTERPRETATION AND CONCLUSIONS

The Property has been a successful producer of iron pellets for over 55 years. The update to the Mineral Resource and Mineral Reserve does not materially change any of the assumptions from previous operations. The addition of TBS in the Mineral Reserve in this update is due to the timing of the earliest that United Taconite could resume mining in that area. In the updated mine plan, the earliest economic case for mining TBS falls within a 10-year window. The site preparation work, including additional exploration drilling, is initially estimated to take upwards of five years before mining can commence.

An economic analysis was performed using the estimates presented in this TRS and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves for a 51-year mine life.

SLR offers the following conclusions by area.

22.1 Geology and Mineral Resources

- The TBN and TBS deposits (Thunderbird deposits) are examples of Lake Superior-type BIF deposits. Above a crude magnetic iron (MagFe) cut-off grade of 17%, Measured and Indicated Mineral Resources exclusive of Mineral Reserves at UTAC are estimated to total 730.4 MLT at an average grade of 22.3% MagFe.
- In both 2019 and 2020, actual versus model-predicted values of crude ore, pellet production, and weight recovery or process recovery were accurate to between 1.5% and 7.0%, depending on the year and variable.
- Exploration sampling, preparation, analyses, and security processes for both physical samples and digital data are appropriate for the style of mineralization and are sufficient to support the estimation of Mineral Resources. The QA/QC program is well developed, long standing, and results are monitored and enacted on where warranted.
- Block model KEV for TBN and TBS compare well to the source data, and the methodology used to prepare the block models is appropriate and consistent with industry standards. Although the UTAC classification is generally acceptable, some post-processing to remove isolated blocks of different classification is warranted.
- Some uncertainty is present in the TBS model, where mining has not occurred since 1991, and most supporting drill hole data is historical or uses an older analytical technique than is currently in place at UTAC. To address this, all Mineral Resources at TBS are limited to Indicated and Inferred.

22.2 Mining and Mineral Reserves

- UTAC has been in production since 1965, and specifically under 100% Cliffs operating management since 2008. Cliffs conducts its own Mineral Reserve estimations.
- Total Proven and Probable Mineral Reserves are estimated at 774.6 MLT of crude ore at an average grade of 22.3% MagFe.
- Mineral Reserve estimation practices follow industry standards.
- The UTAC Mineral Reserve estimate indicates a sustainable project over a 51-year LOM.
- The geotechnical design parameters used for pit design are reasonable and supported by previous operations.

- The LOM production schedule is reasonable and incorporates large mining areas and open benches.
- An appropriate mining equipment fleet, maintenance facilities, and workforce are in place, with additions and replacements estimated, to meet the LOM production schedule requirements.
- Sufficient storage capacity for waste stockpiles and tailings has been identified to support the production of the Mineral Reserve.

22.3 Mineral Processing

- As the Fairlane Facility has been in production since the 1960s, metallurgical sampling and testing is primarily used in support of plant operations and product quality control.
- The Fairlane Facility conducts routine monitoring of tailings, MagFe grades, concentrate iron grades, and final product iron grades. Low-intensity magnetic separating methods are employed to produce both a standard and high-flux, blast furnace-grade pellet, both of which are well received by customers.

22.4 Infrastructure

- The Property is in a historically important, iron-producing region of Northeastern Minnesota.All the infrastructure necessary to mine and process significant commercial quantities of iron ore is in place.
- The site currently contains two Tailings Basin Storage Cells: Tailings Cell No. 1, which operated from 1965 through 1999, and Tailings Cell No. 2, which has been in operations since 1999.

22.5 Environment

- United Taconite indicated that it maintains the requisite state and federal permits and is in compliance with all permits. Various permitting applications have been submitted to authorities and are pending authorization. Environmental liabilities and permitting are discussed in Section 17.0 of this TRS.

23.0 RECOMMENDATIONS

23.1 Geology and Mineral Resources

1. Prepare model reconciliation over quarterly and annual periods, and document methodology, results, conclusions, and recommendations.
2. Compare and analyze the pre-2005 data within the context of the current standard LIS test procedures in place at the Thunderbird Mine, as well as confirm previous results. Consider a small program of twinning historical drill holes at both TBN and TBS to confirm results and logging.
3. Apply the interpolation methodology developed for TBN to TBS in future updates, and transition the process of classifying blocks in future updates to consider local drill hole spacing over a distance to drill hole criterion.
4. Consider whether it is appropriate to develop an additional in-house standard – with higher grades of concentrate silica (8% consio2 to 10% consio2) and lower magnetic iron content – to the existing QA/QC program to assess the accuracy of ore and waste in high concentrate silica contents.
5. Consider implementing a check assay program with a secondary laboratory.
6. Continue to develop the QA/QC program to ensure that the program includes clearly defined limits when action or follow up are required, and that results are reviewed and documented in a report including conclusions and recommendations, regularly and in a timely manner.
7. Update both TBN and TBS Mineral Resource estimates to incorporate new drilling.

23.2 Mining and Mineral Reserves

1. Review potential comingling of waste rock stockpiles between the TBN and TBS for opportunities to reduce the stockpile footprint created external to the open pits and reduce waste haulage profiles.

23.3 Mineral Processing

1. Plant operational performance including concentrate and pellet production and pellet quality continue to be consistent year over year. It is important to maintain diligence in process-oriented metallurgical testing and in plant maintenance going forward.

23.4 Infrastructure

1. Prioritize the completion of an OMS Manual for the TSF with the EOR in accordance with MAC guidelines and other industry-recognized, standard guidance for tailings facilities.
2. Document, prioritize, track, and close out in a timely manner the remediation, or resolution, of items of concern noted in TSF audits or inspection reports.
3. Establish an EPRT with experience in tailings management facilities similar to other Cliffs properties.

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25.0 RELIANCE ON INFORMATION PROVIDED BY THE REGISTRANT

This TRS has been prepared by SLR for Cliffs. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to SLR at the time of preparation of this TRS,
- Assumptions, conditions, and qualifications as set forth in this TRS, and
- Data, reports, and other information supplied by Cliffs and other third party sources.

For the purpose of this TRS, SLR has relied on ownership information provided by Cliffs and verified in an email from Gabriel D. Johnson, Cliffs' Senior Manager – Land Administration, dated January 20, 2022.SLR has not researched property title or mineral rights for UTAC as we consider it reasonable to rely on Cliffs' Land Administration personnel who are responsible for maintaining this information.

SLR has relied on Cliffs for guidance on applicable taxes, royalties, and other government levies or interests applicable to revenue or income from UTAC in the Executive Summary and Section 19. As UTAC has been in operation for over 50 years, Cliffs has considerable experience in this area.

SLR has relied on information provided by Cliffs pertaining to environmental studies, management plans, permits, compliance documentation, and monitoring reports that were verified in an email from Scott A. Gischia, Cliffs' Director – Environmental Compliance, Mining and Pelletizing, dated January 21, 2022.

The Qualified Persons have taken all appropriate steps, in their professional opinion, to ensure that the above information from Cliffs is sound.

Except for the purposes legislated under applicable securities laws, any use of this TRS by any third party is at that party's sole risk.

26.0 DATE AND SIGNATURE PAGE

This report titled Technical Report Summary on the United Taconite Property, Minnesota, USA with an effective date of December 31, 2021 was prepared and signed by:

Signed *SLR International Corporation*

Dated at Lakewood, CO
February 7, 2022 SLR International Corporation

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