Minnesota Department of Natural Resources

500 Lafayette Road
St. Paul, Minnesota 55155-4010

Date: July 11, 2005

To: Parties on the EAW Distribution List
Other Interested Parties

From: Randall Doneen
Principal Planner
Environmental Policy and Review

RE: Minnesota Steel Industries Taconite Mine, Concentrator, Pellet Plant, Direct Reduction Iron Plant, and Steel Mill
Environmental Impact Statement
Scoping EAW/Draft Scoping Decision Document

Enclosed is the Scoping Environmental Assessment Worksheet (EAW) and Draft Scoping Decision Document the Department of Natural Resources (DNR) has prepared to assist in identifying the issues and analyses to include in an Environmental Impact Statement (EIS) for a proposal to reactivate the former Butler Taconite mine and tailings basin, construct a new crusher, concentrator, pellet plant, direct reduced iron plant, and steel mill including electric arc furnaces, ladle furnaces, thin slab casters, and rolling mill to produce sheet steel near Nashwauk, Minnesota.

The DNR and the U.S. Army Corps of Engineers are going to prepare of a joint EIS that would satisfy both state and federal environmental review requirements for the project. The DNR and U.S. Army Corps of Engineers invite comments on the proposed EIS scope during the 30-day scoping period that concludes Wednesday, August 17, 2005 at 4:30 PM. Comments should address the accuracy and completeness of information presented, and suggest issues for investigation in the EIS. The DNR will hold a public scoping meeting on Wednesday, August 10, beginning at 6:30 PM, at the Nashwauk High School, 400 2nd St., Nashwauk, Minnesota.

The Scoping EAW discloses information about the project and its setting and identifies potentially significant impacts. The Draft Scoping Decision Document gives the public a preliminary view of the intended EIS scope and only reflects information available at this time. The DNR will revise the document based on the full scoping record, and will issue a Final Scoping Decision to serve as the "blueprint" for EIS preparation.

Please address any comments to me at the address provided in the EAW, or send an email to Environmental.Review@dnr.state.mn.us with "Minnesota Steel" in the subject line. If using the email address, please include your name and mailing address so that you can be added to the mailing list. Thank you for your interest.

Enclosure: Scoping EAW/Draft Scoping Decision Document

Version 2/99 – editorial corrections May, 05

ENVIRONMENTAL ASSESSMENT WORKSHEET

Note to preparers: This form and EAW Guidelines are available at http://www.eqb.state.mn.us. The Environmental Assessment Worksheet provides information about a project that may have the potential for significant environmental effects. The EAW is prepared by the Responsible Governmental Unit or its agents to determine whether an Environmental Impact Statement should be prepared. The project proposer must supply any reasonably accessible data for — but should not complete — the final worksheet. If a complete answer does not fit in the space allotted, attach additional sheets as necessary. The complete question as well as the answer must be included if the EAW is prepared electronically.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. **Project Title:** Minnesota Steel's Taconite Mine, Concentrator, Pellet Plant, Direct Reduced Iron Plant, and Steel Mill

2. **Proposer:** Minnesota Steel Industries, LLC
   Contact Person: Howard W. Hilshorst
   Title: Executive Vice President
   Address: 555 W. 27th Street
   City, State, ZIP: Hibbing, MN 55746
   Phone: (218) 263-3331
   Fax: (218) 262-3460
   E-mail: howardhilshorst@minnesotasteel.com

3. **RGU:** Minnesota Department of Natural Resources
   Contact Person: Randall Doneen or Scott Ek
   Title: Principal Planner, Environmental Policy and Review
   Address: 500 Lafayette Road, Box 25
   City, State, ZIP: St. Paul, MN 55155-4025
   Phone: (651) 297-3355 or (651) 296-8396
   Fax: (651) 297-1500
   E-mail: randall.doneen@dnr.state.mn.us or scott.ek@dnr.state.mn.us

4. **Reason for EAW Preparation** (check one)

   ☒ EIS scoping ☐ Mandatory EAW ☐ Citizen petition ☐ RGU discretion ☐ Proposer Volunteered

   If EAW or EIS is mandatory give EQB rule category subpart number and subpart name.

   This is a Mandatory EIS in accordance with EQB Rules 4410.4400, subpart 8c, Construction of a new metallic mineral processing facility. A Draft Scoping Decision Document has also been developed and accompanies this Scoping EAW.

5. **Project Location:** County: Itasca

   The proposed project area (MNDNR "Permit to Mine" boundary) would encompass the following (The number of affected sections may be reduced, depending on the selected location of the Tailings Basin. The identified sections do not necessarily include all sections affected with related infrastructure features.):

   - Township 56 North, Range 22 West, all or most of Sections 5, 6, 7, 8, and 17; and parts of Sections 4, 9, 16, and 18.

- Township 56 North, Range 23 West, all or most of Sections 3, 10, and 11; and parts of Sections 1, 2, 4, 6, 8, 9, 12, and 15.

- Township 57 North, Range 23 West, all or most of Sections 35 and 36.

The Alternative tailings basin is located within:

- Township 56 North, Range 23 West, Sections 4, 5, and 6.

- Township 57 North, Range 23 West, Sections 32 and 33

These areas are all within the boundaries of the Lawrence Lake East, Nashwauk, Calumet, Pengilly, and Silica 1:24,000 U.S. Geological Survey (USGS) quadrangle maps (Figure 5-2).

Attach each of the following to the EAW:

- County map showing the general location of the project;
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable);
- Site plan showing all significant project and natural features.

Tables and Figures attached to the Scoping EAW:

Tables
Table 12-1 Wetland Impact Summary
Table 13-1 Preliminary Overall Water Balance
Table 13-2 Water Consumption
Table 13-3 Water Supply
Table 18-1 Typical Chemicals that could be used in the concentrating and pellet plant
Table 18-2 Baseline Water Quality Data
Table 18-3 Surface Water Samples Collected by MIS for Low Level Mercury Analysis
Table 19-1 Project Area Soils Summary
Table 20-2 Metallurgical Analysis of Test Pit Samples B 1998
Table 23-2 Preliminary Controlled Emissions Summary

Figures
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Figure 5-2 Project Location USGS 1:100,000 Scale Map
Figure 5-3 Site Location Map USGS Quadrangle Map
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Figure 6-1 Minnesota Steel Generalized Flowsheet
Figure 9-1 Landcover
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Figure 12-1 Plant Site Wetland Impacts
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Figure 12-4 Stage I Tailings Basin Wetland Impacts
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Figure 12-6 Rare Plant Survey Data
Figure 13-1 Well Use County Well Index Data
Figure 13-2 Piezometric Levels County Well Index Data
Figure 13-3 (MF-001) Water Use Flow Sheet Fresh and Process Water

Figure 13-3 (MF-002) Water Use Flow Sheet Crusher and Concentrator
Figure 13-3 (MF-003) Water Use Flow Sheet Concentrator
Figure 13-3 (MF-004) Water Use Flow Sheet Pellet Plant
Figure 13-3 (MF-005) Water Use Flow Sheet Pellet Plant
Figure 13-3 (MF-006) Water Use Flow Sheet DRI Plant
Figure 13-3 (MF-007) Water Use Flow Sheet Steel Making, TSC and HSM
Figure 19-1 Soils Map
Figure 23-1 Preliminary Process Flow Diagram (Sheets 1-6)
Figure 24-1 Minnesota Steel Wind Rose

6. **Description**

a. Provide a project summary of 50 words or less to be published in the *EQB Monitor.*

Minnesota Steel Industries, LLC (Minnesota Steel) proposes to reactivate the former Butler Taconite mine and tailings basin near Nashwauk, and construct a new crusher, concentrator, pellet plant, direct reduced iron plant, and steel mill including electric arc furnaces, ladle furnaces, thin slab casters, and rolling mill to produce sheet steel.

b. Give a complete description of the proposed project and related new construction. Attach additional sheets as necessary. Emphasize construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes. Include modifications to existing equipment or industrial processes and significant demolition, removal or remodeling of existing structures. Indicate the timing and duration of construction activities.

OVERVIEW

Minnesota Steel proposes to reactivate the former Butler Taconite mine and tailings basin area and add direct-reduced iron production and steel making and rolling equipment in an integrated facility to make steel directly from Minnesota taconite ore. The Minnesota Steel project will be near Nashwauk (Figures 5-1 and 5-2). The area was first mined in 1903 and the former Butler Taconite facility was active from 1967 to 1985.

The purpose of Minnesota Steel's project is to integrate all the steps necessary to make very low cost, high quality sheet steel at the former Butler site. Minnesota Steel's business plan is to make steel from taconite in a cleaner and more efficient manner than traditional steel plants. Minnesota Steel will combine the most modern, commercially proven technologies to allow it to make sheet steel from taconite ore in less than 36 hours. Efficiencies and environmental benefits are gained by having a continuous flow of materials, keeping the material at an elevated temperature throughout the process and by eliminating multiple transportation steps.

The project will be a major step forward in moving Minnesota's iron mining industry away from total reliance on the declining blast furnace sector of the steel industry and let Minnesota capture the benefits of adding value to the taconite ore. Blast furnaces, which use coke, are the only current customers for Minnesota's taconite iron mining industry.

The project will include construction of new facilities - a crusher, concentrator, pellet plant, plant for producing direct reduced iron (DRI), and a steel mill consisting of two electric arc furnaces (EAF's), two ladle furnaces, two thin slab casters, and a hot strip rolling mill – and refurbishment and use of the former Butler facility tailings basin. Minnesota Steel expects to employ about 700 people for production, support, and administration. The ore resource is estimated at about 900 million tons or about 70 years based on the proposed production capacity. As is typical for mine financing, mine planning and detailed design are only being prepared for the first 20 years. The 20 year plan is the proposed project for purposes of this environmental review, and any proposed project beyond the 20 years will require additional environmental review and permitting. Likewise, permits are only being requested for a 20-year mining program. The planned project areas for this program are shown over 2003 aerial photography in Figure 5-4.

Pit and stockpile expansion beyond that described in this document would require modifications to the permits and supplemental environmental review.

Minnesota Steel plans to use natural gas as fuel for pelletizing and direct reduction. This direct reduction technology is used or has been used in North America at Mobile, Alabama; Georgetown, South Carolina; Convent, Louisiana; and Contrecoeur, Quebec. Worldwide there are over fifty similar gas-fired direct reduction plants operating. The former Butler Taconite mine has some of the only iron ore available within the Mesabi Iron Range with the proper grinding characteristics to economically produce DRI and rolled steel. The steelmaking facility will use purchased electricity to power two EAFs. The technology is the latest available with current ongoing operations in North America and worldwide.

The proposed project will produce about 2.4 million short tons per year of hot rolled sheet steel. This will require 4.1 million long tons per year (mlty) of taconite pellets or 12.8 mlty of taconite ore. There will be no scrap (with varying chemistries or other variables) charged to the EAF, other than "home scrap" produced from virgin iron units.

Minnesota Steel expects mine development and plant construction to cost up to $1.6 billion and to take from 24 to 30 months to reach 50% capacity and begin production. Installation of the remaining equipment will commence immediately after startup and will require approximately 24 months to complete.

MINE

The project is based on producing ore from the western portion of the Mesabi Iron Range. This is a major, well-known geologic feature oriented roughly northeast-southwest across more than 100 miles of northeastern Minnesota from near Babbitt to near Grand Rapids. The Mesabi has been the largest source of iron ore produced in Minnesota since the 19th century and Minnesota has been and continues to be the predominant source of iron ore in the United States.

Across the site, bedrock is generally covered by a 25 to 150 foot thick layer of glacial drift, i.e. soil and rocks deposited during the recession of the last glaciers. The formation that will be mined is known as the Biwabik Iron Formation (BIF). This is a layer of rock that is roughly 400 to 500 feet thick. It is the uppermost bedrock unit at the mine site and becomes progressively deeper to the south-southeast, sloping downward at about 7 degrees (about 650 feet deeper per mile). The BIF is subdivided into four members: Lower Cherty, Lower Slaty, Upper Cherty, and Upper Slaty.

Minnesota Steel will obtain its magnetic taconite ores from a horizon within the Lower Cherty member of the Biwabik iron formation. This horizon is typically 180 to 200 feet thick, roughly equal to 30-35% of the total formation thickness, and is subdivided into a number of major and secondary units, based on texture, layering, and variable distribution of the iron-bearing mineral suite.

The minerals within the Lower Cherty magnetic taconite ore horizon, as identified by x-ray powder diffraction and microscopic studies, are overall fine-grained, intimately intergrown, and consist of quartz, magnetite, hematite, sideritic and ankeritic iron carbonates, and silicates, minnesotaite and stilpnomelane. Trace amounts of greenalite, apatite, chamosite, and pyrite-marcasite have been noted in some individual specimens. Hematite occurs both as a primary mineral and as an oxidation product after magnetite. All major iron-bearing minerals are present in each horizon ore unit. They may occur in many combinations and are generally disseminated in quartz-rich layers and concentrated in thinner iron-rich layers.

Based on work by Butler Taconite Company, the ore is expected to have the following mineral percentages:

Table 6-1
Mineral Percentages

Mineral	Mean Composition (%)	Variability (%)*
Iron Oxides	36	24 – 49
Quartz	41	35 – 52
Iron Silicates	12	3 – 22
Iron Carbonates	11	<1 – 23
	100	

*Extremes in variability are related to secondary oxidation and leaching of the uppermost ore units.

Further information on the mineralogy and petrology of the ore will be included in the application for the Permit to Mine.

To the south, the deeper BIF is overlain by the Virginia Formation (also known as the Virginia slate). This is the uppermost bedrock unit south of the mine site. Beneath the BIF is the Pokegama quartzite. Butler drillholes found this formation to be between 200 feet to 240 feet thick. This is the bedrock immediately north of the mining area and roughly to the north side of the plant site. Beneath the Pokegama quartzite is the schist, granite and basalt formation called the Giants Range batholith, also known as “greenstone”; this is the bedrock to the north of the plant site.

The taconite ore of the Biwabik Iron Formation will be mined by open-pit methods within the general mining outline as shown in Figure 5-4. Mining will start at two locations: resumed mining in Pit 5 on the northeast and initiation of mining in the proposed Pit 6 on the southwest. Initially, mining in Pit 5 will begin on the upper benches of the southern end of the pit and eventually will be expanded in all directions. A saddle will remain between the two pits; this contains non-iron-bearing rock and low-grade iron ore that cannot be used in Minnesota Steel’s concentration process. This saddle has been included in the mining area because it is highly likely to be disturbed in the process of mine development.

The current mine plan is preliminary; Minnesota Steel will prepare a detailed mine model and stockpiling plan for inclusion in the EIS. Roughly 12.8 million long tons of crude ore per year will be mined at a strip ratio of about 0.50:1.The maximum depth of mining will be limited by economic conditions as the mine is developed but is assumed to be about 450 feet below the adjacent ground surface.

Minnesota Steel proposes to stockpile overburden, waste rock and lean ore on and near the old Patrick "B" tailings basin as shown in Figure 5-4. Detailed stockpile planning will be completed following the preparation of a mine model and detailed twenty-year mine plan; this will be submitted as part of the application for a Permit to Mine and will be available in time for use in preparation of the draft EIS.

As pit development progresses, Minnesota Steel will also evaluate the feasibility of in-pit stockpiling for aquatic enhancement, although this is not currently assured and may not be feasible. A major factor in feasibility of in-pit stockpiling is the management of mineral rights. There are many general classes of waste rock (magnetic lean ore, non-magnetic lean ore, non-iron bearing rock, glacial drift, and Cretaceous rocks, etc.); different fee owners have different material classifications; it may or may not be possible to mix stockpiles by rock type and fee owner.

After overburden is removed, waste rock and taconite ore will be drilled, blasted and loaded into mine trucks by diesel-hydraulic shovels. There are both economic and environmental considerations that provide incentive for efficient blasting practices. Measures that will be used to make blasting as efficient as possible include:

- Proper hole depth and size must be calculated to contain the energy of the explosive.
- Adequate boosters must be used to ensure that the explosive charge is totally detonated.
- In wet holes, plastic liners must be used to avoid mixing portions of the explosive with groundwater.
- After placement of the explosives, the hole must be collared and backfilled properly to ensure that the energy is contained and directed outward.

The raw ore will be trucked to the primary crusher. Waste rock will either be placed in waste rock stockpiles or used to construct dikes and haul roads. During and following each phase of mining, reclamation of the overburden slopes and stockpiles will be completed according to MNDNR mine land reclamation requirements.

HAUL ROADS

Minnesota Steel will use the existing Butler facility haul roads to transport stripping material to the stockpile area and taconite ore from the mine to the crusher. As the mine pits are expanded and if in-pit stockpiling begins, existing mine pit and inter-pit haul roads will be utilized. Existing haul road alignments and disturbed areas will be utilized to the greatest extent practicable.

DEWATERING

As described above, the northeastern pit includes Pit 5, a pit formerly mined by Butler Taconite. This pit has filled with water. Minnesota Steel's plan is to begin dewatering of Pit 5 during the second year of operation and to dewater Pit 5 completely over a period of three years. This will be done using a vertical turbine pump on a floating barge. Discharged water first will be used to satisfy plant operations and stream augmentation needs; the excess water will be discharged via a pipeline to the Oxhide Stilling Basin and then to Oxhide Lake, Oxhide Creek and Swan Lake.

Pits 1 and 2 lie east of Pit 5 and are hydraulically connected to Pit 5 at current water levels. To keep Pit 5 dewatered, it also will be necessary to lower Pits 1 and 2 by approximately five feet. Again, this will be accomplished using vertical turbine pumps on a floating barge. Water not needed for plant operations or stream augmentation will be discharged to the Oxhide stilling basin and then to Oxhide Lake, Oxhide Creek and Swan Lake.

Additional discussion of dewatering rates is found in response to Question 12. Impacts to receiving waters are discussed in response to Question 18.

Once initial dewatering is complete, maintenance dewatering of Pit 5 will be required. Groundwater inflow, watershed runoff, and direct precipitation will be pumped from the pit. This water will be pumped to Pits 1 and 2 where it would be clarified by detention. Pits 1 and 2 will contribute additional direct precipitation, groundwater inflow and watershed runoff. This water from Pits 1 and 2 first will be used for plant operations. A specified flow would be discharged to maintain flow in Oxhide Creek and any other water bodies potentially affected by mining. Excess pit inflows not required for plant operation or stream augmentation and not capable of being stored in Pits 1 and 2 also would be discharged to the Oxhide Stilling Basin.

Pit 6 will be newly created. Eventually, the pit will be approximately the same size and depth as Pit 5 and will require maintenance dewatering. Based on estimates for Pit 5, this is also expected to be similar to the Pit 5 discharge. The water will be discharged either to Pit 5 and then to Pits 1 and 2 or directly to Pits 1 and 2. Ultimately this dewatering water will also be used for plant operation or for flow augmentation. for lakes and streams. Assuming sedimentation can be prevented; portions of the Pit 6 dewatering discharge may also be pumped directly to local streams or lakes to mitigate impacts of the mining operation on streamflow and lake levels.

Around Year 10 of operation, Pit 6 will be expanded to include the former Draper Annex pit. Although the Draper Annex Pit is much smaller than Pits 5 or 6, dewatering it will temporarily increase the total pumping to Oxhide Stilling Basin. This water would also be discharged to Pits 1 and 2 and used for plant operations or discharged to Oxhide Stilling basin if not needed.

CRUSHER, CONCENTRATOR, PELLET PLANT, AND DIRECT REDUCTION PLANT

The proposed processing plant will be located in Sections 35 and 36 of Township 57N, Range 23W. A simplified flow diagram for the process is shown on Figure 6-1. More detailed diagrams are provided in Figure 23-1. Access to the north and west side of the property for rail and road will be constructed on the west side of the project. The rail layout will allow Minnesota Steel to connect into either the CN right-of-way or the existing Burlington Northern Santa Fe tracks, about six miles southwest of the plant site near the town of Taconite (Figure 5-1).

The crude ore will be trucked from the pits to the primary crusher for size reduction to approximately 12 inches in diameter. The crushed ore will be conveyed to the crude ore stockpile area at the concentrator.

The ore concentration and pellet production processes will be similar to existing Iron Range taconite plants. From the storage area, crushed ore will be conveyed to the concentrator where the magnetic iron oxide minerals (concentrate) will be separated from the nonmagnetic waste (tailings). In the concentrator, the ore will pass through a series of wet mills that will grind the rock to a flour-like consistency. Magnetic separators will separate the concentrate from the waste rock. Concentrate will be further refined by flotation, which will remove the more silica-rich material, leaving nearly pure iron oxide concentrate. Concentrate will be pumped to the pellet plant. Tailings from the concentrator will be pumped to a tailings thickener where excess water will be removed by sedimentation. The tailings slurry will be pumped to the tailings basin for disposal.

In the pellet plant, wet iron oxide concentrate will be dewatered in vacuum filters, mixed with a binder and limestone, and then converted to unfired pellets in balling drums or disks. The unfired pellets will be moved to an indurating furnace and fired into hardened iron oxide pellets. At this time, the pellet plant may use a straight-grate or grate-kiln furnace; air permitting will assume a worst-case combination between the two systems until a decision is made by Minnesota Steel. The oxide pellets will be size screened and then fed (hot) directly to the DRI plant or stored for future balancing of the production schedules. The undersized pellets will be ground and recycled to the concentrate slurry (or sold as sinter feed).

The DRI facility will convert iron oxide pellets to nearly pure iron pellets. The oxide pellets will be conveyed to the top of a 300- to 425-foot-high vertical shaft reactor. The burden (i.e., the packed mass of pellets in the vertical shaft) will move slowly downward through the reactor by gravity and be discharged from the bottom in the form of metallized (chemically reduced) iron pellets.

In the DRI reactor, oxygen in the oxide pellets will be removed by reducing gas, which is generated by catalytic reaction in a reformer. The input to the reformer is a mixture of natural gas and recycled top gas from the reactor. The reformer converts the natural gas to a mixture of hydrogen and carbon monoxide. In the reactor vessel both gases react with the oxygen in the pellets to create water vapor and carbon dioxide, thereby removing the oxygen from the pellet and converting the iron oxide into metallic iron. When the pellets reach the bottom of the reactor, they will pass through a cooling mixture of natural gas and carbon monoxide, cooling the iron and increasing the carbon content of the pellets. The exhaust gases will preheat the reformer gases in a heat exchanger prior to being exhausted. Most of the DRI product will be hot charged to the steel mill EAFs. Some DRI may be stored cold in surge silos for future balancing of the production schedules.

Typically, pellet and DRI production facilities can slightly exceed nameplate capacity, while steelmaking capacity is relatively fixed by rolling mill capacity and product mix. Therefore, excess DRI may be shipped from the plant. The DRI intended for direct sale will be pressed into “briquettes” and sold as hot briquetted iron (HBI), which can be stored and handled more easily than DRI. Feasibility projections have evaluated the possibility of selling up to 408,000 short tons of DRI annually or roughly 13% of total production.

STEELMAKING PLANT

At full capacity, the steelmaking facility will include two EAFs, two ladle furnaces, two thin slab casters, two tunnel furnaces, a vacuum degasser and a hot strip rolling mill. The DRI pellets will be melted in batches in the EAFs, along with additives such as carbon and lime. The molten iron from the EAFs will be transferred to the two ladle metallurgy furnaces. In the ladle furnaces steel is produced through refining, oxygen blowing, temperature control and addition of alloying metals. From the ladle furnace, the liquid steel is transferred to the continuous casters where it is cast into slabs that might typically be approximately 50 mm (two inches) thick. These hot slabs will proceed through a tunnel furnace and series of rolling mills where the slab will be rolled successively thinner, to an ultimate thickness as little as 1 mm. The sheet steel will be coiled for rail or truck shipment. A vacuum degassing station for production of specialized steel products is a potential future phase of the project. This would remove hydrogen and nitrogen through application of a vacuum to the ladle of molten steel.

The DRI charged to the EAF contains silica and other materials that form a slag, a necessary component in steelmaking. Other materials, including mainly calcium oxide (lime) will be added to adjust slag chemistry to condition the slag and to protect the furnace lining. Slag will also be produced in the ladle furnace. The slag (approximately 11% of the weight of steel produced) will be poured, cooled, and then removed for further processing and disposal. The base plan for slag disposal is to manage about 260,000 short tons of slag on site as a non-hazardous waste product. This amount will probably be reduced by metallics recovery to recycle 20% or more of the slag that consists of entrained iron and steel particles. Minnesota Steel intends to evaluate the feasibility of options for beneficial utilization of slag, including: on-site use as road and dike material; regrinding and pumping to tailings basin, and sales to construction companies for use as road aggregate and railroad ballast. Slag is further discussed in response to Question 20.

TAILINGS BASIN

About 9.05 million long tons per year (mlty) of tailings from the concentrating process will be pumped as slurry to the tailings basin. Minnesota Steel's preferred basin location is the former Butler Stage I basin. An Alternative Basin has also been designated. Further evaluation of these alternatives will be considered as part of the Environmental Impact Statement. In either basin, low starter dams will be used as necessary to contain the initial tailings discharge and direct it toward the center of the basin. The lowest part of the basin will form a reservoir that will function as both a settling pond and a clear water reservoir. Tailings disposal will be done by encircling the perimeter of the basin with disposal lines and building the dams hydraulically. The coarsest tailings will drop out first while the fines will deposit toward the center. The coarse tailings will be dozed to create a perimeter dam with an overall outer slope of 4 horizontal to 1 vertical. The disposal lines will be raised periodically to the new dam crest pushed up by the dozer. The basin will increase in elevation and change shape as tailings disposal proceeds upward in elevation. The end product will be a low hill of tailings that will be re-vegetated per MNDNR reclamation requirements and the requirements of the facility's air emissions permit.

Stage I Tailings Basin

The preferred alternative for disposal of tailings would be to utilize the Stage I Tailings Basin area, where Butler Taconite placed tailings on approximately 1,345 acres in the northwest portion of this basin area between 1967 and 1985. The Stage I Tailings Basin would cover an area of approximately 1,929 acres with a crest elevation of approximately 1,515 ft above mean sea level (amsl). This is approximately 80 feet above the existing starter dams. The use of the Stage I basin would require further investigation into the integrity of the dams due to the potential lack of documentation, the period of time when they were constructed, and the fact that they were ultimately planned to be filled over, and to become part of the Stage II basin. An enlarged Stage I basin may be needed if existing dams do not have adequate integrity for tailings disposal. This enlarged basin would construct tailings dams outside of the existing Stage I basin to ensure structural integrity. The area of this enlarged basin, including the former Butler water reclaim basin, is 2,587 acres. The Stage I basin would have more wetlands impacts (432 acres) than the Alternative Basin (192 acres) but most of the wetlands have been formed on former taconite tailings and may represent lower-quality wetlands than those in the Alternative Tailing Basin.

Alternative Tailings Basin

An alternative tailings basin site is located about one mile northwest of the proposed mine site. (Figure 5-4). The basin would be located about 1.6 miles west of the Minnesota Steel plant facilities The area extends from about one-quarter mile southwest of Big Sucker Lake west approximately $1^{2/3}$ miles to an area east of a tributary to Sucker Brook. One of the three headwaters streams feeding Sucker Brook would be filled. No wetlands would be artificially impounded; however, the natural drainage from the south to the north would be blocked by the basin. Surface drainage from the hill south of the basin would likely be diverted to the west and drainage from within the blocked wetland swale would likely be diverted to the south. This alternative location has not been disturbed by past mining activities and, aside from ongoing logging activities, is in a natural condition.

The Alternative Tailings Basin would cover an area of approximately 1,119 acres with a crest elevation of approximately 1,515 ft amsl. Starter dams would be constructed around the north end of the basin to an elevation of 1,400 ft amsl. The tailing basin area as shown includes approximately 100 ft around the perimeter for construction of a seepage collection and diversion channel system. The basin was laid out not to interfere with the transmission line corridor that is located along the south side of the alternative basin location. Wetland impacts would be approximately 192 acres, 240 acres less than the Stage I basin and the pumping distance would be less. However, this alternative site has not been impacted by past mining activities and represents relatively undisturbed lands.

MINELAND RECLAMATION

As part of Minnesota Steel's Permit to Mine application a mine plan will be submitted that includes information about reclamation within the permit boundary. Reclamation of the site must comply with specific requirements identified in Minnesota Rule Chapter 6130. This rule requires that landforms be designed and constructed to complement nearby natural terrain, minimize adverse water quality and quantity effects on receiving waters, enhance the survival and propagation of vegetation, be structurally sound, control erosion, promote early completion and progressive reclamation, and encourage the prompt conversion from mining to an approved subsequent use. At least two years prior to deactivation of any portion of the mining area, proposed subsequent uses shall be presented to the MNDNR commissioner for approval. The proposed uses shall be selected based on:

1. compatibility of adjacent uses;
2. the needs of the area;
3. the productivity of the site;
4. projected land use trends;
5. public health and safety;
6. preventing pollution of air and water; and
7. compatibility with local land use plans and plans of the surface owners.

The purpose of mineland reclamation is to control adverse environmental impacts, plan for future land use, and promote orderly mining that will encourage good mining practices and recognize the beneficial aspects of mining.

CONNECTED ACTIONS

Minnesota Steel expects to purchase natural gas from a supplier, which will need a 16-inch pipeline to connect the facility with a supply line near Grand Rapids. Itasca County has begun evaluating economic and environmental feasibility of alternative corridors for pipeline routes.

Minnesota Steel intends to contract with an electric utility to supply power to the project. One or more transmission lines will be required from a major distribution line to the project area. Minnesota Power has prepared two conceptual plans for connecting the project to the power grid. The power required for the project can be provided from existing sources, from market purchases of power and from power production facilities that are currently planned or proposed. Any new power production facilities would not be a direct result of the Minnesota Steel project and would be built (or not built) independently of the decision on the feasibility of the Minnesota Steel project.

Itasca County has begun economic and environmental evaluation of the road access alternatives. Current conceptual plans are for a County highway to be constructed from Highway 169 to the west end of the plant site. County Highway 58, which runs along the north side of the plant site, would serve as major access route for employees who would enter from State Highway 65, east of the plant. After the mine is operational, County Highway 58 will be terminated at the plant site, just west of the Nashwauk cemetery.

Rail access will be provided for the project by connecting to existing rail lines along Highway 169 near Taconite. Itasca County has begun evaluation of railroad access alternatives.

Water and sewer lines will need to be extended from the City of Nashwauk to supply potable water and domestic sewage treatment for the project.

c. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The purpose of the project is to mine taconite ore with open pit mining methods, crush and process the ore in a concentrator, produce iron oxide pellets in a pellet plant, produce DRI in a vertical shaft reactor, and produce low-cost, high-quality sheet steel in an on-site steel mill consisting of two electric arc furnaces, two ladle furnaces, two thin slab casters, two tunnel furnaces and a hot strip rolling mill while minimizing impacts to the environment. The project is needed to assist in meeting the domestic and world demand for steel.

d. Are future stages of this development including development on any outlots planned or likely to happen?

☒ Yes ☐ No

If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

The ore resource is estimated at about 900 million tons or about 70 years based on the planned production capacity of the processing facility. However, the economic feasibility of the project is based on a 20-year project life. Minnesota Steel cannot predict whether investment for further operation will be economically desirable. Therefore, mine planning and detailed design are being prepared for 20 years of operation and permits are only being requested for the 20-year mining program as shown in Figure 5-4. Pit, stockpile and tailings basin expansions beyond that described in this document would require modifications to the permits and supplemental environmental review.

e. Is this project a subsequent stage of an earlier project? ☒ Yes ☐ No

If yes, briefly describe the past development, timeline and any past environmental review.

The proposed project area has been affected by natural ore and taconite mining since early last century. The most recent mining on the site was conducted by Butler Taconite, which closed in 1985. The mining and tailings disposal components of the proposed project are, in some respects, a continuation of Butler's operation. The Butler Taconite operation did not undergo a formal environmental review, but individual components had operating permits.

A proposal for a similar project was considered in 1999 by Minnesota Iron & Steel and/or its operating subsidiary, MIS Steel, Inc. Minnesota Steel Industries purchased the assets of MIS Steel, Inc., in 2003, including plans, studies, etc. Since then, Minnesota Steel Industries has used many of these prior studies in connection with the current project. This document includes references to this prior work, but it should be understood that the Minnesota Steel Industries is a legal entity that is separate and distinct from Minnesota Iron & Steel and its subsidiary, MIS Steel, Inc., with a separate and different management and ownership structure.

7. **Project Magnitude Data**

Total project acreage: 4,067 (depending on tailings basin alternative) plus ~489 acres of connected actions
Mine and Stockpile Areas: ~1,088 acres
Plant Area: ~379 acres within plant perimeter
Tailings Basin and Pipeline: 2,600 acres (with largest tailings basin alternative)

Number of residential units: unattached: N/A attached: N/A maximum units per building: N/A

Commercial, industrial or institutional building area (gross floor space): total square feet: ~1.3 million

Indicate areas of specific uses (in square feet):

Office: 100,000
Retail
Warehouse
Light industrial
Other commercial (specify)
Manufacturing
Other industrial: 1.2 million
Institutional
Agricultural
Building height: The highest structure will be approximately 300 to 425 feet (DRI reactor)
If over 2 stories, compare to heights of nearby buildings: Much higher

8. **Permits and Approvals Required.** List all known local, state and federal permits, approvals and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure.

Unit of Government	Type of Application	Status
US ARMY CORPS OF ENGINEERS	Section 404 Permit for Wetland Impacts	Basic application submitted.
	Section 7 Endangered Species Act Consultation with U.S. Fish & Wildlife Service	To be completed by Corps as part of Section 404 Permit
MINNESOTA DEPARTMENT OF NATURAL RESOURCES	Permit to Mine	To be applied for
	Water Appropriation permit	To be applied for
	Dam Safety Permit	To be applied for
	Protected Waters Permit	To be applied for
	Wetland Conservation Act	To be applied for (in Permit to Mine)
	Burning Permit (land clearing)	To be applied for if needed
	Takings Permit (for Endangered or Threatened species)	To be applied for if needed
MINNESOTA POLLUTION CONTROL AGENCY	Minnesota Air Emissions Permit	To be applied for
	Section 401 Wetlands Certification	To be applied for
	SDS/NPDES permit(dewatering, wastewater, stormwater)	To be applied for

Unit of Government	Type of Application	Status
	NPDES construction stormwater discharge permit Waste Tire Storage Permit Storage Tank Permit (fuel tanks) Solid Waste Permits (ash, construction debris, slag) Hazardous waste generator and storage	To be applied for To be applied for To be applied for To be applied for if needed To be applied for if needed
MINNESOTA DEPARTMENT OF HEALTH	Radioactive Material Registration (low-level radioactive materials in measuring instruments)	To be applied for
MINNESOTA IRON RANGE RESOURCES BOARD	Collateralized loan for project development	Completed
ITASCA COUNTY	Building Permit and permit for construction in shoreland area Zoning Variances Infrastructure construction (rail, roads, etc.)	To be applied for if needed To be applied for if needed To be funded
FEDERAL AVIATION ADMINISTRATION	Permit for tower construction adjacent to existing radar	To be applied for
For connected actions – concurrent environmental review and approval		
MINNESOTA ENVIRONMENTAL QUALITY BOARD	High Voltage Transmission Line Routing Permit Natural Gas Pipeline Routing Permit	To be applied for by power supplier To be applied for by natural gas supplier

9. **Land Use.** Describe current and recent past land use and development on the site and on adjacent lands. Discuss project compatibility with adjacent and nearby land uses. Indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazards due to past site uses, such as soil contamination or abandoned storage tanks, or proximity to nearby hazardous liquid or gas pipelines.

Figure 9-1 shows existing and proposed land use in the project site.

Much of the area around Minnesota Steel has been excavated or otherwise altered by past and present mining activities as depicted by the disturbed areas shown on Figure 9-1. As a result, several deep, water-filled pits with little to no aquatic vegetation have developed in most former mine pits. Adjacent to the pits are mine dumps consisting of waste rock and surface overburden. These mine dumps are typically sparsely vegetated with saplings (aspen and balsam poplar) and herbaceous, weedy species (e.g., sweet clover, Kentucky bluegrass, and thistles). The plant communities within the project area are shown on Figure 9-2.

The current and historic economic uses of land in this area are mining and logging. Numerous areas within the undisturbed portions of the site are mapped as hydric soils or water within the Itasca County Soil Survey (Figure 9-3). The wetland resources, as shown on Figure 9-4, were generated from 2003 aerial photography.

MNDNR mining regulations require Minnesota Steel to maintain an uninhabited boundary around the facility. Therefore residences and other private property within the Permit to Mine boundary (as shown on Figure 5-4) will be purchased by Minnesota Steel.

MINE, STOCKPILE, CRUSHER AND CONCENTRATOR

The eastern end of the mine site covers the existing Butler Pit 5 and vacant land to the southwest of Pit 5. The southwest part of the mine area is the proposed location of Pit 6. This includes the former Draper Annex mine pit and associated dumps and stockpiles and the Burlington Northern Railroad grades associated with former natural-ore mines. Between Pits 5 and 6 is an area of wooded vacant land.

The mine site is bounded on the north by the proposed stockpile. The proposed stockpile location is shown on Figure 5-4. The stockpile area is located on the former Patrick B Tailings Basin, which has been reclaimed. This former basin is composed of two cells separated by a haul road with a pond in the north end of each cell. The areas located south and east of the plant (Figure 9-4) are primarily made up of sparsely vegetated, old stockpiles. Beyond the stockpile area to the north and west is the plant site and former natural ore tailings basins, waste rock stockpiles, and overburden stockpiles.

The crusher and concentrator will be located to the west and southwest of the stockpile. They will be located on vacant land that has not previously been disturbed by mining. Southwest of the mine site are additional inactive natural ore pits and associated stockpiles, including the Majorca Mine and the Hill Annex Mine (now the central feature of the Hill Annex State Park). The developed portion of the town of Calumet (population ~382) lies approximately one miles south of the west end of the proposed mining area. Snowball Lake (31-108P) and Oxhide Lake (31-106P), both Public Waters lakes, are located south of the proposed mining area (Figure 9-5) and north of U.S. Highway 169. There are public water accesses on the south extension of Oxhide Lake and on Snowball Lake. Seven residences have been built around the southern half of Snowball Lake. The town of Pengilly (unincorporated) lies south of Highway 169, about 1 mile from the mine site. At the former site of the Butler Taconite plant, located along Highway 169 between Nashwauk and Pengilly, is the Midland Research facility, a mineral processing research laboratory. The area immediately southeast of Highway 169 is the site of the Butler Taconite Stage I tailings basin, which has been reclaimed. Southeast of the Stage I tailings basin lies the Stage II tailings basin (Figure 5-4).

To the east of the mine site, between the mine site and the City of Nashwauk are former Butler Pits 1 and 2 as well as the Harrison-Halobe Mine, MacKillikan Mine and the Hawkins and Hadley mines. On the east side of Nashwauk is a chain of inactive pits that include the LaRue, Galbraith, and Argonne pits. A public water access built in recent years allows access to the LaRue pit. South of (and on top of) these reserves are older mine dumps and stockpiles and a natural ore tailings pond. To the southeast of these pits is Keewatin Taconite Reservoir No. 4, which is located on KeeTac property and has a public recreation area that is maintained by the City of Keewatin.

PLANT SITE

Figure 5-4 shows the general layout of facilities in the vicinity of the plant site, which includes the pellet plant, DRI plant and steelmaking facility. The plant site is located in Sections 35 and 36, T57, R23. The plant area is bordered on the south by wetlands, mine dumps, and tailings ponds from former natural ore mining operations. Much of the site has been logged by the landowner in recent years. To the west of the site is a slope leading to Little Sucker Lake (PWI 31-126P), the first in a chain of small lakes tributary to the Prairie River. There are two homes on Little Sucker Lake. To the north of the plant site is County Highway 58, which goes east-west from Nashwauk towards the lakes northwest of the site (Big and Little McCarthy Lakes and the Sucker Lake chain). Buildings shown south of County Highway 58 on USGS maps were removed during Butler Taconite's operation.

The land directly north of the plant site, across Highway 58, in Section 26, T57, R23 (Nashwauk Township) is forested. Logging has occurred in the south end of Section 26 and an inactive gravel pit lies near the center of the section. At the north end of the plant site, a gravel township road branches northwest from Highway 58 and bisects Section 26. One rural residence is located about one-quarter mile north of the section line in Section 26. Further to the northwest are Little McCarthy Lake (PWI 31-123P) and Big McCarthy Lake (PWI 31-120P), both tributary to the Prairie River (Figure 9-5). A cemetery lies less than a mile east of the plant site on the north side of Highway 58. Plant access from the east is, in effect, established by the cemetery location.

TAILINGS BASIN

Stage 1 Tailings Basin

The Stage I Tailings Basin, is the preferred alternate for the tailings disposal.. A factor in this preference is that the basin was used previously by Butler Taconite for disposal of tailings. In addition, the area within the existing dams has been mostly disturbed by past mining operations, especially in the northwest portion of the basin.

For this submittal, the area defined as the Expanded Stage I Tailings Basin includes some previously undisturbed areas outside of the existing dams. Subject to further evaluation, this area may be reduced. The majority of the area that would be impacted has been previously disturbed (2,047 of the 2,586 acres), with both disturbed and undisturbed areas composed of a combination of brush/grasslands, wetlands and forested areas.

To the southwest of the Stage I tailings basin is vacant wooded land and beyond that, at a distance of about one mile, Swan Lake. The lake is highly developed and has about 500 lakeshore and near-lakeshore homes, according to MNDNR lake surveys. The nearest home is about 4,000 feet from the edge of the Stage I basin or 3,500 feet from the expanded Stage I Basin. Pickerel Creek, a designated trout stream, drains south with headwaters at the extreme west end of the Stage I basin. The basin dam forms a part of the watershed divide for Pickerel Creek. New basin construction will be kept at least 300 feet away from the designated trout stream. The north side of the expanded Stage I basin includes a former natural ore tailings basin and a stockpile from natural ore mining. Highway 169 lies beyond these features and, north of that is the City of Nashwauk, the Midland Research buildings and the stockpiles and pits of the Patrick/Kevin and Harrison mines. To the east of the Stage I basin are two natural ore stockpiles and the expanded O'Brien lake reservoir formed by the Butler Stage II tailings dam. Further east is vacant land that was part of the Butler Stage II tailings basin, including the O'Brien diversion. Beyond this are the tailings disposal facilities of Keewatin Taconite and the wastewater treatment ponds for the City of Nashwauk.

Alternative Tailings Basin

An alternative tailings basin location would be to the northwest of the mine, about 1.6 miles west of the Minnesota Steel plant facilities. The area extends from about one-quarter mile southwest of Big Sucker Lake west approximately 1.6 miles to an area east of a tributary to Sucker Brook. One of the three headwaters streams feeding Sucker Brook would be filled. No wetlands would be artificially impounded; however, the natural drainage from the south to the north would be blocked by the basin. Surface drainage from the hill south of the basin would likely be diverted to the west and drainage from within the blocked wetland swale would likely be diverted to the south. This alternative location has not been disturbed by past mining activities and is in a relatively natural condition, aside from ongoing logging activities.

The Alternative Tailings Basin is bounded to the north by a wetland complex and, beyond this, by Big Sucker Lake, which has about 14 residences around it, the nearest being about 1500 feet from the north edge of the tailings basin. To the east of the Alternative Tailings Basin is a wooded valley draining north to Little Sucker Lake which has two homes on it. Further east is the stockpile area for the Minnesota Steel project, which is located on the stockpiles and tailings basin associated with the former Patrick natural-ore mine. Further east is the Minnesota Steel Mine Site, including the former Butler Pits 5. Beyond this are Butler Pits 1 and 2. To the south of the alternative basin are a power line corridor, vacant land used for logging, and the (inactive) Draper Mine tailings basin. Further south are a variety of stockpiles and natural ore pits, including the Hill Annex State Park and the City of Marble. To the west of the Alternative Tailings Basin is a large complex of wetlands extending approximately three miles to Highway 7.

CONNECTED ACTIONS (ACCESS ROADS, RAILROADS, NATURAL GAS PIPELINES, TRANSMISSION LINES)

Itasca County is planning the infrastructure for roads and railroads. Power and natural gas suppliers will be responsible for construction of supply lines for these utilities. Separate permits and environmental review will be required for these infrastructure projects; however, possible environmental impacts will be addressed in this EIS. The infrastructure alignments cross and are located within land uses that are typical to north-central Minnesota. The access road and rail grade alignments are mostly within mine land uses and second growth upland forests. The natural gas alignments also transect mine lands and wetland and upland second-growth forests, clear-cut areas, hay production fields, roads, utility rights-of-way, and low-density rural residential areas. The overall character of the surrounding land uses for the infrastructure alignments is rural. Lakes are also widely scattered throughout the area and many have developed residential shoreland zones.

POTENTIAL ENVIRONMENTAL HAZARDS ON OR NEAR THE SITE

Information provided by the Minnesota Pollution Control Agency has indicated the presence of six potentially contaminated sites in the project vicinity. None of the sites has actions recommended or pending. The presence of these sites is not expected to conflict or interfere with the proposed project.

- Pengilly Dump. Near Pengilly, about 1 mile southwest of the projected permit boundary; was listed on MPCA's 1980 Statewide Open Dump Inventory.

- Nashwauk Dump. One mile east of Little McCarthy Lake and about 1 mile north of the proposed plant site; was listed on MPCA's 1980 Statewide Open Dump Inventory.

- Former Nashwauk City Dump. In the northwest quarter of the northeast quarter of Section 5. It was listed on MPCA's 1980 Statewide Open Dump Inventory. This appears to be between Highway 169 and the northern edge of the Butler Stage I tailings basin, and is not proposed to be part of the tailings basin for this project.

- Keewatin Dump Site. South of Keewatin; was listed on MPCA's 1980 Statewide Open Dump Inventory.

- Former Butler Taconite Plant. On Highway 169 at the south margin of the mining areas. A voluntary cleanup of the site was conducted. The property was listed by EPA as a "No Further Remedial Action Planned (NFRAP)" site and was removed from the EPA's Comprehensive Environmental Response, Compensation, and Liability (CERCLA) system.

- Inland Steel Mining Co. St. Paul Mine (former processing plant now within KeeTac Mining property). About 1 mile east of the eastern extent of mining for this project; operated from 1956 to 1964. Possible use of solvents and greases on site; low priority for inspection and low potential hazard. The property was listed by EPA as a "No Further Remedial Action Planned (NFRAP)" site and was removed from the EPA's CERCLA system.

No other records of potential environmental hazards have been identified. Based on the historical use of portions of the project site for mining and processing activities, it is possible that smaller, unidentified environmental hazards (e.g., small spills) exist within the project boundaries. If such environmental hazards are discovered during facility development, they will be dealt with under the appropriate regulatory program.

POTENTIAL LAND USE CONFLICTS

Although portions of the proposed project site have been used for mining purposes in the past, it has been inactive since 1985. Impacts from re-activating and extending mining operations that could conflict with existing land uses include possible changing water levels in local lakes and pits, increasing local traffic, and noise and vibration from blasting and mining activities. Nearby residences also may be the most sensitive receptors for air emissions from the processing facility. These topics are discussed in more detail in response to the respective questions in this EAW.

PROPOSED TREATMENT OF TOPIC IN EIS

The EIS will discuss potential land use conflicts to nearby residences, water bodies and the cemetery. These potential conflicts will be addressed with respect to other environmental considerations of the project, including physical alteration of water resources, noise blasting impacts, and traffic.

10. **Cover Types.** Estimate the acreage of the site with each of the following cover types before and after development:

Minnesota Steel estimated cover types using geographic information system (GIS) data files maintained by the MNDNR. Acreages are approximate and are based on 1986 Mesabi Range Map Project Maps, updated with aerial photographs. The locations of the plant site, mine, tailings basin and stockpile area are shown in Figure 5-4. Due to differences in soils, habitat value and vegetation, the cover types that have been previously disturbed by mining activity are tabulated separately from those with no apparent previous disturbance.

PLANT SITE

	Number of Acres	
Cover Types	Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	61	0
Wooded/Forest	145	0
Brush/Grassland	116	50
Crop Land	0	0
Lawn/Landscaping	0	5
Residential	0	0
Commercial/Industrial/Transportation	0	0
Impervious Surface (Plant Site)	0	267
(Subtotal)	(322)	(322)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	4	0
Wooded/Forest	13	0
Brush/Grassland	40	5
Residential	0	0
Commercial/Industrial/Transportation	0	0
Impervious Surface (Plant Site)	0	52
(Subtotal)	(57)	(57)
Total	**379**	**379**

MINE AREA

	Number of Acres	
Cover Types	Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	20	0
Wooded/Forest	199	0
Brush/Grassland	128	0
Crop Land	0	0
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Mine Pits	0	347
(Subtotal)	(347)	(347)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	208	0
Wooded/Forest	99	0
Brush/Grassland	63	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Mine Pits	0	0
(Subtotal)	(370)	(370)
Total	**717**	**717**

STOCKPILE AREA

Cover Types	Number of Acres Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	3	0
Wooded/Forest	4	0
Brush/Grassland	7	0
Crop Land	0	0
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Stockpile Areas	0	14
(Subtotal)	(14)	(14)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	103	0
Wooded/Forest	10	0
Brush/Grassland	244	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Stockpile Areas	0	357
(Subtotal)	(357)	(357)
Total	**371**	**371**

TAILINGS PIPELINE CORRIDOR

Cover Types	Number of Acres Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	1	0
Wooded/Forest	6	0
Brush/Grassland	2	0
Crop Land	0	0
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	9
(Subtotal)	(9)	(9)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	1	0
Wooded/Forest	3	0
Brush/Grassland	1	0
Residential	0	0
Commercial/Industrial/Transportation	0	5
(Subtotal)	(5)	(5)
Total	**14**	**14**

ACCESS ROADS

Cover Types	Number of Acres Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	5	0
Wooded/Forest	13	0
Brush/Grassland	26	0
Crop Land	0	0
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	44
(Subtotal)	(44)	(44)

Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	0	0
Wooded/Forest	5	0
Brush/Grassland	11	0
Residential	0	0
Commercial/Industrial/Transportation	0	16
(Subtotal)	(16)	(16)
Total	**60**	**60**

RAILROADS

	Number of Acres	
Cover Types	Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	2	0
Wooded/Forest	21	0
Brush/Grassland	8	0
Crop Land	0	0
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	31
(Subtotal)	(31)	(31)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	3	0
Wooded/Forest	8	0
Brush/Grassland	6	0
Residential	0	0
Commercial/Industrial/Transportation	0	17
(Subtotal)	(17)	(17)
Total	**48**	**48**

NATURAL GAS PIPELINE*

	Number of Acres	
Cover Types	Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	25	0
Wooded/Forest	44	0
Brush/Grassland	31	0
Crop Land	2	2
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	100
(Subtotal)	(102)	(102)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	0	0
Wooded/Forest	0	0
Brush/Grassland	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
(Subtotal)	(0)	(0)
Total	**102**	**102**

* Acres affected assumes a typical corridor as shown in Figure 5-2 for the natural gas pipeline route as a representation of the number of acres and type of land cover affected, but does not imply that this corridor is the selected route at this time.

TRANSMISSION LINES*

	Number of Acres	
Cover Types	Before	After

Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	51	9
Wooded/Forest	72	0
Brush/Grassland	110	90
Crop Land	4	2
Lawn/Landscaping	0	0
Residential	2	2
Commercial/Industrial/Transportation	32	168
(Subtotal)	(271)	(271)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	1	0
Wooded/Forest	3	0
Brush/Grassland	4	0
Residential	0	0
Commercial/Industrial/Transportation	0	8
(Subtotal)	(8)	(8)
Total	**279**	**279**

* Acres affected assumes a typical transmission line corridor as shown in Figure 5-2 as a representation of the number of acres and type of land cover affected, but does not imply that this corridor is the selected route at this time.

TOTAL AREA AFFECTED*

	Number of Acres	
Cover Types	Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	168	9
Wooded/Forest	504	0
Brush/Grassland	428	140
Crop Land	6	4
Lawn/Landscaping	0	5
Residential	2	2
Commercial/Industrial/Transportation	32	352
Impervious Surface	0	267
Mine Pits	0	347
Tailings Basin	0	0
Stockpiles	0	14
(Subtotal)	(1,140)	(1,140)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	320	0
Wooded/Forest	141	0
Brush/Grassland	369	5
Residential	0	0
Commercial/Industrial/Transportation	0	46
Impervious Surface	0	52
Mine Pits	0	370
Tailings Basin	0	0
Stockpiles	0	357
(Subtotal)	(830)	(830)
Total	**1,970**	**1,970**

* Acres affected does not include any of the tailings basin alternatives. Land cover types affected by the various alternative tailings basin areas are provided separately below.

EXISTING STAGE I TAILINGS BASIN*

	Number of Acres	
Cover Types	Before	After

Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	0	0
Wooded/Forest	0	0
Brush/Grassland	0	0
Crop Land	0	0
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Tailings Basin	0	0
(Subtotal)	(0)	(0)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	432	0
Wooded/Forest	74	0
Brush/Grassland	1,423	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Tailings Basin	0	1,929
(Subtotal)	(1,929)	(1,929)
Total	**1,929**	**1,929**

* The number of acres identified is based on utilizing the existing Stage 1 Tailings Basin footprint (within the limits of the existing dams). The configuration shown on most figures with this document represents an expanded footprint, which may be needed if the existing dams are shown not to be adequate to support additional tailings being placed on the interior side of the dams.

EXPANDED STAGE I TAILINGS BASIN*

Cover Types	Number of Acres Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	96	0
Wooded/Forest	436	0
Brush/Grassland	7	0
Crop Land	0	0
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Tailings Basin	0	539
(Subtotal)	(539)	(539)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	0	0
Wooded/Forest	87	0
Brush/Grassland	31	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Tailings Basin	0	118
(Subtotal)	(118)	(118)
Total	**657**	**657**

* The number of acres identified is based on utilizing the existing Stage 1 Tailings Basin footprint (within the limits of the existing dams). The configuration shown on most figures with this document represents an expanded footprint, which may be needed if the existing dams are shown not to be adequate to support additional tailings being placed on the interior side of the dams.

ALTERNATIVE TAILINGS BASIN*

Cover Types	Number of Acres Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	192	0

Wooded/Forest	402	0
Brush/Grassland	520	0
Crop Land	5	0
Lawn/Landscaping	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Tailings Basin	0	1,119
(Subtotal)	(1,119)	(1,119)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	0	0
Wooded/Forest	0	0
Brush/Grassland	0	0
Residential	0	0
Commercial/Industrial/Transportation	0	0
Tailings Basin	0	0
(Subtotal)	(0)	(0)
Total	**1,119**	**1,119**

If **Before** and **After** totals are not equal, explain why:

PROPOSED TREATMENT OF TOPIC IN EIS
Specific mining and plant site details will be addressed during EIS preparation; the EIS will include updated cover type information and "before and after" cover type maps, and will describe the conversion of existing land cover types that will result from project implementation and reclamation.

11. **Fish, Wildlife and Ecologically Sensitive Resources**

a. Identify fish and wildlife resources and habitats on or near the site and describe how they would be affected by the project. Describe any measures to be taken to minimize or avoid impacts.

FISHERIES

The potential water quality impacts to streams are discussed in Question 18. The mine pit dewatering, tailings basin seepage/discharge and processing water needs would alter water flow or water levels of several water bodies that have fishery resources.

Pickerel Creek, a designated trout stream, flows from a small pool near Highway 169 and enters the extreme northern end of Swan Lake. The stream is mainly fed by groundwater in the upper one-third to two-thirds of its length discharge as well as by an NPDES-permitted wastewater discharge from the Midland Research facility. Pickerel Creek was previously impacted by the former Butler Taconite operations. The creek was reclaimed after Butler Taconite closed in 1985 and removed its former processing facility. Stream banks were restored and DNR stocked the steam with brook trout, which now reproduce naturally.

Swan Lake is a 2,472 acre lake that is near, but not within, the project area. It is heavily developed and has fairly good water quality. Data from the summer of 2000 showed total phosphorus levels at or below 30 micrograms per liter, indicating a mesotrophic status. The lake is reported to have large populations of walleye, northern pike, and black crappie. The project is not expected to affect Swan Lake's fishery, but potential impacts will be evaluated in the EIS.

Snowball Lake is 146 acre lake located approximately one-half mile south of the proposed mine area. There is a public access owned by the township on the west side of the lake off of County Road 561. The lake is reported to have a large population of northern pike with a moderate population of bluegill. The lake was stocked with walleye in1994, 1998, and 2001.

Oxhide Lake is a 121 acre, undeveloped lake located southeast of the proposed mining area and northwest of Swan Lake. The MNDNR owns a public boat launch, which is located in the southwest corner of the lake off of Highway 169. The MNDNR reported water clarity of 5.5 ft indicating a status between mesotrophic and eutrophic. Fish survey data from 1999 indicate that the lake has large populations of northern pike and largemouth bass and smaller populations of other game fish. The lake management plan indicates northern pike as the primary species of management with black crappie, bluegill, and largemouth bass as secondary species.

O'Brien Lake is a reservoir formed by the former Butler Stage II tailings dam. It impounded water over two lakes, known as Big O'Brien Lake and Little O'Brien Lake. In the remainder of this document, the reservoir is referred to generically as "O'Brien Lake".

The former Big O'Brien Lake was described by the MNDNR as a 900 acre lake which is located directly east of the Stage I tailings basin in the north part of the former Butler Stage II tailings basin. Water level data obtained from the MNDNR from 1952 until 1978 indicates that the water level of the lake historically ranged from 1346.1 ft amsl to 1352.3 ft amsl during that period with an average water level of 1350.7 ft amsl. Construction of the Butler Stage II tailings dam raised the level of the lake. The water level in 2003 was close to 1375, approximately 25 feet higher than historically. There is no public access to the lake, but the lake is accessed occasionally for fishing. The lake is reported to have a water clarity of over 17 feet, which would classify in the transition zone from oligotrophic to mesotrophic. Fish survey data from 1993 indicated large populations of northern pike, bluegill, and yellow perch.

The former Little O'Brien Lake was indicated by the MNDNR to be the impounded lake within the south part of the former Butler Stage II tailings basin. Construction of the Butler Stage II tailings dam raised the level of the lake. Water level data obtained from the MNDNR from 1952 until 1978 indicates that the water level of the lake historically ranged from 1338.5 ft amsl to 1342.3 ft MSL during that period with an average water level of 1340.1 ft amsl. The water level in 2003 was close to 1375 ft amsl, approximately 35 feet higher than prior to construction of the Stage II dam. No fish survey data are available from the MNDNR, however, anecdotal evidence that the Little O'Brien Lake impoundment does support some fisheries. Reduced outflow from the Stage I tailings basin would not be expected to have a significant impacts on fisheries of O'Brien Lake.

Big Sucker Lake is a 230-acre lake located northwest of the Alternate Tailings Basin. The lake has moderate shoreline development around the west, south, and east sides. There is a public boat access located on the southwest end of the lake off of County Road 58. Based on 2003 survey data, there are large populations of northern pike, bluegill, and black crappie.

Little Sucker Lake has an area of 61acres and Little McCarthy Lake has an area of about 70 acres. Both lakes have populations of bass and panfish and are fished by local anglers. The project may affect water levels in or water flows through these lakes, which has the potential to affect fisheries resources.

Sucker Brook originates within the alternative northwest tailings basin and flows west to the Prairie River approximately 6 miles downstream. No fisheries data is available for Sucker Brook. The Prairie River, just downstream of its junction with Sucker Brook, has 429 square miles of drainage area and a mean discharge of about 225 cubic feet per second. Biological surveys at this location have resulted in the documentation of 21 different fish species with no exotic species present. The site has an Index of Biotic Integrity of 82 out of 100.

The mine pits in the project area are not managed for fisheries and are not open to the public.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will include a qualitative description of fisheries resources and angling activity in the former Butler tailings basin (Big and Little O'Brien Lakes), Swan Lake, Oxhide Lake, Little Sucker Lake, Big Sucker Lake, O'Brien Reservoir, Snowball Lake, O'Brien Creek, Sucker Brook, and Pickerel Creek. The EIS will discuss the potential impacts to fisheries and angling that could result from varying water levels and flows. The EIS will not address impacts to fish in area mine pits. The EIS will suggest impact mitigation strategies where warranted, and will describe long-term mine pit reclamation strategies to provide fisheries habitat when mining ceases.

WILDLIFE

The undisturbed portions of the project area provide habitat for a variety of wildlife species. Upland areas support species common to second-growth forests, including white-tailed deer, snowshoe hare, gray wolves, and ruffed grouse and other bird species. The wetland areas provide habitat for songbirds, furbearers, amphibians and other wetland species. Although the Stage I tailings basin has been used for tailings disposal in the past, it is now inhabited by a variety of wildlife native to northern Minnesota. Approximately one-half of the site of the Alternate Tailings Basin area has been altered by recent logging, but it is not inhabited by humans and appears to be used occasionally for hunting and other recreation. The Stage I and Alternate Tailings Basin areas appear to be used for waterfowl hunting, trapping, deer hunting, and live bait trapping. Large animals may include deer, moose, gray wolves, coyotes, fox, Canada lynx, and bobcats.

Birds may include bald eagles, cormorants, swans, osprey, and hawks. On the reclaimed natural-ore tailings basin at the west side of the Butler tailings basin, sharp-tailed grouse have established a stable population.

The proposed project, including the expanded Stage I tailings basin, will affect about 4,560 acres of land. Use the alternate basin would reduce this to about 3,090 acres. Long term reclamation will restore habitat value and corridors for wildlife movement for a limited number of species in upland areas and the tailings basin, but during active mining the project area will lose nearly all habitat value.

The project area will not be available for hunting, trapping, or other wildlife-oriented recreation during production.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will include a qualitative description of wildlife species present in the project area and describe potential project impacts. The EIS will discuss mitigation, as warranted, through long-term mineland reclamation strategies and preservation of available wildlife corridors within or near the mining area.

b. Are any state-listed (endangered, threatened or special concern) species, rare plant communities or other sensitive ecological resources such as native prairie habitat, colonial waterbird nesting colonies or regionally rare plant communities on or near the site? ☒ Yes ☐ No

If yes, describe the resource and how it would be affected by the project. Indicate if a site survey of the resources has been conducted and describe the results. If the DNR Natural Heritage and Nongame Research program has been contacted give the correspondence reference number: **970464**. Describe measures to minimize or avoid adverse impacts.

The Minnesota Natural Heritage database was searched in March, 1997 and February, 1999 to determine if any rare plant or animal species or other significant natural features are known to occur within the project area. The search found two bald eagle nests, a nesting colony of double-crested cormorants, and great blue herons in the Butler Taconite Stage II tailings basin that is located adjacent to the proposed tailings basin (Stage I) for Minnesota Steel. The bald eagle is listed by the federal government as a threatened species. It is listed by the state of Minnesota as a special concern species. The bald eagle is also federally protected by the Bald and Golden Eagle Protection Act. Since the Stage II basin is not being utilized, no direct impact to the nesting habitat is anticipated.

The site may be part of the overall range of the Canada lynx and the gray wolf. The Canada lynx was put on the federal threatened species list in March 2000. Several unverified sightings of Canada lynx have been reported since 2000 within approximately 5 to 10 miles of the project site. The home range of the Canada lynx ranges from 20 to 94 square miles. The gray wolf is on the state list of species of special concern and has been listed as a federally threatened species since March, 1967.

According to the U.S. Fish and Wildlife Service website, the gray wolf is recovering nationwide, including in Minnesota. Proposals have been made in 2000, 2003 and 2004 to de-list the gray wolf in the coterminous U.S. or in the eastern region (including Minnesota).

Although the Natural Heritage database did not list them, listed plant species are known to occur in the project area and on April 1, 1999 the MNDNR requested that Minnesota Iron & Steel perform a search of the project area for these plants. During 1999, a survey was conducted to help clarify these issues. The project site, including mining and stockpiling areas and Stage I and II tailings basins, was surveyed for the presence of endangered, threatened, special concern and tracked species. The Alternative Tailings Basin will be surveyed for the presence of endangered, threatened, special concern and tracked species in the summer of 2005. During this survey the previously surveyed areas will be examined to verify the presence of listed plant species.

Twelve species of rare plants were located and positively identified in twenty locations (Figure 12-6). Populations of three endangered species and one threatened species were discovered, however only two of those populations, including two endangered species and one threatened species, are located within project areas included in this project. One population of the state-endangered species, pale moonwort (*Botrychium pallidum*), is located in the south end of the proposed stockpile area. A total of four individual plants were found at this location in 1999. Also present in the same general location is the state-threatened species, St. Lawrence grapefern (*Botrychium rugulosum*), but only one plant was documented in this location in 1999. The other is a population of tubercled orchid (*Platanthera flava*), which contained approximately 27 plants when surveyed in 1999, that is located in the north end of the Stage I tailings basin (Figure 12-6). At this time the presence of these species does not appear to present any significant problems for the proposed operation. Except for two populations of a state-listed special concern species in the stockpile area and one population of the same species within the Stage I tailings basin, it is likely that all of the endangered and threatened species can be avoided (Figure 12-6).

Species designated as species of special concern are not legally protected by the State of Minnesota, but efforts will be taken to avoid them or minimize impacts. A total of four special concern species and three tracked species were found at three locations between the southwestern pits, directly south of the plant site.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will include the results of the rare plant survey and database search results, describe potential impacts to listed species and suggest mitigation if warranted. The EIS will evaluate potential impacts to federally threatened and endangered species. Existing information will be evaluated and additional information collected if necessary to support federal regulatory requirements for threatened and endangered species. Potential mitigation strategies and alternatives will be evaluated to prevent and minimize any identified impacts.

12. **Physical Impacts on Water Resources.** Will the project involve the physical or hydrologic alteration — dredging, filling, stream diversion, outfall structure, diking, and impoundment of any surface waters such as a lake, pond, wetland, stream or drainage ditch? ☒ Yes ☐ No

    If yes, identify water resource affected and give the DNR Protected Waters Inventory number(s) if the water resources affected are on the PWI: (**see below**). Describe alternatives considered and proposed mitigation measures to minimize impacts.

AFFECTED LAKES AND STREAMS

Direct physical impacts to water bodies other than mine pits will be limited. Indirect impacts may occur via watershed changes and mine dewatering. The dewatering plans for the project were described in response to Question 6b. Water use and supply for the project are discussed in response to Question 13 and impacts to water bodies due to dewatering and other flow changes are discussed in response to Question 17 and 18.

Water bodies potentially impacted include:

Name	Protected Waters Inventory Status	Type of Impact
Oxhide Lake	31- 106P	• Temporary construction impacts due to reconstruction of dike between Oxhide Stilling Basin and Oxhide Lake. • Increases in inflow volume and decreases in inflow fluctuation due to initial mine dewatering from Pits 5, 1, and 2 during years 2 through 5 of operation. • Reductions in watershed area and yield during plant operation due to plant use of pit water. • Possible increases in yield in Year 10 due to pumping of Draper annex pit. • Reduction in yield for several years after closure (year 20) due to refilling of Pits 1, 2, 5 and 6. • Possible changes in groundwater balance due to dewatering of Pit 6.
Oxhide Creek (between Oxhide Lake and Swan Lake)	Protected stream	• Increases in flow due to mine dewatering from Pits 1 and 2 during years 2 through 5 of operation. • Reductions in watershed area and yield during plant operation due to plant use of pit water. • Watershed change and flow reductions during mining. • Reduction in yield for several years after closure (Year 20) due to refilling of Pits 1,2, 5 and 6.
Snowball extension	31-107P	• Reduction in watershed during mining. • Possible alteration of groundwater balance due to pit dewatering.
Snowball Lake	31-108P	• Reduction in watershed during mining. • Possible alteration of groundwater balance due to pit dewatering.
Little Sucker Lake	31-126P	• Possible reductions in watershed due to construction of plant and creation of stockpiles.
Big Sucker Lake	31-124P	• Possible minor reductions in watershed due to construction of plant and creation of stockpiles.
Little McCarthy Lake	31-123P	• Possible reductions in watershed due to stockpiling and construction of plant.
O'Brien Lake (Big and Little)	Not a protected water	• Reduction in average flows due to loss of Stage I tailings basin portion of lake watershed. • Intermittent discharges of tailings basin water to O'Brien Lake may increase flow through lake.
O'Brien Creek O'Brien Creek (cont'd)	Protected stream	• Reduction in average flows due to loss of Stage I tailings basin portion of watershed. • Intermittent discharges of tailings basin water to O'Brien Lake may increase flow through lake to creek.
Sucker Brook	Protected stream	• A portion of one of the upper tributaries to this stream may be eliminated by the development of the Alternative Tailings Basin if that alternative is chosen.
Swan Lake	31-67P	• Increases in inflow during Years 2 through 5 due to initial mine dewatering. • Watershed change and flow reductions during mining due to appropriation from pits.
Pickerel Creek (Unnamed stream to Swan Lake)	Protected stream	• Flow increases and increases in dissolved solids due to operation of tailings basin if seepage collection system is not implemented.
Existing mine pits	Not on P.W.I.	• Pit 5 will be pumped dry for mining in years 3-5 of operation. It will be enlarged during mining and allowed to refill with water when mining is completed. • Pit 6 will be newly created and allowed to refill with water when mining is completed. • Draper Annex pit will be dewatered during the 10^{th} year of mining It will be allowed to fill with water when mining is completed.

Name	Protected Waters Inventory Status	Type of Impact
		• Pit 5 or 6 or other pits may be partly filled with waste rock and/or overburden to improve littoral habitat

The geomorphology of rivers and streams are directly related to the magnitude, timing, duration, and rate of change in water flow. Changes in stream flow due to the project have the potential affect stream geomorphology. The degree of flow change combined with the sensitivity of the stream channel to flow changes can be used to determine what level of impact would likely occur.

Initial dewatering of pit 5 and water level lowering of pits 1 and 2 into Oxhide Creek are likely to cause the largest degree of flow change. A watershed balance will be completed for the project (see response to Question 13) that can be used to identify how the project would change flow in affected streams. An analysis of stream sensitivity will be needed in determine if predicted flow changes would impact stream geomorphology. The Rosgen methodology for assessing stream channel shape and processes is a recognized hierarchical (stepwise) framework that can be used to determine the impacts of hydraulic alteration to stream geomorphology.

PROPOSED MITIGATION MEASURES TO COMPENSATE FOR UNAVOIDABLE IMPACTS TO LAKES AND STREAMS

A detailed project water balance and watershed yield will be conducted to help quantify impacts on streamflow and lake water levels throughout mining and after closure. The volume of water flowing to Oxhide, Snowball, and Swan Lake will be temporarily increased during initial pit dewatering, then reduced during active mining because of plant consumption. The EIS will address these potential impacts in detail, especially for Swan Lake, to determine if the outlet weir should be modified. The objective of this analysis will be to retain the present water level fluctuation regime for Swan Lake. DNR specialists will work with company representatives to determine flow augmentation requirements to all affected lakes, especially Snowball and Oxhide Lakes, during mining. The EIS will also propose a conceptual post-mining watershed reclamation plan to assure an adequate flow of water to both Snowball and Oxhide Lakes after mining ceases. Pit dewatering during mining and post-mining outflow from the pits will be controlled, as appropriate, to prevent unacceptable fluvial-geomorphic impacts (channel erosion) to Snowball and Oxhide Creeks. See Section 13 for more details on potential hydrologic impacts.

WETLANDS

Overview of Affected Wetlands

The project would affect approximately 1,014 acres of wetlands or areas with wetland characteristics. About 74% of these are wetlands that have formed on lands previously impacted by mining (e.g., inactive tailings basins). Minnesota Steel submitted a Section 404 wetlands permit application to the U.S. Army Corps of Engineers on January 21, 2005 and modified this application on June 1, 2005. This application was intended to provide preliminary information for commencement of environmental review by the Corps of Engineers; additional information requests by the Corps are anticipated and additional data collection and submittal will be completed. Wetland impacts will also be reviewed by the Minnesota Department of Natural Resources under the Minnesota Wetlands Conservation Act; for mining projects this work is reviewed as part of the issuance of the Permit to Mine. Impacts to protected waters are also reviewed by the MNDNR.

Most of the wetlands within the project areas have either developed on disturbed mine lands or are natural wetlands that have been impacted by past mining activities. Figure 9-1 shows the general areas of the project that are composed primarily of disturbed or artificial land surfaces that resulted from the Butler Mine that operated at the site from 1967 to 1985. Wetlands and water resources present throughout the project site are shown on Figure 9-4.

Minnesota Steel has reduced the anticipated wetland impacts of the project from previous proposals for the site. In 1999-2001 Minnesota Iron & Steel requested a permit for impacts to 3,969 acres of wetlands with 1,663 acres of wetland impacts during the first 20 years of mining.

In January, 2005, Minnesota Steel submitted an application to impact 1,005 acres of wetlands. This was done by avoiding the southeastern and northern portions of the Stage II tailings basin, and reducing the mine and stockpile areas. The current project configuration will reduce these impacts further by eliminating the use of the Stage II basin option and using the Stage I Tailings Basin. Impacts for the project using the revised basin plans are estimated to be 1,014 acres. About 74% of these wetlands are low quality industrial wetlands formed on the former Stage I basin. The size of the future tailings basin has been minimized by using "upstream construction" methods or "stacking" of tailings. This method will allow a smaller footprint for the basin. Minnesota Steel will continue to look for ways to avoid and minimize wetland impacts. Minnesota Steel has identified potential sites for mitigation projects that will be included in the EIS.

Some of the wetlands within the plant and mining areas were identified and delineated on October 20–21, 1998 using methods prescribed by the Corps of Engineers. However, because this delineation occurred over five years ago, U.S. Army Corps of Engineers policy requires a new delineation for the project. Wetlands in the plant site area are shown in Figure 12-1; wetlands in the mine area and haul road are shown on Figure 12-2. The delineation report is included in the Wetland Permit Application.

The wetlands that have been delineated to date are a subset of the potential overall wetland impacts. Additional areas within the Minnesota Steel project areas will be disturbed before and after production begins. These areas include:

- Tailings basin
- Pit 6 area
- Concentrator and crusher area
- Lean ore, waste rock, and overburden stockpile areas
- Connected actions, including road access from U.S. Highway 169, railroad access to the plant site, power transmission lines, and natural gas pipelines.

The remaining wetland resources in these areas have been mapped using off-site delineation methods and will be field-verified in the summer of 2005. Former mine pits are mapped as deepwater habitats and are exempt from jurisdiction under the Wetland Conservation Act. Wetlands that have formed on artificial land surfaces created from past mining activities are considered incidental and are also not under the jurisdiction of the Wetland Conservation Act. Wetlands and deepwater habitats present within the Stage I tailings basin were the subject of a land swap agreement made by the state in 1968. The affect of this land swap agreement on state jurisdiction of wetlands and deepwater habitats is uncertain. However, the U.S. Army Corps of Engineers maintains Clean Water Act jurisdiction over wetlands and deepwater habitats that have either formed on artificial land surfaces or have been impacted by past mining activities. Wetlands will be identified, delineated, characterized and mapped in these areas so that appropriate mitigation can be developed.

Wetland Impacts

The projected wetland impacts for the proposed project are shown on Figures 12-1, 12-2, 12-3, 12-4. A summary of all potential wetlands and deepwater habitats in the project areas is provided in Table 12-1. A summary of potential wetland impacts resulting from the operation by wetland type cannot be provided at this time due to the lack of wetland classification data in areas where field verification has not been completed.

It is anticipated that a total of between 677 and 1,014 acres of wetlands and deepwater habitats will be impacted by the project including: plant facilities, mining activities, tailings basin, tailings pipeline, rock and overburden stockpiling, road access, railroad access, transmission lines, and natural gas pipelines at Minnesota Steel. The expected wetland impacts associated with each major project component are shown on Table 12-1 and described below.

Wetland Impacts of Mine Operations

The existing Pit 5, which now contains water, will be dewatered to allow for expansion of the pit. The dewatering of the pit will cease when the mining operation is complete. The enlarged Pit 5 will be allowed to fill with water again and may be partially developed into wetlands, if in-pit disposal of waste rock and overburden are feasible and pursued.

A total of 33 wetlands are projected to be impacted by Pit 5 mining operations along with 3 areas of mine pits (Figure 12-2). A total of 20 acres of wetlands and 184 acres of mine pits are present in this area as shown on Figure 12-2 (Table 12-1). The wetlands in the proposed 20-year mining area were field delineated in 1998. These delineations will be field checked in the summer of 2005. When mining operations cease, mine pits will be allowed to refill with water. Where in-pit stockpiling has occurred, the pits may be developed into lacustrine wetlands.

Development of Pit 6 will require dewatering of the former Draper Annex mine pit in the 10th year of operation. This pit has an area of about 24 acres. After mining has been completed, Pit 6 will be allowed to fill with water and may be partially developed into shallow-water habitat, if in-pit disposal of waste rock and overburden are feasible and pursued.

In addition to direct impacts of pit development, there are potential indirect impacts due to pit dewatering. Based on experience at other mines on the Mesabi Iron Range, it appears probable that there will not be significant indirect wetland drainage impacts resulting from mine pit dewatering. There are numerous examples of wetlands thriving on the rim of mine pits for many years.

Nonetheless, Minnesota Steel will conduct a study beginning in the summer of 2005 to evaluate the potential for wetland drainage impacts and to provide baseline data for evaluating any future changes. This will include the placement of shallow wells in existing wetlands near the proposed mining areas.

Wetland Impacts of Plant Facilities

The filling of part of a large wetland complex south of the plant site will comprise most of the wetland impacts resulting from construction of the plant facilities. A total of 26 wetland areas will be impacted by the construction of the plant facilities (Table 12-1) prior to the start of mining encompassing an area of 65 acres (Figure 12-1). The majority of the impacts will occur along the northern portion of a large wetland complex oriented northeast to southwest through the plant area. The predominant wetland types affected by the plant construction are wet meadow and shallow and deep marshes (Types 2, 3 and 4). These wetlands are dominated by Canada blue-joint grass, cattails, wool-grass, sedges, reed canary grass and asters. The northern end of the wetland complex is dominated by forested and scrub shrub wetlands (Type 7 and 6). The dominant vegetation types in these wetlands include box elder, alder, Canada blue-joint grass, balsam fir, tamarack, northern white cedar, black spruce, black ash and willow.

Wetland Impacts of Stockpiles

The former Patrick B Tailings Basin is planned to be utilized for stockpiling (Figure 12-3). A total of 12 potential wetlands or areas with wetland characteristics have been identified in this area covering an area of 105 acres (Table 12-1). Nearly all of the wetlands (103 acres) appear to have formed after the former tailings basin was decommissioned or have been significantly altered by the tailings basin. The actual extent of wetlands located in the stockpile areas will be field delineated in the summer of 2005.

Since in-pit stockpiling has been permitted by the MNDNR in the past and there appears to be considerable opportunities for this practice within mined-out pits, only a portion of the potential stockpile areas identified on Figure 9-3 may be used. Specific future stockpile areas will be evaluated in detail during final planning to identify areas with minimal wetlands.

Wetland Impacts of Tailings Basin

The proposed tailings basin designs minimize impacts to wetlands due to a less land-intensive tailings storage design than previously proposed. The original tailings basin planned by Butler Taconite included approximately 9,700 acres of land south of Highway 169. Minnesota Steel has greatly reduced the size of the proposed tailings basins compared to the permitted Butler basin. Minnesota Steel proposes to use 4 to 1 dike slopes instead of 40 to 1 slopes planned by Butler. This will maximize the tailings storage volume-to-area, ratio resulting in avoidance of considerable wetland impacts. In addition, the Stage II basin has been eliminated as a preferred basin location and the Alternative Tailings Basin and Stage I basin are being considered. This will further reduce wetland impacts.

The total wetland impacts for the 20-year project life of the expanded Stage I tailings basin is estimated to be 529 acres (Figures 12-4, 12-5, and Table 12-1), of which 82% are wetlands formed on lands previously disturbed by mining activities. Wetlands and water resources within the two Alternative Tailings Basin areas have been identified using off-site wetland identification procedures. If the Stage I basin is utilized, approximately 3.6 additional acres of wetlands will be impacted for the construction of the tailings pipeline.

Wetland Impacts of Connected Actions

Additional activities connected with the project may also impact wetlands. Some of the infrastructure that will need to be constructed to begin operating the mine include:

- Road access to the plant
- Railroad access to the plant
- Natural gas pipeline
- Transmission lines

Figure 12-2 shows possible layouts for these features; the final design of these features has not been determined. The wetland impacts related to these actions are a small fraction of the overall wetland impacts. More complete preliminary designs will be available for use in the preparation of the EIS. Additional environmental review of the possible alternatives for the gas pipeline and transmission lines will be conducted under the route permitting processes for these facilities.

PROPOSED MITIGATION MEASURES TO COMPENSATE FOR UNAVOIDABLE WETLAND IMPACTS

Detailed wetland mitigation planning has begun; an overall mitigation plan will be included as part of the EIS. For impacts to lakes, pits and streams as outlined in the initial table in this section, mitigative measures include possible augmentation pumping to maintain streamflows and modifications to streams and lake outlets to increase flow capacity. Monitoring of Snowball Lake and groundwater levels near that lake should begin when pit expansion toward the lake begins.

For wetland impacts, the overall mitigation program will be defined at the beginning of the project and implemented in ongoing increments of approximately 5 years, as has been done at other Iron Range mines. During the initial permitting of the project, specific wetland mitigation projects will be identified to provide compensatory mitigation for impacts that are expected to occur during the first 5 years of the project. Additional potential wetland mitigation opportunities will be identified to compensate for unavoidable wetland impacts expected during proposed 20-year life of the project. The following analysis includes some general long-term mitigation strategies that will be employed and a more detailed look at compensatory mitigation for impacts created by the project.

Mitigation opportunities closest to the project site will be given preference. The development of potential wetland mitigation projects will focus first on the Mississippi River drainage basin. This basin will encompass the Bank Service Area for the project as currently defined in the draft *Wetland Mitigation Memorandum of Understanding* being developed by the Interagency Wetland Group.

Potential long-term compensatory mitigation strategies could include:

1. Creation of wetlands in borrow areas or other disturbed areas at the project site;
2. Restoration of drained wetlands in the Mississippi River–Grand Rapids watershed and restoration of drained wetlands within adjacent major watersheds (Mississippi River-headwaters, Mississippi River-Brainerd, Pine River, Leech Lake River);
3. Restoration of partially drained wetlands within the Mississippi River–Grand Rapids watershed;
4. Permanent conservation easements and protection of portions or all of Snowball Lake, Oxhide Lake and/or other lakes or other important local resources;
5. Creation of wetlands within mine pits after mining assuming that in-pit disposal of waste rock is feasible;
6. Creation of wetlands on reclaimed tailings basins;
7. Creation of wetlands on stockpiles;
8. Purchase of credits from appropriate, established wetland banks; and
9. Restoration of drained wetlands in an area of Minnesota with <50 percent of pre-settlement wetlands.

Minnesota Steel will prepare a detailed wetland mitigation plan to compensate for the unavoidable impacts to wetlands and to comply with the no-net-loss provisions of the WCA rules and Section 404(b)(1) guidelines of the CWA. Since Itasca County retains greater than 80 percent of its presettlement wetlands, a 1:1 mitigation ratio is allowed under the WCA rules as well as under the CWA when the impacts are replaced by established mitigation wetlands of the same type and within the same major watershed. The mitigation plan will be developed consistent with the replacement standards specified in the WCA rules and the mitigation guidelines specified in the Section 404 Mitigation Memorandum of Agreement (dated February 1990).

Detailed wetland mitigation plans will be developed consistent with the criteria outlined below during the initial permitting of the project. It is anticipated that specific wetland mitigation opportunities will be identified during development of the EIS. The development of these opportunities will likely include the following:

1. The identification of the properties required for completing the wetland mitigation projects;
2. An analysis of the citing requirements in the WCA and the CWA for each project including the proposed mitigation ratios that would apply;
3. A description of the existing wetland resources within each project area;
4. A conceptual plan for restoring/creating wetland resources within each project area;
5. A description of the wetland resources that will be restored, created, or preserved;
6. A summary of the wetland areas that will be restored, created, or preserved;
7. A preliminary schedule for conducting the wetland mitigation activities;
8. A monitoring program to track success of each wetland mitigation project;
9. Additional information regarding deed restrictions or conservation easements that will be recorded; and
10. Assurance from the landowners regarding their willingness to either participate in the mitigation project or to sell the property needed for the project.

Restored or created wetlands will be designed in accordance with the following design criteria, where practicable:

1. Side slopes of the wetland and buffer strip will not be steeper than 5:1 and preferentially at least 10:1 as averaged around the perimeter of the wetland;
2. The wetlands will be constructed with an irregular shape to establish points and bays consistent with the local landscape;
3. Bottom contours will be undulating to provide variable water depth that will support a variety of wetland plants;
4. Non-adjustable control structures will be installed to maintain appropriate hydrologic conditions; and
5. Water levels will be established at a depth not to exceed 6.6 feet.

Detailed wetland mitigation construction plans are expected to be submitted during the final stages of permitting to provide compensation for wetland impacts projected for the first 5 years of the project. Detailed wetland mitigation construction plans for future wetland impacts are expected to be developed and submitted for approval before the impacts occur.

PROPOSED TREATMENT OF TOPIC IN EIS
The proposed project has the potential to significantly affect surface and groundwater resources in the project area both during and after mining. A detailed project water balance and watershed yield will be conducted to help quantify impacts on streamflow and lake water levels throughout mining and after closure. The EIS will include a major discussion of this topic including:

- *Impacts to open water areas and wetlands throughout the project;*
- *Surface water flows in O'Brien, Pickerel, Oxhide and Snowball Creeks, and Sucker Brook;*
- *Modifications to Oxhide Creek;*
- *Upper Oxhide Creek diversion;*
- *Patrick "B" Tailings Basin diversion;*
- *Potential water level impacts to Little Sucker Lake, Snowball Lake, Swan Lake, Little McCarthy Lake, O'Brien Lake, and Oxhide Lake; and*
- *Dam safety issues.*

A Level 1 Rosgen analysis of Oxhide, Snowball, Pickerel, and O'Brien Creeks stream geomorphology will be completed to identify any potential stream reaches that may be sensitive to changes in stream flow. This information will be compared with the stream flow change information (described in Question 13) to identify any stream reaches that require further evaluation for impacts. If this further evaluation identifies any significant adverse impacts due to changes in water flow, monitoring and mitigation will be developed.

Wetland delineations, mitigation sites, and feasibility of wetland mitigation will be evaluated in the EIS. The potential for indirect wetland impacts due to the project will also be included in the EIS.

The EIS will suggest monitoring and mitigation where necessary to better define potential impacts and avoid or minimize known impacts.

13. **Water Use.** Will the project involve installation or abandonment of any water wells, connection to or changes in any public water supply or appropriation of any ground or surface water (including dewatering)?
☒ Yes ☐ No

If yes, as applicable, give location and purpose of any new wells; public supply affected, changes to be made, and water quantities to be used; the source, duration, quantity and purpose of any appropriations; and unique well numbers and DNR appropriation permit numbers, if known. Identify any existing and new wells on the site map. If there are no wells known on site, explain methodology used to determine.

SURFACE AND GROUND WATER APPROPRIATIONS

The proposed project will require significant amounts of water. A preliminary estimate of the overall water balance for the project is listed in Table 13-1.

CONSUMPTIVE USES

The major consumptive uses of water are listed in Table 13-2, and described as follows:

Plant Process Water Consumptive Uses

Drawings of the plant water balance are shown in Figure 13-3. The Plant will use recirculated process water for most operations. The concentrator and portions of the pellet plant have internal circulating loops that use water to transport crushed ore, concentrate and tailings.

These loops may require as much as 60,000 gallons per minute (gpm). These uses do not consume water but simply move it in large quantities. This water will need to be supplemented by fresh water to make up for evaporative losses and other water losses during operations.

At the pellet plant, the wet pellets are dried (prior to induration), resulting in a loss of water from the plant to the atmosphere. Additional consumptive losses occur in the DRI plant and steel plant where process water becomes very hot and must be cooled by passing it through cooling towers. Evaporation also occurs through direct contact of cooling water with the hot steel slabs. Overall, plant processes will consume an estimated 2,760 gpm of water.

Tailings Basin Consumptive Uses

Water will be lost in the tailings basin due to entrapment of water in the pore space of the deposited tailings ("voids loss") as well as to seepage and evaporation. Approximately 1,300 gpm will be lost due to voids loss, and 600 gpm may be lost as seepage. The seepage loss may be captured and returned to the tailings basin or allowed to flow to O'Brien Creek and Pickerel Creek to augment flow rates.

Minnesota Steel also proposes to discharge clarified water from the tailings basin when excess water is present. This will allow discharge of dissolved solids including calcium, magnesium and sulfate in low concentrations. These solids, if allowed to accumulate in the process water, could cause hardness and total dissolved solids to reach levels where they would interfere with plant operations and could exceed water quality standards if discharged. This is discussed in greater detail in response to Question 18. The rate and volume of discharge of clarified tailings basin water process water is not known at this time; an updated water balance and dissolved solids balance will be included in the EIS.

Stream and Lake Flow Augmentation Consumptive Use

It may be necessary to augment flow to Oxhide Creek, O'Brien Creek, Snowball Lake, Little Sucker Lake, and Little McCarthy Lake in order to maintain aquatic habitat. These augmentation requirements will be set by the MN DNR as part of the appropriations permits and Permit to Mine. The minimum flows to these streams and lakes have not yet been evaluated in detail. Minnesota Steel is preparing a detailed water balance for the project and a watershed yield model for streams and lakes affected by the project. Data on these water bodies will be provided in the application for the MNDNR appropriations permit and will be available for use in the preparation of the EIS. In addition, augmentation will be determined with the advice of DNR specialists through the EIS process.

WATER SUPPLY

Water supply sources for the project are listed in Table 13-3. Plant demand for water will be supplied by using runoff from the watersheds that drain to the pits and tailings basin, and by using groundwater inflow to Pit 5, Pit 6 and Pits 1 and 2. A watershed yield model was constructed for the project area and described in the 2001 report *Watershed Yield Model and Preliminary Operational Water Balance*. Contributing watersheds to the plant site, Pit 5, Pits 1 and 2, and the proposed Stage I tailings basin total about 7,100 acres in area and produce an average long-term yield of about 2,970 gallons per minute.

PLANT SITE CONTRIBUTION FROM RUNOFF

The proposed plant site and stockpile area occupies portions of the Pit 5 watershed, as well as Little Sucker Lake, Little McCarthy Lake, and Snowball Lake watersheds. Runoff from the proposed plant and stockpile area will be captured and treated in primary settling basins. From there, discharge will be discharged to the tributary watersheds, used in the plant or sent to Pits 1 and 2. For this discussion, runoff from the plant site and stockpile area is assumed to contribute to the tributary watersheds.

PIT CONTRIBUTION FROM INITIAL DEWATERING AND MAINTENANCE PUMPING

Initial Dewatering

Since the closure of Butler Taconite, groundwater and surface water contribution have filled Pit 5 and Pits 1 and 2. Beginning in about the second year of operation, it will be necessary to completely dewater Pit 5, which will take about three years. The volume of Pit 5 is estimated to be 13,835 acre-feet from the bottom of the pit to elevation 1355 (approximate current water level). Based on extrapolation of past Butler Taconite pumping records and estimation of long-term runoff from contributing watersheds, the pumping rate required to draw down this volume, and keep up with groundwater and surface water inflow, is estimated to be about 4,200 gpm (9.6 cfs). This water would be used for plant operation and for stream augmentation as necessary; excess water would be directed to the Oxhide Stilling Basin. This basin, shown on Figure 5-4, is north of Oxhide Lake and was used by Butler Taconite as a sedimentation basin and discharge point for pit dewatering. The levee separating Pit 5 from the stilling basin will be reconstructed to eliminate backflow into Pit 5. From Oxhide stilling basin, water will flow to Oxhide Lake, then to Oxhide Creek, and finally to Swan Lake. Additional discussion of impacts of dewatering on receiving waters is found in response to Question 17

Pit 5 is separated from Pits 1 and 2 by a saddle of unmined rock. Dewatering Pit 5 will require drawing down Pits 1 and 2 by about five feet to the level of this saddle. Water levels in the Hawkins, Harrison and adjacent pits also will be drawn down as they are currently connected to Pits 1 and 2. As with Pit 5, Pits 1 and 2 will be lowered, starting in the second year of operation, using vertical turbine pumps on a floating barge. The pumps will discharge via a pipeline to the Oxhide Stilling Basin and then to Oxhide Lake, Oxhide Creek and Swan Lake. In order to lower Pits 1 and 2 in three years the estimated pumping rate will be about 2,530 gpm (5.6 cfs) Additional discussion of impacts of dewatering is found in response to Question 12

Around the tenth year of operation, Pit 6 will be expanded to include the former Draper Annex pit. The Draper Annex Pit is much smaller than Pits 5 or 6 but dewatering will cause a small increase in flow rate at that time. This water would also be discharged to Pits 1 and 2 and used for plant operations or discharged to Oxhide Stilling Basin if not needed

Maintenance Dewatering

After initial dewatering during mining, groundwater inflow to Pit 5 is estimated at 1,110 gpm. Surface water inflow to Pit 5 will add an average of 240 gpm for a total of about 1,350 gpm. It is proposed to pump this water into Pits 1 and 2 where it will be stored, clarified and used for plant operations and/or for augmentation of streams affected by the project.

As previously described in response to Question 6, Pit 6 will be newly created. Eventually, the pit will be approximately the same size and depth as Pit 5 and will require maintenance dewatering. Based on estimates for Pit 5, the groundwater and surface water yield from this pit is expected to be similar to the Pit 5 yield, i.e., roughly 1,350 gpm. The water will be discharged either to Pit 5 and then to Pits 1 and 2 or directly to Pits 1 and 2.

Pits 1 and 2 will receive the discharge from active Pits 5 and 6 and local inputs (rainwater, groundwater and watershed runoff) to the pit. Based on pumping records from Butler Taconite operations and records of refilling of the pit following closure, groundwater inflow to Pits 1 and 2 will produce between 700 and 2,570 gpm, depending on the water level. Surface water runoff contributions will provide an additional 240 gpm and 1,430 gpm to Pit 5 and Pits 1 and 2, respectively, on average. Additional detail on the quantity of mine pit dewatering will be included in the EIS.

During periods of above-average precipitation, excess runoff will be stored in Pits 1 and 2 and possibly in the tailings basin. Runoff in excess of what can be stored will be pumped from Pits 1 and 2 to Oxhide Stilling Basin and Oxhide Creek. During these periods, planned discharges also may be made from the Stage I tailings basin if downstream conditions allow. Because of the large size and relatively small watershed of these pits, the discharge is likely to be relatively stable and not characterized by large surges.

TAILINGS BASIN CONTRIBUTION

The Stage I Tailings basin will include approximately 1,929 acres including a seepage collection ditch around the perimeter of the dikes. If the enlarged Stage I basin is required, the area will be 2,586 acres. The watershed of this tailings basin will produce an estimated 600 gpm on average (800 gpm if the enlarged basin is required). The tailings basin also will receive water from the tailings slurry discharge. Most of the water in the tailings basin will be clarified and returned to the plant for reuse; some may be discharged to augment flow in O'Brien Creek.

Based on experience with other mining operations, Minnesota Steel is proposing to discharge water from the tailings basin on an intermittent basis in order to avoid accumulations of dissolved solids that could exceed water quality standards. This issue is discussed in greater detail in response to Question 18. This flow would be directed to O'Brien Reservoir or possibly to O'Brien Creek.

If the Alternative Tailings Basin were used the watershed yield would be slightly smaller; the area of 1,119 acres would yield approximately 480 gpm. Any discharge from this basin would be directed to Sucker Brook and ultimately to the Prairie River.

WELLS AND PUBLIC WATER SUPPLY

No new wells will be required and abandonment of any existing wells is not anticipated. If any wells are located in the project area, they will be abandoned in accordance with the State Well Code. Potable water for the plant and administrative buildings will be obtained by connection to the water supply system of the City of Nashwauk. All other water appropriations will be satisfied through mine pit dewatering and tailings basin return water.

Wells in the vicinity of the project are shown on Figure 13-1, and groundwater levels are shown in Figure 13-2. The nearest municipal wells are located in the City of Calumet, southwest of Pit 6. Three wells are within approximately 1.2 miles from Pit 5, and a fourth well is approximately 2.5 miles away. These wells range in depth from 214 to 503 feet, with bottom elevations ranging from 869 to 1,197 amsl. The water elevations of these wells range from 1,169 to 1,258 amsl. This compares to an anticipated mining depth to approximate elevation 950 amsl.

The City of Nashwauk has two municipal wells that are approximately 3 miles from Pit 5. These wells range in depth from 414 to 540 feet, with bottom elevations ranging from 899 to 1075 amsl. The water elevation of the south well is 1289 amsl (the water elevation of the north well is unknown). This compares to an anticipated mining depth to approximate elevation 950 amsl.

Pit 5 and Pits 1 and 2 both have been pumped dry previously with no noticeable adverse impacts to local wells or wetlands. Minnesota Steel proposes to store as much water as possible in Pits 1 and 2, and will only draw them down to the extent necessary to supply plant needs during dry periods. To the east of Pits 1 and 2 are additional water-filled pits. Therefore, it is likely that impacts to the east will be less than previously experienced. To the west, it is expected that Snowball Lake will be maintained at its current water level (about Elevation 1,354 amsl) which should avoid problems of well interference to the west and south of Pit 6.

PROPOSED TREATMENT OF TOPIC IN EIS

The EIS will include a detailed water balance for the project including processing plant needs, mine pit dewatering, lake/stream augmentation and tailings basin seepage/discharge. Additional sources of water to supply the processing plant will be identified if the balance indicates a water deficit for the processing plant. The water balance will also consider wastewater discharges from the tailings basin to prevent build up of dissolved solids or other water quality concerns.

This information will be used to model how affected watershed yield and lake water levels would change both during and after mining. Impacts to water bodies will be identified and mitigation/monitoring will be developed to minimize impacts.

Potential impacts to nearby wells due to mine pit dewatering will be evaluated in the EIS.

14. **Water-Related Land Use Management District.** Does any part of the project involve a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district? ☒ Yes ☐ No

If yes, identify the district and discuss project compatibility with district land use restrictions.

Itasca County has designated shoreland zones within 1,000 feet and 300 feet of lakes and streams, respectively. Within shorelands, the County zoning ordinance requires a 500-foot setback for mining-related activities. Mining closer than 500 feet will be permitted through a variance only. The proposed mine and associated stockpiles and structures will be greater than the 500 feet setback for shoreland zoning areas, with the possible exception of Pickerel Creek.

The project area includes or involves the shoreland zoning areas of the following waterbodies:

Lake/Stream Name	Shoreland Zoning Classification
Snowball Lake	Recreational Development I
Oxhide Lake	General Development
O'Brien Lake (Butler Stage II basin)	Natural Environment I*
Little Sucker	Natural Environment II**
Pickerel Creek	Natural Environment I

* O'Brien Lake is adjacent to the proposed Phase I Tailings Basin. It is <u>not</u> a MNDNR protected water; however, the original outline of O'Brien Lake, now underwater, was listed as a shoreland zoning area by Itasca County. The 1998 Itasca County zoning maps show the shoreland buffer around the existing waterline within the basin.

** Little Sucker Lake is outside the project area but portions of its shoreland zoning area may be slightly within the project area

None of the project components is within a designated 100-year floodplain. Impacts to local water bodies outside the project boundary are described in response to Questions 17 and 18.

The use of the Stage I Tailings Basin will impinge upon the shoreland zone delineated by Itasca County for O'Brien Lake. The alternative tailings basin is greater than 1,000 feet from Big Sucker Lake. The edge of the Stage I Tailings Basin would be greater than 300 feet from the headwaters of Pickerel Creek.

PROPOSED TREATMENT OF TOPIC IN EIS

The projects relationship to Water-related Land Use Management Districts will be discussed briefly in the EIS. Itasca County's shoreland zoning ordinance will be reviewed and compared to the project. The status of the project with respect to shoreland zoning of Pickerel Creek will be investigated, and if a variance is needed the feasibility of receiving a variance will also be investigated. Mining in proximity to Snowball Lake has the potential to affect lake water levels; this will be analyzed in the EIS along with other potential surface and groundwater impacts.

15. **Water Surface Use.** Will the project change the number or type of watercraft on any water body?
☐ Yes ☒ No

If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

No impacts to water surface use would be predicted from the project and no displacement would occur.

PROPOSED TREATMENT OF TOPIC IN EIS
This topic will not be discussed in the EIS.

16. **Erosion and Sedimentation.** Give the acreage to be graded or excavated and the cubic yards of soil to be moved:

Acres: 2,000 to 3,000; Cubic Yards: 200 million

Describe any steep slopes or highly erodible soils and identify them on the site map. Describe any erosion and sedimentation control measures to be used during and after project construction.

Most of the site will be self-contained; erosion from construction runoff is discussed in greater detail in response to Question 17.

The approximate acreage breakdown is given in response to Question 10 and includes connected actions; only a part of the tailings basin will be graded. The cubic yardage to be moved includes ore, waste rock, and surface overburden over the 20-year life of the project.

Mine pits generally have steep slopes. Glacial drift at the pit edge can erode into the pit. Other steep slopes will be created on overburden and rock stockpiles, and the banks of roads and railways. In the proposed plant area there are steep, rocky, natural slopes that will require re-vegetation.

The DNR Permit to Mine requires stockpiles and pit slopes to withstand a 100-year storm event without failure, and to operate in a manner to minimize erosion. Vegetation is required for surface overburden stockpiles, benches, tops of rock and ore stockpiles, pit overburden slopes, dikes and dams, and cuts, pits, trenches, and other disturbed areas. Vegetation is required in the first normal planting period following the time when the area is no longer scheduled to be disturbed.

Rock, lean ore, and coarse tailings stockpiles must be terraced to include 30-foot-wide benches at 30-foot vertical intervals (maximum), construction of drainage channels, two feet of surface overburden on rock flats, and partial or total re-vegetation.

Surface overburden stockpiles are required to have 30-foot-wide benches at 40-foot vertical intervals, slopes of 2.5 to 1 or shallower, and drainage control systems capable of handling surface runoff without erosion.

The surface overburden portion of pit walls are required to have a setback of at least 20 feet from the rock portion of the pit wall, slopes no steeper than 2.5 to 1, and benches in the overburden. Benches are required to be engineered with an adequate width to manage storm water runoff received from the slopes above them.

Minnesota Steel will be required to prepare a stormwater management plan as part of its application for a NPDES (Stormwater) permit from the MPCA.

As identified in response to Question 12, changes in stream flow are likely. Significant increases in flow combined with stream channels that are sensitive to such changes could result in an increase to downstream sedimentation. This potential will be evaluated in the EIS.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will address runoff from erosion-prone areas of the site, including downstream sensitive areas of Oxhide Creek as part of the larger issue of surface water runoff and overall water quality impacts of the project.

17. **Water Quality: Surface Water Runoff**

a. Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff. Describe any stormwater pollution prevention plans.

See below

b. Identify routes and receiving water bodies for runoff from the site; include major downstream water bodies as well as the immediate receiving waters. Estimate impact runoff on the quality of receiving waters.

Once processing operations have commenced, most site runoff will be used as plant process water so there will be very little runoff from the site. The tailings basin and pits will be self-contained and will be part of the process water system. In addition, Minnesota Steel proposes to capture runoff from the plant site and stockpiles and direct this to the process water system. The sources, management and disposal of process water as well as post-closure water management are discussed below in response to Question 18. The remaining issues involve stormwater runoff during construction and management of stormwater that cannot easily be captured for process water (e.g. the runoff from exterior dikes of the tailings basin), which are described here. This source of runoff is minor in comparison to the overall project area and can be managed without significant impacts to receiving waters.

The current quality of site runoff is good; local water bodies generally meet water quality standards. Minnesota Steel's construction activities will be permitted under a NPDES construction stormwater permit issued by the MPCA. This will require preparation of a construction stormwater pollution prevention plan, including an assessment of the potential sources for sediment and pollutant discharges from the site, identification of the party responsible for implementation of Best Management Practices (BMP's) and the BMP's to be implemented. These BMP's will include erosion prevention practices that will minimize production of sediment. These include seeding and mulching practices and special measures for steep slopes and highly erodible soils (e.g., terracing, silt fence, erosion control fabric and ditch checks). Such locations would include slopes of tailings basin dikes and other water management dikes (e.g., the dike for the Oxhide Stilling Basin). Minnesota Steel anticipates that temporary sediment basins will be used as predecessors to the permanent stormwater detention ponds that will be required in order to collect and pump stormwater into the process water system. The plan also will require identification of receiving waters and special measures to be taken to avoid degrading high quality waters. In the project area, these would likely include avoiding direct runoff to major lakes and high-quality wetlands. MPCA rules require a program of inspection and management to ensure that the construction stormwater pollution prevention plan is being implemented and record-keeping procedures to show that inspection and maintenance have been done. The plan's erosion prevention and temporary sediment control measures will be incorporated into the site grading plans and mine plans for the project.

Specific areas of concern for stormwater management include:

<u>PLANT SITE</u>

Under existing conditions, much of the proposed plant site drains toward Little Sucker Lake via the Oxhide Diversion (see Figure 5-3 for a site map with water bodies identified). Smaller portions of the site drain toward Little McCarthy Lake and possibly the west mine pits and/or the Patrick "B" Tailings Basin.

Since the long-term plan calls for capture and use of stormwater in the process water system, stormwater basins will be a permanent feature at the site and can be constructed before most other grading is done. Filling of wetlands near the plant, described in response to Question 12, will require revegetation and use of temporary barriers such as silt fence to avoid discharge of sediment to the wetlands and their downstream receiving waters (Little Sucker or Little McCarthy lakes).

STOCKPILES

Under existing conditions, the Patrick "B" tailings basin drains south to the (inactive) Draper Annex pit, which will not be pumped and mined until Year 10 of operation, and then to Snowball Lake. Under proposed conditions, the tailings basin will be used as a stockpile for stripped soils, waste rock and lean ore. During initial construction a pad of soil will be placed as a base for waste rock. Again, long-term plans call for detention basins for pumping of stormwater so these basins could be constructed in the first project phases and used for temporary erosion control. Overflow of runoff would be captured in the Draper Annex Pit. During operation, runoff from the stockpile area will be collected, treated in a primary settling basin, and discharged to Pits 1 and 2 or diverted for plant use. The mine plan is compact so there are no long stretches of haul road between pits and stockpiles; drainage from haul roads can be captured by either the pits or the stockpile stormwater collection system.

PIT 5

Under existing conditions, excess water from Pit 5 flows into the Oxhide stilling basin, then into Oxhide Lake and Oxhide Creek before reaching Swan Lake. Approximately 141 acres in the western portion of the projected Pit 5 area currently drains to Snowball Lake. The majority of the area will be self-contained. As stripping occurs, portions that now drain away from the pit will become more self-contained. In years 1 and 2 of operation, Pit 5 will still be discharging by gravity to Oxhide Lake but Pit 5 will still be filled with water and capturing any sediment that is produced in the local area. Once Pit 5is dewatered, the maintenance pumping will be directed to Pits 1 and 2 and will be used for plant process water.

PIT 6

Under existing conditions, most of the Pit 6 area drains to Snowball Lake, either directly or via flow through the Draper Annex pit. Initial stripping of Pit 6 will create a significant depression in the glacial overburden; this depression largely will be self-contained and will have a sump to be used for pumping of runoff during wet weather. The discharge from this pit sump will be directed to Pits 1 and 2. As the pit enlarges, additional dewatering will increase slowly and will be directed to Pits 1 and 2 for use as process water.

TAILINGS BASIN

The Stage I tailings basin is already largely self-contained. Assuming that existing dams can be used as starter dams for tailings stacking, sediment production should be minimal. Where dam breaches must be repaired or where dams are raised, runoff from the exterior slopes could produce sediment. The most important measure for avoiding impacts will be prompt mulching and re-vegetation of these slopes. Construction of the seepage collection system around the exterior of the dikes, especially in the lower areas, will provide an opportunity to collect sediment at the sumps where seepage will be pumped back to the tailings basin.

If the Alternative Tailings Basin is selected the same concerns apply but there would be a greater length of dam construction required. A large portion of this dam construction would be in or near wetlands at the headwater of Sucker Brook. Again, prompt re-vegetation of the basin slopes will be important and an exterior seepage collection system and sump(s) could also function to prevent sediment transport off the project site during initial construction.

PROPOSED TREATMENT OF TOPIC IN EIS

The EIS will include a watershed balance developed from the project water balance and changes in watershed runoff due to mining activities project. A model will be developed to predict changes in watershed yield and affected water bodies. This information will be used to identify potential impacts, mitigation and monitoring to minimize impacts to area water bodies. Potential sources of sediment and pollutant discharges from the site will be assessed and mitigation measures discussed.

18. **Water Quality: Wastewaters**

a. Describe sources, composition and quantities of all sanitary, municipal and industrial wastewater produced or treated at the site.

   See below

b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving waters, including major downstream water bodies, and estimate the discharge impact on the quality of receiving waters. If the project involves on-site sewage systems, discuss the suitability of site conditions for such systems.

   Most surface runoff (Question 17) and wastewater discharges (Question 18) are mixed within the project and cannot easily be discussed separately. Stormwater discharges from exterior portions of the project were discussed in response to Question 17. Stormwater discharges to the process water system and the process water system itself are discussed below. This discussion is divided into discussion of water quantity impacts followed by discussion of water quality impacts.

CHANGES IN FLOW RATE AND VOLUME OF STORMWATER/PROCESS WATER DISCHARGES

Sources of Stormwater/Process Water

Surface water runoff will originate from within the project area at the following general locations:

- Runoff from the proposed plant site, including the crude ore stockpile and crushing operations on the east side of the stockpile;
- Runoff from new waste rock and lean ore stockpiles;
- Runoff to and pumping from the future active and inactive mine pits;
- Runoff from tailings basin; and
- Runoff from new transportation routes, undisturbed upland areas, and existing mining features that will not be part of the active mine area. These new and existing mining features are described below with regard to water quantity and water quality.

Discharge rates for mine dewatering and for normal plant operation were given in response to Question 13. See Table 13-1 for a preliminary water balance. Minnesota Steel is preparing a water balance for the site that will be available for use in preparation of the EIS. The water balance will outline existing and future discharges to major water bodies for dry, normal and wet climatic conditions.

Plant Site

Under existing conditions, much of the proposed plant site drains toward Little Sucker Lake via the Oxhide Diversion (see Figure 5-3 for a site map with water bodies identified). Smaller portions of the site drain toward Little McCarthy Lake and possibly the west mine pits and/or the Patrick "B" Tailings Basin.

Under proposed conditions, plant site runoff will be captured, treated in a sedimentation/detention basin and discharged to Pits 1 and 2. If water quality is acceptable, the stormwater may be pumped directly to the tailings thickener for plant use. The capture and diversion of runoff from the plant site will remove approximately 1% of the watershed area from Swan Lake.

The southeast side of the proposed plant site lies along the route of the Oxhide Diversion, which was created to divert the upper Oxhide Creek watershed to Little Sucker Lake. This was done to stop discharges to Pits 1 and 2 and reduce pumping costs. Following closure of the Butler Mine, the diversion was blocked so that the eastern wetlands drained into the Harrison Pit (which is hydraulically connected to Pits 1 and 2 and to Pit 5). This helped fill the pits quickly and restored the pre-mining drainage pattern.

The remaining western wetlands will continue to drain to Little Sucker Lake. As the project is implemented, no change is proposed to this system. The eastern wetlands, including those lying east of the cemetery and north of County Road 58, will continue draining to the Harrison Pit and into Pits 1 and 2 where the water will be available for the project and/or for stream or lake augmentation.

Stockpile

Under existing conditions, the Patrick "B" tailings basin drains south to the (inactive) Draper Annex Mine, which then overflows to the inactive Draper Annex Pit and then to Snowball Lake. Storm runoff from waste rock and lean ore stockpiles will be stored in sedimentation basins to reduce peak flows; these basins will be located on the southwest, eastern, or western boundary of the stockpile area, depending upon the stage of mine development. The direction of runoff from these stockpiles will be dependent upon project phase and, possibly, upon the project's need for water. It is expected that ponds may be placed on the southwest, northeast or northwest border of the stockpile area to treat runoff that drains from those areas. When the plant has excess water it may be environmentally beneficial to discharge stockpile runoff directly to the tailings thickener after sedimentation, rather than directing it to Pits 1 and 2 and pumping it to Oxhide Stilling Basin.

If Snowball Lake requires augmentation, stockpile runoff could be captured in a pond on the southwest end, and excess treated water may be discharged to the natural drainage course through the Draper Annex (in the first 10 years of the project) and downstream to Snowball Lake. After Pit 6 expands to the Draper Annex, runoff could be routed around the mine; thereafter pumping may be required to discharge to Snowball Lake. Water from the basins near the northern side of the stockpile area could also be routed to Little Sucker Lake, if needed.

Pit 5

Under existing conditions, runoff from Pit 5 flows into the Oxhide stilling basin, then into Oxhide Lake and Oxhide Creek before reaching Swan Lake. Approximately 141 acres in the western portion of the projected Pit 5 area currently drains to Snowball Lake.

Pit 5 will be dewatered over a three-year period during Years 2 through 5. Dewatering flow will be directed to Oxhide Stilling Basin. The rate of discharge is estimated to be 4,300 gpm (9.6 cfs) based on pit volumes and historic Butler Taconite pumping records. From the Oxhide Stilling Basin water will pass through Oxhide Lake and into Oxhide Creek, then into Swan Lake.

Long-term maintenance pumping from Pit 5 would be directed to the Pits 1 and 2 where it will be clarified through long-term storage and then used in the plant operation or discharged. Pit 5 will yield about 240 gpm from surface water inflow and 1,110 gpm from groundwater inflow when the pit is emptied.

Pits 1 and 2

Under existing conditions, Pits 1 and 2 are separated from Pit 5 by a dike of rock that was not usable as ore in the taconite process. The water level of Pits 1 and 2 rose and overflow began from Pits 1 and 2 to Pit 5 through a channel filled with pervious rock material. The current water level is at approximate elevation of 1,355 feet amsl.

In order to dewater Pits 5, Pits 1 and 2 must be drawn down approximately 5 feet to draw the water level below the saddle point in the dike. This drawdown would occur over the same three-year period. The estimated additional pumping from Pits 1 and 2 is between 2,100 and 2,500 gpm (4.7 to 5.6 cfs). The total discharge rate from Pits 1 and 2 (including 1,100 gpm from Pit 5) is estimated to be about 3,500 gpm. This water would also be directed to Oxhide Stilling Basin which flows to Oxhide Lake and Oxhide Creek.

After the mine start-up it is anticipated that Pits 1 and 2 would be allowed to fluctuate to provide a stable water supply for the facility. Maintenance pumping from Pits 1 and 2 (to keep the level below the overflow to Pit 5) would be directed to the plant and/or used for stream and lake augmentation.

The remaining water volume in Pits 1 and 2 would also be utilized as needed for plant process water and/or for stream and lake augmentation. Pits 1 and 2 could provide 1,000 to 1,400 gpm from surface water inflow (assuming the Oxhide Diversion remains blocked) and about 700 gpm from groundwater. The pits could provide a maximum of 2,570 gpm from groundwater inflow (if the pits were completely emptied).

Pit 6

As previously described in response to Question 6, Pit 6 will be newly created. Eventually, the pit will be approximately the same size and depth as Pit 5 and will require maintenance dewatering. Based on estimates for Pit 5, the groundwater and surface water yield from this pit is expected to be similar to the Pit 5 yield, i.e., roughly 1,500 gpm. The water will be discharged either to Pit 5 and then to Pits 1 and 2 or directly to Pits 1 and 2. Additional detail on the hydrogeological relationship between Pit 5 and Pit 6 will be included in the EIS.

Around the tenth year of operation, Pit 6 will be expanded to include the former Draper Annex pit. The Draper Annex Pit is much smaller than Pits 5 or 6 but dewatering will be required; this will cause a small increase in dewatering at that time. This water also would be discharged to Pits 1 and 2 and used for plant operations or discharged to Oxhide Stilling Basin if not needed.

Hawkins Pit

As water is used from Pits 1 and 2, the Hawkins Pit and other natural ore pits immediately west of Nashwauk will be lowered about 5 feet to reduce overflow to Pits 1 and 2 and then to Pit 5. In the event of water shortage the eastern pits could be lowered a maximum of approximately 50 feet before the low water levels would expose a saddle directly west of the Hawkins Pit. No other use of Hawkins Pit water is anticipated. During the drawdown, Minnesota Steel potentially could dispose of waste rock in those pits if regulatory and fee holder permission is granted. This could be a step in increasing the recreational utility of the pit by providing a greater littoral (shallow-water) area.

Tailings Basin

Discharges of stormwater runoff from the Stage I tailings basin will be limited to runoff from the exterior of the starter dams and the exterior of additional layers of tailings as the dams are raised. Internal runoff will be captured in the return water basin and pumped back to the plant. As previously discussed, intermittent discharges from the basin will be made to avoid buildup of dissolved solids; the capability for an intermittent discharge from the basin also will give additional discharge capacity during extremely wet weather. The discharge from the Stage I Tailings Basin will flow to the south end of O'Brien Lake (enlarged by the Butler Stage II dam). Flow will pass through the engineered breach in the dam to O'Brien Creek and Swan Lake. An NPDES permit will be issued for this discharge.

The Alternative Basin, if selected, would be constructed at the head of a tributary to Sucker Brook. It would remove approximately 1,120 acres of the watershed from this tributary and eliminate one of three branches of the stream. Seepage and intermittent controlled discharges would be directed to the tributary of Sucker Brook. This tributary does not have major lakes in it; is parallel to the branch that contains Sucker Lake so that lake would not be impacted by discharges or flow changes from the tailings basin.

POTENTIAL IMPACTS OF CHANGES IN FLOW RATE AND VOLUME OF STORMWATER/PROCESS WATER DISCHARGES

Swan River Watershed

The eastern and southern regions of the project area are part of the Swan River Watershed. Water bodies within and adjacent to the project areas include Oxhide Lake, Oxhide Creek, Snowball Lake, Snowball Creek, Blue Lake, O'Brien Creek, Snowball Creek, and Pickerel Creek. All of these water bodies ultimately discharge to Swan Lake (see Figure 5-3). Swan Lake outlets to the Swan River which drains to the Mississippi River.

O'Brien Lake and O'Brien Creek

O'Brien Lake is the water body formed by the impoundment of water behind the Butler Stage II dam. O'Brien Lake has a watershed that includes the inactive and reclaimed Butler Stage I and Stage II tailings basins. The lake discharges to O'Brien Creek via a breach in the south dam of the Stage II basin. This flow is estimated to be 2,700 gpm on average. O'Brien Creek's natural watershed was greatly reduced by the construction of the O'Brien Diversion, which diverted approximately 18,700 acres around the Butler tailings basins and into Hay Creek. In addition, approximately 1,300 acres of its watershed were diverted into the LaRue Pit, which also outlets into the headwaters of the O'Brien Diversion (Figure 5-4). Therefore, approximately 20,000 acres in total were diverted from O'Brien Creek, compared to its current watershed area of about 7,400 acres (including the Stage I and Stage II tailings basins). Based on a study of regional water yields, such a reduction in watershed area would have reduced the bankfull discharge in O'Brien Creek by more than 200 cfs (90,000 gpm).

As mining commences, the Stage I tailings basin dams will be repaired and the basin will become self-contained. This will further reduce the watershed area tributary to O'Brien Lake. This flow reduction is estimated at 500 gpm on average or about 36% of the flow of O'Brien Creek. This reduction in flow to the central part of Swan Lake will be addressed in the EIS as part of the water balance/nutrient budget for the lake, as well as potential mitigation strategies.

Intermittent discharges of clarified process water will be made from the Stage I basin to avoid buildup of dissolved solids in process water. As large discharges could affect streamflow, basin discharges will be controlled to rates that would not have a significant impact on O'Brien Lake or O'Brien Creek.

Oxhide Lake

Oxhide Lake currently receives overflow from the west mine pits via the Oxhide Stilling Basin. Oxhide Lake drains to Oxhide Creek, which in turn drains to Swan Lake. Only limited streamflow monitoring data exists for Oxhide Creek. Based on limited DNR flow records, the average Pit 5 outflow is approximately 3,000 gpm.

During the first two years of mining, flow regimes in Oxhide Lake and Oxhide Creek should not be significantly different from current conditions. Dewatering discharge from Pit 6 to Pits 1 and 2 and then to Oxhide Lake will slowly increase. Outflow from Pits 5, 1 and 2 and the eastern pits will continue as at present. Plant use and tailings basin losses will require appropriation of about 2,800 gpm from Pits 1 and 2 so; on average the flow in Oxhide Creek would be expected to be reduced, requiring flow augmentation. Water flow in Oxhide Creek will be increased during initial dewatering. During mining operations when pit dewatering would be used for plant processing water, the water flow to Oxhide Creek is expected to decrease.

Sometime in Year 2, dewatering will begin and continue for three years into Year 5. An NPDES permit will be required for this discharge. Flows to Oxhide Creek are estimated as follows:

Pit 5 Dewatering	4,200 to 4,400 gpm
Pits 1 and 2 Dewatering	2,100 to 2,500 gpm
Pit 6 Dewatering	0 to 1,500 gpm
Plant Use	(2,800 gpm)
Normal watershed yield diverted to pits and largely included in pumping	(2,400 gpm)

An increase of about 3,500 to 4,000 gpm (compared to current conditions) is a general estimate of the discharge.

Oxhide Creek has previously received up to 5,000 gpm from pit dewatering. Based on an analysis of regional water yield and modeled discharge, as well as channel characteristics, the estimated bankfull discharge of the stream under existing conditions is estimated to be 99 cfs (44,350 gpm), as measured at the mouth of Oxhide Creek where it enters Swan Lake[1].

Once Pit 5, 1 and 2 have been completely or partially dewatered, maintenance pumping will continue. As discussed in response to Question 13, the net water balance of the project appears to be slightly positive; this does not include additional yield that could be obtained from initial dewatering of Pit 5 and the Draper Annex Pit and does not include yield that could be obtained by further lowering of Pits 1 and 2. Nonetheless, it appears likely that the long-term yield of Oxhide Creek will be reduced. Assuming a base flow is maintained in the stream by pumping, the major impact will be a reduction in the frequency and magnitude of high flows; these will be retained in storage in Pits 1 and 2.

Snowball Lake and Snowball Creek

Snowball Lake currently has a watershed area of approximately 1,584 acres, including undisturbed areas on the southern boundary of the project area and from the Patrick "B" Tailings basin and the inactive Draper Annex pit. Outflow from Snowball Lake passes under U.S. Highway 169 to Snowball Creek, which flows south to the extreme west arm of Swan Lake upstream from the control weir.

With the full expansion of Pit 5 and 6, Snowball Lake's watershed area will be reduced significantly. It is also possible that Pit 6 will capture groundwater that currently flows into Snowball Lake. These changes make it likely that flow augmentation will be needed to maintain water levels in the lake. Water may be pumped from Pits 1 and 2 as necessary to replace the groundwater or runoff that was diverted from Snowball Lake. The groundwater levels between the pit and lake will need to be monitored closely to determine if groundwater flow reversal will occur. If it does, flow augmentation during and after mining will be required to mitigate this impact.

Pickerel Creek

The Pickerel Creek headwaters lie south of the Stage I Tailings Basin and just east of Highway 169. The creek travels downstream past Pengilly and drains to Swan Lake. This creek is a designated trout stream and is listed as a 1B, 2A, 3B, 3C, 4A, 4B, 5 and 6 water. There is one permitted discharge (from Midland Research) on the northern end of the creek. Use of the tailings basin may increase the amount of water that seeps from the base of the basin; this water may be collected by the seepage collection system, which would tend to mitigate increases in flow.

Swan Lake

Tributaries to Swan Lake include Hay Creek, O'Brien Creek, Pickerel Creek, Hart Creek, Oxhide Creek and Snowball Creek. The lake is highly developed and has more than 500 riparian and near-riparian residences, according to MNDNR lake management reports.

The volume of inflow to Swan Lake is important to local residents because it affects the level of the lake and is believed to influence lake water quality. Increases in flow will tend to raise water levels, increasing concerns about shoreline damage and septic tank failure. Decreases in flow will tend to lower water levels, potentially impairing some people's riparian access for boating. During the later stages of operation of Butler Taconite, flow from O'Brien Creek was cut off by the Stage II tailings basin, but dewatering flow from mine pits was directed to Oxhide Creek. At closure, Oxhide Creek flows decreased as the pits filled with water but outflow from the Butler Stage II basin was re-established by breaching the dam.

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[1] Barr Engineering Company. *Swan Lake Rating Curve, Oxhide Creek Channel Stability and Hydrologic Survey*. Prepared for Minnesota Iron & Steel, February 2000.

Amidst these conflicting trends, concerns about water level led to a hearing on Swan Lake water levels and an order from the MNDNR Commissioner to lower the Swan Lake outlet weir by 0.4 feet.

A second concern about flow changes is that the water quality of the lake is partly determined by the residence time in the lake. Phosphorus loading to a lake is a key parameter but, assuming the same phosphorus load, decreased residence time will tend to improve lake water quality.

The United States Geological Survey maintained a stream gauging station at the Swan Lake outlet weir from 1964 to 1990. Over that period, the average flow was 64 cfs or about 29,000 gpm. The maximum flow was 730 cfs in April, 1969 and the minimum was a series of zero flow readings in July, 1988. A study by the Minnesota Pollution Control Agency in 1986 concluded that about 50% of the flow to Swan Lake came from Hay Creek; this source of water will remain unchanged. The immediate watershed around the lake contributed about 18% of the flow while O'Brien Creek contributed about 13%. Use of the Stage I tailings basin would reduce the overall yield to the lake by about 5%. All other streams were relatively minor contributors to the water budget of the lake. Based on these facts and the previous evaluation of the dewatering program, it appears that the increases and decreases in flow that will be experienced at O'Brien Creek, Oxhide Creek and Snowball Lake will not have a major impact on lake levels. However, there may be a benefit to rerouting water from O'Brien Diversion into O'Brien Lake to augment the flow to O'Brien Creek. This will be evaluated further in the water balance study being prepared by Minnesota Steel. This study will be submitted to the MN DNR for use in preparation of the EIS.

Prairie River Watershed

The western part of the project area includes several adjacent water bodies that lie within the Prairie River watershed. The Alternative Tailings Basin, if constructed, would be within the Sucker Brook watershed and would discharge to a southern branch of Sucker Brook. Sucker Brook flows west to the Prairie River and then south to Prairie Lake, the Lower Prairie River and then the Upper Mississippi River. The pellet plant, DRI plant and steel plant will be constructed partly within the watersheds of Little McCarthy Lake and Little Sucker Lake. Little McCarthy Lake outlets to Big McCarthy Lake, which drains to Crooked Lake, and the Prairie River. Little Sucker Lake outlets to a southern branch of Sucker Brook which also joins the Prairie River about six miles west of the plant site.

Little Sucker Lake currently has a watershed area of approximately 1,453 acres. Construction of the plant will divert approximately 350 acres of this watershed into the plant area. Little McCarthy Lake currently has a watershed area of approximately 1,174 acres and construction of the plant may divert up to 300 acres of this watershed into the plant area. These changes alone would not be expected to have a significant impact on Little Sucker Lake or downstream portions of Sucker Brook.

The Alternative Tailings Basin would occupy approximately 1,119 acres of the Sucker Brook watershed in a different tributary watershed than Sucker Lake . If constructed, this would not affect Sucker Lake but could have an impact on the immediately downstream reaches of Sucker Brook. During dry weather, the immediate downstream wetlands and reaches of Sucker Brook would receive less flow than they currently do. Wetland delineations in the summer of 2005 will provide additional information on the hydrology of these downstream wetlands. The need for flow augmentation to the Sucker Brook tributary will be evaluated in studies being conducted by Minnesota Steel. These studies will be completed as part of the MN DNR water appropriations permit applications, which will be included in the EIS.

CHANGES IN WATER QUALITY OF STORMWATER/PROCESS WATER DISCHARGES

Existing Conditions

Water quality of runoff, mine pit water, and surrounding water bodies was characterized by Minnesota Iron & Steel as part of a surface water monitoring program that occurred from March 1997 through July 2000 (see Table 18-2 and 18-3). Water quality sampling began again in April, 2005 and will continue throughout the 2005 open water season; results of the sampling program will be available for use in preparation of the EIS.

The 1997 – 2000 sampling locations included:

- Existing and future mine pits, Pit 1, Pit 5, and Pit F(the east end of Pit 5)
- An inflow to Pit 2 (Upper Oxhide Diversion)
- Water below the Stage II tailings basin (O'Brien Creek Headwaters)
- An outflow point from Oxhide Lake at a culvert crossing Highway 169 (Oxhide Lake Extension)
- Inflow to O'Brien Lake (Tailings Basin North, user developed public access south of railroad bed and at north end of O'Brien Lake)
- Three lakes adjacent to the project site (Snowball, Little Sucker, and Swan Lake)

The water quality of Sucker Brook (location of Alternative Tailings Basin) was not evaluated. It is being sampled in the 2005 sampling season.

Water was analyzed for general parameters such as sulfate, conductivity, total dissolved solids, biological oxygen demand, and fluoride, and metals, including molybdenum, cobalt, and mercury. In general, the water quality data indicate that for all of the waters sampled, the concentration of metals were low or below detection (Table 18-2). For all of the sample dates except May 2, 2000, the concentrations of mercury in Pits 1 and 2, Swan, Oxhide, Sucker and Oxhide Lakes, and at the Stage II tailings basin were below applicable surface water criteria (6.9 ng/L). The samples taken on May 2, 2000 were abnormally elevated at all sites, indicating a potential for inaccurate sample results.

The concentration of parameters such as fluoride and chloride was also found at levels typical of background or undisturbed watersheds. Parameters that are typically elevated for mining areas include conductivity/total dissolved solids, sulfate, chloride, and hardness. These parameters were slightly higher in most of the monitored water bodies compared to background.

Overall, the existing quality of water in the project area is good and it appears that there are not any issues such as acid generation, significantly high dissolved solids, sulfate, or metals as a result of former mining operations. Mercury levels were lower than applicable water quality criteria, with the exception of the May 2, 2000 samples.

FACTORS AFFECTING STORMWATER/PROCESS WATER

Sanitary Wastewater

Sanitary wastewater generated at the plant and mine site will be sent to the City of Nashwauk wastewater treatment facility. This facility is a series of three stabilization ponds that were constructed in 1990, currently has a capacity of 350,000 gallons per day (gpd) and was designed to allow for expansion. This facility currently treats 212,000 gpd and therefore has a reserve capacity of 138,000 gpd. A recent study by RLK-Kuusisto Engineers indicates that the facility has adequate capacity for the added sewage load from the project. This study was based upon 1,000 employees at Minnesota Steel. It estimated that the project would deliver 30,000 gpd of sanitary wastewater to the Nashwauk treatment facility. It is currently expected that there will be 700 employees at the facility. Using the same per-employee flow rate of 30 gpd, current estimates would be that the project will produce 21,000 gpd of sanitary wastewater. This will require approximately 15.2% of the Nashwauk facility's reserve capacity.

Industrial Process Waters

The preliminary process water system for the Concentrator, Pellet Plant, DRI Plant, and Steelmaking Plant is shown in Figure 13-3. The major water sources include a freshwater tank for raw water, a process water sump, and a reclaim pump at the tailings pond (see Figure 13-3). The plant is designed to reuse process water at each step starting from the production of concentrate to the final steel product.

Water is lost from the plant process at several points including the production of green balls, evaporative loss from the waste gas stacks in the Pellet Plant, and evaporative loss from cooling towers in the DRI and Steelmaking Plant. Approximately 2,800 gpm of water will be consumed by the overall plant processes.

Approximately 9.05 million long tons per year of tailings will be discharged in a slurry to the tailings basin. The tailings basin is designed to settle the solids, allowing the water to separate and be reclaimed for reuse in the plant. It is expected that approximately 1,300 gpm of process water will be lost in the voids space of the tailings basin. A discharge from the steel mill to the tailings basin may be made using a separate pump and pipeline to avoid mixing steel mill effluent with flotation plant recycle water in the tailings thickener. Small amounts of oil in the steel mill effluent, even after passing through an oil-water separator, could affect flotation processes. The minor amount of oil left in this discharge will decompose during extended detention in the tailings basin and will not be discharged to surface waters or recycled to the plant. In addition, Minnesota Steel is evaluating separate handling of air scrubber water and air scrubber solids.

The expected chemistry of the water phase of the process water and tailings discharge has not been determined; a chemical mass balance model will be developed to estimate the process water chemistry prior to submission of the NPDES permit application.

The water chemistry balance will include an internal plant process water balance for all the components of the plant and an external water balance that includes the make-up water usage, precipitation on the tailings basin, evapotranspiration, and seepage. The chemical balance will be developed for the plant and tailings basin for constituents that can be modeled using mass balance techniques, that is, those constituents that are found in iron-ore processing and steel making process water that are conservative and are not expected to precipitate or be adsorbed from the dissolved phase of the process water to a particulate phase. Data sources that are and will be available include process water flow balances developed for the plant, hydrologic studies of the plant and tailings basin, chemical balance studies performed for other taconite mines on the Minnesota Iron Range, air modeling studies that will indicate the mass of constituents captured by air pollution control equipment (if wet scrubbers are used), US EPA Office of Science and Technology studies that have been performed for steel mills for the development of effluent limit guidelines, background water quality monitoring data currently being performed for surface waters in and near the project site, and water chemistry data collected as part of a concentrating pilot plant study. Other information such as tailings oxidation and anticipated wet scrubber concentrations will also need to be estimated based on studies from other taconite facilities on the Iron Range.

It is anticipated that an estimation of expected process water chemistry will need to include the following components: dissolved solids contribution by each process, the concentrating effect of evaporative losses on dissolved solids levels, chemical additive use, tailings basin processes such as sulfate oxidation of tails and losses by the tailings voids space, and management of the tailings basin. The management of the tailings basin water is discussed in more detail below.

Process Chemicals

Several process chemicals will be used in the Concentrator and Pellet Plant. See Table 18-1 for a list of chemicals that potentially may be used in the Concentrator and Pellet Plant. Many of these chemicals are commonly used by taconite processing facilities in northern Minnesota.

The flotation process chemical methyl isobutyl carbinol (MIBC) will be used at a rate of approximately 0.1 pounds per long ton of concentrate feed (0.02 grams per liter of feed water). This chemical is readily degraded within days of being discharged to the tailings basin. Flocculants and coagulants will be used in the plant.

An amine collector is a chemical used in the flotation process to help separate iron-bearing ore from silica-rich waste rock. A collector such as Tomah DA-16 (5% acetate) will be used in the ore beneficiation process. The most comprehensive study that could be found regarding the fate of amine collector chemicals was performed by the Iron Ore Company of Canada in 1996. This study was completed at an existing iron ore concentrating and pellet plant in Labrador City, Newfoundland.

Several relevant findings of this study include: 1) 90% of the amine collector that is added to the flotation process is adsorbed by tailings solids, 2) the half life of the amine collector ranged from 1.25 to 2.25 days depending on temperature, 3) the number of days required to degrade the amine by 90% ranged from 2.75 to 8, 4) the mixed concentration of amine in the flotation process ranged from 0.6 to 1.2 mg/L, and 5) the concentration of amine in the liquid phase of the tailings slurry was expected to be lower than the LC50 of the amine tested with several organisms. The LC50 (concentration which kills 50% of test organisms in duration of test) values for two amine collectors tested ranged from 0.064 to 0.17 mg/L for fathead minnow, 0.12 to 0.15 mg/L for Daphnia magna, 0.24 to 0.66 mg/L for rainbow trout, and 0.1 to 0.15 for *Ceriodaphnia dubia.* Based upon this study, it can be concluded that adsorption by tailings and decay of the amine collector in the Minnesota Steel tailings basin will lower the concentration of the amine collector in the tailings basin clear water pool to a level that is significantly below toxic levels.

In addition to the information provided by the Iron Ore Company of Canada study, water samples were recently collected from the tailings waste stream of an iron ore beneficiation pilot plant operation that was conducted for Minnesota Steel in May, 2005. Three sets of samples were taken throughout the test to determine the residual concentration of the chemical in the water phase of the tailings slurry. Because no readily available analytical procedure could be applied to quantify directly the concentration of the amine collector in the tailings slurry, Total Kjeldahl Nitrogen was analyzed in each sample as a surrogate for the amine collector. The contract laboratory has not completed analysis of these samples. The results of the analysis will be included in the EIS.

Limestone will be added to the concentrate prior to filtration in the pellet plant. The limestone will represent about 0.90% of the total filter cake, the goal is to produce a pellet with 0.90% CaO. The chloride and fluoride content of the limestone has been requested from a prospective vendor and will be forwarded to the MN DNR upon receipt.

Sodium phosphate will be used as a boiler water conditioner. Sodium phosphate is also used in the closed-loop cooling water system of the pellet plant. This system provides seal water and machinery cooling water and is separate from the process water system. A tank would hold the machinery cooling water during plant shutdown so discharge from the cooling water system would be very infrequent and in relatively small amounts compared to the volume of the process water system.

The DRI plant will use hydrazine hydrobromide to scavenge oxygen from treated boiler water, which is a closed-loop system, except for infrequent blowdown. Demineralized water will be required for boiler feed and regeneration of the demineralizer will require strong base and acid. Demineralizer effluent will be pH adjusted before discharge to the process water sump. Small quantities of dimethyl sulfate (DMSO) will be used as a pacifier in the DRI process to protect gas heater tubes in the gas reformer.

Chemicals will be required for several processes in the Steelmaking Plant, including: water dechlorination, feedwater oxygen scavenging, feedwater pH control, cooling water corrosion inhibition and deposit control, cooling water fouling control, sheet surface control and water treatment It is a not expected that specialty high alloy steels will be produced; however, microalloys such as manganese, molybdenum and ferrochrome, will be used in the steelmaking process. In general, the process chemicals are either segregated from the process water stream and will be discharged infrequently in small quantities during blowdown or are biodegradable chemicals commonly used at Iron Range taconite plants. A detailed accounting of the chemicals to be used by the Plant and wastewater characteristics will be provided as part of the NPDES permit application.

The steel mill produces an oily wastewater that will be treated by passing through a sedimentation tank and then through an oil-water separator. Because of the larger quantity of this wastewater and the potential for interference with the flotation plant, the effluent from the steel mill may be pumped separately to the tailings basin. As described previously, the minor amount of oil remaining in this effluent will degrade during extended detention in the tailings basin and will not be discharged to receiving waters or recycled to the plant.

Other waste streams will include solvents for machine shop degreasing, transformer oils, vehicle fuels, oils and lubricants. While they will not normally be part of the process water, it is possible that floor runoff in the plant will contain small amounts of these substances. Pollution prevention and good housekeeping practices will be employed in the plant to manage solvents used in the machine shop for degreasing, transformer oils (not PCB), and other oils and lubricants and prevent them from mixing with plant wash water. Treatment of wash water will primarily consist of the use of sumps and oil-water separators to settle solids and remove petroleum hydrocarbons. After this pretreatment, the floor wash water will be pumped to the tailings thickener and then to the tailings basin where any remaining hydrocarbons will decompose during extended detention.

Plant stormwater runoff can be a significant source of sediment and other pollutants. Treatment and control of plant runoff will consist of best management practices such as ponds to settle suspended solids, secondary containment of storage tanks exposed to rainfall, installation of oil water separators for oily water originating from within or outside of the plant, and the reuse of surface water runoff for plant operations.

Plant runoff will be collected in sedimentation/detention basins and pumped to Pits 1 and 2 for further clarification and reuse. In the plant area a large collection/sedimentation pond will be sited on the south side of the northern plant area to collect stormwater runoff from the northern half of the plant. Smaller ponds will be placed adjacent to the concentrator and the pellet plant. The collected water will be routed to Pits 1 and 2 where it will be clarified or it could be diverted directly to the tailings thickener for reuse in process water.

Tailings Basin Seeps and Controlled Discharge

Water that seeps from the perimeter of tailings basin dikes or is intermittently discharged from the clear water pool of the tailings basin will be the only potential source of a process water discharge. The primary concern of these discharges has been the potential effect of such a discharge on the water quality of downstream waters. Water quality parameters typically of concern include fluoride, the metals cobalt and mercury, and dissolved solids including calcium, magnesium, chloride, and sulfate. Minnesota Steel will be required to meet applicable water quality standards for any intermittent discharges and seeps. An NPDES permit application will be submitted to the MPCA prior to commencement of work on the EIS. It will include a water balance and chemical balance to demonstrate that the project will meet applicable standards. The EIS will also address the potential for increased sulfate in receiving water and methylation of mercury in certain aquatic environments (wetlands and lakes).

Waste Rock and Lean Ore Stockpiles

Runoff from waste rock and lean ore stockpiles will be treated in sedimentation basins located on the southwest, eastern, or western boundary of the stockpile area, depending upon the stage of mine development. The direction of runoff from these stockpiles will be dependent upon project phase and, possibly, upon the project's need for water. It is expected that ponds may be placed on the southwest, northeast or northwest border of the stockpile area to treat runoff that drains from these areas.

If stockpile runoff is captured in a pond on the southwest end, excess treated water may be discharged to the natural drainage course through the Draper Annex (in the first 10 years of the project) and downstream to Snowball Lake. After Pit 6 expands to the Draper Annex, runoff could be routed around the mine; thereafter pumping may be required to discharge to Snowball Lake. Treated water from the northern stockpile area could also be routed to Little Sucker Lake after sedimentation.

With the implementation of sedimentation basin for solids removal and periodic maintenance and the use of most of this water for reuse in the plant, it is expected that there will be minimal effects from treated runoff on these receiving waters. Water quality impacts on receiving waters are discussed in greater detail below.

Mine Pit Dewatering Discharge

Pit 5 and Pits 1 and 2 are currently filled with groundwater and will need to be dewatered during Years 2 through 5 of operation as described previously in response to Questions 6b and Question 12. All of this initial dewatering water will be directed to the Oxhide Stilling Basin.

The water from the pits is expected to be high quality, similar to the water that is currently overflowing from the pits to local streams (see Question 17 and Table 18-2 for recent water quality monitoring results).

Maintenance dewatering from Pit 5 will require an average discharge of 1,350 gpm, assuming a portion of its existing watershed will drain to stormwater detention basins. The pit water will be pumped to the head tank or a tailings thickener in the plant and overflow would be pumped to Pits 1 and 2 for storage and future plant use. Other pollution prevention efforts that will be employed in the mining area will include secondary containment for fueling stations, sediment removal by in-pit sumps, the stilling basin, and inactive pits.

WATER QUALITY IMPACTS ON RECEIVING WATERS

Water quality monitoring data collected in 1999-2000 by Minnesota Iron & Steel are presented in Table 18-2

Swan River Watershed

The eastern and southern regions of the project area are part of the Swan River Watershed. Water bodies within and adjacent to the project areas include Oxhide Lake, Oxhide Creek, Snowball Lake, Snowball Creek, Blue Lake, O'Brien Creek, Snowball Creek, and Pickerel Creek. All of these water bodies ultimately discharge to Swan Lake (see Figure 5-3). Swan Lake outlets to the Swan River which drains to the Mississippi River.

O'Brien Lake and O'Brien Creek

O'Brien Lake has been heavily impacted by previous mining activities during natural ore mining and during operation of Butler Taconite. Big and Little O'Brien Lakes were used for tailings disposal during natural ore mining. With the construction of Butler Taconite, the upper watershed of the lakes was diverted to the east into the O'Brien Diversion channel, which empties to Hay Creek. Approximately 1,345 acres of the watershed were filled by with tailings by Butler Taconite through operation of the Stage I Tailings Basin. With construction of the Stage II Tailings Basin, water levels were increased about 25 feet and 280 acres of the resulting impounded lake were filled with tailings. With the shutdown of Butler Taconite, a breach was cut through the Stage II dam and the lake was lowered slightly and stabilized.

As described previously, the current breach in the Stage I tailings basin dikes will be closed and most current runoff from the Stage I Tailings Basin to O'Brien Lake will cease. This will reduce the watershed area tributary to O'Brien Lake and reduce the flow by about 400 gpm on average or about 40% of the flow of O'Brien Creek.

Discharge of tailings water to the Lakes and Creek will occur intermittently in order to avoid buildup of dissolved solids such as hardness, chloride and sulfate in the process water. Discharge may also occur as seepage through the dikes. Discharges of process water from tailings basins are relatively common at taconite plants on the Mesabi Range and are specifically allowed by categorical effluent standards for discharge of excess precipitation. The discharge location has not been determined; the most likely location is on the southwest side at the former Butler reclaim water basins. Discharge would flow to O'Brien Lake and then to O'Brien Creek and ultimately to Swan Lake. Substances expected to be found in the process water were described above and could include low levels of fluoride, the metals cobalt and mercury, and dissolved solids including calcium, magnesium, chloride, and sulfate. Although levels of some of these substances will likely be above background, they will not exceed applicable water quality standards.

Water bodies downstream from the discharge point for both the Stage I Tailings Basin and the Alternative Tailings Basin are not designated as Class 1 (drinking water) by the MPCA. In general, fluoride levels have been shown to be low in seep water from taconite tailings basins because levels are controlled by calcium-fluoride solubility limits. Although cobalt and mercury have been found to be present in seep water from other iron mining facility tailings basins, the levels are typically low. Mercury, in particular, has been shown to be low in many tailings basin seep waters because the tailings material has a high affinity for mercury. The primary water quality issue will be the potential for dissolved solids accumulation, including calcium, magnesium, chloride, and sulfate. At low concentrations these are common, non-toxic and non-bioaccumulative substances. Although increases in sulfate to highly organic, slow water transfer aquatic environments has been shown to increase methylation of mercury. Dissolved solids levels will be kept low so that treatment will not be required and so the water quality of downstream water bodies will not be adversely affected by periodic discharges. Management of dissolved solids concentrations in the process water will require periodic controlled discharges from the tailings basin with make-up from the raw water supply. This will require adequate water supplies to ensure that dissolved solids in the basin can be kept low and to ensure that enough water is available for plant needs. Determination of the appropriate management approach will require the following evaluations which will be completed for the NPDES permit application and the EIS:

- Process water chemical balance for the Concentrator, Pellet Plant, DRI, and Steelmaking Plant.
- Long term chemical and water balance for the tailings basin and make-up water source.
- Estimation of the effect of various tailings basin management alternatives on downstream water quality.

This evaluation will build on previous process water chemical balances and water balances that were developed for MIS. Previous studies and models of receiving waters (e.g. Swan Lake) will be reviewed and updated as needed. This information will be submitted with the NPDES permit application and included in the EIS.

Oxhide Lake

Oxhide Lake currently receives overflow from the west mine pits via the Oxhide Stilling Basin. Oxhide Lake drains to Oxhide Creek, which in turn drains to Swan Lake. Oxide Lake is defined as an unlisted water by the MPCA and is classified as having 2B, 3B, 4A, 4B, 5, and 6 waters. These waters are listed by the MPCA as impaired for mercury. Monitoring study performed in 1999-2001 showed that water quality was generally good and that the concentration of mercury in Oxhide Lake ranged from 0.80 to 1.35 ng/L (excluding the May 2, 2000 sampling results).

During the first two years of mining no major water quality changes appear likely. Stripping of Pit 5 and Pit 6 may produce sediment in runoff; this runoff is proposed to be captured in sediment basins and pumped to Pits 1 and 2. Dewatering discharge from Pit 6 to Pits 1 and 2 and then to Oxhide will slowly increase but long-term retention in Pits 1 and 2 should minimize any sediment from pit pumping or runoff. Outflow from Pits 5, 1 and 2 and the eastern pits will continue as at present.

Sometime in Year 2, dewatering of Pit 5 and lowering of Pits 1 and 2 will begin and continue for three years into Year 5. The water quality of Pits 5, 1 and 2 is excellent so water quality should remain high. Once Pit 5, 1 and 2 have been completely or partially dewatered, maintenance pumping will continue. All dewatering pumping will come from Pits 1 and 2, which have substantial volume so sediment will be removed and water quality of dewatering water should be good; this was previously the case with pumping from Butler Taconite.

Snowball Lake and Snowball Creek

Snowball Lake is defined as an unlisted water by the MPCA and is classified as 2B, 3B, 4A, 4B, 5, and 6 waters. These waters are listed by the MPCA as impaired for mercury based on fish tissue concentrations. Mercury concentrations in Snowball Lake water samples (excluding the May 2, 2000 results) ranged from 0.6 to 4.67 ng/L.

Snowball Lake currently has a watershed area of approximately 1,584 acres, including undisturbed areas on the southern boundary of the project area and from the Patrick "B" Tailings basin and the inactive Draper Annex pit   Outflow from Snowball Lake passes under U.S. Highway 169 to Snowball Creek, which flows south to the extreme west arm of Swan Lake upstream from the control weir.

Construction of stockpiles and stripping of Pit 6 have the potential to create sediment loads in the Snowball Lake watershed. Construction of sediment basins and continued flow of water through the Draper Annex pit will prevent sediment in stockpile runoff from reaching Snowball Lake. Stripping of Pit 6 will produce a depression in the watershed; mining will require construction of sumps where stormwater and sediment can accumulate and stormwater can be pumped to Pits 1 and 2 as previously described. Passage through the sump and through Pits 1 and 2 will remove this sediment.

As the watershed of Snowball Lake is reduced by mining, flow augmentation will likely be needed to maintain water levels in Snowball Lake. The water is likely to come from Pits 1 and 2 and would be of high quality.

After mining Pit 6 will re-fill with water. It is intended that outflow from the pit will be directed to Snowball Lake to re-establish its natural watershed, providing a source of clean water for the lake and stream. A conceptual plan to accomplish this objective, along with associated data needs, will be included in the EIS.

Pickerel Creek

The Pickerel Creek headwaters lie south of the Stage I Tailings Basin and just east of Highway 169. The creek travels downstream past Pengilly and drains to Swan Lake. This creek is a designated trout stream and is listed as a 1B, 2A, 3B, 3C, 4A, 4B, 5 and 6 water. There is one permitted discharge (from Midland Research) on the northern end of the creek. Potential seepage from the Stage I Tailings Basin is the only potential impact that mining operations would have on Pickerel Creek.

Swan Lake

Swan Lake is defined as an unlisted water by the MPCA and is classified as a 2B, 3B, 4A, 4B, 5, and 6 waters. Although the water quality of Swan Lake has been and is currently good both Swan Lake and the Swan River are listed by the MPCA as impaired for mercury, based on fish tissue concentrations. The lake meets water quality standards in all other respects. The current lake transparency is high (an average Secchi disc depth of 5.6 m in the summer of 2004) and the lake can be classified as mesotrophic to oligotrophic. Alkalinity has historically been somewhat higher than levels typically found in northern Minnesota lakes but these levels are commonly found in other Minnesota Lakes with good water quality. Average conductivity from 1976 through 1986 was 257 umhos/cm and there was no apparent trend in conductivity (the Butler mine was operating during this time). In 1978 the average chloride concentration was 6.8 mg/L and was 7.0 in 1986, suggesting that the former mining operations had little effect on chloride levels. The pH of Swan Lake ranged from 6.7 to 8.7 (1976 through 1986) and these values are typical for most lakes. The water quality data described above were been derived from the MPCA Environmental Data Access system (Station 31-0067-02). Additional sampling done in 1999-2000 by MIS showed excellent water quality with low levels of total phosphorus and high clarity. An assessment of nutrient loading to Swan Lake will be included in the EIS.

At the shutdown of Butler Taconite, residents were concerned about the reduction in flow from the mines and the effect that would have on water quality. Water transparency was low in 1985 and 1986; this was felt to correlate with reduced inflows. Studies were undertaken by Butler Taconite and by the MPCA. The studies predicted that long-term water quality in the lake should be relatively good and that mineland reclamation activities did not appear to be degrading the quality of Swan Lake. The MPCA suggested that upgrading of the Nashwauk and Keewatin wastewater facilities and upgrading of riparian septic tanks should be a priority. This has occurred in the subsequent years and water quality has improved.

As mining progresses, runoff volumes from Oxhide Creek and O'Brien Creek will be reduced due to consumption of water by the plant. This will be partially offset by increased yield from groundwater pumping. The flow from Oxhide Creek, including mine pit discharges, was estimated by the MPCA to contribute 6.1% of the yield to Swan Lake, although limited flow records from the Pit 5 outlet suggests the actual contribution is about 9%, probably due to increased groundwater outflow from the pit. During mining, discharges from mine dewatering through Oxhide Creek will be less than the present outflow, however, they should continue to be of high quality, since they will have been detained in Pits 1 and 2. O'Brien Creek was estimated to contribute 12.7% of the inflow volume to Swan Lake; Again, the use of the Stage I Tailings Basin will reduce this by about 40%, resulting in a potential net reduction of inflow to Swan Lake of about 5%. Discharges of clarified process water from the Stage I Tailings Basin will increase slightly concentrations of common dissolved substances such as sulfate, chloride and hardness; if discharge is done frequently enough, the buildup of these substances should be minimal and water quality impacts will be small. Similar discharges have occurred from other taconite plants in the past without noticeable effect.

Due to the historic concern with Swan Lake inflows and potential effects on water quality, MSI will conduct a thorough water balance analysis to quantify all inflow changes. They will also evaluate the effects of nutrient loading changes associated with inflow changes and increased sewage flow through the Nashwauk treatment plant, which enters Swan Lake via Hay Creek. The need for monitoring and mitigation measures will be addressed in the EIS.

When mining is completed, flow reduction will occur as the pits re-fill. This occurred in 1985 and subsequent years and the effect was mitigated by maintenance pumping to maintain streamflow. This flow reduction may be slightly offset by increased seepage from Stage I Tailings Basin through reduction in evaporation losses after reclamation of the basin.

Once the pits refill, the inflow from the watershed should be the same as at present.

Prairie River Watershed

The western part of the project area includes several adjacent water bodies that lie within the Prairie River watershed.

There is limited water quality data available for the lakes within the Sucker Brook watershed and it does not appear that there is any readily available data for Sucker Brook. Monthly water quality monitoring of Sucker Lake and Sucker Brook has been conducted since April 2005; results will be available for use in the EIS.

The Secchi disc depth data for Little Sucker and Sucker Lake indicate that they are generally mesotrophic, meaning they are moderately productive in terms of aquatic animal and plant life. Sampling in 1997-2000 showed moderate to low levels of total phosphorus and low suspended solids. Approximately 15 miles downstream of the Alternative Tailings Basin is a biological monitoring station located on the Prairie River. Fish monitoring performed at this station as part of the MPCA biocriteria program indicates that the fish community is in excellent health in this reach of the Prairie River. Relevant water quality parameters taken as part of the biological assessment included phosphorus (18 ug/L), conductivity (159 umhos/cm), dissolved oxygen (8.2 mg/L), and turbidity (1.6 NTU). The nearest lake downstream of the Alternative Tailings Basin is Prairie Lake (approximately 20 miles from the basin). Water quality was monitored just downstream of the outlet of the lake. Average water quality in 2003 was reported for several standard parameters including dissolved oxygen (10.1 mg/L), total phosphorus (27 ug/L), turbidity (3.7 NTU), and conductivity (182 umho/cm). Approximately 10 miles downstream of this monitoring point the Prairie River discharges into the Mississippi River.

All of the rivers and lakes downstream of the Alternative Tailings Basin and potential stormwater discharge points from the plant are defined as unlisted waters by the MPCA and are classified as class 2B, 3B, 4A, 4B, 5, and 6 waters. With the exception of the Mississippi River, no rivers or streams downstream of the Alternative Tailings basin are on the 2004 list of impaired waters (MPCA). Crooked Lake, which is approximately 10 miles downstream of Little McCarthy Lake, is listed as impaired for mercury.

As described previously, diversion of the plant runoff would reduce volume of inflows to Sucker Lake and possibly to Little McCarthy Lake. However, no significant changes in the long-term water quality of runoff are anticipated, since plant runoff will be captured and used for process water augmentation. Construction stormwater management will be an important factor in protecting the water quality of Little Sucker Lake during the initial stages of plant construction.

The Alternative Tailings Basin, if constructed, would be within the Sucker Brook watershed and would discharge to a southern branch of Sucker Brook. Sucker Brook flows west to the Prairie River and then south to Prairie Lake, the Lower Prairie River and then the Upper Mississippi River. If the Alternative Tailings Basin were to be used by Minnesota Steel, seepage and process water discharge from the basin would discharge to Sucker Brook. Water in the tailings basin would be expected to have elevated levels of constituents typically associated with the liquid phase of iron ore tailings. These constituents typically include chloride, calcium and magnesium (hardness), sulfate, and dissolved iron. The impact would be greater in the wetlands and stream reaches immediately downstream from the tailings basin.

References

Barr Engineering. 2001. *Watershed Yield Model and Preliminary Operational Water Balance*. Prepared for Minnesota Iron and Steel. June 2001.

Barr Engineering. 2000. *Pit 5 Initial Dewatering Study*. Prepared for Minnesota Iron and Steel. June 2000.

Barr Engineering. 1986. *Hydrologic and Nutrient Budget Analysis of Swan Lake, Itasca County, Minnesota*. Prepared for M.A. Hanna Company. October 29, 1986.

MPCA. 1986. *Lake Assessment Program*. Swan Lake. Itasca County, Minnesota. I.D.#31-0067.

PROPOSED TREATMENT OF TOPIC IN EIS

The EIS will include a water chemistry balance for processing water and tailings basin seepage/discharges. This information will be used to identify potential impacts to receiving waters including increased methylation of mercury due to increased sulfate concentrations. The EIS will also include an evaluation of nutrient loading changes to Swan Lake resulting from changes to inflow and increased sewage flow through the Nashwauk sewage treatment plant. Additional detail on the hydrogeological relationship between Pit 5 and Pit 6 will be included in the EIS.

c. If wastes will be discharged into a publicly owned treatment facility, identify the facility, describe any pretreatment provisions and discuss the facility's ability to handle the volume and composition of wastes, identifying any improvements necessary.

See "Sanitary Wastewater" in Question 18b.

d. If the project requires disposal of liquid animal manure, describe disposal technique and location and discuss capacity to handle the volume and composition of manure. Identify any improvements necessary. Describe any required setbacks for land disposal systems.

Not Applicable

19. **Geologic Hazards and Soil Conditions**

a. Approximate depth (in feet) to ground water: **0** minimum **unknown** average
Approximate depth (in feet) to bedrock: **0** minimum **unknown** average

Describe any of the following geologic site hazards to ground water and also identify them on the site map: sinkholes, shallow limestone formations or karst conditions. Describe measures to avoid or minimize environmental problems due to any of these hazards.

None of the listed conditions is present on the site; however groundwater has partially filled the abandoned pits on-site, and will flow into active mining areas. Depth to the water table around the mine site is unknown. Very little water is observable draining from the overburden or rock walls in the pits. Bedrock depth is zero only in disturbed areas; minimum overburden thickness is probably closer to 20 or 25 feet in undisturbed areas, and ranges to over 200 feet at the south margins of the mining areas.

b. Describe the soils on the site, giving NRCS (SCS) classifications, if known. Discuss soil granularity and potential for groundwater contamination from wastes or chemicals spread or spilled onto the soils. Discuss any mitigation measures to prevent such contamination.

Soil types derived from the Itasca County Soil Survey information are listed in Table 19-1 and shown on Figure 19-1. Soil textures include primarily loamy sand, sandy loam, silt loam, and organic soils in the undisturbed areas. The previously disturbed areas are highly variable including some areas with bedrock at the surface to other areas containing deep deposits of glacial overburden.

Stockpiling volumes and methods are being addressed in the mine model and mine plan, which is scheduled to be completed in the summer of 2005.

The stockpiles will store three classes of materials: surface overburden, waste rock and lean ore. The properties of waste rock and lean ore are well known and will not require special procedures. The surface overburden, including soils, will be managed in accordance with Minnesota rules, especially Minnesota Rules Chapter 6130.1 and 6130.2700, the standards for surface overburden stockpile design and construction and 6130.3600, standards for vegetation of mine features.

Soils were cataloged in Table 19-1. Soils in the mine area (which will be the soils to be stockpiled) include Nashwauk fine sandy Loam and Keewatin silt loam, as well as udorthents. Udorthents are areas where soils have been stripped and highly disturbed such as cut-and-fill operations or gravel pits. In this context, nearly level udorthents are areas that have been stripped for mining and very steep udorthents are piles of excavated material. No special measures are anticipated to deal with these soils.

The remaining area comprising over 80% of the area to be stripped, is predominantly silt loam and sandy loam soils. The soils are formed on glacial moraines; subsoils would be glacial till typical of the Mesabi Range The upper horizons of these soil can be erodible but overall, the stripped material should present no major obstacles to formation of stockpile pads for rock and lean ore or to creation of surface stockpiles.

PROPOSED TREATMENT OF TOPIC IN EIS

The EIS will include a discussion of the potential for groundwater contamination from process chemicals and hazardous materials used or stored at the project site. Measures to prevent and contain spills from maintenance and repair of mining equipment will be identified in the EIS.

20. Solid Wastes, Hazardous Wastes, Storage Tanks

a. Describe types, amounts and compositions of solid or hazardous wastes, including solid animal manure, sludge and ash, produced during construction and operation. Identify method and location of disposal. For projects generating municipal solid waste, indicate if there is a source separation plan; describe how the project will be modified for recycling. If hazardous waste is generated, indicate if there is a hazardous waste minimization plan and routine hazardous waste reduction assessments.

Table 20-1
Description of Solids, Sludges and Hazardous Wastes

Source	Quantity (estimated)	Description, Proposed Disposition
Solid Wastes		
Construction	To Be Determined	Construction debris will be generated during construction and through ongoing plant maintenance. Debris will be trucked to a demolition debris landfill.
Mixed solid waste from offices, shops and production facilities (excluding shop and industrial wastes)	Quantities will be typical of an industrial facility with 300 persons per shift.	Typical MSW will be produced from offices and non-production-related locations (lunchrooms, control stations). A comprehensive recycling program will be implemented. A licensed hauler will dispose of non-recyclable wastes.
Crusher baghouse dust	1,400 tpy	Has the composition of ore and will be sent to the concentrator.
Concentrator plant tailings	9 mltpy	Will be sent to the tailings basin. Tailings management will be addressed with wastewater discharge.
Pelletizer baghouse dust	21,000 tpy	Composed of taconite dust that will be internally recycled.
DRI plant baghouse dust	400 tpy	Composed of taconite dust that will be internally recycled.
Mill scale	29,000 metric tons per year	Mill scale (primarily iron oxide) is produced by descaling hot metal strip using water jets. The wet scale is collected in the scale pit, dewatered and disposed of by landfilling or by recycling to the iron-making process. Mill scale is sometimes used as a source of iron by the Portland cement industry.
(In-house) Scrap steel	143,000 metric tons per year	Scrap steel is produced from spillage, ladle skulls and tipped steel in the melt shop as well as from head and tail crops and cobbles in the rolling mill. All scrap will be collected and recycled into the steelmaking process or (if not suitable for reuse) sold as commercial scrap.
Steel Mill, Kiln and DRI Refractory	9,000 tons per year	Furnace lining (refractory) wears out and must be replaced regularly. Used refractory material is not expected to have hazardous characteristics. Normal refractory disposal practice is landfilling but crushing and recycling as construction aggregate is a possibility that will be explored.
Slag	240,000 metric tons per year.	The EAF and ladle furnaces will produce slag. Slag will be tapped into a ladle and transported to the slag handling area. There it is poured, quenched and fragmented for reprocessing. The major constituents of slag are calcium oxide, silicon oxide and iron. Slag is considered non-hazardous and is commonly used as construction material. The metallic fraction of the slag stream will be recycled at the EAFs. As a preferred option the non-metallic fraction will be offered for road or railway construction fill. Alternatively, it may be managed on-site as a non-hazardous industrial waste.
Sludges		
Raw water filtration sludge	To Be Determined	Initial filtration of raw water will produce a filter backwash composed of small particulates and natural debris. The backwash will be thickened by sedimentation and dewatered by a belt filter producing a small amount of dewatered sludge. The sludge will be disposed of by landfilling or on-site land disposal.
Pellet plant air scrubber sludge (tentative pending outcome of	90,000 tpy	Expected to mirror taconite pellet composition. Sludge could be recycled to concentrator for repelletizing or

Source	Quantity (estimated)	Description, Proposed Disposition
BACT review)		sent directly to tailings basin if beneficial for reducing mercury emissions.
DRI plant air scrubber sludge	10,400 tpy	Expected to mirror DRI pellet composition. Sludge to be sent to DRI clarifier which discharges to the Pellet Plant regrind mill.
DRI Cooling Tower Blowdown	To Be Determined	High TDS blowdown will be discharged to the facility process water system.
Oil Separation System	To Be Determined	Oily sludge to be managed by licensed disposal contractor.
EAF– Blowdown	To Be Determined	High TDS cooling tower blowdown will be discharged to direct water cooling circuit; direct water circuit will be treated to remove oil and then pumped to tailings basin.
Steel mill - Scale pit sludge includes oil and grease from the rolling mill and fine iron oxide particles mixed with water.	To Be Determined	Scale pit sludge will be sent to a licensed commercial waste-oil disposal or commercial oil-recovery facility.
Source Hazardous and Special Wastes		
Mine/Crusher Waste Oil and Lubricants	4,000 gallons per year	Assume 35 mine mobile units @ 5 gallons per 2 week period. Shovels and drilling equipment will produce waste lubricants and hydraulic oil. Also, see truck shop, below.
Electric Arc Furnace Baghouse Dust	50,000 tpy	RCRA-listed KO-61 waste; Minnesota Steel will likely pursue declassification of its baghouse dust because virgin iron units supplied to the furnaces will not have the typical heavy metal contaminants introduced by scrap metal. Minnesota Steel plans to briquette baghouse dust with the intent to recharge the material to the EAFs. Alternately, Minnesota Steel will use a commercial hazardous waste contractor or recycling at the start of operations. If successfully delisted, EAF dust would be either recycled into iron/steel processes or disposed of in a local landfill.
DRI Catalyst	241 tons per change out.	Nickel-based catalyst to be recycled by catalyst vendor. Catalyst change out is expected; however, the rate at which catalyst becomes spent can vary depending upon process upsets or malfunctions.
Maintenance – waste solvents	To Be Determined	Waste will be drummed and disposed of by a licensed commercial hazardous waste disposal contractor.
Maintenance – waste lubricants	To Be Determined	Waste will be drummed and disposed of by a licensed commercial hazardous waste disposal contractor.
Paint Shop Waste	4,000 lbs per year	The paint shop will generate small amounts of paint waste, solvents and possibly sandblasting waste. Waste will be drummed and disposed of by a licensed commercial hazardous waste disposal contractor. Assume 10 drums per year.
Truck Shop Waste	1,000 gallons per year	The truck shop will generate used motor oil and smaller amounts of solvents. Waste oil will be collected and disposed of by a licensed commercial waste oil disposal contractor. Assume 40 vehicles @ 2 gallons per month.
Laboratory – waste solvents and materials	300 gallons per year	Waste will be drummed and disposed of by a licensed commercial hazardous waste disposal contractor. Assume 6 drums per year.

During operation, the plant and offices will generate typical mixed solid waste associated with office/industrial operations. These will be hauled to a permitted landfill by a contract waste hauler. Paper waste, glass, and aluminum cans will be separated and recycled.

As indicated in Table 20-1, relatively small quantities of sludge or solvent wastes may be produced by the paint shops and possibly by truck and vehicle shops. These will be managed in accordance with hazardous waste regulations and disposed of by a licensed contractor.

During construction, large amounts of incidental construction debris may be produced. All efforts will be made to recycle materials on site or through available public or private recycling programs. Minnesota Steel may construct a small on-site debris landfill to accept non-recyclable materials. If constructed, the landfill will be designed to comply with state permit requirements. Such a facility would not need independent environmental review. If such a facility is not constructed, construction debris would be hauled to a licensed demolition debris landfill.

The electric arc furnaces will produce dust that will be collected in a baghouse. Emission control dust or sludge from the primary production of steel in electric furnaces is a listed hazardous waste (K061) under Federal regulations. (40 CFR 261.32). This is based on the typical presence of hexavalent chromium, lead and cadmium in dusts. In typical EAF furnaces that use outside scrap as feedstock, these metals are present in the scrap and are subject to volatilization by heating. It appears likely that the concentrations of these metals in the DRI will be much lower and because no purchased scrap will be used, the EAF dust produced by the Minnesota Steel facility may be delisted. If suitable, the dust may be recycled by being briquetted and returned to the EAFs. If the dust can be classified as non-hazardous it may also be landfilled. If the EAF dust is classified as hazardous, the dust would be disposed of by licensed commercial services that specialize in collection and treatment of metallic wastes.

A relatively inert calcium-silicate slag will be produced by the EAF. This is a glassy mixture of silicate, calcium, alumina, and iron. Slag will be produced at a rate equal to 5% to 8% of the DRI feed. The partitioning of minor and trace elements into the steel and the slag is not known at this time. Table 20-2 details the chemistry of the 1998 test pit and the process testing work on a tons-per-year basis. Minnesota Steel expects that, given the virgin DRI charge to the EAFs, the slag and dust amounts will be less than those normally associated with a scrap-fed EAF process and that the range of components in the charge will also be much more consistent.

As noted in Table 20-1, slag will be stored on site until markets can be developed for its eventual reuse. Steel slag is a valuable co-product of steelmaking. About eight million tons of slag from steelmaking were sold for use as road aggregate, de-icing sand, granular construction fill and other uses in 2000. The MPCA reports that leach testing of slag from another electric arc furnace facility in Minnesota resulted in a non-hazardous leachate. The slag does not require special handling or storage and is mainly used as railroad ballast. It appears likely the slag from the Minnesota Steel operation would be environmentally inert, since it will be produced from newly mined ore rather than scrap. The slag produced by Minnesota Steel is a potentially useful product but it will have to compete with similar granular mineral products including native sand and taconite tailings.

As described in response to Question 6, the use of the former Butler Taconite Stage I tailings basin is current preferred disposal area for tailings. Use or the alternative tailings basin will also be analyzed in EIS. Evaluation existing tailings dams of the Stage I basin will be conducted to determine if these dams can be used as part of Minnesota Steel's tailings basin. If these existing tailings dams are unsuitable for further construction, Minnesota Steel proposed an expanded tailings basin within the Stage I area.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will characterize solid wastes such as emission control dust and slag and discuss the potential impacts of available disposal options. Details about the design of the Stage I, expanded Stage I, and the alternative tailings basin will be included in the EIS.

b. Identify any toxic or hazardous materials to be used or present at the site and identify measures to be used to prevent them from contaminating groundwater. If the use of toxic or hazardous materials will lead to a regulated waste, discharge or emission, discuss any alternatives considered to minimize or eliminate the waste, discharge or emission.

See Table 20-1 for a list of solid and hazardous wastes and their method and location of disposal.

The primary hazards represented by the materials in the Minnesota Steel processes are those of combustible/explosive gases (natural gas and reformed gases, which are carbon monoxide and hydrogen) and hot intermediates, products and by-products (e.g., oxide pellets on exiting the pelletizer, DRI pellets on exiting the DRI module, molten and newly cast steel, molten slag). As gases and relatively inert solids composed chiefly of iron, these materials are not considered potential groundwater contaminants.

The steel mill will use a small amount of radioactive material in process monitoring equipment that tracks the level of molten steel in the continuous casting mold. This is standard process monitoring technology for steel mills. The material is commercially provided in specified packaging and is returned to the vendor as spent material for proper handling.

c. Indicate the number, location, size and use of any above or below ground tanks to store petroleum products or other materials, except water. Describe any emergency response containment plans.

Natural gas will be delivered by pipeline and will not be stored on the project site. Petroleum storage tanks will be limited to vehicle fuel, lubricating oils, and hydraulic oils for plant machinery. Some storage of water treatment chemicals also will be required. Storage tanks will be contained by berms or double-wall construction. Minnesota Steel will prepare a spill prevention control and countermeasure (SPCC) plan prior to the start of operations.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will describe liquid materials to be stored on site as well as spill prevention and containment measures.

21. **Traffic**

Parking spaces added: ~300

Existing spaces (if project involves expansion): N/A

Estimated total average daily traffic generated: See discussion below

Estimated maximum peak hour traffic generated (if known) and time of occurrence: See discussion below

Provide an estimate of the impact on traffic congestion on affected roads and describe any traffic improvements necessary. If the project is within the Twin Cities metropolitan area, discuss its impact on the regional transportation system.

CONSTRUCTION

Construction employment at the Minnesota Steel site may be approximately 2,000 workers working on a two or three shift per day basis around the clock. Access to the site mainly will be via County Highway 58 along the north side of the site. Assuming a distribution of 33% day workers, 66% shift workers, and 30% of shift workers on days off, the peak traffic would be about 1,100 vehicles per peak hour during construction, with an average daily traffic load of about 3,500 vehicles.

OPERATION

Itasca County has begun economic and environmental evaluation of the road access alternatives. Current conceptual plans are for a County highway to be constructed from Highway 169 to the west end of the plant site for truck deliveries to the project and to serve the planned rail and utility corridor. County Highway 58, which runs along the north side of the plant site, would serve as major access route for employees who would enter from State Highway 65, east of the plant. After the mine is operational, County Highway 58 will be terminated at the plant site, just west of the Nashwauk cemetery.

Minnesota Steel expects to employ about 700 people for production, support, and administration. Tentative plans call for two 12-hour shifts per day (with workers on four-day rotations). Shift changes will be staggered among various major operating areas. Among other benefits, this will help to reduce traffic congestion. A worst-case estimate of traffic would be to assume no staggered shifts with two daily peaks at the beginning and end of each shift. Assuming the 35 administrative staff work an eight-hour day and that the shift change coincides with either the end or beginning of the administrative day, there would be about 130 shift employees entering, 130 shift employees leaving and 35 administrative employees entering or leaving. The total hourly peak would be about 300 vehicles. The daily traffic from employees would be four shift movements (two entering, two leaving) and two administrative movements (entering and leaving), a total of about 600 vehicles per day.

In 2001, Highway 58 had a daily traffic count of about 100 vehicles per day.[2] The addition of up to 300 vehicles per hour during shift change will likely cause congestion on this highway at those times. Addition of turn and acceleration lanes may be required at the plant entrance or the intersection with Highway 65 north of Nashwauk. From the intersection of Highway 65 and Highway 58, traffic will disperse to the north and south. The larger, southbound, component will split again at the east bypass onto city streets and at Highway 169.

A third source of traffic will be shipments of steel by truck. In addition there will be traffic from vendors and contractors. This is expected to be a relatively minor volume compared to employee traffic. The feasibility study projected 67 truck shipments per day. Assuming same day round trips, this would imply about 140 freight vehicles per day on the proposed western plant access road.

While the alignments are not final, a preliminary traffic forecast has been completed to estimate overall vehicle trips on the plant roads. When the plant is completed, the average daily traffic on the easterly plant road is expected to jump from 100 to somewhere in the range of 2,000 to 3,000. The proposed westerly plant road would carry between 1,000 and 1,500 vehicles.

PROPOSED TREATMENT OF TOPIC IN EIS

The EIS will evaluate potential road access to the plant site and any potential traffic impacts and mitigation as appropriate.

22. **Vehicle-Related Air Emissions.** Estimate the effect of the project's traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or other mitigation measures on air quality impacts. Note: If the project involves 500 or more parking spaces, consult *EAW Guidelines* about whether a detailed air quality analysis is needed.

The traffic volumes implied by constructing and operating the Minnesota Steel project represent slightly more than 10 percent of the daily traffic on Highway 169 (5,800 - 6,400 vehicles/day in 2001). Although a detailed analysis has not been completed, the incremental increase in traffic in a rural setting is expected to have a negligible effect on air quality. Traffic from mine haul trucks is known to be a large source of fugitive particulate emissions at taconite plants but is considered to be part of the stationary source emissions and will be covered by Item 23 below.

[2] MN DOT / U.S. DOT; 2001 Traffic Volumes, Municipalities of Itasca County; Sheet 3 of 7.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will not evaluate vehicle-related air emissions.

23. **Stationary Source Air Emissions.** Describe the type, sources, quantities and compositions of any emissions from stationary sources of air emissions such as boilers, exhaust stacks or fugitive dust sources. Include any hazardous air pollutants (consult *EAW Guidelines* for a listing) and any greenhouse gases (such as carbon dioxide, methane, nitrous oxide) and ozone-depleting chemicals (chloro-fluorocarbons, hydrofluorocarbons, perfluorocarbons or sulfur hexafluoride). Also describe any proposed pollution prevention techniques and proposed air pollution control devices. Describe the impacts on air quality.

The Minnesota Steel project includes a processing plant on the north side of the mines in Sections 35 and 36, T57N, R23W. In addition to mining, stationary processing operations will include ore crushing, ore concentrating, taconite pellet induration, DRI production, a steel mill (i.e., electric arc furnaces, ladle furnaces and rolling mill) and materials handling associated with each of these operations. Mining and mine traffic will be the primary source of fugitive particulate emissions; some fugitive emissions will also come from the tailings basin. The magnitude of fugitive particulate emissions will be similar to other mining operations on the Iron Range.

The proposed project will be considered a new major source under Federal New Source Review (NSR), Prevention of Significant Deterioration (PSD) regulations. As a new major source, the air permit application for the proposed project must include the requirements of the PSD program. These include:

- Demonstration of the application of Best Available Control Technology (BACT) for criteria pollutants. Criteria pollutants include sulfur dioxide (SO_x), nitrogen oxides, (NO_x), particulate (PM_{10}), carbon monoxide (CO) and volatile organic compounds (VOCs).
- A Class II increment analysis (“fenceline” dispersion modeling) will be required for particulates, NO_x, and SO_x.
- An additional impacts analysis for impacts of criteria pollutants on soils and vegetation and
- Class I Area impacts analysis evaluating long range transport of NO_x, SO_x and PM10. Class I areas are national parks and wilderness areas. For this project, the Class I areas of concern include Voyageurs National Park and the Boundary Waters Canoe Area (BWCA).

In addition to PSD requirements, the project will be subject to Maximum Achievable Control Technology (MACT) requirements for those sources that are part of a hazardous air pollutant (HAP) source category or that are major HAP sources individually. Taconite ore processing has been assigned a MACT category. The DRI and steel mill processes may require case-by-case MACT determinations.

Finally, the MPCA’s air permit application form HG-2003 requires an evaluation of mercury inputs and outputs (a mercury balance) and a review of control alternatives. While the Minnesota Steel project will use clean energy sources (natural gas and electricity), there will be new mercury emissions from the project. Mercury is present at trace levels in the taconite ore and it will volatilize when subjected to the temperatures of taconite pellet induration, iron reduction and arc furnace melting. A mercury balance is being prepared for this project; emissions are expected to be comparable to existing Iron Range taconite plants.

PROJECT SITE PERMITTING HISTORY

The Minnesota Steel project will be sited on property that was originally mined by Butler Taconite from 1967 to 1985. Butler Taconite operated under an MPCA air operating permit (No. 62A-83-OT-1). Butler’s processing facility was dismantled and the permit was terminated.

CURRENT AIR QUALITY OF PROJECT SITE

The proposed project is located in an area that is currently in attainment with the National Ambient Air Quality Standards (NAAQS) for airborne particulate matter, nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, and lead and is currently meeting all Minnesota state air quality standards (MAAQS).

The pollutants listed above are generally linked to human health impacts (primarily respiratory health) and also to environmental impacts such as acid rain, smog formation and scenic visibility impairment in protected areas. Emissions of these pollutants from the Minnesota Steel project will not be allowed to impact air quality beyond a permitted incremental increase above current pollutant levels. This increase is calculated by air quality modeling and is called the PSD increment.

Current ambient air concentrations at select area monitoring stations are presented in Table 23-1 below. The data is for 2003 unless otherwise indicated:

Table 23-1
Current Ambient Air Pollutant Concentrations

Pollutant	Monitor Location	Annual Mean	Standard
Ozone	Voyageur National Park	0.043 ppm	0.08 (annual fourth highest 8-hr)
Ozone	Fond du Lac (2004 data) Site: 7416	0.025 ppm	0.08 (annual fourth highest 8-hr)
PM10	Hibbing Taconite (South) Site: 7018	21 $\mu g/m^3$	150 $\mu g/m^3$ (second high 24 hr), 50 $\mu g/m^3$ (annual mean)
CO	Duluth (2004) Site: 7526	0.30 ppm	9 ppm (8-hr average, 1 exceedance per year); 35 ppm (1-hr average, 1 exceedance/year)

Recent monitoring data for SO_2 and NO_2 are not available. The above ambient monitoring data does not exactly reflect the current air quality at the project site, but it represents the best available data geographically and temporally. For PM10 and CO, the air around the project site may be somewhat cleaner than indicated by the monitoring data from Duluth or Hibbing Taconite.

Another set of indicators of the air quality in the project area is the background concentrations that the MPCA has allowed for modeling of other projects in the region. Because there has been limited industrial activity in the immediate vicinity, ambient concentrations may be close to background levels. Examples of these background concentrations for Minnesota Steel, to be validated by the MPCA, would be:

- 16 $\mu g/m^3$ (annual) and 38 $\mu g/m^3$ for PM10
- 90 $\mu g/m^3$ (1-hr), 25 $\mu g/m^3$ (3-hour), 11 $\mu g/m^3$ (24-hour), 3 $\mu g/m^3$ (annual) for SO2
- 12 $\mu g/m^3$ (annual) for NO2

These levels are all well below their respective standards, which improves the ability of the proposed project to demonstrate modeled attainment with the air quality standards at the fence line.

DESCRIPTION OF STATIONARY EMISSION SOURCES

For the purposes of describing the air emission sources, the project can be divided into the following areas:

1. Mining and Crushing Operations
2. Concentrator and Pellet Plant
3. Direct Reduced Iron (DRI) Plant
4. Steel Mill
5. Tailings Basin

Figure 23-1 provides a schematic representation of the preliminary process flow for the project. The sections below describe the emission sources from each area in detail.

Minnesota Steel's operations will center on excavating taconite ore at the mine, processing ore into oxide pellets, converting oxide pellets to DRI pellets, melting DRI pellets to cast steel slabs, and rolling sheet steel from steel slabs. The main activities associated with the mine and plants include:

- Mining, transporting, and crushing ore;
- Recovering and concentrating magnetite from the ore;
- Additive receiving and handling (pellet plant and steel plant);
- Concentrate storage and handling;
- Converting the taconite concentrate to iron oxide pellets in the pellet plant furnaces;
- Pellet storage and handling;
- Direct reduction (DRI) process (2 modules);
- DRI product handling and occasional storage;
- Steel mill (2 EAF melt shop/casting lines and a rolling mill);
- Steel product shipping; and
- Supporting activities (e.g., slag processing; process water treatment; emergency generators)

Mine and Crushers

Mining begins with the blasting, removing, and stockpiling of the unconsolidated overburden and waste rock. This is followed by blasting, loading, and transfer by truck of the taconite ore to primary crushing, where the ore is reduced to 12-inch and then ¾-inch in size in a 2-stage process. Crushed ore is transferred from the crusher by conveyor to crude ore storage located at the concentrator plant. Particulate sources from mining and crushing activities include:

- Fugitive emissions from overburden stripping,
- Fugitive emissions from drilling and blasting of waste rock and taconite ore,
- Fugitive emissions from vehicle traffic in mine,
- Fugitive emissions from loading and unloading of raw materials,
- Wind erosion (fugitive) emissions from storage piles,
- Emissions from ore dumping to crusher,
- Emissions from ore crushing,
- Emissions from the ore crusher apron feeder,
- Emissions from the crushed ore conveyors and tripper conveyor,
- Emissions from the plant feed conveyor (Lines 1 & 2), and
- Emissions from the crushed ore storage apron feeders (Lines 1 & 2).

Except for rock blasting, each of these sources will be included in the air dispersion model analysis. Rock blasting is typically not modeled in these analyses because blasting occurs approximately weekly and emissions are generated only for a few minutes. The models are best suited to handle continuous emission sources as the model assumes that emissions occur continuously for at least one hour. Annual emissions from blasting will be calculated and included in the overall emission inventory.

Concentrator

Concentrating operations involve a series of wet processes that reduce the crushed ore to a powder consistency and physically (magnetically) separate the iron-containing fines from the nonmagnetic waste (tailings). Tailings are directed to the tailings basin as slurry and the concentrated iron (concentrate) is directed as thickened slurry to concentrate storage tanks. Limestone and soda ash are added to the concentrate slurry before it is pumped to the pellet plant.

The conveyors that transfer ore from the coarse ore storage pile to the wet mills are a source of dust emissions. Other ore processing operations at the concentrating section, including the semiautogenous milling process, are wet processes and therefore are not considered to be sources of air emissions. (Semi autogenous grinding involves the use of steel balls to pulverize ore, in addition to the action of the larger pieces of taconite ore).

Particulate sources from the concentrator include:

- Semi-Autogenous Mill Oversize Crusher emissions;
- Emissions from limestone day bin and unloading; and
- Emissions from soda ash day bin, conveying, and loadout

Concentrate Storage and Handling

Concentrate storage and handling operations consist of the on-ground storage of concentrate and the loading of concentrate onto conveyers, and the transfer of concentrate by conveyor. These operations occur only if the concentrate production rate exceeds the capacity of the pellet plant.

Particulate sources from concentrate storage and handling include:

- Fugitive emissions from the concentrate stockpile;
- Fugitive emissions from stockpile truck loading and unloading; and
- Concentrate stockpile reclaim conveyor emissions

Pelletizing (Induration)

Pelletizing operations include the storage and dewatering of concentrate, the blending of binder into the dewatered (high moisture) concentrate cake, the forming of the concentrate/binder mixture into "green balls," the firing of the green balls into hardened iron oxide pellets, and the transfer of the oxide pellets to storage or directly to the DRI plant. Pellet firing is expected to use a natural gas-fired, straight grate pelletizer or a grate-kiln pelletizer. The analysis of emissions will assume a straight grate pelletizer as a worst case until a final decision has been made by Minnesota Steel. The pelletizer will use gas stream recycling for heat recovery. Waste gas will exit the process through four exhaust stacks. Because the pelletizer is the first location in the process where the concentrate is exposed to high heat, it is the largest source of mercury emissions for the entire project.

Emission sources associated with these operations include: receiving and handling of binder (e.g., copolymer of sodium acrylate and acrylamide, or modified starch), the addition of dry additive to the concentrate at the additive blending stations, grate feed and discharge to the cooler, waste gas emissions at the traveling grate, feeders to the pellet transfer conveyors, pellet screening and the various pellet transfer conveyors leading to the DRI plant or pellet storage area.

Emissions from pelletizing include PM/PM_{10}, NO_x, SO_2, CO, and VOC. Sources include:

- The binder silo and day bin (PM/PM_{10} only)
- Emissions from the grate feed (PM/PM_{10} only)
- Emissions from the traveling grate launder
- The pelletizer grate waste gas stack emissions
- Emissions from the pellet discharge zone (PM/PM_{10} only)

Pellet Storage and Handling

Pellet handling and transfer operations consist of pellet screening and size classification, on-ground storage, transfer of product pellets to the DRI plant oxide day bins, and transfer of oversize and undersize pellets and pellet fines to the regrind mill.

Emission sources associated with these operations include: the discharge of product pellets to storage piles; pellet feed to the DRI plant; storage and handling of off-spec pellets and chips; separation of product pellets from off-spec pellets and chips; and the storage and transfer of the fines and chips for reprocessing.

Particulate emissions originate from:

- Vibrating feeders and pan feeders
- DRI product conveying emissions
- Pellet stockpiles to the screen conveyor
- Pellet screen/grizzly screening
- Conveying the DRI fines from the stockpile to the regrind mill
- Conveying oxide pellets to the oxide storage bins for DRI plants I and II
- Pellet storage bin loading for DRI plants I and II
- Conveyor drops 1 & 2 to both DRI plants

Additive Receiving and Handling

Additives used by Minnesota Steel likely will include limestone, soda ash, hydrated lime, quicklime, alloying metals, mold powder, graphite, carbon electrodes, binders and flotation polymer in various forms and quantities. Additive receiving and handling includes railcar or truck unloading, transfer to the additive storage silos, and the transfer of additives from the silos to day bins. Unloading and transfer is pneumatic. Point source emissions for the additive receiving and handling operations will result from venting of additive silos and day bins during pneumatic transfer. Day bins vent back to the storage silos, whose vents are controlled with fabric filters. Particulate emissions from receiving and handling of additives originate from:

- The hydrated lime day bin, unloading and conveying
- The quick lime day bin and conveying
- The graphite day bin, unloading and conveying

Direct Reduced Iron (DRI) Process

The DRI modules convert iron oxide pellets into highly metallized (95 percent plus) iron pellets. Screened oxide pellets are fed onto the bin feed conveyor for transfer to oxide day bin storage. From the oxide day bins, pellets are conveyed to the top of the reduction shaft and discharged into the charge hopper. The oxide pellets begin to descend through a counter-current stream of hot reducing gas and exit the reduction shaft at the bottom as DRI product. DRI pellets can be stored or sent to the steelmaking process.

The two major reaction systems within the direct reduction process are the reduction furnace and the reformer. In the reduction furnace, iron oxide (primarily hematite, with the chemical composition of Fe_2O_3) reacts with carbon monoxide (CO) and hydrogen (H_2) contained in the reducing gas to produce metallic iron (Fe), while liberating carbon dioxide (CO_2) and water vapor (H_2O). The second major reaction system within the direct reduction process is the reforming of natural gas to produce the reducing gas. Natural gas is reacted with top-gas (CO_2 and water vapor) captured at the top of the reduction shaft to produce a reducing gas rich in CO and H_2.

Emission sources associated with DRI plant operations include: combustion emissions from the natural gas-fired reformer burners and, particulate matter emissions from the day bins and material handling operations (loading, feeding, and conveying) of oxide pellets and DRI product. Emissions from the Direct Reduction process include:

- Fugitive emissions from the DRI Plants I and II charge hoppers
- Emissions from the reformer ejector stacks for DRI Plants I and II
- DRI cooling tower emissions
- Emissions from DRI Plants I and II discharge to feeder conveyors
- Emissions from DRI feeder drops to conveyors
- DRI product screening emissions
- Emissions from product conveying to storage silos
- Emissions from DRI product silos to feeder conveyors
- Emissions from DRI product conveying to the Electric Arc Furnaces (EAFs)

Steel Mill

The steel mill will consist of a melt shop, including two electric arc furnaces (EAFs), two ladle furnaces, a vacuum degasser, two slab casters, tunnel furnaces, a heated transfer table, rolling stands and coiling. The EAFs will produce liquid steel from DRI pellets. The liquid metal will be tapped from the EAFs to ladle furnaces, which allow the temperature and composition of the molten steel to be adjusted prior to continuous casting. The molten steel stream exits the ladle through a slide gate and ceramic nozzle in the ladle bottom and fills a tub-like distribution vessel called a tundish. The molten steel flows through drain holes in the tundish, through a submerged entry nozzle, and fills an oscillating, water-cooled copper mold. Molten steel begins to solidify as it passes through the mold and emerges as slabs a minimum of two inches thick.

After complete solidification, the continuous slab is cut inline into the required lengths. The solidified steel slabs proceed to the tunnel furnace to equalize the temperature of the steel slab prior to initial shaping in the roughing mill. The heated transfer table receives the slab from the roughing mill and delivers it to the finishing mill. The finishing mill decreases the slab thickness by forcing the steel through a series of roll stands. Hydraulic force is used to successively reduce cross-sectional area between the rolls and increase the length of the steel. Steel emerges from the rolling process as thin as 1-mm thick sheet steel. Finally, the sheet steel is coiled for storage and shipping.

Emission sources associated with steel mill operations include:

- Particulate emissions from the EAF I and EAF II charging conveyors
- Particulate emissions from the drop to the EAF I and II charge hoppers
- EAF I and EAF II baghouse emissions (PM/PM_{10}, NO_x, SO_2, CO)
- Ladle Furnace I and Ladle Furnace II emissions (PM/PM_{10}, NO_x, SO_2, CO)
- Emissions from Thin Slab Caster I and II (PM/PM_{10}, NO_x, CO)
- Emissions from Tunnel Furnace I and II (natural gas combustion)
- Heated transfer table emissions (natural gas combustion)
- Tundish and ladle dryers (natural gas combustion)
- Home scrap processing (acetylene torch emissions; insignificant)
- Slag processing (PM/PM_{10})
- Truck traffic (PM/PM_{10})
- Lime and additive silos (PM/PM_{10})
- Emissions from 4 steel mill cooling towers (PM_{10})

All significant sources will be included in the model. The steel mill representation will incorporate emission information for two melt shop lines as provided by the equipment vendor.

Tailings Basin

The waste rock (tailings) produced in the concentration process will be pumped as a slurry from the tailings thickener through the tailings pipeline to the tailings basin. In the tailings basin, the tailings will separate by gravity from the process water and the water will be reclaimed and returned to the plant. The tailings basin will be reclaimed as exterior slopes are completed and interior beaches will be temporarily vegetated as required to control fugitive emissions. The major sources of fugitive dust emissions from the tailings basin are:

- Wind erosion emissions from the tailings basin
- Dam construction and basin maintenance work (heavy equipment operation)

Support Activities

There are a number of support activities, which are activities and sources of relatively small emissions. Support activities will include the sources listed below.

- Building heaters

- Solvent use
- Welding/cutting equipment
- Water Quality/Product Quality Laboratories
- Fuel storage tanks
- Replacement of tundish, ladle and arc furnace refractory linings
- Plant maintenance activities
- Process water treatment
- Emergency generators

DISCUSSION OF PROJECT IMPACTS ON AIR QUALITY

As a "greenfield" project, Minnesota Steel is subject to the most current environmental regulations, which mandate the application of the best air emissions control that is commercially available for the different processes making up the overall facility. A preliminary Minnesota Steel air emissions inventory is summarized in Table 23-2. The inventory indicates that the project, like other steel industry facilities on the Iron Range, will be a major source of particulate, sulfur dioxide, nitrogen oxides and carbon monoxide, collectively referred to as "criteria" pollutants. The emission levels indicated in the table trigger the federal requirements to control emissions to a level that prevents the significant deterioration of the existing air quality.

Minnesota Steel is required to apply to the MPCA for a prevention of significant deterioration (PSD) permit and demonstrate that the project will not have a significant adverse impact on existing air quality. Within the PSD permit application, Minnesota Steel will be required to provide information demonstrating that new air emissions do not impact existing air quality beyond an allowable increment for Class I and Class II-defined areas. In Minnesota, Class II areas are all those that are not designated as National Parks or Wilderness Areas.

Air dispersion modeling is used to predict air emission impacts on Class I and Class II areas. Class I modeling will analyze the impact of NO_x, SO_2 and fine particulate (PM_{10} or less) on visibility (i.e., their contribution to haze) in designated park or wilderness areas. Initial modeling may indicate pollutant concentrations that exceed an ambient standard at the property line or exceed an allowable increment and may, subsequently, dictate higher controls or a process reconfiguration. Minnesota Steel also will be required to provide a best available control technology (BACT) review, which will set emission limits and control efficiencies for specific point sources (stacks). Given that modeling and the BACT review dictate a certain level of emissions, the emission totals reflected in the inventory summary (Table 23-1) are expected to change to some degree during the air permit application process.

The proximity (a minimum of 52 miles) of the project to designated Class I areas (Voyageurs National Park and the Boundary Waters Canoe Area Wilderness) requires an analysis of the project's air emissions impact on those areas. As in the more immediate area of the plant, the project is required to demonstrate that the new air emissions will not result in pollutant concentration increases that exceed established Class I increments. Federal land managers for the National Park Service and USDA Forest Service require analyses for PSD increment, visibility, regional haze, and Air Quality Related Values (AQRVs), such as the effect of acid deposition on surface waters within a Class I area. Experience at other Iron Range facilities has shown that the FLM's primary concern will be visibility impairment (haze formation). Emissions of SO_x, NO_x, and fine particulates contribute to haze formation. The analysis of Class I area impacts will be performed in accordance with the current Federal Land Managers' Air Quality Related Values Workgroup (FLAG) guidance.

Because this is a new facility, all Minnesota Steel sources will be included in the PSD increment modeling. The PSD increments are much lower than the NAAQS and MAAQS; therefore, modeling attainment with the PSD increments will be the limiting standards for PM_{10}, SO_2, and NO_x.

Fugitive and point source emissions to the air, such as the by-products of natural gas combustion, contain small amounts of chemicals regarded as hazardous air pollutants (HAPs). These substances are regulated under Title III of the Clean Air Act and will be part of Minnesota Steel's permit review.

Primarily, the Minnesota Steel emission inventory includes emissions of small amounts of antimony compounds, arsenic compounds, benzene, beryllium compounds, cadmium compounds, chromium compounds, cobalt compounds, formaldehyde, hexane, lead compounds, manganese compounds, mercury compounds, naphthalene, nickel compounds, selenium compounds, toluene, and 1,4-dichlorobenzene (see also Table 23-2). As discussed earlier, control of HAP emissions may be achieved indirectly by controlling criteria pollutants or directly by designing control for a specific chemical.

RISK ASSESSMENT

Minnesota's environmental review process includes evaluation of potential risk to human health and the ecology that is represented by new projects. Minnesota Steel will prepare a human health and ecological risk assessment for the proposed facility for use in the EIS and air quality permit.

The objectives of the risk assessment are:

1. To evaluate the potential human health and ecological risk associated with potential emissions to ambient air from the proposed Minnesota Steel facility under routine operating conditions; and

2. To characterize potential human health and ecological risks associated with tailings basin discharge to land, groundwater, and surface water.

The risk assessment will be divided into two sections: the human health screening-level risk assessment (HHSRA) and the ecological screening-level risk assessment (ESRA). The "screening-level" refers to the use of conservative assumptions, input values and risk scenarios (e.g., maximum exposed individual), which generally over-estimate potential risks to human and ecological receptors. The HHSRA will evaluate potential human health risk due to direct (inhalation) and indirect (for example, soil contact, homegrown food consumption, fish consumption) exposure. The ESRA will consider direct exposure and indirect exposure through the food chain (for example birds consuming contaminated worms and plants).

The risk assessment will be conducted according to the US EPA's guidance document, "Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities" (USEPA, 1998 and updates). The main parts of the risk assessment are outlined below:

1. Develop a study-specific conceptual model identifying the site boundary, potential chemical emissions to air and water, exposed populations, routes of exposure and potential health outcomes.

2. Develop exposure point concentrations using air dispersion modeling and discharge water evaluation.

3. Conduct a direct (inhalation) and indirect (multiple pathways) HHSRA, which will include the traditional components of risk assessments, including hazard identification (what are the chemicals of concern emitted from the facility), exposure assessment (who is exposed to what chemical and concentration), toxicity assessment (how toxic are the chemicals), risk characterization (what is the potential risk to the exposed individual or population), and uncertainty analysis (how likely is the estimated risk to occur and how variable are the assumptions that went into developing those risk estimates).

4. Conduct, as a first step, an ESRA, including the identification of potential persistent and bioaccumulative chemicals, estimation of soil, surface water and sediment chemical concentration, estimation of long term chemical concentrations in tailings basin seepage. If the screening level assessment indicates the potential for adverse ecological impacts, a more detailed risk analysis based on direct and indirect exposures through the food chain will be completed.

5. Prepare and submit a risk analysis report to the MNDNR to be included in the EIS process.

GREENHOUSE GASES

Minnesota Steel will use natural gas, which has approximately 40 percent less carbon than coal so the CO_2 emissions from gas combustion are proportionately lower. Carbon dioxide is regarded as a greenhouse gas; however, it is not a regulated pollutant. All fossil fuels are hydrocarbons and by definition contain carbon, which forms CO_2 during complete combustion. There are currently no techniques for reducing the formation of CO_2 during combustion; however, the amount of CO_2 emitted per unit of work performed can be optimized to reduce CO_2 emissions per MW, for example, or per ton of steel produced. The inherent efficiencies in charging hot taconite to the DRI plant and hot DRI to the steel mill will also contribute to overall lower CO_2 emissions per ton of steel produced.

Based on a projected natural gas use of 37,000 million cubic feet per year by Year 5, the project will eventually emit about 2,200,000 tons of carbon dioxide per year via combustion sources in the pellet plant, DRI plant and steelmaking facility. To provide a comparison, Minnesota Power reported 8,276,151 tons of carbon dioxide emissions in 2003 from its 1,025 MW power plant in Cohasset, MN[3].

PROPOSED POLLUTION CONTROL EQUIPMENT AND PRACTICES

Possible air emissions control technologies to be evaluated for effectiveness within the BACT review include the systems listed below.

- Wet (venturi) scrubbers, electrostatic precipitators (wet or dry), baghouses and clean fuel for particulate control;
- Wet (venturi) scrubbers, lime injection, wet electrostatic precipitator and clean fuel for sulfur dioxide control;
- Low NOx burners, catalytic reduction, non-catalytic reduction and low temperature oxidation for nitrogen oxides control; and
- Catalytic reduction and good combustion practices for carbon monoxide control.

The evaluation will also consider the level of co-beneficial reduction in hazardous air pollutants (HAPs) offered by technically feasible options that may complement the proven control approaches. Among the list of HAP chemicals is (elemental) mercury, which is expected to be emitted primarily by the pellet plant where pellet induration is the first exposure of ore-based mercury to high temperature processing. In meeting the stringent particulate emission limits set by the taconite MACT standard, there is an expectation of some co-benefit reduction in mercury. Elemental mercury (vs. oxidized mercury) is typically difficult to remove from the flue gas stream. However, on-going MNDNR study suggests that some mercury may deposit or adsorb on taconite mineral during induration. When mercury becomes attached to solid material the prospect for removal from the gas stream is significantly enhanced. Mercury-laden particulate that is removed from the waste gas stacks by control equipment could be segregated from the typical recycling of taconite dust and subsequently remove mercury from the process. The transfer of segregated dust to the tailings basin represents one potential option for sequestering the associated mercury and this option will be included in the overall evaluation of mercury control alternatives.

PROPOSED TREATMENT OF THE SUBJECT IN THE EIS
Air emissions and potential impacts will be a major topic in the EIS. The EIS will include a human health and ecological risk assessment of the project. The EIS will also evaluate multi-media impacts from various air quality control devices that may be used at the processing plant.

24. **Odors, Noise and Dust.** Will the project generate odors, noise or dust during construction or during operation?
☒ Yes ☐ No

If yes, describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts. Also identify locations of nearby sensitive receptors and estimate impacts on them.

[3] U.S.EPA Clean Air Markets Division; Data and Maps - http://cfpub.epa.gov/gdm/

Discuss potential impacts on human health or quality of life. (Note: fugitive dust generated by operations may be discussed at item 23 instead of here.)

ODORS

The Minnesota Steel project is not expected to be a significant source of odor emissions. Diesel exhaust odors are a potential exception. The majority of diesel activity will be in the mining and tailings basin operations; however, new diesel fuel and engine emission standards are currently being implemented and it is reasonable to assume that diesel emissions from Minnesota Steel operations will be dramatically less than a typical mine experiences today.

Onsite wastewater treatment will be inorganic in nature to condition water for process use. These processes are not significant generators of odor.

The tailings that will be deposited in the tailings basins are essentially odor-free. The flotation reagents used by the Concentrator processes for final tailings separation have a slight (though not generally disagreeable) odor. The flotation process will be operated within a closed facility.

DUST

Dust will be generated during construction and during actual plant operations. Dust emissions from operations will be evaluated as part of the facility's air permitting (described in response to Question 23). A preliminary list of potential sources and measures that can be taken to mitigate adverse impacts include:

Potential Dust Source	Measures to Mitigate Adverse Impacts
Earth/rock moving for preparation of plant site	Compaction, spraying of haul roads, minimizing of open areas, rapid revegetation of disturbed areas
Construction traffic	Dust suppressant application (water or chemical)
Removal of overburden prior to and during mining	Compaction, spraying of haul roads, good stockpiling practices to minimize wind erosion
Drilling and blasting of waste rock and ore	Water sprays, good blasting technology, adherence to blasting standards
Truck loading and haul truck traffic associated with transfer of waste rock and ore	Water sprays, compaction and spraying of haul roads, good stockpiling practice to minimize dust production
Plant and mill operation	Discussed previously under Question 23
Mine land reclamation (earthmoving)	Compaction, spraying of haul roads, revegetation of disturbed areas
On-site traffic	Paving of roadways, use of dust suppressants
Wind erosion of tailings basin	Planned revegetation of filled areas or maintenance of filled areas in wet condition for use as wetland mitigation

Construction of mine facilities, roads, railroad spur(s), natural gas pipeline, electric transmission and local building(s) will generate dust typical of large construction projects for a two-year period. Construction-related dust impacts are not expected to be significant or sustained. The nearest residential receptor for mining-related dust impacts is located at the south end of Snowball Lake at a distance of approximately 0.9 miles from initial mining activity and 0.5 miles from the eventual 20-year mining plan.

The entire project will be required to meet National Ambient Air Quality Standards (NAAQS) at the project boundary. The probable receptors would be defined by the location of the source and the prevailing wind direction. The wind rose (shown on Figure 24-1) defines the prevailing wind direction and speed at Hibbing, the nearest meteorological station. Dominant winds are from the south-southwest (summer) and from the north-northwest (winter).

For the plant and mine, the nearest receptors, to the northeast (prevailing summer winds), excluding County Highway 58 and the Nashwauk cemetery, would be rural residences along Minnesota Highway 65, north of Nashwauk, beyond the stockpile/buffer area and approximately 1 to 3 miles away. The cemetery is 0.3 miles from the east end of the proposed plant site.

The south rim of Pit 6 is about 500 feet north of Snowball Lake, which currently has nine homes around it. For prevailing winter winds, the nearest receptor would be the community of Pengilly, about 3.5 miles south-southeast of the plant. At these distances the impacts of particulates would be expected to be very small. Modeling as part of the permitting process will be required to verify these assumptions and will be addressed in the EIS.

Tailings basins require proper management to minimize fugitive dust. The potential for dust lift-off caused by dry, windy conditions will be managed under a Fugitive Dust Control Plan that will include minimizing unvegetated beach and dike area, application of temporary seeding to areas that will be inactive for a substantial time, application of mulch to areas that will be inactive for short terms, and application of dust suppressants to problem areas.

For the Stage I Tailings Basin, the nearest receptors to the northeast (summer) would be Highway 169 and possibly portions of the cities of Nashwauk and Keewatin. The distance from potential dust-producing areas could range from less than 1 to more than 5 miles, depending on the stage of tailings basin development. Summer winds would generally move material in the direction of National Steel Pellet Company's tailings basin. For winter prevailing winds, the nearest receptors would be the homes along the east side of Swan Lake or the few rural residences along Itasca County Highway 16 east of the tailings basin as well as more distant homes along State Highway 73 in and near the community of Silica. Distances could range from about 1 to more than 5 miles, depending on the Stage of tailings basin development. Overall, impacts of dust production from the tailings basin are expected to be small.

The Alternative Tailings Basin (if selected) would be located about 1.6 miles west of the Minnesota Steel plant facilities. This alternative site is bounded to the north by Big Sucker Lake, which has about 14 residences around it, the nearest being about 1,500 feet from the north edge of the tailings basin. The Hill Annex State Park is located about 1 mile south of this site.

NOISE

Iron mining and processing are obviously heavy industrial operations and the source of various levels of noise. These activities have been part of the primary economic driver for northeastern Minnesota communities for many decades. Local residents and nearby communities are likely to be accustomed to the sound from normal mine activities in the area. Noise impacts from Minnesota Steel mining would be expected to be similar to impacts experienced from the neighboring Keewatin Taconite operations.

The current noise standards for the State of Minnesota are located at Minnesota Rules, Chapter 7030.0040, Subpart 2. The rules for permissible noise vary according to which “Noise Area Classification” is involved. In a residential setting, for example, the noise restrictions are more stringent than in an industrial setting. The rules also distinguish between nighttime and daytime noise; less noise is permitted at night. The standards list the sound levels exceeded for 10 and 50 percent of the time in a one-hour survey (L_{10} and L_{50}) for each noise area classification, as follows:

Table 24-1
Applicable Minnesota Noise Standards

Noise Area Classification		Noise, Standard, dB(A)			
		Daytime		Nighttime	
		L_{50}	L_{10}	L_{50}	L_{10}
1	Residential	60	65	50	55
2	Commercial	65	70	65	70
3	Industrial	75	80	75	80

The standards are given in terms of the percent of time during a measurement period (typically one hour) during which a particular decibel (dB(A)) level may not be exceeded. A daytime L50 of 60 (dB(A)), for example, means that during the daytime, noise levels may not exceed 60 (dB(A)) more than 50 percent of the time.

The Minnesota Steel processing facility itself will be about one mile from the nearest current residence and about one-half mile from the Nashwauk cemetery. Sections of the facility such as the pellet plant, DRI plant and the steel mill are sources of noise. The noise will be relatively low-toned and constant, consistent with industrial fans, so it should present less annoyance than higher-pitched or variable tones of changing loudness.

The pellet plant processes of milling, indurating, and screening are sources of noise; however, these operations are generally contained within the plant buildings and are not expected to be a significant source of noise at the property line.

Within the DRI plant, (based on typical values) expected noise levels at a DRI plant are 95 to 105 dB(A) inside the blower area, 85 to 90 dB(A) immediately outside the blower area, and 70 to 80 dB(A) at plant area boundaries. Lower values are achievable with modified acoustical design.

The electric arc furnaces will be the principal source of noise in the steel mill. Noise levels in excess of 100 dB(A) may occur during the startup of a new heat or batch. After the initial melting of material has happened and continuous feeding commences, the noise levels are lower. Ladle furnace and refractory demolition noise levels are generally in the range of 85 dB(A). The melt shop and building construction will control noise levels to the allowable standards.

The rolling mill noise levels may exceed 85 dB(A) near the rolling, shearing and stacking equipment. Again, these activities will occur inside buildings, which will reduce noise levels to the allowable standards.

The steel mill also includes, cooling towers, an air handling system with baghouse, and a home scrap cutting yard, all of which have noise levels in the range of 85 dB(A). These sources are not enclosed and noise attenuation will depend upon distance. At a distance of one-half mile, these sources should be well below state noise standards at the nearest home and at the Nashwauk cemetery. Depending on background noise levels, they are likely to be audible, however.

The issue of noise from mine sites was addressed in considerable detail in the Regional Copper-Nickel Study (Minnesota State Planning Agency, 1976-1979). That study evaluated several sources of noise from potential mine sites, including:

- Chain saws and skidders used in clearing the mine site
- Blasting
- Excavators and drills
- Large trucks hauling and dumping rock
- Backup alarms on mine excavators and trucks
- Mine site warning sirens
- Over-the-road diesel trucks
- Trains hauling ore
- Train whistles

In considering potential mine noise impacts the study took into account many factors. Because ambient noise can mask noise originating from distant sources, ambient sound patterns and levels in both urban and rural areas were evaluated. The study also considered the relative frequency and duration of the noise from the various mine sources. The attenuation of the sound with distance was considered, and seasonal effects – resulting from changing leaf cover in the surrounding forests, and changes in prevailing wind direction – were also accounted for. These generic observations from the Regional Copper-Nickel Study give a general indication of the probable sources of noise and the overall expectations for noise generation.

- "Clearing operations, while noisy, are of relatively short duration, and therefore are less likely to cause significant annoyance or disturbance to those within hearing distance.

- Shovels and drills, being typically electric-powered, are not powerful sources of acoustic energy. (Note: Minnesota Steel plans currently call for diesel – hydraulic shovels)

- The percussive noise from blasting is not likely to be particularly objectionable. The activities associated with blasting – spotter aircraft noise and warning sirens – are more likely to be causes of significant acoustic impact than the blasting itself. Blasting is a short duration event that will likely occur only one or two times per week. Using test blasts and meteorological monitoring, mine blasting is timed to minimize acoustic and structural impacts.

- High-frequency sounds are attenuated more rapidly than low-frequency sounds. The backup alarms on trucks, loaders, and excavators, for example, die out relatively rapidly with distance. The extreme limit of audibility for such noise is 5 to 10 km (3 to 6 miles).

- Computer modeling of the noise propagation from mine site warning sirens (such as those used in preparation for blasting) showed that during a calm summer night, the extreme limit of audibility is 17 km (10.6 miles).

- Over-the-road diesel trucks hauling supplies to and from the mine site can be expected to have similar noise emissions as mine trucks. Because the operation of these trucks is relatively infrequent, however, the noise impact from these trucks is relatively insignificant.

- Railroad locomotive noise was evaluated, and the maximum impacted distance was found to be 19 km (12 miles). Railroad horns, however, which are designed to be especially detectable by the human ear, produce noise that can be heard at a greater distance. The maximum predicted range of audibility is 30 km (19 miles). Like over-the-road diesel hauling, railroad hauling is expected to be relatively infrequent, and the sounding of locomotive signal horns occurs only at crossings. The railroad noise would therefore not be expected to be of great concern.

Truck Noise

The Regional Copper Nickel Study observed that: "the large ore-hauling trucks will continue to be the limiting factor for noise impact since they are powerful acoustic sources and are an important part of the operation. The trucks will be the dominant noise source for persons not on mining property since they are operating in the open as opposed to in-plant sources which are subject to substantial noise muffling due to building walls." With this in mind, the Copper Nickel Study focused on truck noise, and evaluated the distances at which truck noise would be heard under several conditions (winter, summer, night, day). Detailed evaluations were made of the noise from both 85-ton and 170-ton trucks, under normal operating, and dumping (bed-lift) conditions.

In general, the study of truck noise showed that:

- Due to the direction of the prevailing winds, sound will carry more readily to areas to the southeast of a mine site, and less readily to areas to the northeast.
- Mine noise is most likely to be heard during calm summer nights, when there is the least sound masking from wind noise, and temperature inversions boost sound transmission.

- Larger trucks will be heard farther away than smaller trucks.
- When dumping their loads, the characteristics of the engine/muffler noise is such that it can be heard at greater distances than under normal operating conditions.

The larger (170-ton) trucks considered in the study were expected to give the greatest noise impact of any mining noise sources considered. Modeling indicated that the extreme limit of audibility for these vehicles is 35 km (22 miles), with a 10 dB(A) peak considered detectable. At 20 km (12.5 miles), the peak noise level expected from these trucks would be 25 dB(A). Although trucks used by Minnesota Steel will likely be larger than 170 tons, the noise impacts would be expected to be similar.

As mentioned above, prevailing winds are from the northwest, so that areas to the northeast of the Mine Site are acoustically sheltered. The noise from 170-ton trucks is expected to be inaudible at distances greater than 22 miles. Therefore truck noise from the Minnesota Steel mine would not be audible in the BWCA which is greater than 50 miles from the site.

Blasting

Blasting activity will be routine activity scheduled roughly once per week. Minnesota Steel will use the same blasting agents as other taconite mines, a mixture of about 94% ammonium nitrate and 6% fuel oil, commonly referred to as ANFO. A common form of this mixture is ANFO emulsion or a mixture of ANFO and ANFO emulsion. ANFO emulsion contains ammonium nitrate dissolved in water. The water is dispersed in fuel oil. Because oil surrounds the oxidizer, it is resistant to moisture and therefore more useful in damp conditions. This also increases the density and energy production of the explosive compared to dry granules of ANFO.

ANFO will be supplied by one of the explosive supply companies that serve the Mesabi Iron Range. After boreholes are drilled, ANFO is delivered by truck and loaded into the boreholes for detonation. The five impacts of blasting in surface mines are ground vibrations, air blast, flyrock, dust, and fumes. Much of the area has experienced blasting impacts previously during natural ore mining and the operation of Butler taconite. Minnesota has a vibration limit of 1.0 inches/ second with no specified frequencies. The U.S. Bureau of Mines recommendations are 0.50 inches/second for old homes (plaster) and 0.75 inches per second for modern homes (wallboard) in the low frequency range. Minnesota Steel will be required to comply with these standards. A pre-operation inspection and videotaping of the nearest homes could help to document the degree of any later damage. A seismic monitoring program was implemented during the Butler Taconite operations; Minnesota Steel proposes to implement a similar program for this project.

Air blast is the shockwave propagated through the atmosphere. Flyrock is rock that is blown loose from the free face of the rock and travels beyond the area intended for blasting. Both airblast and flyrock can be minimized by proper blasting planning, including drill hole placement, sequencing velocity, face orientation, and monitoring of explosive weight. Air blast can be affected by wind direction as well. Butler Taconite conducted an air blast monitoring program and the practice was to explode a small test shot to check atmospheric conditions for air blast; Minnesota Steel proposes to implement a similar air blast monitoring program.

Dust and gases are usually not a major problem outside the immediate blasting area. As with air blast, wind direction is important. When necessary, dust and gas production can be reduced by wetting the area to be blasted. Excessive fumes can be avoided by good explosive design and usage.

PROPOSED TREATMENT OF TOPIC IN EIS

Blasting and noise production are not anticipated to be significant, but will be discussed in the EIS. Existing noise modeling done for the previous Minnesota Iron and Steel project will be updated to reflect actual noise emissions from Minnesota Steel's selected haul trucks. The EIS will also identify potential mitigation measures of noise impacts.

25. **Nearby Resources.** Are any of the following resources on or in proximity to the site?
Archaeological, historical or architectural resources? ☒ Yes ☐ No
Prime or unique farmlands or land within an agricultural preserve? ☐ Yes ☒ No
Designated parks, recreation areas or trails? ☒ Yes ☐ No
Scenic views and vistas? ☒ Yes ☐ No
Other unique resources? ☐ Yes ☒ No

If yes, describe the resource and identify any project-related impacts on the resource. Describe any measures to minimize or avoid adverse impacts.

ARCHAEOLOGICAL, HISTORICAL, OR ARCHITECTURAL RESOURCES

The Minnesota Historical Society has previously provided information pertaining to known archaeological, historical, or architectural resources at the project location. The response indicated that the site (plant, mine, and tailings basin) contained no known archeological, historical or architectural resources. Because of the large search area requested, a number of historic buildings in the cities of Calumet, Marble, Pengilly, Nashwauk, and Keewatin were listed. The proposed project will not affect these buildings.

In January 2005, The 106 Group Ltd. conducted a literature search for the Minnesota Steel project area; a copy of the report is included as an attachment to this EAW. A background research was conducted using the Minnesota State Historic Preservation Office (SHPO) site files for information on previously identified archaeological sites and architectural history properties within one mile (1.6 kilometer [km]) of the project area and on cultural resources surveys previously conducted within the project area. Research indicates that no archaeological surveys have been conducted within the survey area. No sites have been recorded within the current project area. Only one site (21IC325) has been recorded within one mile of the project area. Site 21IC325 (Nelson Site) is a site dating from pre-European settlement where tool making took place (a precontact lithic scatter). It contained stone chips from tool making (debitage) and a side-notched projectile point located on a ridge overlooking O'Brien Creek, approximately 0.25 miles east of Swan Lake. The specific cultural context of the site is not provided on the state archaeological site form (MN Archaeological Site Form 21IC325, on file at the SHPO).

The 106 Group found that the Minnesota Steel project area is in proximity to and encompasses portions of a chain of natural lakes that trends southeast from an area northwest of the project area through the stockpile and mine areas to Swan Lake and beyond. A map of the area as it was between 1869 and 1905 depicts an "Ind. [Indian] Trail to Swan L." that follows the northwest to southeast-trending portion of the chain of lakes, to a "Chippewa Indian [House]" and "Indian Village" on the western shore of Swan Lake (Trygg 1966). Swan Lake is also connected to a lake to its northeast, O'Brien Lake, via O'Brian Creek and Little O'Brien Lake, historically another portion of O'Brien Creek (Trygg 1966). Little O'Brien Lake runs through the proposed tailings basin. A previously recorded archeological site is located on O'Brien Creek, southeast of the proposed tailings basin. That the Minnesota Steel project area is in proximity to a chain of lakes and was used by Native Americans when Europeans first settled in this area heightens its potential for containing archaeological sites dating to the pre-contact, contact, or post-contact periods.

The 106 Group recommended that Phase I field survey be conducted of portions of the site that will be disturbed and that have not previously been disturbed by subsequent mining operations. During the scoping process Minnesota Steel will consult with the Corps and SHPO to refine these recommendations and prepare a scope of work for additional survey work to be completed during the preparation of the DEIS.

With respect to historical resources, the 106 Group found that the mines in eastern Itasca County were opened soon after the Great Northern Railway line was extended from Kelly Lake to Nashwauk in 1903.

The project area is located in the portion of the Mesabi Iron Range dominated by the former Butler Brothers Mining Company (BBMC) operations The BBMC's first involvement with the Mesabi Iron Range occurred in 1902 when it undertook the first in a series of mine stripping contracts. The BBMC converted its business on the Mesabi Iron Range from mine stripping to mine operation during the early 1910s. The BBMC's mining operations expanded with the Great Northern Iron Ore Properties leases for the Patrick-Kevin group in 1915.

The BBMC was one of the several smaller operators on the Mesabi Range during the heyday of the natural-ore mining era that extended from the 1910s through the 1940s,   The BBMC and its subsidiaries ranked seventh of 29 mine operators in Lake Superior mining district in 1930. The project is closest to the t Patrick-Kevin Group. In 1915, the BBMC entered into two lease agreements with the Great Northern Iron Ore Properties firm of St. Paul, a subsidiary firm of the Great Northern Railway. One lease was for the Ann and Patrick Mines, while the other covered the Kevin Mine; the Kevin and Patrick mines were opened in 1916 and 1917, respectively. The Langdon Mine was opened in 1929 during an expansion period for the Patrick-Kevin Mine group; the nearby Ann Mine opened in 1929 and the West Patrick Mine in 1933. The high production years during the early 1940s resulted in the expansion and more connections between the various mines pits in the group

In 1967, the Hanna Company developed the Butler Taconite operation in the project area, one of the eight taconite operations on the Mesabi Iron Range. The operation, affected by the downturn in the steel industry during the early 1980s, was closed in 1985. The plant was located close to the former BBMC headquarters, and the company town of Cooley was demolished. The Butler Tailings Basin, located southeast of TH 169 is a prominent element of the taconite operation that remains visible.

The 106 Group recommended that the area included in the former BBMC Patrick-Kevin Mine Group natural – ore mining operation and the subsequent Butler Taconite facility should be evaluated as a potential historic engineered mining system and mining landscape. They noted that the overlay of a second engineered system for mining and taconite processing complicates the evaluation of the naturally-ore mining system; the relative impact on the mining landscape by the two eras of mining would have to be assessed.

A Phase I survey is recommended to document the mining resources in the project areas that are over 45 years of age and would have direct effects from the project. The integrity of the portion of the Great Northern Railway Nashwauk-Gunn Line in the project area should be assessed; it is likely that it would be an additional NRHP-eligible segment of the larger resource for which a recommendation of eligibility has been made. The assessment of the historic significance of the individual resources, as well as the potential for the Patrick-Kevin Mine group to be a historic engineered mining complex or part of a historic mining landscape, should be included in future work.

In June 2005, the St. Paul District Corps of Engineers informed the State Historic Preservation Office that they believe that the project area has low to moderate archeological potential and very low probability of identifying a large complex archeological site in areas affected by the project. They also found that no historic buildings or structures were inventoried in the project area and, although there will be issues involving a potential historic mining landscape, most of the potentially contributing resources that might be affected by the project have been altered by mining activities that continued until 1985 and the project will not introduce elements that are out of character in a mining district. The Corps of Engineers has found that potential historic property issues would not strongly influence the selection of alternatives for the project and, if the project resulted in an adverse effect, it could be mitigated. Therefore the Corps believes that a programmatic agreement , which would be incorporated into the EIS, is the most reasonable approach to satisfy the requirements of Section 106 during this phase of the permitting process. This would be a contractual agreement to a plan for investigations, decisions and potential additional actions that would have to be implemented prior to various phases of project permitting and construction.

PROPOSED TREATMENT OF TOPIC IN EIS

The EIS will include a discussion of archeological and historical resources using information presented in the EAW. It will also include a programmatic agreement between Minnesota Steel and the Corps of Engineers St. Paul District which will define the schedule and requirements for Phase I investigations through the permitting and construction period.

<u>DESIGNATED PARKS, RECREATION AREAS, SCENIC VIEW OR TRAILS</u>

The Hill Annex Mine State Park is located immediately southwest of the project in section 16, Township 56 North, Range 23 West. Hill Annex is an historic site showing the history and impacts of the mining industry. It should not be affected by the proposed project. Mineland reclamation rules specifically allow mining in the area of parks devoted to a mining theme or history.

Iron Range Resources maps show the grade of the former DM&IR railroad to be the Greenway/Alborn Snowmobile Trail. This route is adjacent to and parallel to the south face of the tailings dam. Operation of the mine and tailings dam should not interfere with the trail. There are also grant-in-aid snowmobile trails on and near the project site. Many of these will need to be relocated.

The Mesabi Trail is a walking and bicycling trail that is planned to extend along the length of the Mesabi Range from Grand Rapids to Ely. The segment between Pengilly and Nashwauk has not been completed. The project will therefore not affect the existing trail; the proposed project does not appear to have any inherent conflicts with the completion of the link from Nashwauk to Pengilly.

A scenic overlook is located in downtown Nashwauk for viewing the Hawkins and Harrison mine pits. The Minnesota Steel facility (but not its mine pits) will be visible at a distance from this scenic overlook. The level of water in the pits that can be seen will be lowered by at least five feet; this should not impair the effect of the view.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will include a map of the snowmobile trails and Mesabi Trail and discuss the impacts of the proposed project on their use.

26. **Visual Impacts.** Will the project create adverse visual impacts during construction or operation? Such as glare from intense lights, lights visible in wilderness areas and large visible plumes from cooling towers or exhaust stacks? ☒ Yes ☐ No If yes, explain.

The proposed Minnesota Steel plant site is on a ridge 2 miles north of Highway 169 and about one half mile from the nearest residence. As a result, the plant facilities will likely be visible from the highway. In addition, the DRI plant will have two vertical shaft reactors that may be from 300 to 425 feet tall. They will be visible from Highway 169 and from houses in the vicinity. The DRI reactors will not have significant exhaust stack or plume, but will have aircraft warning lights. The DRI plant gas reformer stacks, which are typically about 160 feet tall, will have a plume in winter, as will the pellet plant stacks.

During cool, wet weather, the evaporative discharge from the DRI and steel mill cooling towers may contribute to local fogging conditions in the immediate plant vicinity. Detailed modeling with the local meteorological data set to determine the frequency of fogging conditions has not been considered necessary for this project. The distances to surrounding public roads or residences diminish the potential for adverse impacts from fogging and icing originating from the cooling towers. Fogging and icing impacts from cooling towers occur within approximately one mile from the cooling towers. Maximum impacts typically occur between 1/4 and 1/2 mile from cooling towers. At their closest distance to the cooling towers, the city of Nashwauk and Highway 169 are each approximately 2 miles from the facility. The Nashwauk cemetery near the entrance gate to the facility is slightly less than one mile from the cooling towers and could possibly be affected by fogging or icing. Highway 58 along the north side of the facility will no longer be a public road within the range of the cooling tower plumes after the plant begins construction and operation.

Fogging or icing occurs under certain meteorological conditions associated with fairly strong winds which can cause the plume to be brought to the surface near the cooling towers. Those conditions are occasional. Cooling tower design (e.g., using mist eliminators) can help minimize fogging and icing impacts.

Nearly all operations at the entire plant site will be visible from County Highway 58, except where hidden by fencing or trees.

Aside from any mining activity visible from the Hawkins overlook in Nashwauk, the public will not be able to see the mining operation from Nashwauk. Certain stockpiles may become visible or change in outline as they are built up. An existing public overlook of the Hawkins Pit in Nashwauk will continue to be usable; the view of the Hawkins pit may become more dramatic as the pit is dewatered and expanded. Mining will continue on 24-hour per day basis; site lighting will include both fixed lighting and vehicle lighting. Hauling to the top of the stockpiles may cause vehicle lighting to be visible in the surrounding landscape.

Portions of the Stage I tailings basin are adjacent to U.S. Highway 169; the basin will be visible from the highway for roughly two miles. From the exterior it will appear to be a vegetated slope; tailings disposal operations will be behind the exterior dam. Comparable impacts were experienced during the Butler Stage I operation. In later portions of tailings basin development, the vegetated exterior slopes of the reclaimed tailings basin may be visible from Swan Lake as a line on the eastern horizon.

The visual impacts discussed here are considered to be different than visibility impacts to local or Class I areas due to air emissions. Visibility impacts due to air emissions (e.g., haze) are discussed in Question 23 and will be evaluated in the air permitting process. The results of the visibility evaluation will be included in the EIS as part of the discussion of air quality impacts.

PROPOSED TREATMENT OF TOPIC IN EIS
Visual impacts are not anticipated to be significant, however limited information beyond what is provided in the EAW will be used to identify potential lighting impacts and mitigation.

27. **Compatibility with Plans and Land Use Regulations.** Is the project subject to an adopted local comprehensive plan, land use plan or regulation, or other applicable land use, water, or resource management plan of a local, regional, state or federal agency? ☒ Yes ☐ No

If yes, describe the plan, discuss its compatibility with the project and explain how any conflicts will be resolved. If no, explain.

Itasca County has a comprehensive land use plan that was adopted in May, 2000. The land use plan sets general goals for the County and for some specific sub-areas. A general county goal is to "Support the continuation and expansion of the mining industry". It appears that the project is in conformance with this goal and the activities that the plan lists to support that goal.

Most of the project area is zoned for heavy industry. There are only limited exceptions in a number of sections, primarily regarding the Alternative Tailings Basin. Some of sections 28, 29, 32 and 33 are zoned "farm residential" and "open". If this alternative is selected, these areas will require rezoning or a variance from existing zoning.

Future land use of the project area will be important given the close proximity to the City of Nashwauk. Any evaluation of potential future land use will need to consider the goals and objectives of City of Nashwauk and the Itasca County.

PROPOSED TREATMENT OF TOPIC IN EIS
Compatibility with plans will not be analyzed in the EIS.

28. **Impact on Infrastructure and Public Services.** Will new or expanded utilities, roads, other infrastructure or public services be required to serve the project? ☒ Yes ☐ No

If yes, describe the new or additional infrastructure or services needed. (Note: any infrastructure that is a connected action with respect to the project must be assessed in the EAW; see *EAW Guidelines* for details.)

The project will require construction of a gas pipeline, electric transmission lines, an auxiliary access road and additional railroad lines. A typical corridor for each of these is shown on the project location and site maps (Figure 5-2, 5-3, and 5-4) as a representation of the number of acres and type of land cover affected, but does not imply that this corridor is the selected route at this time.

The response to Question 6 (description of Connected Actions) includes a discussion of the relationship between the permitting and environmental review processes for these projects and the permitting and environmental review processes for the Minnesota Steel project. While these are being handled as separate projects by separate project proposers, the Minnesota Steel EIS will include the potential environmental impacts of these projects.

Minnesota Steel expects to purchase natural gas from a supplier that will need a 16- inch pipeline to connect the project area with a supply line near Grand Rapids. Itasca County has begun evaluating economic and environmental feasibility of alternative corridors for pipeline routes. Three routes are being considered at this time and the route for Alternative 3 is displayed on the project site maps.

Minnesota Steel intends to contract with an electric utility to supply power to the project. One or more transmission lines will be required from a major distribution line to the project area. Minnesota Power has prepared conceptual plans for connecting the project to the power grid. The route displayed on the project site maps is considered preliminary; additional design and study will occur in the route selection process conducted by the Minnesota Environmental Quality Board. The power required for the project can be provided from existing sources, from market purchases of power and from power production facilities currently planned or proposed. Any new power production facilities would not be a direct result of the Minnesota Steel project and might be built (or not built) independent of the decision on the feasibility of the Minnesota Steel project.

Itasca County has begun economic and environmental evaluation of the road access alternatives. Current conceptual plans are for a county highway to be constructed from Highway 169 to the west end of the plant site for truck deliveries to the project. County Highway 58, which runs along the north side of the plant site, will serve as major access route for employees who would enter from State Highway 65, east of the plant. County Highway 58 will be terminated at the plant site**.** Road construction will undergo separate environmental review and permitting.

Rail access will be provided for the project by connecting to existing rail lines along Highway 169. Itasca County has begun evaluation of railroad access alternatives.

Domestic sewage treatment and potable water are proposed to be supplied by the City of Nashwauk. No additional capacity is needed to serve the project, however water and sewer lines will need to be extended to serve the site.

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will include information on design and impacts of constructing a gas pipeline, water/sewer lines, electric transmission lines, auxiliary road access, and additional railroad lines.

29. **Cumulative impacts.** Minnesota Rule part 4410.1700, subpart 7, item B requires that the RGU consider the "cumulative potential effects of related or anticipated future projects" when determining the need for an environmental impact statement. Identify any past, present or reasonably foreseeable future projects that may interact with the project described in this EAW in such a way as to cause cumulative impacts. Describe the nature of the cumulative impacts and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to cumulative impacts *(or discuss each cumulative impact under appropriate item(s) elsewhere on this form).*

The following discussion and analysis was prepared using the Council on Environmental Quality handbook for considering cumulative effects under the National Environmental Policy Act (CEC, 1997) as guidance. Cumulative impacts analysis addresses the combined environmental effects of the proposed project and of past, present and reasonably foreseeable future actions. These effects are analyzed by evaluating whether the affected resource, ecosystem or human community has the capacity to accommodate additional effects. These include both direct and indirect effects on a given resource, ecosystem and human community and include actions by private and governmental bodies. Cumulative impacts may occur when similar impacts accumulate or when diverse impacts have a synergistic effect. Cumulative impacts should be analyzed over the entire life of the potential impact and not just the life of the project. Finally, cumulative impacts analysis should focus on truly meaningful effects.

INVENTORY OF POTENTIALLY CUMULATIVE EFFECTS

The first step in a cumulative impacts analysis is the identification of potential cumulative effects associated with the proposed project. General consideration of other proposed actions in the Arrowhead Region (discussed below) results in the following tabulation of potential aspects of the Minnesota Steel project that could have cumulative environmental effects:

- Air quality and visibility impairment related to mining and industrial emissions from multiple sources.
- Ecosystem acidification related to industrial plant emissions from multiple sources.
- Ecological and human health risk resulting from the bioaccumulation of mercury as related to industrial plant emissions from multiple sources.
- Wetland loss related to mine activities.
- Water flow changes and associated stream channel changes related to land form alteration, pit dewatering, and plant consumption.
- Water quality changes related to land form alteration, pit dewatering, and plant wastewater discharges.
- Fish and Wildlife habitat loss or travel corridor barriers (and potential effects on threatened or endangered wildlife) related to mining and industrial activities.
- Threatened or endangered plant species loss related to mining activities.

INVENTORY OF POTENTIALLY AFFECTED RESOURCES

The second step in cumulative impacts analysis is to inventory potentially affected resources. Cumulative impacts should be analyzed in terms of the specific resource, ecosystem and human community being affected. In addition, the cumulative impacts analysis should focus on those impacts that are significant enough to be meaningful.

The "project impact zone" and the "extent of the resource beyond zone of direct impact" can be different for each resource. For instance, the project's impact on a plant species is most likely limited to the immediate vicinity where direct or indirect impacts are great enough to cause a loss of individual plants. The extent of the plant species beyond that area would include all areas where the species is found in Minnesota. On the other hand, the project impact zone for particulate emissions to the air would likely be much larger than the immediate project area, although the extent of the resource beyond the project impact area might be defined as only northeastern Minnesota. Impacts in sensitive areas (e.g. the BWCA) must meet more stringent standards than elsewhere in the region.

The following is a general inventory of resources that potentially could be affected by the Minnesota Steel project and the extent of those resources beyond the zone of direct impact:

- Air quality in federally-administered Class I areas (e.g., BWCA, Voyageurs National Park).
- Water quality in low-buffering capacity aquatic and terrestrial ecosystems in federally administered Class I areas (e.g., BWCA, Voyageurs National Park) due to deposition of sulfates, nitrates, and mercury.
- Water quality and flow in Swan Lake and Swan River.
- Water quality in the Prairie River.
- Wetlands in the vicinity of the mine and in the Swan Lake watershed and Prairie River watershed.
- Wildlife habitat at the mine site and greater surrounding area.
- Populations of state and federal listed threatened, endangered and special concern plant species at the mine site and the related populations throughout Minnesota.
- Aquatic biota and fish in O'Brien Lake and O'Brien Creek, Oxhide Lake and Oxhide Creek, Snowball Lake and Snowball Creek and Little Sucker Lake and Sucker Creek as a portion of the Upper Mississippi basin.

It should be noted that noise impacts are not easily treated as cumulative impacts. Because of the logarithmic nature of noise measurements, a doubling of sound energy (i.e., a second equal source) only produces about a 3 dB increase in sound levels.

Therefore, for a cumulative impact to occur and cause an exceedance of noise standards, there would have to be two sources, both producing sound at levels just below the standard at the receptor of interest. In practice, noise sources are usually so different, whether in distance or magnitude, that one predominates and the other is insignificant. There are no other significant noise sources in the proposed Minnesota Steel site area.

No cumulative impacts analysis is proposed for Class II air quality impacts. Class II impact refers to the effects on air quality due to the emissions of criteria pollutants in the immediate vicinity of the project site. These impacts are modeled at the ambient air boundary of the facility (i.e., the fenceline). It is not proposed to conduct a cumulative impacts analysis for Class II air quality impacts beyond the analysis required for PSD permitting. Past and present actions will be included in the air permit application and considered in the EIS evaluation of air quality impacts. Actions that are anticipated to be included in the basic analysis include, the existing permitted modifications at Keewatin Taconite, the former operations of Butler Taconite, the existing Boswell Energy Center power plant and UPM/Blandin Paper Company.

Other Iron Range facilities such as United Taconite, MinnTac, Northshore, Ispat Inland, Hibbing Taconite, LTV Steel Mining Company (closed), Minnesota Power plants at Hibbard, Sylaskin, Taconite Harbor, and Cloquet are too distant to be considered in a Class II analysis.

If such an analysis were to be conducted, the cumulative impacts for class II areas would need to address the impacts of reasonably foreseeable future sources. In order to have meaningful impacts on Class II analysis, such future emissions would have to be large and in reasonable proximity to the Minnesota Steel facility. Reasonably foreseeable future emissions include:

- Proposed PolyMet Mining project – this facility has not yet received an emissions permit; however, its relatively low emissions and long distance from Minnesota Steel make it unlikely to have a meaningful cumulative impact on Class II areas.
- Proposed Mesabi Nugget plant– this has not received an emissions permit; however, its distance from the Minnesota Steel site make it unlikely to have a significant cumulative Class II impacts .
- Proposed Mesaba Energy Generation Plant - As described above, Excelsior Energy continues feasibility studies of its Mesaba Energy project. However, the project is considered speculative and not “reasonably foreseeable” since it has not progressed to the permitting stage and a location for the project has not been determined. If the project is found feasible and is sited near the Minnesota Steel project site, a cumulative impacts evaluation of Class II area impacts may be required.
- Proposed Laurentian Wood-Fired Generation Plants - The Laurentian Energy facilities will be relatively small and distant from the Minnesota Steel facility; they would not likely generate meaningful cumulative Class II impacts.
- Further implementation of new regulatory programs (taconite MACT, etc.). These would tend to decrease probable future impacts from existing nearby sources and would not produce meaningful cumulative effects.

Therefore, in the absence of significant, reasonably foreseeable projects located in the vicinity of the project, additional Class II analysis for impacts of future projects is not meaningful.

“OTHER ACTIONS” THAT MAY AFFECT RESOURCES

The third step in cumulative effects analysis is to inventory the other actions that may affect the resources previously listed. To the extent that a resource may be impacted by Minnesota Steel, it must be determined whether other actions or projects will affect the resource. Those “other actions” include both governmental actions and private actions (which may also have governmental approvals). The following is a list of past, present and reasonably foreseeable future actions that may have impacts on the resources listed above:

Governmental Actions

- City of Nashwauk wastewater treatment discharges to the Keewatin Taconite reservoir system and then to Hay Creek.

- City of Keewatin wastewater treatment discharges to the Keewatin Taconite reservoirs and Oxhide Diversion.
- Ongoing pumping of the Hill Annex Mine.
- Permitting of Swan Lake outlet weir and the 1985 alteration following closure of Butler Taconite.
- Logging of state and county lands in the Arrowhead Region.
- Implementation of taconite MACT standards by facilities in the Arrowhead Region.
- Implementation of the Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR) for coal-fired power plants in Minnesota.
- Implementation of the Regional Haze Rules and Best Available Retrofit Technology (BART) to reduce emissions of SO_2, NOx, and fine particles in Minnesota, adjoining states, and states found to contribute significantly to visibility impairment in the Class I areas in Minnesota.
- Implementation of Minnesota's Regional Mercury TMDL in the Swan River Watershed.
- The Laurentian Energy project is a semi-public partnership between Hibbing Public Utilities and Virginia Public Utilities to provide renewable energy to Xcel Energy. Two wood-fired boilers for power generation, less than 25 MW each, will be built at each existing facility. The project is currently proposed and has begun environmental review and permitting.
- Implementation of federal Clean Fuels regulations, such as Ultra-Low Sulfur diesel fuel.
- Future governmental actions are generally included in agency plans and budgets and can be predicted with some certainty. These include implementation of regulatory programs that will change past, present or future projects and their impact on the environment. In this area, a significant change will be the implementation of the Regional Haze Rule, including BART, the MACT standards for taconite facilities and the CAIR and CAMR for coal fired power plants. It is reasonably foreseeable that all taconite plants in northeastern Minnesota and coal fired power plants in the upper Midwest region will be required to reduce their air emissions in the coming several years.

Another program, Minnesota's proposed total maximum daily load (TMDL) for mercury, will require reductions in the emissions of mercury from the taconite industry and power generation industry over the next 30 years.

Private Actions

Past and present private actions include:

- Butler Taconite and predecessor natural ore operations; establishment, operation and closure in the Swan Lake watershed and Arrowhead Region airshed.
- Keewatin Taconite company and predecessor natural ore operations in the Swan Lake Watershed and Arrowhead Region airshed.
- Hibbing Taconite company and predecessor natural ore operations outside the Swan Lake Watershed but within the Arrowhead Regional airshed.
- Other past natural ore mining operations in the Swan Lake Watershed.
- Other taconite operations (with proposed modifications, if appropriate) located in other watersheds but in the Arrowhead Regional airshed.
- Minnesota Power Clay Boswell and Syl Laskin Energy Center operations outside the Swan River watershed but within the regional airshed.
- Minnesota Power Taconite Harbor power station operations in the Arrowhead Region airshed.
- Minnesota Power Hibbard power station operations in the Arrowhead Region airshed.
- Logging on private lands (Blandin UPM-Kummene North America and other private lands) in the Swan Lake Watershed.
- Operation of the Blandin UPM Kummene paper mill and proposed expansion.
- Shutdown of LTV Steel Mining Company furnaces in the Arrowhead Region airshed.
- North Shore Mining Company's power plant at Silver Bay
- Emission reductions in other parts of Minnesota (Xcel Energy's Metropolitan Emission Reduction Project).

Future private actions are less certain; projects may be studied for feasibility and then abandoned. A number of projects have been officially brought to the notice of the State of Minnesota and, in some cases, of the Federal government.

- Blandin UPM Kummene paper is pursuing permits for mill expansion at its Grand Rapids facility; this is also projected to roughly double pulpwood consumption.
- PolyMet Mining Company has begun environmental review and permitting of a non-ferrous mining project within the Arrowhead regional airshed.
- Mesabi Nugget Company, LLC, is currently actively pursuing permits for construction of the iron conversion project at the Cliffs Erie site; it will be located in an old mine pit near Hoyt Lakes, Minnesota. Plant Site, in the Arrowhead regional airshed.
- Cliffs Erie is currently pursuing permits for the construction and operation of a taconite pellet railroad load- out facility at the former LTV Steel Mining Company facility near Hoyt Lakes.
- Excelsior Energy Inc. of Minnetonka, MN, has been selected by the Department of Energy to receive $36 million for the development of a 531-megawatt Mesaba Energy Project in northern Minnesota. Depending on the location of the project, this proposed future action may be relevant to several cumulative impact issues. One location under consideration is near Bovey, Minnesota, about five miles west of the Minnesota Steel project. Because this proposed project has not advanced to the feasibility stage, it was not considered further for inclusion in the cumulative impacts analysis. If this project (Mesaba Energy) advances, MN Rules will require environmental review of the impacts related to Mesaba Energy.
- Additional non-ferrous mining ventures have been discussed regarding the eastern end of the Mesabi Range. These include the Teck Cominco and Birch Lake (Franconia Minerals) projects. Except for ore sample collection, neither project has commenced detailed planning activities for full-scale operations. They remain speculative at this time. Teck Cominco notified state officials in 2004 that active efforts to develop its project have been tabled indefinitely. Because neither proposed project has advanced to the feasibility stage, they were not considered further for inclusion in the cumulative impacts analysis. If either project advances, MN Rules will require the future preparation of a mandatory EIS for each project. Cumulative impacts related to these projects will be addressed at that time.

SUMMARY OF CUMULATIVE IMPACT ISSUES TO BE ADDRESSED

Given the preceding analysis steps, nine cumulative impact issues will be addressed in the EIS. Each of these issues is discussed below. Each discussion provides background on the issue, a description of the approach to evaluate the issue, and a description of the data needs to perform the analysis.

1. Class I Areas - PM_{10} Increment

Background

In contrast to Class II analysis, regional air quality can be affected by multiple sources at greater distances. Minnesota Steel is expected to trigger Prevention of Significant Deterioration (PSD) permitting for PM_{10}, NOx, SO_2, and CO. Therefore, Minnesota Steel will be required to evaluate the potential impact of these pollutants on the Class I areas.

This analysis will use NOx, SO_2 and speciated PM_{10} (coarse particulate, fine particulate, etc) data, as well as primary sulfate emissions for the project, and use the CALPUFF modeling system per FLM guidance to estimate ambient air concentrations in Class I areas within 250 kilometers of the project site. Specific details of the modeling for Class I areas will be resolved with the FLMs.

Modeling results will be summarized in a Class I areas report to be submitted to the FLMs (with state agencies receiving a copy as well) as part of the PSD permitting. Recent Class I evaluations (e.g., Mesabi Nugget and Northshore Mining Company) have identified exceedence of the 24-hour PM_{10} Significant Impact Level (SIL)[4] in the BWCAW. The FLMs have expressed concerns about exceedences of the SIL. Given the results of these previous modeling studies and the proximity of the project site to the BWCAW, Minnesota Steel will provide an assessment in the EIS of potential impacts from multiple facilities with regard to PM_{10} in Class I areas. This assessment will include an evaluation of the potential emission reductions from in-state and out-of-state sources that are likely to result from implementation of the Regional Haze Rule and the Best Available Retrofit Technology (BART) rule and the potential resulting decrease in air pollutant concentrations in Minnesota's Class I areas.

Approach to Evaluation

A semi-quantitative assessment of Class I Areas PM_{10} increment will be performed. Background information on Class I Areas PM_{10} increment in Minnesota will be summarized:

- Summary of long-range regional transport issues for $PM_{2.5}$ (fine aerosol), sulfate, and nitrate
- Summary of the IMPROVE monitoring network data for particulates (including ammonium nitrate, ammonium sulfate, coarse particulate, and elemental carbon and organic carbon) for the period of record for the Voyageurs National Park site and the BWCA site.
- Summary of the PM_{10} air concentrations available from any nearby state monitoring sites
- Summary of air modeling studies conducted to date and the available results, with particular emphasis on major source contributions of fine particulate from in-state sources and out-of-state sources (national studies, CENSARA, other state efforts)
- Summary of current and foreseeable future federal regulatory controls to $PM_{2.5}$, PM_{10}, sulfates, nitrates:
    - Implementation of the Taconite MACT standard (PM10 as a surrogate for metals);
    - Regional Haze Rule;
    - NOx SIP call (40 CFR parts 51, 72, 75, 96);
    - Clean Air Interstate Rule;
    - EPA proposed rule (Federal Register, Vol. 70, No. 35) for NOx in Class I Areas);
    - EPA "to-be" proposed rule for Best Available Retrofit Technology, BART (April 2005)
- Summary of current and foreseeable future state regulatory controls and/or actions
    - State acid rain rule and statewide SO_2 emissions cap
    - Title IV of the 1990 Clean Air Act Amendments
    - Inventory of affected MN sources
- Timeframe: Emissions projections (increases, decreases) from the proposed facilities, as well as from existing facilities subject to the various regulatory requirements, will be through the year 2020.

Estimates of current PM_{10}, SO_2, and NO_x emissions from sources in Minnesota will be summarized based on the most current emission inventory available. Emissions will be reported for major geographic areas in the state (Twin Cities, Iron Range, etc.). The trend of state-wide emissions will be assessed using existing historical emission inventory data. This analysis will cover the period of record for such data. Background monitoring data ($PM_{2.5}$) for Voyageurs National Park and Ely (Fernberg Road) will also be summarized as will PM_{10} monitoring data from nearby sites.

[4] Note: The exceedence of a SIL, by itself, does not indicate that adverse impacts will be associated with a project's emissions. The SILs were established by U.S. EPA as a threshold for decision-making with regard to potential cumulative impacts from one or more projects. A SIL is set at 4 percent of the Class I area increment. U.S. EPA's working assumption is that as long as no individual source contribution exceeds 4 percent of a Class I increment, it is unlikely that the accumulation of sources over time will exceed that increment. In other words, if all new/modified sources model impacts below the respective SILs, there is reasonable assurance that cumulative potential impacts from all new/modified sources would not exceed the available increment. The need for a cumulative analysis with regard to increment consumption is made on a case-by-case basis, taking into account numerous factors, including the level of air emissions controls for the project sources (this information provided in the project's BACT report), significance of the exceedence of a SIL, economic feasibility to install additional air emission controls, and magnitude of emissions from the project as compared to emissions from existing sources.

Cumulative impacts will be based on projections of the potential increases or reductions in SO_2, NO_x, and PM_{10} emissions from current Minnesota sources. Emission estimates from the following reasonably foreseeable actions will be included in the analysis, including:

- Existing taconite plants with proposed modifications
- Proposed Mesabi Nugget Plant
- Proposed Cliffs Erie Railroad Pellet Transfer Facility
- Proposed PolyMet Mining project
- Implementation of the Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR).
- Implementation of Taconite MACT standards
- Formal shutdown of LTV Steel Mining Company taconite furnaces
- Implementation of the Regional Haze rule with associated BART application
- Proposed Laurentian wood-fired generation plants
- Implementation of heat recoup for taconite grate-kiln cooler systems
- UPM Blandin paper mill expansion

The assessment will summarize the potential implications for PM_{10} increment in the BWCA and Voyageurs National Park. Results will be summarized in a report to be submitted to the MPCA and the EIS contractor prior to commencement of work on the EIS. Description of air emissions control technologies is expected to be a significant section of the report. The results will be verified by the MPCA, which may choose to delegate verification to the EIS contractor. Results of the cumulative analysis will be incorporated into the EIS by the contractor with guidance from the MPCA.

Data Needs for Analysis of Potential Cumulative Impacts

- Monitoring data from the IMPROVE Network for Voyageurs National Park and the BWCAW
- Air modeling studies (national, CENSARA, other state efforts)
- PM_{10}, SO_2, and NOx emission inventory data (total facility) from the MPCA for facilities of interest
- PM_{10} monitoring data for existing nearby sites
- Estimated potential emission increases from reasonably foreseeable actions

2. Ecosystem Acidification Resulting From Deposition of Air Pollutants

Background

Acid deposition is a long-range pollution transport problem caused by local, regional, national and international emissions of nitrogen oxides and sulfur dioxide. Acid deposition, has two parts: wet and dry. Wet deposition refers to acidic rain, fog, and snow. Dry deposition refers to acidic gases and particles; approximately 50 percent of acid deposition is due to dry deposition. Prevailing winds blow the compounds that cause both wet and dry acid deposition across state and national borders, and sometimes over hundreds of miles. The strength of the combined effects of wet and dry deposition depend on many factors, including how acidic the precipitation is (pH and hydrogen ion, H+), and the chemistry and buffering capacity of the aquatic and terrestrial ecosystems, including watershed vegetation and soils.

Minnesota has been a leader in the assessment of acid deposition impacts and regulation of pollutants contributing to ecosystem acidification. Acid deposition is currently regulated under Minnesota Rules through an acid deposition standard of 11 kilograms per hectare per year and a statewide SO2 emissions cap (Mn. Rules Chapter 7021) and federal rules (Title IV of the 1990 Clean Air Act Amendments and 40 CFR Parts 72 and 75). These regulations generally apply only to large electrical generating units (EGUs).

Acid deposition is an ongoing concern for states with low buffering capacity ecosystems. Most (90%+) of the acid deposition in Minnesota is due to out-of-state sources. Minnesota has low-buffering capacity lakes (typically seepage lakes with no inlets or outlets). Minnesota's terrestrial ecosystems (soils, vegetation, etc.) have been found to be less sensitive to acid deposition than the aquatic ecosystems.

Seepage and headwater lakes are found within 10 kilometers of the Minnesota Steel site. Therefore, an assessment of potential cumulative effects should be provided in Minnesota Steel's EIS for aquatic ecosystems.

Minnesota Steel's preliminary emissions estimates of pollutants from the processing plant that contribute to acid deposition include 691 tons per year (tons/yr) of SOX and 1,155 tons/yr of NOx (see Question 23 in this EAW). Because of these emissions, the FLMs will require Minnesota Steel to conduct an assessment of its estimated project emissions for potential sulfur and nitrogen deposition onto Class I areas within 250 kilometers of the project. In addition to Class I areas, acid deposition potential in other areas will be evaluated. The Class I modeling results will be included in the acid deposition cumulative impact discussion.

Approach to Evaluation

A semi-quantitative assessment of cumulative acid deposition in Minnesota will be performed. Background information on acid deposition in Minnesota will be summarized:

- Summary of the long range pollutant transport issue (National Acid Precipitation Assessment Program; NAPAP)
- Summary of Minnesota's assessments of ecosystem buffering capacity (1980 – 2000)
- Summary of Minnesota's air modeling studies of source contributions (1986)
- Summary of Minnesota regulatory controls to protect sensitive ecosystems
- Summary of current and foreseeable future federal regulatory controls
- Timeframe: Emissions projections (increases, decreases) from the proposed facilities, as well as from existing facilities subject to the various regulatory requirements, will be through the year 2020.

Trend analysis will be conducted for SO2 and NOx statewide emissions (using existing state wide emission inventory data) and for deposition monitoring data at three sites in northern Minnesota. These analyses will cover the period of record for such data and will include comparisons to the state wide emission cap and the deposition standard (11 kilograms/hectare/year) which were established to protect Minnesota's aquatic and terrestrial ecosystems.

The potential cumulative impacts will be based on projections of the potential increases or decreases in sulfate and nitrate deposition to Minnesota ecosystems from reasonably foreseeable actions:

- Existing taconite plants with proposed modifications
- Existing power plants
- Proposed Mesabi Nugget Plant
- Proposed PolyMet Mining project
- Implementation of the Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR).
- Implementation of the Regional Haze rule with associated BART application
- Shutdown of LTV Steel Mining Company taconite furnaces
- Proposed Laurentian wood-fired generation plants
- Implementation of taconite MACT standards
- Implementation of heat recoup for taconite grate-kiln cooler systems

The results of the cumulative impacts assessment will be compared to the Minnesota annual acid deposition standard which was promulgated to protect sensitive ecosystems. The assessment will summarize the potential implications for Minnesota ecosystems.

Results will be summarized in a report to be submitted to the MPCA and the EIS contractor. Description of air emissions control technologies is expected to be a significant section of the report. The results will be verified by the MPCA (this may be delegated to the EIS contractor). Results of the cumulative analysis will be incorporated into the EIS by the contractor with guidance from the MPCA.

Data Needs for Analysis of Cumulative Impacts

- Existing studies assessing Minnesota's ecosystem buffering capacity
- Existing air modeling results that identify Minnesota source and/or out-of-state contributions to deposition in Minnesota
- State air emission inventory data for SO2 and NOx emissions; 1975 to 2005
- Deposition monitoring data from the National Atmospheric Deposition Program (NADP) for Voyageurs National Park, Fernberg Road (Ely), and Wolf Ridge (Finland).

3. Mercury Deposition and Bioaccumulation in Fish

Background

Mercury emissions, deposition, and bioaccumulation in fish tissue have been the focus of researchers, state and federal regulators, and the public for more than a decade. Mercury is a long-range transport pollutant. In most areas of Minnesota, up to 90% of the mercury entering a lake or river comes from a wide variety of natural and man-made pollution sources located throughout North America and the rest of the world; 10% or less of the mercury falling on Minnesota's water is estimated to be from Minnesota sources. Conversely, most of the mercury from Minnesota's air emission sources tends to be transported outside the state. Water discharges of mercury account for less than 1% of the mercury that reaches Minnesota waters. In addition, microbial activity within aquatic and terrestrial ecosystems affects the amount of methylmercury that is available for uptake by biota. Therefore, there is not a direct relationship between Minnesota mercury air releases, the amount of mercury entering Minnesota lakes, and concentration of mercury (as methylmercury) in fish.

Air emissions of mercury in Minnesota have been addressed by the Voluntary Mercury Reduction Initiative (Minnesota Statutes, section 116.915). In 1999, the legislature allowed Minnesota businesses, in cooperation with the MPCA, to voluntarily reduce mercury emissions from a 1990 baseline by 70% by 2005. According to the MPCA's 2002 progress report to Legislature on the Mercury Reduction Program (January 2002) and the emissions data provided in the preliminary mercury TMDL (http://www.pca.state.mn.us/water/tmdl/tmdl-mercuryplan.html#statewideplan), that reduction goal has been accomplished due largely to reduction in purposeful uses of mercury in consumer products (e.g. latex paints, fungicides, etc.).

Lake sediment data, deposition monitoring data, and fish tissue data that have been collected in Minnesota since the early 1990s indicates that mercury deposition and subsequently fish tissue concentrations in Minnesota have declined since the 1970s in some areas, but have not declined in others. In order to attain water quality standards, the MPCA has recently proposed to require a 93% reduction in mercury emissions from in-state mercury air emission sources and a similar reduction from outside-of-Minnesota emission sources. The preliminary draft of the mercury TMDL contains information on mercury deposition and mercury in water and fish tissue, as well as state-wide, national and worldwide inventories.

Given Minnesota's emphasis on reducing mercury emissions and fish tissue concentrations, the fact that the proposed Minnesota Steel project will have mercury emissions, and the presence of numerous lakes in the vicinity of the project, a cumulative analysis for mercury will be provided in Minnesota Steel's EIS.

Approach to Evaluation

A semi-quantitative assessment of cumulative mercury deposition will be performed. Background information on mercury deposition in Minnesota will be summarized:

- Summary of the long range transport issue.
- Summary of studies assessing mercury deposition and bioaccumulation in fish tissue in Minnesota's aquatic ecosystems.
- Summary of air modeling results for source contributions (national, state efforts).
- Summary of state actions and the state's proposed statewide TMDL (93% reduction in MN emissions).
- Summary of current and foreseeable future federal regulatory controls.

- Timeframe: Projections of emissions increases or decreases from the proposed facilities, as well as from existing facilities subject to the various regulatory requirements, will be through the year 2020.

The assessment of potential impacts will be completed through mercury emission trend analyses using existing state wide emission inventory data and trend analyses of annual wet mercury deposition monitoring data at two sites in northern Minnesota. These analyses will cover the period of record for such data and will include comparisons to natural background.

Cumulative impacts will be based on projections of the potential increases or reductions in mercury emissions from general source categories (e.g., electric utilities, mining, products, etc). Emission estimates from reasonably foreseeable actions will be included in the analysis:

- Existing Taconite Plants w/Proposed Modifications
- Existing Power Plants w/Proposed Modifications
- Proposed Mesabi Nugget Plant
- Proposed PolyMet Mining project
- Implementation of Taconite MACT Standards
- Shutdown of LTV Steel Mining Company taconite furnaces
- UPM Blandin paper plant expansion
- Proposed Laurentian wood-fired generation plants
- Implementation of the CAIR and CAMR for coal-fired power plants
- Implementation of Minnesota's regional Mercury TMDL

Potential emissions of mercury from current and reasonably foreseeable future projects will be subject to the statewide TMDL. The implementation plan for the TMDL will specify the actions necessary to control mercury emissions so as to meet water quality standards.

Results will be summarized in a report to be submitted to the MPCA and the EIS contractor. Description of air emissions control technologies is expected to be a significant section of the report. The results will be verified by the MPCA, which may choose to delegate the verification to the EIS contractor. Results of the cumulative analysis will be incorporated into the EIS by the contractor with guidance from the MPCA.

Data Needs for Analysis of Cumulative Impacts

- Existing studies assessing mercury deposition and bioaccumulation in fish tissue Minnesota.
- Existing air modeling results that identify contributions from Minnesota and/or out-of-state emission sources to mercury deposition in Minnesota.
- Available statewide mercury emissions estimates for 1990, 2000, and 2005 from the state.
- Deposition monitoring data from the National Atmospheric Deposition Program (NADP) for the Marcell Experimental Forest (near Grand Rapids) site and the Fernberg Road (Ely) site.

4. Visibility Impairment

Impairment of visibility is caused by very small particles, including solid particles and aerosols. Like acid deposition and mercury deposition, emissions of pollutants that cause visibility impairment are generated from natural sources, as well as anthropogenic sources in Minnesota, the United States and throughout the world. Visibility impairment can be caused by direct emissions of SO2 (aerosol), primary SO4 (particulate) and elemental carbon (particulate). However, secondary formation of chemicals (e.g., ammonium sulfate and ammonium nitrate) also contributes significantly to visibility impairment. Visibility is of primary concern in the Class I areas - national parks and wilderness areas.

In addition to the regulations under PSD for Class I areas, US EPA has promulgated regulations aimed to reduce "regional haze". States have joined regional planning organizations or RPOs to develop state budgets for pollutants leading to the formation of fine particles, and to require states to develop state implementation plans (SIPs) by 2008 to reduce emissions to within those budgets.

Minnesota is a member of the central states RPO called CENRAP. However, because it borders two other RPOs – the Midwest RPO to the east and the western RPO (WRAP) to the west, inventories of emission sources in Minnesota are included in all three RPOs.

Visibility monitoring is conducted in Minnesota's Class I areas, Voyageurs National Park and Boundary Waters Canoe Area Wilderness (BWCA), as part of the IMPROVE network.

Given the proximity of the proposed facility to the BWCA, as well as the close proximity of other known projects to the BWCA, an assessment of potential cumulative visibility impacts will be included in Minnesota Steel's EIS, taking into account the planned government actions to reduce regional haze and improve visibility in the Class I areas.

Due to the long-range transport of pollutants that affect visibility, the federal regulations intended to improve visibility in the Class I areas will also result in improvements to visibility in Class II areas.

Approach to Evaluation

A semi-quantitative assessment of cumulative visibility impacts will be performed. Because of the federal regulations governing visibility, the assessment will focus on Minnesota's Class I areas. Background information on visibility pollution in Minnesota will be summarized:

- Summary of long range transport issue.
- Summary of IMPROVE monitoring network in Voyageurs Nat. Park and Boundary Waters Canoe Area Wilderness.
- Summary of air modeling results for source contributions (national, CENSARA, other state efforts).
- Summary of current and foreseeable future federal regulatory controls.
- Timeframe: Projections of increases or decreases in emissions from the proposed facilities, as well as from existing facilities subject to the various regulatory requirements, will be through the year 2020.

The assessment of potential impacts will be completed through statewide SO2, NOx, and PM10 emission trend analyses using existing statewide emission inventory data (listing of sources and ton/yr emissions). Trend analysis will provide breakout of emissions by geographic area of the state (Twin Cities, Iron Range, etc.) In addition, a trend analysis of background monitoring data from Voyageurs National Park and Ely (Fernberg Road) will be provided, including plots of light extinction and other pertinent parameters, depending on data availability.

Cumulative impacts will be based on projections on the potential increases in SO2 and NOx emissions in Minnesota from current and reasonably foreseeable actions. Emission estimates from the following past, current and reasonably foreseeable actions will be included in the analysis:

- Existing taconite plants with proposed modifications
- Proposed Mesabi Nugget Plant
- Implementation of Taconite MACT standards
- Proposed PolyMet Mining project
- Proposed Laurentian wood-burning generation facilities
- UPM Blandin paper mill expansion
- Shutdown of LTV Steel Mining Company taconite furnaces
- Implementation of the CAIR and CAMR for coal-fired power plants
- Emission reductions in other parts of Minnesota (Metropolitan Emission Reduction Project)
- Implementation of federal Clean Fuels regulations, such as Ultra-Low Sulfur diesel fuel

Results will be summarized in a report to be submitted to the MPCA and the EIS contractor. Description of air emissions control technologies is expected to be a significant section of the report. The results will be verified by the MPCA, which may choose to delegate verification to the EIS contractor. Results of the cumulative analysis will be incorporated into the EIS by the contractor with guidance from the MPCA.

Data Needs for Analysis of Cumulative Impacts

- IMPROVE Network monitoring data for Voyageurs National Park and the BWCAW
- Existing studies assessing cumulative visibility impacts in Minnesota
- Existing air modeling that identifies contributions from Minnesota sources
- State emission inventory data pertaining to SO2, NOx, and PM10

5. Loss of Threatened and Endangered Plant Species

Background

Minnesota's Endangered Species Rules (Parts 6212.1800 to 6212.2300) impose a variety of restrictions, a permit program, and several exemptions pertaining to species designated as endangered or threatened. The federal Endangered Species Act of 1973, as amended (16 USC 1531 - 1544) requires the U.S. Department of the Interior to identify species as endangered or threatened according to a separate set of definitions, and imposes a separate set of restrictions pertaining to those species.

Several definitions apply to Minnesota's program for protection of rare plants:

- A species is considered **endangered** if the species is threatened with extinction throughout all or a significant portion of its range within Minnesota.
- A species is considered **threatened** if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota.
- A species is considered a **species of special concern** if, although the species is not endangered or threatened, it is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its status. Species on the periphery of their range that are not listed as threatened may be included in this category along with those species that were once threatened or endangered but now have increasing or protected, stable populations. Species of special concern are not protected by Minnesota's Endangered Species Statute or the associated Rules.

It is assumed that the development and operation of the project will result in the taking of a limited number of special concern species plants and at least one state-listed threatened or endangered species. Therefore, a cumulative impacts analysis will be performed to assess the cumulative loss of those specific species populations.

Approach to Evaluation

A semi-quantitative analysis of cumulative impacts will be performed. Because the MN DNR is charged with administering the program to protect state-listed threatened and endangered species and managing species with the potential to become threatened or endangered within the state of Minnesota, the entire state will be defined as the geographic boundary for analysis. While the range of most of the potentially affected species extends beyond the state boundary, the regulatory program does not, and it would be difficult to determine "truly meaningful effects" within the species natural ranges that extend into other states and Canada. The species that will be addressed in the analysis are listed in Table 29-1.

Table 29-1
Rare Species Present Within or Near the Minnesota Steel Site

Common Name	Scientific Name	State Status[1]	Minnesota Steel Observations	Approximate # of Individuals	Habitat where found
Pale moonwort	*Botrychium pallidum*	E	1 population	4	Former tailings basin
Ternate grapefern	*Botrychium rugulosum (=ternatum)*	T	1 population	1	Former tailings basin
Least grapefern	*Botrychium simplex*	SC	7 populations	~950	Full to shady exposure, edge of alder thicket, forest roads, in former tailings basins and stockpiles
Prairie moonwort	*Botrychium campestre*	SC	2 populations	23	Disturbed mine areas, edge of trail in alder thickets
Matricary grapefern	*Botrychium matricariifolium*	T	4 populations (not all populations recorded)	55+ (2 populations not enumerated)	Openings in second-growth forest
Tubercled rein-orchid	*Platanthera flava*	E	3 populations	148 +	Moist meadow and shrub carr in tailings basin, moist quaking aspen stand
Clustered bur-reed (floating marsh marigold)	*Sparganium glomeratum*	SC	1 populations	10	Shallow water at edge of pond

[1] E - Endangered, T - Threatened, SC - Species of Concern, T - Tracked

The life history of each species will be described including what is known about their preferred habitats, the role of disturbance in their life history, range, sensitivity to stresses, and the current level of understanding of the species. This characterization will differentiate between pioneering species and those that are part of mature communities.

Species losses from the following reasonably foreseeable actions will be included in the analysis as forecasted for 27 years consistent with the Minnesota Steel projection of 2 years of construction, 20 years of operation and 5 years of closure:

- Proposed PolyMet mine
- Proposed Ispat Inland Mine Pits
- Proposed Cliffs Erie pellet railroad loading project
- Proposed Mesabi Nugget Project

Losses from other projects with the potential to affect the species of interest will also be included in the analysis if the necessary species population information is available at the time of the analysis and can be provided by MN DNR.

The past projects will include projects for which the MN DNR has issued takings permits for the species of interest.

Through compilation of known records of each species within the state from the Natural Heritage Information System, a distribution map for each species will be prepared. The data will be compiled to summarize the number of known populations, approximate numbers of plants and locations. Takings permit information will be analyzed to determine the extent of past losses. The baseline condition will also include a description of how land use conditions affecting the various species have changed over time and how they are likely to change in the future; both with and without the proposed projects.

Impacts related to past, present, and reasonably foreseeable future impacts be evaluated through a semi-quantitative summary of number of populations and individuals of each species that may be affected and the magnitude of those effects based on the knowledge of the species within the state. This evaluation will include determining whether the various species are particularly vulnerable to decline. The "magnitude" of the effects will be evaluated within the context of the state, the affected region, and the MN DNR regulatory program.

Data Needs for Analysis of Cumulative Impacts

- Natural Heritage Information System records for the potentially affected species
- Takings permit information from throughout the state for the potentially affected species
- Life history information for the potentially affected species
- Specific threatened and endangered species survey information for reasonably foreseeable future projects
- Land cover and habitat characteristics for the proposed project site(s) before the proposed project and the likely land cover and habitats that will be present after the project is complete

6. Loss of Wetlands

The Minnesota Wetland Conservation Act Rules (Minnesota Rules Chapter 8420) regulate the draining, filling, and excavating of wetland resources to maintain no net loss. The rules include a permit program to allow for unavoidable wetland impacts requiring replacement of lost wetland resources at ratios ranging from 1:1 to 1.5:1. Section 404 of the Clean Water Act regulates the discharge of dredged or fill material to waters of the U.S., which includes wetlands hydraulically connected to navigable waters or interstate waters. The permit program includes provisions for allowing unavoidable wetland impacts that must be mitigated at ratios ranging from 1:1 to 1.5:1.

The development and operation of the plant, mine and tailings basin will result in the unavoidable loss of wetland resources. Therefore, an analysis will be performed to assess the cumulative loss of those specific wetlands and the past and projected loss of other wetlands in the upper Swan River watersheds.

Approach to Evaluation

A semi-quantitative analysis of cumulative impacts to wetlands will be performed. Because several of the primary functions performed by wetlands are directly related to watershed processes, the analysis will be performed on a watershed basis. The geographic area of analysis will be the upper Swan River watershed including Swan Lake and tributary watersheds, about 81.5 square miles. Historic activities within the upper Swan River watershed that have affected wetland resources are primarily mining activities and urban development over the last one hundred years. The remainder and majority of the watershed have seen limited disturbance and loss of wetlands. The baseline condition for wetland resources will be established using the following approach.

The National Wetland Inventory data will be used to help establish the baseline wetland condition in the undisturbed areas of the watershed since it is the best data representing the extent of wetland resources in the upper Swan River watershed. In the areas of the watershed that have been significantly altered, wetlands will be mapped and classified to the extent feasible using a number of historic data resources layered in a geographic information system including:

- 1930's aerial photographs
- Original U.S. Geological Survey 7.5 minute quadrangle topography maps from the early 1950's, prior to the onset of taconite mining activities.
- MN DNR GIS data that incorporates notes from the original survey of the area and includes detailed wetland vegetation information.

The baseline condition will also include a description of how conditions affecting wetlands have changed over time and how they are likely to change in the future; both with and without the proposed projects.

A similar wetland mapping effort may be conducted to establish wetland conditions at an interim point in time, (e.g., 1970) to help track trends in wetland loss.

The next step will be to prepare a mapping of wetland resources as they exist at the present time, before the start of any further projects in the upper Swan River watershed. This wetland mapping will be prepared using information from the National Wetland Inventory mapping and from site-specific wetland surveys that have been conducted within the areas of the upper Swan River watershed. This wetland mapping will be compared to the historic wetland (baseline) mapping to quantify the effects of past activities on wetland resources within the analysis area.

Wetland losses from the following reasonably foreseeable action in the upper Swan River watershed will be included in the analysis as forecasted for 27 years, consistent with Minnesota Steel's projection of 2-years of construction, 20 years of operation and 5 years of closure:

- Future expansion of Keewatin Taconite's pits as described in the Permit to Mine.

Losses from other proposed projects with the potential to affect wetland resources in the upper Swan River watershed will also be included in the analysis if wetland impact information is available at the time of the analysis.

It is not proposed to analyze cumulative wetland losses in the upper Prairie River Watershed. In contrast to the upper Swan River, the upper Prairie River watershed is largely undeveloped and has not experienced significant past industrial or mining projects. Minnesota Steel is not aware of other reasonably foreseeable projects that in the watershed that would significantly affect wetlands. Therefore, cumulative effects analysis of the Prairie River would not add to the basic evaluations of the current project that will be completed in the EIS.

Impacts related to past, present, and reasonably foreseeable future actions will be evaluated through a quantitative summary of the number of acres of various wetland types that may be have been affected in the past and may be affected in the future and the magnitude of those effects within the watershed. Trends that may be discernible from evaluating the data will be evaluated. This evaluation will include determining whether various wetland types are particularly vulnerable to rapid degradation. The "magnitude" of the effects will be evaluated within the context of the overall wetland resources within the watershed.

Alternative configurations of the project will be evaluated to determine if the projected impacts can be minimized. Unavoidable wetland impacts will be mitigated in accordance with the state and federal wetland permitting programs.

Data Needs for Analysis of Cumulative Impacts

- National Wetland Inventory maps for the Swan River watershed
- 1930's, 1970's and most recent good quality aerial photographs
- Original U.S. Geological Survey 7.5 minute quadrangle topography maps from the early 1950's, prior to the onset of significant mining activities
- MDNR GIS data that incorporates notes from the original survey of the area and includes detailed wetland vegetation information
- Wetland inventories from past and proposed projects within the watershed
- Future mine plans for Keewatin Taconite
- Wetland mitigation plans for the past and reasonably foreseeable future projects
- Evaluation of proposed wetland losses from the Minnesota Steel project. This must include an understanding by Minnesota Steel and the agencies regarding the implications of the 1968 land exchange agreement.

7. Wildlife Habitat

Background

Since the state was established (1858), Minnesota's ecosystems have all been affected by both human and natural disturbances. The drastic reduction in native prairie, which has been converted to row-crop agriculture, is a well-known example of human disturbances. Much of the forested areas of the state are still forested and appear to have been less impacted by disturbance in that they remain forested with native species. However, both human activities (e.g., mining, urbanization and logging) and natural disturbances (e.g., fire, windstorms, and insect infestation) have altered the character of the original ecosystems in the Arrowhead Region.

Assessment of the cumulative impacts of any single human activity such as mining in the forested northern areas of the state is therefore difficult because that specific impact must be separated from all the other human and natural disturbances that have occurred. An assessment of cumulative impacts on wildlife and wildlife habitats is not only constrained by the available data, as are all such analyses, but by the interacting effects of human and natural disturbances.

In addition to general habitat loss, mining activity on the Iron Range has created a unique, but unnatural, impact on the landscape in the Arrowhead Region. The locations and orientation of mineralized deposits, and thus the mining activities, are in a relatively narrow, linear band from Ely to Grand Rapids. The length and extent of 125 years of mining activity and associated infrastructure (Shear-walled mine pits, tailings piles, haul and railroads, tailings basins, and associated structural development) in its' entirety could potentially cause a "landscape barrier" which precludes travel corridors. These landscape barriers may have impacts on dispersal, migration, and/or seasonal movements of large mammals, small to medium mammals, and reptiles/amphibians.

Each additional lost travel corridor through the Iron Range could potentially push this cumulative impact over a threshold. Once beyond that threshold, these species' normal/ historic movement and dispersal patterns could be altered forever. Negative consequences would be both short and long term, including effects on genetic distribution, food procurement, summer/winter range accessibility, annual dispersal and other yet unknown or unforeseen parameters.

This landscape impact is not limited to wildlife. The Iron Range human population will be both impacted by, and in direct competition for, the remaining available travel corridors on the landscape. This remaining space is, or will be, needed for our communities and infrastructure, too. Planned mining development is the key to providing for a sustainable landscape on the Iron Range.

Approach to Evaluation

The approach to evaluation of habitat loss and barriers will be to choose an appropriate analysis area, a baseline time and condition and then: 1) assess the cumulative disturbance (habitat loss) of past and current mining and associated infrastructure development on that baseline condition; and 2) assess the presence of landscape barriers of past, current and proposed future actions on dispersal, migration, and/or seasonal movements of large mammals, small to medium mammals, and reptiles/amphibians. Using other available information, a qualitative description of the habitat in areas disturbed by mining and habitat changes that were not associated with mining (e.g., logging, fire, windstorms, and insect infestation) will also be provided.

Marschner's map of the original vegetation of Minnesota (see Heinselman, 1975) will be used to define the baseline vegetation condition. This map was compiled from the U.S. General Land Office Survey Notes (GLO). This map is based on field notes of the GLO surveyors, who conducted the original land surveys of Minnesota during the period 1850 to 1905. It was drafted at a 1:500,000 scale. Marshner mapped 16 vegetative/ecosystem categories, ranging from marshes to pine groves. The map therefore is the best representation of the original ecosystems of Minnesota before the impact of European man.

Aerial photography will also be used to identify increases in landscape barriers. Early aerial photography (~1930's) will be compared with recent aerial photographs to identify and illustrate the trends in landscape barriers. It is reasonable to assume that prior to human disturbance habitat barriers were minimal with respect to the current condition and no additional effort will be given to characterization of baseline conditions for evaluation of habitat barriers.

The quality of historical records generally is directly proportional to the area considered (i.e., the average of small-scale errors tends toward zero as increasingly large areas are considered). The geographic boundary for impact analysis of habitat loss will therefore be necessarily large: the Arrowhead Region including the counties Cook, Lake, St. Louis, Carleton, Aitkin, Itasca, and Koochiching.

For finer discrimination, albeit with more potential error, cumulative impacts due to barriers will be focused on habitats within a proximity of the iron formation that are likely to impact wildlife that use those habitats. A buffer of 15 miles around the iron range will be used to focus this evaluation. Travel corridors that exist as part of the current condition will be identified and compared with the reasonable foreseeable condition to locate opportunities for maintaining travel corridors.

The actual acres of the various ecosystems mapped by Marshner (16 categories, ranging from marshes to pine groves) that have been disturbed by past and current mining and infrastructure development will be tabulated as will the relative loss by ecosystem category. These tabulations will also be summarized by ecological subsection. The area disturbed will be derived either from the "Forested Areas" map from the Manitoba Remote Sensing Centre (16 classes, including Urban/Industrial, Gravel Pits and Open Mines, and Roads and Improved Trails and Rail Lines), 2003 Mine Features GIS mapping layer available from MDNR, or if those map layers are not suitable, then from the "1990 Census of the Land" (9 categories including Urban and rural development and Mining). A similar assessment will be carried out overlaying a GIS layer of the projected cumulative disturbance 30 years in the future (total time of construction, operation and closure of current mining proposals) as related to the following proposed future actions:

- Proposed PolyMet Mine
- Proposed Mesabi Nugget Plant
- Proposed Cliffs Erie Railroad Pellet Transfer Facility
- Proposed MSI DRI/Steel Plant
- Future mining plans for existing taconite operations
- Proposed Mesaba Energy power generation station

An interpretation of the extent of habitat barriers will be performed for small-and-medium sized mammals, large mammals, and reptiles/amphibians. In addition, an interpretation of habitat loss will be performed for populations of gray wolf, Canada lynx and bald eagle (species listed as threatened by U.S. Department of the Interior). All of these assessments will be qualitative and will be informed by previously completed studies in northern Minnesota (see below).

Previous assessments will be used to provide perspective on those changes in ecosystems that are associated with the cumulative effects of mining in contrast to those associated with other human and natural disturbances (e.g., logging, fire, windstorms, and insect infestations). These assessments were not specifically targeted on the mining areas of the state, but instead considered either the entire forested area of the state or some sub-area in northern Minnesota. The following assessments will be reviewed to provide a brief qualitative perspective on ecosystem changes not related to mining:

- Friedman, S. K. 2001. Landscape scale forest composition and spatial structure: A comparison of the presettlement General Land Office Survey and the 1990 forest inventory in northeastern Minnesota. Ph.D. thesis, University of Minnesota, St. Paul. Friedman reconstructed the presettlement forest vegetation in northeastern Minnesota using General Land Office Survey Records and assessed change in this forest following the introduction of logging and the suppression of fire.

- Minnesota Generic Environmental Impact Statement Study on Timber Harvesting and Forest Management in Minnesota (GEIS). The GEIS analyzed impacts resulting from timber harvesting and associated management activities in Minnesota, such as logging, reforestation, and forest road construction. Four sections of the GEIS may be useful in describing forest change not related to mining, including: Section 5.2.1 Forest Area and Cover Type Abundance, Section 5.2.4 Forest Fragmentation, Section 5.6.1 Forest Resources - Extent, Composition, and Condition, and Section 5.7.4 Cumulative Unmitigated Significant Impacts.

- Minnesota Forest Resource Council (MFRC) Landscape Project. The MFRC Landscape Project is a landscape level program and coordination effort. As part of the Project, a number of reports have been generated that may be used in this evaluation of cumulative impacts. All reports are available from the MFRC website http://www.frc.state.mn.us/Info/MFRCdocs.html, and include:

  - Changes in disturbance frequency, age and patch structure from pre-European settlement to the present in north central and northeastern Minnesota. LT-1203a
  - Contemporary forest composition and spatial patterns of north central and northeastern Minnesota: An Assessment using 1990s LANDSAT data (accompanying maps/plates). LT-1203b
  - Changes in forest spatial patterns from the 1930s to the present in north central and northeastern Minnesota: An analysis of historic and recent air photos (accompanying maps/plates). LT-1203c
  - Potential future landscape change on the Nashwauk Uplands in northeastern Minnesota: an examination of alternative management scenarios using LANDIS. LT-1203d
  - Background paper: relationships between forest spatial patterns and plant and animal species in northern Minnesota (Report) (Appendices). LT-1203f
  - Forest Plan Revision Final Environmental Impact Statement for Chippewa and Superior National Forests. As part of their comprehensive planning process, the U.S. Forest Service developed an Environmental Impact Statement that discussed changes in forest conditions with time. Appendix H is a cumulative review that is most relevant. This document can be found at http://www.superiornationalforest.org/analyses/2004Plan/feis/index.shtml.

Data Needs for Analysis of Cumulative Impacts

- Marschner's map of the original vegetation of Minnesota – available from the DDNR Data Deli (http://maps.dnr.state.mn.us/deli/)
- The land cover map "Forested areas" from the Manitoba Remote Sensing Centre – available from the Minnesota Land Management Information Center (http://www.lmic.state.mn.us/chouse/land_use_comparison.html)
- The land cover map "1990s Census of the Land" – available from the Minnesota Land Management Information Center
- The map: "Ecological Subsections of Minnesota" – – available from the DDNR Data Deli
- 2003 Mine Features GIS mapping layer available from MDNR
- In addition, the reports cited above (Friedman, GIES, MFRC, and U.S. Forest Service) are necessary and available as noted.
- Early aerial photographs (~1930's), and recent aerial photographs (2004).

Friedman, S. K. 2001. Landscape scale forest composition and spatial structure: A comparison of the presettlement General Land Office Survey and the 1990 forest inventory in northeastern Minnesota. Ph.D. thesis, University of Minnesota, St. Paul.

Heinselman, M.L. 1975. Interpretation of Francis J. Marschner's Map of the Original Vegetation of Minnesota. USDA Forest Service, North Central Forest Experiment Station, St. Paul, MN. Available from: MDNR - Division of Forestry's digitized GIS layer of Marschner's map.

8. Aquatic Habitat and Fisheries

Background: Potential loss of aquatic habitat and fisheries may occur as a result of hydrologic alterations, water quality degradation and increased erosion and associated sedimentation. Additionally, impacts could occur from chemical (water quality, temperature, etc.) or physical barriers that exert a biological effect constraining dispersal, movement or foraging. For example significant increases in streamflow may change channel stability, eroding banks and increasing sediment load, inundating downstream riffle habitats and affecting invertebrate productivity. These changes can subsequently affect the species diversity and growth of sport and non-sport fish.

Watersheds across the iron range have experienced significant perturbations from mining, logging, transportation and other construction projects (residential and commercial development). Watersheds have been severed and natural drainage patterns have been affected. The cumulative impacts to stream geomorphological processes and subsequent effects to aquatic habitat and fisheries have been substantial. Understanding the potential for further impacts is essential to develop adequate mitigation plans to provide sustainable resources into the future.

Approach to Evaluation

Results from the proposed cumulative effects analysis of water quality and water flow changes and associated stream channel changes will be used to evaluate cumulative effects to aquatic habitat and fisheries. Any significant impacts identified in these analyses will be considered with respect to chemical or physical barriers that affect aquatic ecosystems. No additional past, present and reasonably foreseeable actions will be included for this cumulative effects analysis, besides the actions that are included in the water quality, water flow and associated stream channel change analysis. The geographic scope of this analysis will also duplicate that of the water quality, water flow and associated stream channel changes analyses.

Data Needs for Analysis of Cumulative Impacts

- Information on affected aquatic habitats and fisheries that will be developed as part of the project specific impact analysis of the EIS.
- Conclusions from water quality cumulative effects analysis.
- Conclusions from water flow and associated stream channel changes cumulative effects analysis.

9. Streamflow and Lake Level Changes

Background

Cumulative impacts to the physical character of streams and lakes can occur from increases or decreases in flow or changes in the pattern of flow. The causes can include both point discharges (e.g., mine dewatering discharges) and changes in watershed runoff caused by land use changes (e.g., timber harvest). The impacts of flow changes can include erosion, sedimentation, low flow conditions, and high velocities resulting in flushing of aquatic life. Changes in frequency of bankfull flow can cause stream degradation. Changes to streams may accumulate over time, even for non-contemporaneous impacts if, for example, a stream is eroded and degraded by one event and then further eroded by a second event.

Flow impacts to streams and lakes are regulated under the MNDNR's program for appropriations of water and for work in public waters. Physical impacts to wetlands are also regulated by the Corps of Engineers, the MNDNR and the MPCA.

Minnesota Steel will have point discharges of industrial wastewater to Oxhide Lake (from pit dewatering) and to O'Brien Lake (from seepage and intermittent discharges from the Stage I Tailings Basin).

If the Alternative Tailings Basin is chosen, the discharge would be to Sucker Brook, rather than to O'Brien Lake. In this case, the discharges to Sucker Brook would be expected to be relatively small in volume. The intermittent process water discharges from the tailings basin can be timed to coincide with the most appropriate flow conditions in Sucker Brook. Other changes to the Sucker Brook and the Prairie River that might be cumulative are limited to forest harvesting and the impacts of rural residential development. Again, these are relatively small impacts. Therefore, the possibility of significant impacts to Sucker Brook and the Prairie River via either direct discharge or cumulative impacts of discharge (including Minnesota Steel) is believed to be small.

Minnesota Steel's discharges to the upper Swan River (including tailings basin discharge and mine dewatering) are expected to be larger and not capable of being delayed because long-term storage of the mine dewatering discharge would require an impracticably large reservoir. In addition, Minnesota Steel will appropriate water for the processing plant from mine pits that now discharge to Oxhide Creek, raising the possibility of increases in discharge during wet weather and decreases in discharge during dry weather. Short-term peak stormwater discharges from the plant site and stockpile areas will be mitigated by design of sedimentation and treatment basins to limit peak flows to approximate pre-development flows and by storage and sedimentation of the runoff in Pits 1 and 2 prior to discharge. During reclamation, there will be a period of time when the Pits 5, 6 and 1 and 2 will be filling with water and the flow to the upper Swan River will be reduced as water accumulates in the pits. Therefore, the cumulative impact of greater concern is the long-term flow regime of the Swan Lake and its tributaries, including changes to the duration and frequency of exceedence of the bankfull flow.

Approach to Evaluation

A quantitative assessment of cumulative impacts due to changes in flow will be performed for the upper Swan River (including Swan Lake).

Evaluation of hydrologic changes could be done with two major types of models: Changes in short-term flow patterns (e.g., storm runoff) are typically analyzed using hydrologic simulations models such as TR-20, HEC-1 (now HEC/HMS) or SWMM. Long-term flow patterns are most readily analyzed using models such as WATBUD, SWMM (in continuous simulation mode) or the Meyer model. As mentioned above, the changes to the long-term flow regime are more likely to have impacts so the latter class of models would be most applicable.

Based on the land use and land cover data from the cumulative impacts studies for wildlife and wetlands, a pre-settlement hydrologic model can be created. Direct calibration of this model will not be possible; the only readily available historic data is U.S.G.S. gauging data from the years 1964 to 1990. This period already includes significant disturbance of natural watershed conditions; by this time mining and timber harvesting activities already had occurred. The model will be evaluated for reasonableness by comparison with reference watersheds that are largely undisturbed. The model will then be modified and be calibrated to recent flow gauging data since closure of Butler Taconite in 1985. This will include the effects of past and present actions (through 1990), including :

- Existing Butler Taconite pits and preceding natural ore pits. Modification of land use (including wetland loss) by past mining practices within the upper Swan River watershed.
- Operation of Keewatin Taconite pits and tailings basins and predecessor natural ore mining operations.
- Construction and operation of the Swan Lake weir.
- Typical timber harvest activities on county and private lands.
- Existing runoff from the development of Cities of Nashwauk and Keewatin, including operation of wastewater treatment plants.

The hydrologic models will be modified to include actions since the date of the monitoring and potential future actions including:

- Minnesota Steel discharges to upper Swan River.
- Minnesota Steel appropriations for process water and stream augmentation from Pits 1 and 2.

- Long-term flow management of Minnesota Steel's pits during and after filling of pits.
- Implementation of the Regional Mercury TMDL.
- Changes in runoff quantity due to future development of the cities of Keewatin and Nashwauk.
- Any reasonably foreseeable changes to discharges from Nashwauk and Keewatin POTW's due to development and/or treatment system changes.
- Any potential changes in water discharge from Keewatin Taconite discharges in the upper Swan River watershed.
- Any reasonably foreseeable changes to timber harvest activities on state and county lands and private lands.

The threshold of significance for this cumulative impact assessment for streams will be the likelihood of major change in stream morphology as defined by the Rosgen classification method or other applicable method (Rosgen, 1994). This analysis will be based on stream reconnaissance completed in 2005 by Minnesota Steel as a base condition which will then be modified by predicted changes in streamflow.

The threshold for evaluation of cumulative impacts to Swan Lake will be significant changes to the range or frequency of high and/or low-water conditions in the lake as determined by the annual maximum and minimum stage-probability relationships for the lake.

Data Needs for Analysis of Cumulative Impacts

- Flow data for Swan River at or above Swan Lake outlet
- Lake level data for Swan Lake
- Discharge data for Nashwauk and Keewatin POTW's
- Discharge data for Butler Taconite and LTV Steel Mining Company
- Historic air photos or GIS coverages showing modification of land use (including wetland loss) by past mining practices within the upper Swan River watershed
- Discharge data from Keewatin Taconite and evaluation of possibility of changes to Keewatin Taconite discharges in future
- Data on typical timber harvest activities, state and county lands and private lands.
- Estimates of existing and future land use for the Cities of Nashwauk and Keewatin
- Estimates of future Minnesota Steel discharges from mine pits and tailings basins, during project development, operation and closure, including long-term flow management of pits during and after filling of pits.

10. Water Quality Changes

Background

Cumulative water quality impacts can occur from point or non-point discharges of pollutants to a given water. For most water bodies, cumulative impacts occur through simultaneous or near-simultaneous discharges that are in reasonable geographic proximity. Accumulation of pollutants in sediments is an exception to this generalization. Point discharges of industrial or municipal wastewater are regulated under the MPCA's NPDES permit program. Non-point discharges above natural background levels occur when land use changes increase area export of pollutants. In the project vicinity, these changes include filling of wetlands and construction of mining and facilities and urban development that may produce lower-quality runoff. Impacts of both point and non-point discharges can be mitigated by treatment.

Minnesota Steel will have point discharges of wastewater to Oxhide Lake (from pit dewatering) and to O'Brien Lake and O'Brien Creek (from intermittent releases from the tailings basin).

If the Alternative Tailings Basin is chosen, the discharge would be to Sucker Brook, rather than to O'Brien Lake. Sucker Brook and its immediately downstream tributaries do not have significant past industrial or urban development; aside from timber harvest, which is a temporary and largely reversible impact, there are no past or present actions that justify evaluation.

In addition, there are no known or reasonably foreseeable future actions to the Sucker Brook watershed. Therefore, the possibility of significant cumulative impacts to Sucker Brook and the Prairie River via either direct discharge or cumulative impacts of discharge (including Minnesota Steel) is believed to be small. This indicates that analyzing only the impacts of Minnesota Steel on Sucker Brook will adequately describe all impacts.

Approach to Evaluation

A quantitative assessment of cumulative water quality impacts will be performed for the Upper Swan River (including Swan Lake). Minnesota Steel's process water will be managed so that any intermittent discharge from the basin will meet chronic aquatic toxicity-based standards but levels of dissolved solids, hardness, chlorides and sulfate and possibly some metals such as manganese may be elevated above natural background levels. Other common pollutants such as BOD, bacteria and suspended solids are not expected to be present in significant quantities in the discharges. The actual construction of the Minnesota Steel facility can be expected to generate sediment but this impact is readily mitigated by sedimentation and will be of short duration. Therefore, this impact is not proposed as a suitable subject for cumulative impact analysis.

A number of models are available to analyze generation, fate and transport of pollutants in streams. Models recently used in Minnesota EIS's and NPDES permitting procedures include HSPF and QUAL2E and dilution models. Because dissolved solids, hardness, chlorides, sulfates and metals are largely conservative substances and a loss of these substances is not expected over the long term, an initial practical evaluation could be conducted using a conservative dilution model of the stream water quality. If this indicates that potential cumulative impacts may be experienced, a more comprehensive model could then be applied. It appears likely that the initial modeling phase will be required for the NPDES permit and will be available to the EIS contractor. In this phase, Oxhide Lake, Oxhide Creek and Swan Lake will be modeled using the hydrologic loading of water from tributary subwatersheds (see previous discussion of cumulative impacts of flow changes) for dry, normal and wet conditions. The background loading of pollutants from the watershed will be estimated based on historic and recent monitoring results. For each hydrologic scenario, loading from the Minnesota Steel facility will be included and the resultant concentrations will be calculated as a simple dilution model. Upstream additions of pollutants from other discharges will be evaluated for past, present and future actions by other parties.

The models will first be calibrated to existing conditions monitoring data from 1999 through 2001 and 2005. This will inherently include the effects of past and present actions (through the date of monitoring) including:

- Existing discharges from Nashwauk and Keewatin POTW's
- Residual impacts of past tailings disposal by Butler Taconite and predecessor operations.
- Other existing sources within the former Butler Taconite company (e.g. waste rock piles tributary to Swan Lake)
- Modification of land use (including wetland loss) by past mining practices within the upper Swan River watershed above Swan Lake
- Typical timber harvest activities on state and county lands and private lands
- Existing rural and residential development in the Swan Lake watershed
- Existing discharges (overflow) from natural ore and taconite pits
- Existing discharge from Keewatin Taconite
- Existing runoff from the development of the Cities of Nashwauk and Keewatin

The water quality models will than be modified to include actions since the date of the monitoring and potential future actions including:

- Minnesota Steel pit and tailings basin discharges
- Implementation of the Regional Mercury TMDL
- Any reasonably foreseeable changes to discharges from Nashwauk and Keewatin POTW's due to development and/or treatment system changes

- Any reasonably foreseeable changes to timber harvest activities, state and county lands and private lands

Minnesota water quality standards were promulgated to protect human health and aquatic life. The threshold for this cumulative impacts assessment will be Minnesota's chronic aquatic toxicity-based standards applicable to the respective waters being evaluated. The future conditions scenarios will be completed for both operation and post-closure conditions, assuming that all other reasonably foreseeable actions have been completed.

Data Needs for Analysis of Cumulative Impacts

- Estimates of current and future hydrologic loadings from subwatersheds (see previous cumulative impacts discussion for flow)
- Water quality monitoring data for O'Brien Lake, O'Brien Creek and Swan Lake
- Any reasonably foreseeable changes to discharges from Keewatin or Nashwauk POTW's due to development and/or treatment system changes
- Estimate of reasonable scenarios of area and frequency of future timber harvests within the upper Swan River
- Current discharge monitoring data for the Keewatin Taconite facilities and any reasonably foreseeable changes in discharges
- Proposed Minnesota Steel pit and tailings basin discharges, including post-closure discharges
- Historic air photos or GIS coverages showing modification of land use (including wetland loss) by past mining practices within the upper Swan River watersheds
- Data on typical present and future timber harvest activities on state and county lands and private lands
- Data on existing and potential future rural and residential development in the upper Swan River watershed
- Data on land use or other factors affecting existing or potential future runoff from the development of the Cities of Keewatin and Nashwauk
- Implementation plan for the Regional Mercury TMDL

PROPOSED TREATMENT OF TOPIC IN EIS
The EIS will evaluate cumulative effects to the following resources:

- *Air quality in federally-administered Class I areas (e.g., BWCA, Voyageurs National Park)*
- *Water quality in low-buffering capacity aquatic and terrestrial ecosystems in federally administered Class I areas (e.g., BWCA, Voyageurs National Park) due to deposition of sulfates, nitrates, and mercury*
- *Water quality and flow in Swan Lake and Swan River*
- *Water quality in the Prairie River*
- *Wetlands in the vicinity of the mine and in the Swan Lake watershed and Prairie River watershed.*
- *Wildlife habitat at the mine site and greater surrounding area*
- *Populations of state and federal listed threatened, endangered and special concern plant species at the mine site and the related populations throughout Minnesota*
- *Aquatic biota and fish in O'Brien Lake and O'Brien Creek, Oxhide Lake and Oxhide Creek, Snowball Lake and Snowball Creek and Little Sucker Lake and Sucker Creek as a portion of the Upper Mississippi basin*

30. **Other Potential Environmental Impacts.** If the project may cause any adverse environmental impacts not addressed by items 1 to 28, identify and discuss them here, along with any proposed mitigation.

None

31. **Summary of Issues.** *Do not complete this section if the EAW is being done for EIS scoping; instead, address relevant issues in the draft Scoping Decision document, which must accompany the EAW.* List any impacts and issues identified above that may require further investigation before the project is begun. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.

RGU CERTIFICATION. The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9b and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature: [signature] Date: July 11, 2005

Title: Principal Planner

Environmental Assessment Worksheet was prepared by the staff of the Environmental Quality Board at the Administration Department. For additional information, worksheets or for *EAW Guidelines*, contact: Environmental Quality Board, 658 Cedar St., St. Paul, MN 55155, 651-296-8253, or http://www.eqb.state.mn.us