Revised 2/99 – editorial corrections May, 05

ENVIRONMENTAL ASSESSMENT WORKSHEET

Note to preparers: This form is available at www.mnplan.state.mn.us. *EAW Guidelines* will be available in Spring 1999 at the web site. 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:** Mesabi Nugget Phase II Project

2. **Proposer**: Mesabi Mining, LLC; Steel Dynamics, Inc.

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3. **RGU**: Minnesota Department of Natural Resources
   Contact person: Bill Johnson, EIS Project Manager
   Title: Planning Director
   Division of Ecological Resources
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4. **Reason for EAW preparation** (check one)
   EIS scoping _X_ Mandatory EAW___ Citizen petition ___ RGU discretion___ Proposer volunteered___

   If EAW or EIS is mandatory give EQB rule category subpart number and subpart name. 4410.4400 Subpart 8. Subpart Name: Metallic mineral mining and processing.
   Subpart 8(B) Construction of a new facility for mining metallic minerals or for the disposal of tailings from a metallic mineral mine.
   Subpart 8(C) Construction of a new metallic mineral processing facility.

5. **Project location** County: St. Louis City/Township: Cities of Hoyt Lakes & Aurora; Town of White

NW¼ Section 5	Township 58N	Range 14W
NE¼ Section 6	Township 58N	Range 14W
SW¼ Section 18	Township 59N	Range 14W
NW Section 2	Township 58N	Range 15W
NE Section 3	Township 58N	Range 15W
Section 19 (most)	Township 59N	Range 14W
Section 20 (West & SE)	Township 59N	Range 14W
Section 29 (most)	Township 59N	Range 14W
Section 30 (most)	Township 59N	Range 14W
Section 31 (NE, NW, & SE)	Township 59N	Range 14W
Section 32 (most)	Township 59N	Range 14W
S1/2 S1/2 Section 13	Township 59N	Range 15W
Section 21 (SE & SW)	Township 59N	Range 15W

Section 22 (S1/2 & part N1/2)	Township 59N	Range 15W
Section 23 (most)	Township 59N	Range 15W
Section 24 (most)	Township 59N	Range 15W
Section 25 (Road corridor in NE, SE, SW)	Township 59N	Range 15W
Section 26 (Road corridor in S1/2)	Township 59N	Range 15W
Section 27 (most)	Township 59N	Range 15W
Section 28 (most)	Township 59N	Range 15W
Section 34 (most)	Township 59N	Range 15W
Section 35 (most)	Township 59N	Range 15W

Attach each of the following to the EAW:

- County map showing the general location of the project. (See Figure 5-1)
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable). (See Figure 5-2)
- Site plan showing all significant project and natural features. (See Figure 5-3)

6. **Description**

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

Mesabi Nugget Phase II will mine and concentrate taconite ore. An existing mine will be re-opened and a new taconite concentration facility constructed. Portions of the concentrate produced will be used in an existing iron nugget demonstration plant; the remainder will be shipped to the proposer's facilities in other states or sold on the open market.

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

The proposed Mesabi Nugget Phase II project will produce iron oxide concentrate using established methods of magnetic separation and flotation. The major project components include: 1) reactivation of a taconite mine, 2) installation of a new crusher, and 3) installation of a new concentrator with magnetic separation and flotation. The project will be located north of Hoyt Lakes, Minnesota; see Figures 5-1 and 5-2. The project will be located entirely on portions of the former LTVSMC site, which was also known as Erie Mining Company prior to 1986. Prior to taconite mining, natural ore mining occurred in nearby pits as early as 1903.

Iron ore concentrate will be used in two ways:

- Approximately one-third of the concentrate (about 1.04 million tonnes per year) will be used as a local feedstock to an iron nugget Large Scale Demonstration Project (LSDP), which was previously permitted and is currently under construction. The facility produces an iron product used as a scrap substitute in the production of steel.

- The remaining balance of concentrate (about 2.09 million tonnes per year) will be shipped by rail for use in other facilities. Depending upon market conditions, the shipped concentrate may be used in facilities owned by the proposer or sold to other iron and steel producers.

Construction is expected to begin on Phase II facilities in 2010. Mining and production of concentrate on one line is expected to begin in third quarter of 2010 or earlier as permitting allows. Two additional lines of concentrate production are expected to be phased in through the third quarter of 2013 (or earlier as dictated by permitting and equipment deliveries); this will provide the capacity to initiate offsite concentrate shipment. Mining, stockpiling and tailings disposal plans have been formulated for a foreseeable project life of 20 years. Operation of the facility beyond that time will depend on a variety of factors including mining and steel manufacturing technology and steel and energy prices. Any operation of the facility beyond the current planning horizon will require additional planning, environmental review, and permitting.

This project does not include any additional production capacity at the iron nugget facility. Addition of additional nugget furnaces would require additional environmental review and permitting.

Project elements that require new construction, cause physical manipulation of the environment, or produce wastes can be considered in terms of:

Mine
Crushing & Concentrating
Tailings Management
Concentrate Management
Transportation & Utility Infrastructure
Mineland Reclamation

Mine

Mine-related operations can be considered in terms of site mineralogy and operations. See Figure 5-3.

Site Mineralogy. The project will extract taconite-type iron ore from the eastern 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 Iron Range has been the largest source of iron ore produced in Minnesota since the 19th century. Minnesota has been and continues to be the predominant source of iron ore in the United States.

The Biwabik Iron Formation (BIF) near Hoyt Lakes, MN is the formation proposed for project-related mining activity. The iron ore formation is up to three miles wide at the surface, and up to 500 feet thick. It is a series of layers of rock that is roughly 400 to 500 feet thick. It is the uppermost bedrock at the northern end of the project area, becoming progressively deeper to the south-southeast, dipping at about 7 degrees. The bedrock is generally covered by a 25 to 90 foot-thick layer of glacial till, which is soil and rocks deposited during the last glacial recession.

The BIF has four major members. From top to bottom, these are the Upper Slaty, Upper Cherty, Lower Slaty, and Lower Cherty. Most of the iron ore is found in the Upper Cherty and Lower Cherty members. To the south, the BIF is overlain by the Virginia Slate formation. Beneath the BIF is the Pokegama quartzite. This is the bedrock exposed immediately north of the mining area and extends 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 Aurora Sill, a small intrusive formation in the Biwabik Iron Formation is present to the south and west of the project site; see Item 30 for further discussion of the Aurora Sill.

The minerals found in the magnetic taconite ore horizon, (e.g., Upper and Lower Cherty), have been evaluated by x-ray powder diffraction and microscopic studies. They 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.

> *Proposed Action*: Mine the Biwabik Iron Formation along the Mesabi Iron Range near Hoyt Lakes, MN.

Mining Operations. LTVSMC actively mined Areas 2WX, 1SE, and 6 until operations ceased in early 2001. The project is to re-open Areas 2WX and 6 to active mining. The pits and stockpiles left by previous operations are shown in Figure 5-3.

> *Proposed Action*: Re-open Area 2WX and Area 6 to mining.

Mining must account for differences in ore quality and silica content between the Lower and Upper Cherty ores. The Area 6 Pit has lower reserves of a higher-quality Lower Cherty ore while the larger reserves in the Area 2WX Pit have higher silica Upper Cherty ore. The concentration processes are optimized to manage silica content, so it is anticipated that Area 2WX will be the predominant source of ore. As needed, and especially in the early years of concentrate production, ore will be blended from the Lower Cherty formation in Area 6, to ensure a high-quality concentrate. Mining in Area 6 will be almost entirely at the north end of the existing pit, as well as in the new Area 6NW and Area 6SW Pits.

Limited mining and scavenging of ore for processing may occur in other areas of the project site. This could include some portion of the lean taconite stockpiles at Area 2WX that were left from previous mining. It may also include scavenging of broken ore on the north side of Area 1 Pit. All of these areas are included in the project area as shown on Figure 5-3.

> *Proposed Action*: Ore may be secured at other sites from scavenging lean taconite stockpiles or broken ore areas.

The taconite ore of the Biwabik Iron Formation will be mined by open-pit methods within the general mining outlines shown in Figure 5-3. A generalized cross-section of the mine through the Area 2WX Pit, showing the BIF members and a typical benching arrangement is shown in Figure 6-1. A detailed mine phasing plan and additional geologic information, including mineralogy and petrology, will be submitted as part of the application for a permit to mine that will be available for use in preparing the EIS. In terms of production, operating 24 hours per day, 365 days per year, the mine will have an annual production of about 3.15 million metric tones of taconite concentrate. This amount of concentrate is slightly less than one-half the production of previous LTVSMC operations, which produced an average of 6 to 7 million tonnes of taconite pellets per year from its facilities. The project can be compared with previous operations because roughly the same amount of raw ore generates the same amount of finished concentrate or pellet product.

Pit development will follow procedures typical to other Mesabi Iron Range operations. Areas to be mined will first be stripped of overburden using diesel shovels and large wheel loaders. This will generate about 1 million metric tonnes per year of overburden. Stripping will be done annually and will ensure a 6 to 12 month inventory of stripped area. Overburden stockpiles will be located on and adjacent to existing stockpiles from prior mining of the pits as shown in Figure 5-3. A typical stockpile cross-section (including both overburden and waste rock) is shown in Figure 6-2.

In-pit disposal of stockpile material will be evaluated as the final mine plan is prepared; the evaluation will be included in the application for the permit to mine. 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.

> *Proposed Action*: Mining will be by open-pit method and will include overburden stripping, pit-type operations, haul roads, stockpiles, and a tailings disposal area.

Mine support facilities including the truck shop and crew facilities will be located at Area 2WX as shown on Figure 5-3. Stripped material will be hauled to overburden stockpiles in diesel trucks. The equipment inventory, including truck fleet configuration, is described Item 23.

> *Proposed Action*: The project includes construction of a truck shop and crew facilities.

After stripping, both waste rock and the iron formation will be drilled and blasted on benches approximately 30 feet in depth. The area to be blasted will be drilled using conventional self-propelled diesel or electric drill rigs to produce a pattern of drill holes. These holes will be filled with an emulsion of ammonium nitrate and fuel oil (ANFO) that will be electrically detonated to break the rock. Blasting procedures are described in further detail in response to Item 24.

> *Proposed Action*: Blasting will be used on both the waste rock and iron formation.

Waste rock and lean ore will be loaded in trucks and hauled to stockpiles generally located as shown on Figure 5-3. Waste rock and lean ore production is projected to average about 6 million tonnes per year. Some waste rock may be used to construct dikes, dams and haul roads. Detailed stockpile plans will be submitted for use in preparing the EIS.

> *Proposed Action*: Waste rock and lean ore will be stockpiled.

"Lean taconite" stockpiles were created during the LTVSMC operation. These stockpiles were not of sufficient grade to utilize in the previous operation, but were of high enough quality to warrant retention for potential use at a later date. Preliminary data suggests that this material could be utilized for at least a portion of the feed to the crusher and concentrator. The largest stockpile, which represents around 5 million cubic yards of material, or around 2 million tonnes of total concentrate, is located just south of Area 2WX. Further study will be required to determine whether this material could be utilized in the early years of the operation to further reduce concentrate costs. Where stockpiles will be processed, they will be sampled and characterized to ensure that they are suitable for use and that they do not contain materials from previous mining operations that would present any environmental hazards. Use of these stockpiles would tend to reduce the need to expand the pit area and

increase the space available for stockpiling, thus reducing wetland and other impacts of stockpiling and would likely reduce fugitive emissions from stripping, and blasting and hauling out of pits.

> *Proposed Action*: Lean taconite stockpiles from previous operations may be used for a portion of the crusher and concentrator feed.

Raw ore will be trucked from the pit to the primary crusher to be located at the north end of Area 2WX. The haul road from Area 6 to the primary crusher at Area 2WX will be constructed on the route of earlier rail lines that served the Stephens and Knox natural ore operations. Ore scavenged from the north side of Area 1 will be transported to the primary crusher using existing haul roads. Approximately 3,600 feet of roadway between Area 1 and Area 2WX will be widened by about 100 feet to accommodate two-way haul truck traffic and rail and conveyor corridors; see Figures 6.3a and 6.3b.

> *Proposed Action*: Raw ore will be trucked to the primary crusher using existing roads. Some road widening is proposed.

Area 6 Pit and Area 2WX Pit will require dewatering prior to restart of mining; they began filling with water after earlier mining ceased in 2000. Water from both pits will be pumped to area streams under the conditions of existing appropriations permits that have been transferred to Mesabi Nugget Delaware LLC from Cliffs-Erie LLC, who purchased the property and permits from LTVSMC. The pumped water will be discharged to one or more of the streams that previously received discharges from these pits, including: First Creek, Second Creek and the unnamed creek southeast of Area 2WX in Section 31, henceforth referred to as "Unnamed Creek."

> *Proposed Action*: Area 6 Pit and Area 2WX Pit will be dewatered, with the discharge directed to First, Second, and Unnamed Creeks.

During operation, the mine pits will collect both groundwater inflow and surface runoff from precipitation. This water will drain to sumps within the pits where it may be pumped to the clear water reservoir in the Area 1 Pit and used for process water. Any excess water not required for operations will be discharged to surface waters in accordance with requirements of LTVSMC's former permits that have been transferred to Mesabi Nugget from Cliffs-Erie. Further detail on pit dewatering is included in response to Item 18.

Crushing and Concentrating

Raw ore must be mechanically processed using crushing and grinding action before the magnetic component can be separated from the non-magnetic constituents. A new crushing facility and concentrator will be installed to accomplish this objective.

Blast ore is first hauled by truck to the crusher for processing; see Figure 6.4 for a preliminary layout of the crusher area. The crusher is a complex of three (3) coarse jaw crushers that feed one (1) fine crusher. Several existing stockpiles will be moved to provide a site for the crusher complex; site preparation will be typical to industrial operations. Coarse crushing occurs first, which is followed by secondary crushing. Coarse crushing converts large blocks of ore (from 3' x 2' x 1') to an average 8" sized chunks that are further processed by the secondary, or gyratory cone crusher, to <1.50" material. Once crushed, this ore product will be transferred to the concentrator ore barn either by conveyors or by haul trucks operating on the haul road between Area 2WX and Area 1. A Crushed Ore Movement Plan will be available for use in preparation of the EIS. A process flow sheet for the crusher and concentrator is shown in 6-4.

Proposed Action: Install a new crusher.

The new concentrator will be sited northeast of the existing nugget plant site along the northeast rim of the Area 1 Pit. This is called the "plant area" for the purposes of the Scoping EAW and is depicted on Figure 6-5. The concentrator will be housed in a steel-framed building with insulation and a roof. Finely crushed ore will be fed to the wet grinding circuits where roll presses reduce particle size to <0.25", which is followed by ball milling of particles down to 80% passing through 325-gauge mesh. Once ground, the material is directed to magnetic separators to separate magnetic particles from non-magnetic tailings. From here, the magnetic iron material will pass though a flotation circuit where the particles will be coated with a hydrophilic collector, typically an amine collector such as Tomah DA-16. The flotation process uses air bubbles in water enhanced by a frother, such as MIBC, to float the higher-silica particles that will be directed to the separate tailings management system. The remaining iron concentrate will be thickened and pumped as a slurry to the nugget plant. All concentrate will be thickened and dewatered. Excess concentrate (at a maximum during winter production when shipping will likely not occur) will be stored in an open stockpile at the plant site. Conveyors will move the concentrate from the stockpile to the silos of the rail loadout facility. The concentrator is expected to produce 3.15 million tonnes per year (dry weight) of concentrate.

Proposed Action: Install a new concentrator.

Tailings Management

Tailings are non-magnetic and high-silica rock particles rejected during the concentration processes. On average, about 8.5 million tonnes of tailings will be produced each year. Tailings will be pumped from the concentrator to the tailings thickener where excess water will be removed by sedimentation; the excess water will be directed for reuse in the facility's process water system.

The thickened tailings will be pumped to the west end of the Area 1 Pit. This pit was used by LTVSMC for taconite mining from 1954 (initial stripping) to 1987 (final ore production). It is about 3.7 miles long and is roughly 125 feet deep at its current outflow of about Elevation 1,546.5. The pit will be used for in-pit disposal of tailings in a manner similar to that used by ArcelorMittal Steel for its Minorca Pit. Future mining in parcels immediately adjacent to the tailings disposal site will require maintenance of a dike for separation similar to what was completed at Area 9. No tailings basin is proposed for the project.

Proposed Action: Conduct in-pit disposal of tailings.

The tailings pipeline from the tailings thickener will have two branches to allow movement of the discharge points around the pit rim. This approach allows for even deposition of tailings across the entire pit. The heaviest particles (coarse tailings) will settle out first; the finer fractions, or slimes, will flow down the slope of the deposited tailings pile to settle in the deeper sections of the pit. Filling will occur from west to east. A starter dike constructed of waste rock or coarse tailings will be used to separate the west end of the pit (the tailings disposal area) from the east end; the dike would also carry the south tailings pipeline and a roadway for tailings pipeline maintenance. Additional dikes will likely be constructed to create interior cells to encourage tailings deposition and to allow shaping of the final tailings basin landform. Drop structures will be required to pass process water and stormwater flows safely across the dikes; these structures will be similar to those constructed at LTVSMC and other Mesabi Range taconite facilities.

Proposed Action: A permeable rock dike may be constructed.

It is projected that around Year 17 the deposited tailings will have filled the west end of the pit to the level of the run-out water level of the pit. In most areas the pit wall will continue to contain the tailings, but in some areas external dikes composed of previously deposited coarse tailings will be constructed by "stacking." This material is obtained at the edge of the basin and is shaped into additional dikes to contain further tailings production. This process can be continued indefinitely. Deposited tailings will be sloped from west to east with a maximum elevation of about 1,590 feet. In most areas the final land surface will be below the pit rim but in places it will be about 20 feet above the lowest adjacent ground level. The long-term result of in-pit disposal will be a sloped plain of reclaimed tailings in the west end of the pit. This method was used for tailings management at the previous LTVSMC tailings basin.

Proposed Action: Additional external dikes will likely be constructed around Year 17 using previously deposited coarse tailings.

The dikes will be designed to pass flows resulting from large rainstorms and to resist lateral forces due to deposited tailings and water. East of the tailings area there will be a pool of reclaim water used as both a portion of the treatment system and as a reservoir for plant water supply.

While tailings deposition continues below the runout level, it will displace about 0.09 cubic meters per second (1,450 gallons per minute) from the Area 1 Pit. This will be an addition to other components of the pit water balance, including surface water and groundwater inflow and outflow. Assuming the displaced water is not otherwise lost to surface or groundwater outflow, a portion of this water may be used as makeup water for the plant; any remainder will be pumped from the clear water pool to Second Creek after appropriate treatment, which is described in Item 18.

Proposed Action: Displaced water in the pit will be reused as makeup water for the plant or treated and discharged to Second Creek.

Concentrate Management

The oxide concentrate will be stockpiled in an open stockpile. About one-third of the production will be transferred to the LSDP iron nugget facility that was permitted in 2005 and will be ready for operation in the second quarter of 2009. Until the Phase II project is constructed, the LSDP nugget facility will use imported Canadian concentrate.

Concentrate not used by the LSDP iron nugget facility will be shipped off-site. It is expected that a significant portion of the concentrate will be shipped to Steel Dynamics Iron Dynamics facility in Butler, Indiana. Depending on market conditions, portions of the concentrate may also be sold to other iron and steel producers.

Proposed Action: Concentrate will be used onsite or shipped to other locations.

Transportation and Utility Infrastructure

Access to the site can occur from County Road 666 or from TH 135; see Figure 5-1. Gates are in place to control access for mine employees, vendors, or other authorized entrants. Both of these access points were used during the former LTVSMC operations. The Area 2WX shops can be accessed using these locations.

Proposed Action: Access to the site will continue to come from use of County Road 666 or TH 135.

Rail operations will use Canadian National (CN) lines. A short rail line extension from the former LTVSMC plant to the LSDP is already planned. Additional rail lines will be constructed to increase efficiency; see Figure 5-3. Direct access to the CN is not currently available; an additional length of track will be constructed to the east of the facility to allow direct access to the CN rail line. This new south rail access will use the existing causeway between Area 1 and Area 2WX and then join the CN mainline near Area 2WX as shown in Figure 5-3. The rail line to the plant will be extended to the west and a rail loading facility will be constructed for concentrate loading.

Proposed Action: New rail lines will be constructed.

The project will not generate significant new energy demand. Northern Natural Gas (NNG) has an existing 10-inch diameter pipeline that brings gas from Carlton, Minnesota to serve the former LTVSMC mining operation. The gas line has adequate capacity to serve both Mesabi Nugget Phase I (LSDP) and Phase II and the proposed PolyMet facility. A service line is being constructed to the plant site as part of LSDP construction; the approximate route is shown in Figure 5-3.

Electric transmission is readily available near the site. Minnesota Power served the LTVSMC facility with a 138,000 kVA line from the Syl Laskin power facility at Hoyt Lakes and a power supply line is being constructed to the plant site as part of the LSDP (shown on Figure 5-2 and 5-3). No additional power lines will be required for Phase II. Minor internal power lines will be required to supply power to the mines.

Mineland Reclamation

Areas disturbed by mining-related operations will be reclaimed as detailed in the mine plan, which addresses all mining activities under the DNR's Permit to Mine. Reclamation of the site must comply with specific requirements identified in Minnesota Rules Chapters 6130 and 8420 and the USACE Section 404 Permit. The mineland reclamation rules require, among other things, 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 will be reviewed by DNR. Factors considered in the selection process for proposed uses include:

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.

Objectives of the mineland reclamation plan include: control of adverse environmental impacts; options for future land use; and promotion of orderly mining to encourage good mining practices and recognize the beneficial aspects of mining.

Proposed Treatment of Topic in EIS:
The EIS will include a complete project description, including the timing of all phases of construction and operation. The status of all project-related mineral rights will be presented in the EIS. The EIS will show the location of tailing disposal areas that include a cross section showing final proposed configuration.

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 produce iron concentrate from taconite ore for use as feedstock for the existing LSDP plant or other North American iron and steel operations.

d. Are future stages of this development including development on any outlots planned or likely to happen?
___Yes _X_No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

The project is defined for a 20-year period of operation. Additional, untapped reserves are however expected to be available. Whether mining will be pursued beyond that point is speculative and will reflect planning and financing conditions present at that time. If continuation of operations is pursued, or new project activities are proposed, environmental review and permitting will occur subject to the laws and regulations at that time.

Mesabi Nugget had previously planned to add two additional nugget furnaces at the site. Uncertainty regarding the ability to obtain permits for air emissions led to elimination of that portion of the project. Operation of the LSDP, including testing of air emissions control technologies, may make it feasible to propose additional nugget capacity at the site. This is not included in the current project and, if proposed, environmental review and permitting will occur subject to the laws and regulations at that time.

e. Is this project a subsequent stage of an earlier project? _X_Yes ___No
If yes, briefly describe the past development, timeline and any past environmental review.

The project is the second phase of the overall project. In 2003-2004, a pilot plant constructed and operated by Mesabi Nugget, LLC in Silver Bay, Minnesota demonstrated the ITmk3 technology, which is a proprietary direct reduction technology pioneered by Kobe Steel. The pilot plant produced 10,000 tonnes of iron nuggets that were subsequently converted into steel via the EAF operation.

The LSDP is under construction at the project site north of Hoyt Lakes. The Minnesota Legislature exempted the project from State Environmental Review in 2004. In 2009, this demonstration plant will begin producing up to 600,000 metric tonnes per year of iron nuggets from iron oxide concentrate purchased from the spot market. A schematic diagram of the previously permitted Nugget process is shown in Figure 6-6.

The cumulative effects of both the LSDP and Mesabi Nugget Phase II Project will be evaluated in the EIS.

7. **Project magnitude data**

Total project acreage:	4,757	
Plant Site	1,855	Includes Area 1, rail connections, and tailings disposal area
Area 2WX	1,759	Includes pits and stockpiles, plant road corridor, crusher area
Area 6	1,143	Includes pits and stockpiles, haul road to crusher

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: 828,000

Indicate areas of specific uses (in square feet): Approximate Total: 1,360,000

Office 15,000*	Manufacturing N/A
Retail N/A	Other industrial 1,310,000**
Warehouse 15,000	Institutional N/A
Light industrial N/A	Agricultural N/A

Other commercial (specify)
Building height: See below. If over 2 stories, compare to heights of nearby buildings:
Final design of most buildings and large site features is not completed but based on other facilities the following would be representative heights:

*Administration Building **Includes crusher, cobbler, ore barn, concentrator, filtering, balling, and truck shop.

Area 2WX	
Mine Office and Shops building	75 feet
Coarse Crusher	60 feet
Coarse Crushed Ore Stockpile	100 feet from tip of belt to grade
Secondary/Fine Crusher	115 feet
Turn Bin of Fine Crusher	70 feet
Stockpiles	230 to 290 feet above natural ground surface

Area 6	
Stockpiles	230 to 290 feet above natural ground surface

Area 1	
Existing Nugget Plant (highest stacks)	197 feet
Fine Ore Barn	120 feet
Concentrator	125 feet
Filter Building	80 feet
Slurry Storage Tanks	75 feet to top of agitator shelter

No significant structures are planned for Area 6.

Proposed Treatment of Topic in EIS:
The topic is not significant and will be discussed briefly in the EIS using updated information from the EAW. The EIS will provide updated calculations of project magnitude data that are available as project-related designs are further developed.

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 Corp of Engineers	Section 404 Permit for Wetland Impacts	To be applied for Section 7 Endangered Species Act Consultation with U.S. Fish & Wildlife Service will be completed by Corps as part of Section 404 Permit Section 106 National Historic Preservation Act consultation with Minnesota State Historical Society (SHPO) will be completed by Corps as part of Section 404 Permit.
DNR	Permit to Mine	DNR Permit to Mine #1.1 has been transferred from Cliffs-Erie LLC to the proposer (for the portions of the mine area applicable to this project). A permit to mine application will be submitted.
	Water Appropriation permit	The following appropriation permits were originally issued to Cliffs-Erie LLC and were in force for Phase I: • # 73-5182 (Area 1 mine dewatering) • # 79-2204 (Area 2WX mine dewatering) • # 73-5185 (Area 6 mine dewatering) • # 73-5188 (Area 9S mine dewatering) Phase II operations have not been permitted; new and/or amended permits will be required.
	Dam Safety Application	Tailings deposition in Area 1 Pit will require dam safety permits.
	Work in Protected Waters	Construction of a discharge outfall to public waters wetland #69-250W or Second Creek may be required and a permit will be applied for if needed. Installation of utilities and conveyors between the crusher and the plant site and associated widening of the embankment will require minor work in the Second Creek crossing. Also, construction of the haul road from Area 6 to 2WX may require improved crossing of Second Creek; a permit will be applied for if needed for these activities.
	Minnesota Wetland Conservation Act	Impacts evaluation and mitigation plan are reviewed as part of Permit to Mine for mineral development projects.
	Burning Permit (land clearing)	To be applied for (if needed) For burning of brush and trees generated from site clearing.

Unit of Government	Type of Application	Status
	Takings Permit (for Endangered or Threatened species)	To be applied for (if needed) If avoidance of impacts to Endangered/Threatened species not reasonably feasible.
MPCA	Part 70 Operating Permit/New Source Review Authorization	An application will be submitted to amend Permit No. 13700318-001 issued to Mesabi Nugget LLC to cover the addition of crushing, concentrating and shipping facilities. The Cliffs-Erie Title V Air Emission Permit for Hoyt Lakes Plant Site (#13700009-002) has been transferred to Mesabi Nugget. Amendments will be requested to cover Phase II operations.
	NPDES Permit for mine operations and mine-related stormwater discharges	The Cliffs-Erie NPDES permit for mine dewatering covering multiple streams and pits has been transferred to Mesabi Nugget (Permit No. MN0069078) to the extent that it covers discharges from Area 2WX, Area 1, and Area 6 Pits to Second Creek and discharges from Areas 1, 9, 6, and 9S Pits to First Creek. The permit will be modified to cover non-closure conditions.
	NPDES permit for plant operations and plant-related stormwater discharges	Existing NPDES/SDS Permit No. MN0067687 issued in August 2005 to Mesabi Nugget will be modified to include the addition of crushing and concentrating facilities, in-pit disposal of taconite tailings and any required modifications to the WWTF.
	Section 401 Water Quality Certification of Corps of Engineers Section 404 Permit	To be applied for Section 401 of the Clean Water Act requires that an applicant for a federal license or permit provide a certification that any discharges from the facility will comply with the Clean Water Act, including compliance with state water quality standards.
	Waste tire storage permit	To be applied for Required if more than 500 tires need to be stored at one time prior to disposal.
	Storage Tank Permit (fuel tanks)	To be applied for Required for above-ground storage of fuel, lubricants, or other materials.
	Solid Waste Permit (slag)	To be applied for (if needed)
	Hazardous Waste Generator and Storage	To be applied for (if needed)
	Demolition Debris Disposal Facility Permit.	To be applied for (if needed)

Unit of Government	Type of Application	Status
MDH	Radioactive Material Registration (low-level radioactive materials in measuring instruments	To be applied for (if needed)
	Noncommunity Nontransient Public Water System	Facility will likely constitute a new system. Plans for treatment, pumping, storage, distribution and related facilities must be submitted for approval.
St. Louis County	Commercial Septic Tank Permit	To be applied for (if needed)
	Building Permit	To be applied for (if needed)

Treatment of Topic in EIS:
The EIS will identify project-related permits and approvals.

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.

Land Use. The project site has been subject to varying degrees of mining-related activity for over 100 years. This has included development and abandonment of natural ore pits, logging, ore and waste rock stockpiling, and open pit mining for taconite. While some parts of the site can be considered relatively undisturbed, most of the site is in some state of disturbance as a function of past operations. For purposes of the land use discussion, the site can be described by dividing it into three major geographic areas, specifically: Area 2WX Pit and Stockpiles; Area 6 Pit and Stockpiles; and Plant Site and Area 1 Pit (including Area 9 Pit and Area 1 Pit SE).

Area 2WX Pit and Stockpiles

LTVSMC began stripping Area 2WX in 1980. Ore production lasted from 1987 to early 2001. The past land use of the pit and stockpile area was wetlands and forested uplands. A small natural ore pit, the Vivian Mine, existed in the south-central portion of Section 20, T59N, R14W; it was backfilled to provide space for the rail loading operations at the Area 2WX Pit. County Highway 110 formerly passed through Sections 29 and 30, T59N R14W, which provided a road connection between the City of Aurora and the Mesaba railroad junction.

The nearest residential receptors will be identified in the EIS and permitting but appear to be homes in Hoyt Lakes on the south shore of Colby Lake, about one mile from the south end of the Area 2WX stockpiles.

The surrounding land use is as follows:

Table 9-1. Land Uses Near Area 2WX

Direction	Immediate Features (Within Approximately One Mile)	More Remote Features
East	• North-south Minnesota Power high voltage transmission line and LTVSMC/PolyMet water supply line from Colby Lake • Wooded land/wetlands • CN Railroad line to the LTVSMC/PolyMet/ Mesabi Nugget Phase I facilities • County Road 666 (road access to LTVSMC/Mesabi Nugget facilities)	• LTVSMC Area 2E Pit and Wentworth natural-ore pit and associated dumps and stockpiles • Additional wooded land
Southeast	• North-south Minnesota Power high voltage transmission line and LTVSMC/PolyMet water supply line from Colby Lake • Site of proposed Mesaba Energy project • Large wetland complex adjacent to Wyman Creek	• CN railroad • Colby Lake and Partridge River
South	• North-south Minnesota Power high voltage transmission line • LTVSMC/PolyMet water supply line from Colby Lake • Former LTVSMC water pumping station • Colby Lake • Minnesota Power Laskin Energy Center	• City of Hoyt Lakes • Whitewater Reservoir
Southwest	• CN Railroad • Partridge River • Wooded land	• First and Second Creeks • Mine stockpiles from St. James natural-ore pit
West	• Wooded uplands and wetlands • Second Creek • Stephens natural-ore pit (closed) and associated stockpiles and tailings basin	• Area 6 Pits and stockpiles
Northwest	• Knox natural ore pit and stockpile • Second Creek • Area 1 Pit and Mesabi Nugget LSDP construction site (proposed Phase II plant site) • Stockpiles associated with Area 1 Pit	• Wooded uplands of the Embarrass Mountains
North	• Second Creek and associated wetlands • Roads, stockpiles and railroads associated with LTVSMC Area 1 Pit operations	• Wooded uplands of the Embarrass Mountains
Northeast	• Second Creek and associated wetlands • CN Railroad • North-south Minnesota Power high voltage transmission line and LTVSMC/PolyMet water supply line from Colby Lake	• Former LTVSMC plant site (under redevelopment by PolyMet Mining) • LTVSMC Area 2E Pit and Wentworth natural-ore pit and associated dumps and stockpiles

Area 6 Pit and Stockpiles

LTVSMC developed Area 6 as both a natural ore and taconite mine from 1965 until early 2001. The past land use of the pit and stockpile area was wetlands and forested uplands. The former TH 35, which is now TH 135, and County Highway 110 previously passed through Area 6. Both have been rerouted.

The nearest residential receptors will be identified in the EIS and permitting. A preliminary determination has identified two sets of residences. One consists of homes in the City of Aurora south of the St. James Pit, about one mile from the south end of the Area 6 stockpiles. A second set of homes and building sites is on the east side of Wynne Lake, about two miles west of the Area 6 stockpiles.

The surrounding land use is as follows:

Table 9-2. Land Uses Near Area 6

Direction	Immediate Features (Within Approximately One Mile)	More Remote Features
East	• Second Creek • Wooded uplands and wetlands	• Dumps and rail access associated with Stephens natural ore mine (closed) • Area 2WX
Southeast	• Stockpiles associated with development of Area 6 Pit • Second Creek • Wooded upland	• CN railroad • Mine stockpiles from St. James natural-ore pit • Partridge River and Colby Lake
South	• First Creek (rerouted) • St. James Pit and associated stockpiles, roads and railroads • City of Aurora	• Partridge and St. Louis Rivers
Southwest	• First Creek (rerouted) • St. James Pit and associated stockpiles, roads and railroads • First Creek (rerouted) • LTVSMC Area 9S Pit	• Wooded uplands • Additional small natural ore pits and associated stockpiles
West	• Stockpiles associated with earlier development of LTVSMC Area 9S Pit and Area 6 Pit • Grade of former rail line associated with Area 6 Pit • Wooded uplands	• Power transmission line • Lakeshore homes on east side of Wynne Lake • Wynne Lake
Northwest	• First Creek • Area 9 Pit and associated stockpiles and rail lines • Area 1 Pit	• TH 135 • Embarrass Mountains • Sabin Lake
North	• Area 9 Pit and associated stockpiles and rail lines • Stevens Creek (tributary to Second Creek) • Stephens natural-ore mine (closed) and Area 1 Pit and associated stockpiles, roads and rail grades • Donora natural ore stockpile and settling basins	• Stockpiles associated with Area 1 Pit • Wooded uplands of the Embarrass Mountains
Northeast	• Stephens Creek (tributary to Second Creek) • Stephens natural-ore mine (closed) and associated processing facilities, stockpiles, roads and rail grades	• Second Creek and associated wetlands • Knox Pit (closed)

Plant Site and Area 1 Pit (Including Area 9 Pit)

The proposed concentrator will be located at the site where the LSDP plant is currently being constructed on a large area of bedrock that was stripped of overburden by LTVSMC. It is located on the north side of the Area 1 Pit. The Area 1 Pit was mined by Erie Mining Company and LTVSMC from 1954 to 1987. Area 1 was formerly wooded upland on the south slope of the Embarrass Mountains. TH 135 previously ran north-south across the current center of Area 1.

Area 9 lies between Areas 6 and 1, with a narrow saddle of land separating Areas 1 from 9. The Area 9 Pit is southwest of what was Little Mesaba Lake (also known as Old Mesaba Lake). Little Mesaba Lake was mined out for natural ore by the Donora Mine, which was owned by United States Steel, and then subsequently mined by J&L and LTVSMC under the name "McKinley Extension Mine." When mining was completed, both the Donora Pit and Area 9 Pit re-filled with water and have now become one water body.

The nearest residential receptors will be identified in the EIS and permitting. A preliminary determination has identified homes and building sites on the east side of Wynne Lake, about 1.5 miles west of the west end of Area 1 Pit and Area 9 Pit. The nearest receptor to the actual plant site appears to be rural residential homes in Sections 9 and 10, T59N, R15W, about 2.5 miles to the northwest.

The surrounding land use is as follows:

Table 9-3. Land Uses Near Plant Site and Area 1 Pit

Direction	Immediate Features (Within Approximately One Mile)	More Remote Features
East and Northeast	• Area 1 maintenance shops (now owned by PolyMet Mining) • Mining stockpiles rail grades and roads • Former LTVSMC plant (under redevelopment by PolyMet Mining) • County Road 666 (road access to LTVSMC plant/PolyMet/Mesabi Nugget facilities)	• Second Creek and associated wetlands • CN Railroad • North-south Minnesota Power high voltage transmission line and LTVSMC/PolyMet water supply line from Colby Lake • CN Railroad line to the LTVSMC/Mesabi Nugget LSDP facilities
South and Southeast	• Knox and Stephens natural ore mines (closed) and associated stockpiles, roads and rail grades	• Wetlands and wooded uplands • Second Creek • Area 6 facilities
West and Southwest	• Mine stockpiles associated with earlier development of LTVSMC Area 9S and Area 6 Pits • Grade of former rail line associated with Area 6 Pit • Wooded uplands • TH 135	• Wooded uplands • Power transmission line • Lakeshore homes on east side of Wynne Lake • Wynne Lake
North and Northwest	• Mine stockpiles associated with development of Area 1 Pit • TH 135 • North entrance road	• Wooded upland of Embarrass Mountains • Rural homes near Embarrass, MN

Potential Environmental Hazards. Site assessments for past contamination were completed as part of the closure plant for the LTVSMC as implemented by Cliffs-Erie. The areas of concern (AOC's) identified in these studies are shown in Figure 9-3 and described in Table 9-4. Remediation for some areas is completed and the rest are in process. For properties now owned or leased by Mesabi Nugget, the responsibility and financial assurance for remaining remediation has been transferred to Mesabi Nugget from Cliffs-Erie.

Table 9-4. Status of Areas of Concern for Soil Contamination On or Near the Proposed Project.

Description	Status			Comments / Assumptions
	Complete	In Progress	Future	
Area 6 & 9 Reporting Site		X		Phase I ESA/SAP in progress-; reclamation expected to adequately address surface soil cleanup.
Area 6 Vibratory Loading Pockets		X		Phase I ESA/SAP is in progress and is expected to adequately address issues without further investigation.
Area 6 Truck Fueling Station		X		Reported Leak site; Limited Site Investigation (LSI) fieldwork complete, results pending.
Area 6 Misfired Blast	X			MPCA VIC & DNR closure obtained.
Area 9S Former Aurora Dump Site			X	The former Aurora Dump site has been relocated and/or mined. A limited MPCA Voluntary Investigation & Cleanup (VIC) Program investigation will be conducted to demonstrate that the dump is no longer present and relocated dump material is not a risk to human health and the environment. This is expected to be completed prior to mining operations.
Stockpile #9021			X	It is expected that a limited MPCA VIC Program investigation will demonstrate that Stockpile #9021 is not a risk to human health and the environment. This is expected to be completed prior to mining operations
Area 9N Vibratory Loading Pocket		X		Phase I ESA/SAP is in progress and is expected address issues without further investigation.
Area 2WX Reporting Site		X		Phase I ESA/SAP is in progress and is expected adequately address issues without further investigation.
Shovel Salvage (soils testing required)		X		Phase I ESA/SAP In Progress; reclamation expected to adequately address surface soil cleanup.
Area 2WX Truck fueling station		X		Reported Leak site; LSI fieldwork complete, results pending.

Description	Status			Comments / Assumptions
	Complete	In Progress	Future	
Pre-taconite (Predessesor to CE)			X	The Pre-taconite (pre-tac) plant area has been partially mined. However, because fuel storage and handling was present/performed at the plant, it is anticipated that an MPCA Petroleum Remediation Program (PRP) investigation will be necessary in addition to MPCA VIC Program investigation required for closure. Closure may require cleanup of petroleum contamination which may be necessary per MPCA's PRP. This is expected to be completed prior to mining operations..
Area 2WX Vibratory loading pocket		X		Phase I ESA/SAP is in progress; expected to adequately address issues without further investigation.
Area 2WX Superpocket		X		Phase I ESA/SAP in progress; reclamation expected to adequately address surface soil cleanup.
Area 1W Petroleum Contaminated Soil			X	Land treatment of petroleum contaminated soils was permitted/approved by MPCA at Area 1W. It is expected that closure will be limited to obtaining records and/or documentation of previous land treatment facility closure. This is expected to be completed prior to commencement of mining operations.
Sludge Site (City Sewage Sludge)			X	Land application of city sewage sludge was permitted/approved by MPCA. It is expected that closure will be limited to obtaining records and/or documentation of previously land application site closure. This is expected to be completed prior to commencement of mining operations.
1004 Storage Area			X	It is expected that a limited MPCA VIC Program investigation will demonstrate that the 1004 Storage Area is not a risk to human health and the environment. This is expected to be completed prior to commencement of mining operations.

Description	Status			Comments / Assumptions
	Complete	In Progress	Future	
Roofing Disposal			X	Roofing material was disposed near a wet, low-lying area. Surface water risk may be present and removal of the roofing material may be required as part of a MPCA VIC Program. A presumptive remedy involving relocation of old dumps to a permitted solid waste facility would be utilized if roofing material removal is required. It is assumed that roofing material can be disposed at Cliffs-Erie LLC's Industrial Landfill SW-619. This is expected to be completed in the first five years of mining operations.

Taconite Resources. The taconite mineral resources located within the project boundary have multiple ownership. The minerals that are not controlled by Mesabi Nugget through lease or ownership may be subject to future activity by others. Consideration of avoiding actions that would make future access to these resources uneconomic must occur in mine- and facility-related planning. The EIS will discuss how mine and facility planning ensures future access to onsite taconite resources.

Cumulative Effects. Cumulative adverse effects of land use decisions do not appear likely. Past, present and reasonably foreseeable future actions in the vicinity are mining and industrial uses and land use planning by St. Louis County, along with the Cities of Aurora and Hoyt Lakes, appears likely to maintain the present situation.

Proposed Treatment of Topic in EIS:
This topic is minor; it will be discussed briefly in the EIS using information in addition to the EAW. Land use conflicts are not anticipated. The majority of the lands near the proposed project have been, and will continue to be, used for mining and mineral processing. Environmental issues related to the project's proximity to existing and proposed mining and power generation facilities will be addressed under the specific environmental issue (e.g., cumulative effects of air emissions or visibility). The EIS will discuss how mine and facility planning ensures future access to onsite taconite resources.

Potential land use conflicts are also addressed in the traffic and noise sections.

10. **Cover types.** Estimate the acreage of the site with each of the following cover types before and after development. **If Before and After totals are not equal, explain why.**

The cover type estimates account for differences between significantly disturbed and relatively undisturbed parts of the site. Differences in soils, habitat value and vegetation were considered and areas previously disturbed by mining activity are tabulated separately from those with no apparent previous disturbance. DNR data was used to estimate areas disturbed by mining; this data was updated as needed to account for disturbance in the last years of LTVSMC operation. Estimates of wetland areas and vegetative cover are based on field work completed in 2007 and 2008.

Previously disturbed landforms included grasslands on reclaimed mine areas, barren rock areas, and early successional woodlands and forest. Seeded grasslands on reclaimed mine sites are categorized separately. Because of the high interspersion of barrens and early successional forest, and highly disturbed nature of the landscape, early successional forest and barrens were categorized as "disturbed." Cover types before and after project development are shown on Figures 9-1 and 9-2 respectively.

It should be noted that pits, stockpiles and tailings basins will be subject to progressive reclamation during mining so the area of disturbance at any time will always be less than the total area. "Deep Water" includes pits that may be dewatered during operation; post-mining deep water area is estimated as equivalent to existing; actual extent will depend on degree of in-pit stockpiling.

For purposes of the cover type discussion, the site can be described by dividing it into three major geographic areas, specifically: Area 2WX Pit and Stockpiles; Area 6 Pit and Stockpiles; and Plant Site and Area 1 Pit and Area 9 Pit. An overall project total is also provided.

Cumulative Effects. The cumulative effects associated with project-related changes in cover type will be addressed in specific impact areas where appropriate.

Proposed Treatment of Topic in EIS:
The topic is minor, but will be discussed briefly in the EIS using updated information in the same format as the EAW. Specific mining and plant site development details will be developed prior to or 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. Other sections of the EIS will address specific environmental impacts associated with changes in cover types, in particular the environmental effects of wetland-related changes.

Table 10-1. Cover Types – Area 2WX

Cover Types (acres)	Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	153	0
Wooded/Forest	260	0
Brush/Grassland	0	0
Crop Land	0	0
Lawn/Landscaping	0	0
Impervious Surface (Plant Site)	0	0
Other (describe)	0	0
	0	0
(Subtotal)	(413)	(0)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	0	0
Wooded/Forest	17	0
Brush/Grassland (Reclaimed Stockpiles)	464	0
Crop Land	0	0
Lawn/Landscaping	0	0
Impervious Surface (Plant Site)	0	0
Other (Disturbed)	497	1391*
Deep Water	368	368
(Subtotal)	(1346)	(1759)
Total	**1759**	**1759**

Table 10-2. Cover Types –Area 6.

Cover Types (acres)	Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	33	0
Wooded/Forest	122	0
Brush/Grassland	0	0
Crop Land	0	0
Lawn/Landscaping	0	0
Impervious Surface (Plant Site)	0	0
Other (describe)	0	0
	0	0
(Subtotal)	(155)	(0)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	12	0
Wooded/Forest	0	0
Brush/Grassland	426	0
Crop Land	0	0
Lawn/Landscaping	0	0
Impervious Surface (Plant Site)	0	0
Other (Disturbed)	349	942*
Deep Water	201	201
(Subtotal)	(988)	(1143)
Total	**1143**	**1143**

Table 10-3. Cover Types – Plant Site and Area 1 Pit and Area 9 Pit

Cover Types (acres)	Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	23	0
Wooded/Forest	347	0
Brush/Grassland	0	0
Crop Land	0	0
Lawn/Landscaping	0	0
Impervious Surface (Plant Site)	0	0
Other (describe)	0	0
	(370)	(0)
(Subtotal)		
Areas Previously Disturbed by Mining Activity		0
Types 1 to 8 Wetlands	14	0
Wooded/Forest	0	0
Brush/Grassland	0	0
Crop Land	0	0
Lawn/Landscaping	0	0
Impervious Surface (Plant Site)	0	0
Other (Disturbed)	609	993*
Other (Tailings Disposal Area)	0	431
Deep Water	862	432
(Subtotal)	(1485)	(1855)
Total	**1855**	**1855**

Table 10-4. Cover Types – Overall Project Total

Cover Types (acres)	Before	After
Areas Not Disturbed by Previous Mining Activity		
Types 1 to 8 Wetlands	209	0
Wooded/Forest	728	0
Brush/Grassland	0	0
Crop Land	0	0
Lawn/Landscaping	0	0
Impervious Surface (Plant Site)	0	0
Other (describe)	0	0
	0	0
(Subtotal)	(938)	(0)
Areas Previously Disturbed by Mining Activity		
Types 1 to 8 Wetlands	26	0
Wooded/Forest	17	0
Brush/Grassland	890	0
Crop Land	0	0
Lawn/Landscaping	0	0
Impervious Surface (Plant Site)	0	0
Other (Disturbed)	1445	3326*
Deep Water	1431	1001
(Subtotal)	(3819)	(4757)
Total	**4757**	**4757**

*Post mining disturbed area will be a combination of additional deep water habitat,

reclaimed waste rock and overburden stockpiles, and roads. Immediate cover on uplands will be a mix of open rock face and grassland; longer-term will include forested areas.

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.

Natural Landscape. The project site is within the Northern Superior Uplands Ecological Section and within portions of two subsections, the Nashwauk Uplands and the Laurentian Uplands. Original elevations ranged between 1,425 and 1,635 feet, but mine pits and stockpiles have increased that range to between 1,300 and 1,700 feet. Habitats were identified through aerial photography and on-site vegetation and wetland surveys. No surveys have been conducted for fish or wildlife, but species typical for the observed habitats are discussed.

Fish Resources. Fish habitat includes mine pits, wetlands, and streams. The former mine pits that have filled with water and have barren rock shores, sometimes steep or vertical rock walls, and little or no shallow areas or vegetated shorelines. They are not managed as a fishery resource and are typically considered to have low habitat value for fish and wildlife. Streams include First Creek, Second Creek, the Partridge River, and a flowage identified as Unnamed Creek. Beaver dams are common on the streams, some of which are narrow with limited flow. Unnamed Creek flows through a wetland complex in the southwest portion of Area 2WX. This wetland complex includes open water habitats, some of which result from beaver dams. This type of habitat likely restricts species composition primarily to small, non-game fish. Wetland complexes, and associated streams such as Second Creek and Unnamed Creek, have emergent wetland vegetation, floating vegetation, and open water habitat. These areas provide shelter and reproductive habitat for non-game fish species, habitat for aquatic macroinvertebrates, and food resources for herpetofauna, waterfowl, water-dependent avifauna, and certain mammals.

The Partridge River discharges to the St. Louis River. Walleye, northern pike, white sucker, rock bass, largemouth bass, and numerous minnow species were sampled in 2005 at two reaches of the St. Louis River located near the mouth of the Partridge River. Although no surveys have been taken, it is likely that walleye and northern pike are present in the six-mile reach of the Partridge River between the St. Louis River and Colby Lake. It is also likely that walleye and northern pike use the lower portions of Second and First Creek at times, particular in the spring. A 1968 survey of Stephens Creek (tributary to Second Creek) sampled 1 small northern pike, 1 white sucker, and 1 Johnny darter by electro fishing in the most downstream sampling station. No information is available for Unnamed Creek, but it is possible that northern pike run up this creek. In general, these tributary streams likely provide rearing habitat for the larger fish species and likely support a variety of species of minnows and invertebrates.

Colby Lake supports a fishery that includes bluegill sunfish, northern pike, yellow perch, white sucker, walleye, black crappie, yellow bullhead, rock bass, channel catfish, and shorthead redhorse.

The project has the potential to affect aquatic resources from haul roads, mine pit dewatering, wetland conversion, and stream loss. Specifically:

Haul Roads. Project-related haul roads will cross Second Creek in two locations. These crossings currently exist and are proposed in lieu of new crossings. Stream crossings can provide opportunities for erosion and sedimentation, contaminant import, or dust deposition.

Dewatering. The project will include mine pit dewatering. Such discharges are proposed to First Creek, Second Creek, and Unnamed Creek, all of which flow to the Partridge River. Changes in flow can affect the distribution of riffles and pools on the receiving water as well as modify stream sinuosity (e.g., pattern of bends or curves) as well as water quality (e.g., sedimentation, turbidity). These changes can reduce habitat suitability for resident organisms.

Wetland Conversion/Stream Loss. Unnamed Creek flows through a wetland complex in the southeast portion of Area 2WX. This wetland complex includes open water habitats, some of which result from beaver dams. Expansion of the mine pits and stockpiles in Area 2WX will result in wetland conversion. Expansion of the Area 2WX stockpiles to the southwest will eliminate a reach of Unnamed Creek and associated aquatic and wetland habitats. Habitat loss/conversion has the potential to adversely affect fish resources that are present, including alteration of instream water quality and temperature.

Water flowing from overburden, waste rock and lean ore stockpiles has the potential to generate sediment that could reach natural waters. This could be mitigated by installation of sedimentation ponds where runoff would be collected and treated prior to discharge from the site; adherence to water quality Best Management Practices can also ameliorate potential concerns. Past experience with waste rock and lean ore from these mineral formations has shown no tendency to acid formation and none is expected from the proposed project. Project-related runoff is regulated by MPCA's NPDES Permit. Potential water quality impacts are described in Items 17 and 18.

Cumulative Effects. Cumulative effects to fish resources would come from changes in water quality or quantity due to mining-related activity. These issues are addressed in Items 13, 17, and 18.

Proposed Treatment of Topic in EIS:
This topic is minor, but will be discussed with limited information beyond that in the EAW. The EIS will describe fish and other aquatic resources using existing data; no new surveys will be conducted. The EIS will address the potential for establishment of a viable fishery in the mine pits at the conclusion of the project, including potential mitigation strategies available to achieve such an objective. Potential impacts from haul roads will be described.

A Rosgen Level 1 geomorphology assessment and hydrologic assessment will be conducted; see Items 12 and 13. Projected changes in stream morphology, especially from pit dewatering, will be considered in terms of impacts to fish and aquatic habitat. If adverse impacts are identified, the EIS will detail measures to avoid, minimize, or mitigate these impacts.

Impacts associated with project-related activity in Area 2WX to stream/wetland habitats will be qualitatively assessed. Mitigation for adverse impacts from these activities will be described.

Wildlife Resources. Habitat at the site reflects a mix of previously disturbed and relatively undisturbed areas; see Table 10-4.

Previously Disturbed Areas. Much of the project site consists of pits, stockpiles and haul roads from previous mining activities. These disturbed areas include open water pits, vertical rock faces, bare rock with little or no soil development, and vegetated areas. Plant communities in these disturbed areas range from sparsely vegetated barrens to seeded grasslands and young aspen forests to small wetlands formed in excavated depressions. Barrens are found in and around mine pits, haul roads and work areas. Scattered seedlings and saplings of trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*)

and white birch (*Betula papyrifera*) are present in rock crevices and microsites but are of limited stature. Groundcover is sparse to absent. Where some soil is present, saplings form a patchy, young woodland canopy with limited understory or shrub cover.

Reclaimed areas are present on the site. This was accomplished by depositing glacial till parent material and seeding ground cover at stockpiles and work areas. These communities are low-diversity grasslands dominated by smooth brome (*Bromus inermis*), timothy (*Phleum pratense*), poverty oatgrass (*Danthonia spicata*), and field milkvetch (*Astragalus agrestis*). Additional ruderal species are present including sweet clover (*Melilotus officinalis*), birdsfoot trefoil (*Lotus corniculatus*), foxtail barley (*Hordeum jubatum*), and occasional seedlings of balsam poplar.

On older stockpiles, woodlands have developed dominated by trembling aspen and white birch (4-8 inch diameter at breast height (dbh)) with a grassy groundcover dominated by bluejoint (*Calamagrostis canadensis*) and little shrub or subcanopy cover.

Relatively Undisturbed Areas. Native plant communities, not previously disturbed by mining operations, include upland deciduous forest and a variety of wetland types.

Upland forests are found on nearly level, moderately well drained, loamy soils with abundant rock fragments derived from the Rainy Lobe during Wisconsinan glaciation. The forests have an apparent history of cycles of intensive logging; this is evidenced by unimproved logging roads that run throughout the forested areas. Stands are even-aged and mid-successional, estimated to be younger than 50 years, with canopy trees up to 12-14 in dbh, although typically less than 10 in dbh. Snags and coarse woody debris are limited.

Repeated cycles of logging and disturbance limit the structural and species diversity of upland forests. Dominant canopy species include trembling aspen, white birch, and balsam poplar. Occasional red pine (*Pinus resinosa*), white pine (*Pinus strobus*), and balsam fir (*Abies balsamea*) are present. White spruce (*Picea glauca*), white cedar (*Thuja occidentalis*) and jack pine (*Pinus banksiana*) are uncommon to rare in these forests. The shrub and sapling layer is sparse to abundant and consists of species such as beaked hazel (*Corylus cornuta*), bush honeysuckle (*Diervilla lonicera*), raspberry (*Rubus occidentalis* and *R. strigosus*), mountain maple (*Acer spicatum*) and aspen and birch saplings. The ground layer is more diverse than the canopy layer, although it tends to be dominated by a few species common in northern forests such as wild sarsaparilla (*Aralia nudicaulis*), longstalk sedge (*Carex pedunculata*), bluebead lily (*Clintonia borealis*), Canada mayflower (*Maianthemum canadensis*), and star flower (*Trientalis borealis*).

A variety of wetlands are found on the project site including conifer swamp, hardwood swamp, bog, shrub-carr, wet meadow, and shallow marsh. See Item 12 for a more detailed accounting of onsite wetland resources.

The history of mining and logging on the site has reduced and modified the amount and quality of wildlife habitat. Large areas of mine-impacted land has limited habitat diversity and value, however, mine areas and roads may be used as travel routes. Upland forests have been clearcut one or more times, and most stands are now even-aged, mid-successional forests. Many of the wetlands on and around the project site are the least disturbed ecosystems in the area. These wetlands include wetland complexes of conifer swamp, shrub wetland, wet meadow, and open water habitats.

Fauna expected to be present include species typical to northern Minnesota. Studies of nearby sites, habitat descriptions, and anecdotal observations provide insight into wildlife species that are found, or are likely to be found, on the site. Although most of the site is disturbed by mining-related activity, the combined balance of forested upland and diverse wetland habitats provide likely habitat for mammals such as moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), coyote (*Canis latrans*), gray wolf (*Canis lupus*), bobcat (*Lynx rufus*), beaver (*Castor canadensis*), pine marten (*Martes americana*), fisher (*Martes pennanti*), mink (*Mustela vison*), red squirrel (*Tamiasciurus hudsonicus*), red fox (*Vulpes vulpes*), bats, snowshoe hare (*Lepus americanus*), small mammals, and possibly Canada lynx (*Lynx canadensis*). Bear scat was observed on the west side of Area 2WX, and three bears were spotted east of Area 2WX. Five wolves were observed east of the Area 2WX Pit. Wetlands may provide habitat for amphibians, great blue heron (*Ardea herodias*), common snipe (*Gallinago gallinago*), belted kingfisher (*Megaceryle alcyon*), and swamp sparrow (*Melospiza georgiana*). Forests and/or open areas may provide habitat for raptors, owls, woodpeckers, and numerous passerine bird species. Ruffed grouse (*Bonasa umbellus*) may also be present.

The project has the potential to affect wildlife resources in terms of mine pit and stockpile expansions, habitat fragmentation, habitat connectivity, and various operational impacts.

Mine Pit and Stockpile Expansions. The greatest potential impacts to wildlife habitat would occur as a result of expansion of mine pits and stockpiles in Area 2WX, ultimately converting wetlands and upland deciduous forests to open-water habitat and grassland/shrubland/young forest.

Habitat losses are projected to include upland deciduous forest, a reach of Unnamed Creek, and wetlands associated with that creek such as conifer swamp, shrub-carr, wet meadow, and open water habitat. Species that are fossorial, nest or roost in cavities, or are relatively immobile and could not avoid construction equipment would be killed during mine development. These include amphibians and reptiles, burrowing small mammals, rodents and other slow-moving mammals, and cavity nesting/roosting birds and bats. More mobile species, such as deer, moose, coyote, and birds would leave the area during construction, but would have to compete with other wildlife for food and shelter in newly-occupied sites. As a result, health and survivorship of these individuals could be lessened. If construction occurred during winter when most birds and bats are on wintering grounds or migrating, the number of wildlife killed during construction would be reduced. Displacement of resident species due to winter construction, however, would force these animals to seek new food and shelter sources during the time of year when these sources are most limiting and wildlife tend to be under greatest physical stress. Although direct impacts are expected to be mostly localized, given the history of development and other projects in the vicinity, a potential for cumulative effects is present as a function of habitat loss and/or conversion.

Habitat Fragmentation. Mining, in combination with roads, transmission lines, and railroads has fragmented wildlife habitat throughout the region. Construction and development of previous iron mines in the vicinity has converted much of the area to pits and stockpiles with limited value to wildlife. Waste rock stockpiles have begun to revegetate and provide some browse and cover for wildlife, but their value is greatly reduced compared to habitat that existed in the area prior to mining. Logging has virtually eliminated mature and older forests. Although this project will involve the loss of some wildlife habitat, the fragmentation impact is lessened because site development will involve previously disturbed sites, or will involve expansion of previous mine areas rather creation of entirely new mine areas.

Habitat Connectivity. The configuration and distribution of various habitat types can result in travel corridors that are important for the maintenance of viable wildlife populations for some species. A study completed for the DNR (EOR, 2006) suggests that a north-south wildlife travel corridor exists between

Area 2WX and Area 6 and passes to the east of Area 1; this may not be the only travel route in the project vicinity. The travel corridor has large blocks of contiguous wildlife habitat and native plant communities with limited landscape barriers.

This project will result in the direct loss of relatively little of the habitat in the travel corridor. Construction activities and increased traffic on haul roads east of Area 1 Pit may make wildlife less likely to move through the travel corridor. The travel routes of non-flying wildlife often follow logging or drilling roads, powerlines, road, and railroad rights-of-way, streams, and forest edges. The existing use of the travel corridor by wildlife is not known, nor how that usage compares to wildlife movement outside the corridor, in particular west of Areas 1, 9 and 6 or east of Areas 2WX and 1. In-pit stockpiling and reclamation activities may mitigate adverse effects to potential travel corridor impacts.

Operational Impacts. Mining and construction-related activity generate light and glare, noise, and traffic that can adversely affect wildlife species.

Light and glare would primarily be associated with mine buildings, active stockpiles and mine pits. Light and glare can benefit wildlife by attracting insects that are important to some species, such as bats. Light and glare, however, can affect the behaviors of wildlife and make some species more susceptible to predation at night. Most wildlife would avoid areas of the mine that are active and well-lit.

Noise from both construction and mining operations can affect wildlife. Species more sensitive to noise will be impacted more than more tolerant species; assessment of effects is somewhat subjective. Wildlife sense a range of sound frequency spectrums, many of which may be inaudible to humans. Wildlife also are known to habituate to noise, especially noises that are steady or continuous, such as noises that would occur at the mill. Wildlife are less likely to habituate to sudden, infrequent impulse noises, with greatest impact during breeding, roosting, and hibernation. Loud, sudden noises would be expected to displace a variety of wildlife found on the Mine Site, including deer, game birds, and small mammals.

A potential for traffic-related mortality is present from vehicle movement on the site. Wildlife injury and death are expected to occur from increased traffic volume on the roads. Information on the current number of wildlife killed annually on roads in the area is not known, but is likely small since the mines on the site are inactive. During mine construction and operation, vehicle traffic would increase on haul roads and on public roads leading to the mine. Thus, wildlife fatalities would be expected to increase during mine construction and operation. Amphibians, reptiles, and small and large mammals would probably be most affected. Habitat suitability for some wildlife would also be reduced near the facilities and roads due to vehicular traffic and noise.

The risks to wildlife of a spill during the transport of materials used for maintenance and operation of the mine, and during storage and use of the materials at the mine, would depend on the location of the spill and type and amounts of materials spilled. The management and use of these materials is described in the response to Item 20.

Cumulative Effects. Cumulative effects to wildlife and wildlife habitat include the effects from past and proposed activities on the project site and in the surrounding region. Previous mining activities on the site have led to the direct loss of some habitat and altered quality and type of other habitats. The proposed project will also lead to the loss and alteration of wildlife habitat. The expansion or reuse of previous mine facilities reduces the impacts from the current project compared to what might occur from development at a new location.

Impacts to wildlife habitat will result from other regional projects such as PolyMet's NorthMet project, Mesaba Energy, and expansion of the Laskin Energy Center. Those proposed projects, in combination with previous mining and the proposed Mesabi Nugget Phase II project, will likely alter the abundance and distribution of wildlife habitat in the regional landscape as well as the volume of traffic on public roadways.

Proposed Treatment of Topic in EIS:
This topic is significant, and information beyond what is in the EAW will be included in the EIS. The EIS will include a major discussion of this topic.

Project-Specific Analysis. Project-related impacts will be characterized in terms of:

- Results of available wildlife surveys;
- Quantification of specific types of habitat;
- Suitability and quality of habitats for common wildlife species; and
- Potential mitigation for impacts to wildlife species.

This discussion will make use of existing studies that are appropriate for identification of the potential impact. Examples of studies that may be used include data from the Copper-Nickel Study Plots and previous environmental impact documents for projects in the area.

Cumulative Effects Analysis. The overall cumulative loss of wildlife habitat in the Partridge River Watershed will be evaluated. Studies from the PolyMet Mining EIS will be updated and applied to the Phase II Project, which requires extending the PolyMet analysis to the confluence of the Embarrass River. The original, current, and expected future area of wildlife habitat cover will be tabulated. The EIS will identify potential impacts to wildlife resulting from covertype conversion, including habitat fragmentation and reduced connectivity, and travel corridor disruption.

The cumulative effects to wildlife habitat in the vicinity will be determined by use of the National Wetland Inventory Maps, USGS Quadrangle maps from 1949 and 1950 (prior to the beginning of taconite mining), Marschner's Original Land Cover Maps, and DNR Gap Analysis Program landcover data. The extent of land cover types will be tabulated and the current and expected future areas and percentages will also be determined.

The cumulative risk to wildlife from traffic collision will be estimated by considering current traffic volumes on public roadways and predicted increases in traffic from this and surrounding projects.

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? _X_ 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: ERDB20080111. Describe measures to minimize or avoid adverse impacts.

A search of the DNR Natural Heritage Information System (NHIS) Database revealed no known populations of state-listed species or other sensitive ecological resources within a mile of the project site. However, proximity

and habitat similarities to other mine sites suggest a strong likelihood that one or more protected species of animals and plants is present on the site.

Animals. Listed animal species include:

Bald eagle (*Haliaeetus leucocephalus*) is a state special concern species that is no longer included on the federal list of threatened and endangered species. No bald eagle nests are known to the NHIS database from the project vicinity. No impacts are anticipated.

Gray wolf (*Canis lupus*) is a state special concern species that is also no longer on the federal list. A pack of five wolves was seen west of the Area 2WX Pit. Gray wolves likely roam throughout the entire project site and surrounding vicinity. Wolf packs can be widely roaming with home ranges that greatly exceed the size of the project site. Minimal impacts are anticipated.

Canada lynx (*Lynx Canadensis*) is a federally threatened species that has been documented in St. Louis County, although the NHIS has no confirmed sightings from the project vicinity. The principal prey of the Canada lynx is snowshoe hare, whose habitat includes coniferous and mixed forests, especially where a thick understory is present such as in early successional forest stands. Most of the forest habitat on the project site has experienced cycles of clearcutting and are dominated by aspen and birch. Conifers are generally minor constituents of upland forests. These even-aged forests have limited structural diversity or coarse woody debris. The disturbance history of the upland forests may make them relatively low quality habitat for snowshoe hare, reducing the likelihood of lynx occurring on the project site. Stands of mature conifer swamp are present on the site, and these stands show evidence of limited selective logging rather than extensive clearcutting. They are of higher ecological quality than the upland forests and may provide some snowshoe hare and lynx habitat.

Impacts to Canada lynx are considered to be minimal because of habitat scarcity. The relative rarity of the animal makes traffic collisions unlikely.

Plants. Botanical surveys of portions of the project site were conducted on July 5-8 and August 13-16, 2007. The surveys were conducted by teams of 2 or 3 botanists. The searches took into consideration the current list of state-protected species and the changes proposed by the DNR. It is expected that proposed changes will take effect sometime in 2008

The survey areas were based on preliminary project boundaries. After the surveys were completed, some areas have been removed from the project layout, and other areas have been added. Consequently, the entire project site has not been exhaustively searched for the presence of protected plant species. It should be noted that no physical disturbance is projected for Area 9; impacts will be limited to possible water level changes. The areas surveyed were as follows:

Area	**Extent of Botanical Survey**	
	July 2007	**August 2007**
Area 1	None	Partial
Area 2WX	Partial	Partial
Area 6	None	Partial
Area 9	None	None
Area 2WX to Area 6 Haul Road	None	Partial
Area 1 to Area 2WX Haul Road	None	None

The first botanical survey occurred in the first week of July, near the end of the time appropriate for searching for species of moonworts in the genus *Botrychium*, several of which are state-listed. At the time of the survey, a known population of moonworts off-site was visited to determine if plants were still present. That population had several plants remaining, although some were senescent. On the Mesabi Nugget project site, one population of moonworts was found, although those plants also showed signs of senescence. Searches in other similar habitats did not locate additional populations of moonworts. However, because of the search dates and moonwort phenology, the failure to find moonworts cannot be interpreted as a reliable indication that populations are not present. The possibility that plants are present but lacked above-ground structures at the time of the survey cannot be excluded. It is common that *Botrychium* species of moonworts and grapeferns co-occur, so the presence of a non-listed species may indicate that appropriate habitat is present for listed species. The occurrence of a non-listed species, *Botrychium multifidum*, on the project was documented, and locations were exhaustively searched for additional species of *Botrychium*.

In addition to *B. multifidum*, five plant species were found that are currently, or are proposed to be, listed as state endangered, threatened or special concern; see Figure 11-1. Five populations of *B. multifidum* were located. Most populations consisted of only a few individuals. These small populations are found on the east side of the Area 2WX Pit, north of the Area 2WX Pit, along the haul road between Areas 2WX and 6, and west of Areas 1 and 9. A population of approximately 200 individuals was found in and near the northwest corner of Area 2WX and along the eastern end of the haul road between Areas 2WX and 6.

The *B. multifidum* site north of the Area 2WX Pit includes two moonwort species that are currently state-listed or are proposed for listing. This site is a small clump of saplings of balsam poplar and quaking aspen with sparse ground cover between the edge of a stockpile and a haul road. Under the partial sapling canopy, one individual of *B. pallidum* (currently state endangered; proposed state special concern) was found and seven individuals that have been putatively identified as *B. ascendens* (currently non-listed; proposed state endangered). Until recent years, *B. ascendens* was unknown in Minnesota. It is widespread in western North America with a limited number of more easterly localities. It has been found at a very few locations in Minnesota, and for this reason, the DNR has proposed listing it as a state-endangered species.

One species of state-listed grapefern was documented: *Botrychium rugulosum* (currently state threatened; proposed state special concern). Three populations of *B. rugulosum* were found, all in close proximity to populations of *B. multifidum*. The populations of *B. rugulosum* were all small, consisting of 2-3 individuals. Two of the populations occur under partial canopy of balsam poplar along the haul road between Areas 2WX and 6. The final population is near a haul road west of Area 9.

Two additional species that are listed as special concern species were documented in wetlands on the project site. Both of these species are special concern on the current and proposed state lists. Three populations of *Carex flava*, were found in a conifer swamp at the southwest edge of Area 2WX. At least 200 flowering stems of yellow sedge were observed among the three populations. The plants were found under a partial canopy of black spruce on saturated organic soil with abundant *Sphagnum* hummocks.

Torrey's manna-grass, *Torreyochloa pallida,* was found in two seasonally inundated wetlands. Two populations totaling approximately 200 ramets were found at the edges of mud flats in a wetland east of Area 2WX. The wetland was inundated in June, but no standing water was present in August. This wetland was included within the project boundaries in a preliminary site design, but it is not included in the final site design. The third population is found in a wetland near the northwest corner of Area 2WX, on the south side of the haul road

between Areas 2WX and 6. The population extends over at least 50 m of the wetland, and ramets are locally abundant. More than 1,000 flowering stems were present.

The conservation status and occurrence observed species at the site is reported in Table 11-1 according to both the current and proposed state lists. See Table 11-1.

Impacts to protected plant species may occur through alteration of habitat and destruction of existing populations. Because many species of *Botrychium* depend on some level of ecosystem disturbance, and populations are frequently found in early successional habitats in roadsides or near stockpiles, it is reasonable to expect that mine operations and post-mine reclamation will create pockets of habitat appropriate for some protected species. The dependence of the species on periodic disturbance suggests that the species persist in a landscape as a metapopulation with establishment and extinction of populations as microsite characteristics change. DNR's Takings Permit regulates potential impacts to State-listed Endangered and Threatened Species.

Cumulative Effects. Cumulative effects to protected species include the effects from past and proposed activities on the project site and in the surrounding region such as road construction, PolyMet, Mesaba Energy, and expansion of the Laskin Energy Center. Those proposed projects, in combination with previous mining and the proposed Mesabi Nugget Phase II project, may alter the abundance and distribution of protected plant species in the regional landscape.

Proposed Treatment of Topic in EIS:
The topic is significant, and information beyond what is in the EAW will be included in the EIS.

Project-Specific Analysis. A more complete description of potential lynx habitat will be described in the EIS.

The EIS will include a major discussion of the topic of impacts to protected plant species including:

- Results of more extensive surveys for protected plant species;
- Evaluation of alternative project layouts that may avoid or reduce possible impacts to some populations of protected plan species; and
- Potential mitigation for unavoidable impacts to protected species.

The EIS will use more complete information on species present and population sizes and locations to assess potential project-related impacts and identify options for minimization and mitigation.

Mitigation measures for protected plants to be discussed should include, but not be limited to: preservation and monitoring of existing populations to the extent possible; monitoring of habitat characteristics; and periodic site surveys to document any new populations that may establish. Relocation of populations should be considered a last resort option because of the low probability of relocation success. Preservation of existing populations is preferred whenever possible. Such preservation should include not only the current population but also enough area for colonization of new microsites as woody plant succession closes the canopy. Another option would be to manage vegetation through selective cutting or pruning of woody plants to maintain a moderate level of canopy closure appropriate for *Botrychium* species, although this is an untested option.

Cumulative Effects Analysis. Protected plant species losses from other projects with the potential to affect

Table 11-1. State-Protected Plant Species on the Mesabi Nugget Project Site

Common name	Scientific Name	Federal Status*	State Status*	Proposed State Status*	Occurrence	Abundance and Distribution	Habitat
Upswept moonwort	*Botrychium ascendens*	N	N	E	North end of Area 2WX	1 population, 7 individuals	Under saplings at edge of stockpile
Leathery grapefern	*Botrychium multifidum*	N	N	N	East side of Area 2WX; NW corner of 2WX; along haulroad between Areas 2WX and 6	5 populations, >200 individuals	Under saplings at edge of stockpile and roads; upland forest
Pale moonwort	*Botrychium pallidum*	N	E	SC	North end of Area 2WX	1 population, 1 individual	Under saplings at edge of stockpile
St. Lawrence grapefern	*Botrychium rugulosum*	N	T	SC	Along haulroad between Areas 2WX and 6; west of Area 9	2 populations, 6 individuals	Under saplings at edge of road
Yellow sedge	*Carex flava*	N	SC	SC	SW portion of Area 2WX	3 populations, ~200 ramets in wetlands on the	Conifer swamp
Torrey's manna-grass	*Torreyochloa pallida*	N	SC	SC	Northwest edge of Area 2WX and east of Area 2WX	3 populations, >1000 ramets	Seasonally inundated wetlands

*E = Endangered; T = Threatened; SC = Special Concern; N = Not Listed.

species of interest will be included in a cumulative effects analysis if data are available from the DNR. Data may include information on population sizes, locations and demographic structure from new records in the NHIS database, new records not yet recorded in the NHIS database, and takings permits for regional projects. The risk of decline of a species will be evaluated in the context of the project site, the region, and the state.

Reference

Emmons & Oliver Resources, Inc. (EOR). 2006. *Cumulative Effects Analysis on Wildlife Habitat and Travel Corridors in the Mesabi Iron Range and Arrowhead Regions of Minnesota*. Prepared for the Minnesota Department of Natural Resources. May, 2006.

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? _X_ 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.

No lakes occur within the project boundary. Previous mine pits have become deep water habitats. The water body of the Area 9 Pit includes what was formerly Little Mesaba Lake. Numerous wetlands and several streams are within the project footprint or are crossed by haul roads. State Protected Waters include: First Creek; Second Creek; Unnamed Creek; Unnamed Wetland (69-250W); Colby Lake (69-249P); and Partridge River.

Natural Landscape. The site is located in the St. Louis River watershed, encompassing portions of minor watersheds including First Creek, Second Creek, Unnamed Creek, and the Partridge River. The entire site drains to the south towards Colby Lake and/or the Partridge River. The project site and surrounding vicinity consist of a mosaic of upland areas on loamy glacial till interspersed with wetlands and wetland complexes. The pre-settlement topography had little relief with original elevations ranging between 1,425 and 1,635 feet, but mine pits and stockpiles have increased that range to between 1,300 and 1,700 feet. Native wetland soils are typically level organic soils overlaying mineral glacial till. Wetland soils range from shallow muck to very deep peat, and in some landscape positions, organic soils are stratified with thin layers of alluvial mineral deposits.

Wetland Resources. Wetlands occurring within the project area were identified by a combination of on-site wetland identification and off-site methods using aerial photography, National Wetland Inventory (NWI) maps, soil survey maps, and topographic maps. The wetlands were classified using the Eggers and Reed Wetland Classification Method and the US Fish and Wildlife Service Circular 39 Wetland Classification System. Many of the wetlands on the project site have been impacted by previous mining activities. These impacts include partial fill for haul roads and altered hydrology through artificial impoundment or dewatering from pit excavation. Additionally, some wetlands in areas previously altered by mining are incidental wetlands resulting from impoundment or collection of water in artificial basins.

Common wetland types found on the site are listed below along with typical dominant and associated vegetation:

Type 2, Wet Meadow. Canada bluejoint grass (*Calamagrostis canadensis*), lake sedge (*Carex lacustris*), tussock sedge (*Carex stricta*), and red raspberry (*Rubus strigosus*), with scattered willows (*Salix spp*.), speckled alder (*Alnus rugosa*), and sphagnum mosses (*Sphagnum* spp.).

Type 3, Shallow Marsh. Cattails (*Typha* spp.), bur-reed (*Sparganium eurycarpum*), and bulrushes (*Scirpus* spp.).

Type 6, Shrub-Carr. Speckled alder, black spruce (*Picea mariana*), bunchberry *(Cornus canadensis*), Labrador tea (*Ledum groenlandicum*), and sphagnum mosses.

Type 7, Coniferous Swamp. Black spruce, tamarack (*Larix laricina*), occasional white cedar (*Thuja occidentalis*), speckled alder and sphagnum mosses.

Type 7, Hardwood Swamp. Black ash (*Fraxinus nigra*), black spruce, speckled alder, cinnamon fern, woodland strawberry (*Fragaria vesca*) and sphagnum mosses.

Type 8, Bog. Low-stature ericaceous shrubs such as Labrador tea, leather leaf (*Chamaedaphne calyculata*), and bog rosemary (*Andromeda glaucophylla*); scattered tamaracks and black spruce and a continuous ground layer of sphagnum mosses,

Wetlands often occur as complexes with multiple wetland types reflecting varying edaphic and hydrologic conditions. Conifer swamps are primarily found in wetland complexes, associated with shrub-carr and wet

meadow. Hardwood swamps occur mostly in depressions in what is otherwise upland glacial till. Bog communities are found in wetland complexes or as fragments that have been isolated by past construction of mine haul roads. Shrub-carr and wet meadows often occur in transitional positions between uplands, conifer swamps, and open water marshes and streams. Shallow marshes are found in wetland complexes between wet meadows and open water habitats and also in depressions formed from previous mining activities. In wetland complexes, they occur on deep peat or muck and support a variety of native wetland species. In disturbed areas, marshes occur on shallow organic soils above an impermeable rock substrate and support a relatively low diversity of plant species.

Table 12-1 lists wetlands by the predominant wetland community type in each project area. Figures 12-1, 12-2, and 12-3 show the distribution of wetlands within the project areas.

Direct impacts to wetlands are principally due to wetland loss from: excavation of mine pits; deposition of tailings, overburden, and rock; construction of plant facilities; and expansion of haul roads. It is estimated that approximately 289 acres of wetlands will be directly affected by the project; see Table 12-1. These estimates are conservative where it was assumed that all wetlands within the overall project boundary would be affected. The actual acreage and wetland types will be determined after completion of future on-site wetland identification, delineation, and characterization within all project areas. Opportunities for avoiding impacts within the project area will be evaluated once delineations have been completed and detailed project planning is being conducted.

Indirect wetland impacts may result from partial filling, excavation, and altered hydrology caused by adjacent mine pit dewatering. Partial fill into wetlands could provide an opportunity for colonization of the remaining area by exotic or invasive species; expansion of such species is undesirable. Altered hydrology, through impoundment, changing the watershed area, or dewatering, could affect the wetland functions and values, including vegetation and wildlife habitat. Increased hydrology could result in mortality of existing vegetation and establishment of low diversity vegetative communities. Reduced hydrology could result in the conversion to drier wetland communities or upland communities, or a decrease in abundance of native wetland species. The magnitude and location of indirect impacts to wetlands from the project have not been estimated.

Avoidance and/or minimization of wetland impacts in future mine planning will be attempted where practicable. Due to operational requirements of the mining operations, opportunities to avoid wetlands may be limited. Detailed analysis will be conducted to determine the level of mitigation that will be needed for project-related impacts.

The overall wetland mitigation program will be defined at the beginning of the project and implemented in approximately 5-year increments. Detailed wetland mitigation plans will be developed for inclusion in the EIS to compensate for the unavoidable wetland impacts planned during at least the first five years of the project. Conceptual wetland mitigation plans will be developed for inclusion in the EIS to compensate for the unavoidable wetland impacts planned during the remainder of the project. The search criteria/methodology for locating potential wetland mitigation sites will be developed and approved by the USACE and MPCA for EIS- and permitting-related purposes.

Wetland mitigation planning will follow requirements of the Wetland Conservation Act (Minnesota Rules Chapter 8420), Section 404 of the Clean Water Act, and wetland mitigation measures required by Minn. Rules part 7050.0186. Mitigation opportunities identified at the project site, and within the St. Louis River Watershed, will be given preference. If insufficient opportunities are identified in those areas that are feasible

Table 12-1. Wetlands and Deep Water Habitats on Project Site

Wetland Type /Area*	Area (acres)
Areas 1 and 9	
Type 2, Wet Meadow	0.5
Type 3, Shallow Marsh	13.1
Type 6, Shrub-Carr	0.8
Type 7, Coniferous and Hardwood Swamp	22.6
Type 8, Bog	0.0
Deep water habitats (mine pits)	862.2
Area 1 Total Wetlands	**36.9**
Area 1 Total Wetlands and Deep Water Habitats	**899.2**
Area 2WX	
Type 2, Wet Meadow	1.6
Type 3, Shallow Marsh	0.4
Type 6, Shrub-Carr	9.4
Type 7, Coniferous and Hardwood Swamp	112
Type 8, Bog	29.9
Deep water habitats (mine pits)	368.1
Area 2WX Total Wetlands	**153.3**
Area 2WX Total Wetlands and Deep Water Habitats	**521.3**
Area 6	
Type 2, Wet Meadow	5.8
Type 3, Shallow Marsh	14.7
Type 6, Shrub-Carr	1.5
Type 7, Coniferous and Hardwood Swamp	23.2
Type 8, Bog	0.0
Deep water habitats (mine pits)	201.1
Area 6 Total Wetlands	**45.2**
Area 6 Total Wetlands and Deep Water Habitats	**246.3**
Total	
Type 2, Wet Meadow	7.8
Type 3, Shallow Marsh	28.2
Type 6, Shrub-Carr	11.7
Type 7, Coniferous and Hardwood Swamp	157.8
Type 8, Bog	29.9
Deep water habitats (mine pits)	1431.4
Project Total Wetlands	**235.4**
Project Total Wetlands and Deep Water Habitats	**1666.8**

*Wetlands are classified according to the predominant type within a wetland or wetland complex. Acreages are estimates based on a combination of onsite and offsite identification.

and prudent, the search will expand to adjacent watersheds. Mitigation planning efforts will focus on replacing wetland impacts with similar wetland communities and ahead of the impacts where practicable. Compensatory wetland mitigation will be conducted at ratios consistent with the Corps of Engineers wetland mitigation policy and the Minnesota Wetland Conservation Act requirements.

Stream Resources. Streams at the site include First Creek, Second Creek, and Unnamed Creek.

First Creek is located southwest of Area 6. First Creek originally flowed out of Little Mesabi Lake, to the southeast towards the Partridge River. The upper reach of this stream has been heavily impacted by previous mining activities by reduction of the stream's watershed and by fill and channelization.

Second Creek is located east of Area 6, west of Area 2WX and south of Area 1. It flows through a series of wetland complexes to the south and southwest towards the Partridge River. The stream is crossed by several existing mine haul roads.

Unnamed Creek is found southwest of Area 2WX, flowing through a wetland complex towards Colby Lake. Unnamed Creek formerly flowed from headwaters in wetlands east of the LTVSMC Plant site; a large portion of the creek was eliminated by development of the Area 2WX Pit and associated stockpile construction.

Each of these streams is listed on the DNR Public Waters Inventory (PWI). The PWI also includes a wetland in the course of Second Creek at a point just downstream from the haul road between Areas 1 and 2WX (Unnamed 69-250W). Colby Lake and the Partridge River are both outside of the project boundary but may receive outfall discharges from the site. Table 12-2 and Figure 12-4 summarize PWI resources.

Potential environmental effects to all Protected Waters, which are streams, lakes, rivers, and wetlands specifically listed by the State of Minnesota, are summarized in Table 12-2. Project-related activity that changes or diminishes the course, current, or cross section of public waters by any means, including filling, excavating, or placement of materials into the bed, is regulated by a DNR Public Waters Work Permit.

Table 12-2. Potential Impacts to Protected Waters

Name	Public Water Inventory Status	Type of Potential Impact
First Creek	Public Water Stream—flows south to Partridge River	Reduction in watershed, alteration of groundwater due to pit dewatering, and excavation. Construction of outfall and subsequent pit dewatering discharges from Area 6 Pit, Area 6NW Pit, and Area 6SW Pit.
Second Creek	Public Water Stream—receives flow from an unnamed wetland (69-250W) and flows to the Partridge River	Fill due to creation of haul road, placement of culvert, or culvert extension on Area 1 – Area 2WX haul road and Area 2WX – Area 6 haul road. Construction of outfall and subsequent dewatering discharge from Area 6 and Area 2WX Pits. Possible changes to discharge of project wastewater at SD-001. Possible alteration of groundwater due to Area 6 Pit dewatering.
Unnamed Wetland (69-250W)	Public Water Wetland—Second Creek flows through this wetland	Possible changes to discharge of project wastewater at SD-001.
Unnamed Creek	Public Water Stream—flows to Colby Lake (69-249P)	Reduction in watershed; stream eliminated due to Area 2WX stockpile expansion; construction of outfall and subsequent dewatering discharge from Area 2WX.
Colby Lake (69-249P)	Public Water Lake	Possible discharges from mine pit dewatering (either directly or via Unnamed Creek).
Partridge River	Public Watercourse	Possible discharges from mine pit dewatering (either directly or via tributaries mentioned above).

Additional Water Resources. Water-filled pits, which are deep water habitats from previous mining activities, are present in Area 1, Area 2WX, Area 6, and Area 9; see Table 12-1 and Figures 12-1, 12-2, and 12-3. Although inactive in recent years, the mining companies have maintained applicable permits in anticipation of possible future mining and dewatering activities. The proposed project will not directly affect Area 9; indirect effects are possible due to nearby dewatering of the Area 6NW Pit and the dewatering previously permitted in Phase I to lower the water level of the Area 1 Pit.

Area 2WX and Area 6 Pits currently exist and are filling with water. The East Range Hydrology Study (DNR, 2004) predicted that Area 2WX Pit would overflow to the southwest to Unnamed Creek at Elevation 1,455 sometime between the years 2013 and 2017. Water levels would be approximately 50 feet above those observed in 2004 and 34 feet above levels of March 2008. Likewise, the Area 6 Pit was predicted to overflow, also at a design Elevation 1,455, toward Second Creek sometime in late 2008 or early 2009. In March 2008, the water level had reached Elevation 1,457.7 so overflow is imminent or possibly underway on an intermittent basis; it may occur either overland (e.g., diffuse flow through wetland) or through shallow sand and rock. The Area 1 Pit is already overflowing at about Elevation 1,547, thus flowing to Second Creek by seepage through a road embankment on the southeast side of the pit. All of these pits are characterized by deep water and steep rock walls with little or no littoral area or vegetation.

These existing mine pits will be affected by the project. Anticipated effects are listed below:

- Partial filling of Area 1 Pit with tailings. The placement of tailings in the Area 1 Pit offers the possibility of creating wetland areas and possible littoral habitat at the completion of mining through planned placement of tailings. This could serve as partial mitigation of wetland impacts associated with the proposed project.

- Dewatering and enlargement of Area 2WX Pit and Area 6 Pit. During the project, the Area 6 and Area 2WX Pits will be dewatered and enlarged. Additional excavations will occur at Area 6SW and Area 6NW Pits. At the conclusion of the project these pits will be allowed to re-fill with water, creating a substantially greater amount of deepwater habitat of comparable value to the current pits. In-pit stockpiling of overburden and waste rock, if feasible, has the potential to enhance the value of the post-project pits by creating littoral areas that may be of value to fish and wildlife. In the past, such stockpiling has been hampered by the need to compensate owners of the remaining underlying mineral rights.

- Possible water level decrease in Area 9 Pit from dewatering of Area 1 Pit and Area 6 and Area 6NW Pits, and possible outfall to Area 9 Pit from Area 6NW Pit dewatering. The water level of the Area 9 Pit will likely be lowered to somewhere between the minor lowering of Area 1 Pit (by about 20 feet) and the complete lowering of Area 6 Pit (over 100 feet). The groundwater flow model proposed to be created for the EIS (see Item 13) would assist in determining this effect. No physical changes are proposed to the Area 9 Pit and at the conclusion of the project the pit will refill. If pit dewatering from Areas 6 and 6NW Pits is directed to the Area 9 Pit, this lowering of water levels could be reduced.

Greater discussion of the project's potential effects on hydrology and water quality of deepwater habitats provided by onsite mine pits is provided in response to Items 17 and 18.

Cumulative Effects. Cumulative effects to wetlands include the effects from past and proposed future activities on the project site and in the Partridge River Watershed. Previous mining activities on the site have led to the direct loss of certain wetlands and altered quality and type of other wetlands. The proposed project will also lead to the loss and alteration of wetlands. The expansion or reuse of previous mine facilities reduces the impacts from the current project compared to what might occur from development at a new location.

Impacts to wetlands will result from other regional projects such as road construction, PolyMet's NorthMet Project, Northshore Mine expansion, Mesaba Energy, and expansion of the Laskin Energy Center. Those proposed projects, in combination with previous mining and the proposed Mesabi Nugget Phase II project, will alter the abundance and distribution of wetlands in the regional landscape. Discussion of cumulative effects to hydrology and water quality of other, non-wetland water bodies is provided in response to Items 13, 17, and 18.

Proposed Treatment of Topic in EIS:
The topic is significant, and information beyond what is in the EAW will be included in the EIS.

Project-Specific Analysis. The EIS will provide a major discussion of this topic including:

- Impacts to open water areas and deepwater habitats (e.g., mine pits);
- Wetland impacts;
- Wetland impact avoidance and minimization; and
- Wetland mitigation.

Wetland impacts will be quantified after completion of additional on-site wetland identification and characterization. Impacted wetlands will be categorized according to primary and secondary type and relative quality. Hydrologic monitoring of wetlands in the vicinity of pits will be conducted and the data will be provided for use in preparing the EIS and as baseline data for future monitoring of impacts. Indirect impacts from dewatering and watershed reduction along with cumulative effects will also be estimated and discussed. The EIS will suggest monitoring and mitigation where warranted. The feasibility of in-pit stockpiling to avoid wetland impacts at Area 2WX and Area 6 will be evaluated. The possibility of using tailings disposal or in-pit stockpiling and mineland reclamation procedures to produce viable wetland and aquatic habitats in the pits at project mid-life will be evaluated.

The EIS will also assess project-related impacts to Public Waters in terms of changes in the course, current, or cross-section of affected waters; see Item 13. Mitigation for adverse impacts will be identified.

Cumulative Effects Analysis. The overall cumulative loss of wetlands in the Partridge River Watershed will be evaluated by updating similar studies to be completed for the PolyMet Mining EIS and extending the analysis to the confluence of the Embarrass River. The original, current, and expected future area of wetland cover and percentage of watershed land cover in wetland will be tabulated.

The cumulative loss of wetlands in the Partridge River Watershed will be determined by use of the National Wetland Inventory Maps, USGS Quadrangle maps from 1949 and 1950 (prior to the beginning of taconite mining) and Marschner's Original Land Cover Maps. This analysis will require assessment of change at the subwatershed level, (e.g., First Creek). The area of wetland and the percentage of land cover in wetland will be tabulated for each watershed and the current and expected future areas and percentages will also be determined.

Reference

Adams, J.L., R.T. Leibfried, E.S. Herr, 2004. *East Range Hydrology Project, Final Report.* Minnesota Department of Natural Resources, March, 2004.

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)? _X_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.

The proposed project will require a significant quantity of water. An overview of the plant water balance is provided below and on Figure 13-1. Process water will be supplied from existing taconite pits under DNR water appropriation permits; new permit applications will be needed for Phase II. Excess water from the dewatering of the pits will be discharged in compliance with existing NPDES permits. The project will require no connection to public water supplies, nor will any wells be abandoned.

Project-related water use is described in terms of the process plant water balance, water appropriations, and wells and public water supply.

Process Plant Water Balance

The proposer has developed a preliminary water balance to describe water-related operations of the process plant and tailings basin. The methodology is similar to that used for other mining-related projects. The pit hydrology is based on previous studies; no new data was collected for this EAW. The following assumptions were used for pit hydrology:

- Average annual precipitation is 28" based on 1930-2000 records from the area.
- Average water surface evaporation in the area is approximately 20.5" based on NOAA Technical Report NWS 33.
- Average watershed runoff is 11" based on data DNR modeling in the area (Adams et al., 2004)

While the water balance presented here is preliminary, it does identify the major sources and sinks for water in the process and provides a general estimate of flow magnitude.

Project-related water use in processing can be functionally characterized in terms of two operations: the proposed concentrator process and the previously permitted nugget process. The process plant as a whole will be a net consumer of water. The plant will use recirculated process water where possible. Make-up water will be supplied from the Area 1 Pit. In the unlikely event of a shortage of makeup water, additional water pumped from the Area 6 and Area 2WX Pits could be used. Figure 13-1 summarizes the plant water balance during on-going mining operations (after pit dewatering is complete). The role of the Area 1 Pit is also relevant to this discussion.

Concentrator Process. The water use in the concentrator is included in Figure 6-4. There are two sources of water to the concentrator process. A small volume of water will enter the concentrator process with the ore and

larger amounts of water will be withdrawn from the Area 1 Pit. The water required for the concentrator process includes the water needed to transport tailings and clean water needed directly by the plant for uses like pump seal water, floor wash, dust control and fire protection. The clean water uses are minor and generally non-consumptive, or in other words the source of this water will be Area 1 Pit and the water will be discharged back to the Area 1 Pit following use; these flows are not quantified here. Water leaves the concentrator process either with the concentrate to the nugget process or with the tailings to the western end of the Area 1 Pit. Prior to being discharged to the Area 1 Pit, the tailings go to a thickener. Water balance components are shown on Figure 13-1.

Nugget Process. The previously permitted nugget process takes make-up water from the Area 1 Pit. As described above, a small amount of water enters the process with the concentrate. An additional amount is created by condensation of water vapor created by fuel combustion. The primary loss of water from the process is through evaporation associated with the cooling towers for both the machinery cooling water and scrubber water return. In order to help prevent build-up of chemicals within the process water, plant process water, including blowdown from scrubbers, is sent to a waste-water treatment plant as described in response to Item 18. Approximately 75 percent of the stream that reports to the waste-water treatment plant is returned to the concentrator process. The remaining 25 percent is discharged to the Area 1 Pit.

Table 13-1. Previous Water Appropriations Permits

Permit Number*	Source	Use	Maximum Pumping Rate (gpm)	Maximum Annual Rate (MGAL)	Preliminary Proposed Pumping Rate (gpm)	Current Permit Holder
79-2204	Area 2WX Pit	Mine Dewatering	20,000	10,512	8,000 (initial dewatering) 1,300 (maintenance dewatering)	Mesabi Nugget
73-5185	Area 6 Pit	Mine Dewatering	4,000	1,050	10,000 (initial dewatering) 2,800 (maintenance dewatering)	Mesabi Nugget
73-5182	Area 1 and Area 9 Pits	Mine Dewatering	12,000	3,049	N/A	Mesabi Nugget
05-2058	Area 2WX Pit and Area 1 Pit	Metal Processing	5,000	2,628	1,000 to 5,000 (during operation)	Mesabi Nugget

*Issued to Cliffs-Erie, LLC.

Area 1 Pit. The Area 1 Pit will be used both for water supply for the plant and for disposal of tailings from the concentrator. The tailings will be deposited from west to east, leaving a clear water basin in the eastern portion of the pit. Following closure of the LTVSMC plant in 2001, the water level in Area 1 Pit has stabilized at approximate elevation 1,547 ft-msl, (Adams, et. al., 2004). The pit currently has an uncontrolled discharge on the southeast side, flowing through coarse road and railroad fill, with the water ultimately reaching Second Creek. During plant operations, the water level in the Area 1 Pit will be maintained at an elevation below the outlet elevation in order to prevent uncontrolled discharge from the pit and to handle temporary storm events or unforeseen water quality changes.

The Area 1 Pit will receive water from the tailings discharge from the concentrator and from the wastewater treatment plant associated with the nugget process. Deposition of tailings in the pit will displace additional water. The pond of water within the Area 1 Pit will be reduced in area as tailings are deposited but should have an area of at least 540 acres, resulting in an average annual net influx of about 200 gpm for net precipitation less evaporation. This may be slightly increased by additional water gain from Area 9 Pit, which is thought to have a

close connection to the Area 1 Pit. The watershed area contributing runoff to Area 1 Pit is approximately 4,000 acres, resulting in an average annual runoff input of 1,900 gpm.

The Area 1 Pit also receives an estimated net groundwater inflow of approximately 1,900 gpm (based on flow measurements from November 2004, when the pit had stabilized at the current overflow level). A better estimate of groundwater inflow will be developed as part of the water balance for the Area 1 Pit and other pits; this estimate will be based on historic pit filling records, precipitation, and temperature data. When the water level in the Area 1 Pit is lowered as allowed by the NPDES permit for the Nugget facility, it is likely that there will be less and perhaps no groundwater outflow from the pit. This will be determined as part of the water balance and groundwater analysis conducted for the EIS.

The water balance will look at a range of scenarios, including current conditions, conditions during operation, and post-closure conditions. During the operation of the project, the Area 1 Pit may also receive discharge from the dewatering of the Areas 2WX and 6 Pits if needed for water supply. Excess water from the east side of the Area 1 Pit will be pumped to Second Creek (in accordance with NPDES permit #0067687), as described in response to Item 18.

Water Appropriations

Project-related water appropriations require consideration of the area's general hydrogeology, existing appropriation permits, and hydrology of the Area 1 Pit, Area 2WX Pit, and Area 6 Pit.

General Hydrogeology. The geology in the vicinity of the Site can be characterized as a thin cover of Rainy Lobe till overlaying the Biwabik Iron Formation. In general, groundwater elevations are believed to be a subdued replica of bedrock topography, with areas of high groundwater coinciding with bedrock hills. As such, groundwater flow directions are likely similar to surface water flow directions. Groundwater flow is believed to occur primarily within the surficial deposits, as is discussed below, but groundwater flow within the bedrock may be locally significant. Approximate water table elevations, based on pit water levels, stream water levels, and water levels reported for area wells, are shown on Figure 13-2.

Existing Appropriations Permits. Cliff-Erie, LLC was issued water appropriation permits for the dewatering of the Areas 1, 2WX, 6, and 9 Pits. In 2005 Mesabi Nugget, LLC received a new appropriation permit to withdraw water from the Areas 2WX and 1 Pits for industrial use under Phase I. Previous appropriation permits issued to Cliffs-Erie, LLC are listed in Table 13-1. In Phase II, additional water appropriations may be needed from the Area 1 Pit to meet the increased demand from the plant. Additional appropriations will likely be needed from the Area 6 Pit in order to dewater the pit prior to mining. New or amended permits will be required for the project.

Area 1 Pit. The hydrology of the Area 1 Pit was discussed above. As shown in Figure 13-1, the conceptual water balance estimates that an average of approximately 7,400 gpm will be pumped from the Area 1 Pit to the plant, while 5,900 gpm will be discharged into the pit from the plant. These values reflect withdrawals and discharges to the pit only, not other losses of or internal recycling of that same water. Additionally, 976 metric tonnes per hour of tailing with a specific gravity of roughly 3.00 will be deposited in the western portion of the pit, which will displace approximately 1,450 gpm of water until tailings levels exceed the current water level. After that time, tailings deposition will tend to trap pore water and require additional make-up water. Excess water from the Area 1 Pit will be pumped to Second Creek. The discharge from this outfall will be

approximately 5,000 gpm, however this may vary with climate and will be subject to the ability to meet NPDES permit requirements for mercury.

Area 2WX Pit. The Area 2WX Pit has two sub-basins that combine to form a single pit at an elevation of approximately 1,410 ft-msl. The total watershed area for this pit is 1,027 acres, (Adams et al., 2004). The pit was completely dewatered until the shutdown of the LTVSMC plant in 2001; it is now slowly refilling. A 2004 hydrology study of the LTVSMC pits indicated that the majority of the groundwater currently entering this pit flows through the unconsolidated deposits and originates from Second Creek, with only a small amount of inflow coming from the Biwabik Iron Formation. Water balance values representative of conditions that can be expected during operations are shown on Figure 13-1.

It will be necessary to dewater Area 2WX Pit prior to mining. Pit dewatering will be conducted up to a maximum pumping rate of 20,000 gpm, and an annual pumped volume of 10,512 million gallons per year, if permitted. The volume of Area 2WX Pit is estimated to be 15,220 acre-ft from the bottom of the pit to elevation 1,430 ft-MSL, which is the assumed elevation at the start of initial dewatering (Adams et al., 2004). It is anticipated that the pit could be dewatered over the course of 18 months at a rate of 8,000 gpm. The initial dewatering flows could be transferred to Unnamed Creek, Second Creek, or the Partridge River subject to NPDES permit flow requirements for individual discharge points; see Item 17. It is proposed to direct dewatering flows to Unnamed Creek since it is the closest stream; it historically received dewatering flows from Area 2WX Pit and will not receive discharges from other pits. Preliminary surveys indicate that it has a low gradient, large culverts and appears able to accommodate the discharges. The pit will be completely dewatered prior to the start of mining.

Following the initial dewatering stage, a constant discharge rate of about 1,300 gpm will be needed to keep the pit dewatered. This is the estimated sum of the inflow rates from groundwater, precipitation less evaporation and watershed runoff. This water will be either discharged into Second Creek, Unnamed Creek, the Partridge River or the Area 1 Pit in accordance with the requirements of the NPDES for the proposed project. If the detailed water balance indicates a need for use of water from the Area 2WX Pit to augment the Area 1 Pit water supply, the chemical composition of the Area 2WX Pit water will be included as a factor in the overall water-chemistry balance for the Area 1 Pit. The effect is likely to be beneficial as the water quality of the Area 2WX Pit is anticipated to be better than the water quality of the Area 1 Pit during mineral processing. The results of this water-chemistry balance will be used as an input to the risk assessment and the Area 1 Pit discharge water quality analysis.

Area 6 Pit. The Area 6 Pit has two major sources of groundwater inflow: seeps from Second Creek along the pit's eastern wall and seeps along the southwestern wall in the direction of Area 9S Pit. As with the Area 2WX Pit, the groundwater contribution from the Biwabik Iron Formation is assumed to be negligible. According to the East Range Hydrology Report:

> *"Seepage inflow from Second Creek is controlled by bedrock elevation about 1445 ft. msl. Seepage inflow from the direction of Pit 9S enters Area 6 Pit well above the proposed runout elevation and will therefore not be affected [by] Area 6 Pit water level."*

At pit water elevations below 1,445 msl, the predicted groundwater seepage rate into the pit is 5.1 cfs (2,300 gpm). It is important to note that it was estimated that approximately half of the groundwater inflow to the pit was from water from Second Creek. At the outlet elevation of 1,455 ft-msl, this inflow rate is predicated

to be 3.5 cfs. Area 6 Pit has a total watershed of 786 acres (Adams, et. al., 2004). Water balance values representative of conditions that can be expected during operations are shown on Figure 13-1.

As with the Area 2WX Pit, it will be necessary to dewater the Area 6 Pit prior to mining. The East Range Hydrology Study predicted that the pit will begin to overflow in late 2008 or early 2009, and recommended construction of an outlet ditch at a design elevation of 1,455 feet. Because the current elevation is about 1,457.7 msl, overflow is imminent. At the recommended overflow level of 1,455 feet, the pit will have a volume of 25,000 acre-ft.

While there is an existing water appropriations permit (#73-5185) for pumping from this pit, the maximum allowable pumping rate does not appear to be large enough to dewater the pit, so an amendment to the permit will likely be needed. It is anticipated that the pit will be dewatered over the course of about 27 months at a rate of 10,000 gpm. This will allow recovery of existing loose ore on benches at about Elevation 1,430 feet within 9 months and drilling of the next ore bench at Elevation 1,320 feet after about 24 months. The pit water could be transferred to Second Creek or First Creek subject to NPDES permit flow requirements for individual discharge points; see Item 17. It is proposed to discharge to Second Creek, since it is the closest stream and has a larger watershed area and historically received dewatering flows from this pit.

After the Area 6 Pit has been dewatered, an average discharge rate of about 2,800 gpm will be needed to keep the pit dewatered. This is the estimated sum of the inflow rates from groundwater, precipitation less evaporation and watershed runoff. This water will be discharged to Second Creek in accordance with NPDES permit requirements for the proposed project. Ore will also be mined from Area 6SW and Area 6NW Pits; dewatering from these areas will be pumped to the Area 6 Pit. These additional pits will result in a small increase in the volume of pumping from Area 6.

Existing data indicates that the Area 1 Pit will be adequate to supply the plant operations. If additional water were required for plant operations, part of the dewatering flows from Areas 6 or 2WX Pits could be pumped to the plant. If the detailed water balance indicates a need for use of water from the Area 2WX Pit or the Area 6 Pit to augment the Area 1 Pit water supply, the chemical composition of the Area 2WX Pit or Area 6 Pit water will be included as a factor in the overall water-chemistry balance for the Area 1 Pit. The results of this water-chemistry balance will be used as an input to the risk assessment and the Area 1 Pit discharge water quality analysis.

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. All water appropriations will be satisfied through mine pit dewatering. Potable water for the plant, mine building and administrative buildings will be supplied as a bleed stream from the reverse osmosis system for the plant. Prior to the construction or alteration of a public water supply system, complete plans and specifications must be submitted to the Minnesota Department of Health Drinking Water Protection Section. Plans for treatment, pumping, storage, distribution and related facilities must be submitted for approval.

Available data on existing and sealed wells in the vicinity of the project and groundwater levels are shown in Figure 13-2. These wells are identified based on records submitted over the last 30 years; it is possible that other wells exist. The risk assessment will include an additional search for potential groundwater receptors using historical air photos and maps and information from local public utilities. The approximate water table at the site

is shown in Figure 13-3. There are no active nearby municipal wells in the vicinity. The Area 1 Pit, the Area 2WX Pit and the Area 6 Pit have been pumped dry previously.

The cities of Hoyt Lakes and Aurora both draw water from surface water features. Aurora receives its water from the St. James Pit, which is located approximately 2,000 feet south-southwest of the Area 6 Pit. The city of Hoyt Lakes receives its water from Colby Lake, which is located 10,000 feet south of the Area 2WX Pit. A preliminary review of water level data for the St. James Pit and Colby Lake during historic dewatering of the Areas 2WX and 6 Pits suggests that the proposed dewatering will not affect Aurora's or Hoyt Lake's water supply; see Adams, et. al., 2004. This situation will need to be evaluated further in the EIS.

Groundwater Quality

Potential groundwater quality impacts associated with the project will be evaluated as part of the EIS. This evaluation will expand upon the work being conducted to assess potential drinking water impacts to also assess overall impacts to the groundwater resource, including quality. In addition to potential impacts associated with the Area 1 Pit, an evaluation of the spill protection measures, as described in response to Items 19 and 20, will be included.

Cumulative Effects. Project-related appropriations identify that water budgets for the mine pits include a groundwater component; this is a potentially significant issue. In addition, the permeability of the bedrock has not been quantified; it may vary with zones of low permeability accompanied by higher zones along fractures, faults and man-made workings. Surficial aquifers may also be present in the area and which may move significant quantities of water. All these factors will be considered in the EIS.

The Cliffs-Erie-PolyMet facility will receive water from Colby Lake and the NorthMet mine site and not from groundwater. The Cliffs-Erie tailings basin is known to release dissolved solids and hardness to groundwater. However, groundwater flow at that facility is to the north, toward the Embarrass River, and dewatering of Areas 6 and 2WX Pits is unlikely to affect regional flows.

Municipal water supplies for the Cities of Aurora and Hoyt Lakes will be used to meet additional water demands placed on them by residential growth stemming from this project, as well as the cumulative effect from other projects; see Item 28.

Proposed Treatment of Topic in EIS:
The topic is significant; information beyond what was in the EAW will be included in the EIS.

Project-Related Analysis. The EIS will include a detailed water balance for the project including processing plant water needs and mine pit dewatering. This information will be used to model how affected pit water levels, dewatering rates, and watershed yields will change both during and after mining. Impacts to water bodies will be identified and mitigation/monitoring will be developed to minimize impacts. The EIS will provide a detailed breakdown of the Area 1 Pit water budget; the water budget will account for potential changes in groundwater inflow as a function of decreasing pit level.

Potential impacts to nearby wells and water supply sources due to mine pit dewatering will also be evaluated in the EIS. In order to provide the level of detail that will be needed for the EIS, it will likely be necessary to collect additional information on the hydrogeology of the site (e.g., bedrock permeability), specifically the interconnection between the pits and the potential exchange of water between the pits and the bedrock aquifer.

A model of groundwater flow will be used to verify pit dewatering rates and estimate groundwater flow patterns. The EIS will provide a timeline showing the historical sequence of mining at the site, including the depths of or previously dewatered pits to the degree known. Additional areas of inquiry include:

- The presence, precise locations, and hydraulic characteristics of any potential conduits (faults, fractures or underground workings) that may provide rapid flow pathways between the mine pits (particularly between Area Pit 1 and the St. James Pit).
- The potential exchange of water between the pits and glacial sediments.
- The lateral and vertical extent of the Quaternary hydrostratigraphic units.
- The hydraulic characteristics of the Quaternary and bedrock units.

The EIS will include a quantitative assessment of the possibility that dewatering discharges will impact the Hoyt Lakes water supply. The EIS will at a minimum include a mass-balance analysis for the mixing of worst-case (both quantity and quality) discharge effluent with Colby Lake water. Pertinent drinking water standards, as specified in the Safe Drinking Water Act, should serve as the measure against which worst-case contaminant concentrations are compared.

Risk Assessment. Minnesota Statutes section 116.0717 require that an applicant who wishes to deposit tailings from minerals processing facilities into mine pits must conduct a risk assessment to demonstrate that the deposition will not pose an unreasonable risk of pollution or degradation of groundwater. Therefore a human health risk assessment will be conducted to evaluate the risk of pollution or degradation of groundwater.

The risk assessment will focus on the groundwater pathway and will evaluate potential risks to private and public drinking water supplies and to the water quality of the Partridge River. Potential multipathway risks (e.g., inhalation, food consumption) will be evaluated separately as described in response to Item 23. However, potential risks from other media (e.g., inhalation, food consumption) and drinking groundwater will be added together to estimate a "total" potential incremental risk for the project. Major receiving waters of interest are expected to be Colby Lake and the St. James Pit, which are the water supplies for the cities of Hoyt Lakes and Aurora respectively, although the potential for exposure via private wells will also be evaluated.

The risk assessment will be conducted according to standard US Environmental Protection Agency (USEPA) protocols and will use the Minnesota Department of Health study of in-pit tailings disposal at ArcelorMittal's (formerly the Inland Steel Mining Company) Minorca Pit (Minnesota Department of Health, 1998) as a relevant guide for this analysis. For that analysis, it was assumed that dissolved constituents found in the Minorca Pit would be transported to the Missabe Mountain Pit in similar concentrations, at which point some dilution would occur. This is a conservative approach because follow-up studies at the Minorca project have shown that geochemical reactions are likely to attenuate some dissolved contaminants as they travel through the iron rock formation (Berndt and Liebfried, 2007). Similarly, the proposed risk assessment will be based on an assumption that dissolved constituents found in the Area 1 Pit would be transported to the St. James Pit in similar concentrations. Dilution will be estimated using conservative estimates of groundwater inputs and outputs based on pit water balances and the hydrogeology of the site. The work of Berndt and Liebfried (2007) will be used to provide a context for the conclusions. The scopes of the groundwater analysis and the risk assessment studies will be submitted to the state and federal agencies for review in the late summer of 2008 prior to initiating work on the studies.

As noted in Item 23, the EIS will address potential human health risks from the fish pathway. This will be assessed using the MPCA's Mercury Risk Estimation Method. This analysis will assess potential impacts to fish

in a nearby lake and the potential risks to recreational and subsistence fishers that consume locally caught fish. The potential risks from inhalation/consumption will be added to the other potential risks (e.g., drinking water) to provide an estimate of "total" incremental risk associated with the project.

The EIS will identify the provisions of a water quality monitoring program for Colby Lake and the St. James Pit. Potential provisions of a water supply contingency plan will be identified.

Cumulative Effects Analysis. Overall cumulative effects to the groundwater resource, including quality, are addressed in Item 18. Potential cumulative effects to municipal water supplies from induced development and other projects are addressed in Item 28.

References

Adams, John L., 1998. *Hydrologic Changes Affected by Inland Steel's In-Pit Tailings Disposal Proposal*. (Appendix C to Minnesota Department of Natural Resources, Draft Supplemental Environmental Impact Statement – In-Pit Tailings Disposal Project, Ispat Inland Mining Company, Virginia, Minnesota. November 1998.)

Adams, J.L., R.T. Leibfried, E.S. Herr, 2004. *East Range Hydrology Project, Final Report.* Minnesota Department of Natural Resources, March, 2004.

Berndt, M. and Liebfried, R., 2007. A Geochemical Tracer Study of Minnesota's First In-Pit Disposal Facility for Taconite Tailings.

Minnesota Department of Health, 1998. *Health Risk Assessment for the Proposed Minorca In-Pit Tailings Disposal Project*.

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 _X_ No

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

Figure 14-1 shows the zoning map, including floodplain and shoreland zoning, for the area within and near the proposed project area.

Shoreland Zoning. The City of Aurora does not have a shoreland ordinance. The City of Hoyt Lakes has identified shoreland zoning districts for the Partridge River, Colby Lake, Second Creek (below County Highway 666) and Unnamed Creek. The Town of White has the same shoreland ordinance as St. Louis County.

Little Mesabi Lake is classified as a Natural Environment Lake with a designated 1000-foot shoreland protection zone; see Figure 14-1. Little Mesabi Lake is now one water body with LTVSMC Area 9 Pit. Mesabi Nugget's proposed Area 6NW Pit lies within the lake's original zoning district. Water levels in the Area 9 Pit may be affected by: 1) pumping in Area 6 or Area 6NW Pits; 2) pumping of the Area 1 Pit; or 3) by tailings deposition in the Area 1 Pit.

Floodplain Zoning. No delineated 100-year floodplains are included in the project area. The Cities of Hoyt Lakes and Aurora have not completed floodplain studies.

St. Louis County relies on Flood Insurance Rate Maps provided by the Federal Emergency Management Agency (FEMA) to identify flood susceptibility. The Partridge River is included as an "Unnumbered A zone," which indicates that it is a special flood hazard area that is inundated by the 100-year flood with no base flood elevations delineated. The project area (and most of the unincorporated area) is designated as Zone X, which is defined as an area of 500-year floodplain, or an area of 100-year floodplain with flooding depths of less than 1 foot, or an area protected by a levee. This definition as applied to this site recognizes large areas of wetland in the vicinity.

Proposed Treatment of Topic in EIS:
This topic is minor, but will be discussed briefly with limited information beyond that in the EAW. The status of the project with respect to shoreland zoning of Little Mesabi Lake, the Partridge River, Second Creek, Unnamed Creek, and Colby Lake will be identified in the EIS. Potential changes in water levels in Little Mesabi Lake will be discussed in the EIS. The EIS will address proposed changes in zoning overall, including need for variances. Related figures will be updated in the EIS.

15. **Water surface use**. Will the project change the number or type of watercraft on any water body? __Yes _X_No
If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

Proposed Treatment of Topic in EIS:
The topic is minor. The EIS will not include a discussion of water surface use.

16. **Erosion and sedimentation.** Give the acreage to be graded or excavated and the cubic yards of soil to be moved:
acres: approx. 4,700; cubic yards: over 13 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.

The area to be graded is conservatively estimated as the entire project area less the footprint of the Area 9 Pit.

The estimate of cubic yards of soil to be moved includes overburden stripping from Area 2WX and Area 6.

In addition to overburden, approximately 48 million cubic yards of waste rock and lean ore will be moved to stockpiles and 95 million cubic yards of ore (in-place) will be excavated and processed, resulting in about 120 million cubic yards of tailings to be disposed in the Area 1 Pit.

Opportunities for erosion and/or sedimentation from project-related actions can result from activities at the plant area, mining and stockpiling, and road and rail construction.

Plant Area. The LSDP is currently under construction. The volume of earthmoving required for the Phase II project has not yet been calculated. Both the construction erosion control plan and the permanent erosion controls for the LSDP are covered by a Stormwater Pollution Prevention Plan (SWPPP) that was submitted to the MPCA and reviewed as a condition of the NPDES permit for the project. It is anticipated that erosion control at the Phase II facility will be an extension of the approved practices currently being implemented. These include:

Construction-related Provisions:

- Use of check dams and berms.
- Use of rock ditch checks, rock logs, bio-rolls or similar materials to reduce transport of sediment.
- Stone pads, wash racks or equivalent systems to prevent tracking sediment onto public roads.
- Use of temporary sedimentation basin

Permanent Controls:

- Use of a berm to divert stormwater flow away from the site.
- Use of detention ponds to remove sediment. Existing NPDES permit MN0067687 requires that stormwater from the Mesabi Nugget Phase I project, such as from the raw material/product storage areas, be routed to sedimentation basins and then to the wastewater treatment system for additional treatment prior to discharge.
- Water that is not captured by the ponds will flow into Area 1 Pit, which is considered part of the water treatment system as well.

Mining and Stockpiling. Mining will require movement of about 20 million tonnes of overburden and 111 million tonnes of waste rock and lean ore, as well as 215 million tonnes of ore. The overburden, waste rock and lean ore will be stockpiled.

The existing NPDES permits for pit pumping for Areas 2WX and 6 have been transferred to Mesabi Nugget. Both permits required submittal of a Stormwater Pollution Prevention Plan and the requirements of those permits will be followed in mining and stockpiling operations. Mesabi Nugget anticipates that the existing LTVSMC/Cliffs-Erie Stormwater Pollution Prevention Plan for Area 2WX and Area 6 will need to be updated to incorporate limited modifications to mine operations and stockpile layouts and to conform to current requirements for such plans.

Mine pits in bedrock generally have steep slopes but are not prone to erosion. Glacial drift at the pit edge can erode into the pit and must be graded and vegetated in accordance with DNR regulations to reduce discharge of sediment to the pit sumps; pit sumps can also trap sediment in runoff. Other steep slopes will be created on overburden and rock stockpiles, and the banks of roads. Potential erosive effects of pit pumping on Second Creek are discussed in response to Item 17.

The DNR Permit to Mine requires stockpiles and pit slopes to be designed 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; 2 feet of surface overburden on rock flats; and vegetated.

Surface overburden stockpiles are required to have a minimum 30-foot-wide benches with a maximum 40-foot vertical lift height, slopes of 2.5 to 1 or shallower, drainage control systems capable of handling surface runoff without erosion, and revegetated.

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, minimum 30 foot benches with a maximum height of 60 feet in the overburden and revegetated. Benches are required to be engineered with an adequate width to manage storm water runoff received from the slopes above them.

Road and Rail Construction. A haul road will be constructed from Area 6 to the crusher at Area 2WX and the main haul road from Area 2WX to the plant area will also be widened by an estimated 100 feet. Volumes of cut and fill have not yet been calculated. This will require clearing and grubbing adjacent to existing embankments and placement of fill to reach the required road width. The rail connections include replacement of rails on existing railroad embankments and the grading of new embankments in some areas. Replacement of rails is expected to generate only small quantities of sediment. Construction of new rail connections will require standard construction erosion control measures such as berms, silt barriers, or sedimentation ponds.

Cumulative Effects. Other nearby facilities such as the proposed Cliffs-Erie pellet loading facility, PolyMet, and Northshore Mining Company, may have disturbed areas that could contribute total suspended solids and possibly taconite dust to Second Creek. Cumulative effects of such changes in water quality are addressed in response to Item 18.

Proposed Treatment of Topic in EIS:
The topic is minor, but will be discussed briefly in the EIS using updated information in the same format as the EAW. Volumes for Phase II earthmoving and main haul road cut and fill will be provided. The EIS will address runoff from erosion-prone areas of the site, including pit slopes and stockpiles as part of the issue of surface water runoff and overall water quality impacts (see Items 17 and 18) and as part of the reclamation plan (see Item 30). Mitigation measures for adverse impacts will be described.

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.

Surface water runoff will occur primarily at the three active locations within the project area: the plant site, the Area 6 Pit and associated stockpiles, the Area 2WX Pit and associated shops and stockpiles, and other mining areas. In general, most site runoff will be captured, treated and if needed and depending upon location, runoff will be either reused as process water make-up, or discharged to surface waters. The sources, management and disposal of process water as well as post-closure water management for surface waters are discussed in Item 18. The sources, management, and disposal of site runoff are described below by project location, followed by a description of the individual receiving waters and discussion of potential for effects on receiving waters.

Plant Site. Stormwater runoff from the plant site currently drains to the Area 1 Pit because the site was stripped to bare rock by earlier mining operations. Both the Phase I LSDP plant and new Mesabi Nugget Phase II Project elements are situated on the Area 1 Pit mine bench. The bedrock is highly fractured so flow into Area 1 Pit occurs both through overland flow and through fractures.

Construction of the LSDP and Phase II projects will tend to reduce fracture flow and increase overland flow. As part of the construction of the LSDP, sediment basins are being constructed; these will be enlarged as needed for Phase II. Surface water runoff generated during construction and normal operations (e.g., runoff from roof drains, the rail yard, concentrating operations, haul roads) will be directed for treatment into the basins (the primary constituent in runoff will be suspended solids).

Given the current impervious nature of the undeveloped plant site, changes in runoff volume due to the construction and operation of the Phase II plant will be insignificant. Runoff water quality from the plant site is expected to contain substances typical of industrial sites including suspended solids and oil and grease; some contact with raw materials including taconite concentrate, limestone and coal will tend to increase the concentrations of suspended solids in stormwater. The need for any additional treatment will be evaluated as part of the water-chemistry balance to be submitted for use in preparing the EIS. Treatment by sedimentation and skimming will remove most of these substances; subsequent long-term storage in the Area 1 Pit will substantially eliminate any remaining concentrations of these substances. Existing NPDES permit MN0067687 requires that stormwater from the Mesabi Nugget Phase I project, such as from the raw material/product storage areas, will be routed to sedimentation basins and then to the wastewater treatment system for additional treatment prior to discharge.

Areas 6 and 6NW Pits / Associated Stockpiles and Haul Roads. Historically, surface water inflows, direct precipitation, and groundwater inflows to Area 6 Pit have been collected in mine sumps where solids are allowed to settle prior to discharge. Sump water has been pumped and discharged through mine pit dewatering outfalls SD006 and SD024; see Figures 17-1 and 17-2.

Permitted discharge from SD006 has been to Second Creek at an average and maximum rate of 10 and 14.4 MGD (described in the written description section of the permit, not as a limit), respectively. Permitted discharge from SD024 has been to First Creek at a maximum of 7.2 MGD. The total of maximum permitted discharges, 21.6 MGD has been permitted since the pit dewatering permits were issued in 1973; therefore the proposed dewatering will not violate non-degradation requirements, assuming that discharge concentrations are consistent with historical levels.

Historically, TSS concentrations in discharges from the Area 6 Pit have been within permitted levels and have been low (averaged 2.8 mg/L in 1999-2001); see Tables 17-1. Additional monitoring with a much wider range of parameters, including sulfate, has been initiated in 2008 in support of the EIS; the data from this program will be available for use in the EIS. Turbidity and dissolved iron levels have also been within permitted levels and have been low (1999-2000). During LTVSMC's operation of Area 6 Pit, dewatering flow rates in 1999-2000 averaged 5.6 MGD with a maximum rate of 18.7 MGD. Pit water management and dewatering activities under Mesabi Nugget will be consistent with past activities under LTVSMC, that is, collecting water in sumps for solids removal, and dewatering though existing permitted outfalls to First, Second, and Unnamed Creeks at similar discharge rates and water quality.

Mining will also be conducted at Area 6NW Pit and at Area 6SW. Overburden will be stripped and piled adjacent to the mine pits. Waste rock generated during mining operations will be deposited on the Area 6 stockpiles. Dewatering water that has been treated by settling in sumps will be directed south through pipes to First Creek or to the Area 6 Pit; these will not be considered new discharges if existing Area 6 permitted outfalls are used. If the detailed water balance indicates a need for additional water, a portion of the Area 6 dewatering discharge may be pumped to Area 1 Pit. If this additional supply is believed necessary, the chemical composition of the Area 6 Pit's water will be included as a factor in the overall water-chemistry balance for the

Area 1 Pit. The existing Area 6 Pit stockpiles, which are west of Area 6 Pit, will be used to store overburden, lean ore and waste rock.

Drainage pathways, runoff volume, and runoff water quality under Mesabi Nugget will be largely unchanged from past activities under LTVSMC. An additional stockpile area will be on previously disturbed ground north of the Area 6 Pit. Runoff from this area is likely to flow to either First Creek or Second Creek, based on preliminary drainage divides. Subsurface runoff and surface runoff (if any) from the Area 6 Pit stockpiles will drain east to Area 6 Pit or to upland and wetland areas adjacent to the west end of the Area 6 Pit and then to First Creek. Baseline monitoring of runoff from existing stockpiles will be conducted in the spring of 2008 to evaluate the runoff quality and the potential for additional sedimentation or other treatment from these or future stockpiles to avoid increasing pollutant loads or impacting receiving waters.

Taconite ore will be transported from the Area 6 Pit to the crushing area on an improved road that will lead from directly north of Area 6 Pit, across Second Creek, and to the north end of the Area 2WX Pit. Runoff from the haul roads will need to be managed with the use of Best Management Practices (BMPs) and with consideration of the expected receiving water body (e.g., Second Creek, wetlands). BMPs will be maintained and implemented in accordance with a storm water pollution prevention plan that will be developed prior to the start of construction.

Before mining resumes, water that has accumulated in Areas 6 Pit site will be pumped and transferred to either Second or First Creek; see Item 13 regarding anticipated mine pit dewatering activities. It is currently proposed to dewater to Second Creek over 27 months at a rate of 10,000 gpm. During operation, groundwater and surface water inflow will be pumped to Second Creek at about 2,800 gpm.

Area 2WX Pit and Associated Stockpiles and Crusher/Cobber. Historically, surface water inflows, direct precipitation, and groundwater inflows to the Area 2WX Pit have been collected in mine sumps where solids are allowed to settle prior to discharge. Sump water has been pumped and discharged through a total of eight mine pit dewatering outfalls (SD014 through SD021). Each outfall has a permitted rate of 5.0 (average) and 7.2 (max) MGD (discussed in the written description section of the NPDES permit, not as a limit). The total of maximum permitted discharges, 40 MGD has been permitted since the pit dewatering permits were issued in about 1979; therefore the proposed dewatering will not violate non-degradation requirements, assuming that discharge concentrations are consistent with historical levels.

Historically, TSS concentrations in discharges from Area 2WX Pit have been within permitted levels and have been low (averaged 2.0 mg/L in 1999-2000); see Table 17-2. Turbidity and dissolved iron levels have also been within permitted levels and have been low (1999-2000). During operation of the LTVSMC mine, dewatering flow rates in 1999-2000 from Area 6 Pit averaged 5.6 MGD with a maximum rate of 10.7 MGD. Pit water management and dewatering activities under Mesabi Nugget will be consistent with past activities under LTVSMC, that is, collection of water in sumps for solids removal, and dewatering through existing permitted outfalls to Second Creek and Unnamed Creek. Because the footprint of the mine will not be materially changed, it is expected that mine discharge quality and quantity under Mesabi Nugget will be similar to the discharge quality and quantity under LTVSMC operations. If the detailed water balance indicates a need for additional water, a portion of the Area 6 Pit dewatering discharge may be pumped to Area 1 Pit. If this additional supply is believed necessary, the chemical composition of the Area 6 Pit water will be included as a factor in the overall water-chemistry balance for the Area 1 Pit.

Table 17-1
Area 2WX Pit Dewatering Discharge Data
PIPE OUTFALL 050
MN0042536-SD-6

PARAMETER	Turbidity	Turbidity	Solids, Total Suspended (TSS)	Solids, Total Suspended (TSS)	Flow	pH	pH	Flow	Flow	Iron, Dissolved (as Fe)	Iron, Dissolved (as Fe)
LIMIT_AND_UNIT	*NTU*	*25.0 NTU*	*20 mg/L*	*30 mg/L*	*mgd*	*8.5 SU*	*6.5 SU*	*mgd*	*mgd*	*1.0 mg/L*	*2.0 mg/L*
LIMIT_TYPE	*CalMoAvg*	*DailyMax*	*CalMoAvg*	*DailyMax*	*CalMoAvg*	*InstantMax*	*Instant Min*	*Daily Max*	*CalMoTot*	*CalMoAvg*	*DailyMax*
Jul-99	1.4	2.5	6	10.5	10.427	8.7	7.9	18.72	323.3	<0.03	<0.03
Aug-99	2.8	5.6	4.3	8.5	4.209	8.4	8.2	9.504	130.5	<0.03	<0.03
Sep-99	0.09	0.11	2.9	3	7.767	8.2	8.1	10.296	233.9	0.03	0.05
Oct-99	0.06	0.12	5.1	6.7	6.89	8.1	8.1	10.038	213.6	0.03	0.06
Nov-99	0.1	0.2	3.8	4	5.53	8.1	8	6.339	165.9	<0.03	<0.03
Dec-99	<0.1	<0.1	3	3.5	3.356	7.8	7.5	5.112	104	0.04	0.07
Jan-00	<0.10	<0.10	0.6	1.2	3.947	7.6	7.4	5.688	114.5	0.02	0.03
Feb-00	0.16	0.32	3	6	4.071	7.1	7	4.536	126.2	0.02	0.04
Mar-00	0.81	1.1	1.8	3.6	4.353	7.8	7.8	5.472	130.6	<0.03	<0.03
Apr-00	0.405	0.44	2	2	7.045	7.9	7.5	7.704	218.4	<0.03	<0.03
May-00	0.57	0.68	0.6	1.2	3.265	7.8	7.6	3.888	97.9	<0.03	<0.03
Jun-00	0.23	0.27	0.7	1.3	6.8	8.1	7.5	7.056	210.8	0.02	0.03
Jul-00	0.44	0.62	4.2	4.7	6.057	8	7.7	7.416	187.77	<0.03	<0.03
Aug-00	0.58	0.58	0.8	1.6	5.573	7.9	7.9	8.582	167.175	<0.03	<0.03
Sep-00	0.37	0.37	2.6	2.8	6.289	7.6	7.3	6.367	188.673	<0.03	<0.03
Oct-00	0.36	0.41	2.8	2.8	3.328	7.6	7.5	5.285	99.843	<0.03	<0.03
Nov-00											
Dec-00											
Jan-01	0.73	0.73	3.4	3.6	2.119	8.2	7.8	4.788	65.688	<0.03	<0.03

Source: http://pca-gis04.pca.state.mn.us

Table 17-2
Area 6 Pit Dewatering Discharge Data
PIPE OUTFALL 050
MN0042536-SD-6

PARAMETER	Turbidity	Turbidity	Solids, Total Suspended (TSS)	Solids, Total Suspended (TSS)	pH	pH	Flow	Flow	Flow	Iron, Dissolved (as Fe)	Iron, Dissolved (as Fe)
LIMIT_AND_UNIT	*NTU*	*25.0 NTU*	*20 mg/L*	*30 mg/L*	*8.5 SU*	*6.5 SU*	*mgd*	*mgd*	*mgd*	*1.0 mg/L*	*2.0 mg/L*
LIMIT_TYPE	*CalMoAvg*	*DailyMax*	*CalMoAvg*	*DailyMax*	*Instant Max*	*Instant Min*	*CalMo Avg*	*Daily Max*	*CalMoTot*	*CalMoAvg*	*DailyMax*
Jul-99	9.89	5.8	10	6.121	8.2	9.36	8.4	189.7	<0.03	<0.03	9.89
Aug-99	0.75	1.5	3	8.879	7.9	9.648	8.4	275.3	<0.03	<0.03	0.75
Sep-99	0.02	1.6	1.6	7.102	7.9	9.907	8.3	213.1	<0.03	<0.03	0.02
Oct-99	0.11	1.7	1.8	8.484	8	10.656	8.2	263	<0.03	<0.03	0.11
Nov-99	<0.1	0.5	1	5.107	7.8	7.632	8	153.2	0.02	0.03	<0.1
Dec-99	<0.1	0.5	1	4.623	7.7	4.752	7.9	143.3	<0.03	<0.03	<0.1
Jan-00	0.9	10	18.8	4.297	7.2	4.32	7.5	133.2	<0.03	<0.03	0.9
Feb-00	0.95	2	4	3.726	7.1	4.32	7.4	108	<0.03	<0.03	0.95
Mar-00	0.23	0.6	1.2	5.329	7.3	6.984	7.6	165.2	<0.03	<0.03	0.23
Apr-00	1.4	<1.0	<1.0	5.575	7.2	6.984	7.9	167.2	0.02	0.04	1.4
May-00	0.22	<1.0	<1.0	4.606	7.6	4.606	7.8	142.8	<0.03	<0.03	0.22
Jun-00	1	1	2	2.88	7.6	3.168	7.9	86.4	<0.03	<0.03	1
Jul-00	0.28	1	2	5.703	7.5	6.912	7.7	176.8	0.04	0.05	0.28
Aug-00	0.62	1.2	1.2	6.361	7.5	6.588	7.6	197.21	<0.03	<0.03	0.62
Sep-00	0.32	<1.0	<1.0	6.564	7.8	7.056	7.8	196.92	<0.03	<0.03	0.32
Oct-00	0.55	0.6	1.2	3.786	7.5	6.552	7.6	113.57	<0.03	<0.03	0.55
Nov-00	0.4	0.6	1.2	5.616	7.5	4.847	7.8	145.414	<0.03	<0.03	0.4
Dec-00											
Jan-01	0.81	<1.0	<1.0	3.527	7.8	4.896	7.8	109.344	<0.03	<0.03	0.81

Source: http://pca-gis04.pca.state.mn.us

The existing Area 2WX Pit stockpiles are located south and east of Area 2WX Pit; they will be used to store overburden, lean ore, and waste rock. Drainage pathways, runoff volume, and runoff water quality under Mesabi Nugget operation will be largely unchanged from past activities under LTVSMC. Subsurface runoff and surface runoff (if any) from the Area 2WX Pit stockpiles will drain east to upland and wetland areas adjacent to the stockpiles, and west to wetland complexes that drain to Unnamed Creek. An insignificant volume of water may also runoff the east and southern border of the 2WX stockpile and to Unnamed Creek that is located west of the 2WX stockpile. Baseline monitoring of runoff from existing stockpiles will be conducted to evaluate the runoff quality and the potential for additional sedimentation or other treatment from these or future stockpiles to avoid increasing pollutant loads or impacting receiving waters.

Taconite ore will be transported from Area 2WX Pit to the crushing area that is located just north of Area 2WX Pit. The quality and quantity of runoff from the haul road(s) are expected to be unchanged from past operations. BMPs will be maintained and implemented in accordance with the storm water pollution prevention plan to prevent sediment from entering wetlands and potentially affected streams (e.g., Second Creek) adjacent to waste rock stockpiles and haul roads.

The crusher will be located to the north of the Area 2WX Pit. Ore from all pits will be transported to the crushing area via haul roads. Crushed ore will be sent to the plant by conveyor or haul truck. All crushing area runoff will be collected with ditches and pipes and directed to a sedimentation basin where solids will be removed prior to discharge to Second Creek.

Before mining resumes, water that has accumulated in Area 2WX Pit will be pumped and discharged to Unnamed Creek or Second Creek to the west of the pit; see Item 13 regarding anticipated mine pit dewatering activities. During normal operations, pit water will be discharged to Second Creek or to Unnamed Creek located just south of the pit and west of the stockpiles. Unnamed Creek drains to the south to the Partridge River just downstream of the outlet of Colby Lake but upstream of the control structure for the lake. Second Creek enters the Partridge River approximately one mile south of the Colby Lake outlet. Mesabi Nugget currently proposes to discharge initial dewatering flows to Unnamed Creek over a period of 18 months at about 8,000 gpm. It is proposed to discharge operational dewatering flows to Unnamed Creek at about 1,300 gpm.

Existing broken ore may be scavenged on the north side of the Area 1 Pit west of the plant site. No stripping or waste rock/lean ore management will be required and runoff would flow to the Area 1 Pit.

Mesabi Nugget's construction activities for the Phase II project will be permitted under a new General Construction Stormwater Permit. This permit requires preparation of a construction stormwater pollution prevention plan (SWPPP), including an assessment of the potential sources for sediment and pollutant discharges from the site, identification of the party responsible for implementation of BMPs, and the BMPs to be implemented. The SWPPP can be modified to reflect changes in construction activities as the project proceeds.

Operational aspects of the project will be addressed under existing NPDES permits MN0069078 (mining area) and MN0067687 (Mesabi Nugget Phase I) that requires submittal of a SWPPP for industrial stormwater activities. For mines like the proposed operation, typically all direct mining-related or operational "construction" activity such as overburden stripping, stockpile construction, or in-pit haul roads, are covered under the industrial stormwater provisions that apply to the individual NPDES permit for the facility. Other peripheral constructions activities ancillary to the mine such as buildings, parking lots, or access roads are typically covered under the separate general construction stormwater permit.

Applicable BMPs include construction of detention ponds and erosion prevention practices that will minimize production of sediment. Ponds constructed as temporary sedimentation basins may be precursors to permanent stormwater detention basins. Erosion prevention practices will include seeding and mulching practices and special measures for steep slopes and highly erodible soils (e.g., terracing, silt fencing, erosion control barriers and ditch checks). The SWPPP also requires identification of receiving water and special measures to be taken

to avoid degrading high quality waters such as high-quality wetlands and downstream lakes. MPCA rules require a program of inspection and management such that the 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.

Future NPDES permit conditions may include sector-specific provisions to address unique water quality impacts of the particular sector. The EIS will identify if such provisions are applicable to the project.

Post closure activities will be conducted in accordance with Minn. Rules part 6130.4100, and will include activities such as vegetation of all disturbed areas including overburden stockpiles and pitwalls, waste rock stockpiles, tailings basin slopes (if any), and unused or abandoned roads. Provisions will be made for pit outlets, and sizing and grading of outlets will be conducted in accordance with expected minimum and maximum flow rates when pits overflow (post-closure).

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.

RGU Note: The routes and receiving waters addressed for both surface water runoff (in Item 17) and process water discharges (in Item 18) are largely similar. The following text is applicable to a similar descriptive requirement in Item 18b.

Surface Water Routes – Hydrology and Water Quality

Watershed Description. The proposed Mesabi Nugget Phase II Project will be located within the Partridge River Watershed, between Hoyt Lakes and Aurora. The Partridge River flows out of Colby Lake at the southeast side of the project area and joins the St. Louis River about 6 miles below the project; the St. Louis flows approximately 120 miles to Lake Superior.

The regional pattern of receiving waters and major watershed boundaries are shown in Figure 17-1. More detailed delineation of watersheds in the vicinity of the project is shown in Figure 17-2. Watershed areas before and after the project are tabulated in Table 17-3. Changes in runoff from the project area are expected to be in approximate proportion to the changes in watershed area before and after project development (e.g., new mining pits or stockpiles). It can be seen in Table 17-3 that the changes in watershed areas are not expected to be significant.

Table 17-3. Total Watershed Area for Watersheds Potentially Affected by Mining Operations

Watershed	Total Watershed Area (ac)		Change (%)
	Existing Conditions	Future Conditions *	
First Creek	2,714	2,820	4%
Second Creek**	8,964	10,841	21%
Unnamed Creek	413	359	-13%
Colby-Whitewater	9,087	9,087	0%
Unnamed Creek 2	3,736	3,706	-0.2%
TOTAL	24,913	26,813	7.6%

*Maximum after mining commences and during mining and plant operations. Does not reflect closure conditions.

**Although Knox and Stephens Pits are not currently overflowing, it is expected that they will do so in the near future or will contribute to streamflow via shallow groundwater discharge. They are included in the Second Creek Watershed for this reason.

The minor changes to the First Creek and the Second Creek watersheds before and after the project are largely due to the resumption of mine dewatering activities at the Areas 6 and 2WX Pits. Currently, the Areas 6 Pit and the 2WX Pits are filling with water and do not discharge to the First Creek and Second Creek watersheds, and hence are not a part of these watersheds. This would occur naturally as the pits fill with water and reach the overflow level. For the Area 6 Pit, which is near the runout elevation, this may occur in the near future. During project operations, mine dewatering will restart, and these pits will again be a part of these watersheds. Unnamed Creek watershed area will decrease because of the expansion of the Area 2WX Pit and stockpile.

Project-related Distribution of Runoff to Receiving Waters. As described in Items 17a and 18a, there are three general locations where surface water runoff, process water, and surface water discharges will be generated. These are the Plant site, Area 6 Pit and associated stockpiles, and the Area 2WX Pit and associated stockpiles; see Figure 17-2. There may also be some limited runoff to the Area 1 Pit from scavenging of broken ore on the north side of that pit. All of these project areas ultimately drain to First Creek, Second Creek, and Unnamed Creek, as shown in Figure 17-2.

First Creek. First Creek formerly carried outflow from Little Mesaba Lake and later received dewatering flows from mining operations. Since mining ceased, it has become nearly dry because Little Mesaba Lake (now part of the Area 9 Pit lake) appears to be hydraulically connected to Area 1 Pit via groundwater. The Area 1 Pit, in turn, flows to Second Creek. Figure 17-3 shows several photographs of First Creek. First Creek joins Second Creek about 2,000 feet above the confluence with the Partridge River.

First Creek is classified under MPCA rules as a 2B, 3C, 4A, 4B, 5, and 6 stream. First Creek is not listed by the MPCA as impaired (i.e., 303(d) list).

Second Creek. Second Creek has been highly disturbed by mining and mineral processing operations over the last century. Second Creek has received pit dewatering and stockpile runoff from natural ore mines including the Knox, Vivian and Stephens mines and their associated dumps and stockpiles. It also received runoff from the Erie/LTVSMC taconite operation, including past mining and stockpiling operations at Area 6. It currently receives outflow from Area 1 Pit. In the fall of 2007 it experienced very high flows due to clearing of beaver dams. Figure 17-4 includes several photographs of the stream. It originally flowed from wetlands located in Section 9, T59N, R14W; this location is now the Cliffs-Erie tailings basin. The stream now starts at the south side of the Cliffs-Erie plant site and flows about six miles southwest and south through the general Mesabi Nugget project area.

Second Creek is classified as a 2B, 3C, 4A, 4B, 5, and 6. Second Creek is not listed by the MPCA as impaired (i.e., 303(d) list).

The water quality of Second Creek has been monitored by several entities and at several locations. For several years LTVSMC monitored the headwaters of Second Creek as part of NPDES permit monitoring requirements (permit # MN0042536). In 2006, the PolyMet Mining Corporation performed approximately a half-year of water quality monitoring at the headwaters of Second Creek and in Second Creek immediately upstream and approximately 3 miles downstream of a future Mesabi Nugget process water discharge (SD001). This information was submitted to the DNR in support of the PolyMet EIS. Since August 2006, Mesabi Nugget (as part of NPDES permitting requirements, permit # MN0067687) has been monitoring the

water quality of Second Creek immediately upstream and approximately three miles downstream of the future Mesabi Nugget LSDP process water discharge (there is currently no process water discharge from Mesabi Nugget LSDP).

The PolyMet Mining Corporation monitoring data show that the water quality of the Second Creek headwaters is reflective of past LTVSMC mining operations and may be influenced by the inactive Erie/LTVSMC tailings basins. The water quality data indicate that the levels of metals were low, including mercury which averaged 1.9 ng/L during the PolyMet monitoring period, but not including boron and molybdenum which were elevated when compared to surface waters in the area. Other constituents that were elevated when compared to undisturbed surface waters included chloride, sulfate, total dissolved solids, specific conductance, hardness (calcium and magnesium), fluoride, and alkalinity. Constituents that were found to be above applicable water quality criteria (Second Creek is a Class 2B, 3C, 4A, 4B, 5 and 6 water under Minnesota Rules Chapter 7052) include total dissolved solids, specific conductance, and hardness.

Water quality has also been monitored as part of the Mesabi Nugget LSDP NPDES permit at two downstream locations in Second Creek. Monitoring has been conducted for total dissolved solids and hardness (calcium and magnesium) at these locations. The concentrations of these constituents at the upstream and downstream locations are similar to the levels at the headwaters. However, the constituent levels of magnesium and total hardness are higher at the downstream locations, potentially resulting from inflows from the existing Area 1 Pit overflow (this discharge currently does not include process water discharges from the LSDP project). Sulfate was not part of the required monitoring plan for the Phase I Mesabi Nugget NPDES permit but has been added in monitoring now underway to support the EIS and subsequent permit applications.

Water quality measurements conducted by the PolyMet Mining Corporation also indicate that dissolved solids and hardness levels in Second Creek are similar to the levels at the headwaters. This data set also includes additional measurement of metals, including mercury, methyl mercury, and constituents that are typically influenced by mining activity such as chloride, sulfate, and dissolved solids. Mercury in Second Creek does not appear to change appreciably from the headwaters down to the confluences with the Partridge River. The concentrations of other metals such as molybdenum, as well as other constituents such as chloride, appear to decrease from the headwaters down to the Partridge River. Conductivity, total dissolved solids, and sulfate tend to increase in the more downstream reaches of Second Creek. This may be due to the influence of discharges from Area 1 Pit (which has elevated dissolved solids and sulfate), inflows from Stephens Creek, or other former mining features. The water quality of runoff from newly created stockpiles and pits at Areas 2WX and 6 will be studied in the EIS, as will the effect of ore processing and tailings disposal on the water quality of the Area 1 pits.

Unnamed Creek**.** This stream originally flowed over a two-mile course from Section 29, T59N, R14W to the south into the Partridge River downstream of Colby Lake. Construction of the Area 2WX Pit and stockpiles eliminated about half of the stream; the remainder joins the Partridge River above the control structure for Colby Lake. In the past the stream received a majority of the flows from Area 2WX Pit dewatering and also received runoff from Area 2WX stockpiles. The stream is marshy but has a well defined channel as shown in photographs in Figure 17-5.

Unnamed Creek is classified under MPCA rules as a 2B, 3C, 4A, 4B, 5, and 6 stream. Unnamed Creek is not listed by the MPCA as impaired (i.e., 303(d) list).

Unnamed Creek #2. This stream has its headwaters in Section 22, T59N, R14W, about two miles southeast of the Cliffs-Erie plant site. It flows about three miles to enter Colby Lake in the southwest corner of Section 5, T58N, R14W, about 5,000 feet upstream from Unnamed Creek #1. During LTVSMC's operation of Area 2WX, mine dewatering may have been discharged to this stream from discharge point SD019; however, discharge monitoring records since 1999 indicate that discharges did not occur in the years just prior to LTVSMC closure. It is possible that it received some minimal runoff either directly or indirectly from the Area 2WX stockpiles.

Unnamed Creek #2 is classified under MPCA rules as a 2B, 3C, 4A, 4B, 5, and 6 stream. Unnamed Creek #2 is not listed by the MPCA as impaired (i.e., 303(d) list).

Colby Lake and Whitewater Lake. Colby Lake is a 540-acre mesotrophic lake which discharges to the lower reaches of the Partridge River. The lake is controlled by the rate of outflow in the Partridge River which begins as a broad arm of the lake and narrows to become a stream. Because both Unnamed Creek and Unnamed Creek #2 enter flow into the lake above the Partridge River, they contribute flow to Colby Lake. The City of Hoyt Lakes is located on the south side of Colby Lake and takes its drinking water from the lake.

Colby lake has been listed as impaired by the MPCA due to mercury in fish tissue. It is classified by the MPCA as a Class 1B, 2Bd, 3C, 4A, 4B, 5, and 6.

Water from the Partridge River can also enter Whitewater Lake, located south of Colby Lake. Formerly known as Partridge Lake, Whitewater Lake was impounded in 1955 for use as a water storage reservoir for the Erie Mining taconite operation. It is separated from Colby Lake by three 8-foot gates that can be opened to release a large flow of water from Colby Lake to Whitewater Reservoir during high water levels. The diversion works also contains three high-volume pumps to move water back to Colby Lake during low water levels. Minnesota Power now operates the diversion works and has stabilized lake levels to facilitate recreational use on the lake.

Whitewater Lake is not listed as impaired by the MPCA; it is classified as Class 2B, 3C, 4A, 4B, 5, and 6.

Partridge River and St. Louis River. Colby Lake and all of the streams mentioned previously discharge directly or indirectly to the Partridge River. This river has a watershed area of 128 square miles at the Colby Lake outlet. The river is not listed as impaired by the MPCA; it is classified as a Class 2B, 3C, 4A, 4B, 5, and 6.

Recent and historical flow and water quality monitoring data are available for the Partridge River below the confluence of Second Creek and the St. Louis River below the confluence of the Partridge River. As part of the Regional Copper Nickel Study, water quality monitoring stations were sited on the Partridge River (CN122) and the St. Louis River (CN127). An extensive list of water quality constituents were monitored as part of this study and include general parameters (e.g., chloride, biological oxygen demand or BOD, nutrients), metals, and some organics. Data was collected in the mid-1970s. In general, this database is of high quality with some exceptions (i.e., mercury). Flow and some limited water quality monitoring data is available at a USGS monitoring station on the Partridge River (USGS 04016000) just downstream of the confluence of Second Creek and on the St. Louis River (USGS 04016500) just downstream of the confluence of the Partridge River. Both of these stations are currently inactive. Further downstream in the St. Louis River there are several flow, water quality, and biological monitoring stations. Data collected at these stations can be accessed through the Minnesota Pollution Control Agency website.

The St. Louis River is listed as impaired by the MPCA in most reaches, including those immediately upstream and downstream of the confluence with the Partridge River due to mercury concentrations in fish tissue. Further downstream the St. Louis River is also listed as impaired due to water column concentrations of mercury and a variety of other pollutants including DDT, dieldrin, PCBs in fish tissue and dioxin. Mercury levels in outflows from the pits are expected to be low and not to be significant contributors to the impairment under either existing or future conditions. The pollutants responsible for the remaining impairments are not expected to be present in discharges from the project.

The St. Louis River is classified as Class 2B, 3C, 4A, 4B, 5, and 6.

Effects on Surface Waters

First Creek. Although not currently proposed, First Creek may receive dewatering discharges from the Area 6 Pit, Area 6NW and SW Pits, and will likely receive runoff from some Area 6 stockpiles. Dewatering flows may partially restore the stream, provided they are consistent with the past flows that shaped the stream. Depending on the timing of stockpile construction and the sediment control practices used, suspended solids may be contributed by stockpile runoff.

Second Creek. Second Creek will receive a treated industrial wastewater discharge from the Nugget facility via Area 1 Pit. Nugget plant operations will be largely unchanged but operation of the concentrator and the deposition of tailings will affect the composition and levels of dissolved constituents in the Area 1 Pit as described in response to Item 18. The discharge from the LSDP Nugget plant is already authorized by a NPDES permit; this will be modified to cover the addition of the concentration processes and the runoff from the plant site as well as tailings disposal in Area 1 Pit.

This Phase II discharge could add several dissolved constituents (e.g., calcium, sodium, chloride, and sulfate) and potentially some trace metals (e.g., nickel, zinc, mercury, and molybdenum) to Second Creek. The Area 1 Pit will receive tailings slurry from taconite processing as well as air scrubber blowdown that has been treated by chemical coagulation and precipitation to remove sulfate, fluoride, solids, and metals, followed by filtration through a Mesabi Nugget developed filtration system. The expected water quality of the Area 1 Pit during the lifespan of the project will need to be estimated given current water management and treatment plans (see Item 18, Proposed Treatment of Topic in EIS). Area 1 Pit will discharge to Second Creek through an existing, permitted discharge (SD001). Hence, the primary effect of plant operations will be to the water quality of Second Creek, and further downstream, potential changes in Partridge River and St. Louis River water quality. Relevant applicable criteria include chloride, hardness, dissolved solids, trace metals, and mercury.

No hydraulic or hydrologic effects are anticipated due to the discharge to Second Creek. Current Area 1 Pit discharge rates are currently estimated to be approximately 4.3 cfs and future average discharge rates are not expected to be significantly greater than current rates that have occurred in the past.

Further downstream, Second Creek may receive a portion or all of the dewatering discharge from the Area 6 Pit and Area 2WX Pit. Effects of dewatering discharges might include stream bed scouring, bank erosion, and sediment transport. The capacity of Second Creek to handle dewatering discharge will depend upon stream bed structure, stream flow, gradient, width and other factors. The stream will also receive runoff from portions of the Area 6 and Area 2WX stockpiles; depending on the timing of stockpile construction and the sediment control practices used, suspended solids may be contributed.

In addition to direct effects of Area 1 Pit discharges to Second Creek and other waters, groundwater outflow from the Area 1 Pit is likely, especially after water levels have been allowed to recover following the cessation of mining operations in Year 20. Direct groundwater flow is possible but indirect transport is also possible. The East Range Hydrology Study indicated that Second Creek loses a significant amount of flow to Area 6 Pit. The Area 6 Pit appears to be upgradient of the St. James Pit, although the degree of hydraulic connection is uncertain. The potential exists for Area 6 Pit to lose water to the St. James Pit in the future, after mining at the Area 6 Pit has ceased and water levels rebounded. Both direct and indirect flow pathways will be evaluated in the drinking water risk assessment described previously in response to Item 13.

Unnamed Creek. The remaining upper reaches of Unnamed Creek will be largely eliminated by placement of fill for the enlargement of the Area 2WX stockpile. The remaining lower segment of Unnamed Creek will likely receive dewatering flows from the Area 2WX Pit and a portion of the stockpile runoff from the Area 2WX stockpiles. Previous mine dewatering has not caused noticeable long-term impacts to the stream but determination of maximum allowable flows will be a requirement for mine dewatering planning. Stockpile runoff may contribute suspended solids to the stream, depending on the erosion control procedures and the state of stockpile development.

Unnamed Creek #2. The stream is adjacent to the east side of Area 2WX and likely receives only minimal runoff from stockpiles. No increase is anticipated.

Colby Lake. As mentioned previously, dewatering flows discharged from the Area 2WX Pit to Unnamed Creek would have hydraulic effects on Colby Lake since the creek enters the northwest arm of the lake (the Partridge River) above the control structure for the lake. Unnamed Creek #2 also enters the lake but dewatering discharges are not proposed to be directed to this creek. Prolonged dewatering discharges to either of these creeks would tend to reduce the probability of low water levels; effects on high water levels are likely to be insignificant due to the extremely large outflows from the lake.

Pit dewatering water from Area 2WX and stockpile runoff from the 2WX stockpiles was directed to Unnamed Creek for about 15 years; this activity ended in 2001. It is unclear to what degree water might flow from the mouth of Unnamed Creek to the southeast in the Partridge River arm of the lake toward the main body of Colby Lake. Such flow would be most likely under conditions of low or no outflow and westerly winds. Any discharge to Unnamed Creek #2 would enter at a point much closer to the main body of the lake and would be more likely to reach the lake. Since the most likely pollutant would be suspended solids, the potential exists for minor localized increases in turbidity and for small increases in overall nutrient loading to the lake. These effects are likely to be small compared to the general loading from the 100-square mile watershed entering via the Partridge River.

Partridge River. The Partridge River will receive discharge from any of the previously mentioned water bodies so it will also be affected by any changes in discharge or water quality in those water bodies. However, the watershed area and flow characteristics of the Partridge River are so large that any effects are likely to be minimal.

The primary potential effect of operations at Areas 6 and 2WX Pits will be the hydrologic and hydraulic effects of dewatering discharges to Unnamed and Second Creeks and possibly First Creek at project start-up (discharge of accumulated water in the pits) and during normal operations.

Cumulative Effects. Cumulative effects to the physical character of streams 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, drought, 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. During reclamation, there will be a period of time when the mine pits will be filling with water and the flow to Second Creek and the Partridge River will be reduced as water accumulates in the mine pits.

Mesabi Nugget's appropriations and discharges could affect First Creek, Second Creek, Unnamed Creek and, to a lesser extent, the Partridge River below Colby Lake. Effects on Colby Lake levels due to flow changes are expected to be small due to the large discharge capacity of the Colby Lake dam.

Therefore, the cumulative change of greater concern is the long-term flow regime of Second Creek, First Creek, Unnamed Creek and the Partridge River, including changes to the duration and frequency of exceedence of the bankfull flow.

Other past, present and reasonably foreseeable future actions that might have cumulative effects on flows in these streams include:

Action	**Potentially Affected Resource**
Modification of land use (including wetland loss) by past mining practices within the upper Partridge River watershed	First, Second and Unnamed Creeks and Partridge River
Modification of flow from PolyMet mine site	Partridge River
Existing discharge from Northshore Mining Company Mine and Crusher area	Partridge River
Changes in to existing condition of tailings basin from PolyMet operations	Second Creek
Existing Laskin Energy Center discharges	Partridge River
Existing discharge from City of Hoyt Lakes POTW	Partridge River
Operation of Whitewater Reservoir	Partridge River
Typical timber harvest activities on SNF, state and county lands and private lands.	Partridge River
Existing runoff from the development of City of Hoyt Lakes	Partridge River

Proposed Treatment of Topic in EIS:
The topic is significant; information beyond what was in the EAW will be included in the EIS.

Project-Specific Analysis. The EIS will include a model of the overall watershed balance from the project water balance and changes in watershed runoff due to project mining activities. The model will provide predicted changes in watershed yield and affected water bodies, in particular, the effect of project activities on First Creek, Second Creek, and Unnamed Creek stream stability. Model selection and definition of the modeling approach will be done in consultation with technical staff of the cooperating agencies.

The model will first be calibrated to available flow gauging data. Since no long-term flow gauging has been done on First, Second or Unnamed Creeks, and since the nearest streamflow gauge for the Partridge River is located above the reach of interest, these models will be calibrated to the few available stream measurements and will be checked by application of other simple models such as USGS and DNR regression estimates.

A physical evaluation such as a Rosgen evaluation will be conducted to help evaluate the stability of First Creek, Second Creek, and Unnamed Creek under existing conditions, and the sensitivity of these streams to hydraulic change (e.g., dewatering discharges).

The EIS will include an evaluation of whether the mining related contaminants that have been found in Second Creek, which are expected to be added by discharges from Mesabi Nugget operations, may indirectly impact water quality at the St. James Pit. The East Range Hydrology Study indicated that Second Creek loses a significant amount of flow to Area 6 Pit. The Area 6 Pit appears to be upgradient of the St. James Pit, although the degree of hydraulic connection is uncertain. The potential exists for Area 6 Pit to lose water to the St. James pit in the future, after mining at Area 6 Pit has ceased and water levels rebounded.

The EIS will identify any "sector specific" requirements for consideration in NPDES permitting and how they apply to the project. The EIS will identify mitigation for adverse impacts, including potential measures included in the respective SWPPPs.

The EIS will consider project-related SO4 contributions to receiving waters, especially potential sources from waste rock piles containing high sulfide rock. If waste rock piles are identified as a significant potential source, potential mitigation measures, such as subaqueous disposal, water treatment, or routing, will be identified to reduce potential contributions and related impacts.

Cumulative Effects Analysis. The hydrologic models will be modified to assess cumulative effects from: 1) actions since the date of the monitoring, and 2) potential future actions, including:

- Potential future discharges and appropriations at Mesabi Nugget facility.
- Reductions in flow due to filling of Mesabi Nugget pits during reclamation.
- Proposed PolyMet Mine Site impacts to Partridge River, tailings basin activities on Second Creek, and appropriations for PolyMet from Colby Lake.
- Appropriations, discharges and land use changes at proposed Cliffs-Erie Railroad Pellet Transfer Facility construction and operation.
- Changes in runoff quantity due to future development of City of Hoyt Lakes.
- Any reasonably foreseeable changes to discharges from Hoyt Lakes Publicly Operated Treatment Works (POTW) due to development and/or treatment system changes.
- Any potential changes in water discharge from Northshore Mining Company discharges in Partridge River watershed.
- Any reasonably foreseeable changes to timber harvest activities on SNF, state and county lands and private lands.

The threshold of significance for this cumulative effects 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 2007 by Mesabi Nugget as a base condition that will then be modified by predicted changes in streamflow.

Study Data Needs

- Estimated pit dewatering and groundwater flow data (from groundwater model, see response to Item 13).
- Estimated process water appropriations and discharges.
- Stormwater management plan for the proposed Mesabi Nugget facilities.
- Existing hydrologic models of Partridge River.
- Flow data for Partridge River.
- Lake level data for Colby Lake.

- Discharge data for Hoyt Lakes POTW.
- Discharge data for Erie Mining Company and successors LTVSMC and Cliffs-Erie discharges from pits.
- Historic air photos or GIS coverages showing modification of land use (including wetland loss) by past mining practices within the upper Partridge River watershed.
- Discharge data from Northshore Mining Company Mine and Crusher area and evaluation of possibility of changes to Northshore Mining Company discharges in future.
- Appropriations and discharge data for Syl Laskin Energy Center discharges.
- Operation plans and historic lake levels for Whitewater Reservoir.
- Data on typical timber harvest activities on Superior National Forest, state and county lands and private lands.
- Estimates of existing and future land use for City of Hoyt Lakes.
- Estimates of future PolyMet Mine Site flow impacts related to mine development, operation and closure, including long-term flow management of PolyMet mine pit during and after filling of pit as well as estimates of flow impacts related to alterations to the tailings basin.
- Estimates of potential future discharges and appropriations at Mesabi Nugget facility.
- Water balance for proposed Cliffs-Erie Railroad Pellet Transfer Facility construction and operation.

18. **Water quality: wastewaters**
    a. Describe sources, composition and quantities of all sanitary, municipal and industrial wastewater produced or treated at the site.

Sanitary Wastewater. Workers at the plant and mine offices/crusher will generate sanitary wastewater. Employees working at the mine sites will use portable toilet facilities that will be hauled either to a POTW or to a dump station at the mine site for disposal. Sanitary wastewater generation is estimated at 30 gallons per day per employee, based on experience at other taconite facilities and published values. Based on an estimate of 124 employees on site each day, overall wastewater production is estimated at about 4,000 gpd. At both the plant site and at the mine office and shops a sanitary sewage holding tank will be used to contain sanitary wastewater. It will be pumped and disposed of at the Hoyt Lakes POTW, which should be well within the capacity of the treatment facility.

During construction, sanitary wastewater will be generated at portable toilets provided by the construction contractor and disposed of by a licensed disposal service hauling the wastewater to a municipal facility, most likely at Hoyt Lakes. Construction employment is estimated at up to 250 persons for the LSDP and wastewater generation from portable toilets on construction sites are roughly one-half (0.5) gallon per person per day; estimated wastewater generation would be less than 125 gpd, which would not significantly affect local POTWs. With the exception of temporary generation of sanitary wastewater during construction, no municipal wastewater will be generated or treated.

Industrial Wastewater. The project will generate industrial wastewater. Process waters will be generated from two sources. One source is the previously permitted LSDP nugget plant and the second is the proposed Mesabi Nugget Phase II concentrator to be located at the plant site north of the Area 1 Pit. Phase II will include the addition of an ore grinding and concentrating facility. Pumping for pit dewatering will produce a discharge to local streams. Stockpiles will also contribute stormwater runoff to local streams and loss of wetlands, especially coniferous bogs, will increase pollutant loading from the affected areas. A conceptual facility layout and water flow chart is provided in response to Item 13.

The chemical composition of the process water will be a function of raw material processing and concentrate production, air emission control equipment, evaporative processes and process chemical usage, as well as the existing permitted nugget production.

The existing permitted LSDP nugget plant, which uses coal as a reductant, is expected to contribute trace metals, chloride, sodium, iron, fluoride, and sulfate to process waters. Cooling towers will also be installed at the plant. Operation of cooling towers has the effect of concentrating the dissolved solids in water used to make up for evaporative losses in the cooling tower. Cooling towers also require chemical additions to inhibit deposition, balance pH and inhibit biological activity. Typically, the dissolved constituents in the cooling tower blowdown are concentrated by several factors (called cycles of concentration) relative to the make-up water. In the Phase I LSDP facility, the air emissions control scrubbers are expected to be the largest source of particulates and dissolved solids in process water. The scrubbers are also expected to contribute dissolved sulfate, hardness and total dissolved solids as well as particulates.

Additional chemicals that will be used in the nugget plant include biocides, corrosion inhibitors, treatment chemicals such as coagulants and softeners, acids and caustic. These salts are expected to potentially include sodium, calcium, magnesium, chloride, phosphorus and nitrogen.

The addition of the concentrator lines will require fewer chemicals than the operation of the existing permitted LSDP nugget plant. The major process chemicals will be iron ore concentrating and flotation chemicals such as methyl isobutyl carbinol (MIBC) and amine-based collectors. Taconite grinding and concentrating has been shown to contribute low levels of chloride, sulfate, carbonate, and magnesium to water used in the grinding and concentrating processes, both directly in the process and potentially through the oxidation of tailings after disposal.

Tailings will be deposited behind a dike separating the process water reservoir at the east end from the tailings disposal area at the west end. The dike will be constructed using waste rock and/or tailings. Depending on plans for wetland development on the tailings basin a second dike may be developed to allow a “plateau” to be constructed at water level while remaining tailings will be placed at higher elevations. Following closure of the dike(s), tailings will be deposited by moving the tailings discharge point around the west perimeter of the pit, allowing coarse tailings to settle out at the edge of the pit and fine tailings and slimes to deposit near the center.

In order to evaluate the magnitude of potential water quality impacts of tailings deposition, a comparison was made between:

- the current water quality in the Area 1 Pit;
- the projected water quality of the process water for the Phase I Nugget Plant in the Area 1Pit at 8 years (a conservative estimate for water quality at the end of the first NPDES permit term);
- The projected water quality of the process water for the Phase I Nugget Plant in the Area 1 Pit at equilibrium; and
- the clear water pool at the Minorca pit, which has provided in-pit tailings disposal for the ArcelorMittal taconite plant since December, 2001. See Table 18-1.

The data for the Area 1 Pit is taken from the water balance spreadsheet for the NPDES permit application for the Phase I Mesabi Nugget project. The data for the Minorca pit is taken from “A Geochemical Tracer Study of Minnesota’s First In-pit Disposal Facility for taconite Tailings” by Michael Berndt and Bob Liebfried of the DNR (undated, but available in 2008).

Table 18-1. Comparison of Existing and Projected Water Quality of Area 1 Pit and Observed Water Quality from ArcelorMittal In-Pit Tailings Disposal (PPM)

Parameter	Area 1 Pit, Existing Conditions	Nugget Plant Scrubber Water Predicted	Nugget Plant Treated Scrubber Water (to pit)	Projected Pit Discharge Quality	ArcelorMittal Minorca Clearwater Pool
Ca	31	470	214	102	30-40
Mg	160	275	30	110	50-60
Hardness	748	1,015	1,111	888	80-100 +
SO4	374	1,828	1,990	1,000	50 - 80
Fl	0.2	817	7.5	3	2-4
As	3.3	4.5	4.5	0.8	2.7

Minorca figures from *A Geochemical Tracer Study of Minnesota's First In-Pit Disposal Facility For Taconite Tailings.* Berndt and Leibried, DNR, 2008.

As can be seen, in all cases but two, the projected concentration in Area 1 Pit from treatment of scrubber and other blow-down waters is much higher than the dissolution of chemicals from tailings deposited in the Minorca Pit; one exception is the concentration of arsenic. With the arsenic exception, it is likely that the concentrations of chemicals from treatment of scrubber and other blowdown will simply overwhelm the concentration of chemicals from dissolution from the tailings. For arsenic, it is proposed to use the concentration found in the Minorca Pit.

It should be noted that the water balance from Phase I was based upon complete mixing in the pit. Also assumed was a steady-state influx of groundwater equal to the discharge and use rate. Placement of tailings will also affect the available volume of storage in the Area 1 Pit, which will affect both sedimentation and dilution of process wastewater. Dilution was an important component of the predictions of water quality for the Phase I Nugget Plant NPDES Permit. A more sophisticated water balance will be prepared for this EIS, including groundwater and surface water modeling. The results of that modeling may result in different predictions of water quality in the Area 1 Pit.

During permitting of the Phase I LSDP nugget plant, variances were granted for discharges of total dissolved solids, hardness, alkalinity and specific conductance. The addition of the concentrator lines is not expected to reduce progress in addressing these variances but this will be a topic of study in the EIS. The calculated hardness in the Minorca Pit is estimated to be 314 mg/L (based on concentrations of calcium and magnesium measured). This is approximately one-half the current hardness in the Area 1 Pit, and lower than the projected concentrations. Other anions are similarly higher in the Area 1 Pit than in the Minorca Pit. It is expected that the TDS and specific conductance in Area 1 Pit will be driven by treatment of scrubber blowdown and other blowdown waters, and not by dissolution of materials from the disposed tailings.

Berndt and Leibfried did not directly measure bicarbonates (alkalinity) but noted at page 15 of their report "the initial water in the clearpool was found to be highly super-saturated with respect to many carbonate minerals, including dolomite, calcite, aragonite, magnesite and monohydrocalcite. … Thus, with the relatively short residence times for water in the Minorca Pit and for waters having high Mg/Ca ratio, it is not surprising that water in the Minorca is supersaturated with respect to carbonate minerals."

The current water quality in Area 1 Pit appears similar, in that there is a high Mg/Ca ration (approximately 5:1). Again, it is likely that alkalinity in Area 1 Pit will be driven by treatment of scrubber blowdown and other blowdown waters, and not by dissolution of materials from the disposed tailings.

A complete water chemistry balance will be prepared for the facility as part of the NPDES permit application; this balance will be available for use in the preparation of the EIS.

Water quality of discharges from dewatering of Areas 2WX and 6 Pits will be estimated from data collected on existing pit water; data from dewatering at other taconite mines will also be used. Likely concerns would focus mainly on incremental loading of mercury (at very low concentrations) and sulfate. The water quality of stockpile runoff will be estimated by a program of runoff sampling at former LTVSMC stockpiles. This program is being conducted in the summer of 2008. Additional estimates may be obtained using data on stockpile runoff from other facilities, if available.

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. (See answer for c below)

The wastewater treatment system will employ chemical coagulation and precipitation to remove sulfate, fluoride, solids, and metals, followed by two stages of filtration through a Mesabi Nugget developed filtration system (MNC Mercury Filter - patent pending) for enhanced mercury removal. Chemical precipitation is accomplished using a two stage metals removal and softening system employing lime, ferric chloride, cationic and anionic polymers, caustic (soda ash) and water treatment chemicals among others to form metal hydroxides and metal sulfides. The precipitate generated will be passed through a filter press with the solids disposed off-site in an approved landfill. Effluent from the solids contact clarifier will be passed through a microfilter and the first of two proprietary mercury filters for additional solids and mercury removal before entering the west end of Area 1 Pit, where additional settling and chemical reactions will occur. The effluent from the east end of Area 1 Pit will then be treated using the second proprietary mercury filter for polishing prior to discharge through SD001 to Second Creek.

The Phase I facility will use a proprietary mercury filter to treat low levels of mercury that naturally occur in the raw water to levels that will meet standards for discharge. In the Phase II project, it is anticipated that mercury will be reduced to suitable levels by mechanisms that have been observed at other Mesabi Range taconite facilities. Treated process water will be mixed with the tailings slurry which will then be pumped and transported approximately 3 miles in a pipe to the west end of the Area 1 Pit. Tailings will be deposited in the Area 1 Pit, and because mercury has a high affinity for tailings and has been shown to quickly adsorb to tailings, mercury that has adsorbed to tailings will be sequestered in the Area 1 Pit (Monson, et. al., 2000; Engesser and Berndt, 1997). If this mechanism does not adequately control levels of mercury in wastewater, the Phase I mercury filter can continue to be used and adapted, if necessary, for use in treating the Phase II discharge.

There will be a single treated process water discharge through an existing permitted Mesabi Nugget outfall (SD001). Water from the Area 1 Pit will be discharged by pipe directly to Second Creek just downstream of the causeway between Area 2WX and the plant site. The discharge rate and the effect of the discharge on receiving waters will largely be dependant upon the water and chemical balances of the Plant, Area 1 Pit, and water sources available as make-up. This is discussed below as a proposed EIS, major discussion-level topic.

Mesabi Nugget's discharges will be treated to meet applicable standards but levels of hardness and total dissolved solids and possibly chlorides and sulfate may continue to 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 Mesabi Nugget 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 effects analysis.

As described previously in response to Item 17, stockpile runoff and clearing and stripping of mining areas as well as loss of wetlands could contribute suspended solids and other pollutants to streams; this can likely be mitigated by sedimentation and erosion control practices.

An on-site sewage system will be constructed at the Plant. Sanitary waste generated at the mine pits will be collected and disposed by a commercial sanitary waste operator. Sanitary waste treatment is discussed in 18(a).

Cumulative Effects. Cumulative water quality effects can occur from point or non-point discharges of pollutants to a receiving water. For most water bodies, cumulative effects occur through simultaneous, or near simultaneous, discharges to the water body that are in reasonable geographic proximity. This same pattern and degree of discharges to surface waters can in turn affect groundwater quality.

Mesabi Nugget will have a point discharge of industrial wastewater to Second Creek at SD-001, north of Area 2WX. Discharges of dewatering water during mining will occur to Second Creek, Unnamed Creek and possibly to First Creek. All of these streams discharge to the Partridge River.

Other actions that could have the potential for cumulative effect include those projects discharging to First Creek, Second Creek, Unnamed Creek, the Partridge River, and possibly the St. Louis River. The first three streams are short, have low flow, and small local tributary areas and are more likely to be affected by multiple wastewater discharges. Projects discharging to the Partridge or Embarrass Rivers, notably dewatering at Northshore Mining Company, impacts from PolyMet Mining Co., the Laskin Energy Center, and the City of Hoyt Lakes have lower potential for cumulative effects due to the large watershed area and significant distance separating the project discharge locations. The Mesaba Energy project is proposed to be designed as a zero liquid discharge facility, according to the Draft EIS for the project and would therefore have low probability for cumulative water quality effects. Noted actions include:

Action	**Resource Potentially Affected**
Discharge from Mesabi Nugget Phase I facility	Second Creek, Partridge River
Future discharge from Mesabi Nugget Phase II facility	Second Creek, Partridge River
Pit dewatering discharges from Area 6 and Area 2WX	Second Creek, Unnamed Creek, First Creek, Partridge River
Site and stockpile runoff from Mesabi Nugget pits, crusher and stockpile	Second Creek, Unnamed Creek, First Creek, Partridge River
Proposed Cliffs-Erie Railroad Pellet Transfer Facility construction and operation	Second Creek, Partridge River
Discharges from Cliffs-Erie/PolyMet facility (including tailings basin seepage) to Second Creek headwaters	Second Creek, Partridge River
Land use changes, including loss of wetlands.	Second Creek, Unnamed Creek, First Creek, Partridge River
Dewatering discharges from Northshore Mining Company	Partridge River
Discharges from PolyMet Mine Site, including releases to groundwater and subsequent discharge to streams	Partridge River

Action	Resource Potentially Affected
Discharges from Syl Laskin Energy Center	Partridge River
Discharges from City of Hoyt Lakes	Partridge River

Proposed Treatment of Topic in EIS:
The topic is significant; information beyond what was in the EAW will be included in the EIS.

Project-Specific Analysis. The EIS will include a water and chemistry balance for plant process water and Area 1 Pit, including the proposed treatment system. The EIS will also include estimates of dewatering discharge rates and volumes for the Areas 2WX and 6 Pits, identify receiving waters and the probable quality of such discharges waters, including mercury and sulfate. The effect of stockpile construction and the loss of wetlands will be evaluated using estimates of pollutant export change due to land use change and estimates of pollutant sequestration loss due to loss of wetland storage and vegetation. All of this information will be used to identify potential impacts to First Creek, Second Creek, Unnamed Creek, and other receiving waters. The addition of the concentrator lines to the wastewater stream relative to sustaining progress in addressing water quality variances will be a topic of study in the EIS.

The EIS will include a detailed listing of all process chemicals that are proposed to be added to make-up water, including those used for iron ore processing and flotation, controlling mineral deposition, balancing pH, inhibiting biological activity or corrosion, coagulating, softening and acids and caustics. This information will be used in the health risk assessment.

The analysis will include a mass-balance analysis for the mixing of worst-case (both quantity and quality) discharge effluent with Colby Lake water. Pertinent drinking water standards, as specified in the Safe Drinking Water Act, will serve as the measure against which worst-case contaminant concentrations are compared. The EIS will evaluate indirect impacts to other possible receptors, including possible groundwater seepage from Area 1 Pit and Area 6 Pit toward the St. James Pit.

A number of models are available to analyze generation, fate and transport of pollutants in streams. Models recently used in Minnesota EISs and NPDES permitting procedures include HSPF and QUAL2E and dilution models. For the Partridge River initial estimates of impact will be completed using a simple dilution model since this was the approach used by PolyMet Mining and that information will form the basis for a cumulative effects analysis of the Partridge River. Final model selection and modeling approach will be determined by consultation among the cooperating agencies.

Cumulative Effects Analysis. A quantitative assessment of cumulative water quality impacts will be performed for Second Creek, Unnamed Creek, and to First Creek if dewatering discharges are proposed. The cumulative effects of discharges and wetland losses on the Partridge River will be analyzed and, if significant impacts are noted, the analysis will be extended to the St. Louis River.

A cumulative evaluation of all projects in the St. Louis River watershed will not be conducted. However, the loading of bioaccumulative substances, particularly mercury (and sulfate which can lead to methylation and increased bioavailability of mercury), will be estimated for the proposed project and the other projects listed above and the incremental loading from the projects will be determined at key downstream locations on the Partridge and St. Louis Rivers using the most recent data as a baseline estimate of loading.

The threshold for this cumulative effects assessment will be Minnesota's standards applicable to the respective waters being evaluated and the Safe Drinking Water Act standards that are applicable to Colby Lake as a

drinking water source for the City of Hoyt Lakes. Minnesota water quality standards were promulgated to protect a number of uses, including human health (drinking water – Class 1) and aquatic life and recreation (Class 2). They are also in place to protect waters for industrial consumption (Class 3) and agriculture and wildlife (class 4). Standards related to these other classes will be considered in addition to the project-specific assessment of human health and aquatic life protection. The future conditions scenarios will be completed for both operation and post-closure conditions, assuming that all other reasonably foreseeable actions have been completed.

Potential cumulative groundwater quality effects associated with the project will be evaluated as part of the EIS. This evaluation will expand upon the work being conducted to assess potential drinking water impacts to also assess overall impacts to the groundwater resource.

Data Needs for Analysis of Cumulative Effects

The following data are needed to assess cumulative water quality effects from wastewater discharges:

- Estimates of current and future hydrologic loadings from subwatersheds (see previous cumulative effects discussion for flow)
- Water quality monitoring data for First, Second, Unnamed Creeks, the Partridge River, and St. Louis River (if required)
- Estimates of mercury and sulfate concentrations and load for the Partridge and St. Louis Rivers.
- Data on past and existing Cliffs-Erie/PolyMet tailings basin seepage and pit and plant discharges to Second Creek
- Data on proposed PolyMet impacts from the Mine Site and predictions of subsequent loads to the Partridge River.
- Discharge data for the Syl Laskin Energy Facility.
- Historic air photos or GIS coverages showing modification of land use (including wetland loss) by past mining practices within the First, Second and Unnamed Creek watersheds
- All pertinent sources of data on process water discharges and tailings effluent. This includes previous tailings effluent characterization work conducted on the LTVSMC tailings by the DNR (In-Pit Disposal of Taconite Tailings Geochemistry, 1999) and additional work conducted on the same tailings basins by PolyMet. These data, plus any others that are known, should be compiled into a single reference for agency review and use 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.

During facility operation, no wastes will be discharges into publicly owned treatment facilities.

During construction, sanitary wastewater will be generated at portable toilets and disposed of by a licensed disposal service hauling the wastewater to a municipal facility, most likely at Hoyt Lakes. The Hoyt Lakes wastewater treatment facility will have adequate capacity to handle these flows.

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.

References:

Berndt, M. 2003. *Mercury and Mining in Minnesota*. Minerals Coordinating Committee Final Report. June 30, 2003 , Revised Oct. 15, 2003 Minnesota Department of Natural Resources Division of Lands and Minerals

Engesser, J., and Niles, H.B., 1997. *Mercury Emissions from Taconite Pellet Production.* Coleraine Minerals Research Laboratory. Prepared for the Minnesota Pollution Control Agency. September, 1997

Monson, BA; Pruchnofski, GJ; Wagner, D; Osmundson, M; Twaroski, CJ. *Estimated Mercury Emissions, Deposition and Tailings Basin Discharge from a Proposed Expansion of a Taconite Processing Facility in Northeast Minnesota*. 2000.

19. **Geologic hazards and soil conditions**

a. Approximate depth (in feet): to ground water: minimum 0 (in wetlands) / average Unknown
to bedrock: minimum 0 (bedrock outcrops) / average Unknown but generally <40 feet except in stockpile areas

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 features are present. It should be noted that underground mine workings could constitute as a source of environmental problems if they are found to connect mine pits in such a way as to allow for rapid movement of groundwater and contaminants to drinking water receptors. For the project, the connection would be to the St. James Pit.

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 St. Louis County Soil Survey information are listed in Table 19-1 and are shown on Figure 19-1. The majority of the project area is mapped as disturbed land, including mine stockpiles and pits. Soil texture in the undisturbed areas is primarily stony loam or loam. The underlying glacial deposits are generally characterized as Rainy Lobe till, which has a sandy loam matrix texture with 48-87% sand (Jennings and Reynolds, 2005).

The truck shop will be located on the north side of the Area 2WX Pit. Standard fueling/maintenance operations will occur at the truck shop; this will include the majority of fuel transfers. There will be a secondary containment located in this area to contain any spills. A fueling truck will be utilized for remote fueling operations in the pits for smaller mobile equipment. Prior to the start of operations, Mesabi Nugget will prepare a Spill Prevention Control and Countermeasure Plan that will include, among other issues, the management of both types of fueling and measures to protect surface and groundwater from contamination.

Cumulative Effects. No cumulative effects are anticipated.

Proposed Treatment of Topic in EIS:
The topic is minor, but will be discussed with limited information beyond that in the EAW. 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. The EIS will include an inventory of tanks and major process consumables and will assess the potential for contaminants to reach the Area 1 Pit and thus affect the proposed drinking water system, as well as downstream receptors, either via direct discharges to Second Creek or groundwater seepage. Measures to prevent and contain spills from maintenance and repair of mining equipment will be identified in the EIS. The EIS will report a review of existing records for existence of underground mine workings in the project area.

Table 19-1. Project Area Soils Summary

Soil Symbol	Soil Type	Percent of Project Area	Soil Texture	Hydrologic Group
1048	Dumps, iron mine	13.3%	--	--
1049	Pits, iron mine	44.1%	--	--
1050	Tailings basin	--	--	--
1003B	Udorthents, loamy (cut and fill land)	12.5%	Unspecified	B
1020A	Bowstring and Fluvaquents, loamy, 0 to 2 percent slopes, frequently flooded	0.1%	Unspecified	D
1021A	Rifle soils, 0 to 1 percent slopes	2.0%	Silt Loam	D
1022A	Greenwood Soils, 0 to 1 percent slopes	--	Mucky Peat	D
B119A	Tacoosh mucky peat, Upham basin, 0 to 1 percent slopes	--	Muck	D
B27A	McQuade-Buhl complex, 0 to 2 percent slopes	--	Loam over Clay	D
F1C	Eaglesnest stony loam, 4 to 12 percent slopes, very bouldery	2.3%	Stony Loam	C
F2B	Eaglesnest-Wahlsten complex, 2 to 8 percent slopes, bouldery	--	Stony Loam	C
F3D	Eveleth-Eaglesnest-Conic complex, 6 to 18 percent slopes, bouldery	--	Stony Loam	C
F4E	Eveleth-Conic, bouldery-Rock outcrop complex, 18 to 30 percent slopes	--	Stony Loam	C
F9B	Cloquet loam, 2 to 8 percent slopes	--	Loam	B
F10D	Cloquet-Pequaywan complex, pitted, 0 to 18 percent slopes	--	Loam	B
F11B	Eaglesnest stony loam, 2 to 8 percent slopes, bouldery	--	Loam	C
F12B	Eaglesnest-Babbitt complex, 1 to 8 percent slopes, bouldery	10.2%	Stony Loam	C
F13A	Babbitt, bouldery-Aquepts, rubbly, complex, 0 to 3 percent slopes	3.0%	Stony Loam	C
F14D	Eveleth stony loam, 8 to 18 percent slopes, bouldery	1.5%	Stony Loam	C
F17A	Aquepts, 0 to 2 percent slopes, rubbly	--	Loamy Fine Sand	D
F19A	Pequaywan loam, Rainy Lobe, 0 to 3 percent slopes	--	Loam	B
F26G	Shagawa-Beargrease complex, 35 to 60 percent slopes, extremely bouldery	--	Stony Loam over Sand	B
F27C	Beargrease, very stony loam, 2 to 15 percent slopes, extremely stony	--	Stony Loam over Sand	A

Soil Symbol	Soil Type	Percent of Project Area	Soil Texture	Hydrologic Group
F30G	Conic, very bouldery-Insula, very bouldery-Rock outcrop complex, 20 to 70 percent slopes	--	Variable	C
F32A	Merwin peat, 0 to 1 percent slopes	4.4%	Stony Loam	D
F34A	Cathro muck, depressional, 0 to 1 percent slopes	0.4%	Peat	D
F35D	Eveleth, bouldery-Conic, bouldery-Aquepts, rubbly, complex, 0 to 18 percent slopes	--	Stony Loam	C
F36D	Conic, bouldery-Insula, bouldery-Rock outcrop complex, 8 to 25 percent slopes	--	Variable	D
F129A	Tacoosh mucky peat, 0 to 1 percent slopes	--	Muck	D
GP	Pits, gravel-Udipsamments complex	--	--	--
M-W	Water, miscellaneous	5.4%	--	--
USFS	U.S. Forest Service mapping	--	--	--
W	Water	--	--	--

Several of the soil types are disturbed areas. These include mine dumps ("Dumps, iron mine"), mine pits ("Pits, iron mine"), tailings basins, and gravel pits ("Pits, gravel-Udipsamments complex").

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.

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. Construction debris will be hauled to a licensed demolition debris landfill.

As noted in Table 20-1, unmarketed slag will be used as a material in haul road construction or hauled to a suitable permitted solid waste disposal facility.

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.

Mesabi Nugget expects to begin operations as a very small quantity generator of hazardous waste. See Table 20-1 for a list of solid and hazardous wastes and their method and location of disposal. Toxic and

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

Source	Quantity (estimated)	Description, Proposed Disposition
Solid Wastes from Phase II Project		
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)	To Be Determined	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.
Demolition wastes	To Be Determined	Typical demolition wastes such as sandblast waste, concrete, refractory brick, and wood. A licensed hauler will dispose of demolition wastes.
Crusher baghouse dust	To Be Determined	Has the composition of ore and will be sent to the concentrator.
Concentrator plant tailings	7.4 million tons / year	Will be sent to the Area 1 Mine tailings basin. Tailings management will be addressed with wastewater discharge.
Solid Wastes from Existing Phase I LSDP Nugget Plant		
Green ball dryer baghouse dust	To Be Determined	Composed primarily of taconite concentrate and coal dust that will be internally recycled.
Rotary Hearth Furnace	To Be Determined	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.
Spent tailings from taconite mercury filters	15,500 gpd	Will be included in RHF plant wet scrubber sludge stream (see below) and either trucked to a permitted solid waste disposal facility or, if possible, used as an agricultural soil amendment following evaluation through the University of Minnesota's beneficial use program.
Slag	To Be Determined	The RHF will produce slag. The major constituents of slag are calcium oxide, silicon oxide and iron. Slag is considered non-hazardous and is commonly used as construction material. Mesabi Nugget has completed a Waste Management Plan that addresses slag disposal. As a preferred option the non-metallic fraction will be offered for road or railway construction fill. Alternatively, it may be used on-site for haul road construction waste or trucked to a permitted solid waste disposal facility.
Sludges		
Raw water filtration sludge	To Be Determined	Initial screening of raw water will produce a small amount of waste composed of coarse particulates and natural debris. The screenings will be trucked to a permitted solid waste disposal facility.
RHF plant wet scrubber sludge	To Be Determined	Expected to include iron oxide, metallic iron and possibly small amounts of coal and binder. Scrubber solids will be filter pressed onsite and trucked to a permitted solid waste disposal facility or, if possible, used as an agricultural soil amendment following evaluation through the University of Minnesota's beneficial use program.

Source	Quantity (estimated)	Description, Proposed Disposition
RHF Cooling Tower Blowdown (Sent to wastewater treatment)	To Be Determined	Small amounts of solids from cooling tower cold well sump will be combined with RHF scrubber sludge and managed as noted above.
Source Hazardous and Special Wastes		
Mine/Crusher Equipment Waste Oil and Lubricants	To Be Determined	Shovels and drilling equipment will produce waste lubricants and hydraulic oil. Also, see truck shop, below.
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	To Be Determined	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.
Truck Shop Waste	To Be Determined	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.
Laboratory – waste solvents and materials	To Be Determined	Waste will be drummed and disposed of by a licensed commercial hazardous waste disposal contractor.

hazardous materials will be managed as described in Table 20-1. Safeguards (i.e. containment berms and structures) will be built into storage systems, thereby greatly diminishing the likelihood of these materials contaminating groundwater.

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. Above-ground fuel storage tanks will be utilized at the truck shop and will be located in secondary containment. Storage tanks will be contained by berms or double-wall construction. Mesabi Nugget will prepare a spill prevention control and countermeasure (SPCC) plan prior to the start of operations, if required.

Cumulative Effects. Project-related disposal of solid and hazardous wastes and from presence of tanks appear unlikely to produce cumulative effects. As described above, wastes will be disposed of at permitted off-site facilities. Spills or leakage from tanks would be contained locally and would be unlikely to coincide with effects of other tanks or leaks.

Proposed Treatment of Topic in EIS:
The topic is minor, but will be discussed with limited information beyond that in the EAW. Estimates will be provided for the types, amounts, and compositions of solid and hazardous wastes produced from future operations as listed from Table 20-1. Disposal locations for municipal solid waste and demolition waste will be provided in the EIS. The EIS will detail AST and UST requirements for diesel fuel operations.

21. **Traffic**. Parking spaces added: N/A. Existing spaces (if project involves expansion) N/A. Estimated total

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

The project does not occur in the Twin Cities metropolitan area.

The LTVSMC/Cliffs-Erie taconite facility operated for almost 50 years at the project location with approximately 1300 to 2700 employees, depending on production rate and staffing model. The proposed Mesabi Nugget LSDP facility will employ 58 workers and the implementation of Phase II is expected to raise the total number of workers to about 220. Overall traffic impacts should be well below what has been experienced in the past. Access to the facility, including Areas 6 and 2WX, will be via the main gate, accessed from County Road 666, and the north gate, accessed from TH 135. These are the same highways that formerly served the LTVSMC/Cliffs-Erie taconite facility.

Operational Traffic. Initial projections are that Mesabi Nugget Phase II (including the LSDP) will employ about 28 day-shift employees working five days per week and 192 persons working on two twelve hour shifts per day with shifts rotated to maintain operation 7 days per week. With reductions for weekends, each shift would have about 48 persons present on site. The worst traffic situation would occur if the start or finish of the daytime employees' workday coincided with shift change. A conservative assumption is that no car pooling would occur and only personal vehicles would be used for commuting. In this case, the arriving and leaving shift workers and the day employees would combine to produce a worst case of about 124 vehicles per hour with 76 vehicles moving in one direction (day shift plus end of shift) and 49 vehicles moving in the other direction (beginning of shift). In actuality, end-of-shift and beginning-of-shift traffic might occur in the same peak hour but would never actually coincide. Delivery of materials and supplies to the plant might coincide with this peak traffic but peak hour delivery traffic should be less than 10 vehicles per hour. This traffic count is well within the capacity of the existing paved two-lane county highway leading from Hoyt Lakes to the plant.

Construction Traffic. During construction and startup it is possible that more workers would be present than during normal operation. The number of construction workers is unknown but should be less than 250 workers per day. Assuming a distribution of 200 workers on day and evening shifts and 50 on night shifts, the peak traffic would be less than 150 vehicles per hour (peak hour) during construction with a daily total of about 750 trips per day. A worst case would assume that construction of Phase II would overlap with startup of the Phase II so the net traffic could be greater, with conservative peak traffic of 370 vehicles per hour.

Cumulative Effects. Because the PolyMet facility will use the same entrance roads, specifically County Road 666 and TH 135, cumulative traffic effects may occur. If constructed, the PolyMet facility would employ between 490 and 600 employees, according to the Scoping EAW submitted for the project, with a maximum traffic impact conservatively estimated at 300 vehicles per hour. If combined with the Mesabi Nugget operational traffic and deliveries, the average daily traffic would increase to about 1,900 vehicles per day and the peak hour traffic would be 424 vehicles per hour. This simple addition assumes that both facilities would have identical shift change times and all traffic enters via County Road 666.

If cumulative traffic effects do occur, avenues for mitigation are available. The route for employees coming from the north and west is via TH 135, so all traffic need not enter via County Road 666. Employees could shift their route to the facility if traffic impacts become too great at one entrance or another. In addition, shift change hours could be modified to avoid coinciding with shift changes at PolyMet Mining Co. and the hours of daytime employees.

For construction traffic, cumulative effects are unlikely as long as construction for the two projects do not coincide. According to the current PolyMet website, PolyMet's construction is currently projected to begin in late 2008 with initial production of concentrates in mid-2009. Mesabi Nugget's Phase II construction will begin in early 2010 and end in about mid-2013. The net effect will be that construction traffic may be of greater duration but volumes should not be additive as currently projected.

Proposed Treatment of Topic in EIS:
The topic is minor, but will be discussed briefly in the EIS using the updated information in the same format as the EAW. Estimates of employee and operational traffic levels will be updated from more detailed project planning data when necessary.

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.

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 the response to Item 23 below. The parking lot will not hold 500 vehicles.

Proposed Treatment of Topic in EIS:
The topic is minor and will not be addressed in the EIS. The EIS treatment of the topic of air emissions from mine haul trucks is part of the overall description of air quality issues provided in response to Item 23.

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.

Existing Conditions

Regulatory Background. The proposed Phase II Project will be considered a major modification to an existing major PSD source under Federal New Source Review (NSR), Prevention of Significant Deterioration (PSD) regulations. As a major modification, the air permit application for the proposed project must include the requirements of the PSD program for those emissions from "point sources." These include:

- Demonstration of the application of Best Available Control Technology (BACT) for PSD pollutants for which the project exceeds the significant emission rates. Based upon the current emission inventory, the pollutants for which the BACT analysis will be performed include particulate (PM10 and PM2.5).
- A Class II NAAQS analysis ("fenceline" dispersion modeling) will be required for particulates (PM10 and PM2.5).
- A Class II increment analysis ("fenceline" dispersion modeling) will be required for particulates (PM10 only). Class II increments for PM2.5 have not yet been finalized by USEPA.

- An additional impacts analysis for impacts of criteria pollutants on soils and vegetation.
- Class I Area impacts analysis evaluating potential impacts of NOx, SOx and particulates PM10 and PM2.5 on visibility. 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). The Phase II project will not be major source of NOx and SOx. However, in conducting a visibility analysis, in accordance with Federal Land Manager guidance, the emissions of PM10, PM2.5, SOx, and NOx must also be included. Therefore, SOx and NOx will be considered in the visibility modeling analyses. In addition to the visibility impact analysis, Mesabi Nugget will evaluate potential impacts on Class I PM10 increment.

In addition to PSD requirements, the project may 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. This facility is subject to a case-by-case MACT determination because it does not fall into any listed major source category.

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. The existing Phase I Nugget plant heats taconite concentrate in the process of creating iron nuggets. In this process, traces of mercury in the concentrate are volatilized. The permit for the Phase I permit imposed an overall annual limit of 75 pounds of mercury emissions to the air. It also requires the Mesabi Nugget facility to perform research and testing with a goal to reduce mercury emissions by fifty percent. In the Phase II project, no major additional sources of mercury are proposed. The proposed Phase II project does not include major additional thermal sources such as furnaces or kilns so comparable mercury emissions from coal combustion or ore processing will not occur. The additional mercury emissions that may result from fuel oil combustion in mine mobile sources (haul trucks) are anticipated to be minimal.

Project Site Permitting History. Phase II of the Mesabi Nugget Delaware project will be located on the western portions of the former LTVSMC taconite mine and near the former LTVSMC processing facility near Hoyt Lakes. Mesabi Nugget Delaware is currently permitted to construct a 600,000 metric ton per year iron nugget production scale demonstration facility at the site under permit 13700318-002.

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 Mesabi Nugget 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 are for 2003 unless otherwise indicated.

Recent monitoring data for SO2 and NO2 are not available. The above ambient monitoring data do not exactly reflect the current air quality at the project site, but they represent the best available data geographically and temporally. For PM10, PM 2.5, and CO, the air around the project site may be somewhat cleaner than 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 Reservation, Cloquet (2004 data) Site: 7416	0.025 ppm	0.08 (annual fourth highest 8-hr)
PM10	Hibbing Taconite (South) Site: 7018	21 µg/m3	Annual =50 µg/m3
PM10	Boundary Waters (BOWA_1 Site)*	8.0 µg/m3	Annual = 50 µg/m3
PM10	Voyageurs Nat. Park (VOYA_2 Site)*	7.3 µg/m3	Annual = 50 µg/m3
PM2.5	Boundary Waters (BOWA_1 Site)*	5.0 µg/m3	Annual = 15 µg/m3
PM2.5	Voyageurs National Park (VOYA_2 Site)*	4.4 µg/m3	Annual = 15 µg/m3
CO	Duluth (2004) Site: 7526	0.30 ppm	9 ppm (8-hr average, 1 exceedence per year); 35 ppm (1-hr average, 1 exceedence/year)

*Source: IMPROVE Summary data; http://vista.colostate.edu/improve/data/improve/ summary_data.htm

by the monitoring data from Duluth or Hibbing Taconite due to current lack of industrial activity at or near the project site.

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 recently been only limited industrial activity in the immediate vicinity, ambient concentrations may be close to background levels. Examples of these background concentrations for Mesabi Nugget, to be validated by the MPCA, would be:

- 16 µg/m^3 (annual) and 38 µg/m^3 (24-hour) for PM10;
- 90 µg/m^3 (1-hr), 25 µg/m3 (3-hour), 11 µg/m^3 (24-hour), 3 µg/m^3 (annual) for SO2; and
- 12 µg/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.

Mining shall be managed to control avoidable dust as provided by Minn. Rules part 6130.3770.

Description of Air Emission Sources

Mesabi Nugget Phase II will mine and concentrate taconite ore. An existing mine will be re-opened and a new taconite concentration facility constructed. Portions of the concentrate produced will be used in an existing iron nugget demonstration plant; the remainder will be shipped to the proposer's facilities or sold. Overall, the main activities associated with the project include:

- Ore Mining, transport, and crushing;
- Recovering and concentrating magnetite from the ore;
- Additive receiving and handling;
- Concentrate storage and handling;
- Supporting activities (e.g. process water treatment; emergency generators); and
- Tailings disposal.

Figures 6-4 and 6-6 provide a schematic representation of the preliminary process flow for the project. The sections below give a preliminary description of the emission sources from each area. More detailed process flow information will be provided in the air emissions permit application to be submitted prior to commencement of preparation of the draft EIS.

A preliminary inventory of the types of mobile equipment proposed to be used for mining is includes: seven (7) 150-ton trucks; four (4) 15-yard front end loaders; 2 drills; 1 stemming loader; 1 backhoe 3-yd; 1 mobile crane (40 gt); 1 drill water truck; 1 lowboy (50 gt); 1 semi-tractor; 1fuel truck; 1 welding truck; 1 road water truck; 1 sander; 1 road grader; 1 D10 tractor; 10 pickup trucks, and one switch locomotive. The proposer notes these estimates are conservative for purposes of estimating air emissions and other potential effects; actual equipment may vary depending on market pricing and availability. In addition, instead of the proposed four 15-yard front end loaders, this aspect of the project could be addressed by three 15-yard front end loaders and one 23-yard hydraulic shovel.

The role of major project activities as air emission sources is discussed below.

Ore Mining, Transport, and Crushing. Mining will begin with the blasting, removing, and stockpiling of the unconsolidated overburden and waste rock. This will be followed by blasting, loading, and transfer by truck of the taconite ore to primary crushing, followed by secondary and fine (tertiary) crushing. The crushed ore will be transferred from the crusher by conveyor or truck to crude ore storage located at the concentrator plant. Particulate sources from mining and crushing activities will 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 material transfer points; and
- Tail-pipe emissions for diesel off-road vehicles

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 will occur approximately weekly and emissions will be 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 will be a series of wet processes that will reduce the crushed ore to a powder consistency and will physically (magnetically) and hydraulically (hydro-sizers) separate the

iron-containing fines from the nonmagnetic waste (tailings). Roll presses would be operated with adequate initial moisture in the feed to reduce emissions to negligible levels. Tailings will be pumped to the tailings basin as slurry and the magnetic concentrate iron will be further concentrated by passing it through a flotation process where higher silica rock particles will be removed from the concentrate and sent to the tailings basin. The resulting final concentrate will be dewatered by filtration; the resulting concentrate will be moved by conveyor to the LSDP nugget plant or to concentrate storage and shipping.

The conveyors or haul trucks that transfer ore from the coarse ore storage pile to the wet mills will be a source of dust emissions. Other ore processing operations at the concentrating section are wet processes and therefore are not considered to be sources of air emissions. There may be minor emissions of PM10 and PM2.5 in the form of aerosols from the flotation operations.

Concentrate Storage and Handling. Operations to store and handle concentrate will consist of the on-ground storage of concentrate and the loading of concentrate onto conveyers, and the transfer of concentrate by conveyor. Particulate sources from concentrate storage and handling will include:

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

Tailings. 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 west end of Area 1 Pit, which will serve as an in-pit 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 or treated 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 (once tailings levels exceed water levels in Area 1 Pit); and
- Dam construction and basin maintenance work (heavy equipment operation) if tailings depths are in excess of water levels in Area 1 Pit.

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. This plan will be submitted as part of the air emissions application for use in preparation of the EIS.

Support Activities. There will be a number of support activities, which will be sources of relatively small emissions. Support activities for the impact assessment will include the sources listed below.

- Building heaters;
- Solvent use;
- Welding/cutting equipment;
- Water Quality/Product Quality Laboratories;
- Fuel storage tanks;

- Painting;
- Plant maintenance activities;
- Process water treatment; and
- Emergency generators.

Project Impacts on Air Quality

Air Emissions Analysis. The Mesabi Nugget Phase II project is subject to all current environmental regulations and will apply air emissions controls as required by rules and regulations. Preliminary order of magnitude emission estimates for the mine and related sources (with and without mobile sources) are presented in Table 23-2. The table includes pollutants anticipated to exceed significant emission rates. The Phase II project is not expected to be a source of emissions of other PSD pollutants including lead, fluorides, sulfuric acid mist, total reduced sulfur, reduced sulfur compounds, CFCs, or Halons; this assumption will be re-examined during preparation of the EIS and the review of the air emissions permit application. The project is anticipated to be a major source of particulate matter (e.g., PM10, PM2.5). The anticipated emission levels will trigger the federal PSD requirements to apply BACT and analyze potential impacts on air quality.

Mesabi Nugget will be required to provide information demonstrating that air emissions do not exceed state or National Ambient Air Quality Standards (NAAQS) or impact existing air quality beyond an allowable increment for Class I- and Class II-defined areas. Minnesota has two Class I Areas – Voyageurs National Park and the Boundary Waters Canoe Area Wilderness (BWCAW). Class II areas are those areas 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 NOx, SO2 and fine particulate on visibility (i.e., their

Table 23-2. Order of Magnitude Potential Emissions

MNC Mining Sources - Total Without Mobile Sources tpy									
CO	F	H2S	H2SO4	NOx	Pb	PM	PM 10	SO2	VOC
0.000	0.001	0.000	0.000	0.000	0.01	1200	330	0.000	0.3

MNC Mining Sources - Total With Mobile Sources tpy									
CO	F	H2S	H2SO4	NOx	Pb	PM	PM 10	SO2	VOC
75	0.001	0.000	0.000	120	0.01	1200	330	8	20

	tpy									
	CO	F	H2S	H2SO4	NOx	Pb	PM	PM 10	SO2	VOC
Phase I	450	110			950	4		500	400	160
Phase I plus Mining	450	110			950	4	1200	830	400	160
Phase I plus Mining plus Mobile	525	110			1070	4	1200	830	408	180

contribution to haze) in designated park or wilderness areas. The proximity of the project to designated Class I areas (Voyageurs National Park and the Boundary Waters Canoe Area Wilderness) will require an analysis of the project's air emissions impact on those areas.

The project will be required to demonstrate that the new air emissions will not result in pollutant concentration increases that exceed established Class I increments for PM10. Federal land managers for the National Park Service and USDA Forest Service require analyses for visibility and other Air Quality Related Values (AQRVs), such as the effect of acid deposition on surface waters within a Class I area. Emissions of SOx, NOx, and fine particulates contribute to visibility impairment. The analysis of Class I area impacts on visibility will be performed in accordance with the current Federal Land Managers' Air Quality Related Values Workgroup (FLAG) guidance.

Because this is essentially a new facility, all Mesabi Nugget sources will be included in the Class I and II PSD increment modeling. The PSD increments are much lower than the NAAQS and MAAQS; therefore, modeling attainment with the PSD increments will likely be the limiting standards. Mesabi Nugget should also conduct analyses to demonstrate there will be no exceedences of the NAAQS and MAAQS. Because the USEPA has not yet promulgated increment standards for PM2.5, potential project impacts will be compared to the NAAQS only for this pollutant.

Fugitive and point source emissions to the air, such as the by-products of fuel oil and natural gas combustion, contain small amounts of chemicals regarded as hazardous air pollutants (HAPs). The Phase II Project may be a major modification to a major HAP source. If so, these substances would be regulated under Title III of the Clean Air Act and would be part of Mesabi Nugget's permit review.

Experience with other mining, beneficiation and iron conversion projects suggests that the Mesabi Nugget emissions could include 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. As discussed earlier, control of HAP emissions may be achieved indirectly by controlling criteria pollutants or directly by designing control for a specific chemical. The air emissions permit application will contain a complete inventory of anticipated HAPs emissions and an analysis of the project's compliance with applicable standards.

Greenhouse Gases. Carbon dioxide (CO2) is a non-regulated greenhouse gas. Combustion of hydrocarbon-based fuels (e.g., fossil fuels) results in CO2 formation. Although the rate of CO2 creation during combustion is fixed, the amount of CO2 emitted per unit of work performed can be optimized for reduced CO2 emissions. In Phase II, the primary source of greenhouse gases will be mobile sources operating in the mine. MPCA permitting guidance recommends that greenhouse gas data be compiled for the proposed project; this information will be reported in the EIS.

Proposed Pollution Control Equipment and Practices

Air emissions control technologies will be evaluated for effectiveness during the BACT. Likely technologies for evaluation include the systems listed below.

- Wet (venturi) scrubbers;
- Electrostatic precipitators (wet or dry);
- Baghouses;
- Clean fuel for particulate control; and
- Controls for mobile sources at the facility.

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.

Proposed Treatment of Topic in EIS:
The topic of project impacts on air quality is significant, and information beyond what is in the EAW will be included in the EIS.

The EIS will provide a major discussion of this topic including: descriptions of air emissions sources; potential control technologies; and any impacts to Class I and Class II areas. A BACT analysis will by completed for particulates (PM10, PM2.5). A MACT analysis will be completed for relevant pollutants. The EIS will also contain the following ambient air quality analyses:

- A Class I PM10 increment;
- Class I visibility impacts (inclusive of PM10, SO2, NOX emissions);
- Class II NAAQS/MAAQS analysis for PM10;
- Class II increment analysis for PM10; and
- Class II NAAQS analysis for PM2.5.

Greenhouse gas emissions of the project will be quantified and reported in the EIS as described in MPCA air permitting guidance. The guidance recommends quantification of direct greenhouse gas emissions as well as those generated through the use of energy at the facility.

The cumulative nature of these potential effects will be discussed in the EIS. NAAQS and PSD increment analyses include relevant nearby emission sources and can be considered cumulative. Visibility impact analyses are project-specific but extensive data on the cumulative effects of air pollution sources on visibility are available as part of the official record for the MPCA development of Minnesota's proposed Regional Haze State Implementation Plan (SIP). Existing Iron Range sources, including Mesabi Nugget's furnace, were included in the work completed for the SIP. Monitoring data for other relevant pollutants are also available.

AERA

The EIS will provide the results of the Air Emission Risk Analysis (AERA) to be completed for the air emissions permit.

An Air Emissions Risk Analysis was conducted for the Phase I Large Scale Demonstration Project (LSDP) that followed MPCA's risk analysis guidance (MPCA 2004, Version 1.0). The analysis assessed potential inhalation only risks at the operating boundary and multimedia risks (inhalation + consumption of locally grown food, including beef and milk) at more distant locations where residents and farmers were identified to be a reasonable current or future land use. In addition, the potential impacts from the local mercury deposition on fish concentrations and risks to recreational and subsistence fishers consuming locally caught fish were assessed as part of the AERA.

The estimated summed inhalation risks at the property boundary were below the Minnesota Department of Health (MDH) guideline values for cancer (1x10-5) and non-cancer (1.0 for acute and chronic). The summed multimedia risks for a potential resident and farmer receptor were also below the MDH guideline values for cancer and non-cancer effects. The potential local deposition of mercury was estimated to be very small and the potential change in fish mercury concentrations was determined to be very small as well and likely not

measurable. No significant issues with potential ecological impacts were identified by Minnesota state agencies in their review of the AERA or in their review of the project as a whole.

Mesabi Nugget will update the AERA conducted for the Large Scale Demonstration Project (LSDP) to now include the Phase II project; this will update the potential for adverse effects to human health. This information for the proposed facility will be available for use in preparation of the EIS and review of the air quality permit. The objective of the risk assessment is to evaluate the potential human health risks through direct (inhalation) and indirect (consumption of locally grown food) exposure to potential air emissions from the project under routine operations.

The updated AERA will follow the MPCA's most recent guidance (September 2007, Version 1.1). 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 AERA will evaluate potential human health risk due to direct (inhalation) and indirect (for example, homegrown food consumption, and fish consumption) exposure.

A cumulative risk analysis will be required and will follow MPCA guidance. A protocol for preparation of the AERA and drinking water risk assessment will be prepared and submitted to the reviewing agencies, specifically MPCA and MDH. The main tasks of the risk assessment include:

1. Develop a study-specific conceptual model identifying the site boundary, potential chemical emissions to air, potential exposed populations, routes of exposure and potential health outcomes.
2. Develop exposure point concentrations using air dispersion modeling.
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. Prepare and submit a risk analysis report to the DNR for inclusion in the EIS process.

Proposed Treatment of the AERA in the EIS:
Air emissions and potential impacts will be a major topic in the EIS. The EIS will include an updated Air Emissions Risk Analysis conducted according to MPCA guidance (September 2007, Version 1.1). The AERA will assess the potential risks to human health at a conservative screening level from the combined air emissions from both the Phase I and Phase II Projects. Required modeling will follow these protocols:

- The chemicals of potential interest (COPI) for the AERA will be based on potential emissions associated with Phase I nugget operations (material handling, emissions from the rotary hearth furnace related to nugget production and using coal as a reductant) and Phase II mining-related operations (mining, ore hauling, ore crushing-grinding-concentrating, and material handling).
- Air dispersion modeling will be conducted with the AERMOD model to estimate maximum one-hour and annual air concentrations.
- The maximum modeled air concentrations will be input to the MPCA's Risk Assessment Screening Spreadsheet (RASS) and inhalation and multi-pathway risks will be calculated.

The EIS will address potential human health risks from the fish pathway. This will be assessed using the MPCA's Mercury Risk Estimation Method. This analysis will assess potential impacts to fish in a nearby lake and the potential risks to recreational and subsistence fishers that consume locally caught fish.

As discussed in Item 13, potential impacts from tailings disposal in Area 1 Pit to groundwater will be assessed and potential incremental risk to a person drinking water from St. James Pit or Colby Lake will be estimated. The potential risks from drinking water will be added to the other potential risks (e.g., inhalation, food consumption) to provide an estimate of "total" incremental risk associated with the project.

24. **Odors, noise and dust**. Will the project generate odors, noise or dust during construction or during operation?
_X_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. 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 project will produce odors, but most of these can be characterized as minor in nature and extent. A possible exception is diesel exhaust associated with equipment for mining- and tailings-related operations. New diesel fuel and engine emission standards are currently being implemented. Because these new standards will be applied to Phase II, diesel-related odors should be less than historic norms.

Onsite industrial wastewater treatment will be inorganic in nature to condition water for process use and re-use or discharge. These processes are not significant generators of odor. Similarly, 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

Phase I activities will generate dust, including construction of: mine facilities, roads, railroad spur(s), a natural gas pipeline, and electric transmission lines and local building(s). Construction has already begun and will continue in 2008 under the LSDP.

Phase II activities will generate dust during both construction of facilities and plant operations. Construction-related activity will continue to generate dust typical of large construction projects at intermittent intervals for a four-year period. Construction-related dust impacts are not expected to be significant or sustained.

Dust emissions from operations will be evaluated as part of the facility's air permitting; see Item 23. Mining shall be managed to control avoidable dust according to Minn. Rules part 6130.3700. A preliminary list of potential dust sources and the 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)

Potential Dust Source	Measures to Mitigate Adverse Impacts
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 operation	Discussed previously under Item 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 deposited tailings	Planned revegetation or mulching of filled areas or maintenance of filled areas in wet condition

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. Dominant winds are from the south-southwest (summer) and from the north-northwest (winter).

For the plant and mine, the nearest receptors are approximately 1 to 3 miles away. 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 included in the EIS; see Item 23.

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. The plan will include: provisions to minimize unvegetated beach and dike areas; 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 known or potential problem areas.

Noise

Regional Copper Nickel Study. Taconite mining and processing constitute heavy industrial operations that produce varying levels of noise from multiple sources. The Regional Copper-Nickel Study (Minnesota State Planning Agency, 1976-1979) conducted a detailed analysis of mining-related noise for this type of operation. Sources typical to these mines include, but are not limited to:

- Chain saws and skidders;
- Blasting;
- Excavators and Drills;
- Large Truck Operation;
- Backup Alarms;
- Warning Sirens;
- Over-the-Road Diesel Trucks;
- Trains Hauling Ore; and
- Train Whistles.

The Copper-Nickel study considered multiple factors in identifying potential noise-related environmental effects associated with the listed mining-related activities. Ambient sound patterns and levels in both urban and rural areas were evaluated; this is necessary because ambient noise can mask noise originating from distant sources. 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. Seasonal effects that result from changing levels of leaf cover in surrounding forests, and changes in prevailing wind direction, were also taken into account. These generic observations from the Regional Copper-Nickel Study provide a good estimate of the probable sources of noise and the overall expectations for noise generation associated with Phase II implementation.

The Regional Copper-Nickel Study provides the following assessment for each of the noted activities. Specifically:

Chain Saws and Skidders. These are used to clear vegetation from undisturbed portions of the mine site. 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.

Blasting. 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. In general, the percussive noise from blasting is not likely to be particularly objectionable. Associated blasting-related activities that produce noise, such as spotter aircraft and warning sirens, are more likely to be causes of significant acoustic impact than the blasting itself. Blasting must comply with the provisions of Minn. Rules part 6130.3900.

Excavators and Drills. Use of shovels and drills, which are typically electric-powered, are not substantial sources of acoustic energy.

Large Truck Operation. Large trucks are used to haul and dump rock. This activity is considered a powerful acoustic source and is the dominant noise source for persons not on mining property. Large truck operations differ from other noise producing activities since they are operating in the open as opposed to in-plant noise sources, where noise generation is muffled by building walls.

The Copper Nickel Study conducted detailed analysis of this issue. It evaluated the distances at which truck noise generated by both 85-ton and 170-ton trucks would be heard under several conditions (winter, summer, night, day). Assessments included normal operating conditions (e.g., transporting rock) as well as dumping or bed-lift conditions. Study conclusions include:

- 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).

Backup Alarms. The backup alarms on trucks, loaders, and excavators generate high-frequency sounds. High-frequency sounds are attenuated more rapidly than low-frequency sounds, which means they die out rapidly with distance. With the right conditions, the extreme limit of audibility for such noise is 5 to 10 km (3 to 6 miles).

Warning Sirens. Warning sirens are used at operating mines, especially as a blasting notification measures. Noise propagation modeling shows that during a calm summer night, the extreme limit of audibility is 17 km (10.6 miles).

Over-the-Road Diesel Trucks. Tractor-trailer trucks are used to haul supplies to and from the mine site. They can be expected to have noise emissions similar to large mine trucks. Because the operation of these vehicles is relatively infrequent, related noise impacts can be relatively insignificant.

Trains Hauling Ore. Operating trains generate low-to-mid range frequency sounds that can be heard for some distance from the source. The Copper Nickel Study evaluated railroad noise and determined that train-related sound can be detected a maximum of 19 km (19 miles). Because the relative infrequency of train-related operations, the impact is not considered to be significant.

Train Whistles. Railroad horns are designed to be especially detectable by the human ear. They produce noise that can be heard at a greater distance than generated by train operation per se. The maximum predicted range of audibility is 30 km (19 miles). Although impacts would be coincident with sound generated by operating trains and travel a greater distance, the relative infrequency of the sound makes it considered as being non-significant.

Regulatory Context. Minn. Rules part 7030.0040, subp. 2 provides the current noise standards for the State of Minnesota. The rules for permissible noise vary according to the specific "Noise Area Classification" that 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 (L10 and L50) for each noise area classification; see Table 24-1.

Table 24-1. Applicable Minnesota Noise Standards / Noise, Standard, dB(A)

Noise Area Classification		**Daytime**		**Nighttime**	
		L50	**L10**	**L50**	**L10**
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 surrounding land use is largely industrial; see Item 9. The nearest sensitive receptor to the actual plant site appears to be rural residential homes in Sections 9 and 10, T59N, R15W, that are located about 2.5 miles

northwest of the plant site. For mining and stockpiling operation, the nearest receptors appear to be homes in Hoyt Lakes on the south shore of Colby Lake. These homes are about one mile from the south end of the Area 2WX stockpiles; they are over two miles from the proposed mine and crusher location.

Project-related Effects. Areas of impact due to the project include:

Large Truck Operation. The project fleet includes 150-ton vehicles, which are slightly smaller than the 170-ton trucks evaluated in the Regional Copper Nickel Study. All other things being equal, the noise impacts are expected to be similar.

Blasting. Blasting activity will be a routine activity scheduled roughly once per week. The blasting agent will be typical to similar operations and will be 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 will be delivered by truck and loaded into the boreholes for detonation.

The environmental impacts of blasting at ferrous mining operations are regulated by the DNR under Minn. Rules parts 6130.3800 and 3900. The goal of the rule is to ensure that effects of air overpressure and ground vibrations from production blasts will not be injurious to human health or welfare and property outside mining areas. Much of the area has experienced blasting impacts previously during natural ore mining and the operation of Northshore, ArcelorMittal Steel, and LTVSMC mining operations. The five impacts of blasting in surface mines are ground vibrations, air blast, flyrock, dust, and fumes.

- *Ground Vibrations*. 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. The project 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. The proposer has committed to implement a seismic monitoring program at the commencement of mining to ensure that blasting practices are not exceeding acceptable limits.

- *Air Blast and Flyrock*. 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.

  Minnesota regulations limit air blast to 130 dB. Glass breakage is the first sign of excessive air blast and generally occurs at 140 dB or above. Minnesota Rules require that the operator must monitor all open pit blasts. As with ground vibration, the air blast monitoring station is required to be located adjacent to the nearest structure located on lands not owned or controlled by the mining company.

  Air blast can be affected by wind direction as well. In unusual conditions air blast can be affected by wind direction as well, including temperature inversions. Erie Mining Company/LTVSMC conducted an air blast monitoring program; the practice was to explode a small test shot to check

atmospheric conditions for air blast. The project proposes to implement a similar air blast monitoring program.

- *Dust and Gases*. Blasting can generate substantial dust and gas at the immediate blast site. However, these are typically not a major problem outside this immediate 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.

Plant Noise. The plant noise will be relatively low-toned and constant, consistent with industrial fans, so it should present less annoyance to sensitive receptors than higher-pitched or variable tones of changing loudness. Railroad traffic and switching may present shorter-term impulsive noise that may be more noticeable.

Mining and Stockpiling Operations. Sound levels from these operations will be audible to sensitive receptors but are not expected to exceed any applicable noise standard. In the event of noise complaints, Mesabi Nugget's environmental staff will meet with the affected party and attempt to determine whether the facility is meeting applicable standards and will attempt to identify the source of the sound causing the problem and to resolve the issue. As appropriate, or if requested, Mesabi Nugget will voluntarily conduct sound monitoring to ensure that the facility is meeting applicable noise standards.

Proposed Treatment of Topic in EIS:
The topic is minor and will be discussed briefly in the EIS using information beyond the EAW.

The EIS will require preparation of a limited noise analysis. Baseline data will be used to model future noise levels as a function of operational and blasting activities. The noise analysis will be conducted under generally accepted principles of noise-related impact assessment. Nearest sensitive receptors and potential mitigation will be identified in the EIS.

25. **Nearby resources.** Are any of the following resources on or in proximity to the site?
    a. Archaeological, historical or architectural resources? _X_Yes ___No
    b. Prime or unique farmlands or land within an agricultural preserve? ___Yes _X_ No
    c. Designated parks, recreation areas or trails? _X_Yes ___No
    d. Scenic views and vistas? ___Yes _X_No
    e. Other unique resources? ___Yes _X_ No
    If yes, describe the resource and identify any project-related impacts on the resource. Describe any measures to minimize or avoid adverse impacts.

a. The potential for the project to affect historical, architectural, and archaeological resources was assessed.

Historical/Architectural Resources

Project Area. The project area extends across approximately six miles of the eastern end of the Mesabi Range. Mining exploration began in the general vicinity in the late 1880s, but natural ore mines were not developed until the early 20th century. The Erie Mining Company's Hoyt Lakes Taconite Plant (1957) was situated east of the project area in Sections 8, 9, 16 and 17 of T59N, R14W. The water-filled, Erie Mine Area 1 open pit mine dominates much of the northern part of the project area landscape.

Literature Search. Landscape Research LLC conducted an architectural history literature search of property proposed for mining development by Mesabi Nugget. The literature search examined mining histories, mine industry maps, and local histories in the University of Minnesota and Minnesota Historical Society Collections. State Historic Preservation Office (SHPO) files were consulted for applicable inventory records. Aerial photographs (1939-40) were compared to historic Mesabi mining maps including Leith (1909) and the Great Northern Iron Ore Properties series (1939-1958). The Iron Ores of Lake Superior (Crowell & Murray, Inc., (1911-1930) provided information about mine openings and ownership. Erie Mining Company plans and records are on file at PolyMet Mining Inc. headquarters in Hoyt Lakes.

The work *Mesabi Iron Range Historic Contexts, Itasca and St. Louis Counties, Minnesota* (2005), prepared by Landscape Research LLC for MnDOT, provided further information on interpretation of National Register Bulletin 42, Guidelines for Identifying, Evaluating, and Registering Historic Mining Properties. Reconnaissance-level fieldwork was conducted at the project area on 11/05/07.

Natural Ore Mining. The Mesabi Nugget project area includes at least seven natural-ore open pit mines that were opened in the early 20th century by the Perkins, Oliver, and other mining companies. The natural-ore mining period involved the Stephens, Knox, and other mines; it extended from ca. 1900 to 1991, when the last ore was taken from the Stephens Pit.

Natural ore extraction occurred at multiple locations on the project site. Principal operations are described as such:

- The Stephens Mine (1903) in Sections 25 and 26, T59N, R15W and the adjoining Perkins Mine (1909; Section 26) and Weed Mine (ca. 1914, Section 25) are at the western end of the area. These sites eventually were mined to form a single pit.
- The Donora Mine (ca. 1900) was opened by United States Steel in 1975; it is found in Sections 27 and 28, T59N, R15W and eventually became one water body with LTVSMC's Area 9 Pit.
- Further east, underground mines were opened at the Adriatic (1906) in Section 30 and the Knox (1909) in Section 19; these operations too were in T59N, R15W.
- The Vivian Mine (1912) in Section 20, T59N, R14W was also opened as an underground mine.

Ore from these natural ore mines was shipped on the Duluth Missabe and Iron Range (DM&IR) Railroad to Two Harbors. Most mine pits within the project area have flooded as pit lakes, but stripping and lean ore stockpiles line their edges.

Several mining "locations" (or company housing sites) were developed within the project area. One such location is documented in a ca. 1910 photograph of the "Adriatic Location" (mndigital.org). Federal census records also document mining locations along a road at or near the Adriatic, Knox, Stephens, and Perkins mines. Limited preliminary fieldwork revealed no evidence of foundations or structures that might be associated with these or other locations.

Erie Mining Company. The Mesabi Nugget project area includes the length of Mine Area 1, which is an open pit taconite mine opened by the Erie Mining Company in 1957 and then subsequently owned or controlled by LTVSMC (1987-2001), Cliffs Erie (2001-2007), and Mesabi Nugget (2007-present). Mining at the Area 1 Pit ended around 1986. Erie's monumental plant was the second commercial taconite operation on the Mesabi Iron Range. The ore was loaded from the pit to rail cars and transported to the coarse crusher in nearby Section 9, T59N, R15W; once crushed it was then processed to produce taconite pellets. The pellets were then shipped 74 miles to Erie's facility at Taconite Harbor. Spurs of the Erie Mining Company Railroad were laid across the

project area at the edges of Mine Area 1 and followed the course of pit expansion, which reached an additional mile to the east by the late 1960s.

The Phase I Evaluation and Historic Context Study for the PolyMet Mining, Inc. NorthMet Project (Draft 2007) recommended that the period of significance for the Erie Mining Company Concentration Plant is 1954 to 1969, spanning the design, engineering, and construction of the facilities, and reflecting the plant's role in early commercial taconite production on the Mesabi Iron Range.

There are no architectural history properties recorded in SHPO databases within the project area. The Mine Area 1 Shops (SL-HLC-017) in Section 18, T59N, R14W are outside the project boundary and appear to be the only remaining Erie Mining Company buildings near the project area. These shops are being transferred from Cliffs-Erie LLC to PolyMet Mining and will not be affected by the Mesabi Nugget project. Archaeological fieldwork by Soils Consulting reports that there are no manufacturing-related structures remaining around natural ore mines in the project area (Soils Consulting, 2007).

Across the project area, sections of track from spurs of the DM&IR Railroad and Erie Mining Company Railroad have been removed. There is evidence of haul roads and loading ramps, and other isolated features associated with activity around Mine Area 1 between Area 1 between 1957 and 2001.

Archaeological Resources

Soils Consulting Inc. conducted a Phase I archaeological resources survey in 2007 within the proposed project area (Soils Consulting, 2008). While the original research design proposed a sampling of landscape types, field survey showed that there was only a small percentage of land area within the project area that had not been heavily altered by past mining activity. Consequently, field survey resulted in an almost complete coverage of the undisturbed parts of the project area. Most of the landscapes identified on early aerial photos and U.S.G.S. topographic maps as having a high potential to contain subsurface archaeological sites have either been removed by mine pits or buried under waste rock or lean ore stockpiles.

Two small undisturbed landscape segments were examined by shovel testing. One is located in Section 35, T59N, R15W; it is adjacent to Second Creek. The second is located in Section 32, T59N, R14W; it borders a wetland drainage. No cultural materials were found.

Most of the remaining undisturbed upland areas within the project were examined by pedestrian survey. One light scatter of early 20th century artifacts was found in Section 35, T59N, R15W. Materials included glass bottle fragments, tin cans, and the base of a ceramic shaving mug. There were no identifiable building outlines or foundations and much of the area had been heavily affected by a bulldozed roadbed. An abandoned refrigerator and more recent beer cans suggested additional more recent use, possibly as a hunting camp.

A group of small possible cellar/storage pits was located at a second location in Section 24, T59N, R15W. A thorough search of this vicinity located no building outlines, foundations, or historic trash. Consequently, the historic context and function of this area could not be determined.

It is the opinion of the researchers that no undisturbed archaeological sites occur within the project boundaries. Neither of the more recently used locations identified contain significant archaeological or historic data.

b. The site does not include prime or unique farmlands and no such lands have been identified in the project vicinity.

c. Recreational resources do occur in the general project area. Specific resources include:

- The City of Aurora maintains a three-mile recreational walking trail on the west side of the City. This is located over one mile away from the project site.
- A grant-in-aid snowmobile trail exists that is part of a regional system maintained by volunteers affiliated with the Minnesota United Snowmobile Association. The trail is maintained by the Ranger Snowmobile/ATV Club of Hoyt Lakes and connects from the Pequaywan Trail on St. Louis County CSAH 16 to Hoyt Lakes to Aurora to Biwabik to Gilbert. The trail passes north of the St. James Pit, approximately ½ mile south of Area 6 and would not be affected by the proposed project.
- The regional Mesabi Trail does not pass in the project vicinity.

d. No designated scenic views or vistas have been identified.

e. No other unique resources have been identified.

Proposed Treatment of Topic in EIS:
The topic is minor, but will be discussed with limited information beyond that in the EAW. Any resources identified will be discussed and mitigation to prevent impacts will be proposed.

Historic Mining Landscape Features. There appear to be no features representing a potential large-scale, National Register-eligible historic mining landscape within the project area. *Bulletin 42, Guidelines for Identifying, Evaluating, and Registering Historic Mining Properties*, notes that the mining process during the period of significance, including excavation, processing, and shipment, should be evident as much as possible. Also, related townsites and locations should have a high level of historic integrity. The Mesabi Nugget project area encompasses highly disturbed mine pits that are the result of the activity of several mining companies and several mining methods.

Additional Phase I investigations will be undertaken to inform the EIS. These will focus on specific mining resources that are more than 45 years of age and would have direct effects from the project. These include:

Remaining Railroad Segments. Phase I investigation are recommended for:

- A DM&IR spur in Section 6, T59N, R14W near the Area 2WX stockpile; and
- Remaining segments of the Erie Mining Company Railroad north of Mine Area 1 in Sections 21, 22, 23, and 24, T59N, R15W and Section 18, T59N, R14W.

The NRHP eligibility of these segments of two important transportation rail resources on the Mesabi Iron Range should be evaluated for their association with the development of the iron ore industry during the period 1886-1957. Although the track has been removed, the roadbed may remain and the route may be discernable.

Historic Roadways. Two historic roadways will also be evaluated.

- The abandoned segment of the former TH 35, known as the Old Aurora Road, which is evident in air photos in Section 34, T59N, R15W. This highway is associated with the development of the

mining district between Aurora and the Erie Plant and was rerouted as Erie Mine Area 1 was expanded to the west.

- Evidence of a trail shown by Leith (1909) and later converted to County Highway 110 (later relocated) that extended across Sections 34 and 35, T59N, R15W. This route should be evaluated for its association with the mining locations recorded in the 1910 federal census and its association with early development of the Mesabi Range.

Archaeological Resources. No further archaeological investigations are proposed for the EIS.

Recreation Resources. No further analysis is proposed for recreation resources. The EIS will use the same information a provided in the EAW.

The proposed investigations of mining resources will be completed and available prior to the beginning of preparation of the EIS. Additional Phase II studies, if required, will be completed during the EIS preparation.

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 _X_No
If yes, explain.

Mining projects can generate visual effects from a variety of sources. The potential for visual effects is addressed as a function of major project components.

Plant Site. The plant site is located at approximately Elevation 1,600 to 1,700 feet above sea level. The highest portions of the plant are stacks of the previously permitted Phase I nugget plant (now under construction). The tallest stack will have an elevation of 1,874 feet above sea level and will likely have red warning lights; a determination of warning light installation has not been made.

The plant site will be largely screened from nearby visual receptors. The ridge of the Embarrass Mountains occurs north of the plan site; with an elevation of 1,850 to 1,900 feet above sea level, the plant will be almost entirely screened by the land to the north. One exception would involve the Embarrass Mountains proper, where the viewshed would be similar to that currently present with the previous LTVSMC operations. In cold weather, the plume from the plant stacks and/or cooling towers may be visible above the ridgeline from these receptors; the nearest receptors would be the rural residential homes in Sections 9 and 10, T59N, R15W, about 2.5 miles northwest of the plant site, and possibly travelers on TH 135 over one mile northwest of the plant. In other directions the nearest receptors are much further away. At this distance, any plumes should be a relatively small feature on the landscape and not inconsistent with the past and present mining and mineral processing land use. Any visible plumes will mainly be associated with the existing permitted LSDP nugget plant rather than the proposed mining, grinding and concentrating operations.

Area 1 Pit. Homes and building sites exist about 1.5 miles west of the west end of the Area 1 Pit on Wynne Lake. Because tailings disposal at the west end of the pit will not rise more than 20 feet above the current rim elevation of Area 1 Pit, this activity should not be visible outside the project boundary.

Area 2WX Crusher, Pit and Stockpiles. The crushing areas in the north portion of Area 2WX will have relatively low structures. The highest point will likely be the fine crusher at about 115 feet in height. Other process units will be up to 100 feet high; see Item 7. The equipment will be operating and lighted at night but will not generate plumes. The equipment will be visible from County Road 666 at a distance of less than

1,000 feet. However, the highway is a dead-end roadway serving as access to the Mesabi Nugget and PolyMet Projects and other potential mining properties on the Dunka Road. These are not considered sensitive visual receptors.

Stockpile construction in Area 2WX will produce visual impacts consistent with past experience when the stockpiles were constructed by LTVSMC. Stockpiling will proceed on a 24-hour per day basis. For night operations, lighting will include both fixed lighting and vehicle lighting. Hauling to the top of stockpiles may cause vehicle lighting to be visible in the surrounding landscape. The top of the lifts at the Area 2WX stockpiles is expected to be about Elevation 1,740, or about 100 feet higher than the current elevation. This is significantly above the surrounding terrain, which is at about Elevation 1,510 to the northeast and 1,450 to the southwest. To the north, northwest and northeast the nearest receptors would be mining properties and the site of the proposed Mesaba Energy facility. These would not be considered sensitive receptors.

The stockpiles are not shielded to the south by terrain. The stockpiles are visible from the west arm of Colby Lake. At a greater distance, they are visible from the residential homes on the southeast side of Colby Lake. Lights may be visible at night from these locations. No significant plumes will be generated by mining or stockpiling.

The Boundary Waters Canoe Area Wilderness is at least 25 miles away. At that distance, the curvature of the earth would hide any structure less than 400 feet tall. Even if a large structure or landform were visible, it would intersect about 0.2 degrees of arc, comparable to the arc of a 0.1-inch object at arm's length. Even minor significant local screening near the receptor (e.g., a 50-foot tree at a distance of three miles) would hide the structure. No visual impacts are predicted to the BWCA from mining facilities.

Area 6. As an existing feature on the project site, the Area 6 stockpiles already generate a degree of visual impact upon nearby receptors. The tops of the stockpiles currently range from 1,640 to 1,700 above sea level; they are 50 to 130 feet above the surrounding terrain. Two existing stockpiles will be enlarged, one north of the Area 6 Pit and one at the south end. Currently the southern in-pit stockpile is about 250 feet high; it rises a maximum of about 25 feet above the surrounding land. At project completion the southern stockpile will be larger in extent but no higher. The northern stockpile is now about 150 feet above the surrounding land. At closure it will be larger in extent and about 60 feet higher, which takes it to a maximum elevation of 1,710 feet above sea level. The maximum height of the northern stockpile above surrounding terrain will be about 210 feet.

As with Area 2WX, the land to the north and east is mining property and does not contain sensitive receptors. The southern tip of Area 6 lies within the City of Aurora; the nearest receptors appear to be homes on Railroad Avenue West, on the south side of the St. James Pit. These residents would see the stockpiles on the horizon at a distance of more than one mile. At this distance, local terrain and trees would largely screen the stockpiles. The same is true to a greater degree for homes on the east side of Wynne Lake, about two miles to the west of Area 6; the distance is greater and the intervening terrain is higher than the proposed stockpile elevations. Users of the Grant-In-Aid snowmobile trail will likely see mining-related activity over the life of the project, especially since this recreation occurs during leaf-off conditions in the winter. Site reclamation can provide mitigation for project-related visual impacts.

Cumulative Effects. A potential cumulative visual effect would be the combined impact of the construction of Area 2WX stockpiles and Mesaba Energy's facilities as viewed from the north arm of Colby Lake just above the outlet.

Proposed Treatment of Topic in EIS:
The topic is minor, but will be discussed briefly in the EIS using updated information in the same format as the EAW. Nearest visual receptors will be reconfirmed and reported in the EIS. Estimates of building and stockpile heights and proposed lighting plans will be checked and updated as needed based on more detailed project information.

The possibility of cumulative visual effects on recreational users of Colby Lake from the construction of the Area 2WX stockpile will be evaluated. Any cumulative visual effects of the stockpile and possible development of Mesaba Energy will be discussed. Potential mitigation will also be identified, including reclamation strategies to improve the aesthetics of the stockpile view.

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

St. Louis County – Comprehensive Plan. The project is subject to the St. Louis County Comprehensive Land Use Plan and St. Louis County zoning regulations. The comprehensive plan was adopted in August, 1981 and is embodied in County Ordinance 27. Mine related uses are addressed in Concept 13 while waterfront-related uses are addressed in Concept 8; the latter applies to project-related activity in the vicinity of Little Mesabi Lake.

St. Louis County – Zoning. St. Louis County zoning in the area follows the adopted comprehensive plan; Figure 14-1 depicts the zoning districts on the project site. Zoning is defined in Section 5 of Ordinance 46. Provisions of project-related note include:

> Section 5.08. This ordinance states that "[m]ining, quarrying, and processing of products from these activities" are permitted uses in "Ind-4" zoning districts.
>
> Section 5.03. This ordinance states that "[r]esidential" land use districts, mining is not a permitted or conditional use. Only mineral exploration and evaluation is allowed, only as a conditional use.

The "Res-5" zoning in the west one-half of Section 27, and east one-half of Section 28, T59N, R15W appears inconsistent with development of the proposed Area 6NW Pit. The general purpose of zoning in this part of the project site is to protect shoreland areas. The proposer will request a rezoning of this area, which will also require an amendment to the adopted Comprehensive Plan.

City of Aurora. The southern end of Area 6 is within the City of Aurora. The project area is zoned for mineral development. No western boundary is defined on the mining district on the north end of the city.

City of Hoyt Lakes. Most of the plant area, crusher area, and Area 2WX Pit and stockpiles are located within the City of Hoyt Lakes. The City has not adopted a comprehensive plan. No zoning is applicable to the project.

Town of White. The majority of Area 1, Area 9S, and Area 6 is within the Town of White. No town-related zoning is applicable to the project.

Superior National Forest. The southern portion of Area 2WX, including portions of the pit and all of the stockpile area is within the proclamation boundary of the Superior National Forest; see Figure 5-1. The USFS

adopted an updated forest management plan in 2004. Figure MAS-2 of that plan shows that the proposed project is not within any area designated for management under the plan. The Management Plan for the forest does not apply to private lands, even though those lands may lie within the forest boundary.

Proposed Treatment of Topic in EIS:
The topic is minor, but will be discussed briefly in the EIS with additional information from the EAW. The project's consistency with zoning around Little Mesaba Lake will be reported; future need for project-related rezoning or comprehensive plan amendment will be identified. The western boundary of the City of Aurora's mining district will be reported. The EIS will also evaluate mineland reclamation strategies to develop those designs that are most compatible with surrounding land uses and local community goals.

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 _X_ 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.)

Direct Demand for Infrastructure and Public Services

The project will not require new utilities, roads, other infrastructure or public services.

Energy Infrastructure. Electrical- and natural gas-supply infrastructure is already in place along County Road 666 at the project boundary. No external upgrades are required.

Site Access – Vehicular/Truck. Access to the Plant Site is available via existing local roads and highways. Highway capacity of TH 135 and County Road 666 are projected to be adequate to handle estimated traffic. Project personnel would commute to and from the plant or mine office in their own vehicles using existing local roads and highways. Some raw materials and supplies will also arrive via truck. Highway modifications and upgrades are not anticipated.

Site Access – Rail. Raw materials will also be received by rail. As noted in Item 6, the existing CN railroad line is already in place adjacent to the site and connections are being constructed as part of the Phase I LSDP project. Additional rail improvements may be constructed on the project site as part of the Phase II Project.

Sanitary Sewer. Sanitary wastewater generation is estimated at 30 gallons per day per employee. This estimate is based on experience at other taconite facilities and published values. With a projected 124 employees on site each day, overall wastewater production is estimated at about 4,000 gpd. At both the plant site and at the mine office and shops a sanitary sewage holding tank will be used to contain sanitary wastewater. It will be pumped and disposed of at the Hoyt Lakes POTW, which should be well within the capacity of the treatment. Therefore, no sanitary sewer is needed with the project.

Fire/Police. The facility will have its own fire suppression systems and staff will be equipped and trained to fight fires. Based on past experience at mining facilities, demand for municipal firefighting services would be very rare. The facility will also have its own security program for protection of the public; direct demand for police services should be minimal.

Treatment of Topic in EIS:
The topic is minor, but will be discussed briefly in the EIS using updated information in the same format as the EAW. Project-related additions to rail lines will be identified.

Indirect Demand for Public Services

Development of this project and other projects in the area will tend to increase economic activity and may result in growth in population in local communities. This, in turn, may require public expenditure on public services such as fire, water, police, education, and health care. Determining whether such demands will arise is best described in terms of a cumulative effects analysis.

Cumulative Effects. The most direct cumulative effects that are likely are economic and demographic effects.

Construction and operation of multiple industrial developments in the Arrowhead Region (Aitkin, Cook, Itasca, Koochiching, Lake, St. Louis and Carlton Counties) will create numerous jobs, increased tax revenues, and royalties to the state and private interests. The effects of the multiplication factor of jobs and the cash spent to operate such facilities would expand the demand for intermediate products. Thus, supplying firms output would increase and create additional jobs and tax revenue throughout the local and regional economy. Additional employees in various sectors of the economy would create demand for additional goods and services such as grocery stores, service stations and clothing stores that would also create an induced impact on the economy.

In short, the construction and operation of multiple developments would generate direct, indirect and induced impacts to the local and regional economies.

Demographic and economic effects could also produce subsequent impacts that should be considered including:

- Infrastructure impacts (water, wastewater, streets)
- Social service impacts (schools, public safety, libraries, health care)
- Community organization (impact on governmental budgets and procedures)
- Social/psychological impacts (demographic and economic impacts on community organizations and social systems such as churches, community groups, cultural activities, and changes in community priorities for activities such as senior care and retirement)

Treatment of Topic in EIS:
The topic is significant; information beyond what was in the EAW will be included in the EIS. Consideration of the project's potential economic, employment, and sociological impacts is required by state and federal rules.

Economic Effects. The economic effects of the project alone and the cumulative effect of other projects in the area will be evaluated using economic models similar to those previously developed for the PolyMet and Minnesota Steel EISs. A quantitative assessment of cumulative employment and economic effects will be performed; results for both St. Louis County and the East Range will be reported. Background information on employment and the economy of St. Louis County and the East Range will be summarized in terms of:

- Historical population trends by county and major population centers.
- Historical employment trends by county.
- Historical tax revenue trends by county.
- Summary of historical economic activity (major industries, major sources of employment) by county.
- Summary of population, employment, tax revenue and economic activity in 2002 (the baseline year).

Impact analyses will be completed through input-output mathematical modeling to estimate employment impact, output impact, and value added measures in terms of total (direct, indirect and induced) impacts for the construction period, operations period and closure period. Analyses will also assess impacts to State, Local and Federal taxes and royalties. All prices will correspond with the most recent data available.

Baseline Conditions. Economic activity reported in the most recent tax year available in the County/East Range will establish the baseline condition. Cumulative effects will be assessed by combining the baseline economic activity and projections of average annual employment (year by year) and estimated construction cost (year by year) for each of the following future (if they meet the criterion for "reasonably known") and past actions:

- The proposed Mesabi Nugget project including both Phase I and Phase II.
- Proposed PolyMet Mining NorthMet Project.
- Proposed Mesaba Energy Project (Excelsior Energy, Inc.).
- Proposed Cliffs-Erie Railroad Pellet Transfer project (Cliffs-Erie, LLC).
- Proposed expansions of existing taconite plants.

The analysis will report findings for a typical year in four discrete periods: baseline year, construction period, operating period and closure period. Findings will be reported as employment, output impact (dollars), value added impact (dollars) and tax impact (dollars).

Demographic Effects. Background information on social structure of the East Range will be summarized for the latest available data year, including population characteristics including: structure by age, sex, family size, ethnicity, income, type of employment (including unemployed)

The probable effect on the population of local communities will be estimated. This will be done by projecting the existing population and demographic trends of the communities in the absence of the project and adding estimated in-migration caused by employment demand. Employment demand will be converted to overall demographic effect by consideration of family size, based on demographic data appropriate to the employment classes being considered.

Location of employees and their families may be based on housing patterns of existing and past projects, if available, (e.g., general data on communities of residence of staff of LTVSMC) or a simplified method of apportionment such as a "gravity" model that assumes that employees will disperse in direct proportion to the population of the community and in inverse proportion to the square of the commuting distance to the community.

The result will be an estimate of population changes in nearby communities with rough estimates of changes in key community demographics (e.g., school census).

Community Impacts. Where communities show significant predicted changes in demographics, past data on community structure and organization will be collected and summarized. This will include information for the latest available data year on size of government organizations (cities, townships and counties); participation in voluntary associations (description of groups and linkage to national organizations, if any); and inequities (economic, social or cultural) among community groups.

For communities where changes are likely to be significant, local officials will be consulted to determine the adequacy of existing infrastructure and possible improvements that might be required for infrastructure and

community services. Because such local infrastructure improvements are not defined and still speculative, and are likely to be widely dispersed and subject to their own permitting and/or environmental review, no environmental assessment of their secondary impacts will be done. Resulting changes in governmental budgets and procedures will be discussed and evaluated and a qualitative discussion in community organization will be provided, including:

- Analysis of change in community structure: size of government organization (cities, townships and counties); participation in voluntary associations (description of groups and linkage to national organizations, if any); and inequities (economic, social or cultural) among community groups.
- Analysis of projected changes in availability of housing and community services including: municipal water supply, police protection, health care, elderly care, schools, libraries, retail centers, recreational facilities, gathering places, computer access facilities.
- Assessment of stakeholder perception toward proposed projects as related to perceived changes in quality-of-life issues such as: health, safety, security (personal and economic), political power, family stability, use of the natural environment, environmental quality, displacement or relocation, and trust in political and social institutions (intended to gauge community and stakeholder consensus on the cumulative effects of proposed projects on their shared vision for the future of the East Range).
- Potential cumulative effects to municipal water supplies from induced development and other projects.

Data Needs. Data will be collected with the assistance of local planning and resource agencies such as the East Range Joint Powers Board (ERJPB) and the University of Minnesota – Duluth. Working with Iron Range Resources (IRR), St. Louis County Planning Department, Minnesota Department of Employment and Economic Development (DEED), and the Arrowhead Regional Development Commission (ARDC), the consultant team will collect data from the Townships, Cities, St. Louis County, the State of Minnesota and other sources including the individual projects listed above.

Data pertaining to the following will be collected, examined, and used in the impact modeling process:

- Input – Output mathematical model (e.g., IMPLAN Professional).
- Economic activity data files (e.g., IMPLAN Data Files).
- Average annual employment (year by year) and estimated construction cost (year by year) for proposed projects (see above).
- Population data by county as provided by DEED or similar database.
- Population change projections derived from projected employment changes.
- Projected change in government organization structure as determined by respective government units.
- Projected change in participation in voluntary organizations as determined by respective organizations.
- Description of inequities among community groups as determined by group representatives (responsive government units and responsive voluntary organizations as suggested by government units).
- Projected changes in housing availability as determined by economic input-output analysis.
- Projected changes in availability of community services resulting from projected population changes.
- Change in availability will be determined by responsible governmental units, school districts, care facilities, local Chamber of Commerce, and DEED, as appropriate.
- Identification and definition of stakeholders.

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).*

RGU Note: The discussion of cumulative effects reflects guidance provided by the Minnesota Supreme Court in the CARD Decision, which distinguishes between cumulative "effects" and cumulative "impacts;" see 713 N.W.2d 817 (Minn. 2006). EQB is developing updated guidance for RGUs in their consideration of cumulative effects in the context of an individual project.

Cumulative Effects. Specific types cumulative effects are addressed in response to other items. The following text provides background for discussion in other items.

Cumulative effects analysis addresses the combined effects of the proposed project and the effects 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 effects may occur when similar impacts accumulate or when diverse impacts have a synergistic effect. These projected consequences should be analyzed over the entire life of the potential project impact and not just the life of the project. Finally, cumulative effects analysis should focus on truly meaningful effects.

The affected resource of interest for cumulative effects analysis is important in determining the geographic and temporal boundaries of the analysis. This in turn helps identify the past, present and reasonably foreseeable actions that will also be included in the analysis. For example, cumulative effects related to water quality would be limited to the watershed of interest and would not consider the effect of a nearby action in a different watershed.

Inventory of Potential Cumulative Effects

The first step in assessing a project's cumulative effects involves identification potential areas of effect that could result from the project's interaction with other past, present, or reasonably foreseeable projects. Review of previous responses in this scoping EAW and general consideration of other proposed actions in the region resulted in the following tabulation of potential actions having potential cumulative effects:

- Visibility impairment in Class I areas related to mining and industrial emissions from multiple sources.
- Air concentrations in Class II areas related to projects in the immediate vicinity of the proposed project.
- Wetland loss related to mine construction activities.
- Stream flow changes due to dewatering activities, alteration of watersheds, construction activities at multiple mines and by water appropriation/discharges at multiple industrial facilities.
- Water quality changes caused by construction activities at multiple mines and by industrial plant and mine discharges from multiple sources.
- Wildlife habitat loss or fragmentation (and potential effects on threatened or endangered wildlife) related to mine construction activities.
- Threatened or endangered plant species loss related to mine construction activities.
- Employment and economic output related to construction and operation of multiple industrial facilities.
- Social structure changes related to construction and operation of multiple industrial facilities.

Inventory of Potentially Affected Resources

To avoid vagueness, potential cumulative effects should be analyzed in terms of the specific resource, ecosystem, and human community being affected. In addition, the cumulative effects analysis should focus on those impacts that are significant enough to be meaningful. The following is a general inventory of resources that could be potentially affected by the Mesabi Nugget project and the extent of those resources beyond the zone of direct impact:

- Air quality in Class II areas adjacent to the Mesabi Nugget site and in federally administered Class I areas (e.g., BWCAW, Voyageurs National Park).
- Water quality and flow in the First Creek, Second Creek, Unnamed Creek, and Partridge River.
- Water quality of Area 1 Pit, Area 6 Pit, Colby Lake, and St. James Pit.
- Wetlands in the vicinity of the project and in its related watersheds (First Creek, Second Creek, Unnamed Creek, and the Partridge 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 Partridge River and as a portion of the Lake Superior basin.
- Economy and tax base of Babbitt, Hoyt Lakes, Aurora and in the local region.
- Community structure and well being of the cities of Hoyt Lakes and Aurora and the local region.

It should be noted that 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 visibility-impairing emissions to the air would likely be larger than the immediate project area, although the extent of the resource beyond the project impact area might be defined as northeastern Minnesota. Impacts in Federal protected areas (e.g. the BWCA) must meet more stringent standards and thresholds than elsewhere in the region. Because the project is located in the Lake Superior Basin, more stringent water quality standards, particularly for mercury, apply through the Great Lakes Initiative.

"Other Actions" That May Affect Resources

To the extent that a resource may be adversely affected by the Mesabi Nugget project, it must also be determined whether other actions or projects will affect that resource. These "other actions" include both governmental actions and private actions, the latter of which may also have governmental approvals. The following is a list of past, present and reasonably foreseeable actions that may have impacts on the resources listed above:

Governmental Actions include:

- City of Hoyt Lakes wastewater treatment discharges to the Partridge River.
- Logging of the Superior National Forest lands.
- Logging of state and county lands in the Arrowhead Region.
- Implementation of taconite MACT standards by facilities in the Arrowhead Region.
- Implementation of Electric Utility MACT Standards for coal-fired power plants in Minnesota.

- Implementation of the Regional Haze Rules to reduce emissions of SO2, 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 the Best Available Retrofit Technology (BART) rule adopted in 2005 to reduce emissions of SO2, NOx, and fine particles in Minnesota, adjoining states, and states found to contribute significantly to visibility impairment in the Class I areas in Minnesota.
- Future governmental actions are generally included in agency plans and budgets and can be predicted with some certainty.

Existing Private Actions that may have cumulative effects include:

- LTVSMC closure and furnace shutdown in early 2001 in the Embarrass and Partridge River Watersheds and the Arrowhead Region airshed.
- Erie Mining Company establishment in the 1950s and development of the City of Hoyt Lakes in the Partridge River watershed and Arrowhead Region airshed.
- Northshore Mining Company mine site and crusher operations in the Partridge River watershed and Arrowhead Region airshed.
- Other taconite plant operations (with proposed modifications, if appropriate) located in other watersheds but in the Arrowhead Region airshed.
- Operation of Whitewater Reservoir in the Partridge River watershed.
- Minnesota Power Syl Laskin Energy Center operations in the Partridge River watershed and the Arrowhead Region 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 (Minnesota Power land -former LTVSMC property, Cliffs-Erie land, other private land) in the Partridge River Watershed.
- Lakeshore development for recreation and residential on Wynne and Sabin Lakes.

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. These include:

- Proposed Mesaba Energy power generation station construction and operation in the Arrowhead Region airshed. Excelsior Energy Inc. of Minnetonka, MN has been developing plans for the 531-megawatt electrical generation facility under a Department of Energy grant. Two locations are being considered, one of which is in the Partridge River watershed.
- Minnesota Steel Industries, LLC (MSI) DRI/steel plant construction near Nashwauk, MN, and operation in the Arrowhead Region airshed.
- United States Steel proposed expansion of production at its Keewatin Taconite facility and operation in the Arrowhead Region airshed.
- Proposed PolyMet Mining Co. NorthMet operations located in the Partridge River watershed and the Arrowhead Region airshed.
- Cliffs-Erie has been issued permits for the construction and operation of a taconite pellet railroad load-out facility near the former LTVSMC plant site.
- A new pit has been opened at the ArcelorMittal taconite facility near Virginia with mine dewatering discharged to a tributary of the Embarrass River. A second adjacent pit will be opened later in the project.

Additional non-ferrous mining ventures have been discussed in the general vicinity of the PolyMet project. These include the Teck Cominco, Duluth Metals, and Birch Lake projects. Except for ore sample collection, none of the projects has initiated detailed planning activities for full-scale operations. They remain speculative at this time. Because these projects have not advanced to the feasibility stage, they were not considered further for inclusion in the cumulative effects analysis. If any of these projects advance, Minnesota Rules will require the preparation of a mandatory EIS before the project can proceed. Potential cumulative effects related to these projects should be addressed at that time.

Summary of Issues Where Cumulative Effects Are Addressed in EIS

Twelve cumulative effects issues will be addressed in the EIS. Each of these issues was discussed previously in the applicable response, as indicated 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.

Potential Cumulative Effect	Addressed in Item:
Loss or Fragmentation of Wildlife Habitat	Item 11
Loss of Threatened And Endangered Plant Species	Item 11
Loss of Wetlands	Item 12
Hoyt Lakes Area Projects and Air Concentrations in Class II Areas	Item 23
Streamflow and Lake Level Changes	Item 17
Surface and Ground Water Quality Changes	Item 18
Class I Areas PM10 concentrations	Item 23
Class I Areas Visibility Impairment	Item 23
Mercury Bioaccumulation in Fish Resources	Item 23
Visual Effects to Colby Lake	Item 26
Economic Impacts	Item 28
Social Impacts	Item 28

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.

The RGU notes two additional areas of potential environmental effects not addressed in Items 1 to 28 in this EAW.

1. Potential for Amphibole Minerals and Asbestiform Fibers to be Present in the Biwabik Iron Formation

Asbestiform fibers have been linked to a rare type of lung cancer called mesothelioma. There is uncertainty about whether the type of amphibole mineral fibers present in the Biwabik Iron Formation near Babbitt, Minnesota, on the far east end of the Mesabi Iron Range, have the same health effects as commercial asbestos fibers. MDH has previously identified that where amphibole minerals are not present, then potential health effects from amphibole mineral fibers are not expected.

A summary discussion on the potential for amphibole minerals to be present in the ore body to be mined by Mesabi Nugget is presented below.

Introduction. The Mesabi Iron Range is a major, well-known geologic feature oriented roughly northeast to southwest across more than 120 miles of northeast Minnesota. It stretches from near Birch Lake on the east end, slightly east of Babbitt, to near Grand Rapids on the west end. The former LTVSMC mine, as well as the proposed location for the Phase II Project, is approximately 6 miles north of the town of Hoyt Lakes and approximately 16 miles southwest of Babbitt. Mesabi Nugget proposes to re-open a portion of the former LTVSMC mine, specifically the Areas 1, 2WX, and 6 Pits.

MN-fibers are defined by Minnesota state agencies as particles with a 3:1 length-to-width ratio and no minimum length. They include all amphibole and chrysotile minerals. The potential for generation of MN-fibers, along with any potential concerns for associated health risks, depends on the mineral composition of the ore body as well as what physical/mechanical forces are applied. In general terms, the more the ore is ground the more MN-fibers that are created.

Ore Body Mineralogy. The first appearance of grunerite and other amphibole minerals occurs in the far eastern part of the Biwabik Iron Formation near Babbitt. The presence of the amphibole minerals in the Babbitt area is associated with the intrusion of the Duluth Complex into the Biwabik Iron Formation. In comparison, there have been no similar intrusions of the Biwabik Iron Formation by the Duluth Complex in the western part of the Mesabi Iron Range, which encompasses the Grand Rapids area eastward to approximately Aurora.

Between Aurora and Babbitt there is a transition zone in the Biwabik Iron Formation that is identified as Zone 2 by French (1968); this transition zone includes Mesabi Nugget's proposed mining locations.

As described by French (1968), Zone 2 mineralogy identifies that transitional taconites are present but the mineralogy of these transitional taconites is similar to the taconite ore from the main and western portions of the Biwabik Iron Formation. Data from tailings samples from the main and western portions of the Iron Range indicate the ore is composed mostly of magnetite or hematite, Stilpnomelane, Minnesotaite, iron-talc and greenalite (French 1968). Of these minerals, Stilpnomelane can appear fibrous; however, its folia are inelastic and brittle and therefore are not, by definition, asbestiform. Minnesotaite is also a common mineral in the Biwabik Iron Formation and is a sheet silicate similar to talc; however, all of the fibers that have been observed in tailings samples from the main and western part of the Iron Range are non-amphibole and have had low aspect ratios (close to 3:1) and did not appear likely to break into long thin fibers (Zanko et al. 2003). In comparison, asbestiform fibers typically have aspect ratios of 20:1 or greater.

The metamorphism and mineralogical changes due to the intrusion of the Duluth Complex into the Biwabik Iron Formation are abrupt and occur at the east/southeast edge of this Zone 2 (French 1968). Just to the east of Area 2WX Pit, a line representing the known occurrence of amphibole minerals in the Biwabik Iron Formation runs diagonally from northeast to southwest (Zanko et al. 2003). The Area 2WX Pit, including the expansion area, is the closest project activity to the intrusion at 0.5 to 0.75 miles; the Areas 1 and 6 Pits are further away at 2 to 3 miles distance. Due to the abrupt intrusion of the Duluth Complex into the Biwabik Iron Formation and the available mineralogical information, French (1968) concluded that the mineralogy of Zone 2, which includes the area around the Area 2WX Pit, is similar to the mineralogy of the western portion of the Biwabik Iron Formation where no amphibole minerals have been identified to date.

Based on the information from French (1968) and Zanko et al. (2003), amphibole minerals are not likely to be present in the portion of the Biwabik Iron Formation proposed to be mined by Mesabi Nugget from the Area 2WX Pit.

Existing Fibers-Related Data. Fibers related data are available from several sources for the taconite mining operations on the Mesabi Iron Range. Mineralogical and specialized microscopic analyses conducted by Zanko et al (2003) and MDH (Ring 1981) show that coarse taconite tailings sample composites from main and western Mesabi Range taconite mines did not contain any of the six regulated asbestos minerals, nor did they contain amphibole minerals.

The Ring (1981) data report the presence of amphibole MN-Fibers in LTVSMC tailings. This is because these tailings result from the mixing of ore from pits located both east and west of the amphibole minerals line (as identified by Zanko, et. al., 2003); the Ring (1981) memorandum also notes that Erie Mining had pits in both regions. This "mixing" is an important distinction because ore from mine pits located west of the amphibole minerals line do not have amphibole minerals associated with it. The Erie Mining tailings samples had a count of 0.58 fibers per nanogram of solids, which was intermediate between the much higher easterly results from Reserve/Northshore and the lower results from western operations. Such a value would be expected in tailings produced from pits lying on both sides of the line.

The existing fibers-related data for the taconite ore mined and processed by Erie Mining/LTVSMC operations is limited and additional data has been collected by Mesabi Nugget.

New Data: Analysis of Samples of Ore to be Mined by Mesabi Nugget. Mesabi Nugget collected ore samples from Area 1 Pit from an existing raw material stockpile, Area 2WX Pit (upper cherty magnetite ore), and Area 6 Pit (lower cherty magnetite ore), respectively. The samples were collected from stockpiles of material from the appropriate horizons based on visual inspection by an experienced mining engineer. These samples were analyzed for the presence/absence of amphibole minerals according to the Minnesota Department of Health methodology (Method 851; transmission electron microscopy, TEM). Summary results include:

- Amphibole minerals were not identified as being present in the ore samples.
- Chrysotile (i.e., the asbestos form of serpentine) was not identified as being present in the ore samples.
- The MN-fibers present in each sample were identified as "Non-amphibole/ Non-chrysotile."

Additional Mineralogical Feature in the Project Area. Geologists at LTVSMC identified that the southeast portion of Area 6 Pit was close to a intrusive igneous feature known as the Aurora Sill. According to the Final Environmental Impact Statement for the Mittal Steel East Reserve Project (DNR, 2007) there is widespread occurrence of fibrous amphiboles within a narrow band (e.g., contact aureole) of the Aurora Sill. This sill is an unusual, small alkalic intrusive unit that cuts through the Biwabik Iron Formation near the City of Aurora, MN. The mineral of concern is Crocidolite, a sodium bearing iron amphibole that requires high temperatures and a fluid source rich in sodium to form. These conditions were present only in the parts of the iron formation immediately adjacent to the Aurora Sill, thus allowing for contact metamorphism to occur; (French, p. 14).

The Aurora Sill extends approximately 5.6 kilometers along the Mesabi Range north of the town of Aurora and ranges in thickness from 6 to 37 meters (Phillips, et al. 2000). A portion of the sill was mapped by LTVSMC. The sill has been observed in core holes to the south and southeast of the existing Area 6 Pit.

The location of the Aurora Sill, as inferred by LTVSMC from drilling data, is shown in Figure 30-1, along with estimates of thickness of the sill in holes where it was present. The sill is found stratigraphically towards the

bottom of the Upper Cherty member of the Biwabik Iron Formation. An exposure of the sill can be seen, as a pinkish band, at the top of the highwall at the south end of the Area 6 Pit. From there, it is known to dip to the south, following the trend of the iron formation. As can be seen on the figure, the 20-year pit limit of the Area 6 Pit will not intersect the location of the Aurora Sill. The figure also shows that the Aurora Sill "pinches out" or disappears approximately one mile to the east of the Area 6 Pit and therefore is not a feature that is expected to be associated with the Area 2WX Pit, which is located approximately 1.7 miles to the northeast of the Area 6 Pit.

All of the planned mining activities in the Area 6 Pit occur at the north end of the existing pit, over half a mile away from the known occurrence of the Aurora Sill. At the north end of the pit, the formations being mined are much lower stratigraphically, thus occurring in the Lower Slaty and Lower Cherty members of the Biwabik Iron Formation. In other words, the Aurora Sill occurs in the Upper Cherty member of the Biwabik Iron Formation and therefore closer to the surface at the south end of the Area 6 Pit, while the planned mining will occur deeper in the iron formation at the north end of the pit. Because mining is planned at the north end of Area 6 Pit at a deeper depth in the iron formation than the Aurora Sill, this geologic feature is not expected to affect operations in any way.

Sill-related material is quite unique and easily identified from the iron ore. If intersection were to occur, the sill material would not be crushed, ground, or concentrated; this means there is a very low potential of releasing mineral fibers to the atmosphere. Further, even if the mine plan changed and mining in the southern portion of the Area 6 Pit were included in the project, additional confirmatory drilling prior to mining in the south portion of the pit would be required to ensure that: 1) either the planned mining would not intersect the Aurora Sill; or 2) contingency plans could be made to isolate the Aurora Sill material from the iron ore to be processed.

Conclusions. Mesabi Nugget plans to mine west of the amphibole minerals line. Because of this, current information indicates that it is unlikely that amphibole minerals will be associated with the ore deposits extracted by Phase II operations. Previously collected samples and newly collected data support this conclusion. Therefore, the potential release of amphibole MN-fibers or asbestiform fibers to air or water is not likely to occur from, or be associated with, the proposed project.

References

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Proposed Treatment of Topic in EIS:
The topic is regionally significant, but the very low probability of encountering amphibole minerals or the Aurora Sill in the portion of the Biwabik Iron Formation to be mined by Mesabi Nugget justifies treatment of the topic with limited information beyond the EAW. No additional data collection or testing of ore samples is proposed, however the method of sample collection for the Area 2WX and Area 6 Pits' ores will be identified (e.g., core sample, stockpile sample) in addition to the location of the samples and their stratigraphic horizon if collected in situ. The EIS will include figures that show the relationship of the Duluth Complex to the Biwabik Iron Formation and the project; the figures will show known data on the intrusion as well along any appropriate buffer zone to indicate uncertainty in the line. The EIS will include a draft Sill Intersection Contingency Plan prepared by the proposer outlining how to identify such materials and what steps would be taken in the event they are encountered.

2. Mineland Reclamation

Because Mesabi Nugget is proposing to use in-pit tailings disposal and to consider in-pit stockpiling, a number of alternatives exist for mineland reclamation. Mineland reclamation planning includes reclamation of the mine pits, the overburden, waste rock and lean ore stockpiles, tailings facilities, and site cleanup.

Proposed Treatment of Topic in EIS:
The topic is significant; information beyond what was in the EAW will be included in the EIS. The EIS will present a proposed mineland reclamation plan as follows:

Mine Pit. The size and shape of the mine pits will depend on the location of ore and economic factors. The descriptions provided in response to Item 6 are subject to change as the ore body is better defined. Significant issues that must be addressed as part of reclamation planning are refilling of pit, pit outflow, and potential for construction of littoral zones to enhance productivity.

Overburden, Waste Rock, and Lean Ore Stockpiles. The size and location, of stockpiles needs to address economics of mining, preservation of mineral reserves, wetland impacts and wildlife habitat and travel corridors.

Tailings Facilities. Tailings disposal should evaluate the preservation of mineral reserves, creation of littoral zones and wetland mitigation sites, and possible creation of wildlife habitat and travel corridors.

Site Revegetation. Vegetation and eventual land use of project components will also be important considerations in mine planning. Although the time frame for mining is 20 years, and additional time will be needed for reclamation, there is potential to reclaim the site such that many impacts from the disturbance can be mitigated. Compliance with progressive reclamation requirements under Minn. Rules part 6130.3600, subp. 3 will be discussed.

Watershed Integrity. Watershed restoration compliance with Minn. Rules part 6130.2200 will be discussed. To the extent practicable, all lands disturbed by mining will be reintegrated into their original watersheds. Pre-mining flows and water balance will be reestablished to minimize impacts on the watershed and down stream users.

Site Cleanup. Measures necessary for site cleanup will be discussed.

Data for this discussion will be provided by submittal of the application for the DNR Permit to Mine prior to commencement of preparation of the EIS.

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 _____ Date____August 10, 2008_____

Title _____Natural Resources Planning Director_____

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