Minnesota Pollution Control Agency

# National Pollutant Discharge Elimination System /State Disposal System (NPDES/SDS) Permit Program Fact Sheet

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| **Permittee:** U.S. Steel Corp.<br>**Permit Number:** MN0057207<br>8819 Old Hwy 169<br>Mt. Iron, MN 55768 | **Facility Name:** Minntac Tailings Basin |

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| **Current Permit Expiration:** July 31, 1992 |
| **Public Comment Period Begins:** Date<br>**Period Ends:** Date |
| **Receiving Water:** Dark River - 2B, 3C, 4A&B, 5, 6 |
| **Proposed Action:** Permit Reissuance with Compliance Schedule |

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**Permitting Contact**
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## Purpose and Participation

**Purpose**
The Commissioner of the Minnesota Pollution Control Agency (MPCA) has made a preliminary decision to reissue a National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) permit to U. S. Steel Corp. (USS) for operation of its Minntac tailings basin. This fact sheet has been prepared according to Title 40 of the Federal Code of Regulations (CFR) parts 124.8 and 124.56 and Minn. R. 7001.0100, subp. 3 to provide information regarding the proposed reissuance of the NPDES/SDS permit.

This fact sheet outlines the principal issues related to the preparation of this draft permit and documents the decisions that were made in the determination of the effluent limitations and conditions of this permit.

**Public Participation**
You may submit written comments on the terms of the draft permit or on the Commissioner's preliminary determination. Your written comments must include the following:

1. A statement of your interest in the permit application or the draft permit.
2. A statement of the action you wish the Minnesota Pollution Control Agency (MPCA) to take, including specific references to sections of the draft permit that you believe should be changed.
3. The reasons supporting your position, stated with sufficient specificity as to allow the Commissioner to investigate the merits of your position.

You may also request that the MPCA Commissioner hold a public informational meeting. A public informational meeting is an informal meeting which the MPCA may hold to help clarify and resolve issues.

In accordance with Minn. R. 7000.0650 and Minn. R. 7001.0110, your petition requesting a public informational meeting must identify the matter of concern and must include the following: items 1 through 3 identified above; a statement of the reasons the MPCA should hold the meeting; and the issues you would like the MPCA to address at the meeting.

In addition, you may submit a petition for a contested case hearing. A contested case hearing is a formal hearing before an administrative law judge. Your petition requesting a contested case hearing must include a statement of reasons or proposed findings supporting the MPCA decision to hold a contested case hearing pursuant to the criteria identified in Minn. R. 7000.1900, subp. 1 and a statement of the issues proposed to be addressed by a contested case hearing and the specific relief requested. To the extent known, your petition should include a proposed list of witnesses to be presented at the hearing, a proposed list of publications, references or studies to be introduced at the hearing, and an estimate of time required for you to present the matter at hearing.

You must submit all comments, requests, and petitions during the public comment period identified on page 1 of this notice. All written comments, requests, and petitions received during



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the public comment period will be considered in the final decisions regarding the permit. The Commissioner has pre-determined that the draft permit will be presented to the MPCA's Citizens' Board (Board) for final decision. You may participate in the activities of the Board as provided in Minn. R. 7000.0650.

**In order to be considered, comments, petitions, and/or requests must be submitted by the last day of the public comment period to:**

Erik Smith
Minnesota Pollution Control Agency
520 Lafayette Rd. North
St. Paul, MN 55155

The permit will be reissued if the MPCA determines that the proposed Permittee or Permittees will, with respect to the facility or activity to be permitted, comply or undertake a schedule to achieve compliance with all applicable state and federal pollution control statutes and rules administered by the MPCA and the conditions of the permit and that all applicable requirements of Minn. Stat. ch. 116D and the rules promulgated thereunder have been fulfilled.

More detail on all requirements placed on the facility may be found in the Permit document.

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## Facility Description

**Background Information**

Facility History and Outstanding Schedule of Compliance

The Minntac Tailings Basin has been in operation since approximately 1967, prior to passage of the Clean Water Act, and was first issued an NPDES/SDS permit on September 30, 1987. This permit expired on July 31, 1992. The Permittee continues to operate the Facility under the expired permit according to Minn. R. 7001.0160.

There has been a long-standing issue with increasing concentrations of pollutants in the tailings basin (notably sulfate, specific conductance, and hardness), and the impact this has had on groundwater and surface water. Beginning in 2001 or earlier, the Agency and the Permittee have entered into agreements to conduct studies and perform remedial measures to reduce concentrations of Sulfate and other pollutants in the tailings basin and surrounding waters leading to the June 9, 2011 SOC, which still has outstanding actions to be performed by the regulated party.

Distinction Between State and Federal Discharges

Within this fact sheet, the term discharge can have several meanings. The intended meaning will be denoted as follows:

- Discharge(H) – (Hydrologic definition) The flow of water, including any suspended solids, dissolved chemicals, and or biological materials from one water body or aquifer to another, or through a given cross-sectional area.

- Discharge(CWA) – (NPDES - CWA definition) Any addition of any pollutant to **navigable waters** from any point source. Navigable waters means waters of the United States, including the territorial seas. Waters of the United States is defined by 40 CFR 122.2.

- Discharge(S) – (Minn. Stat. § 115.01 definition) The addition of any pollutant to the **waters of the state** or to any disposal system.

    - -"Waters of the state" means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, reservoirs, aquifers, irrigation systems, drainage systems and all other bodies or accumulations of water, surface or underground, natural or artificial, public or private, which are contained within, flow through, or border upon the state or any portion thereof. {with the exception that disposal systems or treatment works operated under permit or certificate of compliance of the agency are not "waters of the state." - Minn. R. 7050.0130(2)}

This permit contains conditions and limits on the management and discharge(H) of the facility's industrial process wastewater, stormwater, and onsite domestic wastewater effluent. The conditions and limits are derived from both state and federal authority. Those derived from state authority govern discharge(S) of wastewater from the tailings basin to groundwater, which is a water of the state but not a water of the United States (navigable water). Additionally, any



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impacts to surface waters from pollutants that were transported from the tailings basin via groundwater are addressed under state statute based on the reasoning discussed below. Seepage that emerges either from the side of the basin dike, or within the vicinity of the toe of the dike, that creates surface flow or ponded features that would not exist in the absence of the tailings basin, has historically been regulated by MPCA under federal NPDES guidelines. That practice will continue under this permit. The differentiation between this seepage and discharge(H & S) to groundwater is discussed below.

MPCA uses the term "deep seepage," to refer to wastewater from the basin that enters the underlying surficial aquifer and travels as groundwater, which may emerge into the surrounding wetlands, lakes or stream channels as baseflow, or may remain in the subsurface within the regional groundwater flow system. The surficial aquifer beneath and surrounding the tailings basin consists of unconsolidated glacial sediments and as such, the movement of water through it is consistent with the physics of porous media flow. Within the aquifer, which at this facility extends laterally for several miles, water can move in any direction depending on the hydraulic head (water table) conditions, which can, and do vary aerially and over time. This flow system is neither confined nor discrete and is not consistent with the examples of underground conveyances explicitly mentioned in the CWA definition of a point source (i.e., is not a tunnel or discrete fissure). Flow through porous media is also subject to lateral dispersion, which is the mixing and spreading of the pollutant perpendicular to the path of fluid flow. There is a scaling factor to this phenomenon, whereby the degree of dispersion often increases at a greater rate as the flow path lengthens. Consequently, the area over which impacted groundwater may discharge(H) to surface water features can be thousands of feet in length, covering hundreds, to thousands of acres, particularly when discharging(H) to wetlands. Although deep seepage may eventually commingle with surface water, the flow path that the pollutants travel from the basin to surface water is not a discernible, confined, and discrete conveyance. Therefore the transfer of pollutants from the tailings basin to surface water via groundwater does not meet the CWA definition of a point source, and consequently it is not a discharge(CWA) under the CWA.

In addition to the ways that deep seepage does not conform to the physical description of a point source, EPA's published opinions have excluded groundwater from coverage under the CWA. The U. S. EPA has recently proposed a revision to the definition of **waters of the United States** in which "groundwater, including groundwater drained through subsurface drainage systems" is explicitly excluded from classification as a "water of the United States" See Federal Register, Vol. 79, No. 76 / Monday, April 21, 2014 / Proposed Rules. Also, when initially developing Effluent Limit Guidelines and New Source Performance Standards for the mining industry, EPA stated "the Agency does not propose to regulate seepage from impoundments at ore mines and mills other than those extracting uranium. The extent to which such seepage adversely affects navigable waters (as opposed to groundwater) is highly problematic. Frequently, even when seepages reaches navigable waters, it does not constitute a point source discharge – a discernible, confined and discrete conveyance – and is therefore not subject to effluent limitations." (Federal Register Vol. 47, No. 114, Monday, June 14, 1982)

Although Federal regulations do not govern discharges(H) to groundwater or seepage from tailings basins, Minn. Stat. § 115.03, subd. 1, item e gives MPCA authority to require permits for the operation of disposal systems discharging (S & H) to waters of the state, and a person



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operating a disposal system is required to have a permit under Minn. Stat. § 115.07. The Minntac tailings basin meets the definition of disposal system in Minn. Stat. § 115.01, subd. 5 and **Waters of the state** include all accumulations of water, surface or underground (Minn. Stat. § 115.01, subd. 23). Consequently, MPCA intends to regulate deep seepage as a discharge(S) to a water of the state in accordance with State Disposal System Permit guidelines.

In addition to deep seepage, discharge(H) from the tailings basin may occur as seepage points along the exterior toe of the outer basin dikes. These features are analogous to base of hillslope springs. Some are small and ephemeral, while some of the larger seeps create ponded features with measureable flows of several hundred gallons per minute into the adjacent wetlands and streams. The source of this water, particularly at the larger, persistent seeps, is likely a combination of the following:

A. flow from the basin, through the dike, emerging very near the base (dike seepage);
B. flow under the dike, on a curving flowpath through the native sediments (shallow groundwater flow); and
C. precipitation falling on the outer portion of the dike and percolating through it (throughflow).

Historically, MPCA has issued an NPDES permit establishing effluent limits and other conditions to control these seeps and intends to do so under this permit also. The flow from the large seeps is often observable and with installation of a berm and outlet weir it can be measured, similar to flow from a ditch or channel. This allows quantification of flow volume and pollutant load, such that the reasonable potential to cause or contribute to exceedance of a water quality standard can be evaluated and, if necessary, effluent limits can be determined and applied.

Facility Location Legal Description

The US Steel - Minntac Tailings Basin Area facility (Facility) is located in multiple Sections of Township 59 North, Ranges 18 and 19 West, Mountain Iron, St. Louis County, Minnesota.

The facility covers approximately 8700 acres (13.6 square miles) and consists of the Minntac tailings basin, the drainage area contributing surface runoff to the basin, and all wastewater disposal systems within the area designated on the map on page 13. The contributing drainage area includes part of an overburden/rock stockpile area to the southwest of the basin, as well as part of the Minntac plant area. That portion of the plant area which drains to the basin includes the concentrator, the agglomerator, the sewage treatment plant, the lube storage area, a substation, the plant area reservoir, and part of the crushing facilities.

Facility Operations Description

The principal activity at this facility is taconite processing. At the maximum operating rate, the facility will generate 15 million long tons of taconite pellets per year. The Minntac plant consists of a series of crushers and screens, a crusher thickener, a concentrator, an agglomerator, and various auxiliary facilities. The concentrator utilizes a series of mills, magnetic separators, classifiers, hydroclones, hydroseparators, screens and thickeners, as well as a flotation process. Chemical additives include flocculants and various flotation reagents. The flocculants comprise Calgon M-5729, added to the crushing plant dust collector slurry at a rate of one pound per hour



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(lb/hr), and Calgon M-5372 or equivalent cationic homopolymers added to the concentrator tailings slurry prior to the thickening stage, at a rate of 170 lb/hr. The flotation reagents comprise: (a) an alkyl ether primary amine acetate or alkyl ether diamine acetate collector, Arosurf MG-83, Arosurf MG-83A, Tomah DA-17-5% Acetate, or equivalent (alkyl chain R no greater than $C_{14}$), added at a maximum rate of 295 lb/hr; (b) an alcohol frother, methyl isobutyl carbinol, Arosurf 2057, Nalflote 8848, or equivalent (mixed $C_4$ to $C_9$ aliphatic alcohols only), added at a maximum rate of 101 lb/hr; and (c) anti-foaming agents Oreprep D-202 or Nalco 7810 Antifoam, added at a maximum rate of 162 lb/hr.

The agglomerator receives the concentrate, which is then dewatered by disc filters. The filter cake is then mixed with bentonite and formed into pellets in balling drums. The pellets are dried, heated, and fired in a grate kiln, and then loaded for rail transport.

Wastewater inputs to the tailings basin consist of the following, with their estimated average rates:

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| • Fine tailings slurry/concentrator process water | 22,000 gpm |
| • Agglomerator process water | 14,800 gpm |
| • Sewage plant discharge, formerly covered under NPDES/SDS Permit MN0050504 | 40 gpm |
| • Laboratory wastewater (neutralized) | 3,650 gal/yr |
| • Plant non-process water (wet scrubber discharge, floor wash, roof runoff, non-contact cooling water | Unknown |
| • Runoff from plant area, stockpile areas and adjacent upland areas | Unknown |

The agglomerator process water, sewage plant discharge, laboratory wastewater, plant non-process water and surface runoff from the plant area enter the south side of the basin through a series of pipes and ditches to the north of the concentrator and agglomerator buildings, in Section 28. Surface runoff from the upland area to the southeast of the basin enters through a series of four culverts through the perimeter dam. Runoff from the stockpile area and upland area to the southwest of the basin enters by seepage through the perimeter dam.

An average of 21 million long tons of dry fine tailings and 14 million long tons of dry coarse tailings are disposed of each year in the tailings basin. The coarse tailings are generated from the classifier, following the first stage of milling and magnetic separation. The fine tailings are generated from the crusher thickener overflow and the tailings thickener underflow. The fine tailings slurry and concentrator process water is directed by gravity flow through pipes from the Step I, II, and III thickeners to a series of open ditches to the Minntac tailings basin. The flow from the flotation process is restricted to Step I thickeners. The fine tailings slurry and flotation wastewater is routed to the tailings basin via one of two flow routes (east or west). Internal waste stream WS006 is representative of the fine tailings slurry wastewater flow to the east while WS007 is representative of the wastewater flow to the west. The basin is segmented into several cells, and the fine tailings spigot point is periodically moved from one cell to another. A permanent pumping station located within the basin returns water to the plant site reservoir. The station is located on the east side of Cell 1 (SE ¼, Section 15). Calcium chloride is occasionally used as a chemical dust suppressant on the basin and haul-roads in the facility. Some coarse



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tailings are used for sanding on roads in the facility during the winter, and others are sold as aggregate product.

The various basin cells are separated by dikes, each constructed of a single berm of coarse tailings placed by truck and various pieces of auxiliary equipment. Most of the perimeter dam for the tailings basin is constructed by spigotting a fine tailings slurry into the core between parallel inner and outer coarse tailings dikes; that part of the perimeter dam on the southwest side of the basin is constructed in the same manner as the interior basin dikes. The coarse tailings dikes are constructed by truck in ten foot lifts. The perimeter dam spigot lines are located on the dry side of the core; this creates a surface slope from the dry side down to the wet side, thus causing the water from the slurry to pond on the wet side of the core and seep through the wet side dike to the retained water within the disposal facility. Peat was removed from the original ground area to be occupied by the perimeter dam, and a ten foot deep key-way was dug in the core portion of this area.

A demolition debris landfill (Solid Waste Permit SW-240) is located on the southeast corner of Cell A-2. The abandoned Minntac dump site (Agency Landfill Inventory Number SL-183) is located in the southwest corner of Cell 1 (SW ¼, SE ¼, Section 21 and NW ¼, NE ¼, Section 28). Paper, lunch wastes, wood scrapes, scrap metal, mill grease, and waste oil were disposed of at this dump during its period of operation.

A minor permit modification was done in 2010 to allow for the construction of a Seep Collection and Return System (SCRS) as required by a Schedule of Compliance originally entered into by the Company and the MPCA on November 14, 2007, and as amended by Amendment No. 1 on February 25, 2010.

Due to safety issues at the current internal monitoring station, WS001, the minor permit modification in 2010 also included the relocation of monitoring station WS001 to two separate monitoring stations, now identified as WS006 and WS007. These stations are representative of the entire fine tailings slurry flow from the Concentrator which also includes wastewater flow from the flotation process. The fine tailings slurry is directed through one of two routes at any given time, either to the east portion of the tailings basin past WS006 or to the west portion of the tailings basin past WS007, for uniform tailings distribution and disposal. These locations were used to monitor for the presence of free amine in the fine tailings slurry flow and any associated toxicity. Since monitoring results have not indicated the presence of amines or shown toxicity, and since WET testing is required at the discharge location (SD001) and in surface water under the reissued permit, toxicity monitoring at WS006 and WS007 will no longer be required.

A domestic wastewater treatment plant for the facility was previously covered under SDS permit number MN0050504, but will be incorporated into this reissued permit. The plant consists of a lift station which discharges to bar screens followed by an activated sludge package plant. The package plant is an extended aeration Infilco Accelo-BIOX Type "C" Plant. It provides continual aeration, mixing, recirculation, settling, and clarification within a single circular unit. Raw domestic wastewater is introduced at the bottom, outer zone of the unit; aeration and mixing is provided by a sparge ring at the bottom of this outer zone. Mixed liquor from the outer zone



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overflows into an inner cone that provides settling; the settling sludge is returned by gravity to the outer zone as return activated sludge (RAS). A cylindrical clarification zone within the inner cone then discharges through a peripheral launder. The effluent is disinfected using sodium hypochlorite prior to routing from the system to the tailings basin. Monitoring of the effluent to the basin will occur at WS008. Waste activated sludge is periodically pumped directly from the outer zone as needed and transported to the Mt. Iron WWTP. The WWTP was originally designed for an average flow of 0.06 mgd and a maximum flow of 0.09 mgd. The WWTP is a Class C facility.

Stormwater

Facilities that discharge storm water associated with industrial activity as defined at 40 CRF 122.26(b)(14) are required to either apply for an NPDES storm water permit or include in their permit application information pertaining to storm water sufficient to allow the permitting authority to include storm water requirements into the facility's NPDES/SDS permit.

Storm water permits typically require the Permittee to meet the effluent limitations in the permit, develop a storm water pollution prevention plan that contains descriptions of the measures and controls the Permittee will implement to meet the effluent limitations, and perform monitoring and inspection.

Storm water effluent limitations can be numeric or in the form of best management practices, which are control measures used by the Permittee to eliminate or reduce the exposure of pollutants to rain, snow, snowmelt, and the runoff generated from these events. A storm water pollution prevention plan typically requires the organization of a pollutant prevention team, development of a site map, including the location of potential pollutant sources and drainage patterns, and the description of the measures used to limit the exposure of pollutants to storm water or to treat polluted storm water prior to discharging it to local waterways.

Since all storm water at this Facility is contained within the tailings basin, additional monitoring points and numeric limitations specific to storm water are not needed. Management of storm water will be done utilizing best management practices and a pollution prevention plan.

Site Geology and Hydrology

Geology at the site consists of a thin layer (0 to 50 feet) of heterogeneous glacial outwash sediments comprised of variably interbedded and intergraded silty sands, gravels and thin clay units. The sediments are overlain by a thin layer of organic rich soils, including peat deposits in the lowest-lying areas. The glacial sediments are generally thinnest at the southern part of the site along the Laurentian Divide and deepen to the north. The underlying bedrock is granitic and is thought to be relatively impermeable except for a shallow zone of weathering at its surface. The bedrock surface is irregular and generally mimics the surface topography in that local highlands are underlain by elevated bedrock knobs and wetlands and surface water features are generally situated over bedrock depressions.

The tailings basin also straddles a north-south trending watershed divide and has buried the headwaters of the major streams in those watersheds, the Dark River to the west and the Sand



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River to the east. The headwaters for both streams are now adjacent to the basin dike and are presumably fed by emergent groundwater originating from the basin ("deep seepage", as previously defined). Each stream is situated over a roughly U-shaped bedrock depression that is up to about 90 feet deep. The western half of the northern dike is also on the southern boundary of the Johnson Creek watershed which extends north of the tailings basin. There is no channelized surface flow leading away from the basin in this watershed.

Given the position of the tailings basin on the edge of the Laurentian Divide, and the greatly elevated hydraulic head (30+ feet) that has been created within it, it is presumed that the general groundwater flow is away from the basin to the east, north and west and that after more than 40 years of operation, essentially all groundwater in the surficial aquifer beneath the basin is tailings-impacted. Due to the extreme head gradient across the dikes (~0.05), and the relatively shallow gradient in the surrounding wetlands (~0.001 to 0.003), considerable emergent flow at and near the base of the dikes is expected, and has been observed. This is supported by monitoring and modeling results which show the presence of an upwards vertical gradient near the basin that diminishes with distance from the basin. Emergent groundwater seepage at the toe of the basin dike which flows into the Dark River and Sand River has been allowed under the existing permit at compliance/monitoring locations SD001 and SD002, respectively. Average flows over the past decade have been approximately 0.14 million gallons per day (MGD) at SD001 and 0.28 MGD at SD002 (prior to seep collection). Air photos indicate that there are other areas of shallow seepage that do not report to the monitoring stations and represent unaccounted for flow.

In 2010, the permittee installed a seep collection and return system (SCRS) along roughly 1 ¾ miles of the east side of the basin including SD002. The SCRS system consists of catch basins located in each of the 13 identified seepage locations, hydraulically connected by subsurface HDPE piping to pump stations. Each of the seepage areas have been shaped and graded to promote seepage flow to the catch basins. Sheet pile cut-off walls were installed downgradient of each catch basin, connecting areas of higher elevation on either side of each discrete seepage location, to a depth of approximately 15 feet below existing ground level to ensure that surrounding wetlands are minimally impacted. The SCRS system consists of two subsystems, one collecting seepage from the northern section and the other from the southern section. Each subsystem terminates in a pump station consisting of a concrete vault containing a duplex pump system capable of returning the collected seepage back to the tailings basin clear pool reservoir. An average of 0.78 MGD was collected by this system in October of 2010, which is 0.5 MGD greater than the average flow previously reporting to SD002. Construction of a similar system on the west and northwest sides of the basin is required under the June 9th, 2011 SOC. The Dark River SCRS is currently being revised to minimize wetland impacts and it is anticipated to be installed and operational during the term of this reissued permit.

<u>NPDES Outfall Monitoring Station Legal Description</u>
SD001 (formerly 020) on the west toe in the SE ¼, NE ¼, NW ¼, Section 18 is the only monitored outfall subject to compliance with NPDES guidelines under the CWA in this joint SDS/NPDES permit. Monitoring has been conducted at the SD001 sampling station due to its position at the headwaters of the Dark River, and because it is thought to be representative of the multiple dike seeps existing on the west and northwest perimeter of the tailings basin.



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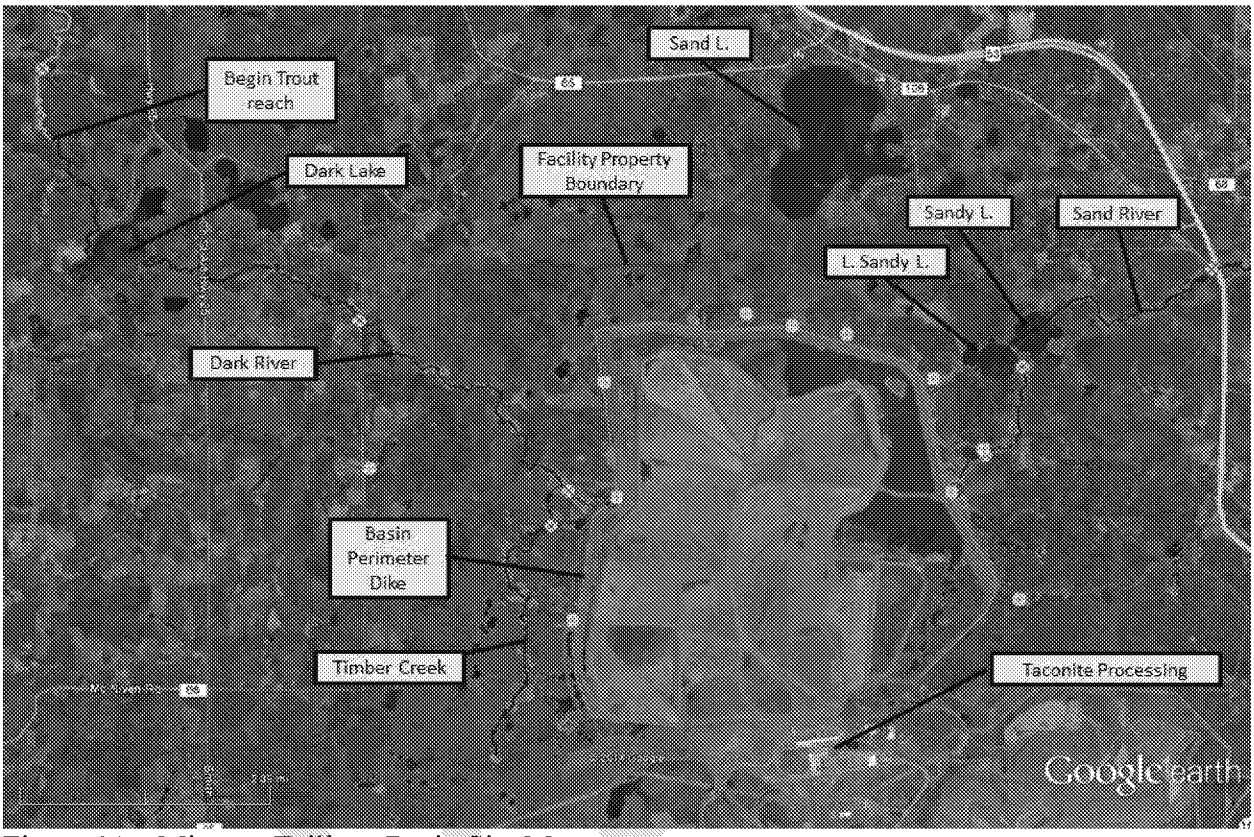


Figure 01 – Minntac Tailings Basin Site Map

Surface Water Monitoring Locations

Under this permit, the Permittee will be required to establish Sampling Stations (described below) for monitoring of surface water quality in surface water downgradient of the tailings basin. Where the tailings basin is causing or contributing to exceedance of water quality standards, interim and/or final compliance limits are established in this permit.

Surface water monitoring for compliance with numeric water quality standards and narrative criteria is proposed in streams and lakes listed in the State of Minnesota Public Waters Inventory (PWI) that originate within one mile of the tailings basin. On the west side, this includes the Dark River and Timber Creek. On the east side there is the Sand River which originates near the basin and passes through Admiral Lake, Little Sandy Lake and Sandy Lake. To the north, there are no PWI features within one mile, only a few shallow wetland features, and Sand Lake, which is just greater than one mile from the basin. There is a lesser gradient to the north than to either the east or west and there is no known impact to Sand Lake from the basin. Sampling conducted there in 2010 and 2011 indicated an average sulfate concentration of 3.2 mg/L and specific conductance of approximately 100 uS/cm, which are in the anticipated range of background concentrations for these parameters in this region. Therefore, no monitoring of Sand Lake is proposed at this time.



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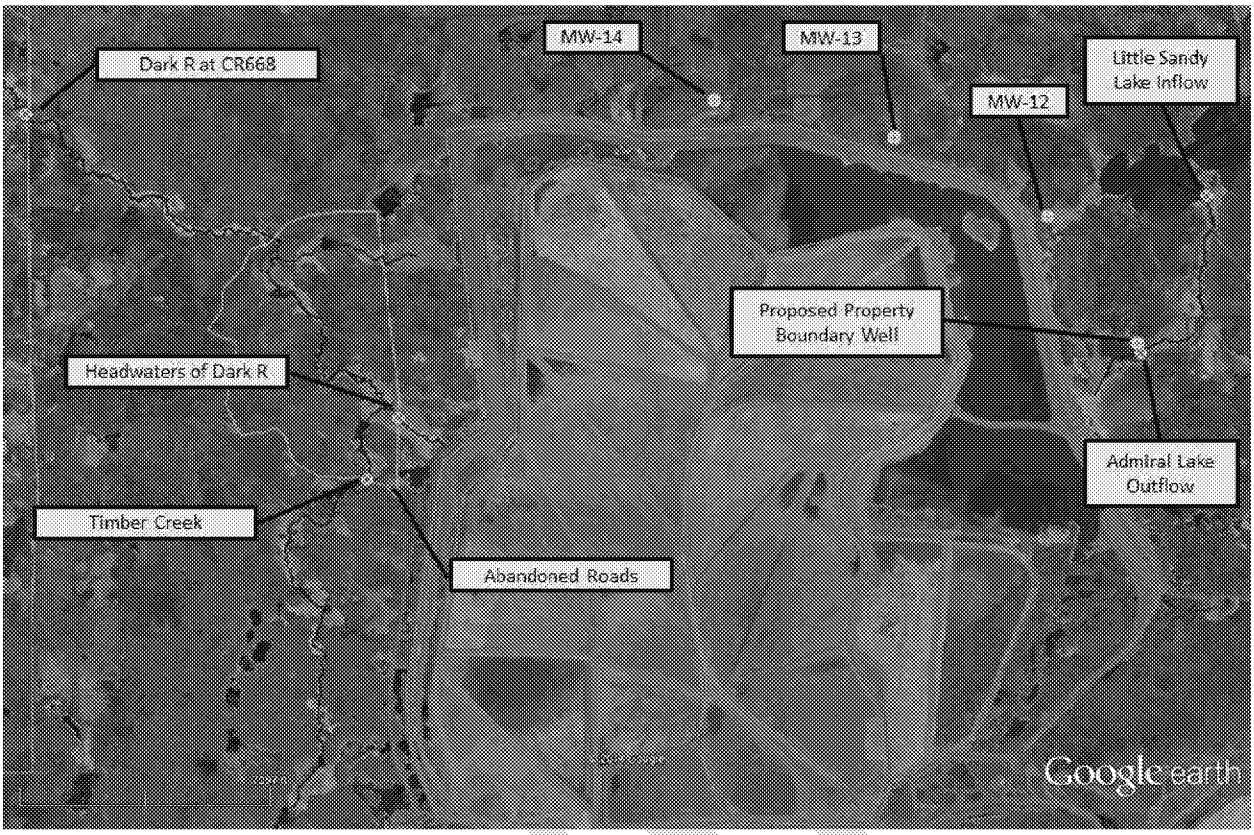

Figure 02 – Monitoring locations new to this permit

Timber Creek (Class 2B, 3C, 4A, 4B, 5 and 6) originates on the north flank of the Laurentian Divide and flows to the north, generally parallel to the west side of the basin and at an average distance of about ½ mile from it. With a total length of about 4.4 miles, Timber Creek flows into the Dark River approximately 2000 feet downstream from its headwaters at the toe of the basin. There is no known flow or analytical information for Timber Creek. Based on air photo analysis, it appears to be roughly 10 feet wide in those portions of the stream that are channelized, however in many areas the stream passes through shallow, flooded wetlands and would likely be difficult to follow on the ground. Compliance monitoring is proposed for Timber Creek because seeps on the southwest corner of the basin appear in air photos to be tributary to it, and it is likely to be receiving emergent groundwater that originated at the tailings basin as a portion of its baseflow. A surface water sampling station for compliance monitoring is proposed at where the creek crosses an abandoned roadway, roughly one-half mile prior to Timber Creek's confluence with the Dark River (Figure 02). This location was chosen because it would allow for assessment of impacts from possible groundwater and surface water contamination that could occur along almost the full length of the stream and because the abandoned roadway may provide a means of access from a basin perimeter road roughly one-third of a mile away.

The Dark River (Class 2B, 3C, 4A, 4B, 5 and 6) originates just outside of the tailings basin near current monitoring station SD-001 and flows approximately 7.5 miles before entering Dark Lake (Class 2B, 3C, 4A, 4B, 5 and 6). It continues flowing north out of Dark Lake for 1.59 miles where its designation changes to a trout stream (Class 1B, 2A, 3B, 4A, 4B, 5 and 6) for the next 7.91 miles. After the trout stream reach, the river continues for 1.36 additional miles before

entering the Sturgeon River, which flows north for 28.27 miles before entering the Little Fork River. Sampling has been conducted for a limited set of parameters at two downstream locations on the Dark River under the SOC. Sample location D-1 is where the Dark River crosses County Road 668 (~4 river miles from the basin) and location D-1a is where the river crosses County Road 65, which is within the trout stream reach (Class 2A, 3B, 4A, 4B, 5 and 6), roughly 1 ¼ miles downstream from where the designation starts. These locations are shown on figure 02. Elevated concentrations of sulfate, total dissolved solids, bicarbonate, hardness, and specific conductance have been observed at locations D-1 and D-1A; some concentrations exceed applicable surface water standards.

Impacts to the Dark River from the tailings basin are presumed to be from surface flow originating at seeps, including SD-001, and shallow and deep seepage groundwater flow that enters the Dark River as baseflow both near the basin and at unknown distances downgradient from the basin. Under the 2011 SOC, a SCRS is to be constructed along the western basin margin which will presumably capture the current surface flow from SD-001 as well as shallow groundwater flow. This will likely result in a change in the observable location of the headwaters of the Dark River, as well as a significant decrease in concentrations of parameters in this area, particularly during times when baseflow is not the dominant component of headwaters stream flow (i.e. snow melt). Due to this, the possibility exists that under some hydrologic conditions, downstream tailings-impacted baseflow contributions could cause an increase in the concentrations of some parameters from what is observed at the headwaters. To assess this, and to ensure that compliance is maintained along the length of the stream, monitoring for compliance is proposed in the Dark River at a headwaters location and a downstream location where it is likely that most or all of the tailings-impacted baseflow has emerged (figure 02). The proposed headwaters location is just prior to where Timber Creek joins the River. Although this is about 1700 feet further from the basin than SD-001, this location is chosen because due to its distance from the basin, it will likely have measureable flow even after the SCRS is operational. It should be noted that the exact location of both the Timber Creek and Dark River headwaters sampling stations will be determined by field conditions.

Insufficient information exists regarding the groundwater flow patterns and groundwater-surface water interactions along the Dark River to know at what point the river has ceased receiving tailings-impacted baseflow. Determining this would likely require a significant study in terms of time and expenditure. The existing SOC sampling point D-1 at the County Road 668 crossing is 4.4 river miles downstream from the basin and 2.3 miles from the northwest corner of it. It is very likely that this location is far enough from the basin that there is not any significant loading to the river downstream of this point, and it is the first downstream point on the river that has existing maintained access. For these reasons, this location (CR 668 crossing) is proposed as the downstream sampling point on the Dark River. Compliance monitoring requirements would also be developed at this location in order to ensure and evaluate compliance with water quality standards for those parameters that are unique to the downstream portion of the Dark River that is a designated trout stream. Concentrations of key parameters at the CH65 location within the trout stream reach are fairly consistently about one-half of those observed at the CR668 sampling point during same-day sampling events; thus, establishing permit compliance limits at the CR668 sampling point to protect the downstream trout stream use of the Dark River is reasonable and defensible.



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The Sand River (Class 2B, 3C, 4A, 4B, 5 and 6) originates just outside of the tailings basin near former monitoring station SD-002 and flows approximately 1/4 mile before entering Admiral Lake. It exits the east side of the lake and flows roughly 1 ¼ miles to Little Sandy Lake, which flows directly into Sandy Lake through an approximately 60 foot wide opening in a peninsula which otherwise separates the two lakes, which are also known as the Twin Lakes (Class 2B, 3C, 4A, 4B, 5 and 6). The river exits the east end of Sandy Lake and flows east 11.84 miles where it joins the Pike River. Under the existing permit, monitoring was done for sulfate and flow at SW-001 which is where the Sand River crosses highway 53, approximately 2 ½ miles downstream from Sandy Lake (Figure 02). Additionally, under an agreement between the Bois Forte Band of Chippewa and U.S. Steel, monitoring has been conducted since 2010 by the 1854 Treaty Authority at four locations; the inlet to Little Sandy Lake, the middle of Little Sandy Lake, the middle of Sandy Lake, and the outlet of Sandy Lake, identified as Twin 1, 2, 3, and 4, respectively. Monitoring at these locations as well as SW-001 has shown elevated concentrations of sulfate, total dissolved solids, bicarbonate, and specific conductance with some concentrations exceeding applicable water quality standards. Not all parameters for which there are applicable water quality standards have been monitored for however.

Like the monitoring proposed for the Dark River and for similar hydrologic reasons, compliance monitoring is proposed along the Sand River and its associated lakes at a near headwaters location and a downstream location. With operation of the SCRS on the east side of the tailings basin, there is no longer any observable flow at SD-002. The segment of the Sand River from between the basin and Admiral Lake is poorly channelized and hard to discern. For this reason the "headwaters" sampling station is proposed to be where the Sand River exits Admiral Lake on its east side. There is no known monitoring data for Admiral Lake, and a compliance point here would be representative of the water quality in the lake resulting from both stream inflow and groundwater contributions and possibly allow for flow monitoring if a definable channel is present or can be established. Flow monitoring is desirable because coupled with chemical analysis, it will allow for mass transport calculations to be performed, which can be used to determine where contaminant mass may be entering the river system.

Sampling conducted by the 1854 Treaty Authority from 2010 through 2012 has shown that concentrations of water quality parameters impacted by the tailings basin are greatest at the upstream Twin 1 location and decrease at each successive downstream sampling location. For this reason, the "downstream" sampling location on the Sand River is proposed to be at the inflow of the river to Little Sandy Lake, at the general location of the current Twin 1 sampling point. Also, since MPCA staff have made a preliminary draft staff recommendation that Little Sandy Lake and Sandy Lake can be considered waters used for the production of wild rice, the river's inflow to these two lakes is the logical point to monitor for compliance with the sulfate standard for wild rice production waters.

Sampling at SW001 shall continue under the reissued permit so that the gross pollutant loading to the Sand River can be monitored and compared to a significant period of record to assess the ongoing impact of the tailings basin, the effectiveness of mitigation efforts, and to determine if limits are needed to protect surface water along this portion of the Sand River.



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Groundwater Monitoring Locations
Under this permit, the Permittee will be required to monitor groundwater quality downgradient of the tailings basin at existing and proposed monitoring wells. Where the tailings basin is causing or contributing to exceedance of groundwater quality standards at the property boundary, final compliance limits are established in this permit.

Monitoring is currently conducted at ten monitoring wells, installed to depths of 14.5 to 34.8 feet below the ground surface around the basin. Wells GW003, GW004, GW006, GW007, and GW008 are located roughly adjacent to the outer basin dike and all show impact from the basin. Well GW009 is about 2 ¼ miles west of the basin and does not appear to be impacted by pollutants from the basin. GW010 is located roughly 1200 feet east of the southeast corner of the basin and appears to be cross-gradient, but monitoring results are variable and may reflect impact from the basin. Monitoring at these wells will continue under the reissued permit to assess ongoing impacts to groundwater, however since they are all distant from the property boundary, limits will not be established. Wells GW012, GW013, and GW014 are located along the property boundary, therefore compliance limits are established at these wells. Under the reissued permit an additional groundwater monitoring location (GW011) shall be installed near the property boundary in the vicinity of Admiral Lake. A well nest, consisting of shallow (water table), intermediate and deep wells, is to be installed to monitor groundwater flow in the bedrock trench which roughly underlies the Sand River. Following installation, three rounds of sampling will be performed, and the well with the highest concentration of sulfate will receive the GW011 designation and be used as the compliance monitoring location.

**Components and Treatment Technology**
Current Information
The facility uses a wastewater treatment system for the blowdown from the Agglomerator Line wet scrubber. The wastewater treatment system includes: a scrubber water recirculation tank, a equalization/precipitation tank, lime slurry make-up and feed system, 1st stage thickener, polymer make-up and feed system, scrubber solids settling/storage pond, and all related piping and equipment.

Scrubber blowdown water from the recirculation tank is sent to the equalization/precipitation tank at an average rate of 50 gallons per minute (gpm). Lime is added at the equalization/precipitation tank to increase calcium concentrations and promote calcium sulfate (gypsum) precipitation. Settling of the precipitated solids occurs in the 1st Stage Thickener. Polymer may be added to the 1st Stage Thickener to enhance solids settling. The solids are sent to a 25 acre-foot, composite lined settling/storage pond located on-site for the dewatering, and possible ultimate disposal, of the solids generated from the treatment system. The overflow from the 1st Stage Thickener is sent to either the Concentrate Thickener or Slurry Mix Tank. Available alkalinity in the concentrate slurry converts from bicarbonate to carbonate and allows calcium carbonate precipitation. The calcium carbonate precipitate is then removed in the disc filters along with the concentrate and made into pellets. The filtrate from the disc filters is then used as process water and eventually sent to the tailings basin. The treatment system is specifically designed to achieve a "no net increase" in mass loading of sulfate and calcium to the tailings basin. Fluoride removal also occurs due to the reactive nature of fluoride with excess calcium.



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Waste stream monitoring stations WS002, WS003, and WS004 are included for the scrubber wastewater treatment system. WS002 is located at the plant water make-up to the scrubber system, WS003 is located at the overflow from the 1st Stage Thickener, and WS004 is located on the concentrate slurry to the Concentrate Thickener or Slurry Mix Tank.

A minor modification of the permit was done in 2007 to include the addition of waste stream monitoring station WS005, and the revision of the requirement for "no net increase" in calcium mass loading to the tailings basin to more appropriately require a "no net increase" in hardness (calcium + magnesium) mass loading to the tailings basin. WS005 is located at the influent to the Step I Reclaim Thickener. Monitoring at WS005 is required since the Step I Reclaim Thickener can receive overflow from the 1st Stage Thickener in order to comply with the "no net increase" in hardness requirement as described in this permit.

Changes to Facility or Operation

Make note of any changes in operation or components. Check with Permittee.

Make-up Water

The operation currently imports approximately 4.64 million gallons per day (MGD) of water from the Mt. Iron Pit at the mining area to make up for losses that occur during taconite processing and recirculation of the water through the tailings basin ponds. Part 7.ppp of the June 9, 2011 Schedule of Compliance, identified the use of alternate make up water with a lower sulfate concentration than Mt. Iron pit water as a means to mitigate the increased loading of sulfate to the basin water, and required a study to evaluate alternative water sources. Sump 6 at the mining area was identified as a suitable source and a proposal to utilize this water has been approved by MPCA. It is scheduled to become operational by January 31, 2015.

To enable possible further reductions in loading of sulfate and hardness to the basin, this permit authorizes USS to manage its intake water supply source(s), without modification to this permit, when the following conditions are met:

1. The proposed water source is of an equivalent or better water quality, with respect to concentrations of total sulfate, hardness (ca + mg), total dissolved solids and bicarbonate, than the water source (sole or composite) being utilized at the time of the requested change, and of any Mt. Iron Pit or Sump 6 water source that may be available but is not being utilized at that time;
2. The appropriation has received an applicable permit from DNR, if required;
3. The appropriation has received other applicable permits (401/404 permits) if required;
4. Utilization of the water source complies with all applicable dam safety regulations;
5. The appropriation has completed the environmental review process if required;
6. The water has been analyzed in accordance with the guidelines described in Total Facility - General Requirements - Sampling subsection of the permit for the following parameters: alkalinity (bicarbonate as CaCO3), aluminum (total), ammonia, antimony (total), arsenic (total), barium (total), bicarbonates (HCO3), boron (total), cadmium, chloride, cobalt, (total), copper, Fluoride, Hardness (Ca+Mg as CaCO3), Iron (total), Lead, Manganese (total), Mercury, Molybdenum, pH, Phosphorous, Salinity, Selenium,



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Silver, Sodium, Specific Conductance, Strontium MCLG, Sulfate, Total Dissolved Solids, Temperature, Thallium, Turbidity, TSS, and Zinc; and,

7. If concentrations of any parameters identified in subheading 6 in the proposed source water exceed that of the existing make up water (excluding sulfate, hardness, total dissolved solids, or bicarbonate, which may not exceed existing concentrations), US Steel must submit documentation that utilization of the water source is not likely to cause or contribute to exceedances of applicable water quality standards in waters of the State downgradient and downstream of the Facility.

Recent Compliance History

The most recent compliance inspection occurred on November 15, 2011. Identified concerns and corrective actions are summarized below.

*Inspection Summary*

A Compliance Evaluation Inspection was conducted on November 15, 2011, by John Thomas and Andrew Streitz of the MPCA to determine the facility's compliance with the terms and conditions of its NPDES/SDS Permit. Mr. Tom Moe (USS Minntac) accompanied the MPCA inspectors during the inspection. The following is a summary of the findings and comments resulting from that inspection.

Areas of Concern or General Comments:

1. During the review period of July, 2010 through September, 2011, DMRs were submitted complete and on-time. The Permittee began submitting DMRs electronically in August, 2010. During the review period there were no effluent limit violations at SD001 or SD002.

2. There has been no discharge at SD002 after June, 2010, when the seep collection and return system became fully operational.

3. The Seepage Collection and Return system was fully operational by July, 2011. Flow meters are installed at each of the pumping stations. There are two pump stations - one is located at catchbasin #5, which receives gravity flow from catchbasins #1 - #4 and #6 - #9. The second pumpstation is located at catchbasin 10, which is located near proposed monitoring well #11 (west of Admiral Lake). Catchbasin #10 receives gravity flow from shallow de-watering wells #11 - #13. De-watering well #13 is located at the northeast corner of the tailings basin, near peizometer #5.

4. Flow through the weir at SD001 was unrestricted – there was sufficient drop on the outfall side of the weir to allow accurate flow measurement at SD001.

Alleged Violations/Corrective Actions:

1. Violation: NPDES/SDS Permit No. MN0057207 Chapter 4 Part 3.1 states, in-part that on an annual basis, the mass of sulfate leaving the scrubber system shall be less than or equal to the mass of sulfate entering the scrubber system.



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For calendar year 2010, there was a net increase of 57,558 pounds of sulfate mass to the tailings basin due to operation of the Line 3 scrubber system.

Corrective Action: The June 9, 2011 Schedule of Compliance between the U.S. Steel and MPCA contains requirements to address this ongoing violation. No further response is required to address this violation at this time.

2. Violation: NPDES/SDS Permit No. MN0057207 Chapter 4 Part 3.2 states, in-part that on an annual basis, the number of moles of excess hydroxide ion (Step 4) must be equal to or greater than the number of moles of excess calcium and magnesium (Step 3) in the thickener overflow stream.

For calendar year 2010, there was a net increase of 741,468 pounds of hardness mass to the tailings basin due to operation of the scrubber system.

Corrective Action: The June 9, 2011 Schedule of Compliance between U.S. Steel and MPCA contains requirements to address this ongoing violation. No further response is required to address this violation at this time.

3. Violation: NPDES/SDS Permit No. MN0057207 Chapter 7 Part 10.1 indicates:

The Permittee shall properly operate and maintain the systems used to achieve permit compliance. Proper operation and maintenance includes effective performance, adequate funding, adequate staffing and training, and adequate process and laboratory controls, including appropriate quality assurance procedures.

NPDES/SDS Permit No. MN0057207 Chapter 7 Part 10.2 states:

The Permittee is responsible for insuring system reliability and shall install adequate backup or support systems to achieve permit compliance and prevent the discharge of untreated or inadequately treated waste. These systems may include alternative power sources, auxiliary treatment works and sufficient storage volume for untreated wastes.

Information submitted with the August, 2011 DMRs for NPDES/SD Permit No. MN0057207 indicates that pipelines used to pump line 3 thickener overflow to the Step I Reclaim Thickener or the Concentrate Thickener became plugged either due to scaling or plugging with excess solids. In addition, the Step I reclaim thickener was taken out of service between August 3 and October 13 due to operational error that caused damage of thickener components. The result was that during the period of August 13 – August 20 the wastestream from the line 3 scrubber bypassed the hardness reduction component of the line 3 scrubber wastewater treatment system.

Corrective Action: within 30-days of receipt of this report submit a written response indicating measures that will be taken to ensure that:



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1. the extent of hardness scaling of pipelines will be regularly assessed such that line cleaning and/or replacement will occur prior to pipeline plugging.
2. overflow from the classifiers which handle spillage from the grate will be monitored to prevent excess coarse material from plugging the pipelines from the 287 sump.
3. the Step I Reclaim Thickener will not be overloaded with solids.

Recent Monitoring History
A table with the last 12 months of monitoring results is included at the end of this document.

## Receiving Water(s)

**Use Classification**
For the SD001 outfall the receiving water is the Dark River (Class 2B, 3C, 4A, 4B, 5 and 6, with additional 1B, 2A and 3B classification for the designated trout stream portion). These use classifications include aquatic life and recreation, industrial consumption, agriculture and wildlife, and aesthetic enjoyment and navigation, and other beneficial uses not specifically listed. Aquatic life and recreation classification includes waters that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes and for which water quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare.

**Use Classification Descriptions**

Class 2 waters, aquatic life, and recreation.
Aquatic life and recreation includes all waters of the state that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes, and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats, or the public health, safety, or welfare.

Class 3 waters, industrial consumption.
Industrial consumption includes all waters of the state that are or may be used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes, and for which quality control is or may be necessary to protect the public health, safety, or welfare.

Class 4 waters, agriculture, and wildlife.
Agriculture and wildlife includes all waters of the state that are or may be used for any agricultural purposes, including stock watering and irrigation, or by waterfowl or other wildlife, and for which quality control is or may be necessary to protect terrestrial life and its habitat, or the public health, safety, or welfare.

Class 5 waters, aesthetic enjoyment, and navigation.
Aesthetic enjoyment and navigation includes all waters of the state that are or may be used for any form of water transportation or navigation or fire prevention, and for which quality control is or may be necessary to protect the public health, safety, or welfare.
Impairments



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Class 6 waters, other uses, and protection of border waters.
Other uses include all waters of the state that serve or may serve the uses in subparts 2 to 6, or any other beneficial uses not listed in this part, including, without limitation, any such uses in this or any other state, province, or nation of any waters flowing through or originating in this state, and for which quality control is or may be necessary for the declared purposes in this part, to conform with the requirements of the legally constituted state or national agencies having jurisdiction over such waters, or for any other considerations the MPCA may deem proper.

**Impairments**
The receiving water impairments downstream of the Minntac tailings basin are shown in the table below.

West Side Discharge (SD001):

| Downstream Impairments | Number of Impaired Reaches | TMDL Status |
|---|---|---|
| **Sturgeon River** | **2** | |
| Mercury in Fish Tissue | 2 | *See WLA section below.* |
| **Little Fork River** | **11** | |
| Mercury in Fish Tissue | 7 | *See WLA section below.* |
| Turbidity | 4 | These impairments are part of the Littlefork Major Watershed project. Currently stressor ID is underway and a draft TMDL has not been completed. |
| **Rainy River** | **7** | |
| Mercury in Fish Tissue | 7 | *See WLA section below.* |
| **Lake of the Woods: Main Lake** | **3** | |
| Mercury in Fish Tissue | 1 | *See WLA section below.* |
| Nutrient/Eutrophication Biological Indicators | 2 | A draft TMDL is expected to be completed sometime in 2016-2017. There is no WLA assigned to this discharge at this time. (*10/28/13 phone conversation with Cary Hernandez)* |

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## Existing Permit Effluent Limits

The existing NPDES/SDS Permit MN0057207 included technology based effluent limits for seepage discharges(CWA) and monitoring without limits for surface water, groundwater and internal waste streams. A summary of monitored parameters is shown in the table below.

| Parameter | Limit | Units | Limit Type | Effective Period | Frequency |
|---|---|---|---|---|---|
| **GW003, 004, 006-010** | | | | | |
| Amines | | mg/L | Single Value | Apr, Jul, Oct | 1 x month |
| Elevation of GW Relative to Mean Sea Level | | ft.a.m.s.l. | Single Value | Apr, Jul, Oct | 1 x month |
| Temperature | | Deg C | Single Value | Apr, Jul, Oct | 1 x month |
| pH | | SU | Single Value | Apr, Jul, Oct | 1 x month |
| Specific Conductance | | umh/cm | Single Value | Apr, Jul, Oct | 1 x month |
| Total Sulfate | | mg/L | Single Value | Apr, Jul, Oct | 1 x month |
| **SD001 & SD002** | | | | | |
| Amines | | mg/L | CalMoAvg / Daily Max | Jan-Dec | 1 x month |
| pH | 6.0-9.0 | SU | InstantMin / InstantMax | Jan-Dec | 1 x month |
| Specific Conductance | | umh/cm | CalMoMax | Jan-Dec | 1 x month |
| Total Sulfate | | mg/L | CalMoMax | Jan-Dec | 1 x month |
| Flow | | mgd | CalMoTot / CalMoAvg / Daily Max | Jan-Dec | 2 x month |
| Oil & Grease | 10 / 15 | mg/L | CalMoAvg / Daily Max | Jan-Dec | 2 x month |
| Total Susp. Solids | 30 / 60 | mg/L | CalMoAvg / Daily Max | Jan-Dec | 2 x month |
| **SW001** | | | | | |
| Total Sulfate | | mg/L | Single Value | Jan-Dec | 1 x month |
| Flow | | mgd | Single Value | Jan-Dec | 1 x month |
| **SW002** | | | | | |
| Amines | | mg/L | Single Value | Jan-Dec | 2 x year |
| Toxicity, Whole Effluent (Acute) | | TUa | Single Value | Jan-Dec | 2 x year |
| **WS002** | | | | | |
| Calcium, Dissolved (as Ca) | | mg/L | CalMoAvg | Jan-Dec | 1 x week |
| Chloride, Total | | mg/L | CalMoAvg | Jan-Dec | 1 x week |
| Hardness, Ca & Mg, Calculated (as CaCO3) | | mg/L | CalMoAvg | Jan-Dec | 1 x week |
| Sulfate, Dissolved (as SO4) | | ug/L | CalMoAvg | Jan-Dec | 1 x week |
| Flow | | mgd | CalMoAvg | Jan-Dec | 1 x week |
| **WS003** | | | | | |
| Calcium, Dissolved (as Ca) | | mg/L | CalMoAvg | Jan-Dec | 1 x week |
| Chloride, Total | | mg/L | CalMoAvg | Jan-Dec | 1 x week |
| Fluoride, Total (as F) | | mg/L | CalMoAvg | Jan-Dec | 1 x month |
| Hardness, Ca & Mg, Calculated (as CaCO3) | | mg/L | CalMoAvg | Jan-Dec | 1 x week |
| pH | | SU | CalMoMin | Jan-Dec | 1 x week |
| Flow | | mgd | CalMoAvg | Jan-Dec | 1 x week |
| **WS004** | | | | | |
| pH | | SU | CalMoMax | Jan-Dec | 1 x week |
| **WS005** | | | | | |
| pH | | SU | CalMoMax | Jan-Dec | 1 x week |
| **WS006 & WS007** | | | | | |
| Amines | | mg/L | Single Value | Jan-Dec | 1 x year |
| Toxicity, Whole Effluent (Acute) | | TUa | Single Value | Jan-Dec | 1 x year |
| Evaporation, accumulated | | in | CalMoTot | Jan-Dec | 1 x month |
| Precipitation | | in | CalMoTot | Jan-Dec | 1 x month |



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**Technology Based Effluent Limits (TBELs)**
40 CFR Subpart A—Iron Ore Subcategory § 440.10 establishes TBELs for pH (6.0-9.0 SU), TSS (30 mg/L daily max. / 20 mg/L mo. Avg.), and dissolved iron (2.0 mg/L daily max. / 1.0 mg/L mo. Avg.). These values were instituted as compliance limits at SD001 and SD002.

**Water Quality Based Effluent Limits (WQBELs)**
There are no WQBEL's in the existing permit.

## Proposed Permit Limits and Monitoring

**Technology Based Effluent Limits**
40 CFR Subpart A—Iron Ore Subcategory § 440.10 establishes TBELs for pH (6.0-9.0 SU), TSS (30 mg/L daily max. / 20 mg/L mo. Avg.), and dissolved iron (2.0 mg/L daily max. / 1.0 mg/L mo. Avg.). These values will continue as compliance limits at SD001 under the reissued permit.

**Water Quality Based Limits**

*Reasonable Potential for Chemical Specific Pollutants (40 CFR § 122.44 (d)(1)*
Federal regulations require MPCA to evaluate the discharge to determine whether the discharge has the reasonable potential to cause or contribute to a violation of water quality standards. The MPCA must use acceptable technical procedures, accounting for variability (coefficient of variation [CV]), when determining whether the effluent causes, has the reasonable potential to cause, or contribute to an excursion of an applicable water quality standard. Projected Effluent Quality (PEQ) derived from effluent monitoring data is compared to Preliminary Effluent Limits (PELs) determined from mass balance inputs. Both determinations account for effluent variability. Where PEQ exceeds the PEL, there is reasonable potential to cause or contribute to a water quality standards excursion. When Reasonable Potential is indicated the permit must contain a WQBEL for that pollutant.

SD001 is the effluent monitoring station in this permit. There was sufficient DMR data to conduct reasonable potential analysis for sulfate and specific conductance at this station. Both parameters were found to have reasonable potential to cause or contribute to a water quality standards excursion. Since there is a compliance schedule to mitigate the discharge from SD001, interim limits were established using the procedure described in the section "Compliance Limits in Surface Waters". The following table shows the values used in the reasonable potential calculations.



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| Parameter | | Sulfate (mg/L) | Specific Conductance (mg/L) |
|---|---|---|---|
| | | | |
| Plant Flow | (mliters/d) | 0.53 | 0.53 |
| (ADW) | (mgd) | 0.14 | 0.14 |
| | | | |
| River $7Q_{10}$ | (mliters/d) | 0.00 | 0.00 |
| (Class 2B) | (mgd) | 0 | 0 |
| River 7Q10 | (cfs) | | |
| | | | |
| Background Conc. | | 0.8 | 0.8 |
| | | | |
| Continuous Std (cs) | | 1000 | 1000 |
| | | | |
| Maximum Std (ms) | | | |
| | | | |
| Final Acute Value | | | |
| | | | |
| | | | |
| Waste Ld Allocation: | | | |
| | WLAcs | 1000 | 1000 |
| | WLAms | | |
| | | | |
| Coeff of Variation (CV) | | 0.10855119 | 0.097333503 |
| Variance | | 0.01171448 | 0.009429216 |
| Std. Dev. | | 0.10823344 | 0.097104149 |
| Duration (n days) | | 30 | 30 |
| | | | |
| Long Term Ave.-LTA | | | |
| | $u_4/u_{30}$ | 6.86166164 | 6.866424161 |
| | u | 6.85600075 | 6.861867425 |
| | LTAcs | 955.14 | 959.66 |
| | $u_1$ | | |
| | LTAms | | |
| Use LTAcs < LTAms: | | | |
| | | | |
| WQBEL: Daily Max. | | 1221.4 | 1197.2 |
| | $s^2_n$ | 0.00587439 | 0.004725722 |
| | $s_n$ | 0.07664459 | 0.068743884 |
| | $u_n$ | 6.85892079 | 6.864219172 |
| Mo.Av. (2x) | | 1080.31 | 1072 |
| | | | |
| Max Meas Effl Value | | **1320.00** | **3180** |
| # data points | | 166 | 166 |
| PEQ factor | | 1 | 1 |
| Proj Effl Qual.(PEQ) | | **1320** | **3180** |
| | | | |
| PEQ > Daily Max | | TRUE | TRUE |
| PEQ> Monthly Ave | | TRUE | TRUE |
| PEQ > FAV | | NA | NA |
| Reasonable Potential | | Yes | Yes |



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**Salty Discharge Monitoring**
As a result of increased concern regarding salty discharges, MPCA staff determined that there is a need to obtain more information from dischargers. Industrial and municipal facilities with continuous, periodic/seasonal, or intermittent waste flows where the receiving water stream flow to effluent design flow dilution ratio under low flow conditions is less than 5:1 (annual climatic 7Q10:Average Dry Weather Design Flow [domestic] or Maximum Daily Design Flow [industrial]) will be required to monitor effluent for parameters listed in Table 2. Additionally, facilities with salty waste streams from concentrating treatment technologies (e.g., reverse osmosis, ion exchange, membrane filtration, etc.) and food processing industries using density-based (saline) sorting processes will be required to monitor for the parameters in Table 2, regardless of the receiving water to effluent flow dilution ratio. This includes POTWs that accept salty waste streams from water treatment plants or certain sectors of industrial facilities.

Permittees may request a reduction in monitoring if after two years of data (or 10 data points for controlled discharges at ponds), if the monitoring does not indicate a reasonable potential to exceed a water quality standard. The permit shall contain language to this effect in the surface discharge chapter.

Industrial Facilities: Monitoring frequencies will be determined on an individual basis and generally consistent with domestic wastewater facilities. The determination will be made based on the industrial facility process(es) and whether the parameters of concern are known to be present or suspected to be present. The typical monitoring frequency for the salty discharge parameters for industrial facilities, such as ethanol facilities, is once per month. If an industrial discharger proposes to direct salty waste streams to a domestic (or other permitted) facility, the receiving facility permit should be modified if necessary to add appropriate pollutant monitoring and/or limits.

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Table 2. Monitoring Parameters
(More items may have to be monitored if the receiving water is classified for use as a source of drinking water.)

| **Analyte** | **Units (Jan – Dec MoMax)** | **WQ Standard/Justification** |
|---|---|---|
| Chloride | mg/L | Class 2 and 3 |
| Ca and Mg Hardness as CaCO3 | mg/L | Class 3 |
| Specific Conductance | umhos/cm | Class 4A |
| Total Dissolved Salts (a.k.a:solids) | mg/L | Class 4A |
| Sulfates as SO4 | mg/L | Class 4A,4B |
| Bicarbonates (HCO3) | mg/L | Class 4A |
| Sodium | mg/L | Class 4A |
| *Calcium | mg/L | Class 4A |
| *Magnesium | mg/L | Class 4A |
| *Potassium | mg/L | Class 4A |
| Whole Effluent Toxicity (WET)** | | Use U.S. EPA Method 821-R-02-013 for chronic WET testing for fathead minnows and Ceriodaphnia dubia, if the receiving water is a Class 2(fisheries waters) or 821-R-02-012 for acute WET testing fathead minnows Ceriodaphnia dubia and Daphnia magna, if the discharge does not impact a Class 2 water |

* Analytes necessary to calculate Sodium as %total cations. The sodium water quality standard is 60% of total cations
**WET testing will be applied to permittees on a case-by-case basis.

*Iron and Manganese Monitoring*
Monitoring for iron and manganese in groundwater will be conducted under this permit without limits. The geochemical behavior of these elements is such that the concentration of dissolved iron and manganese ions is controlled more by the local redox state of the groundwater than by proximity to an elevated source. (Hem, Study and Interpretation of the Chemical Characteristics of Natural Water. 3rd ed., U.S. Geological Survey Water Supply Paper 2254)) At this facility, as well as other facilities, there is little correlation between the concentrations discharged to groundwater and those measured in the downgradient monitoring wells. Observed manganese concentrations in the tailings basin water have been roughly 280 ug/L, while monitoring well results have ranged from 102 ug/L to 4558 ug/L. Concentrations in groundwater at GW009, which is an unimpacted background well, have been 139 to 167 ug/L, which is higher than several wells that are impacted by the basin. Iron and manganese are unique in that their concentrations do not correlate with any other parameter related to tailings basin discharge. Also, most dissolved species of the ions will readily precipitate when exposed to dissolved oxygen concentrations typical of surface water or groundwater in contact with the atmosphere. Consequently, the ability of elevated concentrations to persist downgradient is generally limited.



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Monitoring data collected under this permit and for studies undertaken by DNR will be evaluated at the next reissuance to determine if limits are appropriate.

**Compliance Limits in Surface Waters**

As part of state conditions controlling discharges(S) to groundwater, this permit will establish surface water monitoring stations in waters that are potentially impacted by groundwater from this facility. The permit will establish limits for these surface waters based on applicable water quality ambient standards. The permit will require monthly monitoring.

*Interim Limits*

When a compliance schedule is being used to mitigate exceedances of state water quality standards it is appropriate to establish interim limits based on the more stringent of the current operating conditions at the Facility or existing permit limits. At this facility, there are no existing limits in surface water, so the interim limits will be based on existing conditions. Using recent monitoring data, the limit will be set at the $95^{th}$ percentile of the lognormal distribution that is defined by the monitoring data collected at each sampling station. The formula to determine the $95^{th}$ percentile of a lognormal distribution is as follows:

Exp ($\mu + 1.65\ \Sigma$), where $\mu$ is the mean of the log of the original data and $\Sigma$ is the standard deviation of the log values.

The value calculated from this formula shall be the monthly average limit for that sampling station. A minimum of 10 data points will be needed for this calculation and the data must meet the following requirements to be used in the calculation:

- Each data point must have been collected in a discreet calendar month and the data set must have been collected over an interval of at least one year;
- data must have been collected within three years of the date at which the interim limit calculation is performed;
- for stations where there is greater than one year of record, all the data available within the preceding three years will be used in the calculation; and,
- the data set used must have at least 5 percent of the data collected in each of the calendar quarters (i.e. if there are 20 samples, at least one sample must have been collected in each of the four quarters);

For stations newly established under this permit, and for existing stations that do not have a valid data set as defined above, the interim limit for a surface water station will be calculated after data have been collected monthly for a minimum of one year, and at least 10 monthly measurements have been reported. In the calendar month following fulfillment of these requirements, an interim limit will be calculated using the formula described above. Also calculated at this time will be the $99^{th}$ percentile of the lognormal distribution [Exp ($\mu + 2.326\ \Sigma$)]. If this value exceeds the applicable state water quality standard, the interim limit will become enforceable under this permit. If it does not exceed the state water quality standard, monitoring for that parameter will continue under this permit, without limits. The use of the $99^{th}$ percentile to determine if the water may have a reasonable potential to exceed the state water quality standards based on ambient monitoring is consistent with the statistical technique used to



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conduct reasonable potential for the critical effluent concentration for a point source discharge, and is therefore a reasonable methodology.

The following table shows the data and calculations used to derive interim limits at Dark River monitoring locations.

**Calculation of Interim Limits at 95th Percentile**

**Dark River at CR 668**

| | Hardness | | TDS | | Spec. Cond. | | Sulfate | | Alkalinity | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (mg/L) | (LN) | (mg/L) | (LN) | (mg/L) | (LN) | (mg/L) | (LN) | (mg/L) | (LN) |
| Minimum | 389 | 5.963579 | 526 | 6.265301 | | | 187 | 5.231109 | 187 | 5.231109 |
| | 430 | 6.063785 | 548 | 6.306275 | 744 | 6.612041 | 238 | 5.472271 | 188 | 5.236442 |
| | 555 | 6.318968 | 744 | 6.612041 | 826 | 6.716595 | 298 | 5.697093 | 209 | 5.342334 |
| | 590 | 6.380123 | 749 | 6.618739 | 988 | 6.895683 | 335 | 5.814131 | 244 | 5.497168 |
| | 811 | 6.698268 | 1050 | 6.956545 | 1091 | 6.99485 | 459 | 6.12905 | 375 | 5.926926 |
| | 1100 | 7.003065 | 1600 | 7.377759 | 1416 | 7.255591 | 689 | 6.535241 | 417 | 6.033086 |
| | 1200 | 7.090077 | 1610 | 7.383989 | 2026 | 7.613819 | 741 | 6.608001 | 432 | 6.068426 |
| | 1220 | 7.106606 | 1620 | 7.390181 | 2103 | 7.65112 | 750 | 6.620073 | 463 | 6.137727 |
| | 1220 | 7.106606 | 1650 | 7.408531 | 2137 | 7.667158 | 763 | 6.637258 | 476 | 6.165418 |
| | 1320 | 7.185387 | 1658 | 7.413367 | 2164 | 7.679714 | 767 | 6.642487 | 479 | 6.171701 |
| | 1420 | 7.258412 | 1880 | 7.539027 | 2367 | 7.769379 | 814 | 6.70196 | 505 | 6.224558 |
| | 1430 | 7.26543 | 1920 | 7.56008 | 2422 | 7.792349 | 909 | 6.812345 | 547 | 6.304449 |
| Maximum | 1550 | 7.34601 | 1950 | 7.575585 | 2424 | 7.793174 | 920 | 6.824374 | 682 | 6.52503 |
| Mean | 1018.1 | 6.829717 | 1346.5 | 7.108263 | 1725.7 | 7.370123 | 605.4 | 6.286569 | 400.3 | 5.912644 |
| Log norm distr mean(mg/L) | | 1041 | | 1378 | | 1756 | | 625 | | 406 |
| St Dev | 393.0961 | 0.466986 | 518.4389 | 0.470852 | 632.0395 | 0.430107 | 252.8276 | 0.52892 | 147.0768 | 0.417509 |
| Var | 167401.6 | 0.236248 | 291177.1 | 0.240177 | 435789.7 | 0.201809 | 69248.59 | 0.30307 | 23434.23 | 0.18884 |
| 90th Percentile (mg/L) | | 1689 | | 2243 | | 2765 | | 1063 | | 633 |
| 95th Percentile (mg/L) | | 1999 | | 2658 | | 3229 | | 1286 | | 736 |
| 99th Percentile (mg/L) | | 2741 | | 3654 | | 4318 | | 1839 | | 976 |

red denotes that the concentration exceeds the water quality standard

**Dark River at CH65**

| | Hardness | | TDS | | Spec. Cond. | | Sulfate | | Alkalinity | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (mg/L) | (LN) | (mg/L) | (LN) | (mg/L) | (LN) | (mg/L) | (LN) | (mg/L) | (LN) |
| Minimum | 236 | 5.463832 | 348 | 5.852202 | | | 125 | 4.828314 | 101 | 4.615121 |
| | 306 | 5.723585 | 416 | 6.030685 | 488 | 6.190315 | 164 | 5.099866 | 119 | 4.779123 |
| | 311 | 5.739793 | 460 | 6.131226 | 587 | 6.375025 | 167 | 5.117994 | 126 | 4.836282 |
| | 437 | 6.079933 | 576 | 6.356108 | 602 | 6.400257 | 236 | 5.463832 | 206 | 5.327876 |
| | 496 | 6.206576 | 605 | 6.405228 | 823 | 6.712956 | 244 | 5.497168 | 208 | 5.337538 |
| | 636 | 6.455199 | 796 | 6.679599 | 877 | 6.776507 | 361 | 5.888878 | 251 | 5.525453 |
| | 678 | 6.519147 | 829 | 6.72022 | 1161 | 7.057037 | 390 | 5.966147 | 252 | 5.529429 |
| | 702 | 6.553933 | 865 | 6.76273 | 1178 | 7.071573 | 392 | 5.971262 | 287 | 5.659482 |
| | 710 | 6.565265 | 920 | 6.824374 | 1239 | 7.12206 | 399 | 5.988961 | 288 | 5.66296 |
| | 764 | 6.638568 | 986 | 6.893656 | 1319 | 7.184629 | 426 | 6.054439 | 308 | 5.7301 |
| Maximum | 788 | 6.669498 | 1040 | 6.946976 | 1412 | 7.252762 | 489 | 6.192362 | 312 | 5.743003 |
| Mean | 551.3 | 6.237757 | 712.8 | 6.509364 | 968.6 | 6.814312 | 308.5 | 5.642657 | 223.5 | 5.340579 |
| Log norm distr mean(mg/L) | | 560 | | 721 | | 980 | | 314 | | 227 |
| St Dev | 192.0805 | 0.406529 | 230.342 | 0.358579 | 318.4253 | 0.362584 | 118.6817 | 0.442217 | 74.29225 | 0.391402 |
| Var | 40584.42 | 0.181792 | 58363.16 | 0.141436 | 112660.7 | 0.146074 | 15493.87 | 0.215111 | 6071.273 | 0.168515 |
| 90th Percentile (mg/L) | | 865 | | 1066 | | 1454 | | 499 | | 346 |
| 95th Percentile (mg/L) | | 1001 | | 1213 | | 1657 | | 585 | | 398 |
| 99th Percentile (mg/L) | | 1317 | | 1546 | | 2117 | | 789 | | 519 |

*Final Limits*

To protect the class 3 (industrial consumption) and class 4a (agriculture) designated uses of surface water bodies, monthly monitoring results must be below the state water quality ambient standard for an applicable pollutant greater than 90 percent of the time. Therefore the Permittee

will be in violation of permit conditions during a given monitoring period when the following occurs:

1. the monitoring result for that month exceeds the permit limit; and
2. the compliance limit has been exceeded for that monitoring location greater than 10 percent of the time over the preceding 12 months in which monitoring was completed, ending during the most recent reporting month.

This method is reasonable and protective of water quality because of the following:

- It is consistent with how impairments for similar non-toxic, conventional pollutants are determined;
- the uses (industrial and agricultural) being protected by these standards are unlikely to be disrupted by excursions that represent a limited percentage of total water volume appropriated for the use; and,
- it accounts for the statistical possibility that an analytical result may falsely exceed the limit due to deviation from the true concentration that is within the acceptable range of accuracy for that analytical technique.

*Sulfate Limits*

Minn. R. 7050.0224 includes a 10 mg/L water quality standard for sulfates applicable to water used for the production of wild rice, during periods when the rice may be susceptible to damage by high sulfate levels.

On July 25, 2013, MPCA staff made a Draft Recommendation that Little Sandy and Sandy Lakes, also known as Twin Lakes, is a water used for production of wild rice based on the following information:

- Wild rice in the Twin Lakes is documented in the Sandy Lake and Little Sandy Lake Monitoring (2010-2012) Technical Report and the Minntac Water Inventory Reduction Draft EIS. The Minntac Draft EIS states "historical references cite that, in 1982 there existed 121 acres of wild rice in Sandy Lake and 89 acres of wild rice in Little Sandy Lake".
- The Sandy Lake and Little Sandy Lake Monitoring Technical Report identifies various locations within the Twin Lakes where wild rice has been observed in various field studies in 2006, 2007, 2010, 2011 and 2012.
- Wild rice is also identified in Sandy Lake and Little Sandy Lake in Appendix B of the 2008 DNR Report.

This draft MPCA staff recommendation for the east side of the US Steel Minntac tailings basin is based on information currently available. MPCA staff will consider additional information that may become available in the future, whether from project proposers or from other interested/affected parties, and reserves the right to modify the draft staff recommendation accordingly. Based on current knowledge and Rules, the final compliance limit of 10 mg/L total sulfate, to be achieved greater than 90 percent of the time in monthly monitoring, as monitored at the SW005 the inlet to Little Sandy Lake shall be the mitigation target for Little Sandy and



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Sandy Lakes. An interim limit will be established under this permit using the procedure detailed above.

## Additional Requirements

**Compliance Schedules**

There are two compliance schedules contained in this permit. One addresses discharges(S) to groundwater that impact waters of the state, and one addresses surface discharge(CWA) to waters of the state and waters of the United States.

As required by Minn. R. 7001.0150 Subp. 2. Special conditions, this permit contains a compliance schedule to mitigate the tailings basin's discharge(S) to groundwater that has caused waters of the state (groundwater and surface water) to exceed applicable water quality criteria and numeric standards (hereinafter referred to as the "Compliance Schedule"). A separate compliance schedule, or "schedule of compliance" as described in 40 CFR 122.2, addresses dike seepage that discharges(CWA) to the Dark River and its tributary wetlands (hereinafter referred to as the "SD Compliance Schedule").

The Compliance Schedule for mitigation of discharge(S) to groundwater is intended to eliminate the exceedance of applicable water quality criteria and numeric standards for the designated uses of the waters of the state surrounding and downstream of the tailings basin. Monitoring and investigative activities have shown concentrations of certain parameters in surface water and groundwater that exceed applicable numeric standards. For surface water, the known parameters are bicarbonate, hardness, specific conductance, sulfate and total dissolved salts (solids) and for groundwater they are sulfate and total dissolved solids. Exceedances for some or all of these parameters have been observed in the Dark River, Little Sandy Lake, Sandy Lake, and groundwater at the northeast property boundary and basin perimeter. Based on the area hydrology, it is presumed that there are similar exceedances in Timber Creek, Admiral Lake, and the Sand River from the tailings basin to Little Sandy Lake, although MPCA does not have monitoring data from those locations.

Minn. R. 7001.0150 Subp. 2 states that "Each draft and final permit must contain conditions necessary for the permittee to achieve compliance with applicable Minnesota or federal statutes or rules, including each of the applicable requirements in parts 7045.0450 to 7045.0649 and 7045.1390, and any conditions that the agency determines to be necessary to protect human health and the environment. If applicable to the circumstances, the conditions must include; A schedule of compliance that leads to compliance with the appropriate Minnesota or federal statute or rule. The schedule of compliance must require compliance in the shortest reasonable period of time or by a specified deadline if required by Minnesota or federal statute or rule. If appropriate, the schedule of compliance must include interim dates, which in no case may be separated by more than one year. A permit with a schedule of compliance must require the submission to the commissioner of progress reports. The progress reports must be submitted not later than 14 days after each interim and final date of compliance regarding the permittee's compliance or noncompliance with the schedule of compliance and they must explain any instance of noncompliance and state the actions that have been taken to correct the noncompliance." Since the Compliance Schedule only addresses discharge(S) to waters of the



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state, there is no applicable federal statute or rule requiring compliance by a specified deadline, so all activities under this schedule require compliance with final limits in "the shortest reasonable period of time".

The Compliance Schedule has broken the route to compliance into four broad activities that are meant to inform and define each subsequent activity, leading to implementation of the determined final solution(s). The first activity is an "Investigation Work Plan" due 30 days after permit reissuance, the purpose of which is to identify impacts to waters of the state, and the sources and routes of pollutants. This plan is due only 30 days after permit issuance because much work has already been done on this over the past decade or more of monitoring and SOC activities, and because MPCA provided the Permittee with information on the likely compliance points for this permit and identified where it believed additional knowledge would be needed to inform mitigation efforts during meetings in February and March of 2014.

The majority of the work performed under the Investigation Work Plan should be accomplished within a year of permit reissuance although some studies or monitoring may continue past that time. However, sufficient knowledge should be obtained in time to submit a "Compliance Strategy Plan" within 13 months of permit reissuance. This plan should include a report on the findings to date of the Investigation Work Plan and use that information to propose how the Permittee intends to evaluate mitigation technologies with the goal of identifying potential technologies for non-mechanical and/or mechanical treatment, mitigation alternatives, or combinations of actions that upon implementation could reduce water quality impacts from the tailings basin sufficient to attain long-term compliance with permit final compliance limits for the parameters of concern at surface water and groundwater locations in the shortest reasonable period of time.

Completion of activities under the Compliance Strategy Plan will provide the information necessary to prepare and submit a "Final Compliance Plan" within 25 months of permit reissuance. This plan will identify the specific treatment systems and/or mitigation that will be implemented to achieve compliance with permit limits in the shortest reasonable period of time, including a schedule for pilot testing, if necessary. The Compliance Schedule requires that at all steps in the process of choosing a final solution(s), mitigation options are reviewed with consideration of facility closure, so that stop gap measures which could lead to worsening water quality are avoided.

The fourth activity under the Compliance Plan is the submission of detailed plans for any construction that may be required, along with a timeline for implementing the final solution(s), including permitting and construction, if necessary, and a means to monitor progress towards compliance with final limits.

MPCA believes that this schedule is achievable by the Permittee and that its implementation will help to achieve compliance in the shortest reasonable period of time. Much site investigation and research into treatment and remedial technologies has been done by the Permittee under a series of SOC's since 2001. The Compliance Schedule essentially provides three years for the Permittee to evaluate, choose and pilot a remedy. It is difficult to schedule a timeframe for implementation of a remedy, the nature and scale of which is currently unknown, therefore it is



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reasonable that the timeline for those activities remains to be determined. Additionally, since it is also unknown where the remedy will be implemented (e.g. treatment of basin water or interception of groundwater), and due to the varying time of travel between waters of the state and possible remedial locations, it is impossible to predict the time to compliance for a specific water body, presently. To ensure timely submittal of plans, which fulfill all specified requirements, the Permittee shall meet with MPCA three months prior to each plan submittal deadline to present a progress report and draft plan, if available.

The Compliance Schedule as detailed in the draft permit is as follows:

*Compliance Schedule for Mitigation of Discharge(S) to Groundwater*

1) The Permittee shall meet the terms of the compliance schedule detailed below to mitigate impacts to waters of the state and to attain compliance with the water quality-based final compliance limits contained in this permit. Compliance with final limits for these locations shall be attained in the shortest reasonable period of time in accordance with Minn. R. 7001.0150, subp. 2(A).
2) For as long as this compliance schedule is in effect, it shall be the responsibility of the Permittee to make progress towards attainment of the water quality-based final compliance limits until such time as compliance is attained. The requirements in conditions 3 through 16 cease to apply if the Permittee achieves compliance with applicable water quality-based final compliance limits, and receives written confirmation of compliance from MPCA.
3) If any of the submitted Plan(s) described herein propose actions requiring permits and/or approvals, the Permittee shall obtain all applicable permits and approvals prior to any construction.
4) As new information becomes available during the course of the Compliance Schedule, the Permittee may submit revisions to the submitted Investigation Work Plan, Compliance Strategy Plan or the Final Compliance Plan. Such revisions shall be incorporated as enforceable provisions into the respective Plans.
5) Within 30 days after permit reissuance, the Permittee shall submit, a **Minntac Tailings Basin Compliance Investigation Work Plan (Investigation Work Plan)**. This plan shall describe how the Permittee proposes to investigate and evaluate site conditions that are critical to the selection and implementation of mitigation efforts and/or other activities that could be taken to reduce water quality impacts from the tailings basin sufficient to attain compliance with water quality-based final compliance limits for the identified parameters of concern, including bicarbonate, hardness, sulfate, specific conductance and total dissolved solids.
6) The Investigation Work Plan shall include, but is not limited to, the following:

    a) Field data collection plan necessary to:
        i) identify the significant surface and subsurface flow paths from the tailings basin to surrounding surface and ground-waters under existing and foreseeable hydrologic conditions at the tailings basin;
        ii) evaluate water quality along the identified flow paths;
        iii) determine aggregate acute and chronic toxic effects to aquatic organisms from the Permittee's operations at compliance locations in the Sand River and Dark River Watersheds; and



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iv) develop an understanding of the fate and transport of Tailings Basin-derived chemical constituents at a level sufficient to assess the effectiveness of considered mitigation technologies and strategies, including, at a minimum; a system mass balance that accounts for the transport or transformation of parameters of concern to within plus or minus ten percent of the mass calculated to be emanating from the tailings basin.

b) A determination of sources and potential quantities of contaminants released from the basin, including sources such as coarse tails, fine tails, recirculating process water, air emissions control contributions, and tailings lock-up water (pore water).

c) An estimate of the timeframe over which the tailings basin will continue to release pollutants from tailings lock-up water and oxidation of emplaced tails.

d) A detailed schedule for implementation of items a-c that includes adequate justification for the time periods proposed to accomplish each action.

7) Upon submittal of the Investigation Work Plan and schedule, the Permittee shall initiate the plan of action identified in the Plan in accordance with the schedule contained therein. Written notification shall be submitted to the MPCA within 14 days of implementation of the Work Plan.

8) Within 13 months of permit issuance, the Permittee shall submit a **Compliance Strategy Plan** that at a minimum includes the following:

a) The findings of the Investigation Work Plan, including information addressing all tasks in items a-c.

b) Evaluation of mitigation technologies with the goal of identifying potential technologies for non-mechanical and/or mechanical treatment, mitigation alternatives, or combinations of actions that upon implementation could reduce water quality impacts from the tailings basin sufficient to attain long-term compliance with permit final compliance limits for the parameters of concern at surface water and groundwater locations in the shortest reasonable period of time.

c) A detailed description of how each of the identified passive and/or active treatment technologies, mitigation alternatives or combinations of actions will be evaluated with respect to their technical and economic feasibility and their effectiveness in mitigating impacts to waters of the state and achieving long-term compliance with final permit compliance limits in the shortest reasonable period of time.

d) Development of a site conceptual model that describes sources, fate and transport of Tailings Basin contaminants sufficiently for the purpose of predicting future hydrogeological and water quality conditions at the tailings basin during its operation, and post closure, and to evaluate the efficacy of how the identified potential passive and/or active treatment technologies, mitigation alternatives or combinations of actions will allow the site to meet final compliance limits.

e) Evaluation of how the identified potential passive and/or active treatment technologies, mitigation alternatives or combinations of actions will allow the site and surrounding receiving waters to meet applicable water quality standards post closure, including:

i) an estimate of operation and maintenance costs associated with each option to maintain compliance with water quality standards;

ii) an estimate of the length of time that active treatment or maintenance of passive systems would be required to maintain compliance with water quality standards.



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f) Analysis of how the identified potential passive and/or active treatment technologies, mitigation alternatives or combinations of actions may impact site closure in accordance with MDNR requirements, which include a dry basin.

9) Upon submittal of the Compliance Strategy Plan and schedule, the Permittee shall initiate the plan of action identified in the Plan in accordance with the schedule contained therein. Written notification shall be submitted to the MPCA within 14 days of implementation of the Work Plan.
10) Within 25 months of permit issuance, the Permittee shall submit a **Final Compliance Plan** that at a minimum includes the following:
    a) The findings of the Compliance Strategy Plan, including information addressing all tasks in items a-f.
    b) A detailed proposal identifying the specific treatment systems and/or mitigation that will be implemented to achieve compliance with permit limits in the shortest reasonable period of time.
    c) A basis for design, site plan, process schematic(s), preliminary design and specifications for major components of the specific treatment systems, or pilot treatment systems if needed, and/or mitigation to be implemented.
    d) A schedule which will incorporate any pilot testing, if necessary, to finalize the design process.
    e) discussion of final closure requirements
11) Upon submittal of the Final Compliance Plan and schedule, the Permittee shall initiate the plan of action identified in the Plan in accordance with the schedule contained therein. Written notification shall be submitted to the MPCA within 14 days of implementation of the Work Plan.
12) Within 37 months of permit issuance the Permittee shall submit to MPCA:
    a) A "near final" design package which will include additional detail to the previous submittal and specifications for components based on any pilot testing conducted,
    b) A preliminary monitoring plan that will allow quantifiable biannual assessment of the performance of the treatment system and/or mitigation relative to its ability to achieve compliance with final limits by the specified date.
    c) A timeline, based on information collected under the Investigation Work Plan for when the reduction of pollutant load to the watershed will be observed at the monitoring stations.
    d) A detailed schedule of milestones, occurring at intervals of annually or less, which include, at a minimum, start of construction, completion of construction, start-up, and initiation of operation, with adequate justification for the timeline described in the schedule meeting the in the shortest reasonable period of time requirement.
    e) Upon submittal, the milestone deadlines will become fully enforceable commitments of this compliance schedule, and failure to achieve these commitments will constitute a permit violation enforceable by MPCA.
13) Biannually after the chosen remedy is operational, the Permittee shall submit to the MPCA a Semi-annual Compliance Schedule Progress Report. The Compliance Schedule Progress Reports shall include, but are not limited to:
    a) Description of the improvements in water quality observed at the monitoring stations. If the observed reductions in pollutant load in the receiving waters are less than anticipated



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the Permittee will include an explanation as to why the observations are not in line with expectations.

b) A description of the activities that have occurred in the previous 6 months relative to completion of the actions required in the approved Plans;
c) A summary of ongoing monitoring data and the progression toward attaining compliance with the water quality-based final compliance limits; and
d) Anticipated activities to be completed in the next 6 months relative to completion of the actions required in the approved Plans and relative to any adaptive management necessary to improve pollutant load reduction in order to meet water quality standards.

14) The Permittee shall attain compliance with the water quality-based final compliance limits in the shortest reasonable period of time.
15) If any of the submitted Plan(s) described herein propose actions requiring permits and/or approvals, the Permittee shall obtain all applicable permits and approvals prior to any construction.
16) As new information becomes available during the course of the Compliance Schedule, the Permittee may submit revisions to the submitted Investigation Work Plan, Compliance Strategy Plan or the Final Compliance Plan. Such revisions shall be incorporated as enforceable provisions into the respective Plans.

<u>SD Compliance Schedule - for Eliminating Discharge(CWA) to the Dark River</u>

This compliance schedule incorporates the remaining activities from the 2011 SOC related to the construction of a Seepage Collection and Return System (SCRS) for the Dark River Watershed. As was discussed previously, MPCA has historically regulated seepage that emerges either from the side of the basin dike, or within the vicinity of the toe of the dike under federal NPDES guidelines. Consequently, this SD Compliance Schedule is intended to meet the definition and implementing guidelines for a schedule of compliance as described in 40 CFR § 122.2 and § 122.47. The remedy for the impacts to the Dark River from this seepage is to eliminate the discharge(CWA), therefore final compliance with the conditions of the SD Compliance Schedule contained within this permit will be considered to have occurred upon implementation of the SCRS and cessation of discharge from identifiable seeps. This shall occur as soon as possible, and in no case later than December 31, 2016. This date is reasonable because the SCRS is in the final stages of receiving state and federal wetlands permits, therefore construction will presumably begin in 2015.

Monitoring was required under the previous permit at the SD001 sampling station due to its position at the headwaters of the Dark River. Analysis of samples from this location has demonstrated that this discharge(CWA) has reasonable potential to cause or contribute to exceedances of water quality standards in the Dark River for the pollutants bicarbonate, hardness, specific conductance, sulfate and total dissolved solids (TDS).

Construction of a Seepage Collection and Return System to eliminate the discharge of surface seepage to the Dark River Watershed is required under the June 9, 2011 Schedule of Compliance between MPCA and U.S. Steel. Collection of surface seepage from the west side of the Minntac tailings basin for return to the recirculating process water system would eliminate the remaining surface discharge (CWA) to waters of the United States.



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Remaining requirements from the SOC are incorporated in this permit and include the following:

The Permittee shall commence construction of the SCRS following the latter of either MPCA approval of the SCRS Plans and Specifications or the expiration of any appeal period for the permit issued by MPCA or other appropriate regulatory agencies pursuant to the application(s) submitted to such agencies and provided that no judicial or administrative appeal(s) or citizen suit(s) challenging such permit(s) have been filed. If these conditions are satisfied during the period of April 15 through September 30, then initiation of construction of the SCRS within 30 days is required, otherwise initiation of construction shall be delayed until the next construction season. A construction season is defined as April 15 through December 15.
The Regulated Party shall notify the MPCA of SCRS construction commencement within 10 days of construction initiation.

The Regulated Party shall complete construction of the SCRS within eight consecutive construction-season months during one or more construction season(s).

The Regulated Party must initiate operation of the SCRS within 30-days of completion of the SCRS and notify the MPCA of SCRS initiation within 10 days of initiation.

The SCRS shall be constructed and operational as soon as possible and in no case later than December 31, 2016.

## Total Facility Requirements (TFR)

All NPDES/SDS permits issued in the state of Minnesota contain certain conditions that remain the same regardless of the size, location or type of discharge. The standard conditions satisfy the requirements outlined in 40 CFR § 122.41, Minn. R. 7001.0150, and Minn. R. 7001.1090. These conditions are listed in the Total Facility Requirements chapter of an NPDES/SDS permit. These requirements cover a wide range of areas, including recordkeeping, sampling, equipment calibrations, equipment maintenance, reporting, facility upsets, bypass, solids handling, and changes in operation, facility inspections and permit reissuance.

## Nondegredation and Anti-Backsliding

*All instances of the word discharge in this section refer to the CWA definition of a point source discharge.*
In accordance with Minnesota Pollution Control Agency rules regarding nondegredation for all waters (that are not Outstanding Resource Value Waters), nondegredation review is required for any new or expanded significant discharge (Minn. R. 7050.0185). A significant discharge is 1) a new discharge (not in existence before January 1, 1988) that is greater than 200,000 gallons per day (gpd) or 2) an expanded discharge that expands by greater than 200,000 gpd that discharges to any non-ORVW water other than a Class 7 water or 3) a new or expanded discharge containing any toxic pollutant at a mass loading rate likely to increase the concentration of the toxicant in the receiving water by greater than one percent over the baseline quality.



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The discharge from the Minntac Tailings basin existed prior to January 1, 1988, therefore it is not a new discharge. In determining if it is an expanded discharge, the earliest available Discharge Monitoring Reports (DMR's) for the facility are from 1991, so those records were used. The average discharge rates from SD001 and SD002 during the 1991 calendar year were 84,000 gpd and 365,000 gpd, respectively. Discharge from those same points over the past 3 years were 130,000 gpd and 0 gpd. There are also other seepage points along the basin perimeter, but these have not been monitored comprehensively enough to assess changes in gross discharge from the basin, however, with the installation of the Sand River SCRS it is presumed that the current gross discharge is less than it was in 1988. Given this, and that the Permittee will install a comparable SCRS for discharges to the Dark River Watershed, there is not a new or expanded discharge at the facility, therefore, a nondegradation review is not necessary.

This Permit also complies with Minn. R. 7053.0275 regarding anti-backsliding. Any point source discharger of sewage, industrial, or other wastes for which a national pollutant discharge elimination system permit has been issued by the agency that contains effluent limits more stringent than those that would be established by parts 7053.0215 to 7053.0265 shall continue to meet the effluent limits established by the permit, unless the permittee establishes that less stringent effluent limits are allowable pursuant to federal law, under section 402(o) of the Clean Water Act, United States Code, title 33, section 1342.

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# DMR Summary Report



## US Steel Corp - Minntac Tailings Basin Area (MN0057207)

*First DMR in Delta: 1/1999*

### Ground Water Station GW003 (Monitoring Well 3)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | <0.25 | | | <0.25 | | | | | | <0.25 | | | |
| Elevation of GW Relative to Mean Sea Level | feet | SingleVal | 1460.5 | | | 1460.5 | | | | | | 1460.6 | | | **1,460.533** |
| pH, Field | SU | SingleVal | 7.0 | | | 6.9 | | | | | | 6.9 | | | **6.933** |
| Specific Conductance, Field | umh/cm | SingleVal | 2029 | | | 2062 | | | | | | 2055 | | | **2,048.667** |
| Sulfate, Total (as SO4) | mg/L | SingleVal | 702 | | | 725 | | | | | | 710 | | | **712.333** |
| Temperature, Water (C) | Deg C | SingleVal | 12.7 | | | 12.3 | | | | | | 9.1 | | | **11.367** |

### Ground Water Station GW004 (Monitoring Well 4)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | <0.25 | | | <0.25 | | | | | | <0.25 | | | |
| Elevation of GW Relative to Mean Sea Level | feet | SingleVal | 1469.2 | | | 1469.2 | | | | | | 1469.6 | | | **1,469.333** |
| pH, Field | SU | SingleVal | 6.4 | | | 6.2 | | | | | | 6.3 | | | **6.3** |
| Specific Conductance, Field | umh/cm | SingleVal | 1381 | | | 1383 | | | | | | 1418 | | | **1,394.0** |
| Sulfate, Total (as SO4) | mg/L | SingleVal | 490 | | | 488 | | | | | | 511 | | | **496.333** |
| Temperature, Water (C) | Deg C | SingleVal | 14.0 | | | 10.9 | | | | | | 7.9 | | | **10.933** |

### Ground Water Station GW006 (Monitoring Well 6)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | <0.25 | | | <0.25 | | | | | | <0.25 | | | |
| Elevation of GW Relative to Mean Sea Level | feet | SingleVal | 1461.2 | | | 1461.2 | | | | | | 1461.2 | | | **1,461.2** |
| pH, Field | SU | SingleVal | 6.6 | | | 6.5 | | | | | | 6.5 | | | **6.533** |
| Specific Conductance, Field | umh/cm | SingleVal | 2025 | | | 2024 | | | | | | 1938 | | | **1,995.667** |
| Sulfate, Total (as SO4) | mg/L | SingleVal | 813 | | | 826 | | | | | | 840 | | | **826.333** |
| Temperature, Water (C) | Deg C | SingleVal | 16.3 | | | 13.2 | | | | | | 10.6 | | | **13.367** |

### Ground Water Station GW007 (Monitoring Well 7)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | <0.25 | | | 0.25 | | | | | | <0.25 | | | **0.25** |
| Elevation of GW Relative to Mean Sea Level | feet | SingleVal | 1451.1 | | | 1451.1 | | | | | | 1451.2 | | | **1,451.133** |
| pH, Field | SU | SingleVal | 7.2 | | | 6.9 | | | | | | 7.1 | | | **7.067** |
| Specific Conductance, Field | umh/cm | SingleVal | 1792 | | | 2224 | | | | | | 2408 | | | **2,141.333** |

Note: a limit in the Limit and Units column which is demarcated by asterisks is an Intervention limit, not a hard, violation-causing limit.

# DMR Summary Report

## US Steel Corp - Minntac Tailings Basin Area (MN0057207)

*First DMR in Delta: 1/1999*

### Ground Water Station GW007 (Monitoring Well 7)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sulfate, Total (as SO4) | mg/L | SingleVal | 583 | | | 759 | | | | | | 734 | | | **692.0** |
| Temperature, Water (C) | Deg C | SingleVal | 14.2 | | | 12.0 | | | | | | 6.5 | | | **10.9** |

### Ground Water Station GW008 (Monitoring Well 8)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | <0.25 | | | <0.25 | | | | | | <0.25 | | | |
| Elevation of GW Relative to Mean Sea Level | feet | SingleVal | 1480.5 | | | 1480.5 | | | | | | 1480.8 | | | **1,480.6** |
| pH, Field | SU | SingleVal | 7.1 | | | 6.7 | | | | | | 6.5 | | | **6.767** |
| Specific Conductance, Field | umh/cm | SingleVal | 1468 | | | 1820 | | | | | | 1898 | | | **1,728.667** |
| Sulfate, Total (as SO4) | mg/L | SingleVal | 396 | | | 520 | | | | | | 13.5 | | | **309.833** |
| Temperature, Water (C) | Deg C | SingleVal | 17.1 | | | 12.7 | | | | | | 340 | | | **123.267** |

### Ground Water Station GW009 (Monitoring Well 9)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | <0.25 | | | <0.25 | | | | | | <0.25 | | | |
| Elevation of GW Relative to Mean Sea Level | feet | SingleVal | 1432.3 | | | 1431.5 | | | | | | 1433.0 | | | **1,432.267** |
| pH, Field | SU | SingleVal | 5.8 | | | 5.7 | | | | | | 5.7 | | | **5.733** |
| Specific Conductance, Field | umh/cm | SingleVal | 68 | | | 58 | | | | | | 68 | | | **64.667** |
| Sulfate, Total (as SO4) | mg/L | SingleVal | <1.0 | | | <2.0 | | | | | | <2.0 | | | |
| Temperature, Water (C) | Deg C | SingleVal | 12.7 | | | 12.3 | | | | | | 5.8 | | | **10.267** |

### Ground Water Station GW010 (Monitoring Well 10)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | <0.25 | | | <0.25 | | | | | | <0.25 | | | |
| Elevation of GW Relative to Mean Sea Level | feet | SingleVal | 1530.3 | | | 1528.1 | | | | | | 1531.7 | | | **1,530.033** |
| pH, Field | SU | SingleVal | 6.5 | | | 6.3 | | | | | | 6.2 | | | **6.333** |
| Specific Conductance, Field | umh/cm | SingleVal | 1448 | | | 139 | | | | | | 141 | | | **576.0** |
| Sulfate, Total (as SO4) | mg/L | SingleVal | 22.2 | | | 17.6 | | | | | | 20.2 | | | **20.0** |
| Temperature, Water (C) | Deg C | SingleVal | 12.8 | | | 11.2 | | | | | | 7.0 | | | **10.333** |

Note: a limit in the Limit and Units column which is demarcated by asterisks is an Intervention limit, not a hard, violation-causing limit.

# DMR Summary Report



## US Steel Corp - Minntac Tailings Basin Area (MN0057207)

*First DMR in Delta: 1/1999*

### Surface Discharge Station SD001 (Seepage outfall 020)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow | MG | CalMoTot | 3.0 | 3.66 | 3.04 | 3.39 | 3.66 | 3.49 | 4.14 | 4.52 | 4.49 | 3.94 | 3.77 | 3.64 | **3.728** |
| Flow | mgd | CalMoAvg | 0.10 | 0.12 | 0.10 | 0.11 | 0.12 | 0.11 | 0.13 | 0.16 | 0.14 | 0.13 | 0.12 | 0.12 | **0.122** |
| Flow | mgd | DailyMax | 0.12 | 0.12 | 0.11 | 0.11 | 0.16 | 0.12 | 0.16 | 0.16 | 0.16 | 0.14 | 0.12 | 0.12 | **0.133** |
| Oil & Grease, Total Recoverable (Hexane Extraction) | 10 mg/L | CalMoAvg | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 | 1.6 | <1.4 | <1.4 | <1.4 | **1.6** |
| Oil & Grease, Total Recoverable (Hexane Extraction) | 15 mg/L | DailyMax | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 | 2.0 | <1.4 | <1.4 | <1.4 | **2.0** |
| pH | 9.0 SU | InstantMax | 7.1 | 7.0 | 7.2 | 7.2 | 7.1 | 7.2 | 7.2 | 7.2 | 7.2 | 7.1 | 7.1 | 7.1 | **7.142** |
| pH | 6.0 SU | InstantMin | 7.1 | 7.0 | 7.0 | 7.1 | 7.0 | 7.2 | 6.9 | 7.1 | 7.2 | 7.1 | 7.1 | 7.0 | **7.067** |
| Solids, Total Suspended (TSS) | 30 mg/L | CalMoAvg | 5.6 | 2.2 | 3.4 | 2.3 | 2.4 | 4.0 | 2.9 | 1.3 | 2.0 | 1.3 | 3.0 | 3.6 | **2.833** |
| Solids, Total Suspended (TSS) | 60 mg/L | DailyMax | 6.0 | 2.8 | 3.6 | 3.6 | 3.2 | 4.4 | 4.8 | 1.6 | 2.8 | 1.6 | 3.6 | 4.8 | **3.567** |
| Specific Conductance | umh/cm | CalMoMax | 2663 | 2699 | 2699 | 2686 | 2649 | 2641 | 2780 | 2806 | 2767 | 2708 | 2696 | 2699 | **2,707.75** |
| Specific Conductance | umh/cm | CalMoMax | 2663 | 2699 | 2699 | 2686 | 2649 | 2641 | 2780 | 2806 | 2767 | 2708 | 2696 | 2699 | **2,707.75** |
| Sulfate, Total (as SO4) | mg/L | CalMoMax | 1060 | 1120 | 1090 | 1070 | 1090 | 1000 | 1110 | 1080 | 1100 | 1090 | 1060 | 1060 | **1,077.5** |

### Surface Discharge Station SD002 (Seepage outfall 030)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow | MG | CalMoTot | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| Flow | mgd | CalMoAvg | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| Flow | mgd | DailyMax | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| Oil & Grease, Total Recoverable (Hexane Extraction) | 10 mg/L | CalMoAvg | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| Oil & Grease, Total Recoverable (Hexane Extraction) | 15 mg/L | DailyMax | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| pH | 9.0 SU | InstantMax | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| pH | 6.0 SU | InstantMin | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| Solids, Total Suspended (TSS) | 30 mg/L | CalMoAvg | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| Solids, Total Suspended (TSS) | 60 mg/L | DailyMax | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| Specific Conductance | umh/cm | CalMoMax | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| Specific Conductance | umh/cm | CalMoMax | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |
| Sulfate, Total (as SO4) | mg/L | CalMoMax | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | NoDis | |

Note: a limit in the Limit and Units column which is demarcated by asterisks is an Intervention limit, not a hard, violation-causing limit.

# DMR Summary Report

## US Steel Corp - Minntac Tailings Basin Area (MN0057207)

*First DMR in Delta: 1/1999*

### Surface Water Station SW001 (Sandy River Station 701)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow | mgd | SingleVal | 13.1 | 8.08 | 0.37 | 0.22 | 3.05 | 2.81 | 3.12 | 2.73 | 4.8 | 4.78 | 66.0 | 41.5 | **12.547** |
| Sulfate, Total (as SO4) | mg/L | SingleVal | 49.8 | 12.1 | 1.3 | 68.1 | 44.1 | 120 | 220 | 235 | 331 | 285 | 55.0 | 36.2 | **121.467** |

### Surface Water Station SW002 (McNiven Creek Station 702)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | | | | | | <0.25 | | | | | | | |
| Toxicity, Whole Effluent (Acute) | TUa | SingleVal | | | | | | <1.0 | | | | | | | |

### Waste Stream Station WS002 (Plant water to Line 3 scrubber)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flow | mgd | CalMoAvg | 0.18 | 0.19 | 0.20 | 0.16 | 0.18 | 0.19 | 0.18 | 0.17 | 0.18 | 0.19 | 0.17 | 0.14 | **0.178** |
| Hardness, Calcium & Magnesium, Calculated (as CaCO3) | mg/L | CalMoAvg | 1026 | 1039 | 1078 | 1116 | 1110 | 1150 | 1223 | 1307 | 1320 | 1108 | 1045 | 930 | **1,121.0** |
| Sulfate, Dissolved (as SO4) | ug/L | CalMoAvg | 838000 | 867000 | 889000 | 886000 | 923000 | 948000 | 950000 | 1057000 | 1026000 | 834000 | 730000 | 723000 | **889,250.0** |

### Waste Stream Station WS003 (1st Stage Thickener Overflow)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride, Total | mg/L | CalMoAvg | 541 | 393 | 685 | 691 | 665 | 633 | 669 | 665 | 528 | 650 | 600 | 601 | **610.083** |
| Flow | mgd | CalMoAvg | 0.14 | 0.14 | 0.13 | 0.13 | 0.14 | 0.15 | 0.14 | 0.13 | 0.13 | 0.13 | 0.14 | 0.12 | **0.135** |
| Fluoride, Total (as F) | mg/L | CalMoAvg | 8.2 | 3.1 | 6.9 | 5.0 | 7.1 | 9.1 | 12.6 | 4.7 | 3.1 | 16.3 | 3.8 | 5.6 | **7.125** |
| Hardness, Calcium & Magnesium, Calculated (as CaCO3) | mg/L | CalMoAvg | 2166 | 2418 | 2412 | 2140 | 2435 | 2654 | 2788 | 2550 | 1923 | 2393 | 2355 | 2463 | **2,391.417** |
| pH | SU | CalMoMin | 9.5 | 10.9 | 7.4 | 8.4 | 8.4 | 5.4 | 9.2 | 9.3 | 9.3 | 8.8 | 6.1 | 10.3 | **8.583** |
| Sulfate, Dissolved (as SO4) | ug/L | CalMoAvg | 1520000 | 1500000 | 1502000 | 1602000 | 1940000 | 2118000 | 2100000 | 2040000 | 1970000 | 1880000 | 1598000 | 1547000 | **,776,416.667** |

### Waste Stream Station WS004 (Concentrate Slurry)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH | SU | CalMoMax | 8.4 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.1 | 8.2 | 8.2 | 8.3 | 8.0 | 8.3 | **8.25** |

Note: a limit in the Limit and Units column which is demarcated by asterisks is an Intervention limit, not a hard, violation-causing limit.

# DMR Summary Report

## US Steel Corp - Minntac Tailings Basin Area (MN0057207)

*First DMR in Delta: 1/1999*

### Waste Stream Station WS005 (Step I Reclaim Thickener influent)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH | SU | CalMoMax | 9.0 | 9.2 | 8.9 | 8.7 | 8.9 | 8.7 | 8.6 | 8.5 | 8.5 | 8.5 | 8.6 | 8.7 | **8.733** |

### Waste Stream Station WS006 (Concentrator Fine Tailings Slurry Discharge - Eastern Tailings Basin Disposal)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | | | | | | NoFlo | | | | | | | |
| Evaporation, Accumulated | in | CalMoTot | | | | | | NoFlo | | | | | | | |
| Precipitation | in | CalMoTot | | | | | | NoFlo | | | | | | | |
| Toxicity, Whole Effluent (Acute) | TUa | SingleVal | | | | | | NoFlo | | | | | | | |

### Waste Stream Station WS007 (Concentrator Fine Tailings Slurry Discharge - Western Tailings Basin Disposal)

| Parameter Name | Limit and Units | Limit Type | 7/13 | 8/13 | 9/13 | 10/13 | 11/13 | 12/13 | 1/14 | 2/14 | 3/14 | 4/14 | 5/14 | 6/14 | Ave |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amines, Organic Total | mg/L | SingleVal | | | | | | <0.25 | | | | | | | |
| Evaporation, Accumulated | in | CalMoTot | | | | | | 20.83 | | | | | | | **20.83** |
| Precipitation | in | CalMoTot | | | | | | 27.82 | | | | | | | **27.82** |
| Toxicity, Whole Effluent (Acute) | TUa | SingleVal | | | | | | <1.00 | | | | | | | |

Note: a limit in the Limit and Units column which is demarcated by asterisks is an Intervention limit, not a hard, violation-causing limit.