MINNESOTA POLLUTION CONTROL AGENCY

National Pollutant Discharge Elimination System (NPDES)/

State Disposal System (SDS) Permit Program Fact Sheet

Reissuance

MN0055948

Permittee:	United States Steel Corporation 600 Grant St Ste 1683 Pittsburgh, Pennsylvania 15219-2755
Facility name:	United States Steel Corporation, Minnesota Ore Operations – Keetac Tailings Basin Area 1 Mine Rd Keewatin, Minnesota 55753
Current permit expiration date:	**October 31, 2016**
Public comment period begins:	**July 8, 2025**
Public comment period ends:	**September 9, 2025**
Receiving water:	Reservoir 2 (Class 2Bg, 3, 4A, 4B, 5, 6 water); Unnamed Creek (Class 2Bg, 3, 4A, 4B, 5, 6 water); Hay Creek (Class 2Bg, 3, 4A, 4B, 5, 6 water); Hay Lake (Class 2Bg, 3, 4A, 4B, 5, 6 water).
Permitting contact:	Stephanie Handeland Minnesota Pollution Control Agency 520 Lafayette Rd N Saint Paul MN 551554194 651-757-2405 stephanie.handeland@state.mn.us

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Purpose and participation

Applicable statutes
This fact sheet has been prepared according to the 40 C.F.R. § 124.8 and 124.56 and Minn. R. 7001.0100, subp. 3 in regard to a draft National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) permit to construct and/or operate wastewater treatment facilities and to discharge into waters of the State of Minnesota.

Purpose
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.

The primary reason for reissuing the permit is due to permit expiration.

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.

The MPCA is planning to host an in-person public informational meeting. A public informational meeting is an informal meeting which the MPCA may hold to help clarify and resolve issues. The public informational meeting will take place in Virginia, Minnesota. Information regarding the public meeting will be provided once the venue is secured. Please refer to our website at https://www.pca.state.mn.us/get-engaged/public-comments for additional information.

For more information on the permits, preliminary variance determination, the upcoming public meeting and to sign up for updates on permitting, rulemaking, and other actions related to mining in northeast Minnesota, visit the MPCA's Keetac web page.

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 one through three 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 one of this notice. All written comments, requests, and petitions received during the public comment period will be considered in the final decisions regarding the permit. If the MPCA does not receive any written comments, requests, or petitions

during the public comment period, the Commissioner or other MPCA staff as authorized by the Commissioner will make the final decision concerning the draft permit.

Comments, petitions, and/or requests must be submitted by the last day of the public comment period to:

Stephanie Handeland
Minnesota Pollution Control Agency
520 Lafayette Rd N
Saint Paul MN 551554194

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.

General information

The permit is based on an updated NPDES/SDS permit application dated 09/29/2023 and additional documents found in the Administrative record.

Description of permitted facility

The Keetac Tailings Basin is located near the city of Keewatin in St. Louis and Itasca Counties, Minnesota. The Keetac Tailings Basin NPDES/SDS Permit covers the following areas/activities as per the NPDES/SDS Permit Facility Description: tailings basin, the drainage area contributing surface run-off to the basin, and all non-sewage wastewater disposal systems within the permitted area.

The principal activity at this facility is the disposal of taconite tailings and related wastewater from the Keetac Plant. The tailings and related wastewater that are disposed of in the tailings basin are generated by the Keetac Plant, which is located north of Highway 169. The Plant currently produces blast furnace (BF) grade and direct reduction (DR) pellets. The Plant consists of a series of crushers and screens, a concentrator, and an agglomerator. The concentrator consists of a series of mills, magnetic separators, hydroseparators, hydroclones, screens, and thickeners. A flocculant is added to the concentrator tailings slurry before the thickening stage. When producing DR grade concentrate, a reverse flotation process is used for beneficiation of the BF grade concentrate. Three chemical additives are used as part of the reverse flotation process: a collector, a frother, and a defoamer. The agglomerator receives the concentrate, which is mixed with limestone then dewatered by disc filters. The filter cake is then mixed with bentonite and formed into pellets in balling drums. Process water from the agglomerator, as well as recirculating non-contact cooling water, and floor drains, is recirculated as process water within the Plant. Make-up water for the Plant's recirculating non-contact cooling water system is softened and treated with various other chemical additives, such as corrosion inhibitors, descalers, and microbiocides. Certain chemicals are also utilized in the wet scrubber and blowdown treatment system for pH control, coagulation, sulfate removal and clarification. Corrosion inhibitor/descaler chemicals are used in the vacuum seal water system and kiln.

The wastewater flow to the tailings basin consists of the tailings slurry (taconite tailings and associated concentrator process wastewater) and treated wet scrubber blowdown water for a total average flow rate of 20 million gallons per day (MGD). This wastewater is piped under pressure from the Keetac Plant across Highway 169 and is spigotted into the tailings basin. The dual tailings pipelines have several gravity flow drainage points along their route that are used during routine maintenance, winter operations, and emergency situations, such as pump failure. Several dump valve drainage points flow by gravity directly to the tailings basin. An average of 13 million long tons of dry tailings are disposed of each year in the basin. The tailings are generated from the plant thickeners. The basin is divided into several parts, principally the older Stage 1 and the active Stage 2 basins. Much of the Stage 1 basin has undergone re-vegetation. Water is occasionally pumped from Reservoir 2 to Reservoir 6 to control water inventories at an average rate of 400 million gallons per year. The tailings basin is principally underlain by glacial till and glaciofluvial deposits.

The interior tailings basin dikes are constructed of coarse tailings which are spigotted from the tailings pipelines. The exterior basin dikes are constructed of clay starter dikes with a coarser sand and gravel chimney drain. A barge system in the second stage interior tailings basin pumps basin wastewater to the second stage exterior pond for additional clarification. A stop-log decant tower structure discharges water from the second stage exterior pond to Reservoir 6 for reuse. Tailings basin water from Reservoir 6 is reclaimed and pumped back to the Keetac Plant for further ore processing. If the water levels in Reservoir 6 get high enough, discharge can occur through siphon outfall SD 001, at a combined maximum rate of 9.4 MGD, to Reservoir 2. Under normal circumstances, discharge from Reservoir 6 occurs on a periodic basis through Outfall SD 005 to Reservoir 2 at an average flow of approximately 4.6 MGD.

The current permit authorizes a discharge of mine pit dewatering from the Sargent Pit to Reservoir 2 via Outfall SD 009. Discharge from SD 009 is prohibited by the draft permit until it can attain final effluent limits as described in the limits and monitoring section of the permit.

Surface drainage from the tailings basin area, in the form of surface run-off from the exterior dikes, flows to the West Swan River, unnamed wetlands, Hay Creek to Swan Lake, Reservoir 2, Reservoir 2 North, and Welcome Creek. West Swan River, Hay Creek to Swan Lake, and Welcome Creek are class 2Bg, 3, 4A, 4B, 5, and 6 waters; Reservoir 2 and Reservoir 2 North are class 2B, 3, 4A, 4B, 5, and 6 waters; and the unnamed wetlands are class 2D, 3, 4A, 4B, 5, and 6 waters.

Surface water station SW 001 is located at the weir outlet of Reservoir 2 and is used for monitoring only. No limits are associated with this monitoring station. Various surface waters located downstream of the tailings basin have been added to the draft permit to aid in the proposed functional equivalent analysis determination requirement. The new required surface water monitoring locations include the following:

Table 1 – New Proposed Surface Water Monitoring Locations

Station	Location	Latitude	Longitude	PLS
SW 001	Reservoir 2 Outlet	47.34565	-93.104996	T56 R22W S10 NWSW
SW 002	Hay Creek	47.30476	-93.0953229	T56 R22W S26 SENW
SW 003	Reservoir 2 to Hay Creek	47.30577	-93.1003885	T56 R22W S26 NESW
SW 004	Hay Lake	47.28726	-93.1001379	T56 R22W S35 NESW
SW 005	Hay Creek Headwaters	47.33574	-93.06336234	T56 R22W S18 SWNW
SW 006	Unnamed Wetland	47.34108	-93.09163627	T56 R22W S11 SWSE
SW 007	Hart Lake	47.26267	-93.140373	T55 22W S9 SWNE
SW 008	Unnamed Creek	47.30594	-93.0654967	T56 R21W S30 SWNW

Internal monitoring stations within the tailings basin have also been added to the draft permit. Monitoring of the tailings basin pool water is required at the Stage 2 Interior Pond (WS 003) and the pool water of the Stage 2 Exterior Pond (WS 004). Monitoring at WS 001 is an existing internal monitoring location for non-precipitation inputs to the facility. Monitoring station WS 002 reports the total volume discharged from the tailings basin and replaces the previous SD 008 discharge calculation station.

Chemical dust suppressants are occasionally used at the facility in accordance with MPCA approvals. A repair shop/garage is located in the Southwest ¼ of the Southeast ¼ of Section 36. Sewage generated at this site is contained in portable units and disposed of off-site at a nearby municipal wastewater treatment facility.

A 2020 Supreme Court decision in County of Maui v. Hawaii Wildlife Fund, 140 S. Ct. 1462 (2020), (Maui) requires that regulators consider whether discharges of wastewater from a facility to groundwater are functionally equivalent to direct discharges of the wastewater to surface water. At this time, there is not sufficient information to make a functional equivalent determination at the Keetac tailings basin. This permit requires the Permittee to conduct additional sampling at various surface water and internal waste stream monitoring locations to determine whether or not there is a functionally equivalent discharge from the tailings basin. This permit does not authorize a functionally equivalent discharge from the tailings basin seepage to surface water. If it is determined a functionally equivalent discharge from the tailings basin exists, the permit will be modified or reissued and the functionally equivalent discharge will be regulated under the modified or reissued permit.

Facility location
The facility is located in the multiple sections of Township 56 and 57 North; Range 21 and 22 West, City of Keewatin, Itasca & St. Louis Counties, Minnesota (latitude: 47.424, longitude: -93.063). The address for the facility is 1 Mine Rd, Keewatin, MN 55753-3330

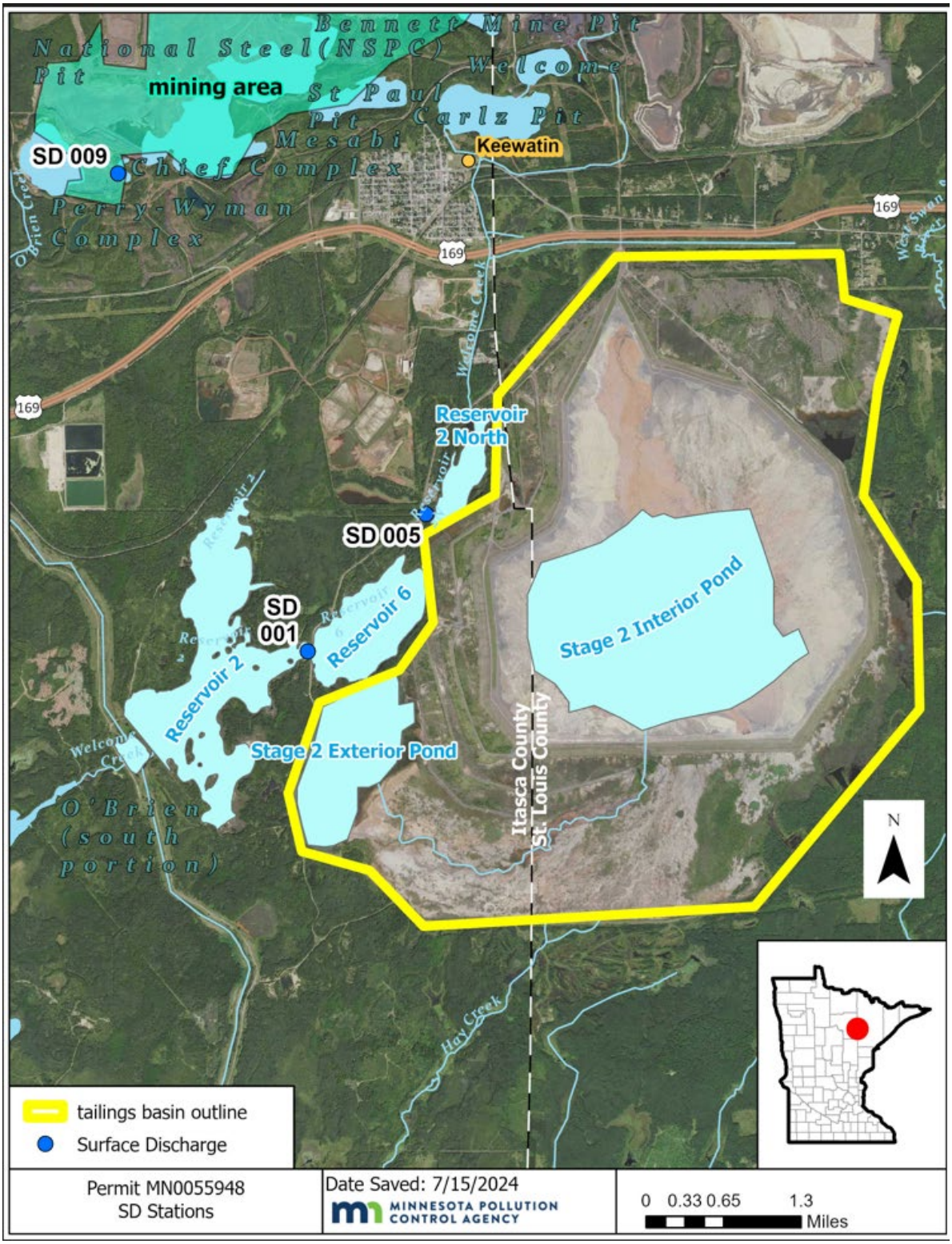
Outfall location
The Keetac Tailings Basin area consists of two tailings slurry decant water outfalls, SD 001 and SD 005. Discharge SD 001 is a siphon from Reservoir 6 which discharges when water levels in Reservoir 6 are high. Under normal circumstances, the discharge from Reservoir 6 flows through culvert outfall (SD 005) to Reservoir 2. Both tailings basin outfalls discharge tailings slurry decant water from Reservoir 6 to Reservoir 2, which flows to Hay Creek. The permit also includes a proposed mine pit dewatering station (SD 009) from the Sargent Pit. This outfall was approved in the 2011 permit reissuance and will be located at the edge of the Sargent Pit. Outfall SD 009 has not been constructed, but will ultimately discharge to Reservoir 2 as approved in 2011 once it is established.

Table 2 – Outfall Summary

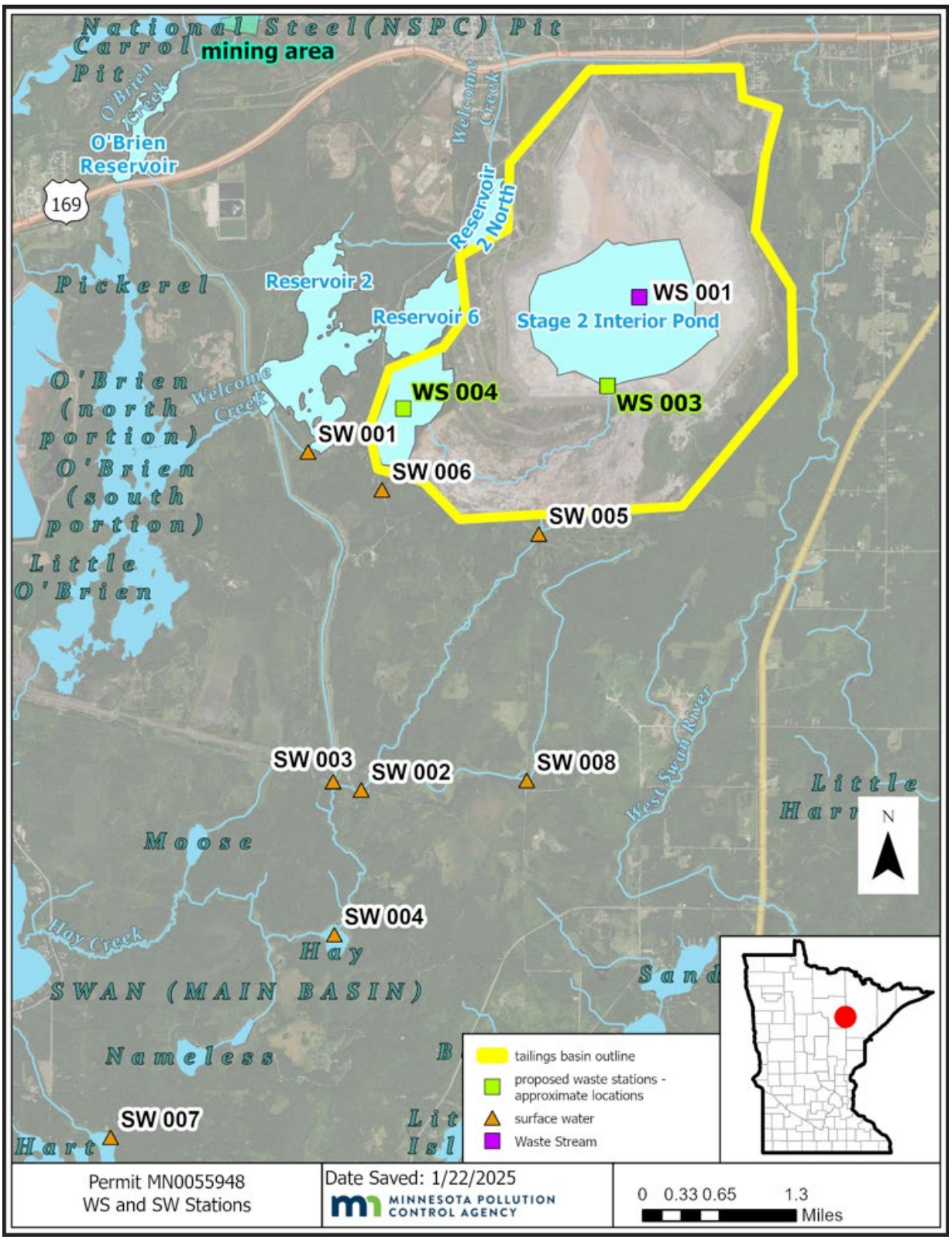
Station ID	Local Name	PLS Location	GPS Coordinates (Latitude, Longitude)	Receiving Water	Receiving Water Use Class
SD 001	Siphon Outfalls 011, 012, 013	NE ¼ of SE ¼ of Section 2, T56N, R22W	47.36, -93.09	Reservoir 2 to Hay Creek	Class 2Bg, 3, 4A, 4B, 5, 6 Water
SD 005	Culvert outfall from Reservoir 6	NE ¼ of NW ¼ of Section 1, T56N, R22W	47.37, -93.08	Reservoir 2 to Hay Creek	Class 2Bg, 3, 4A, 4B, 5, 6 Water
*SD 009	Sargent Pit Dewatering	Section 1, T57N, R22W	TBD	Reservoir 2 to Hay Creek	Class 2Bg, 3, 4A, 4B, 5, 6 Water

*Outfall SD 009 has not been constructed, but will ultimately discharge to Reservoir 2 once it is established.

Maps of permitted outfalls
**Location of SD 009 TBD*



Maps of proposed surface water and internal waste stream monitoring locations



Components and treatment technology

Tailings Basin and Reservoirs

The Keetac Tailings basin stores and manages tailings material and associated process wastewater that is generated form the processing of iron ore. The basin has an area of approximately 6,178 acres and is divided into several parts, principally the older Stage 1 basin and the active Stage 2 basin. Much of the Stage 1 basin has undergone re-vegetation.

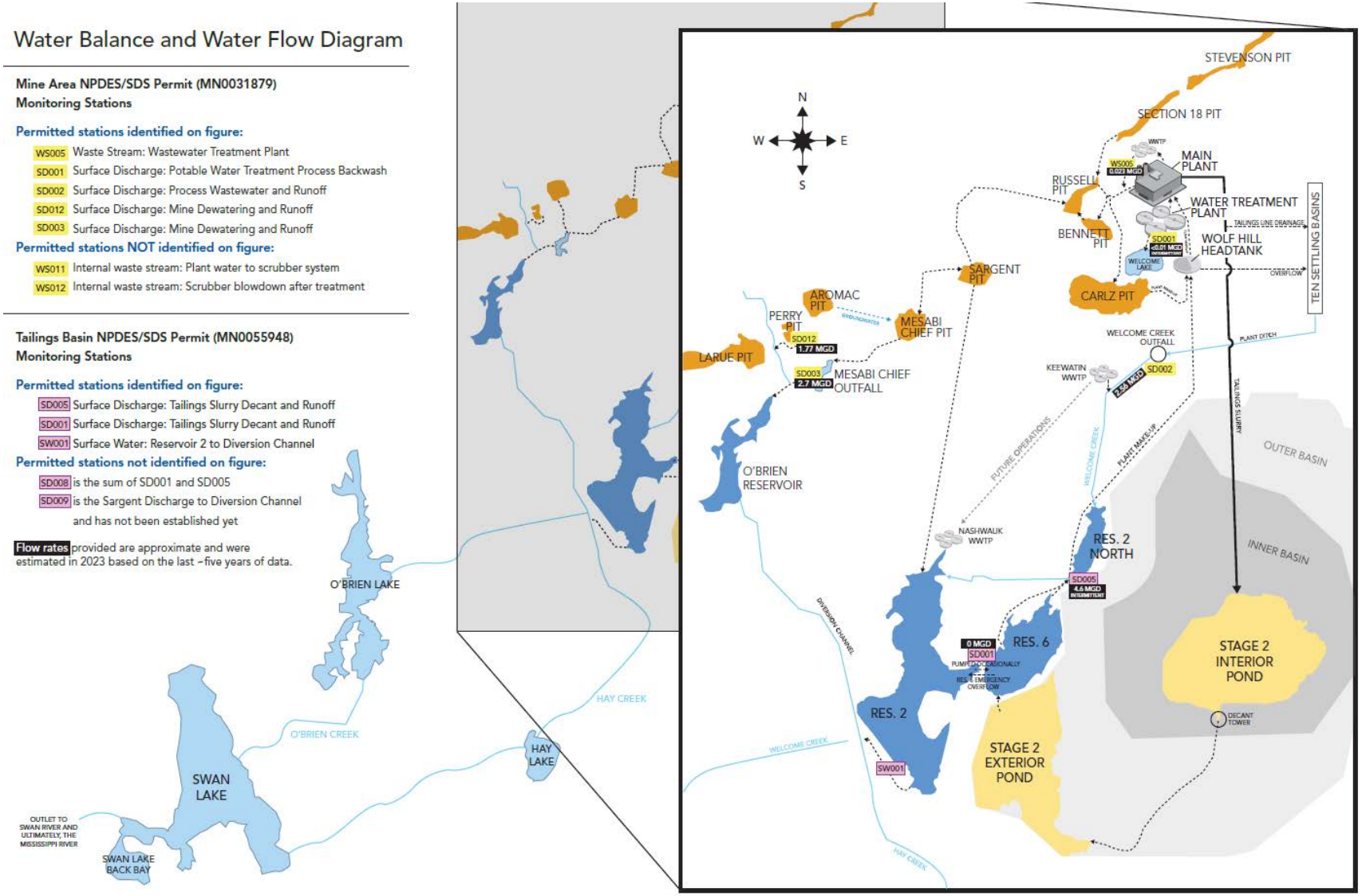
Nearby reservoirs are used to manage water at the tailings basin. Reservoir 2 is located to the west of the basin and Reservoir 6 is located to the north of the basin. Water is occasionally pumped from Reservoir 2 to Reservoir 6 to control water inventories.

The interior dikes of the tailings basin are constructed of coarse tailings. The exterior basin dikes are constructed of clay started dikes with a coarser sand and gravel chimney drain. A barge system in the second stage interior tailings basin pumps basin wastewater to the second stage exterior pond for additional clarification. A stop-log decant tower structure discharges water from the second stage exterior pond to Reservoir 6 for reuse. Tailings basin water from Reservoir 6 is reclaimed and pumped back to the Keetac plant for further ore processing. The tailings basin has the capability of discharging through a siphon outfall, SD 001 to Reservoir 2. Reservoir 6 discharges periodically through outfall SD 005 to Reservoir 2.

Mine Pit Dewatering

Mine pit dewatering is authorized from the Sargent Pit to Reservoir 2 via outfall SD 009 at a maximum rate of 4.7 mgd. This outfall was approved in 2011 permit reissuance and will be located at the edge of the Sargent Pit at PLS coordinates T 57 N, R 22W, Section 26. Outfall SD 009 has not been constructed at this time

Flow schematic



Historical changes to facility or operation

The permit issued in 2011 permitted an expansion of the taconite processing plant and included new proposed discharge from the Sargent Pit. There have been no changes to the facility since the last permit issuance.

U. S. Steel has installed Direct Reduction grade pellet equipment at Keetac (DR Project). As a result, Keetac is now capable of producing either blast furnace (BF) or direct reduction (DR) grade concentrate and pellets. There are no associated changes in the sources of wastewater, no changes to the existing wastewater discharges, no net increase in sulfate mass loading, and no increase of flow in the wastewater discharges associated with this project.

Significant changes from the previous permit

The draft permit contains the following changes from the last issued permit:

- SD 001 and SD 005 Limits and Monitoring
    - Added monthly monitoring for calcium, total iron, magnesium, potassium, sodium, manganese, chloride, alkalinity, fluoride, total dissolved solids, specific conductance and oxidation reduction potential to aid in the determination of whether the tailings basin has a functional equivalent of a point source discharge. Sulfate monitoring is required twice per month.
    - Added annual monitoring for nitrite + nitrate nitrogen, total Kjeldahl nitrogen, total nitrogen, and total phosphorus in accordance with the MPCA's Nutrient Strategy.
    - Added quarterly monitoring for dissolved mercury and total suspended solids (grab) when quarterly mercury monitoring is conducted in accordance with the MPCA's Mercury Strategy.
    - Removed monthly monitoring for selenium.
- SD 008
    - Removed SD 008 and renamed/replaced with an internal monitoring limits calculation station WS 002.
- SD 009 Limits and Monitoring
    - Discharge from SD 009 is prohibited until the discharge can attain the final sulfate effluent limits of 14 mg/L monthly average, 24 mg/L daily maximum.
    - Added annual monitoring for nitrite + nitrate nitrogen, total kjeldahl nitrogen, total nitrogen, and total phosphorus in accordance with the MPCA's Nutrient Strategy.
    - Added quarterly monitoring for dissolved mercury and total suspended solids (grab) when quarterly mercury monitoring is conducted in accordance with the MPCA's Mercury Strategy.
    - Removed monthly monitoring for selenium.
- SW 001 Limits & Monitoring
    - Added monthly monitoring at SW 001 for calcium, total iron, magnesium, potassium, sodium, manganese, chloride, alkalinity, sulfate, fluoride, total dissolved solids, specific conductance and oxidation reduction potential to aid in the functional equivalency of a direct discharge determination.
- Surface Water Monitoring
    - Added surface water monitoring locations at Hay Creek (SW 002), Reservoir 2 to Hay Creek (SW 003), Hay Lake (SW 004), Hay Creek Headwaters (SW 005); Unnamed Wetland (SW 006); Hart Lake (SW 007); and Unnamed Creek (SW 008) to aid in the functional equivalency of a direct discharge determination. Monthly monitoring at the new surface water monitoring stations is required for calcium, total iron, magnesium, potassium, sodium, manganese, chloride, alkalinity, sulfate, fluoride, total dissolved solids, specific conductance and oxidation reduction potential.

- Internal Waste Stream Monitoring
    - Added internal monitoring locations for monitoring of the tailings basin pool water (WS 003) and at the Stage 2 Exterior Pond (WS 004) to aid in the functional equivalency of a direct discharge determination. Monthly monitoring at the new surface water monitoring stations is required for calcium, total iron, magnesium, potassium, sodium, manganese, chloride, alkalinity, sulfate, fluoride, total dissolved solids, specific conductance and oxidation reduction potential.
- Sulfate
    - Addition of interim effluent limits for sulfate at SD 001 and SD 005 (Phase 1 sulfate limits).
    - Updated compliance schedule to attain final monthly average and calendar month maximum sulfate effluent limits of 14 mg/L and 24 mg/L respectively at outfalls SD 001, SD 005 and SD 009. (Phase 2 sulfate limits)
- Chronic Whole Effluent Toxicity Testing (WET)
    - Addition of chronic whole effluent toxicity testing to be conducted quarterly at discharges SD 001, SD 005 and SD 009.
    - Requirement to conduct monitoring for total dissolved solids, specific conductance, sodium, magnesium, calcium, potassium, sulfate, chloride, alkalinity and nitrate nitrogen during each WET test.
- Per-and Polyfluoroalkyl Substances (PFAS) Inventory
    - Permittee is required to conduct a PFAS Inventory to establish whether PFAS containing materials have been or are used at the facility and if they have been discharged or are being discharged to the environment.
- Functional Equivalency
    - Requirements have been added to the permit to determine if there are effects from the seepage of the tailings basin facility to surface waters via the functional equivalent of a direct discharge.
    - The permit includes a requirement to submit an evaluation prior to permit expiration with the facility's determination of functional equivalency of a direct discharge to a surface water from a discharge to groundwater.
- Biological Monitoring
    - Fish and macroinvertebrate sampling is required once every five years for the life of the permit in the Hay Creek watershed.
- Annual Meeting
    - The Permittee shall conduct a public meeting annually to disclose factual information to the community regarding facility operations, changes made or planned to reduce pollutants in its mining related discharge and compliance with environmental permits and regulations.
- Compliance Schedule
    - This permit includes proposed water quality-based final effluent limits for sulfate of 14 mg/L (monthly average) and 24 mg/L (monthly maximum), applicable at outfalls SD 001, SD 005 and SD 009. These limits are derived from the Class 4A water quality standard that is protective of waters used for the production of wild rice. The facility is not currently designed to treat effluent from these outfalls for sulfate. The Permittee must attain compliance with the final effluent limits as soon as possible, but no later than April 30, 2030.

Special conditions

- Functional Equivalent Evaluation due 180 days prior to permit expiration.
- Per- and Polyfluoroalkyl Substances Inventory due 18 months after permit issuance.
- Compliance Schedule to identify sulfate treatment and mitigation alternatives, construct a sulfate treatment system and attain compliance with final sulfate effluent limits within 60 months of permit issuance.
- Chronic toxicity testing due quarterly, 36 months after permit issuance.
- Biological monitoring due November 15 of the year data was collected.
- Submit a Stormwater Annual Report by March 31 of each year following permit issuance.

Recent compliance history

A Compliance Evaluation Inspection (CEI) occurred on June 15, 2017, by John Thomas and Holly Johnson of the MPCA. The CEI consisted of a visual inspection of the facility and a discussion with Tom Moe and Bethany Given from US Steel Keetac. There was also a review of the monthly discharge monitoring reports (DMRs) for the time-period of July 2013 – April 2017.

Based on the results of the inspection, the following violations were noted:

- Missing discharge monitoring reports for 2014, 2015, 2016 and 2017.
- Incomplete Chemical Dust Suppressant Annual Reports for 2014 and 2015; and
- Late Chemical Dust Suppressant Annual report for 2016.

The MCPA requested the company to provide a written response to address how missing information would be provided in a timely manner in the future. The issue was resolved and there are no further active enforcement actions by the MPCA for this facility.

Recent monitoring history

The table below lists the last 12 months of monitoring data submitted by the facility and the existing monitoring parameters.

Station	Parameter	Limit Type	Limit	Units	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24
SD 001	Flow	CalMoAvg		mgd	0	0	0	0	0	0	0	0	0	0	0	0
		CalMoMax		mgd	0	0	0	0	0	0	0	0	0	0	0	0
		CalMoTot		Mgal	0	0	0	0	0	0	0	0	0	0	0	0
	Iron, Dissolved (as Fe)	CalMoAvg	1	mg/L	0	0	0	0	0	0	0	0	0	0	0	0
		DailyMax	2	mg/L	0	0	0	0	0	0	0	0	0	0	0	0
	Mercury, Total (as Hg)	SingleVal		ng/L	0	0	0	0	0	0	0	0	0	0	0	0
	pH	InstantMax	9	SU	0	0	0	0	0	0	0	0	0	0	0	0
		InstantMin	6	SU	0	0	0	0	0	0	0	0	0	0	0	0
	Solids, Total Suspended (TSS)	CalMoAvg	20	mg/L	0	0	0	0	0	0	0	0	0	0	0	0
		DailyMax	30	mg/L	0	0	0	0	0	0	0	0	0	0	0	0
	Specific Conductance	CalMoAvg		mmh/cm	0	0	0	0	0	0	0	0	0	0	0	0
	Sulfate, Total (as SO4)	CalMoAvg		mg/L	0	0	0	0	0	0	0	0	0	0	0	0
		CalMoMax		mg/L	0	0	0	0	0	0	0	0	0	0	0	0
SD 005	Flow	CalMoAvg		mgd	1.04	0.02	0	0	0.14	2.11	0.92	3.29	5.8	1.17	3.91	13.68
		CalMoMax		mgd	1.84	0.5	0	0	0.43	4.56	7.09	7.09	9.7	0.5	13.96	35.87
		CalMoTot		Mgal	31.2	0.5	0	0	4.3	63.2	28.4	101.9	168.8	36.4	117.3	424.2
	Iron, Dissolved (as Fe)	CalMoAvg	1	mg/L	0.126	0.05	0	0	0	0	0	0	0	0	0	0
		DailyMax	2	mg/L	0.126	0.05	0	0	0	0	0	0	0	0	0	0

	Mercury, Total (as Hg)	**SingleVal**		**ng/L**	**0.649**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	pH	**InstantMax**	**9**	**SU**	**8.5**	**8.5**	**0**	**0**	**8.5**	**8.37**	**7.6**	**8.2**	**8.1**	**8**	**8.3**	**8.2**
		InstantMin	**6**	**SU**	**8.5**	**8.5**	**0**	**0**	**8.5**	**8.37**	**7.6**	**8.2**	**8.1**	**8**	**8.3**	**8.2**
	Selenium, Total (as Se)	**CalMoAvg**		**ug/L**	**0**	**1.95**	**0**	**0**	**2.01**	**1.51**	**1.1**	**1.7**	**1.7**	**2.3**	**3**	**3**
	Solids, Total Suspended (TSS)	**CalMoAvg**	**20**	**mg/L**	**1.2**	**2.2**	**0**	**0**	**2.6**	**1.1**	**2.1**	**0**	**1.1**	**2.7**	**3.4**	**2.2**
		DailyMax	**30**	**mg/L**	**1.2**	**2.2**	**0**	**0**	**2.6**	**1.1**	**2.1**	**0**	**1.1**	**2.7**	**3.4**	**2.2**
	Specific Conductance	**CalMoAvg**		**mmh/cm**	**725**	**736**	**0**	**0**	**808**	**823**	**866**	**890**	**922**	**957**	**882**	**922**
	Sulfate, Total (as SO4)	**CalMoAvg**		**mg/L**	**89**	**91.1**	**0**	**0**	**98.7**	**102**	**95.1**	**112**	**117.5**	**117**	**123**	**122**
		CalMoMax		**mg/L**	**90.4**	**91.1**	**0**	**0**	**98.7**	**102**	**97.9**	**112**	**120**	**117**	**123**	**123**
SD 008	**Evaporation, Accumulated**	**CalMoTot**		**in**	**2.9**	**4.05**	**4.5**	**3.7**	**2.35**	**0.67**	**0.23**	**0.21**	**0.27**	**0.63**	**1.3**	**2.2**
	Flow	**CalMoTot**		**Mgal**	**31.2**	**0.5**	**0**	**0**	**4.3**	**63.2**	**28.4**	**101.9**	**168.8**	**36.4**	**117.3**	**424.2**
	Precipitation	**CalMoTot**		**in**	**1.9**	**2.82**	**0.77**	**4.42**	**1.78**	**0.97**	**3.11**	**0.82**	**0.86**	**0.89**	**2.54**	**4.26**
SD 009	**Chloride, Total**	**CalMoMax**		**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Flow	**CalMoAvg**		**mgd**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		CalMoTot		**Mgal**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Iron, Dissolved (as Fe)	**CalMoAvg**	**1**	**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		DailyMax	**2**	**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Mercury, Total (as Hg)	**SingleVal**		**ng/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Nitrite Plus Nitrate, Total (as N)	**SingleVal**		**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Nitrogen, Ammonia,	**SingleVal**		**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	Total (as N)															
	Nitrogen, Kjeldahl, Total	**SingleVal**		**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	pH	**InstantMax**	**9**	**SU**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		InstantMin	**6**	**SU**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Selenium, Total (as Se)	**CalMoAvg**		**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Solids, Total Dissolved (TDS)	**SingleVal**		**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Solids, Total Suspended (TSS)	**CalMoAvg**	**20**	**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		DailyMax	**30**	**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Specific Conductance	**CalMoAvg**		**mmh/cm**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Sulfate, Total (as SO4)	**CalMoAvg**		**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
		CalMoMax		**mg/L**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Receiving water(s)

Use classification

The facility has three permitted discharge outfalls: SD 001, SD 005 and SD 009. Discharge SD 001 is a controlled discharge for tailings basin water from Reservoir 6 via siphon to Reservoir 2. Outfall SD 001 is used when water levels in Reservoir 6 are high enough to discharge. Outfall SD 005 was established to discharge tailings basin water under normal operations from Reservoir 6 to Reservoir 2. The physical discharge location for SD 009 has not been constructed at this time, however when it is established, it will discharge mine pit dewatering from the Sargent Pit to Reservoir 2 as approved in the 2011 permit issuance.

All waters of the state of Minnesota must be classified based on considerations of best usage in the interest of the public and in conformance with the requirements of the applicable statutes, as described in Minn. R. 7050.0140. Based on these considerations, the receiving waters downstream of the Keetac Tailings Basin are classified as listed in the table below.

Discharge	Receiving Water	Receiving Water Use Classification
SD 001	Reservoir 2 to Hay Creek	Class 2Bg, 3, 4A, 4B, 5, 6 Water
SD 005	Reservoir 2 to Hay Creek	Class 2Bg, 3, 4A, 4B, 5, 6 Water
SD 009	Reservoir 2 to Hay Creek	Class 2Bg, 3, 4A, 4B, 5, 6 Water

Class 1 waters, domestic consumption. Domestic consumption includes all waters of the state that are or may be used as a source of supply for drinking, culinary or food processing use, or other domestic purposes and for which quality control is or may be necessary to protect the public health, safety, or welfare.

Class 2 waters, aquatic life and recreation. Aquatic life and recreation includes all waters of the state that support or may support aquatic biota, 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 water, 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.

Class 6 waters, other uses and protection of border wars. Other uses includes 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 agency may deem proper.

The beneficial use subclass designators "e," "g," and "m" are added to the Class 2 designator as specific additional designators. The additional subclass designators do not replace the Class 2 designator. All requirements for Class 2 stream and river habitats in Minn. R. 7050.0222 and 7052.0100 continue to apply in addition to requirements for Class 2Bg stream and river habitats in Minn. R. 7050.0222. These subclass designators are applied to lotic waters only.

More information on the classification of waters can be found in Minn. R. 7050.0140.

Summary of existing permit effluent limits

The following tables summarize the final limits and monitoring requirements of the most recently issued permit dated November 15, 2011.

Table 3 – SD 001

Pollutant, units	Calendar month average	Calendar month maximum	Calendar month total	Instantaneous maximum	Instantaneous minimum	Daily maximum	Frequency	Which months
Flow	Monitor only	Monitor only	Monitor only				1 x month	Jan – Dec
Iron, Dissolved (as Fe)	1.0 mg/L					2.0 mg/L	1 x month	Jan - Dec
Mercury, Total (as Hg)		Monitor only					1 x month	Jan - Dec
pH				9.0 SU	6.0 SU		1 x month	Jan - Dec
Total Suspended Solids (TSS)	20 mg/L					30 mg/L	1 x month	Jan - Dec
Specific Conductance	Monitor only						1 x month	Jan - Dec
Sulfate, Total (as SO_4)	14 mg/L	24 mg/L					2 x month	Jan - Dec

Table 4 – SD 005

Pollutant, units	Calendar month average	Calendar month maximum	Calendar month total	Instantaneous maximum	Instantaneous minimum	Daily maximum	Calendar Quarter Maximum	Frequency	Which months
Flow	Monitor only	Monitor only	Monitor only					1 x month	Jan – Dec
Iron, Dissolved (as Fe)	1.0 mg/L					2.0 mg/L		1 x month	Jan - Dec
Mercury, Total (as Hg)							Monitor only	1 x quarter	Jan - Dec
pH				9.0 SU	6.0 SU			1 x month	Jan - Dec
Selenium, Total (as Se)	Monitor only							1 x month	Jan – Dec
Total Suspended Solids (TSS)	20 mg/L					30 mg/L		1 x month	Jan - Dec
Specific Conductance	Monitor only							1 x month	Jan - Dec
Sulfate, Total (as SO_4)	14 mg/L	24 mg/L						2 x month	Jan - Dec

Table 5 – SD 009

Pollutant, units	Calendar month average	Calendar month maximum	Calendar month total	Instantaneous maximum	Instantaneous minimum	Daily maximum	Calendar quarter maximum	Frequency	Which months
Chloride, Total		Monitor only						1 x month	Jan – Dec
Flow	Monitor only	Monitor only	Monitor only					1 x month	Jan – Dec
Iron, Dissolved (as Fe)	1.0 mg/L					2.0 mg/L		1 x month	Jan – Dec
Mercury, Total (as Hg)							Monitor only	1 x quarter	Jan – Dec
Nitrite plus Nitrate, Total (as N)		Monitor only						2 x year	Jan – Dec
Nitrogen, Ammonia, Total (as N)		Monitor only						2 x year	Jan – Dec
Nitrogen, Kjeldahl, Total		Monitor only						2 x year	Jan – Dec
pH				9.0 SU	6.0 SU			1 x month	Jan – Dec
Selenium, Total (as Se	Monitor only							1 x month	Jan – Dec
Solids, Total Dissolved (TDS)		Monitor only						2 x year	Jan – Dec
Solids, Total Suspended (TSS)	20 mg/L					30 mg/L		1 x month	Jan – Dec
Specific Conductance	Monitor only							1 x month	Jan – Dec
Sulfate, Total (as SO_4)	14 mg/L	24 mg/L						2 x month	Jan – Dec

Proposed permit effluent limits

Surface water discharge stations

Limits and monitoring requirements for surface water discharges are set in consideration of Minnesota state water discharge criteria, also known as SDRs. SDRs are based on Minn. R. ch. 7053, Minnesota state WQBELs for the receiving water use classification, federal TBEL limits applicable to specific discharge types, or a combination of these limits to regulate the discharge of wastewater. When limits overlap for a particular pollutant, the most protective limit is applied. In addition, the Minnesota Pollution Control Agency (MPCA) may derive limits that are specific to a particular discharge. These limits may be based on toxicity studies, professional judgment analysis, technology-based standards, and in some instances, standards developed by other U.S. states or regulatory agencies.

The receiving water lowest average seven-day flow with a once in ten-year recurrence interval ($7Q_{10}$) low flow at outfalls SD 001, SD 005 and SD 009 is zero cubic feet per second (cfs), thus no dilution factors were used in determining the discharge limits in relation to the immediate receiving waters.

The monitoring frequency at surface discharging outfalls (SD 001, SD 005 and SD 009) is based on MPCA guidelines. The monitoring frequencies are set to achieve sufficient data to determine the compliance with limits established for iron ore mining facilities.

Technology-based Effluent Limits (TBEL)

EPA promulgated the Ore Mining and Dressing Effluent Guidelines and Standards (40 CFR 440) in 1975, and amended the regulation in 1978, 1979, 1982 and 1988. The regulations under 40 CFR 440 Subpart A cover wastewater discharges from ore mines and processing operations. This effluent limit guideline (ELG) has been incorporated into the NPDES/SDS permit for the discharges at the Keetac Tailings Basin and the mine pit dewatering discharge at the Sargent Pit and is applicable at SD 001, SD 005 and SD 009.

Table 6: TBELs – SD 001, SD 005 and SD 009

Pollutant	Calendar month average	Daily Maximum	Range	Basis
Iron (dissolved)	1.0 mg/L	2.0 mg/L		40 CFR 440.12(a)
Total suspended solids (TSS)	20 mg/L	30 mg/L		40 CFR 440.12(a)
pH			6.0 – 9.0 SU	40 CFR 440.12(a)

Allowable Discharge Narrative TBEL Limits:

In addition to the numerical technology based effluent limits identified in Table 6 above, 40 CFR §440.14(c)(1) states, in part, "there shall be no discharge of process wastewater to navigable waters from mills that employ magnetic and physical methods to beneficiate iron ore in the Mesabi Range". 40 CFR §440.14(c)(2) allows for the discharge of the difference between the annual precipitation falling on the treatment facility and the drainage area contributing surface runoff to the treatment facility and annual evaporation may be discharged subject to the limits set forth in §440.104(a).

The Permittee shall discharge through outfalls SD 001 and SD 005 no more than the annual net precipitation from the tailings basin during each calendar year. The annual net precipitation shall be determined by the following formula to allow for this provision in the event precipitation exceeds the annual evaporation at the site:

Y = (Af * P) - (At * E)

where:

Y = annual net precipitation
Af = area of the tailings basin plus the drainage area contributing surface runoff to the tailings basin
P = total annual precipitation
At = open water area of the tailings basin plus Reservoir 6
E = annual lake evaporation.

The total annual precipitation annual lake evaporation shall be based on the sum of the data reported through WS 002.

The total allowable annual discharge under the permit is limited to the volume of net precipitation calculated using the above formula.

If the Permittee does not discharge through outfalls SD 001 and SD 005 the volume equivalent to the annual net precipitation in a given calendar year, then the Permittee may carry over the difference between the annual net precipitation and the actual volume discharged as a credit to the annual net precipitation for the following calendar year. Such credit may be carried over only to that calendar year immediately following the year in which not all of the allowable discharge volume was utilized.

Water Quality-based Effluent Limits (WQBEL)

Minn. R. 7053.0205, subp. 8 authorizes the MPCA to develop WQBELs for point source discharges to waters of the state of Minnesota to protect receiving waters for the applicable use classifications. Minn. R. 7050.0155 requires that all waters must maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters, including the waters of another state.

Wastewater discharges from the tailings basin (SD 001 and SD 005) and the mine pit dewatering discharge from the Sargent Pit (SD 009) discharge to Reservoir 2 which flows to Hay Creek and ultimately to Hay Lake. The receiving water and downstream waters are designated as Class 2Bg, 3, 4A, 4B, 5, 6 waters and are subject to water quality-based effluent limits.

The quality of Class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm aquatic biota, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface water is not protected as a source of drinking water (Minn. R. 7050.0222, subp. 4).

The draft permit contains interim and final effluent limits for total sulfate for the discharges from the tailings basin outfalls (SD 001 and SD 005). Sulfate limits are WQBELs based on Class 4A waters that are used for the production of wild rice (Minn. R. 7050.0224 Subpart 2). The interim sulfate limits were developed based on an effluent limit review of current discharge concentrations from the tailings basin discharge at SD 005. The interim sulfate limits are concentrations that are currently achievable. The interim sulfate effluent limits will be managed through a compliance schedule in the draft permit and are applicable until the facility attains compliance with the final effluent limits as required by the compliance schedule. The interim and final sulfate limits are listed in Table 7 and Table 8.

The proposed mine pit dewatering discharge (SD 009) for the Sargent Pit dewatering to Reservoir 2 pit was originally permitted in 2011, however, discharge from this pit has not initiated and an outfall location has not yet been constructed. Discharge from SD 009 is prohibited until the proposed outfall can attain final effluent limits for sulfate.

Table 7: Interim and Final WQBELs – SD 001 and SD 005

Pollutant	Calendar month average	Daily maximum	Monthly maximum	Basis
INTERIM Sulfate, Total (as SO_4)			135.3 mg/L	Minn. R. 7050.0224 Subp. 2
FINAL Sulfate, Total (as SO_4)	14 mg/L	24 mg/L		Minn. R. 7050.0224 Subp. 2

Table 8: Final WQBELs – SD 009

Pollutant	Calendar month average	Daily maximum	Monthly maximum	Basis
FINAL Sulfate, Total (as SO_4)	14 mg/L	24 mg/L		Minn. R. 7050.0224 Subp. 2

Reasonable Potential for Chemical Specific Pollutants [40 C.F.R. § 122.44 (d)(1)]

Background for reasonable potential review

Federal regulations (40 C.F.R. § 122.44(d)(1)) require the MPCA to evaluate the discharge to determine whether the discharge has the reasonable potential (RP) to cause or contribute to a violation of WQS. The MPCA must use acceptable technical procedures, accounting for variability (coefficient of variation, or CV), when determining whether the effluent causes, has the reasonable potential to cause, or contribute to an excursion of an applicable WQS. 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 RP to cause or contribute to a WQS excursion. When RP is indicated, the permit must contain a WQBEL for that pollutant.

Sulfate and Wild Rice

A reasonable potential evaluation for total sulfate was conducted in 2011 for the previous permit reissuance. During the 2011 permit reissuance, the MPCA made the determination that sulfate from the facility's discharges via SD 001 and SD 005 (and SD 009 when activated) reach (or will reach) downstream waters that are used for the production of wild rice. Pursuant to Minn. R. 7050.0224 Subpart 2, and the available information at the time of that permit reissuance, the MPCA included final effluent limitations for total sulfate based on a water quality standard of 10 mg/L total sulfate for these outfalls. A reasonable potential analysis was conducted for SD 001, SD 005 and SD 009 and is summarized in the table below. The calculations were based on a zero-dilution factor, due to the fact that Hay Lake is above the currently supported water quality standard of 10 mg/L sulfate using a default CV of 0.6. The MPCA has since conducted an impaired waters review. Hay Lake, located downstream of the Keetac mining discharges is listed as impaired for sulfate; therefore, the sulfate limits calculated in 2011 will remain in the permit. A summary of the reasonable potential calculation is in the Table 9 below.

Table 9 - Reasonable Potential – Sulfate

Parameter	SD 001: Sulfate (mg/L)	SD 005: Sulfate (mg/L)	SD 009: Sulfate (mg/L)
Maximum measured effluent value	**77.6**	**137**	**113**
Projected effluent quality (PEQ) @ n data points	85.36 (10)	1 (47)	700.6 (1)
Plant design flow (mgd)	**9.4**	**23**	**4.75**
Receiving water design flow (mgd)	0	0	0
Background concentration	0	0	0
Continuous standard (cs)	10	10	10
Maximum standard (ms)	-	-	-
Final acute value (FAV)	-	-	-
Mass Balance - cs	10	10	10
Mass Balance - ms	-	-	-
Coefficient Of Variation (CV)	0.6	0.6	0.6
Long Term Average: LTA cs	7.8902	7.8029	7.802
LTA ms	-	-	-
Preliminary Effluent Limit (PEL): Daily Maximum	24.3	24.3	24.3
Monthly Average	14.0	14.0	14.0
Reasonable Potential PEQ>PEL (Dmax/FAV)	**Yes**	**Yes**	**Yes**

Selenium and Specific Conductance

For the tailings basin discharge, SD 005, a reasonable potential analysis was conducted for selenium and specific conductance. Since 2014, the discharge has never once discharged above the applicable selenium water quality standard of 5 ug/L. The max reported value was 3 ug/L with 64 samples analyzed. No selenium effluent limitation is required and selenium monitoring is discontinued at SD 005 and SD 009 in the draft permit.

Since 2014, the discharge has never once discharged specific conductance at a level that could impair agricultural irrigation (1500 uS/cm). The max reported value was 1028 uS/cm with 63 samples analyzed. No specific conductance effluent limit is needed to protect irrigation.

Summary of proposed final effluent limit and monitoring requirements

Table 10 – SD 001

Pollutant, units	Calendar month average	Calendar month maximum	Calendar month total	Calendar quarter maximum	Calendar year maximum	Instantaneous maximum	Instantaneous minimum	Daily maximum	Frequency	Which months
Alkalinity, Total		Monitor only							1 x month	Jan - Dec
Calcium, Total (as Ca)		Monitor only							1 x month	Jan - Dec
Chloride, Total		Monitor only							1 x month	Jan - Dec
Eh (Oxidation Potential)		Monitor only							1 x month	Jan - Dec
Flow	Monitor only	Monitor only	Monitor only						1 x month	Jan – Dec
Fluoride, Total (as F)		Monitor only							1 x month	Jan - Dec
Iron, Dissolved (as Fe)	1.0 mg/L							2.0 mg/L	1 x month	Jan - Dec
Iron, Total (as Fe)		Monitor only							1 x month	Jan - Dec
Magnesium, Total (as Mg)		Monitor only							1 x month	Jan - Dec
Manganese, Total (as Mn)		Monitor only							1 x month	Jan - Dec
Mercury, Dissolved (as Hg)				Monitor only					1 x quarter	Mar, Jun, Sep, Dec
Mercury, Total (as Hg)				Monitor only					1 x quarter	Mar, Jun, Sep, Dec
Nitrite plus Nitrate, Total (as N)					Monitor only				1 x year	Dec
Nitrogen, Kejldahl, Total					Monitor only				1 x year	Dec
Nitrogen, Total (as N)					Monitor only				1 x year	Dec
pH						9.0 SU	6.0 SU		1 x month	Jan - Dec
Phosphorus, Total (as P)					Monitor only				1 x year	Dec
Potasslium, Total (as K)		Monitor only							1 x month	Jan - Dec
Sodium, Total (as Na)		Monitor only							1 x month	Jan - Dec
Solids, Total Dissolved (TDS)		Monitor only							1 x month	Jan - Dec
Total Suspended Solids (TSS)	20 mg/L							30 mg/L	1 x month	Jan - Dec
Solids, Total Suspended (TSS, grab (Mercury)				Monitor only					1 x quarter	Mar, Jun, Sep, Dec
Specific Conductance	Monitor only	Monitor only							1 x month	Jan - Dec
Sulfate, Total (as SO_4)	14 mg/L	24 mg/L							2 x month	Jan - Dec

Table 11 – SD 005

Pollutant, units	Calendar month average	Calendar month maximum	Calendar month total	Calendar quarter maximum	Calendar year maximum	Instantaneous maximum	Instantaneous minimum	Daily maximum	Frequency	Which months
Alkalinity, Total		Monitor only							1 x month	Jan - Dec
Calcium, Total (as Ca)		Monitor only							1 x month	Jan - Dec
Chloride, Total		Monitor only							1 x month	Jan - Dec
Eh (Oxidation Potential)		Monitor only							1 x month	Jan - Dec
Flow	Monitor only	Monitor only	Monitor only						1 x month	Jan – Dec
Fluoride, Total (as F)		Monitor only							1 x month	Jan - Dec
Iron, Dissolved (as Fe)	1.0 mg/L							2.0 mg/L	1 x month	Jan - Dec
Iron, Total (as Fe)		Monitor only							1 x month	Jan - Dec
Magnesium, Total (as Mg)		Monitor only							1 x month	Jan - Dec
Manganese, Total (as Mn)		Monitor only							1 x month	Jan - Dec
Mercury, Dissolved (as Hg)				Monitor only					1 x quarter	Mar, Jun, Sep, Dec
Mercury, Total (as Hg)				Monitor only					1 x quarter	Mar, Jun, Sep, Dec
Nitrite plus Nitrate, Total (as N)					Monitor only				1 x year	Dec
Nitrogen, Kejldahl, Total					Monitor only				1 x year	Dec
Nitrogen, Total (as N)					Monitor only				1 x year	Dec
pH						9.0 SU	6.0 SU		1 x month	Jan - Dec
Phosphorus, Total (as P)					Monitor only				1 x year	Dec
Potasslium, Total (as K)		Monitor only							1 x month	Jan - Dec
Sodium, Total (as Na)		Monitor only							1 x month	Jan - Dec
Solids, Total Dissolved (TDS)		Monitor only							1 x month	Jan - Dec
Total Suspended Solids (TSS)	20 mg/L							30 mg/L	1 x month	Jan - Dec
Solids, Total Suspended (TSS, grab (Mercury)				Monitor only					1 x quarter	Mar, Jun, Sep, Dec
Specific Conductance	Monitor only	Monitor only							1 x month	Jan - Dec
Sulfate, Total (as SO4)	14 mg/L	24 mg/L							2 x month	Jan - Dec

Table 12 – SD 009

Pollutant, units	Calendar month average	Calendar month maximum	Calendar month total	Calendar quarter maximum	Calendar year maximum	Instantaneous maximum	Instantaneous minimum	Daily maximum	Frequency	Which months
Chloride, Total		Monitor only							1 x month	Jan - Dec
Flow	Monitor only	Monitor only	Monitor only						1 x month	Jan – Dec
Iron, Dissolved (as Fe)	1.0 mg/L							2.0 mg/L	1 x month	Jan - Dec
Mercury, Dissolved (as Hg)				Monitor only					1 x quarter	Mar, Jun, Sep, Dec
Mercury, Total (as Hg)				Monitor only					1 x quarter	Mar, Jun, Sep, Dec
Nitrite plus Nitrate, Total (as N)					Monitor only				1 x year	Dec
Nitrogen, Kejldahl, Total					Monitor only				1 x year	Dec
Nitrogen, Total (as N)					Monitor only				1 x year	Dec
pH						9.0 SU	6.0 SU		1 x month	Jan - Dec
Phosphorus, Total (as P)					Monitor only				1 x year	Dec
Solids, Total Dissolved (TDS)		Monitor only							1 x month	Jan - Dec
Total Suspended Solids (TSS)	20 mg/L							30 mg/L	1 x month	Jan - Dec
Solids, Total Suspended (TSS, grab (Mercury)				Monitor only					1 x quarter	Mar, Jun, Sep, Dec
Specific Conductance		Monitor only							1 x month	Jan - Dec
Sulfate, Total (as SO_4)	14 mg/L	24 mg/L							2 x month	Jan - Dec

Explanation of total phosphorus limit review

Total phosphorus:

Federal law [40 C.F.R. § 122.44(d)] restricts mass increases of pollutants upstream of an impaired water and requires WQBEL(s) to be established for pollutant parameters where it is found that a NPDES/SDS discharger has the reasonable potential (RP) to cause or contribute to an excursion above a state WQS. An effluent limits analysis was completed to determine if the facility's discharge has RP to cause or contribute to an exceedance of a state WQS or contribute to any downstream impairment. As a result of the analysis, it was determined that discharge from the facility does not have RP; and therefore, a WQBEL for total phosphorus is not required at this time.

River Eutrophication Standards (RES)

A watershed review was conducted to determine total phosphorus effluent limits for NPDES facilities discharging to the Upper Mississippi River - Grand Rapids Watershed. This analysis demonstrated that the facility does not have RP to cause or contribute to a river eutrophication impairment in the Grand Rapids Watershed, under permitted effluent conditions. As such, no limit in the permit is needed to protect the immediate receiving waters based on current performance levels and permitted flow.

Detailed information regarding the TP limit evaluation can be found in the January 12, 2018, MPCA memorandum titled, *"*Total Phosphorus effluent limit review: Upper Mississippi River – Grand Rapids Watershed*."* A copy of the MPCA memorandum is available upon request from the MPCA.

Waste stream stations

Limits and monitoring requirements for waste streams are assigned to ascertain a waste stream's impact on wastewater treatment processes, another treatment facility, and/or land treatment/discharge sites. Requirements are based on MPCA sampling policies and/or state health requirements. The draft permit contains four internal waste stream monitoring stations: A water intake station for non-precipitation inputs into the facility (WS 001); A calculation station for monitoring the allowable discharge volume at the tailings basin (WS 002); internal monitoring at the Stage 2 interior pond (WS 003); internal monitoring at the Stage 2 exterior pond (WS 004) functional equivalency determination. The monitoring requirements at the waste streams stations are summarized in the tables below.

Summary of proposed internal monitoring and reporting requirements

Table 13: WS 001

Pollutant	Calendar month total	Frequency	Which months
Flow, Total	Monitor only	1 x month	Jan – Dec

Table 14: WS 002

Pollutant	Calendar month total	Frequency	Which months
Evaporation, Accumulated	Monitor only	1 x year	Jan - Dec
Flow	Monitor only	1 x year	Jan - Dec
Precipitation	Monitor only	1 x year	Jan - Dec

Table 15: WS 003 and WS 004

Pollutant	Calendar month maximum	Frequency	Which months
Alkalinity, Total	Monitor only	1 x month	Jan – Dec
Calcium, Total (as Ca)	Monitor only	1 x month	Jan – Dec
Chloride, Total	Monitor only	1 x month	Jan – Dec
Eh (Oxidation potential)	Monitor only	1 x month	Jan – Dec
Fluoride, Total (as F)	Monitor only	1 x month	Jan – Dec
Iron, Total (as Fe)	Monitor only	1 x month	Jan – Dec
Magnesium, Total (as Mg)	Monitor only	1 x month	Jan – Dec
Manganese, Total (as Mn)	Monitor only	1 x month	Jan – Dec
Nitrite plus Nitrate, Total (as N)	Monitor only	1 x month	Jan – Dec
pH	Monitor only	1 x month	Jan – Dec
Potassium, Total (as K)	Monitor only	1 x month	Jan – Dec
Sodium, Total (as Na)	Monitor only	1 x month	Jan – Dec
Solids, Total Dissolved (TDS)	Monitor only	1 x month	Jan – Dec
Specific Conductance	Monitor only	1 x month	Jan – Dec
Sulfate, Total (as SO_4)	Monitor only	1 x month	Jan – Dec

Surface water stations

Monitoring of nearby surface waters is required in the permit to determine whether wild rice in Hay Lake is protected from sulfate. This additional surface water monitoring will also aid in the functional equivalency determination work required in the draft permit.

Monitoring at Reservoir 2 is conducted at SW 001. The outlet of Reservoir 2 at SW 001 is a monitoring station originally requested by the Permittee and is in the existing permit. Flow is monitored from this station and additional parameters to aid in the functional equivalency determination have been added to SW 001 in the draft permit. A summary of the rationale for the new proposed monitoring stations is summarized in the table below:

Table 16: Rationale for each surface water monitoring station.

Station	Location	**Rationale**/Purpose
SW 001	Reservoir 2	Monitoring station required by existing permit
SW 002	Hay Creek	Quantify salt loading from wetland complex south of tailings basin into Hay Creek
SW 003	Reservoir 2 to Hay Creek	Quantify salt loading from Reservoir 2 and upstream dischargers
SW 004	Hay Lake	1) Quantify salt loading from sources upstream of Hay Lake 2) Understand how sulfate concentrations vary in Hay Lake over time 3) Determine whether Hay Lake is in exceedance of the wild rice standard
SW 005	Hay Creek Headwaters	1) Quantify salt loading from wetland complex immediately south of basin 2) Allows for comparison with downstream stations to understand near basin water quality and the effect of any dilution
SW 006	Unnamed Wetland	Understand salt concentrations in a wetland near the basin that is not hydrologically connected by a surface water discharge
SW 007	Hart Lake	Understand salt concentrations in a nearby waterbody that is not hydrologically connected to any upstream dischargers and has sulfate near regional baseline levels (median 2.7 mg/L)
SW 008	Unnamed Creek	Quantify salt loading from wetland complex south of tailings basin

The proposed monitoring requirements for the surface water stations are found Table 17 below. A Surface Water Monitoring Protocol document with additional details regarding the SW station(s) is available upon request.

Table 17: SW 001 – SW 008

Pollutant	Calendar month maximum	Frequency	Which months
Alkalinity, Total	Monitor only	1 x month	Jan – Dec
Calcium, Total (as Ca)	Monitor only	1 x month	Jan – Dec
Chloride, Total	Monitor only	1 x month	Jan – Dec
Eh (Oxidation potential)	Monitor only	1 x month	Jan – Dec
Fluoride, Total (as F)	Monitor only	1 x month	Jan – Dec
Iron, Total (as Fe)	Monitor only	1 x month	Jan – Dec
Magnesium, Total (as Mg)	Monitor only	1 x month	Jan – Dec
Manganese, Total (as Mn)	Monitor only	1 x month	Jan – Dec
Nitrite plus Nitrate, Total (as N)	Monitor only	1 x month	Jan – Dec
pH	Monitor only	1 x month	Jan – Dec
Potassium, Total (as K)	Monitor only	1 x month	Jan – Dec
Sodium, Total (as Na)	Monitor only	1 x month	Jan – Dec
Solids, Total Dissolved (TDS)	Monitor only	1 x month	Jan – Dec
Specific Conductance	Monitor only	1 x month	Jan – Dec
Sulfate, Total (as SO_4)	Monitor only	1 x month	Jan – Dec

Pollutants of concern

Mercury

This permit contains requirements for mercury monitoring. These requirements were added in response to the EPA's approval of the Minnesota statewide Mercury Total Maximum Daily Load (TMDL) plan. More information on the TMDL can be found on the MPCA's website at https://www.pca.state.mn.us/business-with-us/statewide-mercury-tmdl. Specific mercury monitoring requirements are found in the Surface Discharge Stations sections of this permit. Those requirements include sampling for TSS via a grab sample taken at the same time as the total and dissolved mercury grab samples are taken.

The mercury monitoring at outfalls SD 001, SD 005 and SD 009 is consistent with the *MPCA Permitting Strategy for Addressing Mercury in Municipal and Industrial Wastewater Permits* (2013) located on the MPCA's website at https://www.pca.state.mn.us/sites/default/files/wq-wwprm1-16.pdf.

Nitrogen

Nitrogen is a pollutant that can negatively impact the quality of Minnesota's water resources, including water used for drinking. Studies have shown that nitrogen in lakes and streams has a toxic effect on aquatic life such as fish. Like phosphorus, nitrogen is a nutrient that promotes algae and aquatic plant growth often resulting in decreased water clarity and oxygen levels. The Statewide Nutrient Reduction Strategy (https://www.pca.state.mn.us/air-water-land-climate/reducing-nutrients-in-waters)identifies goals and milestones for nitrogen reductions for both point and non-point nitrogen sources in Minnesota. To gain a better understanding of the current nitrogen concentrations and loadings received by and discharged from the facility, effluent nitrogen monitoring is required, in accordance with Minn. Stat. ch. 115.03.

The draft permit includes effluent monitoring for nitrite plus nitrate-nitrogen, total Kjeldahl nitrogen and total nitrogen at a frequency of once per year for the five-year term of the permit. There is no nitrogen limit in the permit. This nitrogen monitoring will provide the data necessary to develop a better understanding of the total nitrogen concentrations and loadings that are discharged. Once a more extensive total nitrogen data set is established, nitrogen reduction work can begin to achieve the necessary reductions to meet the goal of a 20% reduction in total nitrogen loads from point source dischargers by 2025. The changes and/or increases in total nitrogen monitoring in wastewater permits as a result of the *Statewide Nutrient Reduction Strategy* is outlined in the *Minnesota NPDES Wastewater Permit Nitrogen Monitoring Implementation Plan* document located on the MPCA's website at https://www.pca.state.mn.us/sites/default/files/wq-wwprm1-22.pdf.

Per- and Polyfluoroalkyl substances (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are a group of more than 5,000 human-made chemicals that do not break down over time. They are a class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom. Their extreme resistance to degradation in the environment and resistance to destruction in wastewater treatment plants, landfills, and incinerators has led to the nickname "forever chemicals."

Many PFAS are known to be health hazards to humans. Several specific PFAS have been linked to increased risks for cancer, liver disease, immune system disfunction, and other negative health impacts. PFAS can also negatively impact aquatic life and wildlife.

Due to the potential for chemical additive products used in the company's process potentially containing PFAS ingredients, The draft permit includes requirements for the Permittee to conduct a PFAS Inventory to identify and reduce potential sources of PFAS in its processing facility. The PFAS Inventory is due within 18 months of permit issuance.

Phosphorus

Phosphorus is a common constituent in many wastewater discharges and a pollutant that has the potential to negatively impact the quality of Minnesota's lakes, wetlands, rivers, and streams. Phosphorus promotes algae and aquatic plant growth, often resulting in decreased water clarity and oxygen levels. In addition to creating general aesthetic problems, these conditions can also impact a water body's ability to support healthy fish and other aquatic species. Therefore, phosphorus discharges are being carefully evaluated throughout the state.

All phosphorus samples must be analyzed by a certified laboratory and the data submitted to the MPCA. If the laboratory would like more information about becoming certified, please call the Environmental Laboratory Certification Unit at 612-676-5200. Samples must be collected in a clean bottle (preferably cleaned by a certified laboratory) that was not washed with phosphate detergent. Also, a sulfuric acid preservative must be added immediately after the sample is collected, and it must be stored at four degrees Celsius until analysis. If a contract laboratory is used, the bottle and preservative would typically be provided by the laboratory analyzing the sample.

Guidance for considering phosphorus in the wastewater treatment system can be found on the MPCA's website at https://www.pca.state.mn.us/water/phosphorus-management-plans or the University of Minnesota's website at http://www.mntap.umn.edu/greenbusiness/water/phosphorus.htm. For additional information about completing the PMP, please contact the MPCA at 651-282-6143 or 800-657-3864.

Salty discharge monitoring

In recent years, MPCA staff became aware of issues associated with "salty discharges." As a result, MPCA staff began to request monitoring for these facilities and began assigning effluent limits to facilities that already have data that show a reasonable potential to exceed a WQS for Classes 2, 3 and 4. Total dissolved solids and specific conductance monitoring at a frequency of once per month is required by the draft permit.

Specific Conductance – Class 4A Irrigation

Since 2014, the discharge has never once discharged specific conductance at a level that could impair agricultural irrigation (1,500 uS/cm). The max reported value was 1028 uS/cm with 63 samples analyzed. No specific conductance effluent limit is needed to protect irrigation.

Specific Conductance – Aquatic life

Minnesota does not a have a Class 2 numeric aquatic life water quality standard that protects aquatic life from excess total salt levels. Since Minnesota does not have a numeric aquatic life water quality standard, no total salt (E.g. specific conductance indirectly measures total salts) reasonable potential analysis can be performed exclusively using numeric water quality standards listed in rule.

To protect water quality from excess total salts, MPCA must consider the Class 2 narrative water quality standard. The main expression of the narrative standard is in Minn. R. 7050.0150, Subp. 3. This states that "For all class 2 waters…the normal aquatic biota and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of aquatic biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters."

In addition, Minn. R. 7050.0222 contains narrative statements that the quality of each surface water with a Class 2 designation should be "such as to permit the propagation and maintenance of a healthy community of…aquatic biota and their habitats[,]" as appropriate to the Class 2 subclass (Class 2A cold water, Class 2B warm or cool water, Class 2D wetlands). While a narrative standard provides a clear statement of the conditions that should be present in waterbodies, it does not provide numeric values that must be met to ensure those conditions. It therefore is less easily used to craft NPDES permit conditions, and an additional narrative translator step is needed in order to implement narrative standards in discharge permits.

The MPCA does not have a specific process in rule to translate the narrative aquatic life standard into numeric effluent limitations in NPDES permits to protect total salts using specific conductance. EPA has not established a national guidance document to perform this translation that is applicable to Minnesota's Northern Lakes and Forest Ecoregion. Since no formal translation process has been established, MPCA will first consider the biological health of aquatic life in waters downstream of Keetac.

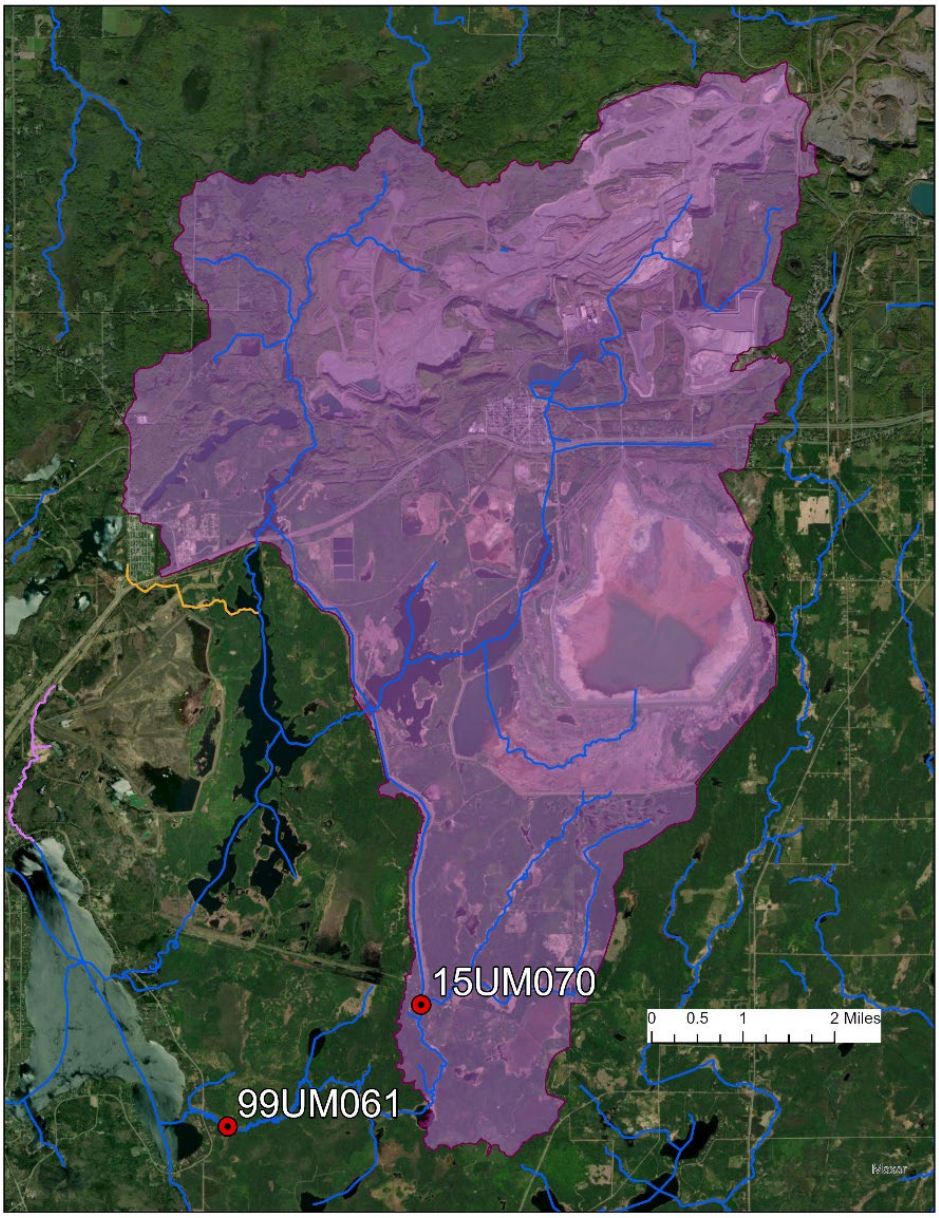
Minnesota has a Class 2 numeric Index of Biological Integrity (IBI) water quality standard that measures the overall health of aquatic communities by assessing the types of fish and macroinvertebrates that exist in surface waters. The IBI was designed and calibrated to be an indicator of overall stress on the biological community and is therefore the ultimate endpoint in determining if anthropogenic stressors are impacting aquatic life. The IBI was not designed to respond to any one stressor, but it is capable of showing a response to a single stressor, if that stressor is the overwhelming influence impacting aquatic health. When attempting to understand if the aquatic life of a stream is being impacted by a suspected stressor, the first step is to look at the IBI score.

Downstream of Keetac's discharges, but upstream of Hay Lake, only one location has been sampled for biology, location 15UM070 and it was last sampled in 2015 (Figure 1). Location 99UM601 is downstream of Hay Lake and has a slightly different hydrology. The fish IBI score at 15UM070 was excellent and statistically exceeded the upper confidence of the applicable biocriteria but the macroinvertebrate IBI score was statistically below the lower confidence of the applicable the macroinvertebrate IBI criteria (Table 1, Figure 1).

Table 1. IBI scores at locations downstream of Keetac sampled in 2015.

	Applicable Class 2Bg Numeric IBI Standard	Location 15UM070	Location 99UM601
Fish IBI	47	73	60
Macroinvertebrate IBI	53	39	60

Figure 1. Two locations where IBI sampling has occurred in the Hay Creek Watershed. The purple area is the watershed area upstream of Hay Lake.



The MPCA watershed assessment team wrote the following about the fish IBI score:

> *"Two biomonitoring stations (15UM070, 99UM061) each with one reportable/assessable fish sample; 15UM070 was sampled in July 2015, and 99UM061 was sampled in Aug 2015. The sample from 15UM070 scores above the exceptional use standard for fish aquatic life; 99UM061 scores right at the exceptional use standard. Both samples have very good diversity and contain several sensitive taxa (Longnose Dace, Logperch). Recommend support for aquatic life based on the fish community. March 21, 2017"*

The MPCA watershed assessment team wrote the following about the macro IBI score:

> *"Hay Creek is a small stream that drains approximately 60 square miles of forested and mining lands into the Southeast basin of Swan Lake, near Pengilly, MN. The headwaters of Hay Creek are channelized and much of the water originates from United States Steel Corporations tailings basin (Reservoir #2). Hay Creek was monitored at two locations (15UM070 & 99UM061) during the summer of 2015. The lower portion of Hay Creek is characteristic of a slow flowing, meandering stream with close connectivity to its forested wetland floodplain. Habitat within this stretch consists of woody debris, undercut banks, overhanging vegetation, submerged and emergent vegetation, and deep pools. Station 99UM061 was used to characterize this portion of the stream, and was originally sampled in 1999 however, these data are outside the 10 year assessment window. Macroinvertebrate index of biological integrity (M-IBI) scores from the 1999 and 2015 samples are above the general use threshold, however, there has been a 23 point decline in M-IBI since the 1999 visit. The upper portion of Hay Creek is a faster flowing section with most of its flow coming from the upstream tailings basin. Habitats in this section consist of small riffles, woody debris, and some undercut banks. M-IBI scores are below the general use threshold and at the lower confidence interval. All three samples are representative of a BCG (biological condition gradient) tier 3, with several sensitive taxa present at each location. The poor M-IBI scores at 15Um070 are likely due to the absence of dragonfly, stonefly and other predacious taxa; all often representative of long-lived taxa. Give the presence of sensitive taxa, BCG tier 3 ratings it appears this stream likely has water quality supportive of aquatic life, however due to the low score at 15UM070 we recommend an additional macroinvertebrate score be collected to confirm a full support decision. Given the decline in both fish and macroinvertebrate scores from 1999-2015 this stream appears to be in a declining pattern and likely in need of additional protection, therefore we recommend this stream be placed in the vulnerable category. 3-21-17"*

The final decision on IBI impairments is summarized below:

> *"After discussion during the watershed assessment team meeting, the suggestion to collect an additional macroinvertebrate sample was stayed. The rational for this was due to the overall Biological Condition Gradient scores, excellent Fish-IBI scores, and presence of several sensitive taxa at 15UM070. The watershed assessment team agrees this stream is meeting aquatic life parameters and recommends full support. 3-22-17*"

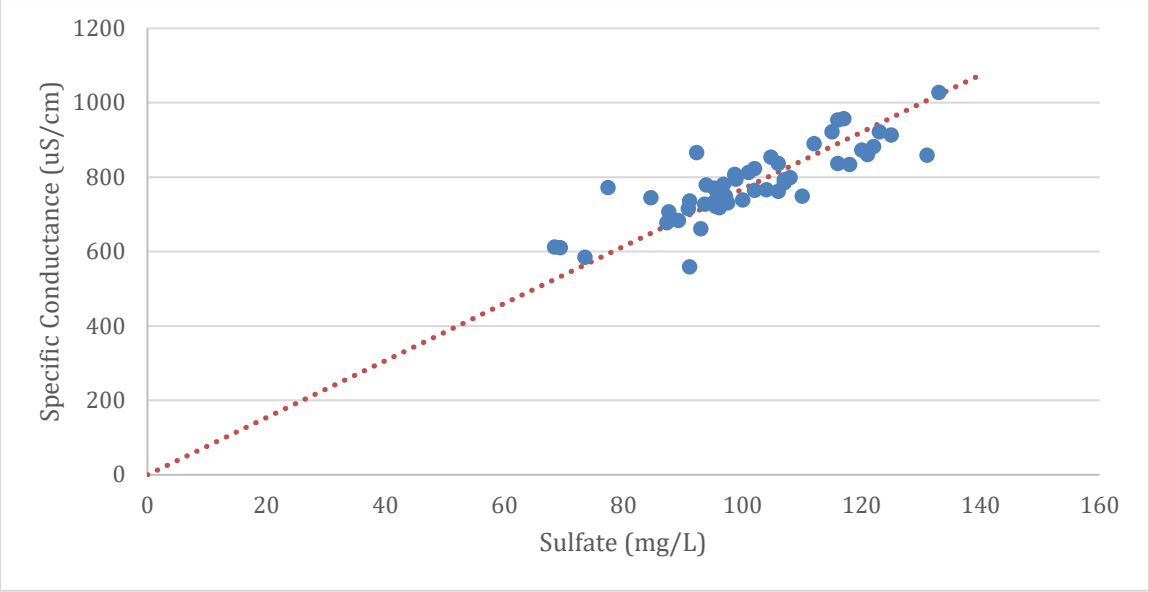
The MPCA did not list Hay Creek as impaired for IBI because the macroinvertebrate scores were just below the lower confidence intervals. There was evidence that macroinvertebrates that are sensitive to high total salt levels were present and fish populations were excellent. Since there is no clear evidence that aquatic life in waters downstream of Keetac are below the applicable IBI criteria, MPCA did not perform a numeric translation of the narrative aquatic life standard to then determine whether Keetac is causing or contributing to an exceedance of the narrative aquatic life standard with regards to specific conductance under 40 CFR 122.44(d)(1)(vi)(A).

MPCA is including a new requirement that Keetac perform additional IBI and surface water sampling in waters closer to their discharge as described in Attachment 2: Surface Water Monitoring Protocol. This will allow for a scientifically defensible specific conductance effluent limit determination during the permit re-issuance.

In order to protect aquatic life in downstream waters from excess total salts, sulfate will be used as the indicator parameter for the water quality parameter of total salinity or specific conductance as allowed under 40 CFR 122.44(d)(1)(vi)(C). When the 14 mg/L monthly average sulfate limit is complied with, specific conductance will likely be <200 uS/cm, which is lower than Minnesota's draft regional benchmark of 329 uS/cm that is likely to protect aquatic life (Example in Figure 2). For each 1 mg/L of sulfate dissolved in water, approximately 1.5 µS/cm of specific conductance is added and when sulfate limits are complied with sulfate ions will add less than 20 uS/cm of the total specific conductance signature (McCklesly, 2012; Snoeyink and Jenkins, 1991). There is no prudent or feasible full scale water treatment technology that can selectively remove only sulfate ions to less than 50 mg/L and thus removing sulfate will remove other major ions as well, which further lowers specific conductance (Kinnunen et. Al . 2018; Runti el. Al. 2018; Andrews and Richargs, 2017).

Since the 14 mg/L sulfate limit will protect Minnesota's class 2 aquatic life narrative standard from excess total salts and specific conductance, no additional specific conductance limits are needed in this permit. If limits on the indicator parameter of sulfate are found to no longer protect aquatic life in downstream waters, the permit may be modified, revoked or re-issued to include conditions that ensure that aquatic life is protected in downstream waters.

Figure 2. The relationship between specific conductance and sulfate at discharge station SD 005.



Sulfate

Sulfate monitoring for protection of wild rice waters

In 1973 Minnesota adopted a sulfate water quality standard to protect wild rice. In a February 16, 2022, letter to the MPCA, the US Environmental Protection Agency (EPA) stated that MPCA issued NPDES permits are required to comply with the federally-approved sulfate water quality standard and Minnesota Rules.

In order to comply with federal law and the total sulfate water quality standard, MPCA is including total sulfate limits (if applicable) and monitoring requirements in permits that are upstream of a water used for the production of wild rice. There are currently approximately 2400 waters within the state of Minnesota that have been identified as waters used for the production of wild rice (this includes the 35 waters identified on the 303(d) impaired waters list). The Keetac tailings basin discharges and mine pit dewatering from the Sargent Pit are upstream of Hay Lake, a water used for the production of wild rice and listed as impaired for sulfate/wild rice.

A reasonable potential evaluation for total sulfate was conducted in 2011 for the previous permit reissuance. The 2011 permit required effluent limits for total sulfate at SD 001, SD 005, and SD 009 based on Minnesota Rule 7050.0224, Subp 2. The 2011 permit also contained a compliance schedule to attain compliance with the final effluent limits for sulfate no later than August 17, 2019.

Minnesota Session Law[1] was passed in 2016 which provided the following for NPDES permits issued after January 1, 2010, and before May 1, 2016, that contains final effluent limits resulting from implementation of the wild rice water quality standard in Minnesota Rules part 7050.0224, subpart 2. If as of May 1, 2015, the Permittee is in substantial compliance with any compliance schedule permit conditions related to those final limits or has executed a schedule of compliance to resolve any noncompliance that existed before May 1, 2015, the: 1) sulfate limits resulting from the wild rice water quality standard in Minn.R. 7050.0224, subp 2 are no longer valid; and 2) any compliance schedule permit conditions related to those final limits are no longer valid. Following this legislation, US Steel delayed its compliance with the schedule and the company has not attained compliance with the final effluent limits originally permitted in 2011.

In response to the 2016 Session Law, EPA issued a letter to MPCA dated February 16, 2022, stating Minnesota is required to issue NPDES permits containing effluent limitations to meet all federally approved water quality standards as required by the Clean Water Act, federal regulations, and EPA-approved Minnesota laws and rules. The draft permit contains a compliance schedule which requires the permittee to meet a monthly average sulfate concentration of 14 mg/L and a daily maximum sulfate concentration of 24 mg/L at outfalls SD 001, SD 005 and SD 009. The proposed discharge from the Sargent Pit (SD 009) has never discharged nor has the actual outfall been constructed. Discharge from outfall SD 009 is prohibited until the outfall can attain final effluent limits for sulfate per the compliance schedule in the draft permit. A monthly maximum interim limit of 135.3 mg/L is applied at the tailings basin discharges (SD 001 and SD 005) and will apply under a compliance schedule in the draft permit until 12 months after completing construction of the selected treatment alternative or until the final effluent limits are met, whichever comes first.

The term of the compliance schedule is based on the time for completion of evaluations by the Permittee, time for implementation of any final plans for attaining compliance, including time for obtaining various regulatory approvals and construction of the chosen treatment option(s). Justification for the sulfate compliance schedule is further explained in the "Compliance Schedule" section below.

US Steel Corporation submitted an application for a Sulfate Site-Specific Standard for Hay Lake on August 17, 2022. On February 14, 2024, the MPCA sent US Steel a letter denying their application for a site-specific standard class 4A wild rice sulfate standard in Hay Lake. On March 18, 2024, US Steel appealed that denial letter in the Minnesota court of appeals and the appeal was denied on June 25, 2025. The draft permit does not contain a Site-Specific Standard for sulfate.

Total suspended solids (TSS)

Suspended Solids may include both organic and inorganic matter. The inorganic compounds may include sand, silt, clay and precipitated metals. The organic fraction may include such materials as wood fibers and unsettled biomass from biological treatment systems.

[1] [1] Minn. Laws 2016, Chapter 165, S.F. No. 3376, Section 1. Sulfate Effluent Compliance

These solids may settle out rapidly and bottom deposits are often a mixture of both organic and inorganic solids. Solids may be suspended in water for a time and then settle to the bed of the stream or lake. They may be inert, slowly biodegradable materials, or rapidly decomposable substances. While in suspension they increase the turbidity of the water, reduce light penetration, and impair the photosynthetic activity of aquatic plants. Suspended solids may kill fish and shellfish by causing abrasive injuries, by clogging gills and respiratory passages, by screening out light and by promoting and maintaining the development of noxious conditions through oxygen depletion. Suspended solids also reduce the recreational value of water.

There are no waste load allocations for total suspended solids in the Upper Mississippi River Total Suspended Solids TMDL (MPCA 2020).

Special Permit Conditions

Functional Equivalent Determination of Discharge

A 2020 Supreme Court decision in *County of Maui v. Hawaii Wildlife Fund*, 140 S. Ct. 1462 (2020), (Maui) requires that regulators consider whether discharges of wastewater from a facility to groundwater are functionally equivalent to direct discharges of the wastewater to surface water. The Maui decision identified several factors that could be considered when assessing the 'functional equivalency' of a discharge to groundwater such as the amount of time and distance of travel through the groundwater prior to discharging to a surface water, the nature of the subsurface materials through which the groundwater flows and the likelihood that the wastewater discharged to groundwater would be diluted, chemically altered or otherwise changed prior to discharged to surface water. These factors are not exhaustive and other factors may also be considered in assessing functionally equivalency.

In the process of preparing the draft reissued permit, the MPCA evaluated the available information to assess whether any uncollected seepage from the tailings basin would constitute a functionally equivalent discharge as considered by the US Supreme Court. The MPCA considered the factors identified by the Court and determined that the information was not sufficient to be able to conclude whether functional equivalency exists.

Because the chemistry of the tailings basin seepage has not been fully characterized, the MPCA has taken a step-wise approach in the draft permit to gather the information to assess whether the discharge of seepage is affecting downgradient surface waters via the functional equivalent of a direct discharge. The draft permit includes a requirement for the permittee to conduct a functional equivalent analysis. This includes expanded monitoring requirements of the basin pool water as well as monitoring at 8 new downstream monitoring locations. The water quality monitoring will be used to determine whether pollutants being discharged via seepage are the functional equivalent of a direct discharge to surface waters. This data will be assessed as it is collected and upon MPCA review if it is determined that tailings basin seepage is causing or contributing to a violation of water quality standards via the functional equivalent of a direct discharge, the permit may be modified to incorporate corrective mitigation or adaptive management to address the seepage discharge and/or to authorize the discharge as an NPDES discharge. In accordance with Minn. R. 7001.0170, adaptive management or corrective actions may require a modification of the permit, including a public notice of the proposed modifications.

Impairments and Total Maximum Daily Load (TMDL) study

A recent impaired waters review was completed on March 27, 2024. The following in a summary of the recent impaired waters review. The full impaired waters review memo is available upon request.

The US Steel Corporation, Minnesota Ore Operations – Keetac Tailings Basin Area discharges to Reservoir 2 which leads to Hay Creek, in the Mississippi River – Grand Rapids Watershed. There are 48 impairments downstream for the following parameters: aluminum, Escherichia coli (E. coli), fecal coliform, mercury in fish tissue, mercury in water column, nutrients, PCBs in fish tissue, perfluorooctane sulfonate (PFOS) in water, perfluorooctane sulfonate (PFOS) in fish tissue, sulfate, total suspended solids and turbidity. There are no draft or final waste load allocations found for this facility at the time of this review.

Whole effluent toxicity

The MPCA requires chronic Whole Effluent Toxicity (WET) testing when the receiving water to effluent ration is less than or equal to 20:1. The draft permit contains chronic WET monitoring because the ratio of the receiving water 7Q10 flow to the facility's monthly average flow is zero.

This permit does not include chronic whole effluent toxicity limits; however the draft permit contains a monitoring requirement for whole effluent toxicity testing and is required to conduct chronic toxicity tests for Surface Discharge Stations SD 001, SD 005 and SD 009. Results of the chronic toxicity tests will be evaluated against a monitoring threshold value of 1.0 TUc. The permittee is also required to sample for total dissolved solids, specific conductance, sodium, magnesium, calcium, potassium, sulfate, chloride, alkalinity and nitrate nitrogen during each WET test. This will allow for a more informed TIE/TRE process should it be required.

It is recommended that chronic WET testing monitoring requirements start quarterly, 36 months after permit reissuance. Quarterly monitoring for chronic WET is required for one year. After monitoring for year 3 is complete, WET monitoring must occur annually for the life of the permit at SD 001, SD 005 and SD 009.

The chronic WET tests are required to be conducted in accordance with procedures outlined in EPA-821-R-02-013 "Short-term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" - Fourth Edition (Chronic Manual) and any revisions to the Manual. [Minn. R. 7001]

Chemical additives

Chemical additives are addressed by the additive limits and associated monitoring in the permit.

Table 18: Chemical additives currently approved for use at this facility consist of the following:

Name	Dosage frequency	Location	Maximum addition rate
Zetag 7130	Continuous	Concentrator thickener	1,506.8 lbs/day
CL-2840	Continuous	Closed loop water system	33.2 lbs/day
CL-4074	Continuous	Vacuum pump	30.2 lbs/day
CL-2150	Continuous	Closed loop water system	5.6 lbs/day
Hydrated lime	Continuous	Scrubber water system	6,575.3 lbs/day
P-817-E	Continuous	Scrubber water system	32.9 lbs/day

Name	Dosage frequency	Location	Maximum addition rate
CL-16	As needed	Closed loop water softener	0.05 gal/day
Diluted HCl	As needed	Various	0.05 gal/day
Rydlime	As needed	Various	0.79 gal/day
Super gold	As needed	Various	0.05 gal/day
Magnesium chloride or calcium chloride solution	As needed	Tailings basin roads	21.9 lbs/day
Tomamine M100-7	Continuous	Reverse flotation process	2,810 lbs/day
NS 9521	Continuous	Reverse flotation process	280 lbs/day
NS-9548	Continuous	Reverse flotation process	27 lbs/day
ChemTreat FBD1105	Continuous	Scrubber	70 gal/day

Stormwater management

Industrial facilities with a standard Industrial Classification (SIC) of 1011 (Iron Ores) are required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for industrial stormwater disposal. The facility consists of the Keetac tailings basin and the drainage area contributing surface runoff to the basin. The stormwater originating at the tailings basin area and the Sargent Pit area is routed through permitted outfalls SD 001, SD 005 and SD 009 and regulated under these permitted discharge locations. The MPCA has added the necessary industrial stormwater requirements language and limits and monitoring to this permit. The Permittee does not need to obtain separate Industrial Stormwater General Permit Coverage.

The provisions for runoff control are based on Minn. Stat. ch. 115 and state WQS, according to Minn. R7001.1080, 7050.0210 and 7050.0220, and 40 C.F.R. § 122.26. The best management practices requirements are based on Minn. R. 7001.1080.

Compliance schedules

The permit issued in 2011 and modified in 2012 contained a compliance schedule to reduce sulfate concentrations and attain compliance with a monthly average sulfate limit of 14 mg/L and a daily maximum sulfate limit of 24 mg/L. Minnesota Session Law[2] was passed in 2016 which provided the following for NPDES permits issued after January 1, 2010, and before May 1, 2016, that contains final effluent limits resulting from implementation of the wild rice water quality standard in Minnesota Rules part 7050.0224, subpart 2. If as of May 1, 2015, the Permittee is in substantial compliance with any compliance schedule permit conditions related to those final limits or has executed a schedule of compliance to resolve any noncompliance that existed before May 1, 2015, the: 1) sulfate limits resulting from the wild rice water quality standard in Minn. R. 7050.0224, subp. 2 are no longer valid; and 2) any compliance schedule permit conditions related to those final limits are no longer valid. Following this legislation, the MPCA did not enforce the compliance schedule in the 2012 permit and the compliance schedule was delayed. The company has not attained compliance with the final effluent limits required by the compliance schedule originally permitted in 2011.

[2] [1] Minn. Laws 2016, Chapter 165, S.F. No. 3376, Section 1. Sulfate Effluent Compliance

The draft permit contains a compliance schedule for the company to attain compliance with a final monthly average sulfate limit of 14 mg/L and a daily maximum sulfate limit of 24 mg/L by April 30, 2030. The compliance schedule includes requirements for the permittee to identify and evaluate sulfate treatment and mitigation alternatives, for submittal of plans and specifications for a sulfate treatment option and for construction of a sulfate treatment option. The draft compliance schedule contains an enforceable sequence of actions, specific dates (dependent on permit issuance) and 14-day reporting requirements and final dates of compliance as described in 40 CFR 122.47(a)(1), 40 CFR 122.47(a)(3), and 40 CFR 122.41(l)(5). See the revised draft permit for details.

The timeframe allowed by the compliance schedules in the draft permits is *"as soon as possible"*. The Permittee has done work as described in Attachment 1; however, it needs additional time to design treatment system(s), procure equipment, go through environmental review for construction of a treatment system, and construct the actual treatment system(s) as allowed by 40 CFR 122.47(a)(1).

The MPCA has summarized the record of the actions taken by the Permittee under the 2011 Keetac Mine Area and Tailings Basin permit compliance schedules as well as the MPCA response, which also includes enforcement actions taken during this timeframe. The MPCA believes this summary of information regarding the history of compliance with the schedules in the permit shows the actions taken by the Permittee towards compliance with the final sulfate effluent limits as required by 40 CFR 122.47(a). The record reflects that a compliance schedule is appropriate and will result in compliance as soon as possible and no later than April 2030. See Attachment 1 for details.

Variances

There are no variances in the draft permit.

The Permittee submitted a variance request from Minnesota Rules Ch. 7050.0224 Subp. 2 for effluent limits based on the Class 4A sulfate water quality standard for waters used for the production of wild rice on May 30, 2025. Upon review of the documents, the MPCA has made the preliminary decision to deny the variance request. Documentation regarding the variance denial can be found in Attachment 3.

Total facility requirements

Certified laboratory

Effective January 1, 2013, all Minnesota municipal, county, or industrial laboratories that analyze wastewater per Clean Water Act requirements must be certified by the MPCA or the Minnesota Department of Health. Information regarding MPCA laboratory certification is located on the MPCA website at https://www.pca.state.mn.us/business-with-us/mpca-laboratory-certification. If there are any questions concerning the MPCA laboratory certification, please contact the MPCA at 800-657-3864 or by email at qa.questions.mpca@state.mn.us. Commercial laboratories doing these analyses must maintain Minnesota Department of Health certification.

Electronic Discharge Monitoring Reports (eDMRs)

The eDMRs, Sample Values/Operational Spreadsheets, and related attachments shall be electronically submitted via the MPCA e-Services (https://rsp.pca.state.mn.us/TEMPO_RSP/Orchestrate.do?initiate=true). Paper copies of DMRs will no longer be accepted. The eDMR and Sample Value/Operational Spreadsheets are generated directly from the limits and monitoring requirements in the reissued permit for the facility. They are generated by the Pollution Control Data Specialist assigned to manage the data for the facility and will be available online within 30 days of the permit action, please make sure to download the most recent version of the eDMR and Sample Value/Operational Spreadsheet prior to submitting the next monthly eDMRs.

Construction projects
Separate written approval of plans and specifications, in addition to the final issued permit, must be obtained from the MPCA before construction can begin for any planned construction projects.

Additional requirements
Minnesota NPDES/SDS Permits contain certain conditions that remain the same regardless of the size, location, or type of discharge. These standard conditions satisfy the requirements outlined in 40 C.F.R. 122.41, Minn. R. 7001.0150 and Minn. R. 7001.1090. These requirements cover a wide range of areas, including operation and maintenance, outfall erosion control, best management practices, equipment calibration and maintenance, monitoring and analysis, recordkeeping, reporting, upsets, bypass, solids handling, changes in operation, inspections, records retention, general prohibitions, duty to notify, compliance responsibilities, compliance/noncompliance notification, entry and inspection, and permit modification and reissuance.

Antidegradation and anti-backsliding

Antidegradation: Changes to the facility may result in an increase in pollutant loading to surface waters or other causes of degradation to surface waters. If a change to the facility will result in a net increase in pollutant loading or other causes of degradation that exceed the maximum loading authorized through conditions specified in the existing permit, the changes to the facility are subject to antidegradation requirements found in Minn. R. 7050.0250 to 7050.0335. The permit does not propose to allow a new or increased discharge and does not trigger antidegradation.

Anti-backsliding: Any point source discharger of sewage, industrial, or other wastes for which a NPDES Permit has been issued by the MPCA that contains effluent limits more protective than those that would be established by Minn. R. 7053.0215 to 7053.0265 shall continue to meet the effluent limits established by the permit, unless the permittee establishes that less protective effluent limits are allowable pursuant to federal law, under section 402(o) of the Clean Water Act, United States Code, title 33, section 1342.

The NPDES permit issued in 2011 for the Keetac Tailings Basin contained a compliance schedule for the company to attain compliance with the water quality-based effluent limits for sulfate of 14 mg/L (monthly average) and a daily maximum limit of 24 mg/L by August 17, 2019.

The MPCA is proposing to include a compliance schedule in the draft permit to address the company's non-compliance with attaining final effluent limits for sulfate.

The NPDES/SDS permits for Keetac were previously issued on November 15, 2011. The Keetac mine area permit (MN0031879) contained a detailed compliance schedule to meet final sulfate effluent limits at facility outfalls to protect wild rice. The sulfate limits were set at a monthly average of 14 mg/L and a monthly maximum limit of 24 mg/L. The Keetac tailings basin permit (MN0055948) required compliance with the compliance schedule contained in the Keetac mine area permit.

> The compliance schedule defined dates for compliance with final effluent limits and stated (in part), "*Compliance with the final effluent limits shall be attained as soon as possible, and in no case shall compliance be attained later than August 17, 2018, for non-tailings basin discharges, and August 17, 2019, for tailings basin discharges, unless the permit is modified pursuant to 40 CFR 122.62".*

The compliance schedule required a Water Management Study, a Sulfate Reduction Strategy Study, and a Sulfate Reduction Plan (SRP) which included options for evaluating treatment alternatives. The SRP was required to propose actions to lead to compliance with final effluent limits "as soon as possible", with a schedule for implementation. A summary of the actions taken by the Permittee and the MPCA response to these actions between 2011 to 2017 is included in Attachment 1.

Minnesota Session Law[1] was passed in 2016 which provided the following for NPDES permits issued after January 1, 2010, and before May 1, 2016, that contains final effluent limits resulting from implementation of the wild rice water quality standard in Minnesota Rules part 7050.0224, subpart 2. If as of May 1, 2015, the Permittee is in substantial compliance with any compliance schedule permit conditions related to those final limits or has executed a schedule of compliance to resolve any noncompliance that existed before May 1, 2015, the: 1) sulfate limits resulting from the wild rice water quality standard in Minn. R. 7050.0224, subp. 2 are no longer valid; and 2) any compliance schedule permit conditions related to those final limits are no longer valid. As a result of this legislation, the compliance schedule was delayed and the company has not attained compliance with the final effluent limits originally permitted in 2011.
Since compliance with the final effluent limits has not occurred due to the 2016 Session Law, the MPCA is proposing to include a compliance schedule in the draft permits for Keetac. EPA comments submitted on September 6, 2024, suggesting compliance schedules are not appropriate for the Keetac site as it would be considered backsliding under *40 C.F.R. § 122.44(l)(1) 1 unless one of the exceptions in those statutory and regulatory provisions applies*. An exception to backsliding is allowed under 40 CFR 122.44(l)(2)(i)(B)(1) which states:

40 CFR 122.44(l) Reissued permits.

> *(1) Except as provided in paragraph (l)(2) of this section when a permit is renewed or reissued, interim effluent limitations, standards or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit (unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification or revocation and reissuance under § 122.62.)*
>
> *(2) In the case of effluent limitations established on the basis of Section 402(a)(1)(B) of the CWA, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 304(b) subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit.*
>
> > *(i) Exceptions—A permit with respect to which paragraph (l)(2) of this section applies may be renewed, reissued, or modified to contain a less stringent effluent limitation applicable to a pollutant, if—*
> >
> > > *(A) Material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation;*
> > >
> > > *(B)(1) Information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance;*

The MPCA believes the compliance schedule proposed in the draft permit qualifies for the exception to antibacksliding under 40 CFR 122.4(l)(2)(B)(1). Information regarding the Minnesota Session Law that was passed in 2016 was not available at the time the permits were issued in 2011. The MPCA had no indication that such a law would be passed by the Minnesota Legislature when the compliance schedules were developed. At that time, it was assumed the Permittee would meet the schedule deadlines and attain compliance with the final effluent limits for sulfate by August 27, 2018, at the Mine Site and August 17, 2019, at the tailings basin site. The 2016 Session Law arguably allowed the Permittee to stop work towards meeting the final effluent limits and given the information the MPCA had at the time, MPCA did not enforce the final effluent limits in the 2011 permits. The Permittee has not attained compliance with the final sulfate effluent limits and an additional compliance schedule is necessary in the reissued permit to allow for additional time to come into compliance with the final sulfate effluent limits. The MPCA believes the exception allowed by 40 CFR 122.44(l)(2)(i)(B)(1) is applicable to the Keetac permits and proposes to continue the process of reissuing the Keetac NPDES permits with compliance schedules to meet the applicable sulfate limits.

The MPCA has summarized the record of the actions taken by the Permittee under the 2011 Keetac Mine Area and Tailings Basin permit compliance schedules as well as the MPCA response, which also includes enforcement actions taken during this timeframe. The MPCA believes this permit complies with Minn. R. 7053.0275 regarding anti-backsliding and that providing additional information regarding the history of compliance with the schedules in the permit extends the administrative record to show the actions taken by the Permittee towards compliance and efforts to attain compliance with the final sulfate effluent limits. See Attachment 1 for details.

Environmental review

An environmental assessment worksheet associated with the Keetac Mine Expansion Project was completed by the Minnesota Department of Natural Resources with a negative declaration for an environmental impact statement on December 30, 2010.

In December 2024, US Steel submitted a proposal to augment its existing Tailings Storage Facility for its Keetac taconite mining operation in St. Louis and Itasca Counties. Activities would involve vertically raising existing tailings retention dikes and water retention dams and does not propose any changes to the permitted mining or processing activities.

Term of permit

The effective date of the permit and the permit expiration date will be determined at the time of issuance.

The MPCA has made a preliminary determination to reissue this NPDES/SDS permit for a term of approximately five years.

Attachment 1

Overview of compliance schedule history

The NPDES/SDS permits for Keetac were previously issued on November 15, 2011. The Keetac mine area permit (MN0031879) contained a detailed compliance schedule to meet final sulfate effluent limits at facility outfalls to protect wild rice. The sulfate limits were set at a monthly average of 14 mg/L and a monthly maximum limit of 24 mg/L. The Keetac tailings basin permit (MN0055948) required compliance with the compliance schedule contained in the Keetac mine area permit.

> The compliance schedule defined dates for compliance with final effluent limits and stated (in part), "*Compliance with the final effluent limits shall be attained as soon as possible, and in no case shall compliance be attained later than August 17, 2018, for non-tailings basin discharges, and August 17, 2019, for tailings basin discharges, unless the permit is modified pursuant to 40 CFR 122.62".*

The compliance schedule required a Water Management Study, a Sulfate Reduction Strategy Study, and a Sulfate Reduction Plan (SRP) which included options for evaluating treatment alternatives. The SRP was required to propose actions to lead to compliance with final effluent limits "as soon as possible", with a schedule for implementation. The following is a summary of actions taken by the Permittee and the MPCA response to these actions between 2011 to 2017.

1. Multiple versions of the SRP were submitted by US Steel and rejected by MPCA between October 6, 2012, and July 1, 2014.

2. The SRP submitted March 1, 2014, was ultimately approved on August 19, 2014.
    a. MPCA approval states dates with compliance with final effluent limits are based on whether or not full-scale technology evaluation was completed.
        i. IF no full-scale evaluation
            1. Mine area – February 19, 2017
            2. Tailings basin area – August 19, 2017
        ii. IF full scale evaluation:
            1. Mine area – within 30 months of evaluation or August 17, 2018, whichever is sooner.
            2. Tailings basin area – within 36 months of evaluation or August 17, 2019, whichever is sooner.
    b. MPCA requested Keetac Technical Feasibility Evaluation by December 19, 2014.

3. Following approval of the SRP, the Permittee was required to complete the actions proposed in the SRP & attain compliance with the final effluent limits detailed in the reissued permits.
    a. The approved SRP required a Technical Feasibility Evaluation within 4-months of SRP approval (Submitted December 19, 2014)
    b. Written progress reports on implementation of the SRP were required every 6-months following SRP approval.

4. US Steel submits application for Site Specific Class 4A Sulfate Standard for Hay Lake, Hay Creek, Swan Lake and Swan River on December 11, 2014. The application stated (in part):

   > *"The sulfate concentrations measured in the subject water bodies ranged from 3.9 to 9.9 mg/L in Swan Lake Southwest Bay, to 13 to 56 mg/L in Hay Creek, Hay Lake and the main body of Swan Lake, all of which are well below the water column sulfate toxicity levels as determined in the studies by Pastor (2013) and Fort et al. (2014)."*

   The application did not propose an alternative standard but argued that a standard of 10 mg/l is not appropriate because wild rice is present in these water bodies at sulfate concentrations higher than 10 mg/L, the geochemistry of the water bodies supports continued maintenance of wild rice and Keetac's discharge does not adversely impact wild rice growth.

   The submittal also included Keetac directed wild rice, water quality and sediment surveys (2009-2012 annual reports), University of Minnesota field studies (2011-2013 surface water/pore water and sediment samples) and DNR wild rice field surveys in the relevant water bodies.

5. US Steel Technical Feasibility Evaluation was submitted on December 19, 2014. The Evaluation discussed the use of BioteQ Ion Exchange Technology and recommended the following:
   a. Pilot-scale treatment testing of wastewater at SD 002.
      i. Pretreatment for solids removal followed by nanofiltration
      ii. Nanofiltration to split influent into permeate and retentate
         1. Permeate projected to meet final sulfate effluent limits
         2. Retentate to be retained for further treatment via lime softening and ion exchange to produce a solid gypsum waste product.

6. MPCA responds to Technical Feasibility Evaluation on January 15, 2015.
   a. Company proposes to test pilot scale.
   b. Full-scale TBD depending on outcome of pilot testing
   c. Progress reports regarding implementation of the SRP due every 6-months

7. USS Submits SRP progress report on February 19, 2015

8. USS Submits SRP progress report on August 19, 2015

9. USS Submits final SRP 6-month update on February 16, 2016

10. Enforcement Action: MPCA issues an Administrative Order Without Review on February 12, 2016. The Administrative Order (AO) concluded Keetac failed to comply with the mine area compliance schedule by failing to initiate and complete pilot testing according to the approved schedule. The AO required the following actions to be completed:
    a. Initiation of pilot testing by May 31, 2016.
    b. Completion of pilot testing by October 31, 2016.
    c. Final report to be submitted by December 31, 2016.

    The AO was rescinded on March 11, 2016, and replaced with a Schedule of Compliance enforcement action on March 11, 2016.

11. Enforcement Action: MPCA issues a Schedule of Compliance (SOC) for failure to begin pilot testing of sulfate removal technology. The SOC was issued on March 11, 2016 and required pilot testing not to exceed expenditure of $100,000.00.

    a. Onsite membrane treatment (ultrafiltration and nanofiltration) of Welcome Creek was conducted by GE Water & Process Technologies; a bulk sample of membrane reject (brine) was subsequently treated by BioteQ Environmental Technologies at its facility in Vancouver.
    b. Final Pilot Testing Report was submitted 12/30/16. Results include:
        i. **Membrane treatment** – ultrafiltration fouling rates were low (sodium hypochlorite was injected into the feed stream to oxidize dissolved iron and convert to a suspended form that can be removed. Although 80+ percent of iron was removed, full scale operation would require further chemical addition to increase iron removal and reduce fouling of nanofiltration membranes. Feed water sulfate concentration was 60 – 90 mg/l, nanofiltration effluent was non-detection (<2 mg/l).
        ii. **BioteQ (ion exchange)**– Treatment of nanofiltration retentate (2 - 55 gallon drums) using lime softening (for magnesium/bicarbonate alkalinity removal) and Sulf-IX (remove calcium and sulfate) so the brine could be recycled to the influent of the membrane treatment system and solids (lime softening and gypsum) could be disposed.
    c. 6-month updates on the SRP were required
    d. The SOC was terminated January 12, 2017

12. Session Law Chapter 165 – SF No 3376 was enacted on May 31, 2016. Session Law for Sulfate Effluent Compliance "applies to any permit issued after January 1, 2010, and before May 1, 2016, that contained final effluent limits resulting from implementation of the wild rice water quality standard in Minnesota Rules, part 7050.0224, subpart2. If, as of May 1, 2016, the permittee is in substantial compliance with any compliance schedule permit conditions related to those final limits or has executed a schedule of compliance to resolve any noncompliance that existed before May 1, 2016;
    a. The final sulfate effluent limits resulting from implementation of the wild rice water quality standard in Minnesota Rules, part 7050.0224, subpart 2, are no longer valid; and
    b. Any compliance schedule permit conditions related to those final limits are no longer valid
        i. Nothing in this section shall relieve the permittee from its obligation to satisfy requirements contained in any schedule of compliance that is in effect as of May 1, 2016."

13. US Steel submits a Draft Pilot Test Workplan as required by the SOC on June 1, 2016.

14. MPCA Comments on the June 1, 2016, Draft Pilot Test Workplan
    a. Discusses conditions of pilot testing for ultrafiltration/nanofiltration and Sulf-IX system
    b. The SOC requires the final Plan to be revised to indicate the chemical characteristics of the UF/NF effluent brine at the time of generation and at the time it is used as influent to the Sulf-IX system

15. US Steel Submits a Final Pilot Testing Report for Membrane Treatment Testing of Welcome Creek Water on December 30, 2016.
    a. Pilot-scale membrane treatment testing of Welcome Creek water was conducted on-site by GE Water & Process Technologies from mid-August 2016 – mid-October 2016.
    b. Pilot-scale treatment testing of bulk sample membrane reject (brine) was subsequently conducted by BioteQ Environmental Technologies, Inc. from mid-October – mid-November 2016 at their facilities in Vancouver, British Columbia.
    c. Submittal includes:

i. Report authored by GTrE that details the results of pilot-scale membrane treatment testing conducted at the Keetac facility.
ii. Report authored by BioteQ that details the results of brine treatment conducted in Vancouver, BC.
iii. These reports conclude the final testing report required by the March 2016 SOC

16. MPCA Terminates the SOC on January 12, 2017

17. US Steel Submits its final SRP 6-Month Update on February 17, 2017 which states, in part:
    a. USS has completed the requirements of the SOC; and
    b. Due to 2016 Session Law, no further SRP updates will be submitted.

18. The MPCA conducts an inspection of the US Steel Keetac facility on June 15, 2017, and issued an inspection report on July 14, 2017. The report reviewed compliance with the permit compliance schedule and states, in part:

    "In May 2016 a Minnesota Statute was passed (2016 Minn. Laws ch. 165) that targets the Permit compliance schedule in this Permit as well as U.S. Steel Keewatin Taconite's NPDES/SDS permit for the tailings basin which contains the same compliance schedule language…"

    "The compliance schedule [excerpted above] was the result of implementation of the wild rice water quality standard. U.S. Steel – Keetac executed a schedule of compliance to resolve alleged noncompliance before May 1, 2016. Therefore, this permit and the Keetac tailings basin permit are subject to the statute. Given the above statute, MPCA is not authorized to enforce the Permit compliance schedule or final effluent limits because they are no longer valid. During the inspection the Permittee indicated that upon completion of the pilot scale testing there have been no further activities regarding implementation of sulfate treatment technologies."

    In this inspection report, the MPCA notified the Permittee the compliance schedule contained in the Keetac permits were no longer enforceable due to the 2016 Session Law.

19. On February 15, 2022 the Regional Administrator at EPA Region 5 notified the MPCA Commissioner that MPCA that the 2015 and 2016 Session Laws are inconsistent with the Clean Water Act and that EPA expects that MPCA's NPDES permits will include effluent limitations to meet all federally approved water quality standards as required by the Clean Water Act, federal regulations, and EPA-approved Minnesota laws and rules as required by federal law for the issuance of federal NPDES permits.

20. Per MPCA request, US Steel submits updated permit applications for the Keetac Mine Area and Tailings Basin NPDES/SDS permits on September 29, 2023. The MPCA begins working on permit reissuance soon after submittal.

Attachment 2:

Discharger: US Steel Keetac – Surface Water Monitoring Protocol
Permit Number: MN0055948
Date: 10/01/24

Water Chemistry Sampling

The surface water monitoring stations in Figure 1 and Table 1 below should be included in the permit. Collecting this data will help allow the MPCA to determine whether the wild rice sulfate is protected in Hay Lake. This data will also help understand whether the permittee has a discharge that is functionally equivalent to a direct discharge. All stations should be sampled monthly for the parameters in Table 2. Table 3 explains the rationale for the selection of the surface water monitoring stations.

Several of these locations will be difficult to access during some times of the year. If the stations cannot be safely accessed, the permittee should explain why in their supplemental DMR report.

Figure 1. Proposed surface water monitoring stations.

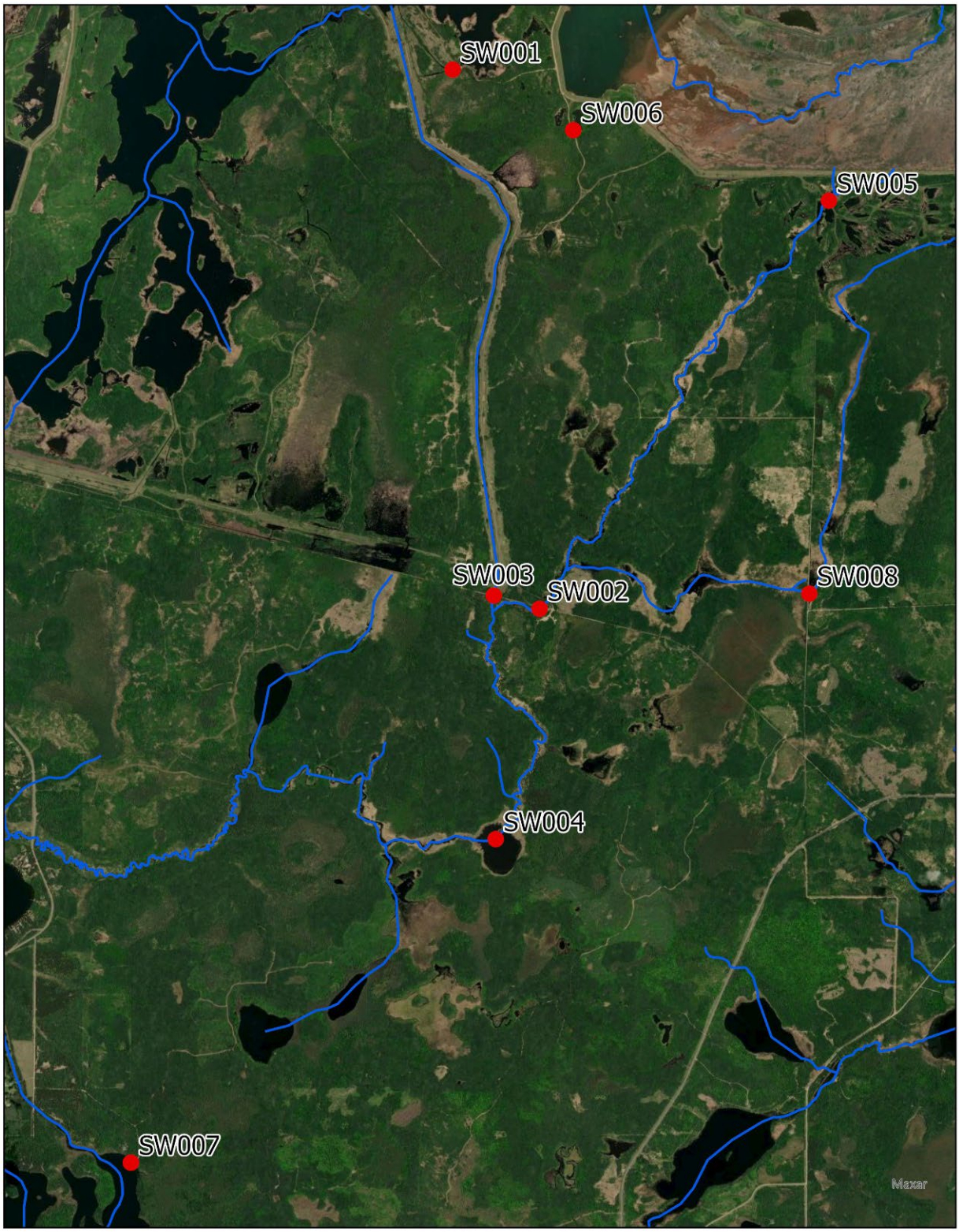


Table 1. Table of surface water monitoring locations and recommended sampling.

Station	Location	Latitude	Longitude	PLS
SW001	Reservoir 2 Outlet	47.34565	-93.104996	T56 R22W S10 NWSW
SW002	Hay Creek	47.30476	-93.0953229	T56 R22W S26 SENW
SW003	Reservoir 2 to Hay Creek	47.30577	-93.1003885	T56 R22W S26 NESW
SW004	Hay Lake	47.28726	-93.1001379	T56 R22W S35 NESW
SW005	Hay Creek Headwaters	47.33574	-93.06336234	T56 R22W S18 SWNW
SW006	Unnamed Wetland	47.34108	-93.09163627	T56 R22W S11 SWSE
SW007	Hart Lake	47.26267	-93.140373	T55 22W S9 SWNE
SW008	Unnamed Creek	47.30594	-93.0654967	T56 R21W S30 SWNW

Table 2. Parameters to be sampled monthly at all surface water monitoring locations.

Parameters	Units
Calcium	mg/L
Iron	mg/L
Magnesium	mg/L
Potassium	mg/L
Sodium	mg/L
Manganese	mg/L
Chloride	mg/L
Alkalinity	mg/L as CaCO3
Sulfate	mg/L
Fluoride	mg/L
Nitrate + Nitrite N	mg/L as N
pH	Standard units
Total Dissolved Solids	mg/L
Specific Conductance	µS/cm
Oxidation Reduction Potential	Eh

Table 3. Rational for the selection of each SW station.

Station	Location	Rationale
SW001	Reservoir 2	Monitoring station is in existing permit
SW002	Hay Creek	Quantify salt loading from wetland complex south of tailings basin into Hay Creek
SW003	Reservoir 2 to Hay Creek	Quantify salt loading from Reservoir 2 and upstream dischargers
SW004	Hay Lake	4) Quantify salt loading from sources upstream of Hay Lake 5) Understand how sulfate concentrations vary in Hay Lake over time 6) Determine whether Hay Lake is in exceedance of the wild rice standard
SW005	Hay Creek Headwaters	3) Quantify salt loading from wetland complex immediately south of basin 4) Allows for comparison with downstream stations to understand near basin water quality and the effect of any dilution
SW006	Unnamed Wetland	Understand salt concentrations in a wetland near the basin that is not hydrologically connected by a surface water discharge
SW007	Hart Lake	Understand salt concentrations in a nearby waterbody that is not hydrologically connected to any upstream dischargers and has sulfate near regional baseline levels (median 2.7 mg/L)
SW008	Unnamed Creek	Quantify salt loading from wetland complex south of tailings basin

Biological Sampling

US Steel must sample fish and aquatic macroinvertebrates at three locations listed in **Table 4** once every five years for the life of the permit to monitor the potential impact of the US Steel Keewatin Taconite mining facility on aquatic life within the Hay Creek Watershed (HUC 12 070101030401) upstream of Hay Lake (WID/AUID 31-0037-00). The exact location of these samples will be determined by US Steel in consultation with MPCA staff and in accordance with MPCA biological monitoring site selection protocols **Figure 2**.

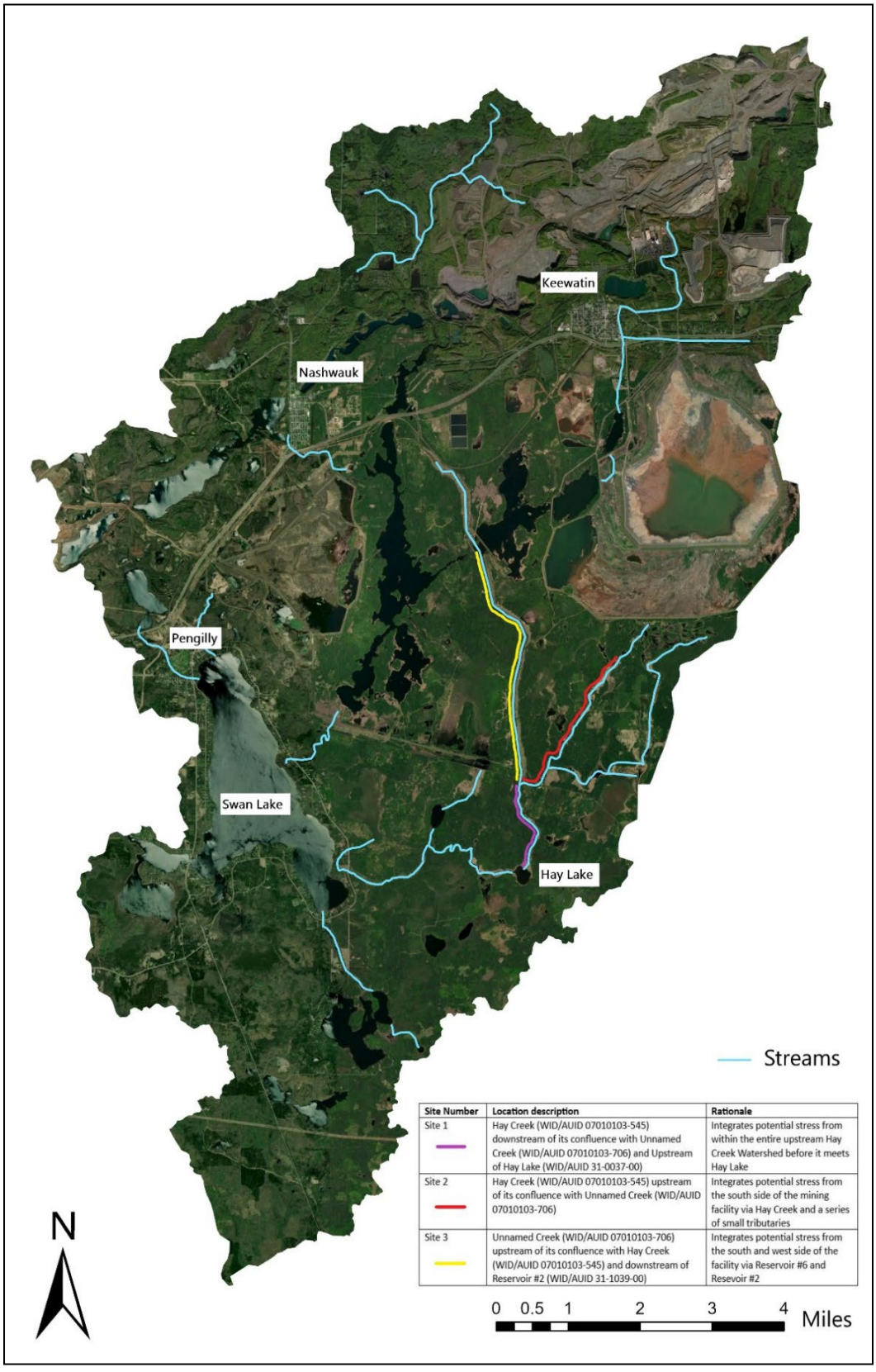
Sampling must be completed following MPCA macroinvertebrate data collection protocols and MPCA fish data collection protocols respectively, and must include a MPCA stream habitat assessment at each of the sites at the time of sampling. US Steel must notify the supervisor of the MPCA North Biological Monitoring Unit (Biological.Monitoring.Info.MPCA@state.mn.us) a minimum of six months prior to sampling and communicate plans for sampling, including crew member names and crew qualifications. US Steel sampling staff must be approved to collect biological monitoring data by the MPCA North Biological Monitoring Unit External Data Coordinator, prior to sampling. US Steel sampling staff must receive training on MPCA fish and macroinvertebrate data collection protocols prior to sampling. Proper training and certification of US steel personnel or their contractors will ensure that the data meet the MPCA data quality standards and allow for use in future water quality assessment(s). MPCA North Biological Monitoring Unit staff will provide US Steel sampling staff with data collection forms that must be used. US Steel must submit the results of the survey data to the MPCA Biological Monitoring External Data Coordinator by November 15th of the year the data was collected using a data submission form provided by the MPCA. US Steel must voucher fish specimens in accordance with MPCA fish data collection protocols. Fish voucher specimens must be sent to the MPCA for taxonomic verification. US Steel must send the macroinvertebrate samples to a lab that will process the sample(s) following MPCA macroinvertebrate sample processing and quality assurance/control procedures.

Once all required information is provided by US Steel, the MPCA North Biological Monitoring Unit will calculate Index of Biological Integrity scores for each sample and communicate the results of sampling to US Steel.

Table 4. Site locations and sampling rationale. The exact location of the samples, within these descriptions, will be determined by US Steel in accordance with MPCA biological monitoring site selection protocols.

Site Number	Location description	Rationale
Site 1	Hay Creek (WID/AUID 07010103-545) downstream of its confluence with Unnamed Creek (WID/AUID 07010103-706) and Upstream of Hay Lake (WID/AUID 31-0037-00)	Integrates potential stress from within the entire upstream Hay Creek Watershed before it meets Hay Lake
Site 2	Hay Creek (WID/AUID 07010103-545) upstream of its confluence with Unnamed Creek (WID/AUID 07010103-706)	Integrates potential stress from the south side of the mining facility via Hay Creek and a series of small tributaries
Site 3	Unnamed Creek (WID/AUID 07010103-706) upstream of its confluence with Hay Creek (WID/AUID 07010103-545) and downstream of Reservoir #2 (WID/AUID 31-1039-00)	Integrates potential stress from the south and west side of the facility via Reservoir #6 and Reservoir #2

Figure 2. Site locations and sampling rationale. The exact location of the samples, within these descriptions, will be determined by US Steel in accordance with MPCA biological monitoring site selection protocols.



Site Number	Location description	Rationale
Site 1	Hay Creek (WID/AUID 07010103-545) downstream of its confluence with Unnamed Creek (WID/AUID 07010103-706) and Upstream of Hay Lake (WID/AUID 31-0037-00)	Integrates potential stress from within the entire upstream Hay Creek Watershed before it meets Hay Lake
Site 2	Hay Creek (WID/AUID 07010103-545) upstream of its confluence with Unnamed Creek (WID/AUID 07010103-706)	Integrates potential stress from the south side of the mining facility via Hay Creek and a series of small tributaries
Site 3	Unnamed Creek (WID/AUID 07010103-706) upstream of its confluence with Hay Creek (WID/AUID 07010103-545) and downstream of Reservoir #2 (WID/AUID 31-1039-00)	Integrates potential stress from the south and west side of the facility via Reservoir #6 and Resevoir #2

Resources:

https://www.pca.state.mn.us/sites/default/files/wq-bsm3-12a.pdf

https://www.pca.state.mn.us/sites/default/files/wq-bsm3-02.pdf

https://www.pca.state.mn.us/sites/default/files/wq-bsm3-12b.pdf

MINNESOTA POLLUTION CONTROL AGENCY

Water Quality Program
Facility-specific Preliminary Determination
Water Quality Standard Variance for Sulfate

United States Steel Corporation
U.S. Steel Keetac Facility and Tailings Basin
Permits MN0031879 and MN0055948

U.S. Steel Keetac facility sulfate variance: Issue statement

U.S. Steel (Permittee) is requesting a variance from the Class 4A water quality standard (WQS) of 10 mg/L sulfate, applicable to waters used for production of wild rice (Minn. R. 7050.0224, Subp. 2) for Hay Lake (AUID 31-0037-00). A variance is a temporary change in a state WQS for a specified pollutant and its associated water quality-based effluent limit (WQBEL). This temporary change, enforceable under a National Pollutant Discharge Elimination System (NPDES) authority, reflects the highest attainable condition for a permittee during the term of the variance (Minn. R. 7050.0190).

U.S. Steel's variance application seeks to modify the sulfate effluent limitations at four surface discharge stations in NPDES Permits Nos. MN0031879 and MN0055948 (Table 1) for their Keetac facility. Sulfate WQBELs were introduced in Keetac's NPDES permits in 2011 and are enforceable under the federal Clean Water Act.

Table 1. Current sulfate effluent limitations in the Keetac mining area and tailings basin permits.

	Mining area (MN0031879)				Tailings basin (MN0055948)		
Station	SD001*	SD002	SD003	SD012	SD001**	SD005	SD009**
Monthly Average Sulfate Limit (mg/L)	Monitor	14	14	14	14	14	14
Daily Maximum Sulfate Limit (mg/L)	Monitor	24	24	24	24	24	24

*WTP backwash discharge, not included in the variance request.

** SD001 is inactive and has not discharged in 5 years. SD009 has not been constructed and has not discharged.

The Permittee has requested a variance under 40 CFR 131.10(g)(3), (Factor 3), [see also Minn. R. 7050.0190, subp. 4(A)(3)] and 40 CFR § 131.10(g)(6), (Factor 6), [see also Minn. R. 7050.0190, subp. 4(A)(6)]. Factor 3 allows permittees to apply for a variance when compliance is not feasible due to human caused conditions or sources of pollution preventing the attainment of the standard, and the pollution cannot be remedied or would cause more environmental damage to correct than to leave in place. Factor 6 allows permittees to apply for a variance when compliance with a water quality standard is not feasible because controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act would result in a substantial economic impact to the permittee and widespread economic and social impacts to the community.

The Minnesota Pollution Control Agency (MPCA) finds the application provides MPCA sufficient information to make a preliminary determination. Upon review of current treatment technologies, discharges, and activities as listed in the permit applications dated September 29, 2023 and February 28, 2025, and the associated sulfate variance request for the U.S. Steel Keetac facilities, MPCA staff have determined the Permittee has not satisfied the conditions necessary to receive a variance under either Factor 3 or Factor 6 and, as a result, recommends the Commissioner deny the sulfate variance request.

All applicable water quality standards not addressed in this sulfate variance request remain applicable to the Permittee.

Regulatory Authority

The Clean Water Act authorizes delegated states to adopt water quality standards variances (40 CFR § 131.14). The MPCA is the agency delegated to administer the Clean Water Act, NPDES permits, and variances in Minnesota. Minn. R. 7050.0224, subp. 2 establishes a sulfate water quality standard to protect wild rice and Minn. R. 7050.0190 sets forth conditions for granting variances from water quality standards.

U.S. Steel has applied for a water quality standards variance. MPCA has the authority to deny a variance request if the agency determines it does not satisfy all the requirements of federal or state law, including 40 CFR § 131.14 or Minn. R. 7050.0190. In addition, the United States Environmental Protection Agency (EPA) must approve or deny all state decisions to approve a variance. See 40 CFR § 131.14; Minn. R. 7050.0190.

This document is the Agency's preliminary determination. See Minn. R. 7050.0190.

MPCA is publicly noticing its preliminary determination to deny the variance and providing an opportunity for a public meeting in accordance with 40 CFR § 25.5 and Minn. R. 7050.0190.

Technical information: NPDES/SDS Permit No. MN0031879 and MN0055948

The U.S. Steel - Keetac Mining Facility is authorized to discharge under two separate NPDES/SDS permits. The mining area is covered under MPCA individual permit MN0031879, and the Tailings Basin is covered under MPCA individual permit MN0055948.

Permit MN0031879 U.S. Steel – Keetac Mining Facility: The principal activity at this facility is the open pit mining of taconite for processing into taconite pellets. The facility consists of the Keetac plant area, all mine excavations, mining waste disposal areas, materials and equipment storage areas, and wastewater disposal facilities. The facility has the capacity to produce blast furnace grade pellets and

direct reduction grade pellets.

Drinking water treatment plant backwash wastewater from the sand filters discharges on a periodic basis through culvert outfall SD 001 at a rate of less than 0.010 million gallons per day (MGD) to Welcome Lake (Class 2B, 3, 4A, 4B, 5, 6 water).

Most surface drainage and groundwater in the mine pits is collected in dewatering sumps and discharged to waters of the state through permitted outfalls or used as process makeup water. A majority of stormwater runoff in the plant area and stockpile areas enters a Diversion Ditch System, which discharges through weir outfall SD 002 at an average rate of approximately 2.56 MGD to Welcome Creek (Class 2Bg, 3, 4A, 4B, 5, 6 water).

Mine pit dewatering from the Mesabi Chief Pit is pumped and discharged through pipe outfall SD 003 at an average rate of approximately 2.7 MGD to O'Brien Creek (Class 2Bg, 3, 4A, 4B, 5, 6 water) which flows to the O'Brien Reservoir (Class 2B, 3, 4A, 4B, 5, 6 water).

Stormwater from activities west of the Mesabi Chief mining area and groundwater flow into the Perry Pit. This permit authorizes discharges of mine pit dewatering from the Perry Pit through pipe outfall SD 012 at an average rate of approximately 1.77 MGD to O'Brien Creek.

All of the discharge stations ultimately flow to Hay Lake (AUID 31-0037-00), which is the first listed impaired water based on the 10 mg/L wild rice sulfate standard downstream of the discharges.

Overflow from the thickener and filtrate from the filter presses are sent to the tailings basin.

An activated sludge package plant treats domestic wastewater and is designed to treat an average flow of 0.040 MGD with a five-day carbonaceous biochemical oxygen demand (CBOD5) strength of 140 milligrams per liter (mg/L). The treated sanitary wastewater effluent is routed through weir station WS 005 to the Bennet Pit. Biosolids from the activated sludge plant are transferred off-site to a permitted wastewater treatment facility.

Permit MN0055948 U.S. Steel – Keetac Tailings Basin: The principal activity at this facility is the disposal of taconite tailings and related wastewater from the Keewatin Taconite Plant (Plant). The facility consists of a tailings basin, drainage area contributing surface run-off to the basin, and all non-sewage wastewater disposal systems within the permitted area. The Plant currently has the capability to produce blast furnace grade pellets and will ultimately be capable of producing direct reduction grade pellets as well.

The Plant consists of a series of crushers and screens, a concentrator, and an agglomerator. Process water from the agglomerator, as well as recirculating non-contact cooling water, and floor drains, is recirculated as process water within the Plant. Make-up water for the Plant's recirculating non-contact cooling water system is softened and treated with various chemical additives. Chemical additives are also used in the wet scrubber and blowdown treatment system, vacuum seal water system, and kiln.

Wastewater flow to the tailings basin consists only of tailings slurry (taconite tailings & associated concentrator process wastewater) and treated wet scrubber blowdown water for a total average flow

rate of 20 million gallons per day (mgd). This wastewater is piped from the Keetac Plant across Hwy 169 and is spigotted into the tailings basin. The basin is divided into several parts, principally the older Stage 1 and the active Stage 2 basins. Much of the Stage 1 basin has undergone re-vegetation. Water is occasionally pumped from Reservoir 2 to Reservoir 6 to control water inventories at an average rate of 400 million gallons per year.

A barge system in the second stage interior tailings basin pumps basin wastewater to the second stage exterior pond for additional clarification. A stop-log decant tower structure discharges water from the second stage exterior pond to Reservoir 6 for reuse. Tailings basin water from Reservoir 6 is reclaimed and pumped back to the Plant for further ore processing. If the water levels in Reservoir 6 get high enough, discharge can occur through siphon outfall SD 001 (Siphon outfalls 011, 012 & 013) at a combined maximum rate of 9.4 mgd to Reservoir 2. Under normal circumstances, discharge from Reservoir 6 occurs on a periodic basis through outfall SD 005 to Reservoir 2 at an average flow of approximately 4.6 mgd.

This permit also authorizes the discharge of mine pit dewatering from the Sargent Pit to Reservoir 2 at a maximum rate of 4.7 mgd via outfall SD 009 which will be located at the edge of the Sargent Pit at PLS coordinates T 57 N, R 22 W, Section 26. This outfall has not been constructed yet.

Surface drainage from the tailings basin area, in the form of surface run-off from the exterior dikes, flows to the West Swan River, unnamed wetlands, Hay Creek to Swan Lake, Reservoir 2, Reservoir 2 North, and Welcome Creek. All of the discharge stations ultimately flow to Hay Lake, which is the first listed impaired water based on the 10 mg/L wild rice sulfate standard downstream of the discharges.

Surface water monitoring is conducted at the Reservoir 2 outlet, Hay Creek, Reservoir 2 to Hay Creek, Hay Lake, Hay Creek Headwaters, Unnamed Wetland, Hart Lake, and an Unnamed Creek.

Internal monitoring for non-precipitation inputs is conducted at WS 001. Calculations for the allowable discharge are reported at WS 002. Water in the Stage 2 Interior Pond is monitored at WS 003. Water in the Stage 2 Exterior Pond is monitored at WS 004.

Factor 3: Human caused conditions or sources of pollution prevent attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place

This variance is being pursued by the Permittee because U.S. Steel argues that compliance with the current WQBELs for sulfate is due to a human caused condition that would cause more environmental damage to correct than leave in place, as defined at 40 CFR § 131.10(g)(3) and Minn. R. 7050.0190, subp. 4(A)(3).

A Factor 3 justification for a WQS action must make two demonstrations. First, the pollution preventing attainment of the use is a result of human caused conditions, like atmospheric deposition, combined sewer overflows, or a dam removal. Factor 3 variances are typically considered in cases where the pollution is from an indirect cause, outside the control of the permittee. This does not describe circumstances where the requestor's processes and discharge itself is the cause of the pollution preventing attainment of the use. U.S. Steel's application did not attempt to explain how the sulfate

pollution is a human caused condition and not caused or contributed to by their own processes and discharge. In 2011, Keetac's NPDES/SDS permits included sulfate effluent limits because Keetac's discharges were demonstrated to cause or contribute to sulfate exceedances at Hay Lake during low-flow stream conditions.

The second clause of Factor 3 requires a demonstration that either the pollution cannot be remedied or that treating the pollution will cause more environmental damage to correct than to leave in place. The application does demonstrate that the pollution can be remedied by identifying a treatment technology that is capable of removing sulfate to meet their WQBEL. U.S. Steel's variance application includes a discussion on the latter that the necessary treatment for meeting their sulfate limits has the potential to cause more environmental damage to correct than to leave in place. The environmental cost arguments presented in the variance request focus on carbon emissions from energy use and waste management, but do not address the benefits of treatment and therefore does not satisfy the second clause of Factor 3.

Therefore, a Factor 3 justification is not appropriate for this variance request.

Factor 6: Substantial and widespread economic and social impacts

This variance is being pursued by the Permittee because they argue compliance with the current WQBELs for sulfate would result in substantial and widespread social and economic impacts for the Facility, as defined at 40 CFR § 131.10(g)(6) and Minn. R. 7050.0190, subp. 4(A)(6).

There is no definition of "substantial and widespread" economic impacts or "economic burden" in either federal rules at 40 CFR § 131.10(g)(6) or state rules at Minn. R. 7050.0190, subp. 4(A)(6) and Minn. R. 7000.7000 subp. 2E, respectively. Since there is no official definition, the Permittee and MPCA rely on EPA's Interim Economic Guidance (1995) (Guidance) for the assessment of substantial and widespread impacts. This Guidance provides a process for a private entity to assess whether both substantial impacts on the permittee as well as widespread impacts on the surrounding community would likely result from compliance with the standards and their associated limits. If substantial impacts on the Permittee cannot be established, an analysis of widespread impacts on the surrounding community is not essential, and variance eligibility cannot be established.

As documented within the application, U.S. Steel hired Barr Engineering to perform an engineering treatment analysis of sulfate treatment costs, and Barr appropriately evaluated and estimated cost of currently available treatment technologies capable of meeting the sulfate limitations. The selected wastewater treatment system relies on linking commercially available physical and chemical processes and involves the installation of equalization basins, lime softening, ultrafiltration, nanofiltration, high-efficiency reverse osmosis, evaporators, crystallizers, filter presses, and centrifuges. The application asserts that four separate wastewater treatment plants, all using the same technologies, would be necessary to comply with effluent limitations. Barr further includes the cost of waste salts disposal. The project costs were performed at a class 4 level (+50%/-30% certainty) and included capital and operations and maintenance costs over a conventional 20-year design life (Table 2) which results in annualized costs of approximately $105 million per year. The MPCA finds that there is unlikely to be a substantially cheaper wastewater treatment system that could consistently comply with the current sulfate limits.

Table 2. Table 1 from Appendix B of the variance application of the costs at each discharge station. 'CAPEX' means capital costs. '20-year NPV OPEX' means the net present value of operations and maintenance costs over a 20-year period.

Table 1 Barr's Opinion of the Probable Total Construction Cost and Operating Cost

	GRAND TOTAL	SD-002	SD-003	SD-005	SD-012
SD Design Flows, gpm	-	3,800	2,800	5,000	1,400
CAPEX =	$538,000,000	$158,000,000	$125,000,000	$186,000,000	$69,000,000
20-year NPV OPEX =	$276,298,000	$77,341,000	$61,698,000	$101,418,000	$35,841,000
Total =	$814,298,000	$235,341,000	$186,698,000	$287,418,000	$104,841,000
+50% =	$1,300,000,000	$400,000,000	$300,000,000	$500,000,000	$200,000,000
-30% =	$600,000,000	$200,000,000	$200,000,000	$300,000,000	$100,000,000

The Guidance identifies one primary metric and three secondary metrics to assess an applicant's financial situation and their ability to pay pollution control costs to comply with water quality standards. The primary metric is the profit rate before and after pollution controls, and the secondary metrics are current ratio, Beaver's ratio, and debt-equity ratio. Minn. R. 7000.7000, Subp. 2E requires examining financial metrics for the most recent three years to determine financial position and affordability for compliance costs. Based on financial analysis of the above metrics for U.S. Steel for the years 2022, 2023, and 2024, the Permittee's financial status is in good standing because it is profitable each year. U.S. Steel has sufficient profits to pay for pollution control costs, and therefore substantial impacts on the Permittee will not result from compliance with water quality standards.

a. Profit rate: The profit rate is a measure that provides an indication of a company's profitability. U.S. Steel estimates the profit rate with and without pollution controls to be 0.07 based on the most recent completed fiscal year earnings and revenues. U.S. Steel estimates the annualized costs of pollution control for compliance with the water quality standard will be $105 million.

   U.S. Steel calculated the "percent change in profit rate due to pollution controls" to be -9.2% using 2024 finances (Table 3) but the reported "profit rate" (0.07) was identical before and after pollution control costs. MPCA replicated the Permittee's calculated "percent change in profit rate" using the equation recommended by the Guidance and the information U.S. Steel provided. The identical 0.07 "profit rate" before and after pollution controls can be attributed to rounding and significant figure practices during calculations; the "profit rate" and "percent change in profit rate" use different rounding practices.

Table 3. Primary Measure: Profit Test table from Appendix C of the variance application

Primary Measure: Profit Test[1]					
Entity	Annual Pollution Control Costs	Most Recently Completed Fiscal Year	Profit Rate Without Pollution Controls	Profit Rate With Pollution Controls	Percent Change in Profit Rate Due to Pollution Controls
United States Steel Corporation	$105,166,000	2024	0.07	0.07	-9.2%
Note:1. Based on the most recently completed fiscal year					

U.S. Steel also reported profit rates of 0.10 and 0.18 for fiscal years 2023 and 2022 respectively and does not provide sufficient supporting financial information about the company's competitors. Given profits and reported earnings for 2024, 2023, and 2022, profits would still be positive after paying the Permittee's projected cost of pollution control, the MPCA concludes that lack of profitability due to installing pollution control is not sufficient to justify a variance.

b. Current ratio: The current ratio is a measure that provides an indication of a company's liquidity, or its ability to pay short-term obligations. U.S. Steel's average current ratio for the past three years is 1.76, with none of the years having a current ratio below 1.0. This suggests that the Permittee is not facing serious liquidity problems. While the current ratio is lower than the EPA's general recommendation of greater than 2.0, a lower current ratio in and of itself is inadequate to prove weak overall finances and therefore, variance eligibility. Notably, the current ratio is not substantially less than 2.0 and as demonstrated above, U.S. Steel is profitable.

c. Beaver's ratio: The Beaver's ratio is a measure that provides an indication of a company's long-term solvency and the likelihood of staying in business. The Permittee's average Beaver's ratio for the past three years is 0.52, which being higher than EPA's recommendation of 0.2, indicates solvency.

d. Debt to equity ratio: Debt to equity ratio measures leverage, or the capacity to take on additional debt. A debt-to-equity ratio between 0 and 1 shows that for each dollar owned by shareholders, the company owes less than $1 to creditors, showing excellent debt capacity or higher than average ability to take on additional debt. U.S. Steel's debt to equity ratio has been: 0.50 for 2022, 0.48 for 2023, and 0.47 for 2024, with an average of 0.48. This indicates that U.S. Steel has the capacity to take on debt to pay for pollution controls.

The variance application was received on May 30, 2025, and the economics included are with respect to the U.S. Steel Corporation. Since that time, Nippon Steel has purchased U.S. Steel. The above economic assessment was performed using the economic information in the variance request submission.

Based on the results of the financial analysis included in the variance application, using economic measures for affordability as directed by the Guidance and cost data provided by the Permittee, MPCA does not find sufficient evidence for substantial economic impacts on the Permittee resulting from compliance with water quality standards, and therefore does not find sufficient financial or economic grounds for variance eligibility at this time.

Submittals

The sulfate variance application was received on May 30, 2025.

Conclusions / Recommendations

Upon review of the submitted variance request, MPCA staff have determined that the Permittee has not satisfied the conditions necessary to grant the sulfate variance. MPCA staff recommend the Commissioner deny the variance requested for NPDES/SDS Permit Nos. MN0031879 and MN0055948 for the U.S. Steel – Keetac facility.

The variance request form and full application from the Permittee has been posted concurrently with this preliminary determination document.

The draft permits and information about how to review and provide comment on both the permits and the variance preliminary determination are available on MPCA's public notice website, https://www.pca.state.mn.us/get-engaged/public-comments. Information about how to attend the public meeting can also be found in the public notice announcement.