



US Steel Keetac Phase 2 EAW Comment Spreadsheet

US Steel Responses – October 24, 2025

ID	Comment	Topic of Concern	Individual Comment Topic	US Steel Response
MCEA-3	<p>More recently, however, U.S. Steel has had concerns about the stability of the Stage 2 Interior dams and its tailings deposition plan. After assessing the risk associated with the tailings basin dams, U.S. Steel “identified that continuing to vertically raise Stage 2 Interior at Keetac in an upstream method was not sustainable.” U.S. Steel accordingly began evaluating options for continuing to use the tailings basin. In 2022, U.S. Steel received permission to raise the Stage 2 Exterior dams, construct an interior diversion berm, and to depose tailings into this space, “with the intent to improve the stability of the Stage 2 Interior basin embankments.” This was intended, however, to be a short term solution.</p>	<p>The Proposed Project is intended to improve safety at the Keetac tailings basin</p>	<p>Dam stability</p>	<p>The Proposed Project is intended to improve safety at the Keetac tailings basin. The Proposed Project includes downstream construction methods and modified centerline which would be an improvement over current operations. By utilizing the existing Stage 2 footprint for the Proposed Project the overall structural height of the Keetac tailings basin is being reduced as opposed to staying only in the Stage 2 Interior footprint. By not vertically expanding the existing footprint higher to match the life of mine and distributing that volume in the Stage 2 Exterior one is reducing potential structural height and therefore reducing risk and consequences of failure. This Project continues to bolster the 2022 work.</p>

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MCEA-4	<p>Now, U.S. Steel expects that both Stage 2 Interior and Stage 2 Exterior will be at their full permitted capacity by 2028, and raising Stage 2 Interior dams as planned is not practicable. Accordingly, it has requested approval of a project that would vertically raise Stage 2 Exterior dams using downstream and modified centerline dams beyond the current tailings basin footprint to allow further tailings placement in the basin. DNR issued an EAW evaluating this project, which noted that the intent of the Proposed Project was not only to align the tailings basin capacity with Keetac’s mine life but also “to reduce risk and improve the safety of the [tailings basin] ... with the ultimate goal of reducing the risk of dam failure.”</p>	<p>The Proposed Project is intended to improve safety at the Keetac tailings basin.</p>	<p>Dam stability.</p>	<p>See MCEA-3.</p>
MCEA-9	<p>However, sixteen years after this pronouncement by DNR, the EAW contains no analysis of the risk of a dam breach or the environmental effects of such an event, and little information about dam safety. Such information could be obtained from U.S. Steel. Accordingly, DNR does not have information necessary to make a decision</p>	<p>DNR must revise the EAW or order an EIS for an analysis of dam safety.</p>	<p>Dam breach of existing Stage 2 interior.</p>	<p>Hypothetical scenarios in the dam break analysis are based on forced breaches. A dam breach analysis has been conducted for current conditions with minimal loss of life potential. DNR Dam Safety has summary of current, mid-life, and final phases. The basin design is intended to hold the Probable Maximum Precipitation design storm without breaching and discharge at a controlled rate following the design storm event. Environmental impacts decrease with additional tons stored and as part of this project primarily as a reduction in</p>

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	about the potential for or significance of the environmental effects of a dam breach and must obtain the information or order an EIS			water, therefore the proposed project reduces risk because the consequence of failures goes down as provided by the dam breach analysis.
MCEA-11	The EAW includes few details about the dams, including information about their dimensions, maps of their precise locations, details about their construction and foundations, and their capacities, both before and after the Proposed Project, that should be included for a complete analysis.	The limited information in the EAW indicates the Keetac tailings basin has the potential to cause environmental effects through breach.	Missing details on proposed dams.	See Figure 6.4 and 6.5. For proposed project - downstream dams and modified centerline dikes. Detailed design is required by DNR Dam Safety and will be part of the Dam Safety Permit Amendment. General cross is provided. This is not an issued for construction design. Final design is required by DNR Dam Safety.
MCEA-12	The EAW states that the tailings basin has piezometers and other measuring equipment, it does not state whether all of these are functional—which has been an ongoing issue at another permitted tailings basin facility, MilePost 7.	The limited information in the EAW indicates the Keetac tailings basin has the potential to cause environmental effects through breach	Piezometers status.	Annual instrumentation summary is provided to DNR Dam Safety. USS has functional piezometers that are frequently observed and monitored and replaced as necessary as part of a monitoring program. Yes, all instruments listed are functional.
MCEA-13	Some of the new dam raises that are part of the Proposed Project will be constructed as downstream raises, but others are less stable—and cheaper to build—types of dams. The Stage 2 Interior dams are upstream dams, initially built on the tailings	The limited information in the EAW indicates the Keetac tailings basin has the potential to cause environ-	Dam construction / safety.	No upstream construction is proposed as part of the Project and no construction will occur on top of tailings. Modified centerline construction does not include construction on top of tailings. However, the type of construction engineering is different than current status. The proposed type of construction is mechanical construction using a downstream or modified centerline dam design.

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	<p>discharged into the Stage 2 Exterior area and then raised in an upstream direction. These dams, because their foundation rests on the tailings they are intended to confine, are the most dangerous type of tailings dam, and they are banned in countries including Chile, Peru, and Brazil. The 2009 EIS noted that a breach of the Stage 2 Interior dam might not be contained on the east side of the facility, where there was no constructed embankment—suggesting that even 15 years ago, DNR recognized the risks posed by these dams. In addition, the EAW states that some of the raises of the Stage 2 Exterior dams will be “modified centerline dams.” Such dams are still built partially on top of tailings, thus incorporating the feature of upstream dams that makes them the least stable and most dangerous type of tailings dam. U.S. Steel itself clearly has concerns about the stability of the dams at the facility, as it determined that continuing to raise the Stage 2 Interior dams as planned was “unsustainable,” and that buttressing of these</p>	<p>mental effects through breach.</p>		<p>Downstream and centerline dams leverage a more suitable foundation and require more dam fill (the resisting force on the tailings) these methods are considered safer than upstream methods. This approach improves dam stability and removes the risk of static liquefaction. Preliminary factors of safety are desirable with this method and continuous monitoring and analysis will be conducted annually throughout the construction of the dams.</p> <p>General cross is provided. This is not an issued for construction design. Final design is required by DNR Dam Safety.</p>

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	dams was needed, thus triggering the Proposed Project.			
MCEA-14	While there are few details in the EAW, it is clear that the Proposed Project also involves a massive expansion of the tailings basin. The tailings basin currently holds tailings from decades of mining in a 5,800 acre deposition area—a space about twice the size of the Minneapolis-St. Paul Airport. If the Proposed Project were built to capacity, the basin would hold 590 million long tons of tailings and the Stage 2 Exterior dams would rise an additional 100 feet, to a height of 1,580 feet. As dam walls get higher and the waste behind them gets deeper, the force against the dam becomes greater, with potential impacts on dam stability. The Proposed Project, then, appears to increase the risk of a dam breach.	The limited information in the EAW indicates the Keetac tailings basin has the potential to cause environmental effects through breach		See MCEA-13.
MCEA-15	However, the true measure of the risks is unclear because the only information about dam stability in the EAW is disconcertingly vague. U.S. Steel asserts that the Proposed Project is intended to improve dam stability, suggesting risk of a dam breach which may be mitigated by the Proposed Project. Yet	The limited information in the EAW indicates the Keetac tailings basin has the potential to cause environ-		See MCEA-9.

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	there is no analysis of the likelihood of a catastrophic failure or lesser breach either before or after the construction of the Proposed Project, and how the project will impact stability	mental effects through breach.										
MCEA-16	One critical measure of a dam’s stability is its factors of safety, but the EAW states that the “DNR does not specify factor of safety criteria for analysis.” ²⁹ Instead, U.S. Steel itself apparently selected a factor of safety that “meets or exceeds industry standards is defensible to independent review.” ³⁰ This factor of safety—chosen by the regulated party and not the regulator—is not specified. Considering that the 2010 EIS used a Total Stress Analysis factor of safety of 1.2, which the EIS admitted was “slightly less protective than the traditional value of 1.3,” ³¹ allowing U.S. Steel to choose its own factor of safety without disclosing it to the public is inadequate. When the instability of the dams is the very reason for the Proposed Project, it is critical for the EAW to analyze that stability to determine the potential for	The limited information in the EAW indicates the Keetac tailings basin has the potential to cause environmental effects through breach.		<p>While MDNR does not specify factor of safety criteria for analysis of perimeter dam/dike stability, dam safety guidelines are specific with respect to what types of stability analyses should be performed including seismic and liquefaction cases.</p> <p>GEI selected the following minimum factor of safety criteria for our evaluation.</p> <table border="0"> <tr> <td>Stability Case</td> <td>Min Factor of Safety Criteria-See Note 2</td> </tr> <tr> <td>Effective Stress Analyses (ESA)</td> <td>1.5</td> </tr> <tr> <td>Peak Undrained Strength Analysis</td> <td>1.5</td> </tr> <tr> <td>Pseudo Static Analysis-See Note 1</td> <td>1.2</td> </tr> </table> <p>Note 1: Peak Ground Acceleration (PGA) 0.03g based on 2014 Update of the United States National Seismic Hazard Maps, and methodology proposed by Seed et. al. 1997</p> <p>Note 2: Minimum factor of safety criteria selected based on current standard of practice for iron ore tailings basins in upper Midwest.</p>	Stability Case	Min Factor of Safety Criteria-See Note 2	Effective Stress Analyses (ESA)	1.5	Peak Undrained Strength Analysis	1.5	Pseudo Static Analysis-See Note 1	1.2
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	environmental effects, but this EAW fails to do so.			
MCEA-21	<p>The EAW does not include the following information:</p> <p>Details about the dams to be built and/or raised by the Proposed Project, including their dimensions, maps of their locations, details about their construction and foundations, and their capacity, both before and after the Proposed Project.</p>	Conclusions		See MCEA-11.
MCEA-22	<p>The EAW does not include the following information:</p> <p>Information about the functionality of piezometers and other measuring stability equipment at the tailings basin.</p>	Conclusions		See MCEA-12
MCEA-23	<p>The EAW does not include the following information:</p> <p>An analysis of the current stability of the dams at the tailings basin facility, and how the Proposed Project will affect their stability.</p>	Conclusions		Slope stability analysis meets or exceeds all standards as noted on MCEA-16.
MCEA-24	<p>The EAW does not include the following information:</p> <p>The factors of safety being used to analyze the stability of the dams.</p>	Conclusions		See MCEA-16.

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WL-1	<p>The stated purpose, EAW at 8, of the Keetac TSF Project “to reduce risk and improve the safety of the TSF while minimizing impacts to the environment – with the ultimate goal of reducing the risk of dam failure” is laudable. Similarly, it would be a positive step if DNR has selected a factor of safety analysis “that meets or exceeds industry standards and is defensible to independent review.” Id. However, the EAW provides no evidence to support this stated Project purpose or dam safety analysis. The EAW provides none of the following pertinent information: a) the chosen minimum factor of safety criteria against which dam stability is now and will be evaluated; b) the current and projected factors of safety at the Keetac tailings dams if the proposed Keetac TSF Project is not built; or c) the projected factors of safety during construction, operations, and closure if the Keetac TSF Project is constructed as proposed. Id. at 8-9. This information must be provided to demonstrate that the proposed TSF Project is</p>	<p>Dam Safety Intent Unsupported.</p>	<p>Factor of safety analysis.</p>	<p>Slope stability analysis meets or exceeds all standards as noted on MCEA-16. The proposed project will not have fine tailings as a foundation thereby removing the risk of static liquefaction.</p>

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	reasonably related to its stated intent and purpose.			
WL-3	Please provide information on geotechnical investigations, instruments, and “adoption of new technologies” that would be installed to monitor the health and performance of the facility.	Dam Safety Intent Unsupported	Dam safety analysis.	Additional performance monitoring instrumentation would be installed. At each transect instrumentation could include inclinometers (to measure horizontal deformations), piezometers (to measure pore water pressures), observation wells (to measure water levels), and settlement plates or other settlement monitoring devices (to measure vertical displacements). Detailed instrumentation transects will be included the Dam Safety Permit Amendment as required.
WL-4	The EAW fails to include maps or illustrations showing either the locations or structures of Keetac TSF Project proposed “down-stream dams” or “modified centerline dikes	Project Description Insufficient	Figure of dams/dikes locations.	See MCEA-11.
WL-5	As noted above, this narrative is not accompanied by any map or illustration of where or what existing or proposed structures the DNR has decided to view as “dikes” and as “dams.”	Project Description Insufficient	Graphics of dams and dikes.	See MCEA-11.
WL-7	The EAW narrative description contains another ambiguity that undermines the ability to evaluate whether the proposed Keetac TSF Project activities support its stated dam safety purpose. The EAW uses the word “foundation” to refer to the	Project Description Insufficient	Foundation materials.	The term modified centerline is used, as the upstream portion of the dam would rest on previously constructed clay dam. The dam would be built in stages or lifts following the tailings deposition.

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	<p>substrate underlying both the downstream and “modified centerline” dams proposed for the Project. However, the foundation for any downstream dam is solid ground, rather than tailings. If the foundation for the “modified centerline” dams were also solid ground, the dams would be appropriately designated as “centerline” not “modified” centerline dams. The EAW must disclose where the “modified” centerline dams are located and whether their “foundation” is actually previously deposited fine tailings and slimes.</p>			
<p>WL-8</p>	<p>If the foundation for proposed new dams is fine tailings, the EAW must explain that this engineering choice does not improve dam stability and explain whether it is driven by the costs of developing off-site sources for dam construction materials.</p>	<p>Project Description Insufficient</p>	<p>Dam safety / construction.</p>	<p>The foundation for the proposed new dam would be coarse tailings, existing clay dam, or suitable native materials. The coarse tailings are engineered for dike and dam construction. Engineered coarse tailings will be developed at the separation facility which will be unique on the range as the equipment is specifically designed for dam construction and reduction of water.</p>
<p>WL-9</p>	<p>The EAW describes some of the Keetac TSF Project changes, but there are gaps in this description that affect evaluation of the purpose of the Project and its potential for significant environmental effects. First, the EAW does not explain the basis</p>	<p>Project Changes Incompletely Disclosed</p>	<p>Project changes.</p>	<p>The full environmental impacts were evaluated for the proposed TSF at a crest elevation 1580' which equates to 590 Mlt of storage. This is 5 feet less than the Stage 2 Interior south dam at ultimate design. After 1580' is reached it was concluded that if Keetac continues storage; new design methodologies, footprint, closure considerations, and resulting analysis of environmental impacts would</p>

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	<p>for the scope and scale of its construction. The EAW states that at current mining rates, for the life of the mine through 2048 the Keetac total tailings delivered to the TSF would be 340 million long tons of tailings. EAW at 9. The EAW then states that the proposed Project would allow storage of 590 million long tons of tailings. Id. The EAW also clarifies that the Project “does not propose to increase the permitted life of the mine,” “does not involve any change in mining or processing from what has been permitted,” and that the 2048 life of mine date “includes time for reclamation and closure.” Id. The EAW further states that the proposed TSF Project would not be completed until 2063. Id. at 11, Table 6.3. The only information in the EAW provides no support for the need to construct a TSF that will not be completed until decades after closure to store 590 million long tons of tailings.</p>			<p>be needed. As ore grades change, leases are acquired, or permit to mine amendments are made actual tonnages to the TSF can change. Therefore, it was determined to conservatively evaluate the full environmental impacts for this proposed project. The TSF will be designed in phases, that reflect applicable permits and terms. There is no negative consequence to the environment if Keetac chose to close and reclamation prior to storing 590 Mlt.</p>
WL-10	<p>In addition, although the Keetac TSF Project proposes a massive increase in wet slurry deposition, the EAW does not describe the volume or percentage of waste-</p>	<p>Project Changes Incompletely Disclosed</p>	<p>Wastewater volume.</p>	

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	<p>water that will be pumped into the TSF with fine tailings or the volume of wastewater that will be impounded behind what the EAW refers to as “downstream” dams. There is no evaluation of the total water flow and captured precipitation that will be contained in the TSF if the proposed Project is constructed.</p>			
<p>WL-11</p>	<p>The EAW states that the Keetac TSF is designed as a “closed system with no direct discharge to surface waters.” Id. at 46. But that is not how the TSF actually operates. In its draft NPDES/SDS permit for the Keetac Tailings Basin, the Minnesota Pollution Control Agency (“MPCA”) recently found that surface drainage from the tailings basin area, “flows to the West Swan River, unnamed wetlands, Hay Creek to Swan Lake, Reservoir 2, Reservoir 2 North and Welcome Creek.” Tailings Basin Permit2 at 4. In fact, the EAW proposes a seepage reduction feature along the upstream face of the water retention dam to reduce seepage through the dam. EAW at 44. The increased size, tailings volume, and wastewater volume if the proposed Project is built have the</p>	<p>Wastewater Release</p>	<p>Seepage, mitigation, and analysis.</p>	<p>36 – Under normal operating conditions, discharge from Reservoir No. 6 occurs periodically through outfall SD-005 (Permit No. MN0055948). From SD 005, water flows to Reservoir No. 2, the O'Brien Diversion Channel, Hay Creek, Hay Lake and ultimately Swan Lake (see Figure 12.8).</p> <p>Engineering judgement suggests that the dam section will experience reduced seepage. Further evaluation is required as part of the DNR Dam Safety permitting process. This is further supported by operational changes that reduce the volume of water sent to the basin, specifically by thickening fine tailings prior to deposition, which decreases water loss to void space. These improvements also contribute to enhanced tailings storage facility stability.</p> <p>8 - Additionally, the proposed water retention dam design incorporates a geomembrane liner along the upstream face to lower the phreatic surface and limit seepage through the dam. For the dike</p>

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	<p>potential to increase the adverse environmental effects of direct surface seepage.</p> <p>The EAW acknowledges that the “Project would increase the overall potential for seepage of process water into the groundwater system.” Id. at 77. In addition, for the West Swan River, the EAW states that there is “[p]otential groundwater seepage from TSF.” Id. at 37, Table 12.2. However, the EAW provides neither analysis nor mitigation to address potential environmental effects from increased polluted discharge to groundwater and through groundwater to surface water.</p>			<p>sections, negligible differences are expected between current options and the proposed project. Driven by the reduction of water stored near the upstream face of the dike, as the beach area would increase driving the pooled water to the water retention dam with a geomembrane liner.</p>
WL-14	<p>Although the EAW hypothesizes that processing finer tailings might offset the increase in seepage of process water through the tailings, no specific facts or analysis in the EAW support this theory.</p>	Wastewater Release	Fine tailings deposition.	See WL-11.
WL-15	<p>Moreover, there are no mitigation measures for the Keetac TSF Project that regulate or control potential adverse</p>	Wastewater Release	Specific seepage mitigation measures.	See WL-11.

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	effects from seepage to and through groundwater.			
WL-16	Currently, there is no groundwater monitoring at the Keetac TSF, and the draft NPDES/SDS permit for the Keetac tailings basin doesn't propose any. See TB Permit at 48-68. The EAW's suggestion that "installation of new monitoring wells" would be needed even to detect changes to seepage conditions and groundwater quality, EAW at 77, underscores that there is no measurement, let alone mitigation, to evaluate or control polluted seepage to groundwater.	Wastewater Release	Monitoring requirements.	Tailing Basin Wetland Replacement Plan Notice of Decision for Phase I, approved by DNR 1/24/2022, requires for review and approval a water quality and quantity monitoring plan.
WL-18	Finally, the EAW describes no existing or proposed "mitigation measures specifically designed" to reduce environmental effects to groundwater or surface water from increased Keetac TSF seepage should the proposed Project be constructed. Minn. R. 4410.1700, subp. 7(B). These effects have the potential to be significant.	Wastewater Release	Groundwater / surface water mitigation (same as comment WL-15).	See WL-11.
WL-25	On several salient issues, the material contained in the EAW is incomplete or inaccurate, Minn. R. 4410.1600. The EAW doesn't	Conclusion	See comments WL-9, WL-1 to WL-3.	See WL-9 and MCEA-9.

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	support the purpose and need for a project at the scale of the Keetac TSF Project and does not substantiate that the proposed Project would reduce rather than increase the risk of dam failure.			
WL-26	The Keetac TSF Project also has the potential for significant environmental effects due to the increase discharge of polluted water to groundwater and through groundwater and surface drainage to surface water, and does not adequately consider, let alone provide mitigation measures to avoid or minimize these risks. Minn. R. 4410.1700.	Conclusion	See comments related to Wastewater Releases, WL-10 to WL-19.	See WL-11.
WL-27	DNR should revise the EAW to address the insufficiencies described in these comments, either to substantiate the need for 590 million long tons of tailings storage or to modify the Project consistent with the 2048 life of the mine.	Conclusion	See comment WL-9.	See WL-9.
WL-29	That revised EAW should also transparently and accurately describe the Keetac TSF Project construction plan and water containment projections, consider the environmental effects of dam failure and increased discharge of polluted	Conclusion	I think this is related to many comments above.	See WL-9 and MCEA-9.

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	wastewater, and specify appropriate mitigation measures.			