

U.S. STEEL KEETAC TACONITE MINE EXPANSION PROJECT

Final Environmental Impact Statement



Prepared by

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Natural Resources**



in cooperation with

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control efficiency; potential controlled mercury emissions are estimated to be 9.45E-03 lb/hr and 83 lb/yr respectively. The Mercury Control Alternatives Evaluation (Barr, 2009K) determined that with the additional installation of the ACI system, the control efficiency increases to a minimum of 50 percent and potential controlled mercury emissions are estimated to be 6.75E-03 lb/hr and 59 lb/yr respectively.

However, the Project Proposer is accepting a permit condition that would limit the Proposed Project potential pellet throughput to 3,600,000 TPY through the new furnace. Therefore the “limited potential” maximum annual mercury emissions from the Proposed Project are shown below.

Proposed Project Mercury Emissions

- after the proposed GSA/ESP system, are estimated to be 76 lb/yr, and
- after the proposed GSA-ACI/ESP system, are estimated to be 54 lb/yr.

In the EIS analysis, the potential mercury air emissions, after emission controls, are estimated to be 93 percent elemental mercury, 1 percent particle-bound mercury and 6 percent oxidized mercury species (Barr, 2009J). This speciation profile is based on data from coal-fired power plants using similar control systems as the Proposed Project.

For the local impacts assessed in this section and in Section 4.9.8 and the cumulative effects analysis in Section 5.5, for the proposed GSA/ESP system (without ACI), the following controlled mercury emission rates and speciation profile are used:

1. maximum hourly emissions – 9.45E-03 lb/hr
2. maximum annual emissions – 76 lb/yr
3. Mercury speciation - 93 percent elemental, 1 percent particle-bound, and 6 percent oxidized

Proposed Project

Chronic cancer risk results for the Proposed Project alone have a maximum result of 0.4 in 100,000. The maximum potential result is for a farmer scenario at maximum exposure levels.

4.9.8.2.4 Mercury Results

The local mercury deposition analysis assesses the potential contributions from the Proposed Project to selected lakes within 10 kilometers. Background mercury deposition is included as an input value to the MMREM spreadsheet and it is assumed the existing facility contributes to the background deposition and to the background mercury fish tissue levels. The MMREM analysis used the most recent mercury emission data available for the existing facility and assumed that a 30 percent mercury control efficiency would be implemented as part of the Proposed Project. Further information on proposed mercury controls is provided in Section 4.9.7.

The analysis shows that the Proposed Project alone would likely not measurably affect fish tissue levels at recreational consumption levels (approximately 0.4 lbs/week). At higher consumption levels (approximately 3 lbs/week) MMREM calculated an incremental HI for fish consumption at 30 percent control of 0.08 to 0.5 depending on the specific lake assessed. (Reference Wachtler Memo 4/14/2009 (Barr, 2009J)). See Section 4.9.7 for further discussion of existing levels and 5.13.1 for potential cumulative results.

4.9.8.2.5 Summary of Results

- Results for the Proposed Project alone are less than general risk assessment guidelines in all cases.
- Results for the existing facility are higher than general risk assessment guidelines for the acute health impact estimates assuming worst-case operating conditions combined with worst-case meteorological conditions.
- Results for the existing facility for the farmer scenario are higher than general risk assessment guidelines for longer time frames (chronic) using maximum exposure assumptions. This is true for farmer cancer, but not for all other chronic, hypothetical exposure scenarios (farmer non-cancer chronic, etc.). Further analysis using MCTE exposure assumptions indicates that the risk estimates for the existing facility are below guidelines.
- Potential mercury emissions from the Proposed Project alone would not be sufficient to affect discernibly mercury fish tissue levels at recreational consumption levels (approximately 0.4 lbs/week). At higher consumption levels (approximately 3 lbs/week), the MMREM calculated an incremental HQ for fish consumption of 0.08 to 0.5, at 30 percent control, depending on the lake assessed.

The acute, chronic non-cancer and chronic cancer risk estimates increase with the Proposed Project, and therefore there is a potential for adverse impacts to health. However, the risks of the Proposed Project alone (excluding the existing facility) are below the guidelines, and therefore the incremental effects are not significant.

At recreational fish consumption levels, there would be no discernable change to human health risk estimates due to mercury emissions from the Proposed Project alone. At higher consumption levels, there would be an adverse effect to human health risk estimates. The significance of the effect on human health estimates is unknown.

This analysis was based on standard risk assessment methods and assumptions designed to be protective of public health. Actual risk estimates are likely to be lower than predicted.

- Mercury emissions from the Proposed Project and the other future projects in the zone of interest were assumed to have the potential to cause mercury impacts within a 15-mile radius from each individual project. It is unlikely that the proposed projects farther away could add to the cumulative mercury impact to a significant degree.

5.5.2 Environmental Consequences

Table 5.5.1 summarizes the estimated future mercury emissions for the recent and reasonably foreseeable future projects assessed in the Mercury CI study.

TABLE 5.5.1 RECENT AND PROPOSED PROJECTS EVALUATED IN THE MERCURY CI STUDY

Project	Location	Potential Mercury Emissions (pounds/year)
Excelsior Energy – West Range Site	Subject to State Site Process	54
Essar Steel Minnesota (Minnesota Steel)	Nashwauk	81
Laurentian Wood-Fired Energy Project	Virginia/Hibbing	7.3
Proposed Project	Keewatin	76
Total		218.3

Source: Barr, 2009R; Table 1.

When compared to existing regional mercury deposition rates, the Mercury CI Study indicates that mercury deposition would potentially increase variable amounts among the six area lakes, depending on how close the source is to each lake and the average atmospheric dispersion of mercury emissions over the landscape, as determined by local wind patterns (Table 5.5.2).

**TABLE 5.5.2 POTENTIAL INCREASE IN MERCURY LOADING AND FISH CONCENTRATIONS
(Due to Cumulative Effects of Multiple Facilities and the Proposed Project Alone)**

A	B	C	D	E	F	G
		Cumulative	Cumulative		Keetac Alone	Keetac Alone
Lake	Ambient Fish Mercury Concentration (ppm) (Appendix D ¹)	Increase in mercury loading and fish contamination (%) (Calculated from Appendix D ¹)	Increase in fish mercury (ppm) (Calculated from columns B and C)	Proportion of Cumulative Due to Keetac alone (%) ² (Table 3 ¹)	Increase in mercury loading and fish contamination (%) (Calculated from columns C and E)	Increase in fish mercury (ppm) (Calculated from columns B and F)
Big Sucker Lake	0.48	3.90%	0.019	5.10%	0.20%	0.001
Coons Lake	0.48	1.50%	0.007	33.80%	0.50%	0.002
Horsehead Lake	0.48	1.40%	0.007	58.70%	0.80%	0.004
Kelly Lake	0.48	2.80%	0.013	78.30%	2.20%	0.011
O'Brien Lake	0.59	2.50%	0.015	16.00%	0.40%	0.002
Swan Lake	0.42	5.50%	0.023	14.50%	0.80%	0.003

¹ Source: Barr, 2009R

² Percentages for O'Brien and Swan account for different modeled mercury air concentrations over the lake as compared to over the watershed.

Table 5.5.2 is based on the following assumptions:

- Mercury speciation of facility emissions will be comprised of approximately 93 percent elemental, 6 percent oxidized, and 1 percent particle-bound mercury,
- Modeled mercury emissions are based on the recent and reasonably foreseeable new facilities within 15 miles of the Proposed Project (including the Proposed Project),
- It is unlikely that any projects outside a 15-mile radius would appreciably impact the lakes near Keetac, based on modeling (Mercury Control Alternatives Evaluation),
- Current deposition of mercury in the Keewatin, Minnesota, area is assumed to be 12.5 ug/m²/yr, and
- Mercury concentrations in fish will be proportional to atmospheric mercury loading to each lake.

Potential mercury emissions from the Proposed Project are estimated at 76 pounds per year, or 35 percent of the total new emissions (218.3 lb) from the four projects evaluated in the cumulative effects report (Table 5.5.1).

The emission of 218 pounds per year of mercury to the atmosphere from the reasonably foreseeable future projects (including the Proposed Project) should be considered in relation to the following information:

The MPCA TMDL goal for mercury concentrations in fish is 0.20 ppm, a concentration that is currently exceeded by large margins for walleye and northern pike in all six lakes (Table 5.5.2).

- By adding 218 pounds per year of mercury emissions from the proposed future projects, Minnesota's emissions would increase by about 6.5 percent at the time that Minnesota's TMDL implementation plan contains an ultimate statewide mercury emission goal of 789 pounds in 2025. A needed reduction of about 75 percent from 2005 emissions.
- Minnesota's statewide mercury emissions are primarily elemental and in 2005 were estimated to be 1.67 short tons (3,341 pounds) or approximately 0.06 percent of global emissions. Worldwide emissions of mercury are approximately 2,400 metric TPY (5,300,000 pounds).

Analysis of the estimated potential cumulative effect of the four projects taken together shows that Swan Lake would experience the greatest increase in fish mercury concentrations, 0.023 ppm or 5.5 percent (Table 5.5.2), of which 0.020 ppm (86 percent) is due to Essar Steel emissions and 0.003 ppm is due to the Proposed Project (Table 3, Acidification CI Study). The least impacted among the six lakes is Horsehead Lake, which is predicted to receive a 1.4 percent increase in mercury; this corresponds to a 0.007 ppm increase in mercury concentrations which are in the fish.

The MPCA TMDL goal for mercury concentrations in fish is 0.20 ppm, a concentration that is exceeded by large margins for walleye and northern pike in all six lakes (Table 5.5.2).

The cumulative effect to mercury concentrations in fish is adverse as fish mercury concentrations (ppm) would increase. The cumulative magnitude of the effect would be significant as mercury concentrations in fish in lakes analyzed are already above the MPCA's TMDL goal for walleye and northern pike. Additional discussion of the ecological risk associated with mercury deposition is discussed in Section 5.13.2, Ecological Risk Assessment.

5.5.3 Mitigation Opportunities

Two of the four projects included in the cumulative effects assessment are under development and do not yet have air emission permits (the Proposed Project and Excelsior Energy's Mesaba Energy), while the other two already have permits issued.