Table 5.2.6-10. East Range Site Cumulative Wildlife Habitat Impacts Analysis Results

	Total Habitat in Study Area (acres)	Total Habitat Impacts (acres)	Percent Loss of Total Habitat		Proportion of Cumulative Impact
			From Past	From Existing	
Past	**103,562**				
Existing	**92,758**		**11.6**%		
Future Actions					
Mesaba Energy Project		**433**		**0.5%**	**8.9%**
PolyMet Mining NorthMet Project		**2,956**		**3.2%**	**61.0%**
Mesabi Nugget		**1,456**		**1.6%**	**30.0%%**
Total of Future Actions		**4,845**		**5.2%**	**100.0**%
Future	**87,912**				

Table 5.2.6-11. Total Habitat for Existing Conditions and Proportion Lost Due to Reasonably Foreseeable Future Actions within East Range Study Area

Habitat Type	Existing Conditions	Impacts of Reasonably Foreseeable Future Actions (acres)	Percent Loss Resulting from Implementation of Foreseeable Future Actions
Open Wetland	1,585	15	0.9%
Lowland Deciduous Forest	1,555	20	1.3%
Lowland Deciduous Shrubland	14,868	244	1.6%
Lowland Conifer Forest	18,712	804	4.3%
Lowland Conifer Shrubland	702	327	46.6%
Upland Conifer Forest	12,418	1,267	10.2%
Upland Conifer/Deciduous Forest Mix	269	3	1.1%
Upland Deciduous Forest (Aspen/Birch)	27,579	1,558	5.6%
Upland Deciduous Forest (Hardwoods)	1,278	214	1.7%
Upland Shrub/Woodland	6,513	113	1.7%
Water	5,431	199	3.7%
Cropland	61	0	0%
Grassland	1,787	81	4.5%
Total	**92,758**	**4,845**	**5.2%**

Potential impacts of the Mesaba Energy Project are listed in Table 5.2.6-**12**. The Mesaba Energy Project would potentially result in a loss of **433** acres of wildlife habitat, which represents a loss of 0.5 percent of the total habitat within the Study Area. The habitat type that would experience the greatest impact would be grassland, which would experience **a** loss of **4.3** percent of the existing acreage in the Study Area.

Table 5.2.6-12. Mesaba Energy Project Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	3	0.9%	20.0%
Lowland Deciduous Forest	18	1.2%	90.0%
Lowland Deciduous Shrubland	34	0.2%	13.9%
Lowland Conifer Forest	9	0.05%	1.1%
Lowland Conifer Shrubland	2	0.3%	0.6%
Upland Conifer Forest	21	0.2%	1.7%
Upland Conifer/Deciduous Forest Mix	1	0.4%	33.3%
Upland Deciduous Forest (Aspen/Birch)	218	0.8%	14.0%
Upland Deciduous Forest (Hardwoods)	1	0.08%	0.5%
Upland Shrub/Woodland	42	0.6%	37.2%
Water	7	0.1%	3.5%
Cropland	0	0%	0%
Grassland	77	4.3%	95.0%
Total	**433**	**0.5%**	**8.9%**

Potential impacts of the PolyMet Mining NorthMet Project are listed in Table 5.2.6-**13**. This project would potentially result in a loss of **2,956** acres of wildlife habitat, which represents a loss of **3.1** percent of the total habitat within the Study Area. The habitat type that would experience the greatest impacts would be **upland conifer forest**, which would experience **a** loss of **9.7** percent as compared to existing conditions within the Study Area.

Table 5.2.6-13. PolyMet Mining NorthMet Project Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	12	0.8%	80.0%
Lowland Deciduous Forest	1	0.06%	5.0%
Lowland Deciduous Shrubland	199	1.3%	81.6%
Lowland Conifer Forest	786	4.2%	97.8%
Lowland Conifer Shrubland	7	1.0%	2.1%
Upland Conifer Forest	1,201	9.7%	94.8%
Upland Conifer/Deciduous Forest Mix	2	0.7%	66.7%
Upland Deciduous Forest (Aspen/Birch)	640	2.3%	41.0%
Upland Deciduous Forest (Hardwoods)	23	1.8%	10.7%
Upland Shrub/Woodland	71	1.1%	62.8%
Water	10	0.2%	5.0%
Cropland	0	0%	0%
Grassland	4	0.2%	4.9%
Total	**2,956**	**3.1%**	**61.0%**

Potential impacts of the Mesabi Nugget project are listed in Table 5.2.6-**14**. This project would result in a potential loss of **1,456** acres of wildlife habitat, which represents a loss of 1.6 percent of the total habitat within the Study Area. **Lowland conifer shrubland** would experience the greatest impact with a loss of **45.3** percent of the total amount represented by the existing conditions.

Table 5.2.6-14. Mesabi Nugget Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	0	0%	0%
Lowland Deciduous Forest	1	0.06%	5.0%
Lowland Deciduous Shrubland	11	0.07%	4.5%
Lowland Conifer Forest	9	0.05%	1.1%
Lowland Conifer Shrubland	318	45.3%	97.2%
Upland Conifer Forest	45	0.4%	3.6%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	700	2.5%	4.5%
Upland Deciduous Forest (Hardwoods)	190	14.9%	88.8%
Upland Shrub/Woodland	0	0%	0%
Water	182	3.4%	91.5%
Cropland	0	0%	0%
Grassland	0	0%	0%
Total	**1,456**	**1.6%**	**30.1%**

There is currently no information available for a footprint for the anticipated St. Louis County roadway from Hoyt Lakes to Babbitt; therefore, no quantitative information could be included in this analysis. However, due to the general planned location of the roadway, it is assumed that construction of it would result in wildlife habitat impacts.

It is generally assumed that development of the Mesaba Energy Project, as well as the other foreseeable future actions, would cause some localized habitat fragmentation around areas of development. This fragmentation may cause some direct mortality to wildlife species resulting from those individuals being restricted from obtaining necessary resources for survival, such as food and water. Over time, fragmented areas may become less populous of species causing overall habitat quality to decline. However, because the Mesaba Energy Project and the other foreseeable future actions are located in regions of Minnesota with large amounts of similar habitat surrounding them, fragmentation impacts are expected to result at the level of the individual and not to a population-wide level.

Wildlife Travel Corridors

There are four MNDNR-defined wildlife travel corridors located entirely or partially within the Study Area – wildlife travel corridors #9, #10, #11, and #12 (refer to Appendix D5, Figure 4). Wildlife travel corridor #10 could be substantially affected by the Mesabi Nugget project to the point that the corridor could be rendered unusable by wildlife. The assumed footprint for the project shows the entire northern boundary of the corridor being impacted, which would completely remove this area from being a viable wildlife movement corridor. However, the final site layout for the project with locations of facilities and ground disturbances would have to be analyzed to confirm or deny this assumption.

Wildlife travel corridor #11 could possibly be affected by the PolyMet Mining NorthMet Project. The PolyMet project would be located approximately one mile northwest of the corridor and it appears that the project could remove a large area of habitat that would affect the ability of wildlife to cross through into habitats to the north and south. However, the final site layout for the project with locations of facilities and ground disturbances would be necessary to determine if it would affect corridor #11.

Wildlife travel corridors #9 and #12 are both located on the boundary of the Study Area and would not be impacted by the Mesaba Energy Project or any of the foreseeable future projects.

The Study Area and the locations of the Mesaba Energy Project and the other reasonably foreseeable future actions have been historically used for mining activities. Both Mesabi Nugget and the PolyMet Mining NorthMet Project would be located on lands that have been degraded by previous mining

activities. Therefore, the majority of the areas that would be impacted by the proposed projects have historically been disturbed.

5.2.7 Rail Traffic

As discussed in Section 3.15, the BNSF and CN rail lines are well established in the Arrowhead Region and experience infrequent to moderately frequent rail traffic on a daily basis. Any additional rail traffic would have the potential to cause increased noise and vibration levels along the rail lines and increased traffic congestion, delays, and safety hazards at public grade rail crossings. Due to current rail traffic along the existing rail lines, cumulative rail impacts would primarily result from the increase in the number, size, and frequency of trains proposed to result from the Mesaba Energy Project and other reasonably foreseeable projects. The cumulative impacts analysis from increased rail use is focused on the potential routes provided by the railways that would serve the Mesaba Generating Station. More specifically, the region of influence for the West Range Site includes the BNSF line from Grand Rapids to Hibbing. For the East Range Site, the region of influence includes the CN line from Iron Junction to Hoyt Lakes (see Appendix D6).

As discussed in Chapter 2, a small segment of rail between Gunn and the proposed West Range Site is currently inoperable due to rising water levels in the CMP. From the 1990's to 2001, this track was experiencing approximately four trains per day and even higher levels during the 1970s. As of October 2006, the Itasca County Regional Rail Authority has been soliciting interest for a shortline railroad operator to provide switching service along this line. The County is currently under contract with a consultant to design and permit the track, and operation is anticipated to begin April of 2009, which would provide a direct eastbound route from Grand Rapids to the West Range Site. Service along this route would most likely return to similar operating conditions when the track was serviceable during the 1990s and local train service would likely resume between Grand Rapids and Superior, Wisconsin. Currently, an estimated six trains daily pass through Grand Rapids in either direction (Excelsior, 2006c).

Once this segment returns to its prior operating condition, Minnesota Steel would satisfy their transport requirements through the base local train trips that would otherwise occur under these conditions. As a result, additional train trips are not expected to be generated by Minnesota Steel, and cumulative impacts related to rail traffic would be substantially similar to those described in Section 4.15 for the West Range Site.

5.2.7.1 Emergency Response

Potential congestion and delays at rail crossings may be a mere nuisance to everyday motorists; however, these delays may mean significant reductions in response time for emergency vehicles, which could result in increased loss of life or property damage. Since emergencies and train crossings are random events, predicting the likelihood of a passing train delaying an emergency vehicle and the length of delay becomes a complicated matter. In responding to an emergency, an emergency vehicle may encounter one of the following scenarios at a grade crossing:

- Not encounter a train and pass without delay through the crossing;
- Arrive at a crossing just as the train arrives and be required to wait the full train pass-by event or detour to the nearest unblocked or nearest grade-separated crossing;
- Arrive during the train crossing. Under this circumstance, the emergency vehicle could utilize the oncoming traffic lane to approach the crossing, avoiding any vehicle queue; or
- Arrive near the end of a train pass-by event and be required to make its way through traffic that has built up during the event.

The amount of time a crossing is blocked is based on the length of the train and the speed of travel. The faster a train is moving and/or the shorter the train length, the less time the crossing would be blocked. To analyze the cumulative impacts that additional train traffic would impose on emergency

response vehicles at grade crossings, the time each crossing would be blocked per train crossing event was determined by assuming a length of train and the speed at which it was traveling. The estimated delay time also includes the time for the train to pass along with time for active warning devices to be deployed and restored after a train had passed (an additional 20 seconds). Since trains in the region typically travel at speeds ranging between 12 and 50 miles per hour, a traveling speed of 25 miles per hour was used for calculations concerning potential vehicle delay from non-project-related trains; for projected-related trains, a speed of 10 miles per hour was used as a conservative estimate based on the rail noise analysis in Section 4.18. Therefore, the blocked crossing time per train passing event for trains resulting from the project was estimated to be approximately 8 minutes for a 115-car train (approximately 7,000 feet) and 9 minutes for a 135-car train (approximately 8,000 feet). For other trains not related to the project, delays would be 3.2 minutes for a 115-car train and 3.6 minutes for a135-car train. The numbers of trains passing through any grade crossing within the regions of influence for the West Range Site and East Range Site are based on estimates provided in Appendix D6, which count each round trip on a rail line as 2 trains per day passing a given crossing. The potential delay times associated with current and reasonably foreseeable projects at both sites are listed in Table 5.2.7-1. These delays are considered conservative estimates and would be shorter at crossings farther away from the plant site, where project-related trains would travel at speeds greater than 10 miles per hour.

The delay time per unit train (i.e., delay time per train crossing event) shown in Table 5.2.7-1 represents the maximum delay time that an emergency vehicle would experience if it arrived at the beginning of a train crossing event. Since details of future train operations for the reasonably foreseeable projects are speculative at this time, conservative estimates on the number of cars per unit train were used to determine more conservative delay times. Discussions on how these delay times would affect each potential project site are provided below.

Table 5.2.7-1. Grade Rail Crossing Delay Times

	Number of cars per unit train	Delay time per unit train	Number of trains crossing per day	Total delay time per day
West Range Site				
Base train traffic	135 cars	3.6 minutes	6 trains (either direction)	21.6 minutes
Minnesota Steel, Inc.	90 cars	-	(included in base traffic)	-
Mesaba Generation Station	135 cars	9 minutes	4 trains (2 round trips*)	36 minutes
			Total	57.6 minutes
East Range Site				
Base train traffic	135 cars	3.6 minutes	12 trains (either direction)	43.2 minutes
Mesabi Nugget	115 cars	3.2 minutes	2 trains (1 round trip)	6.4 minutes
PolyMet	135 cars	3.6 minutes	2 trains (1 round trip)	7.2 minutes
Mesaba Generation Station	135 cars	9 minutes	4 trains (2 round trips*)	36 minutes
			Total	**92.8 minutes**

Source: Excelsior, 2006c
Note: *Maximum for Phases I and II assuming 5 deliveries every 4 days (Excelsior, 2006b)

West Range Site

As shown in Table 5.2.7-1, trains in the West Range Site vicinity could result in a total of 57.6 minutes of delay at the grade crossings each day, which represents a 4 percent probability that an emergency vehicle would be delayed at a grade intersection on any given day. As previously mentioned, Minnesota Steel, Inc. would be the only other reasonably foreseeable project within the region of influence and their transport needs would be accommodated with rail cars in the expected base traffic level. Therefore, from a cumulative standpoint, the time delay estimate for the West Range Site would most likely be equivalent to the estimate predicted in Section 4.13.3.2. However, to account for the unlikely event that the inoperable rail line between Gunn and Taconite could not be renovated, potential

impacts to grade crossing delays resulting from Minnesota Steel's activities have been included for comparison. Under these circumstances, trains traveling eastbound from Grand Rapids would be required to detour south and loop back north to access the Taconite area.

West of the West Range Site, the BNSF rail line between Grand Rapids and Taconite comprises a total of 17 grade rail crossings, including eight in Grand Rapids, one in Coleraine, and two in Taconite. This rail line also includes grade-separated crossings at US 169 and US 2 on the northeastern outskirts of Grand Rapids and one at CR 7 near the project site. East of the West Range Site, the BNSF line between Hibbing and Taconite there are eight grade rail crossings and five grade-separated crossings (see Appendix D6).

The BNSF portion west of the site bisects the city of Grand Rapids. The Grand Itasca Clinic and Hospital is located on the south side of the railroad tracks and because of the rural nature of the region, limited road access to many areas could impede the movement of emergency vehicles. A number of emergency providers, including hospitals and the Itasca County Sheriff's Department were contacted to determine whether there were formal procedures to follow in the event of train passes. All had indicated that there were no specific procedures that were followed. The only grade rail crossings that could create a potential delay for emergency vehicles are in Grand Rapids and in Taconite because there are no grade-separated rail crossings within the city limits. Therefore, emergency vehicles stop and wait for trains to pass or take an indirect route around the train if possible. The only city that has one grade rail railroad crossing and no other means of crossing the railroad is Taconite (Clark, 2006). According to the Deputy Sheriff of the Itasca Sheriff's Department, all other communities between Grand Rapids and Nashwauk, have a bridge crossing and, therefore, do not typically have delay problems at grade crossings.

East Range Site

Rail lines serving the East Range Site have grade crossings at eight locations between Hoyt Lakes and Clinton Township south of Iron Junction, including one crossing in Aurora, one near McKinley, and three near Iron Junction (see Appendix D6). As shown in Table 5.2.7-1, trains in the East Range Site vicinity could result in a total of 92.8 minutes of delay at the grade crossings each day, which represents a 6.4 percent probability that an emergency vehicle would be delayed at a grade intersection on any given day.

Since most of the city limits of the communities near the East Range Site are located wholly on either the north or south sides of the rail line, there would be limited potential for delays at rail compared to the West Range Site. The only grade railroad crossing of concern to emergency response vehicles would be in Aurora – the grade crossing on Main Street is the only one in town. At this location, emergency vehicles would have no other choice, but to wait for the train to pass. All of the other grade rail crossings within the region of influence currently are not a concern, because most of the areas have access to at least one grade-separated crossing within a reasonable distance for re-routing, if necessary.

5.2.7.2 Public Safety at Grade Rail Crossings

The potential increase in risk of accidents at grade crossings is a public safety concern. The Proposed Action would not create new grade crossings; however, the increase in rail usage could increase the likelihood of a rail crossing accident along the existing rail corridors. The rail corridors within the regions of influence at the West Range and East Range Sites already experience daily rail traffic. Therefore, cumulative rail impacts on hazards at-grade crossings would primarily result from the increase in the frequency as a result of the Mesaba Energy Project and other reasonably foreseeable projects.

The most recent five years of accident history that was available at each grade crossing within the regions of influence were examined. In general, because there is relatively little traffic in the regions of influence, there were very few incidents at grade crossings reported in all of Itasca and St Louis Counties. Only two accidents occurred at grade crossings between Grand Rapids and Hibbing – one occurred in Grand Rapids at 3rd Avenue, NE, which employs passive warning signs (crossbuck signs), and the other incident occurred in Keewatin at 1st Street, which employs active signaling (flashing lights and sound).

No incidents were reported in the region of influence for the East Range Site. Rail data for the past five years indicate that there are no planned or recommended improvements to existing safety guards at the grade crossings. Due to the low frequency of accidents at the grade crossings, it is assumed that the level of protection is adequate for the current level of traffic. It is expected that any additional increase in safety hazards would remain low as the incremental addition of trains (see Table 5.2.7-1) is small.

5.2.7.3 Noise and Vibration

Noise and vibration generated by the rail operations have the potential to affect sensitive noise receptors near the rail corridors. Noise sources from rail operations include diesel locomotive engine and exhaust noise, wheel/rail interaction noise (collectively referred to as wayside noise) and horn noise. Wayside noise affects all locations along the rail corridor. Horn noise is an additional noise source at and near grade crossings where trains are required by law to sound a horn for safety.

Since the new rail alignments for the Mesaba Energy Project would be in the proximity of the proposed plant and away from population centers, the cumulative impact discussion on noise and vibration is mainly concerned with the existing rail corridors. Hence, the sounds associated with rail traffic are already part of the existing environment within the regions of influence. The number of sensitive noise receptors and magnitude of noise and vibration levels that would be experienced by the receptors as analyzed in Section 4.18 would generally remain the same, as only one train pass-by would occur at any given time. Therefore, cumulative noise and vibration impacts at the West Range and East Range Sites are expected to be substantially similar under the Proposed Action discussed in Section 4.18.

The frequency at which these impacts occur would increase as the frequency of train traffic would increase. However, as these are on established rail lines, it is expected that the incremental addition of train events would not cause significantly different impacts of the noise and vibration levels. This increase in occurrence of vibration events would present an inconvenience or annoyance to individuals experiencing it, but they would not be expected to cause any structural damage or significant reduction in individuals' quality of life. The most significant increase in noise levels would result from the increased occurrence of train horns at public grade crossings. Since these soundings are required by law to enhance safety of grade crossings the number of instances related to horn sounds would be equal to the number of additional grade crossings. This noise impact is considered a minor tradeoff when considered in the context of the safety benefits. Past FRA studies have indicated that banning whistles had averaged approximately 80 percent more collisions than comparable crossings where whistles were sounded (FRA, 1999).

5.2.8 Greenhouse Gases and Climate Change

5.2.8.1 Background

Greenhouse gases include water vapor, CO_2, methane, N_2O, ozone, and many chlorofluorocarbons. After water vapor, CO_2 is the most abundant greenhouse gas and, unlike water vapor, remains in the atmosphere for long periods of time and tends to mix quickly and evenly throughout the lower levels of the global atmosphere. Many anthropogenic activities release these gases. In the United States, CO_2 emission sources include energy facilities (primarily from fossil fuel combustion) and industrial plants. Industrial processes that emit these gases include cement manufacture, limestone and dolomite calcination, soda ash manufacture and consumption, CO_2 manufacture, and aluminum production (EIA, 2007b).

In the pre-industrial era (before 1750 AD), the concentration of CO_2 in the atmosphere appears to have been in the range of 275-285 ppm (IPCC, 2007c). In 1958, C.D. Keeling and others began measuring the concentration of atmospheric CO_2 at Mauna Loa in Hawaii (Keeling et al., 1976). The data collected by Keeling's team and others since then indicate that the amount of CO_2 in the atmosphere has been steadily increasing from about 316 ppm in 1959 to 386 ppm in 2008 (NOAA, 2009). This secular increase in atmospheric CO_2 is attributed almost entirely to the anthropogenic

activities noted above. In addition, industrial and agricultural activities release greenhouse gases other than CO_2 – notably methane, nitrous oxides, ozone and chlorofluorocarbons – to the atmosphere, where they can remain for long periods of time.

5.2.8.2 The Impacts of Greenhouse Gases on Climate

Climate is usually defined as the "average weather" of a region, or more rigorously as the statistical description of a region's weather in terms of the means and variability of relevant parameters over time periods ranging from months to thousands of years. The relevant parameters include temperature, precipitation, wind, and dates of meteorological events such as first and last frosts, beginning and end of rainy seasons, and appearance and disappearance of pack ice. Because greenhouse gases in the atmosphere absorb energy that would otherwise radiate into space, the possibility that anthropogenic releases of these gases could result in warming that might eventually alter climate was recognized soon after the data from Mauna Loa and elsewhere confirmed that the atmosphere's content of CO_2 was steadily increasing (IPCC, 2007c).

Changes in climate are difficult to detect because of the natural and complex variability in meteorological patterns over long periods of time and across broad geographical regions.[1] There is much uncertainty regarding the extent of global warming caused by anthropogenic greenhouse gases, the climate changes this warming has or will produce, and the appropriate strategies for stabilizing the concentrations of greenhouse gases in the atmosphere. The World Meteorological Organization and United Nations Environment Programme established the Intergovernmental Panel on Climate Change (IPCC) to provide an objective source of information about global warming and climate change, and the IPCC's reports are generally considered to be an authoritative source of information on these issues.

According to the IPCC Fourth Assessment Report, "*Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level*" (IPCC, 2007c). The IPCC report finds that the global average surface temperature has increased by about 0.74°C in the last 100 years; global average sea level has risen about 150 millimeters over the same period; and cold days, cold nights and frosts over most land areas have become less frequent during the past 50 years. The report concludes that most of the temperature increase since the middle of the 20th century "*is very likely due to the observed increase in anthropogenic [greenhouse gas] concentrations*."

The 2007 report estimates that, at present, CO_2 accounts for about 77 percent of the global warming potential attributable to anthropogenic releases of greenhouse gases, with the vast majority (74 percent) of this CO_2 coming from the combustion of fossil fuels. Although the report considers a wide range of future scenarios regarding greenhouse gas emissions, CO_2 would continue to contribute more than 70 percent of the total warming potential under all of the scenarios. The IPCC therefore believes that further warming is inevitable, but that this warming and its effects on climate could be mitigated by stabilizing the atmosphere's concentration of carbon dioxide through the use of: (1) "low-carbon technologies" for power production and industrial processes; (2) more efficient use of energy; and (3) management of terrestrial ecosystems to capture atmospheric CO_2 (IPCC, 2007c).

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[1] Detection of these types of changes was also difficult because of the limited tools that were available for collecting data and for modeling climate systems. However, scientific advances over the last 20 years have vastly improved the tools available for climatological research.

5.2.8.3 Environmental Impacts of Climate Change

The IPCC and the U.S. Climate Change Science Program have examined the potential environmental impacts of climate change at global, national and regional scales. The IPCC report states that, in addition to increases in global surface temperatures, the impacts of climate change on the global environment may include:

- **More frequent heat waves, droughts, and fires;**
- **Rising sea levels and coastal flooding; Melting glaciers, ice caps and polar ice sheets;**
- **More severe hurricane activity and increases in frequency and intensity of severe precipitation;**
- **Spread of infectious diseases to new regions;**
- **Loss of wildlife habitats; and**
- **Heart and respiratory ailments from higher concentrations of ground-level ozone (IPCC, 2007c).**

On a national scale, average surface temperatures in the United States have increased, with the last decade being the warmest in more than a century of direct observations (CCSP, 2008b). Impacts on the environment attributed to climate change that have been observed in North America include:

- **Extended periods of high fire risk and large increases in burned area;**
- **Increased intensity, duration, and frequency of heat waves;**
- **Decreased snow pack, increased winter and early spring flooding potentials, and reduced summer stream flows in the western mountains; and**
- **Increased stress on biological communities and habitat in coastal areas (IPCC, 2007c).**

On a regional scale, there is greater natural variability in climate parameters that makes it difficult to attribute particular environmental impacts to climate change (IPCC, 2007c). However, based on observational evidence, there is likely to be an increasing degree of impacts such as coral reef bleaching, loss of specific wildlife habitats, reductions in the area of certain ecosystems, and smaller yields of major cereal crops in the tropics (IPCC, 2007c). For the northern hemisphere, regional climate change could affect physical and biological systems, agriculture, forests, and amounts of allergenic pollens (IPCC, 2007c).[2]

In the region where the Mesaba Generating Station would be located, the average temperature over the last century has increased slightly from 43.9°F (1888-1917 average) to 44.9°F (1963-1992 average)[3] and precipitation in some areas of Minnesota has increased by up to 20 percent (EPA, 1997). During the next century, Minnesota's climate may change even more – the IPCC predicts that the largest increases in future temperatures are likely to occur in the northern latitudes (IPCC, 2007c).

A report by the Union of Concerned Scientists and the Ecological Society of America identifies other potential impacts of global climate change on the Great Lakes region. The report describes potential impacts on regional wildlife and habitats that could change the distribution of aquatic

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[2] The IPCC report provides more detailed information on the current and potential environmental impacts of climate change and on how climate may change in the future under various scenarios of greenhouse gas emissions.

[3] Temperature measurements for Minneapolis, Minnesota.

species, cause the northward movement of species typical of southern ecosystems, reduce the number of boreal species in the region, and change the composition of forests (Kling et al., 2003).

5.2.8.4 Addressing Climate Change

Because climate change is a cumulative phenomenon produced by releases of greenhouse gases from industry, agriculture and land use changes around the world, it is generally accepted that any successful strategy to address it must rest on a global approach to controlling these emissions. In other words, imposing controls on one industry or in one country is unlikely to be an effective strategy. In addition, because greenhouse gases remain in the atmosphere for a long time and industrial societies will continue to use fossil fuels for at least 25-50 years, climate change cannot be avoided. As the IPCC report states, "*Societies can respond to climate change by adapting to its impacts and by reducing [greenhouse gas] emissions (mitigation), thereby reducing the rate and magnitude of change*" (IPCC, 2007c).

According to the IPCC, there is a wide array of adaptation options. While adaptation will be an important aspect of reducing societies' vulnerability to the impacts of climate change over the next two to three decades, "*adaptation alone is not expected to cope with all the projected effects of climate change, especially not over the long term as most impacts increase in magnitude*" (IPCC, 2007c). Therefore, it will also be necessary to mitigate climate change by stabilizing the concentrations of greenhouse gases in the atmosphere. Because these gases remain in the atmosphere for long periods of time, stabilizing their atmospheric concentrations will require societies to reduce their annual emissions. The stabilization concentration of a particular greenhouse gas is determined by the date that annual emissions of the gas start to decrease, the rate of decrease, and the persistence of the gas in the atmosphere. The IPCC report predicts the magnitude of climate change impacts for a range of scenarios based on different stabilization levels of greenhouse gases. "*Responding to climate change involves an iterative risk management process that includes both mitigation and adaptation, taking into account actual and avoided climate change damages, co-benefits, sustainability, equity, and attitudes to risk*" (IPCC, 2007c).

5.2.8.5 Climate Change, Greenhouse Gases, and the Mesaba Project

As discussed in Section 2.2.3.1, DOE estimates that annual emissions of greenhouse gases from the Mesaba Generating Station would be approximately 11.2 million tons per year of CO_2-equivalents. Over the 20-year commercial life of the project, total emissions would be approximately 224 million tons. These emissions, without mitigation, would add to the approximately 2.6 billion tons (2.4 billion metric tonnes) of energy-related CO_2 emissions released annually by the electric power sector in the United States. Coal-fired power plants account for 2.1 billion tons (1.9 billion metric tonnes) of that amount (EIA, 2008). Globally, 54 billion tons (49 billion metric tonnes) of CO_2-equivalent anthropogenic greenhouse gases are emitted annually, with fossil fuel combustion contributing about 32 billion tons (29 billion metric tonnes). However, it cannot be assumed that, if the Mesaba Generating Station were not built, these additional emissions would be avoided – other fossil fuel power plants might be constructed in its stead, or existing plants might produce more power, thereby increasing their CO_2 emissions.

As noted earlier, emissions of greenhouse gases from the proposed power plant by themselves would not have a direct impact on the environment in the proposed plant's vicinity; neither would these emissions, by themselves, cause appreciable global warming that would lead to climate changes. However, these emissions would increase the atmosphere's concentration of greenhouse gases, and, in combination with past and future emissions from all other sources, contribute incrementally the global warming that produces the adverse effects of climate change described above. At present there is no methodology which would allow DOE to estimate the specific impacts (if any) this increment of warming would produce in the vicinity of the plant or elsewhere.

5.2.8.6 Potential Mitigation through Carbon Capture and Sequestration

The estimates of emissions from the Mesaba Energy Project do not account for any CO_2 removal that could occur as a result of the addition of carbon capture and sequestration systems. The project would be designed to be carbon-capture adaptable (Excelsior, 2006f). The project proponent, Excelsior Energy, has a plan for carbon capture and sequestration with regards to the Project (Excelsior, 2006f). The plan identifies opportunities for CO_2 emissions capture and sequestration from IGCC power plants. Additionally, the plan sets out options for meeting obligations to reduce greenhouse gas emissions that may be imposed on coal-fired power plants in the future. Appendix A provides further details of the carbon capture and sequestration plan. The potential impacts of implementing the plan are addressed in Section 5.1.2.1.

It is important to keep in mind the nature and extent of DOE's proposed action with regard to the Mesaba Generating Station – it is to provide $36 million in funding to Excelsior for a project with a total cost of about $2.16 billion (based on the Cooperative Agreement). About $22 million of that funding has already been made available to Excelsior to allow for it and DOE to share the costs of developing project information (such as project definition, preliminary design, and environmental studies and permitting) needed for this EIS.[4] If DOE were to decide to refrain from providing this funding – or to make installation of carbon capture and sequestration technology a prerequisite for such funding – Excelsior could still decide to build the power plant using other sources of funds.

5.2.8.7 Climate Change, Greenhouse Gases, and the Clean Coal Power Initiative

As described in more detail in Section 1.2, the Clean Coal Power Initiative (CCPI) provides funding to the private sector for projects intended to demonstrate the commercial potential of advanced technologies that could improve the performance of coal-fired power plants as to energy efficiency, pollution control, and cost of operation. DOE selected the Mesaba proposal in Round 2 of a competitive solicitation for projects that would demonstrate advanced power generation technologies that could result in, among other things, better environmental and economic performance.[5] DOE selected this project because of its potential to demonstrate the commercial-readiness of the Conoco Phillips E-Gas™ technology in a fully integrated, utility-scaled IGCC facility. This technology offers, among other advantages, enhanced environmental performance, and increased efficiency. These enhanced performance features include carbon beds for mercury control, ZLD for process and cooling water blowdown, and a CO_2 capture-ready design.

Increased efficiencies can result in small but cumulatively significant reductions in CO_2 emissions from power stations because less fuel is burned in producing each kilowatt hour of electricity. Producing power with IGCC units can facilitate carbon capture because the volume of the gas stream from which the CO_2 would be removed is much smaller; it is a pre-combustion stream and at a higher pressure than the exhaust gas of a pulverized coal unit. In Round 3 of CCPI, DOE has offered funding for projects that would demonstrate carbon capture and sequestration technologies (Funding Opportunity Number DE-FOA-0000042 available at http://www.fossil.energy.gov/programs/sequestration/publications/arra/DE-FOA-0000042.pdf).

Demonstrations of technologies that increase efficiency, facilitate carbon capture, and sequester CO_2 are important steps in developing strategies for stabilizing atmospheric concentrations of

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[4] DOE may also provide a loan guarantee to Excelsior under the EPAct of 2005 for a portion of the private financing of the Mesaba project.

[5] One particular aspect of environmental improvements DOE sought in Round 2 was reduction of mercury emissions.

greenhouse gases. The IPCC report states that there is "high agreement" that atmospheric concentrations can be stabilized by "*deployment of a portfolio of technologies that are either currently available or expected to be commercialized in coming decades assuming that appropriate and effective incentives are in place for their development.*" It identifies carbon capture and storage for coal-fired power plants as one of the "key mitigation technologies" for development before 2030 (IPCC, 2007c). It notes that energy efficiency will also play a key role in stabilizing atmospheric concentrations. DOE believes that the objectives of the CCPI embody these recommendations of the IPCC, and that by providing funding to the Mesaba Generating Station and other CCPI projects, the Department is providing appropriate incentives for developing technologies that can address global warming and the adverse environmental impacts of climate change.

5.3 MITIGATION OF IMPACTS

5.3.1 Mitigation Measures

For all environmental resources, the mitigation of potential adverse impacts from project activities would be achieved through the implementation of BMPs generally required by permitting processes and other Federal, state, or municipal regulations and ordinances. Table 5.3-1 outlines specific mitigation measures, including those required under Federal, state, or local regulations and permitting requirements that Excelsior would implement for each resource area.

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project

Environmental Resources	Mitigation Measures[1, 2]
Aesthetics	**Construction:** • Prior to the commencement of construction, Excelsior would develop a SWPPP, which would outline the erosion BMPs that would be used to minimize landscape scarring. • Use of dust suppression BMPs. **Operation:** • Prior to operation, Excelsior would submit a request to the FAA for a determination of no hazard to avaiation from the emission stacks and HVTL towers. If applicable, obstruction lighting would be installed. • A comprehensive light plan would be generated using input from the Taconite and Hoyt Lakes City councils. • **Beyond BACT (Excelsior has conducted air impacts analysis using "Beyond BACT" emission controls – the emission rates reflect control of sulfur in syngas via Selexol™ [a physical solvent] and control of nitrogen oxides via selective catalytic reduction [SCR]) on Phase II for the East Range Site)**
Air Quality and Climate	**Construction:** During construction, Excelsior would implement the following standard practice with regard to minimizing impacts to ambient air quality: • Use of dust abatement techniques such as wetting soils, covering storage piles with tarps, enclosing storage piles, and limiting operations during windy periods on unpaved, unvegetated surfaces to reduce airborne dust. • Surfacing of unpaved access roads with stone whenever appropriate. • Covering construction materials and stockpiled soils to reduce fugitive dust. • Minimizing disruption to disturbed areas. • Watering land prior to disturbance (excavation, grading, backfilling, or compacting). • Revegetating disturbed areas as soon as possible after disturbance. • Moistening soil before loading into dump trucks. • Covering dump trucks before traveling on public roads. • Minimizing the use of diesel or gasoline generators for operating construction equipment. **Operation:** The following process modification and improved work practices would be implemented to mitigate emissions: • To reduce NO_x: Use of diluent injection in the CTGs; use of clean syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; implementing good combustion practices (GCP) in the TVBs; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators. • To reduce CO and VOCs: Implementing GCP in the CTGs and TVBs; use of clean syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project (continued)

Environmental Resources	Mitigation Measures[1, 2]
	• To reduce SO_2: Use of clean syngas in the CTGs; use of clean syngas or natural gas in the TVBs; implementing GCP in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators. • To reduce H_2SO_4: Use of clean syngas in the CTGs. • To reduce PM: Implementing GCP in the CTGs and TVBs; incorporating high efficiency drift eliminators in the cooling towers; use of clean syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and use of low-sulfur diesel in the fire pumps and emergency generators. BACT has not yet been determined by the MPCA and the need for additional mitigation would be addressed by MPCA, in consultation with FLMs, through the PSD permitting process. DOE may consider additional mitigation as a condition of the Record of Decision. See also Section 5.3.2.2.
Geology and Soils	**Construction:** • Prior to the commencement of construction, Excelsior would develop and implement a SWPPP, which addresses erosion prevention measures, sediment control measures, permanent stormwater management, dewatering, environmental inspection and maintenance, and final stabilization. The SWPP would be submitted to the MPCA for approval prior to the initiation of any construction activities. • As part of the SWPPP, Excelsior would implement erosion BMPs, such as stockpiling and covering topsoil, installing wind and silt fences, and reseeding disturbed areas. • **When crossing agricultural land, Excelsior would follow the mitigations procedures outlined in an Agricultural Mitigation Plan to avoid and reduce the impacts to agricultural quality of the soils."** **Operation:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction). • Prior to commencement of operation, Excelsior would develop and implement a SPCC Plan covering all facility operations as required by MPCA under the Clean Water Act.
Water Resources	**Construction:** • Prior to the commencement of construction, Excelsior would develop and implement an MPCA-approved SWPPP for construction activities (see Geology and Soils - Construction). The SWPPP would address both the plant site**, laydown areas,** and construction along utility corridors. • Implement BMPs within the SWPPP for construction activities for dust suppression and sedimentation control measures (see Air Quality and Climate – Construction). • Prior to construction of the utility infrastructure, Excelsior would apply for MNDNR Public Waters Work Permit for all stream and water crossing, and implement all requirement BMPs or **mitigation** measures to protect these water resources. **Operation:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP for industrial activities and implement the required BMPs, inspections, and training requirements. • Prior to commencement of operation, Excelsior would develop and implement a SPCC Plan to mitigate potential impacts due to the release of petroleum products (see Geology and Soils – Operation). • For the West Range Site, Excelsior would develop a water management plan that would minimize potential impacts on water resources and control the withdrawals of water for use in the power plant.

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project (continued)

Environmental Resources	Mitigation Measures[1, 2]
Floodplains	**Construction:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction). • Should the Mesaba Energy Project be modified in such a manner as to impact a FEMA defined flood hazard boundary at the selected site, it may become necessary to submit the proposed plans to FEMA for incorporation into the community's FIRM panel. All affected communities and applicable local agencies, Mn/DOT and MNDNR, would have to be contacted by the Excelsior during the design phases of the project in order to ensure all flood control requirements are met. **Operation:** • For the West Range Site, Excelsior would develop a water management plan that would minimize potential impacts on water resources and would include pumping details on the CMP, which would prevent flooding potential currently associated with this mine pit.
Wetlands	**Construction:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction) that would minimize potential impacts on wetlands. • Mitigation of wetland impacts would be in the form of direct replacement or through the purchase of credits through an approved wetland bank under USACE and BWSR requirements and guidance. A Combined Wetland Permit Application would be submitted to applicable Federal, State, and local regulatory entities and would include any design details on wetland replacement sites, wetland banks, and/or sources of wetland credits for the project. Mitigation requirements would be determined during the wetland-permitting phase of the project following the NEPA process and before the commencement of construction activities. See also Section 4.7.7 and Appendix F2. **Operation:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction) that would minimize potential impacts on wetlands. • Prior to commencement of operation, Excelsior would develop and implement a SPCC Plan (see Geology and Soils – Operation). • **Use of an enhanced ZLD system would eliminate any discharges of process water and cooling tower blowdown into any water bodies and would, therefore, mitigate water quality impacts to wetlands.**

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project (continued)

Environmental Resources	Mitigation Measures[1, 2]
Biological Resources	**Construction:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction) that would minimize potential impacts on Biological Resources. • Implementing BMPs for dust suppression and sedimentation control measures (see Air Quality and Climate – Construction). • Complying with the provisions of the Federal MBTA, which would include limiting timber and land clearing activities, in particular within woodland and forest habitats, to periods outside of the songbird-nesting season. • For state-listed species protected by the Minnesota Endangered Species Statute, species or sensitive habitats listed in the MNDNR NHIS database that may be potentially affected would require coordination with the MNDNR Division of Ecological Services. Mitigation of impacts to state-listed species can incorporate a wide variety of options ranging from passive measures, such as construction timing outside of critical breeding periods, permanent protection of known habitats elsewhere that contain the resource to be affected, or more aggressive measures including complete avoidance of impact. **Operation:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction). • Prior to commencement of operation, Excelsior would develop and implement a SPCC Plan (see Geology and Soils – Operation). • For the West Range Site, Excelsior would develop a water management plan that would minimize potential impacts on biological resources. • Implementation of wetland mitigation requirements would minimize potential impacts on aquatic and wetland habitats (see Wetlands – Construction).
Cultural Resources	**Construction:** • In accordance with Section 106 of the National Historic Preservation Act, surveys and cultural resource assessments have been provided to MN SHPO and other appropriate agencies for review and comment. A Phase I archaeological survey of locations with high and medium potential **was** conducted at the West Range site in the summer of 2007, consistent with the recommendations of the SHPO. • With regard to the roads, rail lines, HVTL and utility corridors related to either site, archaeological surveys would only be conducted for the site to be permitted by the PUC. And then, only those corridors that are permitted by the PUC would be surveyed. Surveys would necessarily be completed after the DOE Record of Decision. However, DOE intends to enter into an agreement with SHPO and other appropriate parties that will ensure the following: cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any resources for listing on the NRHP is determined; a determination of effects on such resources is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of cultural resources during construction is implemented. The DOE Record of Decision would then be conditional upon implementing the provisions of the agreement. • **Following publication of the Draft EIS, DOE continued its outreach to Native American tribes and participated in conferences with tribal representatives (Section 1.8). Through meetings with Native American tribes a MOA addressing concerns of the tribes was being developed. DOE also intends to enter into a separate PA with the Minnesota SHPO, ACHP, Native American tribes and Excelsior Energy to ensure that: an appropriate APE is specified for any additional cultural resource surveys; cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any resources for listing on the NRHP is determined; a determination of effects on such resources is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of cultural resources during construction is implemented.**

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project (continued)

Environmental Resources	Mitigation Measures[1, 2]
Traffic and Transportation	**Construction:** • To prevent unnecessary traffic congestion and increased road hazards, Excelsior would coordinate with local authorities and implement transportation measures, especially during the movement of oversized loads, construction equipment and materials. • Where traffic disruptions would be necessary, Excelsior would coordinate with local authorities and implement detour plans, warning signs, and traffic diversion equipment to improve traffic flow and road safety.
	Operation: • Excelsior would implement road improvements at the intersection of CR 7 and US 169 to minimize traffic congestion and road hazards currently associated with this intersection. Improvements include adding turning and acceleration lanes.
Safety and Health	**Construction/Operation:** • Comply with OSHA requirements and DOE safety-related directives as they apply to the project during construction and operation activities.
Noise	**Construction:** • Excelsior would implement a noise mitigation plan, which includes the contact of affected receptors during steam blowing and major construction events. • Steam piping would be equipped with silencers that would reduce noise levels during steam blows by 20 dBA to 30 dBA at each receptor location. **Operation:** • Once Phase I begins commercial operations, Excelsior would perform a noise survey to ensure that such operations are in compliance with applicable noise standards. Assuming that construction of Phase II would be concomitant with Phase I operations, Excelsior would perform a noise survey to confirm that the combination of activities (i.e., simultaneous Phase I operation and Phase II construction) would comply with MPCA requirements. • To ensure that noise levels would be below MPCA noise thresholds, Excelsior would conduct an acoustical analysis of the final design and evaluate and select the best suite of noise reduction alternatives to be incorporated as part of the plant design basis. Acceptable ambient noise levels for the proposed land use would be specified in contractor bids to ensure that appropriate noise attenuation features are included in the final facility design and layout specifications.

[1]Mitigation measures listed are applicable to both the West and East Range Sites unless specifically noted.
[2]List of Acronyms: APE – area of potential effect; BACT – best available control technology; BMPs – best management practices; BWSR – Board of Water and Soil Resources (Minnesota); CMP – Canisteo Mine Pit; CO – carbon monoxide; CTG – combustion turbine generator; DOE – Department of Energy; FEMA – Federal Emergency Management Agency; FIRM – Flood Insurance Rate Map; GCP – good combustion practice; H_2SO_4 – sulfuric acid; HVTL – high voltage transmission line; MBTA – Migratory Bird Treaty Act; MNDNR – Minnesota Department of Natural Resources; Mn/DOT – Minnesota Department of Transportation; MPCA – Minnesota Pollution Control Agency; MN SHPO – Minnesota State Historic Preservation Office; NHIS – National Heritage Information System; NO_x – nitrogen oxides; OSHA – Occupational Safety and Health Administration; PM – particulate matter; PUC – Public Utilities Commission; SO_2 – sulfur dioxide; SPCC – Spill Prevention, Control and Countermeasure; SWPPP – Stormwater Pollution Prevention Plan; TVB – tank vent boiler; USACE – U.S. Army Corps of Engineers; VOC – volatile organic compound.

5.3.2 Additional Mitigation Options

If not otherwise required by Federal, state or local ordinances, there are mitigation options for cooling water discharge at the West Range Site that could reduce impacts to water resources. In addition, there are options for mitigation of visibility impacts to Class I areas that may or may not be included in the final air permit for the project. These mitigation options are discussed and assessed in the following sections.

5.3.2.1 Cooling Water Discharge Options at West Range Site

After publication of the Draft EIS, Excelsior announced its commitment to implement an enhanced ZLD system for the West Range Site, comparable to the system discussed below, under *Mitigation Alternative 3 – ZLD Treatment*. A new Appendix H2, which discusses the ZLD system to treat the non-contact wastewater from the proposed facility, has been added for the Final EIS. As described in Section 2.3.1.3, the project proponent's plan ("base case") for the West Range Site is to discharge most of the cooling tower blowdown (CTB) back to the Canisteo Mine Pit (CMP), with limited discharges to Holman Lake. Because the CMP is the source of process water for the plant, the water quality of the CMP would gradually decrease as certain constituents (TDS, hardness, and mercury) increase in concentration. While the plant would be operated to ensure that mercury concentrations would not exceed water quality standards within the CMP, other parameters (TDS, hardness, specific conductivity) could increase to levels above standards. The decreased water quality in the CMP would cause an increase in operational costs for the plant as a result of added treatment costs and chemical usage to improve the process water quality. At present water levels in the CMP, there is a net inflow of groundwater. Once water levels in the CMP are lowered for power plant operations, the flow into the mine pit would likely increase as the water level in the pit decreases).

The following mitigation alternatives, developed by the project proponent (see Appendix H) and summarized in Table 5.3-2 below, are presented to reduce or eliminate CTB discharges to the CMP:

- Mitigation Alternative 1 – Discharge all CTB effluent to Holman Lake; no discharge to the CMP during normal operation conditions;
- Mitigation Alternative 2 – Similar to the base case in regard to the CMP discharges, but discharge a portion or all of the effluent directly Swan River (rather than Holman Lake); and
- Mitigation Alternative 3 – Use ZLD to treat all CTB and recycle the treated CTB back to plant for process water use.

Table 5.3-2. Summary of CTB Mitigation Alternatives

Parameters	**Base Case**		**Mit. Alt. 1**		**Mit. Alt. 2a**		**Mit. Alt. 2b**		**Mit. Alt. 3**	
Phase	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**
Cycles of Concentration	5	3	5	5	5	3	5	5	≥10	≥10
Discharge to CMP (gpm)	300	2,675	0	0	300	2,675	0	0	0	0
Discharge to Holman Lake (gpm)	600	825	900	1,800	0	0	0	0	0	0
Discharge to Swan River (gpm)	0	0	0	0	600	825	900	1,800	0	0
Cooling Water Requirements from the CMP (gpm)	4,400	10,300	4,400	8,800	4,400	10,300	4,400	8,800	3,500	7,000
Net Water Required (gpm)	4,100	7,625	4,400	8,800	4,100	7,625	4,400	8,800	3,500	7,000
Air Emissions (PM) from Drift(tons/year)	20	39	18	35	20	39	18	35	39	78

In addition to these three mitigation alternatives, CTB discharge directly to either the Mississippi or Prairie Rivers was also considered, but neither of these options offered an advantage over the mitigation alternatives. Discharge to either river would increase the capital costs for constructing the additional length of discharge pipelines and would also likely increase operational costs, as the discharge may require pumping. Both rivers are also impaired for the same pollutants (mercury and dissolved oxygen) as the Swan River. The flow in the Mississippi and Prairie Rivers offer more assimilative capacity than the Swan River, but no other advantages, so these are not considered further.

The environmental impacts of each of these mitigation alternatives are discussed below.

Mitigation Alternative 1 – Discharge all CTB Effluent to Holman Lake

Mitigation Alternative 1 provides an upper limit to the potential effluent volume discharged to Holman Lake compared to the base case presented in Section 4.5. Mitigation Alternative 1 would discharge 900 gpm during Phase I and 1,800 gpm during Phase II, and would not include a discharge to the CMP during either phase under normal operating conditions.

Under this alternative, the generating station would operate at 5 COCs during Phase II and, therefore, would require less water for cooling purposes with a resultant decrease in discharge volume. Operating the power station at 5 COCs would result in an increase in pollutant concentrations as more water would be evaporated during cooling. However, this increase would be partially offset by cleaner process water, because no discharges to the CMP (the source of process waster) would occur, and the process water chemistry would remain relatively constant throughout the operating period (subject only to the mixing of the different water sources).

Mitigation Alternative 1 was reviewed to determine the resources that would be affected by this alternative. Because the construction of the process water and discharge pipelines, as well as all the other supporting power generation and transmission infrastructure is the same as the base case, it was determined that the resources that would be affected would be water resources, wetlands, biological resources, and air quality.

Water Resources

Mitigation Alternative 1 would affect water resources in terms of process water withdrawals and the discharges of CTB to Holman Lake. The impacts to these resources are presented in the following sections.

Process Water Supply Systems

The effects on water resources from modifications to the water management plan under Mitigation Alternative 1 include: a decreased requirement for process water that results from operating the power station at 5 COCs rather than 3 COCs during Phase II; the elimination of discharges (during normal operations) to the CMP, reducing the available water supply in the CMP; and improved water quality of the process water and the CMP due to the elimination of discharges to the CMP from the plant that would contain TDS and mercury. As in the base case, the source water is the origin of mercury and phosphorus, rather than the generating station (although the pollutants become concentrated due to evaporation of water in the cooling towers).

Table 5.3-3 compares the process water requirements between the base case and Mitigation Alternative 1. The data shows that sufficient water should be available from the proposed water sources for both phases under Mitigation Alternative 1 under normal operating conditions.

During peak operating conditions, the process water requirements for Phase II could reach 13,000 gpm under Mitigation Alternative 1, which would appear to exceed the assumed sustainable flow (8,800 gpm). However, the peak requirements are of short duration and the water recharge rates in the mine pits are expected to increase as the water levels in the mine pits decrease. In addition, the power station could

operate the pumping stations at the mine pits to transfer water (roughly 300 gpm), during normal operating conditions, into storage (CMP or HAMP) for use during peak demands. Under extreme drought conditions, Excelsior could take all or a portion of the discharge going to Holman Lake and route it back to the CMP as an additional water supply. Therefore, there appears to be sufficient water supply capacities to handle both normal and peak operating conditions for this proposed alternative.

Table 5.3-3. Water Source Supply Capacities

Water Source	Estimated Range of Flow (gpm)	Assumed Sustainable Flow for Water Balance Modeling (gpm)	
		Base Case	Mitigation Alternative 1
Canisteo Mine Pit	810-4,190	2,800	2,800
HAMP Complex	1,590-4,030[1]	2,000[2]	2,000[2]
Lind Mine Pit	1,600-2,000	1,800[3]	1,800[3]
Prairie River	0-2,470[4]	2,470[4]	2,470[4]
Discharge from Mesaba Generating Station	350-3,500	Varies[5]	0
Total	4,350-16,190	>9,100[6] >11,700[7]	9,100
Phase I Requirements		4,400	4,400
Phase II Requirements		10,300	8,800

[1] Maximum flow occurs at minimum operating elevation.
[2] At an operating elevation of 1,230 feet msl.
[3] Estimates of flow are based on one summer flow measurement at the LMP outlet and one summer and one winter measurement taken at the West Hill Mine Pit outlet.
[4] Maximum available flow assumed to be 25% of the 7Q10 flow of the Prairie River.
[5] Water returned to the CMP is expected to be 350 gpm during Phase I operations and 2,650-3,500 gpm during Phase II (Alternative 1) operations.
[6] Total does not include any of the water discharged back to the CMP from the Mesaba Generating Station.
[7] Total includes the minimum quantity of water expected to be discharged back to the CMP during the operation of Mesaba I and II of 2650 gpm, rounded to two significant figures.
Source: Table 4.5-2 and Appendix H

Mitigation Alternative 1 also offers an advantage over the base case in that the source water quality would remain relatively constant over the life of the power station. Table 3.5-4 (Section 3.5) presents the water quality of the different mine pits considered to supply process water for the West Range Site.

Process Water Discharges and Water Quality Standards

As presented in Appendix H, Mitigation Alternative 1 would route all the process water discharges (except those handled by the ZLD) to Holman Lake. The overall effects of this alternative (as compared to the base case) would be:

- An increased flow into Holman Lake (over the current flow of 1,215 gpm) during Phases I and II of 74 to 148 percent, respectively. The base case would result in an increased flow of 50 to 68 percent during Phases I and II.

- Reduced pollutant concentrations/chemical constituents in the discharge to Holman Lake, since the raw water stream from CMP would have a higher quality under this alternative than under the base case.
- A net increase in the pollutant/constituent loadings as a result of the increased flow (even with decreased concentrations). As with the base case, the origin of most of these pollutants (such as mercury and phosphorus) is the source water and not the discharge by the generating station.

Each of these effects is discussed below.

Increased Flow to Holman Lake

Holman Lake is a natural lake that has experienced both natural and man-made fluctuations in water levels and flow over the past several decades. During the operation of the Canisteo Mine, water from dewatering operations was discharged into the lake. Although the volume of water from these dewatering operations is not known, it is believed that the flow volume exceeded the amount planned under Phase II of Mitigation Alternative 1. When the lake was receiving the mine dewatering discharge, the lake level was controlled by a constructed spillway. This spillway no longer functions as a result of recurring beaver dams upstream of the spillway. The water level in the lake is now affected by the partial dismantling of the beaver dam when the water level reaches a height that inundates an adjacent railroad trestle (generally once per year). The water flow that results from this action lowers the water level in the lake approximately 1 to 2 feet over a period of several days, and the flow exiting the lake during this action exceeds the increased flow that would result from Mitigation Alternative 1.

The increased flow through Holman Lake under Mitigation Alternative 1 should help reduce periods of stagnation cited in Section 4.5. Downstream of Holman Lake, the outflow from the lake joins with the Swan River (28,000 gpm average flow, as measured at the discharge from Swan Lake). Based on the average flow for both the Swan River and Holman Lake, the net increase in flow of Mitigation Alternative 1 (during Phase II) would be 6 percent (1,800 gpm divided by 28,000 gpm and 1,215 gpm).

Reduction in Pollutant Concentrations/Chemical Constituents

By operating the generating station at 5 COCs and not using any of the CTB as part of the source for process water, the overall concentrations of pollutants/constituents in the CTB would be reduced (from that of the base case) and would not increase over time as they would under the base case. Table 5.3-4 presents the Phase II concentrations of process effluent after 30 years of operation that would be discharged to Holman Lake.

The chemical constituents that exceed water quality standards are shown in bold. The two constituents that are pollutants of concern for the Swan River are mercury and phosphorus, and the concentrations of both are below water quality standards. The constituents that exceed water quality standards have standards based on either drinking water or irrigation, neither of which would apply to Holman Lake; however, this determination would be made during the NPDES permitting process. The estimated concentrations of chemical constituents should not affect the recreational activities (swimming and boating) that currently occur on the lake.

The in-lake concentrations of these constituents (after mixing with the lake water) would be reduced up to 40 percent and would be below applicable water quality standards after mixing with the Swan River. For example, the full mixed concentration for mercury in Holman Lake would be approximately 2.8 ng/L and, after mixing with the Swan River, about 1.3 ng/L.

Overall, there is a slight beneficial effect for Mitigation Alternative 1 over the base case as a result of the overall decrease in pollutant concentrations/chemical constituents.

Table 5.3-4. Expected IGCC Power Station Discharges for the Base Case and Mitigation Alternative 1 and Applicable State Numerical Water Quality Standards

Constituent	Units	WQ Standard (chronic)	WQ Standard (acute/max)	Class	Anticipated Effluent Water Quality – Phase II (3 COCs) Base Case	Anticipated Effluent Water Quality – Phase II (5 COCs) Mitigation Alternative 1
Hardness	mg/L	250	-	3B	**2,052**	**1,540**
Alkalinity	mg/L		n/a		--	--
Bicarbonate	mg/L	305	-	4A	**1,200**	**869**
Calcium	mg/L		n/a		--	--
Magnesium	mg/L		n/a		--	--
Iron	mg/L		n/a		--	--
Manganese	mg/L		n/a		--	--
Chloride	mg/L	230 (T)	860 (T)	2B	38	26
Sulfate	mg/L		250/10	1B/4A	**590**	**487**
TDS	mg/L		500/700[5]	1B/4A	**2,070**	**1,685**
pH	mg/L		6 - 9	2B	6 - 9	6 – 9
Aluminum	µg/L	125 (T)	1072 (T)	2B	74	50
Arsenic	µg/L	53 (H)	360 (T)	2B	--	--
Barium	µg/L		n/a		--	--
Cadmium	µg/L	2[1] (T)	73[1] (T)	2B	Note 3	Note 3
Chromium (6+)	µg/L	11 (T)	16 (T)	2B	Note 3	Note 3
Copper	µg/L	15[1] (T)	34[1](T)	2B	Note 3	Note 3
Fluoride	mg/L		n/a		--	--
Mercury	ng/L	6.9 (H)	2400 (T)	2B	6.6	4.5
Nickel	µg/L	283[1](T)	2549[1] (T)	2B	37	25
Selenium	µg/L	5 (T)	20 (T)	2B	Note 3	Note 3
Sodium	mg/L		n/a		--	--
Specific Conductivity	umhos/cm	1,000	-	4A	**3,269**[4]	**2,400**[4]
Zinc	µg/L	191[1](T)	211[1](T)	2B	Note 3	Note 3
Phosphorus	mg/L		1[2]		0.05	0.02

[1] indicates a hardness based standard. It is assumed hardness in the receiving water is >200 mg/L based on available data.
[2] phosphorus standard is an effluent limit and not a water quality standard.
[3] results below detection limit.
[4] Values depicted reflect assumed values in the groundwater and LMP.
[5] WQ Standard of 700 mg/L is for total dissolved salts
WQ Standard- based on T-Toxicity Standard or H – Human Health Standard
Class denotes the appropriate MN water use classification for which the WQ standard is based upon. Note the TDS and sulfate standards would not apply to water in the CMP or Holman Lake, but would be applicable to any water used as a drinking or irrigation water source.
Source: Excelsior, 2006a and Appendix H

Increase in Net Pollutant Loadings

One of the main premises of the base case is that the overall loading of mercury and phosphorus would be less than or equal to the loading currently permitted from the dewatering operations at Hill Annex Mine Park. Under Mitigation Alternative 1, the discharge loading of mercury and phosphorus into Holman Lake would be roughly three times higher than the base case. However, the source of the mercury and phosphorus would be the existing levels in the process water sources. Some of the loading is strictly the re-introduction of mercury/phosphorus from one point to another (e.g., the mercury contained in the water removed from the Prairie River or Lind Mine Pit, which flows into the Prairie River, would be discharged to Holman Lake/Swan River and then back into the Prairie River). The remaining portion of the loading comes from the CMP, which currently does not discharge, but would if current water levels continue to rise.

As presented in Appendix H, Excelsior has explored effluent trading options with local permitted discharges. These trading options would involve funding the construction, operation and maintenance of new treatment systems at these permitted facilities to remove phosphorus or mercury to offset the increase in loadings of these pollutants from the Mesaba discharge. The potential for trading options would depend to some degree on the level of offsets required by MPCA during the NPDES permitting process.

Wetland Resources

The potential wetland impacts resulting from the proposed Mitigation Alternative 1 would be the same as those described in Section 4.7.3, West Range Process Water Blowdown Pipeline. The types of wetland functions potentially impaired by Mitigation Alternative 1 include the loss of wildlife habitat, sediment stabilization, flood flow attenuation from direct wetland impacts and the potential gain of fisheries and wildlife habitat resulting from possible secondary wetland impacts. The major difference between the base case and Mitigation Alternative 1 is that Mitigation Alternative 1 would discharge a larger volume of effluent during different operational stages of Phase I and Phase II of the IGCC power station. The increase in CTB discharged to Holman Lake by the base case would vary between 600 to 825 gpm, whereas the discharge by Mitigation Alternative 1 would vary between 900 gpm to 1,800 gpm (Phases I and II respectively).

The current volume of water discharged by Holman Lake without considering volumetric inputs from Phase I or Phase II is estimated at 1,215 gpm. By comparison, the average discharge from the lake associated with Mitigation Alternative 1 would be approximately 2,115 gpm (Phase I) and the potential maximum discharge would be 3,015 gpm (Phase II). Therefore, an increased volume of CTB entering Holman Lake would have varying levels of impacts to terrestrial and aquatic habitats, including wetlands. Changes in surface water elevations along the littoral fringe of Holman Lake could expand the size and shape of aquatic plant community based on the plants' tolerance to inundation and saturation, thereby potentially increasing fisheries wildlife habitat.

Additionally, the wetland biochemistry process could provide an opportunity to fixate or transform pollutants such as phosphorous and similar pollutants into a less mobile form, and thereby possibly improving water quality. An increase in the volume of water could have the potential to affect emergent wetlands located near Swan River. These wetlands could be subject to increased surface water elevations resulting in a slight change in wetland-dependant wildlife habitat. However, the change in habitat could be considered minor when compared to the volume of flow provided by Swan River.

Holman Lake currently experiences an annual drawdown in surface water elevation in order to keep concrete footers associated with railroad trestles near the head waters of the lake above water. Keeping water below the concrete footers functions in maintaining the structural integrity to the railroad trestles. Because Holman Lake would be receiving an increased volume of effluent, the culvert outlet and embankment may have to be structurally modified to support an increase in volume; however this would likely be required under either discharge alternative. Consequently, the aquatic resources bordering the culvert could be temporarily affected by direct and indirect impacts, such as vegetation removal or earth

disturbance. Potential adverse impacts to surface water resources, including wetlands, would be avoided and minimized to the extent practicable, and implementation would be in accordance with mitigation required by the USACE during the wetland permitting phase of the project.

Biological Resources

Mitigation Alternative 1 would use the same effluent pipeline between the power plant and Holman Lake as described in Section 4.8.4, Process Water Blowdown Pipeline 1 (Mesaba IGCC Power Plant Footprint to Holman Lake) (West Range Site). Therefore, the alternative would have no additional construction impacts.

Aquatic Communities

Mitigation Alternative 1 may cause some temporary adverse impacts to aquatic fauna. Adverse impacts to aquatic communities could occur because of the increased flow into Holman Lake, which might result in the additional exporting of fish to Swan River. Impacts to the aquatic fauna would be considered minimal because the export of fish from Holman Lake to the Swan River has been occurring for a number of years, and these fish could use wetlands in or near the Swan River for food and shelter. Drawdown of Holman Lake has occurred on a yearly basis in the past; therefore, fish export has been occurring but may be more continuous under Mitigation Alternative 1.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare plant species within 1 mile of the Process Water Blowdown Pipeline 1; however, investigations for protected species may be required to determine whether species of concern could be affected by the alternative.

Air Quality

For Mitigation Alternative 1, there would be a decrease in TDS concentrations within the process water compared to the base case. The result would be a decrease in worst-case emissions of particulate matter due to cooling tower drift from 39 tons per year to 35 tons per year.

Mitigation Alternative 2a – Base Case with Swan River Discharge

This mitigation alternative is similar to the base case but would relocate the outfall currently proposed for Holman Lake to the Swan River. Mitigation Alternative 2a would reduce the potential for localized impacts associated with discharge into a relatively small lake, and would expand the options for water quality trading mentioned in the discussion of Mitigation Alternative 1. The blowdown pipeline alignment would follow the proposed HVTL and natural gas pipeline corridor from the West Range Site, south approximately 4.5 miles, to where the corridor would cross the Swan River. This crossing is less than half a mile upstream from the confluence of Holman Lake's discharge and the Swan River (see Figure 2.1-2). While the currently proposed pipeline from the plant to Holman Lake could be eliminated, it may be necessary to maintain the proposed tie-in linking the CMP to Holman Lake in order to manage water levels in the CMP. In addition, this alternative could be combined with Mitigation Alternative 1, which would result in having all the CTB effluent being discharged to the Swan River (with no discharge to the CMP).

Mitigation Alternative 2a was reviewed to determine the resources that would be affected by this alternative. It was determined that the resources that would be affected would be water resources and wetlands, as described below.

Water Resources

Mitigation Alternative 2a would affect water resources in terms of process water withdrawals and the discharges of CTB to the Swan River. The impacts to these resources are presented in the following sections.

Process Water Supply Systems

The impacts to water resources from the water withdrawals associated with Mitigation Alternative 2 would be the same as discussed in Section 4.5 for the base case.

Process Water Discharges and Water Quality Standards

Under this alternative, process water discharges to the CMP would be the same as presented in Section 4.5, which indicate a gradual increase in pollutant levels within the CMP and some would eventually reach or exceed water quality standards. Mercury concentrations, however, would not exceed current water quality standards. The impacts to the Swan River would also be similar to the base case, as the mass loading to the watershed for chemicals of concern, such as phosphorus and mercury, would not change under this alternative. However, there would be no direct impacts in Holman Lake (either adverse or beneficial).

Under Mitigation Alternative 2a, impacts to the water quality in the Swan River would be similar to those presented for the base case during average flow conditions, as the discharge would mix with roughly the same overall volume of water (because the discharge would be just upstream of the confluence of Holman Lake). Once completely mixed with the Swan River under average flow conditions (roughly 28,000 gpm), the pollutant concentrations from the CTB discharges would be reduced approximately 33-fold. Based on the expected discharge concentrations shown in Table 5.3-4 for the base case, all parameters would be within water quality standards after complete mixing with the Swan River. However, no water quality monitoring data is available for the Swan River, so the additive effect of this discharge can not be determined.

There would be impacts to the Swan River under low flow conditions. Because the 7Q10 flow of the Swan River is low, 800 gpm (USGS, 2007), the river could consist primarily of CTB during low flow conditions. While the CTB discharge would augment the stream flow during such periods, the TDS and hardness concentrations would be relatively high and exceed standards. As with the base case, a variance for TDS and hardness would be required.

The discharge to Swan River instead of Homan Lake should reduce the possibility of impacts related to the formation of methyl mercury in Holman Lake. While the possibility of methyl mercury formation would not be completely eliminated, some factors that are suggested to be involved with its formation would be diminished. There would generally be less contact with adjacent wetlands under this alternative, and sulfate would be more fully diluted under normal flow conditions. While some localized impacts to the Swan River near the point of discharge are possible, they are of lesser concern in a flowing river than in a lake.

Thermal Impacts

Mitigation Alternative 2a would have minimal thermal impacts on the Swan River during normal flow conditions, as the blowdown discharge would be approximately 3 percent of the river flow. However, during low flows periods, the flow in the river (just downstream of the discharge point) would be predominantly CTB discharge. As in the discussion of water quality impacts for the base case (Section 4.5), there would likely be a need for a variance for the temperature of the discharge. During worst-case conditions, blowdown water would leave the plant at approximately 86°F during peak summer temperatures (Excelsior Energy, 2006a), which just meets absolute state water quality standards, but would exceed the relative limit of 3°F above ambient water temperatures (Minnesota Rules 7050.0220 subparagraph 5). Due to the low 7Q10 value for the Swan River, even with a mixing zone, it is unlikely that this standard could be met without a variance or without the use of cooling ponds.

Wetlands

This alternative would increase the total miles of blowdown pipeline by approximately two miles as compared to the base case. However, the additional pipeline would be along corridors used for the HVTL lines and natural gas pipeline, reducing any impacts associated with a new discharge pipeline corridor. A 150-foot right-of-way (ROW) is proposed where HVTL and natural gas pipelines share a corridor. The corridor may be able to accommodate the blowdown pipeline as proposed, or slight additional widening may be necessary. Therefore, while such widening may cause additional wetland and land use impacts, the impacts would be very small, and would be minimized by staying within established infrastructure corridors to the maximum extent possible and especially within wetlands.

Mitigation Alternative 2b – Mitigation Alternative 1 with Swan River Discharge

This alternative is a combination of Mitigation Alternatives 1 and 2a, where the CTB discharge would be directed to the Swan River rather than Holman Lake, and no CTB discharge would occur into the CMP under normal operating conditions. The impacts from construction of this alternative are the same as presented for Mitigation Alternative 2a; however, the impacts from operation are similar to Mitigation Alternative 1. The water management plan and expected discharge concentration in the CBT discharge would be the same as presented for Mitigation Alternative 1. The impacts from this alternative, not previously discussed for either Mitigation Alternative 1 or 2a, are presented below.

Process Water Discharges and Water Quality Standards

Under this alternative, impacts to the water quality in the Swan River would be similar to those presented for the Mitigation Alternative 2a during average flow conditions, but the volume of CTB discharge would increase up to 1,800 gpm, which would result in less attenuation of the discharge once mixed with the Swan River. However, once completely mixed with the Swan River, the pollutant concentrations from the CTB discharges would be reduced approximately 15-fold. Based on the expected discharge concentrations shown in Table 5.3-4 for the Mitigation Alternative 1, all parameters would be below water quality standards after complete mixing with the Swan River. However, no water quality monitoring data is available for the Swan River, so the additive effect of this discharge can not be determined.

There would be impacts to the Swan River under low flow conditions, as discussed for Mitigation Alternative 2a. While the CTB discharge would augment the stream flow during such periods, the TDS and hardness concentrations would be relatively high and exceed standards. A variance for TDS and hardness would be required.

Thermal Impacts

Mitigation Alternative 2b would have minimal thermal impacts on the Swan River during normal flow conditions, as the blowdown discharge flow would be approximately 6 percent of the river flow. However, during low flows periods, the flow in the river (just downstream of the discharge point) would be predominantly CTB discharge. For this alternative, a request for a variance for the temperature of the discharge may be necessary, as discussed for Mitigation Alternative 2a.

Mitigation Alternative 3 – ZLD Treatment

Since publication of the Draft EIS, Excelsior announced its decision to implement this alternative for the West Range Site. Mitigation Alternative 3 would employ ZLD treatment to eliminate all process-related effluent discharges from the plant. A ZLD system on the West Range Site would be implemented as described for the East Range Site in Section 4.5.4. This alternative would eliminate all CTB blowdown discharges and associated pipelines from the facility and would reduce the facility's overall water appropriation needs. The use of ZLD treatment for all the process wastewaters would result

in a significant increase in capital and O&M costs, a reduction in plant efficiency and output, an increase in solid waste, and an increase particulate matter emissions from cooling tower drift.

Mitigation Alternative 3 was reviewed to determine the resources that would be affected. It was determined that the resources affected would be water resources, solid waste disposal, air quality, and plant capacity and efficiency. This alternative would also reduce the loss of wetlands (up to 17 acres) and reduce impacts to land use, as no CTB discharge pipeline would be constructed.

Water Resources

Process Water Supply Systems

Compared to the base case, the maximum water appropriation needs for two Mesaba phases under this alternative would decrease from 10,300 gpm to 7,000 gpm (Excelsior Energy, 2006a). However, the base case includes the CTB discharge from the plant to the CMP of up to 3,500 gpm, which would be eliminated under Mitigation Alternative 3. Overall, the water needs are slightly less than the base case and Mitigation Alternative 1.

Process Water Discharges and Water Quality Standards

By employing ZLD treatment of all process waters, there would be no impacts to water quality from the operation of the plant under this alternative.

Solid Waste Disposal

Mitigation Alternative 3 would increase the amount of non-hazardous salts that must be transported from the site for disposal at a landfill. For the East Range Site, the Mesaba Generating Plant could produce up to 24,000 tons/year of solid waste by employing ZLD treatment, based on the source water quality that has up to 1,800 mg/L of TDS (Excelsior Energy, 2006b). Because the source water quality on the West Range Site has a lower concentration of TDS (340 mg/L), the maximum non-hazardous waste (salt) production from the ZLD system would be less than 5,000 tons/year at full operation (Phase II). Discussions between Excelsior and the manager of the St. Louis County Solid Waste Department in Virginia, MN (the closest industrial non-hazardous waste facility) determined that the facility can accommodate the waste generated by the ZLD system.

Air Quality

Under this alternative, the cycles of concentration at which cooling towers operate would likely be increased (to 10 or more) and, therefore, there would be an increase of particular matter emissions due to cooling tower drift. At 10 COCs, the particulate emissions due to drift would increase from 39 tons/year to 78 tons/year, resulting in total facility wide particulate emissions of 532 tons/year (instead of 493 tons/yr with the base case). The visibility and air quality impacts from an additional 39 tons/year would be negligible.

Pipeline Alignment Impacts

Under this alternative, construction of blowdown pipelines from the plant would not be necessary. Impacts to wetlands may be reduced by up to 17 acres, and land use impacts would be reduced as well.

Plant Capacity and Efficiency

Operation of the ZLD system would consume electricity, adding to the parasitic load within the facility, which has two closely connected effects. First, it would reduce the net output capacity of the plant. Second, it would reduce the efficiency of the plant proportionately to this reduction in capacity. On the East Range Site, plant capacity could be reduced by up to 2 MW (approximately 0.3%), and the corresponding heat rate increase would be 31 Btu/kWh. As mentioned above, the source water quality at the West Range Site is superior, which is likely to reduce the parasitic load of ZLD treatment versus the

East Range Site. Therefore, a 2 MW reduction in plant capacity and 31 Btu/kWh increase in heat rate are likely to overestimate this effect for the West Range Site. However, to the degree that efficiency is reduced, air emissions, on a per megawatt hour basis, would increase (by a maximum of about 0.3%).

5.3.2.2 Mitigation Options for Visibility Impacts to Class I Areas

As part of the Prevention of Significant Deterioration (PSD) permitting process, Excelsior is currently negotiating with state and Federal regulators to achieve a set of operating conditions that will satisfy all applicable regulatory requirements (including those governing impacts on air quality and air quality-related values like visibility). Because of their inherently high-efficiency and low-polluting technology, IGCC power plants are able to meet more stringent emission standards than conventional power plant technologies (EPA, 2006e). The BACT analysis for the two phases of the Mesaba Energy Project emphasizes the inherently lower polluting nature of IGCC processes and improvements in the design basis of E-Gas™ technology resulting from years of experience at the Wabash River Plant. However, if the current design basis for the Project is deemed by regulators to produce modeled visibility impacts above acceptable thresholds, additional mitigation may be required.

The purpose of this section is to identify options available for mitigating the modeled visibility impacts of the Mesaba Generating Station to Class I areas discussed in Section 4.3. The essence of any option implemented along a continuum of choices would be to reduce emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x), two important precursors of fine particulate matter that produce modeled visibility impacts. Changing the current design basis of Phase I and Phase II of the Mesaba Energy Project to reflect pre and post-combustion SO_2 and NO_X controls characterizing Lowest Achievable Emission Rate technology (*see* 40 CFR 51.165(a)(1)(xiii) to distinguish the Lowest Achievable Emission Rate from BACT represents one extreme of this continuum. Offsetting the Project's SO_2 and NO_x emissions through the purchase of emission allowances or other reduction credits from other facilities, which would not require changes to the Project's existing design basis represents the other extreme. Regardless of the outcome of Excelsior's negotiations with state and Federal regulators over the Project's modeled visibility impacts and any steps required to mitigate them, DOE can require additional mitigation as a condition of the Record of Decision for this EIS.

Enhancement of Existing Design Basis

The current design basis for Phase I and Phase II of the Mesaba Energy Project Generating Station employs a chemical solvent (i.e., methyl diethanolamine or MDEA) to reduce levels of hydrogen sulfide in syngas (which when combusted produces emissions of SO_2) and nitrogen dilution to reduce NO_X formation during syngas combustion. Although Excelsior maintains that the current design basis for the Mesaba Generating Station, involving IGCC technology, represents BACT for SO_2 and NO_x emissions as defined in 40 CFR 52.21(b)(12), Excelsior could be required to enhance its current design basis to produce further SO_2 and NO_X emission reductions to reduce modeled visibility impacts.

For SO_2 emissions, a potential design enhancement would involve increasing the capture efficiency of the acid gas removal system (i.e., the MDEA system) by altering equipment or by changing the solvent used. The MDEA system enhancement could involve adding refrigeration to the MDEA chemical solvent system or increasing the take-off height in the MDEA tower to allow for further contact between MDEA and the sour syngas. This approach would enhance capture of H_2S and ultimately reduce SO_2 emissions from the plant. Alternatively, emissions of SO_2 could be reduced by changing the MDEA chemical solvent to the more-efficient physical solvent, Selexol (a step in the continuum toward Lowest Achievable Emission Rate technology).

Although these options could reduce SO_2 emissions and mitigate modeled visibility impacts in Class I areas, their implementation would adversely impact the power plant's performance. Such impacts would include: reducing the plant's thermal efficiency and output capacity (thereby increasing emissions of CO_2 and criteria pollutants on a pound-per-megawatt-hour basis); introducing additional complexity into

system operations (e.g., the addition of programmable logic controls allowing automated variation of MDEA column take-off point and the resizing of equipment to handle increased gas flow through the Claus unit), increasing production of elemental sulfur to be managed; and increasing capital and operating costs as an overall result. Excelsior is addressing the overall assessment of these impacts as part of its BACT analysis under PSD permitting rules (Excelsior, 2006d).

For NO_x emissions, a potential design enhancement could involve installing post-combustion selective catalytic reduction technology controls. In this case, ammonia would be injected into the flue gas at appropriate points within the HRSG and react with NO_x to produce nitrogen and water (such reaction being catalyzed by proprietary materials). Selective catalytic reduction has been used extensively to control NO_x emissions from pulverized coal units as well as natural gas-fired combustion turbines. However, the use of selective catalytic reduction on higher sulfur coals can result in increased levels of sulfur trioxide (SO_3) (DOE, 2002). For IGCC, there are significant concerns related to the interaction of ammonia and sulfur species, and the addition of selective catalytic reduction can require deeper sulfur removal than otherwise necessary to comply with sulfur emission restrictions. Further, the use of selective catalytic reduction results in stack releases of ammonia via ammonia slip, which can present significant performance issues in the HRSG and decrease the availability of the power plant. Additionally, ammonia releases could contribute to small particle formation that could contribute to modeled visibility impacts.

Emission Offsets

Emissions of SO_2 and NO_x from Phases I and II of the Mesaba Generating Station can be offset through allowance purchases or controls placed on previously uncontrolled or poorly controlled air emission sources. The Mesaba Energy Project represents a unique circumstance in Minnesota in that it is the only coal-fueled power plant that it is required under the Clean Air Interstate Rule to purchase SO_2 allowances equivalent to 100 percent of its SO_2 emissions. Such allowances can be purchased selectively from sources having modeled visibility impacts on Class I areas, so as to represent an effective means of reducing such impacts from Project operations. To the extent that the Project's provision of SO_2 allowances required by the Clean Air Interstate Rule are determined to be insufficient to reduce modeled visibility impacts to acceptable levels, Excelsior could purchase additional SO_2 and NO_x allowances. Excelsior also has the option to upgrade existing air emission sources of SO_2 and NO_x to the extent that such improvements are cost-effective relative to addition of controls beyond BACT and to the extent that such controls would reduce modeled visibility impacts.

As discussed in Section 4.3, Excelsior conducted supplemental modeling analyses of the effectiveness of a sample offset scenario at reducing model-predicted visibility impacts. These analyses were conducted only as examples to provide information and illustrate the concept of mitigation. They do not represent a proposal, because the necessity of mitigation has not been established and the practicability of the scenarios has not been confirmed. The scenario studied was the offset of SO_2 emissions via allowance purchases and/or emission reductions from Laskin Energy Center. This scenario was chosen due to the proximity of Laskin Energy Center to the East Range Site, where model-predicted visibility impacts were highest, and due to the existence of an established program for SO_2 allowance trading for electric generating units.

The analyses used actual SO_2 emissions from 2006 and 2007 (an average of 755 lbs per hour) as a baseline case, and studied offset cases of allowance purchases and/or emission reductions equal to 35 percent and 50 percent of actual emissions. NO_X and PM emissions from Laskin Energy Center were not modeled, so the results do not reflect Laskin Energy Center's total modeled visibility impact. The air modeling methodology was the same as for the multi-source analyses described in Appendix B. The predicted impacts are calculated using Method 2 and are compared to the Method 2 predicted impacts for the Mesaba Energy Project. It should be noted that in comparison

to Method 8, which was also used for calculating visibility impacts as discussed in Section 4.3, Method 2 would likely predict higher impacts for both Mesaba and Laskin Energy Center.

Table 5.3-5 (new table for the Final EIS) shows the results of the offset scenario analyses. Results for Laskin Energy Center alone (SO_2 emissions only) are presented on the left part of the table. Results of the remaining impact of the Mesaba Generating station - after subtracting the number of days of modeled visibility impact eliminated by the Laskin Energy Center offset – are presented on the right part of the table (only the aggregate of the three years is shown). The results from Table 5.3-5 demonstrate that emission offsets can be a viable approach to reducing the number of days for which modeled visibility impacts are predicted.

Table 5.3-5. Class I Visibility Supplementary Modeling Results – Offset Scenarios [(1)]

Laskin Energy Center [(2)]										Mesaba with Laskin Energy Center Offset [(3)]			
Scenario	Emission Rate (lb/hr)	2002		2003		2004		Total		East Range[(4)]		West Range[(5)]	
		Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%
Boundary Waters Canoe Area Wilderness													
Baseline	755	37	11	10	3	9	3	56	17	190	38	58	14
-35%	490	20	4	4	2	5	2	29	8	163	29	31	5
-50%	377	11	3	3	0	3	1	17	4	151	25	19	1
Voyageurs National Park													
Baseline	755	8	3	5	1	7	2	20	6	19	4	62	11
-35%	490	4	0	1	0	5	1	10	1	9	-1[(6)]	52	6
-50%	377	3	0	1	0	2	0	6	0	5	-2[(6)]	48	5

(1) 36-km MM5 data, 4-km CALMET grid resolution and Method 2 for all analyses.
(2) Results based on SO_2 emissions only and therefore do not reflect actual visibility impacts; NO_X and PM_{10} were not modeled.
(3) Results are for Mesaba Generating Station alone, for Baseline Laskin Energy Center scenario, and for Mesaba Generating Station with offset benefit from Laskin Energy Center for reduction scenarios.
(4) Emissions: Mesaba Phase I at 'Proposed' emissions levels, Mesaba Phase II at 'Enhanced' emissions levels.
(5) Emissions: Mesaba Phases I and II combined at 'Proposed' emissions levels.
(6) Negative value because Laskin Energy Center offsets reduce more days than the Mesaba Generating Station would have impacted.

5.4 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

The Proposed Action would commit either the West Range Site or East Range Site as the location for an IGCC electricity generating station for the foreseeable future. Site preparation would include the filling of low-lying areas and grading to provide a developable site plan, which would impact wetlands, vegetation, and wildlife habitat as described in Sections 4.7 and 4.8. Although arguably these resources could be reclaimed at some point in the future, it is unlikely that they would be restored to their original conditions and functionality. Therefore, these commitments are considered irreversible.

> A resource commitment is **irreversible** when primary or secondary impacts from its use limit future use options and **irretrievable** when its use or consumption is neither renewable nor recoverable for use by future generations.

The implementation of the Proposed Action would potentially result in the irretrievable commitment of building materials for construction of the Mesaba Energy Project, although many of the building materials can be reused or recycled at a future date. Operation of the proposed facility would require the irretrievable commitment of coal and/or petroleum coke, natural gas (used during startup and as a backup fuel), and small quantities of process chemicals, paints, degreasers, and lubricants as described in Sections 2.2.2 and 4.16. None of these resources is in short supply relative to the size and location of the proposed facilities. Process water and potable water used by the facility would be returned to the environment by evaporation, treatment, and discharge by publicly owned treatment works (potable water use), and **treated by ZLD (process water)**.

The construction and operation of the proposed facilities would require the commitment of human resources that would not be available for other activities during the period of their commitment, but this commitment would not be irreversible. Finally, the implementation of the Proposed Action would require the commitment of financial resources by Excelsior, its investors and lenders, and DOE for the construction, demonstration, and operation of the Mesaba Energy Project. However, these commitments are consistent with the purpose of and need for the Proposed Action as described in Chapter 1.

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5.5 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The Proposed Action would support the DOE objective of demonstrating and promoting innovative coal power technologies that can provide the United States with clean, reliable, and affordable energy using abundant domestic sources of coal. The long-term benefit of the proposed project would be to demonstrate advanced power generation systems using IGCC technology at a sufficiently large scale to allow industries and utilities to assess the technology's potential for commercial application. The ability to show prospective domestic and overseas customers an operating facility rather than a conceptual design or engineering prototype would provide a persuasive inducement for them to purchase this advanced coal power technology. Successful demonstration would enhance prospects of exporting the technology to other nations and may provide the single most important advantage that the United States could obtain in the global competition for new markets.

The proposed project would minimize SO_2, NO_x, mercury, and particulate emissions. The project is expected to remove almost 99 percent of the SO_2 produced in the IGCC process. The removal of nearly all of the fuel-bound nitrogen from the synthesis gas prior to combustion in the gas turbine would result in appreciably lower NO_x emissions compared to conventional coal-fired power plants. More than 90 percent of the mercury would be removed from the fuel as received, and particulate emissions from the preliminary turbine stack are expected to be near zero. Also, emissions of CO_2 are expected to be 15 to 20 percent less than would be produced at conventional coal-fired power plants, and the facility would be designed to be adaptable for retrofit of carbon capture technology.

The Proposed Action would also support the objectives of the Mesaba Energy Project proponent to provide a source of electric power for the State of Minnesota and the national electric grid, as well as provide economic revitalization for the Taconite Tax Relief Area and Arrowhead Region of Minnesota. Local officials, business leaders, and many residents consider the potential environmental impacts that would occur during construction and operation of the IGCC generating station to be acceptable tradeoffs for the long-term productivity of Iron Range communities. Project aspects that would enhance long-term productivity in the region include:

- The generation of **1,200** $MWe_{(net)}$ to help alleviate the need within Minnesota for **an estimated 2,000** MWe of new baseload power generation **by 2020** (**Appendix F1**).
- The direct, indirect, and induced creation of 400 to 3,600 jobs annually in the Arrowhead Region during the six years of construction for the Mesaba Energy Project Phases I and II (Section 4.11.2.1).
- The direct, indirect, and induced contribution of $3.1 billion of total economic output in the Arrowhead Region during the six-year construction period for Phases I and II (Section 4.11.2.1).
- The direct, indirect, and induced creation of more than 400 jobs annually in the Arrowhead Region during full operation of Phases I and II (Section 4.11.2.2).
- The direct, indirect, and induced contribution of $1.1 billion of total economic output in the Arrowhead Region annually during full operation of Phases I and II (Section 4.11.2.2).
- **[Statement in Draft EIS regarding stabilization of water levels in the Canisteo Mine Pit was removed based on the project announced by MNDNR.]**

Short-term uses of the environment would pertain to the activities and associated impacts during construction that have been described throughout Chapter 4 and include such effects as:

- Aesthetic impacts from construction affecting nearby residents as described in Section 4.2, including the effects on viewsheds from land-clearing activities and the exposure to emissions of fugitive dust and noise during construction.

- Impacts on air quality as described in Section 4.3, including fugitive dust emissions during construction.
- Erosion and sedimentation impacts on surface waters during construction as described in Sections 4.4 and 4.5, which generally would be mitigated through the use of required control measures.
- Loss of wetlands, vegetation, and wildlife habitat caused by land-clearing activities as described in Sections 4.7 and 4.8.
- Traffic impacts during construction attributable to temporary diversions and the movement of heavy equipment as described in Section 4.15.
- Increased noise from construction activities affecting nearby residents as described in Section 4.18.

6. REGULATORY AND PERMIT REQUIREMENTS

Statute, Regulation, Order	Description
Federal Regulations and Permitting	
Acid Rain Permit 40 CFR Part 72	Required for utility units exceeding threshold limits specified in regulation cited.
American Indian Religious Freedom Act of 1978 42 USC 1996	Ensures the protection of sacred locations and access of Native Americans to those sacred locations and traditional resources that are integral to the practice of their religions.
Antiquities Act 16 USC 431 *et seq.*	Protects historic and prehistoric ruins, monuments, and objects of antiquity (including paleontological resources) on lands owned or controlled by the Federal government.
Archaeological Resources Protection Act, as amended 16 USC 470aa *et seq.*	Requires a permit for excavation or removal of archaeological resources from publicly held or Native American lands. Excavations must further archaeological knowledge in the public interest, and the resources removed are to remain the property of the United States. If a resource is found on land owned by a Native American tribe, the tribe must give its consent before a permit is issued, and the permit must contain terms or conditions requested by the tribe.
Clean Air Act, Title I, IV, and V 40 CFR Parts 50 – 95	Establishes NAAQS set by the EPA for certain pervasive pollutants. Applicable Titles: • Title I—Air Pollution Prevention and Control. Basis for air quality and emission limitations, PSD permitting program, SIPs, NSPS, and NESHAP. • Title IV—Acid Deposition Control. Establishes limitations on SO_2 and NO_x emissions, permitting requirements, monitoring programs, reporting and record keeping requirements, and compliance plans for emission sources. This Title requires that emissions of SO_2 from utility sources be limited to the amounts of allowances held by the sources. • Title V—Permitting. Required if the plant falls within 40 CFR 70.3 designations. This Title provides the basis for the Operating Permit Program and establishes permit conditions, including monitoring and analysis, inspections, certification, and reporting. Authority for implementation of the permitting program is delegated to the state of Minnesota.

Statute, Regulation, Order	Description
Clean Water Act, Title IV 40 CFR Parts 104 – 140	Focuses on improving the quality of water resources by providing a comprehensive framework of standards, technical tools, and financial assistance to address the many causes of pollution and poor water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction. Applicable Sections: • Section 402—National Pollutant Discharge Elimination System (NPDES) Permit. Requires sources to obtain permits to discharge effluents and stormwaters to surface waters. The CWA authorizes EPA to delegate permitting, administrative, and enforcement duties to stage governments, while EPA retains oversight responsibilities. The state of Minnesota has been delegated NPDES authority and therefore would issue the NPDES permit. • Section 404—Permits for Dredged or Fill Material. Regulates the discharge of dredged or fill material in the jurisdictional wetlands and waters of the United States. The USACE has been delegated the responsibility for authorizing these actions.
Determination of No Hazard to Air Navigation 14 CFR 77.19	Upon the Proponent's submission of notice of proposed construction of objects potentially affecting navigable airspace, the FAA must confirm such construction constitutes no hazard to air navigation.
Emergency Planning and Community Right-to-Know Act of 1986 42 USC 1101 *et seq.*	Requires that inventories of specific chemicals used or stored on site be reported on a periodic basis. The plant would manufacture, process, or otherwise use a number of substances subject to the Act's reporting requirements, such as some trace amounts of metals and mercury.
Endangered Species Act of 1973, as amended 16 USC 1536 *et seq.*	Enacted by Public Law 93-205, Endangered Species Act of 1973 (16 USC 1531 *et seq.*). Section 7, "Interagency Cooperation," requires any Federal agency authorizing, funding, or carrying out any action to ensure that the action is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. Under Section 7 of the Act, DOE has consulted with the USFWS.
Exempt Wholesale Generator Status 15 USC 79z-5a(e)	Exemption of private generation from certain requirements for public utilities.
Farmland Protection Policy Act 7 USC 4201 *et seq.*	Directs Federal agencies to identify and quantify adverse impacts of Federal programs on farmlands. The Act's purpose is to minimize the number of Federal programs that contribute to the unnecessary and irreversible conversion of agricultural land to non-agricultural uses.
Fish and Wildlife Conservation Act of 1980 16 USC 2901 *et seq.*	Encourages Federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats.
Fish and Wildlife Coordination Act 16 USC 661 *et seq.*	Requires Federal agencies undertaking projects affecting water resources to consult with the USFWS and the state agency responsible for fish and wildlife resources. These agencies are to be sent copies of this DEIS and their comments will be considered.

Statute, Regulation, Order	Description
Migratory Bird Treaty Act, as amended 16 USC 703 *et seq.*	Protects birds that have common migration patterns between the United States and Canada, Mexico, Japan, and Russia. The Act regulates the take and harvest of migratory birds. The USFWS will review this EIS to determine whether the activities analyzed would comply with the requirements of the Migratory Bird Treaty Act.
National Environmental Policy Act (NEPA) of 1969 42 USC 4371 *et seq.*	This EIS is being prepared to comply with NEPA, the Federal law that requires agencies of the Federal government to study the possible environmental impacts of major Federal actions significantly affecting the quality of the human environment.
National Historic Preservation Act of 1966 16 USC 470 *et seq.*	Enacted by Public Law 89-665, National Historic Preservation Act of 1966 (16 USC 470 *et seq.*). Under Section 106, the head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or Federally assisted undertaking in any state and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of the Act a reasonable opportunity to comment with regard to such undertaking.
Native American Graves Protection and Repatriation Act of 1990 25 USC 3001	Directs the Secretary of the Interior to guide the repatriation of Federal archaeological collections and collections that are culturally affiliated with Native American tribes and held by museums that receive Federal funding. Major actions to be taken under this law include: • The establishment of a review committee with monitoring and policymaking responsibilities; • The development of regulations for repatriation, including procedures for identifying lineal descent or cultural affiliation needed for claims; • The oversight of museum programs designed to meet the inventory requirements and deadlines of this law; and • The development of procedures to handle unexpected discoveries of graves or grave goods during activities on Federal or tribal land.
New Source Performance Standards (NSPS) 40 CFR Part 60	The NSPS are technology-based standards applicable to new and modified stationary sources of regulated air emissions. Where the NAAQS emphasize air quality in general, the NSPS focus on particular sources of approximately 70 industrial source categories or sub-categories of sources (e.g., fossil fuel-fired generators, grain elevators, steam generating units) that are designated by size as well as type of process.
Noise Control Act of 1972, as amended 42 USC 4901 *et seq.*	Directs Federal agencies to carry out programs in their jurisdictions “to the fullest extent within their authority” and in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health and welfare.

Statute, Regulation, Order	Description
Notice to the Federal Aviation Administration 14 CFR Part 77	The FAA must be notified if any structures more than 200 ft. high would be constructed at the proposed site pursuant to 14 CFR Part 77. The FAA would then determine if the structures would or would not be an obstruction to air navigation.
Occupational Safety and Health Act (OSHA) of 1970, as amended 29 USC §651 *et seq.*	Compliance with the OSHA would be required according to OSHA standards. Applicable Rules: • OSHA General Industry Standards (29 CFR Part 1910) • OSHA Construction Industry Standards (29 CFR Part 1926)
Permanent Exemption for New Facilities 10 CFR Part 503	Exemption to allow burning of natural gas and fuel oil for power production.
Pollution Prevention Act of 1990 42 USC 13101 *et seq.*	Establishes a national policy for waste management and pollution control that focuses first on source reduction, and then on environmentally safe waste recycling, treatment, and disposal. Executive Order 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*, and Executive Order 13148, *Greening the Government through Leadership in Environmental Management*, provide guidance to agencies to implement the Pollution Prevention Act. DOE requires specific goals to reduce the generation of waste. DOE would implement a pollution prevention plan by incorporating such waste-reducing activities as ordering construction materials in correct sizes and numbers, resulting in very small amounts of waste; and implementing best management practices to reduce the volume of waste generated and reuse waste wherever possible.
Prevention of Significant Deterioration (PSD) Permit 40 CFR 52.21	Required if the plant would have the potential to emit 100 tons per year or more of a pollutant subject to regulation under the CAA. Regulated pollutants include SO_2, NO_x, and CO. A PSD Permit would be issued by the state or local air pollution control agency.
Resource Conservation and Recovery Act (RCRA) of 1976 40 CFR Parts 239 – 299	Regulates the treatment, storage, and disposal of hazardous wastes. Project participants would be required to identify any residues that require management as hazardous waste under RCRA (40 CFR Part 261). For some waste streams, this includes testing waste samples using the toxic characteristic leaching procedure or other procedures that measure hazardous waste characteristics. Applicable Title: Title II—Solid Waste Disposal (known as the Solid Waste Disposal Act), regulates the disposal of solid wastes. Title II, Subtitle C—Hazardous Waste Management, provides for a regulatory system to ensure the environmentally sound management of hazardous wastes from the point of origin to the point of final disposal. Title II, Subtitle D—State or Regional Solid Waste Plans.
Rivers and Harbor Act Permit 33 CFR Part 322	Permit for structures or work in or affecting navigable waters of the United States.

Statute, Regulation, Order	Description
Safe Drinking Water Act 42 USC 300 *et seq.*	Gives EPA the responsibility and authority to regulate public drinking water supplies by establishing drinking water standards, delegating authority for enforcement of drinking water standards to the states, and protecting aquifers from hazards such as injection of wastes and other materials into wells. The Minnesota Department of Health is the state agency responsible for enforcement. EPA regulations for this program are codified at 40 CFR Part 141, and Minnesota rules for this program are codified at Minn. R. ch. 4720.
Sales Tap Approval 18 CFR 157.211	Approval to tap into or modify existing interstate gas pipeline.
Surface Mining Control and Reclamation Act of 1977 30 CFR Part 700 *et seq.*	Provides for the Federal regulation of surface coal mining operations and the acquisition and reclamation of abandoned mines. Title IV of the Surface Mining Control and Reclamation Act is designed to help reclaim and restore abandoned coal mine areas throughout the country.
Executive Orders	
Executive Order 11988, *Floodplain Management* ; Executive Order 11990, *Protection of Wetlands*	• Executive Order 11988, *Floodplain Management*, directs Federal agencies to establish procedures to ensure that they consider potential effects of flood hazards and floodplain management for any action undertaken. Agencies are to avoid impacts to floodplains to the extent practical. • Executive Order 11990, *Protection of Wetlands*, requires Federal agencies to avoid short- and long-term impacts to wetlands if a practical alternative exists. • DOE regulation 10 CFR Part 1022 establishes procedures for compliance with these Executive Orders. Where no practical alternatives exist to development in floodplain and wetlands, DOE is required to prepare a floodplain and wetlands assessment discussing the effects on the floodplain and wetlands, and consideration of alternatives. In addition, these regulations require DOE to design or modify its actions to minimize potential damage in floodplains or harm to wetlands. DOE is also required to provide opportunity for public review of any plans or proposals for actions in floodplains and new construction in wetlands. A statement of findings from the assessment will be incorporated into the Final EIS.
Executive Order 12856, *Right-to-Know Laws and Pollution Prevention Requirements*	Directs Federal agencies to reduce and report toxic chemicals entering any waste stream, improve emergency planning, response, and accident notification, and encourage the use of clean technologies and testing of innovative prevention technologies. In addition, this Order states that Federal agencies are persons for purposes of the Emergency Planning and Community Right-to-Know Act, which requires agencies to meet the requirements of the Act.
Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*	Requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

Statute, Regulation, Order	Description
Executive Order 13007, *Indian Sacred Sites*	Directs Federal agencies, to the extent permitted by law and not inconsistent with agency missions, to avoid adverse effects to sacred sites and to provide access to those sites to Native Americans for religious practices. This Order directs agencies to plan projects to provide protection of and access to sacred sites to the extent compatible with the project.
Executive Order 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*	Directs Federal agencies to incorporate waste prevention and recycling in each agency's daily operations and work to increase and expand markets for recovered materials through preference and demand for environmentally preferable products and services.
Executive Order 13112, *Invasive Species*	Directs Federal agencies to prevent the introduction of or to monitor and control invasive (non-native) species, to provide for restoration of native species, to conduct research, to promote educational activities, and to exercise care in taking actions that could promote the introduction or spread of invasive species.
Executive Order 13148, *Greening the Government through Leadership in Environmental Management*	Makes the head of each Federal agency responsible for ensuring that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision-making and long-term planning across all agency missions, activities, and functions.
Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*	Directs Federal agencies to establish regular and meaningful consultation and collaboration with tribal governments in the development of Federal policies that have tribal implications, to strengthen United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates on tribal governments.
Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*	Requires Federal agencies to avoid or minimize the negative impacts of their actions on migratory birds, and to take active steps to protect birds and their habitats. • Directs each Federal agency taking actions having or likely to have a negative impact on migratory bird populations to work with the USFWS to develop an agreement to conserve those birds. • Directs agencies to avoid or minimize impacts to migratory bird populations, take reasonable steps that include restoring and enhancing habitat, prevent or abate pollution affecting birds, and incorporate migratory bird conservation into agency planning processes whenever possible. • Requires environmental analyses of Federal actions to evaluate effects of those actions on migratory birds, to control the spread and establishment in the wild of exotic animals and plants that could harm migratory birds and their habitats, and either to provide advance notice of actions that could result in the take of migratory birds or to report annually to the USFWS on the numbers of each species taken during the conduct of agency actions.

Statute, Regulation, Order	Description
Indian Treaties – Chippewa	
1826 Fond du Lac	Granted the right to search for and take subsurface minerals.
1837 Saint Peter River	Ceded land to the U.S. in the vicinity of the St. Croix River in Minnesota.
1847 Treaty with the Mississippi and Lake Superior Bands	Ceded land to the U.S. that was intended for the Winnebago reservation, but was never developed.
1847 Treaty with the Pillager Band at Leech Lake	Ceded land to the U.S. that was intended for the Menominee reservation, but was never developed.
1854 Treaty with the Mississippi and Lake Superior Bands	Created the Grand Portage, Fond du Lac, and Lake Vermillion reservations.
1855 Treaty with the Mississippi, Pillager, Winibigoshish bands	Ceded land to the U.S. in return for reservation to be established in traditional habitation areas such as Leech and Cass Lake, Winibigoshish, Mille Lacs, Sand Lake, Rice Lake, Gull Lake, Rabbit Lake, and Lake Pokegama.
1863 Treaty with Pillager, Winibigoshish and Mississippi bands	Created one reservation for all Indians within Minnesota.
1864 Modification to the 1863 Treaty with Pillager, Winibigoshish and Mississippi bands	Reverses many of the reservations established by the 1855 treaty.
1863 Treaty with the Red Lake and Pembina Bands	Ceded land to the U.S. in exchange for 160 acres for men and a 640-acre reservation for chief “Red Bear,” on the north side of the Pembina River.
1864 Amendment to the 1863 Treaty with the Red Lake and Pembina Bands	Modified the terms of the 1863 treaty.
1867 Treaty with the Mississippi Band	Ceded land from the Leech Lake reservation to the U.S. and created the White Earth reservation.
Indian Treaties – Sioux	
1805 Zebulon Pike treaty with the Sioux	Ceded most of Minneapolis and St. Paul to the U.S.
1837 Treaty with the Sioux	Ceded land west of the Mississippi River including Fort Snelling to the U.S.
1851 Treaty of Traverse des Sioux and the Mendota Treaty	Ceded all Sioux land in Minnesota (and Iowa) to the U.S. and created a reservation on the north and south sides of the Minnesota River.

Statute, Regulation, Order	Description
1858 Treaty with the Wahpekeute and Mdewakanton and the 1858 Treaty with the Sisseton-Wahpeton	A reservation was created with the land that the Wahpekeute and Mdewakanton possessed and each head of household was granted 80 acres.
1858 Treaty with the Yankton	Gave the Indians access to a sacred pipestone quarry.
State Regulations and Permitting	
Aboveground Storage Tank Registration Minn. R. ch. 7001 and 7151	Owners of Aboveground Storage Tanks larger than 110 gallons must notify the Agency.
Access Permit Minn. R. 8810.0050	Required whenever there is a request for change in access to or from Mn/DOT ROWs.
Air Emissions Permit Minn. R. ch. 7007	In most cases, a state construction permit is required for all new sources of air pollutants.
Air Pollution Episodes Rule Minn. R. 7009.1000 – 7009.1110	Requires the preparation of an emergency action plan to be implemented in the event that the Commissioner of the MPCA makes an air pollution episode declaration. Requirements under this rule would be considered mitigation measures to reduce emissions from the Mesaba IGCC Power Plant sources.
Beneficial Use Rule **Minn. R. 70035.2860**	**Governs how materials classified as solid waste are determined to have a beneficial use. Coal combustion slag, when used as a component in manufactured products is regulated under the standing beneficial use determination. Under this regulation, the material is considered solid waste until it is incorporated into a manufactured product, or utilized in accordance with a standing or case-specific beneficial use determination. Other materials may require a case-specific beneficial use determination, which would require MPCA agency review.**
Certificate of Need Minn. R. ch. 7829, 7849, 7851, 7853, and 7855	The Minnesota PUC requires a description of the proposed energy facility and its probable location, an indication of forecast information upon which the alleged need is based, a discussion of possible alternatives and why they were rejected, and environmental information related to construction and operation of the proposed facility.
Construction of Tunnels Under Highways Permit Minn. R. 8810.3200 – 8810.3600	Utility construction and relocation on trunk highway ROWs.
Cultural Resources Review 36 CFR Part 800	State review required under National Historic Preservation Act.
Drainage Permit Minn. R. 8810.3200 – 8810.3600	Permit issued for repairs of utility or rebuilding structure (manholes, catch basins, etc.) that are already in place.
Easement Across State-Owned Land Managed by the Minnesota Department of Natural Resources Minn. Stat. § 84.63 and § 84.631	The MNDNR may issue an easement to cross state-owned lands for the purpose of constructing and maintaining roads.

Statute, Regulation, Order	Description
Electrical Inspection Minn. R. ch. 3800	Conformance with electrical code.
Environmental Laboratory Certification Minn. R. 4740.2010 – 4740.2120	Environmental laboratory certification required before data can be submitted in support of permit programs (e.g., as prescribed under NPDES permit program).
Flammable Liquid Tanks Plan Review Minn. Stat. § 299F.011	Aboveground Storage Tank Plan Review for flammable and combustible liquids (private motor vehicle fuel dispensing station).
Hazardous Waste Generator License Minn. R. 7045.0225	Any business that generates more than 10 gallons of hazardous waste in a calendar year must be licensed and pay an annual fee.
License to Cross Public Lands and Waters Minn. R. ch. 6135	For installation of utility services (as defined in statute) across MNDNR-administered land and public waters.
Minnesota Building Code Minn. R. ch. 1305 Minn. R. ch. 1306 Minn. R. ch. 1315 Minn. R. ch. 1346 Minn. R. ch. 4715 Minn. R. ch. 5225 and 5230 Minn. R. ch. 7510 Minn. R. ch. 7512	• International Building Code—Covers the construction of all buildings except detached one- and two-family dwellings and multiple single-family dwellings not more than three stories high (townhouses). Regulations include weather-resistance, ventilation, sanitation, fire-safety, structural integrity, user safeguards, etc. Minnesota's nonresidential code is published by the International Code Council. • Special Fire Protection Systems—Requires the installation of an automatic fire sprinkler system in most nonresidential buildings, both existing and new. • National Electric Code—Adopts a national standard for the installation of electrical wiring, apparatus, and equipment for electric light, heat, power, technology circuits and systems, and alarm and communication systems, as published by the National Fire Protection Association. • Minnesota Mechanical Code—Governs the installation and maintenance of heating, ventilating, cooling, and refrigeration systems. Regulated subjects include furnaces, ductwork, hot water heat, commercial kitchen ventilation, gas piping, exhaust ventilation, etc. • Minnesota Plumbing Code—Governs the installation of plumbing systems in new buildings, additions to buildings, and buildings undergoing alterations. Regulated subjects include water supply piping, waste and vent piping, roof drain piping, backflow protection, plumbing fixtures, etc. • Minnesota Boilers and High Pressure Piping—Governs the design, installation, alteration, repair, removal, operation, and maintenance of various types of boilers and high pressure piping equipment. • Minnesota State Fire Code—Addresses conditions hazardous to life and property from fire, explosion, hazardous material storage, handling, or use, and use and occupancy of buildings and structures. • Fire Sprinkler Systems Plan Review—Permit for fire protection system.

Statute, Regulation, Order	Description
Minnesota Endangered Species Law Minn. R. ch. 6134	Minnesota's Endangered Species Statue (Minn. Stat. § 84.0895) requires the MNDNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting list of Endangered, Threatened, and Special Concern Species is codified as Minn. R. ch. 6134.
Minnesota Standards for Stationary Sources Minn. R. 7011.0150, 7011.0715, and 7011.2300	• Control of Fugitive Particulate Matter—Prohibits the release of "avoidable amounts" of particulate matter. Facilities are required to take reasonable precautions to prevent the discharge of visible fugitive emissions beyond the property line. • Standards of Performance for Post-1969 Industrial Process Equipment—Applies to the Mesaba IGCC Power Plant's coal, petroleum coke, and slag handling equipment that would generate particulate matter emissions. Since the Mesaba IGCC Power Plant is located outside of Minneapolis, St. Paul, and Duluth, and is located more than one quarter mile away from any residence or public roadway, the required control equipment standard to be applied is 85%. • Standards of Performance for Stationary Internal Combustion Engines—Limits visible emissions from emergency fire water pumps and emergency generators to 20% opacity and limits SO_2 emissions to 0.5 lb/MMBTU heat input unless a higher limit has been established through modeling.
NPDES General Construction Stormwater Permit 40 CFR 122.26; Minn. R. 7001.1035	NPDES permit for stormwater discharge required for construction sites disturbing 1 acre or more of land.
NPDES General Industrial Stormwater Permit Minn. R. 7001.1035	Permit for stormwater discharges associated with industrial activity.
NPDES/SDS Permit Minn. R. 7001.0020	Permit required for discharging wastewater to waters of the United States.
Open Burning Permit Minn. Stat. § 88.16	Registering with local forestry office or fire warden is required in forested counties.
Part 70 Operating Permit Minn. R. 7007.0200 and 7007.0250	Construction of a major new source meeting specifications in rules must receive an air emissions permit prior to commencement of construction.
Public Water Supply Plan Review Minn. R. ch. 4720	Required for drinking water systems serving greater than 25 persons.
Public Waters Work Permit (Protected Waters Permit) Minn. R. 6115.0160 – 6115.0280	Work permit for activities that change or diminish the course, current or cross section of public waters within the state.

Statute, Regulation, Order	Description
Railroad Grade Crossing Operating License Minn. R. 8830.2150 and 8830.9991	Operating license will be issued upon submittal and approval of railroad grade crossing signal circuit plans.
Route Permit for High Voltage Transmission Lines Minn. R. ch. 4400	Any proposed power line over 100 kV must obtain a route permit from the PUC, although an applicant has the option to seek local approval for power lines under 200 kV and certain other lines specified in Minn. Stat. § 216E.05.
Route Permit For Natural Gas Pipeline Minn. R. 4415.0035	Pipelines with a nominal diameter of 6 in. or more designed to transport hazardous liquids and pipelines designed to be operated at pressure of more than 275 lbs. per in.^{2} to carry natural gas are required to obtain a Pipeline Routing Permit from the PUC.
Sanitary Sewer Extension Permit Minn. R. 7001.0020	Required when a project does not meet the MPCA design criteria via the Design Certification for Sanitary Sewer Extension Plans and Specifications Checklist.
Site Permit for Large Electric Generating Power Plant Minn. R. ch. 4400	Any proposed power plant over 50 MW must obtain a site permit from the PUC, although an applicant has the option too seek local approval for power plants under 80 MW and natural-gas-fired peaking plants.
Solid Waste Storage Permit Minn. R. ch. 7001 and 7035	Any non-hazardous solid waste **that would be stored in quantities larger than 10 cubic yards for more than 48 hours** would require a permit from the MPCA. **Materials that are authorized for beneficial use do not need a Solid Waste Storage Permit, but do need to comply with the storage standard requirements in subparts 2, 6, and 7 of Minn. R. 7035.2855.**
Underground Storage Tank Registration Minn. R. 7150.0120	Regulated Underground Storage Tank systems must be registered.
Utility Permit on Trunk Highway ROW Minn. R. 8810.3100 – 8810.3600	Permit required to install or move utilities on highway ROWs.
Water Appropriation Permit – Long Term (Exceeding two years) Minn. R. 6115.0600 – 6115.0810; 6115.0010	Permit required to appropriate waters of the state (ground or surface). All active water appropriation permit holders are required to measure monthly water use with an approved measuring device to an accuracy of 10 percent and report water use yearly. Permit holders receive water use reporting forms each year to report their water use.
Water Appropriation Permit – Temporary (1-2 year maximum) Minn. R. 6115.0600 – 6115.0810; 6115.0010	General permit notification form for certain temporary appropriations for construction dewatering, landscaping and hydrostatic testing.

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7. AGENCIES AND TRIBES CONTACTED

Federal Agencies

Federal Energy Regulatory Commission
    Division of Gas – Environment & Engineering
U.S. Army Corps of Engineers
    St. Paul District
U.S. Department of Agriculture – Forest Service
    Superior National Forest
U.S. Department of the Interior
    Fish and Wildlife Service – Twin Cities Field Office
    National Park Service
    Bureau of Indian Affairs
U.S. Department of Transportation – Federal Highway Administration
    Minnesota Division
U.S. Environmental Protection Agency – Region 5
    Water Division

Minnesota Agencies

Minnesota Department of Natural Resources
    Natural Heritage and Nongame Research Program
Minnesota Department of Transportation
    District 1 – Duluth
Minnesota Historical Society
    Minnesota State Historic Preservation Office
Minnesota Indian Affairs Council

Native American Tribes in Minnesota

Bois Forte Reservation
Fond du Lac Reservation
Grand Portage Reservation
Leech Lake Band of Ojibwe
Leech Lake Reservation
Lower Sioux Community
Mille Lacs Band of Ojibwe
Minnesota Chippewa Tribe
Prairie Island Indian Community
Red Lake Band of Chippewa
Red Lake Nation
Shakopee Mdewakanton Dakota Community
Upper Sioux Community
White Earth Reservation
Iron Range Council for Native Americans
1854 Authority

Native American Tribes Located Outside Minnesota

Bad River Band of Lake Superior Chippewa
Cheyenne River Sioux Tribe
Crow Creek Sioux Tribe
Flandreau Santee Sioux
Fort Peck Assiniboine and Sioux Tribes
Keweenaw Bay Indian Community
Lac Courte Oreilles Band of Lake Superior, Chippewa Indians of Wisconsin
Lac du Flambeau Band of Lake Superior, Chippewa Indians of Wisconsin
Lac Vieux Desert Band of Lake Superior, Chippewa Indians
Lower Brule Sioux Tribe
Northern Arapaho Tribe
Northern Cheyenne Tribe
Oglala Sioux Tribe
Red Cliff Band of Lake Superior, Chippewa Indians
Santee Sioux Nation
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
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Ray Bowman, P.G. – Senior Environmental Scientist
M.B.A., Management
M.S., Geology
B.S., Geological Science
21 years of experience in geologic and hydrogeologic investigations, and NEPA support for Federal agencies.

Austina Casey – Environmental Scientist
M.S., Environmental Science
B.S., Chemistry
15 years of experience in the application of environmental policy, regulatory compliance, and air quality analysis for NEPA documentation.

Nancy M. Clark, J.D. – Regulatory Specialist
Juris Doctor
M.S., Environmental Law
B.S., Chemical Engineering
Two years of experience in regulatory compliance and NEPA documentation and analysis on projects for Federal agencies.

A. Brook Crossan, Ph.D., P.E. – Senior Environmental Engineer
Ph.D., Geophysical Fluid Dynamics
M.S., Mechanical Engineering
B.S., Mechanical Engineering
35 years of experience with NEPA documentation and analysis on projects for Federal agencies.

Michael Dorman – Senior Engineer
M.S., Environmental Engineering
B.S., Civil Engineering
28 years of experience in water quality analysis and evaluations, permitting, NEPA document preparation, and environmental compliance for Federal agencies.

Richard Ellenson – Technical Editor
B.A., Journalism
Four years of experience formatting, editing, and writing government publications.

Robert J. Fares – Senior Risk Assessor
B.A., Biology
21 years of experience in assessing multimedia exposures and associated risks for chemicals in the vicinity of hazardous waste sites, released from point sources (e.g., stacks, outfalls), contaminants released as nonpoint sources (e.g., vertical and lateral movement of pesticides resulting from different agricultural techniques), and chemicals released from commercially available products and furnishings during use by consumers.

Sarah M. Forbes – Climate Change Specialist
M.S., Biological Sciences – Plant Community Ecology
B.S., Biology
Eight years of experience in the environmental and energy technology fields with a focus on carbon capture and storage.

Lisa Lambrecht – Staff Engineer
M.B.A., Finance
B.S., Chemical Engineering
16 years of experience in environmental and technical consulting in both manufacturing and government areas, including authoring sections in NEPA documentation.

Jamie Martin-McNaughton – Environmental Scientist
B.S., Geology-Biology
Five years of geological field work experience, figure generation, and document production.

Robert A. Naumann – Environmental Scientist
M.S., Environmental Science
B.S., Natural Resources
Eight years of experience in NEPA documentation, environmental compliance, wetlands, and forestry.

Cynthia Ong – Staff Engineer
M.S., Environmental Science
B.S., Civil Engineering
Five years of experience in general civil site design work and technical and writing support for DOE NEPA documentation.

Dorothy Peterson, P.E. – Senior Environmental Engineer
M.S., Engineering Management
B.S., Engineering
14 years of environmental experience in the areas of site remediation, pollution prevention, environmental planning, community relations, GIS, and authoring NEPA documents.

Nejma Piagentini – Environmental Scientist
M.S., Biology
B.S., Natural Science
Two years of experience in environmental assessments, NEPA documentation and analysis, and research.

J. Michael Rivera – Wetland Ecologist
B.S., Environmental Planning and Analysis
B.S., Earth Science
13 years of experience providing natural resources and related environmental support.

Eva Santorini – Graphic Designer
B.A., Fine Art, Painting
13 years of experience in publication production including the design, layout, and production of books and publications, a wide variety of marketing and promotional materials, and public outreach/educational materials and websites.

Stacey Schueler – Environmental Scientist
B.S., Environmental Science
Eight years of experience in site remediation, natural resource studies and NEPA documentation.

Deborah Shinkle – GIS Specialist
B.A., Environmental Studies
Four years in data analysis and GIS experience on Federal projects.

Liam Sorensen – GIS Specialist
M.S., GIS
B.S., English
Three years of experience in GIS related work; five years of experience in technical writing.

Rachel M. Spangenberg – Senior Scientist
B.S., Biology
19 years of experience in the preparation of NEPA documentation and environmental compliance audits.

Catherine E. Wade – Environmental Scientist
B.S., Environmental Science and Policy – Biodiversity and Conservation Biology
Three years of experience in NEPA documentation, environmental compliance audits, and ecology.

Brian M. Whipple, P.E. – Senior Engineer

M.S., Information Technology
B.S., Environmental Engineering
13 years of experience in hydrogeological analysis, site characterization, and NEPA documentation and analysis on projects for Federal agencies.

Disclosure Statement

Environmental Impact Statement
Mesaba Energy Project
DOE / EIS-0382

CEQ Regulations at 40CFR 1506.5(c), which have been adopted by the DOE (10CFR 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for the purposes of this disclosure is defined in the March 23, 1981, guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026-18038 at question 17a and b.

"Financial interest or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)." See 46 FR 18026-18031.

In accordance with these requirements, the entity signing below hereby certifies as follows: (check either (a) or (b) and list items being disclosed if (b) is checked).

Financial Interest:

(a)	X	Has no past, present, or currently planned financial interest in the outcome of the project.
(b)		Has the following financial interest in the outcome of the project and hereby agrees to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
		1.
		2.
		3.

Contractual Interest:

(a)	X	Has no past, present, or currently planned contractual interest in the outcome of the project.
(b)		Has the following contractual interest in the outcome of the project and hereby agrees to mitigate to the extent necessary to preclude a conflict prior to award of this contract:
		1.
		2.
		3.

Organizational Interest:

(a) X Has no past, present, or currently planned organizational interest in the outcome of the project.

(b) Has the following organizational interest in the outcome of the project and hereby agrees to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Other Interest:

(a) X Has no past, present, or currently planned other interest in the outcome of the project.

(b) Has the following other interest in the outcome of the project and hereby agrees to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Certified by:

March 15, 2007

Signature Date

Frederick J. Carey, President

Name & Title (Printed)

Potomac-Hudson Engineering, Inc.

Company