U.S. Department of Energy
in cooperation with
Minnesota Department of Commerce

MESABA ENERGY PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT
VOLUME I

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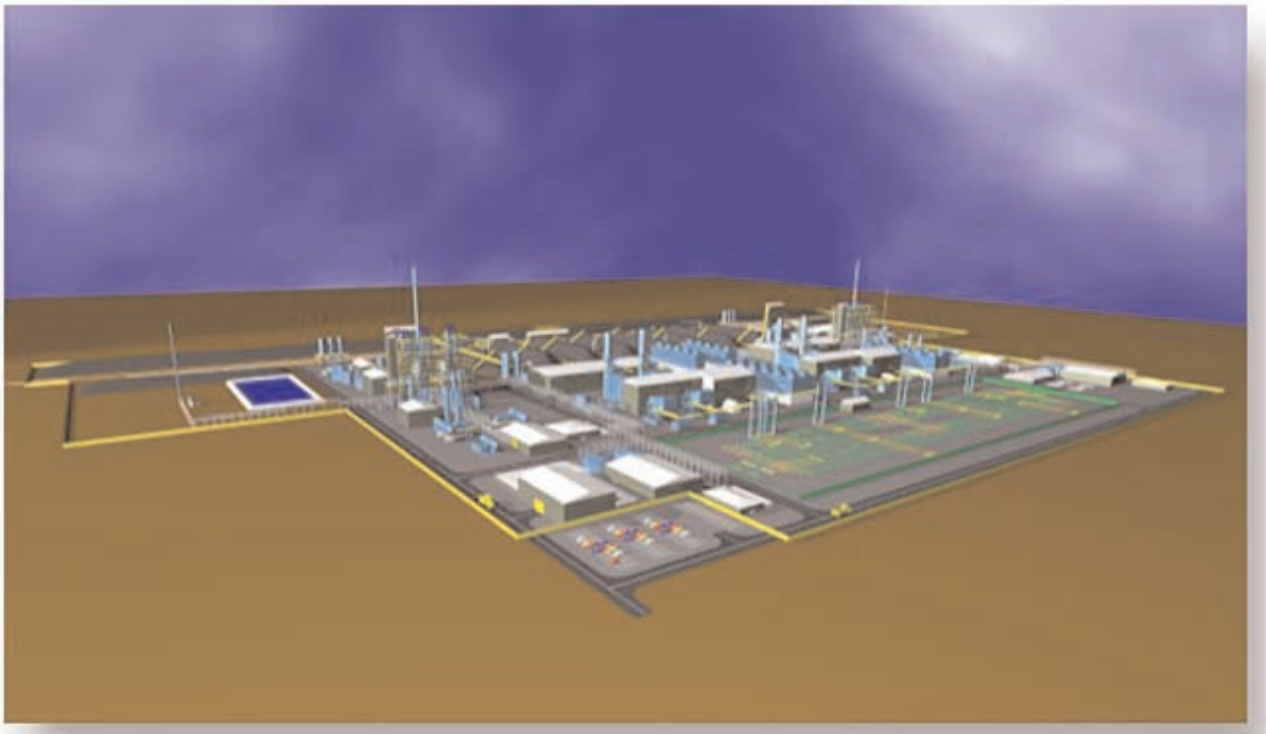

NOVEMBER 2007

Office of Fossil Energy
National Energy Technology Laboratory

COVER SHEET

Responsible Federal Agency: U.S. Department of Energy (DOE)

Responsible State Agency: Minnesota Department of Commerce (MDOC)

Cooperating Agencies: U.S. Army Corps of Engineers and U.S. Department of Agriculture Forest Service

Title: Mesaba Energy Project, Draft Environmental Impact Statement (DOE/EIS-0382D)

Location: Taconite Tax Relief Area of northeastern Minnesota, Itasca and St. Louis Counties

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Abstract:

This Draft Environmental Impact Statement (EIS) provides information about the potential environmental impacts of the proposed Mesaba Energy Project, a coal-based Integrated Gasification Combined Cycle (IGCC) electric power generating facility that would be located in the Taconite Tax Relief Area (TTRA) of northeastern Minnesota. Excelsior Energy Inc. (Excelsior) proposes to design, construct, and operate the Mesaba Energy Project in two phases; each phase would nominally generate 606 megawatts of electricity (MWe) for export to the electrical grid, 1,212 MWe total. DOE's Proposed Action is to provide a total of $36 million in co-funding, through a cooperative agreement with Excelsior under the Clean Coal Power Initiative (CCPI) Program, for the design and one-year operational demonstration testing period for Phase I. The total cost of Phase I is currently estimated at $2.16 billion. This EIS addresses the impacts of both phases of the Mesaba Energy Project as connected actions, even though only Phase I would be co-funded under the CCPI Program. DOE may also provide a loan guarantee to Excelsior pursuant to the Energy Policy Act of 2005 to guarantee a portion of the private sector financing of the project; however, this potential loan guarantee is not part of DOE's Proposed Action. Because the proposed facility is considered a Large Electric Power Generating Plant, the Project is subject to the Minnesota Power Plant Siting Act (Minnesota Statutes Chapter 216E), which requires the preparation of a state-equivalent EIS. The EIS requirements under the National Environmental Policy Act and the Minnesota Power Plant Siting Act are substantially similar, and DOE has prepared this EIS in cooperation with the MDOC to fulfill the requirements of both laws.

The *Federal Register* "Notice of Intent to Prepare an Environmental Impact Statement and Notice of Proposed Floodplain and Wetlands Involvement for the Mesaba Energy Project Integrated Gasification Combined Cycle (IGCC) Demonstration Plant Northern Minnesota Iron Range, Itasca County, MN" was published on October 5, 2005 (70 FR 58207). DOE held public scoping meetings on October 25, 2005, in Taconite, MN, and on October 26, 2005, in Hoyt Lakes, MN. MDOC held public scoping meetings at the same two locations, respectively, on August 22 and 23, 2006. This EIS evaluates the environmental consequences that may result from the Proposed Action at two possible sites (West Range and East Range Sites). Excelsior's preferred site is the West Range Site in the City of Taconite in Itasca County, MN. The East Range Site is Excelsior's alternative site in the City of Hoyt Lakes in St. Louis County, MN. This EIS also analyzes the No Action Alternative, under which DOE would not provide cost-shared funding to demonstrate the Mesaba Energy Project, beyond that required to complete the NEPA process.

Comment Period:

Comments postmarked by January 11, 2008, will be addressed in the Final EIS, which will be used by DOE in its decision-making process for the Proposed Action. DOE will consider late comments to the extent practicable.

SUMMARY

The U.S. Department of Energy (DOE) has prepared this Environmental Impact Statement (EIS) in cooperation with the Minnesota Department of Commerce (MDOC) to evaluate the potential environmental impacts of the Mesaba Energy Project. The project is a two-phased nominal 606 megawatt electricity ($MWe_{(net)}$) per phase, 1,212 $MWe_{(net)}$ total, Integrated Gasification Combined Cycle (IGCC) generating station proposed to be located in northeastern Minnesota (Figure S-1). This EIS has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 as amended (42 USC 4321 et seq.) and the Minnesota Power Plant Siting Act (Minnesota Statutes § 216E.001-.18).

DOE is the lead Federal agency for this EIS; MDOC is the lead state agency. Both the U.S. Army Corps of Engineers (USACE) (St. Paul District, Brainerd Office) and the U.S. Department of Agriculture (USDA) Forest Service (Superior National Forest, Laurentian District) have participated as cooperating agencies. USACE agreed to be a cooperating agency because the placement of dredged or fill material in waters of the U.S., including wetlands, associated with the proposal would require its authorization pursuant to Section 404 of the Clean Water Act (CWA). In its role as a cooperating agency, USACE staff has provided input regarding potential aquatic resource impacts and related regulatory requirements. As a Federal Land Manager, the USDA Forest Service has an affirmative responsibility to protect air quality-related values of wilderness areas. The USDA Forest Service, as a cooperating agency, provides technical expertise in the review of air quality impacts. The proponent for the project is Excelsior Energy, Inc. (Excelsior), an independent energy development company based in Minnetonka, Minnesota.

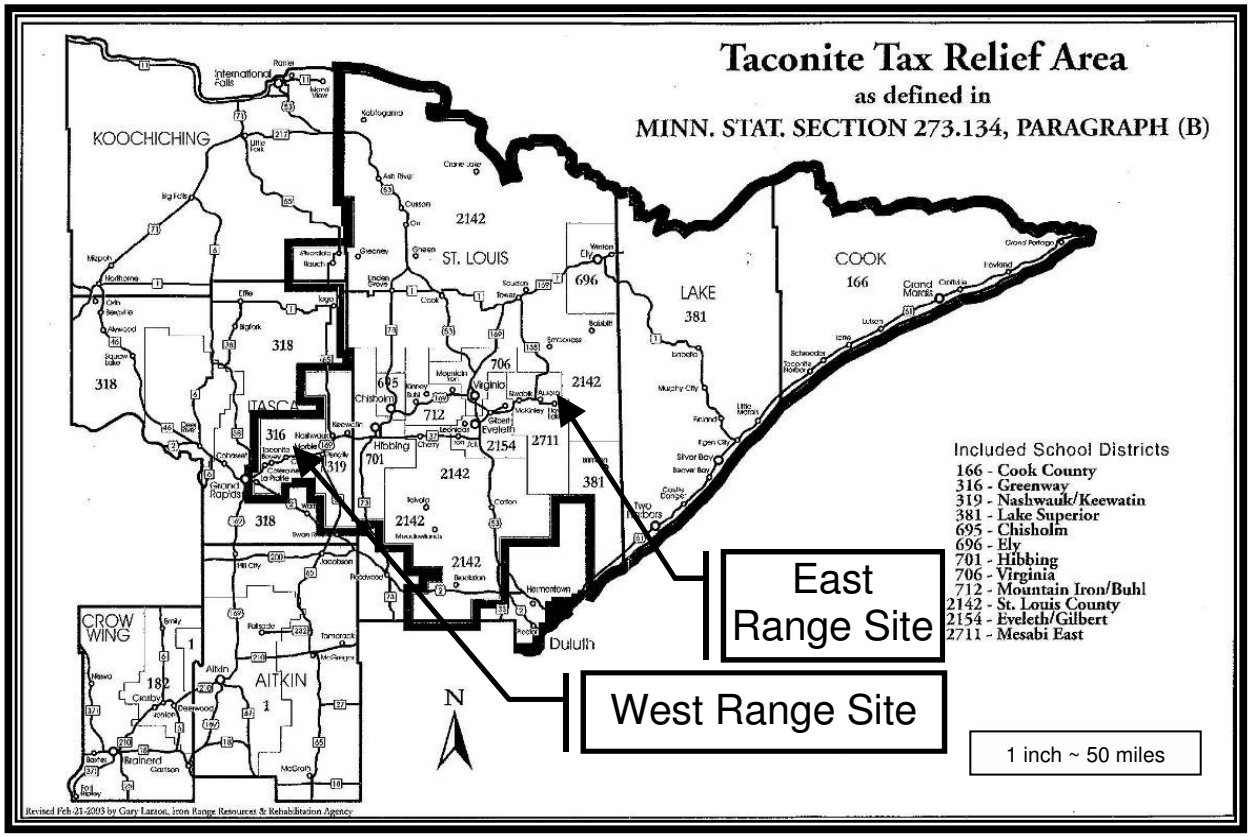


Figure S-1. Potential Project Locations in Taconite Tax Relief Area

PROPOSED ACTION

DOE Proposed Action and Alternatives

DOE's Proposed Action is to provide a total of $36 million in co-funding, through a cooperative agreement with Excelsior under the Clean Coal Power Initiative (CCPI) Program, for the design and one-year operational demonstration testing period for Phase I of the proposed two-phased Mesaba Energy Project. This first phase would be a nominal 606 $MWe_{(net)}$ IGCC power plant with an estimated cost of $2.16 billion (NETL, 2006a). Phase II, which would be an identical, co-located 606 MWe plant, would be privately financed and not involve co-funding by DOE.

A portion ($22,245,505) of the total funding has been made available for cost-sharing in the first budget period under the cooperative agreement, prior to completion of the NEPA process. The activities eligible for cost-sharing during the first period allow for the development of information (such as project definition, preliminary design, and environmental studies and permitting) that provide the basis for this EIS, consistent with DOE requirements and those of the MDOC, USACE, and USDA Forest Service. This is typical both in the amount of funding and the types of allowable activities for a CCPI project of this scope. Making these funds available does not prejudice DOE's ultimate decision on the proposed action and is consistent with DOE and Council on Environmental Quality (CEQ) regulations (10 CFR 1021.211 and 40 CFR 1506.1, respectively), which restrict DOE from taking action that would have an adverse environmental impact or limit the choice of reasonable alternatives until the Record of Decision (ROD) has been issued.

DOE may also provide a loan guarantee to Excelsior pursuant to the Energy Policy Act (EPAct) of 2005 to guarantee a portion of the private sector financing of the project; however, this potential loan guarantee is not part of DOE's Proposed Action. This EIS considers the impacts of both phases of the Mesaba Energy Project as connected actions, consistent with NEPA policy, even though only Phase I would be co-funded under the CCPI Program.

DOE Purpose and Need

DOE's purpose in considering the Proposed Action (to provide cost-shared funding) is to meet the goal of the CCPI Program (NETL, 2006b) by demonstrating the commercial readiness of the Conoco-Phillips E-Gas™ gasification technology in a fully integrated and quintessential IGCC utility-scale application. The principal need addressed by DOE's Proposed Action is to accelerate the commercialization of clean coal technologies that achieve greater efficiencies, environmental performance, and cost-competitiveness. IGCC technology meets the goals of the CCPI by utilizing an estimated 240-year domestic supply of reliable, low-cost coal in an environmentally acceptable manner. The project would demonstrate advanced IGCC technologies to produce electricity, including advanced gasification and air separation systems, feedstock flexibility, improved environmental performance characteristics, and improved thermal efficiency. The technologies would be more efficient, economical, reliable, and environmentally favorable than conventional coal-fueled steam electric generating plants. After a one-year demonstration period, if economically feasible, the Mesaba IGCC power plant may be operated commercially for a period of 20 years or longer.

Alternatives Determined to be Reasonable

Section 102 of NEPA requires that agencies discuss the reasonable alternatives to the proposed action in an EIS. The term "reasonable alternatives" is not self defining, but rather must be determined in the context of the statutory purpose expressed by the underlying legislation.

Congress established the CCPI Program with a specific goal — to accelerate commercial deployment of advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States. The CCPI legislation (Pubic Law No. 107-63) has a narrow focus in directing DOE to demonstrate technology advancements related to coal-based power generation designed to reduce the barriers to continued and expanded use of coal. Technologies capable of producing any combination of heat, fuels, chemicals, or other use byproducts in conjunction with power generation were considered; however, coal is required to provide at least 75 percent of the fuel for power generation. Other technologies that cannot serve to carry out the goal of the CCPI Program (e.g., natural gas, wind power, conservation) are not relevant to DOE's decision of whether or not to provide cost-shared funding support for the Mesaba Energy Project, and therefore, are not reasonable alternatives.

The CCPI Program only allows for joint funding of proposed projects that have been selected through a solicitation and negotiation process. In 2004, DOE issued the second-round CCPI solicitation. Private sector participants submitted proposals in response to the solicitation. A group of proposals, representing diverse technologies and using a variety of coals, was selected to further the goals of the CCPI Program. DOE's choices were limited by virtue of having to choose from the proposals that were submitted under the solicitation process. The proposed project was selected under the second round of the CCPI Program because of the opportunity to demonstrate the specific technology proposed: the Conoco-Phillips E-Gas™ gasification technology in a fully integrated and quintessential IGCC utility-scale application. Other projects that proposed to demonstrate other technologies are not alternatives to the proposed project for NEPA purposes.

Congress not only prescribed a narrow goal for the CCPI Program, but also directed DOE to use a process to accomplish that goal that would involve a more limited role for the Federal government. Instead of requiring government ownership of the demonstration project, Congress provided for cost-sharing in a project sponsored by the private parties, with the provision for repayment of the public funds invested. Therefore, rather than being responsible for the siting, construction and operation of the projects, DOE is in the more limited role of evaluating CCPI project applications to determine if they meet the CCPI Program's goal. It is well established that an agency should take into account the needs and goals of the applicant in determining the scope of the EIS for the applicant's project. When an applicant's needs and goals are factored into the deliberations, a narrower scope of alternatives may emerge than would be the case if the agency is the proprietor responsible for all project-related decisions.

No Action Alternative

Under the No-Action Alternative, DOE would not provide cost-shared funding to demonstrate the commercial readiness of the Conoco-Phillips E-Gas™ gasification technology in a fully integrated and quintessential IGCC utility-scale application (beyond funding required to complete the NEPA process). DOE assumes that if Excelsior were to proceed with development in the absence of DOE funding, the project would include all of the features, attributes and impacts as described for the Proposed Action. However, without DOE participation, it is possible that the proposed project would be canceled. Therefore, for the purposes of analysis in this EIS, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative, meaning that environmental conditions would remain in the status quo (no new construction, resource utilization, emissions, discharges, or wastes generated). If the project were canceled, the proposed technology may not be demonstrated elsewhere. Consequently, eventual commercialization of the integrated technologies would probably not occur because utilities and industries tend to use known and demonstrated technologies rather than unproven technologies. This scenario would not contribute to the CCPI goal of accelerating commercial deployment of advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States.

Alternative Sites

As described in Section 1.5, Excelsior is required by state regulations to consider at least two potential sites for the proposed plant and two potential alignments for high voltage transmission lines (HVTLs). Excelsior's preferred and alternative sites and alignments are described in Section 2.3. Both Excelsior's preferred and alternate sites for the Mesaba Generating Station would be located in the Taconite Tax Relief Area (TTRA) of northeastern Minnesota to receive beneficial consideration in accordance with Minnesota Statutes § 216B.1694 (see Section 1.5). Figure S-1 shows the boundary of the TTRA and the two alternative locations (West Range Site and East Range Site) for the proposed project.

Since DOE's decision in this EIS relates to the funding of a project selected competitively in accordance with objectives of the CCPI Program, DOE has not participated in the identification or selection of alternative sites or alignments for the Mesaba Energy Project. However, Excelsior has prepared an analysis of alternative sites within the TTRA (see Appendix F1), in which it concludes that the West Range and East Range sites are the only practicable alternative sites. DOE has reviewed Excelsior's site analysis and found it to be adequate for purposes of determining reasonable site alternatives for this EIS. Accordingly, the West and East Range sites are evaluated in detail as reasonable alternatives.

Alternatives Eliminated from Further Consideration

DOE considered the following alternatives in addition to the Proposed Action and No Action Alternative. For the reasons described below, DOE elected not to carry these alternatives forward for detailed evaluation in this EIS.

Alternative Sizes

The proposed project could be demonstrated using a smaller-sized plant; however, a smaller-sized plant would not be sufficiently large to demonstrate the large utility-scale commercial viability of the IGCC technology advancements, which is the central purpose of this CCPI project. The smaller-sized, single process system IGCC plant was successfully demonstrated as part of the predecessor Clean Coal Technology (CCT) program at the Wabash River Coal Gasification Repowering Project (Wabash) located in Terre Haute, Indiana. Following the Wabash demonstration, a Value Improving Practices (VIP) process – a formal industry process applying nine separate practices – was applied to examine lessons learned, identify options to improve cost and performance, and optimize the design for application to large utility-scale commercial plant configurations. An availability target above 85 percent would be needed to successfully compete against older technology base load facilities in the power generation industry. Multiple process systems would be required to meet this availability requirement, including a more cost-effective redundancy within the plant, low-cost back-up systems of conventional technologies, and the integration of these features throughout the plant. The proposed project would demonstrate the large utility-scale commercial design configuration resultant from the Wabash VIP process and subsequent research and development consistent with the DOE IGCC Roadmap.

Alternative Technologies

DOE could demonstrate other coal gasification technologies instead of the Proposed Action; however, such alternatives would not demonstrate the commercial readiness of the Conoco-Phillips E-Gas™ gasification technology, which is DOE's purpose for this demonstration project.

Other Alternatives

The alternative of incorporating technologies to reduce the "carbon footprint" of the Mesaba Energy Project was also considered. DOE recognizes that fossil fuel burning is the primary contributor to increasing carbon dioxide (CO_2) concentrations in the atmosphere (IPCC, 2001). CO_2 is a significant greenhouse gas, and increasing concentrations of greenhouse gases show correlation with global warming. DOE recognizes that there are concerns about the effects of fossil fuel use on global climate change. Therefore, DOE oversees other research programs aimed at reducing the cost of electricity associated with power production and proving the viability of technologies for carbon capture and sequestration (CCS) to reduce CO_2 emissions from fossil fuel use. DOE expects that the combined efforts of these programs will enable large-scale plants to come on-line by 2020 that offer 90 percent carbon capture with 99 percent storage permanence at less than a 10 percent increase in the cost of energy services (NETL, 2007). The planned in-service date for the Mesaba Energy Project is well in advance of the timeline for achieving the DOE CCS goal.

Based on an analysis of the current feasibility of carbon capture and sequestration provided in Appendix A2, CCS is not considered a reasonable alternative to DOE's Proposed Action. However, because CCS could become feasible during the commercial lifetime (at least 20 years) of the facility, DOE has evaluated the impacts of implementing CCS during commercial operation of the project in Section 5.1.2.1 of this EIS based on the most current and representative information about available technologies.

Alternatives Available to the Minnesota Public Utilities Commission

The Minnesota Public Utilities Commission (PUC), as supported by the MDOC, has the responsibility for siting power plants having the capacity to operate at 50 MWe or greater (i.e., Large Electric Power Generating Plants [LEPGPs]) and transmission lines designed or capable of operation at a voltage of 100-kilovolts (kV) or greater (i.e., HVTLs). The Minnesota legislature directed the PUC to designate sites that minimize adverse human and environmental impacts while ensuring electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion. Minnesota Rules Chapter 4400 establishes the requirements for submitting and processing a permit application. In the application, the applicant must identify the preferred site for the power plant and one alternative site. As part of the permitting process, the MDOC prepares an EIS on the project and holds a contested case hearing. The PUC has up to one year from the time the application is accepted to complete the process and make a decision on the permit.

In accordance with these requirements, and after considering the potential impacts of the project, the PUC has the responsibility for taking one of the following actions:

(1) Approve and issue permits for Excelsior's preferred site and corridors.
(2) Approve and issue permits for Excelsior's alternative site and corridors.
(3) Disapprove the Joint Permit Application submitted by Excelsior.

Excelsior's Proposed Project and Alternatives

As the project proponent, Excelsior proposes to construct and operate a 1,212-$MWe_{(net)}$ Mesaba Generating Station, together with its associated support structures and utility lines, within the TTRA. The TTRA (see Figure S-1) is a geographic area in northeastern Minnesota that encompasses approximately 13,000 square miles and stretches from Crosby, Minnesota across the state's Cuyuna, Mesabi, and Vermilion iron ore ranges to the north shore of Lake Superior. This area was the site of some of the largest iron mines in the world, but is now economically depressed. Excelsior's project siting efforts centered on the TTRA in part to qualify for favorable consideration as an "innovative energy project" under Minnesota

Statutes § 216B.1694. Excelsior focused particularly on potential sites within the Mesabi Iron Range due to the existing infrastructure system developed in response to earlier industrial mining activities.

In consultation with USACE regulatory staff, Excelsior developed a purpose and need statement to satisfy USACE NEPA and CWA Section 404 requirements. In summary, Excelsior's purpose and need for the project are based on factors including (1) confirming the commercial viability of the IGCC technology for power generation at utility scale; (2) helping to satisfy Minnesota's need for baseload power; (3) implementing state energy policies and objectives; and (4) utilizing Minnesota and Federal incentives for the construction and operation of an "innovative energy project."

The Mesaba Generating Station would consist of the Mesaba Energy Project (Phase I) and an identical facility (Phase II) on the same site. Each phase would be rated nominally at peak to deliver 606 $MWe_{(net)}$ to the high voltage switchyard located within the fenced boundary of the selected site.

The project would employ IGCC technology, using ConocoPhillips E-Gas™ technology. Gasification is the process of converting coal, petroleum coke, or blends of these resources to a gaseous fuel called synthesis gas (syngas). A combined-cycle electric power plant is one that uses both a steam turbine generator and a combustion turbine generator at one location to produce electricity. Combining (integrating) the gasification process with the combined-cycle power plant is known as IGCC, which is an inherently lower-polluting and more energy-efficient technology for producing electricity from solid feedstocks. Key aspects of the project are presented in Table S-1.

In the E-Gas™ process, coal, petroleum coke, or blends of coal and petroleum coke would be crushed, slurried with water, and pumped into a pressurized vessel (the gasifier) along with purified oxygen. In the gasifier, controlled reactions take place, thermally converting feedstock materials into syngas. The syngas is cooled, cleaned of contaminants, and then combusted in a combustion turbine, which is directly connected to an electric generator. The assembly of the combustion turbine and generator is known as a combustion turbine generator (CTG). The expansion of hot combustion gases inside the combustion turbine creates rotational energy that spins the generator and produces electricity. The hot exhaust gases exiting the CTG would pass through a heat recovery steam generator (HRSG), a type of boiler, where steam is produced. The resulting steam is piped to a steam turbine that is connected to an electric generator. The expansion of steam inside the steam turbine spins the generator to produce an additional source of electricity. Electric power for each phase of the project would be produced in two CTGs (about 220 $MWe_{(gross)}$ each) and in one steam turbine generator (STG) (up to 300 $MWe_{(gross)}$), for a total production of 740 $MWe_{(gross)}$ per phase, or 1480 $MWe_{(gross)}$ for Phases I and II.

Table S-1. Key Technology Aspects of the Mesaba Energy Project

Two-Stage Gasifier	Gasifier consists of two stages: a slagging first stage, and an entrained flow, non-slagging second stage. Unlike traditional pulverized coal power plants, where fuel is actually combusted, in an IGCC power plant, slurry is fed to the gasifier along with oxygen (O_2) at an elevated temperature and pressure. The feedstock would be almost totally gasified in this environment to form syngas consisting principally of hydrogen (H_2), carbon monoxide (CO), CO_2, and water.
Syngas Cleanup	Syngas cleanup and desulfurization systems that include the processes for syngas cooling, particulate matter removal, syngas scrubbing, acid gas removal, mercury removal, and potential future retrofit for carbon capture.
Mercury Removal	For mercury removal, the syngas would pass through fixed beds of activated carbon prepared with a special impregnate to remove mercury. Multiple beds would be used to obtain optimized adsorption.

Table S-1. Key Technology Aspects of the Mesaba Energy Project

Carbon Capture Adaptable	The IGCC power plant would be designed to allow for future carbon capture, if required. Technologies currently exist that could allow the removal of CO_2 from the syngas, reducing CO_2 emissions by roughly 30 percent. Future technologies are expected to be demonstrated that could capture up to 90 percent of the CO_2 emission from the combustion gases. Once captured, the CO_2 could be used for enhanced oil recovery or stored in appropriate geologic (saline) formations. As part of its Power Purchase Agreement approval process, Excelsior has submitted a carbon capture and sequestration plan to the PUC (see Appendix A).

Excelsior is required by state regulations to consider at least two potential sites for the proposed plant and, under certain conditions, two potential alignments for HVTLs. Excelsior's site selection process required several years of study that included a three-tiered siting process to identify the most favorable location for the Mesaba Generating Station. The first tier was conducted under a state statute enacted in 2003 (Minnesota Statutes § 216B.1694, Subdivision. 1(3)) that included, among other things, a provision allowing up to three "innovative energy projects" to be located in the TTRA. Excelsior then determined which regions throughout the TTRA have the necessary minimum infrastructure (e.g., HVTLs, water, and gas), rail access, road access, and other necessary components to develop the project. Once the initial candidate areas of the TTRA were identified, a second tier of evaluation was performed that included a review of engineering feasibility, environmental compatibility, community support and acceptance, and other criteria. The third tier of evaluation consisted of a detailed analysis of the candidate project sites in Excelsior's Joint Permit Application.

Fifteen sites were initially identified by Excelsior during the screening process. Excelsior documented its rationale for eliminating certain sites based on the site evaluation criteria and concluded that the West Range Site and the East Range Site are the only practicable alternatives available to Excelsior at this time. Figure S-1 shows the boundary of the TTRA and the locations of the West Range Site and East Range Site.

Expected operational characteristics of the project would generally be the same for the alternative sites with exception of water requirements, discharges, and PM_{10} emissions as described below. The expected operational characteristics for each site are summarized in Table S-2. Pollution prevention, recycling, and reuse features are presented in Table S-3. The location and extent of HVTLs, water sources, rail, gas pipelines, and other infrastructure requirements are dependent upon each of the sites under consideration by Excelsior. Information on these project features as they relate to the sites being considered is provided in the following sections.

The principal differences in operating characteristics of the Mesaba Generating Station at the West Range Site and East Range Site listed in Table S-2 are attributable to the following factors:

- The East Range Site is located in the Lake Superior Watershed of the Great Lakes Basin, while the West Range Site is in the Upper Mississippi River Basin. At either site the generating station would include a Zero Liquid Discharge (ZLD) system to remove contaminants in the discharge from the gasification process. At the West Range Site, cooling tower blowdown water can meet standards for discharge to surface waters. However, because of severe restrictions on discharges of mercury to surface waters in the Great Lakes Basin, the generating station at the East Range Site would include an enhanced ZLD system to process cooling tower blowdown, thus eliminating all discharges. Because of the lower quality of source water in mine pits at the East Range Site, the water could not meet standards for discharge to Great Lakes Basin waters even if discharged directly from the source.
- The use of the enhanced ZLD at the East Range Site would impose an additional power load on the station equal to about 2 MW each for Phases I and II, which would reduce the generating capacity at the East Range Site for the same fuel consumption.

- The lower water quality of process water at the East Range Site would result in greater amounts of particulate mater emissions from the cooling towers.
- The enhanced ZLD at the East Range Site would also increase the solid waste disposal requirements for ZLD filter cake.
- The enhanced ZLD at the East Range Site would, however, reduce the water demand for the station, because the cooling tower could be operated at higher recirculation rates (cycles of concentration) than possible at the West Range Site.

Table S-2. Expected Operating Characteristics – Mesaba Energy Project (Total for Phases I and II, except where noted)

Operating Characteristics	West Range Site	East Range Site
Generating capacity (MWe)[a]		
Phase I	606	<606
Total (Phases I and II)	1,212	<1,212
Load Output		
Capacity Factor (percent)	92	92
Coal consumption[b] (tpd)		
Sub-bituminous (PSQ)	17,100	17,100
Bituminous (PSQ)	12,240	12,240
Sub-bituminous/petroleum coke (50:50) (PSQ)	12,900	12,900
Water requirements[c] (gpm)		
Average water use (at 3 COC for West Range)	10,300	7,400
Peak water use	15,200	10,000
Air emissions (tpy)		
Sulfur dioxide (SO_2)	1,390	1,390
Oxides of nitrogen (NO_x)	2,872	2,872
Particulate matter[d] ≤ 10 microns (PM_{10})	493	709
Carbon monoxide (CO)	2,539	2,539
Mercury (Hg)	0.027	0.027
Lead (Pb)	0.030	0.030
Volatile organic compounds (VOCs)	197	197
Carbon dioxide[e] (CO_2)	10.6(SB)/9.4(B)	>10.6(SB)/>9.4(B)
Effluent discharges		
Sanitary wastewater[f] (gpd)	400	400
Cooling tower blowdown discharge[g] (gpm)	3,500	0
Solid wastes[h] (tpy)		
Mercury removal carbon (H)	14	14
Sour water sludge (H)	30	30
Sour water carbon (H)	48	48
Syngas treatment carbon (H)	60	60
Waste char and ash (NH)	160	160
Zero Liquid Discharge (ZLD) filter cake (H)	~4,400(GI)	~4,400(GI)/<24,500(PB)
Marketable Byproducts (tpd)		
Slag (PSQ)	1,000 – 1,600	1,000 – 1,600
Sulfur (PSQ)	60 – 330	60 – 330

[a] The generating capacity at the East Range Site is expected to be approximately 2 MW less than the West Range Site per phase due to the additional load of the enhanced ZLD system at the East Range Site.
[b] Peak use, both phases. Fuel flexibility allows the IGCC power plant to operate on either sub-bituminous coal, bituminous coal, or a coal/petroleum coke blend.
[c] The use of an enhanced ZLD system at the East Range Site would enable a greater number of cycles of concentration, resulting in a lower demand for process water.
[d] Because of the lower quality of water used for cooling at the East Range Site, PM_{10} emissions from cooling towers would be greater than for the West Range Site.
[e] CO_2 emissions are a function of the feedstock consumed and of the Mesaba Generating Station's net heat rate. SB = Sub-bituminous coal such as Power River Basin Coal; B = Bituminous coal such as Illinois Basin Coal; East Range Site with enhanced ZLD system would have lower efficiency and higher emissions.
[f] Discharged to publicly owned treatment works (POTWs).
[g] East Range enhanced ZLD system eliminates discharge of cooling tower blowdown.
[h] Fuel dependent; H = Hazardous; NH = Non-hazardous; GI = Gasification Island; PB = Power Block
gpd = gallons per day; gpm = gallons per minute; tpd = tons per day; tpy = tons per year.
PSQ = partial slurry quench mode; COC = cycles of concentration.

Table S-3. Key Pollution Prevention, Recycling and Reuse Features

Spill Prevention Control and Countermeasure (SPCC) Plan	The SPCC Plan would develop measures to take in the event of a spill, thereby insulating environmental media from the effect of accidental releases. All aboveground chemical storage tanks would be lined or paved, curbed/diked, and have sufficient volume to meet all regulatory requirements. A site drainage plan would also be developed that would isolate routine, process-related operations from affecting the surrounding environment.
Feed Material Handling	The coal storage area would be paved or lined so that runoff can be collected, tested, and treated as necessary. The coal storage area has facilities to control fugitive dust emissions. The coal conveyors would be covered.
Coal Grinding and Slurry Preparation	The coal grinding equipment would be enclosed and any vents would be routed to the tank vent incinerator/auxiliary boiler. The water used to prepare the coal slurry would be stripped process condensate (recycled).
Gasification, High Temperature Heat Recovery, Dry Char Removal and Slag Grinding	The char produced in gasification would be removed and returned to the first stage of the gasifier (recycled). This improves the carbon conversion in the gasifier and reduces the amount of carbon contained in the gasifier slag. Reduced carbon content makes the slag more marketable and reduces the likelihood that it must be disposed in a landfill.
Slag Handling	The slag dewatering system would generate some flash gas that contains hydrogen sulfide (H_2S). The flash gas would be recycled back to the gasifier via the syngas recycle compressor. Water that is entrained with the slag would be collected and sent to the sour water stripper for recycling.
Sour Water System	Sour water would be collected from slag dewatering and the low temperature heat recovery system, and the ammonia (NH_3) and H_2S would be stripped out and sent to the Sulfur Recovery Unit (SRU). The stripped condensate would be used to prepare coal slurry. Surplus stripped condensate would be sent to the ZLD unit.
Zero Liquid Discharge (ZLD) System*	The ZLD system would concentrate and evaporate the process condensate. The ZLD would produce high purity water for reuse and a solid filter cake for disposal off site. The ZLD would concentrate and dispose of heavy metals and other contaminants in the process condensate. The ZLD would also be a recycle unit because the recovered water would be reused, reducing the total plant water consumption.
Carbonyl Sulfide (COS) Hydrolysis	The gasifier would produce small quantities of COS that cannot be absorbed in the Acid Gas Removal (AGR) system. The COS hydrolysis unit would convert COS to H_2S, which would then be removed in the AGR unit. The COS hydrolysis unit would improve the sulfur recovery efficiency and reduce the total amount of sulfur in the syngas, and ultimately, the release of SO_2 from the HRSG stacks.
Mercury Removal Features	The mercury removal unit would use specially formulated activated carbon to capture trace quantities of mercury that may remain in the syngas. Mercury in the sour water handling system would be captured via activated carbon filters strategically placed prior to potential release points.
Acid Gas Removal (AGR)	The AGR system would remove H_2S from the raw syngas and produce a sweet (low sulfur) syngas for use in the combined cycle power block. The AGR would produce concentrated H_2S feed for the SRU.
Sulfur Recovery Unit (SRU)	The SRU would convert the H_2S to elemental sulfur that would be marketed for use as a fertilizer additive or for production of sulfuric acid. The tail gas from the SRU would be recycled back to the gasifier.

Table S-3. Key Pollution Prevention, Recycling and Reuse Features

Fuel Gas Moisturization	The fuel gas moisturization system would improve the recovery of low level heat from the gasification process and serve as a diluent for the syngas used in the combustion turbines. Nitrogen from the air separation unit (ASU) would also be used as a diluent. Dry, clean syngas typically has a heating value in the range of 250 to 300 Btu per standard cubic foot. If the dry syngas was used directly in the combustion turbines, the thermal NO_x formed would be too high. Earlier IGCC plants used steam injection for NO_x control, which is less efficient than using fuel moisturization and nitrogen.
Integration of the air separation unit (ASU) and Power Block	The ASU would produce nitrogen as a by-product; this is an effective diluent for NO_x control. The ASU would require large amounts of electrical power for air compression. Part of the air compression requirements would be provided by the combustion turbine compressors, further integrating the gasification and combined cycle power block portions. This integration reduces the ASU auxiliary power requirement and increases the net power output by the plant.
Boiler Blowdown and Steam Condensate Recovery	Boiler blowdown and steam condensate would be recovered from the combined cycle power block and gasification facilities and would be reused as cooling tower makeup.
Training and Leadership	All corporate and plant personnel would be trained on continuous improvement in environmental performance especially as such training and programs apply to: (1) setting, measuring, evaluating and achieving waste reduction goals, and (2) reporting the results of such programs in annual reports made available to the public.

*A ZLD system would treat water from the bottom of the ammonia stripper at either site to prevent contaminants in feedstocks from being discharged to surface waters. For the East Range Site only, an enhanced ZLD system would also treat cooling tower blowdown to eliminate all direct effluent discharges to receiving waters as necessitated by the stringent requirements applying to discharges of mercury in the Lake Superior Basin watershed.

West Range Site and Corridors

Excelsior proposes to locate the Mesaba Generating Station on an approximately 1,260-acre site in the City of Taconite within Iron Range Township in Itasca County. The project's generating facilities would connect to the power grid via new and existing HVTL corridors to a substation near the unincorporated community of Blackberry. Excelsior or a local public utility would construct, own, and operate a new natural gas pipeline connecting to two existing 36-inch pipelines owned by Great Lakes Gas Transmission Company (GLG) to provide start-up and backup fuel for the station. Key features of the West Range Site and corridors, including Excelsior's preferred choices for utilities and transportation components and alternatives they considered, are listed in Table S-4 and illustrated in Figure S-2.

East Range Site and Corridors

Excelsior's alternative East Range Site for the proposed Mesaba Generating Station is an approximately 810-acre site within the city limits of Hoyt Lakes in St. Louis County, approximately 1 mile north of the downtown area. The project's generating facilities would connect to the grid via existing HVTL corridors that lead to a substation near the unincorporated community of Forbes. Northern Natural Gas (NNG) would construct, own, and operate a gas pipeline as an extension of the company's interstate pipeline system to provide start-up and back-up fuel for the station. Key features of the East Range Site and corridors, including Excelsior's preferred choices for utilities and transportation components and alternatives they considered, are listed in Table S-5 and shown in Figure S-3.

Table S-4. West Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Rail Access	Coal could be delivered to the West Range Site by either BNSF Railway or CN Railway, which operate on a single track located less than 2 mi from the West Range Site. Direct access to the site would be provided by the construction of short spurs from the mainline tracks onto the site boundary. Construction of 2 mi of new track would be required between the existing mainline track and the boundary of the West Range Site; an additional 4 mi of new track would be required for the portion of the rail loop within the site boundaries. Three alternative rail access alignments were considered for the West Range Site, identified as Alternatives 1A, 1B, and 2. Permanent rights-of-way for the rail alignments would be 100 feet wide. Limits of construction could range from 60 to 760 feet in width depending upon topography.	Alternative 1A (preferred). Requires 35 ac of right-of-way (ROW) and 6 mi of track. Three residences within 1,000 feet and one residence within 400 feet. Alternative 1B. Requires 43 ac of ROW and 6.9 mi of track. The closest residence is 2,000 feet away. Would require significant earth removal for construction and greater distance for coal conveyance once delivered to the site. Alternative 2. Initially considered but eliminated by the project proponent because the need to maintain acceptable curvatures for the track would require routing across a portion of Big Diamond Lake, which would not be economically or environmentally feasible.
Roadway Access	The West Range Site is located about 1.5 mi north of U.S. Highway (US) 169 and about 0.25 mi to the east of Itasca County Road (CR) 7. Other roadways include the Cross-Range Heavy Haul Road, which is a gravel road used to allow heavy or slow loads to be transported between mines across the Iron Range. The Cross-Range Heavy Haul Road also provides access to a cluster of homes in the Big Diamond Lake/Dunning Lake area. Excelsior considered two access road alternatives (Access Road 1 and Access Road 2) to provide access to the West Range Site.	Access Road 1. Project would use the realignment of CR 7 to serve as the primary access road (Access Road 1). The road would pass within 0.5 mi of 22 residences, including six residences within 500 feet. The closest residence would be within 300 feet. Access Road 2. This segment is an extension of Access Road 1 into the site using the CR 7 improvements proposed by Itasca County. However, if these improvements are not implemented, an alternative provides for configuration improvements to CR 7 and US 169.
Process Water Supply	Excelsior initially considered three alternatives for providing process water to the West Range Site, including the use of nearby abandoned mine pits, the Mississippi River, and groundwater sources.	Alternative 1 (preferred). Involves pumping water from nearby abandoned mine pits, including the Canisteo Mine Pit (CMP), the Lind Mine Pit (LMP), and the Hill Annex Mine Pit (HAMP) Complex. Alternative 2. Use of the Mississippi River; eliminated due to extensive infrastructure requirements to convey water. Alternative 3. Use of groundwater sources; eliminated due to extensive infrastructure requirements to accommodate low pumping yields.
Process Wastewater	Process wastewater discharges would consist primarily of cooling tower blowdown blended with relatively low-flow additional wastewater streams from other plant systems. All other contact process water would be managed and treated in the ZLD system. All sanitary wastewater would be treated separately. Hence, the constituents in the discharge essentially would be the same as those present in the process water supply but more concentrated.	Proposed Plan. The receiving waters for cooling water effluent would include both the CMP (proposed Outfall 001) and Holman Lake (proposed Outfall 002). Discharge rates to the CMP and Holman Lake would be inversely proportional to the COC at which the cooling towers would be operated. Excelsior expects that the plant would operate at five COC during Phase I and at three COC during combined Phases I and II.

Table S-4. West Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Potable Water Supply	During construction, the Mesaba Generating Station would require a peak of 45,000 gpd of potable water based on 1,500 personnel using 30 gallons of potable water per day each. After construction of Phase I and II, the water demand would drop to about 7,500 gpd assuming 250 individuals on site year around. Two alternatives were considered to provide potable water to the West Range Site.	Alternative 1 (preferred). Obtain potable water from the City of Taconite, located 2.5 mi southwest of the project site, which would require construction of an 8-inch diameter pipeline from the Taconite system to the site and a booster station. The Taconite system currently has adequate capacity for the project during the operational phase, but the requirements during construction exceed existing capacity. Planned water system improvements will provide the necessary capacity, otherwise Excelsior will need to provide potable water via truck during construction. Alternative 2. Construct an on-site water treatment facility with the capacity to treat 7,500 gpd of water from the CMP and HAMP Complex. Excelsior would own the water treatment facility and be responsible for the operation and maintenance of the facility.
Domestic Wastewater Treatment	The sanitary wastewater discharge from the plant during construction and during operation would be comparable to the volume of daily potable water use. Two alternatives were considered for disposal of domestic wastewater.	Alternative 1. Construct and operate a wastewater treatment facility, discharging to either Little Diamond Lake or via the cooling tower blow down pipeline to Holman Lake. Alternative 2 (preferred). Discharge domestic wastewater to the Coleraine-Bovey-Taconite wastewater collection and treatment system. Consists of constructing approximately 10,000 feet of 12-inch gravity sewer, a pump station, and 2,400 feet of force main from the West Range Site to the City of Taconite's main pump station. Also requires a 50-foot construction ROW and a permanent 30-foot ROW affecting approximately 14 ac and 8 ac, respectively. Alternative would avoid the discharge of treated domestic effluent to public waters impaired for dissolved oxygen (DO) and nutrients.
Natural Gas Facilities	Excelsior or a local public utility proposes to construct, own, and operate one 16-inch (or potentially 24-inch) diameter gas pipeline to supply natural gas to the Mesaba Generating Station that would tap the two existing 36-inch GLG pipelines approximately 12 mi due south of the West Range Site. Three potential natural gas pipeline alternatives were initially considered by Excelsior to provide natural gas to the West Range Site.	Alternative 1 (preferred). Includes 2.5 mi and 10.7 mi of new pipeline, in existing and new corridors, respectively. Four water crossings and three residential units within 300 feet. Pipeline would be licensed/permitted, constructed, owned, and operated by Excelsior. Alternative 2. Includes 10.5 mi and 4.5 mi of new pipeline, in existing and new corridors, respectively. Four water crossings and five residential units within 300 feet. Pipeline would be licensed/permitted, constructed, owned, and operated by NNG (as an interstate pipeline operator). Alternative 3. Includes 7 mi and 5.5 mi of new pipeline, in existing and new corridors respectively. Four water crossings and 29 residential units within 300 feet. Pipeline would be licensed/permitted, constructed, owned, and operated by NNG (as an interstate pipeline operator).

Table S-4. West Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
HVTL – Plan A	Excelsior's Plan A assumes the use of 345-kV circuits. Plan A provides for a preferred route (WRA-1) and an alternative route (WRA-1A). Both routes would share two common segments (one existing and one new ROW), and each route would include two unique segments (one existing ROW and one new ROW). The major difference between the routes is that WRA-1A would run east of and parallel to Twin Lakes Road, while WRA-1 would run west of and parallel to Twin Lakes Road. Both routes would avoid residences located on the road. Excelsior prefers WRA-1, because it would have fewer water crossings, would cross fewer open fields, would avoid gravel mining operations, and would generally be less visible. Both routes are similar in that they traverse areas that have similar residential densities and provide the shortest and most direct routes to the substation.	WRA-1 (preferred). Excelsior would acquire 100-foot ROWs, which would result in a total permanent ROW of approximately 134 ac. Existing HVTL ROWs would not require widening of corridors. Approximately 66 residences would be located within 0.5 mi of the centerline of the preferred alignment, of which 17 would be located within 0.25 mi of the alignment. One residence would be located within 300 feet of the alignment and three others would be located within 500 feet. WRA-1A. Excelsior would acquire 100-foot ROWs, which would result in a total permanent ROW of approximately 121 ac. Existing HVTL ROWs would not require widening of corridors. Approximately 62 residences would be located within 0.5 mi of the centerline of the preferred alignment, of which 21 would be located within 0.25 mi of the alignment. Two residences would be located within 300 feet of the alignment and five others would be located within 500 feet.
HVTL – Plan B	Excelsior's Plan B provides a contingency to allow the use of 230-kV circuits. If the Midwest Independent System Operator (MISO) determines that the 345-kV transmission infrastructure is incompatible with regional transmission planning initiatives, or if the timetable for building 345-kV transmission in the region would not be acceptable, Excelsior would implement a 230-kV transmission contingency plan. Plan B would begin with two 230-kV HVTL circuits mounted on a single steel pole structure, which would accommodate the full 606-MWe output of Phase I and meet the single failure criterion. Although the double-circuit 230-kV HVTLs could accommodate the entire 1,212-MW output of the combined Phases I and II, they would not meet the single failure criterion. Therefore, Plan B would provide for an additional HVTL with the construction of Phase II.	WRB-1 (preferred). Double-circuit 230-kV HVTLs would follow the same alignment as the preferred route (WRA-1) of Plan A. However, the single-pole HVTL structures required for 230-kV HVTLs would be shorter. The new alignment segments would require a ROW with a minimum width of approximately 73 feet. Existing HVTL ROWs would not require widening. WRB-1A. Would follow the same alignment as the alternative route (WRA-1A) of Plan A for Phase I. WRB-2 (preferred). The preferred route for Phase II of Plan B would be the route not selected for the double-circuit 230-kV HVTL in Phase I of Plan B. The structures and new ROW requirements would be comparable to those described for WRB-1, but the poles would be shorter (by approximately 20 feet). In the segments where the double-circuit 230-kV HVTL alignment would coincide with the single-circuit 230-kV alignment, a minimum permanent ROW width of approximately 138 feet would be required for the parallel pole structures (affecting approximately 1.7 mi of new ROW). The new alignments for Plan B, Phases I and II (including both routes) would require permanent ROWs affecting approximately 255 ac. Existing HVTL ROWs would not require widening. WRB-2A. The alternative route proposed for Phase II of Plan B would combine segments from two existing HVTL corridors, one of which traverses the northern section of the West Range Site. WRB-2A would follow an alignment including portions of the ROWs for the Minnesota Power (MP) 45L/28L and 62L/63L HVTLs.

Table S-4. West Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
HVTL – Plan B (continued)		WRB-2A (continued). Because of the 18-mi length, Excelsior proposes to use HVTLs rated at 345-kV on this route to avoid excessive line losses and elaborate switching requirements that would be required for 230-kV. Excelsior proposes to use delta configuration 345-kV structures with an underbuild feature that would carry the existing MP 115-kV HVTLs below the arms holding the 345-kV conductors. The delta configuration structures would require a minimum permanent ROW width of 106 feet, generally within the parameters of the existing ROWs. Therefore, the new alignments for Plan B, Phases I and II (including both routes) would require permanent ROWs affecting approximately 134 ac. Approximately 214 residences are located within 0.5 mi of the ROWs that would be used for Alternative WRB-2A; 98 are located within 0.25 mi of the ROWs. Eight residences are located within 300 feet and 21 others are located within 500 feet.

Acronyms: ac – acre(s); BNSF – formerly Burlington Northern/Santa Fe (Railway Company); CMP – Canisteo Mine Pit; CN – Canadian National (Railway Company); COC – cycles of concentration; CR – County Road; DO – dissolved oxygen; GLG – Great Lakes Gas (Transmission Company); gpd – gallons per day; HAMP – Hill Annex Mine Pit; HVTL – high voltage transmission line; LMP – Lind Mine Pit; mi – mile(s); MISO – Midwest Independent System Operator; MP – Minnesota Power (Company); NNG – Northern Natural Gas (Company); ROW – right-of-way; US – U.S. Highway; ZLD – zero liquid discharge

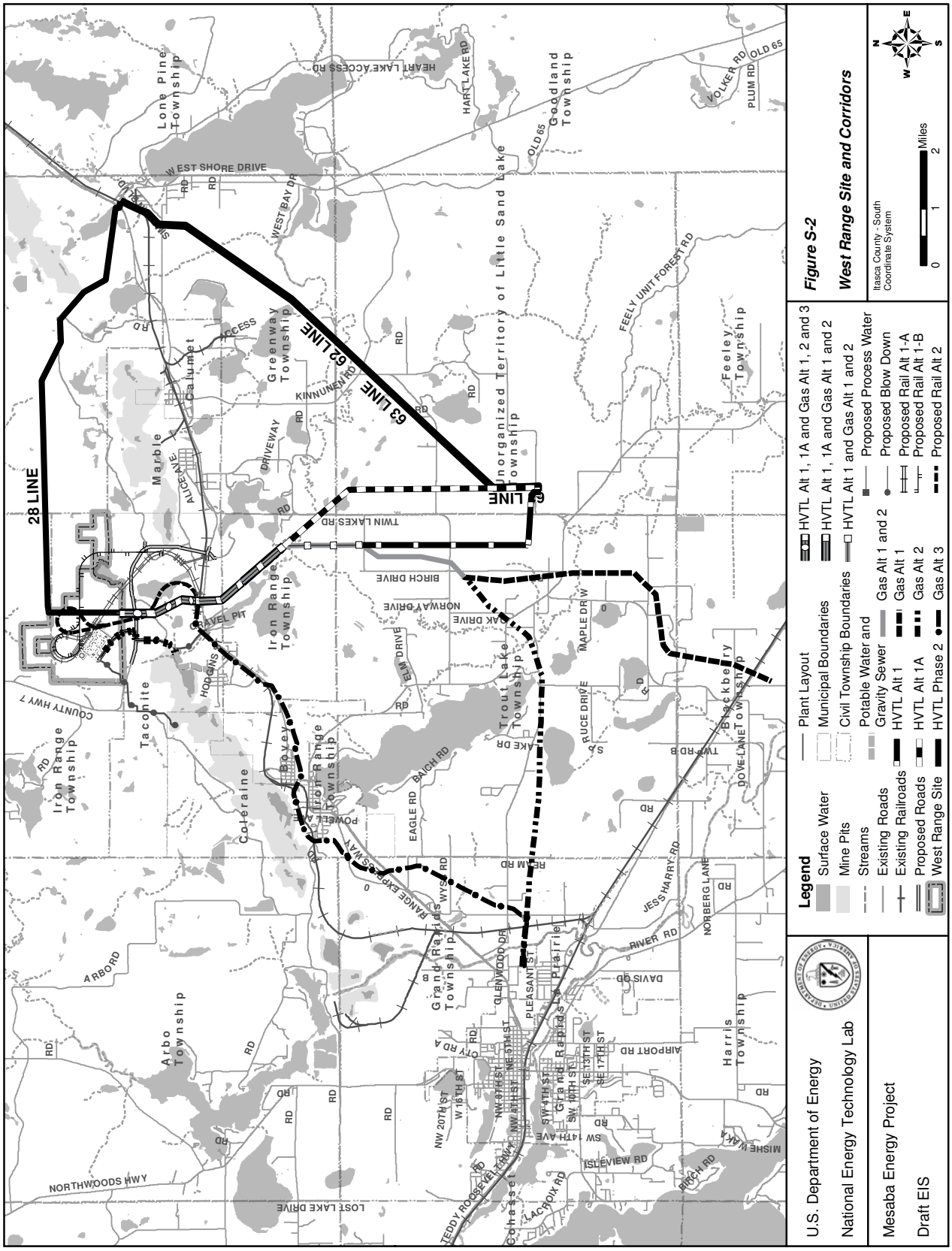

28 LINE
62 LINE
63 LINE
69 LINE
Legend
Surface Water
Mine Pits
Streams
Existing Roads
Existing Railroads
Proposed Roads
West Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Potable Water and Gravity Sewer
HVTL Alt 1
HVTL Alt 1A
HVTL Phase 2
HVTL Alt 1, 1A and Gas Alt 1, 2 and 3
HVTL Alt 1, 1A and Gas Alt 1 and 2
HVTL Alt 1 and Gas Alt 1 and 2
Gas Alt 1 and 2
Gas Alt 1
Gas Alt 2
Gas Alt 3
Proposed Process Water
Proposed Blow Down
Proposed Rail Alt 1-A
Proposed Rail Alt 1-B
Proposed Rail Alt 2
Figure S-2
West Range Site and Corridors
Itasca County - South
Coordinate System
Miles
0
1
2
U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS

Table S-5. East Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Rail Access	Coal would be delivered to the East Range Site by a subsidiary of CN Railway that serves the area. The nearest access to the BNSF Railway is at Hibbing, 40 mi from the East Range Site. Therefore, the CN would be the only feasible near-term rail provider to the East Range Site. The power plant footprint is located approximately 1 mi north and 1 mi west of two CN railroad tracks. The east-west track runs from Eveleth, Minnesota, to Two Harbors, Minnesota. The north-south track connects with the east-west track at Wyman Junction (about 1.7 mi southeast of the East Range Site) and extends north to Embarrass, Minnesota. Permanent ROWs for the rail alignments would be 100 feet wide. Limits of construction could range from 60 to 500 feet in width depending upon topography.	Alternative 1 (preferred). Alternative 1 would provide a traditional rail loop to accommodate a unit train that would return in the same direction. The track would originate near MP's Syl Laskin Energy Center rail spur and travel east-northeast to the Mesaba Generating Station. The track would be about 17,800 feet long. No residential dwellings are located near the proposed alignment. Alternative 2. Alternative 2 would cross the site (rather than looping within it) and connect to the CN north-south track just north of Wyman Junction. This track would be about 18,500 feet long to accommodate a unit train with the rotary coal dumper near the midpoint. To maintain a workable grade, the track would need to cross under CR 666, which would require construction of a roadway bridge.
Roadway Access	The proposed access road would consist of a looped roadway intersecting CR 666 at two locations to provide gradual curves and good sightlines. Traffic would enter the site from the north access point. During construction and other periods of peak volumes, traffic would exit the site at the south access point. Providing two access points from CR 666 would allow flexibility in accessing the station during construction and when maintenance work is performed on CR 666.	Proposed Plan. CR 666 adjoins the proposed East Range Site and is the most practical choice for public road system access.
Process Water Supply	The water demands for the East Range Site would be less than for the West Range Site, because an enhanced ZLD system would be required to comply with stringent regulations affecting discharges to Lake Superior Basin surface waters. Water appropriations can therefore be reduced by up to 700 gpm per phase through such recycling efforts. The enhanced ZLD system would allow for the potential use of wastewaters from other industrial neighbors, but the system would require power above that required at the West Range Site making the generating station at the East Range Site less efficient and more costly to operate. The use of the enhanced ZLD system would produce large additional amounts of residual minerals/salts (24,500 tons/year) that would require disposal in a permitted landfill.	Proposed Plan. Process water for the East Range Site would be drawn from numerous mine pits located in the vicinity. Excelsior proposes to link the various mine pits using water intakes, pump stations, and pipelines. In the event of high inflow rates into Colby Lake during spring runoff or during high precipitation events, water also may be pumped from Colby Lake into Mine Pit 2 West Extension. Mine Pit 2 West Extension would serve as the primary source. A permanent pumping station would be added to this mine pit. The pit would receive input from one or more of the following pits: Mine Pit 6, Mine Pit 2 West, Mine Pit 2 East, Mine Pit 3, Donora Mine Pit, Stephens Mine Pit, Knox Mine Pit 2, Mine Pit 9S, Mine Pit 1 Effluent, PolyMet Mining Dewatering Operations, and/or Colby Lake.

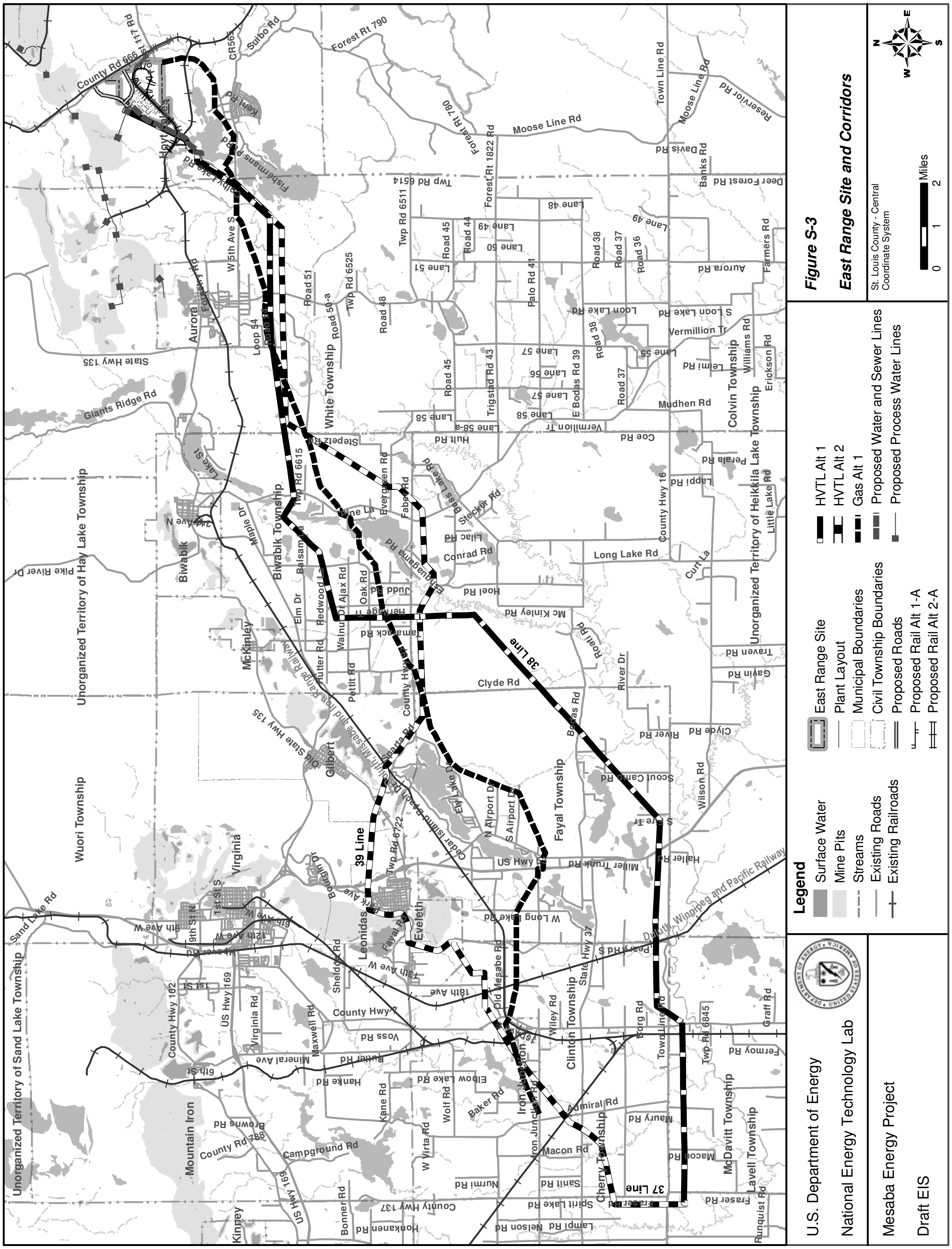
Table S-5. East Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Process Wastewater	The East Range Site is located within the Lake Superior Basin watershed, which is regulated for bioaccumulative chemicals of concern (BCCs), such as mercury, in discharges. Excelsior concluded that there are no proven technologies to remove mercury at such low concentrations at the high flow rates of the Mesaba Generating Station (the peak discharge from Phase I and II would approach 3,500 gpm). Therefore, enlarging the ZLD is the preferred alternative.	Proposed Plan. Excelsior's preferred method for dealing with the mercury discharge limitations at the East Range Site would be to totally eliminate the discharge of cooling tower blowdown by enlarging the ZLD system to handle all of the generating station's process wastewater streams. The system would evaporate any water that could not be reused in the plant processes leaving only a solid stream of salts for disposal at a licensed treatment/disposal facility. Excelsior considered discharging process wastewater to the Hoyt Lakes POTW as an alternative, but the POTW does not have sufficient capacity to manage the daily volumes of cooling tower blowdown.
Potable Water Supply	During construction, the Mesaba Generating Station would require a peak of 45,000 gpd of potable water based on 1,500 personnel using 30 gallons of potable water per day each. After construction of Phase I and II, the water demand will drop to about 7,500 gpd assuming 250 individuals on site year around. Two alternatives were considered to provide potable water.	Alternative 1 (preferred). Obtain potable water from the City of Hoyt Lakes by constructing a 6-inch diameter pipeline approximately 11,000 feet from the East Range Site connecting to a 12-inch water main that serves MP. The city would own and maintain the pipeline and sell water to the station. Alternative 2. Construct an on-site treatment facility with the capacity to treat 7,500 gpd of water from nearby mine pits. Excelsior would own the water treatment facility and be responsible for operation and maintenance.
Domestic Wastewater Treatment	The sanitary wastewater discharge from the plant during construction and during operation would be comparable to the volume of daily potable water use. Two alternatives were considered for disposal of domestic wastewater.	Alternative 1. Construct an on-site wastewater treatment facility comparable to the facility described for the West Range Site. A 12-inch gravity sewer would be constructed to convey treated effluent to the mine drainage stream running from northeast to southwest through the site and discharging into Colby Lake. Would require NPDES permit and licensed operator, and would discharge to Colby Lake, which is the source for the Hoyt Lakes drinking water treatment plant. Alternative 2 (preferred). Discharge domestic wastewater to the City of Hoyt Lakes' wastewater collection and treatment system. Consists of constructing approximately 9,500 feet of 12-inch diameter gravity sewer, a pump station, and about 2,500 feet of 4-inch force main. The wastewater piping would parallel the existing HVTL easement along the west side of the proposed property boundary, south to Colby Lake. A pump station would be located on the north side of Colby Lake. The City of Hoyt Lakes would operate and maintain the sewer line and would be compensated through sewer user fees.
Natural Gas Facilities	NNG is the only pipeline company serving the immediate vicinity of the East Range Site. A 10-inch diameter branch of NNG's pipeline from Iron Junction, Minnesota serves the nearby Cliffs-Erie (CE) plant and directly adjoins the eastern boundary of the East Range Site. However, this branch line lacks adequate capacity to supply the Mesaba Generating Station demand. Therefore, to provide natural gas in the quantity and at the pressure required to supply the station, the following infrastructure would be required.	Proposed Plan. Installation of approximately 33 mi of new, 16- to 24-inch pipeline placed within the existing ROW for the 10-inch CE branch line; addition of a new compressor at the existing point where the GLG and NNG pipelines interconnect; and installation of an ultrasonic meter facility to serve the Mesaba Generating Station. As an interstate pipeline, it would be permitted by NNG under the Federal Energy Regulatory Commission (FERC) review process. Approximately 856 residences are located within 0.5 mi of the existing pipeline ROW, 46 of which are located within 300 feet of the ROW.

Table S-5. East Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
HVTL	Excelsior would configure the high voltage switchyard for the East Range Site at 345-kV for both phases of the Mesaba Generating Station. The option to operate the switchyard at 345-kV at the start of Phase I was based on a 5-MW lower net line loss than would occur if the facilities were operated at 230-kV. Over the project life, the capacity gain associated with the 345-kV option would offset its higher capital cost. The high voltage switchyard required to transmit the entire output from Phase I and Phase II to the point of interconnection with minimum line loss would be installed during construction of Phase I. No further development would be required to accommodate Phase II. Excelsior is proposing to construct new HVTLs to the Forbes Substation, approximately 30 mi directly west-southwest of the East Range Site. The Forbes Substation is a major electrical hub on the east end of the Iron Range that has 500-kV, 230-kV, and 115-kV buses owned by both MP (115/230-kV) and Xcel Energy (500-kV). Excelsior proposes to use two existing corridors, the 39L/37L corridor and the 38L corridor, as routes for its two 345-kV HVTLs. To avoid the high cost and dangerous conditions associated with "hot line" construction methods, Excelsior proposes to acquire an additional 30 feet of ROW along one of the routes between the Laskin and Forbes Substations.	Widen 39L/37L Route (preferred). Acquire additional ROW on the south side of the existing ROW from the Laskin Substation to CR 97, then move to the north side from CR 97 to and across the Thunderbird Mine. The 39L has single-family residential conflicts in three potential locations and potentially one industrial site conflict. These narrow sections of ROW would necessitate either hot line construction or construction in short, scheduled outage windows on the existing line in affected ROWs. The 37L could be widened on either side of the ROW since the only conflicts involve existing transmission lines, which may require outage windows for construction. Approximately 962 residences are located within 0.5 mi of the centerline of the existing ROWs of the 39L and 37L, of which 369 are located within 0.25 mi of the alignment. Approximately 16 residences are located within 300 feet of the ROWs and 33 others are located within 500 feet. Widen 38L Route. Acquire the additional 30 feet of ROW along the 38L corridor on the north side of the existing structures. This route conflicts with three to four short sections of existing 38L ROW where single family residences are located on the north side of the existing 115-kV ROW. The ROW in these locations is too narrow for a 30-foot expansion. Therefore, Excelsior would propose constructing these sections during short, scheduled line outages, or under hot line conditions on the existing 38L 115-kV centerline. Approximately 271 residences are located within 0.5 mi of the centerline of the existing ROWs of the 38L, of which 116 are located within 0.25 mi of the alignment. Approximately 11 residences are located within 300 feet of the ROWs and 11 others are located within 500 feet.

Acronyms: ac – acre(s); BCCs – bioaccumulative chemicals of concern; BNSF – formerly Burlington Northern/Santa Fe (Railway Company); CE – Cliffs-Erie; CN – Canadian National (Railway Company); CR – County Road; FERC – Federal Energy Regulatory Commission; GLG – Great Lakes Gas (Transmission Company); gpd – gallons per day; gpm – gallons per minute; HVTL – high voltage transmission line; mi – mile(s); MP – Minnesota Power (Company); NNG – Northern Natural Gas (Company); NPDES – National Pollutant Discharge Elimination System; POTW – Publicly Owned Treatment Works; ROW – right-of-way; ZLD – zero liquid discharge


U.S. Department of Energy
National Energy Technology Lab
Mesaba Energy Project
Draft EIS
Legend
Surface Water
Mine Pits
Streams
Existing Roads
Existing Railroads
East Range Site
Plant Layout
Municipal Boundaries
Civil Township Boundaries
Proposed Roads
Proposed Rail Alt 1-A
Proposed Rail Alt 2-A
HVTL Alt 1
HVTL Alt 2
Gas Alt 1
Proposed Water and Sewer Lines
Proposed Process Water Lines
Figure S-3
East Range Site and Corridors
St. Louis County - Central Coordinate System
0 1 2 Miles
38 Line
39 Line
37 Line

EIS SCOPING

Because the EIS for the Mesaba Energy Project has been prepared as a joint Federal and state document to satisfy the requirements of NEPA and the Minnesota Power Plant Siting Act, the scoping requirements of both Federal and state legislation were applicable. The DOE public scoping process – including two public scoping meetings – was conducted early in the process as required by NEPA regulations. However, as required under state regulations, MDOC could not conduct public scoping meetings until after receipt of the joint permit application. Therefore, separate DOE and MDOC scoping meetings and scoping periods were held. However, representatives from DOE and MDOC attended all scoping meetings, and the agencies considered scoping comments received during both scoping periods.

DOE Scoping Process

DOE published the Notice of Intent (NOI) to prepare this EIS in the *Federal Register* on October 5, 2005 (70 *FR* 58207), and sent copies to Federal and state agencies. Publication of the NOI initiated the EIS process with a public scoping period (40 Code of Federal Regulations [CFR] Part 1501.7) for soliciting public input. The Federal EIS scoping period extended through November 14, 2005, and included two scoping meetings, one on October 25, 2005, in Taconite, Minnesota, and one on October 26, 2005, in Hoyt Lakes, Minnesota. These locations were selected for their close proximity to Excelsior's respective preferred and alternative sites.

DOE announced the public scoping meetings in the NOI and local newspapers. DOE also notified Federal, state, and local agencies; public officials; non-governmental organizations; and 26 Native American tribal governments, about the meetings. The public was encouraged to provide oral comments at the meeting and to submit comments to DOE by the close of the EIS scoping period. The NOI and announcements provided appropriate addresses and telephone numbers where comments could be communicated to DOE by U.S. Mail, e-mail, toll-free telephone, or facsimile. Collectively, 157 individuals attended the public scoping meetings. Twenty-nine individuals presented oral comments, and six comment sheets were submitted at the meetings. Additionally, 18 comments were submitted by e-mail, five letters were received by mail, four comments were received by facsimile, and two comments were received by telephone.

MDOC Scoping Process

The MDOC held two public scoping meetings for the project on consecutive nights, August 22 and 23, 2006, at the same facilities as the DOE public scoping meetings in Taconite and Hoyt Lakes, respectively. The scoping meetings were announced in the Environmental Quality Board (EQB) Monitor on July 31, 2006, and notices were published in local newspapers. Additionally, notice was sent to those persons whose names are on the EQB general notification list, regional and local governments, and each person whose property is adjacent to any of the proposed sites or routes. Approximately 300 individuals attended the public scoping meetings. All attendees were invited to provide comments, either written or oral, on the proposed project. In all, 50 comments were stated publicly at the meetings and 49 comments were submitted via e-mail, U.S. Mail, or facsimile. All of the various comment submissions were reviewed to characterize specific issues, concerns, and questions to ensure the consideration of all substantive concerns.

Additionally, a Citizens Advisory Task Force was established by the PUC to provide input to the scope of the EIS for the Mesaba Energy Project. The Task Force was requested to: (1) determine whether local site or route specific information as presented within the Joint Permit Application is inaccurate or has missing information; (2) recommend which site- or route-specific impacts and issues of local concern

should be assessed in the EIS; and (3) express a preference for either the preferred or alternative site contained within the Joint Permit Application if a consensus can be reached. Task Force members were selected by the MDOC based on the responses to a solicitation letter, and the Task Force met three times during August 2006 at locations near the West and East Range Sites.

During the final meeting of the Task Force, several members expressed an interest in developing statements related to the project that could be supported by all members. A unanimous consensus was not reached on any of the proposed statements, but a majority of the members voted affirmatively on the following statements (note that the recommendations of the Task Force on limitations to the scope are not binding on DOE):

- *This Task Force recommends that a site or sites be permitted and built on the Iron Range, assuming that all environmental concerns are considered and adequately addressed in the Environmental Impact Statement.*
- *This Task Force recommends that any analysis of cumulative impacts only be conducted on projects that have the necessary permits in place to proceed with the construction of the facility.*

The Commissioner of MDOC issued the EIS Scoping Decision on September 13, 2006 (MDOC, 2006). The EIS Scoping Decision is contained in Appendix G of the EIS.

Scoping Issues

The scope of issues to be addressed in this EIS, and the significant issues related to the action, were determined through several means including:

- The preliminary identification of issues by DOE as a part of the early project planning and internal scoping;
- Additional issues identified by DOE as a result of state and Federal agency consultation and coordination with representatives of Native American tribes;
- The identification of issues and concerns expressed in comments received from the public and interested parties during the NEPA scoping process; and
- Additional issues and concerns expressed in comments received from the public and interested parties during the Minnesota Power Plant Siting Act scoping process.

The Mesaba Energy Project has been assigned PUC Docket Number E6472/GS-06-668. Documents submitted by Excelsior in conjunction with the state permitting process, including the Joint Permit Application (Excelsior, 2006a) and the Environmental Supplement (Excelsior, 2006b), as well as other documents relating to the state review process, and copies of all comments submitted in response to the DOE and MDOC scoping meetings can be accessed at the PUC website:

http://energyfacilities.puc.state.mn.us/Docket.html?Id=16573

Comments received by DOE and MDOC during the respective public scoping periods, and which have been considered appropriately in this EIS, generally aligned in the following categories:

General Comments

Among the general comments received during the DOE scoping period, respondents raised concerns about the absence of direct notification to all adjacent landowners about the meeting, the limited amount of material available about the project before the meetings, the desire for more written information to be available about the project that could be taken home from the meetings, and questions about how the

process would proceed after the meetings. Other comments emphasized that the project should meet all regulatory requirements, expressed concerns regarding the project's emission of greenhouse gases, and raised concerns about the protection of Native American tribal interests.

During the MDOC scoping period, similar concerns were raised. Also, a number of comments contained statements of opinion and rhetorical questions, such as the desirability of a particular site. Such comments were not assimilated into the MDOC Scoping Decision in all cases; however, the EIS has attempted to address the subjects raised to the extent appropriate.

Comments on the Purpose and Need

During the DOE scoping period, respondents expressed concerns about the need for the proposed facility, both from the perspective of electricity demand (e.g., exemption from the Certificate of Need) and from the perspective of whether coal use is the best choice to meet that demand. Others conveyed concerns about the long-term operation and viability of the demonstration plant. Respondents questioned whether the envisioned economic benefits of the proposed facility are valid, and whether economics should outweigh the potentially adverse environmental and human effects.

Many of the same comments were expressed during the MDOC scoping period. However, because Minnesota Statutes § 216B.1694, Subdivision 2, item 1 has exempted this facility from demonstrating need and because this facility qualifies as an "innovative energy project," issues related to the need, size, or type of the facility are excluded from consideration by the MDOC staff. Such issues are not within the scope of the state EIS.

Comments on the Proposed Action (Project Features)

During both the DOE and MDOC scoping periods, respondents recommended project information and details to be provided in the EIS, including process information, information about the expected efficiency and reliability of the plant, feedstocks, utility and resource requirements, emissions, and controls. Other comments addressed the size of the plant and the expected "footprint," rail alignments, transmission corridors, and various other features. This information has been incorporated into the project/process description sections of the EIS.

Comments on the Alternatives

Respondents during both scoping periods expressed concerns about the range of alternatives to be considered in the EIS. Specific comments were made regarding DOE's "No Fund" Alternative, as well as alternative site and technology selection (e.g., greenfield versus brownfield sites and the applicability of carbon sequestration technologies). Other respondents indicated that the project should include alternatives for renewable energy sources, such as wind and solar power that would reduce air pollutants, greenhouse gas emissions, and impacts on global climate change, or that the alternative of avoiding plant construction through increased energy efficiency and conservation should be considered. The range of alternatives available to DOE to satisfy DOE's purpose and need and to satisfy the goals of the CCPI program is explained in this EIS; careful consideration was given to alternative technologies, including carbon sequestration. MDOC has determined that the project proponent has considered siting and routing alternatives as required by state law. MDOC will not, as part of its environmental review, consider whether a different size or different type of plant should be built instead, nor can the MDOC consider the "No Build" option.

Comments Related to Specific Environmental Resources

Numerous comments were received during both scoping periods with respect to specific natural and human environmental resources. The majority of the comments were related to the use of natural resources (e.g., coal, land, and water), the discharge of pollutants to the natural environment (e.g., air, water, and national parks), and the socioeconomic impacts of the project (e.g., jobs, taxes, and property values). Comments were also received relating to eminent domain, wetlands destruction, increased vehicular and rail traffic, the potential for adverse health effects, and demands on local community services (e.g., emergency responders, local water and sewer systems, and tourism/recreation). Native American tribal issues that were raised related to the following areas: surveys to identify cultural resources; protection of treaty rights to hunt, fish, and gather (i.e., potential impacts to wild game species, fisheries, and wild rice); avoidance or minimization of negative impacts to natural resources such as air quality, water quality, and wetlands; and cumulative effects. Concerns were also expressed by the general public about connected actions and the cumulative effects of current industrial activities and future projects planned within the vicinity of the Mesaba Energy Project. MDOC incorporated these issues, along with the typical LEPGP, HVTL, and pipeline routing and siting impacts, into the proposed Order on the EIS Scoping Decision. DOE has addressed these comments in respective resource sections throughout Chapter 4 of this EIS.

ENVIRONMENTAL IMPACTS

Chapter 3 of this EIS describes the baseline conditions for environmental resources that may be affected in the regions of influence for the preferred West Range and alternative East Range Sites. Chapter 4 analyzes the potential impacts or consequences that the Proposed Action and No Action Alternative may have on the respective environmental resources at the preferred and alternative sites. All substantive comments received during the public scoping process were considered in the impact analysis. Table S-6 summarizes the impacts for the No Action Alternative and the Proposed Action at the West Range and East Range Sites for the 17 principal environmental resource subjects considered in this EIS. Chapter 5 provides discussions of mitigation, irreversible and irretrievable commitments, the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and the potential for cumulative impacts resulting from the Proposed Action.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Aesthetics		
No Action	**West Range**	**East Range**
No change in existing conditions; no change in viewsheds or aesthetic resources.	**Power Plant Site:** Change in viewshed for properties within sightline of power plant location. Security lighting and aircraft warning lights for power plant may be visible to closest residences (~50 within 1 mi). Three public lands are located within 20 mi, where vapor plumes may be visible at times (Hill Annex Mine State Park, Forest History Center, and Chippewa National Forest). See also: Noise. **Transportation Facilities:** Aesthetic impacts from rail and road construction and operation for closest residences. See also: Noise. • Rail alt. 1A within 0.5 mi of 16 residences (closest within 400 ft). • Rail alt. 1B within 0.5 mi of 8 residences (closest, 2,000 ft). CR 7 realignment and site access road within 0.5 mi of 22 residences (closest within 300 ft). **Water Sources and Discharges:** Temporary aesthetic impacts during construction. • Process water pipelines within 0.5 mi of 104 residences (four within 500 ft). • Cooling water effluent pipelines within 0.5 mi of 14 residences (two within 500 ft). • Potable/sanitary pipelines within 0.5 mi of 114 residences (four within 500 ft). **Natural Gas Facilities:** Temporary aesthetic impacts during construction. Permanently cleared ROW (low-growing vegetation) • Alt. 1 within 0.5 mi of 153 residences (three within 300 ft). • Alt. 2 within 0.5 mi of 339 residences (five within 300 ft). • Alt. 3 within 0.5 mi of 935 residences (29 within 300 ft). **HVTL Corridors:** Change in viewshed for properties within sightline of new HVTLs (permanently cleared ROW with low-growing vegetation). Increased height and visibility of power poles in existing HVTL ROWs. • Route WRA-1 within 0.5 mi of 66 residences (four within 500 ft). • Route WRA-1A within 0.5 mi of 62 residences (seven within 500 ft). • Route WRB-2A (existing HVTL ROW) within 0.5 mi of 214 residences (29 within 500 ft).	**Power Plant Site:** Change in viewshed for properties within sightline of power plant location. Security lighting and aircraft warning lights for power plant may be visible to closest residences (none within 1 mi). Site is on private land within Superior National Forest boundary, and two other public lands are located within 20 mi, where vapor plumes may be visible. See also: Noise. **Transportation Facilities:** Aesthetic impacts from rail and road construction and operation for closest residences. See also: Noise. No residences within 0.5 mi of either rail alignment alternative (closest, ~1 mi). No residences within 0.5 mi of site access road (closest, >1 mi). **Water Sources and Discharges:** • No residences within 0.5 mi of process water pipeline segments (closest residence >0.75 mi). • No cooling water effluent pipeline (enhanced ZLD system). • No residences within 0.5 mi of potable/sanitary pipelines (closest >0.75 mi). **Natural Gas Facilities:** Temporary aesthetic impacts during construction. Proposed natural gas pipeline on existing pipeline ROW within 0.5 mi of 856 residences (46 within 300 ft). **HVTL Corridors:** All HVTLs on existing HVTL ROWs; widening of one corridor required (permanently cleared ROW with low-growing vegetation). Increased height and visibility of power poles for properties within sightline of HVTLs. • 38L corridor within 0.5 mi of 271 residences (22 within 500 ft). • 39L/37L corridors within 0.5 mi of 962 residences (49 within 500 ft).

Table S-6. Summary Comparison of Impacts (Phases I & II)

Air Quality and Climate		
No Action	**West Range**	**East Range**
No change in existing conditions; no new emissions affecting air quality.	**Power Plant Site:** Annual emissions of criteria pollutants would include 1,390 tons of SO_2, 2,872 tons of NO_X, 2,539 tons of CO, 0.03 tons of Pb, 493 tons of PM_{10}, and 197 tons of VOCs; therefore the facility would be a major source of SO_2, NO_X, CO, PM_{10}, and VOCs under the PSD regulations. Predicted concentrations for each pollutant would be below allowable levels under NAAQS and MAAQS. The plant would potentially emit 0.026 tons per year (tpy) of mercury (below the HAP threshold of 25 tpy) and would include additional technologies to reduce mercury and meet the requirements of the CAMR. Process modification and improved work practices would be implemented to limit potential annual emission rates. Class II PSD increment analysis indicates that the project would comply with all state and Federal increment limits. Class I area impacts analysis indicates that the project impacts would be below allowable increments for all pollutants. Visibility/regional haze analysis in Class I areas predict that, as a result of the Proposed Action, there would be days with greater than 5% visibility (with a potential for detectable change) or greater than 10% visibility (a level of unacceptable degradation) at some point each year. Within the Boundary Waters Canoe Area Wilderness (BWCAW), it is 17 to 39 days of >5% visibility and 6 to 15 days of >10% visibility. At Voyageurs National Park (VNP), it is 16 to 25 days with >5% visibility and 1 to 4 days >10% visibility. However, predicted impacts would occur during days of very high relative humidity in winter and would coincide with days of natural visibility degradation due to fog, precipitation, or low clouds. Without mitigation or capture/storage (see Section 5.1.2.1), the plant would emit approximately 9.4 to 10.6 million tpy of CO_2; thereby adding to the approximately 2.3 billion metric tpy of CO_2 from electric power sources nationwide.	**Power Plant Site:** Annual emissions of criteria pollutants would include 1,390 tons of SO_2, 2,872 tons of NO_X, 2,539 tons of CO, 0.03 tons of Pb, 709 tons of PM_{10}, and 197 tons of VOC; therefore the facility would be a major source of SO_2, NO_X, CO, PM_{10}, and VOCs under the PSD regulations. Because of the source water quality at the East Range Site, emissions of PM_{10} would be higher than at the West Range Site. Predicted concentrations for each pollutant would be below allowable levels under NAAQS and MAAQS The plant would potentially emit 0.026 tpy of mercury (below the HAP of 25 tpy threshold) and would include additional technologies to reduce mercury and meet the requirements of the CAMR. Process modification and improved work practices would be implemented to limit potential annual emission rates. Class II PSD increment analysis indicates that the project would comply with all state and Federal increment limits. Class I area impacts analysis indicates that the project impacts would be below allowable increments for all pollutants. Visibility/regional haze analysis in Class I areas predict that, as a result of the Proposed Action, there would be days with greater than 5% visibility (with a potential for detectable change) or greater than 10% visibility (a level of unacceptable degradation) at some point each year. Within the BWCAW 92 to 131 days of >5% visibility and 44 to 69 days of >10% visibility. At VNP, it is 15 to 26 days of >5% visibility and 4 to 8 days at >10% visibility. However, predicted impacts would occur during days of very high relative humidity in winter and would coincide with days of natural visibility degradation due to fog, precipitation, or low clouds. Without mitigation or capture/storage (see Section 5.1.2.1), the plant would emit approximately 9.4 to 10.6 million tpy of CO_2; thereby adding to the approximately 2.3 billion metric tpy of CO_2 from electric power sources nationwide.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Air Quality and Climate		
No Action	**West Range**	**East Range**
	Odors from H_2S and NH_3 would be negligible, because associated processes would be enclosed. The National Park Service (NPS) has established a Deposition Analysis Threshold (DAT) of 0.01 kg/hectare/yr for both sulfur (S) and nitrogen (N) deposition in Class I areas, which is the level below which adverse impacts are not anticipated. The deposition of S in VNP would be very close to the DAT, and deposition of N would be below the DAT. Because the modeled deposition values represent the highest deposition for any receptor in the Class I area, and the annual emissions for the Mesaba plant used in the model are very conservative, it is unlikely that the DAT threshold for S deposition would be exceeded at any point in VNP. Deposition values for S and N in the BWCAW would be below the DAT. Deposition of mercury would be 1.3 x 10-5 µg/m^3 at a rate of 0.01 cm/sec over lakes and 0.05 cm/sec over the rest of the watershed. Big Diamond Lake would be within the release plume of future facility emissions; therefore, the concentration and rate of deposition was used to determine the incremental contribution of mercury in fish tissues caught from Big Diamond Lake (see Section 4.17, Health and Safety). Mercury emissions and subsequent deposition would be reduced by the high efficiency IGCC technology combined with the design-added mercury removal carbon absorption beds to ensure that mercury emissions from the facility would be less than 10 percent of the mercury in the feedstock. **Transportation Facilities:** Fugitive dust emissions during construction and operations from vehicle traffic, transportation of materials, and material handling. The impacts would be localized and would decrease with distance from site and alignments. **Water Sources and Discharges, Natural Gas Facilities, and HVTL Corridors:** Fugitive dust emissions during construction related to the respective lengths of potential alignments.	Odors from H_2S and NH_3 would be negligible, because associated processes would be enclosed. The DAT of 0.01 kg/hectare/yr established by NPS for both S and N deposition in Class I areas would apply to the East Range Site. The deposition of S in VNP would be very close to the DAT, and deposition of N would be below the DAT. Because the modeled deposition values represent the highest deposition for any receptor in the Class I area, and the annual emissions for the Mesaba plant used in the model are very conservative, it is unlikely that the DAT threshold for S deposition would be exceeded at any point in VNP. Deposition values for S and N in the BWCAW would be below the DAT. Deposition of mercury would be 1.3 x 10-5 µg/m^3 at a rate of 0.01 cm/sec over lakes and 0.05 cm/sec over the rest of the watershed. Colby Lake would be within the release plume of future facility emissions; therefore, the concentration and rate of deposition was used to determine the incremental contribution of mercury in fish tissues caught from Colby Lake based on the analytical results for Big Diamond Lake (see Section 4.17, Health and Safety). Mercury emissions and subsequent deposition would be reduced by the high efficiency IGCC technology combined with the design-added mercury removal carbon absorption beds to ensure that mercury emissions from the facility would be less than 10 percent of the mercury in the feedstock. **Transportation Facilities:** Fugitive dust emissions during construction and operations from vehicle traffic, transportation of materials, and material handling. The impacts would be localized and would decrease with distance from site and alignments. **Water Sources and Discharges, Natural Gas Facilities, and HVTL Corridors:** Fugitive dust emissions during construction related to the respective lengths of potential alignments.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Geology and Soils		
No Action	**West Range**	**East Range**
No change in existing conditions; no new land disturbance.	**Power Plant Site:** The plant footprint (Phases I & II) would occupy approximately 192 ac. Site grading and preparation for the plant footprint would require approximately 2,975,000 yd^3 of cut land and approximately 1,750,000 yd^3 of fill land. Although the site is situated on 137 ac of soils classified as prime farmland or prime farmland if drained, no agriculture uses currently occur on the property. The Minnesota Prime Farmland Exclusion Rule does not apply to the site which is in or within 2 mi of a statutory city. **Transportation Facilities:** Construction impacts from rail and road alignments. No long-term operational impacts. • Rail alt. 1A would disturb 139 ac, require approximately 3,000,000 yd^3 of cut land and 2,000,000 yd^3 of fill land, and occupy approximately 38 ac of prime farmland soils. • Rail alt. 1B would disturb 179 ac, require approximately 8,500,000 yd^3 of cut land and 2,000,000 yd^3 of fill land, and occupy approximately 40 ac of prime farmland soils. CR 7 realignment and site access road construction would disturb 122 ac and occupy approximately 55 ac of prime farmland soil classifications. **Water Sources and Discharges:** Construction of process water supply pipelines would disturb 165 ac and occupy 57 ac of prime farmland soils. Cooling water effluent pipelines would disturb 83 ac and occupy 40 ac of prime farmland soils. Potable/sanitary pipelines would disturb 34 ac and occupy 8 ac of prime farmland. **Natural Gas Facilities:** Construction impacts of alignments. • Alternative 1 would disturb 160 ac and occupy 81 ac of prime farmland soils. • Alternative 2 would disturb 171 ac and occupy 86 ac of prime farmland soils. • Alternative 3 would disturb 142 ac and occupy 66 ac of prime farmland soils.	**Power Plant Site:** The plant footprint (Phases I & II) would occupy approximately 192 ac. Based on site topography, grading and preparation for the plant footprint would require less cut and fill volume than the West Range Site. There are no areas designated as prime farmland within the East Range Site boundary and no agriculture uses currently occur on the property. The Minnesota Prime Farmland Exclusion Rule does not apply to the site which is in or within 2 mi of a statutory city. **Transportation Facilities:** Construction impacts from rail and road alignments. No long-term operational impacts. • Rail alt. 1 would disturb 77 ac and require approximately 2,300,000 yd^3 of cut land and less fill than at West Range. • Rail alt. 2 would disturb 74 ac and require approximately 2,100,000 yd^3 of cut land and less fill than at West Range. Access road construction would disturb 45 ac. Impacts on prime farmland could not be determined from data available, because the soil survey for St. Louis County has not been completed. **Water Sources and Discharges:** Construction of process water supply pipelines would disturb approximately 109 ac. No cooling water effluent pipelines required (due to the use of an enhanced ZLD system). Potable/sanitary pipelines would disturb 25 ac. Impacts on prime farmland could not be determined (soil survey for St. Louis County not complete). **Natural Gas Facilities:** Pipeline would be constructed within an existing gas pipeline ROW requiring disturbance of 350 ac.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Geology and Soils		
No Action	**West Range**	**East Range**
	HVTL Corridors: Impacts of alignments. • Route WRA-1 would disturb 134 ac and occupy <1 ac of prime farmland soils. • Route WRA-1A would disturb 151 ac and occupy <1 ac of prime farmland soils. • Route WRB-2A would disturb land on an existing HVTL ROW.	**HVTL Corridors:** All HVTLs constructed on existing HVTL ROWs with new towers; widening of one or the other corridor required. • 38L corridor would disturb 455 ac. • 39L/37L corridors would disturb 457 ac.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Water Resources		
No Action	**West Range**	**East Range**
No changes to water resources in the project area. The Hill-Annex Mine Park would not be dewatered to the level necessary to view all the historical structures in the mine pit. Also, the CMP will likely overflow within the next 4 to 8 years, potentially causing flooding within Coleraine and Bovey.	**Power Plant Site:** Disturbance of land areas during plant construction, as summarized for Geology and Soils, would create potential for erosion and sedimentation. Impacts on surface waters would be minimized through the implementation of a sediment and erosion control (SEC) plan required for a National Pollutant Discharge Elimination System (NPDES) General Construction Permit. Potential impacts during operation would be minimized through the implementation of a stormwater pollution prevention plan (SWPPP) based on state requirements. Runoff from the plant site and coal pile areas would be routed through stormwater management ponds and oil/water separators, limiting the discharge of pollutants. No impacts on groundwater from the construction or operation of the plant are expected. **Transportation Facilities:** Disturbance of land areas during road and railway construction, as described for Geology and Soils. Impacts on surface waters would be minimized through the implementation of a SEC plan required for a NPDES General Construction Permit. No impacts on surface waters or groundwater from the operation of the road and railway expected. **Water Sources and Discharges:** Average process water demand of 8,800 – 10,300 gpm (15,200 gpm peak) from CMP and interconnected mine pits would not adversely affect water sources. Lowering of water level in CMP would reduce potential for overflow impacts on Coleraine and Bovey. Average cooling water discharges of 3,500 gpm (6,000 gpm peak) to CMP; 825 gpm (6,000 gpm peak) to Holman Lake. Discharges of some parameters may exceed water quality standards, however, the cumulative effects on receiving waters would be monitored by operating staff to ensure parameter concentrations do not exceed NPDES permit limits. Potable water use of 7,500 gpd during operation would not adversely affect Taconite water system, however, the existing water system does not have sufficient capacity to provide the 45,000 gpd during construction. Planned improvements to the system would be necessary to handle this demand, or Excelsior would provide potable water via truck during construction. Domestic wastewater discharges would be within the effective treatment capacity of the regional facility.	**Power Plant Site:** Disturbance of land areas during plant construction, as summarized for Geology and Soils, would create potential for erosion and sedimentation. Impacts on surface waters would be minimized through the implementation of a SEC plan required for a NPDES General Construction Permit. Potential impacts during operation would be minimized through the implementation of a SWPPP based on state requirements. Runoff from the plant site and coal pile areas would be routed through stormwater management ponds and oil/water separators, limiting the discharge of pollutants. No impacts on groundwater from the construction or operation of the plant are expected. **Transportation Facilities:** Disturbance of land areas during road and railway construction, as described for Geology and Soils. Impacts on surface waters would be minimized through the implementation of a SEC plan required for a NPDES General Construction Permit. No impacts on surface waters or groundwater from the operation of the road and railway expected. **Water Sources and Discharges:** Average process water demand of 7,400 gpm (10,000 gpm peak) from interconnected mine pits would not adversely affect water sources. No direct discharge of cooling water to surface waters would occur (due to the enhanced ZLD system). Potable water use of 45,000 gpd during construction and 7,500 gpd during operation would not adversely affect the Hoyt Lakes water system. Domestic wastewater discharges would be within the effective treatment capacity of the municipal facility.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Water Resources		
No Action	**West Range**	**East Range**
	Natural Gas Facilities: Best management practices (BMPs) would be implemented to minimize impacts from erosion and sedimentation during construction. **HVTL Corridors:** BMPs would be implemented to minimize impacts from erosion and sedimentation during construction.	**Natural Gas Facilities:** BMPs would be implemented to minimize impacts from erosion and sedimentation during construction. **HVTL Corridors:** BMPs would be implemented to minimize impacts from erosion and sedimentation during construction.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Floodplains		
No Action	**West Range**	**East Range**
No change in existing conditions; no impact on floodplains.	**Power Plant Site:** No impact. The site is approximately one mile from the nearest 100-year floodplain along the Prairie River. **Transportation Facilities:** No impact. Proposed rail and access road alignments would be located outside of the 100-year floodplain. **Water Sources and Discharges:** No impact. Construction of pipelines would occur outside of the 100-year floodplain. **Natural Gas Facilities:** Temporary impacts may occur during construction of natural gas pipeline alt. 1, 2, or 3 as a result of trenching, stockpiling of soil, and storage of equipment where pipelines would cross the 100-year floodplain of Swan River or Prairie River However, impacts would be mitigated through the use of construction BMPs, and floodplain contours would be restored following construction. No permanent impacts on flood elevations would occur, because the pipelines would be located below the land surface. **HVTL Corridors:** No impact. Construction of HVTLs would occur outside of the 100-year floodplain.	**Power Plant Site:** No impact. The site is outside of the nearest 100-year floodplain of the Partridge River. **Transportation Facilities:** No impact. Proposed rail and access road alignments would be located outside of the 100-year floodplain. **Water Sources and Discharges:** No impact. Construction of pipelines would occur outside of the 100-year floodplain. **Natural Gas Facilities:** Temporary impacts may occur during construction of the natural gas pipeline as a result of trenching, stockpiling of soil, and storage of equipment where the pipeline would cross the 100-year floodplain of the Partridge River. However, impacts would be mitigated through the use of construction BMPs, and floodplain contours would be restored following construction. No permanent impacts on flood elevations would occur, because the pipelines would be located below the land surface. **HVTL Corridors:** Temporary impacts may occur during widening of HVTL corridors (38L or 39L/37L) where the HVTLs would cross the 100-year floodplain of the Partridge, Embarrass, or East Two River. No permanent impact on flood elevations would occur, because permanent structures would be limited to HVTL towers that have small footprints.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Wetlands		
No Action	**West Range**	**East Range**
No change in existing conditions; wetlands would remain in their current status.	**Power Plant Site:** Permanent wetland loss or alteration relating to the plant footprint (Phases I & II) would be approximately 31 acres (ac). **Transportation Facilities:** Construction of rail and road access would result in loss or destruction of wetlands in areas of permanent impact (without mitigation). Areas of temporary impact could result in the alteration of wetland types and functions: • Rail alt. 1A would have a temporary impact on 26 ac and a permanent impact on 77 ac (including center loop). • Rail alt. 1B would have a temporary impact on impact on18 ac and a permanent impact on 64 ac (including center loop). CR 7 realignment and access road construction would impact 10 ac for temporary ROW; 6 ac for permanent ROW. **Water Sources and Discharges:** Construction of pipelines: • Process water supply pipelines would alter 12 ac for temporary ROW (8 ac lost or altered in permanent ROW). • Cooling water effluent pipelines would alter 26 ac for temporary ROW (18 ac lost or altered in permanent ROW). • Potable/sanitary pipelines would alter 4 ac for temporary ROW (2 ac lost or altered in the permanent ROW). **Natural Gas Facilities:** Construction of pipelines: • Alt. 1 would alter 25 ac for temporary ROW (17 ac lost or altered in the permanent ROW). • Alt. 2 would alter 29 ac for temporary ROW (18 ac lost or altered in the permanent ROW). • Alt. 3 would alter 13 ac for temporary ROW (9 ac lost or altered in the permanent ROW). **HVTL Corridors:** Construction of HVTLs. • Route WRA-1 would alter 30 ac for clearing ROW (<1 ac lost for tower emplacements). • Route WRA-1A would alter 25 ac for clearing ROW (<1 ac lost for tower emplacements). • Route WRB-2A would be constructed in existing HVTL ROWs; no additional wetland impacts for clearing anticipated (<1 ac lost for tower emplacements).	**Power Plant Site:** Permanent wetland loss or alteration relating to the plant footprint (Phases I & II) would be approximately 16 ac. **Transportation Facilities:** Construction of rail and road access would result in loss or destruction of wetlands in areas of permanent impact (without mitigation). Areas of temporary impact could result in the alteration of wetland types and functions: • Rail alt. 1 would have a temporary impact on 17 ac and a permanent impact on 59 ac (including center loop). • Rail alt. 2 would have a temporary impact on 18 ac and a permanent impact on 13 ac (no center loop). Access road construction would impact 6 ac for temporary ROW; 3 ac for permanent ROW. **Water Sources and Discharges:** Construction of pipelines: • Process water supply pipelines would alter <3 ac for temporary ROW (<2 ac lost or altered in permanent ROW). • No cooling water effluent pipelines required (due to the enhanced ZLD system). • No wetlands are located in the alignments for potable/sanitary pipelines. **Natural Gas Facilities:** Construction of the natural gas pipeline would alter 67 ac for temporary ROW (47 ac lost or altered in the permanent ROW). **HVTL Corridors:** All HVTLs would be constructed on existing HVTL ROWs with new towers; widening of one or the other corridor would be required. • 38L corridor would alter 29 ac for clearing ROW (<1 ac lost for tower emplacements). • 39L/37L corridors would alter 27 ac for clearing ROW (<1 ac lost for tower emplacements).

Table S-6. Summary Comparison of Impacts (Phases I & II)

Biological Resources		
No Action	**West Range**	**East Range**
No change in existing conditions; biological resources would remain in current status.	**Power Plant Site:** Approximately 155 ac of vegetation communities would be lost or destroyed from construction for Phase I and Phase II. Much of the Iron Range is within the distributional range of the bald eagle, Canada lynx, and gray wolf, which are Federally listed species. The U.S. Fish and Wildlife Service (USFWS) has concurred with DOE's determination that the project is not likely to adversely affect the bald eagle and has agreed to prepare a Biological Opinion (to be included in the Final EIS) addressing potential effects on the lynx and wolf. Eight state-listed plant species (17 occurrences) in general area of site, but no occurrences within the site boundary. Possible, but unlikely, that these species could be affected. **Transportation Facilities:** Construction of rail and road access: • Rail alt. 1A: 54 ac (104 ac within center loop) of vegetation communities lost or destroyed. No known occurrences of state-listed species within 1 mi. • Rail alt. 1B: 55 ac (116 ac within center loop) of vegetation communities lost or destroyed. No known occurrences of state-listed species within 1 mi. Access roads would result in the loss or destruction of 54 ac of vegetation communities. No known occurrences of state-listed species within 1 mi. **Water Sources and Discharges:** Construction of pipelines: Process water supply pipelines would result in the loss or destruction of 53 ac of vegetation communities. Five known occurrences of five state-listed plant species within 1 mi of proposed pipeline. Possible, but unlikely, that these species could be affected by construction (usually found in different habitat types). Cooling water effluent pipelines would impact: • Alt 1 would cause the loss or destruction of 25 ac of vegetation. No known occurrences of state-listed species within 1 mi.	**Power Plant Site:** Approximately 167 ac of vegetation communities would be lost or destroyed from construction for Phase I and Phase II. Much of the Iron Range is within the distributional range of the bald eagle, Canada lynx, and gray wolf, which are Federally listed species. USFWS has concurred with DOE's determination that the project is not likely to adversely affect the bald eagle. In the event that the East Range Site would be selected for the Proposed Action, a Biological Opinion from the USFWS would be required to address potential effects on the lynx and wolf. No known occurrences of state-listed species within 1 mi of site. **Transportation Facilities:** Construction of rail and road access: • Rail alt. 1 would result in the loss or destruction of 142 ac (including center loop with 104 ac of impacts) of vegetation communities. Two stream crossings could cause direct mortality to aquatic biota, habitat fragmentation/conversion, increased water temperature, and increased sedimentation (causing loss in macroinvertebrate communities). No known occurrences of state-listed species within 1 mi. • Rail alt. 2 would result in the loss or destruction of 41 ac of vegetation communities. One stream crossing could cause direct mortality to aquatic biota, habitat fragmentation/conversion, increased water temperature, and increased sedimentation (causing loss in macroinvertebrate communities). No known occurrences of state-listed species within 1 mi. Access roads would result in the loss or destruction of 28 ac of vegetation communities. No known occurrences of state-listed species within 1 mi. **Water Sources and Discharges:** Construction of pipelines: Process water supply pipelines would result in the loss or destruction of 34 ac of vegetation communities. Four stream crossings could temporarily cause increased sedimentation (causing loss in macroinvertebrate communities) and increased biochemical oxygen demand during construction. No known occurrences of state-listed species within 1 mi. No cooling water effluent pipelines are expected (due to the use of an enhanced ZLD system).

Table S-6. Summary Comparison of Impacts (Phases I & II)

Biological Resources		
No Action	**West Range**	**East Range**
	• Alt 2 would cause the loss or destruction of 10 ac of vegetation. No known occurrences of state-listed species within 1 mi. Potable/sanitary pipelines would cause the loss or destruction of7 ac of vegetation communities **Natural Gas Facilities:** • Alt 1 would cause the loss or destruction of 71 ac of vegetation communities. Nine known occurrences of seven state-listed plant species within 1 mi of proposed pipeline. Possible, but unlikely, that these species could be affected by construction (usually found in different habitat types). • Alt 2 would cause the loss or destruction of 43 ac of vegetation communities. Three known occurrences of one state-listed plant species within 1 mi of proposed pipeline. Possible, but unlikely, that these species could be affected by construction (usually found in different habitat types). • Alt. 3 would cause the loss or destruction of 43 ac of vegetation communities. No known occurrences of state-listed species within 1 mi. **HVTL Corridors:** • Route WRA-1 would cause the loss or destruction of 93 ac for tree and shrub clearing resulting in habitat conversion within the ROW. Seven occurrences of five state-listed plant species within 1 mi of proposed HVTL, which could be affected during construction and operation. • Route WRA-1A would cause the loss or destruction of 72 ac for tree and shrub clearing resulting in habitat conversion within the ROW. Seven occurrences of five state-listed plant species within 1 mi of proposed HVTL, which could be affected during construction and operation. • Route WRB-2A would not have a permanent impact on vegetation because it would be located within an existing HVTL corridor. Eleven occurrences of eight state-listed plant species and one occurrence of a state-listed animal species within 1 mi of proposed HVTL, which could be affected during construction and operation.	Potable/sanitary pipelines would cause the loss or destruction of 5 ac of vegetation communities. No known occurrences of state-listed species within 1 mi of potable/sanitary pipelines. **Natural Gas Facilities:** Proposed alignment would cause the loss or destruction of 187 ac of vegetation communities. Five occurrences of three state-listed plant species and seven occurrences of two state-listed animal species within 1 mi of proposed pipeline. Possible that construction could affect these species. **HVTL Corridors:** • 38L corridor would cause the loss or destruction of 89 ac for tree and shrub clearing resulting in habitat conversion as long as the ROW is maintained. Two occurrences of two state-listed plant species and 16 occurrences of three state-listed animal species within 1 mi of proposed HVTL, which could be affected during construction and operation. • 39L/37L corridors would cause the loss or destruction of 86 ac for tree and shrub clearing resulting in habitat conversion as long as the ROW is maintained. Eight occurrences of five state-listed plant species and eight occurrences of two state-listed animal species within 1 mi of proposed HVTL, which could be affected during construction and operation.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Cultural Resources		
No Action	**West Range**	**East Range**
No new structures built, no archaeological or Native American sites disturbed.	**Power Plant Site:** Located within Western Mesabi Iron Range Early Mining Landscape District. MN State Historic Preservation Office (SHPO) has 11 historic properties recorded within the area of potential effect for the West Range Site and corridors. Coordination with SHPO required during construction to avoid or minimize potential impacts to the historic character of the District. No known archaeological resources or Native American cultural resources known to exist within 1 mi of site. The potential for the occurrence of archaeological resources is high within 55 ac (1%) and moderate on 108 ac (2%) of the site. Consistent with the recommendations of the SHPO, a Phase I archaeological survey of locations with high and medium potential was conducted in 2007. Although not yet final, the survey did not uncover any previously unknown resources within the site boundaries. **Transportation Facilities, Water Sources and Discharges, Natural Gas Facilities, HVTL Corridors:** Located within Western Mesabi Iron Range Early Mining Landscape District. SHPO has 11 historic properties recorded within the area of potential effect for site and corridors. Coordination with SHPO required during construction to avoid or minimize potential impacts to the historic character of the District. No known archaeological resources or Native American cultural resources exist within the transportation or utility corridors. A total of 330 ac (5%) of high potential for archaeological resources and 580 ac (12%) of moderate potential for archaeological resources exists along the HVTLs, rail line, and pipeline corridors (combined for all transportation and utility corridors). Archaeological surveys would be conducted only in those corridors to be permitted by the PUC if the West Range site were selected for permitting. Although surveys would necessarily be completed after the DOE Record of Decision, the Record of Decision would be conditional upon implementing the provisions of an agreement between DOE, SHPO, and appropriate parties for the identification and protection of resources.	**Power Plant Site:** No known archaeological sites or Native American cultural resources identified within 1 mi of the site. The study area (30,471 ac) included the site and associated transportation and utility corridors. A total of 4,862 ac (16%) of the study area has a high potential for archaeological resources and 457 ac (1.5%) has a moderate potential for archaeological resources. Phase I surveys are complete, and the SHPO has agreed that no further study is needed, provided that there would be no terrain disturbance at the Longyear historic site. **Transportation Facilities:** Included in the discussion for the plant site above. **Water Sources and Discharges:** The water pipeline corridors would be located within previously disturbed areas; therefore, these corridors would not be expected to contain archaeological or historical resources. **Natural Gas Facilities:** The natural gas pipeline corridor would follow an existing ROW; therefore, no archaeological or historical resources are anticipated. **HVTL Corridors:** The proposed HVTLs would follow existing HVTL corridors, which would minimize potential for impacts. There are two known archaeological sites located within 0.25 mi of the 39L/37L corridors; however, they are outside of the construction ROW. One National Register of Historic Places (NRHP)-listed building and one potentially eligible building are within the town of Eveleth in the vicinity of the 39L/37L route. One eligible site within the HVTL visual area of potential effect crossed by the HVTL corridor south of the plant site. Archaeological surveys would be conducted only in those corridors to be permitted by the PUC if the East Range site were selected for permitting. Although surveys would necessarily be completed after the DOE Record of Decision, the Record of Decision would be conditional upon implementing the provisions of an agreement between DOE, SHPO, and appropriate parties for the identification and protection of resources

Table S-6. Summary Comparison of Impacts (Phases I & II)

Land Use		
No Action	**West Range**	**East Range**
No change in land use; sites and corridors would remain in current status.	**Power Plant Site:** Generating station on 1,260-ac site, currently undeveloped and zoned for industrial use. ~50 residential properties within 1 mi of footprint (closest, 0.71 mi); buffered by ~0.5 mi of dense woodlands. No conflict with local or regional zoning ordinances or land use plans. No use of eminent domain is needed to acquire the site footprint and its surrounding buffer land. The use of eminent domain as allowed by MN Statutes 216B.1694 may be necessary to acquire some public and private lands or easements if agreements to purchase such lands or easements (for associated facilities, utilities, or transportation infrastructure; or to interconnect the Project with such features and available water resources) cannot be negotiated with property owners. **Transportation Facilities:** Rail alignment alternatives: • Alt. 1A within 0.5 mi of 16 residences (closest, 400 ft). • Alt. 1B within 0.5 mi of 8 residences (closest, 2,000 ft). CR 7 realignment and site access road within 0.5 mi of 22 residences (closest within 300 ft). **Water Sources and Discharges:** • Process water pipelines within 0.5 mi of 104 residences (4 within 500 ft). • Cooling water effluent pipelines within 0.5 mi of 14 residences (2 within 500 ft). • Potable/sanitary pipelines within 0.5 mi of 114 residences (4 within 500 ft). **Natural Gas Facilities:** Natural gas pipelines: • Alt. 1 within 0.5 mi of 153 residences (3 within 300 ft). • Alt. 2 within 0.5 mi of 339 residences (5 within 300 ft). • Alt. 3 within 0.5 mi of 935 residences (29 within 300 ft). **HVTL Corridors:** HVTL routes: • Route WRA-1 within 0.5 mi of 66 residences (4 within 500 ft). • Route WRA-1A within 0.5 mi of 62 residences (7 within 500 ft). • Route WRB-2A within 0.5 mi of 214 residences (29 within 500 ft). NOTE: Affected acreages for all alignments and corridors provided in Geology and Soils.	**Power Plant Site:** Generating station on 810-ac site, currently undeveloped and zoned for mining use. No residential properties within 1 mi of footprint (closest, 1.28 mi); buffered by ~0.5 mi of dense woodlands. No conflict with local or regional zoning ordinances or land use plans. No use of eminent domain is needed to acquire the site footprint and its surrounding buffer land. The use of eminent domain as allowed by MN Statutes 216B.1694 may be necessary to acquire some public and private lands or easements if agreements to purchase such lands or easements (for associated facilities, utilities, or transportation infrastructure; or to interconnect the Project with such features and available water resources) cannot be negotiated with property owners. **Transportation Facilities:** Rail and road alignments: No residences within 0.5 mi of either rail alignment alternative (closest ~1 mi). No residences within 0.5 mi of site access road (closest >1 mi). **Water Sources and Discharges:** • No residences within 0.5 mi of process water pipeline segments (closest >0.75 mi). • No cooling water effluent pipeline (enhanced ZLD system). • No residences within 0.5 mi of potable/sanitary pipelines (closest >0.75 mi). **Natural Gas Facilities:** Natural gas pipeline on existing ROW within 0.5 mi of 856 residences (46 within 300 ft). **HVTL Corridors:** All HVTL routes on existing ROWs; widening of one or the other corridor would be required. • 38L corridor within 0.5 mi of 271 residences (22 within 500 ft). • 39L/37L corridors within 0.5 mi of 962 residences (49 within 500 ft). NOTE: Affected acreages for all alignments and corridors provided in Geology and Soils.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Socioeconomics		
No Action	**West Range**	**East Range**
No change in existing socioeconomic conditions; no potential for economic stimulus from proposed project.	**General:** Project spending and creation of new construction and operation jobs would provide value added benefits to regional economy ($3.1 billion over 6 years during construction; $1.1 billion/yr during operation of both phases; the power plant would be expected to operate commercially for 20 years or more). **Power Plant Site:** No displacement of population, housing, businesses, or jobs. Ten or more residential properties closest to the plant footprint could experience impacts on property values based on proximity to facility and resulting aesthetic and noise impacts. Potential temporary adverse impacts on housing demand related to influx of workers during peak construction (>1,500/yr in 2009-11); less than 3,000 housing units in Census Tract 9810, of which 513 were vacant (non-seasonal) or rental units in 2000. **Transportation Facilities:** No displacement of population, housing, businesses, or jobs. Three residences within 1,000 ft of Rail Alignment Alternative 1A could experience impacts on property values due to proximity and resulting aesthetic and noise impacts. Realignment of CR 7 by Itasca County (connected action) may influence local housing development in vicinity. **Water Sources and Discharges:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **Natural Gas Facilities:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **HVTL Corridors:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated.	**General:** Project spending and creation of new construction and operation jobs would provide value added benefits to regional economy ($3.1 billion over 6 years during construction; $1.1 billion/yr during operation of both phases; the power plant would be expected to operate commercially for 20 years or more). **Power Plant Site:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated based on distances to nearest residences. Potential temporary adverse impacts on housing demand related to influx of workers during peak construction (>1,500/yr in 2009-11); less than 1,000 housing units in Hoyt Lakes (Census Tract 140), of which 143 were vacant (non-seasonal) or rental units in 2000. **Transportation Facilities:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated based on distances to nearest residences. **Water Sources and Discharges:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **Natural Gas Facilities:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **HVTL Corridors:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Environmental Justice		
No Action	**West Range**	**East Range**
No change in existing conditions relative to minority and low-income populations; no potential for economic benefits from proposed project.	**Power Plant Site:** Minority and low-income populations in the region of influence for the power plant do not exceed 50% of the population and are not meaningfully greater than the percentages in the general population. Therefore, the plant site would not have a disproportionately high and adverse impact on minority or low-income populations. The closest concentrations of American-Indian populations are located approximately 20 mi from the site. Local tribes expressed concern regarding health risks associated with project pollutants and their impact on traditional food sources. However, the increment of mercury (less than 0.5 percent increase) and other pollutants from the project would be very low and human health impacts from fish consumption would be negligible even within 2 mi from the power plant site. **Transportation Facilities, Water Sources and Discharges, Natural Gas Facilities, HVTL Corridors:** No disproportionately high and adverse impacts on minority or low-income populations are indicated.	**Power Plant Site:** Minority and low-income populations in the region of influence for the power plant do not exceed 50% of the population and are not meaningfully greater than the percentages in the general population. Therefore, the plant site would not have a disproportionately high and adverse impact on minority or low-income populations. The closest concentrations of American-Indian populations are located approximately 50 mi from the site. Local tribes expressed concern regarding health risks associated with project pollutants and their impact on traditional food sources. However, the increment of mercury (less than 0.5 percent increase) and other pollutants from the project would be very low and human health impacts from fish consumption would be negligible even within 2 mi from the power plant site. **Transportation Facilities, Water Sources and Discharges, Natural Gas Facilities, HVTL Corridors:** No disproportionately high and adverse impacts on minority or low-income populations are indicated.
Community Services		
No change in existing conditions relative to community services.	**Power Plant Site:** Demands by the generating station may require staff at local fire and emergency response agencies to increase by 30 to 50%. Large numbers of construction workers (>1,500 during 3 years of peak construction) may affect capacities of local law enforcement agencies. Security requirements for the generating station may affect capacities of local law enforcement agencies. **Transportation Facilities:** Potential for delays to emergency response vehicles at 17 rail grade crossings between Grand Rapids and Taconite (8 in Grand Rapids). Approximately 2.5% daily probability of delay at a crossing caused by train serving Mesaba plant; 4% probability of delay from combined rail traffic. **Water Sources and Discharges:** Security requirements for process water intake facilities may necessitate terminating access to Canisteo Mine Pit for recreational boating. **Natural Gas Facilities:** No displacement of providers or change in demand on community services. **HVTL Corridors:** No displacement of providers or change in demand on community services.	**Power Plant Site:** Demands by the generating station may require staff at local fire and emergency response agencies to increase by 20% or less. Large numbers of construction workers (>1,500 during 3 years of peak construction) may affect capacities of local law enforcement agencies. Security requirements for the generating station may affect capacities of local law enforcement agencies. **Transportation Facilities:** Potential for delays to emergency response vehicles at 8 rail grade crossings between Clinton Township and Hoyt Lakes. Approximately 2.5% daily probability of delay at a crossing caused by train serving Mesaba plant; 5.5% probability of delay from combined rail traffic. **Water Sources and Discharges:** No displacement of providers or change in demand on community services. **Natural Gas Facilities:** No displacement of providers or change in demand on community services. **HVTL Corridors:** No displacement of providers or change in demand on community services.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Utility Systems		
No Action	**West Range**	**East Range**
No change in existing conditions relating to utilities; the region would not benefit from the additional source of power from the Mesaba Energy Project.	**Power Plant Site:** The project would tie into the existing grid without service interruptions and would ensure necessary upgrades to substations and other infrastructure would be installed to prevent system failures. The project would provide another source of power for the region that could reduce outages and help meet future demand. **Transportation Facilities:** No expected impacts. **Water Sources and Discharges:** The Mesaba Energy Project would not adversely affect sanitary wastewater treatment capacity. The wastewater collection system in Taconite currently overflows during heavy rain and high water table events, which may be worsened by new flow from the West Range Site. This collection system would need to be redesigned or repaired regardless of the outcome of this project. During the construction phase of the project, potable water requirements would exceed the capacity of the existing Taconite water supply system; however, planned improvements to the system would provide sufficient supplies. Otherwise, potable water supplies would be brought to the project site by truck. **Natural Gas Facilities:** No impacts on service providers or capacity expected. **HVTL Corridors:** The project's proposed utility lines would be constructed in accordance with all Federal and state regulations, and would pose no adverse impact on other resources.	**Power Plant Site:** The project would tie into the existing grid without service interruptions and would ensure necessary upgrades to substations and other infrastructure would be installed to prevent system failures. The project would provide another source of power for the region that could reduce outages and help meet future demand. **Transportation Facilities:** No expected impacts. **Water Sources and Discharges:** The East Range Alternative would not adversely impact existing potable and sanitary sewer systems, as both have capacity to serve the project. **Natural Gas Facilities:** No impacts on service providers or capacity expected. **HVTL Corridors:** The project's proposed utility lines would be constructed in accordance with all Federal and state regulations, and would pose no adverse impact on other resources.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Traffic and Transportation		
No Action	**West Range**	**East Range**
No change in existing vehicular traffic; Level of Service (LOS) conditions would remain the same. Realignment of CR 7 might not occur; hence, traffic hazards would remain at intersection of CR 7 and US 169.	**Power Plant Site:** During construction: temporary level of service (LOS) degradation of US 169 – from a LOS of C to D; however, new CR 7 or proposed improvements at US 169/CR 7 intersection expected to alleviate traffic congestion and hazards. During operation: LOS would remain the same on nearby roadways, except for CR 7 (south of new Access Road 1), which would improve from B to A because of new Access Road 1. **Transportation Facilities:** Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions. Access Roads: • Access Road 1 would improve LOS on CR 7 (south of new Access Road 1) from level B to level A. • Access Road 2 would be used by site traffic only and would not impact LOS. **Water Sources and Discharges:** Temporary and localized traffic congestion during construction. **Natural Gas Facilities:** Temporary and localized traffic congestion during construction. **HVTL Corridors:** Temporary and localized traffic congestion during construction.	**Power Plant Site:** During construction: temporary LOS degradation of most of nearby roads; however, lowest LOS would be B (represents free flow traffic with little congestion). Reconstruction of Hampshire Drive expected to minimize potential congestion at intersection of CR 666 and CR 110. During operation: LOS would remain the same on nearby roadways, except for CR 666 (north of CR 110), which would degrade from A to B. **Transportation Facilities:** Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions. Access Roads: • Access Road 1 would provide two access points off of CR 666, which would minimize impacts to traffic flow during any future construction or maintenance work on CR 666. **Water Sources and Discharges:** Temporary and localized traffic congestion during construction. **Natural Gas Facilities:** Temporary and localized traffic congestion during construction. **HVTL Corridors:** Temporary and localized traffic congestion during construction.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Materials and Waste Management		
No Action	**West Range**	**East Range**
No change in existing conditions; no increase in the risk of a hazardous waste release.	**Power Plant Site:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (1000-1600 tons per day generated for both phases); however, sufficient capacity is available if disposal of the slag is necessary. Commercially available treatment, stabilization, or disposal for waste streams generated. Generating Station would be regulated as a large quantity generator of hazardous waste (sulfuric acid, spent activated carbon and potentially the ZLD filter cake, as well as smaller quantities of other hazardous wastes). No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with Resource Conservation and Recovery Act (RCRA) would be adhered to. **Transportation Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Water Sources and Discharges:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Natural Gas Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **HVTL Corridors:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment.	**Power Plant Site:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (1000-1600 tons per day generated for both phases); however, sufficient capacity is available if disposal of the slag is necessary. Commercially available treatment, stabilization, or disposal for waste streams generated. Generating Station would be regulated as a large quantity generator of hazardous waste (sulfuric acid, spent activated carbon and potentially the ZLD filter cake, as well as smaller quantities of other hazardous wastes). No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with RCRA would be adhered to. **Transportation Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Water Sources and Discharges:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Natural Gas Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **HVTL Corridors:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Safety and Health		
No Action	**West Range**	**East Range**
No added health and safety risk, and no increase in the probability of construction or operational health and safety risks.	**Power Plant Site:** Construction workers would follow a safety plan and standard safety practices to reduce the potential for construction-related impacts. During the 5-year construction period, statistically less than 1 worker fatality (0.4) would occur. During the operation of the plant, statistically less than 1 operations-related worker fatality (0.01) would occur. Based on air emission modeling results, cancer or morbidity hazards to workers or to the public would be small and would not exceed EPA standards. Specifically, the projected acute, sub-chronic, and chronic non-cancer hazard indices would be 0.5, 0.1, and 0.03, respectively, compared to a threshold index of 1, and the projected cancer risk would be $3x10^{-07}$, compared to a threshold of $1x10^{-05}$. Potential major operating accidents or intentional destructive acts, although not anticipated, could result in fires and localized airborne releases of toxic substances, such as CO, H_2S, and SO_2. In such cases, plant workers would be the most at-risk of injury or death, although the nearest residents, located 0.6 to 0.8 mi from the plant, would also be at-risk from a large release. **Transportation Facilities:** During construction and operation, it is estimated, respectively, that approximately 1.2 and 0.53 fatalities could occur due to the movement of workers and material via trucks and personal vehicles. Because of the relatively low incremental addition of project-related train trips (up to one and two roundtrips per day during Phase I and II, respectively), it is expected that increases to safety hazards at at-grade crossings would be low because baseline vehicular traffic numbers within the region of influence are considered low. **Water Sources and Discharges:** No impacts would be expected. **Natural Gas Facilities:** No impacts would be expected. **HVTL Corridors:** Research regarding the potential for public health risks from the inhalation of pollutant particles charged by HVTLs (i.e., the Henshaw Effect) is currently inconclusive. Therefore, these risks are considered comparable to the risks imposed by tens of thousands of mi of HVTLs already in use throughout the U.S. EMF exposure from utility lines would fall below the 2-kV/m limit at the edge of the ROW. There would be no permanent residents located in areas exceeding 2-kV/m.	**Power Plant Site:** Construction workers would follow a safety plan and standard safety practices to reduce the potential for construction-related impacts. During the 5-year construction period, statistically less than 1 worker fatality (0.4) would occur. During the operation of the plant, statistically less than 1 operations-related worker fatality (0.01) would occur. Based on air emission modeling results, cancer or morbidity hazards to workers or to the public would be small and would not exceed EPA standards. Specifically, the projected acute, sub-chronic, and chronic non-cancer hazard indices would be 0.5, 0.1, and 0.03, respectively, compared to a threshold index of 1, and the projected cancer risk would be $3x10^{-07}$, compared to a threshold of $1x10^{-05}$. Potential major operating accidents or intentional destructive acts, although not anticipated, could result in fires and localized airborne releases of toxic substances such as CO, H_2S, and SO_2. In such cases, plant workers would be the most at-risk of injury or death, although the nearest residents, located 1 mi from the plant, would also be at-risk from a large release. **Transportation Facilities:** During construction and operation, it is estimated, respectively, that approximately 1.2 and 0.53 fatalities could occur due to the movement of workers and material via trucks and personal vehicles. Because of the relatively low incremental addition of project-related train trips (up to one and two roundtrips per day during Phase I and II, respectively), it is expected that increases to safety hazards at at-grade crossings would be low because baseline vehicular traffic numbers within the region of influence are considered low. **Water Sources and Discharges:** No impacts would be expected. **Natural Gas Facilities:** No impacts would be expected. **HVTL Corridors:** Research regarding the potential for public health risks from the inhalation of pollutant particles charged by HVTLs (i.e., the Henshaw Effect) is currently inconclusive. Therefore, these risks are considered comparable to the risks imposed by tens of thousands of mi of HVTLs already in use throughout the U.S. EMF exposure from utility lines would fall below the 2-kV/m limit at the edge of the ROW. There would be no permanent residents located in areas exceeding 2-kV/m.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Noise		
No Action	**West Range**	**East Range**
No change in noise emissions. There would be no new violations or exceedances of noise standards; however, residential noise Receptor 3 (R3) and Receptor 4 (R4) at the West Range are currently above the MPCA noise thresholds. R3 and R4 are residential areas 3,900 and 4,400 ft, respectively, west of the proposed plant site (see Section 3.18 for noise receptor details).	**Power Plant Site:** During construction: Aggregate noise levels at receptors not expected to exceed the MPCA daytime threshold of 60 dBA (L_{50}). Steam blows would be an unavoidable adverse impact. A series of short steam blows, lasting two or three minutes each, would be performed several times daily over a period of two or three weeks during the final weeks of construction. Resultant levels at nearby receptors would range from 88 to 103 dBA; however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. During operation: Daytime – MPCA noise thresholds would not be exceeded. Nighttime – Without mitigation, the noise level exceedances above the L_{50} threshold would occur at residential receptors R2 through R5 and would range from 1.6 dBA (R5) through 3.6 dBA (R4), respectively (R2 through R5 represent residential areas ranging from 3,900 ft to 4,400 ft from the proposed plant site – see Section 3.18 for receptor location details). The noise levels would exceed the L_{10} threshold by 3.4 and 1.5 dBA at R3 and R4, respectively. The greatest predicted increase occurs for the nighttime L_{10} limit at 3 dBA (at R2 and R5) and for the nighttime L_{50} limit at 2.7 dBA (at R2). With the proposed mitigation, it is expected that state noise standards would be met at all sites, except for the L_{10} limit at R3 and R4, because the levels are already over the standard due to their proximities to CR 7. The greatest predicted increase would occur for the nighttime L_{10} limit at 3 dBA (at R2 and R5) and for the nighttime L_{50} limit at 2.7 dBA (at R2). With the proposed mitigation, it is expected that any resulting increase in noise levels from plant operations would not exceed 1 dB, thus would not be perceived at any of the residential receptor locations.	**Power Plant Site:** During construction: MPCA residential daytime noise limits of 60 dBA (L_{50}) would be exceeded at one receptor site by 5 dBA; however, this is not a residential receptor and the increase would be temporary (during construction only). Steam blows would be an unavoidable adverse impact. A series of short steam blows, lasting two or three minutes each, would be performed several times daily over a period of two or three weeks during the final weeks of construction. Resultant sound levels at nearby receptors would range from 88 to 103 dBA; however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. During operation: Noise levels would not exceed daytime or nighttime MPCA thresholds. Without mitigation, predicted daytime and nighttime noise level increases would be less than 1.5 dBA, which would not be detectable at any receptor locations.

Table S-6. Summary Comparison of Impacts (Phases I & II)

Noise		
No Action	**West Range**	**East Range**
	Transportation Facilities: Noise levels would range from 57 to 69 dBA at residential receptors R2 and R5 during rail line construction, but would be temporary (during construction only) and would be below the ATPA guideline of 70 dBA. Train horns, as required under FRA regulations, would be adverse unavoidable impacts at grade crossings. Access Roads: Access Road 1 (new CR 7) would exceed the nighttime L_{10} threshold at 10 receptor sites (an average decibel increase of 1 dB – 6 dB over and above the threshold of 55 dB) and the daytime L_{10} threshold of 65 dBA would be exceeded by 1 dBA at one receptor. These impacts would be temporary. During operation: All receptor locations would be within the daytime limits (L_{50} of 60 dBA). **Water Sources and Discharges:** Temporary and localized increases in noise levels during construction of water pipelines. **Natural Gas Facilities:** Temporary and localized increases in noise levels during construction of natural gas pipelines. **HVTL Corridors:** Temporary and localized increases in noise levels during construction of HVTLs.	**Transportation Facilities:** Incremental rail noise increase may be discernable at residential noise receptors R1, R2, and R3 (ranging from 800 ft to 9,200 ft from the proposed plant site), but would be short-term (during construction only) and below the ATPA guideline of 70 dBA. Train horns, as required under FRA regulations, would be adverse unavoidable impacts at grade crossings. Access Roads: There are no residences or sensitive noise receptors in proximity to the proposed access road intersecting CR 666. **Water Sources and Discharges:** Temporary and localized increases in noise levels during construction of water pipelines. **Natural Gas Facilities:** Temporary and localized increases in noise levels during construction of natural gas pipelines. **HVTL Corridors:** Temporary and localized increases in noise levels during construction of HVTLs.

Acronyms: ac – acre(s); alt. – alternative; ATPA – Andean Trade Preferences Act; BMPs – best management practices; BWCAW – Boundary Waters Canoe Area Wilderness; CAMR – Clean Air Mercury Rule; CMP – Canisteo Mine Pit; CO – carbon monoxide; CO_2 – carbon dioxide; CR – County Road; DAT – deposition analysis threshold; dBA – A-weighted decibels; EMF – electromagnetic field; FRA – Federal Railroad Administration; ft – feet; gpd – gallons per day; gpm – gallons per minute; H_2S – hydrogen sulfide; HAP – hazardous air pollutant; HVTL – high voltage transmission line; IGCC – integrated gasification combined cycle; kg – kilogram; kV – kilovolt; LOS – level of service; m – meter; M – million; MAAQS – Minnesota Ambient Air Quality Standards; mi – mile(s); MPCA – Minnesota Pollution Control Agency; N – nitrogen; NAAQS – National Ambient Air Quality Standards; NH_3 – ammonia; NO_x – nitrogen oxides; NPDES – National Pollutant Discharge Elimination System; NPS – National Park Service; NRHP – National Register of Historic Places; Pb – lead; PM_{10} – particulate matter (aerodynamic diameter <10 µm); PSD – prevention of significant deterioration; RCRA – Resource Conservation and Recovery Act; ROW – right-of-way; S – sulfur; SEC – sediment and erosion control; SHPO – State Historic Preservation Office; SO_2 – sulfure dioxide; SWPPP – Stormwater Pollution Prevention Plan; tpy – tons per year; US – U.S. Highway; VNP – Voyageurs National Park; VOCs – volatile organic compounds; yd – yard; yr – year; ZLD – zero liquid discharge

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