1.1 INTRODUCTION I-1
1.2 Mesaba Energy Project and Regulatory Review I-2
1.2.1 Mesaba Energy Project Proponent I-2
1.2.2 Mesaba One and Mesaba Two I-3
1.2.3 Terminology I-3
1.2.4 Enabling Legislation and Funding I-4
1.2.4.1 Innovative Energy Projects and Their Exemption from Certificate of Need Procedures I-4
1.2.4.2 Mesaba One and Two Located In TTRA I-4
1.2.4.3 Other Incentives Provided to Innovative Energy Projects I-4
1.2.4.4 Funding Awarded to the Project I-5
1.2.5 Environmental Impact Statement Requirements for the Project I-5
1.2.6 Licensing and Permitting Requirements I-12
1.2.6.1 Special State Requirements Imposed Under the Power Plant Siting Act I-12
1.2.6.2 Permits I-12
1.3 Project Purpose and Benefits I-22
1.3.1 Project Objectives I-22
1.3.2 Project's Local, Regional, and National Value and Benefit I-22
1.3.3 Advancing IGCC Process Technology I-23
1.4 Description of the Gasification/Combined Cycle Technology I-25
1.5 LEPGP Sites and HVTL/ Pipeline Routes I-26
1.5.1 Overview I-26
1.5.1.1 LEPGP Sites I-26
1.5.1.2 HVTL Routes I-39
1.5.1.3 Natural Gas Pipeline Routes I-57
1.5.2 Preferred Site-West Range I-61
1.5.2.1 IGCC Power Station Footprint and Buffer Land I-61
1.5.2.2 Associated Facilities I-62
1.5.2.3 HVTL Routes I-66
1.5.2.4 Natural Gas Pipeline Routes I-79
1.5.3 Alternate Site – East Range I-93
1.5.3.1 IGCC Power Station Footprint and Buffer Land I-93
1.5.3.2 Associated Facilities I-96
1.5.3.3 HVTL Routes I-96
1.5.3.4 Natural Gas Pipeline Route I-115
1.6 Technology Selection and Process Description I-123
1.6.1 Technology Selection I-123
1.6.2 Process and Equipment Descriptions: Introduction I-123
1.6.3 Maximum Emission/Discharge Scenarios Quantified I-123
1.6.4 Process Chemistry I-127
1.6.4.1 Gasification I-127
1.6.4.2 COS Hydrolysis I-127
1.6.4.3 Acid Gas Removal I-127
1.6.4.4 Sulfur Removal I-128
1.6.5 Process Operations I-128
1.6.5.1 Slurry Preparation I-128
1.6.5.2 Gasification and Slag Handling I-129
1.6.5.3 Syngas Cleanup and Desulfurization I-132
1.6.5.4 Sulfur Recovery Unit I-135
1.6.5.5 Air Separation Unit I-137
1.6.5.6 Slag Handling, Storage and Loading I-137

1.6.5.7 Combined Cycle Power Block I-138
1.6.6 Plant Utility Systems I-140
1.6.6.1 Tank Vent Collection/Boiler System I-140
1.6.6.2 Sour Water Treatment I-140
1.6.6.3 Zero Liquid Discharge System I-141
1.6.6.4 Auxiliary Boilers I-142
1.6.6.5 Flare I-142
1.6.6.6 Emergency Diesel Engines I-143
1.6.7 Major Process Equipment I-143
1.6.7.1 Air Separation Unit (2x 50%) I-143
1.6.7.2 Feedstock (Coal/Petroleum Coke) Handling (1 x 100%) I-143
1.6.7.3 Gasification Island (3 x 50%) I-143
1.6.7.4 Syngas Treating (2 x 50%) I-144
1.6.7.5 Sulfur Recovery and Tail Gas Recycle (2 x 50%) I-144
1.6.7.6 Power Block I-144
1.6.7.7 General Facilities (1 x 100%) I-144
1.6.7.8 Dominant Structures and Other Buildings Associated With The IGCC Power Station I-145
1.6.8 Expected Process Operating Characteristics I-145
1.7 Resource Inputs I-148
1.7.1 Feedstocks I-148
1.7.1.1 Delivery I-148
1.7.1.2 Receiving and Storage I-149
1.7.1.3 Feedstock and Feedstock Characteristics I-149
1.7.2 Flux Receiving and Storage I-151
1.7.3 Natural Gas Supply Pipeline and Metering Station I-151
1.7.4 Water Supply I-152
1.7.4.1 Non-Contact Cooling (Cooling Tower Operation) I-153
1.7.4.2 Process Water I-153
1.8 Project Discharges and Products I-155
1.8.1 Air Emissions I-155
1.8.1.1 Criteria Pollutants I-155
1.8.1.2 Non-Criteria Pollutant Emissions and Lead I-168
1.8.1.3 Hazardous Air Pollutant Emissions I-168
1.8.2 Water Effluents I-175
1.8.2.1 Site Independent Features of IGCC Power Station I-175
1.8.2.2 West Range (Preferred Site) I-179
1.8.2.3 East Range (Alternate Site) I-196
1.8.3 Pollution Prevention, Recycling and Reuse Plans I-199
1.8.3.1 Site Independent Features I-199
1.8.3.2 West Range IGCC Power Station I-201
1.8.3.3 East Range Site I-201
1.8.4 Waste Treatment Plans I-202
1.8.4.1 Site Independent Treatment Plans I-202
1.8.4.2 West Range (Preferred Site) I-202
1.8.4.3 East Range Site I-203
1.8.5 Solid Waste Generation and Disposal I-203
1.8.5.1 Operational Wastes I-203
1.8.5.2 Construction Wastes I-209
1.8.6 Liquid Waste Generation and Disposal I-212
1.8.7 Primary and Secondary Products I-212
1.8.8 Storage Requirements and Locations I-213

1.8.9 Toxic and Hazardous Materials I-213
1.8.10 Health and Safety Policies and Programs I-217
1.9 Project Schedule and Description of Project Phases I-218
1.9.1 Schedule Overview I-218
1.9.1.1 Significant Milestones Achieved To Date I-218
1.9.1.2 Significant Milestones to be Achieved I-223
1.9.2 Construction Plans I-225
1.9.2.1 Site Independent Construction Plans I-225
1.9.2.2 West Range (Preferred Site) I-229
1.9.2.3 East Range (Alternate Site) I-231
1.9.2.4 Power Station Operating Plan I-231
1.9.2.5 Turndown Operation I-231
1.9.2.6 Operation on Natural Gas I-232
1.9.2.7 Natural Gas Pipeline Operation and Maintenance I-232
1.9.3 Summary of Test Plans I-233
1.9.3.1 Start-up and Commissioning I-233
1.9.3.2 Operational Demonstration Test Plan I-233
1.9.3.3 Plant Demonstration and Operations I-233
1.9.4 Plans Following Demonstration Period I-234
1.10 IGCC Power Station Labor and Construction Material Requirements I-235
1.10.1 Labor Requirements I-235
1.10.1.1 Construction Labor I-235
1.10.1.2 Operations Labor I-235
1.10.2 Construction Materials and Suppliers I-236
1.11 Site-Specific Requirements I-237
1.11.1 West Range (Preferred Site) I-237
1.11.1.1 Rail Loop Access I-237
1.11.1.2 High Voltage Electrical Switchyard and Interconnection to HVTLs I-237
1.11.1.3 Raw Water Intake Structure and Pump House I-237
1.11.1.4 Raw Water Pipeline I-237
1.11.1.5 Raw Water Treatment I-238
1.11.1.6 Cooling Tower Blowdown I-238
1.11.1.7 Potable Water System I-238
1.11.1.8 Sanitary Waste System I-238
1.11.1.9 Natural Gas Supply Pipeline and Metering Station I-238
1.11.1.10 Treated Wastewater Forwarding System I-238
1.11.1.11 Wastewater Pipeline and Outfall Structure I-239
1.11.1.12 Storm Water Collection and Detention I-239
1.11.1.13 Plant Access Road I-239
1.11.1.14 Feedstock Suppliers, Locations, and Transportation/Distribution Methods I-240
1.11.2 East Range (Alternate Site) I-240
1.11.2.1 Rail Loop Access I-240
1.11.2.2 High Voltage Electrical Switchyard and Interconnection to High Voltage Transmission Lines (HVTLs) I-240
1.11.2.3 Raw Water Intake Structure and Pump House I-241
1.11.2.4 Raw Water Pipelines I-241
1.11.2.5 Potable Water System I-241
1.11.2.6 Sanitary Waste System I-241
1.11.2.7 Natural Gas Supply Pipeline I-241
1.11.2.8 Treated Wastewater Forwarding System I-242

1.11.2.9 Wastewater Pipeline and Outfall Structure I-242
1.11.2.10 Storm Water Collection and Detention I-242
1.11.2.11 Plant Access Road I-242
1.11.2.12 Feedstock Suppliers, Locations, and Transportation/Distribution Methods I-242
1.12 Infrastructure Requirements and Justification of Alternatives I-243
1.12.1 Electric Transmission I-243
1.12.1.1 Electrical Design Considerations and Switchyards I-243
1.12.1.2 Generator Outlet Routes: Special considerations I-252
1.12.1.3 Structures and ROW Requirements I-259
1.12.1.4 Conductors I-296
1.12.1.5 Other Transmission Network Reinforcements I-298
1.12.1.6 Transmission Line Construction I-300
1.12.1.7 Transmission Line Operation and Maintenance I-300
1.12.1.8 Electric and Magnetic Fields and Noise I-301
1.12.1.9 HVTL Route Comparisons I-308
1.12.2 Natural Gas Pipeline I-309
1.12.2.1 West Range Natural Gas Pipeline Design Specifications I-309
1.12.2.2 East Range Natural Gas Pipeline Design Specifications I-312
1.12.3 Transportation I-312
1.12.3.1 Rail I-312
1.12.3.2 Roadway Infrastructure I-330
1.12.4 Process Water Supply I-336
1.12.4.1 Water Supplies (Non-Potable): Site Independent Features I-336
1.12.4.2 West Range Process Water System I-339
1.12.4.3 East Range Process Water System I-353
1.12.5 Process Wastewater Discharges I-358
1.12.5.1 Site Independent Features I-358
1.12.5.2 West Range Site Process Water Discharges (Cooling Tower Blowdown Only) I-359
1.12.5.3 East Range Site I-364
1.12.6 Domestic Wastewater Treatment Alternatives I-365
1.12.6.1 Site Independent Features I-365
1.12.6.2 West Range Site I-366
1.12.6.3 East Range Domestic Wastewater Treatment I-371
1.12.7 Potable Water Supply I-373
1.12.7.1 Site Independent Features I-373
1.12.7.2 West Range I-373
1.12.7.3 East Range Potable Water Supply I-375
1.13 Siting Process and Description of Sites I-377
1.13.1 Site Selection Process I-377
1.13.1.1 Development of Selection Criteria I-377
1.13.1.2 Candidate Sites I-379
1.13.1.3 Evaluation of Sites I-380
1.13.2 Reasonable Alternatives I-382
1.13.2.1 DOE's Limited Role in Non-Federal-Government Projects I-382
1.13.2.2 State's Role in Considering Reasonable Alternatives I-382
1.13.2.3 State Law Defines MEP's Technological Type and Location I-383

1.13.2.4 State Law Guides Project's Size, Timing and Number of Sites....I-384
1.13.3 No Action Alternative....I-384
1.14 Comparison of Alternatives I-385

TABLES

1.2-1	List of Permits Potentially Required to Construct and Operate Mesaba One and Two
1.5-1	Proponent's HVTL Plans for West Range IGCC Power Station
1.5-2	HVTL Line Ratings
1.5-3	Proponent's HVTL Plans for East Range Site
1.5-4	Comparison of GO Facilities for West and East Range Sites
1.5-5	Environmental Comparison of Pipeline Routes West Range Project Site
1.6-1	Key Performance Indicators Used to Assess Worst Case Environmental Impacts Of IGCC Power Station (Phase I, PSQ Mode)
1.6-2	Expected IGCC Power Station Operating Characteristics (Phase I, FSQ Mode)
1.6-3	Estimated Product Syngas Composition Multiple Feedstock Plant (Phase Independent)
1.7-1	Feedstock Design Specification Basis
1.7-2	Typical Natural Gas Constituents
1.8-1	Short-Term Emission Summary (Phase I and II)
1.8-2	Annual Emission Summary (Phase I and II)
1.8-3	Maximum CTG Short-Term Emission Rates (Phase I and II)
1.8-4	Maximum CTG Annual Emissions Years 1 – 4 (Phase I and II)
1.8-5	Maximum CTG Annual Emissions Years 5 – 30 (Phase I and II)
1.8-6	Tank Vent Boiler Short-Term Emissions (Phase I and II)
1.8-7	Maximum Tank Vent Boiler Annual Emissions (Phase I and II)
1.8-8	Flare Short-Term Emission Rates (Phase I and II)
1.8-9	Fugitive Emission Estimate (Phase I and II)
1.8-10	Fugitive Particulate Emission Estimate (Phase 1 Operation)
1.8-11	Particulate Matter (PM_{10}) Emissions From Cooling Tower Drift (Per Phase)
1.8-12	Cooling Tower Characteristics (per cell)
1.8-13	Maximum Auxiliary Boiler Short-Term and Annual Emission Rates (Phase I and II)
1.8-14	Emergency Diesel Engines Emissions (Phase I and II)
1.8-15	Annual Hazardous Air Pollutant Emissions (Phase I and II)
1.8-16	Water Appropriation Requirements
1.8-17	Estimated Wastewater Discharge Rates to West Range Site Receiving Waters
1.8-18	Wastewater Discharge Rate From Systems In The Phase I IGCC Power Station
1.8-19	Chemical Additives Used Per Year (Phase I and II)

1.8-20	Current Source Water Quality
1.8-21	Discharge Flow Rates
1.8-22	Current Water Quality of Receiving Waters
1.8-23	Expected IGCC Power Station Discharges and Applicable State Numerical Water Quality Standards
1.8-24	Estimated Operational Waste Streams (Phase I and II)
1.8-25	E-Gas™ Slag Properties
1.8-26	Typical Estimated ZLD Solids Composition
1.8-27	Estimated Construction Waste Streams (Phase I and II)
1.8-28	Feedstock And Byproduct Storage Requirements (Each Phase)
1.8-29	On-site Toxic and Hazardous Materials (Total for Phase I and II)
1.10-1	Estimated Number of Construction Personnel On Site (Phase I)
1.10-2	Estimated Operating Staff Required for IGCC Power Station
1.12-1	West Range Transmission Line Design Summary: Plan A
1.12-2	Plan B HVTL Routing Options
1.12-3	West Range Transmission Line Design Summary: Plan B Phase I
1.12-4	West Range Transmission Line Design Summary: Plan B Phase II
1.12-5	East Range HVTL Design Summary
1.12-6a	Conductor Impedances and Power Flow Data
1.12-6b	Conductor Impedances and Power Flow Data: 345kv
1.12-6c	Conductor Rating Data
1.12-7	Comparison of GO Facilities for West and East Range Sites
1.12-8	Projected Coal Deliveries to the West Range Project Site
1.12-9	Railroad Design Criteria for Phase I: West and East Range Sites
1.12-10	Railroad Alternatives Analysis
1.12-11	East Range Railroad Alternatives Analysis
1.12-12	Water Appropriation Requirements
1.12-13	Process Water Resources Identified for Use by the West Range IGCC Power Station
1.12-14	Abandoned Mine Pit Water Sources
1.12-15	Water Source Supply Capability
1.12-16	Water Appropriation Requirements Matched with Water Supply Capabilities
1.12-17	West Range Pumping Station Capacities
1.12-18	Water Supply Alternatives for the East Range IGCC Power Station
1.12-19	Summary of Hill-Annex Mine Pit NPDES and Appropriations Permits

1.12-20	Estimated Annual Mass Permitted for Discharge to the Swan River Watershed from the Hill-Annex Mine Pit
1.12-21	Water Quality Criteria Standards for the Swan River

FIGURES

1.2-1	Minnesota Taconite Tax Relief Area
1.2-2	Iron Formations in the Lake Superior Region Relative to West and East Range Sites
1.2-3	Geographical Extent of West/Central Mesabi Iron Range
1.2-4	Geographical Extent of East Mesabi Iron Range
1.2-5	Federal EIS Process
1.2-6	Minnesota Power Plant Siting Process
1.2-7	Coordinated DOE/MPUC Environmental Review Process
1.2-8	Mesaba Energy Project General Location Map
1.2-9	West Range Site Vicinity Map
1.2-10	East Range Site Vicinity Map
1.3-1	Cumulative Criteria Pollutant Emissions Avoided With IGCC
1.5-1	West Range Site Showing IGCC Power Station Footprint, Buffer Land, Associated Facilities and Additional Lands
1.5-2	East Range Site Showing IGCC Power Station Footprint, Buffer Land, Associated Facilities and Additional Lands
1.5-3	Phase I and II IGCC Power Station Layout
1.5-4	Visual Rendering of Phase I and II
1.5-5	Surfacing Plan for Phase I and II Developments
1.5-6	Current Drainage Plan for Phase I and II Developments
1.5-7	West Range Site Showing Phase I and II IGCC Power Station Footprint, Buffer Land and Associated Facilities
1.5-8	Preliminary Grading Plan for Phase I and II IGCC Power Station on West Range Site
1.5-9	Cross Sections of Phase I and II IGCC Power Station on West Range Site
1.5-10	East Range Phase I and II IGCC Power Station Footprint, Buffer Land and Selected Associated Facilities
1.5-11	East Range Grading Plan
1.5-12	High Voltage Transmission Lines in Vicinity of West Range Site
1.5-13	West Range Plan A Preferred (WRA-1) and Alternate (WRA-1A) 345kV HVTL Routes
1.5-14	West Range Plan B Phase I Preferred (WRB-1) and Alternate (WRB-1A) 230kV HVTL Routes

1.5-15	West Range Plan B Phase II Preferred (WRB-2) and Alternate (WRB-2A) HVTL Routes
1.5-16	West Range Plan B Phase II Preferred (WRB-2) and Alternate (WRB-2A) HVTL Routes
1.5-17	Existing HVTLs and Substations in the Vicinity of the East Range Site
1.5-18	East Range HVTL Route Milestone Map Showing the Preferred and Alternate Route
1.5-19	GLG (Red) and NNG (Blue) Natural Gas Pipelines in the Vicinity of the Iron Range
1.5-20	Natural Gas Pipelines In the Vicinity of the West Range Site
1.5-21	Zoning Designations in the Region Surrounding the West Range Site
1.5-22	Zoning Designations in the Immediate Vicinity of the IGCC Power Station and Buffer Land
1.5-23	Topographical Map in the Vicinity of the IGCC Power Station Footprint and Buffer Land
1.5-24	Significant Receptors Along the West Range Preferred and Alternate HVTL Routes
1.5-25	West Range Plan A: Preferred HVTL Route (WRA-1), Segment 1
1.5-26	West Range Plan A: Preferred HVTL Route (WRA-1), Segment 2
1.5-27	West Range Plan A: Preferred HVTL Route (WRA-1), Segment 3
1.5-28	West Range Plan A: Alternate HVTL Route (WRA-1A), Segment 1
1.5-29	West Range Plan A: Alternate HVTL Route (WRA-1A), Segment 2
1.5-30	West Range Plan A: Alternate HVTL Route (WRA-1A), Segment 3
1.5-31	West Range Plan B: Alternate Route Phase II (WRB-2A), Segment 1
1.5-32	West Range Plan B: Alternate Route Phase II (WRB-2A), Segment 2
1.5-33	West Range Plan B: Alternate Route Phase II (WRB-2A), Segment 3
1.5-34	West Range Plan B: Alternate Route Phase II (WRB-2A), Segment 4
1.5-35	West Range Proposed Natural Gas Pipeline Route: Segment 1
1.5-36	West Range Proposed Natural Gas Pipeline Route: Segment 2
1.5-37	West Range Proposed Natural Gas Pipeline Route: Segment 3
1.5-38	West Range Proposed Natural Gas Pipeline Route: Segment 4
1.5-39	West Range Natural Gas Pipeline Route Milepost Map
1.5-40	West Range Alternate Natural Gas Pipeline Route: NNG No.2, Segment 1
1.5-41	West Range Alternate Natural Gas Pipeline Route: NNG No.2, Segment 2
1.5-42	West Range Alternate Natural Gas Pipeline Route: NNG No.2, Segment 3
1.5-43	West Range Alternate Natural Gas Pipeline Route: NNG No.2, Segment 4
1.5-44	West Range Alternate Natural Gas Pipeline Route: NNG No.3, Segment 1
1.5-45	West Range Alternate Natural Gas Pipeline Route: NNG No.3, Segment 2
1.5-46	West Range Alternate Natural Gas Pipeline Route: NNG No.3, Segment 3

1.5-47	Hoyt Lakes Zoning Map
1.5-48	East Range IGCC Power Station Footprint and Buffer Land Topography
1.5-49	Existing HVTL Corridors Between the East Range Site and the Forbes Substation
1.5-50	Significant Receptors Along the East Range Preferred and Alternate HVTL Routes and the Proposed Natural Gas Pipeline Route
1.5-51	East Range Preferred HVTL Route Along 39L/37L Corridor: Segment 1
1.5-52	East Range Preferred HVTL Route Along 39L/37L Corridor: Segment 2
1.5-53	East Range Preferred HVTL Route Along 39L/37L Corridor: Segment 3
1.5-54	East Range Preferred HVTL Route Along 39L/37L Corridor: Segment 4
1.5-55	East Range Preferred HVTL Route Along 39L/37L Corridor: Segment 5
1.5-56	East Range Preferred HVTL Route Along 39L/37L Corridor: Segment 6
1.5-57	East Range Preferred HVTL Route Along 39L/37L Corridor: Segment 7
1.5-58	East Range Alternate HVTL Route Along 38L Corridor: Segment 1
1.5-59	East Range Alternate HVTL Route Along 38L Corridor: Segment 2
1.5-60	East Range Alternate HVTL Route Along 38L Corridor: Segment 3
1.5-61	East Range Alternate HVTL Route Along 38L Corridor: Segment 4
1.5-62	East Range Alternate HVTL Route Along 38L Corridor: Segment 5
1.5-63	East Range Alternate HVTL Route Along 38L Corridor: Segment 6
1.5-64	East Range Alternate HVTL Route Along 38L Corridor: Segment 7
1.5-65	East Range Natural Gas Pipeline Milepost Map
1.5-66	East Range Proposed Natural Gas Pipeline Route: Segment 1
1.5-67	East Range Proposed Natural Gas Pipeline Route: Segment 2
1.5-68	East Range Proposed Natural Gas Pipeline Route: Segment 3
1.5-69	East Range Proposed Natural Gas Pipeline Route: Segment 4
1.5-70	East Range Proposed Natural Gas Pipeline Route: Segment 5
1.5-71	East Range Proposed Natural Gas Pipeline Route: Segment 6
1.6-1	Phase I IGCC Power Station Emission Source Block Flow Diagram
1.6-2	Phase II IGCC Power Station Emission Source Block Flow Diagram
1.6-3	Feedstock Grinding and Slurry Preparation
1.6-4	E-Gas™ Gasifier
1.6-5	New Source Performance Standard vs. Mesaba One/Two SO_2 Emission Rates
1.6-6	Gasification and Slag Handling
1.6-7	Particulate Matter Removal
1.6-8	Syngas Scrubbing
1.6-9	Acid Gas Removal

1.6-10	Sulfur Recovery Unit
1.6-11	Illustration of Combined Cycle Concept
1.6-12	Sour Water Treatment
1.8-1	Material Handling System for Phase I IGCC Power Station
1.8-2	Expected Mercury Partitioning in the IGCC Power Station (Mesaba One and Mesaba Two)
1.8-3	Carbon Dioxide Emissions from Mesaba Energy Project vs. Sherco Unit 3
1.8-4	2004 Carbon Dioxide Emission Rates From Large Coal-Fueled Minnesota Generating Plants vs. Mesaba Energy Project
1.8-5	Water Balance Diagram Showing Integration of ZLD System into Gasification Island in Mesaba One and Two Design
1.8-6	Generalized Water Use Block Flow Diagram for West Range IGCC Power Station
1.8-7	Water Management Plan Elements for West Range IGCC Power Station
1.8-8	West Range Site Source and Receiving Waters
1.8-9a	Mesaba One - Water Uses Contributing to IGCC Power Station Discharge
1.8-9b	Mesaba One and Two - Water Uses Contributing to IGCC Power Station Discharge
1.8-10	Points of Chemical Addition in the IGCC Power Station Circulating Water System
1.8-11a	Phase I Water Operations Flow Rates: West Range IGCC Power Station
1.8-11b	Phase I and II Water Operations Flow Rates: West Range IGCC Power Station
1.8-12	NPDES Outfall Locations: West Range IGCC Power Station
1.8-13	East Range ZLD System Design to Eliminate Discharges of Cooling Tower Blowdown
1.9-1	Project Schedule
1.9-2	Temporary Construction Office Plans Associated with Mesaba Two
1.12-1	Conceptual One Line Diagram for West Range and East Range IGCC Power Station Depicting 230kV Switchyard
1.12-2	Conceptual One Line Diagram for West Range and East Range Sites Depicting 230kV Feeds to ASU, Power Block, and IGCC Substation
1.12-3	West Range Plan A Phase I and II IGCC Power Station Switchyard Design
1.12-4	West Range Plan B Phase II Preferred Route (WRB-2) IGCC Power Station Switchyard Design
1.12-5	West Range Plan B Phase II Alternate Route (WRB-2A) IGCC Power Station Switchyard Design
1.12-6	East Range IGCC Power Station Switchyard Design
1.12-7	ROW Widths Along Existing 62L/63L HVTL Corridor
1.12-8	Single Pole Steel HVTL Structure Foundation Design
1.12-9	Pile Foundations for Poorly Drained, Compressible Soils

1.12-10	345kV HVTL Double Circuit Structures Along West Range Plan A Preferred Route (WRA-1)
1.12-11	345 kV HVTL Double Circuit Structures Along West Range Plan A Proffered Route (WRA-1)
1.12-12	ROW Calculation for 345kV HVTL Structures Along West Range Plan A Preferred and Alternate Routes (WRA-1 and WRA-1A) and 43L from IGCC Power Station to Laskin
1.12-13	ROW Calculation for 345kV Double Circuit Structure with 115kV Underbuild Along West Range Plan A Preferred and Alternate Routes (WRA-1 and WRA-1A)
1.12-14	345kV HVTL Double Circuit Structures Along West Range Plan A Alternate Route (WRA-1A)
1.12-15	230kV HVTL Double Circuit Structures Along West Range Plan B Phase I and II Preferred Routes (WRB-1 + WRB-2)
1.12-16	Plan B Phase I Preferred Route WRB-1 230kV Double Circuit HVTL Structure Summary
1.12-17	ROW Calculations for 230kV Single Circuit HVTL
1.12-18	Permanent ROW Calculations for 230kV Double Circuit HVTL
1.12-19	Permanent ROW Calculation for 230kV Double Circuit HVTL with 115kV Underbuild
1.12-20	ROW Calculation for 230kV Single Circuit HVTL
1.12-21	ROW Calculation for 230kV Single Circuit HVTL with Underbuild
1.12-22	345kV HVTL Single Circuit Delta Configuration Structures With 115kV Underbuild Along West Range Plan B Phase II Alternate Route (WRB-2A)
1.12-23	Structure Summary for Plan B Phase II Alternate Route (WRB-2A)
1.12-24	Permanent ROW Calculation for 345 kV Single Circuit Delta Configuration With 115 kV Underbuild (750 ft Span)
1.12-25	Permanent ROW Calculation for 345kV Single Circuit Delta Configuration With 115kV Underbuild (1100 ft Span Right Side)
1.12-26	Permanent ROW Calculation for 345kV Single Circuit Delta Configuration With 115kV Underbuild (1100 ft Span Left Side)
1.12-27	Permanent ROW Calculations for 230kV “H” Frame Structure
1.12-28	Permanent ROW Calculations for 345kV “H” Frame Structure for Special Uses
1.12-29	East Range Preferred 39L/37L 345kV HVTL Route and Structure Configurations
1.12-30	East Range 39l/37L Leg HVTL Structure Summary
1.12-31	East Range 39L/37L Leg HVTL Permanent ROW Calculation-345kV/115kV Double Circuit, 750 Foot Span, Right Side Structure
1.12-32	East Range 39L/37L Leg HVTL Permanent ROW Calculation-345kV/115kV Double Circuit, 750 Foot Span, Left Side Structure

1.12-33	East Range 39L/37L Leg HVTL Permanent ROW Calculation-345kV/115kV Double Circuit, 1100 Foot Span, Right Side Structure
1.12-34	East Range 39L/37L Leg HVTL Permanent ROW Calculation-345kV/115kV Double Circuit, 1100 Foot Span, Left Side Structure
1.12-35	East Range 39L/37L Leg HVTL Permanent ROW Calculation-345kV Single Circuit Structure
1.12-36	East Range Alternate 38L 345kV HVTL Route and Structure Configurations
1.12-37	East Range 38L Leg HVTL Structure Summary
1.12-38	HVTL Structure Configuration for Route to which 30 Foot Permanent ROW Is Added
1.12-39	Permanent ROW Calculation for New Double Circuit HVTL Tower Orientation Assuming 750 ft. Span Between Towers
1.12-40	Electric and Magnetic Field Calculations for Double Circuit 345 kV HVTL
1.12-41	Electric and Magnetic Field and Noise Values-230kV Double Circuit HVTL
1.12-42	Electric and Magnetic Field and Noise Values-230kV Double Circuit HVTL with 115kV Underbuild
1.12-43	Electric and Magnetic Field and Noise Values-345kV Delta Tower HVTL
1.12-44	Electric and Magnetic Field and Noise Values-345kV Delta Tower HVTL with 115kV Underbuild
1.12-45	Electric and Magnetic Field and Noise Values-345kV H-Frame HVTL
1.12-46	Electric and Magnetic Field and Noise Values-345kV/115kV Double Circuit Delta Tower HVTL
1.12-47	Electric and Magnetic Field and Noise Values-230kV Single Circuit Delta Structure
1.12-48	Electric and Magnetic Field and Noise Values-230kV Delta HVTL (Drake)
1.12-49	Electric and Magnetic Field and Noise Values for Single Circuit HVTL Structure
1.12-50	Electric and Magnetic Field and Noise Values-230kV Single Circuit HVTL Structure
1.12-51	Typical Section-Gas Pipeline Open Trench Installation
1.12-52	BNSF and CN Rail Trackage Operated in the Project Vicinity
1.12-53	Typical Cross Section of Rail Track Meeting Design Guideline
1.12-54	Regional Railroad Tracks Highlighting CN Track in the Vicinity of the West Range Site
1.12-55	BNSF and CN Ownership Boundary Near the West Range IGCC Power Station
1.12-56	Alternative Routes for the BNSF To Serve the West Range IGCC Power Station
1.12-57	Alternative Routes for the CN To Serve the West Range or East Range Sites
1.12-58	Alternative Rail Layouts Evaluated for the West Range IGCC Power Station
1.12-59	Existing Highway System in the Vicinity of the West Range Site
1.12-60	Cross Section of a Typical Access Road

1.12-61	Regional Roadway System in Vicinity of East Range Site
1.12-62	Conceptual Illustration of Caisson-Type Intake Structure
1.12-63	Conceptual Illustration of Floating-Type Intake Structure
1.12-64	Average Monthly Flow Rates for Prairie River
1.12-65	CMP Pump Station and GMMP Pump Station Discharge Point
1.12-66	GMMP Pump Station
1.12-67	LMP Pump Station and Prairie River Station Structure
1.12-68	LMP Pump Station Discharge Point
1.12-69	Modeled Annual Variation in CMP Water Levels
1.12-70	Modeled 5-Year Variation in CMP Water Levels
1.12-71	East Range Site Water Resources in Relationship to IGCC Power Station
1.12-72	East Range Process Water Supply Pipeline Segments
1.12-73	Preferred and Alternate Site Locations Within Their Watershed Basins
1.12-74	Annual Mass of Mercury Discharged to Holman Lake
1.12-75	Annual Mass of Phosphorus Discharged to Holman Lake
1.12-76	Domestic Wastewater Treatment Options for West Range IGCC Power Station

2. DESCRIPTION OF THE AFFECTED ENVIRONMENT II-1

2.1 Potentially Significant Receptors II-1
2.1.1 West Range Site II-1
2.1.1.1 West Range IGCC Facility II-1
2.1.1.2 Noise Receptors II-4
2.1.1.3 HVTL Alternatives II-4
2.1.1.4 Natural Gas Pipeline Alternatives II-5
2.1.1.5 Process Water Supply Pipelines II-6
2.1.1.6 Process Water Blowdown Pipelines II-7
2.1.1.7 Potable Water and Sewer Pipelines II-7
2.1.1.8 Rail Lines II-8
2.1.1.9 Roads II-8
2.1.2 East Range Site II-8
2.1.2.1 IGCC Power Station Footprint and Buffer Land II-9
2.1.2.2 East Range HVTL Alternative Routes II-11
2.1.3 East Range Gas Pipeline II-12
2.1.3.1 Potable Water and Sewer Pipelines II-13
2.1.3.2 Process Water Supply Pipelines II-13
2.1.3.3 Rail Lines II-13
2.1.3.4 Roads II-13
2.2 Aesthetics II-13
2.3 Air Quality and Meteorology II-13
2.3.1 Existing Air Quality Conditions II-13
2.3.2 Site Meteorology II-14
2.3.3 Attainment Status II-14
2.3.4 Visibility II-16
2.3.5 Class I Areas II-16
2.3.6 Wind Rose II-17
2.3.7 Air Quality Monitoring II-18
2.3.8 Fog II-18
2.3.9 Odors II-18
2.4 Geology and Soils II-18
2.4.1 Geology and Soils Overview II-18
2.4.1.1 West Range Site II-19
2.4.1.2 East Range Site II-23
2.4.2 Previous Mining Activity II-23
2.4.2.1 West Range Site II-23
2.4.2.2 East Range Site II-23
2.4.3 Climate II-23
2.4.4 Historical Land Use and Vegetation II-24
2.4.4.1 West Range Site II-24
2.4.4.2 East Range Site II-24
2.4.5 Surficial Geology II-24
2.4.5.1 West Range Site II-24
2.4.5.2 East Range Site II-27
2.4.6 Soils II-27
2.4.6.1 West Range II-27
2.4.6.2 East Range II-41
2.4.6.2.1A Minnesota Geologic Survey II-41
2.4.6.3 Prime and Statewide Important Farmland II-47

2.4.7 Bedrock Stratigraphy II-50
2.4.7.1 Archean Batholith II-50
2.4.7.2 Animike Group II-51
2.4.7.3 Upper Precambrian Intrusive Rocks II-51
2.4.8 General Bedrock Geology II-52
2.4.8.1 West Range Site II-52
2.4.8.2 East Range Site II-52
2.4.9 Bedrock II-55
2.4.9.1 West Range II-55
2.4.9.2 East Range Bedrock Geology II-68
2.4.10 Geotechnical Investigations II-74
2.4.10.1.1 West Range Rail Alternative 1A II-77
2.4.11 Seismology II-77
2.4.11.1 Fault Zones in Relation to Minnesota Earthquakes II-79
2.4.11.2 Earthquake Risk II-79
2.5 Water Resources and Water Quality II-81
2.5.1 Surface Water II-81
2.5.1.1 Drainage Areas, Water bodies, and Waterways II-81
2.5.1.2 Water Supply and Discharges II-98
2.5.1.3 Usage and Availability II-100
2.5.1.4 Drainage Areas II-102
2.5.2 Groundwater II-103
2.5.2.1 Groundwater Quality and Quantity II-103
2.5.2.2 Groundwater Depth and Recharge Sources II-106
2.5.2.3 Usage and Availability II-110
2.5.2.4 Permits II-117
2.5.2.5 Groundwater Monitoring Wells II-118
2.5.2.6 Existing Potable Water Treatment Systems II-119
2.6 Floodplains II-120
2.6.1 Description of Floodplains II-120
2.6.1.1 West Range Site II-120
2.6.1.2 East Range Site II-120
2.6.2 Federal Emergency Management Agency (FEMA) Maps II-120
2.6.2.1 West Range Site II-120
2.6.2.2 East Range Site II-121
2.6.3 100-year and 500-year Floodplains II-121
2.6.3.1 West Range Site II-121
2.6.3.2 East Range Site II-121
2.7 Wetlands II-126
2.7.1 Wetland Identification and Mapping Process II-126
2.7.1.1 Off-Site Assessment II-127
2.7.1.2 On-Site Screening II-127
2.7.1.3 Field Delineation II-127
2.7.2 Wetland Classifications II-130
2.7.3 West Range Wetlands II-132
2.7.3.1 Delineated Wetlands II-132
2.7.3.2 Typical West Range Wetland Types II-138
2.7.3.3 Wetlands Along Utility Water Crossings II-144
2.7.4 East Range Wetlands II-151
2.7.4.1 East Range Delineated Wetlands II-151
2.7.4.2 Typical East Range Wetlands II-153

2.7.4.3 Wetlands Along East Range Utility Water Crossings.....II-156
2.8 Land use II-166
2.8.1 Local and Regional Land Uses.....II-166
2.8.2 West Range Existing Land Cover II-170
2.8.2.1 West Range IGCC Power Station Footprint II-170
2.8.2.2 West Range Plan A Preferred HVTL Route (WRA-1).....II-171
2.8.2.3 West Range HVTL Plan A Alternate HVTL Route (WRA-1A) II-171
2.8.2.4 West Range Plan B Phase II Alternate HVTL Route (WRB-2A).....II-172
2.8.2.5 West Range Proposed Natural Gas Pipeline Route.....II-173
2.8.2.6 West Range Natural Gas Pipeline Alternative 2 Route.....II-173
2.8.2.7 West Range Natural Gas Pipeline Alternative 3 Route.....II-174
2.8.2.8 West Range Process Water Supply Pipeline.....II-175
2.8.2.9 West Range Blowdown Process Water Supply Pipeline 1 .....II-177
2.8.2.10 West Range Blowdown Process Water Supply Pipeline 2 .....II-177
2.8.2.11 West Range Potable Water and Sewer Pipelines II-178
2.8.2.12 West Range Rail Line Alternative 1A II-178
2.8.2.13 West Range Rail Line Alternative 1B.....II-179
2.8.2.14 West Range Roads II-180
2.8.3 East Range Existing Land Cover II-181
2.8.3.1 IGCC Power Station Footprint.....II-181
2.8.3.2 East Range 38L HVTL Route.....II-182
2.8.3.3 East Range 39L/37L HVTL Route II-183
2.8.3.4 East Range Natural Gas Pipeline Route.....II-186
2.8.3.5 East Range Process Water Supply Pipelines.....II-186
2.8.3.6 East Range Potable Water and Sewer Pipelines.....II-190
2.8.3.7 East Range Rail Line Alternative 1.....II-191
2.8.3.8 East Range Rail Line Alternative 2.....II-191
2.8.3.9 East Range Roads.....II-192
2.8.4 Publicly Owned Lands II-193
2.8.4.1 West Range II-193
2.8.4.2 East Range.....II-193
2.8.5 Farmland II-195
2.8.5.1 West Range Site and HVTL/Natural Gas Pipeline Routes II-195
2.8.5.2 East Range Site and HVTL/Natural Gas Pipeline Routes.....II-195
2.8.6 Industrial Areas II-196
2.8.6.1 West Range Site and Associated Corridors.....II-196
2.8.6.2 East Range Industrial Areas.....II-196
2.8.6.3 Recreational Areas II-197
2.9 Materials and Waste Management II-199
2.10 Ecological Resources II-199
2.10.1 Flora and Fauna.....II-199
2.10.1.1 West Range Site.....II-199
2.10.1.2 East Range Site II-212
2.10.2 Threatened, Endangered and Other Rare Species II-225
2.10.2.1 West Range Site and Transportation/Utility Corridors.....II-225
2.10.2.2 East Range Site II-233
2.11 Noise..... II-236
2.11.1 Sound and Noise Descriptions II-236
2.11.2 Noise Loss Over Distance.....II-237

2.11.3 Minnesota Pollution Control Noise Guidelines....II-238
2.11.4 Existing Noise Levels II-239
2.11.4.1 West Range Site....II-239
2.11.4.2 East Range Site II-243
2.12 Transportation and Traffic.... II-247
2.12.1.1 West Range Site II-247
2.12.1.1.1 Roads II-247
2.12.1.1.2 Traffic Volumes....II-248
2.12.1.1.3 Rail Line II-248
2.12.1.2 East Range Site....II-248
2.13 Historic and Cultural Resources II-249
2.13.1 Archaeological Resources....II-249
2.13.1.1 West Range IGCC Site II-250
2.13.2 Architectural History Assessment....II-252
2.13.2.1 West Range IGCC Site II-252
2.13.3 Native American Tribal and Religious Practices II-253
2.13.3.1 Current Tribal Boundaries....II-253
2.13.3.2 Current Religious Practices....II-254
2.14 Socioeconomics.... II-254
2.14.1 Population II-254
2.14.1.1 Regional Population Trends....II-254
2.14.1.2 Taconite and Hoyt Lakes Population Trends II-256
2.14.2 Demographics and Special Populations II-257
2.14.2.1 West Range Site....II-257
2.14.2.2 East Range Site II-257
2.14.3 Housing Availability II-258
2.14.4 Employment II-258
2.14.5 Unemployment....II-260
2.14.6 Income and Poverty Rates....II-261
2.15 Community Services.... II-261
2.15.1 Fire and Emergency Medical II-261
2.15.1.1 West Range Site: Taconite....II-261
2.15.1.2 East Range Site: Hoyt Lakes....II-261
2.15.2 Police Protection II-262
2.15.2.1 West Range Site: Taconite....II-262
2.15.2.2 East Range Site: Hoyt Lakes....II-262
2.15.3 Utilities....II-262
2.15.3.1 Preferred Site (West Range)....II-262
2.15.3.2 Alternative Site (East Range)....II-263

2.1-1	Receptors near IGCC Power Station
2.1-2	Receptors Located Along HVTL Routes
2.1-3	Significant Receptors Located along the Proposed Natural Gas Pipeline Route
2.1-4	Significant Receptors Located Within 100 feet of the Natural Gas Pipeline Routes Considered
2.1-5	Significant Receptors along the Process Water Supply Pipeline Corridors
2.1-6	Significant Receptors along the Process Water Blowdown Pipelines
2.1-7	Significant Receptors along the Potable Water and Sewer Pipeline Alignment
2.1-8	Significant Receptors along the Alternative Railroad Alignments
2.1-9	Significant Receptors along Access Roads
2.1-10	Significant Receptors Near the IGCC Power Station Footprint and Buffer Land
2.1-11	Receptors along the HVTL Alternatives
2.1-12	Significant Receptors along the East Range Natural Gas Pipeline Route
2.1-13	Public Gathering Places in the Vicinity of the Natural Gas Pipeline and Significant Receptors within 100 feet of the Alignment's Centerline
2.3-1	National and Minnesota Ambient Air Quality Standards and Monitored Background Concentrations
2.3-2	Class I Increments
2.4-1	Prime and Statewide Important Farmland Within West Range Site and Utility and Transportation Corridors
2.4-2	Prime and Statewide Important Farmland within East Range Site and Utility and Transportation Corridors
2.4-3	Top of Bedrock Elevation Summary
2.4-4	Top of Bedrock Elevation Summary
2.4-5	Geotechnical Laboratory Test Assignments
2.4-6	Historical Seismicity of Minnesota
2.5-1	Surface Water Bodies
2.5-2	Surface Water Bodies
2.5-3	Existing Water Appropriation Permits for Surface Waters Around East Range Site
2.5-4	East Range MDNR Appropriation Permits and Pumping Rates (Surface Waters)
2.5-5	Abandoned Mine Pit Water Sources
2.5-6	Water Source Supply Capability

2.5-7	Average Transmissivities and Hydraulic Conductivities for MDNR Monitoring Wells and Wells On-Site
2.5-8A	Static Groundwater Elevations
2.5-8B	Static Groundwater Elevations
2.5-9	Static Groundwater Elevations Municipal Wells of Surrounding Communities
2.5-10	Pumping Groundwater Elevations City Municipal Wells
2.5-11	Well Inventory: West Range Site
2.5-12	Well Inventory: Canisteo Mine Complex
2.5-13	Well Inventory: Hill Annex Mine Complex
2.5-14	DNR Appropriation Permits and Pumping Rates (Groundwater)
2.5-15	Well Inventory: East Range Site
2.5-16	Well Details Monitoring Wells Constructed On-Site, July 2005
2.5-17	Static Water Elevations Monitoring Wells Constructed On-Site
2.6-1	Communities Impacted East Range
2.7-1	Wetland Types and Definitions in Minnesota
2.7-2	Summary of Wetlands within West Range IGCC Power Station Footprint and Buffer Land
2.7-3	Summary of Wetland Area by Circular 39 Type Within West Range Site Boundary
2.7-4	Summary of Delineated Wetlands within Adjacent Utility Corridors Outside of West Range Buffer Land
2.7-5	Water Crossings for West Range HVTL Alternative 1
2.7-6	Water Crossings for West Range Plan A Alternate Route WRA-1A
2.7-7	Water Crossings for West Range HVTL Plan B Phase II Alternate Route WRB-2A
2.7-8	Water Crossings for West Range Gas Pipeline Alternative 1
2.7-9	Water Crossings for West Range Gas Pipeline Alternative 2 Route
2.7-10	Water Crossings for West Range Natural Gas Pipeline Alternative 3 Route
2.7-11	Water Crossings for West Range Blowdown Process Water Pipeline 1
2.7-12	East Range Wetland Characteristics
2.7-13	Water Crossings for East Range 38L HVTL Route
2.7-14	Water Crossings for East Range HVTL Alternative 2
2.7-15	Water Crossings for Proposed East Range Natural Gas Pipeline Route
2.7-16	Water Crossings for East Range Process Water Supply Pipeline—Area 6 and Stephens Mine to Area 2WX

2.7-17	Water Crossings for East Range Process Water Supply Pipeline—Area 9 South to Area 6
2.7-18	Water Crossings for East Range Process Water Supply Pipeline—Area 9 North (Donora Mine) to Area 6
2.7-19	Water Crossings for East Range Potable Water and Sewer Pipelines
2.7-20	Water Crossings for East Range Rail Line Alternative 1
2.7-21	Water Crossings for East Range Rail Line Alternative 2
2.8-1	West Range IGCC Power Station Footprint
2.8-2	West Range Plan A Preferred HVTL Route (WRA-1)
2.8-3	West Range Plan A Alternate HVTL Route (WRA-1A)
2.8-4	West Range Plan
2.8-5	West Range Proposed Natural Gas Pipeline Route
2.8-6	West Range Natural Gas Pipeline Alternative 2 Route
2.8-7	West Range Natural Gas Pipeline Alternative 3 Route
2.8-8	West Range Process Water Supply Pipeline Segment 1
2.8-9	West Range Process Water Supply Pipeline Segment 2
2.8-10	West Range Proposed Process Water Supply Pipeline Segment 3
2.8-11	West Range Blowdown Process Water Supply Pipeline 1
2.8-12	West Range Blowdown Process Water Supply Pipeline 2
2.8-13	West Range Potable Water and Sewer Pipeline
2.8-14	West Range Rail Line Alternative 1A
2.8-15	West Range Rail Line Alternative 1B
2.8-16	West Range Roads—Access Road 1
2.8-17	West Range Roads—Access Road 2
2.8-18	West Range Roads—Access Roads 1 and 2 Combined
2.8-19	East Range IGCC Power Station Footprint
2.8-20	East Range 38L HVTL Route
2.8-21	East Range 39L/37L HVTL Route
2.8-22	East Range Natural Gas Pipeline Route
2.8-23	East Range Process Water Supply Pipeline—Pipeline 2WX-Site
2.8-24	East Range Process Water Supply Pipeline—Pipeline 2WX-2W
2.8-25	East Range Process Water Supply Pipeline—Pipeline 2W-2E
2.8-26	East Range Process Water Supply Pipeline—Pipeline 3-2E
2.8-27	East Range Process Water Supply Pipeline—Pipeline K-2WX
2.8-28	East Range Process Water Supply Pipeline—Pipeline 6-S-2WX

2.8-29	East Range Process Water Supply Pipeline—Pipeline 9S-6
2.8-30	East Range Process Water Supply Pipeline—Pipeline 9N-6
2.8-31	East Range Potable Water and Sewer Pipeline
2.8-32	East Range Rail Line Alternative 1
2.8-33	East Range Rail Line Alternative 1—Center Loop
2.8-34	East Range Rail Line Alternative 2
2.8-35	East Range Access Road 1
2.8-36	Publicly Owned Lands in the Vicinity of the West Range Site
2.10-1	Terrestrial Land Cover Types from LandSat-Based Land Use-Land Cover and in which Utility or Transportation Corridor it is Encountered
2.10-2	Terrestrial Land Cover Types Encountered in each Utility or Transportation Corridor
2.10-3	Water Crossings for West Range HVTL Alternative 1
2.10-4	Water Crossings for West Range HVTL Alternative 1A
2.10-5	Water Crossings for West Range HVTL Phase 2
2.10-6	Water Crossings for West Range Gas Pipeline Alternative 1
2.10-7	Water Crossings for West Range Gas Pipeline Alternative 2
2.10-8	Water Crossings for West Range Gas Pipeline Alternative 3
2.10-9	Water Crossings for West Range Blowdown Process Water Supply Pipeline Alternative 1
2.10-10	Terrestrial Land Cover Types from LandSat-Based Land Use-Land Cover
2.10-11	Water Crossings for East Range HVTL Alternative 1
2.10-12	Water Crossings for East Range HVTL Alternative 2
2.10-13	Water Crossings for East Range Gas Pipeline Alternative 1
2.10-14	Water Crossings for East Range Pipeline 6-S-2WX
2.10-15	Water Crossings for East Range Pipeline 9S-6
2.10-16	Water Crossings for East Range Pipeline 9N-6
2.10-17	Water Crossings for East Range Potable Water and Sewer Pipeline
2.10-18	Water Crossings for East Range Rail Line Alternative 1
2.10-19	Water Crossings for East Range Rail Line Alternative 2
2.10-20	MDNR NHIS Plant Species Occurrences in Vicinity of West Range Site
2.10-21	MDNR NHIS Occurrences within One Mile of Utility Corridors
2.10-22	MDNR NHIS Plant Species Occurrences within One Mile of East Range Site Transportation or Utility Corridors
2.11-1	Sound Pressure Level (dBA)

2.11-2	7030.0050 Noise Area Classification (NAC) Household Units including Farm Houses
2.11-3	Monitoring results at Receptor 1, 1700 feet from IGCC Power Station Footprint
2.11-4	Monitoring results at Receptor 2, 3900 feet from IGCC Power Station Footprint
2.11-5	Monitoring results at Receptor 3, 3900 feet from IGCC Power Station Footprint
2.11-6	Monitoring results at Receptor 4, 3900 feet from IGCC Power Station Footprint
2.11-7	Monitoring results at Receptor 5, 4100 feet from IGCC Power Station Footprint
2.11-8	Monitored levels at all Receptors, Daytime, dBA
2.11-9	Monitored levels at all Receptors, Nighttime, dBA
2.11-10	Monitoring results at Receptor 1, 800 feet southwest of IGCC Power Station Footprint
2.11-11	Monitoring results at Receptor 2, 7,800 feet from plant
2.11-12	Monitoring results at Receptor 3, 8300 feet from IGCC Power Station Footprint
2.11-13	Monitoring results at Receptor 4, 11,500 feet from IGCC Power Station Footprint
2.11-14	Monitored levels at all Receptors, Daytime, dBA
2.11-15	Monitored levels at all Receptors, Nighttime, dBA
2.14-1	Arrowhead Region Population Trends 1970-2000
2.14-2	Population Change Between Censuses by County for Arrowhead Region
2.14-3	10 Largest MCDs in Northeast Minnesota, 2002
2.14-4	Population Trends Since 1980 for Taconite (West Range) and Hoyt Lakes (East Range)
2.14-5	2000 Census: Region 3 Arrowhead Population Profiles: Total and Minority Populations

FIGURES

2.1-1	Significant Receptors in the Immediate Vicinity West of the West Range IGCC Power Station
2.1-2	Significant Receptors in the Immediate Vicinity Southeast of the West Range IGCC Power Station
2.1-3	Residences and Other Receptors: East Range IGCC Power Station
2.3-1	West Range Wind Rose Data, 1972-1976
2.4-1	Physiographic Areas of Minnesota
2.4-2	Mining Disturbances in the Vicinity of the West Range Site
2.4-3	Historical Mining Disturbances in the Vicinity of the East Range Site
2.4-4	Arrowhead Region Quaternary Geology
2.4-5	West Range Soils and Boring Locations
2.4-6	West Range Corridor Soil and Groundwater Conditions
2.4-7	West Range Site Soil and Groundwater Conditions
2.4-8	East Range Site Quaternary Geology
2.4-9	Prime Farmland in the Vicinity of the West Range Site
2.4-10	Arrowhead Region Bedrock Geology
2.4-11	Geologic Cross Section of Site Area
2.4-12	Soil Borings Useful in Determining Cut and Fill Required for Access Road 2
2.4-13	Subsurface Profile of Cross Section “1-1”
2.4-14	Subsurface Profile of Cross Section “2-2”
2.4-15	Subsurface Profile of Cross Section “3-3”
2.4-16	Subsurface Profile of Cross Section “4-4”
2.4-17	West Range Corridor Depth to Bedrock
2.4-18	West Range Site Depth to Bedrock
2.4-19	East Range Site Bedrock Geology
2.4-20	Depth to Bedrock At East Range IGCC Power Station Footprint and Buffer Land
2.4-21	Bedrock Geology and Earthquake Location Map **(listed as same as 20)**
2.4-22	Bedrock Geology and Earthquake Location Map
2.5-1	West Range Major Drainage Areas
2.5-2	Hill-Annex and Gross Marble Bathymetry
2.5-3	Arcturus Mine Pit Bathymetry
2.5-4	CMP Bathymetry Data

2.5-5	Historical Prairie River Monthly Flow Rates
2.5-6	Lind Mine Pit Bathymetry
2.5-7	East Range Major Drainage Areas
2.6-1	FEMA Floodplains in the Vicinity of the West Range IGCC Power Station Footprint and Buffer Land
2.6-2	FEMA Floodplains the West Range Site Area
2.6-3	FEMA Floodplains near the East Range IGCC Power Station
2.6-4	FEMA Floodplains in the East Range Site Area
2.7-1	West Range Site Surveyed Wetlands and Land Cover Inventory
2.7-2	West Range IGCC Footprint Surveyed Wetlands and Land Cover Inventory
2.7-3	Wetlands Within the East Range IGCC Power Station Footprint and Buffer Lands
2.8-1	West Range Land Use/Land Cover Within the Vicinity of the IGCC Power Station
2.8-2	Land Use/Land Cover in the Vicinity of the West Range Site
2.8-3	East Range Existing Land Use/Land Cover IGCC Power Station Vicinity
2.8-4	East Range Existing Land Use/Cover Pipeline and Transmission Corridors
2.8-5	Publicly Owned Lands West Range Site Area
2.8-6	Mesabi Trail Map
2.8-7	Map of Superior National Forest Scenic Byway
2.8-8	Nearby Recreational Activities in Hoyt Lakes
2.14-1	Environmental Justice Demographics in Arrowhead Region
2.14-2	Annual Unemployment Rate, Arrowhead v. Statewide Average

3.0 ENVIRONMENTAL CONSEQUENCES III-1

3.1 Aesthetics III-2
3.1.1 Methodology III-2
3.1.1.1 Distance from Which Stacks/Buildings Can Be Observed Given a Clear Line of Sight (Site Independent Aesthetic Features) III-3
3.1.1.2 Line of Sight Distance Calculations (Accounting Earth's Curvature) III-9
3.1.1.3 Visibility Calculations Yielding Line of Sight Distances III-10
3.1.2 West Range III-12
3.1.2.1 IGCC Power Station Footprint III-13
3.1.2.2 HVTLs and Structures III-15
3.1.2.3 HVTL Alternate 1A Plan A Alternate Route (WRA-1A) III-17
3.1.2.4 Natural Gas Pipeline Alternative 1 ..... III-19
3.1.2.5 Natural Gas Pipeline Alternative 2 ..... III-19
3.1.2.6 Natural Gas Pipeline Alternative 3 ..... III-19
3.1.2.7 Process Water Supply Pipeline III-20
3.1.2.8 Railway III-23
3.1.2.9 Roadways III-24
3.1.3 East Range III-25
3.1.3.1 IGCC Power Station Footprint III-25
3.1.3.2 High-Voltage Transmission Line Routes III-28
3.1.3.3 Natural Gas Pipeline Alternative 1 ..... III-30
3.1.3.4 Process Water Supply Pipelines III-32
3.1.3.5 Process Water Blowdown Pipeline III-32
3.1.3.6 Potable Water and Domestic Wastewater Pipelines III-32
3.1.3.7 Railway III-32

3.2 Air Quality III-34
3.2.1 Permitting Status III-34
3.2.2 NAAQS and PSD Increment Impact Analysis III-34
3.2.2.1 West Range Analysis III-34
3.2.2.2 East Range Analysis III-40
3.2.3 Nonattainment Area Impact Analysis III-43
3.2.4 Good Engineering Practice Height Analysis III-43
3.2.5 Risks to Human Health and Ecology III-43
3.2.5.1 West Range III-43
3.2.5.2 East Range Site III-44
3.2.6 Emissions from Cooling Towers III-44
3.2.6.1 West Range III-45
3.2.6.2 East Range III-45
3.2.7 Visibility (Air Quality Related Impact) III-46
3.2.7.1 West Range III-46
3.2.7.2 East Range III-49
3.2.8 Construction Impacts III-50
3.2.9 Vehicular Emissions III-50
3.2.10 Soil and Vegetation III-51

3.3 Geology and Soils III-52
3.3.1 Soils III-52
3.3.1.1 West Range III-52

3.3.1.2 East Range III-83
3.3.2 Bedrock III-98
3.3.2.1 West Range III-98
3.3.2.2 East Range III-103
3.3.3 Mitigation Measures III-108
3.3.3.1 West Range Soils III-108
3.3.3.2 East Range Soils III-109
3.3.3.3 Mitigation of Impacts to Prime or Statewide Important Farmlands III-109
3.4 Water Resources and Water Quality III-110
3.4.1 Water Appropriation Impacts III-110
3.4.1.1 West Range III-110
3.4.1.2 East Range III-112
3.4.2 Existing Permits III-113
3.4.2.1 West Range Site III-113
3.4.2.2 East Range Site III-113
3.4.3 New Permits III-113
3.4.3.1 West Range Site III-113
3.4.3.2 East Range Site III-115
3.4.4 Recreational Activities III-117
3.4.4.1 West Range Site III-117
3.4.4.2 East Range Site III-118
3.4.5 Surface/Groundwater Resources III-118
3.4.5.1 West Range Site III-118
3.4.5.2 East Range Site III-119
3.4.6 Potable Water Supply III-119
3.4.7 Stream Diversions, Dredging, and Dumping III-119
3.4.8 Aquifers III-120
3.4.8.1 West Range Site III-120
3.4.8.2 East Range Site III-120
3.4.9 Wastewater III-121
3.4.9.1 West Range Site III-121
3.4.9.2 East Range Site III-121
3.5 Floodplains III-123
3.5.1 Obstruction or Diversion of Flow III-123
3.5.2 Contacts with Agencies III-123
3.5.3 Effects on Project Facilities III-123
3.5.4 Mitigation Measures III-123
3.6 Wetlands III-125
3.6.1 Impacts and Consequences – Preferred Site (West Range) III-125
3.6.1.1 West Range IGCC Power Station III-125
3.6.1.2 West Range HVTL Alternative 1 ..... III-126
3.6.1.3 West Range HVTL Alternative 1A III-129
3.6.1.4 West Range Plan B Phase II Alternate Route WRB-2A III-133
3.6.1.5 West Range Natural Gas Pipeline Alternative 1 ..... III-136
3.6.1.6 West Range Natural Gas Pipeline Alternative 2 ..... III-138
3.6.1.7 West Range Natural Gas Pipeline Alternative 3 ..... III-141
3.6.1.8 West Range Process Water Supply Pipelines III-144
3.6.1.9 West Range Process Water Blowdown Pipeline 1 ..... III-147
3.6.1.10 West Range Process Water Blowdown Pipeline 2 ..... III-149
3.6.1.11 West Range Potable Water and Sewer Pipelines III-150
3.6.1.12 West Range Railroad Alternative 1A III-151

3.6.1.13 West Range Rail Line Alternative 1B III-153
3.6.1.14 West Range Roads III-155
3.6.2 Impacts and Consequences – Alternative Site (East Range) III-157
3.6.2.1 East Range Site IGCC Power Station Footprint III-157
3.6.2.2 East Range HVTL Alternative 1 ..... III-158
3.6.2.3 East Range HVTL Alternative 2 ..... III-163
3.6.2.4 East Range Natural Gas Pipeline Alternative 1 ..... III-168
3.6.2.5 East Range Process Water Supply Pipeline –..... III-172
3.6.2.6 East Range Potable Water and Sewer Pipelines III-178
3.6.2.7 Railroad Alternative 1 ..... III-180
3.6.2.8 Railroad Alternative 2 ..... III-182
3.6.2.9 East Range Roads III-185
3.6.3 Contacts with Agencies III-186
3.6.4 Wetland Impacts Minimization III-186
3.6.4.1 West Range IGCC Power Station Footprint and Buffer Land III-189
3.6.4.2 West Range HVTL Alternative 1 ..... III-189
3.6.4.3 West Range HVTL Alternative 1A III-190
3.6.4.4 West Range Plan B Phase II Alternate Route WRB-2A III-190
3.6.4.5 West Range Natural Gas Pipeline Alternative 1 ..... III-190
3.6.4.6 West Range Natural Gas Pipeline Alternative 2 ..... III-191
3.6.4.7 West Range Natural Gas Pipeline Alternative 3 ..... III-191
3.6.4.8 West Range Process Water Supply Pipeline III-192
3.6.4.9 West Range Process Water Blowdown Pipeline 1 (Facility to Holman Lake) III-192
3.6.4.10 West Range Process Water Blowdown Pipeline 2 (Facility to Canisteo Pit) III-193
3.6.4.11 West Range Potable Water and Sewer Pipelines III-193
3.6.4.12 West Range Rail Line Alternative 1A III-193
3.6.4.13 West Range Rail Line Alternative 1B III-194
3.6.4.14 West Range Roads III-195
3.6.4.15 East Range IGCC Power Station III-195
3.6.4.16 East Range HVTL Alternative 1 ..... III-195
3.6.4.17 East Range HVTL Alternative 2 ..... III-196
3.6.4.18 East Range Natural Gas Pipeline Alternative 1 ..... III-196
3.6.4.19 East Range Process Water Supply Pipeline – Area 2WX to Footprint III-197
3.6.4.20 East Range Process Water Supply Pipeline – Area 2WX to Area 2W III-197
3.6.4.21 East Range Process Water Supply Pipeline – Area 2W to Area 2E III-197
3.6.4.22 East Range Process Water Supply Pipeline – Area 3 to Area 2E III-197
3.6.4.23 East Range Process Water Supply Pipeline – Knox Mine to Area 2WX III-198
3.6.4.24 East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX III-198
3.6.4.25 East Range Process Water Supply Pipeline – Area 9 South to Area 6 ..... III-198
3.6.4.26 East Range Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6 ..... III-199
3.6.4.27 East Range Potable Water and Sewer III-199

3.6.4.28 East Range Railroad Alternative 1 ....III-199
3.6.4.29 East Range Railroad Alternative 2 ....III-200
3.6.4.30 East Range Roads III-200
3.6.5 Mitigation Measures III-200
3.7 Land use III-203
3.7.1 West Range III-203
3.7.1.1 IGCC Power Station and Buffer Land III-203
3.7.1.2 West Range HVTL Alternative 1 ....III-204
3.7.1.3 West Range HVTL Alternative 1A III-204
3.7.1.4 West Range Plan B Phase II Alternate Route WRB-2A III-205
3.7.1.5 West Range Gas Pipeline Alternative 1 ....III-205
3.7.1.6 West Range Gas Pipeline Alternative 2 ....III-206
3.7.1.7 West Range Gas Pipeline Alternative 3 ....III-207
3.7.1.8 West Range Process Water Supply Pipeline III-208
3.7.2 East Range III-214
3.7.2.1 IGCC Power Station Footprint and Buffer Land III-214
3.7.2.2 East Range HVTL Alternative 1 ....III-215
3.7.2.3 East Range HVTL Alternative 2 ....III-216
3.7.2.4 East Range Gas Pipeline Alternative 1 ....III-217
3.7.2.5 East Range Process Water Supply Pipeline III-218
3.7.2.6 East Range Potable Water and Sewer Pipeline III-222
3.7.2.7 East Range Rail Line Alternative 1 ....III-223
3.7.2.8 East Range Rail Line Alternative 2 ....III-224
3.7.2.9 East Range Roads III-225
3.7.3 Publicly Owned Lands III-225
3.7.3.1 West Range Site and Associated Facilities III-225
3.7.3.2 East Range Site and Associated Corridors III-226
3.7.4 Structures III-226
3.7.4.1 West Range Site and Associated Corridors III-226
3.7.4.2 East Range Site and Associated Corridors III-227
3.7.5 Residential Areas III-227
3.7.5.1 West Range Site III-227
3.7.5.2 West Range Associated Corridors III-227
3.7.5.3 East Range Site and Associated Corridors III-228
3.7.6 Farmland III-229
3.7.6.1 West Range Site and Associated Corridors III-229
3.7.6.2 East Range Site and Associated Corridors III-229
3.7.7 Industrial Areas III-229
3.7.7.1 West Range Site and Associated Corridors III-229
3.7.8 East Range Industrial Areas III-230
3.7.9 Recreational Areas III-230
3.7.9.1 West Range Site and Associated Corridors III-230
3.7.10 East Range Site and Associated Corridors III-230
3.7.10.1 Impacts III-231
3.7.11 Site Restoration III-231
3.7.12 Mitigation Measures III-231
3.8 Materials and Waste Management III-232
3.9 Ecological Resources III-233
3.9.1 Federal and State Resource Management Agencies III-233
3.9.2 Flora III-233
3.9.2.1 West Range Site III-233
3.9.2.2 East Range Site III-245

3.9.3 Fauna....III-256
3.9.3.1 West Range Site....III-256
3.9.3.2 East Range Site....III-257
3.9.4 Threatened, Endangered, and Otherwise Rare Species....III-257
3.9.4.1 West Range Site....III-258
3.9.4.2 East Range Site....III-268
3.9.5 Regulatory Implications and/or Mitigation....III-274
3.9.5.1 Flora and Fauna....III-274
3.9.5.2 Threatened, Endangered, or Otherwise Rare Species....III-275
3.10 Noise....III-277
3.10.1 Construction Noise Levels....III-277
3.10.1.1 West Range Site....III-278
3.10.1.2 East Range Site....III-281
3.10.2 Operational Noise Levels....III-284
3.10.2.1 West Range Site....III-285
3.10.2.2 East Range Site....III-286
3.10.3 Traffic Associated Noise Levels....III-288
3.10.3.1 West Range Site....III-288
3.10.3.2 East Range Site....III-290
3.10.4 Rail Noise and Vibration....III-291
3.10.4.1 Federal Rail Impact Criteria for Noise and Vibration....III-291
3.10.4.2 Project Rail Noise and Vibration Levels....III-293
3.10.5 Impact of Construction Noise on Receptors....III-296
3.10.5.1 West Range Site....III-296
3.10.5.2 East Range Site....III-297
3.10.6 Impact of Plant Operation Noise on Receptors....III-297
3.10.6.1 West Range Site....III-297
3.10.6.2 East Range Site....III-297
3.10.7 Impact of Rail Noise and Vibration on Receptors....III-298
3.10.7.1 West Range Site....III-298
3.10.7.2 East Range Site....III-298
3.10.8 Impact of Traffic Noise on Receptors....III-298
3.10.8.1 West Range Site....III-298
3.10.8.2 East Range Site....III-299
3.10.9 Mitigation Measures....III-299
3.10.9.1 Mitigation of Construction Noise....III-299
3.10.9.2 Mitigation of Facility Noise....III-300
3.10.9.3 Mitigation of Rail Line Noise....III-303
3.10.9.4 Mitigation of Traffic Noise....III-303
3.11 Electromagnetic Fields....III-306
3.11.1 Magnetic Field Calculations....III-306
3.11.1.1 West Range IGCC Power Station....III-306
3.11.1.2 West Range – Plan B Phase I Double Circuit 230kV HVTL on Preferred and Alternate Routes....III-309
3.11.1.3 Plan B Phase II Preferred 230kV HVTL Route....III-310
3.11.1.4 West Range. Plan B Phase II 345 kV Delta Single Along Lines 45, 28 and 62....III-313
3.11.1.5 East Range - Single Line 345 kV Delta Along Lines 39 and 37....III-314
3.11.2 Mitigation Measures....III-316
3.12 Transportation and Traffic....III-320
3.12.1 Level of Service....III-320

3.12.1.1 West Range Site III-320
3.12.1.2 East Range Site....III-321
3.12.2 Traffic Projections III-321
3.12.2.1 West Range Site III-321
3.12.2.2 East Range Site....III-322
3.12.3 Mitigation Measures III-324
3.12.3.1 West Range Site III-324
3.12.3.2 East Range Site....III-324
3.13 Historic and Cultural Resources III-325
3.13.1 State Agencies....III-325
3.13.2 Archaeological Resources....III-325
3.13.2.1 West Range Site and Associated Corridors....III-325
3.13.2.2 East Range Site and Associated Corridors III-325
3.13.3 Architectural Resources....III-326
3.13.3.1 West Range Site and Associated Corridors....III-326
3.13.3.2 East Range Site and Associated Corridors III-326
3.13.4 Native American Tribal and Religious Practices....III-326
3.13.5 Area of Potential Effect III-326
3.13.6 Mitigation Measures III-327
3.14 Socioeconomics....III-328
3.14.1 Regional Study Area....III-328
3.14.2 Temporary and Permanent Workers III-328
3.14.3 Availability of Labor III-329
3.14.4 Economic Benefits....III-330
3.14.4.1 Model Inputs....III-330
3.14.4.2 Model Results....III-331
3.14.4.3 Construction Period Economic and Employment III-332
3.14.4.4 Operating Period Economic and Employment Impacts III-334
3.14.4.5 Benefits of Reducing Unemployment III-336
3.14.5 Housing Availability and Real Estate Value III-337
3.14.6 Community Services....III-337
3.14.6.1 Impacts on Emergency Services....III-337
3.14.7 Mitigation Measures III-338
3.15 Safety and Health....III-339
3.15.1 Operational Occupational Hazards III-339
3.16 Environmental Justice....III-340
3.16.1 Site Specific Evaluation....III-340
3.16.2 West Range Site....III-341
3.16.3 East Range Site III-341
3.16.4 American Indian Consumption of Mercury Contaminated Fish....III-341
3.16.5 Mitigation Measures III-342
3.17 Environmental Monitoring III-343
3.18 Regulatory Compliance and Permits Requirements III-344
4.0 AGENCY CONTACTS IV-1
5.0 REFERENCES....V-1

TABLES

3.1-1	Dominant Emission Points Serving Mesaba One and Mesaba Two
3.1-2	Distances At Which Dominant Buildings and Emission Points Are First Discernable
3.1-3	LOS Distances At Which the Dominant Building Emerges from the Horizon
3.2-1	Highest Project Impacts (Phase 1 and 2) and PSD SILs West Range
3.2-2	Results of Mesaba Class II PSD Increment Analysis ($\mu g/m^3$) West Range
3.2-3	Results of Project Class II NAAQS Modeling West Range
3.2-4	Class I PSD Increment Modeling Results for Mesaba Energy Project West Range
3.2-5	Mesaba Cumulative SO_2 Increment Results (Highest Second Highs) West Range
3.2-6	Comparison of East Range Site Near-Field Model Predictions to West Range Impacts as Shown in Permit Application
3.2-7	Mesaba Project (Phases I and II) Increment Impacts East Range Site/ West Range Site
3.2-8	Mesaba CALPUFF Visibility Results Methods 2, 6 and 7 West Range
3.2-9	Mesaba Class I Area Visibility Impacts (Phases I and II) CALPUFF Method 2 Model Results
3.2-10	Daily Emission Rates from Vehicle Traffic
3.2-11	Vegetative Sensitivity Screening for SO_2 Concentrations
3.3-1	Prime and Statewide Important Farmland Impacts – West Range IGCC Power Station Footprint and Buffer Land
3.3-2	Prime and Statewide Important Farmland – West Range HVTL Alternative 1
3.3-3	Prime and Statewide Important Farmland – West Range HVTL Alternative 1A
3.3-4	Prime and Statewide Important Farmland – West Range Plan B Phase II Alternate Route WRB-2A
3.3-5	Prime and Statewide Important Farmland – Natural Gas Pipeline Alternative 1
3.3-6	Prime and Statewide Important Farmland – Natural Gas Pipeline Alternative 2
3.3-7	Prime and Statewide Important Farmland – Natural Gas Pipeline Alternative 3
3.3-8	Prime and Statewide Important Farmland – West Range Process Water Blowdown Pipeline 1
3.3-9	Prime and Statewide Important Farmland – West Range Process Water Blowdown Pipeline 2

3.3-10	Prime and Statewide Important Farmland – Process Water Supply Pipeline Segment 1 – Lind Pit to Canisteo Pit
3.3-11	Prime and Statewide Important Farmland – West Range Process Water Supply Pipeline Segment 2 – Canisteo Pit to West Range Site
3.3-12	Prime and Statewide Important Farmland – West Range Process Water Supply Pipeline Segment 3 – Gross-Marble Pit to Canisteo Pit
3.3-13	Prime and Statewide Important Farmland – West Range Railroad Alternative 1A and Center Loop
3.3-14	Prime and Statewide Important Farmland – West Range Railroad Alternative 1B and Center Loop
3.3-15	Prime and Statewide Important Farmland – West Range Sewer and Water Lines
3.3-16	Prime and Statewide Important Farmland – West Range Roads
3.4-1	Recreational Surface Waters
3.6-1	West Range IGCC Power Station – Summary of Permanent Wetland Impacts
3.6-2	Permanent Wetland Impacts by Type at West Range IGCC Power Station Footprint
3.6-3	West Range HVTL Alternative 1 Tree and Shrub Clearing in Wetlands
3.6-4	West Range HVTL Alternative 1 Wetland Impacts
3.6-5	Wetland Impacts by Type for West Range HVTL Alternative 1
3.6-6	Water Crossings for West Range HVTL Alternative 1
3.6-7	West Range HVTL Alternative 1A Tree and Shrub Clearing in Wetlands
3.6-8	West Range HVTL Alternative 1A Wetland Impacts
3.6-9	Wetland Impacts by Type for West Range HVTL Alternative 1A
3.6-10	Water Crossings for West Range HVTL Alternative 1A
3.6-11	West Range Plan B Phase II Alternate Route WRB-2A Tree and Shrub Clearing in Wetlands
3.6-12	West Range HVTL Phase II Wetland Impacts
3.6-13	Wetland Impacts by Type for West Range Plan B Phase II Alternate Route WRB-2A
3.6-14	Water Crossings for West Range Plan B Phase II Alternate Route WRB-2A
3.6-15	West Range Natural Gas Pipeline Alternative 1 Wetland Impacts
3.6-16	Wetland Impacts by Type at West Range Natural Gas Pipeline Alternative 1
3.6-17	Wetland Impacts at Water Crossings for West Range Natural Gas Pipeline Alternative 1
3.6-18	West Range Natural Gas Pipeline Alternative 2 Wetland Impacts
3.6-19	Wetland Impacts by Type at West Range Natural Gas Pipeline Alternative 2

3.6-20	Wetland Impacts at Water Crossings for West Range Natural Gas Pipeline Alternative 2
3.6-21	West Range Natural Gas Pipeline Alternative 3 Wetland Impacts
3.6-22	Wetland Impacts by Type at West Range Natural Gas Pipeline Alternative 3
3.6-23	Wetland Impacts at Water Crossings for West Range Natural Gas Pipeline Alternative 3
3.6-24	West Range Process Water Supply Pipeline, Segment 2 – Canisteo Pit to West Range Site
3.6-25	Wetland Impacts by Type at Segment 2
3.6-26	West Range Process Water Supply Pipeline Segment 3 – Gross-Marble Pit to Canisteo Pit
3.6-27	Wetland Impacts by Type at Segment 3
3.6-28	West Range Process Water Blowdown Pipeline 1 Wetland Impacts
3.6-29	Wetland Impacts by Type at West Range Process Water Blowdown Pipeline 1
3.6-30	Wetland Impacts at Stream Crossings for Process Water Blowdown Pipeline 1
3.6-31	West Range Process Water Blowdown Pipeline 2 Wetland Impacts
3.6-32	Wetland Impacts by Type at West Range Process Water Blowdown Pipeline 2
3.6-33	West Range Potable Water and Sewer Pipelines Wetland Impacts
3.6-34	Wetland Impacts by Type for West Range Potable Water and Sewer Pipelines
3.6-35	West Range Rail Line Alternative 1A Wetland Impacts
3.6-36	Wetland Impacts by Type for Rail Line Alternative 1A and Center Loop
3.6-37	West Range Rail Line Alternative 1B Wetland Impacts
3.6-38	Wetland Impacts by Type for Rail Line Alternative 1B and Center Loop
3.6-39	West Range Roads Wetland Impacts
3.6-40	Wetland Impacts by Type for Roads
3.6-41	Wetland Impacts - East Range Site Facility
3.6-42	Wetland Impacts by Type – East Range Site IGCC Power Station Footprint
3.6-43	East Range HVTL Alternative 1 Tree and Shrub Clearing in Wetlands
3.6-44	East Range HVTL Alternative 1 Wetland Impacts
3.6-45	Wetland Impacts by Type for HVTL Alternative 1
3.6-46	Stream Crossings for HVTL Alternative 1
3.6-47	East Range HVTL Alternative 2 Tree and Shrub Clearing in Wetlands
3.6-48	East Range HVTL Alternative 2 Wetland Impacts

3.6-49	Wetland Impacts by Type for HVTL Alternative 2
3.6-50	Stream Crossings for HVTL Alternative 2
3.6-51	Wetland Impacts – East Range Natural Gas Pipeline Alternative 1
3.6-52	Wetland Impacts by Type – East Range Natural Gas Pipeline Alternative 1
3.6-53	Wetland Impacts at Water Crossings for East Range Natural Gas Pipeline Alternative 1
3.6-54	Wetland Impacts - East Range Process Water Supply Pipeline – Area 2WX to Footprint
3.6-55	Wetland Impacts by Type - East Range Process Water Supply Pipeline – Area 2WX to Footprint
3.6-56	Wetland Impacts - East Range Process Water Supply Pipeline – Area 3 to Area 2E
3.6-57	Wetland Impacts by Type - East Range Process Water Supply Pipeline – Area 3 to Area 2E
3.6-58	Wetland Impacts - East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX
3.6-59	Wetland Impacts by Type - East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX
3.6-60	Wetland Impacts at Stream Crossings for Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX
3.6-61	Wetland Impacts - East Range Process Water Supply Pipeline – Area 9 South to Area 6
3.6-62	Wetland Impacts by Type - East Range Process Water Supply Pipeline – Area 9 South to Area 6
3.6-63	Wetland Impacts at Stream Crossings for East Range Process Water Supply Pipeline – Area 9 South to Area 6
3.6-64	Wetland Impacts at Stream Crossings for Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6
3.6-65	Wetland Impacts - East Range Potable Water and Sewer Pipelines
3.6-66	Wetland Impacts by Type - East Range Potable Water and Sewer Pipelines
3.6-67	Wetland Impacts at Stream Crossings for Potable Water and Sewer Pipelines
3.6-68	Wetland Impacts – East Range Railroad Alternative 1 and Center Loop
3.6-69	Wetland Impacts by Type – East Range Railroad Alternative 1 and Center Loop
3.6-70	Wetland Impacts at Stream Crossings for Railroad Alternative 1
3.6-71	Wetland Impacts – East Range Railroad Alternative 2
3.6-72	Wetland Impacts by Type – East Range Railroad Alternative 2
3.6-73	Wetland Impacts at Stream Crossings for Railroad Alternative 2

3.6-74	Wetland Impacts – East Range Roads
3.6-75	Wetland Impacts by Type – East Range Roads
3.6-76	Summary of Total Temporary and Permanent ROW Wetland Impacts for West Range Site and Associated Utility and Transportation Corridors
3.6-77	Summary of Total Temporary and Permanent ROW Wetland Impacts for East Range Site, and Associated Utility and Transportation Corridors
3.7-1	West Range IGCC Power Station Footprint Land Use Impacts
3.7-2	West Range HVTL Proposed Alternative Impacts to Land Use/Land Cover
3.7-3	West Range HVTL Alternative 1A Impacts to Land Use/Land Cover
3.7-4	West Range Gas Pipeline Alternative 1 Impacts to Land Use/Land Cover
3.7-5	West Range Gas Pipeline Alternative 2
3.7-6	West Range Gas Pipeline Alternative 3 Impacts to Land Use/Land Cover
3.7-7	West Range Proposed Process Water Line Segment 1 – Lind Pit to Canisteo Pit Impacts to Land Use/Land Cover
3.7-8	West Range Process Water Supply Pipeline Segment 2 – Canisteo Pit to West Range Site Impacts to Land Use/Land Cover
3.7-9	West Range Process Water Supply Pipeline Segment 3 – Gross-Marble to Canisteo Pit Impacts to Land Use/Land Cover
3.7-10	West Range Process Water Blowdown Pipeline 1 Impacts to Land Use/Land Cover
3.7-11	West Range Process Water Blowdown Pipeline 2 Impacts to Land Use/Land Cover
3.7-12	West Range Potable Water and Sewer Pipeline Impacts to Land Use/Land Cover
3.7-13	West Range Rail Line Alternative 1 Impacts to Land Use/Land Cover
3.7-14	West Range Rail Line Alternative 1B Impacts to Land Use/Land Cover
3.7-15	West Range Roads – Access Road 1 Impacts to Land Use/Land Cover
3.7-16	West Range Roads – Access Road 2 Impacts to Land Use/Land Cover
3.7-17	West Range Roads – Access Roads 1 and 2 Combined Impacts to Land Use/Land Cover
3.7-18	East Range IGCC Power Station Footprint Land Use Impacts
3.7-19	East Range HVTL Alternative 1 Impacts to Land Use/Land Cover
3.7-20	East Range HVTL Alternative 2 Impacts to Land Use/Land Cover
3.7-21	East Range Gas Pipeline Alternative 1 Impacts to Land Use/Land Cover
3.7-22	East Range Proposed Process Water Line Pipeline 2WX-SITE Impacts to Land Use/Land Cover
3.7-23	East Range Proposed Process Water Line Pipeline 2WX-W Impacts to Land Use/Land Cover

3.7-24	East Range Proposed Process Water Line Pipeline 2W-E Impacts to Land Use/Land Cover
3.7-25	East Range Proposed Process Water Line Pipeline 3-2E Impacts to Land Use/Land Cover
3.7-26	East Range Proposed Process Water Line Pipeline K-2WX Impacts to Land Use/Land Cover
3.7-27	East Range Proposed Process Water Line Pipeline 6-S-2WX Impacts to Land Use/Land Cover
3.7-28	East Range Proposed Process Water Line Pipeline 9S-6 Impacts to Land Use/Land Cover
3.7-29	East Range Proposed Process Water Line Pipeline 9N-6 Impacts to Land Use/Land Cover
3.7-30	East Range Potable Water Pipeline Impacts to Land Use/Land Cover
3.7-31	East Range Rail Line Alternative 1 Impacts to Land Use/Land Cover
3.7-32	East Range Rail Line Alternative 1 – Center Loop Impacts to Land Use/Land Cover
3.7-33	East Range Rail Line Alternative 2 Impacts to Land Use/Land Cover
3.7-34	East Range Roads Impacts to Land Use/Land Cover
3.7-35	Publicly Owned Lands Traversed – Permanent ROW Acreage
3.9-1	Anticipated Involvement of Federal and State Agencies
3.9-2	Summary of Terrestrial Communities and Proposed Impacts within West Range IGCC Power Station Footprint and Buffer Land
3.9-3	Summary of Terrestrial Communities and Proposed Impacts within West Range HVTL Alternative 1
3.9-4	Summary of Terrestrial Communities and Proposed Impacts within West Range HVTL Alternative 1A
3.9-5	Summary of Terrestrial Communities and Proposed Impacts within West Range Plan B Phase II Alternate Route WRB-2A
3.9-6	Summary of Terrestrial Communities and Proposed Impacts within West Range Natural Gas Pipeline 1
3.9-7	Summary of Terrestrial Communities and Proposed Impacts within West Range Natural Gas Pipeline 2
3.9-8	Summary of Terrestrial Communities and Proposed Impacts within West Range Natural Gas Pipeline 3
3.9-9	Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Supply Pipeline Segment 1

3.9-10	Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Supply Pipeline Segment 2
3.9-11	Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Supply Pipeline Segment 3
3.9-12	Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Supply Pipeline Segment 3
3.9-13	Summary of Terrestrial Communities and Proposed Impacts within West Range Process Water Blowdown Pipeline 2
3.9-14	Summary of Terrestrial Communities and Proposed Impacts within West Range Potable Water and Sewer Pipelines
3.9-15	Summary of Terrestrial Communities and Proposed Impacts within West Range Rail Line Alternative 1A
3.9-16	Summary of Terrestrial Communities and Proposed Impacts within West Range Rail Line Alternative 1B
3.9-17	Summary of Terrestrial Communities and Proposed Impacts within West Range Roads
3.9-18	Summary of Terrestrial Communities and Proposed Impacts within East Range IGCC Power Station Footprint and Buffer Land
3.9-19	Summary of Terrestrial Communities and Proposed Impacts within East Range HVTL Alternative 1
3.9-20	Summary of Terrestrial Communities and Proposed Impacts within East Range HVTL Alternative 2
3.9-21	Summary of Terrestrial Communities and Proposed Impacts within East Range Natural Gas Pipeline Alternative 1
3.9-22	Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Area 2WX to Footprint
3.9-23	Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Area 2WX to Area 2W
3.9-24	Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Knox Mine to Area 2WX
3.9-25	Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX
3.9-26	Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Area 9 South to Area 6
3.9-27	Summary of Terrestrial Communities and Proposed Impacts within East Range Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6

3.9-28	Summary of Terrestrial Communities and Proposed Impacts within East Range Railroad Alternative 1
3.9-29	Summary of Terrestrial Communities and Proposed Impacts within East Range Railroad Alternative 2
3.9-30	Summary of Terrestrial Communities and Proposed Impacts within East Range Potable Water and Sewer Pipelines
3.9-31	Summary of Terrestrial Communities and Proposed Impacts within East Range Roads
3.9-32	MDNR NHIS Plant Species Occurrences in Vicinity of West Range Site Boundary
3.9-33	MDNR NHIS Occurrences within One Mile of HVTL Alternative 1
3.9-34	MDNR NHIS Occurrences within One Mile of HVTL Alternative 1A
3.9-35	MDNR NHIS Occurrences within One Mile of Plan B Phase II Alternate Route WRB-2A
3.9-36	MDNR NHIS Occurrences within One Mile of Natural Gas Pipeline Alternative 1
3.9-37	MDNR NHIS Occurrences within One Mile of Natural Gas Pipeline Alternative 2
3.9-38	MDNR NHIS Occurrences within One Mile of West Range Process Water Supply Pipeline Segment 1
3.9-39	MDNR NHIS Occurrences within One Mile of West Range Process Water Supply Pipeline Segment 3
3.9-40	MDNR NHIS Plant Species within One Mile of East Range HVTL Alternative 1
3.9-41	MDNR NHIS Plant Species Within One Mile of East Range HVTL Alternative 2
3.9-42	MDNR NHIS Plant Species Within One Mile of East Range Natural Gas Pipeline Alternative 1
3.10-1	Individual Noise Levels Generated by Construction Operation Equipment
3.10-2	Aggregate Estimated Noise Levels Generated by Mesaba Power Plant Construction Operations
3.10-3	Estimated Steam Blow Noise Levels
3.10-4	Individual Noise Levels Generated by Construction Operation Equipment
3.10-5	Aggregate Estimated Noise Levels Generated by Mesaba Power Plant Construction Operations
3.10-6	Estimated Steam Blow Noise Levels
3.10-7	Analysis Receptor Locations
3.10-8	None
3.10-9	Estimated Operational Noise Levels at Receptors
3.10-10	FHWA Noise Abatement Criteria

3.10-11	Construction and Operational Traffic Volumes
3.10-12	Modeled Traffic Noise at MINNOISE Receptors
3.10-13	Land Use Categories and Metrics for Rail Noise Impact Criteria
3.10-14	None
3.10-15	ATPA Guidelines for Maximum Air-Borne Noise from Transit Train Operations
3.10-16	Ground Borne Vibration Guideline for Residential Land Use
3.10-17	Estimated Freight Train and Yard Activity Noise Levels
3.10-18	Estimated Freight Train Vibration Levels
3.10-19	Estimated Freight Train and Yard Activity Noise Levels
3.10-20	Estimated Freight Train Vibration Levels
3.10-21	Summary of Noise Mitigation Project Design Features
3.10-22	Economic Analysis for Sound Wall
3.11-1 - 3.11-10	None
3.11-11	State Transmission Line Standards and Guidelines
3.12-1	Forecast Traffic Volumes on TH 169 and CSAH 7 with Excelsior/Mesaba Energy West Range Project—2008 and 2028
3-12-2	Forecast Traffic Volumes with Excelsior/Mesaba Energy East Range Project—2008 and 2028
3.14-1	Estimated Employment
3.14-2	Construction Cost Inputs and Jobs for IMPLAN Model, in 1994 Dollars
3.14-3	Operating Cost and Job Inputs Used for IMPLAN 2.0 model, in 2004 Dollars
3.14-4	Construction Period Economic and Job Impacts for Arrowhead Region, from IMPLAN Model, in 2004 Dollars
3.14-5	Construction Period Jobs Created in Arrowhead Region, in Total Jobs, Both Full-Time and Part-Time, Based on IMPLAN 2.0 Modeling
3.14-6	Mesaba Employment Impacts from Construction, Arrowhead Region and Minnesota, Peak Construction Year 2010, by Industry Sector
3.14-7	Total Economic Impacts From IMPLAN Model for Typical Year, Economic Output in 2004 Dollars
3.14-8	Operating Period Jobs Created by Project, from IMPLAN Model, Based on 107 Direct Part-time and Full-Time Jobs at the Plant
3.14-9	Mesaba Energy, Employment Impacts from Operations, Arrowhead Region, Typical Year, by Industry Sector

FIGURES

3.1-1	West Range Visualization Model Input For Vegetation, Open Areas, and Topography
3.1-2	East Range Visualization Model Input For Vegetation, Open Areas, and Topography
3.1-3	Distance Within Which Objects Become Discernable
3.1-4	Earth Curvature Nomograph
3.1-5	West Range Site Predicted Visibility Impact Areas for IGCC Power Station Stack Emission Points
3.1-6	West Range Site Predicted Visibility Impact Areas for HVTL Structures Along Plan A Preferred Route (WRA-1)
3.1-7	West Range Site Predicted Visibility Impact Areas for HVTL Plan A Alternate Route (WRA-1A) and Plan B Phase II Preferred Route (WRB-2)
3.1-8	Process Water Supply and Blowdown Pipeline Milepost Map
3.1-9	East Range Site Predicted Visibility Impact Areas for IGCC Power Station Stack Emission Points
3.1-10	East Range Predicted Visibility Impact Areas for 39L/37L Route Utilizing Vertically Oriented Double Circuit Single Pole Structures
3.1-11	East Range Predicted Visibility Impact Areas for 38L Route Using Single Pole Delta Configured Double Circuit Structures
3.10-1 - 3.10-7	None
3.10-8	Decibel Addition Graph
3.10-9-13	None
3.10-14	Noise Impact Criteria for Railroad Projects
3.11-1	Plan A 34kV Preferred and Alternative Route Vertically Configured Double Circuit Structure
3.11-2	Plan A 345kV Preferred and Alternative Route Vertically Configured Double Circuit Structure
3.11-3	EMF for 230kV – 2 CKT Vertical Configuration Lapwing 1590 MCM 45/7
3.11-4	EMF for 230kV – 2 CKT Vertical Configuration Lapwing 1590 MCM 45/7 115kV Underbuild Horizontal Configuration Grosbeak 636 MCM 26/7
3.11-5	Plan B Phase II Preferred 230kV Route (Shared ROW with Plan B Phase I HVTL)
3.11-6	Plan B Phase II Preferred 230kV Route (Unshared ROW)
3.11-7	EMF for 345kV – 1 CKT Delta Configuration Bundle Pheasant 1272 MCM 54/19
3.11-8	EMF for 345kV – CKT Delta Configuration Bundle Pheasant 1272 MCM 54/19 115kV Underbuild Horizontal Configuration Grosbeak 636 MCM 26/7
3.11-9	EMF for 345kV – CKT Delta Configuration Bundle Pheasant 1272 MCM 54/19
3.11-10	EMF for 345kV – Vertical Configuration Bundle Pheasant 1272 MCM 54/19 115 kV – Vertical Configuration Rail 954 MCM 45/7
3.11-11	None
3.11-12	Phase Arrangement Comparison for 230kV Line 2 CKT

3.11-13	Phase Arrangement Comparison for 230kV Line 2 CKT–115kV Line Underbuild
3.11-14	Phase Arrangement Comparison for 345kV Line with 115kV Underbuild
3.11-15	Phase Arrangement Comparison for 345kV Line with Parallel 115kV

APPENDICES – See Attached Environmental Supplement Appendix CD

Appendix	Title
Appendix 1	September 2005 University of Minnesota Duluth Research Report
Appendix 2	Market Analysis for Slag and Sulfur Produced by IGCC Power Station Located in Iron Range
Appendix 3	West Range Soil Boring Logs
Appendix 4	RODM Datasheets
Appendix 5	Noise Evaluation Study
Appendix 6	National Historic Preservation Act Reports

ACRONYMS

37L, 39L, etc.	Existing High Voltage Transmission Line Identification Numbers
acfm	Actual Cubic Feet per Minute
ACSR	(Conductor)
AERA	Air Emission Risk Analysis
AGR	Acid Gas Recovery
Al_2O_3	Aluminum Oxide
AMP	Arcturus Mine Pit
AP-42	USEPA Compendium of Air Pollutant Emission Factors
APE	Area of Potential Effect
AQRV	Air Quality Related Values
AREMA	American Railway Engineering and Maintenance Association
ASU	Air Separation Unit
BACT	Best Available Control Technology
BCC	Bioaccumulative Chemical of Concern
BFD	Block Flow Diagram
BFW	Boiler Feed Water
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe (Railway Company)
BOD	Biological Oxygen Demand
BTA	Best Technology Available
Btu	British Thermal Unit
CAA	Clean Air Act

$CaCO_3$	Calcium Carbonate (Limestone)
CAIR	Clean Air Interstate Rule
CALMET	
CALPUFF	
CaO	Calcium Oxide (Lime)
CCPI	Clean Coal Power Initiative
CE	Cliffs-Erie
CEMS	Continuous Emission Monitoring System
C.F.R.	Code of Federal Regulations
CKT	Circuit
CMP	Canisteo Mine Pit
CN	Canadian National (Railway Company)
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COC	Cycles of Concentration
COD	Chemical Oxygen Demand
COS	Carbonyl Sulfide
CR/CRs	Country Road(s)
CSFB	Credit Suisse First Boston
CTG	Combustion Turbine Generator
DLN	Dry Low NO_x
DOE	Department of Energy
DOT	Department of Transportation
EIS	Environmental Impact Statement
EMF	Electromagnetic Field
EPA	Environmental Protection Agency
EPC	Engineering, Procurement and Construction
EPRI	Electric Power Research Institute
EU	Emission Unit
FAV	Final Acute Value
Fe_2O_3	Iron Oxide
FEED	Front End Engineering and Design
FERC	Federal Energy Regulatory Commission
FGD	Flue Gas Desulfurization
FSQ	Full Slurry Quench
GCP	Good Combustion Practice
GLG	Great Lakes Gas Transmission Company
GLI	Great Lakes Initiative

GMMP	Gross Marble Mine Pit
GO	Generator Outlet
GPM	Gallons per Minute
gpm	Gallons per Minute
H_2	Hydrogen
H_2O	Water
H_2S	Hydrogen Sulfide
H_2SO_4	Sulfuric Acid
HAMP	Hill-Trumbull/Hill Annex Mine Pit
HAP	Hazardous Air Pollutant
HHV	Higher Heating Value
HP	High Pressure
HRSG	Heat Recovery Steam Generator
HVTL	High Voltage Transmission Line
IGCC	Integrated Gasification Combined Cycle
IP	Intermediate Pressure
IRR	Iron Range Resources
ISBL	Inside Battery Limits
K_2O	Dipotassium Oxide
kW	Kilo Watt
LAER	Lowest Achievable Emission Rate
lb/million Btu	Pound per Million British Thermal Unit
lb/MMBtu	Pound per Million British Thermal Unit
LGIA	Large Generator Interconnection Agreement
LGIR	Large Generator Interconnection Request
LGIP	Large Generator Interconnection Procedure
LLC	Limited Liability Company
LMP	Lind Mine Pit
LOS/LOSs	Line of Sight/Lines of Sight
LP	Low Pressure
LSTK	Lump Sum Turn Key
MAAQS	Minnesota Ambient Air Quality Standards
MACT	Maximum Available Control Technology
MDEA	Methyl-Diethanolamine
MDNR	Minnesota Department of Natural Resources
MEP	Mesaba Energy Project
MgO	Magnesium Oxide
MISO	Midwest Independent (Transmission) System Operator

MMBtu	Million British Thermal Units
MMBtu/hr	Million British Thermal Units Per Hour
MOPS	Minnesota Office of Pipeline Safety
MP	Minnesota Power (Company)
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utility Commission
MSDS	Material Safety Data Sheets
MVA	Million Volts Amps
MVR	Mechanical Vapor Recompression
MW	Megawatt
N_2	Nitrogen
Na_2O	Disodium Oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory (DOE)
NH_3	Ammonia
NiO	Nickel Monoxide
NNG	Northern Natural Gas Co.
NO_X	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NSP	Xcel Energy (Formerly NSP, Northern States Power)
NSPS	New Source Performance Standards
NTP	Notice to Proceed
O&M	Operation and Maintenance
O_2	Oxygen
OSBL	Outside Battery Limits
OSHA	Occupational Safety and Health Administration
P_2O_5	Diphosphorus Pentoxide
PC	Pulverized Coal
PEP	Project Execution Plan
PM	Particulate Matter
PM_{10}	Particulate Matter having an aerodynamic diameter less than 10 Microns
POI	Point of Interconnection
POTW	Publicly Owned Treatment Works
PPA	Power Purchase Agreement
ppmvd	Parts per Million (dry volume)
ppmw	Part per Million (wet basis)

PRB	Powder River Basin
PSD	Prevention of Significant Deterioration
psig	Pounds per Square Inch (gauge)
PSQ	Partial Slurry Quench
PTE	Potential to Emit
RACT	Reasonable Available Control Technology
RBLC	RACT/BACT/LAER Clearinghouse
RCRA	Resource Conservation and Recovery Act
RMP	Risk Management Program
ROW/ROWs	ROW/Rights of Way
S	Sulfur
SO_3	Sulfur Trioxide
scf	Standard Cubic Feet
SPCC	Spill Prevention Control and Countermeasure
SCPC	Supercritical Pulverized Coal
SCR	Selective Catalytic Reduction
SIL	Significant Impact Limits
SIS	System Impact Study (Part of the MISO LGIP)
SiO_2	Silicon Dioxide
SNCR	Selective Non Catalytic Reduction
SO_2	Sulfur Dioxide
SRU	Sulfur Recovery Unit
STG	Steam Turbine Generator
SV	Stack Vent
Syngas	Synthetic Gas
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TiO_2	Titanium Dioxide
TOC	Total Organic Carbon
TP	Total Phosphorous
TPY	Tons Per Year
TRS	Total Reduced Sulfur
TSP	Total Suspended Particulate Matter
TSS	Total Suspended Solids
TTRA	Taconite Tax Relief Area
TVB	Tank Vent Boilers
V_2O_5	Vanadium Pentoxide
VOC	Volatile Organic Compounds

WWTF	Waste Water Treatment Facility
ZLD	Zero Liquid Discharge