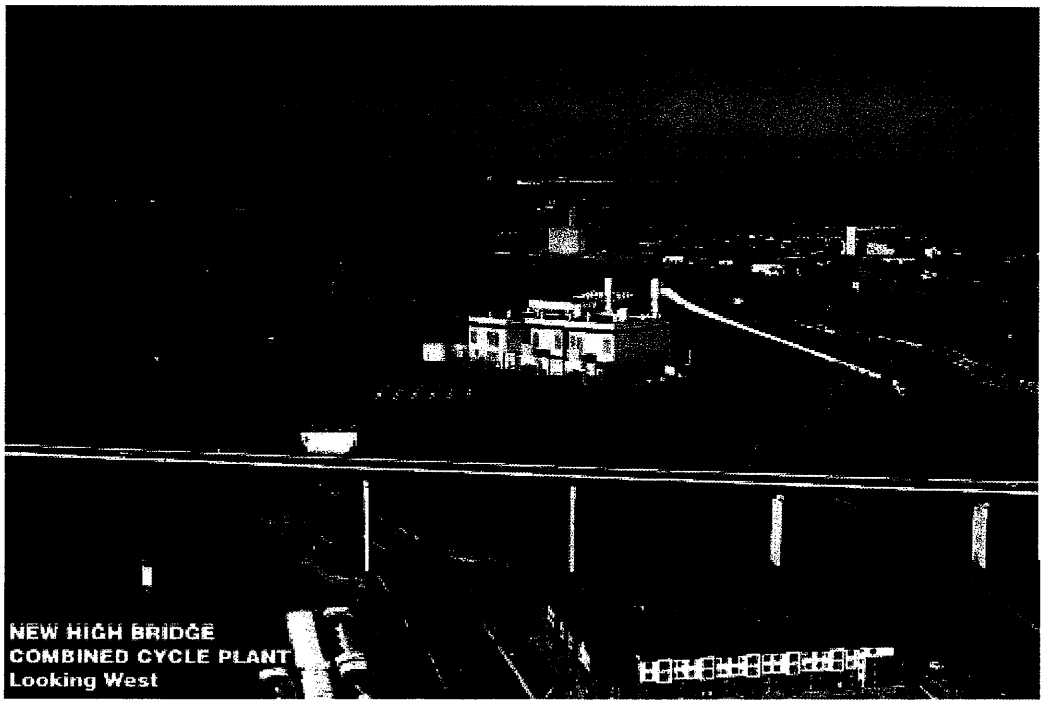
ENVIRONMENTAL ASSESSMENT

HIGH BRIDGE REPOWERING PROJECT
ST. PAUL, MINNESOTA
EQB DOCKET NUMBER 05-91-PPS-XCEL ENERGY HIGH BRIDGE



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1.0 OVERVIEW

The Project. Xcel Energy is proposing to develop, construct, and operate a natural gas-fuel, combined-cycle electric generating facility capable of producing 480 to 665 megawatts (MW). The proposed project consists of replacing an existing 270 MW coal fueled plant (i.e., the High Bridge Plant) with a new, natural gas-fired, combined cycle plant.

Certificate of Need. The facility, which is scheduled to begin operation in the spring of 2008, is part of Xcel Energy's Metropolitan Emission Reduction Proposal (MERP). MERP was reviewed and approved by the Public Utilities Comission (PUC) in Docket E002/M-02-633. The conversion of the High Bridge Plant is exempt from the Certificate of Need requirements of Minnesota Statutes § 216B.243.

Permits. Xcel Energy is required to obtain a Site Permit from the Environmental Quality Board identifying the location upon which the new facility can be built (Minn. Stat. § 116C.57, subd. 1). A natural gas pipeline will be permitted through a separate process.

Environmental Assessment. As part of its review of an application for a Site Permit for the kind of project proposed here, the EQB is required to prepare a document called an Environmental Assessment (Minn. Stat. § 116C.575, subd. 5). In the Environmental Assessment, the EQB evaluates the potential impacts of the project at the site proposed by the applicant and at possible alternative sites that are identified and discusses ways to mitigate these potential impacts.

Major Decisions. The EQB must determine whether to grant a Site Permit to Xcel Energy for the construction of a large electric power generating plant (LEPGP) at the proposed site. The only site under review in this proceeding is the proposed site at the High Bridge Generating Plant in St. Paul. The EQB could include conditions in any Site Permit it issues for the High Bridge Repowering Project if certain conditions are necessary and appropriate.

Public Hearing. The Environmental Quality Board is required to hold a public hearing on the application for a site permit (Minn. Stat. § 116C.575, subd. 6). The hearing is anticipated to be scheduled for May 2005.

Interested persons will have an opportunity at the hearing to ask questions about the project and to make comments that will become part of the administrative record. The hearing examiner will ensure that the record created at the hearing is preserved and transmitted to the board.

The final decision on the issuance of the permit will be made by the full EQB Board. It is anticipated that this matter will come before the EQB Board for a final decision at its monthly meeting in July, 2005.

2.0 INTRODUCTION

On January 31, 2005, Xcel Energy submitted to the Minnesota Environmental Quality Board (MEQB) a site permit application regarding a proposal to construct and operate a natural gas-fired, combined-cycle electric generating facility capable of producing 480 to 665 megawatts (MW). The High Bridge Repowering Project (HBRP) proposal consists of replacing an existing 270 MW coal fueled plant (i.e., the High Bridge Generating Plant) with a new, natural gas-fired, combined cycle plant.

This project is part of Xcel Energy's Metropolitan Emission Reduction Proposal (MERP), which was reviewed and approved by the Public Utilities Comission (PUC) in Docket E002/M-02-633. The conversion of the High Bridge Generating Plant is exempted from the Certificate of Need requirements of Minnesota Statutes § 216B.243.

On February 4, 2005, the EQB Chair notified the applicant in writing of the acceptance of the application as substantially complete and that the application would be reviewed in accordance with the alternative permitting review procedures.

The EQB docket number for this proceeding is 05-91-PPS-Xcel Energy High Bridge.

2.1 PROJECT DESCRIPTION

The High Bridge Generating Plant property is owned by Xcel Energy, is located between Shepard Road to the northwest and Randolph Road to the southeast, and covers about 77 acres (**Figure 1 and Figure 2**). The area immediately to the west of the site is industrial in use. The area immediately to the east of the site is a multi-unit residential development. A recreational corridor lies between the site and the Mississippi River.

The High Bridge Generating Plant address is 501 Shepard Road, St. Paul, Minnesota 55102. The property is located along the Mississippi River, just southwest of the High Bridge in Township 28N, Range 23W, Sections 1 and 12 in Ramsey County.

The layout of the current High Bridge Generating plant and the High Bridge Repowering Project (HBRP) is shown on **Figure 3** and **Figure 4**, respectively.

The HBRP will use the existing circulating water supply and return on the Mississippi River. A new substation on the HBRP site and upgrades to transmission lines will be necessary. These upgrades will include relocating several transmission line structures along four transmission lines that will enter the new High Bridge substation.

Xcel Energy will use the HBRP's capacity for intermediate demand periods. The new units will be operated from a central control center. The HBRP plant will be able to start from a complete shutdown lasting more than 72 hours to full load in five hours (cold start). If the HBRP plant has been off line for less than eight hours, start up will be completed within two hours (hot start). A warm start occurs when the plant is started after being shut down for eight to 72 hours and can be completed in three hours.

Typical operation of the HBRP will consist of combined cycle operation. Duct-firing within the heat recovery steam generator can be employed to increase capacity. The HBRP will also have the capability of cooling inlet air to increase capacity during periods of warm weather. The HBRP plant will be equipped with a steam bypass that will allow the combustion turbine generators to be run while bypassing the steam generator. This will allow the flexibility to operate the plant at partial capacity should the steam turbine generator or related auxiliary equipment be out of service at a time of high demand.

HBRP operational information is summarized in **Table 1**. **Figure 5** illustrates an operational schematic of the HBRP.

Total construction costs for the HBRP are estimated to be about $428 million ($394 million construction, plus an estimated $34 million for remediation, site preparation and existing plant decommissioning).

Xcel Energy anticipates the units will have at least a 30-year operating life. The HBRP is expected to be in the range of 54 percent efficient, depending on operating conditions.

2.1.1 DESCRIPTION of POWER GENERATING EQUIPMENT and PROCESSES

The proposed HBRP will consist of one combined cycle power block in a 2-on-1 configuration and associated support facilities. In a 2-on-1 configuration, two combustion turbines, each directly connected to an electric generator, will exhaust hot gas to dedicated heat recovery steam generators. Steam produced by the two heat recovery steam generators will be combined and directed to a single steam turbine.

The term "combined cycle" refers to a power block arrangement with at least one combustion turbine generator, one heat recovery steam generator, and one steam turbine generator. This design recovers waste heat in the exhaust gases of the combustion turbine and uses the heat to produce steam, which in turn generates additional power.

Each combustion turbine generator consists of the following equipment in series:

- an inlet air filter
- a compressor, where air is drawn in and compressed
- a combustor, where the air/fuel mixture is ignited
- an electric generator
- a power turbine, where the combusted gases expand to rotate a turbine

The air drawn through the inlet is compressed by the rotating compressor blades, and delivered to the combustor at substantially increased pressure and temperature. In the combustor, natural gas is mixed with the inlet air and burned. The high-temperature, high-pressure gas mixture then moves through the combustion turbine causing the rotor blades and shaft to rotate. The rotor shaft turns an electrical generator that produces electrical power.

The combustion turbine generators will be housed in enclosures that provide thermal insulation, acoustical attenuation, and fire extinguishing media containment. Each combustion turbine generator unit will be approximately 100 feet long. The widest and tallest component on the combustion turbine generators will be the inlet air filters, approximately 45 feet wide and 45 feet tall.

The facility will include two heat recovery steam generators – one matched with each combustion turbine. The exhaust gases exit each combustion turbine and flow directly into the heat recovery steam generator. Inside the heat recovery steam generator, the hot exhaust gases are directed across the heat transfer tube surfaces causing the water in the tubes to boil and change into steam. The heat recovery steam generators are also equipped with natural gas-fired duct burners that can be used to input additional heat to increase the steam generating capability of the heat recovery steam generators. Each heat recovery steam generator will be approximately 95 feet tall, 40 feet wide, and 140 feet long.

After passing through the heat recovery steam generator, exhaust gases from each combustion turbine generator will discharge through a steel stack. Each stack will be approximately 19 feet in (inside) diameter.

A single steam turbine will receive steam produced by the two heat recovery steam generators. Steam received from the heat recovery steam generators will be expanded through a three-stage steam turbine and will rotate the turbine shaft, which drives a generator to produce electrical power.

Exhaust steam from the steam turbine will be condensed within a water-cooled steam surface condenser. The condensed steam collects in the bottom of the condenser from which it is pumped back to the heat recovery steam generators to be reused to generate steam. Cycle heat removed from the condensing steam in the condenser is absorbed by circulating water flowing through the condenser tubes. Heat absorbed by the circulating water will be discharged to the river.

The HBRP will utilize the existing circulating water supply intake and discharge structures on the river as currently used by the High Bridge Plant. Modification of the intake will be necessary to meet Clean Water Act 316(b) requirements. Circulating water pumps will pump water from the river intake through the condenser and back to the river discharge.

The combined cycle HBRP will be composed of the power generation building with attached stacks, water treatment and electrical buildings. The power generation building will house two combustion turbine generators, two heat recovery steam generators, and one steam turbine generator with associated piping. The building will be approximately 425 feet long by 350 feet wide and 100 feet tall. Two steel stacks will be located outside the building. The stacks are anticipated to be 150 feet tall, though the final stack height will be determined later based on air permit requirements. The water treatment and electrical buildings will be attached to the main power generation building.

The power generation building, exhaust stacks, and other large outdoor equipment will be in neutral colors to minimize visual impact to the surrounding area. Sound mitigation measures will be incorporated into the HBRP design to meet required noise limits.

2.1.2 AIR EMISSION CONTROL EQUIPMENT

Natural gas combustion generates significantly less particulate matter than oil or coal, and very little sulfur dioxide or other trace air emissions. Uncontrolled natural gas combustion does produce nitrogen oxides (NO_X) and carbon monoxide (CO).

Air emission control equipment at the HBRP will include dry low-NO_X (DLN) combustors and selective catalytic reduction (SCR) to reduce NO_X emissions. Emissions of carbon monoxide (CO), volatile organic compounds (VOC), sulfur oxides (SO_X) and particulate matter (PM_{10}) will be controlled through fuel selection and operational controls (combustion control, operating load, and firing temperature).

Dry low NO_X (DLN) combustor technology premixes air and a lean fuel mixture, which significantly reduces peak flame temperature and thermal NO_X formation. Conventional combustors are diffusion controlled, injecting fuel and air separately, resulting in hot spots that produce high levels of NO_X. In contrast, DLN combustors operate in a "premixed mode" where air and fuel are mixed before entering the combustor, thus reducing the production of NO_X. Additionally, in DLN combustors the amount of NO_X formed does not increase with residence time, allowing the DLN system to achieve low CO and unburned hydrocarbons (UHC) emissions while maintaining low NO_X levels.

The SCR reactor is integrated into the heat recovery steam generator structure. Ancillary equipment includes catalyst change-out handling equipment (lifting devices and their controls, as well as support structures) and reagent (aqueous ammonia) receiving, handling, storage, preparation, and delivery systems.

2.1.3 WATER USE

The HBRP will need water for domestic-type uses, fire protection, turbine inlet air evaporative cooling, steam system make-up water, closed cooling system make-up water, and once-through cooling. There will be three sources of water: the Mississippi River, an existing well on the Plant site, and the City of St. Paul municipal water supply.

Water will be withdrawn from an existing onsite well for steam system make-up water and closed cooling make-up water. The proposed appropriation rate is less than the currently permitted volume of 50 million gallons per year at a maximum rate of 0.25 million gallons per day (MGD). The existing well is constructed in the Prairie du-Chien/Jordan bedrock aquifers. Xcel Energy will request an amendment to the original plant's existing Well Water Appropriation Permit No. 69-1090 (as amended Sept. 16, 2003) and existing River Water Appropriation Permit No. 76-6347 (dated January 17, 1977) in early 2005 to address the change in water usage for the High Bridge Repowering Project from the uses currently described in the permits.

Expected annual municipal water usage by the HBRP plant will be a small fraction of the annual water available from the St. Paul Water Utility. The average annual water provided by the St. Paul Water Utility is 18,300 million gallons.

No increase in appropriation rate or annual withdrawal volume will be requested in either permit amendment request. A summary of expected HBRP water appropriations is presented in **Table 2. Figure 6** illustrates water usage for the HBRP. These water usage estimates are based upon operation at a 50 percent annual capacity factor (capacity factor is estimated to range from 30 to 60 percent).

Domestic and Fire Protection

Water for domestic-type uses such as drinking water, washing facilities, and fire protection will be obtained from the City of St. Paul municipal water supply, which currently serves similar needs of the existing High Bridge Generating Plant.

Turbine Inlet Air Cooling (Evaporative Cooling)

The use of evaporative inlet-air cooling enhances operating efficiency of the gas-fired turbines during the warmest days of the year. An increase in turbine output between 3 and 5 percent can be achieved through cooling of the intake air, depending on the ambient temperature and relative humidity. Up to about 20 percent of the time it is anticipated that evaporative cooling may be used to cool the air entering the turbines. Air is cooled through humidification by allowing water to flow over a fabric or cellular media at the inlet to each combustion turbine. A small stream of water will be taken after the reverse osmosis treatment step and mixed with water from the municipal supply to achieve the proper water quality for evaporative cooler make-up.

Steam System Make-up and Closed cooling Make-up

Water for steam system make-up and closed cooling make-up water will be obtained from the existing on-site well. Xcel Energy currently holds a water appropriations permit (No. 69-1090 G amended March 20, 1973) for the existing well.

Make-up water for the steam boilers and closed cooling make-up water is needed to replace water that is lost through boiler/turbine cycle evaporation, leakages, and boiler blowdown. The purpose of boiler blowdown is to control solids in the boiler water. Blowdown protects boiler surfaces from severe scaling or corrosion problems that can otherwise occur.

The make-up water that will be obtained from the existing plant water well contains minerals and other dissolved solids that require that the water be treated. A water treatment system, consisting of a reverse osmosis (RO) system followed by mixed bed deionization, will be required to produce acceptable water for the make-up water. This treatment process will generate a wastewater with a concentration of the minerals that are naturally present in the source groundwater. This wastewater either will be discharged to the Mississippi River or to the St. Paul sanitary sewer system depending on operating conditions.

Once-through Non-Contact Cooling

Once-through cooling water will be drawn from the Mississippi through the existing intake structure that will be modified as part of the HBRP as described below. The water will pass through the condenser, where it will increase in temperature between 15 to 24 degrees F and then be discharged back into the river immediately downstream.

Xcel Energy will modify the existing plant river water intake, referred to as the Number 2 screenhouse, as part of the HBRP. This modification is necessary in order to meet new requirements under Section 316 (b) of the Clean Water Act.[1] Xcel is proposing to maintain the same withdrawal capacity and rate of water for cooling purposes (about 201 million gallons per day (MGD)). The anticipated withdrawal is approximately 2.6 percent of the mean annual river flow of 7,600 MGD (from 1901 through 2002). This is less than 5 percent of the mean annual river flow, which is required for compliance with Section 316(b).

However, it is also required that the intake velocity be less than or equal to 0.5 feet per second, and the intake does not currently meet that requirement. In order to lower the intake velocity to 0.5 feet per second (or lower), the intake must be modified. The current preliminary design (subject to change as the final design is completed) includes the addition of four wedge wire screens that would be placed on the river side of the existing intake structure. Each screen would be 6 feet in diameter, approximately 19 feet long and T-shaped. The screens would be protected by a sheetpile deflector wall and a curtain wall. The modification would extend the intake approximately 36 feet into the river channel. All necessary precautions will be made to identify the deflector/curtain wall to river traffic.

An air backwash system would be installed in order to clean debris from the new T-screens. Existing trashracks and traveling screens would no longer be essential to operations, but will likely be left in place as a backup to the T-screens.

2.1.4 WASTEWATER

With the exception of fire protection, water used for each of the operational processes also becomes a source of wastewater. Wastewater will be discharged either to the Mississippi River or to the St. Paul sanitary sewer system (MCES). Boiler/steam generator blowdown, service wastewater, and sanitary wastewater (domestic water uses) will be discharged to the St. Paul sanitary sewer system. Once-through non-contact cooling water will be discharged to the Mississippi River. The other wastewater streams, reverse osmosis reject water, and evaporative cooling water blowdown, will be discharged to the Mississippi River with the once-through cooling water when the cooling system is operating. If reverse osmosis reject water and evaporative cooling water blowdown are being generated when the cooling system is not operating, those wastewater streams will be discharged to the St. Paul sanitary sewer system (MCES).

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[1] http://www.epa.gov/waterscience/316b/ph1.htm

A summary of the wastewater discharged and proposed final discharge location for the HBRP is presented in **Table 3**.

2.1.5 SOLID AND HAZARDOUS WASTE GENERATION

The HBRP plant will use and store on site a small number of chemicals. **Table 4** lists the chemicals a generating facility of this size and type typically uses. The chemicals include mineral oil and sulfur hexafluoride for insulating transformers and switchyard equipment, lubrication oil for lubricating CTG bearings, diesel fuel for operating the fire water pump, and various liquid detergents for washing the CTGs.

All chemical storage areas will have appropriate secondary containment (i.e., concrete floors, concrete curbing, etc.). Areas that have the potential for oil or lubrication spills will also be protected by containment structures (i.e., concrete floors, concrete curbing, etc.). Lockable drain valves will be used where appropriate. Where present, floor drains will be directed to an oil/water separator, holding tanks or chemical collection/treatment facilities.

Xcel Energy will privately contract with local waste haulers for collection and disposal of all non-hazardous solid wastes generated at the facility. In the unlikely event that wastes generated during maintenance activities are determined to be hazardous as defined by the Resource Conservation and Recovery Act (RCRA)[2], they will be managed in accordance with applicable requirements. It is anticipated that the High Bridge plant will be categorized as a very small quantity generator (VSQG) under Minnesota Rules Chapter 7045. To be eligible for VSQG classification the facility must generate less than 220 lbs of non acute hazardous waste per month. This type of generator can not accumulate more than 1,000 kg or 2,200 lbs of waste on-site before delivering the waste to a permitted Treatment, Storage and Disposal (TSD) Facility.

2.1.6 FUEL SUPPLY

The HBRP will only use natural gas for fuel to generate electricity. A new gas pipeline will provide high-pressure gas to the site. **Table 5** summarizes the fuel requirements for the HBRP when the entire plant is operating.

A gas-conditioning station will include fuel gas meters and pressure regulators for control and measurement of the gas being supplied. In addition, if required by final design and quality of the natural gas being supplied, gas-conditioning equipment such as compressors, scrubbers and/or filter separators will be included to remove moisture and particulates from the gas stream.

An existing low-pressure gas line serving the existing plant space heating will continue to be used for the same purpose for the HBRP.

[2] http://www.pca.state.mn.us/waste/hw_mnrules.html

2.1.7 CONSTRUCTION

Mobilization at the site will be the first construction activity with Xcel Energy setting up its field offices and the contractor following with mobilization and set up of construction offices, security fencing and entrances.

A pile-driving rig will be set up on the site just prior to the expected start of permanent construction to prepare the area for pile driving. Piles will be driven over a 30-day period. Following the setting of pilings, turbine foundation forms will be constructed and underground services will be installed. At the same time, the foundations for the generator step-up transformers and miscellaneous equipment will be formed. Extensive concrete work for all foundations will follow. Rough-ins for cable and pipe will be installed in the various foundations.

Within two to three months of initial mobilization, deliveries will begin arriving at the site, including the auxiliary equipment shipped by truck and some large equipment shipped by rail or barge. These shipments will continue over a 16- to 18-month period. The timing of these shipments will coincide with the completion and readiness of their respective foundations.

Shipments at the rail siding and the Plant entrance road will be coordinated by the contractor's heavy haul subcontractor. This equipment will be lifted from the rail cars and loaded onto transport vehicles to be driven on site. A construction crane will be located on site to lift large equipment from transport vehicles onto foundations.

The combustion turbines, generators, heat recovery steam generators, steam turbine generator and transformers for the new generating units will be set first, followed by the remaining auxiliary equipment. Erection of the turbine modular air inlets and the exhaust stacks will follow. Next, the building enclosure will be constructed.

The greatest number of on-site workers will be present during the erection of the turbines and installation of detailed wiring and piping, and while work is being performed in the new High Bridge Substation.

The gas pipeline to the HBRP will be constructed while the site work is being completed. The pipeline is planned to enter the northwest corner of the site underground to a gas metering and regulating building. A contractor will take the pipeline from this point to the turbines.

Xcel Energy will be constructing an overhead 115-kV line from the generator step-up transformers to the High Bridge Substation as work nears completion. Work will also be ongoing in the substation to install breakers, transformer and additional protection devices.

2.1.8 ELECTRICAL INTERCONNECTION

In order to accommodate the HBRP, Xcel Energy will need to relocate the High Bridge Substation. Several transmission line structures will also need to be relocated as listed in **Table 6**.

The two combustion turbine generators and the steam turbine generator will generate electricity at a voltage of 18 kV. Three generator step-up transformers will increase the voltage to 115 kV. A 115-kV overhead transmission line approximately 800 feet long will connect the transformers to the relocated High Bridge Substation located on the site, east of the HBRP generating plant.

The transmission interconnection will require at least two tubular steel tower structures, one adjacent to the plant and the other just outside the substation.

2.1.9 PIPELINE

The HBRP will require a new natural gas pipeline to bring natural gas to the facility; Xcel Energy is currently conducting a competitive bidding process to determine the gas supplier for the plant.

The new gas pipeline will likely consist of a 20 inch diameter, steel pipeline, operating at a pressure of 550-700 pounds per square inch (PSI). The pipeline will originate from the Northern Natural Gas (NNG) Cedar Town Border Station, approximately 12 miles to the west (**Figure 7**).

A pipeline route permit from the Minnesota Environmental Quality Board is required for the construction of certain pipelines (Minnesota Statutes 116I.015). The EQB has jurisdiction over pipelines with a diameter of six inches or more that are designed to transport hazardous liquids like crude petroleum and those that are designed to carry natural gas and be operated at a pressure of more than 275 pounds per square inch.

The procedure to be followed in considering a permit for a pipeline depends on the size and type of the pipeline. An applicant may apply for a partial exemption from the complete procedural requirements if the project is not expected to have significant environmental impacts. In such a case, the process of public review normally takes from 60 to 120 days from submission of the application. For more controversial projects with expected significant environmental impacts, a more complex process is required. It can take up to nine months to complete. The procedures are explained in detail in the pipeline routing rules adopted by the EQB (Minnesota Rules Chapter 4415).

2.2 PURPOSE

The purposes of the HBRP, as a component of the MERP, are to:

- Provide environmental improvement at a major metropolitan power plant through significant reductions in SO_X and NO_X emissions and elimination of lead and mercury emissions;
- Assure the availability of clean, reliable generating capacity at a time when additional capacity is needed—the Project will replace the existing coal-fired plant with 271 MW of capacity with a new natural gas-fired combined cycle plant with 480-665 MW of generating capacity (nominal range depending on operating conditions) ; and

- Avoid costly and time-consuming investment in additional transmission and other infrastructure by taking advantage of existing infrastructure at the High Bridge Plant site.

2.3 SOURCES OF INFORMATION

Much of the information contained within this document was provided by the applicant or the applicant's representatives (Barr Engineering Company) in the form of the Application for a Site Permit, High Bridge Combined Cycle Plant and subsequent correspondence.

Additional sources of information are listed below:

- Phase I Architectural History Evaluation & APE, The 106 Group. December 2004
- Noise Monitoring & Modelling Summary Report, Barr Engineering. Febrauary 2005
- Minnesota Pollution Control Agency (http://www.pca.state.mn.us/)
- Minnesota Department of Natural Resources (http://www.dnr.state.mn.us/index.html)
- Minnesota Department of Health (http://www.health.state.mn.us/)
- Minnesota Department of Commerce
- Minnesota Public Utilities Commission (http://www.puc.state.mn.us/index.htm)
- U. S. Environmental Protection Agency (http://www.epa.gov/)
- Electric Power Research Institute (http://www.epri.com/default.asp)
- U. S. Department of Agriculture Natural Resources Conservation (http://soils.usda.gov/about/)
- Minnesota Geological Survey (http://www.geo.umn.edu/mgs/)
- Department of Administration, State Demographic Center (http://www.demography.state.mn.us/)
- Federal Emergency Management Agency (http://www.fema.gov/)
- EQB Docket No. 02-48-PPS-FEP (http://www.eqb.state.mn.us/Docket.html?Id=3217)
- U. S. Department of Energy, Energy Information Administration (http://eia.doe.gov/)
- Air Quality in Minnesota Progress and Priorities, 2005 Report to the Legislature. February 2005

3.0 REGULATORY FRAMEWORK

Typically, prior to the issuance of a site permit, a certificate of need from the Minnesota Public Utilities Commission (PUC) is required for a proposed large energy project. The proposer of a large energy project must show the PUC, through a certificate of need application, that demand for electricity cannot be met more cost effectively through energy conservation and load-management measures and unless the applicant has otherwise justified its need. Minn. Stat. § 216B.243.

The Minnesota Legislature has established a state policy to locate large electric power generating plants in an orderly manner compatible with environmental preservation and the efficient use of resources. The EQB has the responsibility for siting power plants over 50 MW. The legislature directed the EQB to designate sites that minimize adverse human and environmental impact while ensuring continuing electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion.

3.1 CERTIFICATE of NEED

No Certificate of Need is required for the High Bridge Repowering Project.

On July 26, 2002, pursuant to Minn. Stat. § 216B.1692, Xcel Energy submitted an emission reduction proposal to the Minnesota Public Utilities Commission, the Metropolitan Emission Reduction Proposal (MERP) and an accompanying rate rider. The proposal identified emission reduction options at three plants located in the Twin Cities metropolitan area, including the High Bridge Plant in St. Paul. The MERP included replacing the existing coal-fired units at the High Bridge Plant with a natural gas, 2-on-1 combined cycle system plant, eliminating air emissions from burning coal and increasing generation capacity.

On March 8, 2004 the Minnesota PUC issued an Order approving MERP (PUC Docket No. E-002/M-02-633). The PUC Order, Paragraph 7, states: "The Commission clarifies that Xcel Energy need not obtain a Certificate of Need for conversion of the High Bridge Plant as that conversion is exempted from the Certificate of Need requirements of Minnesota Statutes § 216B.243."

3.2 SITE PERMIT REQUIREMENTS

Under the Power Plant Siting Act (Minnesota Statutes §§ 116C.51-.697) a site permit from the Minnesota Environmental Quality Board is required to build a large electric power generating plant (LEPGP). The EQB has adopted rules for the administration of power plant site permits (Minnesota Rules Chapter 4400).

There are two processes available for permitting LEPGPs depending on the type and size of the proposed project. One process, called the Full Review Process, requires the preparation of an Environmental Impact Statement, the holding of a contested case hearing conducted by an administrative law judge (ALJ), the identification of an alternative site, and may take up to one year to complete the permitting process.

In the other process, the Alternative Review Process, a shorter environmental review document termed an Environmental Assessment is prepared; a public hearing where an ALJ is not required is held; the applicant does not have to identify an alternative site; and the process may take up to six months.

The HBRP is eligible for the Alternative Review Process since power plants fueled by natural gas are eligible for the shorter process. Minnesota Statutes Section 116C.575.

On March 3, 2005, a public meeting was held by the MEQB staff at the Centennial Office Building to discuss the HBRP with interested persons and to solicit input into the scope of the Environmental Assessment. The public also had an opportunity to ask questions during informal discussions with company representatives. The public was given until 5:00 pm on March 21, 2005, to submit written comments.

No public comment letters were received. The Chair of the EQB issued a Scoping Order on March 23, 2005 (**Appendix A**).

3.3 OTHER PERMITS

Table 7 contains a list of the anticipated permits and associated environmental approvals required for the HBRP. Compliance with the terms of all applicable and relevant regulatory permits and approvals will be a condition of any Site Permit issued by the Board.

Air Quality Permit

An application for an amendment to the High Bridge Generating Plant air emission permit, Permit No. 12300012-003, will be submitted to the Minnesota Pollution Control Agency (MPCA) to accommodate the HBRP.

Water Appropriations Permits

An amendment to Minnesota Department of Natural Resources permits issued to the High Bridge Generating Plant for Well Water Appropriation (Permit No. 69-1090, as amended Sept. 16, 2003) and River Water Appropriation (Permit No. 76-6347, dated January 17, 1977) will be requested to meet the water needs of the HBRP. The request will not increase annual appropriations from existing permit limits.

National Pollutant Discharge Elimination System (NPDES) Discharge Permit

An amendment to the High Bridge Generating Plant's existing NPDES discharge permit to meet the cooling water needs of the HBRP will be required. In addition to cooling water, approval to discharge of other facility process wastewater streams may be made under the same permit.

Modifications to the cooling water intake structure to accommodate Section 316(b) of the Clean Water Act requirements may also require obtaining a Corps of Engineers Section 10 Work in

Navigable Waters Permit and a Corps of Engineers Section 404 Dredge and Fill Permit and/or a Minnesota DNR Work in Protected Waters Permit.

Metropolitan Council Environmental Services (MCES) Wastewater Discharge Permit

Wastewater from the High Bridge Generating plant that is discharged to the St. Paul sanitary sewer ultimately discharges to the MCES wastewater treatment system. Xcel Energy will apply for modification of the plant's existing MCES permit to accommodate the waste streams from the HBRP.

NPDES Stormwater Program

The HBRP triggers the requirement to apply for coverage under the Minnesota Pollution Control Agency's (MPCA) NPDES Stormwater Permit Program for Construction Activities. Xcel Energy will prepare a Stormwater Pollution Prevention Plan (SWPPP) and apply for coverage under a general permit prior to commencement of Project construction activities in 2005. Xcel Energy will require its contractors to comply with the SWPPP and the provisions of the stormwater permit during construction.

The High Bridge Generating plant is currently covered under the Minnesota General Permit for Industrial Activity (MN G611000) and has a SWPPP. When the HBRP begins operation, Xcel Energy will apply for coverage under the same general permit or will apply for a Certification of No Exposure.

Under the conditional no exposure exclusion, operators of industrial facilities in any of the 11 categories of "stormwater discharges associated with industrial activity," (except construction activities, which are addressed under the construction component of the NPDES Stormwater Program and are not eligible for the no exposure exclusion) have the opportunity to certify to a condition of "no exposure" if their industrial materials and operations are not exposed to storm water.[3]

High-Voltage Transmission Line Route Permit

While the HBRP project will include relocating on-site transmission line structures and reconductoring of certain transmission lines into the plant, these activities do not require a separate HVTL Route Permit under Minnesota Rules Chapter 4400. The relocation of the High Bridge substation and the relocation of the transmission lines are part of the HBRP and are considered associated facilities under the Site Permit.

There may be some additional reconductoring of transmission lines off-site required to support the HBRP, but the planning process is not complete. Those projects are not part of the Site Permit and Xcel Energy would notify the EQB under a separate filing.

[3] http://cfpub.epa.gov/npdes/stormwater/exposure.cfm?program_id=6

If the relocation of a transmission line impacts structures immediately adjacent to the Mississippi River, the U.S. Army Corps of Engineers will have to be notified as part of the existing Section 10 permit for that line.

Gas Pipeline Route Permit

The HBRP project will require a new natural gas pipeline to bring natural gas to the site. Xcel Energy has solicited competitive proposals to obtain the natural gas fuel supply. The pipeline will meet the thresholds of Minnesota Statutes 116I and thus requires a Pipeline Routing Permit from the MEQB.

The natural gas supplier will also apply for other necessary permits for the gas pipeline, which may include:

- MPCA NPDES General Stormwater Permit for Construction Activity
- MDNR License to Cross Public Lands and Waters
- MDNR Wetland Replacement Plan Application
- U.S. Army Corps of Engineers Section 404Wetland Permit

Miscellaneous Permits

The HBRP may require permits, approvals or notifications under the following programs:

- Federal Aviation Administration Notice of Proposed Construction or Alteration (for exhaust stack)
- Exemption to allow burning of natural gas for power production (DOE, 10 CFR chapter 503)
- Road Crossing Permits (Mn/DOT, Minn. Rules Ch. 8810)
- State Building and Construction Permits and Inspections
- Local Building and Construction Permits and Inspection

4.0 ENVIRONMENTAL SETTING

This section contains information on the environmental setting (i.e., water resources, air quality, noise, vegetation, fish, wildlife, traffic, land use, socioeconomic factors, and cultural resources) of the proposed site area.

4.1 AIR QUALITY

The U.S. Environmental Protection Agency (EPA) and the Minnesota Pollution Control Agency (MPCA) have established ambient air quality standards for a number of common pollutants, called criteria air pollutants.[4] The criteria air pollutants are called that because they are the pollutants that are emitted in large quantities and for which health criteria existed in 1972 when Congress passed the Clean Air Act. [5] The criteria air pollutants are sulfur dioxide (SO_2), nitrogen oxides of different chemical composition (represented by the term NO_X,), particulate matter PM 10 and PM 2.5, (where the number specifies the size of the particulates in microns), carbon monoxide (CO), ozone (O_3), and lead (Pb).

A power plant of the type proposed here, burning natural gas, will emit tons of certain criteria pollutants into the atmosphere. These pollutants will be emitted out two stacks approximately 130 feet above grade and will disperse over a large area in prevailing winds. A discussion of Minnesota's air quality and various air quality indexes will help to put the impact of these additional emissions into perspective.

National Ambient Air Quality Standards (NAAQS)

The National Ambient Air Quality Standards (NAAQS) for these criteria pollutants are shown in **Table 8.**[6] The state standards are nearly identical, although Minnesota has a one-hour sulfur dioxide standard.[7] There are two types of air quality standards-primary standards and secondary standards. Primary standards are intended to protect public health, including the health of sensitive populations like asthmatics, children, and the elderly. Secondary standards are intended to protect public welfare, by preventing decreased visibility and damage to crops, animals, vegetation, and buildings.

Areas of the country that do not meet national ambient air quality standards are designated non-attainment areas for the particular pollutant or pollutants for which the standard or standards are not met.

Minnesota currently meets all the above standards; SO2, NO2, CO and PM10 ambient levels are less than 40 percent of their standards. Ozone and PM2.5 levels are at about 80 percent of their respective standards. Minnesota is one of only 11 states that currently meet all federal air quality

[4] http://www.pca.state.mn.us/air/air_rulesregs.html
[5] http://www.epa.gov/air/urbanair/6poll.html
[6] http://www.epa.gov/oar/oaqps/greenbk/index.html
[7] http://www.pca.state.mn.us/air/air_mnrules.html

standards[8] **Figure 8** illustrates the trend, as a percentage of the NAAQS, the criteria air pollutants in the twin cites area.

Air Quality Index (AQI)

The Air Quality Index (AQI) was developed by the EPA to provide a simple, uniform way to report daily air quality conditions. The EPA calculates the AQI for the criteria air pollutants: ground-level ozone (O_3), particle pollution (also known as particulate matter, or $PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2).

The AQI translates each pollutant measurement to a common index, with an index of 100 set to reflect where health effects might be expected in sensitive populations. An AQI value of 100 generally corresponds to the National Ambient Air Quality Standard for the pollutant, which is the level the EPA has set to protect public health.[9]

The pollutant with the highest index value is used to determine the overall AQI. The AQI uses numbers from 0 to 500 to describe the air quality conditions and their possible effects on human health. Readings of 0-50 are described as Good, 51-100 as Moderate, 101-150 as Unhealthy for Sensitive Groups, 151-200 Unhealthy, 201-300 Very Unhealthy, and 301 and above Hazardous.

In large cities (more than 350,000 people), state and local agencies are required to report the AQI to the public daily. When the AQI is above 100, agencies must also report which groups of people, such as children or people with asthma or heart disease, may be sensitive to the specific pollutant. If two or more pollutants have AQI values above 100 on a given day, agencies must report all the groups that are sensitive to those pollutants. Many smaller communities also report the AQI as a public health service.

The MPCA determines the AQI around the state by measuring four pollutants: ozone, sulfur dioxide (SO_2), fine particulate matter ($PM_{2.5}$) and carbon monoxide. Not all pollutants are monitored at each location. The pollutant with the highest value determines the AQI for that hour. The MPCA takes hourly measurements of these pollutants at air quality sites located throughout the state. Ozone levels, which are only elevated in warm weather, are measured from April through September in Minnesota. While the AQI in Minnesota cities rarely reaches the "Unhealthy" level (AQI >200), many citizens are affected by air quality in the "Unhealthy for Sensitive Groups" level (AQI >100).

In 2003, the AQI reached and exceeded the minimum level for an air pollution alert (an AQI of 100-150) nine times for PM2.5 and four times for ozone. This does not mean that Minnesota violated federal air quality standards, however, in part because violating standards involves more than one year's data.[10]

[8] Air Quality in Minnesota Progress and Priorities, 2005 Report to the Legislature. February 2005. MPCA
[9] Air Quality Index. A Guide to Air Quality and Your Health. August 2003. http://www.epa.gov/airnow/aqi_cl.pdf
[10] Air Quality in Minnesota Progress and Priorities, 2005 Report to the Legislature. February 2005. MPCA

AQI values are reported hourly on the MPCA's Web site.[11] Each weekday, you may also hear a recorded message of the daily AQI for the Twin Cities metro area by dialing 651-297-1630.

Criteria Air Pollutants

Sulfur Dioxide.

Sulfur dioxide (SO_2) belongs to the family of sulfur oxide gases (SO_x). These gases are very soluble in water. Sulfur is common in raw materials, including crude oil, coal, and ores that contain common metals like aluminum, copper, zinc, lead, and iron. SO_x gases are formed when fuel containing sulfur, such as coal and oil, is burned, and when gasoline is extracted from oil or metals are extracted from ore. SO_2 dissolves in water vapor to form sulfuric acid, and interacts with other gases and particles in the air to form sulfates and other products that can be harmful to people and the environment, including the formation of acid rain.

Sulfur dioxide causes a wide variety of health and environmental impacts because of the way it reacts with other substances in the air. Sulfur dioxide affects the respiratory system in humans, particularly those of sensitive groups like people with asthma who are active outdoors and children, the elderly, and people with heart or lung disease.[12]

Nationwide, about 20 million tons of sulfur dioxide are emitted by numerous sources each year. Over 65% of this amount, or more than 13 million tons per year, comes from electric utilities, especially those that burn coal. Other sources of SO_2 are industrial facilities that derive their products from raw materials like metallic ore, coal, and crude oil, or that burn coal or oil to produce heat for various processes.

The Minnesota Pollution Control Agency has estimated that in 2000, statewide SO_2 emissions were estimated at about 189,636 tons. Electric utilities and industrial facilities burning coal emit the majority (>85 percent) of SO_2 attributed to point sources. Within this category, electric utilities were the dominant source, accounting for about 62.3 percent of total SO_2 emissions. Ninety-nine percent of electric utility emissions are attributed to coal combustion.[13]

Off-highway vehicles and engines emit 22 percent of SO2. Off-highway emissions come primarily from non-road diesel engines and marine vessels. Highway vehicles contribute 4 percent of the emissions. These emissions are divided between gasoline-powered cars, trucks and motorcycles and diesel vehicles. The remaining three percent of area emissions of SO2 result from fuel combustion by small industrial and commercial facilities and residences.[14]

Nationally, SO2 emissions have decreased 31 percent over the last 20 years. Nationally and in Minnesota emissions have remained essentially level in recent years. The estimated Minnesota 2000 emissions represent a 15 percent increase from 1999 values. The increase is primarily a result of an increase in off-highway emissions from marine vessels. Estimated marine vessel

[11] http://aqi.pca.state.mn.us/hourly/
[12] How sulfur dioxides affects the way we live and breathe. 2000. US EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711 EPA-456/F-98-005
[13] Air Quality in Minnesota Progress and Priorities, 2005 Report to the Legislature. February 2005. MPCA
[14] Ibid

emission increased from 225 tons in 1999 to 23,807 tons in 2000. Increases from this source category are surprising and likely due to a methodology change or error in the EPA inventory.[15]

Continued progress in reducing ambient SO_2 concentrations has been possible because new large utility plants have installed sulfur-removal equipment; and utility, commercial, residential and industrial users continue to shift to lower-sulfur fuels. One additional factor contributing to lower SO_2 concentrations is the lower sulfur content in today's diesel motor fuels.[16]

Nitrogen Oxides

Nitrogen oxides, or NOx, are the generic terms for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Various compounds and derivatives make up the family of nitrogen oxides, including nitrogen dioxide ((NO_2), nitric acid (HNO3), nitrous oxide (N_2O), nitrates (NO_3), and nitric oxide (NO).[17]

Many of the nitrogen oxides are colorless and odorless. However, one common pollutant, nitrogen dioxide (NO_2), along with particles in the air, can often be seen as a reddish-brown layer (smog) over many urban areas. Nitrogen oxides also contribute to acid rain and lead to the formation of ozone upon chemical reaction with volatile organic compounds in the atmosphere.

Nitrogen oxides form when fuel is burned at high temperatures, as in a combustion turbine process. The primary sources of NOx are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels.

Nitrogen oxides cause a wide variety of health and environmental impacts and can attack the respiratory system and cause lung damage.

The EPA estimate for Minnesota statewide emissions of NOx in 2000 is 532,853 tons. The majority of NOx emissions come from the transportation sector, which consists of highway and off-highway vehicles. Highway vehicles contribute 34 percent of total statewide NOx emissions, while off-highway vehicles and engines contribute 30 percent of total NOx emissions. Gasoline and diesel engines contribute the majority of emissions from the transportation sector.[18]

Thirty-one percent of NOx emissions come from point sources as electric utilities and industrial facilities emit NOx during coal and gas combustion. Area sources are responsible for the remaining 5 percent of NOx emissions. Residential and small industrial combustion makes up the majority of area source emissions.[19]

Background concentrations of nitrogen oxide (NO) and NO_2 are approximately 0.5 and 1 part per billion (ppb), respectively. In urban areas, one-hour average concentrations of NO may reach 1-2 parts per million (ppm), with maximum NO_2 levels of about 0.5 ppm. Atmospheric levels of

[15] Ibid
[16] Ibid
[17] How nitrogen oxides affect the way we live and breathe 1998.US EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711 EPA-456/F-98-005
[18] Air Quality in Minnesota Progress and Priorities, 2005 Report to the Legislature. February 2005. MPCA
[19] Ibid

NO and NO_2 show daily variations related to the human transportation/work cycle. Maximum concentrations of NO are observed in early morning hours (6 a.m. to 8 a.m.), followed by a second peak later in the day (4 p.m. to 6 p.m.). High morning concentrations of NO are followed several hours later by peak levels of NO_2 produced by oxidation of NO. Seasonal trends can also be observed. Emissions of NO increase in winter months, when there is higher consumption of heating fuel. The warm and sunny days of summer bring higher NO_2 levels, due to photochemical oxidation of NO.[20]

Nationally, NOx emissions have increased 4 percent over the last 20 years. In Minnesota, from1996-2000, NOx emissions have generally remained constant while the estimated 2000 emissions represent a 9 percent increase from 1999 values. The increase in 2000 estimated emissions is primarily a result of increased off-highway emissions including a ten-fold increase in marine vessel emissions and a doubling of emissions from railroads. Increases from these source categories are surprising and it is likely that they result from a methodology change or error in the EPA inventory. There was also an increase in residential combustion under area sources.[21]

Carbon Monoxide

Carbon monoxide, or CO, is a colorless, odorless gas that is formed when carbon rich fuel is incompletely combusted.

The EPA estimate for Minnesota statewide emissions of CO in 2000 is 2,104,632 tons. The majority of CO emissions come from the transportation sector, which consists of highway and off-highway vehicles. Highway vehicles contribute 52 percent of total statewide CO emissions, while off-highway vehicles and engines contribute 32 percent of total CO emissions. Off-highway emissions come primarily from gasoline consumption by lawn and garden, industrial and recreational engines. The remaining 16 percent of emissions come from point and area sources. Area source emissions are primarily from residential wood burning, waste disposal through open burning and other combustion sources such as wildfires. Point sources include electric utilities and other industries that contribute to CO emissions through fuel combustion. Petroleum refineries are the primary industrial point source that contributes to CO emissions.[22]

Nationally, CO emissions have decreased 18 percent over the last 20 years. However, in Minnesota from1996-2000, CO emissions have generally remained constant except for the estimated 2000 emissions, which represent a 15 percent increase from 1999 values. The EPA inventory attributes this increase to an increase in residential wood burning, non-highway gasoline engine emissions and miscellaneous combustion including wildfires. It is unlikely that actual emissions increased this much over one year, based on trends from years past.[23]

[20] http://www.pca.state.mn.us/air/emissions/emissearch.cfm
[21] Air Quality in Minnesota Progress and Priorities, 2005 Report to the Legislature. February 2005. MPCA
[22] How carbon monoxides affects the way we live and breathe. 2000. US EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711 EPA-456/F-98-005
[23] http://www.pca.state.mn.us/air/emissions/emissearch.cfm

Particulate Matter

Particulate matter, or PM, is the term used to describe particles found in the air (dust, soot, smoke, and liquid droplets). Particles can be suspended in the air for long periods of time. Some particles are large or dark enough to be seen as soot or smoke, while others are microscopic. The larger groups of particles are identified as "coarse," and by definition have a size range from 2.5 to 10 microns (PM_{10}). The smaller groups of particles are identified as "fine," and by definition have a size smaller than 2.5 microns ($PM_{2.5}$). For comparison, a human hair is usually greater than 10 microns in thickness, in the range of 10 to 100 microns.

Particulate matter can be directly emitted into the air or be formed in the air from the physical and chemical transformation of other vaporous or gaseous pollutants such as NO_X, SO_X, VOC and ammonia. The latter are indirectly formed when gases from burning fuels react with sunlight and water vapor. These can result from fuel combustion in motor vehicles, power plants, and in industrial processes.

Particulate matter causes a wide variety of health and environmental impacts. Many scientific studies have linked breathing PM to a series of significant health problems, including cardiovascular problems, throat and nose irritation, lung damage, and bronchitis.[24]

The EPA estimate for Minnesota statewide direct emissions of PM_{10} in 2000 is 894,093 tons. Emissions of secondarily formed PM_{10} are not accounted for in these emissions.[25]

Area sources contribute 92 percent of PM_{10} emissions. The area sources consist of fugitive dust (63 percent) and agriculture and forestry (33 percent) according to the EPA inventory. The remainder of the area source contribution is from combustion. Fugitive dust sources include unpaved roads, paved roads, construction and other sources.

Industrial sources including metal processing, storage and transport, electric utilities, and other industrial processing account for 6 percent of PM_{10} emissions. Metal processing accounts for 45 percent of the industrial portion of PM_{10}. Highway and off-highway sources make up about 2 percent of total PM_{10}.

Fugitive dust sources tend to be located away from people and tend to be coarser particles, which are of less concern from a human health perspective. Particles emitted from non-fugitive dust sources such as cars and wood stoves are smaller, more toxic and more often released in populated areas.

In the 1970's the ambient air quality standard for particulate matter applied to particles larger than 10 microns. In 1997, however, the EPA announced new standards for the smaller (fine) particles, those 2.5 microns or less in diameter ($PM_{2.5}$). The new ambient standards were set at 15 micrograms per cubic meter (ug/m^3) on an annual basis and 65 ug/m^3 for a 24-hour period. Evidence from hundreds of studies has shown that these tiny particles are chiefly responsible for the most serious adverse health impacts associated with air pollution. When inhaled, $PM_{2.5}$

[24] How particulate matter affects the way we live and breathe. 2000. US EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711 EPA-456/F-98-005
[25] Air Quality in Minnesota Progress and Priorities, 2005 Report to the Legislature. February 2005. MPCA

penetrates deep into the human lung, where the particles and the toxic materials attached to them remain lodged.[26]

Nationally, manmade direct PM_{10} emissions have decreased 47 percent over the last 20 years. In Minnesota direct emissions have oscillated up and down from 1996-2000. The estimated Minnesota 2000 emissions represent a 5.5 percent increase from 1999 values. The increase is primarily a result of increased residential wood burning, agricultural and forestry, fugitive dust, and an increase in miscellaneous combustion including wildfires.[27]

Nationally, manmade direct $PM_{2.5}$ emissions have decreased 5 percent over the last 10 years. The estimated Minnesota 2000 emissions (191,198 tons) represent a 10 percent increase from 1999 values (211,389 tons).[28]

Monitored annually for the past three years to determine whether Minnesota attains the NAAQS, average concentrations of fine particulates in the Twin Cities typically range from 11 ug/m^3 to 14 ug/m^3. Atmospheric $PM_{2.5}$ reached alert levels twice in 2002 in Minnesota.[29]

Ozone

Ozone (O_3) is a gas composed of three oxygen atoms. Ozone naturally exists high in the atmosphere, where it shields the earth against harmful ultraviolet rays from the sun. Ground-level (i.e., near the earth's surface) ozone is a product of reactions between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of heat and sunlight. Ozone has the same chemical structure whether it occurs miles above the earth or at ground level; its location in the atmosphere determines whether it represents a problem. In the earth's lower atmosphere, at ground-level, ozone is considered harmful. Sunlight and hot weather cause ground-level ozone to form in harmful concentrations in the air. As a result, it is known as a summertime air pollutant. Many urban areas tend to have high levels of ground-level ozone, but even rural areas are also subject to increased ozone levels because wind carries ozone and pollutants that form it hundreds of miles away from their original sources. Ground-level ozone even at low levels can adversely affect everyone. It can also have detrimental effects on plants and ecosystems.[30]

Ozone can cause breathing problems in sensitive populations. It can also damage plants and trees. Ozone can also reduce visibility.

In late June 2001, the Air Quality Index (AQI) for the Twin Cities reached some of its highest levels since the Clean Air Act took effect in the 1970s. On four days the AQI reached a level considered unhealthy for sensitive groups. These high AQI readings were primarily a result of elevated ground-level ozone concentrations.

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[26] *Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality.* A Special Report of the Institute's Particle Epidemiology Reanalysis Project. July 2000. http://www.healtheffects.org/pubs-special.htm
[27] Air Quality in Minnesota Progress and Priorities. 2005 Report to the Legislature. February 2005. MPCA
[28] Ibid
[29] Minnesota Energy Planning Report 2002. Appendix A
[30] How ground-level ozone affects the way we live and breathe. 2000. US EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711 EPA-456/F-98-005

Emissions of ozone are not reported because ozone is not normally emitted directly into the air. Instead, it is created when "ozone precursors" such as nitrogen dioxide (NO_2) and volatile organic compounds (VOCs) react in a hot stagnant atmosphere. Since heat and sunlight are needed for ozone to be produced, elevated levels of ozone in Minnesota are normally seen on very hot summer afternoons.

Ozone precursors come from a variety of sources. NO_2 can form when fuels are burned at high temperatures. The major NO_2 sources are combustion processes from automobiles and power plants. VOCs are emitted from a variety of sources, including industrial sources, motor vehicles, consumer products and natural sources such as lightning and biological processes in soil.[31]

Lead

Lead levels in the environment have decreased dramatically since lead in gasoline was banned by the Environmental Protection Agency in 1978. The only places where lead is still found in concentrations of concern is in the inner cities, where years of exhaust from motor vehicles burning leaded gasoline have resulted in high levels in the soil in such areas.

In Minnesota, lead in the air has dropped significantly. Between 1984 and 1994 average lead concentrations decreased 87% from .53 micrograms per cubic meter (ug/m3) to 0.06 ug/m3. The national ambient air quality standard is 1.5 ug/m3.[32]

Volatile Organic Compounds

Volatile organic compounds (VOCs) are compounds containing the elements carbon and hydrogen that exist in the atmosphere primarily as gases because of their low vapor pressure. VOCs are defined in federal rules as chemicals that participate in forming ozone. Therefore, only gaseous hydrocarbons that are photochemically reactive and participate in the chemical and physical atmospheric reactions that form ozone and other photochemical oxidants are considered VOCs.

Many VOCs are also air toxics and can have harmful effects on human health and the environment. However, VOCs are regulated as a criteria pollutant because they are precursors to ozone.

The EPA estimate for Minnesota statewide emissions of VOCs in 2000 is 458,306 tons. VOCs are emitted from a variety of sources, including industrial sources, motor vehicles, consumer products and natural sources such as lightning and biological processes in soil. Of the manmade Minnesota sources of VOCs in 2000, 50 percent of the emissions come from the transportation sector; 24 percent from highway vehicles and 26 percent from off-highway vehicles.[33]

[31] Preliminary Assessment of Ozone Air Quality Issues in the Minneapolis/St. Paul Region. Sonoma Technology, Inc. October 10, 2002. http://www.pca.state.mn.us/publications/reports/ozonestudy2002.pdf
[32] Air Quality in Minnesota Progress and Priorities, 2005 Report to the Legislature. February 2005. MPCA
[33] Ibid

Area sources contribute 42 percent of VOC emissions, primarily from solvent utilization, residential wood combustion, and storage and transport of fuels and chemicals. The final 8 percent of emissions come from point sources.

Greenhouse Gases

Another group of air pollutants has risen in importance. Although greenhouse gases (GHG) do not necessarily directly harm human health, their increase in concentration can lead to global climate change. Global climate change poses risks to human health and to ecosystems. Important economic resources such as agriculture, forestry, fisheries, and water resources also may be affected. The principal GHG is carbon dioxide (CO_2).

The estimate for statewide emissions of carbon dioxide, from the fossil fuel burning, in 2000 is 109 million short tons. The majority of the carbon dioxide emissions come from the electric utility (36%) and transportation (34%) sectors. The remaining 30 percent of the emissions come from fossil fuel combustion in the industrial, commercial, residential and agriculture sectors.[34]

Over the five years from 1996-2000, carbon dioxide emissions from fossil fuel burning in Minnesota rose an average of 1.2 percent per year. These increases reflect a continuing increase in the electric utility and transportation sectors. From 1999 to 2000, carbon dioxide emissions increased 5.6 percent.[35]

Toxic Air Pollutants

The burning of natural gas and fuel oil can also result in the emission of non-criteria pollutants of concern. EPA refers to certain chemicals that cause health and environmental hazards as "hazardous air pollutants (HAPs)" or "air toxics." Air toxics include chemicals such as benzene, formaldehyde, acrolein, mercury and polycyclic aromatic hydrocarbons (PAHs). EPA tracks emissions of these chemicals in the National Toxics Inventory (NTI) database.[36]

The MPCA compares concentrations of air toxics in the ambient air to inhalation health benchmarks to determine at what concentrations toxics may cause health concerns. An "inhalation health benchmark" is a point or range below which there is little appreciable risk of harm to humans. Unlike the federal ambient air quality standards, they are guidelines rather than enforceable regulatory standards.

Out of the 45 gaseous air toxics measured by the MPCA that have health benchmarks, the 2003 air quality legislative report identified two that were above health benchmarks: benzene and formaldehyde. Benzene concentrations have been declining since 1996 and current levels are now below inhalation health benchmarks.

Measurements of formaldehyde are above its inhalation health benchmark in Minneapolis, St. Paul, and Duluth, as well as in most other Minnesota cities with monitors. Formaldehyde

[34] Ibid
[35] Ibid
[36] http://www.epa.gov/ttn/atw/

concentrations in Minnesota have been relatively flat since 1995. However, the last two years have shown decreasing levels, especially in downtown Minneapolis. More monitoring is needed to see if this trend continues.

Formaldehyde comes from a variety of sources. It is directly emitted from wood-burning and from fuel-burning vehicles, as well as industrial processes. A significant amount of formaldehyde also comes from the breakdown of other air toxics and from natural sources. These disparate sources make it difficult to control formaldehyde emissions.

4.2 LAND USE

The area surrounding the High Bridge Generating Plant is zoned by the City of St.Paul as an I-2 Industrial Zone. A zoning map of the area is shown in **Figure 9**.

The proposed site for the new generating units is located within a 77-acre parcel owned by Xcel Energy (**Figure 1 and Figure 2**). The nearest residential area is a townhouse development directly northeast of the site.

4.3 NATURAL RESOURCES

The Ecological Classification and Inventory (EC&I) is part of a nationwide mapping initiative, initially established by the US Forest Service, developed to improve the ability to manage natural resources on a sustainable basis. The central concept of the EC&I is the integration of biotic and abiotic environments. This method of classification not only facilitates understanding of the natural environment and the distribution of complex ecological systems, but also allows aggregation and desegregation of data and information for multi-level analysis and planning purposes. This is done by integrating climatic, geologic, hydrologic, topographic, soil, and vegetation data. Three of North America's ecological regions, or biomes, converge in Minnesota: prairie parkland, eastern broadleaf forest and laurentian mixed forest. The occurrence of three biomes in one non mountainous state is rare, and accounts for the diversity of ecological communities in Minnesota.[37] The eastern broadleaf forest province bridges the transition zone between prairie to the west and true forest to the east.

The eastern broadleaf forest province has several subsections; the proposed site lies within the St. Croix Moraine & outwash plains subsection of this province. The northern boundary of this subsection consists of a Superior Lobe end moraine complex (St. Croix Moraine). To the west, terraces associated with the Mississippi River separate this subsection from the Anoka Sand Plain subsection. The south boundary consists of the southern edge of the Rosemount Outwash Plain.

The St. Croix Moraine & outwash plains subsection is a small unit that continues into Wisconsin. Although it is topographically low in comparison to other areas in the state, this subsection is

[37] Albert, Dennis A. 1995. Regional landscape ecosystems of Michigan, Minnesota, and Wisconsin: a working map and classification. Gen. Tech. Rep. NC-178. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station.

dominated by a large moraine and areas of outwash plain. It encompasses much of the seven county urban area and therefore has much urban development within.

Topography/Landform

As stated previously, this subsection is dominated by a Superior Lobe end moraine complex. South of this moraine is a series of outwash plains. There are some areas of loess plain over bedrock or till in the southeastern portion of the unit. Topography is rolling to hummocky on the moraine (steep, short complex slopes) and level to rolling on the outwash.

The elevation of the proposed site is approximately 710 feet mean sea level (msl). The High Bridge Generating Plant site is located along the Mississippi River, within the Mississippi National River and Recreation Area (MNRRA) boundary (**Figure 10**). The MNRRA was established in 1988, and extends along both sides of the river from Dayton to Hastings.

The only wetland on the site is the current facility's stormwater storage pond in the southwest corner of the property. This wetland will remain in use in its current capacity. The High Bridge Generating Plant's former stormwater storage pond at the northwestern edge of the property is identified on the National Wetland Inventory (**Figure 11**). This wetland no longer exists, apparently having been filled during the construction of the new Shepard Road.

Geology/Soils/Hydrology

The soils on the site are currently classified as "Urban Land." The soils were already disturbed and in industrial use prior to the completion of the County Soil Survey (**Figure 12**). The area to be disturbed for construction has already been graded and filled, and is currently used as the HBGP's coal storage area. No areas containing "prime farmland" soils, as defined by Minnesota Rules 4400.3450, Subp.4, are present at the site.

The site is located within the Mississippi Bottomland geomorphic region and is underlain by approximately 100-160 feet of unconsolidated sediments. This region is located within a buried bedrock valley that was eroded and filled during a series of late and post-glacial events. Directly beneath the site are Holocene-aged sediments associated with the current Mississippi River. These sediments are composed primarily of sand and gravel with some fine-grained sediments and organic material. Beneath these sediments lies a sequence of interbedded Pleistocene-aged till and stream sediments, which likely represent both late- Wisconsinan and older glacial deposits. To the north and west of the site is a terrace with sediment from the Glacial River Warren, which is composed of sand and gravel with some silt and clay. These sediments are generally less than 20 feet thick. Elsewhere in the region are till and stream sediments associated with both the Superior Lobe and the Grantsburg Sublobe.

The unconsolidated sediments at the site are underlain by Ordovician-aged sedimentary rocks. The Site is located within a buried bedrock valley, with the Prairie du Chien Group subcropping within the center. Beneath the northwestern portion of the Site, the St. Peter Sandstone is the uppermost bedrock unit. The Prairie du Chien Group is the uppermost bedrock unit beneath the southeastern portion of the Site. The St. Peter Sandstone is composed primarily of fine to medium-grained quartz sandstone with beds of mudstone, siltstone, and shale near the bottom of the unit. The contact between the St. Peter Sandstone and the underlying Prairie du Chien Group is an erosional surface. The Prairie du Chien Group is commonly sandy or oolitic dolostone with thin beds of sandstone, chert, and intraclastic dolostone. **Figure 13 and Figure 14** illustrates the area bedrock and surficial geology, respectively.

Flora

The site of the new generating plant is currently industrial and already free of vegetation. The pre-settlement nature in the vicinity of the site was floodplain forest. Since settlement, the area has been developed, which has effectively removed most evidence of the pre-settlement vegetation. The native forests were almost entirely replaced with industrial, commercial and residential land uses. There are some remnants of pre-settlement oak and maple-basswood forest vegetation indicated by the Minnesota County Biological Survey across the Mississippi River from the site (**Figure 15**).

Fauna

Urban-adapted wildlife, including foxes and songbirds, has been observed on the property.

Rare & Unique Natural Resources

Staff of the Natural Heritage Program of the MDNR was contacted by Barr Engineering and asked to review its database to determine if any rare plant or animal species or other significant natural features are known to occur within the site.

Peregrine falcons, a state-listed threatened species, began nesting under the High Bridge in 1999; Xcel Energy installed a falcon nest box on the High Bridge plant exhaust stack, which falcons began using in 2000. The nest box has been used by falcons every year since, and according to the MDNR, 17 young falcons have successfully fledged from the site.

The Mississippi River also provides habitat for a number of rare fish and mussel species in the area of the High Bridge Generating Plant.

Other nearby occurrences of rare natural resources includes a bat concentration and a dry sand-gravel prairie habitat across the Mississippi River from the site, at Lilydale-Harriet Island Regional Park.

The National Park Service, in cooperation with the Metropolitan Council, the MN Department of Natural Resources, and local authorities, has designated the Mississippi River corridor for protection and improvement.

Recreation Areas

The City of St. Paul maintains Shepard Road and Sam Morgan Regional trails along the north and south boundary of the property, respectively (**Figure10**).

4.4 VISUAL AESTHETIC

The site is already developed (**Figure 16**), housing the existing High Bridge Generating Plant and its coal storage area. The existing building, 530 foot exhaust stack and 125,000-ton coal storage area will be eliminated as part of the HBRP. **Figure 17** illustrates an artist rendition of how the HBRP will appear on the landscape.

4.5 ARCHAEOLOGICAL and HISTORIC RESOURCES

The HBRP will be limited to the previously industrial site, thus there will be no direct impacts to any buildings, including historic structures, except the existing High Bridge Plant.

A review of the Minnesota State Historic Preservation Office (SHPO) records indicated there are numerous reported historic or archaeological resources in the vicinity of the site, including the existing High Bridge Plant, the St. Paul Gas and Light Company Island Plant just southwest of the site, and the John J. Ramsey house, approximately 2,500 feet north of the site.

The 106 Group Ltd., a St. Paul cultural resource consultant, was retained by Xcel Energy to conduct a Phase I architectural history evaluation and Area of Potential Effect (APE) scoping for the site. The purpose of the investigation was to evaluate the eligibility of the existing HBGP for the National Register of Historic Places (NRHP) and to define the project's visual effects within the APE. The conclusions of the investigation are:

1. The existing plant is not eligible for individual listing on the NRHP due to lack of historical significance. In addition, the plant is not eligible for listing on the NRHP as a contributing property within an existing or potential historic district.

2. While the proposed visual effects APE encompasses a large area due to the height of the existing Plant's smoke stack, the proposed project is unlikely to have an adverse effect on the historic properties within the APE.

4.6 TRANSPORTATION

The major traffic route in the area is Shepard Road, which runs east-west along the northern boundary of the site. Other major traffic routes in the vicinity include Minnesota Highway 5 (West 7th Street), the Smith Avenue High Bridge, Interstate 94 and Interstate 35E.

The Union Pacific and Canadian Pacific Railway tracks pass directly adjacent to the north portion of the site property. The Holman Field Airport is located approximately two miles to the east and the Minneapolis/St. Paul International Airport is located approximately five miles west of the site.

Three to four unit trains (115 cars) per week currently deliver coal to the HBGP. Per year, approximately 1,700 trailer loads of ash are trucked to a landfill from the site. In addition, in the summer there is significant on-site use of a watering truck to minimize dust and fire danger.

4.7 SOCIOECONOMICS

Socioeconomics refers to the economic, social, and demographic characteristics of a region. The existing socioeconomic characteristics of Ramsy County, the State of Minnesota, and the Twin Cities Metropolitan area were reviewed by the EQB staff.

Ramsey County comprises a land area of 102,400 acres in the east central portion of Minnesota. Ramsey County is mainly urban; its largest city is St. Paul. The 2000 census reports Ramsey County's population at 511,035 and the City of St. Paul with a population of 287,151.[38]

Table 9 presents the recent population figures for Ramsey County, St. Paul and the State of Minnesota.

The St. Paul Police provide law enforcement services in the area. The St. Paul Police Station is located in downtown St. Paul, a few miles from the site. The local police force currently does, and in the future will be able to, accommodate any law enforcement needs at the HBRP plant.

The HBRP will be equipped with a complete fire protection system, including water and carbon dioxide fire protection measures. This system will be designed in accordance with National Fire Protection Association (NFPA) requirements.

4.8 NOISE

Noise is comprised of a variety of sounds, of different intensities, across the entire frequency spectrum. Humans perceive sound when sound pressure waves encounter the auditory components in the ear. These components convert the pressure waves into perceivable sound. Noise is measured in decibels (dB).

Noise standards have been established by the MPCA, Minnesota Rules part 7030.0040, subp. 2. The MPCA is the regulatory agency responsible for the enforcement of these standards. The standards are consistent with speech (hearing and conversation), annoyance, and sleep requirements for receivers within areas classified according to land use activities.

The MPCA has established various noise area classifications (NAC) and has established noise standards for each classification. The NAC is based on the land use activity at the location of the receiver, and the NAC determines the applicable noise standard. Lower noise levels are required in residential areas, for example, than in industrial zones.

The four noise area classifications are: NAC-1, NAC-2, NAC-3, and NAC-4. Some of the land use activities under NAC-1 include household units, hospitals, religious services, correctional institutions, and entertainment assemblies. NAC-2 land use activities include mass transit terminals, retail trade, and automobile parking. Some NAC-3 land uses include manufacturing

[38] Minnesota Planning Agency, State Demographic Center (http://www.mnplan.state.mn.us/demography/index.html)

facilities, utilities, and highway and street ROW. NAC-4, which has no noise limits, consists of undeveloped and under construction land use areas.[39]

Table 10 sets forth the Minnesota Noise Standards for the appropriate land use areas.

Noise area classifications apply at the location of the noise receptor, not at the property boundary of the noise source. Further, the noise rules require that a municipality with authority to regulate land use prevent new land uses defined in the NAC categories from being established where the noise standards shown in Table 4 would be exceeded if the new land use is permitted.

The area surrounding the site is currently subjected to high noise levels. Recent monitoring data obtained by Barr Engineering indicates that the current background noise levels in the nearby residential areas exceed daytime and nighttime noise standards. The cause of the exceedances is due to traffic noise and not the existing plant.

[39] http://www.pca.state.mn.us/programs/noise.html

5.0 HUMAN & ENVIRONMENTAL IMPACTS

This section contains site specific information on the human and environmental impacts of the proposed large electric power generating plant. The impacts evaluated include those resulting from construction and operation of the plant and include potential impacts of the proposed plant on water resources, air quality, noise, vegetation, fish, wildlife, traffic, land use, socioeconomic factors, and cultural resources.

5.1 AIR QUALITY

The new air emissions sources include the two identical combustion turbines equipped with dry, low-NO_x combustors. Each of the combustion turbines will exhaust to a separate heat recovery steam generator equipped with supplemental duct-firing capacity. Xcel Energy will install a selective catalytic reduction (SCR) system within each heat recovery steam generator to reduce NO_x emissions from the combustion turbine and duct burner exhaust when operating in the combined cycle mode of operation.

Secondary combustion sources include an auxiliary boiler and a new diesel-driven fire pump. One of the emergency diesel-driven generators from the existing High Bridge Plant will be retained for emergency backup service at the new combined cycle plant. This unit will not be modified.

The combustion turbines, duct burners, and auxiliary boiler will all be fired by only natural gas. The new fire pump engine and the existing emergency generator will be fired with diesel fuel.

As both a requirement of federal law (the Clean Air Act) and state law (Minn. Stat. §116.07), Xcel Energy will be required to obtain an amended air permit from the Minnesota Pollution Control Agency. The kind of review the MPCA will conduct and the conditions that are included in any air permit that is issued will depend on the quantity and type of pollutants that will be emitted during operation of the facility.

The HBRP will be subject to Prevention of Significant Deterioration (PSD) review for emissions of carbon monoxide and volatile organic compounds. Emissions of other regulated pollutants are below the PSD thresholds and are therefore not subject to PSD review. The PSD rules require that pollutants subject to PSD review must be controlled through the application of the Best Available Control Technology (BACT). All of the combustion sources will employ good combustion practices to minimize emissions of CO and VOCs. The application of SCR to reduce NO_x emissions qualifies the combustion turbines and duct burners for "Clean Unit Designations" under the PSD rules, because the controls are comparable to BACT.

On January 21, 2005, Xcel Energy submitted an Air Emissions Permit Major Amendment Application (Permit No. 12300012-003) to the MPCA for the HBRP.

Criteria Air Pollutant Emissions

Projected actual air emissions from the HBRP are presented in **Table 11**. These estimates are generally lower than those represented in the air emissions permit application, which are based on *potential* emissions. Potential emissions are based on the maximum emission rate and continuous operation 24 hours a day and 365 days a year. Potential emissions far exceed the projected actual air emissions.

A comparison of the projected annual emissions from the HBRP to actual emissions from the existing HBGP is presented in **Table 12**. Projected actual air emissions provide a more meaningful basis than potential emissions for comparison with the existing emission levels.

In addition to those pollutants identified, there will be a small release of ammonia from the combustion turbine stacks. Xcel Energy proposes to utilize SCR systems in the heat recovery steam generators to control NO_x emissions from the combustion turbines and duct burners. Ammonia emissions result from the use of ammonia as a reagent in the SCR system. Ammonia emissions also referred to as "ammonia slip," will be at a concentration of less than 10 ppm.

NAAQS Modeling

As part of the PSD permit application, air-dispersion modeling was performed to demonstrate that the emissions from the facility will not cause or contribute to a violation of an ambient air quality standard or PSD increment. Modeling was performed using a modeling protocol that conforms to U.S. Environmental Protection Agency (EPA) standards to predict the maximum ambient concentrations.

PSD increments have been established for NO_2, SO_2, and PM_{10} to prevent degradation to air quality by limiting the cumulative change in ambient concentrations that can occur due to construction or modification of facilities in the region after the specific baseline date for each pollutant.

Xcel Energy performed increment modeling for NO_2 to demonstrate that the combustion turbines and duct burners are eligible for designation as "Clean Units." The MPCA identified the District Energy facility as the only other facility that needs to be included in the analysis.

Xcel Energy sources were modeled to determine compliance with the National and Minnesota Ambient Air Quality Standards (NAAQS and MAAQS). MPCA guidance was relied upon to determine the appropriate background concentrations for NO_2 and CO.

A complete modeling report was submitted as part of the PSD permit application. The PSD permit application will be reviewed by the MPCA and will be placed on public notice in accordance with the requirements of the application process.

The modeling results summarized in **Table 13** demonstrate the ambient air concentrations of NO_2 and CO resulting from emissions from the proposed HBRP, together with emissions from other regional emission sources, comply with the corresponding standards.

Hazardous Air Pollutants

In addition to criteria pollutants, the proposed facility will generate small amounts of hazardous air pollutants (HAPs). The EPA has developed National Emission Standards for hazardous air pollutants (i.e., NESHAP) for numerous source categories.

The Clean Air Act Amendments of 1990 established a new and fairly complex program to regulate emissions of 188 hazardous air pollutants from particular industrial sources. The amendments required the EPA to regulate emissions of these HAPs by developing and promulgating technology-based standards. New sources are subject to these requirements if they have the potential to emit HAPs in "major" amounts (i.e., 10 tons or more of an individual pollutant or 25 tons or more of a combination of pollutants).

Estimates of potential HAP emissions are presented in **Table 14**.

Air Emission Risk Analysis

The HBRP is exempt from the requirement to conduct an Air Emissions Risk Analysis (AERA) in accordance with MPCA technical guidance (Air Emissions Risk Analysis Guidance; Version 1.0; March 2004). The purpose of the AERA is to assess the potential health risk attributed to air emissions from a given source. MPCA guidance exempts natural gas-fired combustion units from review. Further, Xcel Energy has agreed to accept limits of 300 hours per year or less on the new diesel-driven emergency fire pump, which exempts this unit from review as well.

Other Sources of Air Pollution

Another potential source of air emissions is fugitive dust from site preparation and construction activities. Fugitive emissions will be controlled to reduce their impact on area residents by watering or applying dust suppressants to exposed soil surfaces as necessary.

5.2 LAND USE

As described in Section 5.2, the City of St. Paul has designated the site as an I-2 industrial zone.

The conversion from a coal-fired facility to a smaller gas-fired facility will result in reduced visual impact on nearby residential areas. The HBRP location takes advantage of existing infrastructure.

Area industries will not be adversely impacted by the HBRP. The decommissioning of the existing plant will result in the loss of a source of steam that the Rock-Tenn Paper Company is currently using. Rock-Tenn is aware of this future loss and has several years to address this change.

No area tourism or recreation areas will be adversely impacted by the HBRP.

Zoning and Displacement

The HBRP will not displace any occupied residences or businesses; the project will not displace any other existing or planned land use, including residential land uses.

The nearest residential area is a townhouse development located approximately 1,400 feet northeast of the proposed location of the HBRP's STG/CTGs.

Agriculture and Farmland

No agricultural land will be used for the HBRP. No prime farmland will be taken out of production.

5.3 NATURAL RESOURCES

Flora

As identified in Section 4.3, there are some remnants of pre-settlement oak and maple-basswood forest vegetation located on the south side of the Mississippi River. Because of their location on the opposite side of the river, these remnants will not be negatively impacted by construction activities.

Fauna

Conversion from the existing coal fired plant to the new gas-fired plant is not expected to negatively impact wildlife in the area

Rare & Unique Natural Resources

While the existing smokestack will be removed as part of the HBRP, Xcel Energy will continue to work with the DNR to aid in peregrine falcon conservation efforts. The falcon nest box will be removed from the existing exhaust stack prior to stack demolition and during a time when the birds are not nesting (May – April nesting period to be avoided). Xcel Energy will work with MDNR Nongame Wildlife staff to determine if an appropriate location and time to place a new falcon nest box can be identified.

Conversion from coal to gas will not adversely impact the habitat of rare fish and mussel species identified by the MDNR's Natural Heritage Program.

Because of their location across the Mississippi River from the site, the bat population and the dry sand-gravel prairie habitat located at Lilydale-Harriet Island Regional Park. will not be impacted by High Bridge Repowering project.

Recreation Areas

No tourism or recreation areas will be adversely impacted by the construction and/or operation of the HBRP.

Prohibited Sites

The EQB has identified (Minnesota Rules part 4400.3450) certain areas, termed "Prohibited Sites", in which no LEPGP can be sited. Examples of prohibited sites include national parks, national historic sites and landmarks, state parks, nature conservancy preserves, and state and national wilderness areas. No prohibited sites are found on or in the immediate vicinity of the proposed site.

Forestry

No forestry-related industry will be adversely impacted by the construction and/or operation of the HBRP.

Mining

No mining-related industry will be adversely impacted by the construction and/or operation of the HBRP.

5.4 VISUAL AESTHETICS

The HBRP will be smaller in size than the existing coal-fired plant, and new exhaust stacks will be lower than existing stack. The 125,000 ton coal storage area will be eliminated. The conversion from a coal-fired to a gas-fired facility will result in a less industrial look and reduced visual impact on the surrounding areas.

The conversion to a gas-fired plant at the site should be more in line with city, state, regional and National Park Service plans for the Mississippi River corridor than continued operation as a coal-fired facility.

Exterior lighting for the facility will be provided as required for security and safety throughout the facility. Illumination levels will be in accordance with the Illuminating Engineering Society (IES) Handbook and code requirements.[40] To reduce the visibility of the facility, task lighting will be utilized instead of flood or area lighting. Lights will be shielded and/or directed towards the ground as much as practical.

[40] Illuminating Engineering Society of North America. 1993. IES Handbook 8th Edition. New York: IESNA and Illuminating Engineering Society of North America. 1984. Lighting for Parking Facilities. RP-20. New York: IESNA

5.5 ARCHAEOLOGICAL & HISTORIC RESOURCES

The HBRP will have no adverse effect on the historical properties in the vicinity of the site.

5.6 TRANSPORTATION

The operation of either airport identified in Section 4.6 will be not be adversely affected by the HBRP.

Additional traffic generated by the HBRP will be limited to the truck traffic associated with ammonia deliveries. The estimated 50 additional truck trips annually will not significantly affect area transportation services.

Conversion to natural gas will eliminate all of the rail traffic (See Section 4.6).

The proposed modifications to the water intake structure will not adversely impact recreational or commercial navigation on the Mississippi. Specific requirements related to river navigation issues will be addressed in the Corps of Engineers Section 10 permit (See Section 3.3) that will be obtained prior to work on the intake structure.

5.7 SOCIOECONOMICS

The local community will benefit financially from the HBRP construction. Construction activities will require an estimated 300 construction workers over the 18-24 month construction period. These high-skill, high-paying positions, including pipe fitters, iron workers, millwrights, boilermakers, carpenters, electricians, and other trades, are estimated to add over $15 million of payroll into the local economy.

Operation of the HBRP after construction will require approximately 25 full-time positions. Periodic major maintenance will also create local jobs.

The HBRP will contribute property taxes to the City of St. Paul, Ramsey County, and the St. Paul School District. The state and Ramsey County will also benefit from income and sales taxes paid as a result of the construction of the HBRP. The operating staff associated with the HBRP will continue to pay payroll taxes.

Similar to construction, the operation and maintenance of a power plant has a multiplier effect of 8.9 jobs and $0.2339 in earnings for the same dollar amounts invested.[41]

Demographic changes to the local area attributable to the construction of the HBRP could consist of population increases from relocating construction workers and families. Workers employed to construct the HBRP, and who are currently living within the regional area, are not expected to relocate. These persons will commute to work, some from significant distances.

[41] Socioeconomic Impacts of Power Plants, EPRI, Palo Alto, CA: EA-2228

The Electric Power Research Institute ("EPRI") report, *Socioeconomics of Power Plants*, indicates that construction workers will travel an average of 73 miles one-way on a daily basis to a jobsite, even up to a maximum of 115 miles one way.[42] The study, which analyzed the commuting patterns of workers on several electric generating facility projects, concluded that the long commuting distances were acceptable to workers due to the temporary nature of construction employment at an electric generating facility site.

A small increase in the local area population attributable to the plant construction can be anticipated.

The operations personnel will not be required until the final months of construction. At approximately that time, they would be selected from the local pool or relocate on a permanent basis.

Given the temporary duration of employment, it is assumed that construction personnel who relocate will rent an apartment or home during employment. The operations personnel and families will most likely purchase living accommodations due to the lengthy expected plant life.

The supply of housing in the study area can easily accommodate the small number of relocating workers and families.

Since the population increase during the construction period is expected to be limited, the increased demand for school, hospital, fire and ambulance, police, and utility services will not be significant. Similarly, since the number of employees required after the construction period and during the facility's operational life is small, no significant impact will occur on the demand for other community facilities and services due to relocating personnel.

The HBRP will not require extraordinary public services nor strain the public infrastructure. Construction and operating simplicity associated with combined cycle technology result in minimal burden on roadways and public services.

5.8 WATER RESOURCES

Surface Water

The HBRP will not significantly impact area water bodies. The site lies on the north bank of the Mississippi River. River water usage will remain approximately the same as the current plant for the new facility (see Section 2.1.3).

Groundwater

As stated in Section 3.3, Xcel Energy will be requesting an amendment to the existing Well Water Appropriations Permit No. 69-1090 (as amended Sept. 16, 2003) The request will not increase the annual appropriations from existing production wells.

[42] Socioeconomic Impacts of Power Plants, EPRI, Palo Alto, CA: EA-2228

In contrast to other high-volume users in the area, including the City of St. Paul, other industries and golf courses, the estimated annual groundwater appropriation for the HBRP is small.

While groundwater is available from the alluvial outwash, most municipal, industrial and private wells in the HBRP vicinity are finished in the Prairie du-Chien/Jordan bedrock aquifer. Other, deeper bedrock aquifers are also available for drinking water uses. Water from the Prairie du-Chien/Jordan aquifer is of high quality, suitable for drinking water without pretreatment (except for the addition of chlorine and fluoride). Large quantities of water are available in this aquifer.

The city of St. Paul has seven municipal water supply wells, six of which are located in the Prairie du-Chien/Jordan aquifer. The six wells are permitted to withdraw up to 13.8 billion gallons per year, and the city routinely withdraws 900 million gallons or more from the wells each year.

Other industrial users in the area also have high-volume Prairie du-Chien/Jordan wells, as do golf courses, mobile home parks and private wells. The St. Paul Pioneer Press is permitted to withdraw 250 million gallons per year.

Wetlands/Floodplains

No wetlands will be disturbed by construction or operation of the HBRP.

Stormwater Management

As stated in Section 3.3, the HBRP will trigger the requirements under the Minnesota Pollution Control Agency's (MPCA) NPDES Stormwater Permit Program for Construction Activities.

Owners and operators of construction activity disturbing one acre or more of land need to obtain a National Pollution Discharge Elimination System and State Disposal System permit (NPDES/SDS). Regulated parties must develop a Storm-water Pollution Prevention Plan (SWPPP).[43]

The SWPPP must be completed prior to submitting the permit application and before beginning construction. The plans must:

- Describe the nature of the construction activity,
- Address the potential for sediment and pollutant discharges from the site,
- Identify someone to oversee BMP implementation,
- Identify chain of responsibility for general contractor and owner,
- Identify temporary sediment basins, if more than 10 acres are disturbed and drain to a single point of discharge,
- Identify permanent storm-water management system,
- Identify erosion prevention practices,
- Identify sediment control practices,

[43] http://www.pca.state.mn.us/water/stormwater/stormwater-c.html

- Identify dewatering and basin draining practices,
- Identify inspection and maintenance practices,
- Identify pollution prevention management measures,
- Retain records,
- Describe the timing of BMP installation,
- Location and type of temporary and permanent BMPs,
- Include standard plates and specifications of BMPs,
- Include a site map identifying pertinent data.

A combination of control measures will be implemented to retain sediment from disturbed areas during construction. Erosion/sediment controls to be implemented during initial construction activities are listed as follows:

- Maintain a vegetative buffer zone between disturbed areas and the stormwater outfall;
- Construct and maintain a graveled access road;
- Construct berms and/or ditches and sequence placement of fill in order to contain and/or route runoff from fill areas to the sediment basin; and
- Construct and maintain a silt fence along the toe of the fill area boundary slopes.

When a project replaces vegetation or other pervious surfaces with one or more acres of cumulative impervious surface, the runoff from the new impervious surface must be treated by one of the following methods:[44]

- Wet sedimentation basin
- Infiltration/filtration
- Regional ponds
- Combination of practices
- Alternative method, pending MPCA approval.

Erosion/sediment controls to be implemented during later construction activities include the following:

- Contain and/or route stormwater from the fill area to sediment basin; and
- Maintain existing vegetative buffers, inlet protection, and silt fences.

As a permanent stabilization measure to be implemented during construction, vegetative cover will be established on the fill area side slopes by sodding or hydroseeding with mixtures that include native grasses depending on local requirements.

Surface water runoff from the Project will follow existing drainage patterns to an on-site infiltration basin at the west end of the site or to existing catch basins located on the eastern portion of the site that discharge directly to the Mississippi River.

[44] http://www.pca.state.mn.us/water/stormwater/stormwater-c.html

Wastewater Management

The primary source of wastewater will be the once-through cooling water (Mississippi River). It is estimated that a negligible amount of the water will be lost to evaporation and the discharge from this source will be approximately the same as that withdrawn from the river. It is not anticipated that there will be a significant change in the quality of this water and all of the wastewater from this source will be discharged back to the river.

The thermal input to the once-through cooling water for the HBRP will be less than the thermal input to the cooling water for the existing plant. It is expected that there will be minimal differences in the discharge temperature for the existing plant and the HBRP and, as a result, temperatures downstream in the Mississippi River are not expected to increase compared to historical operations.

The discharge temperatures of the once-through cooling water for the HBRP are expected to be similar to the range of historical discharge temperatures of cooling water used in the existing plant. At a design flow rate of 201 million gallons per day (mgd), the discharge temperature of the HBRP is expected to range from 76°F to 115°F. With discharge flow rates ranging from 90 to 180 mgd, the discharge temperatures of the current plant (outfall SD 030) ranged from 70°F to 109°F during the 2004 water year (October 2003 through September 2004).

The current NPDES permit (MN0000884) conditions discharges from the existing plant such that the temperature of the Mississippi River is not increased by more than 5°F at the edge of the regulatory mixing zone. The permit also provides limits that are based upon in-stream river temperatures that cannot be exceeded. Temperature transect studies were completed in 1977 and 1978 and demonstrated compliance with the permit conditions. The HBRP will be capable of complying with the thermal discharge limits of the current NPDES permit.

Water quality of the various discharges will reflect the water source, the processes that concentrate the water quality of the water source by evaporation or treatment (reverse osmosis), and the addition of chemicals either for process water treatment or water scaling protection. The water chemistry of the once-through cooling water is expected to be similar to the water chemistry of the Mississippi River, which serves as the source water.

5.9 WASTE MANAGEMENT & DISPOSAL

As described in Subsection 2.1.5, spent hazardous substances such as oil periodically pumped from the oil/water separators, turbine wash water and periodic chemical cleaning wastes will be removed from the plant by a licensed hauler for disposal at a licensed facility. Xcel Energy will privately contract with local waste haulers for collection and disposal of all non-hazardous solid wastes generated at the facility.

5.10 NOISE

The HBRP will not result in perceptible increases in noise levels in nearby residential areas and the HBRP, by itself, will not result in violations of state and local noise standards.

Noise from the operation of the HBRP is expected to be predominantly low frequency noise, as is noise from traffic. Noise from HBRP operation will not significantly impact the acoustical environment given the high background noise levels (particularly in low frequencies) from nearby roadways (e.g., High Bridge, Shepard Road) and the noise control technology that will be employed by the new generating units.

Noise from combined cycle plant operation is a result of air flow through the combustion air intakes and from the exhaust gases discharging from the stacks. The HBRP air inlets will be appropriately sized and fitted with diffusers to minimize velocity and, therefore, the noise of air moving into the inlets. The stacks will be fitted with silencers to reduce the noise of exhaust gases leaving the plant.

The Minnesota Noise L_{50} standard is the sound level that must not be exceeded for more than 50 percent of any given hour (30 minutes). The nighttime standards (the most restrictive) apply from 10 p.m. through 7 a.m. Noise standards apply at the point of the receiver, not at the boundary of the noise source. The HBRP was modeled by itself (not accounting for any other potential noise sources) and the effects upon residences evaluated. Model results show that noise levels from the HBRP at the nearest residences will be below all the applicable Minnesota standards. Six locations around the site were modeled. The residential areas highlighted on **Figure 18** were used as model observation points. The monitoring sites were chosen for their proximity to the existing and proposed plants. Projected levels are shown in **Table 15**.

5.11 PUBLIC SERVICES

Public services in the St. Paul area will be adequate for the construction and operation of the HBRP. These services include water and sewer, waste collection and disposal and fire and police.

All of the city's emergency services can be reached by dialing 911.

6.0 SUMMARY OF MITIGATIVE MEASURES

The construction and operation of a new generating facility will unavoidably result in some environmental effects. This section discusses mitigative measures that will be implemented to address unavoidable effects from the HBRP.

Air Quality

Air pollution control equipment will be included to achieve and maintain compliance with permitted air emission levels. The combustion turbines will be equipped with dry low NOx combustors to limit the production of NOx during combustion. These combustors are designed to maintain the fuel-to-air ratio to a near stoichiometric level, where the quantity of oxygen in the air introduced into the combustion process is just enough to allow the fuel to burn. This "lean" ratio results in a relatively cool combustion zone. NOx is produced in high-temperature zones; therefore, the lower temperature in the combustion zone will reduce the NOx produced.

Air pollution control equipment for the HBRP will also include the use of selective catalytic reduction reactors (SCR) for additional control of NOx emissions from the combustion turbines and duct burners. The SCR reactor is integrated into the heat recovery steam generator structure. Ancillary equipment includes catalyst change-out handling equipment (lifting devices and their controls, as well as support structures) and reagent (aqueous ammonia) receiving, handling, storage, preparation, and delivery systems.

Inherently, natural gas combustion produces little or no particulate or sulfur emissions and, as such, no specific control equipment is required for those pollutants.

Effect of New Noise Source

Noise levels from the HBRP are expected to range from approximately 43 dBA to 48 dBA at the nearest residential receptors. Since the Minnesota Noise Rules would require that the facility not cause noise levels at the nearest residential receptor to exceed 60 dBA during daytime hours or 50 dBA during nighttime hours, the HBRP is expected to fully comply with the state's established noise standards.

The specific type and amount of noise control needed to achieve compliance with the State of Minnesota noise control standards will be selected during the detailed design phase of the proposed project. A successful mitigation program will likely consist of the following components:

- Combustion Turbine Exhaust Silencers;
- Combustion Turbine Air Intake Silencers; and
- Low-Noise Fuel Gas Metering Station.

7.0 Acronyms, Abbreviations and Definitions

ADT	average daily traffic
ANSI	American National Standard Institute
BACT	Best Available Control Technology
BMPs	Best Management Practices
Btu/kWhr	British thermal units per kilowatt-hour
CAA	Clean Air Act
CERCLA	Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
CGTs	Combustion gas turbines
CMP	Crop Management Program
CO	Carbon monoxide
CO_2	Carbon dioxide
CON	Certificate of Need
CT	Combustion Turbine
CY	Cubic yards
dBA	A-weighted decibel
DLN	Dry Low-NO_X
DOC	Department of Commerce
DSM	Demand Side Management
EA	Environmental Assessment
ECS	Ecological Classification System
EIS	Environmental impact statement
EMF	Electromagnetic field
EPA	U.S. Environmental Protection Agency
EQB	Environmental Quality Board
ELCR	Excess Lifetime Cancer Risk
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FEP	Faribault Energy Park
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
GE	General Electric
GHG	Greenhouse gas emissions
GISB	Gas Industry Standards Board
gpd	Gallons per day
HBGP	High Bridge Generating Plant
HBRP	High Bridge Repowering Project
HCP	Habitat Conservation Plan
HRSG	Heat Recovery Steam Generator
HVTL	High Voltage Transmission Line
IES	Illuminating Engineering Society

ISTS	Individual Septic Treatment System
kV	Kilovolt
LAER	Lowest Available Emission Rate
LEPGP	Large Electric Power Generating Plant
LOS	Level-of-service
LUG	Local Unit of Government
MW	Megawatts
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MDOT	Minnesota Department of Transportation
MMPA	Minnesota Municipal Power Agency
MPCA	Minnesota Pollution Control Agency
NAAQS	National Ambient Air Quality Standards
NET	National Emission Trends
NEPA	National Environmental Policy Act
NH3	Ammonia
NTI	National Toxics Inventory
NNG	Northern Natural Gas
NOx	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
OAHP	Office of Archaeology and Historic Preservation
PAH	Polycyclic aromatic hydrocarbons
Pb	Lead
PEMA	Palustrine emergent temporarily flooded
PEMC	Palustrine emergent seasonally flooded
PFOA	Palustrine forested temporarily flooded
PESCP	Permanent Erosion and Sediment Control Plan
PM	Particulate matter
PM_{10}	Particulate matter less than 10 microns in diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in diameter
POWHX	Palustrine open water permanently flooded excavated
ppb	Parts per billion
ppm	Parts per million
PSD	Prevention of Significant Deterioration
psi	Pounds per square inch
PSS	Potential Site Study
PUC	Public Utility Commission
SARA	Federal Superfund Amendments and Reauthorization Act of 1986, as amended
SCR	Selective catalytic reduction
SDS	State Disposal System
SIL	Significant Impact Levels
SO_2	Sulfur dioxide
SPCC	Spill Prevention Control and Countermeasure
STG	Steam turbine generator

USFWS	U.S. Fish and Wildlife Service
TESCP	Temporary Erosion and Sediment Control Plan
TSP	Total Suspended Particulate Matter
UHC	Unburned Hydrocarbon
USACE	United States Army Corp of Engineers
VOC	Volatile organic compounds

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TABLES

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Table 1
Operational Information Summary

Description	Project Data
Nominal generating capability	480 – 665 MW
Operating Cycle	Combined cycle w/ duct firing and inlet air cooling
Typical Dispatch Schedule	Combined cycle operation, 16 hours per day (daytime), 5 weekdays per week, year round
Estimated Starts	Cold – 1 per week (52 per year) Warm – 4 per week (208 per year)
Anticipated annual capacity factor	30 – 60%
Anticipated heat rate (efficiency)	6,220 Btu (54%) – summer conditions w/ evaporative cooling 6,730 Btu (50%) – winter conditions duct fired
Heat Rejected	1,050 million Btu/hr (summer conditions, non-duct fired 1,750 Btu/hr (winter conditions, duct fired)
Source: Site Permit Application, High Bridge Combined Cycle Project, T 3-3. January 27, 2005.	

Table 2
Water Needs Summary

Description	Project Data
Estimated maximum river water pumping rate	201 mgd (intermittent)
Estimated annual river water use	37,000 million gallons (@ 50% capacity factor)
Estimated maximum groundwater pumpingrate	95 gpm (intermittent)
Estimated annual groundwater use	23 million gallons (@ 50% capacity factor & assuming evaporative cooling used for 20% of operating hours)
Estimated maximum municipal supply w/drawl rate	65 gpm
Estimated annual municipal supply use	7 million gallons

mgd = million gallons per day; gpm = gallons per minute

Source: Site Permit Application, High Bridge Combined Cycle Project, T 4-3. January 27, 2005.

Table 3
Wastewater Discharge Summary

Wastewater Source	Estimated Volume	Discharge Location
Once-through Cooling Water Discharge	37,000 million gallons/year	Mississippi River
Steam Boiler Blowdown	11 million gallons/year	Sanitary Sewer
RO Reject Discharge	5 million gallons/year	Mississippi River or to the sanitary sewer depending on operating conditions
Evaporative Cooler Blowdown	2 million gallons/year	Mississippi River or to the sanitary sewer depending on operating conditions
Service and Domestic Wastewater	3 million gallons/year	Sanitary Sewer

Source: Site Permit Application, High Bridge Combined Cycle Project, T 4-4. January 27, 2005.

Table 4
Typical Natural Gas-Fired Power Generating Facility Chemicals

Chemical	Use	Quantity Stored Onsite	Form/Type
Aqueous Ammonia	Selective catalytic reduction	25,000 gallons in two bulk storage tanks	Liquid, 19% solution
Disodium phosphate (Na2HPO4)	Boiler water pH and scale control	55 pounds	Granular
Trisodium phosphate (Na3PO4)	Boiler water pH and scale control	55 pounds	Granular
Ammonium Hydroxide	Feedwater Treatment	Two 55 gallon drums	Liquid
Oxygen Scavenger	Feedwater oxygen scavenger	55 gallon drum	Liquid
Drewgard 315	Closed Cooling System	55 gallon drum	Liquid
Nalco Perma Treat-PC-191 (phosphorus based)	Reverse Osmosis(RO) Antiscalant	300 gallon tote	Liquid
Sodium Bisulfite Solution	RO Pretreatment	200 gallon tote	Liquid
Sodium Hypochlorite Solution	Biological Growth Control and RO Pretreatment	200 gallon tote	Liquid
BetzDearborn Spectrus CT13000	Zebra Mussel Control	55 gallon drum (used only during treatments possibly 1-2 times per year)	Liquid
BetzDearborn Spectrus CT1401	Zebra Mussel Control	Two 30 pound bags (used only during treatments possibly 1-2 times per year)	Powder
Laboratory reagents	Various	Small amounts, generally less than 5 pounds each	Liquid and granular
Citric acid* (Temporarily onsite)	Chemical cleaning of HRSGs (Acid cleaning)	10,000 gallons (Used for initial chemical cleaning and may be used for future chemical cleaning. Approximately every 3 to 5 years)	Liquid, 50% solution
Sodium hydroxide (NaOH)	pH adjustment:RO, boiler	300 gallon	Liquid
Sodium hydroxide (NaOH)* (Temporarily onsite)	Chemical cleaning of HRSGs (Degreasing)	2,000 gallons (Used for initial chemical cleaning and may be used for future chemical cleaning. Approximately every 3 to 5 years)	Liquid, 50% NaOH

Table 4 (continued)
Typical Natural Gas-Fired Power Generating Facility Chemicals

Chemical	Use	Quantity Stored Onsite	Form/Type
Sodium carbonate Na2CO3* (Temporarily onsite)	Chemical cleaning of HRSGs (Neutralization)	30,000 pounds (Used for initial chemical cleaning and may be used for future chemical cleaning. Approximately every 3 to 5 years)	Powder
Sodium nitrite NaNO3* (Temporarily onsite)	Chemical cleaning of HRSGs (Passivation)	9,000 pounds (Used for initial chemical cleaning and may be used for future chemical cleaning. Approximately every 3 to 5 years)	Crystals
Inhibitors, various* (Temporarily onsite)	Chemical cleaning of HRSGs (Foam control agents)	100 gallons (Used for initial chemical cleaning and may be used for future chemical cleaning. Approximately every 3 to 5 years)	Liquid
Mineral insulating oil, C-10	Transformer systems	28,000 gallons	Insulating fluid
Sulfur hexafluoride, (SF6)	Substation electrical insulating gas	100,000 cubic feet	Insulating gas
Lubrication oil	Rotating equipment	20,000 gallons (In four 5,000 gallon tanks)	CTGs and STG bearing lubricating oil
Diesel fuel	Fuel for diesel engine driven fire pump	300 gallons	Diesel fuel
Diesel fuel	Fuel for emergency diesel generator	10,000 gallons	Diesel fuel
Various detergents	Combustion turbine on/off line water wash skid	200 gallons stored	Liquid
Compressed gases			
Carbon dioxide (CO2)	CTGs and STG purge system	6,000 pounds/bottles	Compressed gas
Hydrogen (H2)	CTGs and STG cooling system	1,800 pounds/bottles	Compressed gas

*Chemical cleaning agents shown are those typically used. A decision on which chemicals and quantity will actually be used will be made as the project design continues.

Table 5 Fuel Requirements	
Fuel source	**Natural gas via new distribution interconnection to Northern Natural Gas Interstate Pipeline**
Natural gas volume requirements	**3.2 million SCF/hr/CTG (summer conditions, with evaporative cooling, non-duct fired)** **4.8 million SCF/hr/CTG (winter conditions, duct fired)**
Heat Input	**3,000 million Btu/hr/CTG (summer conditions, with evaporative cooling, non-duct fired)** **4,500 million Btu/hr/CTG (winter conditions, duct fired)**
Source: Site Permit Application, High Bridge Combined Cycle Project, T 3-2, January 27, 2005.	

Table 6
Transmission Line Modification Requirements

Line Name	Voltage	No. of Relocated Structures
High Bridge to Merriam Park and Dayton's Bluff to High Bridge	115 kV	3 (double circuit)
High Bridge to Shepard	115 kV	1 (single circuit)
High Bridge to Rogers Lake	115 kV	3 (single circuit) 1 to be removed (double circuit)

Source: Site Permit Application, High Bridge Combined Cycle Project, T3-1. January 27, 2005.

Table 7
Preliminary Permitting & Approval Requirements

Agency	Permit/Approval	Regulated Activity
	FEDERAL	
EPA	Spill Prevention Control & Countermeasure Plan	Facilities w/ above ground oil storage capacity of greater than 1,300 gallons.
EPA	Risk Management Plan	Potential accidental releases of hazardous chemicals that are used or stored onsite in greater than threshold quantities (Title III of CAAA).
DOE	Alternate Fuels Capability Certification	Baseload facility using natural gas.
FAA	Notice of Proposed Construction or Alteration	Construction of an object which has the potential to affect navigable airspace (height in excess of 200' or within 20,000' of an airport).
FERC	Exempt Wholesale Generator Status	Selling electric energy at wholesale to a utility or other generator.
COE	Section 10 – Work in Navigable Waters Section 404 – Dredge and Fill Permit	Section 10 of the Rivers and Harbors Act of 1899 prohibits the obstruction or alteration of navigable waters of the United States without a permit from the Corps of Engineers. Section 404 of the Clean Water Act, prohibits the discharge of dredge or fill material into waters of the United States, including special aquatic sites such as wetlands, without a permit from the Corps of Engineers.
	STATE	
MPCA	Air Emissions Permit (Amendment)	Construction, installation or alteration of an air contamination source.
MPCA	Title IV Acid Rain Operating Permit	Title IV of CAAA, applicable to fossil fuel fired units > 25 MW.
MPCA	Title V Operating Permit	Title V of CAAA or Federally Enforceable State Operating Permit for significant air emission sources.
MPCA	Hazardous Waste SQG Registration	Generation of small quantities of hazardous waste.
MPCA	Above ground Storage Tank (AST) Permit	Facilities that have > one million gallons of total capacity.
MPCA	NPDES Stormwater Construction Permit	Discharge of storm waters during construction of facility.
MPCA	NPDES Stormwater Operation Permit	Discharge of storm waters during operation of facility.
MPCA	NPDES Wasterwater Discharge	Discharge of wastewaters during operation of facility.
State Historic Preservation Office	Archeological and Historical Review	Activities that could potentially affect archeological or historical resources.
MnDOT	Permit to construct & operate utility facilities on state & federal ROW	Required to construct & operate a utility on a state or interstate highway ROW.

Table 7 (continued)
Preliminary Permitting & Approval Requirements

Agency	Permit/Approval	Regulated Activity
MDNR	Surface Water Appropriation	A water use (appropriation) permit from DNR Waters is required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year.
MDNR	Groundwater Appropriation	A water use (appropriation) permit from DNR Waters is required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year.
MDNR	Public Waters Work Permit	The Water Permits Unit oversees the administration of the Public Waters Work Permit Program.
	LOCAL	
City/County/Tsp	Site Plan Approval	Establishment of power generation facilities as a permitted use.
City/County/Twp	Building Permit/Architectural Review/Fire Safety Approval	Construction of facility.
City/County/Tsp	Soil and Sedimentation Control Permit	Control of soil erosion.
City/County/Tsp	Individual Septic Treatment System	Design, construction and discharge of sanitary wastewater.
City/County/Tsp	Certificate of Occupancy	License to operate facility

EPA – Environmental Protection Agency; DOE – Department of Energy; FAA – Federal Aviation Administration; FERC – Federal Energy Regulatory Commission; COE – Corp of Engineers; MPCA – Minnesota Pollution Control Agency; MnDOT – Minnesota Department of Transportation; MDNR – Minnesota Department of Natural Resources

Table 8
NAAQS Air Pollution Concentration Standards

Pollutant	Averaging Period	Standard	Primary NAAQS	Secondary NAAQS
Ozone	1-hour	Not to be at or above this level on more than 3 days over 3 years	125 ppb	125 ppb
	8-hour	The average of the annual 4th highest daily 8 hour maximum over a 3 year period is not to be at or above this level.	85 ppb	85 ppb
Carbon Monoxide	1-hour	Not to be at or above this level more than once per calendar year.	35.5 ppm	35.3 ppm
	8-hour	Not to be at or above this level more than once per calendar year.	9.5 ppm	9.5 ppm
Sulfur Dioxide	3-hour	Not to be at or above this level more than once per calendar year.	NA	550 ppb
	24-hour	Not to be at or above this level more than once per calendar year.	145 ppb	NA
	Annual	Not to be at or above this level.	35 ppb	NA
Nitrogen Oxide	Annual	Not to be at or above this level.	54 ppb	54 ppb
Particulate Matter (≤10 microns)	24-hour	Not to be at or above this level on more than 3 days over 3 years with daily sampling.	155 ug/m3	155 ug/m3
	Annual	The 3 year average of annual arithmetic mean concentrations at each monitor w/in an area is not to be at or above this level.	51 ug/m3	51 ug/m3
Particulate Matter (≤2.5 microns)	24-hour	The 3 year average of the annual 98th percentile for each population-orriented monitor w/in an area is not to be at or above this level.	66 ug/m3	66 ug/m3
	Annual	The 3 year average of annual arithmetic mean concentrations from single or multiple community-oriented monitors is not to be at or above this level.	15.1 ug/m3	15.1 ug/m3
Lead	Quarter	Not to be at or above this level.	1.55 ug/m3	1.55 ug/m3

Primary NAAQS: the levels of air quality that the EPA judges necessary, with an adequate margin of safety, to protect the public health.
Secondary NAAQS: the levels of air quality that the EPA judges necessary to protect the public welfare from any known or anticipated adverse effects.

Table 9
Historical Population

Area	1990 Census	2000 Census	% Increase
St. Paul	272,235	287,151	5.5
Ramsey County	485,765	511,035	5.2
Twin Cities Metro	2,288,729	2,642,056	15.4
State of Minnesota	4,375,099	4,919,479	12.4

Source: Minnesota Planning Agency

Table 10
State of Minnesota Noise Standards

Noise Area Classification	Daytime (dBA)		Nighttime (dBA)	
	L_{50}	L_{10}	L_{50}	L_{10}
1 (Residential)	60	65	50	55
2 (Commercial)	65	70	65	70
3 (Industrial)	75	80	75	80

dBA = decibels, A-weighted scale; L_{10} = sound pressure level which is exceeded 10% of the time period; L_{50} = sound pressure level which is exceeded 50% of the time period.

Table 11
Air Pollution Emissions

Air Pollutant	Annual Emissions (tons/year)
Particulate Matter (PM/PM_{10})	57.6
Carbon Monoxide (CO)	652.9
Nitrogen Oxides (NO_x)	225.6
Sulfur Dioxide (SO_2)	9.3
Volatile Organic Material (VOC)	123.0
Source: Site Permit Application, High Bridge Combined Cycle Project, T 4-1. January 27, 2005.	

Table 12
High Bridge Generating Plant & High Bridge Repowering Project Comparison

Pollutant	Future Projected Emissions (tons/yr)	Past Actual Emissions (tons/yr)	Projected Emissions Change (tons/yr)
SO_2	9.3	3,892.90	-3,883.6
NO_X	225.6	5,779.2	-5,553.6
PM_{10}	57.6	476.8	-419.3
CO	652.9	257.3	395.6
VOCs	123.0	30.6	92.4

Source: Site Permit Application, High Bridge Combined Cycle Project, T 4-2 (amended). January 27, 2005.

Table 13
Predicted Ambient Air Concentrations

Pollutant	Standard/ Averaging Period	Modeled Concentration ug/m^3	Background Concentration ug/m^3	Total Concentration ug/m^3	Standard ug/m^3
CO	NAAQS 1-hr	8,529.8	7,117	15,646.8	40,000
CO	NAAQS 8-hr	1,008.7	4,344	5,353.7	10,000
NO_2	NAAQS annual	35.9a	32	67.9	100
NO_2	PSD Increment/Annual	21.3b	NA	21.3	25

a – Modeled NO2 concentration for NAAQS compliance demonstration includes contributions from District Energy & Xcel Energy's High Bridge, AS King, Riverside, Sherco, and Black Dog Generating Plants

b –Modeled NO2 concentration for OSD increment compliance demonstration includes contributions from District Energy Boiler No. 7.

Source: Site Permit Application. High Bridge Combined Cycle Project, T 4-2a (amended). January 27, 2005.

Table 14
Hazardous Air Pollutant (HAP) Emissions Summary

Hazardous Air Pollutants	Potential Emissions (tons/years)
Arsenic	0.0011
Beryllium	0.000069
Cadmium	0.0063
Chromium	0.008
Cobalt	0.0005
Lead	0.00019
Manganese	0.0022
Mercury	0.0015
Nickel	0.012
Selenium	0.00014
Benzene	0.22
Dichlorobenzene	0.0069
Formaldehyde	12.6
Hexane	10.3
Acetaldehyde	0.69
Acrolein	0.11
Ethylbenzene	0.55
Xylenes	1.1
Toluene	2.3
1,3-butadiene	0.0074
PAH/POM	0.038
TOTAL HAPs	28.4

Source: Xcel Energy, February 9, 2005 correspondence

Table 15 Projected HBCC Plant Sound Levels		
Receiver	Projected dB(A)	Applicable Minnesota Nighttime L_{50} Noise Standard[1]
1 - Centex Apartments (E)	44	50
2 - Cliff Street (N)	46	50
3 - Cherokee Avenue (S)	46	50
4 - Island Station (W)	43	50
5 - Island Station Point (SW)	48	50
6 - Southwest Cliff Street (NW)	48	50
– The sound level that is exceeded 50% of the time		
Source: Site Permit Application, High Bridge Combined Cycle Project, T 4-5 (amended). January 27, 2005.		

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FIGURES

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APPENDIX A

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STATE OF MINNESOTA

ENVIRONMENTAL QUALITY BOARD

In the Matter of Xcel Energy's Application for a Site Permit for the High Bridge Repowering project.	**ENVIRONMENTAL ASSESSMENT SCOPING DECISION EQB Docket No. 05-91-PPS-Xcel Energy HB**

The above-entitled matter came before the Chair of the Minnesota Environmental Quality Board (MEQB) for a decision on the scope of the Environmental Assessment (EA) to be prepared on the proposed High Bridge Repowering project.

The EQB held a public meeting on March 3, 2005, to discuss the project with the public and to solicit input into the scope of the EA to be prepared. The public was given until March 21, 2005 to submit written comments regarding the scope of the EA.

Having consulted with the EQB staff, I hereby make the following Scoping Order.

MATTERS TO BE ADDRESSED

The EA on the Cannon Falls Energy Center plant project will address the following matters:

1.0 OVERVIEW
2.0 INTRODUCTION
- 2.1 Project Description
  - 2.1.1 Description of Power Generating Equipment and Processes
  - 2.1.2 Air Emission Control Equipment
  - 2.1.3 Water Use
  - 2.1.4 Wastewater
  - 2.1.5 Solid and Hazardous Waste Generation
  - 2.1.6 Fuel Supply
  - 2.1.7 Electrical Interconnection
- 2.2 Purpose
- 2.3 Sources of Information

3.0 Regulatory Framework
- 3.1 Certificate of Need
- 3.2 Site Permit Requirement
- 3.3 Other Permits
- 3.4 Issues Outside EQB Authority

4.0 ENVIRONMENTAL SETTING
5.0 HUMAN AND ENVIRONMENTAL IMPACTS
- 5.1 Air Quality
  - Potential to Emit
  - Criteria Pollutants
  - Air Emissions Risk Analysis
- 5.2 Biological Resources
  - Flora
  - Fauna
  - Rare and Unique Natural Resources

5.3 Culture, Archeological and Historic Resources
5.4 Geology and Soils
5.5 Health and Safety
5.6 Land Use
  Zoning
  Displacement
  Recreational Areas
5.7 Noise
5.8 Socioeconomics
5.9 Transportation
5.10 Visual Impacts and Aesthetics
5.11 Water Resources
  Surface Water
  Groundwater
  Wetlands
5.12 Waste Management and Disposal
  Wastewater
  Solid Waste
  Hazardous Waste

6.0 Summary of Mitigative Measures
7.0 Feasibility

ISSUES OUTSIDE THE SCOPE OF THE EA

The EQB will not, as part of this environmental review, consider the following matter:

1. Whether a different size or different type of power plant should be built.
2. The no-build option.
3. Any alternative sites for the proposed plant.

IDENTIFICATION OF PERMITS

The EA will include a list of permits that will be required for the applicant to construct this project.

SCHEDULE

The EA will be completed by May 5, 2005.

Signed this 22 day of March, 2005

STATE OF MINNESOTA
ENVIRONMENTAL QUALITY BOARD

Robert A. Schroeder, Chair