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# TECHNICAL SUPPORT DOCUMENT
# For
# DRAFT/PROPOSED AIR EMISSION PERMIT NO. 04900030-003

This Technical Support Document (TSD)is intended for all parties interested in the draft/proposed permit and to meet the requirements that have been set forth by the federal and state regulations (40 CFR § 70.7(a)(5) and Minn. R. 7007.0850, subp. 1). The purpose of this document is to provide the legal and factual justification for each applicable requirement or policy decision considered in the preliminary determination to issue the draft/proposed permit.

## 1. General Information

### 1.1 Applicant and Stationary Source Location

| Stationary Source/Address (SIC Code: **4911**) | Corporate/Company Owner |
|---|---|
| 1717 Wakonade Drive East<br>Welch, MN 55089<br>Goodhue County | Northern States Power Company, doing business as Xcel Energy (Xcel Energy) |
| Contact: John K. Chelstrom<br>Phone: 612-330-7682 | 414 Nicollet Mall (Environmental Services Dept.)<br>Minneapolis, MN 55401 |

### 1.2 Description of the Facility

This air emission facility is part of the Northern States Power Prairie Island Nuclear Generating Plant. This facility generates 1076 MW of electricity. The air emission facility is composed of one distillate oil-fired heating boiler and 12 diesel-fired engines for emergencies, to generate power, pump cooling water, or pump water for fire fighting. The generators and water pumps are required by the U.S. Nuclear Regulatory Commission.

### 1.3 Description of any Changes Allowed with this Permit Issuance

This reissuance includes a major amendment to increase the $NO_x$ limit for each diesel engine from 3.35 to 4.0 lbs/mmBTU heat input to allow for some cushion for stack testing the larger diesel engines. As a result, the fuel usage limit will be decreased from 83955 to 70238 gallons/month. This is a Title I condition emission limit to restrict facility $NO_x$ potential emissions to less than the major source level of 250 tons/year.

*Other changes made through this permit action*
Updated standard language for any outdated requirements
Total Facility – added performance testing requirements to total facility level
GP 001 – updated performance testing requirements based on most recent tests
EU 001 – Removed performance testing requirements

Note: All performance tests were reviewed and accounted for up to 10/27/06.

## 1.4 Permit History

| Permit Number and Issuance Date | Action Authorized |
|---|---|
| 04900030-002 (6/3/03) | Changed requirement to submit modeling protocol and results to a requirement to submit modeling information |
| 04900030-001 (6/22/00) | Part 70 Total Facility Permit issuance |

## 1.5 Facility Emissions

**Table 1. Total Facility Potential to Emit Summary**

| | PM (tpy) | $PM_{10}$ (tpy) | $SO_2$ (tpy) | $NO_x$ (tpy) | CO (tpy) | VOC (tpy) | All HAPs (tpy) |
|---|---|---|---|---|---|---|---|
| Total Facility Potential Emissions Increases | (1.2) | (1.2) | (5.8) | 0 | (9.8) | (1.0) | (0.02) |
| Total Facility Limited Potential Emissions | 6.3 | 6.6 | 42.7 | 239.7 | 51.0 | 5.4 | 0.1 |
| Total Facility Actual Emissions (2004) | 0.33 | 0.27 | 0.18 | 10.76 | 3.91 | 0.38 | HAPs not reported in emission inventory |

**Table 2. Facility Classification**

| Classification | Major/Affected Source | Synthetic Minor | Minor |
|---|---|---|---|
| PSD | | $NO_x$, CO, $SO_2$ | $PM_{10}$, PM, VOC |
| Part 70 Permit Program | $NO_x$ | CO, $SO_2$, $PM_{10}$ | VOC |
| Part 63 NESHAP | -- | -- | Single and Total HAP |

## 2. Regulatory and/or Statutory Basis

New Source Review

The facility has limits to keep it a synthetic minor source under New Source Review regulations. No changes are authorized by this permit.

Part 70 Permit Program

The facility is a major source under the Part 70 permit program.

New Source Performance Standards (NSPS)

There are no New Source Performance Standards applicable to the operations at this facility.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

The facility is a minor source for HAPs under 40 CFR pt. 63. Thus, no NESHAPs apply.

Minnesota State Rules

Portions of the facility are subject to the following Minnesota Standards of Performance:

- Minn. R. 7011.0510 Standards of Performance for Existing Indirect Heating Equipment
- Minn. R. 7011.2300 Standards of Performance for Stationary Internal Combustion Engines

**Table 3. Regulatory Overview of Units Affected by the Permit Amendment**

| Unit | Applicable Regulations | Comments: |
|---|---|---|
| Total Facility | 40 CFR pt. 50; Minn. R. 7009.0100 to 7009.0080 | Added NAAQS requirement |
| GP 001 Internal Combustion Engines | Title I limits to avoid PSD; Minn. R. 7007.0800, subp. 2 | Increased $NO_x$ limit to 4.0 lbs/mm BTU heat input for each emission unit |
| | | Decreased Fuel Usage to 70,238 gallons/month |
| | Minn. R. 7017.2020, subp. 1 | Updated Performance Testing requirements based off most recent tests conducted |
| EU 001 Boiler 1 | Minn. R. 7017.2020, subp. 1 | Removed Performance Testing requirements based off most recent tests conducted and very low run times. (6.1 hr in 2005, 25.1 in 2004)<br>This is a backup facility heating boiler, only would be needed if both nuclear generators were down at the same time during the winter heating season. Operating hours for this unit over the last 5 years have been solely for exercising the unit and performance testing. |

## 3. Technical Information

### 3.1 Periodic Monitoring

In accordance with the Clean Air Act, it is the responsibility of the owner or operator of a facility to have sufficient knowledge of the facility to certify that the facility is in compliance with all applicable requirements.

In evaluating the monitoring included in the permit, the MPCA considers the following:

- The likelihood of violating the applicable requirements;
- Whether add-on controls are necessary to meet the emission limits;
- The variability of emissions over time;
- The type of monitoring, process, maintenance, or control equipment data already available for the emission unit;
- The technical and economic feasibility of possible periodic monitoring methods; and
- The kind of monitoring found on similar units elsewhere.

Table 4 summarizes the periodic monitoring requirements for those emission units for which the monitoring required by the applicable requirement are different or new from the previous permit. All other monitoring requirements are still applicable

**Table 4. Periodic Monitoring**

| Emission Unit or Group | Requirement (basis) | Additional Monitoring | Discussion |
|---|---|---|---|
| GP 001 Internal Combustion Engines | Operating Hours for EU 004 and EU 005 | Recordkeeping | Records to show that hours of operation were less than 100 hours for the year. When over 100 hours, an Initial Performance Test is required, then a Testing Frequency Plan, which will make this requirement obsolete. |
| | 12 month rolling average fuel limit | Recordkeeping | Records to show compliance with fuel usage limit |

### 3.2 Calculations of Potential to Emit

Attachment 1 to this TSD contains the PTE calculations, which summarizes the PTE of the Facility. Emission Factors were obtained from AP-42 Chapters 1.3 and 3.4.

### 3.3 Insignificant Activities

Xcel Energy – Prairie Island Nuclear has several operations which are classified as insignificant activities. These are listed in Appendix B to the permit.

### 3.4 Permit Organization

In general, the permit meets the MPCA Delta Guidance for ordering and grouping of requirements. One area where this permit deviates slightly from Delta guidance is in the use of appendices. While appendices are fully enforceable parts of the permit, in general, any requirement that the MPCA thinks should be tracked (e.g., limits, submittals, etc.), should be in Table A or B. The main reason is that the appendices are word processing sections and are not part of the tracking system. Violation of the appendices can be enforced, but the computer system will not automatically generate the necessary enforcement notices or documents. Staff must generate these.

### 3.5 Comments Received

Public Notice Period: November 15, 2006 – December 14, 2006
EPA 45-day Review Period: November 15, 2006 – December 29, 2006
*Summary of comments and changes.*

## 4. Conclusion

Based on the information provided by Xcel Energy – Prairie Island Nuclear, the MPCA has reasonable assurance that the proposed operation of the emission facility, as described in the Air Emission Permit No. 04900030-003, and this TSD, will not cause or contribute to a violation of applicable federal regulations and Minnesota Rules.

Staff Members on Permit Team: Trevor Shearen (permit writer/engineer)
Emily Hansen (enforcement)
Steve Gorg (stack testing)
Marshall Cole (peer reviewer)

Attachment: 1. Total Facility PTE Summary

**ATTACHMENT 1:**
**Total Facility PTE Summary**

**Table 5. Total Facility PTE**

| Pollutant | EU 001[1] | GP 001[2] | | Total Facility | |
|---|---|---|---|---|---|
| | PTE (ton/yr) | Current PTE (ton/yr) | Limited PTE (ton/yr) | Current PTE[3] (ton/yr) | Limited PTE[4] (ton/yr) |
| $NO_x$ | 3.67 | 236.2 | 236.0 | 239.9 | 239.7 |
| $SO_x$ | 13.21 | 35.3 | 29.5 | 48.5 | 42.7 |
| CO | 0.93 | 59.9 | 50.1 | 60.9 | 51.1 |
| PM | 0.37 | 7.05 | 5.90 | 7.42 | 6.27 |
| $PM_{10}$ | 0.37 | 7.05 | 5.90 | 7.42 | 6.27 |
| Total VOC | 0.05 | 6.35 | 5.31 | 6.39 | 5.36 |
| Total HAPs | 0.009 | 0.105 | 0.088 | 0.11 | 0.10 |

[1] EU 001 (ton/yr) from Table 6
[2] GP 001 (ton/yr) from Table 7
[3] Total Facility Current PTE (ton/yr) = EU 001 PTE (ton/yr) + GP 001 Current PTE (ton/yr)
[4] Total Facility Limited PTE (ton/yr) = EU 001 PTE (ton/yr) + GP 001 Limited PTE (ton/yr)

## Table 6. EU 001 – Heating Boiler

| Pollutant | Emission Factor (lb/gal) | Uncontrolled PTE[1] (ton/yr) | Limited PTE[2] (ton/yr) | Actual Emissions[3] (ton/yr) |
|---|---|---|---|---|
| $NO_x$ | 0.0197 [15] | 34.13 | 3.67 | 0.006 |
| $SO_x$ | 0.0710 [11] | 122.84 | 13.21 | 0.022 |
| CO | 0.0050 [11] | 8.65 | 0.93 | 0.002 |
| PM | 0.0020 [11] | 3.46 | 0.37 | 0.001 |
| $PM_{10}$ | 0.0020 [11] | 3.46 | 0.37 | 0.001 |
| Total VOC | 0.0003 [12] | 0.44 | 0.05 | 0.000 |
| Benzene | 2.14E-07 [13] | 3.70E-04 | 3.98E-05 | 6.53E-08 |
| Ethylbenzene | 6.36E-08 [13] | 1.10E-04 | 1.18E-05 | 1.94E-08 |
| Formaldehyde | 3.30E-05 [13] | 5.71E-02 | 6.14E-03 | 1.01E-05 |
| Naphthalene | 1.13E-06 [13] | 1.96E-03 | 2.10E-04 | 3.45E-07 |
| 1,1,1 Trichloroethane | 2.36E-07 [13] | 4.08E-04 | 4.39E-05 | 7.20E-08 |
| Toluene | 6.20E-06 [13] | 1.07E-02 | 1.15E-03 | 1.89E-06 |
| Xylenes | 1.09E-07 [13] | 1.89E-04 | 2.03E-05 | 3.32E-08 |
| Arsenic | 5.48E-07 [14] | 9.48E-04 | 1.02E-04 | 1.67E-07 |
| Beryllium | 4.11E-07 [14] | 7.11E-04 | 7.65E-05 | 1.25E-07 |
| Cadmium | 4.11E-07 [14] | 7.11E-04 | 7.65E-05 | 1.25E-07 |
| Chromium | 4.11E-07 [14] | 7.11E-04 | 7.65E-05 | 1.25E-07 |
| Copper | 8.22E-07 [14] | 1.42E-03 | 1.53E-04 | 2.51E-07 |
| Lead | 1.23E-06 [14] | 2.13E-03 | 2.29E-04 | 3.76E-07 |
| Manganese | 8.22E-07 [14] | 1.42E-03 | 1.53E-04 | 2.51E-07 |
| Mercury | 4.11E-07 [14] | 7.11E-04 | 7.65E-05 | 1.25E-07 |
| Nickel | 4.11E-07 [14] | 7.11E-04 | 7.65E-05 | 1.25E-07 |
| Selenium | 2.06E-06 [14] | 3.56E-03 | 3.82E-04 | 6.27E-07 |
| Zinc | 5.48E-07 [14] | 9.48E-04 | 1.02E-04 | 1.67E-07 |
| Total HAPs | | 8.48E-02 | 9.12E-03 | 1.50E-05 |

| | |
|---|---|
| Max Process Rate | 395 gal/hr |
| Monthly Fuel Limit | 31002 gal/mo |
| 2005 Actual Fuel Use | 610 gal/yr |

[1] Uncontrolled PTE (ton/yr) = Emission Factor (lb/gal) x Max Process Rate x 8760 (hr/yr) / 2000 (lb/ton)
[2] Limited PTE (ton/yr) = Emission Factor (lb/gal) x Monthly Fuel Limit (gal/month) x 12 (month/yr) / 2000 (lb/ton)
[3] Actual Emissions (ton/yr) = Emission Factor (lb/gal) x 2005 Actual Fuel Use (gal/yr) / 2000 (lb/ton)
[11] AP-42 Table 1.3-1 (9/98)
[12] AP-42 Table 1.3-3 (9/98)
[13] AP-42 Table 1.3-9 (9/98)
[14] AP-42 Table 1.3-10 (9/98): (lb/gal) = (lb/MM Btu) x (0.137 MM Btu/gal)
[15] Stack test

## Table 7. GP 001 – Internal Combustion Engines

| Pollutant | Emission Factor (lb/MMBtu) | Current Limited PTE[1] (ton/yr) | Proposed Limited PTE[2] (ton/yr) | Actual Emissions[3] (ton/yr) |
|---|---|---|---|---|
| $NO_x$ (current) | 3.35 [11] | 236.2 | N/A | 17.4 |
| $NO_x$ (proposed) | 4.00 [12] | N/A | 236.0 | 20.8 |
| $SO_x$ | 0.50 [13] | 35.26 | 29.50 | 2.60 |
| CO | 0.85 [14] | 59.94 | 50.15 | 4.43 |
| PM | 0.10 [14] | 7.05 | 5.90 | 0.52 |
| $PM_{10}$ | 0.10 [14] | 7.05 | 5.90 | 0.52 |
| Total VOC | 0.09 [14] | 6.35 | 5.31 | 0.47 |
| Acetaldehyde | 2.52E-05 [15] | 1.78E-03 | 1.49E-03 | 1.31E-04 |
| Acrolein | 7.88E-06 [15] | 5.56E-04 | 4.65E-04 | 4.10E-05 |
| Benzene | 7.76E-04 [15] | 5.47E-02 | 4.58E-02 | 4.04E-03 |
| Formaldehyde | 7.89E-05 [15] | 5.56E-03 | 4.66E-03 | 4.11E-04 |
| Naphthalene | 1.30E-04 [16] | 9.17E-03 | 7.67E-03 | 6.77E-04 |
| Toluene | 2.81E-04 [15] | 1.98E-02 | 1.66E-02 | 1.46E-03 |
| Xylenes | 1.93E-04 [15] | 1.36E-02 | 1.14E-02 | 1.01E-03 |
| Total HAPs | | 1.05E-01 | 8.80E-02 | 7.77E-03 |

| | |
|---|---|
| Current Fuel Usage Limit | 83955 gal/month |
| Proposed Fuel Usage Limit | 70238 gal/month |
| 2005 Actual Rolling Average Fuel Use | 6200 gal/month |
| Distillate Oil Heat Content | 0.14 MM Btu/gal |

[1] Current Limited PTE (ton/yr) = Emission Factor (lb/MM Btu) x Distillate Oil Heat Content (MM Btu/gal) x Current Fuel Usage Limit (gal/month) x 12 (month/yr) / 2000 (lb/ton)

[2] Proposed Limited PTE (ton/yr) = Emission Factor (lb/MM Btu) x Distillate Oil Heat Content (MM Btu/gal) x Proposed Fuel Usage Limit (gal/month) x 12 (month/yr) / 2000 (lb/ton)

[3] Actual Emissions (ton/yr) = Emission Factor (lb/MM Btu) x Distillate Oil Heat Content (MM Btu/gal) x 2005 Actual Rolling Average Fuel Use (gal/month) x 12 (month/yr) / 2000 (lb/ton)

[11] Current Limit
[12] Proposed Limit
[13] Distillate Oil Limit
[14] AP-42, 10/96, Table 3.4-1
[15] AP-42, 10/96, Table 3.4-3
[16] AP-42, 10/96, Table 3.4-4