



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE 4

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE MECHANICAL ENGINEERING BRANCH SCOPE OF REVIEW
REGARDING THE INSTALLATION OF EMERGENCY DIESEL GENERATORS
NORTHERN STATES POWER COMPANY
PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT NOS. 1 AND 2
FACILITY OPERATING LICENSE NOS. DRP-42 AND DRP-60
DOCKET NOS. 50-282 AND 50-306

1.0 BACKGROUND

In Reference 1, Northern States Power Company (NSP or the licensee) submitted a design report for the Station Blackout/Electrical Safeguards Upgrade Project. This report provides details of the design, procurement, fabrication and construction regarding the installation of an additional emergency diesel generator (EDG) system in each unit of the Prairie Island Nuclear Generating Plant (PINGP). In References 2 and 4, NSP updated the design report and provided revised and additional information in response to requests for information by the staff.

The licensee has installed two EDG sets manufactured by the Société Alsacienne de Constructions Mécaniques de Mulhouse (SACM) located in Mulhouse, France. Each EDG consists of one generator driven by two diesel engines. These engines are radiator cooled and are independent of the existing plant cooling system. They are housed in a new building built specifically for these units, with associated control panels, auxiliary equipment, electrical distribution equipment, fuel oil day tanks and lube oil tanks, and the diesel engine radiators.

2.0 EVALUATION

2.1 Seismic Classification

All components of the diesel engine auxiliary systems that are required to operate during a design basis accident, or to mitigate the consequences of such an accident, have been designated as Seismic Category I, in accordance with Standard Review Plan (SRP) Section 3.2.1, "Seismic Classification." These components were stated to have been designed and built to withstand a safe shutdown earthquake (SSE). All other components which are not required for safe shutdown have been classified as Seismic II/I, and have been designed to preclude damage to safety-related systems or components.

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2.2 System Quality Design Classification

In accordance with SRP Section 3.2.2, the licensee identified the following EDG auxiliary systems and components as important for safety:

- Cooling Water System: both high temperature and low temperature interconnecting piping, the radiator, and the expansion tank.
- Fuel Oil Storage and Transfer System: the fuel oil day tanks, the transfer pumps, the fuel oil transfer piping, the storage tank vent lines, the emergency fill connections, and certain instrumentation lines.
- Starting Air System: the air receiver and interconnecting piping.
- Lubrication Oil System: lube oil cooler and interconnecting piping.
- Combustion Air Intake and Exhaust System: the intake air filter, the exhaust silencer, and the interconnecting piping.

These systems have been classified as Quality Group C, corresponding to the quality group classification of Regulatory Guide (RG) 1.26, "Quality Group Classification and Standards for Water-, Steam- and Radioactive-Waste Containing Components of Nuclear Power Plants." In accordance with this classification, safety-related systems and components are required to be designed, fabricated, tested, installed, and inspected under the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Subsection ND. Auxiliary systems are supplied by both NSP and SACM.

2.2.1 Auxiliary Systems Within NSP Scope.

These systems consist of the interconnecting piping, pumps, and tanks. These piping systems are designed, fabricated, and installed by the architect/engineer for this project, Fluor Daniel, Inc. (FDI), in accordance with ASME Section III, 1986 Edition, Subsection ND, with the following exceptions:

1. No N-stamp is required.
2. Maintenance of a current ASME Certificate (NA-8100) or valid stamp is not required.
3. Filing of a quality assurance manual with ASME (NCA-3463, NCA-3862) is not required.

Piping subassembly fabrication and installation is performed under NSP's Quality Assurance (QA)/Quality Control (QC) Program. This program was previously reviewed and approved by the NRC for conformance with the requirements of 10 CFR Part 50, Appendix B. Piping materials are procured per ASME Section II, with NPT-stamping of pipe and fittings. This includes the provision of certified material test reports, and the application of

inspections and tests prescribed by ASME Sections II and III. These inspections are performed at the fabrication facilities and the project site by an Authorized Nuclear Inspector (ANI) from the Hartford Steam Boiler Inspection and Insurance Agency (Reference 3). The ANI's verifications are stated to be essentially equivalent to those performed on an N-Stamp project.

The licensee has essentially justified the exceptions listed above on the basis that the Code of Record for this plant is ANSI B31.1, and that Table 1 of RG 1.26 provides an exemption of the ASME N-stamping requirement. This table states that the "ASME Code N-symbol need not be applied" for Class 2 and 3 safety-related components.

The tanks were fabricated by the Moorehead Tank Co. They were designed and analyzed in accordance with ASME Section III, and reviewed and approved by FDI. In addition, this fabricator has retained the services of an ANI to perform third party inspection of the tanks. The licensee has also stated that the QC at Moorehead was assured during fabrication to be in accordance with its QA/QC requirements. We find this acceptable.

2.2.2 Auxiliary Systems Within SACM Scope.

The SACM portions of the auxiliary systems, consisting of piping (including bellows expansion joints and flexible hose connections) and equipment mounted on the skid and auxiliary tables, were qualified to standards equivalent to, or which meet the intent of, ASME Section III. The manufacturer has performed comparisons of the French Codes and ASME Sections II and III, and concluded that they are similar. The SACM welders are also stated as qualified to ASME Section IX.

The SACM is required by contract through FDI to apply a QA program meeting the requirements of 10 CFR Part 50, Appendix B. The licensee has stated that NSP and FDI have performed three QA audits of SACM, along with several surveillance trips. Inspections at the SACM facilities have also been performed by the Vendor Inspection Branch. We find this acceptable.

2.3 Piping Analyses

Piping analyses have been performed by FDI for all safety-related piping systems listed above, subject to sustained and transient thermal and mechanical loading conditions, including SSE loading. The analyses were performed using standard piping analysis techniques and computer programs. The seismic analysis was based on RG 1.61, "Damping Values For Seismic Design of Nuclear Power Plants." The systems were qualified to the stress allowables in ASME Section III, with one exception. The combustion exhaust subsystem was qualified to the stress allowables in ANSI B31.1 since the temperature of this subsystem exceeds the upper temperature limit for stress values in ASME Section III.

We have reviewed and evaluated the analysis of the combustion air exhaust piping system. Stresses were shown to be well below the allowable stresses, due to the isolation from the diesel engine by flexible expansion bellows. We find this acceptable.

In general, the highest piping stresses are expected to remain well within the acceptance limits due to the extensive use of flexible hose type connections and bellows expansion joints, supplied by SACM. We have reviewed the qualification of these connections and joints for operation under vibratory and high temperature conditions and have determined that they meet the intent of the qualification criteria of ASME Section III, Subsection ND. We find this acceptable.

2.4 Seismic Qualification of Mechanical and Electrical Equipment

Mechanical and electrical equipment classified as Seismic Category I were seismically qualified based on SRP Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," RG 1.100, Rev. 2, "Seismic Qualification of Electrical Equipment For Nuclear Power Plants," and Institute of Electrical and Electronic Engineers (IEEE) 344-1975, "Recommended Practices for Seismic Qualification of Class 1E Equipment For Nuclear Power Generating Stations." We find this acceptable.

2.5 Design Standards

The Design Report lists the design standards, SRP sections and RGs applicable to the design and operation of mechanical and electrical equipment and components. In addition to those listed, NSP has also committed to perform preoperational vibration and thermal expansion testing of the piping systems in accordance with Sections 3 and 7 of ASME/ANSI OMa-1988 (Reference 5). We find this acceptable.

3.0 CONCLUSION

Based on our review, we conclude that pressure-retaining components of safety-related auxiliary fluid systems associated with the proposed EDGs at PINGP meet the requirements and intent of General Design Criterion (GDC) 1, "Quality Standards and Records." This conclusion is based on the licensee having properly classified these pressure-retaining safety-related components as Quality Group C in accordance with the positions of RG 1.26.

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Date: January 4, 1993

4.0 REFERENCES

1. Letter of November 27, 1990, from T. M. Parker, NSP, to USNRC with enclosure: "Design Report for the Station Blackout/Electrical Safeguards Upgrade Project."
2. Letter of December 23, 1991, from T. M. Parker, NSP, to USNRC with enclosure: "Design Report for the Station Blackout/Electrical Safeguards Upgrade Project," Revision 1.
3. Letter of June 23, 1992, from T. M. Parker, NSP, to USNRC.
4. Letter of December 11, 1992, from T. M. Parker, NSP, to USNRC.
5. ASME/ANSI OMa-1988, "Operation and Maintenance of Nuclear Power Plants," Part 3: "Requirements for Preoperational and Initial Start-Up Vibration Testing of Nuclear Power Plant Piping Systems," and Part 7: "Requirements for Thermal Expansion Testing of Nuclear Power Plant Piping Systems."