U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-263/87006(DRS)

Docket No. 50-263 License No. DPR-22

Licensee: Northern States Power Company
414 Nicollet Mall
Minneapolis, MN 55401

Facility Name: Monticello Nuclear Generating Plant

Inspection At: Monticello site, Monticello, Minnesota

Inspection Conducted: May 11-15 and June 15-16, 1987

Inspectors: J. M. Jacobson — 6/29/87 Date

J. F. Smith — 6/30/87 Date

Approved By: D. H. Danielson, Chief
Materials and Processes Section — 6/30/87 Date

Inspection Summary

Inspection on May 11-15 and June 15-16, 1987 (Report No. 50-263/87006(DRS))
Areas Inspected: Routine announced inspection of Licensee's Actions taken to implement Generic Letter 84-11 (Temporary Instruction 2515/89) and Licensee's Actions taken to implement Unresolved Safety Issue A-7 (Temporary Instruction 2515/85) (25589, 37701).
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

Northern States Power Company (NSP)

*Morgan Clarity, Assistant Plant Manager
Dale Larson, Supervisor Nuclear Engineering
Glen Crosby, Lead Quality Assurance (QA) Engineer
Al Kuroyama, Project Engineer
John Bystrzyck, Project Superintendent, Quality Control (QC)
Steve Hammer, Lead Project Engineer
Larry Nolan, Superintendent, Nuclear Technical Services
Tim Bailey, Lead Production Engineer
Verne Thompson, Mechanical Engineer
Jeff Ricker, Superintendent Materials & Special Processes
Joe Schanen, Materials & Special Process Specialist
Doug Nordell, Senior, Quality Engineer
Wayne Shamla, Plant Manager
Doug Nevinski, General Superintendent & Rad Protection

The inspector also contacted and interviewed other licensee employees.

*Telephone exit interview conducted on June 18, 1987.

2. (Closed TI 2515/85) Mark I Modifications

a. General

Additional suppression pool hydrodynamic loads associated with a postulated loss-of-coolant accident (LOCA) were identified during large-scale testing of an advanced design pressure-suppression containment (Mark III). These additional loads, which had not explicitly been included in the original Mark I containment design, result from the dynamic effects of drywell air and steam being rapidly forced into the suppression pool (Torus). Because these hydrodynamic loads had not been considered in the original design of the Mark I containment, a detailed reevaluation of the Mark I containment system was required. As a result of the reevaluation, structural modifications were required to restore the originally intended design-safety margins. These structural modifications included the following items:

- Drywell-to-Wetwell (Torus) Differential Pressure Control.
- Suppression Pool Temperature Monitoring System.
- Downcomer Bracing.
- Vent Header Deflector.

- Safety-Relief Valve (SRV) Quenchers.
- Stiffening of Torus Attached Piping.
- Torus Support Reinforcement.

The following paragraphs address the inspection requirements of NRC Temporary Instruction 2515/85, which was issued to verify satisfactory completion of licensee actions concerning the Mark I Program. Copies of the Plant Unique Analysis Report (PUAR) and the staff Safety Evaluation Report were reviewed by the NRC Inspector to determine the plant modification requirements.

b. Programmatic Review

The NRC inspector reviewed previous inspection reports covering programmatic inspections performed during the modifications. The reports were reviewed to verify the inspection coverage of the following areas:

- Torus Support Reinforcement.
- Torus Internal Modification.
- Torus Attached Piping.

The result of the review is outlined in the following matrix:

TORUS SUPPORT REINFORCEMENT

REPORT NO.	NPI*
INSTALLATION SPECIFICATIONS	X
DESIGN DOCUMENTS	X
CONTRACT & PROCUREMENT DOCUMENTS	X
DRAWINGS	X
PROCEDURES	X
PERSONNEL CERTIFICATIONS & QUALIFICATIONS	X
MATERIAL CERTIFICATIONS	X
OBSERVATIONS FABRICATION/INSTALLATION ACTIVITIES	X
INSTALLATION, INSPECTIONS OTHER QUALITY RELATED DOCUMENTS	X

*NOT PREVIOUSLY INSPECTED

TORUS INTERNALS MODIFICATIONS

REPORT NO. 50-263/	81-23	78-21	80-05	NPI*
INSTALLATION SPECIFICATIONS		X	X	
DESIGN DOCUMENTS		X	X	
CONTRACT & PROCUREMENT DOCUMENTS		X	X	
DRAWINGS		X	X	
PROCEDURES	X	X	X	
PERSONNEL CERTIFICATIONS & QUALIFICATIONS	X	X	X	
MATERIAL CERTIFICATIONS		X	X	
OBSERVATIONS FABRICATION/INSTALLATION ACTIVITIES	X	X	X	
INSTALLATION, INSPECTIONS & OTHER QUALITY RELATED DOCUMENTS	X	X	X	

*NOT PREVIOUSLY INSPECTED

TORUS ATTACHED PIPING

REPORT NO. 50-263/	79-13	76-16	NPI*
INSTALLATION SPECIFICATIONS			X
DESIGN DOCUMENTS		X	
CONTRACT & PROCUREMENT DOCUMENTS		X	
DRAWINGS		X	
PROCEDURES	X	X	
PERSONNEL CERTIFICATIONS & QUALIFICATIONS	X		
MATERIAL CERTIFICATIONS			X
OBSERVATIONS FABRICATION/INSTALLATION ACTIVITIES			X
INSTALLATION, INSPECTIONS & OTHER QUALITY RELATED DOCUMENTS	X		

*NOT PREVIOUSLY INSPECTED

c. Technical Specification Review

(1) Suppression Pool Monitoring Systems

(a) The NRC Inspector reviewed the installation drawings and confirmed that the placement and number of temperature monitoring devices are in accordance with the Plant Unique Analysis Report (PUAR) commitments.

(b) The NRC inspector confirmed that the installation drawings require installation of the Temperature Monitoring Devices at the water level specified in the PUAR. Installation of these devices was confirmed at torus penetrations X-234A and X-234B.

(c) The NRC inspector observed that the Suppression Pool Temperature Indicators and Recorders were operational in the control room.

(d) Instrumentation Alarm Set Points were confirmed to be consistent with the Pool Temperature Limits specified in the Technical Specifications.

(e) The NRC inspector confirmed that the Technical Specification Temperature Limits are consistent with the PUAR.

(f) Drywell/Wetwell Differential Pressure Control System is not applicable to the Monticello Plant.

d. Design Modification Review

(1) SRV Discharge T-Quenchers

During the Fall 1977 outage, three of eight SRV discharge ramsheads located in the suppression pool (torus) were replaced with T-Quenchers to lower hydrodynamic loads during SRV discharge. In-plant tests were subsequently conducted in December 1977. In these tests, the T-Quenchers demonstrated a significant improvement in performance over the ramshead devices. During the Fall 1978 outage, the remaining five Quenchers were installed with minor modifications to the first three.

The modifications were designed and installed in accordance with the provisions of ASME Section XI, 1977 Edition with S-77 Addenda. ASME Section XI, Paragraph IWA 7210 requires that design, fabrication, and installation conform to the original code of construction (ANSI B31.1-73 applies) or later editions. T-Quencher devices which meet the requirements

of ASME Section III, Class 3 are considered to have met the requirements of ANSI B31.1-73. All welding on SRV piping, T-Quenchers, and anchor points required qualifications and procedures to be in accordance with ASME Section IX. Welding on the supports is in accordance with AWS D1.1 Structural Welding Code or ASME Section IX.

Each T-Quencher device consists of two perforated arms attached to a central ramshead. A total of 1588 holes of 0.391 inch diameter are provided along these arms in a graduated hole pattern. Each T-Quencher device is supported within the torus by a support beam spanning the ring girders. The supports are fabricated from 14 inch, schedule 120, pipe (reference drawings NH 86909 and NH 85451) however, the PUAR states that schedule 140 pipe was used. A review of the Nutech prepared Design Report No. NSP-23-082 verified that 14 inch, schedule 120, pipe was used for the analysis of the support beam thus the schedule 140 reference in the PUAR is apparently a typographical error. This modification is documented in Design Change No. 78 M012. The SRV discharge lines are supported at the wetwell elbow by a 16 inch, schedule 160, pipe section support beam. This modification is documented in Design Change No. 79 Z001.

QA records generated by the installer (Cherne Contracting Corporation) were reviewed by the NRC inspector. Samples of welding, NDE, and installation procedures were reviewed and found to be appropriate for this installation. The T-Quencher installation appeared to be in conformance with the PUAR commitments.

(2) Vent Header Deflector

The vent header deflector is designed to substantially reduce hydrodynamic loads due to pool swell on the vent header which may occur during the initial phase of a DBA event. The deflector is located between the vent header and the pool and protects the header from the direct impact of the pool.

The deflector consists of 16 deflector beams and connection assemblies. The beams are suspended beneath the vent header from connection plates which attach to the vent header collars. The deflector is fabricated from 14 inch diameter, schedule 160, pipe with two WT 6X32.5 structural tees attached to the sides.

The vent header and collar have been classified as ASME Section III, Subsection NE Class MC for construction. The deflector and support are outside of the ASME code boundary and were fabricated in accordance with AISC requirements. However, the deflector design is in accordance with ASME Section III, Subsection NF and the attachment to the vent header collar

complies with ASME Section III, Class MC in all respects. All installation welds were performed by welders qualified in accordance with ASME Section IX. Welding on components constructed in accordance with AISC was performed by welders qualified to AWS D1.1 Structural Welding Code or ASME Section IX.

Drawings NH 86907, NH 86908, and NH 86915 were reviewed by the NRC inspector to verify conformance to the PUAR commitments and were found acceptable. A sample of welding, NDE, and installation procedures were reviewed and found to be appropriate for this installation.

(3) Downcomer Bracing

A total of 96 downcomers penetrate the vent header in pairs to direct steam from the drywell into the suppression pool. In order to retain the original design margins during a postulated LOCA, it was necessary to brace the downcomers both longitudinally and laterally.

The intersections of the downcomers and the vent header are reinforced with a system of stiffener plates and bracing members. In the plane of the downcomers, the intersections are stiffened by a pair of 1/2" gusset plates located between each set of the downcomers and a pair of 2-1/2" diameter pipe members at the bottom of each set of two downcomers. The gusset plates are welded both to the tangent points of the downcomer legs and to the vent header. The pipe members are welded to the downcomer legs near the tangent points. The system of stiffener plates is designed to reduce local intersection stresses caused by loads acting in the plane of the downcomers. The system of pipe bracing ties the downcomer legs together in a pair; therefore, separation forces on the pair of downcomer legs will be taken as axial forces in the bracing.

In the direction normal to the plane of the downcomer pair, the intersections are braced by 2-1/2" diameter pipe members located on each side of the vent header. The ends of the horizontal pipe members are welded to the downcomers and the diagonals are connected to the horizontal members by means of gusset plates.

This bracing system provides an additional load path for the transfer of loads acting on the submerged portion of the downcomers and results in reduced local stresses in the downcomer-vent header intersection regions. The system of downcomer-vent header intersection stiffener plates and bracing members provides a redundant mechanism for the transfer of loads acting on the downcomers, thus reducing the magnitude of loads passing directly through the intersection. The bracing

also ties together several pairs of downcomers in the longitudinal direction, causing an increase in stiffness to the overall system that minimizes the dynamic effect of several loads, including SRV submerged structure loads. This also results in load sharing among the downcomers for both chugging lateral loads and SRV submerged structure loads.

The NRC inspector reviewed the following drawings and found them to conform to the PUAR commitments.

- NH-94692, Downcomer Longitudinal Bracing
- NH-94693, Downcomer Longitudinal Bracing

- NH-86911, Downcomer Lateral Bracing
- NH-86916, Downcomer Lateral Bracing

- NH-91155, Downcomer Stiffner Plates
- NH-91156, Downcomer Stiffner Plates

Samples of welding, NDE, and installation procedures were also reviewed and found to be appropriate for this installation.

(4) Torus Penetration Reinforcement

The Mark I Containment program has postulated new hydrodynamic loads in the torus due to a loss of coolant accident (LOCA) and/or safety relief valve (SRV) discharge. These loads cause stresses in the torus shell near the torus piping penetrations which may exceed ASME Section III allowables. The objective of this modification was to reduce these shell stresses to below the code allowable values.

The scope of the project involved the reinforcement of 13 torus penetrations. The systems involved in this modification were HPCI and RCIC turbine exhausts, PCAC-CP4 and CP5, RHR Core Spray, RHR spray header, vacuum breaker instrumentation, construction drains, HPCI condensate, and RCIC off gas.

The work consisted of stiffening the torus attached piping at locations where pipes penetrate the torus shell. The piping penetrations modified were nominally 2", 4", 8", 10", 12" and 20" in diameter. Each modification consisted of a split sleeve welded to the penetrating pipe, stiffening plates extending radially from the split sleeve to pad plates which are welded to the torus shell.

The split sleeves were fabricated from ASTM A-106, Gr.B pipe, cut in half longitudinally, ranging in wall thickness from 3/4" to 1 1/4". The stiffening plates and pad plates are all 1 1/4" thick ASME SA-516, Gr 70 material.

The NRC inspector reviewed Drawings NH-94961, NH-94962 and NH-95019 and found them to conform to the PUAR commitments. Samples of welding, NDE, and installation procedures were reviewed and found to be appropriate for this modification.

e. Visual Inspection

The plant was in operation at the time of this inspection, therefore inspection of torus internal modifications was not possible. The following external modifications were visually inspected for conformance to design drawings and quality of workmanship.

(1) Torus support column stiffening and support saddle installation.

(2) Thermowell placement for Suppression Pool Temperature Monitoring.

(3) The following Torus penetrations were inspected:

X-204 - A, B, C, D	ECCS suction Header
X-211 - A, B	RHR to Spray Header
X-218	Primary Containment and Atmosphere Control
X-234 - A, B	Thermowells

No deviations from design drawings were noted and general workmanship appeared good.

3. (Closed TI 2515/89) Inspection of BWR Stainless Steel Piping in Accordance with Generic Letter 84-11

a. General

Generic Letter 84-11 provided Guidance to the Licensee in the inspection of BWR stainless steel piping for intergranular stress corrosion cracking (IGSCC). The letter identified those actions which would be considered an acceptable response to NRC concerns in this area. Included in these were the following:

1. A piping inspection program was to be undertaken. This program was to identify the percentage of each group of welds to be inspected and the expansion of the inspection scope to occur when crack formation or growth was discovered.

2. The competence of all Level II and Level III ultrasonic test examiners was to be demonstrated.

3. Leak detection system sensitivity, and operability limits were to be established. The conditions for shutdown as a result of unidentified leakage or of inoperability of leakage measurement instruments were to be established.

b. Inspection Program

As a result of extensive replacement of IGSCC susceptible joints, only ten weld joints which are candidates for the inspection program outlined in Generic Letter 84-11 now remain. Inspection of all of these remaining IGSCC susceptible joints in accordance with Generic Letter 84-11 was completed in 1984. The licensee then reverted to the ASME Section XI inspection schedule. Future ISI of these joints will be performed in accordance with NUREG 0313 Revision 2 (draft). Confirmation of the future use of NUREG 0313 was received by telephone from NSP Production Plant Maintenance on June 23, 1987, and will subsequently be formally confirmed to NRR by letter by July 1, 1987. NUREG 0313, Revision 2, requires all susceptible joints which were inspected and found to be free of cracks to be inspected every three and one-third years. Approximately half of these weldments should be inspected each refueling outage.

c. Competence of UT Examiners

The NRC Inspector confirmed that NSP has an Ultrasonic Examination (UT) Procedure, NSP-UT-16, which was written and implemented for the detection and investigation of IGSCC. This procedure is used on all stainless steel welds at NSP's nuclear power plants.

NSP-UT-16, paragraph IV.B. requires that all examination personnel receive documented training for the performance of their specific functions with respect to the detection and investigation of IGSCC by an approved agency. The IGSCC program offered at the EPRI NDE Center is the only one currently acceptable to the NRC and is utilized by NSP. The documentation and training records for each individual used is kept as part of the examination package for each outage.

d. Leak Detection and Leakage Limits

The NRC Inspector confirmed that the Technical Specification (Sections 3.6 and 4.6) requires a plant shutdown for inspection and corrective action when any leakage system indicates, within any period of twenty-four hours, an increase in the rate of unidentified leakage in excess of 2 gpm or its equivalent. These sections also require that at least one of the leakage measurement instruments associated with each pump shall be operable and that an orderly shutdown be initiated immediately by the licensee when the outage time for inoperable instruments reaches a twenty-four hour limit.

e. Performance of Inspection

The NRC Inspector confirmed that IGSCC susceptible welds were inspected in 1984 in accordance with Generic Letter 84-11 and examined the records of six UT Examiners who worked on this job to confirm that they had demonstrated their competence prior to examining welds. These examiners met all requirements for experience, education and training and successfully demonstrated their proficiency in detection of IGSCC at the EPRI NDE Center.

f. Subsequent Activity

The NRC inspector confirmed that the Monticello inservice inspection program provides for scope expansion and additional inspection when new cracks are found or when existing cracks grow to an unacceptable size. The sample will be expanded to 100% examination when new cracks are discovered.

4. Exit Meeting

The inspectors met with site representatives (denoted in Persons Contacted paragraph) at the conclusion of the inspection. The inspector summarized the scope and findings of the inspection noted in this report. The inspector also discussed the likely informational content of the inspection report with regard to documents of processes reviewed by the inspector during the inspection. The licensee did not identify any such documents/processes as proprietary.