

Mr. Mark L. Marchi
Site Vice President
Kewaunee Plant
Wisconsin Public Service
Corporation
Post Office Box 19002
Green Bay, WI 54307-9002

SUBJECT: KEWAUNEE INSPECTION REPORT 50-305/2000002(DRP)

Dear Mr. Marchi:

On February 22, 2000, the NRC completed an inspection at your Kewaunee Nuclear Power Plant. The enclosed report presents the results of that inspection.

During the 5-week period covered by this inspection, your staff's conduct of activities at the Kewaunee facility was generally characterized by safety conscious operations. We observed that operators responded appropriately to a lowering forebay level condition, which occurred as a result of ice formation at the plant intake structure. However, during a subsequent review of the technical basis establishing the circulating water pump forebay level trip setpoint, which is required for service water pump operability, we identified several concerns with the design calculation and the associated assumptions. During this period your staff also identified that the diesel generators' jacket water coolers were potentially undersized. We understand that you seek near-term resolution of these issues. We will review your conclusions upon completion of your efforts.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, the enclosure, and your response, if you choose to provide one, will be placed in the NRC Public Document Room.

Sincerely,

Kenneth Riemer
Kenneth Riemer, Acting Chief
Reactor Projects Branch 2

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Docket No. 50-305
License No. DPR-43

Enclosure: Inspection Report 50-305/2000002(DRP)

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M. Marchi

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cc w/encl: K. Weinbauer, Manager, Kewaunee Plant
B. Burks, P.E., Director, Bureau of Field Operations
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M. Marchi

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cc w/encl: K. Weinbauer, Manager, Kewaunee Plant
B. Burks, P.E., Director, Bureau of Field Operations
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State Liaison Officer

UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION III
801 WARRENVILLE ROAD
LISLE, ILLINOIS 60532-4351

March 23, 2000

Mr. Mark L. Marchi
Site Vice President
Kewaunee Plant
Wisconsin Public Service
Corporation
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Sincerely,



Kenneth Riemer, Acting Chief
Reactor Projects Branch 2

Docket No. 50-305
License No. DPR-43

Enclosure: Inspection Report 50-305/2000002(DRP)

See Attached Distribution

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-305
License No: DPR-43

Report No: 50-305/2000002(DRP)

Licensee: Wisconsin Public Service Corporation

Facility: Kewaunee Nuclear Power Plant

Location: N 490 Highway 42
Kewaunee, WI 54216

Dates: January 19, 2000, through February 22, 2000

Inspectors: J. Lara, Senior Resident Inspector
Z. Dunham, Resident Inspector

Approved By: Kenneth Riemer, Acting Chief
Reactor Projects Branch 2
Division of Reactor Projects

EXECUTIVE SUMMARY

Kewaunee Nuclear Power Plant NRC Inspection Report 50-305/2000002(DRP)

This report includes results of the routine, unannounced inspection by resident inspectors of plant operations, maintenance, engineering, and plant support.

Operations

- The inspectors observed shift turnover meetings and observed discussions regarding the status of plant equipment, planned testing, and maintenance. Operators exhibited adequate working knowledge of plant equipment and instruments. Additionally, the inspectors observed sessions of the licensee's simulator training for licensed operator requalification. The inspectors concurred with licensee management's observations on the training. (Section O1.1)
- The reactor operators adequately responded to a lowering forebay level due to ice formation at the plant intake crib. The licensee's basis for the forebay level circulating water pump trip setpoint did not account for instrument inaccuracies and did not consider the potential for flow degradation due to vortex formation at the suction of the service water pumps. The licensee subsequently implemented a temporary change request to raise the forebay level circulating water pump trip setpoint to ensure service water pump operability pending further analysis. An unresolved item was opened. (Section O2.2)

Maintenance

- The licensee performed work in accordance with the prescribed work instructions. In general, the technicians were knowledgeable of their assigned tasks and work document requirements. (Section M1.1)

Engineering

- Good engineering support to plant operations and maintenance organizations was observed during the course of plant work activities. This was evident through inspectors' reviews of the Kewaunee Assessment Process and various design and degraded equipment issues. The engineering safety evaluations and technical support to other departments were generally technically sound. However, the inspectors identified deficiencies in the design calculation associated with the circulating water pump forebay level trip setpoint. (Section E1.1)
- The licensee identified that the diesel generator jacket water heat exchangers were potentially undersized based on assumed fouling factors and design service water inlet temperature. The inspectors reviewed the licensee's operability evaluation and did not identify any deficiencies. An unresolved item was opened pending the completion of the licensee's review of past diesel generator operability considering historical service water inlet temperature. (Section E1.2)

Plant Support

- The inspectors performed frequent walkdowns of safety-related equipment located within the radiologically controlled area. The inspectors noted that radiation and high radiation areas were posted and controlled in accordance with NRC requirements. Contaminated areas were kept to a minimum thus allowing for operator access to equipment without the need for protective clothing. (Section R1.1)

Report Details

Summary of Plant Status

The unit operated at power levels up to approximately 97 percent power during the 5-week inspection report (IR) period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (Inspection Procedure (IP) 71707)

The inspectors conducted frequent reviews of ongoing plant operations. These reviews included observations of control room evolutions, shift turnovers, and log keeping. The inspectors also reviewed the Updated Safety Analysis Report (USAR) Section 12, Conduct of Operations, the facility's Technical Specifications (TS), and operability evaluations completed by the licensee.

The inspectors observed shift turnover meetings and observed discussions regarding the status of plant equipment, planned testing, and maintenance. Operators exhibited adequate working knowledge of plant equipment and instruments. Additionally, the inspectors observed sessions of the licensee's simulator training for licensed operator requalification. The inspectors concurred with licensee management's observations on the training.

O2 Operational Status of Facilities and Equipment

O2.1 Plant Equipment and System Walkdowns (IP 71707)

In addition to routine plant inspections, the inspectors examined the material condition and system configuration of selected portions of the safety injection system. No deficiencies were identified during the evaluations.

O2.2 Forebay Level Excursion Due to Ice Formation at Intake Structure

a. Inspection Scope (IP 71707 and 37551)

On January 20, 2000, forebay level lowered over a period of 3 hours from an approximate level of 67 percent to 53 percent. The licensee suspected that the lowering level was due to the formation of ice at the plant intake crib. The inspectors reviewed the licensee's response to the lowering forebay level. This review included an evaluation of the licensee's calculations supporting the circulating water (CW) pump forebay level trip setpoint which was set at 42 percent. The following documents were reviewed:

- Operating Procedure E-CW-04, "Loss of Circulating Water," Revision L
- USAR, Section 9.6.2, "Service Water System"
- USAR, Section 10.2.2, "Circulating Water System"
- Kewaunee Assessment Process (KAP) 00-000135, Forebay Level Decrease from 67 percent to 53 percent
- KAP 00-000166, Adequacy of Circulating Water Pump Forebay Level Trip Setpoint
- Safety System Functional Inspection, D-02-047, Service Water (SW) Pump Minimum Submergence
- Request for Information, R-02-06A, Minimum Submergence of SW Pumps
- Temporary Change Request 00-01, Raise Trip Setpoint of CW Pumps

b. Observations and Findings

The facilities' forebay provides a common source of water, taken from Lake Michigan, for the CW and SW pumps. Technical Specifications required that the forebay level trip system be operable to support SW pump operability. The forebay level trip system trips the CW pumps at a level of 42 percent to ensure an adequate supply of water to the SW pumps.

On January 20, 2000, forebay level lowered from an approximate level of 67 percent to 53 percent over a period of 3 hours. A computer alarm set at 60 percent alerted the reactor operators to the lowering forebay level. The licensee suspected that the lowering forebay level was due to ice formation at the intake structure. In response to the lowering forebay level, the operators inspected the forebay for ice formation and started all traveling screens. Following the forebay level lowering to 53 percent, level improved and subsequently returned to an approximate value of 67 percent several hours later. The licensee documented the event in KAP 00-000135.

The inspectors noted that TS 3.3.e.B required that the forebay water level trip system be operable to support SW pump operability and that TS Table 4.1-1, which prescribed the testing frequency of the forebay level instruments, did not include a specific trip setpoint. The inspectors reviewed the licensee's basis for the 42 percent CW pump forebay level trip setpoint and noted the following:

- In 1990, the licensee raised questions about the adequacy of the 42 percent trip setpoint to ensure SW pump operability. Subsequent calculations by the licensee concluded that the forebay level was sufficient at 42 percent to ensure Net Positive Suction Head (NPSH) of the SW pumps at the design flow. Additionally, the calculations indicated that level requirements to preclude vortex formation were more limiting than NPSH and indicated a trip setpoint level of 45.5 percent. Although the initial evaluation indicated a minimum forebay level of 45.5 percent to preclude vortex formation in the SW pumps, the licensee subsequently determined that vortex formation was not of concern. This conclusion was based on no observable damage to the SW pumps during inspections following CW pump trips at a forebay level of 42 percent.

The inspectors identified several concerns with the licensee's calculation and assumptions. The licensee's evaluation on vortex formation was focused on pump

damage and did not consider the immediate short-term potential for air intrusion and flow degradation in the SW system, did not take into account level instrument inaccuracies of 9 inches, and assumed that operator actions would prevent forebay level from lowering to the low level alarm. Additionally, the licensee's analysis of NPSH requirements assumed a 70 degrees Fahrenheit (°F) SW inlet temperature instead of the plant design of 80°F. The licensee documented the inspectors' concerns in KAP 00-000166. After further evaluation, the licensee determined that there was insufficient basis to conclude that vortex formation could not occur. Subsequently, the licensee implemented Temporary Change Request 00-01 to raise the forebay level trip setpoint of the CW pumps to 48 percent and the low level alarm to 52.5 percent to prevent vortex formation in the SW pumps.

At the end of this inspection period, the licensee continued to perform a more detailed evaluation of vortex formation in the SW pumps to determine the acceptability of returning the forebay level CW pump trip to the original 42 percent setpoint. This issue is an unresolved item (URI) pending further NRC review of the licensee's analysis on the minimum required forebay level needed to support SW pump operability. (URI 50-305/2000002-01, Minimum Required Forebay Level to Support Service Water Pump Operability).

c. Conclusions

The reactor operators adequately responded to a lowering forebay level due to ice formation at the plant intake crib. The licensee's basis for the forebay level CW pump trip setpoint did not account for instrument inaccuracies and did not consider the potential for flow degradation due to vortex formation at the suction of the SW pumps. The licensee subsequently implemented a temporary change request to raise the forebay level CW pump trip setpoint to ensure SW pump operability pending further analysis. A URI was opened.

O8 Miscellaneous Operations Issues (IP 92700)

O8.1 (Closed) Violation 50-305/98014-01: Failure to Implement Temporary Changes to Procedures - Two Examples

This violation included 2 examples of a violation of TS 6.8 concerning the failure to temporarily change an annunciator response procedure to reflect the additional actions required to be performed by auxiliary operators and the failure to recognize the need to temporarily change 2 surveillance procedures (SP) prior to performing the surveillance tests when the acceptance criteria had been modified.

With respect to the first violation example, the licensee contested the violation and provided responses to the violation via letters dated December 14, 1998, and April 15, 1999. After further review, the NRC maintained that the licensee used "danger" cards to convey general information and to provide instructions. This was contrary to administrative requirements and bypassed the temporary procedure change process. The licensee's corrective actions included review of all outstanding danger cards to determine if any actions or information provided by danger cards should have resulted in

temporary procedure changes being implemented. Additionally, the licensee has reviewed and revised the site administrative procedures governing procedure development, revision, and control. Additional guidance was provided regarding the requirements for recognizing the need for processing temporary procedure changes. The corrective actions were determined to be acceptable.

With respect to the second violation example, the licensee has implemented corrective actions to address the identified deficiency. These were determined acceptable. This violation is closed.

O8.2 (Closed) Deviation 50-305/98014-02: Changed Allowable Overtime Hours Without Notifying NRC of Change of Commitment

This deviation pertained to the licensee's administrative requirements in Nuclear Administrative Directives, Procedure NAD 3.8, "Overtime Policy," Revision A, to allow individuals to work up to 28 hours in a 48 hour period without pre-authorization. This policy was not in compliance with Generic Letter (GL) 82-12, "Nuclear Power Plant Staff Working Hours," or the last docketed commitment made to the NRC. The GL stated that no individual should work more than 24 hours in a 48-hour period.

The licensee responded to the Notice of Deviation in a letter dated December 14, 1998, and agreed that a change in commitment was not communicated to the NRC. The inspectors reviewed the licensee's corrective actions discussed in the response and determined them to be acceptable. These included performing a safety evaluation on the commitment change and submitting a summary of the safety evaluation to the NRC as part of the annual USAR update on May 25, 1999. The licensee's safety evaluation determined that allowing individuals to work up to 28 hours in a 48-hour period, was acceptable since it meets other guidance within the GL. Specifically, the GL guidance recommended individuals not work more than 16 hours in a 24-hour period. This deviation is closed.

O8.3 (Closed) Licensee Event Report (LER) 50-305/98008-00: Failing To Implement Procedure Change Resulted in Missed Technical Specifications Surveillance Test

The event discussed in this LER was previously documented in IR 50-305/98007, Section M1.2. This event involved the failure to perform surveillance testing of reactor coolant system low flow trip circuit relay contacts during the month of April 1998. This failure was due to not revising surveillance test procedure (SP 47-316B) to incorporate specific instructions for testing the subject contacts. Upon identification of the missed surveillance, the licensee used the TS allowed outage time of 24 hours to perform testing of the logic circuitry for the reactor coolant pump trip circuits as provided by TS 4.0.c. The licensee satisfactorily completed testing of the reactor coolant pump circuits before the 24-hour allowed outage time expired and verified that the contacts opened as required.

Technical Specification Table 4.1-1 required that the reactor coolant flow instrument channel be tested monthly. The failure to test the low flow trip circuit relay contacts during the month of April 1998 was determined to be a violation of TS Table 4.1-1. However, this failure constituted a violation of minor significance and is not subject to

formal enforcement action. The inspectors reviewed the licensee's corrective actions and did not identify any deficiencies. This LER is closed.

O8.4 (Closed) LER 50-305/99001-00: Inadequate Configuration Controls Cause Personnel to Unknowingly Place Plant in Unanalyzed Condition

This issue pertained to control room operators closing a valve being relied upon to provide over pressure protection of a containment penetration. The valve was closed to ensure compliance with TS containment integrity requirements. However, closing the valve resulted in placing the plant in an unanalyzed condition. Details regarding this issue were previously documented in IR 50-305/99001, Section O1.3. The LER documented the licensee's proposed and implemented corrective actions. The inspectors reviewed the licensee's corrective actions and did not identify any deficiencies. No violations were identified. This LER is closed.

O8.5 (Closed) LER 50-305/99002-00: Inadequate Surveillance Test Procedure Results in Redundant Containment Level Instrument Channels Degraded and in Violation of Technical Specifications.

The details of this issue and an associated NCV were documented in IR 50-305/99006, Section O2.2. The inspectors reviewed the licensee's short and long term corrective actions and did not identify any concerns. This LER is closed.

O8.6 (Closed) NCV 50-305/99013-02: Failure to Perform 18-Month Test of Steam Exclusion System

The details of this issue and associated NCV were documented in IR 50-305/99013, Section O2.4. This violation was entered into the licensee's corrective action program as KAP 2436. This NCV is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Maintenance and Surveillance Test Observations (IP's 61726 and 62707)

The inspectors observed and reviewed all or portions of the following surveillance test and maintenance activities:

- SP 33-098, "Safety Injection Pump and Valve Test - IST," Revision AR
- SP 47-316A, "Channel 1 (Red) Instrument Channel Test," Revision G
- SP 56C-093, "Containment Hydrogen Monitor Operational Test," Revision I
- SP 54-058, "Turbine First Stage Pressure Instruments Monthly Channel Test," Revision M

- SP 42-312B, "Diesel Generator B Availability Test," Revision H
- SP 05B-104, "Motor Driven Auxiliary Feed Water Pump and Valve Test - IST," Revision AI
- SP 05B-105, "Turbine Driven Auxiliary Feed Water Pump and Valve Test - IST," Revision AZ

The inspectors also reviewed the surveillance procedure and the appropriate USAR sections. The licensee performed work in accordance with the prescribed work instructions. In general, the technicians were knowledgeable of their assigned tasks and work document requirements.

III. Engineering

E1 Conduct of Engineering

E1.1 General Comments (IP 37551)

Good engineering support to plant operations and maintenance organizations was observed during the course of plant work activities. This was evident through inspectors' reviews of KAPs and various design and degraded equipment issues. The engineering safety evaluations and technical support to other departments were generally technically sound. However, as described in Section O2.2, the inspectors identified deficiencies in the design calculation associated with the CW pump forebay level trip setpoint.

E1.2 Potentially Undersized Diesel Generator Jacket Water Heat Exchangers

a. Inspection Scope (IP 37551)

The inspectors reviewed the licensee's response to identifying that the diesel generators' jacket water heat exchangers were potentially undersized.

b. Observations and Findings

During a review of a design change request to replace the diesel generators' jacket water heat exchangers during the upcoming refueling outage, the licensee determined that the heat exchangers were potentially undersized. This was determined after the licensee received information from the vendor which indicated that the original installed heat exchangers were analyzed assuming a 70°F SW inlet temperature and a fouling factor indicative of a clean water system instead of a raw water system such as SW. This was of concern since current analysis assumed a design SW inlet temperature of 80°F. Subsequent analysis by the licensee determined that the heat exchangers were operable up to a 70°F SW inlet temperature. The inspectors reviewed the licensee's

operability evaluation as documented in KAP 00-000313 and did not identify any deficiencies. The licensee amended an existing night order on SW operability to reflect the 70°F restriction.

At the end of this inspection period, the licensee continued to evaluate past diesel generator operability based on a historical review of SW inlet temperatures. This is a URI pending further licensee evaluation of historical SW inlet temperatures and subsequent NRC review (URI 50-305/2000002-02, Potential Undersized Diesel Generator Jacket Water Heat Exchangers).

c. Conclusions

The licensee identified that the diesel generators' jacket water heat exchangers were potentially undersized based on assumed fouling factors and design SW inlet temperature. The inspectors reviewed the licensee's operability evaluation and did not identify any deficiencies. A URI was opened pending the licensee's review of past diesel generator operability considering historical SW inlet temperature.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 General Comments (IP 71750)

The inspectors performed frequent walkdowns of safety-related equipment located within the radiologically controlled area. The inspectors noted that radiation and high radiation areas were posted and controlled in accordance with NRC requirements. Contaminated areas were kept to a minimum thus allowing for operator access to equipment without the need for protective clothing.

V. Management Meetings

X1 Exit Meeting Summary

On February 22, 2000, the inspectors presented the inspection results to the plant manager and members of his staff. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

X3 Management Meeting Summary

On February 17, 2000, a meeting was held at the Kewaunee facility between NRC and Kewaunee management. Issues discussed included the Kewaunee Improvement Plan, SW system, and other topics of interest.

PARTIAL LIST OF PERSONS CONTACTED

Wisconsin Public Service Corporation

D. Braun, Assistant Plant Manager - Operations
D. Cole, Manager, Engineering and Technical Support
K. Evers, Manager, Nuclear Support Services
G. Harrington, Plant Licensing Supervisor
K. Hoops, Plant Manager, Kewaunee Plant
M. Marchi, Vice President - Nuclear
J. Mortonson, Assistant Plant Manager - Maintenance
M. Reinhart, Superintendent, Radiation Protection
B. Koehler, Superintendent, Plant Quality Programs
J. Stoeger, Superintendent, Operations
T. Webb, Nuclear Licensing Director
K. Weinbauer, General Manager, Kewaunee Plant

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 61726: Surveillance Observations
IP 62707: Maintenance Observation
IP 71707: Plant Operations
IP 71750: Plant Support Activities
IP 92700: Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-305/2000002-01 URI Minimum Required Forebay Level to Support Service Water Pump Operability
50-305/2000002-02 URI Potential Undersized Diesel Generator Jacket Water Heat Exchangers

Closed

50-305/98014-01 VIO Failure to Implement Temporary Changes to Procedures
50-305/98014-02 DEV Changed Allowable Overtime Hours Without Notifying NRC of Change of Commitment
50-305/98008-00 LER Failing to Implement Procedure Change Resulted in Missed Technical Specifications Surveillance Test
50-305/99001-00 LER Inadequate Configuration Controls Cause Personnel to Unknowingly Place Plant in Unanalyzed Condition
50-305/99002-00 LER Inadequate Surveillance Test Procedure Results in Redundant Containment Level Instrument Channels Degraded and in Violation of Technical Specifications
50-305/99013-02 NCV Failure to Perform 18-Month Test of Steam Exclusion System

Discussed

None

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
CW	Circulating Water
°F	Degrees Fahrenheit
DRP	Division of Reactor Projects, Region III
GL	Generic Letter
IP	Inspection Procedure
IR	Inspection Report
KAP	Kewaunee Assessment Process
LER	Licensee Event Report
NCV	Non-cited Violation
NPSH	Net Positive Section Head
NRC	Nuclear Regulatory Commission
PDR	Public Document Room
SP	Surveillance Procedure
SW	Service Water
TS	Technical Specification
URI	Unresolved Item
USAR	Updated Safety Analysis Report