U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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License No:	DPR-43
Report No:	50-305/98013(DRP)
Licensee:	Wisconsin Public Service Corporation
Facility:	Kewaunee Nuclear Power Plant
Location:	700 North Adams Post Office Box 19002 Green Bay, WI 64307-9002
Dates:	August 18 through September 28, 1998
Inspectors:	J. Lara, Senior Resident Inspector P. Simpson, Resident Inspector
Approved By:	Roger D. Lanksbury, Chief Reactor Projects Branch 5

EXECUTIVE SUMMARY

Kewaunee Nuclear Power Plant
NRC Inspection Report 50-305/98013(DRP)

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

Operations

- The licensee identified that both trains of the control room post-accident recirculation system were temporarily inoperable which placed the plant in a condition outside the plant's design basis. However, the notification to the NRC as required by 10 CFR 50.72 was not made within the 1-hour requirement due to a failure to recognize the reportability of the issue until 12 hours later. This was considered of minor safety significance and a non-cited violation was identified. (Section O1.2)

- The licensee adequately completed inspections of new fuel assemblies received at the facility. Two isolated weaknesses were identified involving an out-of-date quality control procedure being referenced in the controlling fuel receipt procedure, and an instance where inspectors observed a lack of attention to procedural details during fuel container cover movements. (Section O1.3)

- Weaknesses were identified concerning the planning and evaluation of the operational impact of a maintenance activity on a safety-related valve, which contributed to the licensee's failure to declare the 'A' train of the residual heat removal system inoperable for an 8 hour period. The licensee did not consider probabilistic risk insights during the planning of the maintenance activity, and failed to evaluate required compensatory actions to support system operability, including the availability of personnel. (Section O2.2)

- With one exception, the licensee adequately identified and revised operations procedures due to a design change. The inspectors identified one case where an alarm response sheet should have been revised to reflect the change in operation of system components. This was considered to be of minor safety significance. (Section O3.1)

Maintenance

- One example of a less than adequate quality control inspection was observed during the performance of corrective maintenance. A quality control inspector was observed to be standing away from the general work area where work involving the installation of cable splices could not be observed. (Section M7.1)

Engineering

- Good engineering support to plant operations and maintenance organizations was observed during the course of plant work activities. These included a design change and safety evaluation regarding operation of the reactor coolant drain tank pumps and engineering involvement during the installation of cable splices. The engineering safety evaluations and support to other departments were technically sound. (Section E1.1)

Plant Support

- During the receipt inspection process for new fuel, radiation protection personnel were observed to be attentive to the ongoing fuel receipt inspections and adequately performed contamination surveys of the transporting vehicle and casks. (Section R4.1)

Report Details

Summary of Plant Status

The unit operated at power levels up to approximately 97 percent power during the 6-week inspection report period.

I. Operations

O1 Conduct of Operations (71707)

O1.1 General Comments

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. These reviews included observations of control room evolutions, shift turnovers, and logkeeping, as well as evaluation of operability decisions. Updated Safety Analysis Report (USAR) Section 12, Conduct of Operations, and the facility's Technical Specifications (TS) were reviewed as part of the inspections.

The inspectors observed various shift turnovers and noted discussions regarding the status of plant equipment, planned testing, and maintenance. Operators exhibited good working knowledge of plant equipment and instruments. Specific events and noteworthy observations are also detailed in the sections below.

O1.2 Plant Operation With Both Trains of Control Room Post-Accident Recirculation (CRPAR) System Temporarily Inoperable

a. Scope

The inspectors performed reviews of the licensee's identification of a reportable condition pursuant to 10 CFR 50.72. The inspectors reviewed applicable licensee documentation including TS, and discussed the event with operations personnel.

b. Observations and Findings

On September 23, 1998, at 10:15 a.m., the licensee notified the NRC that both trains of the CRPAR system were temporarily inoperable for approximately 2 minutes, between 10:26 p.m. and 10:28 p.m. on the previous day. The event occurred when the 'B' train of the control room ventilation system tripped, with the corresponding 'A' train being out-of-service for maintenance. As a result, both trains of the control room ventilation system were inoperable, and since the respective CRPAR systems were dependent on the control room ventilation systems for operability, both CRPAR systems were also rendered inoperable. The 'B' train of the control room ventilation system was subsequently restarted after approximately 2 minutes, which resulted in the associated CRPAR system being restored to an operable status. However, at that time the

licensee staff failed to recognize that the control room ventilation system transient placed the plant in a condition outside of the plant design basis for approximately 2 minutes.

At least one train of the CRPAR system was required to be operable as specified in TS 3.12. With both trains of the CRPAR inoperable, the TS required a plant shutdown within 12 hours. Since both trains were inoperable for only 2 minutes, a plant shutdown did not commence. The licensee reported the event as being in a condition outside the facility's design basis pursuant to 10 CFR 50.72(b)(1)(ii)(B). However, the licensee also identified that the notification should have been made within 1 hour of the event occurrence on September 22. The requirements in 10 CFR 50.72(b)(1)(ii)(B) state that the licensee shall notify the NRC as soon as practical and in all cases within 1 hour of the occurrence of being in a condition that is outside the design basis of the plant. The licensee's failure to make a 1 hour notification to the NRC regarding the inoperable CRPAR systems was a violation of 10 CFR 50.72. This licensee identified violation is not being cited because the criteria specified in Section VII.B of the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, were satisfied (NCV 305/98013-01). The licensee planned to submit a licensee event report within 30 days of the date of occurrence.

c. Conclusions

The licensee identified that both trains of the CRPAR system were temporarily inoperable which placed the plant in a condition outside the plant's design basis for approximately 2 minutes. The notification to the NRC as required by 10 CFR 50.72 was not made within the 1-hour requirement due to a failure to recognize the reportability of the issue. The NRC was subsequently notified approximately 12 hours later. Based on the specific circumstances, this was considered of minor safety significance and a non-cited violation was identified.

O1.3 New Fuel Receipt (60705)

a. Inspection Scope

The inspectors performed a review of licensee activities related to the receipt, inspection, and storage of new fuel. The inspectors reviewed applicable licensee documentation including TS, USAR, and Reactor Engineering (RE) Procedure RE-22, "Receipt and Inspection of New Fuel", Revision J. In addition, the inspectors interviewed maintenance, engineering, and quality control department personnel.

b. Observations and Findings

The licensee's controls for the receipt and inspection of new fuel were prescribed in Procedure RE-22. The procedure was determined to have adequate requirements and controls regarding the receipt, inspection, and storage of new fuel. Attributes included general cautions regarding fuel container movements, material accountability, cleanliness, foreign material exclusion, fuel handling, and storage.

The inspectors identified two concerns during the observations of the new fuel receipt and storage activities. The first concern involved Procedure RE-22 which included a quality control (QC) hold point at the beginning of the shipping container inspection process. This QC hold point was to be performed in accordance with QC procedure QCP 613, "Receipt Inspection of Special Nuclear Materials". However, the inspectors identified that QCP 613 had been deleted in July 1996. Current QC inspections were being performed using Quality Procedure 6.3.1, "Receipt Inspection and Documentation Review", Revision A. This procedure was a generic receipt inspection procedure which referenced specific task-orientated guidelines for the receipt inspection of nuclear material. This procedure was considered acceptable. Although the guidelines were being followed by the QC inspectors, Procedure RE-22 should have specified the correct QC procedure. This issue was discussed with QC personnel for resolution. The licensee initiated Kewaunee Assessment Process (KAP) 2070 to document the problem and track corrective actions. The licensee's failure to update Procedure RE-22 constitutes a violation of minor significance and is not subject to formal enforcement action.

The second concern identified by the inspectors pertained to an observed example of lack of attention to detail to procedural requirements during the movement of fuel cask covers. Step 2.1.6 of Procedure RE-22 stated that fuel container covers were not to be moved over uncovered new fuel. The inspectors observed one instance where a cover was partially moved across the uncovered new fuel pit. However, fortuitously the cover did not pass over the fuel assemblies stored in the fuel pit. This occurrence indicated the need for increased attention to procedural requirement details. This observation was discussed with the responsible personnel involved in the fuel inspection activity. No other similar instances were observed.

A sample of the fuel assemblies were verified to be properly stored in the spent fuel pool and new fuel pit as required by procedural requirements. Technical Specification Section 5.4, Fuel Storage, required that new fuel storage racks shall be maintained with fuel assemblies having a maximum enrichment of 49.2 grams/cm of U_{235}. As a result, several fuel assemblies with enrichment greater than the TS limit were stored in the spent fuel pool. Good material condition of the new fuel pit, spent fuel pool, and general areas was noted.

On September 22, the licensee performed inspections of additional fuel assemblies received at the site. Inspection of the shipping casks revealed that accelerometers for one of the casks had been tripped during transport to the site. The two affected fuel assemblies were inspected and no observable damage was noted. Following discussions with the fuel manufacturer, the two fuel assemblies were to be returned to the manufacturer. The inspectors reviewed the licensee's evaluation of the receipt inspection and administrative requirements provided in Procedure RE-22 and did not identify any deficiencies.

c. Conclusions

The licensee adequately completed inspections of new fuel assemblies received at the facility. Two isolated weaknesses were identified involving an out-of-date quality control procedure being referenced in the controlling fuel receipt procedure, and an instance

where inspectors observed a lack of attention to procedural details during fuel container cover movements.

O2 Operational Status of Facilities and Equipment

O2.1 Plant Equipment and System Walkdowns

In addition to routine plant inspections, the inspectors used Inspection Procedure (IP) 71707 to walk down selected portions of the dedicated shutdown panel and safe shutdown equipment using Operations Procedure N-MI-87-CLA, Dedicated Shutdown System Periodic Checklist, Revision G. In addition the inspectors conducted inspections of the safety-related 125 volt batteries, and the service water systems. No operability concerns were identified.

O2.2 Residual Heat Removal (RHR) System Not Declared Inoperable During Maintenance

a. Scope

The inspectors performed reviews of the licensee's determination to not declare an RHR train inoperable during preventive maintenance activities. The inspectors reviewed applicable licensee documentation including TS, USAR, and related emergency operating procedures. In addition, the inspectors interviewed operations department personnel and the licensee's probabilistic risk assessment (PRA) analyst .

b. Observations and Findings

On August 26, the licensee was performing planned maintenance activities on the RHR 'A' pump suction supply valve from the Refueling Water Storage Tank (RWST), valve (SI-300A). The work scope included opening the valve's normally closed circuit breaker, removing the valve actuator cover, and performing inspection and cleaning of the actuator and circuit breaker internals. The inspectors noted that during these maintenance activities, the licensee had not declared the affected RHR train inoperable. When questioned why the RHR system was considered operable with electrical power removed to valve SI-300A, control room shift management and other licensee personnel stated that the valve remained in the open position to support safety injection mode of operation and, if needed, the valve could be restored to full operational status in a short time. This basis had not been documented prior to commencing the maintenance activity.

Operability requirements for the RHR system were defined in TS 3.3 as:

"An OPERABLE flow path consisting of all valves, piping and interlocks ... required to function during accident conditions. This flow path shall be capable of taking suction from the RWST upon a SI signal and after manual transfer taking suction from the containment sump".

As reflected in USAR Section 6.2.2, the above TS requirement of "manual transfer" means the RHR suction flow path is transferred by control room operator repositioning of several valves, including valve SI-300A, from the control room. The Kewaunee design for transferring to long-term recirculation is not an automatic transfer on low RWST level but rather a manual transfer (requires operator action from the control room). The inspectors determined that the RHR train 'A' should have been declared inoperable while maintenance activities were being performed on valve SI-300A because the valve could not be operated from the control room and the licensee had not established compensatory measures to ensure this function could be performed locally. As specified in TS 3.3.b.2, a 72 hour limiting condition for operation should have been entered. However, since the valve was out-of-service for approximately eight hours and the RHR 'B' train remained operable, the licensee did not violate any limiting condition for operations.

The inspectors reviewed the circumstances related to the planning and performance of the maintenance activity on valve SI-300A. The inspectors noted the following concerns:

- The licensee failed to consider that during a postulated accident condition, valve SI-300A would need to be closed after the initial safety injection mode of operation, and that this action would normally be performed remotely from the control room. Due to the ongoing maintenance activity, the valve could not be closed from the control room because electrical power was isolated and valve actuator components were in various stages of inspection.

- Probabilistic risk assessment (PRA) insights were not considered when the licensee decided to remove power to the valve operator and rely upon local operator actions to close the valve. In addition, the licensee did not evaluate the probabilistic risk impact of taking the entire RHR train out of service in comparison to the risk impact of just taking the valve out-of-service and relying upon manual compensatory actions to operate the valve.

- The licensee did not evaluate the time that it would take for operators to notify maintenance personnel to restore the valve to operable status or the availability of operations personnel to locally operate the valve if required to do so by emergency procedures.

- The licensee did not consider that the area where valve SI-300A was located would likely become a high radiation area if an accident occurred, potentially impacting the ability of operators to locally manipulate the valve.

Based upon the above concerns, the inspectors determined that the licensee did not thoroughly evaluate the potential probabilistic risk and post-accident operational impact of the maintenance activity on valve SI-330A.

Subsequent evaluations by the licensee's PRA analysts indicated that with power removed from motor operated valve SI-300A, the resultant local action required to close the valve during accident conditions resulted in a 140% increase in the failure probability using Kewaunee human reliability methods. The human error probability to transfer to

containment sump recirculation increased by 15 to 22 percent. Using the Kewaunee PRA Model, core damage frequency increased by 1 percent from 3.61×10^{-5}/year to 3.65×10^{-5}/year. However this increase was small compared to the 188% increase due to removing the entire RHR 'A' train from service. These results were independently reviewed by an NRC PRA analyst with comparable results. As such, this issue was of minor significance. However, the inspectors considered that it would have been prudent and conservative for the licensee to perform this PRA analysis and other evaluations prior to commencing the maintenance activities.

c. Conclusions

Weaknesses were identified concerning the planning and evaluation of the operational impact of a maintenance activity on a safety-related valve, which contributed to the licensee's failure to declare the 'A' train of RHR inoperable for an 8 hour period. The licensee did not consider PRA insights during the planning of the maintenance activity, and failed to evaluate required compensatory actions to support system operability, including the availability of personnel.

O3 Operations Procedures and Documentation

O3.1 Procedure Changes Due to Plant Modifications

a. Scope

The inspectors performed a review of operations procedures and system logic diagrams to verify appropriate review and incorporation of required changes following the completion of a plant design change.

b. Observations and Findings

Design Change 2845 changed the normal operating position of valves RC-507, RC-508, and MU-1010-1, from normally open to normally closed. Valves RC-507 and RC-508 are the discharge valves for the reactor coolant drain pumps. The change was initiated to extend the operating life of the environmentally qualified pilot solenoid valves. The solenoids would be changed from normally energized to normally de-energized. As a result, before the reactor coolant drain pumps were started, the RC-507 and RC-508 valves needed to be remotely opened (i.e., the pump will not start with the discharge valves closed).

The inspectors reviewed the safety evaluation for the design change and did not identify any deficiencies. The design change documented the reviews performed to ensure that operations procedures were reviewed and revised as necessary. Fourteen procedures and two alarm response sheets were revised to reflect the different operation of the subject valves. The inspectors performed a sample review of these procedures and verified that they had been appropriately revised. However, the inspectors identified that alarm response sheet for Annunciator 47043-B, Pressurizer Relief Tank (PRT) Abnormal, had not been identified as needing revision. The alarm response sheet provided comments regarding the operation of a PRT drain tank isolation valve. It

stated that when the drain valve was opened, a reactor coolant drain pump would start. However, this statement was no longer accurate or complete in that the reactor coolant drain pump would no longer start since the RC-507 and RC-508 valves were now normally closed. Remote operator action was required to first open the RC-507 and RC-508 valves to allow the pumps to start when the PRT drain valve was opened. This discrepancy was discussed with operations personnel.

The inspectors determined that the comment in the alarm response sheet provided supplemental information to control room operators and did not provide direction for the performance of actions. On September 8, the licensee processed a change to the alarm response sheet to correct the discrepancy. The licensee's failure to revise the alarm response sheets following the implementation of a design change constitutes a violation of minor significance and is not subject to formal enforcement action.

c. Conclusions

With one exception, the licensee adequately identified and revised operations procedures due to a design change. The inspectors identified one case where an alarm response sheet should have been revised to reflect the change in operation of system components. This was considered to be of minor significance.

II. Maintenance

M1 Conduct of Maintenance (61726, 62707)

M1.1 General Comments

a. Inspection Scope (61726 and 62707)

The inspectors observed and reviewed all or portions of selected surveillance test activities and work requests (WR). Included in the inspection was a review of the surveillance test procedure (SP) and the appropriate USAR sections.

b. Observations and Findings

The inspectors determined that, in general, the work associated with these activities was conducted in a professional and thorough manner. Technicians were knowledgeable of their assigned tasks and work document requirements. Specific tests and WRs observed are listed below along with inspectors' comments where applicable.

- WR 33040, Replace Solenoid Valve and Instrument Air Tubing
- WR 214578, Install Raychem Splices
- WR 214574, Repair Spent Fuel Pump Seal Leak

- Preventive Maintenance Procedure 33-03, Safety Injection System QA-1 Motor Operated Valve Maintenance Outside Containment, Revision O
- SP N-ICS-23, Filling and/or Recirculation of Caustic Additive Standpipe, Revision J
- SP 05B-105, Turbine Driven AFW [auxiliary feedwater] Pump and Valve Test - IST [In Service Test], Revision AY
- SP 42-312A, Diesel Generator A Availability Test, Revision H
- SP 23-100, Containment Spray Pump and Valve Test - IST, Revision AE
- SP 47-062A, Reactor Protection Logic Train A Test, Revision J
- SP 55-155A, Engineered Safeguards Train A Logic Channel Test, Revision I

c. Conclusions on Conduct of Maintenance

In general, surveillance testing activities were conducted in an acceptable manner. However, some weakness were identified during the performance of select maintenance activities. These are discussed in Sections O1.3, O2.2, and M3.1 of this inspection report.

M3 Maintenance Procedures and Documentation

M3.1 Use of Unapproved Preliminary Maintenance Procedure

The inspectors observed portions of corrective maintenance activities involving a leak on a spent fuel pool pump. During the performance of WR 214574, Repair Spent Fuel Pump Seal Leak, the inspectors observed the use of corrective maintenance Procedure 21-03, Spent Fuel Pool Pump Overhaul, which was stamped as "PRELIMINARY." Discussions with maintenance personnel indicated that this procedure was not approved for use but it could be taken to the work area to validate its content prior to issuance provided other approved documents, such as vendor manual instructions or WRs, were being used to perform the work. The inspectors had noted that the WR referenced the pump vendor manual for performing the pump seal work and both were available at the work location. The un-approved procedure had been in development status since March 1997. Review of administrative procedures for the use of maintenance procedures did not prohibit the use of preliminary procedures for validation during development. The licensee initiated KAP 2043 to document this issue and track corrective actions.

Additionally, the inspectors had noted that the WR stated that a post-maintenance test was not required upon completion of the pump seal replacement. This was also discussed with maintenance personnel who stated that a post-maintenance test should have been included in the WR to ensure proper pump performance prior to returning the pump to service. Subsequent to the inspectors' questions, the WR was revised to

specify appropriate testing requirements. The licensee initiated KAP 2000 to document this issue and track corrective actions.

The inspectors performed additional reviews of the licensee's USAR and Quality Assurance Program and noted that the spent fuel pool pumps were classified as nonsafety-related. Therefore, no enforcement action was considered. The inspectors discussed with the licensee personnel the potential safety concern of performing work without approved procedures followed by failing to perform post-maintenance testing.

M7 Quality Assurance in Maintenance Activities

M7.1 QC Inspection of Raychem Splice Installation

The inspectors observed QC activities during the performance of various work activities. As documented in previous inspection reports, QC inspections in general were performed appropriately. During this inspection period, the inspectors observed that QC oversight of work activities associated with WR 214578," Install Raychem Splices" was less than adequate. The QC inspector was observed to be standing away from the general work area while the Raychem splices were being installed. The work could not be observed from where the QC inspector was standing. The NRC inspectors observed this practice during the installation of two Raychem splices. This observation became of additional concern when the inspectors noted that the shrinking of the Raychem material did not completely follow the manufacturer instructions. Specifically, the workers failed to follow the proper method for heating and shrinking the Raychem material to ensure uniform shrinkage. This was discussed with the responsible engineer at the work location who had likewise identified this deviation from the manufacturer's instructions and had informed the workers of the same concern. The workers immediately corrected their application methods to conform with the manufacturer's instructions and all subsequent observed splices were correctly applied.

The licensee initiated KAP 2010 to document that the installation practices were not completely in conformance with the manufacturer's instructions and that the workers and the QC inspector were unfamiliar with the specific installation requirement of concern. The NRC observations regarding QC practices were discussed with Quality Programs management for review and evaluation. The inspector was informed that QC expectations and responsibilities would be reviewed as part of the corrective actions for KAP 2010. No other discrepancies were identified.

III. Engineering

E1 Conduct of Engineering (37551)

E1.1 General Comments

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. These

included the design change and safety evaluation regarding operation of reactor coolant drain tank pumps and engineering involvement during the installation of Raychem splices. The engineering safety evaluations and technical support to other departments were technically sound. No deficiencies were identified.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls (RP&C) (71750)

NRC Inspection Procedure 71750 was used in the performance of inspections in the plant support area. Access to most areas of the facility continued to be unrestricted from a radiological safety standpoint. No radiological safety concerns were identified during numerous plant walkdowns and reviews.

R4 Staff Knowledge and Performance in RP&C

R4.1 New Fuel Receipt Activities

During the receipt inspection process for new fuel, the inspectors observed the role of radiation protection (RP) technicians in providing RP controls. Procedure HP 5.12, "Receipt of New Fuel Assemblies", Revision C, was used during this process. The RP technicians were observed to be attentive to the ongoing fuel receipt inspections and adequately performed swipes and contamination surveys of the transporting vehicle and casks. Swipes were also performed on the fuel assemblies as required by procedure HP 5.12. The RP activities in support of the new fuel shipments were performed appropriately in accordance with procedural requirements. No concerns were identified during these reviews.

V. Management Meetings

X1 Exit Meeting Summary

On September 28, 1998, 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.

PARTIAL LIST OF PERSONS CONTACTED

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INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 60705:	Preparation for Refueling
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-305/98013-01	NCV	Failure to Report Condition Outside Design Basis Within One Hour

Closed

50-305/98013-01	NCV	Failure to Report Condition Outside Design Basis Within One Hour

Discussed

None

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
CRPAR	Control Room Post-Accident Recirculation
DRP	Division of Reactor Projects, Region III
ICS	Internal Containment Spray
IP	Inspection Procedure
KAP	Kewaunee Assessment Process
LER	Licensee Event Report
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
PDR	Public Document Room
PRA	Probable Risk Assessment
PRT	Pressurizer Relief Tank
QC	Quality Control
RHR	Residual Heat Removal
RWST	Reactor Water Storage Tank
SI	Safety Injection
SP	Surveillance Procedure
TS	Technical Specification
USAR	Updated Safety Analysis Report
WR	Work Request