ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket No: 50-285
License No: DPR-40

Report No: 50-285/96-16

Licensee: Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
P.O. Box 399, Hwy. 75 - North of Fort Calhoun
Fort Calhoun, Nebraska

Facility: Fort Calhoun Station

Location: Blair, Nebraska

Dates: November 17 through December 28, 1996

Inspectors: W. Walker, Senior Resident Inspector
V. Gaddy, Resident Inspector
G. Good, Senior Emergency Preparedness Analyst
R. Mullikin, Acting Senior Resident Inspector

Approved: W. D. Johnson, Chief, Project Branch B

ATTACHMENTS:

Attachment 1:	Supplemental Information
Attachment 2:	Questions Related to 10 CFR Part 50, Appendix R
Attachment 3:	10 CFR Part 50, Appendix R, Section III.0, White Paper Review
Attachment 4:	FCS FP Configuration Report

EXECUTIVE SUMMARY

Fort Calhoun Station
NRC Inspection Report 50-285/96-16

This routine announced inspection included aspects of licensee operations, engineering, maintenance and plant support. The report covers a 6-week period of resident inspection.

Operations

- An unresolved item was identified regarding oil leakage in and around Reactor Coolant Pump RC-3D. The inspectors also identified three questions concerning the adequacy of the reactor coolant pump lubrication oil collection system and its compliance with the requirements of Section III.0, Appendix R, 10 CFR 50 (Section 02.1).

- The inspectors determined appropriate controls were followed during performance of a concurrent verification and that the licensee tagged out the proper components to remove a containment cooling fan from service (Section 02.1 and 02.4).

- An inspection followup item was identified regarding the actions of the corrective action review group and the corrective action program procedure requirements for reportability determinations (Section 06.1).

- The inspectors noted that several Technical Specification interpretations made reference to the NRC which may give the appearance of NRC endorsement. The inspectors requested that the licensee remove any reference to NRC involvement from the Technical Specification interpretations (Section 08.1).

Maintenance

- Maintenance activities observed were generally completed thoroughly and professionally. However, maintenance, engineering, and operations personnel exhibited a lack of a questioning attitude following a postmaintenance test on Auxiliary Feedwater Pump FW-6. The oil level in the external oil bulb reservoir was observed to be empty and no oil was immediately added (Sections M1.1 and M1.2).

Engineering

- The inspectors reviewed the temporary modifications to the component cooling water system and verified, where possible, that actions required by the temporary modifications were implemented (Section E1.1)

Plant Support

- Several maintenance workers were unfamiliar with the guidance for securing vacuum cleaners that contain internal contamination (Section R1.1).

- The inspectors determined that the onshift dose assessment capability was not clearly described in the emergency plan and implementing procedures (Section P3.1).

Report Details

Summary of Plant Status

At the beginning of the inspection period the Fort Calhoun Station was near the end of its 16th refueling outage. On November 25 the reactor was made critical to start low power physics testing. The outage ended on November 27 with the closing of the output breakers. The plant reached 100 percent power on December 17 where it remained throughout the duration of the inspection.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors frequently observed ongoing plant operations. In general, the conduct of operations was professional and safety-conscious. The inspectors noted effective implementation of management performance expectations during most observations. Specific events and noteworthy observations are detailed in the sections below.

O2 Operational Status of Facilities and Equipment

O2.1 Containment Walkdown

a. Inspection Scope (71707)

On November 11, 1996, the inspectors performed a general walkdown of containment. Specific observations were made of the four reactor coolant pump oil collection system. . Additionally, the inspectors observed a concurrent verification performed by quality control personnel on a pressurizer valve manipulation.

b. Observations and Findings

During the general containment walkdown, the inspectors observed what appeared to be a 2 foot by 2 foot piece of wool insulation secured to a cable tray at the 1025 foot elevation of containment. The inspectors discussed this with design engineering and were informed that this insulation had been evaluated as part of a review conducted concerning NUREG-0897, Revision 1, "Containment Emergency Sump Performance" and no concerns were identified.

Also, during the walkdown, the inspectors expressed concern regarding oil leakage in and around Reactor Coolant Pump RC-3D. The inspectors observed an oil film over most of the reactor coolant pump motor and in the area surrounding the reactor coolant pump motor. In addition, approximately 1 quart of oil was pooled on the floor. The leakage was identified as coming from the upper oil reservoir which has a capacity of approximately 120 gallons. The inspectors discussed the leakage mechanism with the system engineer and were informed that during the first several days of operation, the oil level was observed to drop rapidly from 78 percent to approximately 76 percent where it

appeared to stabilize and then decrease more slowly. The licensee has determined that the oil level can drop to 73 percent in the upper oil reservoir before oil must be added to protect the upper guide bearing. The licensee has issued instructions to add only 3 or 4 gallons of oil at a time to bring the level up to 76 percent when the low level (73 percent) is reached. The system engineer stated that this would help reduce the rate of oil leakage and the fire loading inside containment caused by the leakage.

The inspectors questioned the licensee regarding the increased potential for a fire inside containment due to the lube oil lost from Pump RC-3D. The licensee responded that the additional combustible material inside containment was within the bounds of the containment analysis which took into account an additional combustible loading of 395 gallons of oil. In addition, maintenance personnel observed during the outage that the oil lost during the last cycle had not soaked into the insulation around the pump casing or piping, which could expose it to high temperatures in excess of the oil's flash point of 400°F.

On December 20, a conference call was held between NRC staff and the licensee and, based on that call, additional information concerning reactor coolant pump oil leakage and compliance with 10 CFR Part 50, Appendix R, requirements was requested by the NRC staff. Attached to this report is a summary of the issues leading up to and discussed during this conference call. In addition, two OPPD documents which bear upon this issue are enclosed. Three questions concerning how OPPD complies with the requirements of Section III.0, Appendix R to 10 CFR Part 50 are included in Attachment 2. It is requested that OPPD provide the NRC with a response to these concerns.

Additionally, during the walkdown the inspectors observed a concurrent verification being performed during isolation of Pressurizer Pressure Transmitter PT-103x. The inspectors reviewed Standing Order SO-O-37, "Independent Verification of Critical Systems Component Positioning," Revision 13, and determined that appropriate controls were used during the isolation of the pressure transmitter.

c. Conclusion

The inspectors concluded that the licensee's increased monitoring and operating contingencies based on continual trending of Pump RC-3D oil levels would provide information concerning amounts of oil collected inside containment. Pending NRC staff review of additional information to be provided by the licensee, compliance with Section III.0 of 10 CFR Part 50, Appendix R, will be tracked as an unresolved item (50-285/96016-01).

02.4 Verification of Danger Tagouts

a. Inspection Scope (71707)

The inspectors verified that the danger tagouts established to perform maintenance on Containment Cooling Fan VA-7C were constructed to ensure the equipment was properly isolated.

b. Observations and Findings

The inspectors reviewed the tagouts that had been established to remove the cooling fan from service. The inspectors verified that the tagout had been properly prepared and authorized. The inspectors also verified that the tagged components were in their required positions with the appropriate tags in place. The licensee also had met all the Technical Specification requirements for the inoperable cooling fan.

c. Conclusions

The inspectors concluded that the licensee had adequately prepared and tagged out the proper components to remove the containment cooling fan from service.

O6 Operations Organization and Administration

06.1 Untimely Reportability Determinations

a. Inspection Scope (71707)

The inspectors reviewed a list of condition reports with open reportability determinations.

b. Observations and Findings

On November 27, 1996, the inspectors reviewed a list of open condition reports with outstanding reportability determinations and questioned why the determinations had not been made. Condition Report 199601355, dated October 21, 1996, requested a reportability determination on containment isolation actuation override switches that did not spring return to normal as designed. Condition Report 199601392, dated November 5, 1996, requested a reportability determination on the incorrect bolts installed on Heated Junction Thermocouple YE-116A/B. Condition Report 199601444, dated November 13, 1996, questioned the seismic qualification of Class 1E 4160 VAC breakers while in the racked down position.

The inspectors learned that Condition Reports 199601355 and 199601444 were completed on November 5 and November 22, 1996, respectively, and were determined not to be reportable. Engineering completed these reportability

determinations but did not inform the corrective action group of the results. The inspectors also learned that the reportability determination for Condition Report 199601392 was still open.

The inspectors reviewed Revision 6 of Procedure PED-QP-19, "Evaluation of Potentially Reportability Conditions," and noted that the reportability determination should be made in a timely, prompt manner. The licensee indicated that the reportability determination for Condition Report 199601392 was not promptly completed due to an oversight. This condition report was determined not to be reportable on December 23, 1996.

After additional questions by the inspectors, the licensee initiated an investigation and identified additional deficiencies in their reportability process. The licensee identified that Procedure PED-QP-19 did not require that the plant review committee review reportability determinations. The licensee also determined that Standing Order SO-R-2, "Corrective Action Program," contained unclear guidance. The guidance stated that, in cases where reportability was unclear, the determination shall be presented to the plant review committee for a final determination. The condition review group interpreted this step as a requirement for all reportability determinations to be presented to the plant review committee for final review. Historically, both reportable and nonreportable determinations were presented to the plant review committee for a final reportability decision. The licensee determined that 18 reportability determinations had not been presented to the plant review committee for a final reportability determination. Of the 18 identified by the licensee, all were subsequently determined to be nonreportable.

Standing Order SO-R-2 also required that in accordance with a commitment for Licensee Event Report 93-05, a copy of open reportability issues would be routed to the plant review committee weekly. The licensee determined that this was not being performed. In response, the licensee indicated that the basis for this commitment would be reviewed to determine if it still needed to be performed.

An inspection followup item was opened pending additional NRC review of the corrective action review group and the corrective action program requirements for reportability determinations (50-285/96016-02).

c. Conclusions

The inspectors concluded that the licensee was not prompt in performing a reportability determination for the incorrect bolts installed on a heated junction thermocouple. Following discussions with the inspectors, the licensee identified that all reportability determinations were not being provided to the plant review committee for a final determination. Also, a commitment to provide open reportability issues to the plant review committee was not being performed. Additional NRC review during the next inspection period will be performed.

O8 Miscellaneous Operations Issues

08.1 Review of Technical Specification Interpretations

Recent observations of licensee Technical Specification interpretations and some particular practices concerning implementation have highlighted the need for a review of Technical Specification interpretations and clarification regarding the NRC recognition of Technical Specification interpretations. The NRC considers a Technical Specification interpretation as an interpretation developed by the licensee without consent or review by the NRC.

The NRC does not endorse or recognize licensee Technical Specification interpretations since Technical Specification interpretations are not legal documents and have no legal authority regarding plant operations. Based on the inspectors review, two Technical Specification interpretations were identified which may have the appearance of NRC endorsement.

- Technical Specification Reference 2.7, Technical Specification Interpretation 92-13

- Technical Specification Reference 2.10.1(4), Technical Specification Interpretation 94-13

These Technical Specification interpretations may give the appearance of NRC endorsement which is not an acceptable practice. The inspectors requested that the licensee remove any references to NRC involvement from the Technical Specification interpretations.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Raw Water Strainer Inspection

a. Inspection Scope (62707)

On December 5, the inspectors observed portions of the following maintenance activities performed on Raw Water Strainer AC-12A:

- Inspection of strainer cones for plugging

- Adjustment of strainer to housing clearance

b. Observations and Findings

The inspectors observed that the work packages were present at the job location. Specifically, the inspectors noted that Preventive Maintenance Order 9600701 work package included a description of the as found condition of the strainer cones, the tagout, and the as found strainer to basket housing clearance.

With regard to the strainer, no clogging or damage was observed. The inspectors noted that the technicians rotated the strainer basket one full revolution to observe all strainer cones. The technicians also adjusted the strainer basket to housing clearance as specified in the work instructions.

c. Conclusions

The inspectors found that the work activities were conducted in accordance with procedures. The work packages provided to the technicians were complete and the as found and as left conditions were properly documented.

M1.2 Auxiliary Feedwater Pump Decreased Oil Level

a. Inspection Scope (62707)

The inspectors performed an investigation into the decreased oil level on the motor driven auxiliary feedwater pump following routine preventive maintenance.

b. Observations and Findings

On December 5, 1996, the licensee performed two preventive maintenance activities on Motor Driven Auxiliary Feedwater Pump FW-6. Maintenance personnel changed and analyzed the pump oil and lubricated the pump couplings. The activities were authorized by Preventive Maintenance Orders 9600039 and 9600047, respectively.

Following the completion of these activities, the licensee performed a postmaintenance test. Following the postmaintenance test, which lasted approximately 42 minutes, licensee personnel noticed that the external oil bulb reservoir was empty. However, oil still remained in the reservoir tube. After observing this condition, neither maintenance nor operations personnel present added oil to bring the level to within its normal operating band. There also appeared to be some confusion between operations and maintenance as to which group was responsible for adding oil to the pump. After performing an inspection of the pump to verify no external oil leaks, the pump was declared operable and operations initiated a maintenance work request to add oil to the pump.

The following day, while reviewing the maintenance work request, the plant manager requested that an investigation be performed to determine why the oil level had decreased during the postmaintenance test. During the investigation, the licensee

determined that the decrease in oil level was caused by an air bubble that had shifted from inside the pump to the external oil bulb during the test. The licensee subsequently added oil to the pump and satisfactorily performed the postmaintenance test.

The inspectors discussed this incident with the licensee. The licensee indicated that the preventive maintenance order used to perform the postmaintenance test would be changed to require that oil be added, as needed, following the postmaintenance test.

c. Conclusions

The inspectors concluded that maintenance, engineering, and operations personnel demonstrated a poor questioning attitude and accepted the oil level being below the normal operating level. The licensee did not immediately initiate a condition report to document the reduced oil level. The plant manager exhibited leadership in directing that the cause of the decrease in oil level be determined.

M1.3 Surveillance Activities

a. Inspection Scope (61726)

The inspectors observed portions of the following surveillance activity:

- OI-ST-10, Attachment 14, "Turbine Tests, Control Valves"

b. Observations and Findings

The inspectors noted that the surveillance was performed in accordance with procedures. The inspectors noted that the system engineer for the turbine was actively involved in monitoring the performance of the test.

c. Conclusions

The surveillance activity observed by the inspectors was completed in a controlled manner and in accordance with procedures.

M8 Miscellaneous Maintenance Issues (92700)

M1.1 (Closed) LER 50-285/96-002: manual reactor trip due to lowering condenser vacuum. On March 29, 1996, the plant was manually tripped due to a condenser tube leak. The damaged condenser tube had been discovered during a previous maintenance outage on March 15-25, 1996. However, the tube was not repaired at that time. The licensee determined that the personnel involved in the discovery did not fully investigate the tube leak. The maintenance procedure used did not provide adequate instructions for documenting tube leaks. In addition, the

postmaintenance testing directed by the procedure did not require an adequate postmaintenance test and provide direction on the actions to take if a tube is found to be leaking. The inspectors reviewed the licensee's actions and found them to be appropriate.

III. Engineering

E1 Conduct of Engineering

E1.1 Containment Air Cooler Operability

a. Inspection Scope (37551)

On November 11, 1996, during the refueling outage, a determination was made that the containment air coolers potentially would not function as required during a loss of coolant accident or main steam line break event coincident with loss of offsite power. The potential existed for an internal steam bubble to form in the containment coolers and upon restart of the component cooling water pumps the steam bubble would collapse and generate a water hammer inside the component cooling water piping.

b. Observations and Findings

Based on the licensee's analysis of the above event, a determination was made that component cooling water piping could potentially exceed the design limits for the piping and supports. The licensee was alerted to the potential for this event in Generic Letter 96-06, "Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions," issued September 30, 1996.

The licensee reviewed the current component cooling water configuration and determined several modifications were necessary prior to restart of the facility. These modifications were necessary to prevent the potential for flashing of water to steam in the containment coolers.

The licensee determined that the potential for flashing in the coolers was bounded by the loss of coolant accident event, and that if the component cooling water surge tank pressure was maintained above 32 psig no flashing of water would occur. As a result of maintaining a higher surge tank pressure, the setpoints of the component cooling water surge tank relief valves were increased. The component cooling water surge tank high pressure alarm in the control room was changed to a tank low pressure alarm and a local surge tank pressure gauge was added to provide a redundant indication of tank pressure. In addition, ten thermal relief valves which were identified as being susceptible to lifting at the increased surge tank pressure were gagged.

The inspectors discussed the Safety Analysis for Operability 96-02-00 with the licensee. In addition, a partial walkdown of the component cooling water system was performed to verify that actions required by Temporary Modification 96-042 were implemented. No discrepancies were noted during the walkdown. The safety analysis for operability remains in effect until a permanent resolution is implemented prior to startup from the 1998 refueling outage. In addition, the licensee is required to provide a response to Generic Letter 96-06 by January 1997.

c. Conclusions

The inspectors performed a preliminary review of the safety analysis for operability and the changes implemented by the temporary modification. The safety analysis for operability and the related temporary modification appeared to constitute an appropriate temporary resolution.

E2 Engineering Support of Facilities and Equipment

E2.1 Review of Updated Safety Analysis Report Commitments

A recent discovery of a licensee operating their facility in a manner contrary to the Updated Safety Analysis Report description highlights the need for a special focused review that compares plant practices, procedures, and/or parameters to the Updated Safety Analysis Report descriptions. While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the Updated Safety Analysis Report that related to the areas inspected. The inspectors verified that the Updated Safety Analysis Report wording was consistent with the observed plant practices, procedures and/or parameters.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) Violation 50-285/95024-02: inadequate design control measures resulted in an inadequate amount of trisodium phosphate (TSP) installed to meet the postaccident containment sump water design basis of a pH greater than 7.0. The licensee performed a root cause analysis and found that several opportunities had existed over time to discover that the amount of TSP was not in accordance with the design basis. The licensee attributed this to a lack of a questioning attitude. However, the licensee performed an operability analysis and found that the amount of TSP installed was sufficient and that the TSP baskets were operable. The licensee's corrective actions included establishing a formal calculation to apply to future TSP issues and adding the required amount of TSP during the recent refueling outage to establish a pH of 7.0. The inspectors concluded that the licensee had performed an excellent root cause analysis of the issue and had taken appropriate corrective actions.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 Tours of Radiologically Controlled Area

a. Inspection Scope (71750)

Throughout the inspection period, the inspectors performed routine tours of the radiologically controlled areas.

b. Observations and Findings

During routine tours of the radiologically controlled areas, the inspectors noted that licensee personnel were following all the radiological requirements. The inspectors questioned certain individuals regarding the contents of the radiation work permit that they were covered by while inside the radiologically controlled area. All personnel were familiar with these requirements. Radiation protection personnel were observed to be performing their jobs in a professional manner.

On November 26, 1996, the inspectors noted that a large vacuum cleaner had been left unattended. The vacuum was labeled with an internal contamination sticker. The inspectors also noted that the end of the vacuum hose was not sealed. The inspectors informed the licensee. The licensee informed the inspectors that the vacuum cleaner was being used by maintenance personnel and that it should be sealed when it was not in use. Radiation protection personnel informed the maintenance personnel of these requirements and the condition was corrected. No other similar incidents were observed during this report period.

c. Conclusions

The inspectors concluded that the licensee personnel were knowledgeable of the requirements of their radiation work permits and the radiation protection personnel effectively performed their functions. The inspectors also concluded that several maintenance workers were unfamiliar with the requirements for securing vacuum cleaners that contain internal contamination.

P3 Emergency Preparedness Procedures and Documentation

P3.1 Licensee Onshift Dose Assessment Capabilities (TI 2515/134)

a. Inspection Scope

Using Temporary Instruction 2515/134, the inspectors gathered information regarding:

- Dose assessment commitment in emergency plan
- Onshift dose assessment emergency plan implementing procedure
- Onshift dose assessment training

b. Observations and Findings

On December 17, 1996, the inspectors conducted an in-office review of the emergency plan and implementing procedures to obtain the information requested by the temporary instruction. The inspectors conducted a telephone interview with the licensee on December 18, 1996, to verify the results of the review. Based on the documentation review and licensee interview, the inspectors determined that the licensee had the capability to perform onshift dose assessments using real-time effluent monitor and meteorological data; however, the commitment was not clearly described in the emergency plan and implementing procedures.

c. Conclusion

Although the onshift dose assessment capability existed, the commitment was not clearly described in the emergency plan and implementing procedures. Further evaluation of the information obtained using the temporary instruction will be conducted by NRC headquarters personnel.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the exit meeting on January 2, 1997. While licensee management acknowledged the findings presented, several clarifying questions were asked regarding Technical Specification Interpretations and the appearance of NRC endorsement.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT 1

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Andrews, Division Manager, Nuclear Services
G. Bishop, Assistant Plant Manager
C. Brunnert, Manager, Quality Assurance and Quality Control
G. Cook, Supervisor, Station Licensing
R. DeMeulmeester Jr, Shift Supervisor
D. Dryden, Licensing Engineer
T. Dukarski, Acting Manager, Chemistry
H. Faulhaber, Manager, Maintenance
S. Gambhir, Division Manager, Production Engineering
R. Jaworski, Manager, Design Engineering, Nuclear
D. Leiber, Supervisor, Security Support Services
R. Phelps, Manager, Station Engineering
R. Short, Manager, Operations
M. Tesar, Manager, Corrective Action Group
J. Tills, Manager, Nuclear Licensing
D. Trausch, Manager, Nuclear Safety Review Group
R. Wylie, Manager, Nuclear Construction

NRC

V. Gaddy, Resident Inspector
W. Walker, Senior Resident Inspector

INSPECTION PROCEDURES USED

TI 2515/134: Licensee Onshift Dose Assessment Capabilities
IP 37551: Onsite Engineering
IP 61726: Surveillance Observations
IP 62703: Maintenance Observations
IP 71707: Plant Operations
IP 71750: Plant Support Activities
IP 92902: Followup - Maintenance
IP 92903: Followup - Engineering

LIST OF DOCUMENTS REVIEWED

Emergency Plan Implementing Procedures

EPIP-OSC-2	Command and Control Position Actions/Notifications	Revision 31
EPIP-EOF-6	Dose Assessment	Revision 26
EPIP-EOF-7	Protective Action Guidelines	Revision 12
EPIP-RR-25	TSC/EOF Dose Assessment Coordinator Actions	Revision 17

Other Documents

Fort Calhoun Radiological Emergency Response Plan, Revision 21R1

ITEMS OPENED AND CLOSED

Opened

50-285/96016-01	URI	Reactor Coolant Pump RC-3D lube oil leakage (Section 02.1)
50/285/96016-02	IFI	corrective action program procedure requirements for reportability determinations (Section 06.1)

Closed

50-285/96002	LER	manual reactor trip due to lowering condenser vacuum (Section M1.1)
50-285/95024-02	VIO	Inadequate design control as pertains to amount of trisodium phosphate inside containment (Section E8.1)

ATTACHMENT 2

QUESTIONS RELATED TO 10 CFR PART 50, APPENDIX R

Background

During a routine walkdown of containment, the resident inspector identified a concern regarding the pooling of lube oil beneath Reactor Coolant Pump D. As followup to this concern, the resident inspector obtained a copy of two Omaha Public Power District documents - a "White Paper Review of the Requirements of 10 CFR Part 50, Appendix R, Section III.O," dated August 9, 1996, and a "Fire Protection Configuration Report for the Lube Oil Leak on Reactor Coolant Pump D," dated July 6, 1995. The first document described the OPPD investigation into the reactor coolant pump lube oil collection system configuration and summarized the current design basis of the existing reactor coolant pumps. The second document addressed the loss of lube oil inventory from Reactor Coolant Pump D during power operations.

The NRC's review of these documents was discussed with the OPPD staff in a telephone conversation between Mr. Chris VanDenburgh, of the NRC, and Mr. Goeff Cook, of OPPD, on December 20, 1996. During that telephone call, OPPD staff indicated that Fort Calhoun Station had been granted an exemption to the lube oil collection requirements of 10 CFR Part 50, Appendix R, Section III.O, for the upper and lower oil reservoirs. The OPPD staff explained that the basis for the exemption was that the upper reservoir was internal to the reactor coolant pump and could not be easily collected and the lower reservoir was of low pressure design and, therefore, was unlikely to leak. The white paper indicated that this condition was accepted by the NRC in a Safety Evaluation Report that approved Amendment No. 53, dated November 17, 1980.

In addition, the white paper indicated that the NRC had opened an unresolved item in a 1988 resident inspection report concerning whether the present system complied with Section III.O of Appendix R and whether an exemption was required. The white paper indicated that the Omaha Public Power Division had submitted an exemption request which addressed this issue on November 28, 1988, in LIC-88-1066. Attachment 2 to that request responded to verbal questions regarding the requirement to contain lube oil from unpressurized points. These responses indicated that Omaha Public Power District did not believe they were required to collect leakage from unpressurized internal sources or from high pressure piping where lube oil leakage was not considered credible.

Current Problem

10 CFR Part 50, Appendix R, Section III.O requires the collection of all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil system. The lack of oil collection capability for the upper and lower reactor coolant pumps oil bearing reservoirs and the observed leakage of oil onto the reactor building floor from reactor Coolant Pump D does not appear to comply with Appendix R. Separately, it appears that Omaha Public Power District misinterpreted the Safety Evaluation Report for Amendment 53, in that the exemption which was approved was only to limit the volume of

the oil collection tank to that of one reactor coolant pump. It did not approve a total exemption from the oil collection requirements for high pressure and low pressure leakage points.

Finally, the white paper indicated that a recent modification to Reactor Coolant Pump B had modified the physical configuration of the lube oil system as described in LIC-88-1066. The difference is that there is now a larger lower bearing lube oil reservoir, and the new configuration uses a sightglass on the lower motor bearing reservoir that is not collected. Thus, the Safety Evaluation Report for Amendment 53 does not address the current reactor coolant pump configuration.

Action

In light of the above information, the NRC questions whether the reactor coolant pumps have adequate fire protection. In order to further assess the acceptability of the existing configuration, additional information is needed.

NRC's understanding of the fire protection requirements of Appendix R appears to differ from OPPD's as it relates to the potential reactor coolant pump lube oil leakage sources that must be collected. The white paper and associated documentation on this subject does not clearly articulate how the Fort Calhoun Station meets these regulatory requirements.

The NRC staff proposes the following questions:

1. Provide a comprehensive discussion of how Omaha Public Power District meets the fire protection requirements of Appendix R as it relates to lube oil collection systems in the reactor coolant pumps. This discussion should describe the previous and current plant configuration and detail the scope and basis of any regulatory exemptions that have been granted.

2. The white paper indicates that Omaha Public Power District has recently modified Reactor Coolant Pump B, which has resulted in a physical configuration of the lube oil system that is different from the other pumps. Provide a description of the new configuration of the lube oil system for reactor coolant Pump B and how Omaha Public Power District has addressed the differences as they relate to the applicability of the exemption request in LIC-88-1066.

3. Describe the compensatory measures that Omaha Public Power District has taken (or plans to take) to prevent any further lube oil leakage from the upper bearing of Reactor Coolant Pump D. In addition, provide a detailed description of the present fire hazard that exists in this pump due to the previous uncollected lube oil leakage.

ATTACHMENT 3

10 CFR 50, APPENDIX R, SECTION III.O

WHITE PAPER REVIEW

10CFR50, APPENDIX R, SECTION III.O

WHITE PAPER REVIEW

August 9, 1996

Issue Statement

While performing a fire protection interaction review for MR-95-022, RCP Motor Replacement, existing FP license basis documents were examined for impact. SER (LIC88-0457, dated 12/20/88) regarding an exemption to 10CFR50, Appendix R, Section III.O (RCP Lube Oil Collection) appears to contain an error. An excerpt from section 3.0 of the Safety Evaluation reads:

> "The licensee indicated that oil piping that is unpressurized is either internal to the reactor coolant pump (RCP) motor bearing assembly or qualified to withstand the elevated pressures anticipated during a seismic event."

This appears to be a read back combination of OPPD responses to Staff concerns regarding the exemption request. The purpose of this document is to determine the current status of RCP Lube Oil design basis and any impacts due to MR-95-022.

Scope

This document will be limited to the following:

- investigate and summarize the original RCP Lube Oil Collection configuration
- summarize the current design basis on the existing RCP's
- evaluate MR-95-022 impacts to the existing configuration/exemption basis
- recommend a course of action regarding 10CFR50, Appendix R section III.O
  -existing design basis
  -MR-95-022 impacts

Actions Taken

Reference Documents Reviewed:

1) 10CFR50, Appendix R, Section III.O
2) Original FP Program Submittal, LIC-76-0180, dated 12/31/76
3) Original Program SER, LIC-78-0104, dated 8/23/78
4) Design Package Submittal, LIC-79-0059, dated 6/6/79
5) NRC Triennial Inspection Report, LIC-88-880, dated 9/23/88
6) OPPD Exemption Request, LIC-88-1066, dated 11/28/88
7) NRC Exemption to Appendix R, III.O, LIC88-457, dated 12/20/88
8) MR-95-022. "Reactor Coolant Pump Motor Replacement"

Discussion

RCP motor lube oil collection requirements date back at least to the NRC's Fire Protection Guidelines of Appendix A to APCSB 9.5-1 (1976). OPPD's original FP program submittal (12/31/76) acknowledges RCP lube oil as a 'major combustible'. The submittal goes on to evaluate a 15 minute fire burn in Containment resulting from the combustion of the total inventory of lube oil from one RCP (150 gal.). The evaluation concludes that a burn of this magnitude would not jeopardize safe shutdown. This evaluation is referenced by OPPD as meeting the Appendix A, 'Control of Combustibles' mandate [per section D.2(a)].

The SER granted to OPPD in regard to the 1976 submittal, dated 8/23/78, lists the RCP Lube Oil Collection System as an 'Incomplete Item'. The SER went on to document that OPPD committed to respond to the issue by June 1979. It is assumed that correspondence between OPPD and the NRC took place between the 1976 submittal and the 1978 SER. Documentation of this communication has not been retrieved.

OPPD submitted a Final Design Package of MR-78-057, "RC Pump Lube Oil Collection" to the NRC 6/6/79 (LIC-79-0059). The key passage in this submittal is as follows:

> "The lower oil reservoir is not being collected since it contains only four (4) gallons, has an internal oil cooler and there are no pressurized lines, sight glasses, etc. Also, the oil level transmitter is not contained since the transmitter housing has a pressure rating of 500 psig and it is only exposed to 17 inches of oil.".

The cover letter to this submittal indicates the NRC was to review and approve the modification prior to installation. The NRC documented acceptance of this configuration in Amendment # 53 to the FCS license dated 11/17/80.

The RCP Lube Oil Collection System was again reviewed by the NRC in 1988 during a triennial FP inspection. The results of this inspection (LIC-88-880) once again listed the oil collection system as an "unresolved item". The following excerpt was taken from Section 4. of the report:

> "Since the oil collection system, including collection pans, drain lines, and collection tanks has enough capacity to hold all of the oil from the pumps, there appears to not be a safety concern. However, the present system does not comply with Section III.O of Appendix R and an exemption is required."

OPPD filed an exemption request with the NRC 11/28/88 (LIC-88-1066). Attachment 2 to the exemption request responded to three questions raised during a phone conversation held 11/25/88. The third question/answer is as follows:

> "OPPD states that the system will contain oil from pressurized points. What about unpressurized points?
>
> Answer
> The oil piping that is unpressurized is either internal to the motor bearing assembly or of such a high pressure rating that oil leakage is not considered a credible event. The total volume of the unpressurized oil system in the lower bearing assembly is only four gallons

per pump. The entire upper bearing assembly is provided with collection capacity with the exception of the level transmitters which are rated at 500 psig."

It should be noted that question # 2 regarded seismic design capability of the collection system. The responding NRC exemption SER contained the read back error as discussed in the introduction of this document.

Evaluation

Key Points

- RCP Oil Collection System installed per MR-78-057 was reviewed and approved by the NRC
- NRC Appendix R audit report categorized the FCS RCP oil collection system configuration deviations as 'not safety significant'
- The new pump has a larger lower bearing lube oil reservoir (11 gallons vs 4 gallons).
- The new pump contains less lube oil (total) than existing pumps.
- The new pump configuration has a sight glass on the lower motor bearing reservoir.

Conclusions

1) The existing SER on the RCP lube oil contains a misstatement that should be corrected.
2) The new pump motor lube oil system differs in capacity and fittings (sight glass) from the current exempted configuration.

Recommendations

- removal of the new motor lower bearing sight glass if possible to more closely emulate the existing pump configuration and verify fill/drain piping and level transmitter as equivalent
- perform FP evaluation regarding the remaining configuration differences as "insignificant"
- conduct NRC notification of configuration change (including documentation as not fire safety significant) and request clarification/update of the SER

Ken Erdman
Nuclear Design Engineer

ATTACHMENT 4

FCS FP CONFIGURATION REPORT

FCS FP CONFIGURATION REPORT

Reactor Coolant Pump "D" Lube Oil Leak

July 6, 1995

The purpose of this document is to address the loss of approximately 10 gal. of "D" RCP lube oil inventory during power operations. This white paper will evaluate two concerns. The first concern is the fire hazard and 10CFR50 App. R compliance and the second concern is the operability of the RCP motors under this condition.

Description of the Leak

The lube oil system on the RCP motors consists of two oil reservoirs internal to the motors and an external lube oil cooling system. The loss of oil has been from the upper oil reservoir. The upper oil reservoir surrounds the motor shaft and acts as an oil bath for the upper guide and thrust bearings on the motor.

The decreasing oil level trend for RC-3D motor upper oil reservoir was observed on ERFCS computer point L3161. The indicated oil level rapidly decreased from ~82% ("full" using the local level indicator), but the leak rate reduces as the oil level approaches an indicated 74% (approximately 1 1/4" below "full"). The rate of level decrease undergoes a rather dramatic change as the oil level decreases. At ~82% the oil level decreases about 3% the first day, then less and less over the next week. Following the May outage for the lube oil cooler replacement, it lost 1 1/4" of level (approx. 7 gal.) over the first three weeks. Oil was then added to the pump. The following week the oil level dropped 7/8" (approx. five gallons).

HISTORICAL INFORMATION

Fort Calhoun Station Reactor Coolant Pump motors in general and RC-3D-M in particular tend to leak oil internally when "overfilled". Often RC-3D-M has lost oil on initial startup following an outage until the oil level decreased to a point to where it stabilized. The shaft of the motor passes up through the reservoir and is sleeved to prevent oil from contacting the shaft. However the sleeve does not extend very far above the level of the oil in the reservoir and when overfilled the oil will go over the top of the sleeve and leak down the inside of the sleeve along the motor shaft.

It is believed that a similar phenomenon is occurring at this time, however oil usage is higher than what has been seen in the past. Over the next several weeks the oil level will be monitored to see if it will stabilize.

OIL COLLECTION SYSTEM DESIGN BASIS

Internal oil leakage from the upper reservoir results in the bearing lubricating oil migrating internally in the motor to the cooling fan and also to the lower reservoir. The oil which reaches the cooling fan is atomized and discharged to the RCP bays. This finely atomized oil then collects on the exposed surfaces inside the bay. Other than reducing or stopping the internal oil leak and wiping up the mess, there is little that can be done during operation to collect this oil. The motors were designed not to leak and can't be configured to collect this type of internal oil leak.

External oil leaks are a different matter. Here, external oil leakage (meaning leaks from the external oil piping, pumps and cooler) is collected by pans that totally enclose all external piping, pumps, instrumentation, etc. associated with the RCP motor's upper oil reservoir. The collection and storage of this type of leakage was required by 10CFR50 App. R which states that the following points be protected (ie. collect all oil from the pump and route away from potential ignition sources); oil lift pumps, piping, overflow lines, lube oil coolers, oil fill and drain lines, flanged connections on oil lines and lube oil reservoirs.

The oil collection pans on RC-3A-M and RC-3B-M each drain into one 150 gallon tank in the basement under the RC-2A. Likewise, The oil collection pans on RC-3C-M and RC-3D-M each drain into a 150 gallon tank under RC-2B. Since each RCP motor holds about 140 gallons of oil in the upper oil reservoir, piping, and oil cooler; the system is capable of containing any single RCP motor external oil leak.

Fort Calhoun holds an NRC exemption to Appendix R, Section III O in regards to the collection storage tank serving two pumps but with only enough capacity for one pump(150 gal.). At FCS all four RCPs must be running for the reactor to be critical (low RCS flow trip units automatically shutdown the reactor at ~95% of full flow). The probability that two RCP motors could spill their oil into the oil collection tank such that the tank would overflow is incredibly small.

The lube oil collection system is performing as designed and meets the requirement of 10CFR50 App. R. The oil leakage is internal and cannot be captured per 10CFR50 App. R requirements for a lube oil collection system. This system was reviewed by the NRC and accepted with the stated exemption in 1988. In reviewing the collection system DEN has determined that the system is meeting the requirement to collect and remove oil in accordance with the 10CFR50 App. R.

FIRE HAZARD

While the Lube oil collection system meets its design requirements, the intent of Appendix R must also be considered. The fact that lube oil is escaping from the pump and being deposited around the bay is not acceptable just because the collection system is meeting its design requirements. The intent of Appendix R is that oil would not be released from the RCP and allowed to come into contact with hot process piping which could initiate a fire. It is therefore a condition which must be evaluated from a fire risk aspect to determine the acceptability of the condition. To gain further insight into the consequences of leaking oil DEN reviewed recent events similar in nature.

NRC IEN 94-058: "Reactor Coolant Pump Lube Oil Fire"

Haddam Neck and Millstone NPS experienced RCP lube oil leak events in July of 1994. Haddam Neck had a fire resulting from a pressurized lube oil component failure. The fire was in the oil soaked insulation on the pump casing and piping and was manually extinguished by the unit fire brigade. Millstone experienced undefined motor leaks that resulted in a low flow alarm on the lube oil system and several gallons of oil accumulating outside the pump and collection system in the pump bay. Based on the observed fire hazard in containment, the licensee shut down the plant. No fire occurred. The IEN included the following clarification by the NRC;

> "Oil leaking from the [RCP] lube oil system may come in contact with either (1) surfaces that are hot enough to ignite the oil, or (2) an electrical source of ignition. Appendix R to Part 50 of Title 10 of the Code of Federal Regulations requires the installation of an oil collection system to collect oil from all potential pressurized and unpressurized leakage sites. An adequately designed, installed, and maintained oil collection system is necessary to contain any oil released because of leakage failure of the lubrication system and to minimize fire hazards by draining the oil to a safe location."

IMPACT ON PUMP OPERATION

L3161 should not decrease markedly if the indicated oil level is maintained in the mid to lower 70s. However, if the level continued to drop, then the upper guide bearing will begin to lose lubrication and temperature will begin to rise and perhaps motor vibration will increase as bearing stiffness decreases. If this were allowed to continue unchecked, then the plant would have to be taken off-line and the RCP secured at a bearing temperature of 203°F per OI-RC-9.

CONCLUSION

The leak appears to be internal and cannot be captured by a backfit oil collection system. The existing system is adequately designed to capture all leaks external to the motor. This type of leakage is outside the scope of what the Appendix R system was intended to do.

The additional lube oil to RCP "D" has been evaluated by Systems Engineering (attached) and does not represent an unanalyzed condition for combustible loading. DEN concurs with this evaluation. The additional combustible material in the bay is not significant. The combustible loading for containment is analyzed for an additional 395 gallons of oil(Per Standing Order G-91 for transient loads). The oil lost to date has not soaked into the insulation around the pump casing or piping which would expose it to the high temperatures as occurred at Haddam and the flow of oil in the system is normal unlike Millstone. The majority of the oil is being atomized and spread around the bay with some minor pooling and with some oil going to the lower reservoir. This condition, while not desirable, doesn't represent a fire hazard at this time.

A review of the PRA IPEEE for fire shows that based on compliance with the Design Basis and Appendix R requirements the Core Damage Frequency from a containment fire is 3.14E-7/yr. Based on this information the consequences of a containment fire are not considered risk significant.

The rules here are clear, leakage from the RCP Lube oil system is to be collected and removed from the area (ignition sources). Any accumulation of lube oil in an unsafe location, i.e. in the insulation of hot piping (i.e. piping temperature exceeding the flash point of the oil, 400 degrees F) is unacceptable and outside the requirements of Appendix R. Additional loss of oil must be evaluated against this criteria to insure no safety impact, as has been done for the 10 gallons leaked out to date.

RECOMMENDATIONS FOR CONTINUED PUMP OPERATION

Because the oil level will be lower than normal it is recommended that the upper guide bearing temperature be closely watched for any temperature increase. The alarm setting for T3167 should be set slightly above the current running temperature (T3167 now reads 153°F). Pump vibration should also be closely monitored by Operations.

Next outage the oil in the RC-3D-M lower guide bearing should be changed as there is evidence that Mobil "DTE" Heavy Medium oil has leaked from the upper bearing reservoir to the lower reservoir. The oil level was 119% in the lower reservoir. Some oil has been drained out and is being analyzed. Currently the oil level is 89%. The lower reservoir uses 4 gallons of Mobil 797 oil which has a viscosity of 150 SSU at 100°F compared to 300 SSU for the Heavy Medium. A detailed plan should be developed to trouble shoot and correct the leak at the next outage.

Prepared by: _____ Date: 7/6/95

Reviewed by: _____ Date: 7/6/95