UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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April 26, 2000

EA 00-081

Craig G. Anderson, Vice President,
Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, Arkansas 72801-0967

SUBJECT: NRC SPECIAL INSPECTION REPORT NO. 50-313/00-04; 50-368/00-04

Dear Mr. Anderson:

This refers to the inspection conducted on February 8 through March 12, 2000, at the Arkansas Nuclear One, Unit 1, facility. The purpose of the inspection was to follow up on the February 5, 2000, events which lead to declaring both Unit 1 low pressure injection/decay heat removal pumps inoperable. The findings from this inspection were discussed with your staff on March 30 and April 25, 2000. The enclosed report presents the results of this inspection.

Based on the results of this inspection, two apparent violations were identified and are being considered for escalated enforcement action in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600, dated November 9, 1999. The first apparent violation involved two examples of failing to establish adequate measures for the selection of material, parts, and equipment that are essential to the safety-related functions of the low pressure injection system, as required by 10 CFR Part 50, Appendix B, Criterion III. These failures resulted in the loss of the containment sump recirculation function of the low pressure injection system. The second apparent violation was for Low Pressure Injection Pumps P-34A and -34B being inoperable from at least January 28 to February 5, 2000. This is a violation of Technical Specification 3.3.1(D). Accordingly, no Notice of Violation is presently being issued for these inspection findings. In addition, please be advised that the number and characterization of apparent violations described in the enclosed inspection report may change as a result of further NRC review.

An open predecisional enforcement conference to discuss these apparent violations has been scheduled for May 8, 2000, at 1 p.m. (CDT). The decision to hold a predecisional enforcement conference does not mean that the NRC has determined that violations have occurred or that enforcement action will be taken. This conference is being held to obtain information to enable the NRC to make an enforcement decision, such as a common understanding of the facts, root causes, missed opportunities to identify the apparent violations sooner, corrective actions, significance of the issues, and the need for lasting and effective corrective action. In addition, this is an opportunity for you to point out any errors in our inspection report and for you to provide any information concerning your perspectives on: (1) the severity of the violation, (2) the application of the factors that the NRC considers when it determines the amount of a civil penalty that may be assessed in accordance with Section VI.B.2 of the Enforcement Policy, and (3) any other application of the Enforcement Policy to this case, including the exercise of discretion in accordance with Section VII.

You will be advised by separate correspondence of the results of our deliberations on this matter. No response regarding the apparent violation is required at this time.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Sincerely,

/RA/

Ken E. Brockman, Director
Division of Reactor Projects

Docket: 50-313
License: DPR-51

Enclosure:
NRC Inspection Report No.
50-313/00-04; 50-368/00-04

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	50-313
License No.:	DPR-51
Report No.:	50-313/00-04; 50-368/00-04
Licensee:	Entergy Operations, Inc.
Facility:	Arkansas Nuclear One, Units 1 and 2
Location:	1448 S. R. 333 Russellville, Arkansas 72801
Dates:	February 8 through March 12, 2000
Inspectors:	D. Allen, Project Engineer, Project Branch A W. Sifre, Project Engineer, Project Branch C
Approved by:	P. Harrell, Chief, Project Branch D Division of Reactor Projects
Attachment:	Supplemental Information

EXECUTIVE SUMMARY

Arkansas Nuclear One, Units 1 and 2
NRC Inspection Report 50-313/00-04; 50-368/00-04

This was a reactive inspection to the February 5, 2000, events that resulted in declaring both Unit 1 low pressure injection/decay heat removal pumps inoperable.

Engineering

- The failure to complete adequate engineering evaluations for the replacement of the cast iron bearing housing with a stainless steel housing and the change in lubricating oil viscosity resulted in the inoperability of both low pressure injection/decay heat removal pumps. These two examples of inadequate engineering evaluations constitute an apparent violation of 10 CFR Part 50, Appendix B, Criterion III. Criterion III requires, in part, that measures be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components covered by Appendix B (EA 00-081) (Section E2.1).

- The combination of changes in the bearing housing material and a higher viscosity oil, in combination with low cooling water temperatures (<42°F), resulted in both low pressure injection/decay heat removal pumps operating with high bearing temperatures, which required the pumps to be secured. From January 28 to February 5, 2000, when the cooling water temperature was 42°F or less, both low pressure injection/decay heat removal pumps were not operable as they could not perform their intended safety function. This is a violation of Technical Specification 3.3.1(D) (EA 00-081) (Section E2.1).

Report Details

Summary of Plant Status

At the beginning of this inspection, Unit 1 was proceeding to cold shutdown to repair the antirotation device on Reactor Coolant Pump D. Equipment repairs were completed and the unit was being prepared for restart at the end of this inspection.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 High Inboard Bearing Temperatures on Low Pressure Injection/Decay Heat Removal Pumps P-34A and -34B

a. Inspection Scope (93702)

A reactive inspection was performed in response to Pumps P-34A and -34B failing to perform their intended safety functions. These functions include bringing the plant to cold shutdown, and following a loss-of-coolant accident, provide cooling water to the core by recirculation of the containment sump. When placed in service to cooldown the plant, both pumps experienced high bearing temperatures. This condition required that the pumps be shut down, thus preventing them from performing their decay heat removal function.

The inspectors reviewed the licensee's response to the high bearing temperatures on Pumps P-34A and -34B. This review included: (1) initial response by the operations staff, (2) observation of repairs to Pump P-34B, (3) review of the maintenance history of the pumps, and (4) review of the event response and cause determination documented in Condition Reports CA ANO-1-2000-0068 and -0068-02.

b. Event Discussion

Unit 1 was taken offline at 12:10 a.m. on February 5, 2000, for a planned shutdown to replace the failed antirotation device on Reactor Coolant Pump D. The unit was in the process of cooling down using the reactor coolant system. To achieve cold shutdown conditions, Pump P-34A was placed in service at 11:38 a.m. on February 5, with the reactor coolant system at 240 psig and 280°F. Pump P-34A was stopped at 12:30 p.m. and declared inoperable when the inboard pump bearing temperature exceeded the alarm setpoint of 160°F. Pump P-34B was placed in service at 12:50 p.m., and secured at 1:06 p.m., when the alarm setpoint for its inboard pump bearing temperature was reached. Reactor Coolant Loop B remained in operation for decay heat removal and Reactor Coolant Loop A was maintained operable to comply with Technical Specification 3.1.1.6, which requires two operable LOOPs for removal of decay heat.

When Pump P-34B was declared inoperable, a 1-hour notification was made to the NRC at 2:06 p.m., pursuant to 10 CFR 50.72(b)(1)(i)(A), due to entry into Technical Specification 3.3.1(D), and then Technical Specification 3.0.3 (NRC Event Report 36664). The applicable action statement required the unit be in cold shutdown within

24 hours. Subsequently, the 1-hour notification was retracted. Condition Report CR-ANO-1-2000-0066 documented the operability review and the basis for retraction of the notification.

The condition report stated that Technical Specification 3.3.1(D), which requires two low pressure injection pumps to be operable, was applicable when all of the following conditions exist: (1) reactor coolant system pressure is 300 psig or greater, (2) reactor coolant temperature is 200°F or greater, and (3) nuclear fuel is in the core. At the time the low pressure injection pumps were declared inoperable, reactor coolant system pressure was less than 300 psig; therefore, Technical Specification 3.3.1(D) was not applicable. As a result, the actions specified in Technical Specification 3.0.3 were not required. The inspectors reviewed the basis of the licensee's conclusion that the inoperable pumps were not reportable and identified no problems.

After declaring both low pressure injection/decay heat removal pumps inoperable, operators took immediate actions to determine the cause. Pump P-34A was operated with suction from the borated water storage tank, which is the normal surveillance alignment, and the inboard bearing temperature stabilized at 80°F. Pump P-34B was operated with suction from the borated water storage tank and its inboard bearing temperature stabilized at 70°F. The water in the borated water storage tank is at ambient temperature. Pump P-34B was aligned to the reactor coolant system, which was about 250°F, but after 30 minutes of operation was stopped due to a high bearing temperature. These test runs of the pumps demonstrated that they could satisfactorily operate when pumping fluid at ambient temperature; however, the operational difficulties demonstrated that the pumps could not pump fluids at elevated temperatures.

On February 6, the bearing oil in Pump P-34A was changed from ISO 46 to ISO 22, a lower viscosity oil. Following the oil change, Pump P-34A was operated with suction from the reactor coolant system and its inboard bearing temperature stabilized at 120°F. At 7:41 a.m., Pump P-34A was declared operable for decay heat removal only. At 1:19 a.m. on February 7, Pump P-34A was declared operable for low pressure injection based on the pump successfully pumping fluid from the reactor coolant system with stable bearing temperatures.

The bearing oil in Pump P-34B was changed from ISO 46 to ISO 22. Following this oil change, Pump P-34B was operated with suction from the reactor coolant system and again was stopped due to a high inboard bearing temperature.

On February 8, Pump P-34A was operated in decay heat removal mode and used to reduce the reactor coolant system temperature below 200°F, which placed the unit in cold shutdown.

c. <u>Corrective Actions for Pump P-34B</u>

Pump P-34B was disassembled to troubleshoot and replace the inboard bearing. As-found measurements of the inboard bearing and bearing housing were found to be within the original design tolerances, but were in the range of bearing fits in which calculations predicted insufficient clearances existed with the low cooling water/high pumped fluid temperatures. Calculations were performed by the licensee to determine if the required bearing clearances would be maintained using the tolerances specified by the bearing and pump vendors, considering the variables of the pumped fluid and cooling water temperatures and the material coefficients of thermal expansion of component parts. The calculations indicated that acceptable clearances, for the as-found dimensions in Pump P-34B, would not be maintained over the entire range of allowed tolerances and temperatures.

Pump P-34B was reassembled with the same model bearing, but one with actual outer dimensions on the small side of the allowed tolerance range. To ensure that the pump would function properly, the as-found measurements of the inboard bearing, shaft, and bearing housing were verified, not only to be within the design tolerances, but also in the range of bearing fits predicted by calculation to yield acceptable clearances for the current operating condition.

Temporary Alterations TAP-00-007 and -008 were installed on Pumps P-34A and P-34B to control the inboard bearing temperatures by controlling cooling water flow through the bearing housings. This was achieved by installing a manually-operated valve in the cooling water outlet lines from each inboard bearing housing and a temperature probe in each bearing housing to provide local bearing temperature indication. Postmodification testing involved running each pump while taking suction from the reactor coolant system at approximately 190°F. During the test, the valves were manipulated to control cooling water flow, and bearing temperature response was recorded. The purpose of the temporary alteration was to ensure pump operability for the decay heat removal function for all cooling water temperatures expected during the outage. The combination of larger clearance between the bearing and housing, and controlling the bearing housing temperature using the valve installed as a temporary modification, demonstrated successful operation of Pump P-34B; therefore, it was declared operable for decay heat removal. With Pumps P-34A and -34B operable for their decay heat removal function, both reactor coolant system loops were removed from service to allow work on the antirotation device for Reactor Coolant Pump D.

Following repair of Reactor Coolant Pump D, additional corrective actions were implemented to ensure full operability of the low pressure injection/decay heat removal pumps prior to plant startup. The inboard bearing housings on both pumps were replaced with cast iron housings, which had the inner diameter increased to the upper half of the tolerance band. The pump inboard bearings were also replaced with Model 6217 C4 bearings, which had larger clearances between the inner and outer bearing races. During reassembly, the critical dimensions of the shaft, bearing, and bearing housing were verified to support the design analysis. The design analysis, documented in Engineering Report 002334E109, was performed to demonstrate that the pumps were capable of performing their design functions over the entire range of cooling water temperatures, with the as-left dimensions.

d. Postmaintenance/Modification Testing

The engineering and maintenance staffs developed Workplans 1409.709, 1409.710, 1409.711, and 1409.712 to demonstrate full operability of Pumps P-34A and -34B. The basis of these workplans was to demonstrate that the pumps could pump 280°F reactor coolant across the entire range of cooling water temperatures (32 - 121°F).

In the performance of Workplans 1409.709 and 1409.710, the pumps were operated with suction from the reactor coolant system, at a temperature of approximately 277°F, and with bearing cooling provided by cooling water flowing from a tank of ice water controlled between 32 and 36°F. The pumps were then operated with suction from the reactor coolant system at 277°F, with bearing cooling provided by cooling water passing through a tank heated to 121°F. After testing, the manually-operated valves, installed by the temporary modifications, were tagged in the full-open position. This would allow full cooling water flow to the pump bearings.

The testing performed by the licensee demonstrated that Pumps P-34A and -34B were able to perform their design basis functions, as the pumps were functional when pumping hot reactor coolant through the full range of cooling water temperatures. The functions demonstrated operable were decay heat removal, as well as the function of containment sump recirculation following a loss-of-coolant accident.

Additional long-term corrective actions were planned to address the nonoperational issues not resolved prior to startup. These included changing maintenance procedures for bearing replacement to ensure critical tolerances are maintained; obtaining engineering approval prior to replacing the pump shaft, bearings, or bearing housings; and evaluating and determining long-term solutions for both pumps.

e. Maintenance History

Through interviews with maintenance and system engineering personnel and review of documentation, the inspectors determined that Pumps P-34A and -34B had historically performed well. Routine preventive maintenance activities involved seal replacement and oil changes. The maintenance history items discussed below directly relate to the events that led up to the bearing high temperatures:

- In 1992, new stainless steel bearing housings were installed in both pumps to eliminate a corrosion and fouling problem with the cooling water side of the original cast iron housings. During the annual pump surveillance on Pump P-34B following the outage, the inboard pump bearing temperature failed to stabilize and reached 115°F before the pump was stopped. Following restart of the pump, vibrations and temperatures were observed to be normal and stable.

- In September 1996, Pump P-34B was placed in service to cool down the plant for Outage 1R13. Its inboard bearing temperature began trending up and, after about an hour of service, the motor current spiked from 39 to 50 amps. The inboard bearing temperature rapidly rose to 173°F, immediately decreased to

165°F, and eventually stabilized at 100°F. Over the next 2 weeks, the pump was operated several times with normal bearing temperatures and pump vibrations.

On September 30, the Pump P-34B inboard bearing was inspected and found to have catastrophically failed. The bearing housing was found to be slightly distorted, with the bearing bore egg-shaped and having an average bore diameter undersized and out of specification by 1.5 mils. The root cause of the failure was determined to be the interference fit between the bearing and bearing housing, which prevented the bearing outer race from sliding axially in the bearing housing to account for the expansion and contraction of the internal pump components. The interference was attributed to less than adequate manufacturing of the new housing. The housing bore was machined out to the midpoint of the tolerance range, the mechanical seal was replaced, and new bearings were installed. Testing was performed following the maintenance activities. This testing confirmed that the pump was fully functional.

- In September 1999, the bearing oil was changed to a higher viscosity oil to prolong the service life of the outboard thrust bearings. The oil was changed to a higher viscosity based on the experience of another utility with the new, higher viscosity oil. The other utility had changed the oil to reduce the wear on the pump bearing, thus reducing the frequency required for bearing replacement. The licensee had opted to change the oil in their pumps for the same reason.

f. <u>Review of the Causes for High Bearing Temperatures on Pumps P-34A and -34B</u>

An Event Response Team was formed to identify and correct the cause of the bearing overheating problems. The team documented, in Condition Report ANO-1-2000-0068-02, the cause of the high inboard bearing temperature to be an original equipment design problem. The design of the pump did not adequately consider the relationship of: (1) the range of the cooling water temperatures provided for bearing cooling, and (2) the clearances between the inboard bearing and bearing housing.

Condition Report ANO-1-2000-0068-02 also identified a contributor to the event to be the oil viscosity. In combination with the cold cooling water temperatures, the magnitude of the bearing housing shrinkage, and the bearing fit, the higher oil viscosity resulted in greater heat generation. This generated heat contributed to greater thermal expansion of the bearing race and, as a result, prevented the bearing from moving axially inside the bearing housing.

The licensee's conclusions stated that starting the low pressure injection/decay heat removal pumps with pumped fluid temperatures greater than ambient, such as during reactor coolant system cooldown, resulted in the pump casing expanding faster than the pump shaft. The clearances at the inboard radial bearing had to be adequate to allow axial movement between the bearing outer race and the bearing housing without excessive axial loading of the bearing. Low cooling water temperatures and the resultant bearing housing contraction, combined with thermal expansion of the shaft from the higher temperature of the shaft, could cause an interference that prevents the bearing from sliding axially in the housing. The contraction of the housing and expansion of the shaft could also result in the loss of clearance between the inner and outer bearing races. The licensee concluded that the primary conditions that were all necessary for the pumps to become inoperable were: (1) original equipment design specification did not include the cooling water temperature range, and (2) the bearing housing material was changed without adequate technical review. The licensee noted that a secondary contributing factor was the changing of the bearing oil to higher viscosity oil (ISO 22 to ISO 46).

The inspectors reviewed the evaluation completed by the licensee with respect to determination of the root cause of the high bearing temperatures. Based on this review, the following observations were made:

- The licensee stated that the basic root cause was the original design of the pumps. Specifically, the problem involved the allowed vendor tolerances for the pump component and assemblies. The licensee determined that, even if the pump was assembled within the tolerances specified by the vendor, the pump may not have operated within the full range of cooling water temperatures that it would experience.

  The inspectors acknowledged that the vendor tolerances for clearances of parts in the pump were not adequate for the range of cooling water temperatures the pump could experience. However, the inspectors also noted that both pumps had historically performed well in service for the decay heat removal function. It was not until a different material for the bearing housing and a different viscosity oil was introduced by the licensee that the pump experienced problems.

- In 1992, when the carbon steel bearing housing was replaced with a stainless steel housing, there was an opportunity to identify the problem with internal clearances in the pump. After the new bearing housings were installed, Pump P-34B was operated and high bearing temperatures were experienced during a surveillance test. No action was taken to identify the reason for the temperature problem. It is now apparent that the installation of a bearing housing with a different coefficient of thermal expansion resulted in clearances between the internal pump parts becoming a problem.

- In 1996, the bearing temperature on Pump P-34B increased and then stabilized. The pump was operated a number of times over the next 2 weeks and was then inspected. The bearing was found to have failed. At that time, the licensee identified that internal pump clearances were critical to the proper functioning of the pump. However, actions were not taken to address all the potential causes for this problem, which included installation of the stainless steel bearing housing in 1992.

- In 1999, the bearing oil was changed to a higher viscosity oil to reduce wear on pump bearings. This change resulted in increased heat generation in the bearing. As a result, the expansion of the pump internal components lubricated by the oil resulted in the clearances between the pump parts becoming a problem.

The inspectors concluded that there was an original design problem with the internal clearance with the pump; however, this design problem did not cause operational problems until the licensee implemented changes to the internals of the pump. This conclusion is supported by the historically good operation of the pumps up until the changes were first made. The introduction of stainless steel for carbon steel bearing housing resulted in the internal clearances becoming a problem, where no problem had existed before. The licensee also installed a higher viscosity oil in the pumps to prolong bearing life. Introduction of this oil further increased the problem of internal clearances in the pump. The inspectors noted that, had the licensee performed proper engineering evaluations for the changes in bearing housing material and oil, the internal clearance problems may not have occurred.

g. Apparent Violations

The inspectors determined that the cause of the high inboard bearing temperature was the failure to establish adequate measures for the selection and review for suitability of application of material, parts, and equipment that are essential to the safety-related functions of the low pressure injection/decay heat removal pumps. Examples of inadequate engineering evaluations are discussed below:

- In 1992, stainless steel bearing housings were installed to replace the original carbon steel housing. This was done to minimize corrosion on the cooling water side of the housing. The housings had a greater coefficient of thermal expansion and a lower heat transfer coefficient than the original cast iron housings. The engineering evaluation completed for this design change failed to consider the greater thermal expansion of the new material and, as a result, did not identify the potential affect the change to the new material would have on pump internal clearances.

- In September 1999, the bearing oil in the pumps was changed from ISO 22 to a higher viscosity oil, ISO 46. This change was initiated to reduce the wear on bearings, thereby increasing bearing life. The engineering evaluation for this change in oil type failed to identify that the higher viscosity oil would increase the heat generation in the bearing and cause greater thermal expansion of the bearing race. As a result of this change, internal clearances became critical to the performance of the pumps. The engineering evaluation for the change in oil viscosity was not thorough and did not adequately consider the thermal characteristics of the lubricant and the resultant impact on the inboard bearing performance.

The above two examples of inadequate engineering evaluations constitute a failure to properly implement measures for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components covered by 10 CFR Part 50, Appendix B. This is an apparent violation of 10 CFR Part 50, Appendix B, Criterion III (EEI 50-313/0004-01).

As discussed above, the combination of a different bearing housing material and a higher viscosity oil, with low cooling water temperatures, resulted in Pumps P-34A and -34B not being able to perform their intended safety function because of bearing temperature problems. As demonstrated by the events of February 5, 2000, a cooling water temperature of 42°F or lower was sufficient to prevent satisfactory bearing performance. From January 28 to February 5, 2000, the cooling water temperature was 42°F or less. For at least this period, both low pressure injection/decay heat removal pumps were not operable. This is a violation of Technical Specification 3.3.1(D), which requires both pumps to be operable when: (1) reactor coolant system pressure is 300 psig or greater, (2) reactor coolant temperature is 200°F or greater, and (c) nuclear fuel is in the core (EEI 50-313/0004-02).

h. <u>Risk Assessment</u>

A risk assessment was performed by the NRC to determine the significance of these issues. The assumptions were:

- During an accident the pumps would perform their low pressure injection function while pumping from the borated water storage tank, which is at ambient temperatures.

- The pumps would fail to perform the loss-of-coolant accident, postinjection recirculation from the containment sump, which is assumed to be at elevated temperatures of 250°F.

- The duration of the inoperability was half the time from when the grade of oil was changed until the date of discovery, from September 27, 1999, until February 5, 2000. The actual cooling water temperature at which Pump P-34A would fail is uncertain.

- Limited credit was allowed for the remaining mitigation capability, which was for the reactor building spray pumps to inject into the reactor coolant system from the containment sump.

The risk assessment resulted in a conditional core damage probability of 6.5 E-05.

i. <u>Generic Implications</u>

A Unit 1 review was performed by the licensee to identify other cooling water cooled components that could be adversely impacted by the low temperatures. Additional reviews were performed to verify proper lubricant was used, safety-related equipment temperature and vibration data did not indicate potential problems similar to those on the low pressure injection/decay heat removal pumps, and system performance data did not indicate other modifications that could have impacted operation of safety-related equipment over the range of temperatures postulated during normal or accident conditions. Two potential problems were identified.

The Unit 1 reactor building spray pumps may be susceptible to radial bearing preload under worst case fits permitted within the existing design tolerances. Corrective actions included demonstrating operability by testing both spray pumps over the full range of cooling water temperatures and implementing administrative controls to prevent maintenance activities that could alter the existing radial bearing configuration.

The Unit 1 emergency feedwater pumps had radial bearings similar in configuration to the low pressure injection/decay heat removal pumps. An engineering review identified several significant differences, including less axial movement, cast iron bearing housing, and larger clearances. The evaluation concluded the emergency feedwater pumps were fully operable.

A Unit 2 review was also performed and identified one potential problem. The Unit 2 high pressure safety injection pumps had a similar design. The pump vendor did not recommend cooling water less than 75°F due to thermal expansion differences between the bearing housing and the bearing outer race. A previous evaluation, Engineering Request 974487D201, determined the pumps would remain operable without cooling water to the bearings or seals. The cooling water isolation valves had been tagged closed until final resolution of this issue.

c. Conclusions

The failure to complete adequate engineering evaluations for the replacement of the cast iron bearing housing with a stainless steel housing and the change in lubricating oil viscosity resulted in the inoperability of both low pressure injection/decay heat removal pumps. These two examples of an inadequate engineering evaluations constitute an apparent violation of 10 CFR Part 50, Appendix B, Criterion III. Criterion III requires, in part, that measures be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components covered by Appendix B.

The combination of changes in the bearing housing material and a higher viscosity oil, in combination with low cooling water temperatures (<42°F), resulted in both low pressure injection/decay heat removal pumps operating with high temperatures, which required the pumps to be secured. From January 28 to February 5, 2000, when the cooling water temperature was 42°F or less, both low pressure injection/decay heat removal pumps were not operable as they could not perform their intended safety function. This is a violation of Technical Specification 3.3.1(D).

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of the licensee's staff on March 30 and April 25, 2000. The licensee acknowledged the findings presented.

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

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee

C. Anderson, Vice President, Nuclear
G. Ashley, Licensing Supervisor
R. Bement, General Manager
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C. Zimmerman, Unit 1 Plant Manager

NRC

C. Nolan, Project Manager, NRR
J. Shackelford, Senior Reactor Analyst, Region IV

INSPECTION PROCEDURES USED

93702 Prompt Onsite Response To Events At Operating Power Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-313/0004-01	EEI	Inadequate design control resulted in overloading the LPI/DHR Pump Inboard Bearings (Section E2.1)
50-313/0004-02	EEI	LPI/DHR Pumps Were Inoperable, in violation of Technical Specification 3.3.1 (Section E2.1)

Closed

None