

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 50-482
License No.: NPF-42
Report No.: 50-482/99-14
Licensee: Wolf Creek Nuclear Operating Corporation
Facility: Wolf Creek Generating Station
Location: 1550 Oxen Lane, NE
Burlington, Kansas
Dates: September 5 through October 16, 1999
Inspectors: F. L. Brush, Senior Resident Inspector
R. A. Kopriva, Senior Project Engineer
Approved By: W. D. Johnson, Chief, Project Branch B

ATTACHMENT: Supplemental Information

EXECUTIVE SUMMARY

Wolf Creek Generating Station NRC Inspection Report No. 50-482/99-14

Operations

- The inspectors concluded that the licensee took the appropriate actions to complete the repairs on the failed reactor coolant system Loop 1 flow bistable output signal. When the signal failed, the licensee tripped the bistable within 6 hours as required by Technical Specifications. The licensee was required to remove the trip signal to allow troubleshooting activities. The licensee resolved the concern with removing the bistable from the tripped condition during discussions with NRC staff. The licensee was very thorough in their process of analyzing the concern, the technical restrictions, troubleshooting, including potential consequences, and repair activities (Section O4.1).

Maintenance

- The maintenance activities for installing a turbine building closed cooling water system valve were well planned and thoroughly briefed. Personnel safety precautions and practices were excellent when using a freeze seal to allow installation of the valve with the plant operating (Section 1.1).
- The licensee's actions were appropriate when essential service water Train A was removed from service to repair containment isolation Valve EF-HV-49. The licensee posted protected train signs for emergency core cooling system Train B components and Emergency Diesel Generator B. The licensee also postponed maintenance work and surveillance tests to lessen the impact on the core damage frequency (Section 4.1).
- The licensee identified that Technical Specification Section 3.6.1.1 should have been entered when using the postaccident sampling system and hydrogen analyzer system for containment atmosphere sampling or surveillance testing because the automatic isolation of the affected penetrations was dependent on a single channel of the solid state protection system. Thus, given a single failure, isolation of the penetrations could not be assured. From initial plant startup to May 24, 1999, the licensee failed to restore containment integrity within 1 hour when using the postaccident sampling system and hydrogen analyzer system for containment atmosphere sampling or surveillance testing. The licensee also failed to place the plant in Hot Standby within the 6 hour requirement of Technical Specification Section 3.6.1.1. This is a violation of Technical Specification Section 3.6.1.1. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Performance Improvement Requests 99-1978 and -2773 (closure of Licensee Event Report 99-006-00, 01) (Section M8.1).
- After procedure changes were implemented following issuance of Technical Specification Amendment 89, the licensee failed to perform the monthly channel checks on postaccident neutron flux instruments. This is a violation of Technical Specification 4.3.3.6, Table 4.3-7, Item 14. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement

Policy. This violation is in the licensee's corrective action program as Performance Improvement Request 99-2789 (closure of Licensee Event Report 99-010-00) (Section M8.2).

Engineering

- The failure to ensure the centrifugal charging pump discharge flow rate was less than or equal to 556 gallons per minute was a violation of Technical Specification Section 4.5.2.h.1(b). This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Performance Improvement Request 99-2845 (closure of Licensee Event Report 99-011-00) (Section E8.1).

Report Details

Summary of Plant Status

The plant operated at essentially 100 percent power during the entire report period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors conducted frequent reviews of ongoing plant operations. In general, the conduct of operations was professional and safety-conscious. Plant status, operating problems, and work plans were appropriately addressed during daily turnover and plan-of-the-day meetings. Plant testing and maintenance requiring control room coordination were properly controlled. The inspectors observed several shift turnovers and noted no problems.

O2 Operational Status of Facilities and Equipment

O2.1 Review of Equipment Tagouts (71707)

The inspectors walked down the following tagout:

Clearance Order 99 - 0830 - FC Auxiliary feedwater pump turbine

The inspectors did not identify any discrepancies. The tagout was properly prepared and authorized. All tags were on the correct devices and the devices were in the position prescribed by the tags.

O2.2 Engineered Safety Feature System Walkdowns (71707)

The inspectors walked down accessible portions of the following engineered safety features and vital systems:

- Emergency Diesel Generators A and B and
- Auxiliary Feedwater Trains A, B, and T.

Equipment operability, material condition, and housekeeping were acceptable. The inspectors observed a small leak on the Emergency Diesel Generator A fuel oil low pressure switch. The licensee initiated a work request to address the fuel oil leak.

O4.1 Failure of Reactor Coolant System Loop 1 Flow Bistable Output Signal to the Solid State Protection System

a. Inspection Scope (71707)

The inspectors reviewed the licensee's response to the failure of the reactor coolant system Loop 1 flow bistable output signal to the solid state protection system.

b. Observations and Findings

The licensee informed the inspectors of a failed control room reactor coolant system Loop 1 Flow Bistable FB-414 output signal to the solid state protection system. The licensee complied with Technical Specification 3.3.1 and placed the bistable in the tripped condition. The inspectors observed several control room briefings, two operational meetings, and a planning meeting for repair or replacement of the bistable and participated in several conference call discussions with the NRC headquarters staff to discuss Technical Specification compliance during the repair and testing of the bistable.

The inspectors observed the licensee's control room briefing pertaining to the failed bistable, the actions taken, and possible repair activities. The licensee completed initial troubleshooting and confirmed that the signal from the flow detector to the electronic processing cabinet was working properly. The licensee identified a concern related to the remaining troubleshooting, repair or replacement, and subsequent testing of the bistable. In order to troubleshoot the channel associated with the failed bistable output signal, the licensee was required to take the bistable out of the tripped condition. The licensee believed that the Technical Specifications did not allow taking the bistable out of the tripped condition for troubleshooting or repair.

The inspectors attended several licensee meetings where the operations department discussed, in depth, the Technical Specification requirements, the basis for the requirement, the required troubleshooting activities to identify the specific location, and the type of failure of the bistable. The inspectors found these meetings to be thorough and very detailed, including discussions of potential problems, options, and concerns.

Because of questions raised by licensee personnel about maintaining compliance with the Technical Specifications, the licensee discussed their concerns with NRC regional and headquarters staff. The licensee needed a thorough understanding and clarification of the requirements and limitations of Technical Specification 3.3.1 as it applied to troubleshooting and repairing the failed bistable signal. The NRC staff concluded that, in this specific instance, the licensee was able to take the bistable out of the tripped condition for troubleshooting without violation of the Technical Specification.

The licensee took the failed bistable out of the tripped position and commenced troubleshooting. Maintenance personnel were successful in quickly determining that the failed component was an input relay in the solid state protection system cabinet. The licensee returned the bistable to the tripped condition and replaced the relay. The licensee satisfactorily completed postmaintenance testing.

c. Conclusion

The inspectors concluded that the licensee took the appropriate actions to complete the repairs on the failed reactor coolant system Loop 1 flow bistable output signal. When the signal failed, the licensee tripped the bistable within 6 hours as required by Technical Specifications. The licensee was required to remove the trip signal to allow troubleshooting activities. The licensee resolved the concern with removing the bistable from the tripped condition during discussions with NRC staff. The licensee was very thorough in their process of analyzing the concern, the technical restrictions, troubleshooting, including potential consequences, and repair activities.

O8 Miscellaneous Operations Issues (92901)

- O8.1 (Closed) Licensee Event Report (LER) 50-482/99-008-00: automatic reactor trip following closure of main feedwater regulating Valve D. The valve closed when a controller card in an instrument cabinet failed. The reactor tripped when the water level in Steam Generator D decreased to the trip setpoint of 23.5 percent. All safety systems responded as required. This event was discussed in NRC Inspection Report 50-482/99-13, Section O4.1.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments - Maintenance

a. Inspection Scope (62707)

The inspectors observed or reviewed portions of the following work activities:

Work Order 99 - 212617-001	Replace the K125 input relay on Solid State Protection System Panel SB032A and
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Work Order 99 - 204654-027	Installation of an isolation valve in the turbine building closed cooling water system.
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b. Observations and Findings

All work observed was performed with the work packages present and in active use. The inspectors frequently observed supervisors and system engineers monitoring job progress, and quality control personnel were present, when required. Maintenance work was reviewed to ensure adequate work instructions were provided, the work performed was within the scope of the authorized work, and the work performed was adequately documented. In all cases, the impact on equipment operability and applicable Technical Specifications actions were independently verified.

The licensee conducted thorough briefings and planning sessions prior to the installation of the turbine building closed cooling water system isolation valve. The installation of the valve required the use of a freeze seal on a 3-inch diameter pipe. The licensee thoroughly discussed personnel safety concerns since the freeze seal used liquid nitrogen to provide the cooling medium. Control room operators followed this maintenance activity closely. The maintenance activity was completed successfully without any complications or problems.

c. Conclusions

The maintenance activities for installing a turbine building closed cooling water system valve were well planned and thoroughly briefed. Personnel safety precautions and practices were excellent when using a freeze seal to allow installation of the valve with the plant operating.

M1.2 General Comments - Surveillance

a. Inspection Scope (61726)

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

- Test Procedure STS IC-211B, "Actuation Logic Test Train B Solid State Protection System," Revision 30;
- Test Procedure STS KJ-005A, "Manual/Auto Start, Synchronization & Loading of Emergency D/G NE01; and
- Test Procedure STS KJ-015A, "Manual/Auto Fast Start, Synchronization & Loading of Emergency D/G NE01."

b. Observations and Findings

The surveillance testing was conducted satisfactorily in accordance with the licensee's approved programs and the Technical Specifications.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Review of Material Condition During Plant Tours

a. Inspection Scope (62707)

The inspectors performed routine plant tours to evaluate plant material condition.

b. Observations and Findings

The inspectors observed a significant amount of water in the radwaste building pipe tunnel. The tunnel was between the auxiliary and radwaste buildings. The licensee

determined that the water was groundwater from inleakage and was not contaminated. There was also a significant amount of corrosion of flooring and door materials. The licensee was developing a plan to address the inleakage and corrosion.

M4 Maintenance Staff Knowledge and Performance

M4.1 Failure of Essential Service Water Containment Isolation Valve EF HV-49 to Fully Close

a. Inspection Scope (62707)

The inspectors evaluated the licensee's response to the failure of essential service water containment isolation Valve EF-HV-49 to fully close during a surveillance test.

b. Observations and Findings

The inspectors observed the licensee's actions when essential service water Train A was removed from service. The licensee drained the essential service water system to allow troubleshooting and repair of Valve EF HV-49. The licensee determined that an obstruction on the valve seat prevented the valve from closing. The licensee found what appeared to be a calcium deposit on the seat. The licensee replaced the valve seat and reinstalled the valve. The valve passed all postmaintenance testing. The licensee was investigating the source of the calcium deposit.

The following major components or systems were inoperable while essential service water Train A was drained:

- Emergency Diesel Generator A,
- Auxiliary Feedwater Pump A,
- Component Cooling Water System A,
- Centrifugal Charging Pump A, and
- Residual Heat Removal System A

The inspectors reviewed the licensee's operational risk assessment for the essential service water system Train A outage. The baseline core damage frequency was $3.49E-05$. The core damage frequency with essential service water Train A removed from service was $7.42E-05$. The licensee postponed various surveillance and maintenance activities to lessen the impact on plant risk. The licensee also posted signs to protect emergency core cooling system Train B components to preclude any further impact on plant safety. The inspectors walked down various Train B components and did not observe any problems.

c. Conclusions

The licensee's actions were appropriate when essential service water Train A was removed from service to repair containment isolation Valve EF HV-49. The licensee posted protected train signs for emergency core cooling system Train B components and Emergency Diesel Generator B. The licensee also postponed maintenance work and surveillance tests to lessen the impact on the core damage frequency.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) LER 50-482/99-006-00, 01: loss of containment integrity without entering Technical Specifications. The licensee identified that Technical Specification Section 3.6.1.1 should have been entered when using the postaccident sampling system and hydrogen analyzer system for containment atmosphere sampling or surveillance testing because the automatic isolation of the affected penetrations was dependent on a single channel of the solid state protection system. Thus, given a single failure, isolation of the penetrations could not be assured. Valve lineups during containment atmosphere testing or surveillance testing created an open path from containment. The licensee determined that on several occasions in Modes 1, 2, and 3, the 1-hour time limit for restoring containment integrity was exceeded. This required the plant to be in Hot Standby in 6 hours as required by Technical Specification Section 3.6.1.1. The licensee also determined that the containment penetrations were open for greater than 6 hours on several occasions.

The licensee determined that the root cause was a lack of understanding of the containment isolation design for the hydrogen analyzer system during procedure development. The licensee developed the procedures during initial plant startup. The licensee's corrective actions included:

- Placing information tags on the containment isolation valves stating the Technical Specification requirement,
- Reviewing and revising the affected procedures, and
- Revising the methods for performing containment atmosphere sampling.

Technical Specification Section 3.6.1.1 requires that primary containment integrity be restored within 1 hour or be in hot standby in 6 hours. From initial plant startup to May 24, 1999, the licensee failed to restore containment integrity within 1 hour when using the postaccident sampling system and hydrogen analyzer system for containment atmosphere sampling or surveillance testing. The licensee also failed to place the plant in Hot Standby within the 6 hour requirement of Technical Specification Section 3.6.1.1. This is a violation of Technical Specification Section 3.6.1.1. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Performance Improvement Requests 99-1978 and -2773 (50-482/9914-01).

M8.2 (Closed) LER 50-482/99-010-00: failure to perform monthly channel checks on postaccident monitoring neutron flux instruments in accordance with Technical Specification Requirement Section 4.3.3.6, Table 4.3-7, Item 14. The licensee identified that Procedure STS ML-001, "Monthly Surveillance Log," was revised incorrectly when the requirements of Technical Specification Amendment 89 were incorporated into the procedure. Amendment 89 was issued on October 2, 1995.

The licensee stated that the root cause was that a procedure writer incorrectly determined that a step in Procedure STS CR-001, "Shift Logs for Modes 1, 2, & 3," satisfied the Technical Specification change requirements. The licensee's corrective actions included:

- Revising Procedure STS ML-001 to include the Technical Specification Section 3.6.1.1 requirements,
- Completing Procedure STS ML-001 for the postaccident monitoring neutron flux instruments,
- Revising Procedure STS CR-001,
- Updating the surveillance tracking database to correctly identify the procedures that satisfy the requirements of Technical Specification Section 4.3.3.6, Table 4.3-7, and
- Reviewing other procedural changes required by Technical Specification Amendment 89 for errors. None were discovered.

Technical Specification Section 4.3.3.6, Table 4.3-7, Item 14, requires monthly channel checks on postaccident neutron flux instruments. After procedure changes were implemented following issuance of Technical Specification Amendment 89, the licensee failed to perform the monthly channel checks. This is a violation of Technical Specification 4.3.3.6, Table 4.3-7, Item 14. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Performance Improvement Request 99-2789 (50-482/9914-02).

III. Engineering

E8 Miscellaneous Engineering Issues (92903)

- E8.1 (Closed) LER 50-482/99-011-00: failure to ensure the centrifugal charging pump discharge flow rate was less than or equal to 556 gallons per minute in accordance with Technical Specification Section 4.5.2.h.1(b). On August 20, 1999, the licensee determined that at least from 1992 until May 9, 1999, the charging pump discharge flow exceeded the required flow rate by up to 2 gallons per minute. The flow rate was determined with one charging pump running as required by the Technical Specifications. The licensee could not check earlier than 1992 due to the unavailability of data.

The licensee determined that the condition could have existed since 1987, when test Procedure STS BG-004, "CVCS Seal Injection and Return Flow Balance," was developed. The procedure did not take into account the following:

- Inconsistencies in instrument readings,

- Nonconservative differential pressure selection for determining required flows, and
- Variable system hydraulic conditions.

This event is of low safety significance. The Technical Specification limit of 556 gallons per minute would have been exceeded by 2 gallons during a design basis large break loss-of-coolant accident event. However, the centrifugal charging pump flow rate would not have exceeded the runout limit of 560 gallons per minute.

The licensee's corrective actions included:

- Evaluation of the current valve settings and recent flow data. The flow rates were set correctly during the last surveillance performed on May 9, 1999;
- Revising Procedure STS BG-004 prior to the next refueling outage to preclude nonconservative errors in the valve and instrument settings; and
- Reviewing similar pump configurations prior to the next refueling outage to determine if the condition exists in other systems.

The failure to ensure that the centrifugal charging pump discharge flow rate was less than or equal to 556 gallons per minute was a violation of Technical Specification Section 4.5.2.h.1(b). This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Performance Improvement Request 99-2845 (50-482/9908-03).

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 General Comments (71750)

The inspectors observed health physics personnel, including supervisors, routinely touring the radiologically controlled areas. Licensee personnel working in radiologically controlled areas exhibited good radiation worker practices.

Contaminated areas and high radiation areas were properly posted. Area surveys posted outside rooms in the auxiliary building were current. The inspectors checked a sample of doors, required to be locked for the purpose of radiation protection, and found no problems.

V. Management Meetings

X1 Exit Meeting Summary

The exit meeting was conducted on October 19, 1999. The licensee did not express a position on any of the findings in the report.

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

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. J. Angus, Manager, Licensing and Corrective Action
G. D. Boyer, Chief Administrative Officer
J. W. Johnson, Manager, Resource Protection
O. L. Maynard, President and Chief Executive Officer
B. T. McKinney, Plant Manager
R. Muench, Vice President Engineering
S. R. Koenig, Manager, Performance Improvement and Assessment
C. C. Warren, Chief Operating Officer

INSPECTION PROCEDURES USED

IP 37551	Onsite Engineering
IP 61726	Surveillance Observations
IP 62707	Maintenance Observations
IP 71001	Licensed Operator Requalification Program Evaluation
IP 71707	Plant Operations
IP 71750	Plant Support Activities
IP 92901	Followup - Operations
IP 92902	Followup - Maintenance
IP 92903	Followup - Engineering
IP 92904	Followup - Plant Support

ITEMS OPENED AND CLOSED

Opened

50-482/9914-01	NCV	Loss of containment integrity without entering Technical Specifications (Section M8.1)
50-482/9914-02	NCV	Failure to perform monthly channel checks on postaccident monitoring neutron flux instruments (Section M8.2)
50-482/9914-03	NCV	Failure to ensure the centrifugal charging pump discharge flow rate was less than or equal to 556 gallons per minute (Section E8.1)

Closed

50-482/99-006-00, 01	LER	Loss of containment integrity without entering Technical Specifications (Section M8.1)
50-482/99-008-00	LER	Automatic reactor trip following closure of main feedwater regulating Valve D (Section O8.1)
50-482/99-010-00	LER	Failure to perform monthly channel checks on postaccident monitoring neutron flux instruments in accordance with Technical Specification Requirement Section 4.3.3.6, Table 4.3-7, Item 14 (Section M8.2)
50-482/99-011-00	LER	Failure to ensure the centrifugal charging pump discharge flow rate was less than or equal to 556 gallons per minute in accordance with Technical Specification Section 4.5.2.h.1(b) (Section E8.1)
50-482/9914-01	NCV	Loss of Containment integrity without entering Technical Specifications (Section M8.1)
50-482/9914-02	NCV	Failure to perform monthly channel checks on postaccident monitoring neutron flux instruments (Section M8.2)
50-482/9914-03	NCV	Failure to ensure the centrifugal charging pump discharge flow rate was less than or equal to 556 gallons per minute (Section E8.1)