

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-482/90-39 Operating License: NPF-42

Docket: 50-482

Licensee: Wolf Creek Nuclear Operating Corporation (WCNOC)
P.O. Box 411
Burlington, Kansas 66839

Facility Name: Wolf Creek Generating Station (WCGS)

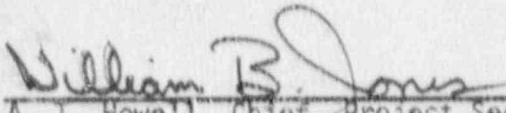
Inspection At: WCGS, Coffey County, Burlington, Kansas

Inspection Conducted: December 23, 1990, through January 7, 1991

Inspectors: M. E. Skow, Senior Resident Inspector
Project Section D, Division of Reactor Projects

L. L. Gundrum, Resident Inspector
Project Section D, Division of Reactor Projects

Approved:


A. T. Howell, Chief, Project Section D
Division of Reactor Projects

1/18/91
Date

Inspection Summary

Inspection Conducted December 23, 1990, through January 7, 1991 (50-482/90-39)

Areas inspected: A special inspection involving onsite followup of an event.

Results: Within the area inspected, one apparent violation was identified. The violation involved a failure to satisfy a Technical Specification requirement for having two emergency core cooling system subsystems operable in Mode 1.

DETAILS

1. Persons Contacted

Principal Licensee Personnel

- *J. A. Bailey, Vice President Operations
- *G. D. Boyer, Director Plant Operations
- *H. K. Chernoff, Supervisor Licensing
- *T. F. Deddens, Jr., Outage Manager
- *R. D. Flannigan, Manager Nuclear Safety Engineering
- *C. W. Fowler, Manager Instrumentation and Control
- *T. J. Garrett, Manager Nuclear Safety Analysis
- *N. H. Hoadley, Manager Plant Design, NPE
- *R. W. Holloway, Manager Maintenance and Modification
- *W. T. James III, Mechanical Engineering, NPE
- *R. K. Lewis, Supervisor Results Engineering
- *W. M. Lindsay, Manager QA
- *V. J. MacTaggart, Manager NPE-Wichita
- *W. B. Norton, Manager Technical Support
- *C. E. Parry, Director Quality
- *K. R. Peterson, Sr. Engineer, NPE
- *J. M. Pippin, Director Nuclear Plant Engineering
- *C. E. Rich, Jr., Supervisor Electrical Maintenance
- C. M. Sprout, Manager NPE-Wolf Creek
- *J. D. Weeks, Manager Operations
- *S. G. Wideman, Sr. Engineering Specialist
- *M. G. Williams, Manager Plant Support

The inspectors also contacted other members of the licensee's staff during the inspection period to discuss identified issues.

*Denotes those personnel in attendance at the exit meeting held on January 7, 1991. Mr. A. T. Howell, Chief, Project Section D, Division of Reactor Projects, also attended the exit meeting.

2. Onsite Followup of Events at Operating Power Reactors (93702)

The objectives of this inspection were to document onsite followup of this event. An overview of the event, the details of the event, and the conclusions of the inspection are provided.

a. Overview

At 12:30 p.m. on December 23, 1990, control room personnel declared both SI pumps inoperable because the common recirculation line from the pumps to the RWST became blocked with ice when the nonsafety related heat trace system failed to energize as designed at 40°F. Operators placed both SI pump controls in pull to lock to prevent pump damage from potentially occurring had the pumps started and

operated in a shutoff head condition. In the event of an SI signal, manual actuation of the pumps would have been required once RCS pressure decreased below the shutoff head of the pumps. This condition was an apparent violation of TS 3.5.2 (482/9039-01) which requires that two independent ECCS subsystems be operable in Mode 1. With one ECCS subsystem inoperable, the TS action statement requires the inoperable subsystem to be restored to OPERABLE status within 72 hours or be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours. Each subsystem requires the operability of a SI pump.

Since the LCO does not provide an action statement for both subsystems being inoperable, TS 3.0.3 was entered. TS 3.0.3 required that within 1 hour action be initiated to place the unit in at least HOT STANDBY (Mode 3) within the next 6 hours and at least in HOT SHUTDOWN (Mode 4) within the following 6 hours. Because the licensee could not restore flow through the common recirculation line, a plant shutdown was initiated at 4 p.m. and a NOUE was declared in accordance with emergency planning procedure, EPP 01-2.1, Revision 8, "Emergency Classification," Step 4.2.5. As a result of efforts to thaw the line using an external heat source, flow through the common recirculation line was restored at 5:02 p.m. The power reduction was stopped at 5:07 p.m., SI Pump "A" was verified as being operable at 5:35 p.m., and TS 3.0.3 was exited. The NOUE was terminated at 5:40 p.m. At 5:57 p.m., SI Pump "B" was declared operable, and TS 3.5.2 was exited.

b. Details of Event

The initial indication of heat tracing problems occurred on the evening of December 20, 1990. Control Room Annunciator ALR 55F, "Freeze Protection Trouble," came into alarm. This annunciator provided a common trouble alarm for the following heat tracing control panels: demineralized water system freeze protection, condensate system freeze protection, reactor makeup water system freeze protection, and borated refueling water system freeze protection. The heat trace control panel for the borated refueling water system controlled three heat trace circuits. One circuit was for the common recirculation line to the RWST, one circuit was for the overflow line, and the third circuit was not used. Each freeze protection system consisted of one ambient temperature thermostat that would energize the heat trace for the respective freeze protection system. An additional low temperature thermostat was provided for each heat trace circuit that would alarm on the respective heat trace panel if the temperature continued to decrease around the heat traced pipe. The ambient temperature thermostats actuate the heat trace at 40°F, and the low temperature thermostats actuate the local alarm on the heat trace panel and the common control room annunciator at 35°F. These thermostats were last calibrated in October 1989.

When the common control room alarm was first received on December 20, 1990, the BOP computer indicated that the heat tracing control panel associated with the demineralized water system was affected. Since there was no reflash capability for the control room alarm, any subsequent local heat tracing control panel low temperature alarms were masked in the main control room. The licensee subsequently verified using the printout from the BOP computer that all four heat tracing control panels went into alarm on December 20 and 21, 1990.

The alarm response procedure, ALR 00-055F, "FRZ PROT TROUBLE," Revision 3, required the operators to verify that the power supply breakers to the freeze protection panel, the heater circuits, and the control circuit were closed. After operations personnel verified the power supply breakers were closed, control room personnel requested that electrical maintenance personnel verify current in the heat trace circuits for the four freeze protection systems. Electrical maintenance personnel logged that the control room had called but did not log if they were asked to check the heat trace circuits for the four freeze protection systems. Electrical maintenance personnel did inform the control room that the heat tracing was energized and at full current for the demineralized water tank overflow line and the condensate storage tank overflow line. Since these circuits were working but the alarms were still in, a WR was written to ensure there was no blockage of the overflow lines.

However, because of apparent miscommunications between operations and electrical maintenance personnel, it appears that current flow through the heat trace circuits associated with the RWST was not verified. The alarm response procedure stated, "if temperature control cannot be restored, initiate flow through the piping that is below normal temperature using applicable system procedures." The licensee later determined that establishing flow through the demineralized water tank and condensate storage tank overflow lines was not necessary, and left the heat tracing control panel low temperature annunciator in alarm. Therefore, Control Room Annunciator ALR 55F remained in alarm. Subsequent shifts, believing that only the above overflow lines were affected, did not investigate the control room alarm further. The licensee did not document a subsequent request by operations personnel for electrical maintenance personnel to verify current in the heat trace circuits periodically prior to the discovery of the frozen RWST recirculation line.

At 7 minutes after midnight on December 23, 1990, operators attempted to fill the RWST to clear Control Room Annunciator ALR 47E, RWST Hi/Low, using a line from the chemical volume control system that supplies flow to the RWST through the common recirculation line. However, operators were unable to verify flow to the RWST. In checking the valve lineup, they noted that a valve in the flow path

had a WR written on November 22, 1990. The WR noted that the valve stem for Valve BG V195 was separated from the diaphragm. They suspected that the valve was closed. Since the RWST level was still well above the TS limit, the operators decided to wait for the day shift to determine if parts were available to repair the valve. No further attempts to refill the RWST were made by this shift.

The day shift attempted to fill the RWST at 11:39 a.m. on December 23, 1990, from the spent fuel pool through the common recirculation line but could not obtain flow. It was at this time that the operators questioned if the common recirculation line was obstructed. The common recirculation line was run from the auxiliary building pipe chase and up through a small heated valve room. The pipe exits the building at a height of approximately 12 feet and it extends approximately 25 feet up to the RWST. The heat trace control panel for the borated refueling water freeze protection system was located on top of the heated valve room. Electrical maintenance personnel verified that the heat tracing was not energized. The licensee found that the ambient temperature thermostat that should have actuated the heat trace circuitry was not working. A temporary modification was initiated that jumpered the defective ambient temperature thermostat, energizing the heat tracing. The licensee replaced the ambient temperature thermostat. I&C personnel determined that the failed thermostat did not actuate when placed in a -12°F environment. The licensee attributed the failure of the thermostat to internal mechanical binding. Subsequent to the event, the inspectors determined that as of January 10, 1991, none of the low temperature thermostats associated with the borated water freeze protection system had been calibrated since 1989.

The shift supervisor called out personnel to erect scaffolding and install plastic sheeting to retain the heat that was being supplied from a temporary heater. Later, the insulation surrounding the pipe was removed. It was noted that approximately 6 feet of piping, located between two pipe supports, appeared frosted and the insulation in this area was wet. In the area that appeared to have frozen, some pipe deformation occurred. The common recirculation piping is seismically supported, but it is classified as nonsafety-related piping. The pipe deformation was subsequently evaluated as not affecting the integrity of the pipe.

c. Conclusions

- ° An apparent violation of TS 3.5.2 is being considered for escalated enforcement in accordance with the NRC Enforcement Policy, 10 CFR Part 2, Appendix C (1990). The apparent violation involves the failure to meet TS 3.5.2 operability requirements for the ECCS subsystems, specifically the SI pumps, during plant operation. The apparent violation stems from the failure to implement sufficient measures to prevent the common recirculation line from becoming obstructed with ice.

- ° Discussion with licensee personnel revealed that an obstruction of the common recirculation line was not considered to be a credible failure mode for the SI pumps. The design requirement of maintaining the line above 40°F was implemented using a single heat trace circuit that relied on nonclass 1E power.
- ° The design of the recirculation piping had previously been addressed internally as a result of IE Bulletin No. 79-24, "Frozen Lines," and in the response provided to IE Bulletin No. 88-04, "Potential Safety-Related Pump Loss." No revisions were made to the alarm response procedure for Control Room Annunciator ALR 055F as a result of these reviews. A review of the licensee's evaluation of IE Bulletin No. 79-24, revealed that the licensee concluded that the existing heat trace system was adequate.
- ° The alarm response procedure did not provide adequate guidance to ensure that the freeze protection systems were operating. The alarm response procedure steps, to initiate flow through the affected line, were not appropriate for the refueling water storage and condensate storage tank overflow lines.
- ° Discussions with licensee personnel revealed that freeze protection thermostats were not routinely calibrated.
- ° Documentation of the problem with Valve BG V195 did not describe the as-left condition of the valve as it affected system operation, (i.e., open, shut, or throttled). Operations personnel were able to initiate flow through BG V195 after the recirculation line was thawed. It appears that the common recirculation line may have been blocked with ice as early as 12:07 a.m. on December 23, 1991. Potentially, the event could have been diagnosed earlier if the operators had a basis for knowing the valve's actual position.
- ° The control room operators acted conservatively after identifying the event. Communication and coordination between operations and maintenance resulted in prompt actions to thaw the pipe and restore normal conditions.
- ° An LER will be issued on this event. Initial notification of this event was made to the NRC Operations Center, in accordance with the 10 CFR 50.72, for the declaration of an Emergency Class specified in the licensee's Emergency Plan.

3. Exit Meeting (30703)

The inspectors met with licensee personnel (denoted in paragraph 1) on January 7, 1991. The inspectors summarized the scope and findings of the inspection. The licensee did not identify as proprietary any of the information provided to, or reviewed by, the inspectors.

ATTACHMENT

Acronym List

BG	chemical volume control system
BOP	balance of plant
ECCS	emergency core cooling system
HP	health physics
I&C	instrumentation and control
LER	licensee event report
LCO	limiting conditions for operation
NOUE	notification of unusual event
NPE	nuclear plant engineering
QA	quality assurance
RCS	reactor coolant system
RWST	refueling water storage tank
SI	safety injection
TS	Technical Specification
WCGS	Wolf Creek Generating Station
WCNOC	Wolf Creek Nuclear Operating Corporation
WR	work request

INSPECTOR'S REPORT

Office of Inspection and Enforcement

SKOW, MICHAEL E.

REVIEWER

HOWELL, A. T.

INSPECTORS
GUNDRUM, LINDA L.

LICENSEE/VENDOR

TRANSACTION TYPE

DOCKET NO. (8 digit) OR LICENSE NO. (BY PRODUCT) (13 digit)

REPORT

NEXT INSP. DATE

WOLF CREEK NUCLEAR OPERATING CORPORATION

- I - INSERT
- M - MODIFY
- D - DELETE
- R - REPLACE

05000482

9039

PERIOD OF INVESTIGATION/INSPECTION

INSPECTION PERFORMED BY

ORGANIZATION (CODE OF REGION/HQ CONDUCTING ACTIVITY (See ISAC 0530 Manpower Reporting - Weekly Manpower Reporting - In code))

FROM			TO		
MO	DAY	YR	MO	DAY	YR
12	23	90	01	07	91
20	25	26	31	32	33

- 1 - REGIONAL OFFICE STAFF
- 2 - RESIDENT INSPECTOR
- 3 - PERFORMANCE APPRAISAL TEAM

OTHER

REGION	DIVISION	BRANCH
4	2	2
33	34	35

REGIONAL ACTION (Check one box only)

TYPE OF ACTIVITY CONDUCTED (Check one box only)

- 1 - NRC FORM 591
- 2 - REGIONAL OFFICE LETTER

- 02 - SAFETY
- 03 - INCIDENT
- 04 - ENFORCEMENT
- 05 - MGMT. AUDIT

- 06 - MGMT. VIOL.
- 07 - SPECIAL
- 08 - VENDOR
- 09 - MAT. ACCT.
- 10 - PLANT SEC.
- 11 - INVENT. VER.
- 12 - SHIPMENT EXPORT
- 13 - IMPORT

- 14 - INQUIRY
- 15 - INVESTIGATION

INSPECTION/INVESTIGATION FINDINGS (Check one box only)

TOTAL NUMBER OF VIOLATIONS AND DEVIATIONS

ENFORCEMENT CONFERENCE HELD

REPORT CONTAINS 2700 INFORMATION

LETTER OF REPORT TRANSMITTAL DATE

A	B	C	D
<input checked="" type="checkbox"/>			
1 - CLEAR			
2 - VIOLATION			
3 - DEVIATION			
4 - VIOLATION & DEVIATION			

A	B	C	D

A	B	C	D

A	B	C	D

NRC FORM 591 (OR REL) LETTER ISSUED

REPORT SENT TO HQ FOR ACTION

JAN 18 1991

MO	DAY	YR	MO	DAY	YR

MODULE INFORMATION

MODULE INFORMATION

REC. ORD.	MODULE NUMBER INSP.										REC. ORD.	MODULE NUMBER INSP.																	
TYPE	NUMBER	PHASE	MANUAL	CHAPTER	PROCEDURE NUMBER	LEVEL	SEC	PRIORITY	DIRECT INSP. TIME/STAFF HOURS EXPENDED THIS INSPECTION	PERCENTAGE COMPLETED TO DATE	STATUS	TYPE	NUMBER	PHASE	MANUAL	CHAPTER	PROCEDURE NUMBER	LEVEL	SEC	PRIORITY	DIRECT INSP. TIME/STAFF HOURS EXPENDED THIS INSPECTION	PERCENTAGE COMPLETED TO DATE	STATUS	PHASE	MANUAL	CHAPTER	PROCEDURE NUMBER	LEVEL	
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* CIRCLE SEQUENCE IF VIOLATION OR DEVIATION