

WOLF CREEK

NUCLEAR OPERATING CORPORATION

Rick L. Gardner
Plant Manager

March 22, 2010

WO 10-0009

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Reference: Letter WO 10-0001, dated January 7, 2010, from M. W. Sunseri;
WCNOC, to USNRC

Subject: Docket No. 50-482: Licensee Event Report 2009-009-01,
Defeating Feedwater Isolation on Low T_{avg} Coincident with P-4
Function Results in Missed Mode Change

Gentlemen,

The Reference submitted Licensee Event Report (LER) 2009-009-00 which described an event involving the defeating of the feedwater isolation on low T_{avg} coincident with P-4 Function using procedure SYS SB-122, "Enabling/Disabling P-4/Lo T_{avg} FWIS." Defeating this Technical Specification (TS) 3.3.2, "Engineered Safety Feature Actuations System (ESFAS) Instrumentation," TS Table 3.3.2-1 Function constituted a failure to take action to place the plant in Mode 4 as required by TSs.

On November 10, 2009, Nuclear Regulatory Commission (NRC) Integrated Inspection Report 2009004 identified a Green noncited violation of Limiting Condition for Operation (LCO) 3.0.3 in which both trains of TS 3.3.2, "Engineered Safety Feature Actuations System (ESFAS) Instrumentation," Table 3.3.2-1, Function 8.a (ESFAS Interlocks, Reactor Trip, P-4) were bypassed with jumper wires in accordance with a plant procedure. The Reference submitted LER 2009-009-00 pursuant to 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by the plant's TSs based on the NRC Inspection Report 2009004 characterization of the issue as a violation of TSs. The Reference included a discussion indicating that this event did not meet the criteria for reporting under 10 CFR 50.73(a)(2)(v) as an event or condition that could have prevented the fulfillment of a safety function.

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On February 11, 2010, NRC Integrated Inspection Report 2009005 identified a Severity Level IV noncited violation of 10 CFR 50.73 for failure to report this event in a timely manner and not reporting this event per 10 CFR 50.73(a)(2)(v)(D). The enclosed LER 2009-009-01 is being submitted as a corrective action for the February 11, 2010, NRC Integrated Inspection Report 2009005 violation.

There are no commitments in this submittal. If you have any questions concerning this matter, please contact me at (620) 364-4156, or Mr. Richard D. Flannigan, Manager Regulatory Affairs at (620) 364-4117.

Sincerely,

A handwritten signature in black ink, appearing to read "Rick L. Gardner", with a long horizontal flourish extending to the right.

Rick L. Gardner

RLG/rlt

Enclosure

cc: E. E. Collins (NRC), w/e
G. B. Miller (NRC), w/e
B. K. Singal (NRC), w/e
Senior Resident Inspector (NRC), w/e

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollect@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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4. TITLE

Defeating Feedwater Isolation on Low Tavc Coincident with P-4 Function Results in Missed Mode Change

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	22	2009	2009	009	01	03	22	2010	FACILITY NAME	DOCKET NUMBER 05000
9. OPERATING MODE 3			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)							
10. POWER LEVEL 000			<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)		<input type="checkbox"/> 50.73(a)(2)(i)(C)		<input checked="" type="checkbox"/> 50.73(a)(2)(vii)		
			<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
			<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.73(a)(2)(ii)(B)		<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
			<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(ix)(A)		
			<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(iv)(A)		<input type="checkbox"/> 50.73(a)(2)(x)		
			<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(v)(A)		<input type="checkbox"/> 73.71(a)(4)		
			<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)		<input type="checkbox"/> 50.73(a)(2)(v)(B)		<input type="checkbox"/> 73.71(a)(5)		
			<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)		<input type="checkbox"/> 50.73(a)(2)(v)(C)		<input type="checkbox"/> OTHER		
			<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)		<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)		Specify in Abstract below or in NRC Form 366A		

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

Richard D. Flannigan, Manager Regulatory Affairs

TELEPHONE NUMBER (Include Area Code)

(620) 364-4117

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On August 22, 2009, at 0540 hours Central Daylight Time (CDT), with the plant in Mode 3, Control Room staff defeated the feedwater isolation on low Tavc coincident with P-4 Function using procedure SYS SB-122, "Enabling/Disabling P-4/Lo Tavc FWIS." This procedure was performed for restoring main feedwater flow through the main feedwater isolation valves (MFIVs) to supply water to the steam generators. On August 23, 2009, at 0125 hours the jumpers installed for defeating the feedwater isolation on low Tavc coincident with P-4 function were removed and procedure SYS SB-122 completed at 0140 hours.

The Nuclear Regulatory Commission (NRC) Resident questioned the defeating of the feedwater isolation on low Tavc coincident with P-4 function while in Mode 3. Technical Specification (TS) 3.3.2, Table 3.3.2-1 specifies the applicable Mode for Function 8.a. (Reactor Trip, P-4) as Modes 1, 2, 3. Defeating the feedwater isolation on low Tavc coincident with P-4 function using procedure SYS SB-122 results in both channels being defeated. There is no TS Condition for two inoperable trains. Limiting Condition for Operation (LCO) 3.0.3 specifies that when an associated Action is not provided, action shall be initiated within 1 hour to place the plant in Mode 4 in 13 hours. Action was not taken as required by the TSs.

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NARRATIVE**PLANT CONDITIONS PRIOR TO EVENT:**

MODE - 3

Power - 0

EVENT DESCRIPTION:

On August 22, 2009, at 0540 hours Central Daylight Time (CDT), with the plant in Mode 3, Control Room staff defeated the feedwater isolation on low Tavag coincident with P-4 Function [EIS: JC] using procedure SYS SB-122, "Enabling/Disabling P-4/Lo Tavag FWIS." This procedure was performed for restoring main feedwater flow through the main feedwater isolation valves (MFIVs) to supply water to the steam generators.

On August 23, 2009, at 0125 hours the jumpers installed for defeating the feedwater isolation on low Tavag coincident with P-4 function were removed and procedure SYS SB-122 completed at 0140 hours.

BASIS FOR REPORTABILITY:

The Nuclear Regulatory Commission (NRC) Resident questioned the defeating of the feedwater isolation on low Tavag coincident with P-4 function while in MODE 3. Technical Specification (TS) 3.3.2, "Engineered Safety Feature Actuations System (ESFAS) Instrumentation," Table 3.3.2-1 specifies the applicable Mode for Function 8.a. (ESFAS Interlocks, Reactor Trip, P-4) as Modes 1, 2, 3. Defeating the feedwater isolation on low Tavag coincident with P-4 function using procedure SYS SB-122 results in both channels being defeated. There is no TS Condition for two inoperable trains. LCO 3.0.3 specifies that when an associated Action is not provided, action shall be initiated within 1 hour to place the plant in Mode 4 in 13 hours. Action was not taken as required by the TSs.

On November 10, 2009, NRC Inspection Report 2009004 identified a Green noncited violation of Limiting Condition for Operation (LCO) 3.0.3 in which both trains of TS 3.3.2, Table 3.3.2-1, Function 8.a (ESFAS Interlocks, Reactor Trip, P-4) were bypassed with jumper wires in accordance with a plant procedure. This event is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by the plant's TSs based on the NRC Inspection Report 2009004 characterization of the issue as a violation of TSs.

The feedwater isolation on low Tavag coincident with P-4 provides a control function (not in the primary success path) against excessive cooldown events while the Main Feedwater System is operating. Feedwater isolation via this function is not modeled in any Updated Safety Analysis Report (USAR) Chapter 15 analyses, nor is it credited in the sensitivity studies presented in WCAP-9230, "Report on the Consequences of a Postulated Main Feedline Rupture," (referenced in USAR Section 15.2.8 for the feedwater system pipe break accident). Review of this event at the time of submitting LER 2009-009-00 determined that it did not meet the criteria for reporting under 10 CFR 50.73(a)(2)(v) as an event or condition that could have prevented the fulfillment of a safety function.

On February 11, 2010, NRC Integrated Inspection Report 2009005 identified a Severity Level IV noncited violation of 10 CFR 50.73 for failure to report this event in a timely manner and not reporting this event per 10 CFR 50.73(a)(2)(v)(D). The inspection report concluded that the event could have prevented the fulfillment of the safety function of structures or systems that are need to mitigate the consequences of an accident in that the Updated Safety Analysis Report, Section 7.3.8, "NSSS Engineered Safety Feature Actuation System," indicates the specific functions which rely on the ESFAS for initiation include main feedwater line isolation as required to prevent or mitigate the effect of excessive cooldown.

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Additionally, this event is being reported per 50.73(a)(2)(vii) as an event where a single cause or condition caused at least two independent trains or channels to become inoperable in a single system designed to mitigate the consequences of an accident. The event is reported under this criteria as a corrective action to address the conclusions reached in NRC Integrated Inspection Report 2009005.

CAUSE:

The apparent cause of this event is that during procedure development and again during corrective action program evaluations, personnel considered the feedwater isolation on low Tav_g coincident with P-4 to be a control function that was not part of the P-4 interlock, but rather used the P-4 interlock as input. As such, the feedwater isolation on low Tav_g coincident with P-4 function was not considered to be required for P-4 interlock operability per TS Table 3.3.2-1.

An inaccurate mental picture of technical specification application was formed on the basis of individual functions rather than overall constraint. Although it is possible to differentiate between those individual P-4 functions that ensure safe operation of the plant and those P-4 functions that are desirable control functions, all functions comprise the P-4 interlock. Technical Specification 3.3.2 specifies the Reactor Trip, P-4 ESFAS interlock as being applicable in Modes 1, 2, and 3. The basis for defeating the feedwater isolation on low Tav_g coincident with P-4 Function was based on a validation of function, not on the legitimacy of permission per the plant TSs. The bases for this cause is discussed below.

TS 3.3.2, Table 3.3.2-1 specifies the applicable Mode for Function 8.a. (ESFAS Interlocks, Reactor Trip, P-4) as Modes 1, 2, 3. The TS Bases identifies the functions of the P-4 as:

- Trips the main turbine;
- Isolates main feedwater with coincident low Tav_g;
- Allows manual block of the automatic reactivation of safety injection after a manual reset of safety injection; and
- Allows arming of the steam dump valves and transfers the steam dump from the load rejection Tav_g controller to the plant trip controller; and
- Prevents opening of the main feedwater isolation valves (MFIVs) if they were closed on safety injection or steam generator water level - high high.

With the P-4 interlock enabled (reactor trip and bypass breakers open), feedwater isolation will occur if Tav_g is less than or equal to 564 degrees F. The feedwater isolation on low Tav_g coincident with P-4 provides a control function (not in the primary success path) against excessive cooldown events while the Main Feedwater System is operating.

For reactor trips in Modes 1 and 2, the feedwater isolation on low Tav_g coincident with P-4 offsets the sudden decrease in reactor heat production by isolating main feedwater, which provides a similarly large reduction in heat sink to prevent an excessive Reactor Coolant System (RCS) cooldown. When reactor trip breakers are opened in Mode 3, there is no change in heat production from the reactor, and thus no need to isolate main feedwater.

In order to maintain steam generator water levels after feedwater isolation, the auxiliary feedwater (AFW) pumps may be needed until the feedwater isolation signal can be reset and the MFIVs can be reopened. If feedwater flow is not isolated while the RCS is cooling down, Tav_g will undershoot the target value of no-load temperature. The addition of AFW further aggravates the undershoot effects. This undershoot could result subsequently in safety injection actuation on low RCS pressure and a reduction in shutdown margin. Consequently, the nuclear steam supply system was designed with a feedwater isolation on low RCS Tav_g coincident with reactor trip.

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In 1994, in an effort to expedite startup physics testing it was desired to perform rod drop testing by dropping an entire control bank vice individual rods. It was decided the dropping of an entire control rod bank could best be accomplished by opening the reactor trip breakers. However opening the reactor trip breakers leads to the generation of a feedwater isolation signal when below the Tav_g setpoint associated to the P-4 interlock. When the reactor trip breakers are opened for this test in Mode 3, a feedwater isolation is required to control RCS temperature, and creates an undesirable plant transient, including the actuation of auxiliary feedwater. In order to suppress the feedwater isolation signal upon opening the reactor trip breakers, Reactor Engineering personnel proposed defeating the low Tav_g plus P-4 input to the feedwater isolation circuitry. In support of this request, an evaluation of the USAR Chapter 15 accident analysis was performed to ensure safe operation of the plant would be maintained. The evaluation assumed that only the feedwater isolation function would be defeated and that all other reactor trip P-4 signals would remain active and function normally. The evaluation concluded that there was no impact to the current USAR analyses or reduction in the analyzed margin of safety.

Wolf Creek Nuclear Operating Corporation (WCNOC) assessments of TSs were documented as a Technical Specification Clarification (TSC). Technical Specification Clarification 006-94 approved bypassing of the feedwater isolation function during rod drop testing. Unreviewed Safety Question Determination (USQD) 94-0154, supported this TSC. A self-assessment performed in 1999 also determined the practice of defeating the feedwater isolation coincident with low Tav_g function to be acceptable.

The acceptability of bypassing the P-4 interlock was later questioned by the corrective action program via Performance Improvement Request (PIR) 2001-0041. PIR 2001-0041 provided information that the bypass of the signal for feedwater isolation coincident with low Tav_g did not affect the P-4 input and output signals, or make the P-4 signal inoperable. The evaluation stated that according to the TS Bases the function to isolate feedwater coincident with low Tav_g was not required by technical specifications. The evaluation further stated that only certain functions of the P-4 interlock were required in Mode 3. The explanation for confusion regarding the requirements was that the TS 3.3 Bases was written differently than other specifications, and that operability requirements could only be determined by reading the Bases and the specification together. The conclusion states that although TSs require Reactor Trip, P-4 Function to be operable in Modes 1, 2, and 3, this does not mean that all of the functions for which P-4 is an input are also required to be operable in Modes 1, 2, and 3. Copies of the TS Bases for several other plants were obtained and cited as further indication that the feedwater isolation on low Tav_g coincident with P-4 Function could be defeated.

ACTIONS TAKEN:

Procedure SYS SB-122 has been revised to delete Mode 3 acceptability to disable the feedwater isolation on low Tav_g coincident with P-4 Function. Procedure GEN 00-006, "Hot Standby to Cold Shutdown," was revised to make an equipment out-of-service log entry to reinstate the feedwater isolation on low Tav_g coincident with P-4 Function as a Mode 3 restraint. Procedure STS AE-201, "Feedwater Chemical Injection Inservice Valve Test," prerequisite was revised to state that the feedwater isolation P-4 jumper is to be used in Mode 4 and Mode 5. GEN 00-002, "Cold Shutdown to Hot Standby," was revised to direct removal of the feedwater isolation P-4 jumper prior to entering Mode 3.

Procedure STS RE-018, "Multiple Rod Drop Time Measurement," has been revised to remove the ability to jumper out the feedwater isolation signal upon receipt of reactor trip with Tav_g below 564 degrees F.

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SAFETY SIGNIFICANCE:

Feedwater isolation via this function is not modeled in any USAR Chapter 15 analyses, nor is it credited in the sensitivity studies presented in WCAP-9230, "Report on the Consequences of a Postulated Main Feedline Rupture," (referenced in USAR Section 15.2.8 for the feedwater system pipe break accident). In order to satisfy the licensing basis accident analyses, feedwater isolation capability must be provided whenever the main feedwater system is in service and automatic valve closure must be provided after initiation signals from safety injection and steam generator water level high-high. These events are analyzed with the plant at hot zero power, full power or part power conditions. Feedwater isolation would be actuated by a safety injection signal for the large and small break LOCA and steamline break accidents. For the analysis of the Excessive Feedwater Flow event in USAR Section 15.1.2, continuous addition of excessive feedwater is prevented by the steam generator high-high level trip, which initiates feedwater isolation and trips the turbine and main feedwater pumps. Therefore, blocking the feedwater isolation signal on low Tavg coincident with P-4 will have no impact on any accidents previously evaluated in the USAR since the signal to be blocked has not been credited.

OPERATING EXPERIENCE/PREVIOUS EVENTS:

As indicated above, WCNOG procedures have allowed defeating the feedwater isolation signal on low Tavg coincident with P-4 in MODE 3 since 1994.