

# WOLF CREEK

NUCLEAR OPERATING CORPORATION

Matthew W. Sunseri  
Vice President Operations and Plant Manager

January 7, 2010

WO 10-0001

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

Subject: Docket No. 50-482: Licensee Event Report 2009-009-00,  
Defeating Feedwater Isolation on Low  $T_{avg}$  Coincident with P-4  
Function Results in Missed Mode Change

Gentlemen,

The enclosed Licensee Event Report (LER) is being submitted in accordance with 10 CFR 50.73, "Licensee event report system," paragraph (a)(2)(i)(B) as a condition prohibited by the plant's Technical Specifications (TS). The LER involves 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 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, 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, "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. Therefore, 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.

JE22  
NRR

There are no commitments in this submittal. If you have any questions concerning this matter, please contact me at (620) 364-4008, or Mr. Richard D. Flannigan, Manager Regulatory Affairs at (620) 364-4117.

Sincerely,

A handwritten signature in black ink, appearing to read "M W Sunseri". The letters are cursive and somewhat stylized.

Matthew W. Sunseri

MWS/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 infocollects@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 Tavq 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	00	01	07	2010		05000
									FACILITY NAME	DOCKET NUMBER
										05000

<b>9. OPERATING MODE</b> 3	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§:</b> (Check all that apply)									
<b>10. POWER LEVEL</b> 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 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 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
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**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

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b> MONTH: _____ DAY: _____ YEAR: _____
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**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 Tavq coincident with P-4 Function using procedure SYS SB-122, "Enabling/Disabling P-4/Lo Tavq 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 0840 hours the jumpers installed for defeating the feedwater isolation on low Tavq coincident with P-4 function were removed and procedure SYS SB-122 completed.

The Nuclear Regulatory Commission (NRC) Resident questioned the defeating of the feedwater isolation on low Tavq 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 Tavq 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 Tavg coincident with P-4 Function [EIS: JC] using procedure SYS SB-122, "Enabling/Disabling P-4/Lo Tavg 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 Tavg 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 Tavg 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 Tavg 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 Tavg 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). As such, review of this event 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.

**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 Tavg 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 Tavg coincident with P-4 function was not considered to be required for P-4 interlock operability per TS Table 3.3.2-1.

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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<sub>g</sub> 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<sub>g</sub>;
- 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<sub>g</sub> 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<sub>g</sub> is less than or equal to 564 degrees F. The feedwater isolation on low Tav<sub>g</sub> 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<sub>g</sub> 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<sub>g</sub> 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<sub>g</sub> coincident with reactor trip.

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<sub>g</sub> 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<sub>g</sub> 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.

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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<sub>g</sub> 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<sub>g</sub> 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<sub>g</sub> 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<sub>g</sub> 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<sub>g</sub> 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<sub>g</sub> 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<sub>g</sub> below 564 degrees F.

**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 Tav<sub>g</sub> 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.

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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.