

# WOLF CREEK

NUCLEAR OPERATING CORPORATION

Terry J. Garrett  
Vice President, Engineering

December 7, 2006

ET 06-0056

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

Subject: Docket No. 50-482: Licensee Event Report 2006-003-00,  
Indications Discovered on Pressurizer during Preplanned In-service  
Inspections

Gentlemen:

During preplanned in-service examination of the pressurizer nozzle to safe-end dissimilar metal welds, five circumferential indications were discovered. These circumferential flaw indications were smaller than critical flaw sizes reported in Material Reliability Program (MRP) safety assessments. However, Wolf Creek Nuclear Operating Corporation (WCNOC) conservatively assumed the flaws to be unacceptable and installed preplanned full structural weld overlays for repair of the flaws. Therefore, the enclosed Licensee Event Report (LER) 2006-003-00 is being submitted pursuant to 10 CFR 50.73(a)(2)(ii)(A), as a condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded.

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4084, or Mr. Kevin Moles at (620) 364-4126.

Very truly yours,



Terry J. Garrett

TJG/rtt

Enclosure

cc: J. N. Donohew (NRC), w/a  
B. S. Mallett (NRC), w/a  
G. B. Miller (NRC), w/a  
Senior Resident Inspector (NRC), w/a

TE22

# 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: 50 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.

<b>1. FACILITY NAME</b> WOLF CREEK GENERATING STATION	<b>2. DOCKET NUMBER</b> 05000 482	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
Indications Discovered on Pressurizer During Preplanned In-service Inspections

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
10	11	2006	2006	- 003 -	00	12	07	2006	FACILITY NAME	DOCKET NUMBER
										05000
										05000

<b>9. OPERATING MODE</b> 5	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§:</b> (Check all that apply)			
<b>10. POWER LEVEL</b> 0	<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 checked="" 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 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 Kevin J. Moles, Manager Regulatory Affairs	TELEPHONE NUMBER (Include Area Code) (620) 364-4126
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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	AB	PZR	West	Y					

<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 October 11, 2006, at approximately 12:40 Central Standard Time, Engineering personnel performing pre-planned in-service examination of the pressurizer nozzle to safe end dissimilar metal (DM) welds reported the identification of five circumferential flaw indications. Three indications were located in the surge nozzle DM weld, one indication was in the "C" safety nozzle DM weld, and one indication was in the relief nozzle DM weld. The locations are part of the Reactor Coolant System (RCS) pressure boundary. There was no evidence of RCS pressure boundary leakage. The most probable mechanism responsible for the indications is primary water stress corrosion cracking (PWSCC).

Wolf Creek Generating Station was shutdown for its 15th refueling outage and was in Mode 5, cold shutdown. Weld overlay of the safe end DM welds on the pressurizer was an activity scheduled for the Refuel 15 outage. Weld overlay repairs of the flaw indications were performed prior to the unit's return to power operations.

The safety significance of this event is low. These circumferential flaw indications were smaller than critical flaw sizes reported in Material Reliability Program, MRP-113. Although welds may be susceptible to PWSCC that can result in small leaks, industry experience with PWSCC shows that complete failure of the weld joints is considered to be very unlikely.

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**17. NARRATIVE** (If more space is required, use additional copies of NRC Form 366A)

Plant Conditions Prior to the Event:

MODE – 5  
Power – 0 percent

Event Description:

Wolf Creek Nuclear Operating Corporation (WCNOC) performed pre-planned inservice examinations of the nozzle to safe-end dissimilar metal (DM) butt welds and safe-end to pipe stainless steel butt welds on the safety, relief, spray, and surge line connections to the pressurizer during Refueling Outage 15 in October 2006. The examinations for the DM and stainless steel butt welds used Performance Demonstration Initiative (PDI) qualified ultrasonic examination (UT) procedures. On October 11, 2006, at approximately 12:40 Central Standard Time, Engineering personnel notified the Control Room that five circumferential flaw indications had been discovered. Three indications were located in the surge nozzle DM weld, one indication was in the "C" safety nozzle DM weld, and one indication was in the relief nozzle DM weld. The locations are part of the Reactor Coolant System (RCS) pressure boundary. The indications were at or very near the pipe inside diameter (ID) and there was no evidence of RCS pressure boundary leakage. A complete description of the flaw indications was provided to the NRC in WCNOC letter ET 06-0049, dated November 29, 2006. Weld overlay of the safe-end DM welds on the pressurizer was an activity scheduled for Refueling Outage 15, subsequent to the pre-planned inservice examinations. The weld overlays were installed prior to the unit's return to power operations.

Basis for Reportability:

10CFR50.72(b)(3)(ii)(A) requires reporting of any event or condition that results in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded. NUREG –1022 provides an example of welding or material defects in the primary coolant system which cannot be found acceptable under ASME Section XI. Since the indications were not acceptable under ASME Section XI inservice flaw acceptance standards, WCNOC made an eight hour Emergency Notification System call in accordance with 10 CFR 50.72(b)(3)(ii)(A).

The industry, through the Material Reliability Program (MRP), has performed safety assessments that have bounded the identified flaw indications, i.e., these flaw indications were smaller than critical flaw sizes reported in MRP-113, "Alloy 82/182 Pipe Butt Weld Safety Assessment for US PWR Plant Designs". However, WCNOC did not perform flaw evaluations to specifically determine the acceptability of the flaw indications and conservatively assumed the flaws to be unacceptable and installed pre-planned full structural weld overlays for repair of the flaws. Therefore, the flaw indications are assumed to be a condition that resulted in the nuclear power plant, including its principal safety barriers, being seriously degraded, resulting in a reportable condition.

This condition is also reportable pursuant to 10 CFR 50.73(a)(2)(ii)(A) for any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded.

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17. **NARRATIVE** (If more space is required, use additional copies of NRC Form 366A)

Root Cause:

The most probable mechanism responsible for the indications found on the pressurizer relief, safety, and surge nozzle DM butt welds is PWSCC. The characteristics of the indications determined by UT examination and their location in PWSCC susceptible materials are consistent with PWSCC in welds that contain Alloy 600/82/182.

Corrective Actions:

Corrective actions taken to correct the indications were:

1. Installed full structural repair weld overlays on the three nozzle to safe-end DM butt welds with reported flaw indications.
2. The weld overlay of each nozzle to safe-end DM weld would preclude future examination of the adjacent stainless steel safe-end to pipe weld due to the close proximity of the two welds. Therefore, weld overlays were also installed as follows: (a) Full structural repair weld overlays were installed on the adjacent stainless steel safe-end to piping butt welds where pre-weld overlay examination included less than 90% of the code required examination volume; and (b) preemptive full structural weld overlays were installed on the remaining adjacent stainless steel safe-end to piping butt welds.
3. Installed preemptive full structural weld overlays to the remaining pressurizer nozzle to safe-end DM butt welds to mitigate further susceptibility of the DM welds to PWSCC.

Safety Significance:

The identified flaw indications are a degradation of the RCS pressure boundary but were not through wall and therefore, did not result in any through wall leakage. The industry, through the Materials Reliability Program, performed safety assessments that have bounded the identified degradation. Therefore, these welds were capable of performing their required passive pressure boundary function.

Though less likely than axial cracks, PWSCC can cause circumferential cracks. The residual stresses and material microstructure are very unlikely to be uniform around the circumference of the weld because of inherent variations in the welding process. Because the rates of crack initiation and propagation depend on stress and microstructure, the cracks form at different times and grow at different rates around the pipe circumference. Thus, only a small circumferential length of the crack grows through wall causing a leak before the average depth of the crack around the circumference affects the structural integrity of the weld joint. Therefore, sudden rupture of a pressurizer attachment weld is considered to be very unlikely.

Industry experience of PWSCC crack growth shows there would be time available for detection of a leak within the range of installed leakage detection allowing for orderly plant shutdown to repair the weld. The likelihood of failure to detect and appropriately respond to a small leak, before it might propagate to allow significant RCS leakage, is low.

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

Operating Experience/Previous Events:

LER 2005-002-00 reported a condition where evidence was found of boric acid deposits indicating a leak in a weld in the steam generator (SG) C and D lower head bowl drain lines. These conditions were attributed to PWSCC and the lower head bowl drain lines were repaired. In addition, the same preventative measure was taken for the lower head drain lines on SGs A and B.