

# WOLF CREEK

NUCLEAR OPERATING CORPORATION

Britt T. McKinney  
Site Vice President

JAN 15 2004

WO 04-0004

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

Subject: Docket No. 50-482: Licensee Event Report 2003-004-00, Failure of  
Safety Injection Accumulator Vent Line.

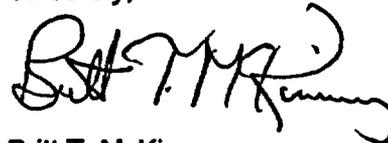
Gentlemen:

The enclosed Licensee Event Report (LER) 2003-004-00 is being submitted pursuant to 10 CFR 50.73(a)(2)(ii)(A) regarding Reactor Coolant System leakage at Wolf Creek Generating Station.

Wolf Creek Nuclear Operating Corporation has made no commitments in the enclosed LER.

If you should have any questions regarding this submittal, please contact me at (620) 364-4112 or Mr. Kevin Moles at (620) 364-4126.

Sincerely,



Britt T. McKinney

BTM/rlg

Enclosure

cc: J. N. Donohew (NRC), w/e  
D. N. Graves (NRC), w/e  
B. S. Mallett (NRC), w/e  
Senior Resident Inspector (NRC), w/e

IE22

**LICENSEE EVENT REPORT (LER)**

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

Estimated burden per response to comply with this mandatory information 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 Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to [tjs1@nrc.gov](mailto:tjs1@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NE08-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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> 05000482	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
FAILURE OF SAFETY INJECTION ACCUMULATOR VENT LINE

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	17	2003	2003	004	00	01	15	2004		05000
									FACILITY NAME	DOCKET NUMBER
										05000

<b>9. OPERATING MODE</b> 5	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>									
<b>10. POWER LEVEL</b> 0	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)						
	20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)						
	20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)						
	20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)						
	20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER	Specify in Abstract below or in NRC Form 366A					
	20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)							
	20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)							
	20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)							
	20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)							
	20.2203(a)(3)(i)	<input checked="" type="checkbox"/>	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)						

**12. LICENSEE CONTACT FOR THIS LER**

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	BQ	PSX	W120	Yes					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>				<b>15. EXPECTED SUBMISSION DATE</b>				
YES (if yes, complete EXPECTED SUBMISSION DATE)				<input checked="" type="checkbox"/>	NO	MONTH	DAY	YEAR

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

On November 17, 2003, during Wolf Creek Generating Station (WCGS) refueling outage number 13, a non-licensed Nuclear Station Operator observed water leaking approximately 25 to 30 drops per minute from the ASME Code Class 2, 3/4-inch line upstream of Safety Injection (EP) system valve EPV0109. This is the 3/4-inch vent line on the combined SI/RHR outlet piping to EP Accumulator Tank D. The Reactor Coolant System (RCS) leakage constitutes degradation of a principal safety barrier and is considered reportable to the requirements of 10 CFR 50.73(a)(2)(ii)(A), "Degraded or Unanalyzed Condition." Conditions that represent welding or material defects in the primary coolant system which cannot be found acceptable under ASME Section XI standards are reportable to this criterion.

The cracked vent line and associated socket weld were removed and repaired on November 18, 2003. The completed weld repair was inspected, tested and found acceptable.

Initial evaluation concluded that this was a fatigue crack initiating from a filing groove that induced a stress concentration that, after several years of cycling, propagated through the vent line.

The safety significance of this event is low. The RCS leakage that resulted from the cracked vent line is within the capability of reactor makeup systems and a complete failure is bounded by the plant Loss of Coolant Accident (LOCA) analysis.

**LICENSEE EVENT REPORT (LER)**

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		2003	- 004	- 00	

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

**Background:**

The Safety Injection (EP) System [EIS Code: BQ] functions to deliver borated water from an accumulator tank installed on each Reactor Coolant System (RCS) [EIS Code: AB] cold leg during the post-LOCA injection phase in order to mitigate the consequences of a design basis accident (DBA). Each accumulator is connected to its respective RCS cold leg piping through a ten-inch pipe. Accumulators A, B, and D are equipped with a 3/4-inch manual fill and/or vent valve, used to support maintenance activities for the accumulator, connected to the six inch return lines from the EP and Residual Heat Removal (RHR) System [EIS Code: BP] pump return lines, which then connect to the ten-inch accumulator discharge line. This 3/4-inch manual valve is connected directly to the ten-inch accumulator discharge line for accumulator C. In each case, a 3/8-inch diameter orifice is drilled into the fitting at the vent piping connection and defines the boundary between the American Society of Mechanical Engineers (ASME) Code Class 1 RCS piping and the ASME Code Class 2 accumulator vent piping. By design, these orifices ensure that flow through this line in the event of a catastrophic guillotine-type break is within the capability of the reactor makeup water systems. The vent valves are normally closed and a closure flange is installed during normal operation. Valve EPV0109 is the 3/4-inch vent valve for the accumulator tank TEP01D.

**Plant Conditions Prior to the Event:**

Mode - 5

Power - 0%

RCS Pressure was approximately 345 PSIG. RCS Temperature was approximately 125 degrees F. The "A" train of the RHR System was providing shutdown cooling.

**Event Description:**

On November 17, 2003, during Wolf Creek Generating Station (WCGS) refueling outage number 13, a non-licensed Nuclear Station Operator observed water leaking approximately 25 to 30 drops per minute from the 3/4-inch line downstream of the drilled 3/8-inch orifice in the pipe and upstream of the EP system valve EPV0109. This is the ASME Code Class 2, 3/4-inch vent line on the combined SI/RHR outlet piping to the "D" EP accumulator tank.

**Basis for Reportability:**

This condition constitutes degradation of a principal safety barrier and is considered reportable to the requirements of 10 CFR 50.73(a)(2)(ii)(A), "Degraded or Unanalyzed Condition." Guidance provided in section 3.2.4 of NUREG 1022, Revision 2, states that conditions that represent "welding or material defects in the primary coolant system which cannot be found acceptable under ASME Section XI, IWB-3600, "Analytical Evaluation of Flaws" or ASME Section XI, Table IWB-3410-1, 'Acceptance Standards,' are reportable to this criterion."

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

**Root Cause:**

The apparent root cause of this event is that a groove at the toe of the weld induced a stress concentration region that, after several years of cycling, propagated in a fatigue crack which eventually moved inward through the piping wall. The crack was determined to be circumferential, approximately 3/8-inch long, and located at the toe of the ASME Code Class 2 socket weld FW508. Preliminary evaluation of the weld indicates that the groove most likely occurred when the weld was prepared for the required surface examination during plant initial construction.

The affected piping and the weld have been removed and sent for hardware failure analysis to confirm the hypothesis of a groove initiated stress concentration region resulting in a crack aggravated by fatigue.

**Corrective Actions:**

The weld was mechanically removed and a weld repair was completed per ASME Code Section XI on November 18, 2003. The repair shortened the vent piping by approximately 1.5 inches, resulting in an increase in the resonant frequency of the cantilever bending mode for the piping, thus reducing the vulnerability of fatigue cracks in this area. Following the completion of these repairs, a liquid penetrant test of the completed repairs was performed per ASME Section III requirements and found acceptable.

On November 28, 2003, following completion of the weld repair, flow was restored through the EP and RHR systems. With RHR flow established at 2200 gallons per minute through the main 6-inch piping run, three vibration readings were taken at the top and bottom of the vent line. Evaluation of the data collected indicates that the stresses resulting from vibrational displacement on the vent line are within the allowable limits.

Piping configurations for the A, B, and C accumulators were examined to determine if a similar condition exists on any of the pipe connections for the respective vent connections. Vent valve EPV0067 for the C accumulator has a similar configuration to that of EPV0109, however it is cantilevered off ten-inch piping, whereas EPV0109 is cantilevered off six-inch piping, and is therefore not subject to the same cyclic stresses. While there are numerous vent/drain valve connections of the same configuration type throughout the power block, each socket weld itself has a unique geometry and is not expected to exhibit the same stress characteristics as the EPV0109 socket weld.

**Safety Significance:**

The safety significance of this event is low. A 3/8-inch diameter orifice at the vent piping connection to the main piping run ensures that flow through this line in the event of a catastrophic guillotine-type break is within the capability of the reactor makeup water systems. Such a failure is bounded by the plant Loss of Coolant Accident (LOCA) analysis.

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

**Previous Occurrences:**

A search was performed of Licensee Event Reports (LERs) at WCNOG since January 1998 using key words cyclic fatigue failure, socket welds, pipe leakage, and fatigue cracks. No LERs were identified. A search of internal operating experience identified three events related to small-bore piping and piping weld cracks at WCGS. None of these events were related to cracks resulting from grooves or other weld flaws determined to be the result of grinding.