

# WOLF CREEK

NUCLEAR OPERATING CORPORATION

Clay. C. Warren  
Vice President Operations Support

AUG 11 2000

CO 00-0045

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Mail Station P1-137  
Washington, D. C. 20555

Reference: Letter CO-0035 dated June 23, 2000, from C. C. Warren, WCNOG, to USNRC

Subject: Docket No. 50-482: Licensee Event Report 2000-002-01

Gentlemen:

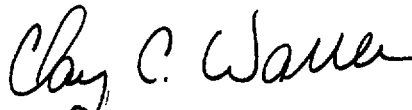
The Reference submitted Licensee Event Report (LER) 2000-002-00, pursuant to 10 CFR 50.73(a)(2)(i)(B), regarding identification by Wolf Creek Generating Station (WCGS) personnel of a condition that resulted in violation of post-Amendment 123 WCGS Technical Specification (TS) 3.4.15, "Reactor Coolant System (RCS) Leakage Detection Instrumentation," and pre-Amendment 123 WCGS TS 3.4.6, "Reactor Coolant Leakage Detection Systems."

The enclosed supplemental LER 2000-002-01 provides additional information regarding the basis for reportability, event description, significance, and corrective actions associated with LER 2000-002-00, and documents historical entry into TS Limiting Condition for Operation (LCO) 3.0.3, which is also reportable under the provisions of 10 CFR 50.73(a)(2)(i)(B).

The attachment to this letter identifies the actions committed to by Wolf Creek Nuclear Operating Corporation (WCNOG) in the enclosed LER.

If you should have any questions regarding this submittal, please contact me at (316) 364-4048, or Mr. Tony Harris at (316) 364-4038.

Very truly yours,

  
Clay C. Warren

CCW/rtr

Enclosure  
Attachment

cc: J. N. Donohew (NRC), w/e, w/a  
W. D. Johnson (NRC), w/e, w/a  
E. W. Merschoff (NRC), w/e, w/a  
Senior Resident Inspector (NRC), w/e, w/a

IE22

**LICENSEE EVENT REPORT (LER)**

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

**APPROVED BY OMB NO. 3150-0104 EXPIRES  
06/30/2001**

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If 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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**TITLE (4)**  
Loss of Containment Total Unidentified Leak Rate Computer Point Operability

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV. NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	24	2000	2000	002	01	08	11	2000	FACILITY NAME	DOCKET NUMBER
<b>OPERATING MODE (9)</b>		<b>MODE 1</b>		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)						
POWER		100%		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
<b>LEVEL (10)</b>				20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
				20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
				20.405(a)(1)(iii)		x		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)
				20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
				20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

**LICENSEE CONTACT FOR THIS LER (12)**

**NAME**  
Karl A. (Tony) Harris  
Manager Regulatory Affairs

**TELEPHONE NUMBER (Include Area Code)**  
(316) 364-4038

**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

**SUPPLEMENTAL REPORT EXPECTED (14)**

YES	X	NO	<b>EXPECTED SUBMISSION DATE (15)</b>	<b>MONTH</b>	<b>DAY</b>	<b>YEAR</b>

**ABSTRACT (16):**

On May 24, 2000, Wolf Creek Generating Station (WCGS) operators identified that the Nuclear Plant Information System (NPIS) computer point LFU0769, "Containment Total Unidentified Leak Rate," had been inoperable since April 2, 2000, at 0300 Daylight Savings Time (DST), following the change to DST. This condition violated the Limiting Condition of Operation (LCO) requirements and actions of WCGS post-Amendment 123 Technical Specification (TS) 3.4.15. Investigation determined that the condition had also occurred historically, violating pre-amendment 123 TS 3.4.6. Review also identified an April 17, 1995, entry into the conditions of LCO 3.0.3 that was not previously recognized, identified, and reported. These events are reportable in accordance with 10 CFR 50.73 (a)(2)(i)(B) and NUREG-1022, Revision 1, "Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73." An error in vendor supplied software caused leak rate calculations to be suspended whenever a DST change occurred, and both vendor and WCGS Acceptance Tests did not verify that leak rate calculations were unaffected by DST-related time changes. Inadequate use of the Qualification, Validation, and Verification (QV&V) process by the WCGS NPIS Project Team members is a root cause of this failure. Corrective actions include evaluation of NPIS software, investigation of the classification and grading of software, and a review of the potential concurrent inoperability of systems. There was minimal impact on safety from this condition, as safety function was not lost.

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

**Plant Conditions Prior to the Event:**

Mode -- 1

Power -- 100 percent

Temperature -- 586.2 degrees Fahrenheit

Pressure -- 2238.2 pounds per square inch gauge

**Basis for Reportability:**

As discussed in NUREG-1022, Revision 1, if the conditions, required actions, and associated Limiting Condition for Operation (LCO) completion times of technical specifications are not met, then the event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B).

Wolf Creek Generating Station (WCGS) Technical Specification (TS) 3.4.15 requires the Containment Sump Level and Flow Monitoring System to be operable when the plant is in Modes 1, 2, 3, and 4. With the system inoperable, LCO 3.4.15 requires that Surveillance Requirement 3.4.13.1 "Reactor Coolant System (RCS) Water Inventory Balance" be performed once per 24 hours. LCO 3.4.15 also requires that the system be restored to operable status within 30 days. If either of these conditions is not accomplished, then the plant must be in Mode 3 within 6 hours and in Mode 5 within 36 hours.

On April 2, 2000, clock time at WCGS was changed from 0200 hours Central Standard Time (CST), to 0300 hours Daylight Savings Time (DST). From the time of the change on April 2, 2000, until discovery on May 24, 2000, WCGS was continuously in Mode 1 and the Nuclear Plant Information System (NPIS) was not performing calculations of the leak rate into the containment normal sumps and the containment instrument tunnel sump. Nominally, NPIS software recalculates these leak rates every 15 minutes based on sump level changes. Without these calculations, the Containment Sump Level and Flow Monitoring System was inoperable. This inoperable condition was not identified when it occurred, and the LCO 3.4.15 requirements and action statements for RCS Leakage Detection Instrumentation were not met.

Subsequent review of historical operating data showed this inoperable condition also occurred in 1992 through 1999, when the plant shifted to and from DST. During this period, only in April through May of 1995 did the inoperable condition exceed the 30 day provision of pre-Amendment 123 WCGS TS "Leakage Detection Systems" LCO 3.4.6.1. The inoperable condition was not identified when it occurred, and the requirements and action statements for LCO 3.4.6.1 were not met. Thus, the 1995 and 2000 events are reportable under the provisions of 10 CFR 50.73(a)(2)(i)(B).

Additionally, it was identified that during the 1995 event, on April 17, 1995, Containment Radiation Monitors GT RT-31 and -32 were both placed in bypass for 31 minutes. With these monitors bypassed, both the gaseous and particulate radiation monitor systems were inoperable at the same time as the Containment Sump Level and Flow Monitoring System. This left only one detection system operable, and caused WCGS to be outside the action statement of pre-Amendment 123 LCO 3.4.6.1, thereby requiring entry into LCO 3.0.3. Entry into LCO 3.0.3 is also reportable under the provisions of 10 CFR 50.73(a)(2)(i)(B), and is the reason for this supplemental LER.

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**Event Description:**

On May 24, 2000, WCGS licensed reactor operators questioned why Nuclear Plant Information System (NPIS) computer point LFU0708, "Containment Sump Total Leak Rate," was not updating as expected while the containment sump pumps were running. This LFU0708 NPIS computer point provides input to computer point LFU0769, "Containment Total Unidentified Leak Rate," which is required to be operable in accordance with WCGS TS 3.4.15, "RCS Leakage Detection Instrumentation." WCGS Information Services (IS) personnel investigated, and subsequently discovered that the LFU0708 point had been inoperable since changing to Daylight Savings Time (DST) on April 2, 2000, at 0300. WCGS Information Services personnel immediately stopped and restarted both NPIS central processing units (CPUs) on May 24, 2000, and verified that the containment leak rate points were restored to an operable status. This action restored the updating of leak rate calculations, including computer points LFU0708 and LFU0769.

Examination of the NPIS subroutines involved in calculations of leak rates into these sumps identified that the lines of code involved in this event date from an NPIS upgrade in 1991. Review of operating data has shown that the same problem with the calculation of leak rate into containment sump occurred in 1992, 1993, 1994, 1995, 1996, 1997, 1998, and 1999, when the plant shifted to and from DST. Only in April through May of 1995 did the inoperable condition exceed the 30 day provision of pre-Amendment 123 WCGS TS "Leakage Detection Systems" LCO 3.4.6.1.

Additionally, a review of pre-amendment 123 TS 3.4.6.1 system operability identified that during the 1995 event, on April 17, 1995, Containment Radiation Monitors GT RT-31 and -32 were both placed in bypass for 31 minutes. With these monitors bypassed, both the gaseous and particulate radiation monitoring systems were inoperable at the same time as the Containment Sump Level and Flow Monitoring System. This left only one detection system operable, and caused WCGS to be outside the action statement of pre-Amendment 123 LCO 3.4.6.1, thereby entering the conditions of LCO 3.0.3. When an LCO is not met, or its associated actions are not met, then TS LCO 3.0.3 requires that within one hour action must be initiated to place the unit in a MODE in which the TS does not apply (in this instance, HOT STANDBY within 24 hours), or that corrective measures must be completed that permit operation under the LCO action statement. In this event, WCGS inadvertently corrected the condition requiring TS LCO 3.0.3 entry within 31 minutes, when the Containment Radiation Monitors were returned to service.

**Root Cause:**

WCGS Performance Improvement Request (PIR) 2000-1570 was initiated and used to document evaluation of the problem, root causes of the event, and to identify and document appropriate corrective actions. These evaluations determined that:

1. Science Applications International Corporation (SAIC) did not meet contract requirements for NPIS software in 1991. An error in the software caused leak rate calculations to be suspended whenever a DST-related time change occurred. In addition, the SAIC Factory Acceptance Test did not verify that leak rate calculations were unaffected by DST-related time changes. Due to the historical nature of this concern, the root causes for this SAIC programming error and inadequate Factory Acceptance Test are unknown.

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2. The Site Acceptance Test of NPIS software by WCGS personnel was inadequate in that it failed to verify that leak rate calculations were unaffected by DST-related time changes. Inadequate use of the Qualification, Validation and Verification (QV&V) process by the WCGS NPIS Project Team members in 1991 is the root cause of this failure.

**Corrective Actions Taken:***Immediate Corrective actions:*

- Information Services personnel immediately stopped and restarted (rebooted) both NPIS central processing units (CPUs) on May 24, 2000, and verified that the containment leak rate points were restored to an operable status. This action restored the updating of leak rate calculations, including computer points LFU0708 and LFU0769.
- WCGS personnel reviewed operating logs and equipment-out-of-service logs for the years 1992, 1993, 1994, 1995, 1996, 1997, 1998, and 1999, to determine whether or not either the Containment Atmosphere Particulate Radiation Monitoring System or the Containment Atmosphere Gaseous Radiation Monitoring System was inoperable during the time that the leak rate calculations were suspended following the Spring and Fall Daylight Savings Time changes. This review determined that, for 31 minutes on April 17, 1995, both the gaseous and particulate radiation monitor systems were inoperable at the same time as the Containment Sump Level and Flow Monitoring System. This left only one detection system operable, and caused WCGS to be outside the action statement of pre-Amendment 123 LCO 3.4.6.1, thereby entering the conditions of LCO 3.0.3. No other examples of coincident inoperability were identified.

*Actions to Prevent Recurrence:*

- Information Services will review NPIS points identified in PIR 1999-3865 as being significant for coding that involves time or time interval checks or calculations. Any needed software revisions that are identified from this review will be completed and implemented before PIR 2000-1570 is closed, and will be fully documented
- in the closure of PIR 2000-1570. These changes will ensure that time changes (Central Standard Time/Daylight Savings Time) will not adversely affect calculations of leak rates into the sumps (containment normal sumps, instrument tunnel sumps, Residual Heat Removal sumps, and Auxiliary Building sumps).
- WCGS Information Services is continuing to investigate the issue of not adequately classifying/grading software to determine the scope and extent of the problem. This is an on-going corrective action previously documented in WCGS PIR 1999-3865 and in associated LER 1999-014-00, issued December 30, 1999, that also addresses the programmatic aspects of this event.

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**Safety Significance:**

*Alternate Means of RCS Leak Detection*

Post-Amendment 123 TS 3.4.15 and pre-Amendment 123 TS 3.4.6.1 state that the following RCS leakage detection systems shall be OPERABLE when the plant is in Modes 1, 2, 3, or 4:

- a) The containment sump level and flow monitoring system, and
- b) One containment atmosphere particulate radioactivity monitor, and
- c) One containment air cooler condensate monitoring system or one containment atmosphere (gaseous) radioactivity monitor.

The containment atmosphere particulate and gaseous radioactivity monitors, the containment cooler condensate flow monitoring system, and containment temperature and humidity indications provide alternate means for Control Room operators to detect RCS leakage. RCS leakage rates of the magnitude necessary to be detectable by increased sump levels or more frequent sump pump operation are expected to be noted first by the more sensitive radiation and moisture detection equipment.

Gross leakage can be detected by the charging pump flow method (which uses charging flow rate, letdown flow rate, pressurizer level and reactor coolant temperatures), as well as by monitoring pressurizer level and unscheduled increases in the amount of reactor makeup water required to maintain the normal level in the pressurizer. In addition, surveillance test STS BB-004, "RCS Water Inventory Balance" is performed every 48 hours during Modes 1 through 4. This surveillance test does not rely on calculated computer points, and is totally independent of the containment sumps. The surveillance enables calculation of both RCS identified and unidentified leakage, to determine whether they meet the acceptance criteria (no more than 10 gallons per minute [gpm] identified, and no more than 1 gpm unidentified). This surveillance satisfies Technical Specification Surveillance Requirement SR 3.4.13.1. Since plant startup, minor RCS leakage above the acceptance limits has been identified by this surveillance. In each case, the leaks were isolated and repaired in accordance with established WCNOG procedures.

*Actual Impact*

There has been no impact on plant or personnel safety, or to the health and safety of the public. The problem that caused 15-minute updates of the leak rate calculations to be suspended did not prevent identification of leaks into the containment sump. NPIS point LFU0769 "Containment Total Unidentified Leak Rate" continued to be updated; it changed when another input to LFU0769, LFU0705 "Containment Cooler Total Unidentified Leak Rate," changed. On April 27, 2000, leakage from a blowdown valve was detected because the operating crew identified an increase in LFU0769.

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**Potential Impact**

Failure to detect RCS leakage could potentially result in an unanalyzed condition involving unidentified RCS leakage in excess of that assumed in the safety analyses. The assumption of 1 gpm unidentified leakage detection in the safety analyses is used to develop radiological source term information for dose consequence calculations. However, as described above, other available indications have been used since initial plant startup for licensed reactor operators to detect greater than 1 gpm unidentified leakage from RCS pressure boundary degradation. Also, diverse Control Room indicators, redundant with indications from calculated computer points, are available to assure continued safe plant operation. Therefore, the suspension of sump leak rate calculations that occurred during the years of 1992 through 2000, and the brief inoperability of the gaseous and particulate monitoring systems in 1995, had minimal potential impact on RCS leakage detection and on the associated safety analyses.

**Significance Determination Results**

RCS leak detection system instrumentation is not modeled in the Wolf Creek Probabilistic Safety Assessment (PSA). Failure of these detection channels has no impact on systems credited in the prevention or mitigation of core damage. Therefore, there is no change in the core damage frequency from these detection channels and/or process computer points, and safety function was not lost. This event screened "GREEN" using NRC Inspection Manual Chapter 0609, "Significance Determination Process."

Based on the above evaluations of alternate means of detection, potential and actual impact, and significance determination, safety function was not adversely affected; therefore, there was minimal impact on safety from this condition.

**Other Previous Occurrences:**

Previous LERs were reviewed for the years 1997, 1998, and 1999, for events of similar root cause; that is, the failure of a vendor to meet procurement specification combined with a failure of WCGS personnel to adequately verify the product to the specification. LER 1999-014-00, issued on December 30, 1999, also identified a concern with vendor factory acceptance testing and WCGS site acceptance test methodology. While the LER 2000-002-00/2000-002-01 event and the LER 1999-014-00 event had similar contributing factors, the nature of the software errors was different, and the corrective actions for the 1999-014-00 event would not have prevented the LER 2000-002-00/2000-002-01 event.

No other LERs were found which identified this same root cause; however, LER 1999-013-00 identified a similar contributing factor of a failure to re-validate and re-verify a computer program of the Chemistry Data Management System after changing a software quality assurance procedure. Due to the historical nature and different context of the events, the corrective action for LER 1999-013-00 would not have precluded this LER 2000-002-00/2000-002-01 event.

**LIST OF COMMITMENTS**

The following table identifies those actions committed to by Wolf Creek Nuclear Operating Corporation (WCNOC) in this document. Any other statements in this submittal are provided for information purposes and are not considered to be commitments. Please direct questions regarding these commitments to Mr. Tony Harris, Manager Regulatory Affairs at Wolf Creek Generating Station, (316) 364-4038.

COMMITMENT	Due Date/Event
Information Services will review NPIS points identified in PIR 1999-3865 as being significant for coding that involves time or time interval checks or calculations. Any needed software revisions that are identified from this review will be completed and implemented before PIR 2000-1570 is closed, and will be fully documented in the closure of PIR 2000-1570.	The review and Implementation of any needed software revisions will be completed by October 16, 2000. Documentation of the review and any software revisions will be completed by December 22, 2000.
WCGS Information Services is continuing to investigate the issue of not adequately classifying/grading software to determine the scope and extent of the problem. This is an on-going corrective action previously documented in WCGS PIR 1999-3865 and in associated LER 1999-014-00, issued December 30, 1999, that also addresses the programmatic aspects of this event.	December 15, 2000