WOLF CREEK
NUCLEAR OPERATING CORPORATION

Otto L. Maynard
Vice President Plant Operations

October 14, 1994

WO 94-0150

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

Subject: Docket No. 50-482: Licensee Event Report 94-010-00

Gentlemen:

The attached Licensee Event Report (LER) is being submitted pursuant to 10 CFR 50.73 (a)(2)(iv) concerning an actuation of an Engineered Safety Feature (ESF).

Very truly yours,

Otto L. Maynard

OLM/jad

Attachment

cc: L. J. Callan (NRC), w/a
D. D. Chamberlain (NRC), w/a
J. F. Ringwald (NRC), w/a
J. C. Stone (NRC), w/a

IE22
1/1

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORD REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
WOLF CREEK GENERATING STATION	05000482	1 OF 5

TITLE (4)

Engineered Safety Features Actuation due to Loss of Source Range Instrumentation

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
9	16	94	94	010	00	10	14	94	FACILITY NAME	DOCKET NUMBER

OPERATING		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
mode	4		20.402(b)		20.405(c)	X	50.73(a)(2)(iv)	X	73.71(b)
POWER	0		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)		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	TELEPHONE NUMBER (Include Area Code)
Richard D. Flannigan Manager Regulatory Services	316-364-4117

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
B	JC	CTR	Westinghouse	Yes						

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED	MONTH	DAY	YEAR
	YES (If yes, compleled EXPECTED SUBMISSION DATE)	X	NO				

ABSTRACT

On September 16, 1994, at 1812 (CDT), with Wolf Creek Generating Station in Mode 4, cooling down in preparation for refueling, Source Range Instrument SE N-31 was declared inoperable due to indicated counts increasing while there was no increase to input counts. Source Range Instrument SE N-32 exhibited the same characteristics and was declared inoperable at 0555 on September 17, 1994. The Shift Supervisor entered Technical Specification 3.3.1, Action Statement 5 b., and opened the Reactor Trip Breakers as required. When the Reactor Trip Breakers were opened, the Engineered Safety Features Actuation Signal for Main Feedwater Isolation was actuated and the Main Feedwater Isolation valves closed as per design.

The root cause of this event is failure of the Source Range Instrumentation due to noise disturbance. Corrective action was to replace both channels of Source Range Instrumentation, SE N-31 and SE N-32.

PLANT CONDITIONS AT THE TIME OF EVENT

Plant Operational Condition: Mode 4
Plant Power Level: 0
Reactor Coolant System Temperature: Approximately 320 degrees Fahrenheit

BASIS FOR REPORTABILITY

Technical Specification (TS) 3.3.1 requires that both Source Range Instrumentation channels be OPERABLE during shutdown (Modes 3, 4 and 5) or the actions of Action Statement 5 b. must be met. Action Statement 5 b. requires, in part, that with no channels OPERABLE the Reactor Trip Breakers be open.

On September 17, 1994, Control Room Operators opened the Reactor Trip Breakers in response to a loss of both channels of Source Range Instrumentation. When the Reactor Trip Breakers were opened, an Engineered Safety Features Actuation Signal (ESFAS) for Main Feedwater Isolation was activated and the Main Feedwater Isolation valves closed as per design. The valid actuation of an Engineered Safety Features (ESF) is reportable per 10 CFR 50.72 (b)(2)(ii) and 10 CFR 50.73 (a)(2)(iv).

DESCRIPTION OF EVENT

On September 16, 1994, at 1812 (CDT), with Wolf Creek Generating Station (WCGS) in Mode 3, cooling down in preparation for refueling, Control Room Operators observed that the indicated counts for Source Range Instrument SE N-31 were increasing even though there was no increase in the input counts as verified by Source Range Instrument SE N-32 and Gamma-Metrics. (One channel of the Gamma-Metric Neutron Flux Monitoring System provides source range (0.1 to 10^5 cps) and wide range (10^{-8} to 200% power) indication in the Control Room. The second channel provides source and wide range indication at the Auxiliary Shutdown Panel.) Pending evaluation by Engineering, Source Range Instrument SE N-31 was conservatively declared inoperable at 1812, and Technical Specification 3.3.1 was entered and the actions for Action Statement 5 a. completed.

On September 17, 1994, at 0555, with WCGS in Mode 4, Source Range Instrument SE N-32 indicated increased counts resulting in a Flux Doubling signal which caused the charging pump suction from the Volume Control Tank (VCT) to swap over to the Refueling Water Storage Tank (RWST). Source Range Instrument SE N-32 was declared inoperable and the Shift Supervisor contacted Chemistry personnel and requested them to sample the Reactor Coolant System (RCS) to verify that no RCS dilution had occurred. At 0856, the required four hour notification phone call was made to the NRC Operations Center.

At 0618, in response to both Source Range Instrumentation channels being inoperable, and as directed per TS 3.3.1 Action Statement 5 b., Control Room Operators opened the Reactor Trip Breakers and an anticipated ESF Main Feedwater Isolation occurred. Per TS 3.3.1 Action Statement 5 b., valves BG-V178, "Reactor Makeup Water to Chemical Mix Tank/Boric Acid Blending Isolation Valve," and BG-V601, "Reactor Makeup Water to the Boric Acid Blending Tank Upstream Isolation Valve," were locked closed; the SHUTDOWN MARGIN was verified; and activities which could cause positive reactivity changes were suspended. At 0635, Chemistry personnel reported to Control Room Operators that at 0610 the RCS was at 2137 ppm Boron with the minimum requirement being 1107 ppm Boron. No RCS dilution had occurred.

On September 18, 1994, at 0920, Source Range Instrument SE N-31 was declared OPERABLE once it was determined by Engineering personnel that the noise level was not large enough under actual conditions to make the boron dilution protection system inoperable. With only one Source Range Instrument OPERABLE the actions for TS 3.3.1 Action Statement 5 a. were performed.

Based on recurring noise problems with the Source Range Instrumentation channels, a permanent replacement had been planned for the seventh refueling outage, which commenced on September 16, 1994, at 0001. On September 20, 1994, at 0459, Control Room Operators entered TS 3.3.1 Action Statement 5 b., when both Source Range Instruments were declared inoperable for replacement under Work Requests 3305-94 and 3306-94. Replacement work was completed on Source Range Instrument SE N-31 at 1312 and instrument SE N-32 at 1430. Operators used Gamma-Metrics to monitor counts while the instruments were being replaced.

ROOT CAUSE

The root cause of this event was the failure of both Source Range Instruments due to high noise disturbances from design deficiencies in the cable connectors. The noise induced into the Source Range Instrumentation channels has historically been associated with temperature variances and problems with the ground strap which connects the grounds between the source and intermediate range detectors. This ground strap has been proven at other plants to produce ground loops which induce noise on the detector signal.

CORRECTIVE ACTIONS

The corrective action for this event was the replacement of the Source Range Instruments. Replacement work was completed on the Source Range Instruments on September 20, 1994.

Configuration Change Package 01085 Revision 0, and Work Requests 3305-94 and 3306-94 were initiated to change out the old Westinghouse model Source Range Instruments (WL 24157) and replace them with the new Westinghouse model (NY-10042).

The new instruments have the following improvements:

1) Thirty foot cable lengths which allow the connectors to be made up inside the junction boxes;
2) A lower operating voltage to reduce noise;
3) Titanium, instead of aluminum, outer housing to eliminate boric acid water corrosion;
4) Nickel, versus stainless steel, cable outer-shield to optimize noise rejection; and,
5) A gold plated, versus bare tungsten, center wire to reduce potential internal corrosion by gamma and high energy neutron exposure.

Additionally, Westinghouse confirmed that removing the ground strap to enhance source range performance is acceptable. This was done during the replacement work.

This was a changeout to an improved model made by the original supplier. The replacement model has been field proven at other plants for over three years and has better noise reduction characteristics. Therefore, it will decrease the probability of future Source Range Instrument failures due to noise.

SAFETY SIGNIFICANCE

In the event of a boron dilution transient, the Source Range Instruments detect a doubling of the neutron flux. This information is sent to the Solid State Protection System which automatically initiates valve movement to mitigate the event. Specifically, the suction of the charging pump is transferred from the VCT to the RWST. The RWST contains water borated to 2400 - 2500 ppm. Also, an alarm is sounded in the Control Room to indicate that Flux Doubling has occurred and valve movement has started. In the analysis of a

boron dilution event, credit is taken for instrumentation which provides for Control Room alarm and automatically initiates appropriate valve movement.

In the event described above, both Source Range Instruments were out-of-service for a period of time. During this time neutron flux was measured by Gamma-metrics. Additionally, no change in source range counts occurred during this time. Had an inadvertent boron dilution event occurred, sufficient information was available to the Control Room Operators to take action to terminate the event in a timely manner and initiate boration as required. Plant safety and public health and safety were assured throughout the event.

PREVIOUS SIMILAR OCCURRENCES

There have been no previously reportable similar occurrences.