WOLF CREEK
NUCLEAR OPERATING CORPORATION

Otto L. Maynard
Vice President Plant Operations

July 3, 1996

WO 96-0101

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 96-006-00

Gentlemen:

The attached Licensee Event Report is being submitted pursuant to 10 CFR 50.73 (a) (2) (iv) concerning Engineered Safety Features and Reactor Protection System actuations. The actuations were caused by closure of a Steam Generator Feedwater Regulating Valve due to a roll pin failure.

If you should have any questions regarding this submittal, please contact me at (316) 364-8831 extension 4450, or Mr. Terry S. Morrill at extension 8707.

Very truly yours,

Otto L. Maynard

OLM/jad

Attachment

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

JE22
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 PAPERWORK 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 7

TITLE (4)
Actuation of Engineered Safety Features Due to Failure of the "C" Steam Generator Feedwater Regulating Valve

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
06	06	96	96	006	00	07	03	96	FACILITY NAME	DOCKET NUMBER

OPERATING		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
	1		20.402(b)		20.405(c)	X	50.73(a)(2)(iv)		73.71(b)
POWER			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
	99%		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)
Terry S. Morrill Manager Regulatory Services	316-364-8831, ext. 8707

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
D	SB	Roll Pin	Copes/Vulcan	Yes						

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

ABSTRACT:

On June 6, 1996, at 1320 (CDST), a reactor trip occurred at the Wolf Creek Generating Station (WCGS). The reactor trip was caused by a "lo-lo" level in Steam Generator "C". The "lo-lo" level resulted from reduced feedwater flow to the steam generator. Subsequent investigation determined that the failure of a 3/16" roll pin in the "C" Steam Generator Main Feedwater Regulating Valve (AE-FCV-530) had allowed the valve plug to separate from the valve stem. The plug of the valve then dropped to the closed position, reducing feedwater flow through the valve. The Reactor Protection System (RPS) and the Engineered Safety Features (ESF) performed as required. The automatic actuation of the reactor trip occurred as expected, with all rods inserting fully.

WCNOC had originally replaced this roll pin with a solid pin in 1988. However, during March of 1996, WCNOC replaced valve stem assemblies with spare assemblies from the warehouse which contained roll pins instead of solid pins.

The root cause of this event was inadequate design modification procedures that failed to address stored inventory and future procurement. Following the reactor trip on June 6, 1996, the correct pins were installed in three of the four Main Feedwater Regulating Valves (MFRV). All MFWRVs now have the correct pins. Holds were placed on stored equipment; procedure changes were implemented; and a review is being performed to determine the extent of the programmatic concern.

Plant Conditions Prior to the Trip:

Operational Status = Mode 1
Reactor Coolant Temperature = 586 degrees Fahrenheit
Reactor Coolant Pressure = 2240 psig
Reactor Power = 99%

Basis for Reportability:

This report is submitted to document an automatic actuation of the Reactor Protection System (RPS) [JC] and the Engineered Safety Features (ESF) [JE]. This incident is reportable under 10CFR50.73(a)(2)(iv) which requires the Licensee to report any event or condition that resulted in manual or automatic actuation of an Engineered Safety Feature (ESF), including the Reactor Protection System (RPS).

Description of Event:

On June 6, 1996, at 1320 (CDST), a reactor [RCT] trip occurred at the Wolf Creek Generating Station (WCGS). The reactor trip was caused by a "lo-lo" level in Steam Generator [SG] "C". This "lo-lo" level resulted from reduced feedwater flow to the steam generator. The automatic actuation of the reactor trip occurred as designed, with all rods inserting fully. The Reactor Protection System (RPS) and the Engineered Safety Features (ESF) performed as required.

Subsequent investigation determined that the failure of a 3/16" roll pin in the "C" Steam Generator Main Feedwater Regulating Valve (valve number AE-FCV-530) [SJ-FCV] had permitted the valve plug to separate from the valve stem, allowing the plug of the valve to drop to the closed position, reducing feedwater flow through the valve. The roll pin that failed was originally designed to prevent the stem of the valve from rotating. This roll pin is designed to keep the threaded connection between the valve plug and the valve stem from unthreading and disengaging.

Based on a Callaway Licensee Event Report (LER 88-006-00), Plant Modification Request (PMR) 02594 was implemented in November of 1988, to replace the roll pins in the four eight inch Main Feedwater Regulating Valves. At that same time, WCNOC elected to replace the four roll pins in the four inch Main Feedwater Regulating Bypass Valves as well. This replacement of roll pins in the Bypass valves was performed as a conservative step to enhance future plant equipment reliability. The roll pins were replaced in both types of valves in November of 1988, with solid pins of 300 series stainless steel with hardness of approximately 20 RC.

In accordance with a recommendation from COPES-VULCAN, INC., the solid pins were peened over on both ends, rather than being tack welded, as was done at Callaway. This modification was reviewed and approved by both COPES-VULCAN, INC. and Westinghouse, at that time.

This WCNOC modification proved effective; however, those Main Feedwater Regulating Valve parts, and Main Feedwater Regulating Bypass Valve parts, that were stored in the warehouse, were not modified in accordance with PMR 02594. This occurred because design modification procedures failed to effectively address stored inventory and future procurement. In addition, those assemblies that were later received in the warehouse also were not modified. These assemblies also had roll pins installed, instead of the solid pins.

In March of 1996, during Refueling Outage VIII, because of stem wear in the "B", "C", and "D" Main Feedwater Regulating Valves (AE-FCV 520, 530, and 540), new stem assemblies from the warehouse were installed in these valves. These assemblies contained roll pins instead of solid pins. The stem assembly for Main Feedwater Regulating Valve "A", valve AE-FCV-510, was not replaced at that time.

The root cause investigation to this event also revealed that on May 12, 1990, the Main Feedwater Regulating Bypass Valve assemblies for valves AE-FCV-550, 560, 570, and 580 were also replaced with assemblies from the warehouse that contained roll pins. Replacing the solid pins with roll pins did not affect the performance or function of the smaller Bypass valves.

WCGS returned on-line at 1421 CDST on June 8, 1996. The plant trip outage duration was approximately forty-nine hours.

Root Cause and Corrective Actions:

Root Cause:

The root cause of this event was inadequate design modification procedures that failed to address stored inventory and future procurement. The design procedures for the roll pin modification only addressed the parts installed in the plant. WCNOC's procedures for design modification did not assure that the parts stored in the warehouse, and the additional parts that were purchased later, conformed to the design modification.

Although roll pins in the field-installed equipment, were replaced with solid pins in November of 1988, those parts that were originally stored in the warehouse, and those parts that were later received in the warehouse, were not verified to meet the design modification. These spare parts still had roll pins installed instead of the solid pins. Some of these parts were installed in field equipment at a later date. The roll pin that was installed in Main Feedwater Regulating Valve AE-FCV-530 subsequently failed on June 6, 1996, with the resultant plant trip.

Contributing Factors:

- The COPES-VULCAN, INC. Vendor Manuals were not updated with current information. Vendor manuals M-724-00473 and M-724-00476, in section 7.6, gave several references to use of a roll pin instead of the solid pin that was required.

Corrective Actions:

- The roll pins were replaced with solid pins in three of the four Main Feedwater Regulating Valves (Valves AE-FCV-520, AE-FCV-530, and AE-FCV-540). (There was no need to replace the pin in the fourth valve, AE-FCV-510, because it still contains the correct solid pin that was installed in November of 1988.)

- The replacement of the roll pins in Main Feedwater Regulating Bypass Valves AE-FCV-550, 560, 570, and 580 will be performed during the next outage of sufficient duration to support the activity or prior to start up from Refueling Outage IX.

- All Main Feedwater Regulating Valve and Main Feedwater Regulating Bypass Valve parts and assemblies that were stored in the warehouse and in satellite storage areas were immediately identified and put on hold. Those parts that contain roll pins will be returned to the vendor or be modified prior to being released to the field.

- WCNOC personnel have revised design and procurement procedures and material codes to assure that future procurement will incorporate this roll pin modification.

- WCNOC Administrative Procedures AP 05-001, Revision 1, "Change Package Planning and Implementation," AP 05-002, Revision 1, "Dispositions and Change Packages," AP 05-005, Revision 1, "Design, Implementation and Configuration Control of Modifications," AP 24-002, Revision 0, "Requisition and Procurement Process," and AP 24I-003, Revision 0, "Materials Technical," have been revised to assure that design modifications and changes are effectively implemented for procured and stored parts and equipment. Engineering procedure KPN-F-311, Revision 6, "Procurement of Items and Repair Services"

has also been revised to include the above guidance, and has been reissued as Administrative Procedure AP 24A-001, Revision 0, "Procurement of Items and Services." Additionally, Administrative procedures AP 05-002 and AP 05-005 have been revised to assure that vendor instruction manuals and related drawings are updated to be consistent with the modification.

- Vendor instruction manuals and associated drawings for Main Feedwater Regulating Valves and Main Feedwater Regulating Bypass Valves have been revised to reflect the latest approved configuration.

- WCNOC will assess the generic nature of the identified root cause for four non-safety related systems and four safety related systems. That assessment will be implemented as follows:

    1. For the four non-safety related systems, WCNOC will determine if the design change effectively addressed spare parts and procurement. In addition, WCNOC will also review design changes to determine if the design change was correctly reflected in the associated vendor manuals and drawings.

    2. For the four safety related systems, the assessment will be performed by expanding the scope of the system functional assessments previously discussed in the Enforcement Conference Meeting of May 10, 1996. The scope for these four safety related systems, will be expanded to include the review topics for the four non-safety related systems discussed above.

WCNOC will perform the assessments of the safety and non-safety related systems in parallel. Dates for completion of the assessments are given in the chart below. During January of 1997 WCNOC Executive management will re-evaluate the completion schedule, based on the portion of the assessment completed at that time.

System Title	Date of Completion
Auxiliary Feedwater System and Feedwater System	12/31/96
Essential Service Water System and Service Water System (WS)	6/30/97
Component Cooling Water System and Main Generation System	12/31/97
Residual Heat Removal System and Main Turbine System	4/30/98

Safety Significance:

Main Feedwater Regulating Valves

The safety significance of this event has been evaluated and determined to be low, although any challenge causing a plant trip is not desirable. This is an ANS Condition II event as discussed in the WCNOC USAR Section 15.2.7, "Loss of Normal Feedwater Flow."

The event reduced normal feedwater flow to "C" Steam Generator, resulting in the reduction of inventory level in the secondary side of the steam generator. The reduction in level provided the input to trip the reactor, isolate all normal feedwater and start the motor and turbine driven auxiliary feedwater pumps. There were no adverse effects on the reactor core, the Reactor Coolant System [AB], or the Main Steam System [SB], due to the auxiliary feedwater system's capacity to supply the necessary heat sink. All safety equipment performed as designed and there were no adverse effects on the health and safety of the public.

Additionally, although the eight inch Main Feedwater Regulating Valves are non-safety related, one of their functions is to back up the main feedwater isolation valves [SJ-ISV]. The valve with the roll pin that failed would have performed this function because it failed closed, as designed.

Main Feedwater Regulating Bypass Valves

The four inch Main Feedwater Regulating Bypass Valves, AE-FCV-550, 560, 570 and 580 were not involved in this event. The roll pins originally installed, the solid pins subsequently installed per the design change, and the roll pins that were inadvertently re-installed to replace the solid pins, have all performed their function as designed.

The four inch Bypass valves are only used on plant startup from 0% to approximately 25% reactor power and are maintained in closed position after the Main Feedwater Regulating Valves are placed in service. During these lower feedwater flow conditions, the magnitude of flow variations or perturbations are considerably smaller than when above 70% power. These variations in flow provide cyclic loads on the Main Feedwater Regulating Valves, and can damage the roll pin of the larger eight inch valves. These smaller four inch Bypass valves currently use drilled cage internals. This also provides a smoother flow characteristic than the cage used in the larger eight inch valves. The Main Feedwater Regulating Bypass Valves are not subjected to the same cyclic loads as the Main Feedwater Regulating Valves.

Additionally, the roll pins that were installed in the four Bypass valves in 1990 have performed as designed with no problems. These four inch Bypass valves were not included in the valve sizes (eight inch and larger) recommended for pin replacement by the vendor.

As stated above, WCNOC originally replaced the roll pins in these valves as an enhancement, not because of any problem with the pin's performance. Therefore, replacement of the pins in the bypass valves will be performed during the next outage of sufficient duration to support the activity or prior to start up from Refueling IX.

Other Previous Occurrences:

There were no previous occurrences of this type at Wolf Creek Generating Station.