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10CFR50.73
Ollie S. Bradham
Vice President
Nuclear Operations

October 6, 1989

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

SUBJECT: Virgil C. Summer Nuclear Station
Docket No. 50/395
Operating License No. NPF-12
LER 89-016

Gentlemen:

Attached is Licensee Event Report No. 89-016 for the Virgil C. Summer Nuclear Station. This report is submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv).

Should there be any questions, please call us at your convenience.

Very truly yours,

O. S. Bradham

RJB/OSB:lcd
Attachment

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Virgil C. Summer Nuclear Station	DOCKET NUMBER (2) 05000395	PAGE (3) 1 OF 06
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TITLE (4)
Shutdown Due to Inoperable MSIV

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)
09	08	89	89	016	00	10	07	89			05000
05000											

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)									
POWER LEVEL (10) 2.8	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.408(e)	<input type="checkbox"/> 60.79(a)(2)(iv)	<input type="checkbox"/> 73.71(b)						
	<input type="checkbox"/> 20.408(a)(1)(i)	<input type="checkbox"/> 60.30(a)(1)	<input type="checkbox"/> 60.79(a)(2)(v)	<input type="checkbox"/> 73.71(a)						
	<input type="checkbox"/> 20.408(a)(1)(ii)	<input type="checkbox"/> 60.30(a)(2)	<input type="checkbox"/> 60.79(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 306A)						
	<input type="checkbox"/> 20.408(a)(1)(iii)	<input checked="" type="checkbox"/> 60.73(a)(2)(i)	<input type="checkbox"/> 60.79(a)(2)(vii)(A)							
	<input type="checkbox"/> 20.408(a)(1)(iv)	<input type="checkbox"/> 60.73(a)(2)(ii)	<input type="checkbox"/> 60.79(a)(2)(vii)(B)							
<input type="checkbox"/> 20.408(a)(1)(v)	<input type="checkbox"/> 60.73(a)(2)(iii)	<input type="checkbox"/> 60.79(a)(2)(ix)								

LICENSEE CONTACT FOR THIS LER (12)

NAME W. R. Higgins, Supervisor, Regulatory Compliance	TELEPHONE NUMBER 8103 3451-4042
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NFRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NFRDS
X	SJ	CDU	S261	N					
X	SB	SHV	4174	N					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

At 0410 hours on September 8, 1989, a controlled reactor shutdown was commenced as required by Technical Specification 3.7.1.5, "Main Steam Line Isolation Valves" (MSIV). "A" MSIV had been declared inoperable at 0001 hours on September 8, 1989 when it was found that a normally extinguished indicating light in the associated test circuit was illuminated. With this indication, it was perceived that the valve would not close in accordance with Technical Specifications. The plant entered Mode 2 at 0550 hours on September 8, 1989.

At 1600 hours on September 8, 1989, the cause of the illuminated light in the test circuit was identified to be a crushed conduit that resulted in a short circuit of the test circuit wiring. The crushed conduit was the result of movement of a four inch feedwater forward flush line due to the system flashing to steam during operation and the transient that resulted when the system refilled with water.

The short circuit caused by the crushed conduit did not affect the operation of the valve. The valve would have functioned as designed due to the capability to break the seal-in circuit either by control switch or a main steam isolation actuation signal.

Corrective action consisted of repairing the conduit/test circuit wiring. In addition, the method of operating this non-safety system is being reviewed with input from Engineering to minimize the probability of future system transients.

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

PLANT IDENTIFICATION:

Westinghouse - Pressurized Water Reactor

EQUIPMENT IDENTIFICATION:

Main Steam Line Isolation Valve (MSIV) - EIIS - SB
Feedwater System - EIIS - SJ

IDENTIFICATION OF EVENT:

"A" MSIV was declared inoperable due to test circuitry and a controlled shutdown performed.

EVENT DATE:

September 8, 1989

REPORT DATE: No later than October 7, 1989.

This report was initiated by Off-Normal Occurrence Report 89-087.

CONDITION PRIOR TO EVENT:

Mode 1 - Reactor Power 28%

DESCRIPTION OF EVENT:

At 0410 hours on September 8, 1989, a controlled reactor shutdown was commenced as required by Technical Specification 3.7.1.5, "Main Steamline Isolation Valves" (MSIV). "A" MSIV had been declared inoperable at 0001 on September 8, 1989, when it was found that a normally extinguished indicating light in the associated test circuit was illuminated. With this indication, it was perceived that the valve would not close in accordance with Technical Specifications. The plant entered Mode 2 at 0550 hours on September 8, 1989. At 1600 hours on September 8, 1989, the cause of the illuminated light in the test circuit was identified to be a crushed conduit that resulted in a short circuit of the test circuit wiring. The crushed conduit was the result of movement of a four inch feedwater forward flush line due to the system flashing to steam during operation and the transient that resulted when the forward flush system refilled with water.

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

CAUSE OF EVENT:

The damage to the MSIV conduit resulted from a system transient that caused the feedwater system forward flush line to move axially and hit the conduit. The following is a summary of the feedwater forward flushing line transient. A one line diagram is provided for system information and ease of following the event.

On August 25, 1989, the plant was taken off line due to high tailpipe temperature at the "A" pressurizer safety valve (Reference LER 89-015 dated September 19, 1989). To accommodate replacement of the safety valve, the plant was placed in Mode 5. The reactor was returned to power operation on September 1, 1989.

During feedwater system heat-up, the feedwater forward flush system was first aligned so that flow was from the deaerator, through valves 1689A, B, and C-FW, through valve 1677-FW, and back to the deaerator. During this heatup the system was realigned per the operating procedure to an alternate path by opening valve 1681-FW to the condenser and then closing 1677-FW to the deaerator. The alternate path was utilized to accelerate the cleanup of the secondary system and to also control deaerator level since the deaerator startup drain valve IFV-3235 had been experiencing operational problems.

After the forward flushing evolution was completed, valves were aligned per procedure so that the forward flush lines were isolated with the exception of a single path to the condenser through valve 1681-FW. Valves 1689A, B, and C-FW, 1676-FW, 1677-FW, 1679-FW and 3235-FW were all closed. Since the temperature of the water in the system was at least 225°F and the condenser pressure was 1 psia, it was estimated that at least 20% of the water in the forward flush piping (between the condenser through 1681 up to the 1689 valves) would have flashed to steam. The system was left in this alignment for at least 2 hours allowing ample time for the water to flash. This action left the piping filled with water at 1 psia with pockets of steam at the high points in the line.

During the same time period the line from closed valve 1677-FW to the deaerator was cooling. This line which was filled (or partially filled) with water, was open to the deaerator steam environment of approximately 50 psia.

At some point in time, at least 2 hours after completion of forward flush, an operator placed the system in the normal operating lineup by first closing valve 1681-FW and then opening valve 1677-FW.

Opening valve 1677-FW allowed a column of water to flow into a closed piping volume filled with a steam/water mixture at 1 psia. The water was accelerated by the 50 psi steam/water mixture from the deaerator. As the water entered the line between valves 1677, 1689A, B and C, and 1676, it passed through 8 inch diameter piping to a breakdown orifice (XPS-118-FW) which limited the water's momentum. The water continued through the 8 inch diameter pipe until it reached the elevation (448 feet) of the 6 inch diameter pipe which leads to the B and C 4 inch diameter forward flush lines. A similar but smaller transient probably occurred in the B

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and C lines, but the transient loads caused no problems because of the pipe routing and support configuration.

The water continued filling the system to the elevation (456 feet) of the 4 inch diameter line to the A forward flush line and the 8 inch diameter clean up/recirculation line to valve 1676-FW. When the water reached closed valve 1689A-FW, the momentum of the water mass caused a pressure spike at the valve. A pressure wave then traveled back through the water in the A forward flush line. It was dampened by piping flexibility, friction, and the increased volume of the 8 inch diameter piping. The damage that occurred was limited to the 4 inch diameter A forward flush line.

ANALYSIS OF EVENT:

The short circuit caused by the crushed conduit did not affect the operation of the MSIV's. The valve would have functioned as designed due to the capability to break the seal-in circuit either by control switch or by a main steam isolation actuation signal.

The transient of the four inch line caused no significant safety hazard. Should a rupture or line break have occurred during the initial flush, a loss of condenser vacuum would have been the result. Should the break have occurred during discharge to the deaerator, the deaerator would have depressurized via the break.

IMMEDIATE CORRECTIVE ACTION:

The pipe was inspected for bulges due to hoop stresses caused by the momentary pressure spike and no indications of overstress were found. Eight supports were damaged and the 4 inch diameter pipe was bent in two locations at support points due to the axial forces. NDE was performed on the piping at elbows and locations where deformation (bending) occurred to assess the condition of the pressure boundary. NDE showed that no degradation occurred. The system was restored to the design condition, inspections and NDE were completed, and supports were repaired.

ADDITIONAL CORRECTIVE ACTION:

The method of operating this non-safety system is being reviewed with input from Engineering to minimize the probability of future system transients. This corrective action conforms to the direction provided in Appendix X of the ANSI B31.1, 1989 Code. The Code states that plant operating procedures should be changed to prevent reoccurrence of transients. The above corrective action will be completed by December 30, 1989.

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PRIOR OCCURRENCES:

None.

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Virgil C. Summer Nuclear Station

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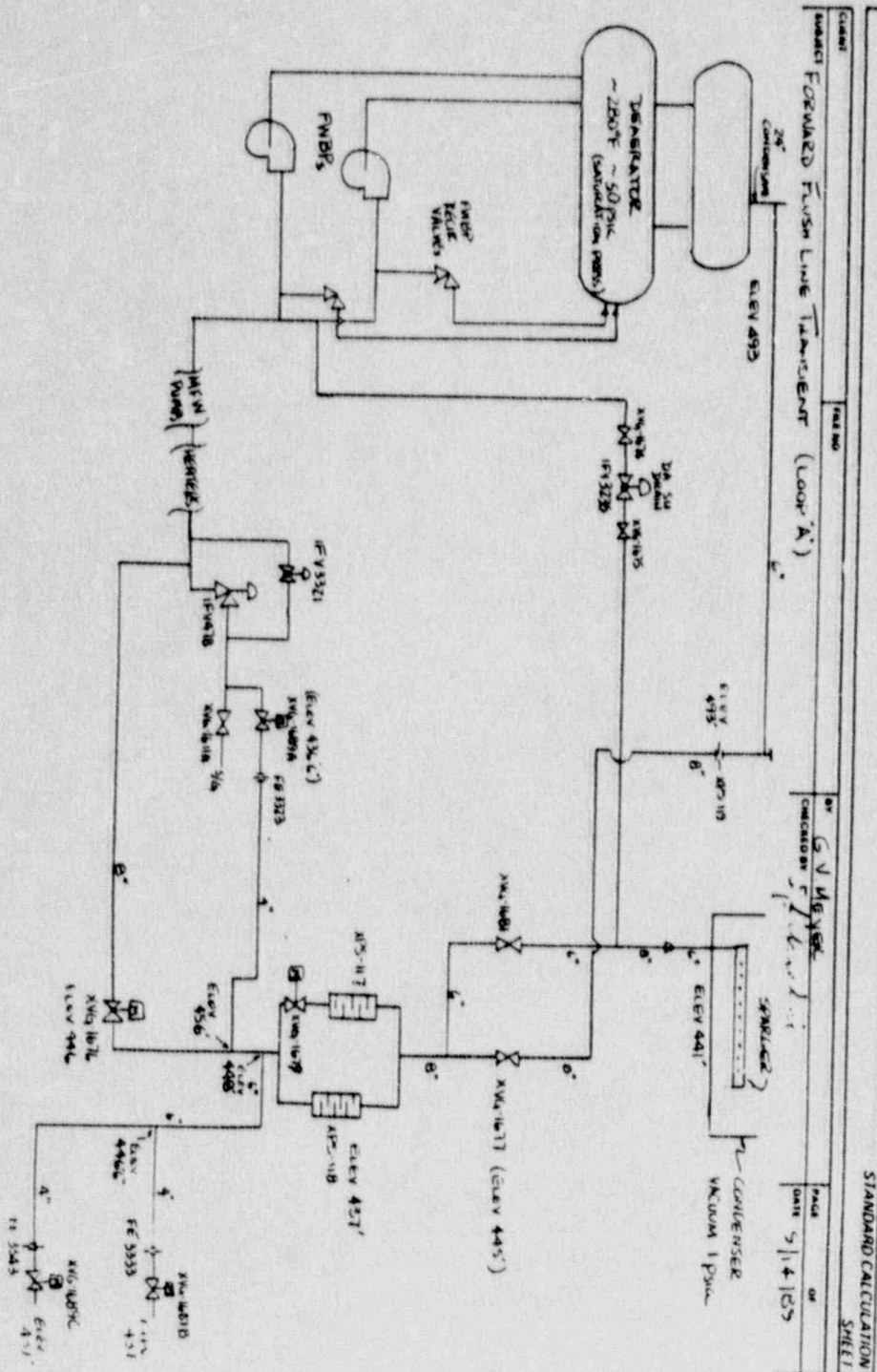
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