

CHARLES H. CRUSE
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February 13, 1995

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 2; Docket No. 50-318; License No. DPR 69
Licensee Event Report 95-002
Unit 2 Trip Due to Steam Generator Low Levels After SGIS Actuation

The attached report is being sent to you as required under 10 CFR 50.73 guidelines. Should you have any questions regarding this report, we will be pleased to discuss them with you.

Very truly yours,

for
C. H. Cruse
Plant General Manager

CHC/MDM/bjd

Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
L. B. Marsh, NRC
D. G. McDonald, Jr., NRC
T. T. Martin, NRC
P. R. Wilson, NRC
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LICENSEE EVENT REPORT (LER)

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.

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

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TITLE (4) Unit 2 Trip Due to Steam Generator Low Levels After SGIS Actuation

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)
01	13	95	95	-- 002 --	00	02	13	95		05000
										05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more) (11)							
POWER LEVEL (10)	100	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(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)			
		20.405(a)(1)(iii)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		OTHER	
		20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		(Specify in Abstract below and in Text, NRC Form 366A)	
		20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)			

LICENSEE CONTACT FOR THIS LER (12)

NAME M. D. Milbradt, Compliance Engineer	TELEPHONE NUMBER (include Area Code) 410-260-4352
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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

SUPPLEMENTAL REPORT EXPECTED (14)

X	YES (If yes, complete EXPECTED SUBMISSION DATE)	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
				06	01	95

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

On January 13, 1995, at approximately 1047, Calvert Cliffs Unit 2 tripped from 100 percent power due to low levels in the Steam Generators (SGs). The Reactor Protective System low level trip occurred after an Engineered Safety Feature Actuation System Steam Generator Isolation Signal (SGIS) was generated.

At around 1020 on Friday, January 13, 1995, Instrument Maintenance (IM) technicians tripped SGIS Channel ZG as part of surveillance testing. At around the same time an IM safety tagger, walking down a tagging request, twisted an instrumentation cable for SG pressure transmitter 2PT1013A to read the cable scheme number. A wire in the cable was broken and SGIS Channel ZD tripped, resulting in the SGIS actuation.

Corrective actions include placing restrictions on electrical walkdowns; retermination of the transmitter wires, and potential changes to surveillance procedures.

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

1. DESCRIPTION OF EVENT

On January 13, 1995, at approximately 1047, Calvert Cliffs Unit 2 tripped from 100 percent power due to low levels in the Steam Generators (SGs). The Reactor Protective System (RPS) low level trip occurred after an Engineered Safety Feature Actuation System (ESFAS) Steam Generator Isolation Signal (SGIS) was generated. The SGIS signal caused the Main Steam Isolation Valves (MSIVs) and Main Feedwater Isolation Valves to close, as well as the tripping of the Steam Generator Feed Pumps, Heater Drain Pumps, and Condensate Booster Pumps, resulting in SG levels shrinking to the low level setpoint. At the time of the event, Unit 2 was operating at 100 percent power and normal operating temperature and pressure.

At around 1020 on Friday, January 13, 1995, Instrument Maintenance technicians began a pre-planned calibration of Channel D pressure sensor loop for 21 SG, in accordance with Surveillance Test Procedure (STP) M-510D-2 (RPS SG Pressure Calibration Checks). Part of this procedure verifies the setpoint for ESFAS SGIS Channel ZG. The SGIS instrumentation is comprised of four channels per SG that receive SG pressure input. A SGIS signal is generated when two of the four channels sense pressure less than 703 psia in a SG. As part of the STP, the technicians tripped Channel ZG to check the setpoint, thus changing the logic for a SGIS actuation to one out of three.

At around the same time on January 13, an IM Safety Tagger began to walkdown a tagging request for the scheduled replacement of transmitters during an upcoming Unit 2 refueling outage. The tagger wanted to verify the proper location for safety tags by comparing the actual wiring configuration associated with the transmitters to a schematic drawing he was using. One of the transmitters scheduled to be replaced was 21 SG pressure transmitter 2PT1013A, located in Panel 2C43A. This transmitter provides SG pressure input to various RPS, ESFAS, and Auxiliary Feedwater (AFW) functions including Channel ZD SGIS in 21 SG.

The tagger opened Panel 2C43A to identify termination points for the instrumentation cable to 2PT1013A. A group of cables were bundled together in the cabinet and the scheme number on the cable for 2PT1013A was not readily visible. To verify the scheme number the tagger reached in and rotated the cable towards him. The cable consists of two wires, one colored white and one black. After rotating the cable the tagger noticed the black wire was no longer connected to its terminal lug. The tagger then proceeded to the Control Room to inform Operations of the broken wire.

At approximately 1047, with 21 SG sensor Channel ZG already in the tripped condition for SGIS, due to testing, the wire for 2PT1013A was broken. This resulted in a loss of sensed pressure for Channel ZD SGIS. With two out of

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four SGIS channels tripped on 21 SG the MSIVs and Main Feedwater Isolation valves were automatically shut and the Steam Generator Feed Pumps, Heater Drain Pumps, and Condensate Booster Pumps were automatically tripped. The resulting shrink in SG levels resulted in the reactor trip.

Level in 21 SG continued to decrease and an Auxiliary Feedwater Actuation Signal (AFAS) was generated when the level in 21 SG reached -170 inches approximately six and one half minutes after the trip. Both the motor driven AFW Pump (23) and one of the turbine driven pumps (21) were automatically started in response to the AFAS signal (the second turbine driven AFW pump is normally secured). Only one of the AFW turbine driven pump's redundant main steam supply valves opened (2-MS-4071) and provided steam to 21 AFW pump after receiving the AFAS signal. Troubleshooting later determined 2-MS-4070 failed to open due to a degraded handswitch contact.

Approximately 40 seconds after the trip the technicians removed their test equipment for STP M-510D-2. The removal of their equipment caused a momentary loss of SG pressure as sensed by Channel ZG of the AFAS BLOCK circuitry. Auxiliary Feedwater Actuation Signal BLOCK uses input from the four channels of SG pressure on each SG to isolate AFW if a rupture occurs in a SG. When two of four channels on one SG sense a differential pressure of 115 psia or more as compared to the same two channels on the second SG an AFAS BLOCK signal is generated, resulting in an isolation of AFW to the SGs. When the wire for 2PT1013A was broken an AFAS BLOCK signal was created for Channel ZD on 21 SG. As mentioned above, ZG AFAS BLOCK was generated when the technicians removed their equipment. Although there were two out of four channels satisfying the BLOCK logic, the signal on Channel ZG was only momentary (1 second) and did not seal in, thus AFW was not isolated to the SGs. After the reactor trip, operators initiated Emergency Operating Procedure (EOP)-0, "Post Trip Immediate Actions" and proceeded to recover the plant in a normal fashion.

II. CAUSE OF EVENT

The cause of the reactor trip was an RPS signal generated as a result of low SG water levels (-50 inches) after an SGIS signal was generated. The SGIS signal resulted from satisfying the two out of four logic for low SG pressure on 21 SG. The closure of the MSIVs caused SG pressure to increase resulting in a shrink in levels. This shrink combined with the isolation of feedwater resulted in the low level trip.

A Significant Incident Finding Team (SIFT) was appointed by the Plant General Manager to investigate the event. The SIFT determined the cause associated with both SGIS channels being tripped at the same time is that both activities, the performance of the STP and the verification of wires, were

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allowed to occur at the same time. Approval to start the STP was approved by the Control Room staff. The staff was not aware of the tagging walkdown, including entrance into panel 2C43A. The walkdown was considered a non-intrusive activity and there was no formal requirement or expectation for prior notification.

The cause for the broken black wire has been identified as faulty installation. Panel 2C43A was initially installed in 1982. A preliminary materials evaluation discovered evidence of stripping damage on the black wire. Four of the seven strands in the wire were broken for some period of time. Movement of the wire since 1982 resulted in low cycle fatigue on the remaining three strands causing them to eventually break. The Quality Control program in place at the time also failed to identify the stripping damage in 1982. Additionally, an opportunity to fix the black wire was missed in 1986 when the white wire was found to be degraded with only one strand still connected. The white wire was reterminated but apparently due to a less than adequate questioning attitude, the black wire was not inspected or repaired.

The cause of sensor channel ZG trip was the performance of STP M-510D-2. The STP was being performed to satisfy Surveillance Requirement 4.3.1.1 channel calibration for SG pressure low. Plant staff personnel had interpreted the surveillance requirement to include, in the Channel Calibration check, the requirement to trip the actuation logic to achieve proper test results.

An actuation logic bypass feature was installed under a Facility Change Request (FCR) in 1993 to allow maintenance and testing of ESFAS equipment without tripping the actuation logic. As a result of inadequate communications between Electric and Controls (E&C) personnel and the FCR project manager, this feature was not incorporated into this STP because of E&C's concern that use of the bypass feature would invalidate the test results. A review of the Technical Specifications and the STP after the event, determined use of the bypass feature will not invalidate test results.

III. ANALYSIS OF EVENT

After the MSIVs shut, pressure in the SGs increased rapidly causing SG levels to shrink. As levels declined, the reactor tripped at the -50 inch level. This is the expected plant response to this event. SG levels continued to decrease to the -170 inch level whereupon an AFAS signal was generated. The AFW pumps started and established a positive level trend in both SGs. The only other notable occurrence was the AFAS BLOCK signal described above. Because of the signal's short duration, this did not isolate AFW. Plant recovery was normal thereafter.

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Except for the items noted above, based on the fact that all systems responded as designed and this event is bounded by existing analysis in our Updated Final Safety Analysis Report, it is concluded that no significant safety consequences resulted. This event is considered reportable under 10 CFR 50.73(a)(2)(iv), as an event that resulted in the automatic actuation of any engineered safety features including the RPS.

IV. CORRECTIVE ACTIONS

Short Term

- A. Both the black and the white wires associated with 2PT1013A in Panel 2C43A were properly reterminated.
- B. In response to the trip, the Superintendent-Nuclear Operations issued guidance for awareness training that was given to site personnel involved in conducting wiring checks or electrical/instrument walkdowns in the field. The precautions stressed included:
 - Alerting the Control Room Staff to any walkdowns or wiring checks in Control Room panels, safety related cabinets/panels or other trip sensitive equipment in the plant;
 - Where possible, limiting the walkdowns or inspections on energized systems, especially in trip-sensitive cabinets/panels to visual inspections only; and
 - Using extreme caution in touching wire harnesses, considering the potential effect on the plant prior to touching, looking carefully for degraded wires or connections, and documenting degraded conditions in an Issue Report.
- C. The current wire stripping guidance and QC plan for observing stripping activities were both reviewed and determined to be adequate.
- D. Troubleshooting on 2-MS-4070 was performed immediately following the trip. A degraded contact on the valve's handswitch was determined to be the problem and the handswitch was replaced prior to restarting the Unit. This handswitch is tested monthly during normal surveillance testing and had passed its most recent test.
- E. Revisions to STPs, providing for the use of the bypass function, are currently being considered.

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Long Term

As mentioned above, a SIFT was formed in response to this event. Additional long term corrective actions may be generated by the investigation. If any corrective actions generated from this investigation are associated with the cause(s) of the event, they will be provided in a supplement to this LER.

V. ADDITIONAL INFORMATION

A. Failed Component Identification

Component	EIIS Funct Code	EIIS System Code
SG Pressure Transmitter Instrumentation Cable	CBL1	SJ
Main Steam Control Valve to AFW Pumps	FCV	SJ

B. Previous Similar Events

There have been no previous reportable events in which an inadvertent SGIS caused low levels in the SGs resulting in a reactor trip.