VERMONT YANKEE
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April 27, 2001
BVY 01-36

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

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
Reportable Occurrence No. LER 2001-01, Rev. 0

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 2001-01, Rev. 0.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Kevin. H. Bronson
Plant Manager

cc: USNRC Region I Administrator
USNRC Resident Inspector – VYNPS
USNRC Project Manager – VYNPS
VT Dept. of Public Service

IE22

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(6-1998)

LICENSEE EVENT REPORT (LER)

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)
WORN PROTECTIVE CIRCUIT AUXILIARY CONTACT RESULTS IN AN INVALID PROTECTIVE SYSTEM ACTUATION – PLANT TRIP

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 NAME	DOCKET NUMBER
03	19	01	2001	01	00	04	25	01	N/A	

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)							
POWER LEVEL (10)	100		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)	X	50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		Specify in Abstract below or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Kevin Bronson, Plant Manager	(802) 257-7711

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (12)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
N/A	JC	CNTR	G080	YES		N/A				
N/A						N/A				

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

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

On 3/19/01, Instrument and Control Technicians were performing an Average Power Range Monitoring (APRM) System Functional Test. Per the procedure, the technicians had placed the "A" APRM (APRM-A) logic in the "bypass" condition, blocking any associated protective signals from the Reactor Protection System (RPS). The balance of in-service APRM's provide the required protection system outputs during testing. When required by the test procedure, a licensed operator restored the APRM-A bypass switch to "normal" to allow the APRM-A to deliver a trip signal to the RPS. This step is intended to verify proper circuit operation by actuating half of the logic necessary to insert an automatic shutdown. Restoration of the APRM-A bypass switch resulted in an automatic insertion of all control rods. Upon observing the insertion of control rods, the licensed operator initiated a manual plant trip. The cause of the trip was a worn auxiliary contact plunger in the "B" trip system circuitry that had remained in the tripped condition following previous testing. The half trip signal inserted by the APRM-A testing, combined with the closed "B" trip system contact, opened one of the backup scram valves, initiating an automatic insertion of all control rods. The worn auxiliary contact has been replaced. A temporary modification has been installed to verify that the affected auxiliary contact in the "B" trip system (as well as similar auxiliary contacts in the "A" and "B" trip systems) reset properly following future actuations. VY management has established a requirement to use the temporary modification to monitor the contacts for proper operation. Permanent configuration/process changes are being considered. The worn contact failed in the safe condition (initiating a protective action), plant safety systems operated as designed, and the operating crew operated plant systems in accordance with procedures bringing the plant to a stable shutdown condition. Therefore, this event caused no significant increase in risk to public health and safety.

DESCRIPTION

On 03/19/01, VY was operating at rated thermal power with the "A" RHR (EIIS=BO) subsystem removed from service for routine maintenance.

Event Timeline

At 1227 , Instrument and Control Technicians were performing an APRM-A System Functional Test. Per the procedure (VY Operating Procedure 4302), the technicians had placed the APRM-A logic (EIIS=IE) in the "bypass" condition, blocking any associated protective signals from the RPS (EIIS=JC) system.

At 1232,

1. An APRM-A high signal was inserted into the bypassed APRM-A for testing.
2. With APRM-A in bypass, the balance of in-service APRM's provide the required protection system outputs.
3. The APRM-A was restored to normal per the test procedure, admitting the APRM-A output to the RPS logic.
4. The licensed reactor operator at the control board observed control rods inserting.
5. There was no indication that a full reactor scram signal was present.
   - Only the "A" RPS auto scram signal was indicated.
   - The "A" RPS auto scram signal is the expected result of the APRM-A testing.
   - The "B" RPS system status lights indicated no trip signal was being generated by the "B" RPS logic.

At 1233,

1. The licensed reactor operator initiated a manual scram using the manual scram push buttons.
2. The rapid power reduction resulted in a momentary lowering of reactor water level (shrink), causing the expected Primary Containment Isolation System (PCIS, EIIS=JM) actuation, isolating process flow lines in the following:
   - Liquid and Gaseous Radioactive Waste Systems (EIIS=WF)
   - Primary Containment Atmosphere Control and Sampling Systems (EIIS=VB)
   - Reactor Water Cleanup System (EIIS=CE)
   - Containment spray and cooling features in the Residual Heat Removal System

At 1234, Reactor pressure was being controlled using the Main Turbine Mechanical-Hydraulic Control System (EIIS=JI) to control the discharge of decay heat to the main condenser via a main turbine bypass valve.

At 1235, following the shrink and the subsequent restoration of reactor water level, the "C" Reactor Feedwater Pump (EIIS=SJ, P) tripped on high reactor water level.

At 1241 through 1342, during this period the operating crew:

1. Reset the scram signal
2. Established reactor water level control using the "C" Reactor Feedwater Pump and manual control of the low flow feed water regulating valve (EIIS=LCV)
3. Reset containment isolation signals and returned affected systems to their normal shutdown plant alignment, as applicable
4. Aligned other balance of plant systems to support shutdown plant operations

At 1405, the operating crew verified that the appropriate steps of applicable plant procedures had been performed.

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

At 1430, VY Instrument and Control personnel discovered an auxiliary contact (EIIS=CNTR) in a back-up scram valve (EIIS=V) control circuit out of its normal (open) position. The contact is designed to close upon a signal from the "B" RPS logic and reopen by spring tension when the "B" RPS logic trip signal is reset. The auxiliary contact armature (plunger) was found broken. This condition caused binding that prevented spring force from returning the contact to the open position. The auxiliary contact was in control circuitry that had been tested previously on 03/19/01 and may have become bound in the closed condition during that testing. The failed component is a General Electric model CR105X200P auxiliary contact.

CAUSE

1. The root cause for the binding of the auxiliary contact plunger was normal wear.
2. The reason that the plunger failure was not detected until it resulted in a plant trip is that the circuit design does not provide for positive contact position indication.

ANALYSIS

The RPS System initiates a rapid, automatic shutdown (scram) of the reactor. This action is taken to prevent excessive fuel cladding damage and any nuclear system process barrier damage following abnormal operational transients. The RPS System overrides operator and process controls.

The Control Rod Drive (CRD, EIIS=AA) System inserts the negative reactivity necessary to shut down the reactor when a scram is initiated by the RPS System. When a scram signal is received, high pressure water forces each control rod rapidly into the core.

The RPS and CRD systems function together to initiate an insertion of control rods when plant process parameters (and/or manual operator input) indicate that it is necessary to rapidly insert all 89 control rods. The insertion of the control rods is affected by depressurizing the pneumatics that hold 89 sets of scram valves (one set for each control rod) closed. The primary means for depressurizing the pneumatics to an individual set of scram valves is by repositioning a set of Scram Solenoid Pilot Valves (SSPV's, EIIS=20). As a back-up to the repositioning of the SSPV's, the CRD system employs two back-up scram valves. Repositioning either back-up scram valve will depressurize the pneumatic header supplying all 89 sets of SSPV's, causing a rapid shutdown of the reactor. Repositioning either back-up scram valve requires a scram signal from both the "A" and "B" RPS trip systems.

Prior to the automatic shutdown of the VY plant on 03/19/01, one of the auxiliary contacts providing a "B" RPS trip system input to a single back-up scram had failed in the closed (tripped) position. This, in effect, sealed in a "B" RPS trip signal to that individual back-up scram valve. Design of the control circuitry precluded readily identifying this "invisible half-scram." During the 03/19/01 testing an "A" RPS trip signal was generated and admitted to the back-up valve control circuitry. This step, combined with the failed-closed auxiliary contact in the "B" trip system, completed the logic necessary to reposition a single back-up scram valve and begin depressurizing the related pneumatics.

The broken auxiliary contact failed in the safe (tripped) position. Therefore it presented no challenge to either the RPS or CRD performing their safety objectives.

If the broken plunger in the auxiliary contact had caused the device to bind in the open (non-tripped) position, redundancy within the related circuitry would have ensured that both back-up scram valves actuated as designed, causing the scram air header to depressurize and control rods to insert.

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

An additional assessment was performed to determine the safety implications of the stuck auxiliary contact possibly inhibiting the operation of its main contact. To perform this assessment it was conservatively assumed that a stuck auxiliary contact would prevent repositioning of the main contactor. The assessment confirmed that the resultant failure of the main contactor could not prevent the RPS system from accomplishing its safety objective. This is consistent with the single failure design requirements of the VY RPS system and Engineered Safety Feature control circuitry. Additionally, it was identified that the results of disabling the main contactor by a stuck auxiliary contact would be readily identified during routine testing and/or normal plant operation. Plant procedures would then direct the crew to take appropriate actions to address the degraded equipment.

The required plant safety systems operated as designed, and the plant staff operated systems in accordance with procedures bringing the plant to a stable shutdown condition. Therefore, this event caused no significant increase in risk to public health and safety.

CORRECTIVE ACTIONS

1. The failed auxiliary contact was replaced and tested satisfactorily. This action was completed on 03/19/01.

2. A Temporary Modification was implemented on 03/20/01.

   a. Voltmeters were installed in the two RPS Back-up Scram Valve circuits. The Temporary Modification facilitates voltage readings needed to confirm reset of the auxiliary contacts after scram signals are reset.

   b. The voltmeters are being used to take measurements required by interim administrative controls.

3. VY technical personnel identified and inspected similar protective circuits and contacts to determine if additional contacts should be replaced and/or monitored.

   a. The assessment concluded it to be prudent to replace a second auxiliary contact in the affected back up scram valve control circuit.

Vermont Yankee is evaluating the feasibility of several long-term corrective actions.

ADDITIONAL INFORMATION

Vermont Yankee has not reported any similar events to the USNRC.