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APR 2 5 2003

L-2003-087
10 CFR § 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: Turkey Point Unit 3
Docket No. 50-250
Reportable Event: 2003-004-00
Date of Event: February 27, 2003
As-Found Cycle 19 Main Steam Safety Valve
Setpoints Outside Technical Specification Limits

The attached Licensee Event Report 250/2003-004-00 is being submitted pursuant to the requirements of 10 CFR § 50.73(a)(2)(i)(B) to provide notification of the subject event.

Very truly yours,

Terry Jones

Terry O. Jones
Vice President
Turkey Point Nuclear Plant

DRL

Attachment

cc: Regional Administrator, USNRC, Region II
Senior Resident Inspector, USNRC, Turkey Point Nuclear Plant

IE22

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

LICENSEE EVENT REPORT (LER)

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

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE

As-Found Cycle 19 Main Steam Safety Valve Setpoints Outside Technical Specification Limits

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	27	2003	2003	- 004 -	00	04	25	2003	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	1
10. POWER LEVEL	60

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more)

	20.2201(b)		20 2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20 2203(a)(4)		50.73(a)(2)(iii)		50 73(a)(2)(x)
	20 2203(a)(1)		50 36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73 71(a)(4)
	20.2203(a)(2)(i)		50 36(c)(1)(ii)(A)		50 73(a)(2)(v)(A)		73.71(a)(5)
	20 2203(a)(2)(ii)		50 36(c)(2)		50.73(a)(2)(v)(B)		OTHER
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50 73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A
	20 2203(a)(2)(iv)		50 73(a)(2)(i)(A)		50 73(a)(2)(v)(D)		
	20 2203(a)(2)(v)	X	50 73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20 2203(a)(2)(vi)		50 73(a)(2)(i)(C)		50 73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50 73(a)(2)(ii)(A)		50 73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
David R. Lafleur	(305) 246 - 7150

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	SB	RV	C710	YES	-	-	-	-	-

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

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

On February 27, 2003, Turkey Point Unit 3 was in Mode 1 and holding at approximately 60 percent reactor power while performing Technical Specification surveillance testing of the Main Steam Safety Valves setpoints. Three Main Steam Safety Valves lifted outside the Technical Specification limits of +/- 3% due to micro-bonding between the valve and the disc. In each case, the unit entered then exited the applicable Technical Specification 3.7.1.1.b Action Statement as the valves were removed from service, then returned to service within the Technical Specification allowed outage time of 4 hours.

A fourth Main Steam Safety Valve lifted outside the Technical Specification Limit due to a misalignment of the valve yoke rod and nut and could not be returned to service. The plant entered the Action Statement for Technical Specification 3.7.1.1.b and reactor power was reduced below 53 percent.

During the planned unit refueling shutdown which commenced on March 1, 2003, all four valves were disassembled, repaired, and returned to service prior to unit restart.

Operation of the facility with the Main Steam Safety Valves as-found settings was within analytical bounds; therefore, this event had no impact on the health and safety of the public.

Description of the Event

On February 27, 2003, Turkey Point Unit 3 was in Mode 1 and holding at approximately 60 percent reactor power for testing of the Main Steam Safety Valves (MSSVs) [SB:RV] during the downpower for the Turkey Point Unit 3 Cycle 20 refueling outage.

At 9:28 AM, MSSV RV-3-1410 was declared Out of Service (OOS) when its tested opening pressure was 6.2% above the required setpoint. RV-3-1410 is configured on the 3C Steam Generator (SG). Since the Technical Specification (TS) allowable lift setting is +/-3%, the unit entered the Action Statement for TS 3.7.1.1.b, which requires either valve restoration to operable status or a unit reduction in power to </=53% within 4 hours. RV-3-1410 was subsequently tested twice to within +/-1% of its required setpoint.

The cause for the failure was determined to be micro-bonding of the nozzle and disc due to differential thermal expansion between the contact surfaces of the nozzle and the disc. Due to the planned unit shutdown scheduled for 2/28/03, RV-3-1410 would not be subjected to a subsequent heatup and the set pressure was satisfactorily demonstrated to be within the limits of TS 3.7.1.1. The valve was returned to service at 12:10 PM and the unit exited from the TS Action Statement.

At 2:38 PM, RV-3-1402 was declared OOS when its tested opening pressure was 4.8% above the required setpoint. RV-3-1402 is configured on the 3A SG. The unit again entered the Action Statement for TS 3.7.1.1.b. RV-3-1402 was subsequently tested twice to within +/-1% of its required setpoint. The cause for the valve failure was again determined to be due to nozzle and disc micro-bonding. RV-3-1402 was returned to service at 5:10 PM and the unit exited from the TS Action Statement.

At 4:31 PM, RV-3-1406 was declared OOS when it tested at 8.2% above the required setpoint. RV-3-1406 is configured on the 3B SG. RV-3-1406 was subsequently adjusted and retested to open within +/-1% of its required setpoint however, the cause for the failure was not determined at that time and the valve remained OOS. Unit reactor power was reduced to <53% at 6:28 PM in accordance with the Action Statement of TS 3.7.1.1.b.

At 10:20 PM, RV-3-1411 was declared OOS when its tested opening pressure was 7.4% above the required setpoint. RV-3-1411 is configured on the 3C SG. RV-3-1411 was declared OOS, and subsequently satisfactorily retested. The cause for the valve failure was again determined to be due to nozzle and disc micro-bonding. The unit had already complied with the applicable Action Statement of TS 3.7.1.1.b due to failure of RV-3-1406 and reactor power remained at <53% until subsequent unit shutdown on 3/1/03.

The findings of the MSSVs failing setpoint testing are listed in Table 1.

Table 1 As-Found Lift Settings

Valve Number	Design Setpoint	As-Found Setpoint	As-Found Percentage
RV-3-1402	1115 psig	1169.0 psig	104.84 %
RV-3-1406	1100 psig	1190.6 psig	108.24 %
RV-3-1410	1085 psig	1152.4 psig	106.21 %
RV-3-1411	1100 psig	1181.4 psig	107.40 %

Four safety valves are installed on each of the unit's three main steam lines. The safety valves protect the steam generator and main steam piping from overpressure conditions and serve as a heat sink for the reactor coolant system if the main condenser is unavailable and the atmosphere steam dump valves cannot relieve pressure during a reactor trip or a secondary transient.

The Turkey Point MSSV Inservice Testing Program conforms to the ASME Section XI-1989 requirements, invoking ASME/ANSI OM-1987, Part 1. Paragraph 1.3.3.1 (e) of Part 1 specifies that:

> "Any valve exceeding its stamped set pressure by 3% or greater shall be repaired or replaced, the cause of the failure shall be determined and corrected, and the valve shall successfully pass a retest before it is returned to service."

Cause of the Event

RV-3-1402/1410/1411

Inspection of valve internals confirmed the cause of the high lift setpoints for RV-3-1402, RV-3-1410, and RV-3-1411 to be micro-bonding of the nozzle and disc. Set pressure test results that exhibit a large reduction following the as-found test (typically 30 psig) are symptomatic of this phenomenon. Micro-bonding of the nozzle and disc can occur when the harder disc (410 SS) causes microscopic galling of the softer nozzle (316 SS) during heatup, because of the differential thermal expansion between the contact surfaces. These small gall beads cause the disc and nozzle to fuse to a limited degree. Under these conditions, the first set pressure lift off is often significantly higher than subsequent lifts. The high initial setpoint pressures, followed by subsequent acceptable set pressure tests, are consistent with this phenomenon.

The traditional corrective action for micro-bonding has been to resurface the nozzle and disc (the disc is usually replaced) during the safety valve overhaul. However, it was noted that there had been an increasing trend in occurrences of micro-bonding, which is apparently related to seating surface finish. Previous MSSV overhaul procedures had specified that the valve seating surfaces be lapped to a "mirror finish" without specifying the quality of the finish. This lead to different vendors using different quality finishes. The MSSV surface finishes were subsequently specified to conform to an L4-L8 profile (i.e., lapped to a 4-8 μ-in finish) to eliminate nozzle and disc micro-bonding.

RV-3-1406

A review of the history of RV-3-1406 indicated that several valve configuration changes had been implemented during the previous refueling outage. The valve spring had been replaced with a larger coil diameter spring, evaluated as equivalent. The larger spring required that new spring washers, machined to achieve the correct setpoint, be installed to match the diameter of the spring. The new spring washers were thicker, such that installation of approximately 3/8 inch thick "C" shaped spacers between the shoulders on the yoke rods and the yoke were needed. This change

allowed the spring to be extended sufficiently to reduce the setpoint adjustment to the required range.

The spacers allowed the valve to be initially set to the required setpoint. However, since the "C" shaped spacers did not provide a continuous contact surface between the yoke rod and the yoke nut, some degree of dimensional instability was introduced during Cycle 19 operation. This caused misalignment, and thus, variability of the setpoint.

The surveillance test results of RV-3-1406 showed the largest deviation from the design setpoint and consistently tested high. These test results are not consistent with micro-bonding so dimensional instability, created by the spring washers and yoke rod spacers, was determined to be the cause of the high lift setpoint. Corrective actions were specified to correct the dimensions of the spring washers and remove the yoke rod spacers from the valve.

Analysis of the Event

The existence of similar discrepancies in multiple valves is an indication that the discrepancies may well have arisen over a period of time and that the condition existed during plant operation. Based on the fact that the Unit 3 MSSV surveillance testing resulted in multiple failures and that this condition could have existed during Unit 3 Cycle 19 operation, this event is reportable under 10 CFR 50.73(a)(2)(i)(B).

A review of past MSSV test failures going back to 1997 indicates that multiple failures with similar discrepancies did not occur during this time period. However, single failures, which may have existed during the operating cycle prior to surveillance testing may have occurred. The existence of single failures during the period were assessed at the time as not reportable based on no firm evidence that the failures existed during the operating cycle. Also, no occurrence of multiple, similar failures existed to support indication that the discrepancies may have arisen over a period of time. Additionally, at the time of the new MSSV failures, no previous failure experience may have existed for definitive assessment.

The following events, not previously reported, involved failures of MSSVs during setpoint testing:

<u>3/1/97, Turkey Point Unit 3</u>

RV-3-1412 lift setpoint was tested to be 4.8% high due to a clogged body drain. The clogged drain allowed water buildup to occur around the nozzle, causing increased cooling, raising the valve setpoint lifting pressure. Reactor power was reduced to </= 53% in accordance with TS 3.7.1.1.b. The disposition considered the failure to have occurred at the time of the test with no generic valve issues.

<u>3/13/99, Turkey Point Unit 4</u>

RV-4-1412 lift setpoint was tested to be 4.2% high due to micro-bonding. Reactor power was </= 53% at the time of testing.

2/26/00, Turkey Point Unit 3

RV-3-1406 lift setpoint was tested to be 3.1% high due to micro-bonding. Reactor power was </= 53% in accordance with TS 3.7.1.1.b.

9/29/01, Turkey Point Unit 3

RV-3-1406 lift setpoint was tested to be 4.5% high and RV-3-1412 was tested to be 3.6% high. RV-3-1406's failure is most likely due to a misalignment due to a collapsed spring. RV-3-1412's failure was determined to be due to micro-bonding. Reactor power was at 0% at the time of testing.

Analysis of Safety Significance

A review of the Turkey Point Safety Analyses was performed to assess the impact of the combined effect of the four (4) MSSV's "as found" condition on Cycle 19 operation. The analyses in which the MSSVs are modeled include:

- Rod Withdrawal From Power (RWFP)
- Feedwater System Malfunction
- Increase in Steam Flow
- Loss of Flow
- Locked Rotor
- Loss of External Electrical Load (LOL)/Turbine Trip
- Loss of Normal Feedwater (LONF) With/Without Loss of Non-Emergency AC Power
- Small Break LOCA

The review indicated that only the events that are susceptible to overpressure conditions may be impacted by the "as found" condition of the subject MSSVs. These include:

- Loss of External Electrical Load (LOL)/Turbine Trip (Limiting Event)
- Rod Withdrawal From Power (RWFP)
- Loss of Normal Feedwater (LONF) With/Without Loss of Non-Emergency AC Power

The overpressure design criteria to which these transients have to comply, require that the peak pressures reached during the event (for both the Reactor Coolant System (RCS) and the Main Steam System (MSS)) do not exceed 110 percent of the design pressures (2485 psig RCS and 1085 psig MSS). This translates into the following design basis criteria: 2733.5 psig for the RCS and 1193.5 psig for the MSS.

Analysis of the three pressurization safety analyses events resulted in no challenges to the design bases of these events and it is concluded that the "as found" MSSVs performance test data did not result in any past operability concerns for Unit 3's Cycle 19 operation. Thus, this event had no impact on the health and safety of the public.

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

Corrective Actions

1. RV-3-1406 was disassembled, inspected and repaired to correct the conditions leading to unacceptable as-found testing.

2. RV-3-1402, RV-3-1410 and RV-3-1411 were disassembled and the seating surfaces were lapped to an L4 - L8 acceptance criteria.

3. Plant maintenance procedures will be revised to include specific lapping instructions to prevent micro-bonding of the MSSV seats.

4. The MSSV manufacturer has resolved the spring washer dimensional tolerance discrepancy.

5. All Unit 3 MSSVs were tested as satisfactory prior to unit restart as part of the expanded scope testing requirements of ASME/ANSI On-1987, Part 1, paragraph 1.3.3.1(e)(1).

Additional Information

EIIS codes are shown in the format [EIIS SYSTEM: IEEE component function identifier, second component function identifier (if appropriate)].