



MAY 03 2006

10 CFR § 50.73
L-2006-112

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

Re: Turkey Point Unit 3
Docket No. 50-250
Reportable Event: 2006-002-00
Date of Event: March 5, 2006
As-Found Cycle 21 Main Steam Safety Valve
Setpoints Outside Technical Specification Limits

The attached Licensee Event Report 250/2006-002-00 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,

A handwritten signature in black ink, appearing to read 'Terry O. Jones'.

Terry O. Jones
Vice President
Turkey Point Nuclear Plant

Attachment

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

Handwritten initials 'JED2' in black ink, located in the bottom right corner of the page.

LICENSEE EVENT REPORT (LER)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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 Turkey Point Unit 3	2. DOCKET NUMBER 05000250	3. PAGE 1 OF 7
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4. TITLE
As-Found Cycle 21 Main Steam Safety Valve Setpoint Outside Technical Specification Limits

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	05	2006	2006	- 002 -	00	05	03	2006		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)			
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
10. POWER LEVEL 50	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME Olga Hanek – Licensing Engineer	TELEPHONE NUMBER (Include Area Code) 305-246-6607
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

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

14. SUPPLEMENTAL REPORT EXPECTED <input checked="" type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE MONTH: 08, DAY: 15, YEAR: 2006
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On March 5, 2006, Turkey Point Unit 3 was in Mode 1 and holding at approximately 50 percent reactor power while performing Technical Specification surveillance testing of the Main Steam Safety Valves setpoints, just prior to the Unit 3 Cycle 22 Refueling Outage. The Unit 3 C Steam Generator (SG) MSSV, RV-3-1412, as-found lift pressure was 1154.6 psig, which was greater than the TS allowable setpoint pressure of $\pm 3\%$ of 1115 psig (1081.6 psig - 1148.4 psig). RV-3-1412 was declared inoperable and the plant entered TS action statement 3.7.1.1.b. Reactor power was at 50%, which was below the 53% reactor power required per TS 3.7.1.1.b. The valve was subsequently adjusted and retested twice to within $\pm 1\%$ of its required setpoint. In addition, the Unit 3 B SG MSSV, RV-3-1406, as-found lift pressure was 1154 psig, outside the TS allowable setpoint of $\pm 3\%$ of 1100 psig (1067 psig – 1133 psig).

The preliminary cause of the failure to meet TS allowable setpoint for RV-3-1412 was a slow build-up of corrosion between the disc holder/guide interface and/or the spring/spring washers. The preliminary cause of the failure to meet TS allowable setpoint for RV-3-1406 was micro-bonding. During the planned Unit 3 refueling shutdown which commenced on March 5, 2006, the valves were either replaced with a spare or, the original valve was disassembled and repaired.

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.

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

Description of the Event

On March 5, 2006, Turkey Point Unit 3 was in Mode 1 and holding at approximately 50 percent reactor power for testing of the Main Steam Safety Valves (MSSVs) [SB:RV] during the downpower for the Turkey Point Unit 3 Cycle 22 refueling outage.

As-found set pressure of the Unit 3 C steam generator MSSV RV-3-1412 was 1154.6 psig, which was 3.55% above the Technical Specification (TS) allowable setpoint pressure of $\pm 3\%$ of 1115 psig (1081.6 psig - 1148.4 psig). At 05:40 AM, MSSV RV-3-1412 was declared inoperable and 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 $\leq 53\%$ within 4 hours. Since the unit was at approximately 50% power level, no power changes were required in order to comply with TS 3.7.1.1.b.

RV-3-1412 was subsequently tested at 1148.4 psig, 2.99% above the TS allowable setpoint. The valve was subsequently adjusted and retested twice to within $\pm 1\%$ of its required setpoint of 1115 psig. In addition, the valve was re-tested to be within $\pm 1\%$ of its required setpoint approximately 8 hours later, lifting at 1123.2 psig and 1125.5 psig. MSSV RV-3-1412 was declared operable on March 5, 2006, at 8:00 PM and the plant exited TS action statement 3.7.1.1.b.

As a result of the RV-3-1412 failed test, the Inservice Testing (IST) program required a test expansion of the IST testing requirements for the Turkey Point Unit 3 Cycle 22 refueling outage. Two more valves were tested as the expanded scope, RV-3-1408 and RV-3-1406. However, RV-3-1406 failed to lift within the TS allowable setpoint, therefore, due to this failure, all other MSSVs were required to be tested. All remaining MSSVs test results were within the $\pm 3\%$ range of the allowable TS as-found setpoint pressure.

As-found lift pressure of the Unit 3 B steam generator MSSV RV-3-1406 was 1154.3, which was 4.9% above the TS allowable setpoint pressure of $\pm 3\%$ of 1100 psig (1067 psig - 1133 psig). RV-3-1406 was declared inoperable on March 5, 2006, at 11:25 AM and 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 $\leq 53\%$ within 4 hours. Since the unit was at approximately 50% power level, no power changes were required in order to comply with TS 3.7.1.1.b. The valve was re-tested and lifted at 1081.8 psig or 1.65% below the TS allowable as-left setpoint of $\pm 1\%$ of 1100 psig. The valve was subsequently adjusted and re-tested three times, lifting at a pressure within $\pm 1\%$ of the TS allowable as-left setpoint of 1100 psig. RV-3-1406 was declared operable on March 5, 2006 at 02:20 PM.

Reportability

A review of the reporting requirements of 10 CFR 50.72 and 10 CFR 50.73 and NRC guidance provided in NUREG-1022, Revision 2, Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73, was performed for the subject condition. As a result of this review, the condition is reportable as described below.

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10 CFR 50.73(a)(2)(i)(B) requires the reporting of :

"Any operation or condition which was prohibited by the plant's Technical Specifications except when:

- (1) The Technical Specification is administrative in nature;
- (2) The event consisted solely of a case of a late surveillance test where the oversight was corrected, the test was performed, and the equipment was found to be capable of performing its specified safety functions; or
- (3) The Technical Specification was revised prior to discovery of the event such that the operation or condition was no longer prohibited at the time of discovery of the event."

The MSSVs, RV-3-1406 and RV-3-1412, as-found degraded condition is reportable under the requirements of 10CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications. The Limiting Condition for Operation (LCO) 3.7.1.1 is the controlling Technical Specification for MSSV surveillance testing at Turkey Point. This specification requires that in Modes 1 through 3 "all main steam line Code safety valves associated with each steam generator shall be OPERABLE with lift settings as specified in Table 3.7.2." Table 3.7.2 requires the lift setting for valve RV-3-1412 to be 1115 psig ± 3% and for RV-3-1406 to be 1100 psig ± 3%. Therefore, since the as-found condition for RV-3-1412 and RV-3-1406 did not comply with the values in the Technical Specifications Table 3.7.2, the above condition is reportable per 50.73(a)(2)(i)(B) requirements.

Cause of the Event

RV-3-1412

The Unit 3 C steam generator MSSV, RV-3-1412, as-found set pressure was 1154.6 psig which is outside the as-found TS allowable range of 1115 psig ± 3% (1081.6 psig to 1148.4 psig). The relief valve was subsequently tested at 1148.4 psig, or 2.99% above the TS setpoint of 1115 psig. Adjustments were made to restore the valve to within ± 1% of the TS allowable as-left set pressure of 1115 psig. The valve was tested two more times with the resulting as-left set pressures falling within ±1% of 1115 psig. In addition, the valve was re-tested approximately 8 hours later at a set pressure of 1123.3 psig and 1125.5 psig. The test results are summarized in the table below.

The Cycle 21 as-left setpoint for RV-3-1412 was 1110.3 psig on February 27, 2003. Based on the as-found lift setting of 1154.6 psig, the setpoint drifted 44.3 psig during Cycle 21 operation. Assuming an average seat diameter of 24.626 in², the observed lift pressure increase is equivalent to an increase in the force required to lift the disc of 1091 lbs. This observed increase in force is most likely due to an increase in friction between moving and stationary parts or an increase in the set pressure due to corrosion products increasing the spring pre-load. Set pressure test results that exhibit almost identical high set pressures are indicative of this particular cause.

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RV-3-1412 was shipped offsite for disassembly, inspection, and refurbishment. An inspection report has not been received from the vendor at this time to enable confirmation of the cause.

Review of EPRI Safety and Relief Valve testing and Maintenance Guide found that the typical cause attributed for the setpoint drifting high on MSSVs is due to:

- 1) internal minor corrosion bonding
- 2) minor corrosion of the guide and disc holder surfaces
- 3) presence of binding between the guide and disc holder surfaces (e.g., minor galling isolated to one side of guide/disc holder)

Based on the as-found test results and observations during disassembly, inspection and refurbishment, the preliminary apparent cause of the high as-found lift setpoint for RV-3-1412 was attributed to corrosion at the disc holder/guide interface and/or the spring/spring washer. RV-3-1412 was replaced with a spare during the Unit 3 Cycle 22 refueling outage. Long term actions and a final cause determination will be documented in a supplemental LER.

RV-3-1406

The Unit 3 B steam generator MSSV, RV-3-1406, as-found set pressure of 1154.3 psig is 4.9% higher than the TS allowable as-found set pressure range of $\pm 3\%$ of 1100 psig (1067.0 psig – 1133.0 psig). The valve was re-tested and lifted at a set pressure of 1081.8 psig, or -1.01% below the 1100 psig set point. RV-3-1406 was subsequently adjusted and re-tested three more times with resulting set pressure within the as-left TS allowable setpoint of $\pm 1\%$ of 1100 psig.

Based on the results of the as-found set pressure and subsequent test results, the preliminary apparent cause for the failure of RV-3-1406 is micro-bonding of the nozzle and disc (often categorized as “sticking”). Set pressure test results that exhibit a moderate-to-large reduction following the as-found test (typically about 30 psi), are symptomatic of this phenomenon. The change in observed set pressure test results for RV-3-1406 was 73 psi. Micro-bonding of the nozzle and disc can occur when the harder disc (565 SS) causes microscopic galling of the softer nozzle (316 SS) during heatup due to the differential thermal expansion between the contact surfaces. These small gall beads cause the disc and nozzle to fuse. Investigations performed by Altran Corporation for PG&E support this theory as a potential reason for the observed step change in the first and second set pressure tests. RV-3-1406 was overhauled and the disc replaced with an Inconel disc to enhance resistance to micro-bonding. Any additional long term actions and a final cause determination will be documented in a supplemental LER.

Analysis of Safety Significance

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 atmospheric steam dump valves cannot relieve pressure during a reactor trip or a secondary transient.

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A review of the Turkey Point Safety Analyses was performed to assess the impact of MSSVs RV-3-1406 and RV-3-1412 as-found condition on Cycle 21 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 MSSVs RV-3-1406 and RV-3-1412. 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.

The limiting over pressurization design basis event is the Loss of Electrical Load or LOL. The operation of the MSSVs play a significant role in the results of the LOL event. The safety significance of the out of tolerance MSSVs RV-3-1406 and RV-3-1412 has been evaluated with respect to the consequences of this event.

The LOL design basis analysis takes credit for the MSSVs to mitigate the consequences of the over pressurization of the RCS and the secondary side main steam system. The analysis assumes that every one of the 12 MSSVs opens at 3% above the nominal value allowed by Technical Specifications (TS 3.7.1.1). During the Unit 3 Cycle 22 refueling outage, only 2 of the 12 valves tested were found to be out of tolerance, RV-3-1412 and RV-3-1406. A review and assessment of the as-found condition of RV-3-1412, RV-3-1406 (>3% above setpoint) and the other 10 tested valves (<3% above setpoint) has concluded that the as-found condition for RV-3-1412 and RV-3-1406 is bounded by the analysis assumption. The average as-found lift settings for all 12 valves was 1.22% above the setpoint as compared to the analysis assumption of all MSSVs opening at 3% above the nominal setpoint. Therefore, the overall MSSV response of the as-found MSSV condition is bounded by the LOL safety analysis.

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Based on the above discussion it is concluded that the overpressure design basis criteria for the LOL event would not have been exceeded during Cycle 21 as a result of the as-found RV-3-1406 and RV-3-1412 pressure setpoints. Therefore, it is concluded that the as-found MSSVs performance test data did not result in any safety concerns during Unit 3 Cycle 21 operation. Thus, this event had no impact on the health and safety of the public.

Corrective Actions

Short Term

1. RV-3-1412 was initially adjusted to an as-left set pressure within $\pm 1\%$ of 1100 psig and declared operable.
2. RV-3-1412 was subsequently replaced with a spare during the Unit 3 Cycle 22 refueling outage.
3. RV-3-1406 was initially adjusted to an as-left set pressure within $\pm 1\%$ of 1100 psig.
4. RV-3-1406 was subsequently inspected, overhauled and retested during the Unit 3 Cycle 22 refueling outage.

Long Term

Long term corrective actions and a final cause determination will be documented in a supplemental LER for both of the subject MSSVs.

Additional Information

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

Similar Events

1. Turkey Point Unit 3, Docket No. 50-250, Reportable Event: 2003-004-00, dated February 27, 2003, "As-Found Cycle 19 Main Steam Safety Valve Setpoints Outside Technical Specification Limits," Letter L-2003-087, dated April 25, 2003. The cause of this event was attributed to micro-bonding of the nozzle and disc for some valves and a spring washer dimensional tolerance discrepancy for one valve.
2. Turkey Point Unit 4, Docket No. 50-251, Reportable Event: 2003-002-00 dated October 2, 2003, "As-Found Cycle 20 Main Steam Safety Valve Setpoint Outside Technical Specification Limits," Letter L-2003-295, dated December 3, 2003. The cause of this event was attributed to micro-bonding of the nozzle and disc.

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- Turkey Point Unit 3, Docket No. 50-250, Reportable Event: 2004-002-00 dated September 25, 2004, "As-Found Cycle 20 Main Steam Safety Valve Setpoint Outside Technical Specification Limits," Letter L-2004-261, dated November 19, 2004. The cause of this event was attributed to a slow build-up of corrosion between the ground ends of the spring and the spring washers.