

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Sequoyah, Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 2 8	PAGE (3) 1 OF 0 3
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TITLE (4)
Rupture of Pressurizer Relief Tank (PRT) Disc

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)
0 8	2 0	8 4	8 4	0 1 3	0 1 0	2 0	8 8	5			0 5 0 0 0
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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) 1 0 0	20.402(b)		20.406(c)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)		73.71(b)			
	20.408(a)(1)(i)		50.38(c)(1)		50.73(a)(2)(v)		73.71(c)			
	20.408(a)(1)(ii)		50.38(c)(2)		50.73(a)(2)(vii)		OTHER (Specify in Abstract below and in Text, NRC Form 366A)			
	20.408(a)(1)(iii)		<input checked="" type="checkbox"/> 50.73(a)(2)(i)		50.73(a)(2)(viii)(A)					
	20.408(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)					
20.408(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(ix)						

LICENSEE CONTACT FOR THIS LER (12)

NAME Heyward R. Rogers, Compliance Section Engineer	TELEPHONE NUMBER AREA CODE: 611 15 817 1 01 - 1 6 1 1 4 1 7
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRRDS			
X	A	E	I	R	H	D	H	2	9	1	0	Y

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO					

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

This is a supplemental report.

During normal plant operations on 08/20/84, unit 2 experienced a rupture of the pressurizer relief tank (PRT) rupture disc at 1203 CST. This resulted in a containment ventilation isolation and the shutdown of the unit was initiated and the unit complied with the Radiological Emergency Plan for an unusual event. The PRT disc rupture was caused by a leaking pressurizer safety valve which relieves to the PRT.

Upon rupture of the PRT disc, the containment radiation levels increased to the lower compartment setpoints and generated the signal for the CVI. Also, the containment pressure increased to 0.35 psid which exceeded LCO limits of 0.3 psid. The increase in pressure was reduced by the automatic opening of the ice condenser doors and starting of additional lower compartment fans by operator action.

After completion of unit shutdown, both PRT rupture discs and the leaking safety valve were replaced.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		

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

Prior to the event, on 08/11/84 with unit 2 at 100% power (2235 psi and 578 degrees F), one of the pressurizer safety valves (2-SRV-68-653) experienced some slight leakage across the seat. Relief from this safety valve is designed to flow to the PRT, which has two rupture discs. In accordance with the FSAR, Section 5.5.11, table 5.5.11-1, the pressurizer relief tank has a designed rating of 100 psig at 340 degrees F with an 85 ± 5 percent psig rupture disc release pressure. The design basis of the relief tank and rupture disc is to have the capability to relieve a capacity equal to the combined capacity of the pressurizer safety valves. The tank is also designed to absorb the pressurizer discharge during a step load decrease of 10 percent. This is equivalent to the discharge of pressurizer steam equal to 110 percent of the volume above full power water level setpoint.

During operation prior to the event, PRT and safety valve parameters were monitored by Operations personnel to ensure safe operation of the plant. All parameters including level, temperature, and pressure in the PRT were being maintained within prescribed operation limits. On the date of the event, 08/20/84, with the PRT parameters within limits, one of the two unit 2 PRT discs failed at a pressure significantly lower than its design rating. The rupture resulted in a small increase in radiation levels in the lower containment causing a containment ventilation isolation initiated by radiation monitor RM-90-106. There was no purging activity at the time of the event; therefore, the only isolation valves that closed were those to the radiation monitor itself, and no inadvertent releases were made. Operations personnel initiated shutdown of the unit and notified NRC by phone of the event in accordance with SQN REP IP-2. Unit shutdown (mode 3 - hot standby) was completed at 1556 CST on 08/20/84.

Repair work was initiated on the ruptured PRT disc and the failed disc sent to Westinghouse to determine the cause for its premature failure. The disc was supplied by Westinghouse, manufactured by Black, Sivalls, and Bryson, and was a Type BV with a manufacturer's range of 86-100 psi @ 200 degrees F. The results of the Westinghouse evaluation are as follows. The visual and lower power light microscope examinations of the failed rupture disc showed that the rupture was caused by a force with high kinetic energy. This indicates that the pressure in the pressurizer relief tank was due to a gas (steam) rather than the tank being overfilled with liquid. The unfailed disc showed signs of plastic deformation, since its crown height was higher than its vacuum support. The difference in crown height allowed the disc to collapse back on the vacuum support and cause wrinkling damage or localized plastic deformation.

Measurements of the failed rupture disc thickness as compared to the original manufacturing record of the disc's thickness suggested evidence of thinning. This thinning could only be caused by a pressure that would create a stress higher than the yield strength of the disc material. Since the reported pressure prior to rupture was approximately 20 psi, the thinning is believed to have been caused by a preservice hydrostatic test conducted by the Tennessee Valley Authority in 1981.

The results of the fractographic examinations of both the failed disc and vacuum support revealed the dimpled morphology indicative of a ductile type failure.

The chemical analyses of the failed rupture disc and vacuum support were performed by energy dispersive spectroscopy (EDS). The results of the analysis conformed to that of commercial 316 stainless steel with respect to the EDS accuracy.

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

The results of the tensile tests on the material from the failed rupture disc were compared to manufacturer data. The ultimate and yield strengths of the failed disc were higher than the as manufactured data. This increase is from the plastic deformation that occurred during pressurization past the yield strength of the material. Further evidence of the plastic deformation is the reduction in thickness (thinning) that was observed on the remaining portion of the rupture disc as compared to the as manufactured thickness measurement. A review of preoperational tests (W-1.1), completed March 31, 1981, for unit 2 and January 15, 1979, for unit 1, showed that the PRTs were to be pressurized to 60 psig. The actual test pressures were 65 psig and 60 psig for units 2 and 1 respectively. Early failure of the rupture disc would not affect any safety system from detecting and actuating to isolate containment due to an increase in radioactivity from the PRT. Also, the premature failure of the disc would not have prevented the fulfillment of the design basis of the PRT.

Leakage from the safety valve and from a pressurizer spray valve stem leakoff line resulted in minor fluctuations in PRT parameters. Normally, these fluctuations would not be significant; however, the weakened state of the rupture disc aggravated by the PRT parameter fluctuations resulted in premature rupture of the disc.

The Crosby safety valve (model 6M6 HB-BP-86) has a design setpoint of 2485 psig. When it was removed and leak tested, it was found to have gross leakage at 2300 psig. This leakage made the actual determination of the setpoint impossible; however, due to the design of the valve, the seat leakage would tend to make the valve relieve at a more conservative (lower) pressure. The valve deficiency is not considered to have degraded the safety of the plant during the time from the discovery of the leak until the valve was replaced, since the valve would have lifted and RCS integrity was not degraded.

Further investigation into drainage points to the PRT showed that a PRT spray valve (PCV-68-340D) stem leakoff line was leaking at the stem packing due to normal wear. During the shutdown, the valve was backseated. Full repairs were made during the subsequent outage.

An evaluation of this event, its causes and effects was made to ensure plant safety before unit restart. After the replacement of the PRT rupture disc, safety valve, and backseating of the spray valve, the unit returned to power at 0432 CST on 08/30/84.

Rupture discs for unit 1 have a manufacturer's rating of 86-100 psi, which is slightly higher than stated in the FSAR of 85 psi \pm 5 percent. The small increase in range will not significantly affect the design operation of PRT; however, it will allow for a slightly larger pressure change in the PRT during step load changes of approximately 10 percent before rupture of the disc. In the event of a safety on PORV lifting, the pressure rating difference will have little or no effect on PRT operation. The possibility of an accident different than analyzed in the FSAR is not created nor is the probability of an occurrence increased. Sufficient capability exists to identify and limit any PRT disc rupture and the margin of safety as defined in the BASES of any technical specification is not reduced.

TENNESSEE VALLEY AUTHORITY

Sequoyah Nuclear Plant
Post Office Box 2000
Soddy Daisy, Tennessee 37379

February 8, 1985

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 2 - DOCKET NO.
50-328 - FACILITY OPERATING LICENSE DPR-79 - REPORTABLE OCCURRENCE REPORT
SQRO-50-328/84013, REVISION 1

The enclosed revised licensee event report provides supplemental information concerning the forced unit shutdown due to a rupture of the pressurizer relief tank relief disc. This event was reported in accordance with 10 CFR 50.73, paragraph a.2.i.A and a.2.iv.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

P. R. Wallace
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Plant Manager

Enclosure
cc (Enclosure):

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