ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
DBA MOVEMENTS OF SCV
NCR CEB 79-23
10 CFR 50.55(e)

FINAL REPORT

Description of Deficiency

Piping which penetrates the steel containment (SCV) with rigid penetrations or is rigidly attached to SCV was analyzed and designed without adequate consideration for design basis accident (DBA) movements of SCV. Specifically, earlier analysis and design of piping systems penetrating the steel vessel incorrectly accounted for the following:

(1) Most piping systems which penetrate the steel vessel are supported by rigid pipe supports, springs, and/or by mechanical seismic supports (snubbers). However, the containment and piping response to earthquake motion is rapid enough to cause the snubbers to lock up thereby preventing movement of the pipes.

(2) The displacement of the vessel wall and attached piping (at the point of attachment) was incorrectly assumed to be only outward for the analysis and design of certain piping systems where movement of the vessel wall was considered. However, inward movement of the containment vessel must also be considered where vessel wall movement is important.

(3) In the original analysis of Sequoyah and Watts Bar piping systems, TVA's analysis approach was to conservatively analyze for containment vibratory motion during a DBA inside containment using static displacements. This analysis was consistent with the analysis approach and philosophy which was used at that time for free standing steel containment buildings and was judged to be adequate to encompass inertial effects. It has recently been determined that acceleration effects due to the rapid vibratory movement of the containment vessel may not be adequately considered by the static analysis.

The attached table lists the piping systems by penetrations which are to be reanalyzed to correct this nonconformance. All piping systems listed must be reanalyzed to account for the inertial effects. This reanalysis will envelope any corrective action for the displacement problem.

Safety Implications Statement

Had this condition gone uncorrected, certain piping systems would have been overstressed during a DBA and could, as a consequence, result in a breach in containment integrity. This could have adversely affected the safe operation of the plant.

Corrective Action

TVA has generated time history and response spectra data at each containment nozzle location for each of the six primary system DBA's. Using this information, all piping systems having rigid penetrations through the SCV are being reanalyzed giving full consideration for the DBA event. Also, the new DBA movements are being examined with respect to bellows type penetrations by both TVA and the bellows penetration vendor. No problems are anticipated with these penetrations.

The analysis effort is still in progress for units 1 and 2. Where necessary, supports for piping systems are being relocated or redesigned. Flexible hoses are being installed to isolate the SCV movement from small diameter piping. All analysis, design and construction will be completed by fuel load for each respective unit.

WATTS BAR NUCLEAR PLANT

Piping Penetrations Affected by NCR CEB 79-23

Penetration Number	Analysis (A) Flx Hose (FH)	System*	Pipe Size	Service	Sys Reqd for Safe Shutdown
16	A	CVCS (Supply)	3	Normal charging to Regen Hx	
29	A	CCS (Disch)	6	R.C. Pump Oil Cooler	
35	A	CCS (Disch)	6	Excess Letdown Hx	X**
39A	FH	WDS	1	N2 to Accumulators	
39B	FH	WDS	.75	N2 to Pressure Relief Tank	
40A	A	AFW (Supply)	4	Auxiliary Feedwater	X
40B	A	AFW (Supply)	4	Auxiliary Feedwater	X
40D	A	CSAS (Supply)	3	Air supply for H2 Purge	
41	FH	WDS	3	Floor Sump Pump Discharge	
42	A	PWS	3	Pressurizer Relief Tank Makeup	
43A	A	CVCS (Supply)	2	Sealwater Injection - RC Pump	
43B	A	CVCS (Supply)	2	Sealwater Injection - RC Pump	
43C	A	CVCS (Supply)	2	Sealwater Injection - RC Pump	
43D	A	CVCS (Supply)	2	Sealwater Injection - RC Pump	
44	A	CVCS (Disch)	4	Sealwater Return - RC Pump	
48A	A	Containment Spray	12	Spray Header	X
48B	A	Containment Spray	12	Spray Header	X
49A	A	RHR Spray	8	Spray Header	X
49B	A	RHR Spray	8	Spray Header	X
50A	A	CCS (Disch)	3	RC Pump Thermal Barrier	
50B	A	CCS (Supply)	3	RC Pump Thermal Barrier	
52	A	CCS (Supply)	6	RCP, CRDM, Lower Cont Vent Cooler	
53	A	CCS (Supply)	6	Excess Letdown Hx	X**
56	A	ERCW (Supply)	6	RCP, CRDM, Lower Cont Vent Cooler	
57	A	ERCW (Disch)	6	RCP, CRDM, Lower Cont Vent Cooler	
58	A	ERCW (Supply)	6	RCP, CRDM, Lower Cont Vent Cooler	
59	A	ERCW (Disch)	6	RCP, CRDM, Lower Cont Vent Cooler	
60	A	ERCW (Supply)	6	RCP, CRDM, Lower Cont Vent Cooler	
61	A	ERCW (Disch)	6	RCP, CRDM, Lower Cont Vent Cooler	
62	A	ERCW (Supply)	6	RCP, CRDM, Lower Cont Vent Cooler	
63	A	ERCW (Disch)	6	RCP, CRDM, Lower Cont Vent Cooler	
64	FH	ACS	2	Instrument Room Vent Cooler	
65	FH	ACS	2	Instrument Room Vent Cooler	

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Penetration Number	Analysis (A) Flx Hose (FH)	System*	Pipe Size	Service	Sys Reqd for Safe Shutdown
31	A	FPS	4	RCP, Fire Protection	
94	A	RM	1.5	Containment Atmosphere Monitor	
95	A	RX	1.5	Containment Atmosphere Monitor	
66	FH	ACS	2	Instrument Room Vent Cooler	
67	FH	ACS	2	Instrument Room Vent Cooler	
68	FH	ERCW (Supply)	2	Upper Containment Vent Cooler	●
69	FH	ERCW (Supply)	2	Upper Containment Vent Cooler	
70	FH	ERCW (Disch)	2	Upper Containment Vent Cooler	
71	FH	ERCW (Disch)	2	Upper Containment Vent Cooler	
72	FH	ERCW (Disch)	2	Upper Containment Vent Cooler	
73	FH	ERCW (Disch)	2	Upper Containment Vent Cooler	
74	FH	ERCW (Supply)	2	Upper Containment Vent Cooler	
75	FH	ERCW (Supply)	2	Upper Containment Vent Cooler	
76	FH	CSAS	2	Service Air	
77	FH	DWS	2	Demineralized Water	
78	A	FPS	4	Service to RCP Spray Coverage	
82	A	Fuel Pool Cooling	6	From Refueling Cavity	
83	A	Fuel Pool Cooling	4	To Refuleing Cavity	
110	A	UHI (Supply)	2	UHI Valve Test Line	
114	FH	ICS	2	Glycol Floor Cooling	
115	FH	ICS	2	Glycol Floor Cooling	
***	-	HC	12	SCV Hydrogen Removal	●
***	-	HC	12	SCV Hydrogen Removal	

*For description of acronyms, see next page.

**The CCS piping between the excess letdown heat exchanger and the steel containment vessel is TVA Class B and is required to function as a containment boundry (i.e., a closed system). It is for this reason that it is indicated as required for safe shutdown. The function of supplying and discharging CCS water to and from the heat exchanger is not required for safe shutdown.

***System does not penetrate SCV but is attached to the SCV.

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Acronyms	System
CVCS	Chemical Volume and Control System
CCS	Component Cooling System
WDS	Waste Disposal System
AFW	Auxiliary Feedwater System
PWS	Primary Water System
ICS	Ice Condenser System
FPS	Fire Protection System
ERCW	Essential Raw Cooling System
DWS	Demineralized Water System
UHI	Upper Head Injection System
ACS	Air-Conditioning/Chilled Water System
RM	Radiation Monitoring
HC	Hydrogen Collector