

May 15, 2002

MEMORANDUM TO: Nilesh Chokshi, Chief
Materials Engineering Branch
Division of Engineering Technology
Office of Nuclear Regulatory Research

Mark Cunningham, Chief
Probabilistic Risk Analysis Branch
Division of Risk Analysis and Applications
Office of Nuclear Regulatory Research

FROM: Jack Rosenthal, Chief *Original signed by J. Rosenthal*
Safety Margins and Systems Analysis Branch
Division of Systems Analysis and Regulatory Effectiveness
Office of Nuclear Regulatory Research

SUBJECT: STATUS OF THERMAL HYDRAULIC PTS CALCULATIONS

Since my last memo on this subject dated December 2001, the case list for the 4 PTS plants has grown as follows:

Oconee-1: From 148 to 171, 23 new, additional cases (Table 1)
T-H Status: All 171 cases completed

Beaver Valley-1: From 34 to 81. 47 new, additional cases (Table 2)
T-H Status: 55 cases completed. Remainder by 6/7

Palisades: From 26 to 47. 21 new, additional cases (Table 3)
T-H Status: All 47 cases completed.

Calvert Cliffs: From 31 to 37. 6 new, additional cases (Table 4)
T-H Status: All 37 cases completed.

Since December, the total number of RELAP cases has grown from 239 to 336, for a total of 97 new cases added during calendar year 2002. While the cases listed for Oconee and Beaver Valley-1 are now essentially final, such is not the case for Palisades and Calvert Cliffs, where we can anticipate that approximately 25 cases each are still to be defined from PRA.

The definition of additional runs for Palisades and Calvert Cliffs is dependent on the schedules of the respective utilities, who are performing the PRAs for these two plants. We are expecting the additional Palisades cases will be defined by PRA in early June, with the T-H calculations to

follow by early July. We expect the additional Calvert Cliffs cases will be defined by August, with the T-H calculations to follow by September.

follow by early July. We expect the additional Calvert Cliffs cases will be defined by August, with the T-H calculations to follow by September.

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DATE	05/08/02*		05/13/02*		05/15/02*	

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
1	LOCA	2.54 cm (1 inch) surge line break	None	None	No	No	N/A					
2	LOCA	3.59 cm (1.414 in) surge line break	None	None	No	No	N/A					
3	LOCA	5.08 cm (2 in) surge line break	None	None	No	No	N/A	S	3.27E-08	2.56E-04	8.36E-12	
4	LOCA	7.183 cm (2.828 in) surge line break	None	None	No	No	N/A	S	4.85E-07	2.97E-05	1.43E-11	
5	LOCA	10.16 cm (4 inch) surge line break	None	None	No	No	N/A	S	9.19E-06	2.97E-05	2.72E-10	
6	LOCA	3.59 cm (1.414 in) cold leg break	None	None	No	No	N/A					
7	LOCA	5.08 cm (2 inch) cold leg break	None	None	No	No	N/A					
8	LOCA	2.54 cm (1 inch) surge line break	1 stuck open safety valve in SG-A	None	No	No	N/A	B	0	5.58E-08	0	
9	LOCA	2.54 cm (1 inch) surge line break	2 stuck open safety valves in SG-A	None	No	No	N/A					
10	LOCA	3.59 cm (1.414 inches) surge line break	2 stuck open safety valves in SG-A	None	No	No	N/A					
11	LOCA	2.54 cm (1 inch) surge line break	1 stuck open safety valve in SG-A	HPI terminated when subcooling margin exceeds 55.6 K (100° F)	No	No	N/A					
12	LOCA	2.54 cm (1 inch) surge line break	1 stuck open safety valve in SG-A	HPI throttled to maintain 27.8 K (50° F) subcooling margin	No	No	N/A	B	0	4.79E-07	0	
13	LOCA	2.54 cm (1 inch) surge line break	2 stuck open safety valves in SG-A	HPI terminated when subcooling margin exceeds 55.6 K (100° F)	No	No	N/A					
14	LOCA	3.59 cm (1.414 in) surge line break	None	Operator is assumed to trip the reactor coolant pumps at 2.778 K (5° F) subcooling.	No	No	N/A					
15	LOCA	2.54 cm (1 in) surge line break with HPI Failure	None	At 15 minutes after transient initiation, operator opens all TBVs to lower primary system pressure and allow CFT and LPI injection.	No	No	N/A	B	3.78E-07	3.07E-08	1.15E-14	
16	LOCA - HZP	2.54 cm (1 in) surge line break	None	None	Yes	No	N/A					

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17	LOCA - HZP	2.54 cm (1 in) surge line break	1 stuck open safety valve in SG-A	None	Yes	No	N/A					
18	TT/RT	None	SG level control system failure causes SG overfill.	Operator is assumed to shut off the emergency feedwater system when the level reaches 96% operating range.	No	No	N/A					
19	TT/RT	None	SG level control system failure causes SG overfill. EFW continues running and the SGs flood and remain flooded.	Operator throttles EFW, maintaining flooded SGs without flooding the steam lines.	No	No	N/A					
20	TT/RT	None	One stuck open TBV in SG-A	The operator throttles HPI to maintain a level of 5.59 m (220 in) in the pressurizer	No	No	N/A					
21	TT/RT	None	None	None	No	No	N/A					
22	TT/RT	Stuck open PORV	None	None	No	No	N/A					
23	TT/RT	None	SG level control system failure causes SG overfill. EFW continues running and the SGs flood and remain flooded.	Operator trips MFW and turbine driven EFW. Motor driven EFW remains running.	No	No	N/A					Same as 19?
24	TT/RT	None	SG level control system failure causes SG overfill. MFW continues running and the SGs flood.	Operator trips MFW when water enters the steam lines.	No	No	N/A					
25	MSLB	None	MSLB with trip of turbine driven emergency feedwater by the MSLB circuitry.	None	No	No	N/A					
26	MSLB	None	MSLB without trip of turbine driven	None	No	No	N/A					

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			emergency feedwater									
27	MSLB	None	MSLB without trip of turbine driven emergency feedwater.	Operator throttles HPI to maintain 50° F (27.8 K) subcooling margin.	No	No	N/A	B	6.40E-08	2.09E-06	1.33E-13	
28	TT/RT	None	1 stuck open safety valve in SG-A	None	No	No	N/A	B	0	1.02E-07	0	
29	TT/RT	None	1 stuck open safety valve in SG-A and a second stuck open safety valve in SG-B	None	No	No	N/A	B	0	2.69E-07	0	
30	TT/RT - HZP	None	1 stuck open safety valve in SG-A	None	Yes	No	N/A	B	0	1.13E-07	0	
31	TT/RT - HZP	None	1 stuck open safety valve in SG-A and a second stuck open safety valve in SG-B	None	Yes	No	N/A	B	0	5.04E-09	0	
32	TT/RT	None	SG level control system failure causes SG overfill. MFW continues running and the SGs flood.	Operator trips MFW when water enters the steam lines. Operator also throttles HPI (throttling criteria is 50°F subcooling and 120" pressurizer level)	No	No	N/A					
33	TT/RT	None	One stuck open TBV in SG-A. Valve recloses in 10 minutes.	None	No	No	N/A					
34	TT/RT	Stuck open pressurizer safety valve	None	None	No	No	N/A	S	3.18E-09	3.85E-04	1.22E-12	Corrected error in stuck open pwr SRV flow area.
35	TT/RT	None	1 stuck open safety valve in SG-A	Operator throttles HPI to maintain 27.8 K (50° F) subcooling or 304.8 cm (120 in) of level in the pressurizer, whichever is controlling.	No	No	N/A					
36	TT/RT	None	1 stuck open safety valve in SG-A and a	Operator throttles HPI to maintain 27.8 K (50° F)	No	No	N/A	B	0	1.39E-05	0	

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Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
			second stuck open safety valve in SG-B	subcooling or 304.8 cm (120 in) level in the pressurizer, whichever is controlling.								
37	TT/RT - HZP	None	1 stuck open safety valve in SG-A	Operator throttles HPI to maintain 27.8 K (50° F) subcooling or 304.8 cm (120 in) level in the pressurizer, whichever is controlling.	Yes	No	N/A	B	0	1.21E-06	0	
38	TT/RT-HZP	None	1 stuck open safety valve in SG-A and a second stuck open safety valve in SG-B	Operator throttles HPI to maintain 27.8 K (50° F) subcooling or 304.8 cm (120 in) level in the pressurizer, whichever is controlling.	Yes	No	N/A	B	0	2.56E-06	0	
39	SGTR	None	SGTR with a stuck open SRV in SG-A. A reactor trip is assumed to occur at the time of the tube rupture.	None.	No	No	N/A					
40	SGTR	None	SGTR. A reactor trip is assumed to occur at the time of the tube rupture.	Operator uses pressurizer sprays to depressurize.	No	No						
41	TT/RT	Stuck open pressurizer safety valve. Valve recloses at 6000 secs (RCS low pressure point).	None	None	No	No	N/A	S	2.32E-05	2.56E-06	5.92E-11	Corrected error in stuck open pzs SRV flow area.
42	TT/RT - HZP	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	None	None	Yes	No	N/A	S	1.18E-04	1.76E-06	2.06E-10	Corrected error in stuck open pzs SRV flow area.
43	TT/RT	Stuck open PORV. Valve recloses at 400 sec (RCS low pressure point)	None	None	No	No	N/A					
44	LOCA	2.54 cm (1 in) surge line break with HPI	None.	At 15 minutes after initiation, operators open all TBVs to	No	No	N/A	B	7.39E-08	2.71E-08	1.99E-15	

<p style="text-align: center;">Table 1 Oconee Case List (3/21/02)</p>												
Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		Failure		depressurize the system to the CFT setpoint. When the CFTs are 50 percent discharged, HPI is assumed to be recovered. The TBVs are assumed remain open for the duration of the transient.								
45	TT/RT	None	Loss of MFW and EFW. At ~30 minutes after operator starts HPI and opens the PORV, EFW is restored. Normal EFW level control is assumed.	Operator starts primary system "feed and bleed" cooling by starting the HPI and opening the PORV at RCS pressure > 2275 psia. Operator also trips one RCP in each steam generator loop (if 0.27 K (0.5° F) subcooling margin is reached, the remaining two RCPs are tripped). The operator then closes the PORV and throttles HPI to maintain 55 K (100° F) subcooling.	No	No	N/A					
46	TT/RT	None	Loss of MFW and EFW. At ~30 minutes after operator starts HPI and opens the PORV, EFW is restored. Normal EFW level control is assumed.	Operator starts primary system "feed and bleed" cooling by starting the HPI and opening the PORV at RCS pressure > 2275 psia. Operator also trips one RCP in each steam generator loop (if 0.27 K (0.5° F) subcooling margin is reached, the remaining two RCPs are tripped). The operator then closes the PORV but fails to throttle HPI.	No	No	N/A					
47	TT/RT	None	Loss of MFW and EFW. At ~30 minutes after operator starts HPI and opens the PORV, EFW is restored. EFW level control fails where	Operator starts primary system "feed and bleed" cooling by starting the HPI and opening the PORV at RCS pressure > 2275 psia. Operator also trips one RCP in each steam generator loop (if 0.27 K (0.5° F)	No	No	N/A					

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Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
			the steam generators are overfilled and remain overfilled but water does not enter the steam lines.	subcooling margin is reached, the remaining two RCPs are tripped).								
48	TT/RT	None	Loss of MFW and EFW. At ~30 minutes after operator starts HPI and opens the PORV, EFW is restored. Normal EFW level control is assumed.	Operator starts primary system "feed and bleed" cooling by starting the HPI and opening the PORV at RCS pressure > 2275 psia. Operator also trips one RCP in each steam generator loop (2.7 K (5° F) subcooling margin is reached, the remaining two RCPs are tripped). The operator then closes the PORV and throttles HPI to maintain 55 K (100° F) subcooling.	No	No	N/A					
49	TT/RT	None	Loss of MFW and EFW.	Operator opens the TBV to depressurize the secondary side to below the condensate booster pump shutoff head so that these pumps feed the steam generators. Booster pumps are assumed to be uncontrolled so that the steam generators are overfilled. Booster pump flow is then assumed to be terminated. Operator throttles HPI to maintain ~ 55 K (100° F) subcooling and a pressurizer level of 254 cm (100 in) or more. The operator also throttles the TBVs to maintain 3.45 MPa (500 psi) secondary side pressure.	No	No	N/A					
50	TT/RT	None	Loss of MFW and EFW.	Operator opens all TBV to depressurize the secondary side to below the condensate booster pump shutoff head so that these	No	No	N/A					

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Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
				pumps feed the steam generators. Booster pumps are assumed to be uncontrolled so that the steam generators are filled to the top. Booster pump flow is then assumed to be terminated. Operator throttles HPI to maintain ~ 55 K (100° F) subcooling and a pressurizer level of 254 cm (100 in) or more. The TBVs are kept fully opened due to operator error.								
51	TT/RT - HZP	None	Loss of MFW and EFW.	Operator opens the TBV to depressurize the secondary side to below the condensate booster pump shutoff head so that these pumps feed the steam generators. Booster pumps are assumed to be uncontrolled so that the steam generators are filled to the top. Booster pump flow is then assumed to be terminated. Operator throttles HPI to maintain ~ 100oF subcooling and a pressurizer level of 100 inches or more. The operator throttles the TBVs to maintain 500 psi secondary side pressure.	Yes	No	N/A					
52	LOCA	14.37 cm (5.656 in) surge line break	None	None	No	No	N/A	B	5.20E-05	7.15E-06	3.72E-10	
53	LOCA	20.32 cm (8 inch) surge line break	None	None	No	No	N/A	B	1.10E-04	8.36E-06	9.18E-10	
54	LOCA-Hi K	5.08 cm (2 in) surge line break	None	None	No	Yes	3	S	1.75E-06	2.56E-04	4.46E-10	
55	LOCA-Hi K	7.183 cm (2.828 in) surge line break	None	None	No	Yes	4	B	6.79E-06	8.34E-06	5.66E-11	
56	TT/RT-Hi K	Stuck open	None	None	No	Yes	34	S	1.65E-06	3.85E-04	6.35E-	Corrected error in

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Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		pressurizer safety valve.									10	stuck open pzs SRV flow area.
57	TT/RT	None	Two stuck open safety valves in SG-A.	Operator isolates EFW in SG-A.	No	No	N/A					
58	LOCA-Hi K	10.16 cm (4 inch) surge line break	None	None	No	Yes	5					
59	TT/RT	None	2 stuck open safety valves in SG-A	Operator throttles HPI to maintain 27.8 K (50oF) subcooling or pressurizer level of 304.8 cm (120 inches), whichever is limiting. The operator stops emergency feedwater flow to SG-A at 15 minutes after accident initiation.	No	No	N/A					
60	TT/RT - HZP	None	2 stuck open safety valves in SG-A	Operator throttles HPI to maintain 27.8 K (50° F) subcooling or pressurizer level of 304.8 cm (120 inches), whichever is limiting. Assume that the operator stops emergency feedwater flow to SG-A at 15 minutes after accident initiation.	Yes	No	N/A					
61	MSLB	None	MSLB with shutdown of the MFW and the turbine driven EFW pumps by the MSLB circuitry.	Operator stops motor driven EFW flow to the affected steam generator after 10 minutes.	No	No	N/A					
62	MSLB	None	MSLB with shutdown of the MFW and the turbine driven EFW pumps by the MSLB circuitry. Break occurs in the containment so that RCP trip occurs due to a containment	None	No	No	N/A					

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			isolation signal at 1 minute after break initiation.									
63	LOCA-S	5.08 cm (2 in) surge line break. Core flood tank temperature of 294 K(70°F). Nominal temperature is 300 K (80° F)	None	None	No	No	3	S	7.85E-08	2.56E-04	2.00E-11	
64	LOCA-S	5.08 cm (2 in) surge line break. Core flood tank temperature of 310 K(100°F). Nominal temperature is 300 K (80° F)	None	None	No	No	3	S	5.81E-08	2.56E-04	1.48E-11	
65	LOCA-S	5.08 cm (2 in) surge line break. HPI temperature of 278 K (40° F). Nominal temperature is 294 K (70° F)	None	None	No	No	3	S	3.70E-07	2.56E-04	9.46E-11	
66	LOCA-S	5.08 cm (2 in) surge line break. HPI temperature of 300 K (80° F). Nominal temperature is 294 K (70° F).	None	None	No	No	3	S	2.29E-08	2.56E-04	5.84E-12	
67	LOCA-S	5.08 cm (2 in) surge line break. Increased effective heat transfer coefficient used (1.3 x HTC).	None	None	No	No	3	S	1.43E-08	2.56E-04	3.64E-12	
68	LOCA-S	5.08 cm (2 in) surge line break. Decreased effective heat transfer coefficient used (0.7 x HTC).	None	None	No	No	3	S	2.03E-07	2.56E-04	5.18E-11	

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69	LOCA-S	5.08 cm (2 in) surge line break. Increased loop flow resistance to reduce natural circulation (100 % increase).	None	None	No	No	3	S	7.98E-08	2.56E-04	2.03E-11	
70	LOCA-HZP	5.08 cm (2 inch) surge line break	None	None	Yes	No	3	S	2.57E-07	6.18E-06	1.58E-12	
71	LOCA-S	5.08 cm (2 in) surge line break. Reduced vent valve resistance (delta-P) to opening (Factor of 0.5).	None	None	No	No	3	S	4.64E-08	2.56E-04	1.18E-11	
72	LOCA-S	5.08 cm (2 in) surge line break. No vent valve function.	None	None	No	No	3	S	9.21E-08	2.56E-04	2.35E-11	Same as 80
73	LOCA-HZP	14.366 cm (5.656 in) surge line break	None	None	Yes	No	52	S	7.13E-05	6.03E-07	4.29E-11	
74	LOCA-HZP	2.54 cm (1 in) surge line break with HPI Failure	None	At 15 minutes after transient initiation, the operator opens all turbine bypass valves to lower primary system pressure and allow core flood tank and LPI injection.	Yes	No	15	S	0	1.83E-08	0	
75	LOCA-HZP	2.54 cm (1 in) surge line break with HPI Failure	None	At 15 minutes after sequence initiation, operators open all TBVs to depressurize the system to the CFT setpoint. When the CFTs are 50 percent discharged, HPI is assumed to be recovered. The TBVs are assumed remain opened for the duration of the transient.	Yes	No	44	S	3.96E-05	1.34E-07	5.32E-12	
76	LOCA	3.81 cm (1.5 in) surge line break	None	None	No	No	N/A	S	1.33E-07	2.56E-04	3.39E-11	
77	TT/RT	None	One stuck open TBV in SG-A. Valve recloses in 20	Operator throttles HPI to maintain 558 cm (220 in) level in the pressurizer.	No	No	N/A					

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			minutes.									
78	LOCA-S	5.08 cm (2 in) surge line break. No heat structures.	None	None	No	No	3					
79	LOCA-S	5.08 cm (2 in) surge line break. No heat structures and no vent valve function.	None	None	No	No	3					
80	LOCA-S	5.08 cm (2 in) surge line break. No vent valve function.	None	None	No	No	3					Same as 72
81	LOCA	5.08 cm (2 inch) surge line break with HPI Failure	None	At 15 minutes after transient initiation, operator opens all TBVs to lower primary system pressure and allow CFT and LPI injection.	No	No	15	S	1.81E-07	3.08E-06	5.57E-13	
82	LOCA	2.54 cm (1 in) surge line break with HPI Failure	None	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. At 3000 seconds after initiation, operator starts throttling HPI to 5°F subcooling and 100" pressurizer level.	No	No	44	S	1.74E-07	2.28E-07	3.96E-14	
83	TT/RT	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	None	After valve recloses, operator throttles HPI 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)	No	No	41	S	8.60E-07	1.14E-03	9.82E-10	Corrected error in stuck open pzs SRV flow area.
84	TT/RT	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	None	After valve recloses, operator throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)	No	No	41	S	2.03E-05	3.66E-05	7.42E-10	Corrected error in stuck open pzs SRV flow area.
85	TT/RT	Stuck open	None	After valve recloses, operator	No	No	41	S	2.39E-09	1.14E-03	2.70E-	Corrected error in

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		pressurizer safety valve. Valve recloses at 3000 secs.		throttles HPI 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)							12	stuck open pzs SRV flow area.
86	TT/RT	Stuck open pressurizer safety valve. Valve recloses at 3000 secs.	None	After valve recloses, operator throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)	No	No	41	S	2.39E-09	4.17E-05	9.96E-14	Corrected error in stuck open pzs SRV flow area.
87	TT/RT	Stuck open pressurizer SRV and HPI Failure	None	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. The HPI is throttled 20 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	No	No	41	S	6.10E-07	2.41E-07	1.46E-13	Corrected error in stuck open pzs SRV flow area.
88	TT/RT	Stuck Open pressurizer safety valve and HPI Failure	None	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. The SRV is closed 5 minutes after HPI recovered. HPI is throttled at 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	No	No	87	S	2.74E-08	7.44E-07	2.04E-14	Corrected error in stuck open pzs SRV flow area.
89	TT/RT	None	Loss of MFW and EFW.	Operator opens all TBVs to depressurize the secondary side to below the condensate booster	No	No	50	B	0	1.26E-06	0	

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Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
				pump shutoff head so that these pumps feed the steam generators. Booster pumps are assumed to be initially uncontrolled so that the steam generators are overfilled (240 inches startup level). Operator controls booster pump flow to maintain SG level at 30 inches (startup level) due to continued RCP operation. Operator also throttles HPI to maintain ~ 100oF subcooling and a pressurizer level of 100 inches or more. The TBVs are kept fully opened due to operator error.								
90	TT/RT	None	2 stuck open safety valves in SG-A	Operator throttles HPI 20 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	No	No	29	B	0	6.98E-07	0	
91	SGTR	None	SGTR with a stuck open SRV in SG-B. A reactor trip is assumed to occur at the time of the tube rupture. Stuck safety relief valve is assumed to reclose 10 minutes after initiation.	Operator trips RCP's 1 minute after initiation. Operator also throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (assumed throttling criteria is 5°F subcooling or 100" pressurizer level).	No	No	39	B	0	6.12E-05	0	
92	TT/RT-HZP	Stuck open pressurizer safety valve. Valve recloses at 6000 secs .	None	After valve recloses, operator throttles HPI at 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer	Yes	No	41 and 83	S	2.81E-05	1.96E-04	5.48E-09	Corrected error in stuck open pzs SRV flow area.

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
				level).								
93	TT/RT-HZP	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	None	After valve recloses, operator throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	No	41 and 84	S	9.51E-05	6.18E-06	5.88E-10	Corrected error in stuck open pzs SRV flow area.
94	TT/RT-HZP	Stuck open pressurizer safety valve. Valve recloses at 3000 secs.	None	After valve recloses, operator throttles HPI 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	No	41 and 85	S	5.63E-05	1.96E-04	1.10E-08	Corrected error in stuck open pzs SRV flow area.
95	TT/RT-HZP	Stuck open pressurizer safety valve. Valve recloses at 3000 secs.	None	After valve recloses, operator throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	No	41 and 86	S	5.66E-05	6.18E-06	3.50E-10	Corrected error in stuck open pzs SRV flow area.
96	TT/RT-HZP	Stuck open pressurizer safety valve and HPI Failure	None	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. HPI is throttled 20 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	No	41 & 87	S	7.06E-06	4.17E-08	2.94E-13	Corrected error in stuck open pzs SRV flow area.
97	TT/RT-HZP	Stuck open pressurizer SRV and HPI Failure	None	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. SRV is closed at 5 minutes after HPI is recovered. HPI is throttled at 1 minute after	Yes	No	87 and 88	S	1.62E-70	1.27E-07	2.06E-77	Corrected error in stuck open pzs SRV flow area.

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
				5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).								
98	TT/RT-HZP	None	Loss of MFW and EFW.	Operator opens all TBVs to depressurize the secondary side to below the condensate booster pump shutoff head so that these pumps feed the steam generators. Booster pumps are assumed to be initially uncontrolled so that the steam generators are overfilled (240 inches startup level). Operator controls booster pump flow to maintain SG level at 30 inches (startup level) due to continued RCP operation. Operator also throttles HPI to maintain ~ 100oF subcooling and a pressurizer level of 100 inches or more. The TBVs are kept fully opened due to operator error.	Yes	No	50 and 89	B	0	6.56E-08	0	
99	MSLB	None	MSLB with trip of turbine driven EFW by MSLB Circuitry.	HPI is throttled 20 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	No	No	27	B	3.72E-08	2.34E-07	8.70E-15	
100	MSLB-HZP	None	MSLB with trip of turbine driven EFW by MSLB Circuitry	Operator throttles HPI 20 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	No	27 and 99	B	3.98E-07	2.34E-07	9.33E-14	
101	MSLB-HZP	None	MSLB without trip of turbine driven EFW	Operator throttles HPI to maintain 50° F (27.8 K)	Yes	No	27	B	1.33E-07	3.98E-07	5.27E-14	

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
			by MSLB Circuitry	subcooling margin.								
102	TT/RT-HZP	None	2 stuck open safety valves in SG-A	Operator throttles HPI 20 minutes after 2.77 K (5°F) subcooling or 254 cm (100 in) pressurizer level is reached (throttling criteria is 2.77 K (5°F) subcooling and 100" pressurizer level).	Yes	No	29 and 90	B	0	2.10E-07	0	
103	SGTR-HZP	None	SGTR with a stuck open SRV in SG-B. A reactor trip is assumed to occur at the time of the tube rupture. Stuck safety relief valve is assumed to reclose 10 minutes after initiation.	Operator trips RCP's 1 minute after initiation. Operator also throttles HPI 10 minutes after 2.77 K (5° F) subcooling or 254 cm (100 in) pressurizer level is reached (assumed throttling criteria is 2.77 K (5°F) subcooling or 254 cm (100 in) pressurizer level).	Yes	No	39 and 91	B	0	5.02E-08	0	
104	LOCA-HZP	3.59 cm (1.414 in) surge line break	None	None	Yes	No	2	S	0.00E+00	6.18E-06	0	
105	LOCA	5.08 cm (2 inch) surge line break with HPI failure.	None	None	No	No						
106	LOCA-HZP	7.18 cm (2.828 in) surge line break	None	None	Yes	No	4	S	1.38E-06	7.58E-05	1.04E-10	
107	LOCA-Hi K	2.54 cm (1 inch) surge line break	2 stuck open safety valves in SG-A	HPI terminated when subcooling margin exceeds 55.6 K (100o F)	No	Yes	13					
108	TT/RT-Hi K	Stuck open pressurizer safety valve	None	None	No	Yes	34	S	1.75E-06	3.85E-04	6.74E-10	Duplicate of 56. Corrected error in stuck open pzs SRV flow area.
109	TT/RT-Hi K	Stuck open pressurizer safety valve. Valve recloses at 6000 secs (RCS low pressure point).	None	None	No	Yes	41	B	1.48E-04	1.02E-05	1.51E-09	Corrected error in stuck open pzs SRV flow area.
110	LOCA-Hi K	5.08 cm (2 inch) surge line break with	None	At 15 minutes after transient initiation, operator opens both	No	Yes	81	B	3.77E-06	3.08E-06	1.15E-11	

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		HPI Failure		TBV to lower primary system pressure and allow CFT and LPI injection.								
111	LOCA-Hi K	2.54 cm (1 in) surge line break with HPI Failure	None	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. At 3000 seconds after initiation, operator starts throttling HPI to 5°F subcooling and 100" pressurizer level.	No	Yes	82	B	4.19E-15	3.08E-06	1.28E-20	
112	TT/RT-Hi K	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	None	After valve recloses, operator throttles HPI 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)	No	Yes	83	B	1.72E-06	4.32E-04	7.42E-10	Corrected error in stuck open pzs SRV flow area.
113	TT/RT-Hi K	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	None	After valve recloses, operator throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)	No	Yes	84	B	5.49E-05	1.46E-05	8.02E-10	Corrected error in stuck open pzs SRV flow area.
114	TT/RT-Hi K	Stuck open pressurizer safety valve. Valve recloses at 3000 secs.	None	After valve recloses, operator throttles HPI 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)	No	Yes	85	B	0	4.28E-04	0	Corrected error in stuck open pzs SRV flow area.
115	TT/RT-Hi K	Stuck open pressurizer Safety Valve. Valve recloses at 3000 secs.	None	After valve recloses, operator throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)	No	Yes	86	B	2.13E-07	1.62E-05	3.45E-12	Corrected error in stuck open pzs SRV flow area.
116	TT/RT-Hi K	Stuck open pressurizer safety	None	At 15 minutes after initiation, operator opens all TBVs to lower	No	Yes	87	B	1.31E-06	2.41E-07	3.15E-13	Corrected error in stuck open pzs SRV

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		valve and HPI failure		primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. The HPI is throttled 20 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).								flow area.
117	TT/RT-Hi K	Stuck open Pressurizer safety valve and HPI failure	None	At 15 minutes after initiation, operator opens all TBV to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. The SRV is closed 5 minutes after HPI recovered. HPI is throttled at 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	No	Yes	88	B	8.64E-07	7.44E-07	6.43E-13	Corrected error in stuck open pvr SRV flow area.
118	LOCA-Hi K	5.08 cm (2 inch) surge line break	None	None	Yes	Yes	70	S	6.02E-06	6.18E-06	3.71E-11	
119	LOCA-Hi K	2.54 cm (1 in) surge line break with HPI Failure	None	At 15 minutes after transient initiation, the operator opens all turbine bypass valves to lower primary system pressure and allow core flood tank and LPI injection.	Yes	Yes	74	B	0	1.83E-08	0	
120	LOCA-Hi K	2.54 cm (1 in) surge line break with HPI Failure	None	At 15 minutes after sequence initiation, operators open all TBVs to depressurize the system to the CFT setpoint. When the CFTs are 50 percent discharged, HPI is assumed to be recovered. The TBVs are assumed remain opened for the duration of the	Yes	Yes	75	B	1.50E-04	1.34E-07	2.01E-11	

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
				transient.								
121	TT/RT-Hi K	Stuck open pressurizer safety valve. Valve recloses at 6000 secs .	None	Operator throttles HPI at 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	Yes	92	S	6.32E-06	1.96E-04	1.23E-09	Corrected error in stuck open pzs SRV flow area.
122	TT/RT-Hi K	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	None	Operator throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	Yes	93	S	3.10E-04	6.18E-06	1.91E-09	Corrected error in stuck open pzs SRV flow area.
123	TT/RT-Hi K	Stuck open pressurizer safety valve. Valve recloses at 3000 secs.	None	Operator throttles HPI 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	Yes	94	S	6.21E-06	1.96E-04	1.21E-09	Corrected error in stuck open pzs SRV flow area.
124	TT/RT-Hi K	Stuck open pressurizer safety valve. Valve recloses at 3000 secs.	None	Operator throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	Yes	95	S	1.47E-04	6.18E-06	9.06E-10	Corrected error in stuck open pzs SRV flow area.
125	TT/RT-Hi K	Stuck open pressurizer safety valve and HPI Failure	None	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. HPI is throttled 20 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).	Yes	Yes	96	B	2.23E-07	4.17E-08	9.31E-15	Corrected error in stuck open pzs SRV flow area.
126	TT/RT-Hi K	Stuck open pressurizer safety	None	At 15 minutes after initiation, operator opens all TBVs to lower	Yes	Yes	97	B	2.77E-06	1.27E-07	3.52E-13	Corrected error in stuck open pzs SRV

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		valve and HPI Failure		primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. SRV is closed at 5 minutes after HPI is recovered. HPI is throttled at 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level).								flow area.
127	SGTR-HiK	None	SGTR with a stuck open SRV in SG-B. A reactor trip is assumed to occur at the time of the tube rupture. Stuck safety relief valve is assumed to reclose 10 minutes after initiation.	Operator trips RCP's 1 minute after initiation. Operator also throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached.	Yes	Yes	103	S	0	5.02E-08	0	
128	LOCA-HiK	7.18 cm (2.828 in) surge line break	None	None	Yes	Yes	106	S	1.98E-05	7.58E-05	1.49E-09	
129	LOCA	10.16 cm (4 inch) cold leg break	None	None	No	No	N/A					
130	LOCA	14.37 cm (5.656 in) cold leg break	None	None	No	No	N/A					
131	LOCA-HZP	10.16 cm (4 inch) surge line break	None	None	Yes	No	5	S	3.09E-05	6.03E-07	1.86E-11	
132	LOCA-HZP	20.32 cm (8 inch) surge line break	None	None	Yes	No	53	S	1.15E-04	8.04E-08	9.22E-12	
133	LOCA-HZP & HiK	10.16 cm (4 inch) surge line break	None	None	Yes	Yes	131	S	8.66E-05	6.03E-07	5.21E-11	
134	LOCA-HZP & HiK	20.32 cm (8 inch) surge line break	None	None	Yes	Yes	132	S	2.51E-04	8.04E-08	2.01E-11	
135	LOCA-S	8.53 cm (3.36 in) surge line break (Break flow area	None	None	No	No						

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		reduced by 30% from 10.16 cm (4 in) break). Vent valves do not function.										
136	LOCA-S	4.34 cm (1.71 in) surge line break (Break flow area increased by 30% from 3.81 cm (1.5 in) break). Winter conditions assumed (HPI, LPI temp = 277 K (40° F) and CFT temp = 294 K (70° F)).	None	None	No	No	N/A					
137	TT/RT-S	TT/RT with stuck open pzz SRV (valve flow area reduced by 30 percent). Summer conditions assumed (HPI, LPI temp = 302 K (85° F) and CFT temp = 310 K (100° F)). Vent valves do not function.	None	None	No	No	N/A					Corrected error in stuck open pzz SRV flow area.
138	TT/RT-S	TT/RT with stuck open pzz SRV. Summer conditions assumed (HPI, LPI temp = 302 K (85° F) and CFT temp = 310 K (100° F)).	None	None	No	No	N/A					Corrected error in stuck open pzz SRV flow area.
139	TT/RT-S	TT/RT with partially stuck open pzz SRV (flow area equivalent to 1.5 in diameter opening). HTC coefficients increased	None	None	No	No	N/A					Corrected error in stuck open pzz SRV flow area.

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		by 1.3.										
140	TT/RT-S	TT/RT with stuck open pzz SRV. SRV assumed to reclose at 3000 secs. Operator does not throttle HPI.	None	None	No	No	N/A					Corrected error in stuck open pzz SRV flow area.
141	LOCA-HiK	8.19 cm (3.22 in) surge line break (Break flow area increased by 30% from 7.18 cm (2.828 in) break).	None	None	No	Yes	N/A	B	1.39E-05	4.93E-05	6.83E-10	
142	LOCA-HiK	6.01 cm (2.37 in) surge line break (Break flow area decreased by 30% from 7.18 cm (2.828 in) break).	None	None	No	Yes	N/A	B	1.23E-06	4.93E-05	6.07E-11	
143	LOCA-HiK	7.18 cm (2.828 in) cold leg break.	None	None	No	Yes	N/A	B	9.84E-09	4.93E-05	4.84E-13	
144	LOCA-HiK	8.53 cm (3.36 in) surge line break (Break flow area reduced by 30% from 10.16 cm (4 in) break). Vent valves do not function.	None	None	No	Yes	135	B	3.54E-06	6.30E-05	2.22E-10	
145	LOCA-HiK	4.34 cm (1.71 in) surge line break (Break flow area increased by 30% from 3.81 cm (1.5 in) break). Winter conditions assumed (HPI, LPI temp = 277 K (40° F) and CFT temp = 294 K (70°	None	None	No	Yes	136	B	0	6.30E-05	0	

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		F)).										
146	LOCA-HiK	TT/RT with stuck open pzz SRV (valve flow area reduced by 30 percent). Summer conditions assumed (HPI, LPI temp = 302 K (85° F) and CFT temp = 310 K (100° F)). Vent valves do not function.	None	None	No	Yes	137	B	7.54E-07	1.04E-04	7.87E-11	Corrected error in stuck open pzz SRV flow area.
147	TT/RT-Hi K	TT/RT with stuck open pzz SRV. Summer conditions assumed (HPI, LPI temp = 302 K (85° F) and CFT temp = 310 K (100° F)).	None	None	No	Yes	138	B	5.60E-07	8.96E-05	5.01E-11	Corrected error in stuck open pzz SRV flow area.
148	TT/RT-Hi K	TT/RT with partially stuck open pzz SRV (flow area equivalent to 1.5 in diameter opening). HTC coefficients increased by 1.3.	None	None	No	Yes	139	B	0	1.05E-04	0	Corrected error in stuck open pzz SRV flow area.
149	TT/RT-Hi K	TT/RT with stuck open pzz SRV. SRV assumed to reclose at 3000 secs. Operator does not throttle HPI.	None	None	No	Yes	140	B	6.87E-07	1.02E-05	7.02E-12	Corrected error in stuck open pzz SRV flow area.
150	LOCA	14.37 cm (5.656 in) surge line break. ECC suction switch to the containment sump included in the analysis.	None	None	No	No	52					
151	LOCA	20.32 cm (8 inch)	None	None	No	No	53					

Table 1
Oconee Case List (3/21/02)

Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		surge line break. ECC suction switch to the containment sump included in the analysis.										
152	LOCA-Hi K	7.183 cm (2.828 in) surge line break. ECC suction switch to the containment sump included in the analysis.	None	None	No	Yes	55					
153	LOCA-HiK	8.19 cm (3.22 in) surge line break (Break flow area increased by 30% from 7.18 cm (2.828 in) break). ECC suction switch to the containment sump included in the analysis.	None	None	No	Yes	141					
154	LOCA-HiK	8.53 cm (3.36 in) surge line break (Break flow area reduced by 30% from 10.16 cm (4 in) break). Vent valves do not function. ECC suction switch to the containment sump included in the analysis.	None	None	No	Yes	144					
155	LOCA-HiK	28.738 cm (11.314 in) hot leg break. ECC suction switch to the containment sump included in the analysis.	None	None	No	Yes	N/A					

<p style="text-align: center;">Table 1 Oconee Case List (3/21/02)</p>												
Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
156	LOCA-HiK	40.64 cm (16 in) hot leg break. ECC suction switch to the containment sump included in the analysis.	None	None	No	Yes	N/A					
157	LOCA-HiK	57.48 cm (22.63 in) hot leg break. ECC suction switch to the containment sump included in the analysis.	None	None	No	Yes	N/A					
158	LOCA-HiK	40.64 cm (16 in) cold leg break. ECC suction switch to the containment sump included in the analysis.	None	None	No	Yes	N/A					
159	LOCA-HiK	14.37 cm (5.656 in) surge line break	None	None	No	Yes	52					
160	LOCA-HiK	14.37 cm (5.656 in) surge line break. ECC suction switch to the containment sump included in the analysis.	None	None	No	Yes	150					
161	LOCA-HZP & HiK	14.366 cm (5.656 in) surge line break	None	None	Yes	Yes	73	S				
162	LOCA-HZP & HiK	14.366 cm (5.656 in) surge line break. ECC suction switch to the containment sump included in the analysis.	None	None	Yes	Yes	73	S				
163	LOCA-HiK	20.32 cm (8 inch) surge line break	None	None	No	Yes	53					
164	LOCA-HiK	20.32 cm (8 inch)	None	None	No	Yes	151					

<p style="text-align: center;">Table 1 Oconee Case List (3/21/02)</p>												
Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		surge line break. ECC suction switch to the containment sump included in the analysis.										
165	TT/RT-HZP & Hi K	Stuck open pressurizer safety valve. Valve recloses at 6000 secs (RCS low pressure point).	None	None	Yes	Yes	109					
166	TT/RT-HZP & Hi K	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	None	After valve recloses, operator throttles HPI 1 minute after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)	Yes	Yes	112					
167	TT/RT-HZP & Hi K	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	None	After valve recloses, operator throttles HPI 10 minutes after 5°F subcooling or 100" pressurizer level is reached (throttling criteria is 5°F subcooling and 100" pressurizer level)	Yes	Yes	113					
168	TT/RT-HiK	TT/RT with stuck open pzs SRV. SRV assumed to reclose at 3000 s. Operator does not throttle HPI.	None	None	Yes	Yes	149					
169	LOCA-HiK	TT/RT with stuck open pzs SRV (valve flow area reduced by 30%) Summer conditions assumed (HPI, LPI temp =302K (85F) and CFT temp = 310K (100F)	None	None	Yes	Yes	146					
170	TT/RT-HiK	TT/RT with stuck open pzs SRV. Summer conditions	None	None	Yes	Yes	147					

<p style="text-align: center;">Table 1 Oconee Case List (3/21/02)</p>												
Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	LDH	Hi K	Mod of	PRA	CPF	Init Freq	RPV failure freq	Comments
		assumed (HPI, LPI temp =302K (85F) and CFT temp = 310K (100F)										
171	TT/RT-HiK	TT/RT with partially stuck open p2r ARV (flow area equivalent to 1.5 in diameter opening). HTC coefficients increased by 1.3	None	None	Yes	Yes	148					

Yes

Table 2
Beaver Valley RELAP5 Case List

Number	Description
1	1.0" Surge line break
2	1.414" Surge line break
3	2.0" Surge line break
4	2.828" Surge line break
5	4" Surge line break
6	5.657" Surge line break
7	8" Surge line break
8	11.314" hot leg break
9	16" hot leg break
10	22.63" hot leg break
11	Turbine/Reactor trip (base case)
12	Turbine/Reactor trip w/1 stuck open pressurizer PORV
13	Turbine/Reactor trip w/1 stuck open pressurizer PORV (isolated after 20 minutes)
14	Turbine/Reactor trip w/1 stuck open pressurizer SRV
15	Turbine/Reactor trip w/1 stuck open SDV
16	Turbine/Reactor trip w/2 stuck open SDVs
17	Turbine/Reactor trip w/1 stuck open SDV and all MSIV's closed at 20 minutes to isolate
18	Turbine/Reactor trip w/3 stuck open ASDVs (1 per generator)
19	Turbine/Reactor trip w/2 stuck open ASDVs (generators A and B)
20	Turbine/Reactor trip w/1 stuck open ASDV (generator A)
21	Turbine/Reactor trip w/1 stuck open ASDV (generator A) and MSIV isolation at 20 minutes

22	Turbine/Reactor trip w/1 stuck open pressurizer PORV and 1 stuck open ASDV (generator A)
23	Turbine/Reactor trip w/1 stuck open pressurizer SRV and 1 stuck open ASDV (generator A)
24	Turbine/Reactor trip w/3 stuck open MS-SRVs (one in each SG)
25	Turbine/Reactor trip w/2 stuck open MS-SRV (generators A and B)
26	Turbine/Reactor trip w/1 stuck open MS-SRV (generator A)
27	Turbine/Reactor trip w/1 stuck open MS-SRV (generator A) and MSIV closure at 20 minutes
28	Turbine/Reactor trip w/full MFW to all 3 SGs (trip when water in steam line)
29	Turbine/Reactor trip w/full MFW to 2 SGs (generators A and B), trip when water in steam line
30	Turbine/Reactor trip w/Full MFW to 1 SGs (generator A), trip when water in steam line
31	Turbine/Reactor trip w/feed and bleed (operators open all pressurizer PORVs and use all charging/HPI pumps)
32	Main steam line break (double ended guillotine break)
33	Two stuck open pressurizer PORVs
34	Two stuck open pressurizer SRVs
35	One stuck open pressurizer SRV that recloses at 1200s
36	Three stuck open steam dump valves
37	Steam generator tube rupture
38	Steam generator tube rupture with stuck open steam dump valve
39	One stuck open pressurizer PORV and one stuck open steam dump valve
40	One stuck open pressurizer SRV and one stuck open steam dump valve
41	One stuck open pressurizer SRV and one main steam SRV
42	One stuck open main steam SRV that recloses at 7000 s
43	One stuck open pressurizer SRV that recloses at 4000 s
44	Steam generator overfeed to three SGs with full MFW from hot standby

45	Steam generator overfeed to three SGs with full MFW from full power
46	Steam generator overfeed to two SGs with full MFW from hot standby
47	Steam generator overfeed to one SG with full MFW from hot standby
48	Steam generator overfeed to three SGs with full MFW, switch to auxiliary feedwater when the SGs are full
49	Main steam line break without MSIV closure
50	Steam generator tube rupture with RCPs tripped
51	Steam generator tube rupture with stuck open pressurizer PORV, stuck open ADV, RCPs tripped, and broken SG fed with auxiliary feedwater
52	1" surge line break from hot standby
53	1.414" surge line break from hot standby
54	2" surge line break from hot standby
55	2.828" surge line break from hot standby
56	4" surge line break from hot standby
57	5.657" surge line break from hot standby
58	8" surge line break from hot standby
59	Stuck open pressurizer SRV that recloses at 3000 s
60	One stuck open pressurizer SRV that recloses at 6000 s
61	Two stuck open pessurizer SRVs that reclose at 3000 s
62	Two pressurizer SRVs that reclose at 6000 s
63	16" cold leg break
64	Two stuck open pressurizer SRVs from hot standby
65	Two stuck open pressurizer SRVs, no HPI, open all steam dump valves 5 minutes after HPI demand signal
66	Two stuck open pressurizer SRVs, one recloses at 3000 s
67	Two stuck open pressurizer SRVs, one recloses at 6000 s

68	Two stuck open pressurizer SRVs that reclose at 6000 s, no HPI, open all steam dump valves 5 minutes after HPI demand signal
69	Two stuck open pressurizer SRVs that reclose at 3000 s from hot standby
70	Two stuck open pressurizer SRVs that reclose at 6000 s from hot standby
71	One stuck open pressurizer SRV that recloses at 6000 s from hot standby
72	One stuck open pressurizer SRV, no HPI, open all steam dump valves 5 minutes after HPI demand signal
73	One stuck open pressurizer SRV, no HPI, open all steam dump valves 5 minutes after HPI demand signal from hot standby
74	Main steam line break with continued auxiliary feedwater to the broken steam generator
75	Steam generator overfeed to three SGs with full MFW from full power, RCPs tripped
76	Steam generator overfeed to three SGs with full MFW from full power, RCPs tripped, from hot standby
77	Feed and bleed, open all pressurizer PORVs, full HPI, from hot standby
78	Loss of MFW and auxiliary feedwater, open all steam dump valves, maintain steam generator level using condensate feedwater pumps
79	Main steam line break with continued auxiliary feedwater to the broken steam generator, RCPs tripped
80	Main steam line break with continued auxiliary feedwater to the broken steam generator, RCPs tripped, from hot standby
81	Main steam line break with continued auxiliary feedwater to the broken steam generator, HPI failure, open atmospheric dump valves on intact steam generators, after accumulators discharge 50%, restore HPI

Notes:

- A. A reactor trip is equivalent to a turbine trip in the RELAP5 model.
- B. There are eighteen Steam Dump Valves (SDV) which are connected to the common steam header for all three generators.
- C. There are three Atmospheric Steam Dump Valves (ASDV) which are connected one per steam line (loop A, B and C)
- D. There are five main steam safety relief valves (MS-SRV) connected to each steam line (loop A, B and C), fifteen total valves.

Table 3 Palisades RELAP 5 Case List									
Case Number	Case Type	Primary Side Failure	Secondary Side Failure	Operator Action	HZP	Hi K	Mod of	PRA	Comments
1	LOCA-HiK	2.54 cm (1 inch) surge line break. Containment sump recirculation included in the analysis.	None	None	No	Yes	N/A		PRA case 001
2	LOCA-HiK	3.59 cm (1.414 in) surge line break. Containment sump recirculation included in the analysis.	None	None	No	Yes	N/A		PRA case 002
3	LOCA-HiK	5.08 cm (2 in) surge line break. Containment sump recirculation included in the analysis.	None	None	No	Yes	N/A		PRA case 003
4	LOCA-HiK	7.183 cm (2.828 in) surge line break. Containment sump recirculation included in the analysis.	None	None	No	Yes	N/A		PRA case 004
5	LOCA-HiK	10.16 cm (4 inch) surge line break. Containment sump recirculation included in the analysis.	None	None	No	Yes	N/A		PRA case 005
6	LOCA-HiK	14.366 cm (5.656 inch) surge line break. Containment sump recirculation included in the analysis.	None	None	No	Yes	N/A		PRA case 006
7	LOCA-HiK	20.32 cm (8 inch) surge line break. Containment sump recirculation included in the analysis.	None	None	No	Yes	N/A		PRA case 007
8	LOCA-HiK	5.08 cm (2 in) surge line break. Containment sump recirculation included in the analysis.	1 stuck-open ADV on SG-A. No AFW isolation.	None	No	Yes	N/A		PRA case 003c
9	LOCA-HiK	5.08 cm (2 in) surge line break. Containment sump recirculation included in the analysis.	1 stuck-open ADV on SG-A. Normal MFW/AFW function.	Operator isolates AFW to affected SG at 15 minutes after initiation.	No	Yes	8		PRA case 003a
10	LOCA-HiK	5.08 cm (2 in) surge line break. Containment sump	1 stuck-open ADV on SG-A. Normal MFW/AFW function.	Operator isolates AFW to affected SG at 30 minutes after initiation.	No	Yes	8		PRA case 003b

		recirculation included in the analysis.							
11	LOCA-HiK	5.08 cm (2 in) surge line break. Containment sump recirculation included in the analysis.	1 stuck-open ADV on SG-A. Failure to isolate MFW and condensate feed system.	None.	No	Yes	N/A		PRA case 003d
12	LOCA-HiK	5.08 cm (2 in) surge line break. Containment sump recirculation included in the analysis.	1 stuck-open ADV on SG-A. Failure of both MSIVs on unaffected SG to close.	Operator does not isolate AFW on affected SG.	No	Yes	N/A		PRA case 003e
13	TT/RT	One stuck open pressurizer SRV. Containment spray is assumed not to actuate.	None.	None.	No	No	N/A		PRA case 010
14	TT/RT	None.	2 stuck-open ADVs on SG-A	None.	No	No	N/A		PRA case 013, 13c
15	TT/RT	None.	2 stuck-open ADVs on SG-A combined with controller failure resulting in the flow from two AFW pumps into affected steam generator.	Operator starts second AFW pump. Operator isolates AFW to affected SG at 15 minutes after initiation.	No	No	17		PRA case 013a
16	TT/RT	None.	2 stuck-open ADVs on SG-A combined with controller failure resulting in the flow from two AFW pumps into affected steam generator.	Operator starts second AFW pump. Operator isolates AFW to affected SG at 30 minutes after initiation.	No	No	17		PRA case 013b
17	TT/RT	None.	2 stuck-open ADVs on SG-A combined with controller failure resulting in the flow from two AFW pumps into affected steam generator.	Operator starts second AFW pump.	No	No	N/A		PRA case 013d
18	TT/RT	None	1 stuck-open ADV on SG-A. Failure of both MSIV on SG-A to close.	Operator does not isolate AFW on affected SG. Normal AFW flow assumed (200 gpm).	No	No	N/A		PRA case 013e
19	TT/RT	None.	1 stuck-open ADVs on SG-A	None.	Yes	No	N/A		PRA case 013f
20	TT/RT	None	SG level control system failure causes SG overfill. MFW continues running and the SGs flood.	Operator terminates MFW when either water flows to the steam line or 75,000 gallons is pumped into the steam generators.	No	No	N/A		PRA case 016 (modified)
21	TT/RT	None	SG level control system failure causes SG overfill. MFW continues running and the SGs flood.	Operator terminates MFW when either water flows to the steam line or 75,000 gallons is pumped into the steam generators.	Yes	No	N/A		PRA case 016a
22	TT/RT	None.	Loss of MFW and AFW.	Operator depressurizes through ADVs and feeds SG's using condensate booster pumps.	No	No	N/A		PRA case 017

				Operators maintain a cooldown rate within technical specification limits and throttle condensate flow at 84 % level in the steam generator.					
23	TT/RT	Two stuck-open pressurizer SRVs that reclose at 6000 sec after initiation. Containment spray is assumed not to actuate.	None.	None.	No	No	42		PRA case 018. May not be needed if Case 42 downcomer temperature results remain above 400 F.
24	MSLB	None	Break assumed to be inside containment causing containment spray actuation.	None	No	No	N/A		PRA case 020, 020c
25	MSLB	None	Break assumed to be inside containment causing containment spray actuation.	Operator isolates AFW to affected SG at 15 minutes after initiation.	No	No	24		PRA case 020a
26	MSLB	None	Break assumed to be inside containment causing containment spray actuation.	Operator isolates AFW to affected SG at 30 minutes after initiation.	No	No	24		PRA case 020b
27	MSLB	None	Controller failure resulting in the flow from two AFW pumps into affected steam generator. Break assumed to be inside containment causing containment spray actuation.	Operator starts second AFW pump.	No	No	N/A		PRA case 020d
28	MSLB	None	Failure of both MSIVs to close. Break assumed to be inside containment causing containment spray actuation.	Operator does not isolate AFW on affected SG.	No	No	N/A		PRA case 020e
29	MSLB	None	None. Break assumed to be inside containment causing containment spray actuation.	None	Yes	No	N/A		PRA case 020f
30	LOCA-HiK	5.08 cm (2 in) surge line break	None.	None	Yes	Yes	N/A		PRA case 023
31	TT/RT	None.	Failure of MFW and AFW. Containment spray actuation assumed due to PORV discharge.	Operator maintains core cooling by "feed and bleed" using HPI to feed and two PORVs to bleed.	No	No	N/A		PRA case 026
32	TT/RT	None.	Failure of MFW and AFW. Containment spray actuation assumed due to PORV discharge.	Operator maintains core cooling by "feed and bleed" using HPI to feed and two PORV to bleed. AFW is recovered 15 minutes after initiation of "feed and bleed" cooling. Operator closes PORVs when SG level	No	No	31		PRA case 026b

				reaches 60 percent.					
33	TT/RT	None.	Failure of MFW and AFW. Containment spray actuation assumed due to PORV discharge.	Operator maintains core cooling by "feed and bleed" using HPI to feed and PORV to bleed. AFW is recovered 30 minutes after initiation of "feed and bleed" cooling. Operator closes PORV when SG level reaches 60 percent.	No	No	31		PRA case 026c
34	MSLB/SGTR	Single tube fails in SG-A due to MSLB vibration.	None.	Operator isolates AFW to affected SG at 15 minutes after initiation. Operator trips RCPs assuming that they do not trip as a result of the event.	No	No	N/A		
35	MSLB/SGTR	Ten tubes assumed to fail in SG-A due to MSLB vibration.	None.	Operator isolates AFW to affected SG at 15 minutes after initiation. Operator trips RCPs assuming that they do not trip as a result of the event.	No	No	N/A		
36	MSLB	None	Controller failure resulting in the flow from two AFW pumps into affected steam generator. Break assumed to be inside containment causing containment spray actuation.	Operator starts second AFW pump. Operator isolates AFW to affected SG at 15 minutes after initiation.	No	No	27		PRA case 020d
37	MSLB	None	Controller failure resulting in the flow from two AFW pumps into affected steam generator. Break assumed to be inside containment causing containment spray actuation.	Operator starts second AFW pump. Operator isolates AFW to affected SG at 30 minutes after initiation.	No	No	27		PRA case 020d
38	TT/RT	None.	Loss of MFW and AFW.	Operator depressurizes through ADVs and feeds SG's using condensate booster pumps. Feed is terminated once SG's are filled.	No	No	N/A		PRA case 017
39	LOCA-HiK	27.94 cm (11 in) hot leg break. Containment sump recirculation included in the analysis.	None.	None.	No	Yes	N/A		
40	LOCA-HiK	40.64 cm (16 in) hot leg break. Containment sump recirculation included in the analysis.	None.	None.	No	Yes	N/A		
41	LOCA	55.88 cm (22 in) hot leg break. Containment sump	None.	None.	No	Yes	N/A		

		recirculation included in the analysis.							
42	TT/RT	Two stuck open pressurizer SRVs. Containment spray is assumed not to actuate.	None.	None.	No	No	N/A		PRA case 010
43	TT/RT	None.	Failure of MFW and AFW.	Operator maintains core cooling by "feed and bleed" using HPI to feed and two PORVs to bleed.	No	No	31		Same as Case 31 except that containment spray is assumed not to be actuated as a result of PORV discharge.
44	TT/RT	None.	Failure of MFW and AFW.	Operator maintains core cooling by "feed and bleed" using HPI to feed and two PORV to bleed. AFW is recovered 15 minutes after initiation of "feed and bleed" cooling. Operator closes PORVs when SG level reaches 60 percent.	No	No	43		Same as Case 32 except that containment spray is assumed not to be actuated as a result of PORV discharge.
45	LOCA	5.08 cm (2 in) surge line break. Containment sump recirculation included in the analysis.	None	None	No	No	3		
46	LOCA	10.16 cm (4 inch) surge line break. Containment sump recirculation included in the analysis.	None	None	No	No	5		
47	LOCA	40.64 cm (16 in) hot leg break. Containment sump recirculation included in the analysis.	None.	None.	No	No	40		

Variations:

1. HPI throttling – once pressurizer level is ~ 150 inches, throttle to 100F subcooling. Apply to all cases where HPI starts and fills system.
2. Low decay heat (HZP) variation – possibly repeat all runs
- 3.

Table 4
Calvert Cliffs RELAP5 Cases List

Case No	Case Description
1	1.0" Pressurizer Surge Line Break
2	1.414" Pressurizer Surge Line Break
3	2.0" Pressurizer Surge Line Break
4	2.828" Pressurizer Surge Line Break
5	4" Pressurizer Surge Line Break
6	5.657" Pressurizer Surge Line Break
7	8" Pressurizer Surge Line Break
8	11.314" HLB 50 min to recirc. Sump temperature = 140F
9	16" HLB 45 min to recirc. Sump temperature = 140F
10	22.627" HLB 40 min Sump temperature = 140F
11	16" CLB 45 min to recirc. Sump temperature = 140F
12	2" cold leg break
13	1 Stuck Open Pressurizer PORV
14	1 Stuck Open Pressurizer PORV That is Isolated After 20 Minutes
15	1 Stuck Open Pressurizer SRV
16	1 Stuck Open Steam Dump Valve
17	2 Stuck Open Steam Dump Valves
18	3 Stuck Open Steam Dump Valves
19	1 Stuck Open Atmospheric SDV (steam generator A) with isolation at 20 min
20	2 Stuck Open Atmospheric SDV (steam generator A)
21	1 Stuck Open Atmospheric SDV (SG A)

22	1 Stuck Open Pressurizer PORV and 1 Stuck Open Atmospheric SDV (SG A)
23	1 Stuck Open Presurizer SRV and 1 Stuck Open Atmospheric SDV
24	2 Stuck Open MS-SRV (Steam Generator A and B)
25	1 Stuck Open MS-SRV (Steam Generator A)
26	SG overfeed with full MFW to 2 SGs (SG A & B) (MFW tripped when water in steam line)
27	SG overfeed with full MFW to 1 SG (SG A) (MFW tripped when water in steam line)
28	Main Steam Line Break (double ended guillotine break)
29	2 Stuck Open Pressurizer PORVs
30	2 Stuck Open Pressurizer SRVs
31	1 Stuck Open Pressurizer SRV which re-closes at 4000 second
32	2 stuck open pressurizer SRVs which reclose at 700 psig
33	Steam Generator Tube Rupture
34	Steam Generator Tube Rupture w/1 Stuck Open SDV
35	1 Stuck Open Pressurize PORV and 1 Stuck Open SDV
36	1 Stuck Open Pressurizer SRV and 1 Stuck Open SDV
37	1 Stuck Open Pressurizer SRV and 1 Stuck Open MS-SRV

Abbreviation: N/A - Not Applicable; reason follows
DNR - Did not run; reason follows

Note: SDV - Equivalent to TBV in Calvert Cliffs
ASDV - Equivalent to ADV in Calvert Cliffs