



C PERCENT PRESSURIZER LEVEL (APPROXIMATE)
PZRLVL=(((ZWPZ-0.3247)*14.288))
C PERCENT SIRWT LEVEL
SIRWTLVL=(ZWRWST-0.4572)*14.5815
END
C CALCULATE SUBCOOLING MARGIN
FUNCTION
TSATCR = TSAT(PPS)
SUBCM = TSAT(PPS) - TWCR
SUBCMF = SUBCM * 1.8
END
C 1 PA = 0.0001450377377 PSI
FUNCTION OVERPRES = (PRB(12) - PSAT(TWRB(12)))*0.0001450377377
C 1 M = 3.28083 FT
C 1 FT(pressure) = 2.30414765 PSI
C 3.28083 x 2.30414765 = 7.55952
FUNCTION HPNPSHAV = (4.1148 + ZWRB(13))*7.55952 + OVERPRES
FUNCTION TSAT12 = TSAT(PRB(12))*9./5.-459.7
FUNCTION SUBCOOL1 = (TSAT(PRB(12)) - TWRB(12))*9./5.
C Containment Volume Averaged Gas Temperature and Pressure
C Voltot = total containment volume
C * = SUM(VOLRB(i),i,1,16)
C * = 1.64027E6 FT**3
FUNCTION
VOLTOT = 1.64027E6
SUMTGR1 = TGRB(1)*711400+TGRB(3)*489900+TGRB(4)*6822
SUMTGR2 = TGRB(5)*55210+TGRB(6)*62090+TGRB(7)*84210
SUMTGR3 = TGRB(8)*43720+TGRB(9)*1884+TGRB(10)*22280
SUMTGR4 = TGRB(11)*386+TGRB(12)*75660+TGRB(13)*1364
SUMTGR5 = TGRB(14)*33930+TGRB(15)*20830+TGRB(16)*30580
SUMTGRB = SUMTGR1+SUMTGR2+SUMTGR3+SUMTGR4+SUMTGR5
TGRBTOT = (SUMTGRB/VOLTOT)*9./5.-459.7
SUMPRB1 = pRB(1)*711400+pRB(3)*489900+pRB(4)*6822
SUMPRB2 = pRB(5)*55210+pRB(6)*62090+pRB(7)*84210
SUMPRB3 = pRB(8)*43720+pRB(9)*1884+pRB(10)*22280



SUMPRB4 = pRB(11)*386+prB(12)*75660+pRB(13)*1364
SUMPRB5 = pRB(14)*33930+pRB(15)*20830+pRB(16)*30580
SUMPRB = SUMPRB1+SUMPRB2+SUMPRB3+SUMPRB4+SUMPRB5
PRBTOT = (SUMPRB/VOLTOT)*0.0001450377377

END

PARAMETER CHANGE

END PARAMETER CHANGE

C attach file for all Palisades runs

C PLOTS

PLOTFIL 88

WHPIXX // GENESF HPSI FLOW
WLPI1X // GENESF LPSI FLOW
WSPAXX // GENESF UPPER COMPT SPRAY FLOW
ZWRWST // water level in refueling water storage tank
WESFDC // flow rate of ESF water to downcomer nodes
WESFCL // flow rate of ESF water to cold leg nodes
PQT // pressure in quench tank
TWQT // temperature of water in quench tank
MH2QT1 // mass of H2 in quench tank
PACUM // pressure in accumulator

END


PLOTFIL 90 //

PPZ // pressure in pressurizer
ZWPZ // collapsed water level in pressurizer
TWCR // core water temperature
SUBCMF // subcooling margin (TSATCR - TWCR) in F
ZWBS // collapsed water level in broken S/G downcomer
PBS // pressure in broken S/G
TWBS // temperature of water in broken S/G

END

PLOTFIL 92 //


ZWBS // collapsed water level in broken S/G downcomer
PBS // pressure in broken S/G
ZWUS // collapsed water level in unbroken S/G downcomer
PUS // pressure in unbroken S/G

	Entergy PSA Engineering Analysis	EA-PSA-SDP-D11-2-11-07	Rev. 0
		Appendix B – Page 8 of 10 MAAP Attach & Plot Files	


TWBS // temperature of water in broken S/G
 TWUS // temperature of water in unbroken S/G
 END
 PLOTFIL 93 //
 WWFWBS // FEEDWATER, INCLUDING AUX FEED, TO BROKEN S/G
 WWFWUS // FEEDWATER, INCLUDING AUX FEED, TO UNBROKEN S/G
 WSTTDB // FEEDWATER TURBINE EXTR STEAM
 WSTTDU // FEEDWATER TURBINE EXTR STEAM
 average WGBST // flow B S/G relief, safety, MSIVs (gas)
 average WGUST // flow U S/G relief, safety, MSIVs (gas)
 WGBST // flow B S/G relief, safety, MSIVs (gas)
 WGUST // flow U S/G relief, safety, MSIVs (gas)
 END
 C Flag For Determining when PZR Sprays Turn On
 WHEN TIM > 0.
 PZRSPRAY = 0.
 END
 PLOTFIL 94
 TSATCR // saturation temperature at primary system pressure
 SUBCM // saturation temperauter - core water temperature
 SUBCMF // subcooling margin in degrees F
 ZWBS // collapsed water level in broken S/G downcomer
 ZWUS // collapsed water level in unbroken S/G downcomer
 ZWPZ // collapsed water level in pressurizer
 WWFWBS // MFW including AFW, TO broken S/G
 WWFWUS // MFW including AFW, TO unbroken S/G
 PSPDBSG // Primary-Secondary Pressure Differential, BROKEN SG
 PSPDUSG // Primary-Secondary Pressure Differential, UNBROKEN SG
 VDOTCHP // Volumetric Flow Rate in GPM for Charging Pumps
 VDOTHPI // Volumetric Flow Rate in GPM for HPSI Pumps
 VDOTLPI // Volumetric Flow Rate in GPM for LPSI Pumps
 OVERPRES // overpressure of containment compartment 13
 HPNPSHAV // average NPSH available at the HPSI pump
 TSAT12 // saturation temperature of containment compartment 13
 SUBCOOL1 // amount of subcooling of containment compartment 13



MWCST0 // mass of water in CST Tank
ZWRWST // water level of CST Tank
TGRBTOT // volume averaged containment gas temperature
PRBTOT // volume averaged containment pressure
BSGLVL // % S/G Water Level in Broken
USGLVL // % S/G Water Level in Unbroken
PZRLVL // % PZR Water Level
SIRWTLVL // % SIRWT Water Level
END
PLOTFIL 95
TCRHOT // Peak Core Temperature (mass averaged over matl in node)
PPS // PCS Pressure
TWHPS // Temperature of water in the hot leg
TWLPS // Temperature of water in the cold leg
TWPS // Average temperature of water in the primary system
WWFWUS // Total FW (main or aux) to the unbroken steam generators, LB/HR
WWFWBS // Total FW (main or aux) to the broken steam generators, LB/HR
VAFWB // Feedwater Volumetric Flow Rate (MFW & Aux) to broken S/G GPM
VAFWU // Feedwater Volumetric Flow Rate (MFW & Aux) to unbroken S/G GPM
ZWUS // Collapsed water level in unbroken SG downcomer
ZWBS // Collapsed water level in broken SG downcomer
WWBST // Total water flow through the broken SG relief valves, safety valves, and the main steam line (includes the MSLB flow)
WGBST // Total gas flow through the broken SG relief valves, safety valves, and the main steam line (includes MSLB flow)
WGUST // Total gas flow through the broken SG relief valves, safety valves, and the main steam line (includes MSLB flow)
MWCST0 // Mass of Water in Condensate(CST)& PCS Makeup Storage Tank (T-2)
ZWRWST // water level of CST Tank
BSGLVL // % S/G Water Level in Broken
USGLVL // % S/G Water Level in Unbroken
PZRLVL // % PZR Water Level
SIRWTLVL // % SIRWT Water Level
WSTRV // Total flow of steam through the pressurizer valves
WGRV // Combined flow rate of gas out of pressurizer through relief valves and safety valves
WWRV // Total water flow through the pressurizer relief valves and safety valves

	Entergy PSA Engineering Analysis	EA-PSA-SDP-D11-2-11-07	Rev. 0
		Appendix B – Page 10 of 10 MAAP Attach & Plot Files	

VDOTCHP // Volumetric Flow Rate in GPM for Charging Pumps
 VDOTHPI // Volumetric Flow Rate in GPM for HPSI Pumps
 VDOTLPI // Volumetric Flow Rate in GPM for LPSI Pumps
 VDOTSPA // Spray 54-A Volumetric Flow Rate in GPM
 VDOTSPB // Spray 54-B Volumetric Flow Rate in GPM
 VDOTSPC // Spray 54-C Volumetric Flow Rate in GPM
 PRB(1) // Crane to Dome - North and South (corresponding to GOTHIC nodes 1 & 2) pressure
 TGRB(1) // Crane to Dome - North and South (corresponding to GOTHIC nodes 1 & 2) gas temp
 VMWCST // Volume of Remaining Water in Condensate Storage Tank (T-2)& PCS Makeup Storage Tank (T-81)
 ZWCST // CST Level
 ZWCPS // Collapsed Water Level in the Primary System Relative to the Bottom of the Vessel
 END

	Entergy PSA Engineering Analysis	EA-PSA-SDP-D11-2-11-07	Rev. 1
		Attachment 06 – Page 1 of 1	

Attachment 06 Event Trees



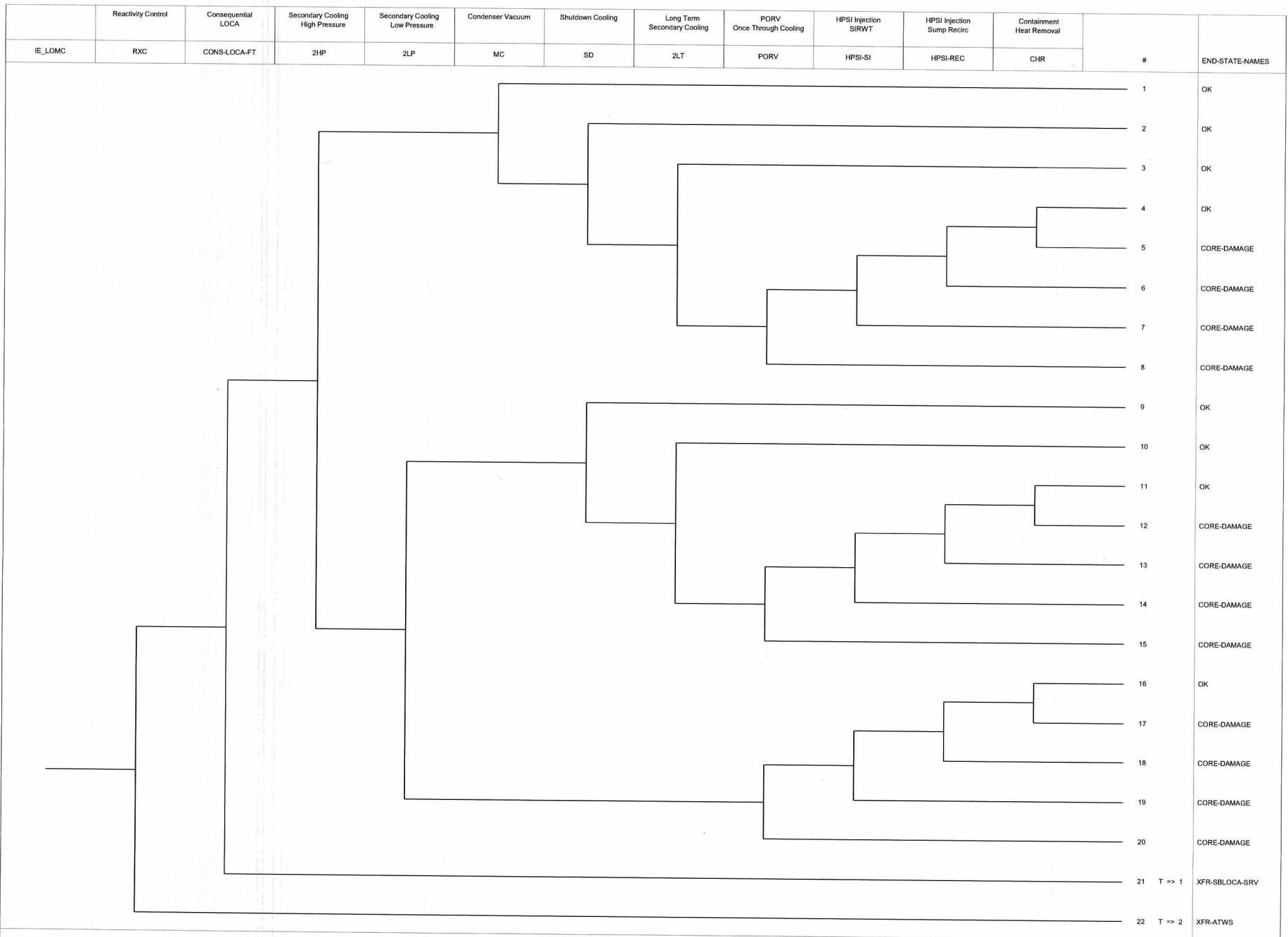
Figure A06-1: Transient with Loss of Main Condenser (TR-MCND)



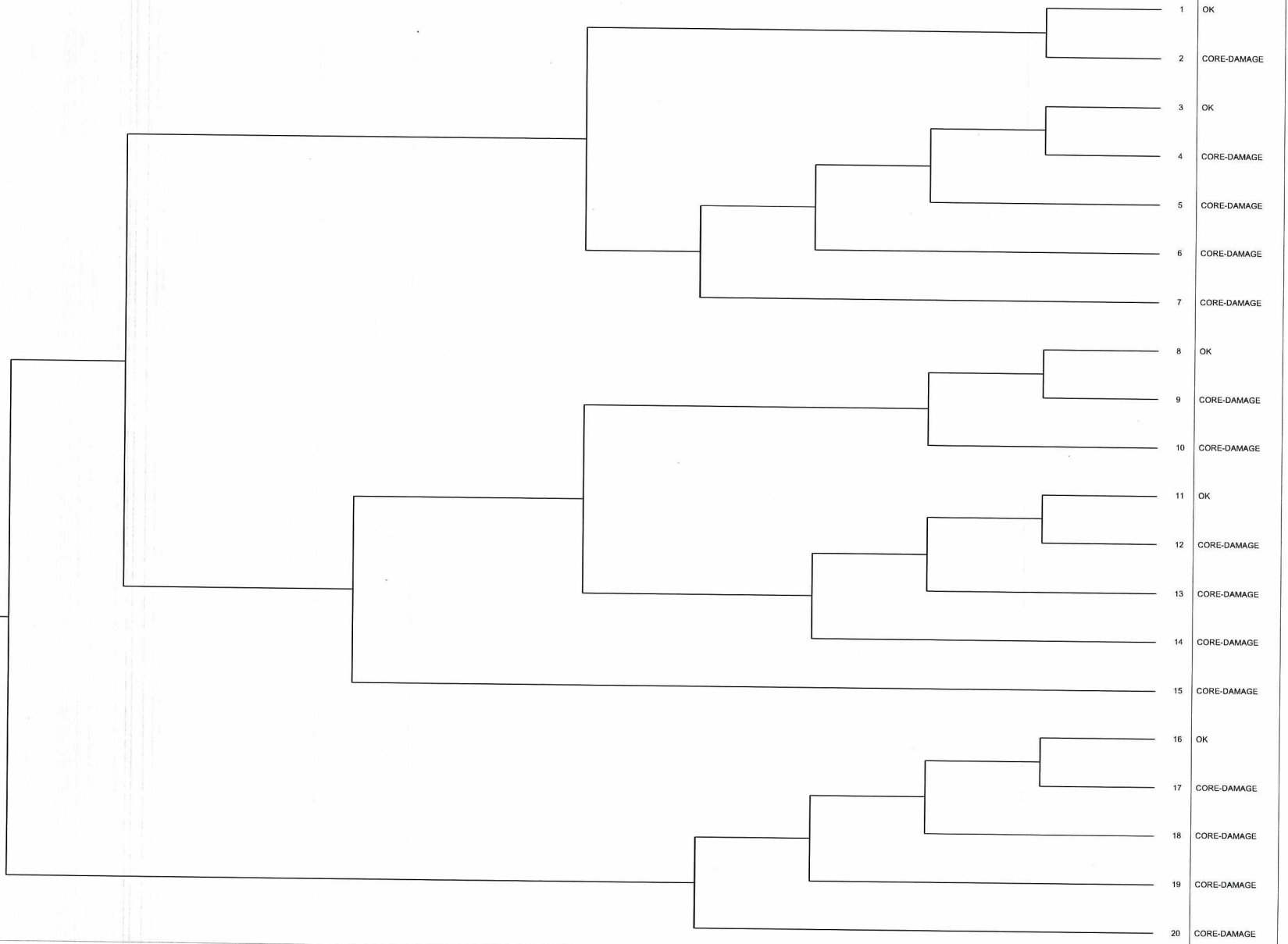
Figure A06-2: Transfer to Loss of Coolant Accident via Pressurizer Safety Relief Valve(s) (XFR-SBLOCA-SRV)



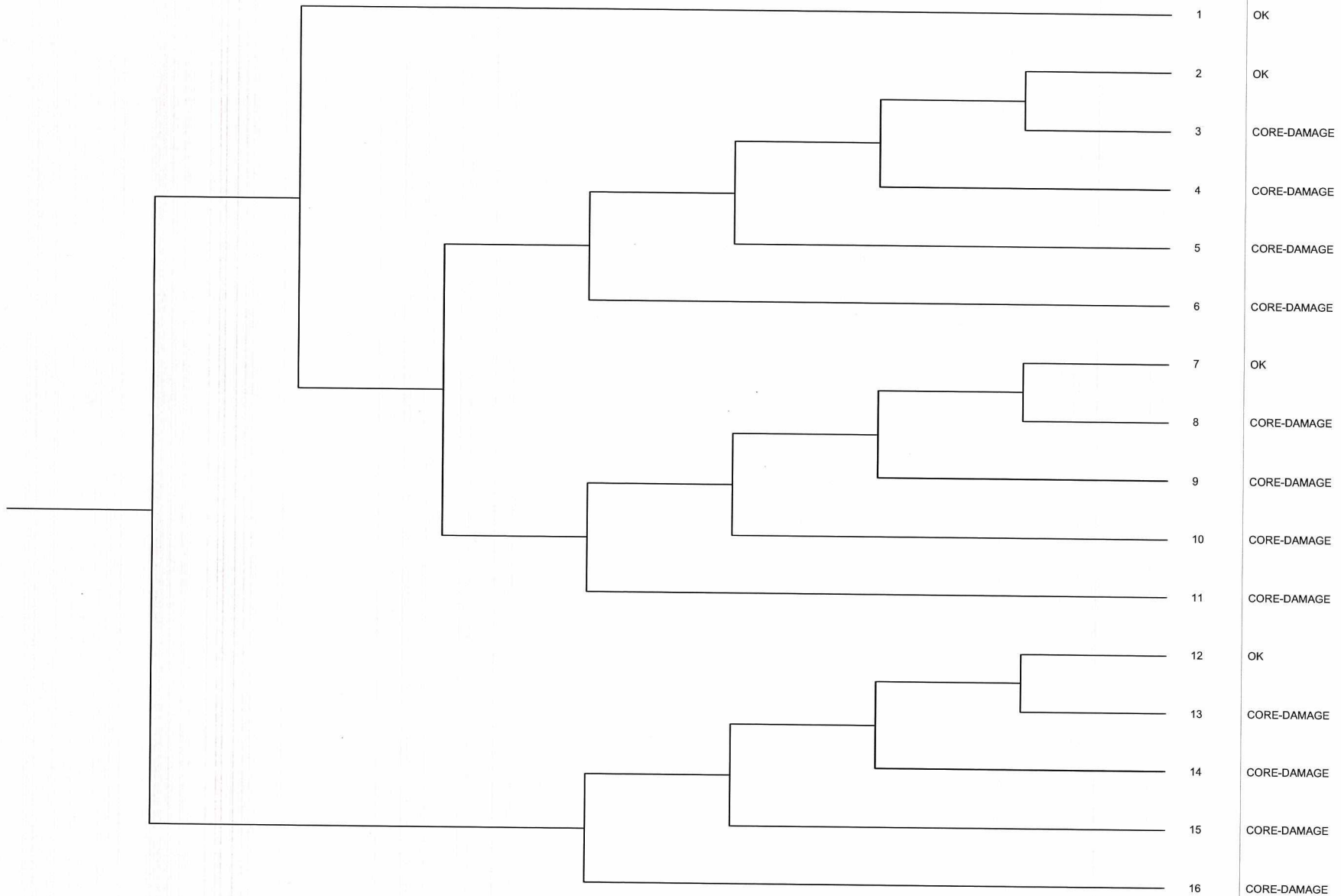
Figure A06-3: Transfer to Anticipated Transient Without SCRAM (XFR-ATWS)



Challenge to Pressurizer Safety Relief Valve - Potential Stuck Open PZR SRV SBLOCA	Secondary Cooling Hi-Press	Pressurizer Safety Relief Valves Closure (Given Steam or Water Relief)	Charging (2/3 Charging Pumps based on MAAP runs)	HPSI Injection SIRWT	Shutdown Cooling (requires DC recovery for ADVs)	Secondary Cooling Long Term	HPSI Injection SIRWT	PORVs Once-Thru Cooling	HPSI Injection RAS	Containment Heat Removal		
IE_SRV-SBLOCA	2HP	PZR-SAFETIES-FTC	CHRG	HPSI-SI	SD	2LT	HPSI-SI	PORV	HPSI-REC	CHR	#	END-STATE-NAMES



	Electrical Scram Signal Faults	Mechanical Scram Faults	Turbine Trip	Pressurizer Safeties Open	Negative Moderator Coefficient	Pressurizer Safeties Closed	Emergency Boration 1 Charging Pump		
IE_ATWS	RXC-ELEC-FAULTS	RXC-MECH-FAULTS	TTF	RVO	MTC	RVC	CHRGW1PP	#	END-STATE-NAME





Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 07 – Page 1 of 4

Attachment 07: Change Sets

Table A07-1: Change Sets for SAPHIRE Project: PSAR2C(D11-2)

Change/Flag Set	Event	Calc. Type	Prob/Freq	Description
0_BASE				SET TRIP CHARGING PUMP HEP TO 0 FOR CONSISTENCY WITH PSAR2C
	G-PMOA-TRIP-PUMP	1	0.00E+00	OPERATOR FAILS TO TRIP CHARGING PUMP(S) PRIOR TO CHALLENGING PZR SRVS
0_BYPASS_REG_FIX				SET P-CBOB-BYREG HEP TO 1.7E-2 VICE 0.5 FOR CONSISTENCY WITH HRA
	P-CBOB-BYREG	1	1.70E-02	WHEN "TRUE" OP RECOVERY OF THE BYPASS REG IS CREDITED
0_D11-2_EVENT_REC0				09/25/2011 D11-2 FAULT EVENT WITH RECOVERIES APPLIED
	A-PMME-P-8B	1	1.53E-02	AFW TURBINE PUMP P-8B FAILS TO START (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
	D-BCMT-ED-15	1	1.00E+00	BATTERY CHARGER #1 FAILS TO FUNCTION (EVENT CONSEQUENTIAL FAILURE)
	D-BCMT-ED-17	1	1.00E-01	BATTERY CHARGER #3 FAILS TO FUNCTION (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
	D-CBMC-72-119	1	1.00E+00	72-119 DC BREAKER FAILS TO REMAIN CLOSED (EVENT CONSEQUENTIAL FAILURE)
	D-HSE-CHGR3-INS	T		SET TO 'T' - CHARGER #3 IN SERVICE
	D-HSMC-HS-72-01	1	1.00E-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
	G-PMOA-TRIP-PUMP	1	6.80E-03	OPERATOR FAILS TO TRIP CHARGING PUMP(S) PRIOR TO CHALLENGING PZR SRVS
	M-OOOT-LPF-INIT	T	1.00E+00	OP FAILS TO SUPPLY CONDENSATE TO DEPRESSURIZED S/G (LP FEED) (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP – NO RECOVERY)



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 07 – Page 2 of 4

Table A07-1: Change Sets for SAPHIRE Project: PSAR2C(D11-2)

Change/Flag Set	Event	Calc. Type	Prob/Freq	Description
	P-B1MK-EA-13	1	2.60E-03	FAULT ON BUS 1E (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
	P-PAMK-EY-10	1	3.30E-02	FAULT ON 120V PREFERRED AC BUS Y10 (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
	P-PAMK-EY-30	1	1.00E-01	FAULT ON 120V PREFERRED AC BUS Y30 (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
0_D11-2_EVENT_REC1				09/25/2011 D11-2 FAULT EVENT WITH RECOVERIES APPLIED
	A-PMME-P-8B	1	1.05E-01	AFW TURBINE PUMP P-8B FAILS TO START (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
	D-BCMT-ED-15	1	1.00E+00	BATTERY CHARGER #1 FAILS TO FUNCTION (EVENT CONSEQUENTIAL FAILURE)
	D-BCMT-ED-17	1	1.00E-01	BATTERY CHARGER #3 FAILS TO FUNCTION (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
	D-CBMC-72-119	1	1.00E+00	72-119 DC BREAKER FAILS TO REMAIN CLOSED (EVENT CONSEQUENTIAL FAILURE)
	D-HSE-CHGR3-INS	T		SET TO 'T' - CHARGER #3 IN SERVICE
	D-HSMC-HS-72-01	1	1.00E-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
	G-PMOA-TRIP-PUMP	1	6.80E-03	OPERATOR FAILS TO TRIP CHARGING PUMP(S) PRIOR TO CHALLENGING PZR SRVS
	M-OOOT-LPF-INIT	T	1.00E+00	OP FAILS TO SUPPLY CONDENSATE TO DEPRESSURIZED S/G (LP FEED) (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP – NO RECOVERY)
	P-B1MK-EA-13	1	2.60E-03	FAULT ON BUS 1E (EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 07 – Page 3 of 4

Table A07-1: Change Sets for SAPHIRE Project: PSAR2C(D11-2)

Change/Flag Set	Event	Calc. Type	Prob/Freq	Description
	P-PAMK-EY-10	1	1.00E-01	FAULT ON 120V PREFERRED AC BUS Y10
				(EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
	P-PAMK-EY-30	1	1.00E-01	FAULT ON 120V PREFERRED AC BUS Y30
				(EVENT CONSEQUENTIAL FAILURE – SURROGATE FOR RECOVERY HEP)
0_IE_SET				SET IE_LOMC (LOSS OF MAIN CONDENSER) TO 1
	IE_LOMC	1	1.00E+00	(EVENT CONSEQUENTIAL FAILURE)
0_PRE-EVENT_EOOS				09/25/2011 PRE- D11-2 FAULT EVENT EQUIPMENT OUT OF SERVICES
	P-CBMB-252-302	T		CIRCUIT BREAKER 252-302 FAILS TO CLOSE
				(OUT OF SERVICE PRIOR TO EVENT)
	P-CBMC-252-302	T		CIRCUIT BREAKER 252-302 FAILS TO REMAIN CLOSED
				(OUT OF SERVICE PRIOR TO EVENT)



Entergy PSA
Engineering
Analysis


EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 07 – Page 4 of 4

Table A07-2: Change Sets Applied to Each Endstate

Endstate:	0_LOMC_BASE	0_LOMC_D11-2_REC0	0_LOMC_D11-2_REC1
Change Sets:	HEVENTS(LGCLS-NRML-CNF)	HEVENTS(LGCLS-NRML-CNF)	HEVENTS(LGCLS-NRML-CNF)
	0_BYPASS_REG_FIX	0_BYPASS_REG_FIX	0_BYPASS_REG_FIX
	0_PRE-EVENT_EOOS	0_PRE-EVENT_EOOS	0_PRE-EVENT_EOOS
	0_IE_SET	0_IE_SET	0_IE_SET
	0_BASE	0_D11-2_EVENT_REC0	0_D11-2_EVENT_REC1

	Entergy PSA Engineering Analysis	EA-PSA-SDP-D11-2-11-07	Rev. 1
		Attachment 08 – Page 1 of 28	

Attachment 08: Cutsets

Note: Entire table is changed from Revision 0 – revision bars omitted for editorial reasons.

Top 100 cut sets

Project : PSAR2C(D11-2)

End State: 0_LOMC_D11-2_REC0

Min Cut Upper Bound: 6.445E-006

This Partition: 3.426E-006

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
1	17.15	17.15	1.11E-06	IE_LOMC		1.00E+00
				MTC2	PERCENTAGE OF TIME W/MTC NOT SUFFICIENTLY POSITIVE	2.30E-01
				/RVO	Pressurizer Safeties Open	9.99E-01
				RXC-ELEC-FAULTS	Electrical Scram Signal Faults	4.81E-06
2	25.28	8.13	5.24E-07	IE_LOMC		1.00E+00
				G-PMOE-P-55ABC	OPERATOR FAILS TO INITIATE CHARGING FLOW	1.10E-01
				/RVC	Pressurizer Safeties Closed	9.91E-01
				/RVO	Pressurizer Safeties Open	9.99E-01
3	27.73	2.45	1.58E-07	RXC-ELEC-FAULTS	Electrical Scram Signal Faults	4.81E-06
				IE_LOMC		1.00E+00
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 2 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
4	29.14	1.41	9.06E-08	IE_LOMC		1.00E+00
				G-PMOE-P-55ABC	OPERATOR FAILS TO INITIATE CHARGING FLOW	1.10E-01
				/RVC	Pressurizer Safeties Closed	9.91E-01
				/RVO	Pressurizer Safeties Open	9.99E-01
				/RXC-ELEC-FAULTS	Electrical Scram Signal Faults	1.00E+00
				RXC-MECH-FAULTS	Mechanical Scram Faults	8.40E-07
				/TTF	Turbine Trip	9.90E-01
5	30.21	1.07	6.90E-08	IE_LOMC		1.00E+00
				A-AVOA-MISCALADJ	OPERATOR FAILS TO ADJUST AFW FLOW GIVEN FLOW INSTRUMENT MISC	1.45E-03
				A-ISOH-AFW-HDR3	MISCALIBRATION OF ALL FLOW INSTRUMENTS ON ALL HEADERS	1.30E-04
				H-ZZOA-OTC-CDTNL-HEP-2	COND HEP: A-AVOA-AFWFLADJ * B-XVOB-ADVS-MAN * H-ZZOA-OTC-INIT	3.66E-01
6	30.85	0.64	4.14E-08	IE_LOMC		1.00E+00
				RVC	Pressurizer Safeties Closed	8.61E-03
				/RVO	Pressurizer Safeties Open	9.99E-01
				RXC-ELEC-FAULTS	Electrical Scram Signal Faults	4.81E-06
7	31.48	0.63	4.06E-08	IE_LOMC		1.00E+00
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				B-XVOB-ADVS-MAN	OPERATOR FAILS TO CLOSE MANUAL VALVES TO CLOSE ADV	4.03E-02
				H-ZZOA-OTC-CDTNL-HEP-4	COND HEP: B-XVOB-ADVS-MAN * H-ZZOA-OTC-INIT	1.85E-02
8	32.01	0.53	3.43E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 3 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-RVMA-PRV-1043B	PRV-1043B POWER OPERATED RELIEF VALVE FAILS TO OPEN	9.29E-03
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
9	32.54	0.53	3.43E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-RVMA-PRV-1043B	PRV-1043B POWER OPERATED RELIEF VALVE FAILS TO OPEN	9.29E-03
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
10	33.04	0.5	3.24E-08	IE_LOMC		1.00E+00
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				O-RVCC-PORVS-MA	COMMON CAUSE FAILURE OF BOTH PORVS TO NOT OPEN	5.95E-04
11	33.53	0.49	3.17E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				U-FLCC-BS-1318&19&20-PLU	CCFAIL OF SWS DISCHARGE BASKET STRAINERS 1318 & 1319 & 1320 PLUGGING	4.66E-06
12	34.01	0.48	3.09E-08	IE_LOMC		1.00E+00



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 4 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				A-CVCC-AFWPP3-MA	ALL 3 AFW PP CK VALVES CK-FW726	1.07E-05
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
13	34.47	0.46	2.97E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				Y-PMCC-P8C66ABME	COMMON CAUSE FAILURE OF P-8C	5.10E-05
14	34.92	0.45	2.89E-08	IE_LOMC		1.00E+00
				A-AVOA-MISCALADJ	OPERATOR FAILS TO ADJUST AFW FLOW GIVEN FLOW INSTRUMENT MISC	1.45E-03
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				H-ZZOA-OTC-CDTNL-HEP-2	COND HEP: A-AVOA-AFWFLADJ * B-XVOB-ADVS-MAN * H-ZZOA-OTC-INIT	3.66E-01
15	35.37	0.45	2.89E-08	IE_LOMC		1.00E+00
				A-AVOA-AFWFLADJ	OPERATOR FAILS TO ADJUST AFW FLOW GIVEN FAILURE OF ONE HDR	1.45E-03
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				H-ZZOA-OTC-CDTNL-HEP-2	COND HEP: A-AVOA-AFWFLADJ * B-XVOB-ADVS-MAN * H-ZZOA-OTC-INIT	3.66E-01
16	35.76	0.39	2.51E-08	IE_LOMC		1.00E+00
				A-CVCC-AFWINJ-MA	ALL 4 AFW INJ CHECK VALVES FTO DUE TO COMMON CAUSE	8.65E-06
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
17	36.14	0.38	2.45E-08	IE_LOMC		1.00E+00
				A-AVOA-MISCALADJ	OPERATOR FAILS TO ADJUST AFW FLOW GIVEN FLOW INSTRUMENT MISC	1.45E-03



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 5 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				A-ISOH-AFW-HDR3	MISCALIBRATION OF ALL FLOW INSTRUMENTS ON ALL HEADERS	1.30E-04
				H-ZZOA-OTC-CDTNL-HEP-3	COND HEP: A-AVOA-MISCALADJ * M-OOOT-LPF-INIT * H-ZZOA-OTC-INIT	5.44E-01
				M-OOOT-LPF-CDTNL-HEP-1	COND HEP: A-AVOA-MISCALADJ * M-OOOT-LPF-INIT * H-AVOA-HPISUBCLG	2.39E-01
18	36.52	0.38	2.42E-08	IE_LOMC		1.00E+00
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				Y-AVMD-CV-3056	AIR OPERATED VALVE CV-3056 FAILS TO REMAIN OPEN	4.44E-04
19	36.9	0.38	2.42E-08	IE_LOMC		1.00E+00
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				Y-AVMD-CV-3027	AIR OPERATED VALVE CV-3027 FAILS TO REMAIN OPEN	4.44E-04
20	37.26	0.36	2.34E-08	IE_LOMC		1.00E+00
				A-AVCC-AFW-4-MA	ALL 4 AFW AOV'S CCAUSE FTO CV-0727/CV-0736/CV-0736A/CV-0749	8.06E-06
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
21	37.6	0.34	2.20E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				A-PSOH-AFWLOSUC	MISCALIBRATION OF ALL AFW LOW SUCTION PRESSURE SWITCHES	1.30E-04
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
22	37.93	0.33	2.16E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 6 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-MVMA-MO-1043A	MOTOR OPERATED VALVE MO-1043A FAILS TO OPEN	5.85E-03
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
23	38.26	0.33	2.16E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-MVMA-MO-1043A	MOTOR OPERATED VALVE MO-1043A FAILS TO OPEN	5.85E-03
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
24	38.59	0.33	2.12E-08	IE_LOMC		1.00E+00
				A-OOOT-CSTMK-CDTNL-HEP-2	COND HEP: L-ZZOA-SDC-INIT * A-OOOT-CSTMKUP * P-CBOB-BUS1E	1.43E-01
				A-PMME-P-936	P-936 FAILS TO START	3.29E-03
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
				L-ZZOA-SDC-INIT	OPERATOR FAILS TO INITIATE SDC	1.55E-02
25	38.89	0.3	1.96E-08	IE_LOMC		1.00E+00
				A-AVOA-AFWFLADJ	OPERATOR FAILS TO ADJUST AFW FLOW GIVEN FAILURE OF ONE HDR	1.45E-03
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 7 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				H-ZZOA-OTC-CDTNL-HEP-2	COND HEP: A-AVOA-AFWFLADJ * B-XVOB-ADVS-MAN * H-ZZOA-OTC-INIT	3.66E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
26	39.19	0.3	1.96E-08	IE_LOMC		1.00E+00
				A-AVOA-AFWFLADJ	OPERATOR FAILS TO ADJUST AFW FLOW GIVEN FAILURE OF ONE HDR	1.45E-03
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				H-ZZOA-OTC-CDTNL-HEP-2	COND HEP: A-AVOA-AFWFLADJ * B-XVOB-ADVS-MAN * H-ZZOA-OTC-INIT	3.66E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
27	39.48	0.29	1.89E-08	IE_LOMC		1.00E+00
				A-PMCC-P8ABC-MG	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO RUN	6.53E-06
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
28	39.77	0.29	1.87E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				U-FLCC-TRAV-SCRN	COMMON CAUSE FAILURE OF TRAVELING SCREENS	2.75E-06
29	40.05	0.28	1.81E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				A-PMOO-P-8C	AFW PUMP P-8C OUT OF SERVICE	3.35E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 8 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				O-RVMA-PRV-1043B	PRV-1043B POWER OPERATED RELIEF VALVE FAILS TO OPEN	9.29E-03
30	40.33	0.28	1.78E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				U-PMCC-P-7ABC-MG	P-7A & P-7B & P-7C FAIL TO RUN DUE TO COMMON CAUSE	2.61E-06
31	40.59	0.26	1.67E-08	IE_LOMC		1.00E+00
				A-OOOT-CSTMK-CDTNL-HEP-2	COND HEP: L-ZZOA-SDC-INIT * A-OOOT-CSTMKUP * P-CBOB-BUS1E	1.43E-01
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
				L-ZZOA-SDC-INIT	OPERATOR FAILS TO INITIATE SDC	1.55E-02
				P-B1MK-EA-13	FAULT ON BUS 1E	2.60E-03
32	40.85	0.26	1.66E-08	IE_LOMC		1.00E+00
				MTC1	PERCENTAGE OF TIME W/MTC NOT SUFFICIENTLY POSITIVE	2.00E-02
				/RVO	Pressurizer Safeties Open	9.99E-01
				/RXC-ELEC-FAULTS	Electrical Scram Signal Faults	1.00E+00
				RXC-MECH-FAULTS	Mechanical Scram Faults	8.40E-07
				/TTF	Turbine Trip	9.90E-01
33	41.1	0.25	1.64E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				P-PAMK-EY-30	FAULT ON 120V PREFERRED AC BUS Y30	1.00E-01
				R-REMD-TX-4	RELAY TX-4 FAILS TO REMAIN DE-ENERGIZED	6.52E-03
				W-RVMB-RV-1039	PZR SAFETY VALVE RV-1039 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
34	41.35	0.25	1.64E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR	6.80E-03



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 9 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
					SRVs	
				P-PAMK-EY-30	FAULT ON 120V PREFERRED AC BUS Y30	1.00E-01
				R-REMD-TVX-4	RELAY TVX-4 FAILS TO REMAIN DE-ENERGIZED	6.52E-03
				W-RVMB-RV-1039	PZR SAFETY VALVE RV-1039 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
35	41.6	0.25	1.64E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				P-PAMK-EY-30	FAULT ON 120V PREFERRED AC BUS Y30	1.00E-01
				R-REMD-TX-4	RELAY TX-4 FAILS TO REMAIN DE-ENERGIZED	6.52E-03
				W-RVMB-RV-1040	PZR SAFETY VALVE RV-1040 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
36	41.85	0.25	1.64E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				P-PAMK-EY-30	FAULT ON 120V PREFERRED AC BUS Y30	1.00E-01
				R-REMD-TVX-4	RELAY TVX-4 FAILS TO REMAIN DE-ENERGIZED	6.52E-03
				W-RVMB-RV-1040	PZR SAFETY VALVE RV-1040 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
37	42.1	0.25	1.64E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				P-PAMK-EY-30	FAULT ON 120V PREFERRED AC BUS Y30	1.00E-01
				R-REMD-TX-4	RELAY TX-4 FAILS TO REMAIN DE-ENERGIZED	6.52E-03
				W-RVMB-RV-1041	PZR SAFETY VALVE RV-1041 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
38	42.35	0.25	1.64E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 10 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				P-PAMK-EY-30	FAULT ON 120V PREFERRED AC BUS Y30	1.00E-01
				R-REMD-TVX-4	RELAY TVX-4 FAILS TO REMAIN DE-ENERGIZED	6.52E-03
				W-RVMB-RV-1041	PZR SAFETY VALVE RV-1041 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
39	42.6	0.25	1.63E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
				Y-AVMB-CV-3056	SIRWT RECIRC VALVE CV-3056 FTC	4.42E-03
40	42.85	0.25	1.63E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
				Y-AVMB-CV-3056	SIRWT RECIRC VALVE CV-3056 FTC	4.42E-03
41	43.07	0.22	1.45E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 11 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
				Y-KVMB-SV-3056B	SIRWT RECIRC VALVE SOLENOID SV-3056B FTE	3.93E-03
42	43.29	0.22	1.45E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
				Y-KVMB-SV-3056B	SIRWT RECIRC VALVE SOLENOID SV-3056B FTE	3.93E-03
43	43.51	0.22	1.45E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
				Z-KVMB-SV-3029A	SUMP TO EAST ESS AIR SUPPLY SV-3029A FTE	3.93E-03
44	43.73	0.22	1.45E-08	IE_LOMC		1.00E+00



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 12 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
				Z-KVMB-SV-3029B	SUMP TO EAST ESS AIR SUPPLY SV-3029B FTE	3.93E-03
45	43.95	0.22	1.45E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
				Z-KVMB-SV-3029B	SUMP TO EAST ESS AIR SUPPLY SV-3029B FTE	3.93E-03
46	44.17	0.22	1.45E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 13 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				Z-KVMB-SV-3029A	SUMP TO EAST ESS AIR SUPPLY SV-3029A FTE	3.93E-03
47	44.39	0.22	1.45E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
				Y-KVMB-SV-3056A	SIRWT RECIRC VALVE SOLENOID SV-3056A FTE	3.93E-03
48	44.61	0.22	1.45E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
				Y-KVMB-SV-3056A	SIRWT RECIRC VALVE SOLENOID SV-3056A FTE	3.93E-03
49	44.83	0.22	1.42E-08	IE_LOMC		1.00E+00
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				Y-AVOB-RAS-VLVS	OPERATOR FAILS TO ENABLE ESS RECIRC VALVES TO CLOSE ON RAS	2.60E-04
50	45.05	0.22	1.40E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 14 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				P-B1MK-EA-12	FAULT ON BUS 1D	2.40E-06
51	45.27	0.22	1.40E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				P-REMD-127-8-X1	RELAY 127-8-X1 FAILS TO REMAIN DE-ENERGIZED	2.40E-05
52	45.49	0.22	1.40E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				P-REMD-127-2-X2	RELAY 127-2-X2 FAILS TO REMAIN DE-ENERGIZED	2.40E-05
53	45.71	0.22	1.40E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				P-REMD-162-154	RELAY 162-154 FAILS TO REMAIN DE-ENERGIZED	2.40E-05
54	45.93	0.22	1.40E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 15 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				P-REMD-162-154X1	RELAY 162-154-X1 FAILS TO REMAIN DE-ENERGIZED	2.40E-05
55	46.15	0.22	1.40E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				R-REMD-194-211	LOAD SHED RELAY 194-211 FTRD	2.40E-05
56	46.36	0.21	1.34E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				A-PMOO-P-8A	AFW PUMP P-8A OUT OF SERVICE	4.52E-03
				Y-PMCC-P8C66ABME	COMMON CAUSE FAILURE OF P-8C	5.10E-05
57	46.56	0.2	1.29E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-FUMK-D028-1	FUSE (FUZ/D028-1) TO PANEL D21A FAILED OPEN	2.21E-05
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
58	46.75	0.19	1.23E-08	IE_LOMC		1.00E+00
				A-REMA-SSX-3P8AB	AFW A/B INJECTION VALVES OPEN RELAY SSX-3/P8A/B FTD	2.41E-04
				Y-PMCC-P8C66ABME	COMMON CAUSE FAILURE OF P-8C	5.10E-05



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 16 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
59	46.94	0.19	1.20E-08	IE_LOMC		1.00E+00
				A-AVOA-CV-2010	OPERATOR FAILS TO OPEN CV-2010 FOR T-939 MAKEUP TO CST	2.59E-03
				A-OOOT-CSTMK-CDTNL-HEP-1	COND HEP: A-AVOA-CV-2010 * A-OOOT-CSTMKUP * Y-AVOB-RAS-VLVS	4.99E-01
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-RVMA-PRV-1043B	PRV-1043B POWER OPERATED RELIEF VALVE FAILS TO OPEN	9.29E-03
60	47.12	0.18	1.17E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-LMMC-HS-1043A	LIMIT SWITCH POS-L FAILS TO REMAIN CLOSED	3.17E-03
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
61	47.3	0.18	1.17E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 17 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				O-LMMC-HS-1043A	LIMIT SWITCH POS-L FAILS TO REMAIN CLOSED	3.17E-03
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
62	47.48	0.18	1.14E-08	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				A-PMOO-P-8C	AFW PUMP P-8C OUT OF SERVICE	3.35E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				O-MVMA-MO-1043A	MOTOR OPERATED VALVE MO-1043A FAILS TO OPEN	5.85E-03
63	47.65	0.17	1.13E-08	IE_LOMC		1.00E+00
				A-FLMK-F-P936	P-936 SUCTION STRAINER PLUGS	1.76E-03
				A-OOOT-CSTMK-CDTNL-HEP-2	COND HEP: L-ZZOA-SDC-INIT * A-OOOT-CSTMKUP * P-CBOB-BUS1E	1.43E-01
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
				L-ZZOA-SDC-INIT	OPERATOR FAILS TO INITIATE SDC	1.55E-02
64	47.82	0.17	1.11E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				W-RVMB-RV-1041	PZR SAFETY VALVE RV-1041 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
				Y-AVMD-CV-3056	AIR OPERATED VALVE CV-3056 FAILS TO REMAIN OPEN	4.44E-04
65	47.99	0.17	1.11E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				W-RVMB-RV-1040	PZR SAFETY VALVE RV-1040 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
				Y-AVMD-CV-3056	AIR OPERATED VALVE CV-3056 FAILS TO REMAIN OPEN	4.44E-04



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 18 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
66	48.16	0.17	1.11E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				W-RVMB-RV-1039	PZR SAFETY VALVE RV-1039 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
				Y-AVMD-CV-3056	AIR OPERATED VALVE CV-3056 FAILS TO REMAIN OPEN	4.44E-04
67	48.33	0.17	1.11E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				W-RVMB-RV-1041	PZR SAFETY VALVE RV-1041 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
				Y-AVMD-CV-3027	AIR OPERATED VALVE CV-3027 FAILS TO REMAIN OPEN	4.44E-04
68	48.5	0.17	1.11E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				W-RVMB-RV-1040	PZR SAFETY VALVE RV-1040 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
				Y-AVMD-CV-3027	AIR OPERATED VALVE CV-3027 FAILS TO REMAIN OPEN	4.44E-04
69	48.67	0.17	1.11E-08	IE_LOMC		1.00E+00
				G-PMOA-TRIP-PUMP	Operator fails to trip charging pump(s) prior to challenging PZR SRVs	6.80E-03
				W-RVMB-RV-1039	PZR SAFETY VALVE RV-1039 FTC (GIVEN SPURIOUS DEMAND)	3.69E-03
				Y-AVMD-CV-3027	AIR OPERATED VALVE CV-3027 FAILS TO REMAIN OPEN	4.44E-04
70	48.84	0.17	1.11E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 19 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-OLMK-49-2625	THERMAL FUSE 49-2625 FAILS OPEN	3.01E-03
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
71	49.01	0.17	1.11E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-OLMK-49-2625	THERMAL FUSE 49-2625 FAILS OPEN	3.01E-03
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
72	49.18	0.17	1.10E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
				Z-AVMA-CV-3029	CV-3029 AIR VALVE FAILS TO OPEN	2.99E-03
73	49.35	0.17	1.10E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 20 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
				Z-AVMA-CV-3029	CV-3029 AIR VALVE FAILS TO OPEN	2.99E-03
74	49.52	0.17	1.07E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
75	49.69	0.17	1.07E-08	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				H-ZZOA-OTC-INIT	OPERATOR FAILS TO INITIATE ONCE THROUGH COOLING	2.90E-03
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
76	49.85	0.16	1.05E-08	IE_LOMC		1.00E+00



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 21 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				Y-PMCC-P8C66A-ME	COMMON CAUSE FAILURE OF P-8C AND P-66A TO START	1.81E-05
77	50.01	0.16	1.03E-08	IE_LOMC		1.00E+00
				A-AVOA-MISCALADJ	OPERATOR FAILS TO ADJUST AFW FLOW GIVEN FLOW INSTRUMENT MISC	1.45E-03
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				H-ZZOA-OTC-CDTNL-HEP-3	COND HEP: A-AVOA-MISCALADJ * M-OOOT-LPF-INIT * H-ZZOA-OTC-INIT	5.44E-01
				M-OOOT-LPF-CDTNL-HEP-1	COND HEP: A-AVOA-MISCALADJ * M-OOOT-LPF-INIT * H-AVOA-HPISUBCLG	2.39E-01
78	50.17	0.16	9.99E-09	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-C2MC-52-2625	CIRCUIT BREAKER 52-2625 (480V) FAILS TO REMAIN CLOSED	2.71E-03
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
79	50.33	0.16	9.99E-09	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 22 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				O-C2MC-52-2625	CIRCUIT BREAKER 52-2625 (480V) FAILS TO REMAIN CLOSED	2.71E-03
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
80	50.48	0.15	9.79E-09	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				P-PAMK-EY-10	FAULT ON 120V PREFERRED AC BUS Y10	3.30E-02
				P-PAMK-EY-30	FAULT ON 120V PREFERRED AC BUS Y30	1.00E-01
				Y-PMCC-P8C66ABME	COMMON CAUSE FAILURE OF P-8C	5.10E-05
81	50.63	0.15	9.69E-09	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				H-PMOO-P-66A	HPSI PUMP P-66A OUT OF SERVICE FOR MAINTENANCE	2.63E-03
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
82	50.78	0.15	9.69E-09	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 23 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				H-PMOO-P-66A	HPSI PUMP P-66A OUT OF SERVICE FOR MAINTENANCE	2.63E-03
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
83	50.92	0.14	9.27E-09	IE_LOMC		1.00E+00
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				O-MVCC-BLKVLV-MA	COMMON CAUSE FAILURE OF BOTH ISOLATION VALVES TO OPEN	1.70E-04
84	51.06	0.14	9.05E-09	IE_LOMC		1.00E+00
				A-PMME-P-936	P-936 FAILS TO START	3.29E-03
				U-FLCC-TRAV-SCRN	COMMON CAUSE FAILURE OF TRAVELING SCREENS	2.75E-06
85	51.2	0.14	8.98E-09	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				E-DGCC-K-6A&B&NSR-MG	EDG1-1 EDG1-2 AND NSR COMMON CAUSE FAILURE TO RUN	3.44E-04
				E-HSE-EDG11-RUN	SET TO 'T' -EDG11 RUN FAILURES ARE MODELED (House Event)	1.00E+00
				E-HSE-EDG12-RUN	SET TO 'T' -EDG12 RUN FAILURES ARE MODELED (House Event)	1.00E+00
				P-LOOP-24HR	LOOP COINCIDENT WITH ANOTHER IEVENT (24 HR MISSION TIME)	4.48E-04
86	51.34	0.14	8.93E-09	IE_LOMC		1.00E+00
				A-PMME-P-8C	AFW PUMP P-8C FAILS TO START	1.65E-03
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 24 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				O-RVMA-PRV-1043B	PRV-1043B POWER OPERATED RELIEF VALVE FAILS TO OPEN	9.29E-03
87	51.48	0.14	8.71E-09	IE_LOMC		1.00E+00
				A-C2MB-152-209	AFW PUMP P-8C CIRCUIT BREAKER 152-209 FAILS TO CLOSE	1.61E-03
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				O-RVMA-PRV-1043B	PRV-1043B POWER OPERATED RELIEF VALVE FAILS TO OPEN	9.29E-03
88	51.61	0.13	8.67E-09	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-CBMC-72-403	DC CIRCUIT BREAKER 72-403 FAILS TO REMAIN CLOSED	1.49E-05
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
89	51.74	0.13	8.63E-09	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				A-PMOO-P-8C	AFW PUMP P-8C OUT OF SERVICE	3.35E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				Y-AVMB-CV-3056	SIRWT RECIRC VALVE CV-3056 FTC	4.42E-03
90	51.87	0.13	8.47E-09	IE_LOMC		1.00E+00



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 25 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				B-HCMA-HIC-0780A	SDCR CONTROLLER HIC-0780A FAILS TO DE-ENERGIZE	1.14E-02
				B-XVOB-ADVS-MAN	OPERATOR FAILS TO CLOSE MANUAL VALVES TO CLOSE ADV	4.03E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				H-ZZOA-OTC-CDTNL-HEP-4	COND HEP: B-XVOB-ADVS-MAN * H-ZZOA-OTC-INIT	1.85E-02
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
91	52	0.13	8.47E-09	IE_LOMC		1.00E+00
				B-HCMA-HIC-0780A	SDCR CONTROLLER HIC-0780A FAILS TO DE-ENERGIZE	1.14E-02
				B-XVOB-ADVS-MAN	OPERATOR FAILS TO CLOSE MANUAL VALVES TO CLOSE ADV	4.03E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				H-ZZOA-OTC-CDTNL-HEP-4	COND HEP: B-XVOB-ADVS-MAN * H-ZZOA-OTC-INIT	1.85E-02
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
92	52.12	0.12	7.95E-09	IE_LOMC		1.00E+00
				A-CVCC-AFWPP3-MA	ALL 3 AFW PP CK VALVES CK-FW726	1.07E-05
				B-XVOB-ADVS-MAN	OPERATOR FAILS TO CLOSE MANUAL VALVES TO CLOSE ADV	4.03E-02
				H-ZZOA-OTC-CDTNL-HEP-4	COND HEP: B-XVOB-ADVS-MAN * H-ZZOA-OTC-INIT	1.85E-02
93	52.24	0.12	7.81E-09	IE_LOMC		1.00E+00



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 26 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				A-PMME-P-8B	AFW TURBINE PUMP P-8B FAILS TO START	1.53E-02
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				Y-PMCC-P8C66ABME	COMMON CAUSE FAILURE OF P-8C	5.10E-05
94	52.36	0.12	7.68E-09	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGB	ONE SAFETY RELIEF VALVE ON SG B FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				Q-FVMD-FCV-3029B	FLOW CONTROL VLV FCV-3029B FAILS TO REMAIN OPEN	2.08E-03
				X-HSE-SGB-BLDN	SET TO 'T' - ESDE ON SG E-50B (House Event)	1.00E+00
95	52.48	0.12	7.68E-09	IE_LOMC		1.00E+00
				B-RVMB-SRV-SGA	ONE SAFETY RELIEF VALVE ON SG A FTC	3.69E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				I-CMOE-IA-COMPS	OPERATOR FAILS TO START A COMPRESSOR (SCREENING VALUE)	1.00E-01
				Q-FVMD-FCV-3029B	FLOW CONTROL VLV FCV-3029B FAILS TO REMAIN OPEN	2.08E-03
				X-HSE-SGA-BLDN	SET TO 'T' - ESDE ON SG E-50A (House Event)	1.00E+00
96	52.6	0.12	7.67E-09	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 27 of 28

Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				A-PMOO-P-8C	AFW PUMP P-8C OUT OF SERVICE	3.35E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				Z-KVMB-SV-3029A	SUMP TO EAST ESS AIR SUPPLY SV-3029A FTE	3.93E-03
97	52.72	0.12	7.67E-09	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				A-PMOO-P-8C	AFW PUMP P-8C OUT OF SERVICE	3.35E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				Z-KVMB-SV-3029B	SUMP TO EAST ESS AIR SUPPLY SV-3029B FTE	3.93E-03
98	52.84	0.12	7.67E-09	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				A-PMOO-P-8C	AFW PUMP P-8C OUT OF SERVICE	3.35E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				Y-KVMB-SV-3056B	SIRWT RECIRC VALVE SOLENOID SV-3056B FTE	3.93E-03
99	52.96	0.12	7.67E-09	IE_LOMC		1.00E+00
				A-PMMG-P-8B	AFW TURBINE PUMP P-8B FAILS TO RUN	5.82E-02
				A-PMOO-P-8C	AFW PUMP P-8C OUT OF SERVICE	3.35E-03
				D-BCMT-ED-15	BATTERY CHARGER #1 FAILS TO FUNCTION	1.00E+00



Entergy PSA
Engineering
Analysis

EA-PSA-SDP-D11-2-11-07

Rev. 1

Attachment 08 – Page 28 of 28


Table A08-1: Top 100 Cutsets

Cut No.	% Total	% Cut Set	Prob.	Basic Event	Description	Event Prob.
				D-BCMT-ED-17	BATTERY CHARGER #3 FAILS TO FUNCTION	1.00E-01
				D-HSMC-HS-72-01	HAND SWITCH 72-01 FAILS TO REMAIN CLOSED	1.00E-01
				Y-KVMB-SV-3056A	SIRWT RECIRC VALVE SOLENOID SV-3056A FTE	3.93E-03
100	53.08	0.12	7.61E-09	IE_LOMC		1.00E+00
				A-PMCC-P8ABC-ME	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS P-8A/B/C TO START	5.45E-05
				Y-AVCC-3027-56MB	BOTH SIRWT RECIRC VALVES CV-3027 & CV-3056 COMMON CAUSE FTC	1.40E-04

Attachment 09 Sequences


Note: Entire table is changed from Revision 0 – revision bars omitted for editorial reasons.

Table A09-1: Sequence Results				
Event tree	Sequence	CCDP	Count	End State
TR-MCND	20	1.95E-06	2126	CORE-DAMAGE
TR-MCND	18	1.30E-06	1913	CORE-DAMAGE
TR-MCND	22-15	1.11E-06	1	CORE-DAMAGE
TR-MCND	22-13	5.26E-07	6	CORE-DAMAGE
TR-MCND	19	3.44E-07	397	CORE-DAMAGE
TR-MCND	8	3.35E-07	669	CORE-DAMAGE
TR-MCND	21-09	1.46E-07	76	CORE-DAMAGE
TR-MCND	21-02	1.42E-07	156	CORE-DAMAGE
TR-MCND	6	1.26E-07	291	CORE-DAMAGE
TR-MCND	21-10	1.21E-07	262	CORE-DAMAGE
TR-MCND	21-15	1.05E-07	77	CORE-DAMAGE
TR-MCND	22-03	9.09E-08	3	CORE-DAMAGE
TR-MCND	7	4.63E-08	119	CORE-DAMAGE
TR-MCND	22-14	4.14E-08	1	CORE-DAMAGE
TR-MCND	5	4.10E-08	72	CORE-DAMAGE
TR-MCND	22-05	1.66E-08	1	CORE-DAMAGE
TR-MCND	22-04	7.15E-09	1	CORE-DAMAGE
TR-MCND	22-16	4.73E-09	1	CORE-DAMAGE
TR-MCND	21-20	3.99E-09	16	CORE-DAMAGE
TR-MCND	22-10	1.93E-09	1	CORE-DAMAGE
TR-MCND	21-19	1.10E-09	6	CORE-DAMAGE
TR-MCND	22-08	9.15E-10	1	CORE-DAMAGE
TR-MCND	22-06	8.18E-10	1	CORE-DAMAGE
TR-MCND	17	6.75E-10	5	CORE-DAMAGE
TR-MCND	21-07	6.67E-10	5	CORE-DAMAGE
TR-MCND	21-18	2.22E-10	2	CORE-DAMAGE

	Entergy PSA Engineering Analysis	EA-PSA-SDP-D11-2-11-07	Rev. 1
		Attachment 09 – Page 2 of 2	

Sequence Key:

- XX Transient with Loss of Main Condenser (TR-MCND)
- 21-XX LOCA via Pressurizer Safety Relief Valve(s) (XFR-SBLOCA-SRV)
- 22-XX Anticipated Transient Without SCRAM (XFR-ATWS)

	Entergy PSA Engineering Analysis	EA-PSA-SDP-D11-2-11-07	Rev. 1
		Attachment 10 – Page 1 of 5	

Attachment 10: Auxiliary Feedwater Flow Rate to Steam Generators E-50A and E-50B Following the Failure of Panel ED-11-2 on September 25, 2011

1.0 PURPOSE

Flow rate indication from the P-8A and P-8B auxiliary feedwater (AFW) pump train was lost for a period of time following the failure of dc panel ED-11-2 on September 25, 2011. It was known that the P-8C pump train was providing relatively equal flow to both steam generators and its associated flow control valves were functioning normally. Pump P-8B started automatically due to the loss of dc power, which also caused its flow control valves to fully open. The P-8B flow rate to the steam generators for this configuration was not known, and the reason for steam generator E-50A level increasing (40% to 90%) significantly more than E-50B (35% to 60%) was not understood. (Note: E-50A and E-50B levels were observed at 40% and 35% during EOP-1.0 (~1515).)

This evaluation utilizes the AFW system Pipe-Flo hydraulic model to establish AFW flow rates to the steam generators as a function of time and dome pressure for input to the Modular Accident Analysis Program (MAAP) model.

2.0 INPUT

2.1 Hydraulic Model

The Pipe-Flo Professional 2007 base-deck hydraulic model of the Auxiliary Feedwater system, as developed in EA-PSA-PIPEFLO-AFW-08-06 [1], was used for the evaluation. Pipe-Flo is classified level "A" (safety related software) in accordance with EN-IT-104. The software quality assurance plan is found in [1].

2.2 Condensate Storage Tank Temperature

The condensate storage tank (T-2) temperature was 87°F as recorded in the electronic operator rounds (eSOMS) at 0752 on 9-25-2011.

2.3 Steam Generator Pressure and P-8C Flow Rate Data

Steam generator pressures were obtained from the PI data archive. PI is classified as SQA category "C" (important to business) in accordance with Entergy procedure EN-IT-104. The plant process computer (PPC) is classified as SQA category "B" system (regulatory commitments). The PPC is the PI data source. Most PPC points are calibrated via technical specification surveillance procedure or preventive maintenance and controlled calibration sheets.

Part of the PI server system runs on the PPC. This portion monitors selected points every second to test against the exception threshold change value. If the change value is exceeded, the data is passed to the PI server and recorded. The PI server also compares the new value against previous values to see if it still fits on a line within the compression limit. If yes, the data is discarded, otherwise it is added to the archive. For pump starts, the compression limit is simply a change in state (on-off or start-stopped). If 8 hours have passed without an archive update, one is made regardless. PI generally provides accurate long term values and greater amounts of data when events are changing rapidly.

For this analysis, PI server tags PT0751B (Steam Generator E-50A Pressure), PT0752B (Steam Generator E-50B Pressure), FT0737 (AFW Flow to Steam Generator E-50A) and FT0736 (AFW Flow to

Steam Generator E-50B) were used to extract sampled data from the PI archive for the period in which P-8B AFW pump was in service on 9-25-2011 (Per Attachment 01 of this analysis P-8C was in service from 15:06 – 15:44). Values shown in Table 2.3-1 are averages over each time period.

	15:06 – 15:20		15:21 – 15:29		15:30-15:39		15:40-16:03	
	Pressure (psig)	P-8C Flow Rate (gpm)	Pressure (psig)	P-8C Flow Rate (gpm)	Pressure (psig)	P-8C Flow Rate (gpm)	Pressure (psig)	P-8C Flow Rate (gpm)
E-50A	948.3	163.4	923.4	164.8	896.9	152.1	859.9	0
E-50B	945.0	162.5	955.7	159.8	969.4	161.7	958.2	163.4

3.0 ASSUMPTIONS

3.1 Major Assumptions

- 3.1.1 Auxiliary feedwater system flow control valves CV-0727 and CV-0749 are fully open from event initiation at 15:06 until steam was isolated to the P-8B steam turbine at an estimated time of 16:03.

Basis: A review of electrical schematics by system experts and operations staff found the flow control valves fail in the fully open position on loss of dc power. Steam isolation to the P-8B turbine driver occurred at approximately 16:03 based on a review of operator logs and interviews. See Attachment 01 for the event time line.

Bias: This assumption is neutral as it represents a realistic event based on the best available information.

3.2 Minor Assumptions

- 3.2.1 For the purpose of establishing the pump suction pressure and recirculation boundary conditions, condensate storage tank (T-2) level is assumed to remain at 82% level. This equates to a level of 274" above the tank bottom [2] (approximately 9.9 psig at the 590 elevation). With respect to the modeled P-8B recirculation node, this would equate to 13.8 psig as it's elevation is at 581 feet. The P-8C recirculation node is at 583 feet, so its boundary pressure is 12.9 psig.

Basis: This level was recorded in the electronic operator rounds (SOMS) database at 10:41 on the day of the event. During the event, level indication was lost.

Bias: This assumption is neutral and has a negligible impact on calculated flow rates. Pump flow rate is normally set by the flow control valves, but it is primarily a function of steam generator pressure when the flow control valves are fully open.

- 3.2.2 All pump curves used in the model are assumed to be nominal (e.g. the pumps have no performance degradation from typical surveillance test results). Pipe-Flo model pump curve data points were obtained from [1].

Basis: Palisades' pump in-service test (IST) data has consistently demonstrated that all pumps in the AFW system perform slightly below manufacturer's factory test data. This can be demonstrated by a review of EA-EC82841-02 Rev. 0, "Auxiliary Feedwater System Capacity", Appendix A. The pump curve data plotted in this analysis illustrates consistent pump performance over several years. Although

some degradation of the pumps is allowed by the IST procedure, which is accounted for in design basis analyses, the actual pump performance has been consistently nominal.

Bias: This assumption is neutral as it results in a realistic evaluation of the pump condition.

3.2.3 Dynamic head loss from the steam generator dome to the main steam safety valves is neglected.

Basis: Reference [4] calculates the dynamic head loss between the steam dome and the main steam safety valves to be 19.9 psid. This analysis accounts for safety valve accumulation and piping losses based on a steam flow rate shortly after a plant trip. Application of this additional pressure to the steam generator boundary condition is deemed overly conservative as it considers the main steam safety valves are fully open for the duration of the event and applies a constant decay heat value for steaming. Realistically, the safety valves are only open for short periods of time, or in an intermediate throttle position for longer periods, and decay heat decreases over time.

Bias: This assumption is neutral. Applying the dynamic head loss value would be overly conservative and unrealistically reduce the P-8B flow rate to the steam generators.

4.0 ANALYSIS

4.1 Pipe-Flo Model Balancing to Test Data with Fully Open Flow Control Valves

Typically, the AFW system is operated by setting the flow control valves to a specific flow rate. To account for line losses and the pressure drop through the flow control valves in the wide open position, flow elements based on Special Test T-202 [3] were developed here.

The T-202 test was performed to determine the system flow rate to a single steam generator with a flow control valve in the full open position and flow to the other steam generator isolated. Although the test was performed using only P-8A, the P-8A/P-8B pump train share common discharge piping and flow control valves. The pumps are also adjacent to each other in the AFW pump room; therefore, any variations in line losses between the two are negligible.

To determine system the pressure drop under the test conditions, simulated flow control valves were inserted into the Pipe-Flo model [1] at pipelines 180 and 210 and set at the test measured flow rate.

Flow Rate to E-50A (gpm)	E-50A Dome Pressure (psia)	Flow Rate to E-50B (gpm)	E-50B Dome Pressure (psia)	T-2 Level (ft)	T-2 Temperature (F)
418.6	889.7	427.3	856.3	608.14	85

With the Pipe-Flo model aligned per the test configuration and boundary conditions established as shown in Table 4.0-1, the modeled flow control valves calculated a pressure drop of 68.89 psid in line 210 (flow to E-50A) and 83.73 psid in line 180 (flow to E-50B) would be required to establish the measured flow rate [1].

Using the calculated differential pressure and measured flow rate from T-202, reference [1] calculated fixed loss coefficients (K) in the pipelines as shown in Table 4.0-2.