

Sequence of Events MP2 Reactor Trip  
March 15, 2004

Time	Event	Comment
20:18:50.48	"B" SGFP Trip	Prior to trip, plant was at 100% power
20:19:38.90	Loop 1 Cold Leg Temperature Alarm	Tcold > 549°F (highest indicated Tcold was 554.6°F)
20:19:45.73	SG 1 Hi-Low Alarm	Low level alarm comes in at <60%, high level at >80%
20:19:51.30	"B" SGFP restarted	
20:19:56.58	SG 2 Hi-Low Alarm	Low level alarm comes in at <60%, high level at >80%
20:20:03.98	RPS Pre-Trip Alarm	Pre-trip on low steam generator water level
20:20:17.88	Low SG Level – Channel "C" trip	Trip setpoint is >48.5%
20:20:17.88	Low SG Level – Channel "B" trip	Automatic reactor trip
20:20:17.92	All 8 trip circuit breakers (TCBs) open	
20:20:18.13	Turbine Trip	Automatic turbine trip on reactor trip
20:20:18.21	NSST breakers open for buses 25A/B (6.9 KV) and 24A/B (4 KV)	Normal disconnect of electrical buses from NSST following a plant trip
20:20:18.24	Low SG Level – Channel "D" trip	
20:20:18.28	VR-11 shifted to alternate supply	This normally happens following a trip and causes a lot of invalid annunciator alarms
20:20:18.29	RSST breakers closed for buses 24C/D (4 KV)	Normal fast transfer of electrical buses to grid following a plant trip
20:20:18.30	RSST breakers closed for buses 25A/B (6.9 KV)	Normal fast transfer of electrical buses to grid following a plant trip
20:20:18.32	PZR backup heater breakers off	Caused by VR-11 power supply swap (pressurizer level lo-lo signal)
20:20:18.34	PZR proportional heaters off	Caused by VR-11 power supply swap (pressurizer level lo-lo signal)

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20:20:18.46	"A" charging pump started. Stopped at 20:20:18.53	Pump start probably caused by "relay chatter"
20:20:18.41 to 20:20:18.52	Main turbine stop valves closed	Limit switch for 2MS60A# (Main Turbine Stop Valve 4) was "fluttering" after the trip
20:20:18.52	The following Main Steam Safety Valves (MSSVs) indicated "open": <ul style="list-style-type: none"> <li>• 2-MS-252 (SG 1)</li> <li>• 2-MS-248 (SG 1)</li> <li>• 2-MS-247 (SG 1)</li> <li>• 2-MS-251 (SG 1)</li> <li>• 2-MS-253 (SG 1)</li> <li>• 2-MS-254 (SG 1)</li> <li>• 2-MS-250 (SG 1)</li> <li>• 2-MS-249 (SG 1)</li> </ul>	All of the MSSVs on one SG Indicating open is not a normal response  All of these open MSSVs indicated closed by 20:20:18.54
20:20:18.67	Condenser steam dump valves open	Quick open signal from RRS opens "B," "C" and "D" condenser dump valves
20:20:18.92	Loose parts monitor alarm	Expected alarm following trip
20:20:19.08	Low SG Level – Channel "A" trip	
20:20:19.11	Atmospheric dump valves (ADV) open	Quick open signal from RRS opens both ADVs
20:20:19.20 to 20:20:19.37	Manual reactor trip pushbuttons pressed	Signal for pushbutton 1 was not received by the PPC (probably a bad contact) – this has been observed previously
20:20:19.30 to 20:20:19.40	RPS trip alarm for thermal margin/low pressure (all 4 channels)	Control rods falling into core cause axial shape index (ASI) to become very positive (bottom peaked) which causes TM/LP setpoint to increase significantly

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20:20:20.00 to 20:20:20.59	All 61 CEAs indicate fully inserted	CEA drop times were normal
20:20:20.39	Turbine bypass valve open alarm	Quick open signal from RRS opens "A" condenser dump valve
20:20:22.45	Pressurizer backup heaters energized	Pressurizer lo-lo level signal cleared at 20:20:18.54 – why did it take so long for the heaters to energize?
20:20:23.61	"A" charging pump starts	Started due to low pressurizer level
20:20:23.75 and 20:20:23.80	AFW Ch1 / Ch2 autostart alarm	Normal response to SG low level – starts 3 minute 25 second time delay. Setpoint is SG level < 26.4%
20:20:24.38	2-MS-252 (SG 1) opens	Highest indicated SG 1 pressure was 976 psia (Nominal setpoint for this valve is 1025 psia)
20:20:49.70	Atmospheric dump valves closed	Setpoint is < 920 psig
20:21:02.65	2-MS-252 (SG 1) closed	MSSV open for 38 seconds
20:21:04.32	Turbine bypass valve closed	
20:21:05.68 and 20:21:06.76	Pressurizer proportional heaters energized	
20:21:06.78	Condenser dump valves closed	Setpoint is SG pressure < 880 psia
20:21:52.70	Turbine bypass valve open	
20:22:37.36	VCT low level alarm	Setpoint is < 70%
20:22:47.96	2-CH-192 BA to RWST open	EOP 2525, CA 10.1 directs operator to align charging pump suction to RWST if VCT level is <70%

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20:23:02.23	2-CH-501 VCT outlet closed	EOP 2525, CA 10.1 directs operator to align charging pump suction to RWST and close VCT outlet if VCT level is <70%
20:23:46.49	"B" Aux feed pump start	Automatic start due to low SG level (3 min 22.74 sec after start signal)
20:23:48.18 and 20:23:48.22	AFW Ch1 / Ch2 auto start alarm clear	SG levels > 26.4% - the auto start signal cleared before the "A" AFW time delay started the pump (3 min 24.42 sec after start signal) Lowest indicated SG level during transient was 3% in SG 1
20:25:32.16	"B" Heater drain pump stop	EOP 2525, step 13
20:25:34.94	"A" Heater drain pump stop	EOP 2525, step 13
20:25:50.52	"B" SGFP stop	EOP 2525, step 14.a
20:26:09.76	2-FW-42A SG1 FW block valve closed	EOP 2525, step 14.b
20:26:15.35	2-FW-42B SG1 FW block valve closed	EOP 2525, step 14.b
20:27:00.34	2-FW-38B SGFP "B" Disch valve closed	EOP 2525, step 14.f
20:30:03.25	"B" AFW pump stop	AFW pump not needed – "A" SGFP supplying water to both SGs
20:30:29.67	"B" AFW pump autostart block	EOP 2525, step 16

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