



Northern States Power Company

Prairie Island Nuclear Generating Plant

1717 Wakonade Dr. East
Welch, Minnesota 55089

May 30, 1997

10 CFR Part 2

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Reply to Notice of Violation (Inspection Report 97006),
Inadvertent Excessive Draining of the RCS Pressurizer While at Cold Shutdown

Your letter of April 30, 1997, which transmitted Inspection Report No. 97006, required a response to a Notice of Violation. Our response to the violation is contained in the attachment to this letter.

In this response we have made new Nuclear Regulatory Commission commitments which are indicated as the italicized statements in the section "Corrective Steps That Will Be Taken To Avoid Further Violations."

Please contact Jack Leveille (612-388-1121, Ext. 4662) if you have any questions related to this letter.

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Plant Manager
Prairie Island Nuclear Generating Plant

- c: Regional Administrator -- Region III, NRC
- Senior Resident Inspector, NRC
- NRR Project Manager, NRC
- J E Silberg

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Attachment: RESPONSE TO NOTICE OF VIOLATION

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RESPONSE TO NOTICE OF VIOLATION

VIOLATION 1

10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings.

Contrary to the above, on March 7, 1997, Procedure 2D8, Revision 7, "Filling and Venting the Reactor Coolant System," was not of a type appropriate to the circumstances because it provided inadequate procedural guidance for operators to properly control the drain of the pressurizer to a desired level and operators drained significantly more water than required from the reactor coolant system.

This is a Severity Level IV Violation (Supplement I).

VIOLATION 2

10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures or drawings.

Special Operations Procedure 2D8, "Filling and Venting the Reactor Coolant System," Revision 7, requires in Step 5.2.55.H that the reactor vessel head and pressurizer be vented to the containment prior to draining the pressurizer.

Administrative Work Instruction 5AWI 3.10.0, "Control and Operation of Plant Equipment," Revision 5, requires, in part, that qualified personnel shall verify that equipment is in the correct configuration prior to installing hold cards.

Contrary to the above:

- a. On March 7, 1997, the reactor vessel head was not vented to the containment prior to draining the pressurizer.
- b. On March 6, 1997, an auxiliary plant equipment operator assigned to hang a hold card on valve 2RC-8-16 in accordance with Work Order 9701175, did not verify that the subject valve was in the open position.

This is a Severity Level IV violation (Supplement I).

RESPONSE TO THE VIOLATIONS

Note that both violations are issued for situations involving the same event. Therefore, the responses for both violations are being combined into one discussion. Also, note that there are attached 7 charts (and an information sheet for the charts) that represent levels and pressures at various times during the event; 6 figures that illustrate the physical relationships of the components of the reactor coolant system and the fluid levels at different stages of the event; and a figure showing the planned reactor coolant system water inventories for the different outage windows. At the time of the event, we were in outage window 5.

Description and Narrative of the Event That Involved the Violations

EVENT DESCRIPTION

Unit 2 was nearing the completion of a refueling outage and was in cold shutdown condition. On the night shift of 3/6/97, the decision was made to lower pressurizer (PZR) level to <50% as required by 2D8, Filling and Venting the Reactor Coolant System (RCS), in preparation for performing surveillance procedure (SP) -2083, Unit 2 Integrated SI test. At the time that this decision was made the RCS vent path (reactor vessel head & pressurizer) established by 2D8 had been isolated by the pre-test line up for testing SV-37096 under work order (WO) 9701175. In order to lower the pressurizer level an alternate vent path needed to be identified and established. An alternate vent path, that could be isolated from the control room, was identified and the isolation for replacing SV-37096 was revised to include valves that would establish the alternate vent path. When the isolation for WO 9701175 (included valves for the alternate vent path) was performed, one of the valves for establishing the alternate vent path was mistakenly left in the CLOSED position instead of OPEN as called for on the isolation and restoration (I&R). By not opening this valve the alternate vent path remained isolated. Thinking that the alternate vent path had been established the RCS was drained to lower the pressurizer level. With an inadequate vent path more water was drained from the RCS than what was indicated by the change in pressurizer cold cal level. After the draining was complete, Reactor Vessel Level Indication System (RVLIS) full range was observed to be indicating lower than what was expected for the indicated pressurizer level. From this observation it was suspected that a possible void existed in the reactor vessel head. On the night shift of 3/7/97, it was determined that one of the valves for establishing the alternate vent path had been incorrectly positioned the night before. Actions to restore the alternate RCS vent path were evaluated and discussed and then implemented under the direction of control room personnel.

EVENT NARRATIVE - (CHRONOLOGICAL DESCRIPTION)

PI is the abbreviation for the new Plant Information Computer that was used to collect data for this evaluation.

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2300 - Entered Outage Window 5, Fill & Vent RCS (SI Test). The controlling procedure for this outage window was 2D8, Filling and Venting the Reactor Coolant System.

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1505 - Completed 2D8, Filling and Venting the Reactor Coolant System, through the 5 minute reactor coolant pump (RCP) runs. RCS pressure reduced to 100 PSIG. The reactor head and pressurizer were vented until solid streams of water issued from the vents. The reactor head was vented through 2RC-8-31, RX Head Vent Flushing Valve for approximately 1 1/2 hours and the pressurizer was vented through 2RC-8-32, Przr Vent Flushing Valve for approximately 10 minutes.

2037 - To prevent gas accumulation in the reactor vessel head and to ensure accurate RCS level indication the reactor vessel head and pressurizer were vented to the containment atmosphere via the head vent system and 2RC-15-1, RCS Vent To Containment Atmosphere. The vent path was aligned and tagged in the OPEN position per 2D8 step 5.2 55.H.

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2D8 completed through step 5.2.56, which allows transition to SP-2071.4, Integrated Leakage Rate Test (ILRT) Prerequisites to the Containment Vessel Integrated Leakage Rate Test, if scheduled. ILRT preparations were started per SP-2071.4, Integrated Leakage Rate Test Prerequisites to the Containment Vessel Integrated Leakage Rate Test.

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In preparation for the ILRT a procedure deviation for changing the established RCS vent path was prepared, reviewed and approved by the Operations Committee (OC). A Temporary Lift of the 2D8 RCS vent path isolation was performed and the new vent path established. This new RCS vent path vented only the pressurizer to the containment atmosphere and could be isolated from the control room.

0435 - (Chart 1) ILRT preparations completed per SP-2071.4. Started pressurizing Unit 2 containment to 46 psig per WO 9613273, SP-2071.5 Procedure For The Containment Vessel ILRT. A precaution and limitation in SP-2071.5 states the following: "The volume of fluid in the RCS will be compressed during the I.L.T.

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This will manifest itself as a decrease in Pressurizer level. Given a 100% Pressurizer level, the volume of the RCS is 6800 ft³. There are two fluids in the RCS: water and whatever air that was not vented out. The water compresses slightly when pressurized to 46 psig. This results in approximately a 3% drop in Pressurizer level. The affect of any air in the RCS is harder to estimate because the volume is unknown. For every percent of RCS volume that is air, pressurizing the RCS to 46 psig will result in a drop of Pressurizer level of about 6%. As an example: if it is assumed that the RCS volume is 1% air, then the expected total drop in Pressurizer level would be 3% + 6% = 9%. In summary, it is expected that Pressurizer level will drop 3%." PI computer data when containment pressurization started: PZR Lvl - 100.02%, RVLIS Upper Range B - 102.36%, RVLIS Full Range B - 99.29%, RHR Inlet Temp - 91.3 F, RC Loop Press - 17.28 psig.

1045 - (Chart 1) Stopped pressurizing Unit 2 containment per the ILRT Lead engineer. PI computer data: PZR Lvl - 79.08%, RVLIS Upper Range B - 104.36%, RVLIS Full Range B - 106.52%, RHR Inlet Temp - 91.2 F, RC Loop Press - 16.38 psig.

1450 - (Chart 1) Resumed pressurization of Unit 2 containment per SP-2071.5. PI computer data: PZR Lvl - 78.96%, RVLIS Upper Range B - 104.45%, RVLIS Full Range B - 106.49%, RHR Inlet Temp - 91.2 F, RC Loop Press - 16.12 psig.

1706 - Stopped pressurizing Unit 2 containment and closed the ILRT air to containment isolation valve to hold pressure. PI computer data: PZR Lvl - 77.41%, RVLIS Upper Range B - 105.47%, RVLIS Full Range B - 106.92%, RHR Inlet Temp - 91.2 F, RC Loop Press - 16.16 psig.

1940 - Opened the Unit 2 containment pressurization valve per the ILRT Lead.

2005 - (Chart 1) Closed the Unit 2 containment pressurization valve per the ILRT Lead. Containment pressurized to test pressure of 46 psig and pressure test started per SP-2071.5. PI computer data: PZR Lvl - 77.35%, RVLIS Upper Range B - 105.64%, RVLIS Full Range B - 106.95%, RHR Inlet Temp - 91.2 F, RC Loop Press - 16.35 psig. The change in pressurizer level from start of the ILRT test until this time was 23%. Based on this change and the precaution at the beginning of the ILRT procedure, it can be assumed that approximately 3.3% of the RCS volume was air.

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1710 - (Chart 1) ILRT surveillance procedure completed and depressurization of Unit

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2 containment began per SP-2071.5. PI computer data: PZR Lvl - 77.17%, RVLIS Upper Range B - 105.84%, RVLIS Full Range B - 106.97%, RHR Inlet Temp - 91.0 F, RC Loop Press - 17.22 psig.

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0020 - (Chart 1) Completed depressurization of Unit 2 containment per SP-2071.5. PI computer data (initial parameters before pressurization enclosed in []): PZR Lvl - 100.08% [100.02%], RVLIS Upper Range B - 103.07% [102.36%], RVLIS Full Range B - 99.88% [99.29%], RHR Inlet Temp - 91.0 F [91.3 F], RC Loop Press - 19.5 psig [17.28 psig].

After the depressurization of Unit 2 containment was complete, ILRT recovery started per SP-2071.6, Recovery From The Containment Vessel Integrated Leakage Rate Test. When the ILRT recovery was close to being completed operations returned to 2D8 at step 5.2.57 and started preparing for the scheduled SP-2083, Unit 2 Integrated SI Test with a Simulated Loss of Offsite Power.

1407 - WO 9701175, "SV-37096 Stroke Time > The Max Time" given Approval to Start Work. During the performance of SP-2248 on 2/28/97, SV-37096, RCS Vent Sys To Contmt Atmos Trn B SV, stroke time was unacceptable, SV-37096 was retested, stroke time was over 2 sec again. SV-37096 was declared inoperable. The work order pre-test line up removed the established RCS vent path.

Approximately 1530 the purification jumper was placed in service per 2C12.2, Purification and Chemical Addition, in preparation for lowering the pressurizer level to <50% cold cal per 2D8.

Around 1700 the Shift Outage Coordinator (SOC), Outage Manager and Superintendent Mechanical Systems met to discuss the need to establish an alternate RCS vent path that would allow draining the pressurizer to <50%, in preparation for SP-2083, while working on SV-37096. An alternate vent path could not be decided on without additional information on the elevations of some of the vent piping and valves. Around 1730 they decided that instead of establishing an alternate RCS vent path, it would be best to hold off on draining the RCS until after SV-37096 repairs were complete.

1800 - (Chart 1) Shift change took place and the off-going crew turned over that they were aligned to drain the pressurizer and that the draining was being delayed until SV-37096 was replaced because there was no RCS vent path. SV-37096 is part of the 2D8 vent path and allows the vent path to be isolated from the control room. After shift change the decision was made to identify and establish an alternate

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RCS vent path that could be isolated from the control room and that would allow the pressurizer to be drained while the repairs on SV-37096 continued under WO 9701175. PI computer data: PZR Lvl - 100.08%, RVLIS Upper Range B - 102.90%, RVLIS Full Range B - 99.56%, RWST Lvl - 94.45%, RHR Inlet Temp - 91.0 F, RC Loop Press - 18.99 psig.

2123 - An alternate vent path from the pressurizer to the containment atmosphere was identified. This alternate vent path did not include the reactor vessel head. The I&R for WO 9701175 was revised to establish this alternate vent path and still provide isolation for replacing SV-37096. Valve 2RC-8-16 isolated position was changed to OPEN, valve 2RC-8-20 added to the I&R with an isolated position of OPEN and 2RC-8-5 was voided on the I&R. This line up provided a RCS vent path (that could be isolated from the control room) from the pressurizer to the containment atmosphere via the PORVs, 2RC-8-16, 2RC-8-20, and 2RC-14-1.

2200 - After providing isolation instructions to the operator for WO 9701175 the isolation was started per the I&R.

2330 - (*Chart 2*) While performing the isolation for WO 9701175, 2RC-8-16, Head Vent To PRT, was mistakenly left in the as found position of CLOSED, instead of positioning it to the OPEN position as required by the I&R and Hold Card. The Hold Card for 2RC-8-16, with an indicated isolated position of OPEN, was then hung on the valve. The failure to properly position this valve in the OPEN position maintained the alternate vent path to the containment atmosphere isolated. Around 2345 isolation 9701175 for replacing the valve and establishing the alternate RCS vent path was completed. PI computer data: PZR Lvl - 99.99%, RVLIS Upper Range B - 102.51%, RVLIS Full Range B - 99.73%, RWST Lvl - 94.44%, RHR Inlet Temp - 90.9 F, RC Loop Press - 17.44 psig.

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0000 - (*Chart 2*) Control room operator started draining the RCS to lower pressurizer level per 2D8 step 5.2.57 B. The Purification Jumper line up with CV-31251, Letdown Divert to HUT in the "DIVERT" position was being used to drain the RCS to 21 CVCS HUT. The drain rate was being regulated by adjusting the position of CV-31228, 21 RCP Loop A PRZR Spray CV and was being monitored using control board indications along with an emergency response computer system (ERCS) quick plot that included PZR, VCT & RCDT levels. PI computer data: PZR Lvl - 99.97%, RVLIS Upper Range B - 102.48%, RVLIS Full Range B - 99.67%, RWST Lvl - 94.44%, RHR Inlet Temp - 90.9 F, RC Loop Press - 16.84 psig, 21 CVCS HUT Lvl (log reading) - 70.0%.

About 0255, (*Chart 2*) three hours into the evolution, the draining was stopped for

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approximately 35 minutes to allow pressurizer level to stabilize. Because of the small size of the vent path and the observed slow decrease in pressurizer level the control room operators decided to stop draining to ensure RCS parameters being observed were responding as expected. Once pressurizer level stabilized and they were satisfied with the response of other RCS parameters being observed the draining was restarted. PI computer data: PZR Lvl - 66.62%, RVLIS Upper Range B - 99.65%, RVLIS Full Range B - 96.73%, RWST Lvl - 94.44%, RHR Inlet Temp - 91.0 F, RC Loop Press - 9.82 psig.

0507 - (Chart 2) Pressurizer cold cal level reached 49% and draining of the RCS was stopped. The indicated amount drained by the 51% change in pressurizer level was 3295 gallons. Because of the inadequate vent path the actual amount drained, which was determined later, was greater than the amount indicated by the change in pressurizer level. It was later determined that the actual amount drained, by using the 21.5% increase in 21 CVCS HUT level, was 7245 gallons. RCS pressure was approximately 8 psig and was recognized to be lower than what was expected (13-15 psig) at this time. However, pressure was thought to be slowly increasing and was assumed it would return to the 13-15 psig range once the RCS returned to atmospheric pressure. The control room operators thought the lower pressure was caused by a drain rate that exceeded the vent path capability. This was turned over to the on-coming crew at shift turnover. PI computer data: PZR Lvl - 48.74%, RVLIS Upper Range B - 97.38%, RVLIS Full Range B - 94.98%, RWST Lvl - 94.44%, RHR Inlet Temp - 91.0 F, RC Loop Press - 8.84 psig, 21 CVCS HUT Lvl (log reading) - 81.5%.

0600 - (Chart 3) The night shift turned over to on-coming crew. The day shift observed RVLIS Full range to be indicating around 94% (100% is full) and concluded that a possible gas void existed in the reactor vessel head. The SOC, Day Shift SM and the Outage Manager discussed this and agreed it wasn't a shutdown cooling issue. Because they did not fully understand how the void was created (they suspected an inadequate vent path but did not know the details) they decided nothing should be done until SV-32096 was repaired and the vent path could be returned to its normal lineup. Repair of SV-37096 continued under WO 9701175 through the shift. PI computer data: PZR Lvl - 48.86%, RVLIS Upper Range B - 97.01%, RVLIS Full Range B - 94.29%, RWST Lvl - 94.44%, RHR Inlet Temp - 91.1 F, RC Loop Press - 8.52 psig, 21 CVCS HUT Lvl (log reading) - 81.5%.

1800 - (Chart 3) The day shift turned over to on-coming crew. The day crew informed them that they suspected that a possible void existed in the reactor vessel head because the RVLIS indications were indicating <100%. PI computer

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data: PZR Lvl - 49.75%, RVLIS Upper Range B - 96.48%, RVLIS Full Range B - 93.36%, RWST Lvl - 94.43%, RHR Inlet Temp - 91.5 F, RC Loop Press - 6.7 psig, 21 CVCS HUT Lvl (log reading) - 82.0%.

Following shift turnover a decision was made to try venting the reactor vessel head to get rid of the gas void in the head by using alternate valves that were not included in the isolation for WO 9701175. It was decided to use the operator who had performed the isolation the night before because of his familiarity with the line up. A pre-job brief was held to ensure that the operator understood the plan for venting the reactor head using 2RC-8-31, Reactor Head Vent Flushing Valve.

The operator went into containment to vent the reactor head through 2RC-8-31. After hooking up a drain hose to the flushing valve and before opening the valve the operator contacted the control room to get instructions on what to do if air was drawn in through the valve. The control room operator informed him that air shouldn't be drawn in because the pressurizer was vented to the containment atmosphere. Thinking back to the isolation that he had performed the night before (3/6/97), the operator in containment told the control room that he didn't think the pressurizer was vented and that he would check the line up before opening 2RC-8-31. The operators check of the pressurizer vent line up found 2RC-8-16 in the CLOSED position with a Hold Card calling for 2RC-8-16 to be held in the OPEN position. He informed the control room of what he had found and that he had made a mistake the night before when performing the isolation. The control room operators discussed this finding with the SS. The decision was made to slowly crack open 2RC-8-16. The control room operators expected pressurizer level to decrease and RCS pressure to increase when the valve was cracked open. The containment operator was told of the new plan and instructed to crack open the valve slowly while maintaining communications with the control room.

2055 - (Chart 4 & 5) When 2RC-8-16 was cracked open the containment operator could hear air being drawn in through the vent valve and line. The control room operators observed pressurizer cold cal level start to slowly decrease.

About 2110 (Chart 4 & 5) When pressurizer cold cal level reached approximately 30% the control room instructed the containment operator to close 2RC-8-16 so the pressurizer could be refilled. PI computer data: PZR Lvl - 48.24%, RVLIS Upper Range B - 96.45%, RVLIS Full Range B - 92.79%, RWST Lvl - 94.43%, RHR Inlet Temp - 91.5 F, RC Loop Press - 9.54 psig.

2112 - (Chart 4 & 5) The control room operator started blended make-up flow to the VCT and then started 22 Charging Pump to refill pressurizer in accordance with

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C12.1 & C12.5. PI computer data: PZR Lvl - 29.25%, RVLIS Upper Range B - 97.49%, RVLIS Full Range B - 95.42%, RWST Lvl - 94.43%, RHR Inlet Temp - 91.4 F, RC Loop Press - 9.93 psig.

2230 - (Chart 4 & 5) When pressurizer level reached 50% cold cal 22 Charging Pump was stopped and a few minutes later the blended make-up flow to the VCT was stopped in accordance with C12.1 & C12.5. About 2650 gallons of blended make-up water was charged into the RCS to increase pressurizer level back to 50%. PI computer data: PZR Lvl - 49.51%, RVLIS Upper Range B - 95.90%, RVLIS Full Range B - 98.28%, RWST Lvl - 94.43%, RHR Inlet Temp - 91.4 F, RC Loop Press - 11.65 psig.

About 2237 (Chart 4 & 5) the operator in containment was instructed to reopen and hang the Hold Card on 2RC-8-16 to vent the pressurizer. No air flow through the valve could be heard. The control room observed pressurizer and RVLIS levels for approximately 25 minutes with no noticeable change. The SS then decided to have the reactor head vented to the containment atmosphere by using manual head vent valves that weren't part of the isolation for repairing SV-37096. PI computer data: PZR Lvl - 50.22%, RVLIS Upper Range B - 95.81%, RVLIS Full Range B - 98.63%, RWST Lvl - 94.43%, RHR Inlet Temp - 91.4 F, RC Loop Press - 11.76 psig.

Approximately 2305 (Chart 4 & 5) the operator in containment opened 2RC-8-5, Reactor Vessel-Vent, 2RC-8-31, Reactor Head Vent Flushing Valve, and 2RC-8-33, Rx Head Vent Orifice Bypass, to vent the reactor head. The operator noted air coming from the vent and the control room observed RCS pressure and RVLIS levels increasing and a slow increase in pressurizer level. Around this same (Chart 5 & 7) time it appears (based on computer data that shows RWST level starting a slow decrease, a increase in pressurizer level and VCT level slow decrease leveling off and holding steady) that the control room operator opened MV-32062, 21 RWST To Chg Pump Suct MV, and closed MV-32063, 21 VCT Outlet To Chg Pump Suct Header MV. In order to close the VCT outlet to the charging pump suction MV-32062 has to be opened first to satisfy valve logic. The opening of the RWST to charging pump suction motor valve allowed RWST water to slowly flow through the charging system into the RCS. This was identified during the event evaluation by reviewing PI computer RWST level readings and confirmed by primary chemistry silica sample results which indicated an increase for this time period. PI computer data: PZR Lvl - 50.54%, RVLIS Upper Range B - 96.10%, RVLIS Full Range B - 99.05%, RWST Lvl - 94.40%, RHR Inlet Temp - 91.4 F, RC Loop Press - 12.30 psig.

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0003 - (Chart 4 & 6) When RVLIS indicated that the reactor vessel head was full the operator in containment was instructed to close 2RC-8-31 and 2RC-8-33. PZR Lvl 69.7% and increasing, RVLIS Full Range 102%, RVLIS Upper Range 99%. PI computer data: PZR Lvl - 67.02%, RVLIS Upper Range B - 98.72%, RVLIS Full Range B - 102.46%, RWST Lvl - 94.10%, RHR Inlet Temp - 91.4 F, RC Loop Press - 13.65 psig.

Pressurizer level continued to slowly increase (Chart 4 & 6) after the reactor head vent valves were closed. The control room operators discussed possible sources of water (RMU tanks, RWST, BAST, SG tubes) that could be causing pressurizer level to increase. Control board tank level indicators were checked and indicated no change. The RWST MVs to the RHR system were checked and found to be closed. From these indications control room personnel concluded that the most likely source of water causing the increase in pressurizer level was from the steam generator (SG) tubes. After the reactor head vent valves were closed the pressurizer was still vented to the containment atmosphere via the PORVs, 2RC-8-16 & 2RC-14-1.

0133 - (Chart 4 & 6) Closed both PORVs because pressurizer level continued to increase. Closing the PORVs isolated the pressurizer vent path to the containment atmosphere and slowed the level increase down until it leveled off. PI computer data: PZR Lvl - 89.29%, RVLIS Upper Range B - 98.56%, RVLIS Full Range B - 103.02%, RWST Lvl - 93.69%, RHR Inlet Temp - 91.4 F, RC Loop Press - 15.57 psig.

0258 - (Chart 4 & 6) Opened both PORVs to determine if the pressurizer level had stabilized. When the valves were opened pressurizer cold cal level started to increase. PI computer data: PZR Lvl - 91.50%, RVLIS Upper Range B - 99.62%, RVLIS Full Range B - 104.27%, RWST Lvl - 93.30%, RHR Inlet Temp - 91.4 F, RC Loop Press - 17.59 psig.

0300 - (Chart 4 & 6) Closed both PORVs to stop the pressurizer level increase. PI computer data: PZR Lvl - 92.50%, RVLIS Upper Range B - 99.98%, RVLIS Full Range B - 103.63%, RWST Lvl - 93.29%, RHR Inlet Temp - 91.4 F, RC Loop Press - 17.4 psig.

0350 - (Chart 4) PI computer data (readings before drain down enclosed in []): PZR Lvl - 93.15% [93.97%], RVLIS Upper Range B - 99.51% [102.48%], RVLIS Full Range B - 103.70% [99.67%], RWST Lvl - 93.11% [94.44%], RHR Inlet Temp - 91.4 F [90.9 F], RC Loop Press - 18.50 psig [16.84 psig].

0600 - The night shift turned over to on-coming crew. The on-coming crew was

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informed of what had been found concerning the RCS vent path line up and what action was taken to vent the reactor vessel head during the shift. PI computer data: PZR Lvl - 93.19%, RVLIS Upper Range B - 99.63%, RVLIS Full Range B - 103.79%, RWST Lvl - 93.11%, RHR Inlet Temp - 91.4 F, RC Loop Press - 19.40 psig.

Around 1400 work was completed on SV-37096 per WO 9701175 and the isolation released.

1530 - WO 9701175 isolation returned to normal and the 2D8 RCS vent path reestablished. Because of the suspected amount of air in the RCS a conservative decision was made to perform another fill and vent of the RCS per 2D8 to improve decay heat removal capabilities before performing SP-2083.

1800 - Shift turnover to the on-coming crew. The on-coming crew continued with steps of 2D8 for performing another fill and vent of the RCS. The additional fill and vent displaced some air from the SG tubes to the reactor vessel head which was then vented off.

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1140 - The pressurizer was successfully drained to 50% cold cal per 2D8 in preparation for performing SP-2083.

Reasons for the Violations

Inappropriate Action 1: *The RCS vent configuration, established by 2D8 during outage window 5, was not adequately controlled.*

Primary Cause(s):

Work Organization/Planing - emergent work on SV-37096 not adequately reviewed/scheduled to determine its effects on the RCS vent path established by 2D8 during outage window 5.

Change Management - the 2D8 RCS vent configuration was not maintained as prescribed and was deviated from without initiating a procedure deviation. Also, outage management's decision to hold off on lowering the pressurizer level until after the work on SV-37096 was complete was not adequately communicated.

Secondary Cause(s):

Written Communication - 2D8 doesn't provide adequate emphasis on maintaining the RCS vent path nor guidance for lowering the pressurizer level.

Inappropriate Action II: *2PC-8-16 was not positioned to the correct isolated position.*

Primary Cause(s):

Work Practices - the operator failed to position the valve in accordance with the Hold Card isolated position and failed to apply self-checking to ensure that the valve position matched the Hold Card isolated position.

Secondary Cause(s):

Verbal Communication - pre-job briefing information provided to the operator before starting the isolation didn't provide him with a clear understanding of the alternate vent path being established and that it would require opening a RCS isolation valve to vent the pressurizer.

Inappropriate Action III: *All available plant indications were not used during the drain down.*

Primary Cause(s):

Work Practices - the operator performing the drain down did not use other available indications to ensure the drain down was progressing as expected e.g. RVLIS, CVCS HUT level, calculating an estimated time required to lower the pressurizer level to 50%.

Written Communication - 2D8 did not reference a procedure or provide guidance for lowering the pressurizer level.

Secondary Cause(s):

Supervisory Methods - progress/status of drain down evolution not adequately tracked or evaluated.

Inappropriate Action IV_(assumed): *RWST to Charging Pump suction MV was not closed after closing the VCT outlet MV.*

Primary Cause(s):

Work Practices - operator did not ensure that the system was restored properly after closing the VCT outlet MV.

Corrective Steps Taken and Results Achieved

Achieving the desired configuration of the reactor coolant system for performing SP-2083 was discussed above in the "Description and Narrative of the Event . . ."

Corrective Steps That Will Be Taken To Avoid Further Violations

1. *Revise 2D8 (1D8) to include procedural guidance for lowering the pressurizer level. Include caution, precaution and limitations that emphasizes maintaining a RCS vent path and guidance for suspected voids in the head based on RVLIS indications. This will be completed prior to the next refueling outage.*
2. *Review other outage procedures that involve RCS draining and ensure they include procedural guidance for draining. This will be completed prior to the next refueling outage.*
3. *Evaluate and strengthen the method by which emergent work is reviewed and scheduled during outages to ensure the work is in accordance with the controlling outage procedures. This will be completed prior to the next refueling outage.*
4. *Revise the method the Shift Outage Coordinator communicates the effects of emergent work and outage planning decisions on work plans and schedules to shift management. Revise the 'Outage Shift Priorities' form to correspond to the new method. This will be completed prior to the next refueling outage.*
5. *Continue the effort on improving the use of self-checking within operations.*
6. *Re-enforce with shift supervision the importance of providing job performance guidance at the pre-job briefing and then tracking the progress/status of the evolution.*
7. *Conduct an overview of this event with operations personnel. Include the following as a minimum:*
 - *use of all available indications (e.g., RVLIS, CVCS HUT Level)*
 - *importance of maintaining the reactor vessel head and pressurizer vented when changing inventory of the RCS or when RVLIS is cut of service*
 - *estimating how long it should take to drain a desired amount*
 - *how to estimate a drain rate using available indications*
 - *how parameters should respond (e.g., RCS pressure, RVLIS full & upper range)*
 - *the effects & indications of draining with an inadequate vent path*

- *importance of monitoring level changes in the tank that is receiving the water being drained*
- *discuss sources of water that could cause an increase in RCS inventory, how they can cause an increase and methods that can be used to identify/eliminate a source*
- *include recent industry drain down events*
- *dedicated BA flow path*

This will be completed prior to the next refueling outage.

8. *Review the controlling procedures used for shutdown conditions and ensure they are properly integrated. This will be completed prior to the next refueling outage.*

The Date When Full Compliance Will be Achieved

Full compliance has been achieved.

Information Page for Charts

2L0112A - VCT Level = 13.08 gals./%

2L0484A - Pressurizer Level (Cold Cal) = 64.6 gals./%

2L0920A - 21 RWST Level = 2929 gals./%

2L0921A - 21 RWST Level = 2929 gals./%

2L0455A - RVLIS Full Range B Level = at 100% the reactor head is full

2P0499A - RC Loop Pressure = psig

2F0128A - Charging Pump Discharge Flow = GPM

2F0138A - Boric Acid Flow - 21 Boric Acid Blender Flow = GPM

2F0140A - 21 Makeup Water Boric Acid Blender Flow = GPM

21 CVCS Holdup Tank = 630 gals./%

Chart 1

Levels - VCT, PZR, RWST, RVLIS Full Range B
RCS Pressure

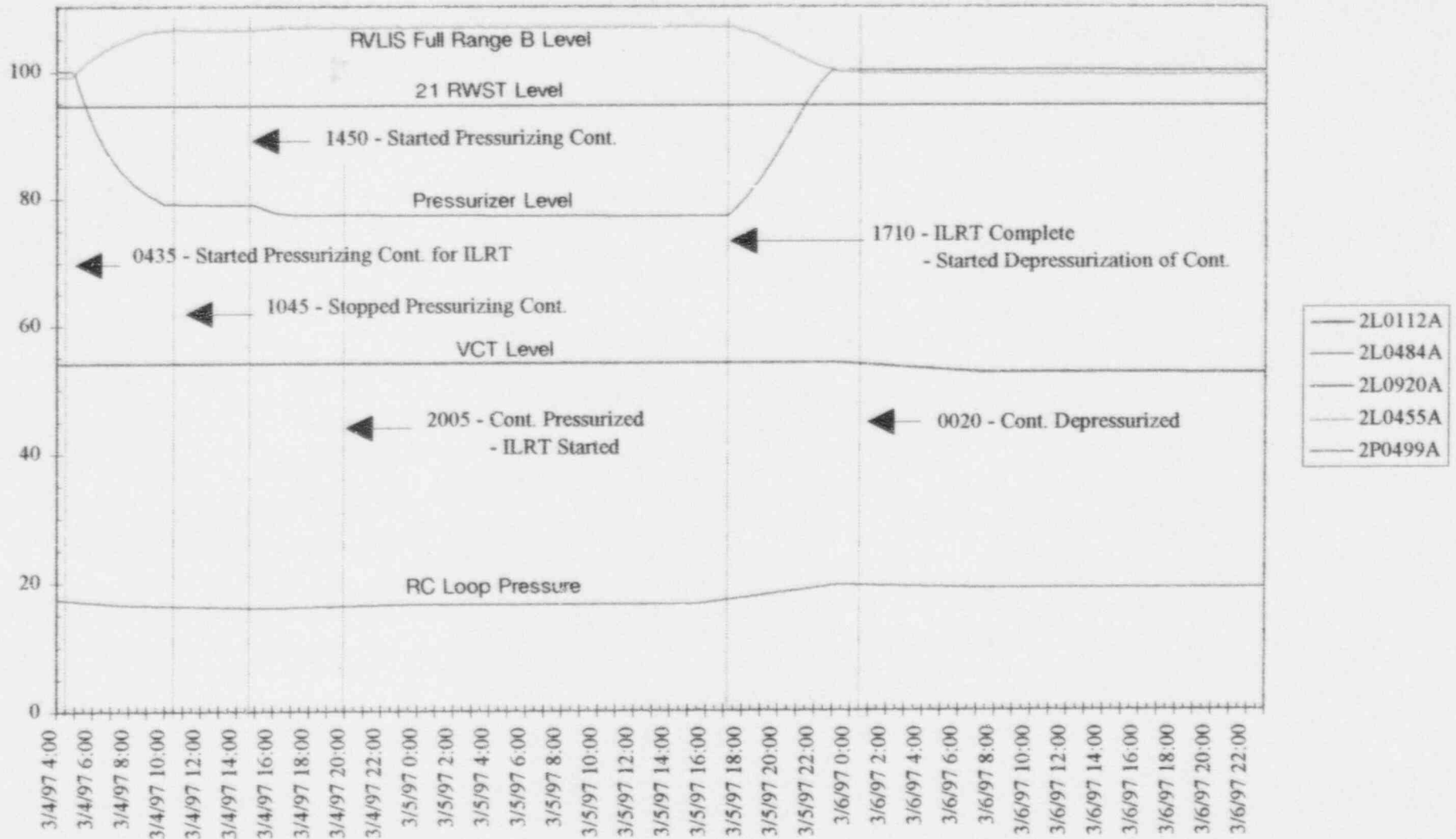


Chart 2

Levels - VCT, PZR, RWST, RVLIS Full Range B
RCS Pressure

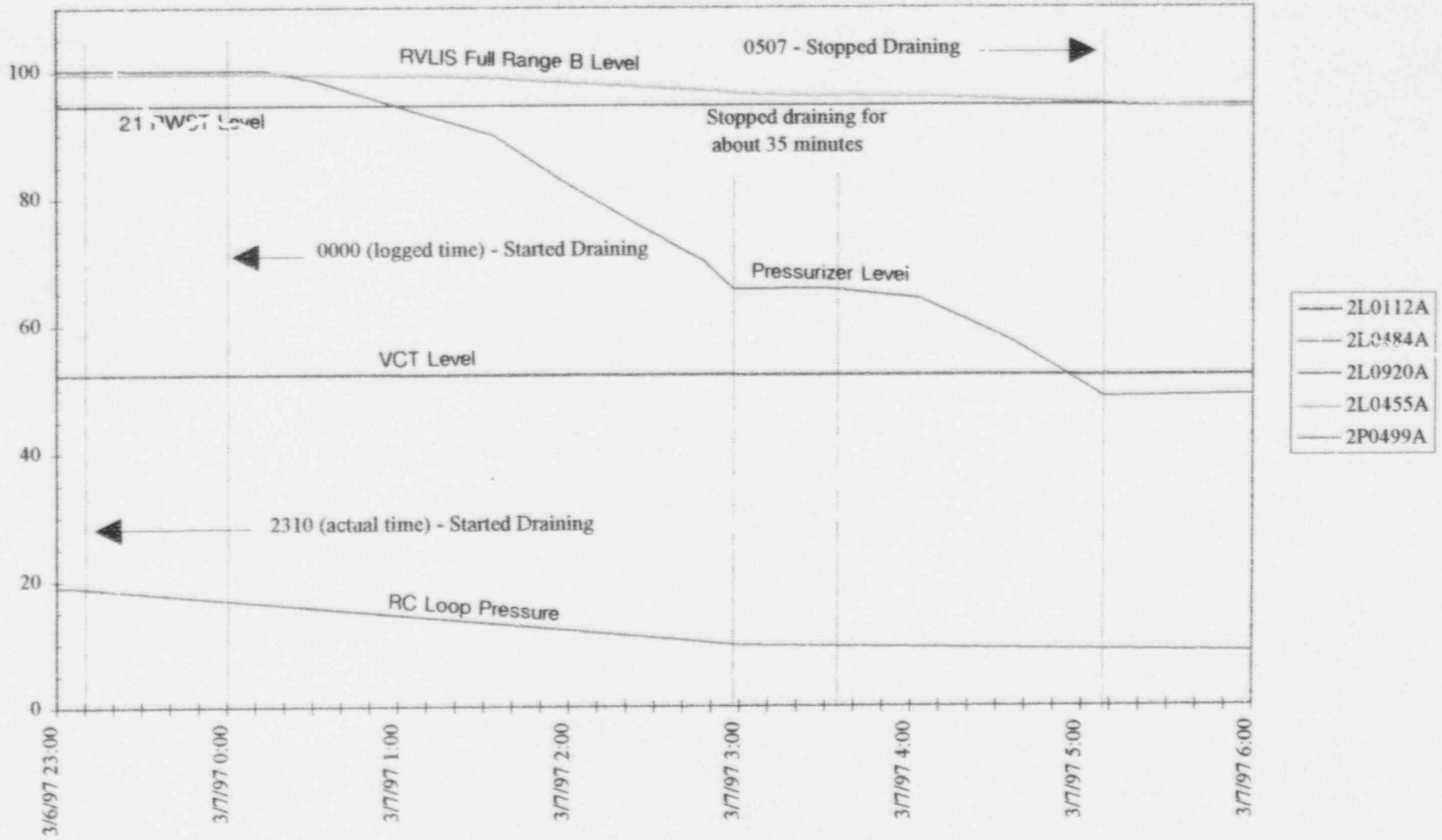
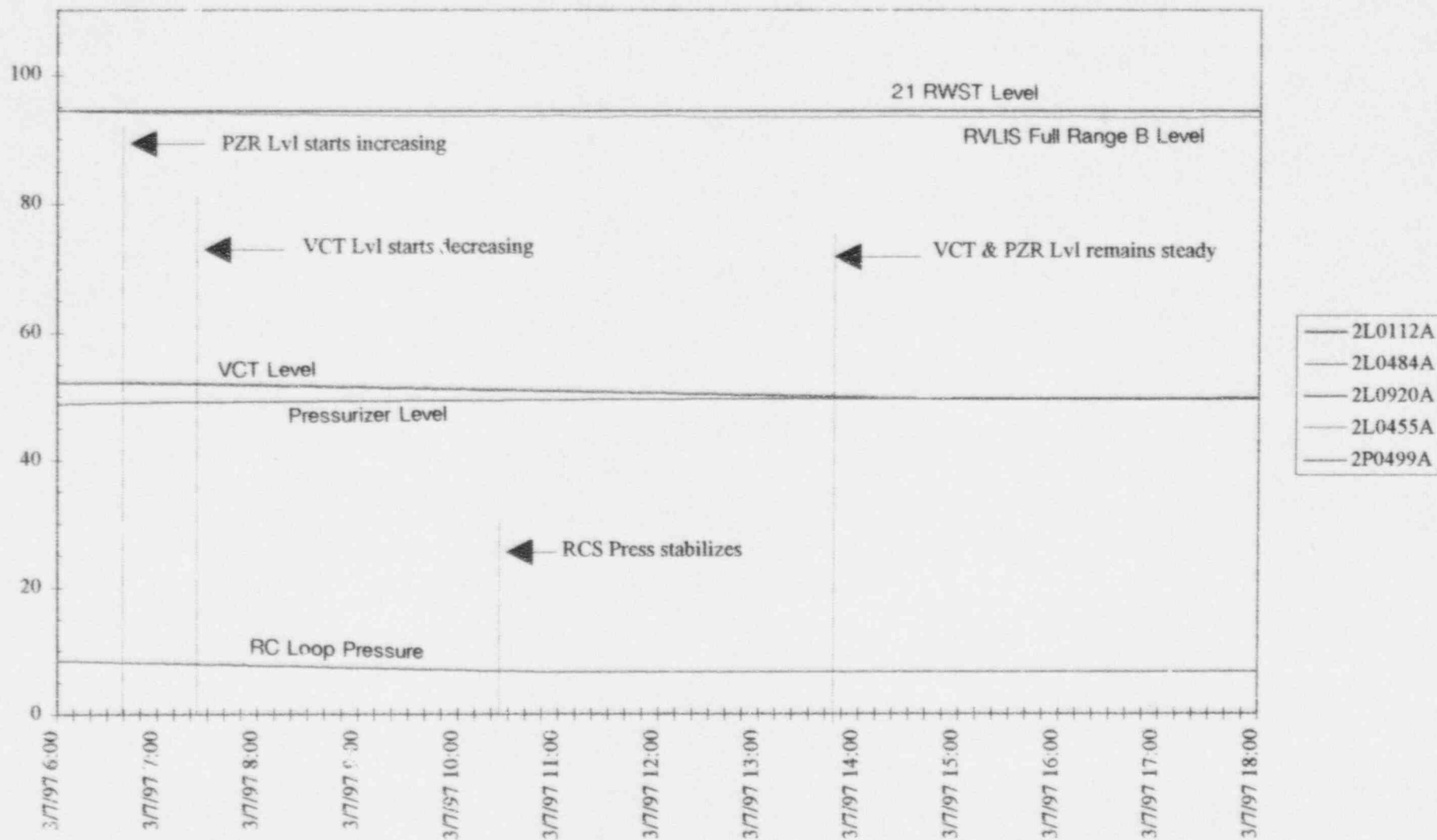


Chart 3

Levels - VCT, PZR, RWST, RVLIS Full Range B
RCS Pressure



**Levels - VCT, PZR, RWST, RVLIS Full Range B
RCS Pressure & Charging Line Flow**

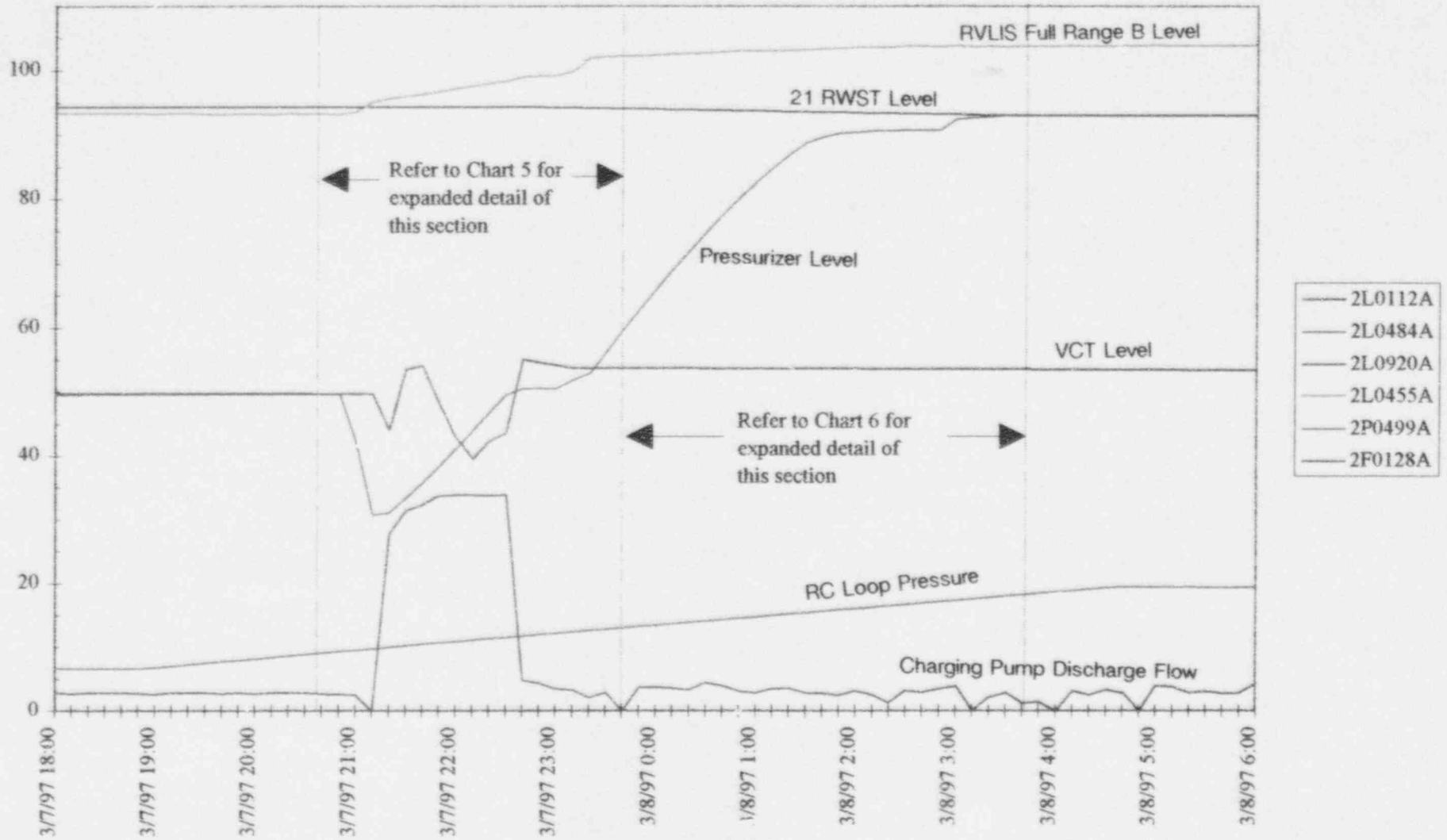


Chart 5

Levels - VCT, PZR, RWST, RVLIS Full Range B
RCS Pressure
Flows - Charging Line, Boric Acid & RMU

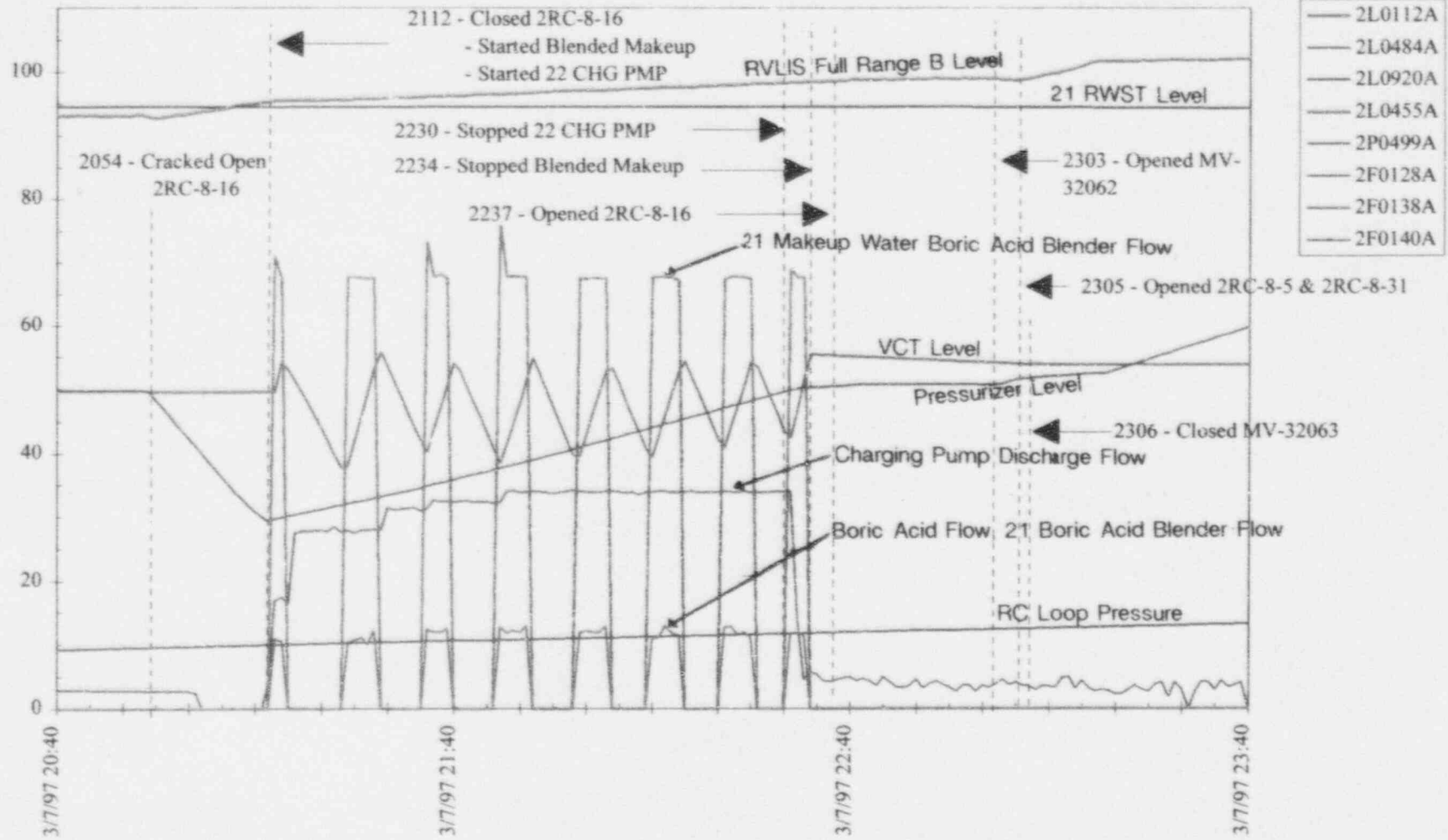


Chart 6

Levels - VCT, PZR, RWST, RVLIS Full Range B
RCS Pressure & Charging Line Flow

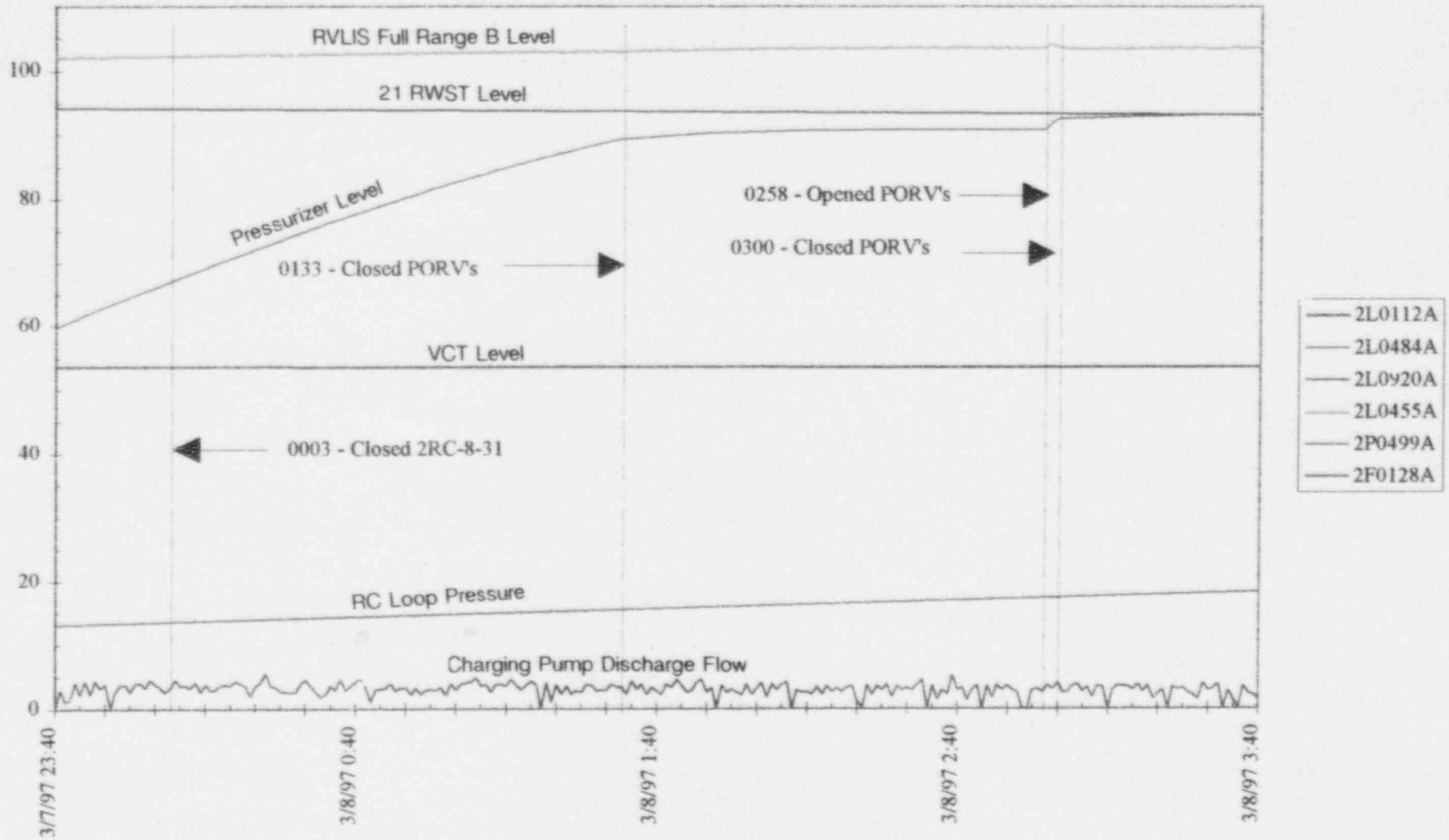
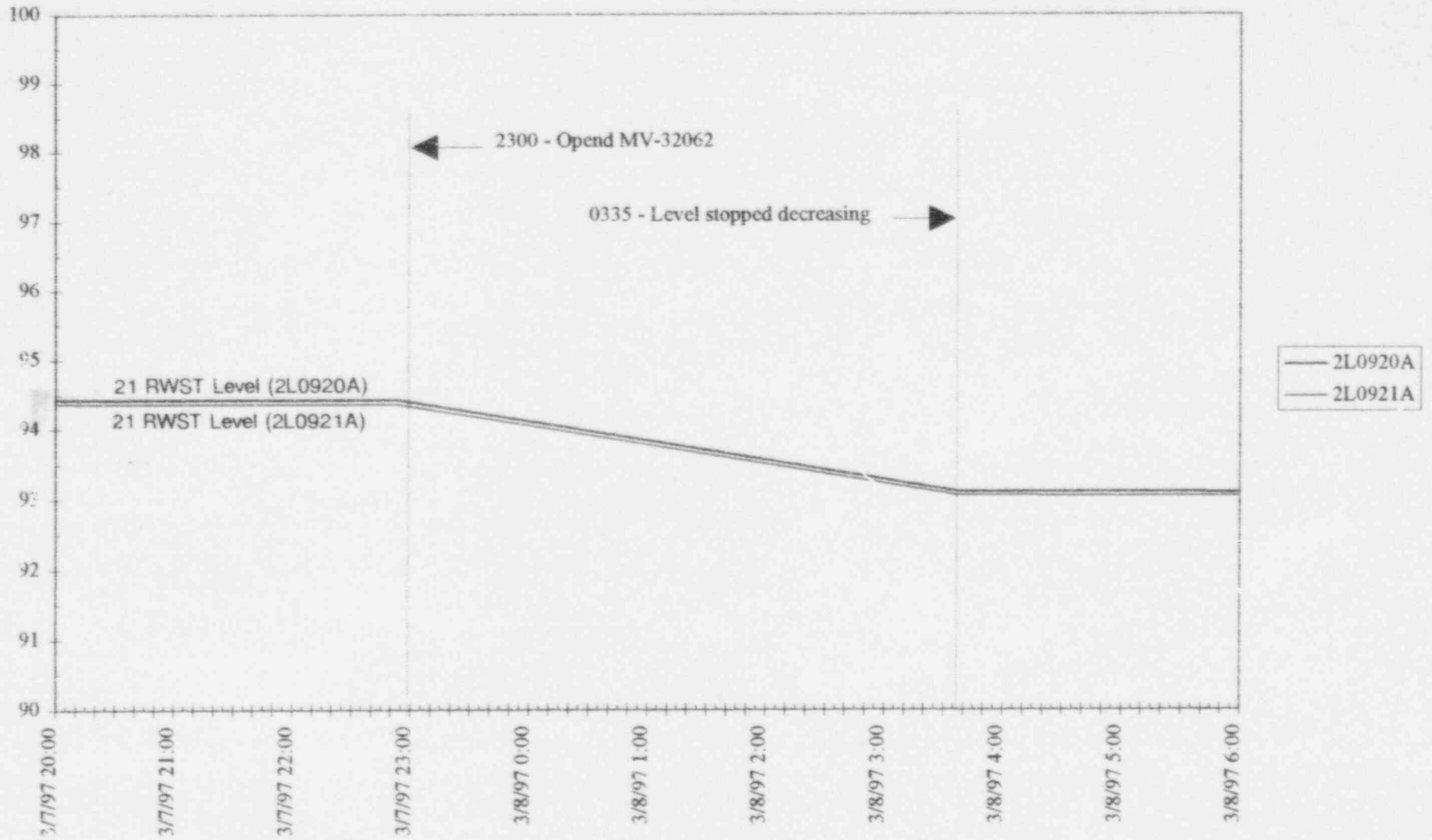


Chart 7

21 RWST Level Change



• UNIT 2 •

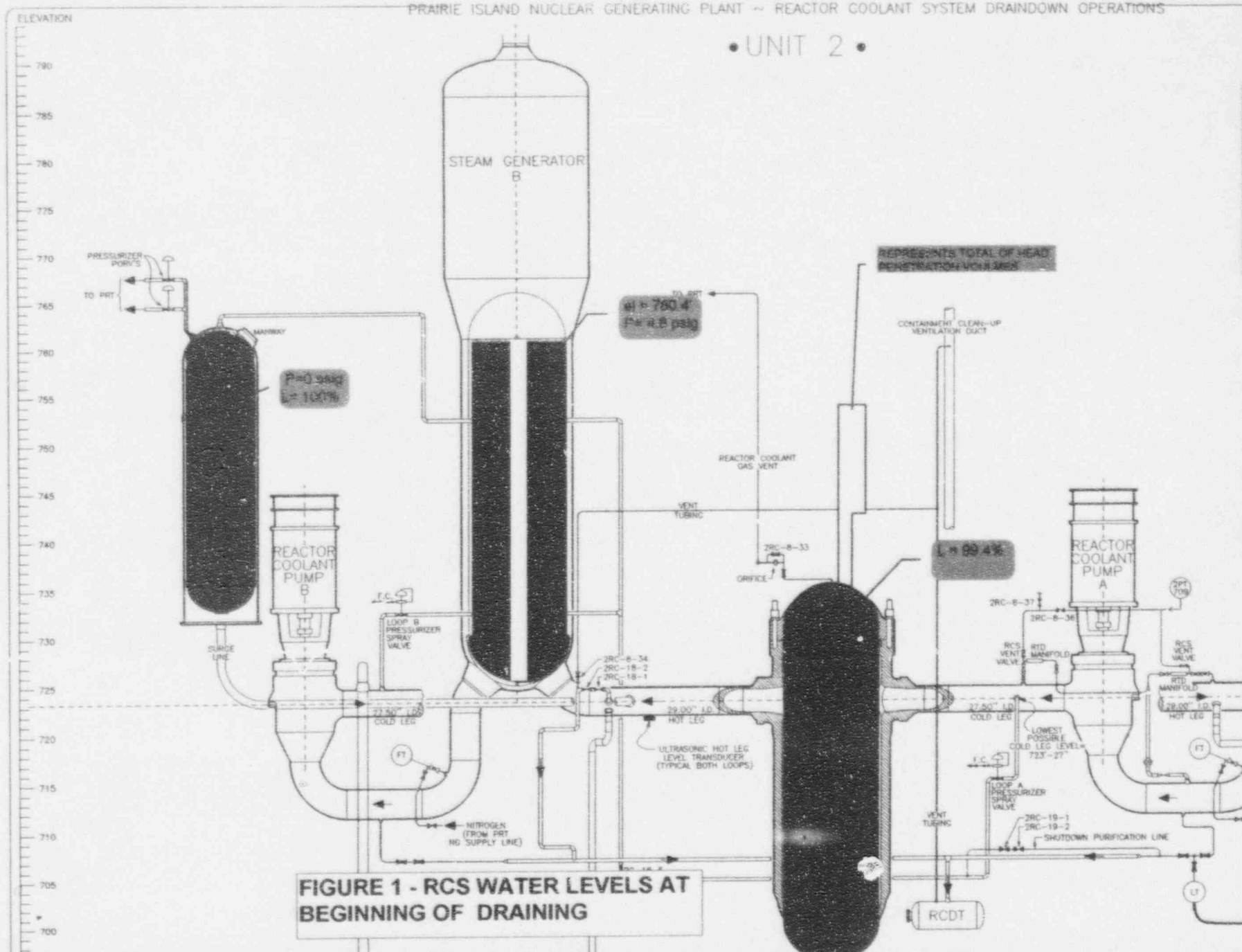


FIGURE 1 - RCS WATER LEVELS AT BEGINNING OF DRAINING

• UNIT 2 •

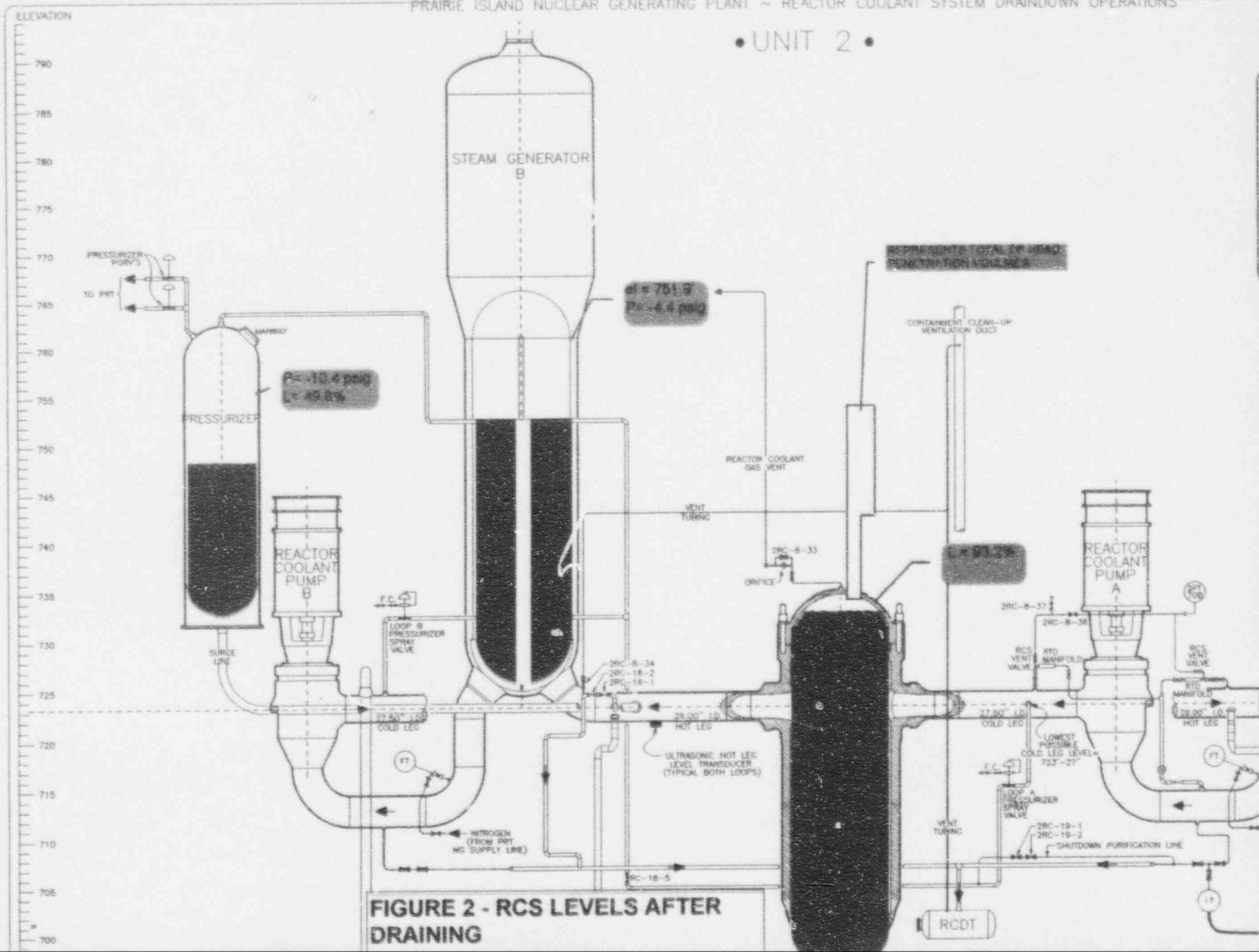


FIGURE 2 - RCS LEVELS AFTER DRAINING

• UNIT 2 •

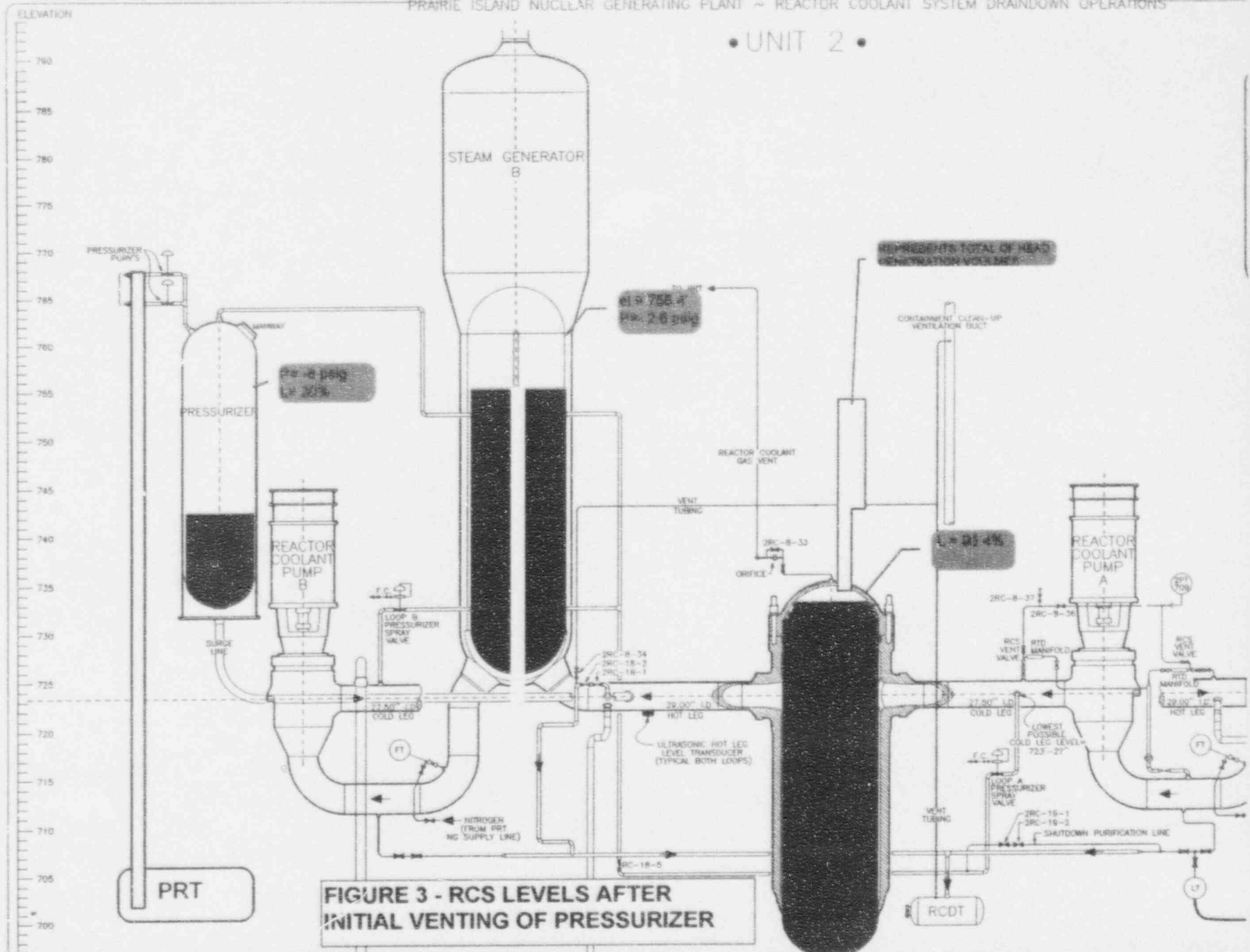


FIGURE 3 - RCS LEVELS AFTER INITIAL VENTING OF PRESSURIZER

• UNIT 2 •

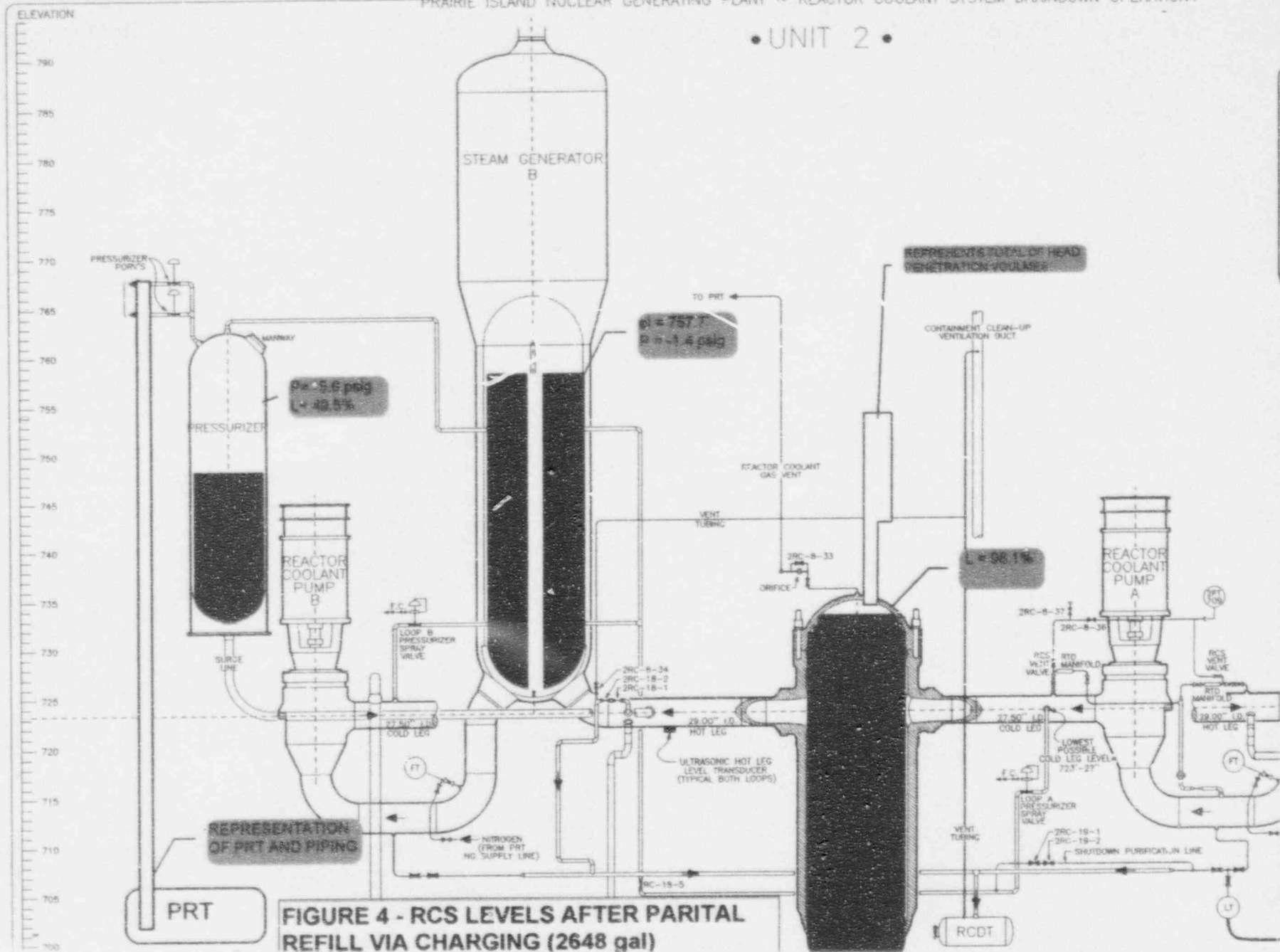


FIGURE 4 - RCS LEVELS AFTER PARTIAL REFILL VIA CHARGING (2648 gal)

• UNIT 2 •

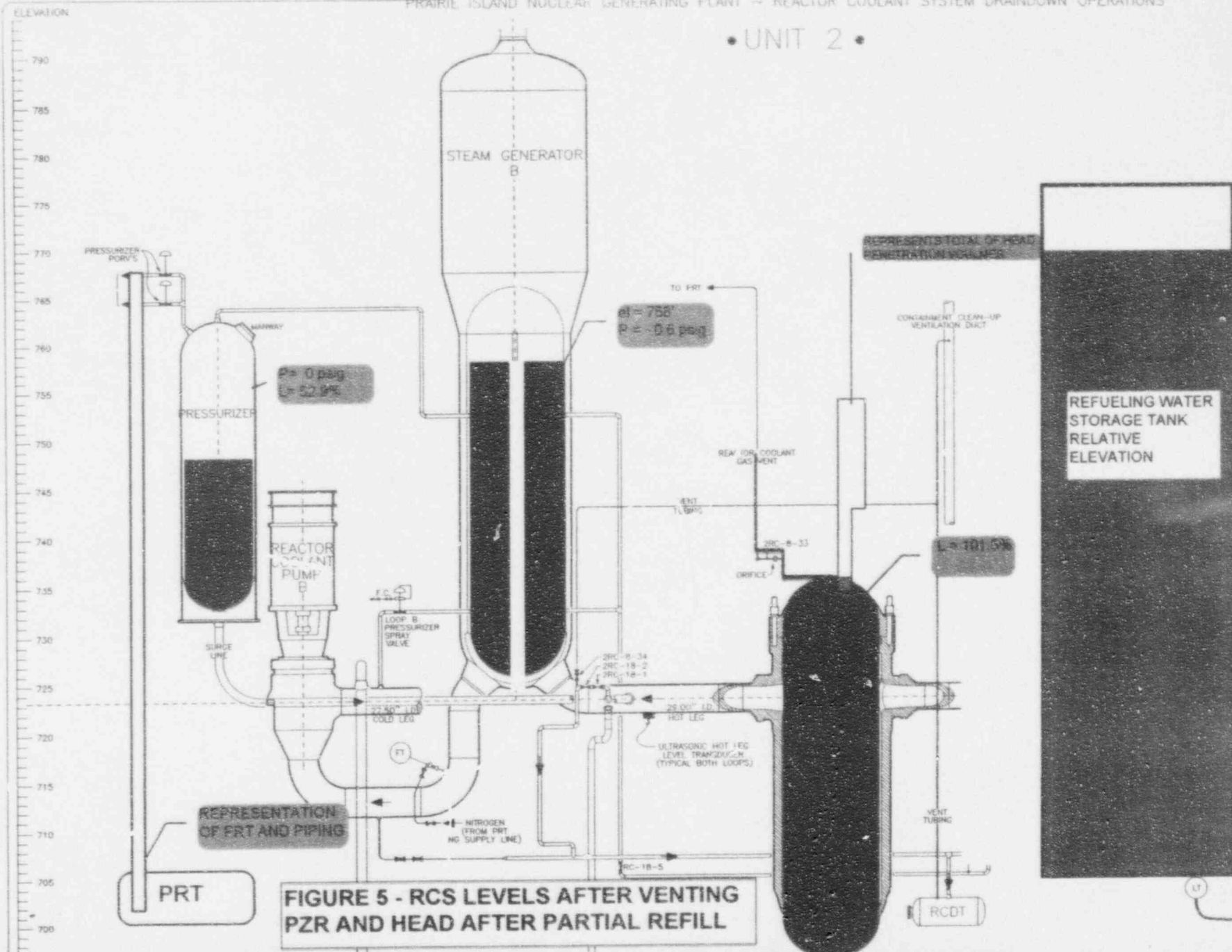


FIGURE 5 - RCS LEVELS AFTER VENTING PZR AND HEAD AFTER PARTIAL REFILL

• UNIT 2 •

