PSEG NUCLEAR L.L.C.
SALEM/OPERATIONS

S1.OP-SO.RC-0006(Q) REV. 26

DRAINING THE REACTOR COOLANT SYSTEM <101 FT ELEVATION WITH FUEL IN THE VESSEL

USE CATEGORY: **I**

- Biennial Review Performed: Yes ____ No ____ NA ✓
- DCP Packages and Affected Document Numbers incorporated into this revision: None
- The following OTSCs were incorporated into this revision: None

REVISION SUMMARY:

- Added Step 2.19.6, supporting a reduced inventory or mid-loop condition with SG Nozzle Dams installed with at least 1 PZR Safety Valve removed as a vent path. **[70108389]**

  At reduced decay heat, the maximum pressure in the loops remains less than the assumed nozzle dam rating of 35 psig for all credible times prior to core uncovery. The core exit temperature is also limited to 280°F, the maximum temperature assumed for the nozzle dam rating. Therefore, 7 MWt is a valid "success" case for the single safety valve removed scenario.
  Reference to Vendor Document "324458, Salem RCS Pressurization Studies for Shutdown Configurations with the Pressurizer Safety Valves or Manway Removed as a Vent Path".

- Step 2.29, added "Supervisory Letter (SL) for Mid-Loop operation" to the list of documents to be reviewed prior to midloop operation. **[70102253]**

IMPLEMENTATION REQUIREMENTS **Effective Date: April 15, 2010**

None

DRAINING THE REACTOR COOLANT SYSTEM <101 FT ELEVATION WITH FUEL IN THE VESSEL

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1.0 PURPOSE

1.1 To provide instructions necessary to drain Reactor Coolant System (RCS) to a level <101 ft elevation with fuel in vessel.

1.2 To provide instructions necessary to monitor Core Cooling and RCS Inventory while operating at Reduced Inventory.

2.0 PREREQUISITES

___ 2.1 **ENSURE** Operations Manager permission is obtained to establish reduced inventory operation (mid-loop operation) with fuel in the vessel.

___ 2.2 **ENSURE** the Supervisory Letter (SL) for Mid-Loop operation is issued to all Supervisors. **[NLR-N89001]**

___ 2.3 **ENSURE** RCS is drained to ≥101 ft.
IAW S1.OP-SO.RC-0005(Q), Draining the RCS to ≥101 Feet Elevation.

___ 2.4 **REVIEW** Components "Off Normal and Off Normal Tagged" List(s) for system and support system(s) associated with the evolution to be performed in this procedure.

___ 2.5 **ENSURE** Unit is in Mode 5 or Mode 6.

___ 2.6 **ENSURE** the following plant systems are in service:

___ 2.6.1 Waste Gas IAW S1.OP-SO.WG-0003(Q), Gaseous Waste Disposal System Operation.

___ 2.6.2 IF RVLIS is to be used to support step 3.7,
THEN Align Reactor Vessel Level Indication for Mid-Loop
IAW S1.OP-SO.RVL-0001(Q), Reactor Vessel Level Instrumentation System.

___ 2.7 **ENSURE** PRT level is <10% when the PORVs are used to satisfy RCS Technical Specification Overpressurization Protection IAW Step 2.8.1.

___ 2.8 **ENSURE** RCS Technical Specification Overpressurization Protection is established:

___ 2.8.1 Vent path defined as at least one of the following:

- ♦ At least one PZR Safety valve removed.
- ♦ Reactor Vessel Head removed.
- ♦ Both PORVs gagged open, both PORV block valves open, and PRT rupture disk removed.
- ♦ Pressurizer manway removed and opened.
- ♦ A vent path approved by System Engineering and documented by an Engineering Evaluation.
- ♦ 1PS59, VENT CONNECTION VLV is OPEN with the blind flange removed.

OR

___ 2.8.2 POPS is in service IAW S1.OP-SO.PZR-0004(Q), Pressurizer Overpressure Protection Operation.

___ 2.9 **ENSURE** ≈39,800 gallons of volume in the CVCS Holdup Tanks is available to receive RCS drainage when Steam Generator U-Tubes are to be drained.

___ 2.10 **ENSURE** RWST level is greater than 30 feet to ensure adequate gravity makeup capability.

___ 2.11 **ENSURE** Reactor Coolant System Activity is ≤0.1 μCi/ml $Iodine^{131}$.

___ 2.12 **ENSURE** Residual Heat Removal System is in operation and maintaining Reactor Coolant System temperature.

___ 2.13 **ENSURE** both 11 AND 12 RHR Loops are OPERABLE.

___ 2.14 **ENSURE** the Sight Glass is in service IAW S1.OP-SO.RC-0005(Q), Draining the Reactor Coolant System to ≥101 Feet Elevation.

___ 2.15 Notify Maintenance to **OPEN** 11 AND 13 Midloop transmitter reference leg low point drain valves. These valves will remain open during the draindown process and will be closed IAW Section 5.3.

___ 2.16 **PERFORM** the following to enable Overhead Alarm Window D-47, RHR MID-LOOP SYS TRBL and disable OHA G-23, 11/12 SGFP SPEED DEV:

___ 2.16.1 **ENSURE** the Beta-Annunciator System SER points 321 is DISABLED.

___ 2.16.2 **ENABLE** the Beta-Annunciator System SER points 270, 286, and 320.

___ 2.16.3 **REMOVE** Plant Computer point "SPEEDDEV" from scan by selecting SCAN OFF.

___ 2.16.4 **FORCE** Plant Computer point "SPEEDDEV" to a value = 0.

___ 2.16.5 **SELECT** UNLATCHED quality for Plant Computer point "SPEEDDEV".

___ 2.16.6 **PLACE** Plant Computer point "SPEEDDEV" back on scan by selecting SCAN ON.

___ 2.17 Direct Maintenance to **PERFORM** Attachment 1 to align Mid-Loop Narrow Range instrumentation in preparation for drain down.

___ 2.18 **ENSURE** Containment Equipment Hatch is installed providing no air gap between Containment and outside environment by <u>either</u> the:

___ 2.18.1 Inner Containment Equipment Hatch is installed with <u>all</u> bolts providing no air gap between Containment and outside environment.

<u>OR</u>

___ 2.18.2 Outage Equipment Hatch (OEH) is installed IAW SC.MD-FR.CAN-0001(Q), OEH Installation, Removal, and Seal Replacement, <u>AND</u> Aligned "SAT" IAW S1.OP-ST.CAN-0007(Q), Containment Closure, Attachment 67.

___ 2.19 **ENSURE** at least 72 hours have elapsed since Reactor Shutdown, AND one of the following conditions is established for decay heat removal upon loss of RHR during reduced inventory conditions:

___ 2.19.1 IF any RCS Cold Leg opening is planned, THEN:

___ ♦ A SG hot leg side manway is removed, and

___ ♦ The corresponding hot leg side nozzle dam is NOT installed.

___ 2.19.2 A reduced RCS inventory condition (including mid-loop operation) with the Pressurizer Manway removed and opened:

___ ♦ The initial RCS temperature is <100°F, and

___ ♦ One SI Pump is available (4KV breaker only C/T for CRS) AND one Centrifugal Charging Pump available and aligned to the SI flow path (Required flow to suppress boiling is 800 gpm) (Refer to Steps 3.5 and 3.6).

___ 2.19.3 A reduced RCS inventory condition (including mid-loop operation unless nozzle dams are installed) using 1PS59, VENT CONNECTION VLV, OPEN with the blind flange removed as a vent path is permissible provided:

___ ♦ At least 8 days have elapsed since Reactor Shutdown OR Decay Heat is <10 MWt following Reactor Shutdown as determined by Engineering, and

___ ♦ Either one of the following:

___ • Both SI Pumps are available (4KV breakers only C/T for CRS) (Refer to Steps 3.5 and 3.6) , or

___ • One SI Pump is available (4KV breaker only C/T for CRS) AND one Centrifugal Charging Pump available and aligned to the SI flow path OR normal charging mode (Refer to Steps 3.5 and 3.6).

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2.19 (continued)

___ 2.19.4 A mid-loop condition with nozzle dams removed for RCS vacuum refill using 1PS59, VENT CONNECTION VLV, OPEN with the blind flange removed as a vent path is permissible provided:

___ ♦ At least 8 days have elapsed since Reactor Shutdown OR Decay Heat is <10 MWt following Reactor Shutdown as determined by Engineering, and

___ ♦ The initial RCS temperature is <100°F, and

___ ♦ Either one of the following:

___ • Both SI Pumps are available (4KV breakers only C/T for CRS) (Refer to Steps 3.9 and 3.6), or

___ • One SI Pump is available (4KV breaker only C/T for CRS) AND one Centrifugal Charging Pump available and aligned to the SI flow path OR normal Charging mode. (Refer to Steps 3.9 and 3.6)

NOTE

17 days since Reactor Shutdown is based on 1/3 of the Core having been replaced. If this has not occurred, verification by Engineering will be required to ensure Reactor is <5 MWt.

___ 2.19.5 A reduced RCS inventory condition with the SG Nozzle Dams installed is permissible with 1PS59, VENT CONNECTION VLV, OPEN with the blind flange removed as a vent path provided:

___ ♦ At least 17 days have elapsed since Reactor Shutdown OR Decay Heat is <5 MWt following Reactor Shutdown as determined by Engineering, and

___ ♦ RCS makeup flow is procedurally restricted to 300 gpm using Charging or Safety Injection Pump for Loss of RHR Recovery, and

___ ♦ Two pressurizer PORVs are open to the PRT.

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2.19 (continued)

___ 2.19.6 A reduced inventory or mid-loop condition with SG Nozzle Dams installed is permissible with at least 1 Pressurizer Safety Valve removed as a vent path provided:

- ♦ Decay Heat is ≤7 MWt following Reactor Shutdown as determined by Engineering, and

___ ♦ Either one of the following:

  - ___ • Both SI Pumps are available (4KV breakers only C/T for CRS) (Refer to Steps 3.5 and 3.12, 3.13), or

  - ___ • One SI Pump is available (4KV breaker only C/T for CRS) AND one Centrifugal Charging Pump available and aligned to the SI flow path OR normal Charging mode. (Refer to Steps 3.5 and 3.12, 3.13).

___ 2.19.7 For all other conditions a vent path (as directed by Engineering) is established and documented by an approved Engineering Technical Evaluation attached to this procedure.

___ 2.20 IF Steam Generator Primary Side tubes were NOT drained, THEN **ENSURE** at least two Steam Generators wide range level are >77% and associated MS10 valves are available for natural circulation cooling in the event of a Loss of RHR.

___ 2.21 **ENSURE** Charging Flow and Letdown Flow indications are available.

NOTE

Any equipment required for rapid Containment closure is required to be pre-staged by the Containment Coordinator.

2.22 **PERFORM** the following to ensure appropriate Containment Closure requirements:

___ 2.22.1 **ENSURE** Containment Closure is established IAW S1.OP-ST.CAN-0007(Q), Refueling Operations - Containment Closure.

___ 2.22.2 Referring to S1.OP-ST.CAN-0007(Q), Refueling Operations - Containment Closure, **DETERMINE** which Containment penetrations would require rapid closure following a loss of RHR AND **ENSURE** the penetrations requiring rapid closure are listed on Attachment 2.

___ 2.23 **ENSURE** at least two of the following primary core exit thermocouples OR the associated alternate core exit thermocouples are available and providing indication by one of the following:

- ♦ Plant Computer, or
- ♦ Manually Recorded locally at the CET Cabinets at least ONCE every 15 minutes:

Primary Core Location	Primary Thermocouple Computer Point OR CET Reading	Alternate Core Location	Alternate Thermocouple Computer Point OR CET Reading	Alternate Core Location	Alternate Thermocouple Computer Point OR CET Reading
D-12	T-31	F-14	T-40	H-13	T-24
	T0031A / * CE31		T0040A / * CE40		T0024A / * CE24
K-12	T-22	D-14	T-49	N-13	T-45
	T0022A / * CE22		T0049A / * CE49		T0045A / * CE45
J-01	T-46	H-02	T-34	H-03	T-26
	T0046A / * CE46		T0034A / * CE34		T0026A / * CE26
H-04	T-14	K-02	T-38	L-05	T-19
	T0014A / * CE14		T0038A / * CE38		T0019A / * CE19

* If a point is selected, it is to be read locally at CET cabinet and manually recorded at least once every 15 minutes utilizing the Additional Reading/Operator Action Log IAW OP-SH-111-101-1001, Use and Development of Operating Logs.

___ 2.24 IF both Safety Injection Pumps are required to be available, THEN **ENSURE** 11 AND 12 Safety Injection Pumps are available (4KV breakers only cleared and tagged for CRS) with an available flow path through 11SJ40 OR 12SJ40, SAFETY INJECTION HEADER STOP VALVE (Refer to Steps 3.5 and 3.6).

___ 2.25 IF one Safety Injection Pump AND one Centrifugal Charging Pump are required to be available, THEN **ENSURE** the following:

___ 2.25.1 11 OR 12 Safety Injection Pump is available (4KV breakers only cleared and tagged for CRS) with an available flow path through 11SJ40 OR 12SJ40, SAFETY INJECTION HEADER STOP VALVE (Refer to Steps 3.5 and 3.6).

___ 2.25.2 11 OR 12 Charging Pump is OPERABLE aligned to either the BIT Cold Leg Injection Flow Path OR normal charging flow path (Refer to Step 3.5).

___ 2.26 **ENSURE** Outage Control Center (OCC) has established the following as protected areas IAW WC-AA.101:

- ♦ Containment (Outside Equipment Hatch Platform)
- ♦ Available Service Water Intake Bays 1 & 3
- ♦ Switchyard
- ♦ Station Blackout Air Compressor
- ♦ 100' Relay Room
- ♦ 100' Mechanical Penetration Area
- ♦ 78' Electrical Penetration Area
- ♦ 84' Switchgear Room
- ♦ 64' Switchgear Room
- ♦ Containment Airlock EL 100'
- ♦ Containment Airlock El 130'
- ♦ Outage Equipment Hatch (OEH)
- ♦ 78' Mechanical Penetration Area
- ♦ All Available EDG Rooms (1A, 1B, 1C)
- ♦ 84' Aux Building
- ♦ 45'/55' Aux Building

___ 2.27 **CONTACT** Hope Creek and Load Dispatcher to review switchyard work scheduled during the course of the midloop evolution. Identified activities are listed on Attachment 2.

___ 2.28 IF the Outage Equipment Hatch door is to be opened during Mid-Loop operation, THEN **ENSURE** Core exit temperature is <100°F, AND all requirements of S1.OP-ST.CAN-0007(Q), Containment Closure are satisfied.

___ 2.29 **ENSURE** SM, CRS, Control Room personnel, Containment Coordinator, and personnel involved in RCS draining evolutions review the following items:

- ♦ S1.OP-AB.RHR-0001(Q), Loss of RHR.
- ♦ S1.OP-AB.RHR-0002(Q), Loss of RHR at Reduced Inventory.
- ♦ S1.OP-AB.CONT-0001(Q), Containment Closure.
- ♦ Engineering evaluation requirements and any actions required to promptly establish an RCS vent path upon loss of RHR.
- ___ ♦ Supervisory Letter (SL) for Mid-Loop operation. **[NLR-N89001]**

___ 2.30 IF the Steam Generator manway covers are to be removed following the RCS drain down, THEN **ENSURE** the Steam Generator manway temperature is ≤130°F before initiating the drain down. **[70034006]**

3.0 PRECAUTIONS AND LIMITATIONS

___ 3.1 Chemistry Department should monitor CVCS Holdup Tank Oxygen concentration during RCS drain down until Oxygen concentration stabilizes below 1%.

___ 3.2 Reduced RCS Inventory Log is required to be maintained IAW SC.OP-DL.ZZ-0027(Q), Log Supplement, whenever RCS level is below Pressurizer level indication.

___ 3.3 Maintain Core exit temperature <100°F whenever the Outage Equipment Hatch door is open during Mid-Loop operation.

___ 3.4 Maintain RHR flow IAW the following guidelines: **[C0102]**

- Operation of RHR Pumps at lower flow rates greatly reduces possibility of air ingestion (vortexing) in RHR Pump suction. To minimize vortexing while the RCS is at reduced inventory, the RHR pump flow rate shall not exceed the following limits:
  - 1900 gpm with RCS between 97.3' to <97.5' elevation
  - 3000 gpm with RCS at 97.5' to ≤101' elevation
- Maintain continuous RHR flow ≥1800 gpm to 3100 gpm. Maintaining ≥1800 gpm ensures adequate pump casing cooling. RHR Pump operation at <1800 GPM should not exceed 3 hours in any 24 hour period. Time <1800 GPM should be maintained IAW S1.OP-DL.ZZ-0001(Q), Control Room Logs.
- Technical Specification minimum allowable RHR flow is 1000 GPM in Mode 6. Operation at <1500 GPM flow rate should be minimized to limit RHR System vibration.
- Station an Operator at RHR Pumps to monitor for cavitation due to vortexing whenever starting RHR Pumps at reduced inventory, making large flow changes, or reducing RCS level below 97.5 ft. elevation.
- Monitor RHR Pump parameters frequently while operating at Reduced Inventory for indication of air binding or vortexing. Cavitation due to vortexing is indicated by fluctuating flow, amps, or suction pressure. Cavitation due to air binding is indicated by zero flow and low amps.

___ 3.5 A maximum of one Safety Injection Pump OR one Centrifugal Charging Pump shall be OPERABLE IAW Technical Specification 3.5.3 as verified by 4.5.3.2.a OR 4.5.3.2.b while in Mode 5 or 6 with the head on the Reactor Vessel.

___ 3.6 13 Charging Pump flow path shall be aligned to Unit 2 OR the pump shall be C/T when 11 or 12 Safety Injection Pump is capable of injection into the core with the RCS temperature ≤312˚F with the Reactor Vessel Head installed. **[C0565]**

___ 3.7 The following level indications shall be available during RCS drain down: **(NLR-N89014)**

___ 3.7.1 At Midloop <99 ft. elevation: The following is required:

___ A. Sight Glass level indication with the following provisions:

- Continuously monitored.
- Provide immediate water level values to the operator in the Control Room using installed and tested communications equipment between the operator at the Sight Glass location and the Control Room OR continuously monitored in the Control Room or locally by a Sight Glass camera monitoring system and an Operator in the Containment briefed as to required actions.
- Sight Glass level readings are recorded at least every 15 minutes in the Control Room Log.

AND

___ B. BOTH mid-loop narrow range level indications are required. RVLIS level indication is optional.

___ 3.7.2 At ≥99 ft. elevation: One of the following is required:

♦ Both____ RVLIS level indications, or

♦ One RVLIS indication AND the Wide Range mid-loop indication, or

♦ Sight Glass level indication with the following provisions:

- Continuously monitored.
- Provide immediate water level values to the operator in the Control Room using installed and tested communications equipment between the operator at the Sight Glass location and the Control Room OR continuously monitored in the Control Room or locally by a Sight Glass camera monitoring system and an Operator in the Containment briefed as to required actions.
- Sight Glass level readings are recorded at least every 15 minutes in the Control Room Log.
- One wide range mid-loop level indication OR one RVLIS indication.

___ 3.7.3 During Vacuum Refill of the RCS, S1.OP-SO.RC-0002(Q), the following level indications are required:

♦ At Midloop <99 ft. elevation: Sight Glass level indicator and both mid-loop narrow range level indications.

♦ At ≥99 ft. elevation: Sight Glass level indication and one wide range mid-loop level indication (1LT16273, Narrow Range Level will be in service when swapping to and from 1LT18070, Wide Range Level).

___ 3.8 Due to RHR suction coming off 11 RCS Loop, the Sight Glass and Midloop Narrow Range (LT-16274) levels should always read greater than Midloop Narrow Range (LT-16273) level when RHR flow exists. The following criteria should be maintained during midloop and draindown operation. If this criteria cannot be maintained then the RCS draindown should be terminated, and Maintenance contacted to investigate and correct the discrepancy. Additionally, the RCS level may be increased at the direction of the SM/CRS, to assist in stabilizing level indication.

- ♦ Mid-Loop Narrow Range (LT-16274) Level compared to Mid-Loop Narrow Range (LT-16273) Level indication:
  +0.2/-0 ft (LT-16274 is within +0.2 to -0 ft of LT-16273)

- ♦ Sight Glass Level compared to Mid-loop Narrow Range (LT-16273) Level indication:
  +0.2/-0 ft (Sight Glass indication is within +0.2 to -0 ft of LT-16273)

- ♦ Sight Glass Level compared to Mid-loop Narrow Range (LT-16274) Level indication: ±0.1 ft

- ♦ Mid-loop Wide Range Level compared to Sight Glass Level indication: ±0.5 ft

- ♦ RVLIS Refueling/Reduced Inventory level compared to Sight Glass Level indication:
  +0.17/-0.33 ft (RVLIS indication is within +0.17 to -0.33 ft of Sight Glass)

- ♦ RVLIS Channel A to Channel B: ±0.25 ft

___ 3.9 The following parameters should be monitored, as applicable for indication of RCS leakage.

- ♦ RHR Flow
- ♦ RHR Pump amps
- ♦ RHR Pump suction and discharge pressure
- ♦ Reactor Coolant System Mid-Loop Narrow Range level
- ♦ RVLIS Cavity/Reduced Inventory level
- ♦ Charging flow rate
- ♦ Letdown flow rate
- ♦ VCT level
- ♦ Containment Sump pumping frequency
- ♦ Plant Computer for RHR alarms
- ♦ RCDT level
- ♦ CVCS Makeup System frequency of operation

___ 3.10 Work activities which have potential to affect RCS inventory, containment closure, and decay heat removal should be minimized.

- ♦ All work activities will be reviewed each shift by Containment Coordinator, SM/CRS or designated SRO, and discipline supervisors.
- ♦ Each review should be documented on Attachment 2, Reduced Inventory Operation Primary System Maintenance Review, and maintained with this procedure.

___ 3.11 Any heatup or cooldown of the Steam Generators when the Steam Generator U-tubes are filled with nitrogen may affect the RCS level due to the expansion or contraction of the nitrogen. Charging and letdown may have to be adjusted to maintain desired level. **[70038182]**

___ 3.12 Power supplies for RCS level Instrumentation are identified in Exhibit 2. These power supplies must be available for Instrumentation to be functional and may be used to assist in troubleshooting loss of indication.

___ 3.13 In order to prevent an uncontrolled RCS level change, the SJ54 valve associated with any accumulator that is NOT completely depressurized should remain closed.

___ 3.14 The following information is based on previous performance of this procedure:

___ ♦ Refueling Outage 2R17 - ≈6,424 gallons (≈1,100 gallons/ft) was drained when RCS level was lowered from the Reactor Vessel Flange (104.34′) to the top of the Hot Legs (98.5′) (Reference SAP Orders 70104314 / 70104444).

___ ♦ The 3/8″ orifice in the Reactor Vessel Head Vent line (1RC900) will limit the ability for air to enter the vessel during the drain down. Therefore, the drain down rate should be maintained at <40 gpm and stopped every so often, at the discretion of the SM/CRS, to allow for system level and pressure to equalize. Operators should expect a rise in level when Charging and Letdown flowrates are matched as the vent continues to allow air in.

___ ♦ The following Plant Computer points may be used to provide additional information during the drain down:

- CHGMLTD, CHARGING MINUS LETDOWN (GPM) (F0128A minus F0134A)
- TOTDIFF, TOTAL DIFF CHARGE AND LETDOWN (GAL) (Letdown Flow / Charging Flow mismatch TOTALIZER)
- RESETOT, RESET TOTALIZER (Force Point to “1” to RESET totalizer. Force Point to “0” START totalizer).

4.0 EQUIPMENT/MATERIAL REQUIRED

4.1 None

5.0 PROCEDURE

5.1 RCS Draindown Preparation Activities

NOTE

This section may be performed concurrent with Section 2.0 activities.

___ 5.1.1 **PLACE** 1PT16275, TRANSMITTER RHR PUMP SUCTION PRESSURE FO, in service as follows:

___ A. **OPEN** 1RH83, MID-LOOP MONITOR ISOL VALVE.

___ B. **OPEN** 1RH84, MID-LOOP MONITOR ISOL VALVE.

___ C. **OPEN** 11RH30, RHR PUMP SUCT PRESS TAP.

___ 5.1.2 **PLACE** 1PT16272, TRANSMITTER RHR PUMP SUCTION PRESSURE, in service as follows:

___ A. **OPEN** 1RH85, MID-LOOP MONITOR ISOL VALVE.

___ B. **OPEN** 1RH86, MID-LOOP MONITOR ISOL VALVE.

___ C. **OPEN** 12RH30, RHR PUMP SUCT PRESS TAP.

___ 5.1.3 **CHECK** 1LT16273, TRANSMITTER REACTOR COOLANT NR LEVEL, in service as follows:

___ A. **CHECK** OPEN 1PS10, PZR INST TAP.

___ B. **CHECK** OPEN 11RC6, RC HOT LEG SAMPLE VALVE.

___ C. **CHECK** 11SS661 is Cleared and Tagged CLOSED as directed by S1.IC-SC.RHR-0002(Q).

___ 5.1.4 **CHECK** either 1LT16274, TRANSMITTER REACTOR COOLANT NR LEVEL, OR 1LT18070, UNIT 1 RC WIDE RANGE MIDLOOP LEVEL, in service as follows:

___ A. **CHECK** OPEN 1PS8, PZR INST TAP.

___ B. **CHECK** OPEN 13RC6, RC HOT LEG SAMP VALVE.

___ C. **CHECK** 13SS661 is Cleared and Tagged CLOSED as directed by S1.IC-SC.RHR-0002(Q).

___ 5.1.5 IF 1PS1/1PS3 valve(s) are available,
THEN **OPEN** one or both to enhance drain down.

___ 5.1.6 **ESTABLISH** the following display trends on Plant Computer using full screen:

___ ♦ VCT level on point L0112A or L0114A

___ ♦ Midloop Narrow Range level on points Y2100A and Y2101A (scale 97-99 ft.)

___ 5.1.7 IF Reactor Head is installed,
THEN **ESTABLISH** a vent path for draining as follows:

___ A. **ALIGN** a Pressurizer vent path using at least one of the following methods:

___ 1. **OPEN** the following:

___ a. 1PR6, STOP VALVE.

___ b. 1PR1, PORV AND STOP VLVS.

OR

___ 2. **OPEN** the following:

___ a. 1PR7, STOP VALVE.

___ b. 1PR2, PORV AND STOP VLVS.

OR

___ 3. IF Pressurizer Safety Valves are removed,
AND FME covering is installed,
THEN notify Maintenance to **REMOVE** any covering which restricts free air flow (other than FME control screen) from Pressurizer Safety nozzles.

OR

___ 4. 1PS59, VENT CONNECTION VLV is OPEN with the blind flange removed.

OR

___ 5. **ALIGN** a drain vent path approved by System Engineering and documented by an Engineering Evaluation.

(step continued on next page)

5.1.7 (continued)

___ B. **ALIGN** Reactor Head Vent path as follows:

___ 1. IF Reactor Vessel Head Vent line between 1RC900 and Reactor Vessel Head Vent valves is removed, THEN **ENSURE** 1RC900, REACTOR HEAD VENT ISOLATION V is LOCKED OPEN providing Reactor Head Vent path.

___ 2. IF Reactor Vessel Head Vent line between 1RC900 and Reactor Vessel Head Vent valves is installed, THEN **UNLOCK** AND **OPEN** the following valves:

___ a. 1RC38, HEAD VENT LINE VENT VALVE.

___ b. 1RC39, HEAD VENT LINE VENT VALVE.

___ C. IF a FME device is installed on the 1RC900 vent path THEN **DIRECT** Reactor Services to remove the FME device from the vent path to provide an unrestricted Reactor Head Vent path.

___ 5.1.8 Notify CRS\STA to **CHECK** that contingency plans for the ORAM Orange condition are in place prior to proceeding to Section 5.2.

5.2 **RCS Draindown**

___ 5.2.1 **RECORD** required data below for in-service CVCS Holdup Tank:

CVCS Holdup Tank	Initial Level	Initial Volume

CAUTION

- **RCS level is to be maintained ≤98.2 ft. at all times to complete Steam Generator draining.**
- **Any remaining Steam Generator water may drain in a slugging fashion and if so will cause variations in indicated RCS levels.**
- **Steam Generators are drained when RCS level is stable at ≤97.5 ft. for at least 1 hour.**
- **RHR flow rate should be between 1800 GPM and 1900 GPM when RCS level <97.5 ft. elevation.**
- **Vortexing in RHR suction piping can occur at RCS levels above loop centerline (97 ft. elevation).**
- **Use extreme caution when operating in reduced inventory. RHR flow rate should be maintained IAW Precaution 3.4 and monitored for indications of air entrainment.**
- **Malfunctions of RHR in reduced inventory are addressed in S1.OP-AB.RHR-0002(Q), Loss of RHR at Reduced Inventory.**

___ 5.2.2 **ESTABLISH** the Sight Glass RCS Level Indicator monitoring IAW Attachment 3.

___ 5.2.3 IF available,
THEN **ENSURE** OPEN following valves:

___ ♦ 1PS1, PZR SPRAY VALVE

___ ♦ 1PS3, PZR SPRAY VALVE

NOTE

If OHA D-47, RHR MIDLOOP SYS TRBL, alarms due to parameters that are being controlled by this procedure, actions required by OHA D-47 should NOT be taken.

___ 5.2.4 **DRAIN** RCS by performing following:

___ A. **ADJUST** Letdown to desired drain rate by opening Letdown flow control valves (1CV8/1CV18) as required.

___ B. IF desired flow cannot be maintained with 1CV8 and 1CV18, THEN:

___ 1. **THROTTLE** RHR Flow Control Valves (RH18/1RH20), as required, to maintain at least 1800 GPM flow to RCS while reducing RCS level.

___ 2. **LOWER** Charging flow to minimum.

___ C. **MONITOR** CVCS Holdup Tank Level while draining the RCS, to ensure expected level response.

___ 5.2.5 When RCS level ≈99 ft. elevation, **ADJUST** Charging and Letdown to stabilize RCS level.

___ 5.2.6 IF 1LT18070, UNIT 1 RC WIDE RANGE MIDLOOP LEVEL, is in service, THEN:

___ A. **DIRECT** Maintenance to ZERO ADJUST level indicator 1LT16273, TRANSMITTER REACTOR COOLANT NR LEVEL to current sightglass reading.

___ B. **HOLD** RCS level at ≈99 ft using 1LT16273, TRANSMITTER REACTOR COOLANT NR LEVEL.

___ C. Direct Maintenance to **PLACE** 1LT16274, TRANSMITTER RHR MIDLOOP NARROW RANGE in service by performing the following using SC.IC-GP.ZZ-0007(Q), General Calibration Procedure for Dixson Edgewise Bargraph Indicator:

___ 1. **REMOVE** 1LI-18070 (Reactor Vessel Wide Range Level Indicator).

___ 2. **INSTALL** 1LI16274 (Reactor Vessel Narrow Range Level Indicator).

___ 3. **PLACE** 1CT-16274 midloop level transmitter selector switch to 1LT-16274 position.

___ 4. **DIRECT** Maintenance to ZERO ADJUST level indicator 1LT16274, TRANSMITTER REACTOR COOLANT NR LEVEL to current sightglass reading.

___ 5.2.7 **ENSURE** following Plant Computer points are valid:

___	♦ Y2102A	___	♦ Y2001A
___	♦ Y2000A	___	♦ Y2104A
___	♦ Y2002A	___	♦ Y2004A
___	♦ FFL1416B	___	♦ FFL1418B
___	♦ T0014A	___	♦ T0022A
___	♦ T0031A	___	♦ T0046A

___ 5.2.8 **ENSURE** the required RCS level indicators, per Step 3.7, are maintaining the following criteria during draining:

___ A. Mid-Loop Narrow Range (LT-16274) Level compared to Mid-Loop Narrow Range (LT-16273) Level indication:
+0.2/-0 ft (LT-16274 is within +0.2 to -0 ft of LT16273)

___ B. Sight Glass Level compared to Mid-loop Narrow Range (LT-16273) Level indication:
+0.2/-0 ft (Sight Glass indication is within +0.2 to -0 ft of LT-16273)

___ C. Sight Glass Level compared to Mid-loop Narrow Range (LT-16274) Level indication: ±0.1 ft

___ D. Mid-loop Wide Range Level compared to Sight Glass Level indication: ±0.5 ft

___ E. RVLIS Refueling/Reduced Inventory level compared to Sight Glass Level indication:
+0.17/-0.33 ft (RVLIS indication is within +0.17 to -0.33 ft of Sight Glass level)

___ F. RVLIS Channel A to Channel B: ±0.25 ft

___ G. <u>IF</u> Mid-loop Narrow Range level indicators are not in agreement, <u>THEN</u> **REQUEST** Maintenance to perform applicable portions of S1.IC-SC.RHR-0002(Q) prior to continuing with RCS drain down.

___ 5.2.9 **DETERMINE** required RCS level IAW following table:

REQUIREMENT	ELEVATION IN FEET	NOTE
RCP Motor Replacement	99.0 to 99.3	Requires S/G tube draining prior to work beginning.
RCP Seal Package maintenance S/G Primary Side maintenance	97.8 to 97.9	Requires S/G tube draining prior to either work beginning.
S/G Tube draining Vacuum refill	97.3 to 97.5	The level is the lowest of the two NR transmitters and the Sight Glass readings.

CAUTION

- **When draining to Midloop it should NOT be assumed that the Steam Generator U-Tubes are completely drained. Salem has experienced unexpected level rises following draindown to Midloop.**
- **Draining Steam Generators utilizing Nitrogen may NOT ensure the U-Tubes are completely drained. Evolutions such as filling the secondary side of the Steam Generator(s) can vacuum drag water into the tubes.**
- **In order to achieve optimal Steam Generator U-Tube drain results, RCS level should be maintained at or near 97.3 feet for at least one hour.**

___ 5.2.10 IF RCS level is to be reduced ≤97.5 ft elevation, THEN:

___ A. **REVIEW** Precaution and Limitation 3.4 for maintaining RHR flow requirements.

___ B. IF required to provide better RHR flow control, THEN **SPLIT** RHR Loops as follows:

___ 1. IF 11 RHR HX is supplying cooling, THEN **CLOSE** 12RH19.

___ 2. IF 12 RHR HX is supplying cooling, THEN **CLOSE** 11RH19.

___ 5.2.11 **CONTINUE** draining RCS by adjusting Charging and Letdown flow until required RCS level is reached.

___ 5.2.12 When required RCS level is obtained, **ADJUST** Charging and Letdown to maintain stable RCS level.

___ 5.2.13 **CLOSE** following valves:

___ ♦ 1PS1, PZR SPRAY VALVE

___ ♦ 1PS3, PZR SPRAY VALVE

___ 5.2.14 IF Reactor Vessel Head Vent line between 1RC900, RX HEAD VENT ISOLATION VLV and Reactor Vessel Head Vent valves is installed, THEN **CLOSE** AND **LOCK** the following valves:

___ A. 1RC38, HEAD VENT LINE VENT VALVE.

___ B. 1RC39, HEAD VENT LINE VENT VALVE.

___ 5.2.15 IF a FME device was removed from the 1RC900 vent path in Step 5.1.7C THEN **DIRECT** Outage Services to replace the FME device.

___ 5.2.16 **MONITOR** Core Cooling and RCS Inventory parameters IAW Section 5.3.

5.3 **Monitoring Core Cooling and RCS Inventory**

NOTE

The requirements and precautions and limitations in this procedure remain effective unless specifically modified by the procedures specified in Step 5.3.4, until RCS level is restored to ≥101 ft.

___ 5.3.1 **MONITOR** the following parameters, if available, for indication of RCS leakage and until RCS level is >101 ft. elevation:

- ♦ RHR Flow
- ♦ RHR Pump amps
- ♦ RHR Pump suction and discharge pressure
- ♦ Reactor Coolant System Mid-Loop Narrow Range level
- ♦ RVLIS Cavity/Reduced Inventory level
- ♦ Charging flow rate
- ♦ Letdown flow rate
- ♦ VCT level
- ♦ Containment Sump pumping frequency
- ♦ Plant Computer for RHR alarms
- ♦ RCDT level
- ♦ CVCS Makeup System frequency of operation

___ 5.3.2 **MAINTAIN** desired RCS level by adjusting charging and letdown flow as required.

___ 5.3.3 IF all midloop evolutions are completed,
AND other non-midloop work is required to be completed while drained down between 99 ft and 101 ft,
THEN **RAISE** RCS level to >99 ft IAW Section 5.4.

___ 5.3.4 IF RCS Fill and Vent is to be performed,
THEN:

___ A. IF RCS level is required to be lowered,
THEN **LOWER** RCS level IAW Section 5.2, as required.

___ B. Notify Maintenance to **PERFORM** the following:

___ 1. **CLOSE** 11 AND 13 Midloop transmitter reference leg low point drain valves.

___ 2. **PERFORM** Independent Verification that 11 AND 13 Midloop transmitter reference leg low point drain valves are CLOSED.

___ 3. **REPORT** to the NCO when steps 5.3.4B.1 and 5.3.4B.2 are complete.

___ C. **INITIATE** S1.OP-SO.RC-0002(Q), Vacuum Refill of the RCS,
OR S1.OP-SO.RC-0003(Q), Filling and Venting RCS, as applicable.

___ 5.3.5 IF filling Refueling Cavity is to be performed,
THEN **INITIATE** S1.OP-SO.SF-0003(Q), Filling Refueling Cavity.

5.4 **Adjusting RCS Level between 97'3" and 101' during Reduced Inventory Conditions**

5.4.1 **MAINTAIN** RCP Seal Injection as follows:

NOTE

Flow to RCP seals is established during CVCS fill and vent. After fill and vent is completed, seal injection remains aligned to the RCPs. Actual flow rate to the seals will depend on VCT pressure vs. RCS level, and normal charging flowrate, unless a Charging Pump is operating. Seal Injection may be isolated to a coupled RCP when the seal package on the associated pump is to be replaced prior to subsequent RCP operation.

CAUTION

When RCPs are coupled, flow to the RCP seals will raise RCS level. RCS level should not be raised ≥99.9' elevation unless seal flow is established to all RCP seals that are NOT on the backseat. This limitation does NOT apply to a coupled RCP when the seal package on the associated pump is to be replaced prior to subsequent RCP operation.

___ A. **ENSURE** Administrative Tags, which could interfere with filling the RCS, are released.

___ B. **ENSURE** VCT makeup is aligned IAW S1.OP-SO.CVC-0006(Q).

___ C. IF Letdown is NOT in service,
THEN:

___ 1. **ENSURE** adequate VCT level and pressure exist.

___ 2. **OPEN** 1CV40, VCT OUTLET STOP.

___ 3. **OPEN** 1CV41, VCT OUTLET STOP.

NOTE

IAW Technical Specification 3.5.3, a maximum of one Safety Injection Pump or one Centrifugal Charging Pump shall be OPERABLE whenever the temperature of one or more of the RCS cold legs is ≤312°F when the head is on the Reactor Vessel.

___ D. IF a Charging Pump is available AND when directed by SM/CRS,
THEN **START** a Charging Pump IAW S1.OP-SO.CVC-0002(Q), Charging Pump Operation, to maintain seal injection flow.

(continued on next page)

5.4.1 (continued)

___ E. **MAINTAIN** at least 1 gpm seal injection flow to each coupled RCP by throttling 1CV71, CHG HDR PCV, as required.

___ F. IF letdown is in service,
THEN **ADJUST** Letdown flow as necessary to maintain RCS level within range specified by SM/CRS by THROTTLING:

___ ♦ 1CV8, LETDOWN ISO FOR RHR

___ ♦ 1CV18, LETDOWN PRESSURE CONTROL VALVE

___ 5.4.2 IF RCS level is required to be raised,
THEN **RAISE** RCS level as follows:

___ A. **MAKEUP** to RCS using one of following methods:

___ 1. **ALIGN** CVCS to RWST as follows:

___ a. **OPEN** at least one of the following RWST TO CHG PMP valves:

___ ♦ 1SJ1

___ ♦ 1SJ2

___ b. **CLOSE** at least one of the following VCT DISCH STOP VALVES:

___ ♦ 1CV40

___ ♦ 1CV41

OR

___ 2. **INCREASE** Charging and control VCT Makeup flow rate to achieve desired rate of level rise.

___ B. **CONTROL** RCS level increase by adjusting charging flow rate to achieve desired rate of level rise.

(step continued on next page)

5.4.2 (continued)

___ C. When RCS level ≈99 ft. elevation, **SECURE** makeup to RCS using one of following methods:

___ 1. IF RWST is aligned to CVCS, THEN:

___ a. **OPEN** both VCT DISCH STOP VALVES:

___ ♦ 1CV40

___ ♦ 1CV41

___ b. **CLOSE** both RWST TO CHG PMP valves:

___ ♦ 1SJ1

___ ♦ 1SJ2

___ 2. **ADJUST** Charging and Letdown to stabilize RCS level.

___ D. IF 1LT16274, TRANSMITTER RHR MIDLOOP NARROW RANGE, is in service, THEN:

___ 1. **HOLD** RCS level at ≈99 ft using 1LT16273, TRANSMITTER RHR MIDLOOP NARROW RANGE LEV.

___ 2. Direct Maintenance to **PLACE** 1LT18070, UNIT 1 RC WIDE RANGE MIDLOOP LEVEL in service by performing the following using SC.IC-GP.ZZ-0007(Q), General Calibration Procedure for Dixon Edgewise Bargraph Indicator:

___ a. **REMOVE** 1LI16274 (Reactor Vessel Narrow Range Level Indicator).

___ b. **INSTALL** 1LI-18070 (Reactor Vessel Wide Range Level Indicator).

___ c. **PLACE** 1CT-16274 midloop level transmitter selector switch to 1LT-18070 position.

(continued on next page)

5.4.2 (continued)

___ E. IF RCS level is required to be raised between 99 ft and 101 ft elevation, THEN **INCREASE** Charging and control VCT Makeup flow rate to achieve desired rate of level increase.

___ F. **SECURE** makeup to RCS when RCS level is at desired level between 99 ft and 101 ft elevation by adjusting Charging and Letdown to stabilize RCS level.

___ G. **MONITOR** Core Cooling and RCS Inventory parameters IAW Section 5.3.

___ 5.4.3 IF RCS level is required to be lowered, THEN **LOWER** RCS level IAW Section 5.2, as required.

5.5 **Completion and Review**

___ 5.5.1 **COMPLETE** Attachment 4, Sections 1.0 and 2.0, AND **FORWARD** this procedure to SM/CRS for review and approval.

___ 5.5.2 SM/CRS **PERFORM** the following:

___ A. **REVIEW** this procedure with Attachments 1, 2, 3, and 4 for completeness and accuracy.

___ B. **COMPLETE** Attachment 4, Section 3.0.

___ C. **FORWARD** completed procedure to Operations Staff.

END OF PROCEDURE SECTION

6.0 RECORDS

6.1 Retain the following IAW RM-AA-101, Records Management Program:

Attachments 1-4
Engineering Evaluation (if applicable)

7.0 REFERENCES

7.1 Updated Final Safety Analysis Report:

7.1.1 Section 5.5, Component and Subsystem Design
7.1.2 Section 6.3, Emergency Core Cooling System
7.1.3 Section 7.3, Engineered Safety Features Instrumentation

7.2 Technical Specifications - Unit 1:

7.2.1 3.4.1.3, Reactor Coolant System - Shutdown
7.2.2 3.4.1.4, Reactor Coolant System - Cold Shutdown
7.2.3 3.4.2.1, Safety Valves - Shutdown
7.2.4 3.4.8, Specific Activity
7.2.5 3.4.9.3, Overpressure Protection Systems
7.2.6 3.5.3, ECCS Subsystems - Tavg <350°F
7.2.7 3.5.5, Refueling Water Storage Tank
7.2.8 3.9.4, Containment Building Penetrations
7.2.9 3.9.8.2, Residual Heat Removal Coolant Circulation - Low Water Level
7.2.10 Table 3.4-3, Minimum Equipment Required for Decay Heat Removal with One Service Water Header Out of Service

7.3 Procedures:

7.3.1 S1.OP-SO.CC-0001(Q), Component Cooling System Operation
7.3.2 S1.OP-SO.RC-0005(Q), Draining the RCS to ≥101 Feet Elevation
7.3.3 S1.OP-SO.RHR-0001(Q), Initiating RHR

7.4 Drawings:

7.4.1 205232, No. 1 Unit Residual Heat Removal
7.4.2 205234, No. 1 Unit Safety Injection
7.4.3 205231, No. 1 Unit Component Cooling
7.4.4 205228, No. 1 Unit Chemical and Volume Control
7.4.5 205201, No. 1 Unit Reactor Coolant System

7.5 **Industry Concerns**:

7.5.1 WCAP-11916, 7-88, Loss Of RHR Cooling While RCS Is Partially Filled.
7.5.2 SC-R200-MSE-0738-1, Mid-Loop Operation, 10/10/88
7.5.3 NRC INFO 87-23, Loss Of Decay Heat Removal Function At PWRs With Partially Drained Reactor Coolant Systems
7.5.4 Westinghouse Owners Group Abnormal Response Guideline WOG-ARG-1, Loss of RHR While Operating at Mid-Loop Conditions, Rev. 0, March 15, 1990
7.5.5 NRC GL 87-12, Loss of Decay Heat Removal
7.5.6 NRC GL 88-17, Loss of Decay Heat Removal
7.5.7 LCR-88-10, License Change Request for RHR Flow Rate
7.5.8 INPO SOER 88-3, Losses of RHR With Reduced Reactor Vessel Water Level at PWRs
7.5.9 NRC Bulletin 88-04, Potential Safety Related Pump Loss

7.6 **Technical/Engineering Letters**:

7.6.1 DCP 1EC-3112, Mid-Loop instrumentation
7.6.2 DCP 1EC-3205, RVLIS instrumentation
7.6.3 NSO LER 272/89-16-00, CVCS Holdup Tank and WGDT O2 Concentration
7.6.4 SRGC 92-057, RCS Level Discrepancies During Draindown
7.6.5 Calculation SC-RHR004-01, RHR Pump Discharge Pressure.
7.6.6 Calculation S-C-RC-MDC-1462 Rev 0, Nitrogen Draining of Steam Generator
7.6.7 DCP 1EC-3531, Mid-loop Wide Range Instrumentation Installation Covers RCS Level Range 97'-109.5' (No Alarms)
7.6.8 DCP 1EC-3389, P250 Plant Computer Replacement
7.6.9 DCP 1EE-0156, Permanent Rod (scale) for Tygon Tube Level Indication
7.6.10 Westinghouse Letter PSE-96-653, RCS Level Gradients During Mid-Loop.
7.6.11 PSBP 324187, Salem RCS Pressurization Studies for Shutdown Configurations with the PS25 Spray Valve Bonnet Removed as a Vent Path
7.6.12 PSBP 324458, Salem RCS Pressurization Studies for Shutdown Configurations with the Pressurizer Safety Valves or Manway Removed as a Vent Path
7.6.13 DS1.6-0533, Salem Unit 1: Calculation of Reactor Decay Heat With Origen-S For 1R17, 3/24/05. (Updates Decay Heat times Associated with PSBP 324187
7.6.14 PR990120161, Reduce Admin RCS Low Level Setpoint.
7.6.15 50.59 Safety Evaluation S00-056, Nuclear Licensing Commitment Change to NL-N89001 to allow an open OEH door during mid-loop conditions when boiling will not occur.
7.6.16 70011386, P250 Computer Points Y2002A and Y2004A
7.6.17 80019141, Midloop Channel to Channel Level Indication
7.6.18 Calculation SC-RC013-01, Rx Lvl Mid-Loop
7.6.19 S-C-RC-MEE-1614, RCS Reduced Level Condition and Required Vent Path With S/G Nozzle Dams Installed

(continued on next page)

7.6 (continued)

7.6.20 DCP 80054219, Annunciate Salem 1 SGFP "Silent" Feed Pump Trips
7.6.21 DCP 80039376, S1 Midloop Sight Glass Installation
7.6.22 70038182, Unexpected Change in RCS Inventory to the Reference Section
7.6.23 70039040, 1PR1 Closure During 28VDC Power Manipulation
7.6.24 S-C-RC-MDC-1911, Analysis of RCS Fill and Vent Piping Modification

7.7 **Cross-References**:

7.7.1 RM-AA-101, Records Management Program
7.7.2 CC-SH-112-1001, Temporary Configuration Changes - Implementation
7.7.3 WC-AA-101, On-Line Control Process
7.7.4 SC.IC-GP.ZZ-0007(Q), General Calibration Procedure for Dixson Edgewise Bargraph
7.7.5 SC.OP-DL.ZZ-0027(Q), Log Supplement
7.7.6 OP-SH-111-101-1001, Use and Development of Operating Logs
7.7.7 S1.IC-CC.RHR-0001(Q), RHR Pump Suction Pressure for Midloop Operation
7.7.8 S1.IC-CC.RHR-0002(Q), RC Level Indication for Midloop Operation
7.7.9 S1.IC-CC.RHR-0005(Q), RHR Midloop Trouble Alarm D-47.
7.7.10 S1.IC-SC.RHR-0001(Q), RHR Pump Suction Pressure for Midloop Operation
7.7.11 S1.IC-SC.RHR-0002(Q), RC Level Indication for Midloop Operation
7.7.12 S1.IC-SC.RHR-0162(Q), Residual Heat Removal Pump Discharge Pressure.
7.7.13 S1.OP-AB.CONT-0001(Q), Containment Closure.
7.7.14 S1.OP-AB.RHR-0001(Q), Loss of RHR
7.7.15 S1.OP-AB.RHR-0002(Q), Loss of RHR at Reduced Inventory
7.7.16 S1.OP-DL.ZZ-0001(Q), Control Room Logs
7.7.17 S1.OP-SO.PZR-0004(Q), Pressurizer Overpressure Protection Operation
7.7.18 S1.OP-SO.RC-0003(Q), Filling and Venting the Reactor Coolant System.
7.7.19 S1.OP-SO.RVL-0001(Q), Reactor Vessel Level Instrumentation System
7.7.20 S1.OP-SO.SF-0003(Q), Filling the Refueling Cavity.
7.7.21 S1.OP-SO.SW-0002(Q), Service Water System - #11 Nuclear Header Outage
7.7.22 S1.OP-SO.SW-0003(Q), Service Water System - #12 Nuclear Header Outage
7.7.23 S1.OP-SO.WG-0003(Q), Gaseous Waste Disposal System Operation
7.7.24 S1.OP-ST.CAN-0007(Q), Refueling Operations - Containment Closure

7.8 **Commitments**:

7.8.1 C0102 - NRC Bulletin 88-04, Potential Safety Related Pump Loss
7.8.2 C0565 - PSLT NLR-N94229 (POPS Setpoint Non Conservative) and ASME Code Case N-514 via Reg Guide 1.147, Rev. 12, dated 5/99
7.8.3 70034006, Draining RCS to Midloop 1st Time Window

ATTACHMENT 1
(Page 1 of 2)

ESTABLISHING NARROW RANGE MID-LOOP INDICATION

___ 1.0 **ENSURE** calibration of the following RCS Mid-Loop instrumentation is completed within the required frequency AND **PLACE** in service IAW the following procedures:

___ 1.1 1PT16275 - RHR MID-LOOP PUMP SUCTION PRESS 11, IAW S1.IC-SC.RHR-0001(Q), RHR Pump Suction Pressure for Midloop Operation

___ 1.2 1PT16275 - RHR MID-LOOP PUMP SUCTION PRESS 11, IAW S1.IC-CC.RHR-0001(Q), RHR Pump Suction Pressure for Midloop Operation

___ 1.3 1PT16272 - RHR MID-LOOP PUMP SUCTION PRESS 12, IAW S1.IC-SC.RHR-0001(Q), RHR Pump Suction Pressure for Midloop Operation

___ 1.4 1PT16272 - RHR MID-LOOP PUMP SUCTION PRESS 12, IAW S1.IC-CC.RHR-0001(Q), RHR Pump Suction Pressure for Midloop Operation

___ 2.0 **ENSURE** the following Narrow Range Mid-Loop indication and alarms are installed, calibrated, and placed in service in preparation for drain:

___ 2.1 1LT16273 - RHR MID-LOOP LVL 11 HOT LEG, IAW S1.IC-SC.RHR-0002(Q), RC Level Indication for Midloop Operation

___ 2.2 1LT16273 - RHR MID-LOOP LVL 11 HOT LEG, IAW S1.IC-CC.RHR-0002(Q), RC Level Indication for Midloop Operation

NOTE

1LT18070, RC Hot Leg 13 Wide Range Mid-Loop, instrumentation may be in service to monitor level. Placing 1LT16274 in service after step 2.3 and 2.4 are completed will be initiated by procedure step 5.2.6 prior to reducing level below 99 ft. It then becomes a matter of Maintenance swapping the Dixson and manipulating a switch in Containment to go from 1LT18070 to 1LT16274.

___ 2.3 1LT16274 - RHR MID-LOOP LVL 13 HOT LEG, IAW S1.IC-SC.RHR-0002(Q), RC Level Indication for Midloop Operation

___ 2.4 1LT16274 - RHR MID-LOOP LVL 13 HOT LEG, IAW S1.IC-CC.RHR-0002(Q), RC Level Indication for Midloop Operation.

ATTACHMENT 1
(Page 2 of 2)

ESTABLISHING NARROW RANGE MID-LOOP INDICATION

___ 3.0 **CHECK** the following procedures have been performed within the required frequency:

___ A. S1.IC-CC.RHR-0005(Q), RHR Midloop Trouble Alarm D-47, to verify Midloop Instrument Channels are operational and in tolerance.

___ B. S1.IC-SC.RHR-0162(Q), Residual Heat Removal Pump Discharge Pressure, to verify transmitters are in tolerance.

___ 4.0 When Steps 1.0 through 3.0 are complete, **ENSURE** Plant Computer is available to monitor RHR alarms and trending for mid-loop & VCT levels
AND request NCO **ENABLE** RHR Mid-Loop computer alarms as follows:

___ 4.1 **ENSURE** the following Plant Computer Alarm Limits are set as indicated:

___ ♦ RHR FLOW-LOW ALARM = 1400

___ ♦ RHR FLOW-HIGH ALARM = 2960

___ 4.2 Using cursor, **SELECT** "PROCESS DIAGRAM W1" icon.

___ 4.3 Using cursor, **SELECT** "Page" from top menu bar.

___ 4.4 Using cursor, **SELECT** "ML Mid Loop Monitor" from the new screen.

___ 4.5 Using cursor, **SELECT** "RHR MIDLOOP RUN FLAG" "RUN/NOT RUN".

___ 4.6 **ENSURE** "RUN" is indicated for alarm status.

___ 4.7 **ENSURE** Incore Temp High Alarm Limit resets to 131°F.

ATTACHMENT 2
(Page 1 of 1)

REDUCED INVENTORY OPERATION PRIMARY SYSTEM MAINTENANCE REVIEW

DATE_____ TIME_____
CONTROL ROOM SUPERVISOR (CRS)_____
CONTAINMENT COORDINATOR_____

MAINTENANCE SUPERVISOR & NOTF/ORDER NUMBERS	PRIMARY SYS JOB PLANNED OR IN PROGRESS **(2)**	CONCERNS **(1)**	RESOLUTION **(3)**

(1) Any unresolved concerns are to be reported to the Operations Manager for action.

(2) **REFER** to Exhibit 1 for component elevations.

(3) All equipment required for rapid Containment Closure is pre-staged and available to the Containment Coordinator.

ATTACHMENT 3
(Page 1 of 1)

OPERATION OF SIGHT GLASS RCS LEVEL INDICATOR

CAUTION

Sight Glass level indication will be affected by any pressure or vacuum in the Containment or Reactor Coolant System.

___ 1.0 **MONITOR** AND **COMMUNICATE** RCS level to Control Room, as required.

___ 2.0 **RECORD** Sight Glass level at least every 15 minutes in the Control Room Log.

ATTACHMENT 4
(Page 1 of 2)

COMPLETION SIGN-OFF SHEET

1.0 **COMMENTS**:

(**INCLUDE** procedure/test deficiencies and corrective actions.)

ATTACHMENT 4
(Page 2 of 2)

COMPLETION SIGN-OFF SHEET

2.0 **SIGNATURES**:

Print	Initials	Signature	Date

INDEPENDENT VERIFICATION:

3.0 **SM/CRS FINAL REVIEW AND APPROVAL**:

This procedure with Attachments 1, 2, 3 and 4 is reviewed for completeness and accuracy. All deficiencies, including corrective actions, are clearly recorded in the COMMENTS Section of this attachment.

Signature:_____Date:_____
SM/CRS

EXHIBIT 1
(Page 1 of 3)

REACTOR COOLANT SYSTEM COMPONENT ELEVATIONS

COMPONENT	ELEVATION
	RVLIS / Sight Glass
STEAM GENERATORS	
Narrow Range Level Tap (Upper)	152.87 feet
Feedwater Nozzle and Sparger	144.50 feet
Narrow Range Level Tap (Lower)	142.23 feet
Top of Tube Bundle	134.75 feet
Primary Side Inlet & Outlet Nozzle Centerline	98.60 feet
Primary Side Manway (Bottom edge)	98.58 feet
REACTOR COOLANT PUMPS	
Seal Injection, Seal Return, & Pressure Taps	99.92 feet
Pump Discharge Centerline	97.00 feet
Pump Inlet Nozzle	91.18 feet
Pump Suction Centerline	86.68 feet
PRESSURIZER	
Base of Pressurizer	104.08 feet
Surge Line Centerline	97.00 feet
0% Cold Cal Level	108.92 feet
REACTOR VESSEL	
Reactor Vessel Flange	104.00 feet
Seal Table	102.00 feet
Nozzle Centerline	97.00 feet
Top of Active Fuel	92.80 feet
RHR SYSTEM	
RHR Discharge Connection to RCS Centerline	97.80 feet
RHR Suction Connection to RCS Centerline	96.50 feet
RHR Heat Exchanger Outlet Centerline	50.5 feet
RHR Pump Suction Centerline	46.83 feet

EXHIBIT 1
(Page 2 of 3)

REACTOR COOLANT SYSTEM COMPONENT ELEVATIONS

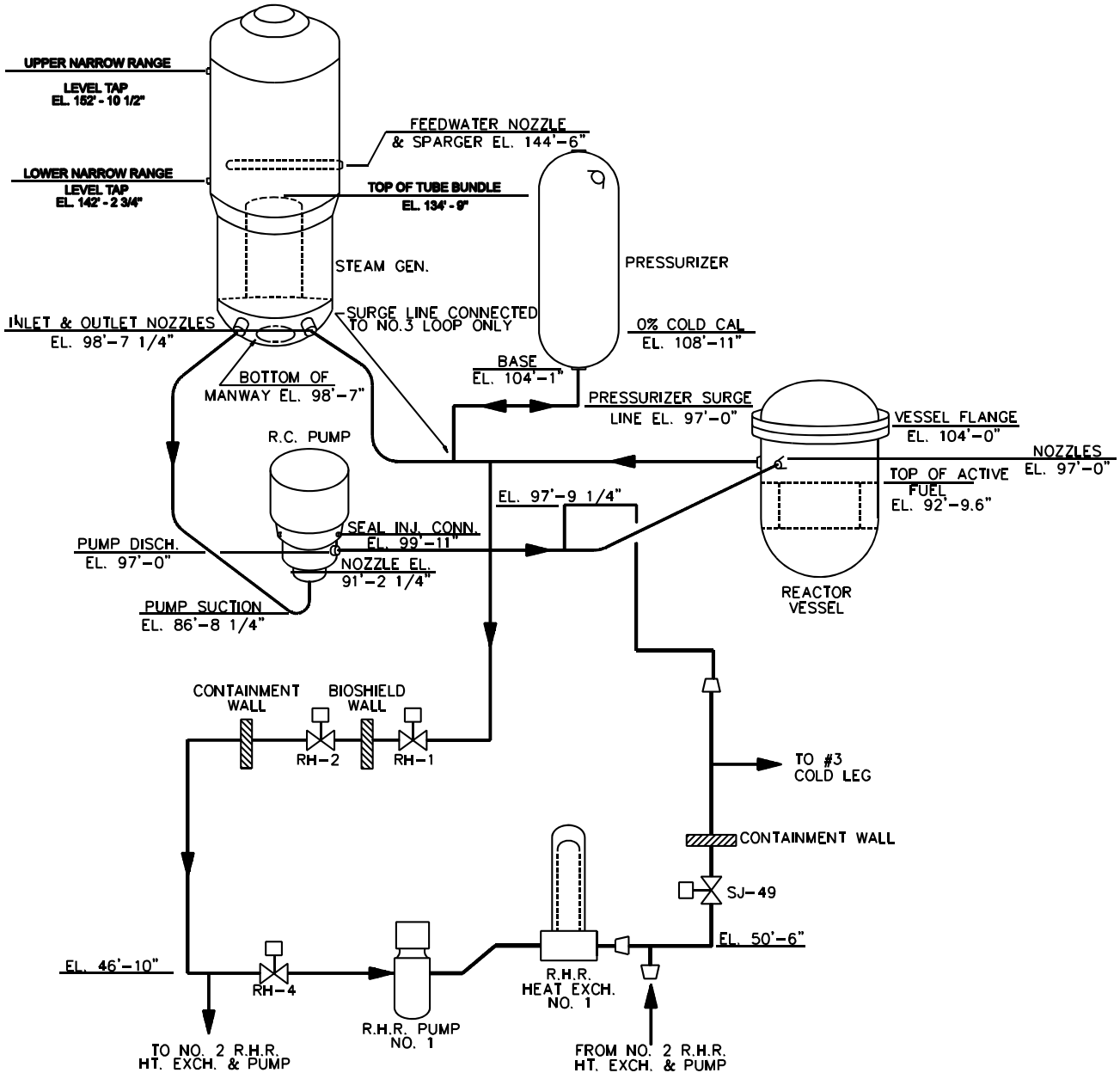

EXHIBIT 1
(Page 3 of 3)

REACTOR COOLANT SYSTEM COMPONENT ELEVATIONS

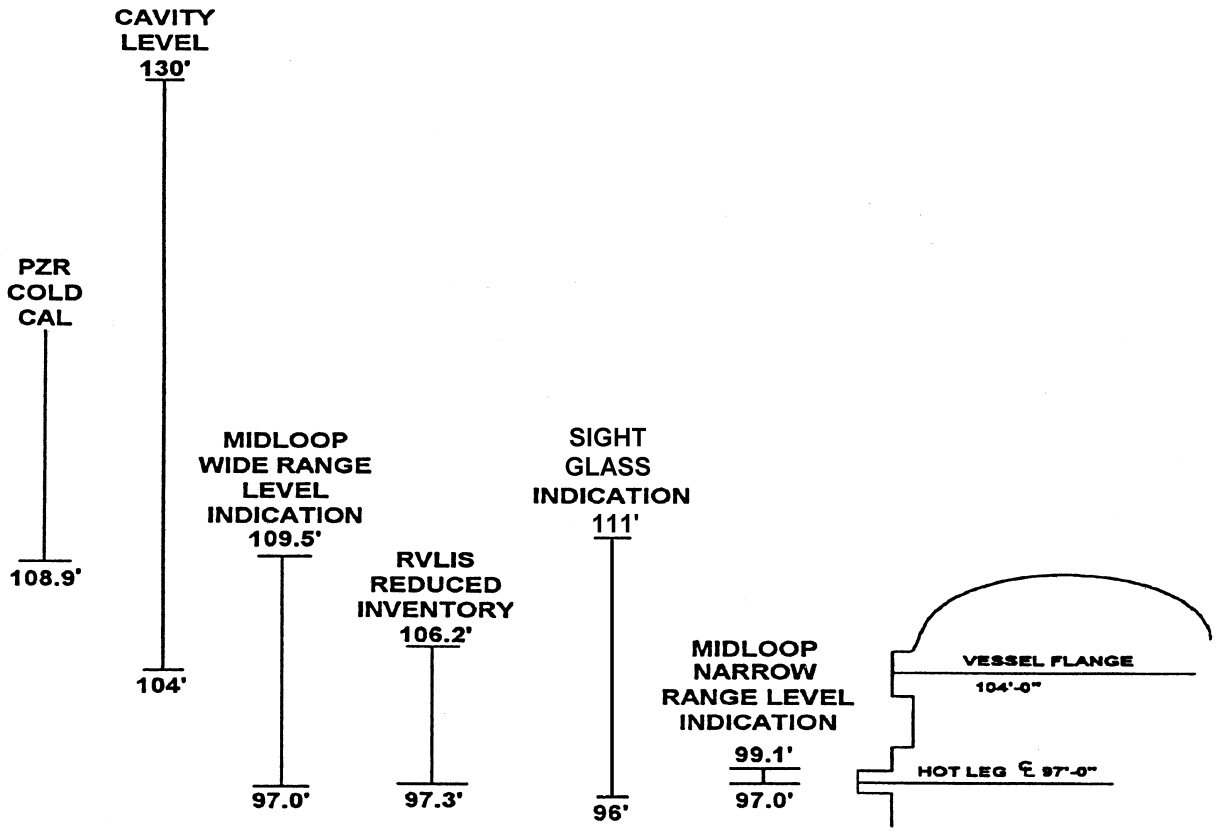

EXHIBIT 2
(Page 1 of 1)

RCS LEVEL INSTRUMENTATION POWER SUPPLIES

Instrument	Power Supply/Inputs	Bus Support
1LT18070 - RHR MID-LOOP WIDE RANGE LVL 13 HOT LEG	1CVIB30, Process Group 3 Interface 1CVIB16, Control Room Computer Interface	1C 230 VAC Vital Bus 1C 125 VDC Vital Bus 1C Diesel Generator
Sight Glass Camera	14MAC-33S, Aux Annun System Data Logging Master	1F460/230V Bus (Reg), 1H460/230V Bus (BU)
	12MAC-33S, Aux Annun System Data Logging Backup	12 Essen. Controls Inverter (1C 230 V Vital Bus)
1LT16273 - RHR MID-LOOP LVL 11 HOT LEG	1AVIB19, Process Group 1 Interface Rack 93-1 1AVIB23, Cont Rm Comptr interface Rk 29	1A 230 VAC Vital Bus 1A 125 VDC Vital Bus 1A Diesel Generator
1LT16274 - RHR MID-LOOP LVL 13 HOT LEG	1CVIB30, Process Group 3 Interface 1CVIB16, Control Room Computer Interface	1C 230 VAC Vital Bus 1C 125 VDC Vital Bus 1C Diesel Generator
RVLIS Train A	1BVIB34, Microprocessor Panel 842-1 Train A 1BVIB36, Hydraulic Isolation Status Panel 841	1B VIB Inverter Normal Power is 1B 230 VAC 1B VIB Inverter Backup Power is 1B 125 VDC
	TE413A, RCS Wide Range Temperature PT405, Wide Range Pressure	1AVIB, Process Rack Power Ch I (1A 230 VAC)
RVLIS Train B	1DVIB18, Microprocessor Panel 842-1 Train B 1DVIB19, Hydraulic Isolation Status Panel 841	1D VIB Inverter Normal Power is 1B 230 VAC 1D VIB Inverter Backup Power is 1B 125 VDC
	TE423A, RCS Wide Range Temperature PT403, Wide Range Pressure	1BVIB, Process Rack Power Ch I (1B 230 VAC)