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November 6, 1984

TMI Program Office
Attn: Dr. B. J. Snyder
Program Director
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Dr. Snyder:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Standby Reactor Coolant Pressure Control System
System Description Update

Pursuant to your letters dated July 20, 1981, and February 4, 1982, attached is the annual update to the Standby Reactor Coolant Pressure Control (SPC) System. This revision reflects design system modifications which will remove the SPC's nitrogen pressurization system.

If you have any questions concerning this information, please call Mr. J. J. Byrne of my staff.

Sincerely,

F. R. Standerfer
Vice President/Director, TMI-2

FRS/RDW/jep

Attachment

cc: Deputy Program Director - TMI Program Office, Dr. W. D. Travers

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GPU Nuclear

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ISSUE DATE November 1984

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DIVISION

SYSTEM DESCRIPTION

FOR

Standby Reactor Coolant

Pressure Control System

(SPC)

FORM 4000-ENG-7310.06-1 (5/84)

Rev.	SUMMARY OF CHANGE	Approval	Date
0	Initial issue per GPU Nuclear Letter 4400-82-L-0009		1/82
1	Reissue per GPU Nuclear letter 4400-82-L-0116		8/82
2	Revised to reflect current plant configuration and to put into the format given in Procedure 4000-ENG-7310.06. Incorporated ECM 1161 - Revisions 0 through 2, S-ECM 1318 - Revision 0, and ECA 3221-84-0007 - Revision 0. Transmitted via GPU Nuclear Letter 4410-84-L-0179.		11/84

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FOR

STANDBY REACTOR COOLANT PRESSURE CONTROL SYSTEM

APPENDIX

TMI-2

SYSTEM DESCRIPTION

STANDBY REACTOR COOLANT PRESSURE CONTROL SYSTEM

1.0 SYSTEM DESCRIPTION

1.1 SUMMARY DESCRIPTION

The Standby Reactor Coolant Pressure Control System is used as a source of borated water for makeup to the Reactor Coolant System. During recovery operations the SPC system will be isolated from the RCS.

Makeup to the Charging Water Storage Tank is from the Borated Water Batching Tank. When level in the Charging Water Storage Tank (CWST) reaches the low end of the normal range, borated water at 3500-6000 ppm boron is mixed and transferred under manual control from the Borated Water Batching Tank until the Charging Water Storage Tank level is restored.

The Charging Water Storage Tank can be recirculated thru the surge tanks to ensure the boron solution remains homogeneous. Recirculation is accomplished by circulating water via SPC-P-1A, or SPC-P-1B through SPC-T-1, SPC-T-2, SPC-T-3 and throttling the discharge to SPC-T-4.

The Standby Reactor Coolant Pressure Control System components are located in the new fuel storage cell on the 331' level and at the 347' level of the Fuel Handling Building.

The Standby Reactor Coolant Pressure Control System is connected to the RC System through existing high pressure injection piping on the Makeup Pump Discharge Header. Locked-closed isolation valves are provided to ensure the makeup pumps do not discharge to the Standby Pressure Control System.

The surge tank levels may be maintained manually by supplying borated water to the system through either of two redundant Charging Pumps. These pumps take suction from the Charging Water Storage Tank (SPC-T-4), and discharge to the outlet line from the surge tank nearest the Reactor Coolant System.

During defueling operations with the reactor vessel head removed, the SPC system will be used as a source of make-up water to the reactor coolant system. Make-up could be required due to normal defueling operations (sampling, evaporation), or during a loss of coolant accident.

1.2 REFERENCES

1.2.1 TMI-2 Project Design Criteria Manual

1.2.2 Burns and Roe Inc. drawing M022, Flow Diagram Standby RC Pressure Control System.

1.2.3 ECA-3221-84-0007, Removal of the SPC N2 System from the Unit 2 Fuel Handling Building.

1.2.4 S-ECM 1318, Rev. 0 RCS Level Alarm on Control Panel SPC-PNL-3.

1.2.5 ECM-1161, Revs. 0, 1 & 2 IIF Level Control System.

1.2.6 ECA-3221-84-0017, Nitrogen System Modifications for the Defueling Water Cleanup System.

1.3 DETAILED SYSTEM DESCRIPTION

1.3.1 Standby Pressure Control Surge Tanks, SPC-T-1 through T-3

Three Surge Tanks (Table 1) are arranged in series at elev. 331' in the new fuel storage cell to provide for makeup to the RC System. The tanks have a capacity of 900 gallons each, and are rated at 2735 psig and 300°F. The tanks are ASME Section III, Class 2. Tank connections include a 6" inlet on the top, and a 6" bottom outlet. The inlet lines are provided with taps for two redundant level transmitters. Each tank is provided with nozzles (near the bottom) to accommodate the level transmitters.

1.3.2 Charging Pumps, SPC-P-1A, SPC-P-1B

Two 40 gpm positive displacement Charging Pumps (Table 2) take a suction on the Charging Water Storage Tank, and as selected, transfer either 40 or 80 gpm of 160°F water into the surge line downstream of Surge Tank SPC-T-1. Both pumps are located at elev. 331' in the Fuel Handling Building and are 480V, 3 Phase, 60 Hz, powered from MCC 2-32A (SPC-P-1A) and MCC 2-42A (SPC-P-1B).

Each pump is protected from the potential effects of an overpressure condition by a backpressure - compensated relief valve set at 600 psig on the discharge, and a thermal relief valve set at 80 psi on the suction. The pump discharge relief valve relieves to the suction line and the suction relief valve relieves to a 55 gallon drum open to the atmosphere. This arrangement minimizes the potential for liquid discharge.

Each Charging Pump is also provided with a self-contained primary packing cooling system. A packing cooling pump (Table 3) supplies demineralized water from a tank to the zone between the high pressure and low pressure packing of the cylinders, and returns the water to the cooling tank.

1.3.3 Charging Water Storage Tank, SPC-T-4

The Charging Water Storage Tank (Table 4) is a 5100 gallon capacity tank located on the 347' elevation of the Fuel Handling Building. It serves as a holdup point from which the 40 gpm Charging Pumps transfer borated water to the RCS. The tank is provided with external strip heaters totaling 113.4 KW that maintain tank water temperature at 160°F for degasification purposes. The heaters are powered from USS 2-45. and are 480V, 3 Phase, 60 Hz. Since the tank is at an elevated temperature, it is insulated with 2" of insulation.

In addition to supplying a holdup volume serving the pumps, the tank has provision for a continuous spray from the combined charging pump discharge header so that spray may be actuated for degasification whenever a charging pump is operating. During normal SPC system standby operations, recirculation is not conducted for degassification purposes.

1.3.4 Borated Water Batching Tank, SPC-T-5

The Borated Water Batching Tank (Table 5) is located on the 347' level of the Fuel Handling Building. It provides for batch mixing of boric acid and demineralized water (500 gallon batches).

The Borated Water Batching Tank is a 632 gallon, austenitic stainless steel tank with a hinged cover for boric acid addition. The maximum useful volume of the tank is 500 gallons. The tank has an internal level gauge with 10 gallon graduations up to 500 gallons. The tank is provided with three 15 KW heaters, powered from MCC 2-32A, which are manually energized to heat the water to aid in dissolving the boric acid. The tank is filled with demineralized water at approximately 20 gpm using hoses from the Cask Cleaning Station on the 347' level in the FHB. To enhance the batch mixing process, a motor operated mixer is provided. The mixer is powered from MCC 2-32A, and is 480V, 3 phase, 60 Hz.

1.3.5 Borated Water Transfer Pump, SPC-P-2

The Borated Water Transfer Pump (Table 6) is located on the 347' level of the Fuel Handling Building, and is used to transfer borated water from the batching tank to the Charging Water Storage Tank. The pump has a capacity of 50 gpm at a 35 foot discharge head. The Borated Water Transfer Pump motor is 480V. 3 phase, 60 Hz., and is powered from MCC 2-32A.

1.3.6 Variable Charging Pump, SPC-P-3

The Variable Charging Pump (Table 7) is located at elevation 331' in the fuel handling building. SPC-P-3 is powered from Motor Control Center 2-42A.

The pump is protected from the potential effects of an overpressure condition by a discharge backpressure-compensated relief valve set at 600 psig and a suction (thermal) relief valve set at 80 psig. The suction relief valve relieves to a 55 gallon drum open to the atmosphere. The pump discharge relief valve relieves to the suction line and then via the suction (thermal) relief valve, if it's setpoint is exceeded. to a 55 gallon drum open to the atmosphere. The variable charging pump will not normally be operated after the reactor vessel head has been removed.

1.4 SYSTEM PERFORMANCE CHARACTERISTICS

Redundant instrumentation and controls are provided for all essential components to ensure system reliability. System piping was designed in accordance with ANSI B31.1. All system liquid piping is compatible with water at 200°F and 6000 ppm boron. The design pressure is 600 psig for the liquid system up to the tie-in isolation check valves, and 1500 psig from the two check valves to the tie-in point on the high pressure injection line.

Provision is made for the addition of chemicals to the system, and sampling points are provided at the CWST outlet and the surge tank outlets.

With the reactor vessel head removed, the SPC system will be isolated from the reactor coolant system. If needed for make-up to the RCS, a charging pump may be operated to transfer makeup water from charging water storage tank, SPC-T-4.

1.5 SYSTEM ARRANGEMENT

For the SPC system arrangement refer to Flow Diagram M022. Component locations are described also in section 1.3, Detailed System Description.

1.6 INSTRUMENTATION AND CONTROL

System instrumentation and controls are listed in Table 8 and panel mounted annunciators are listed in Table 9.

Three panels are provided for controls and indication. One panel, SPC-PNL-1, contains local controls near the surge tanks at elevation 331' in the fuel handling building. The second panel, SPC-PNL-2, contains local controls for the borated water batching tank and transfer pump at the 347' level. The third panel, SPC-PNL-3, is located in the control room, and contains the remote instrumentation, and controls.

Instrumentation and controls are summarized below by the equipment or function they serve.

1.6.1 Surge Tanks, SPC-T-1, 2, & 3

a) SPC-T-1

SPC-T-1 has two differential-pressure level transmitters (SPC-LIT-1A & B) each providing local and remote indication. In addition, one level transmitter (1B) provides local and remote low level alarms, and an interlock to close outlet valve SPC-V71 on low level. A conductivity type level element is also located at the low level setpoint to close outlet valve SPC-V71 and to actuate local and remote low level alarms.

b) SPC-T-2

SPC-T-2 has two level transmitters (SPC-LIT-2A & B) for local and remote indication only.

c) SPC-T-3

SPC-T-3 has two level transmitters, (SPC-LIT-3A & B) each of which provides local and remote indication, high level charging pump stop signal, local and remote high-high level alarm, low level charging pump start signal, and local and remote low-low level alarm and backup charging pump start signal. In addition, the "A" Instrument loop provides the high and low level cycling control signal for the Variable Charging Pump SPC-P-3.

1.6.2 Variable Charging Pump SPC-P-3

The variable charging pump will not operate at variable speeds as originally designed. The pump will not be run while the Reactor Vessel head is removed. The preoperational control signal to SPC-P-3 was removed when SPC-LIC-3A was removed from the SPC system and retagged RC-LIC-102, for use with the IIF Level Control System. The variable charging pump is not required to be operational for normal standby operation.

The pump has start and stop pushbuttons and indicating lights on SPC-PNL-1 and 3. The pump shuts off automatically on high level in SPC-T-3 or low-low level in SPC-T-4, the Charging Water Storage Tank. The pump can be shut off using an "override" control switch which is located and alarmed on SPC-PNL-3.

There is local suction and discharge pressure indication, and local and remote discharge flow indication.

1.6.3 Charging Pumps SPC-P-1A & B

With the SPC system in standby, the charging pumps are normally "OFF" and are only operated using manual control for infrequent operations such as to refill SPC-T-3.

Each pump has start and stop pushbuttons with indicating lights on panels SPC-PNL-1 and SPC-PNL-3. The pumps shut off automatically on high level in SPC-T-3, or low-low level in SPC-T-4. In addition each pump can be shut off using an "override" control switch which is located and alarmed on SPC-PNL-3.

There is local pressure indication at the discharge of either pump, and local and remote flow indication in the common line to the surge tanks. The pumps share a common suction pressure indication with the VCP.

The charging pumps each have an integral packing cooling system with a cooling pump, flow meter, pressure gage, and pressure switch. The cooling pump is started automatically when the charging pump starts. Since the charging pumps can run without cooling water for an extended period of time the cooling water pressure switch only provides a control room alarm on low pressure.

The packing cooling tanks must be filled manually. Filling, if required, should be initiated at 1/4 full, refilling to the 3/4 mark. Cooling water flow is adjusted manually to meet pump requirements. Heat is dissipated to the air, and no external cooling water is required.

1.6.4 Charging Water Storage Tank SPC-T-4

The storage tank has temperature instrumentation which provides local and remote indication and combined high/low temperature alarms. A temperature controller and a local on/off handswitch provide automatic control of the strip heaters mounted on the tank. The heaters will shut off automatically on low level (37%) in SPC-T-4.

Level instrumentation provides local and remote indication, and local and remote high and low level alarms. SPC-LSLL-4A will stop pumps SPC-P-1A&3 when the level in SPC-T-4 reaches a level of 3% of tank capacity. SPC-LSLL-4B will stop pump SPC-P-1B at 24" in SPC-T-4.

The tank also has a local flow indicator in the vent line discharge path. The tank is protected from overpressure by relief valve SPC-R-12.

1.6.5 Borated Water Batching Tank, SPC-T-5 and Transfer Pump, SPC-P-2

All controls and indications associated with the Batching Tank and Transfer Pump are local. The control switches are mounted on panel SPC-P-2.

The Batching Tank is provided with a manually operated mixer and three manually operated 15 KW heaters. Temperature indication for the batching tank is provided locally. The tank also has an internal 0-500 gallon level indication

The Borated Water Transfer Pump is manually operated. Indicating lights are provided on the local control panel. A discharge pressure gauge is provided.

1.6.6 RC and SPC Pressure and Differential Pressure

Local and remote RC pressure is available from the decay heat removal system between DH-V3 and the RB penetration. Local SPC system pressure is available at SPC-PI-14 (Heise Gauge), located next to SPC-PNL-1. Remote SPC System Pressure, with SPC-V-71 open, is available in the Control Room at SPC-PNL-3.

Reactor coolant pressure at the DHR system is compared to SPC system pressure, and the differential pressure is displayed on SPC-PNL-3. Local and remote alarms are provided for high differential pressure in either direction.

The SPC actual system pressure is compared to the desired pressure set in either of the two pressure reducing control loops. A handswitch on SPC-PNL-3 is used to select the operating control loop for this comparison. Local and remote alarms are provided for a high differential, in either direction, between desired and actual system pressure. These alarms will be disabled for the remainder of the Recovery Program while the RCS is open to atmosphere and not capable of being pressurized.

1.6.7 RCS Level Indication and SPC Operation During RCS Drain Down

During RCS drain down the SPC system will not be lined up to the RCS. The SPC will be used only as a makeup source for the RCS. However, SPC instrumentation will be used as follows:

RCS level indication will be provided using SPC instrument string SPC-22 by changing range module SPC-PI-22-2 located on SPC-PNL-3 and retag to RC-LI-100A. Readout will change from "psig" to "inches of water". Recorder SPC-PR-22/SPC-PR-15 located on SPC-PNL-3 will be retagged to RC-LR-100/SPC-PR-15 and the multiplier will be on the "x6" scale. Indicator SPC-PI-22-1 located on SPC-PNL-1 will be retagged to RC-LI-100 and the indicator scale will read "0-600 inches of water". A reference leg exists from the pressure tap down stream of nitrogen system valve NM-V150 to RC-LI-100 and RC-LI-101 to subtract the reactor building pressure. The string can be restored to its original configuration by electrically reconnecting the SPC pressure transmitter. SPC-LIC-3A was retagged RC-LIC-102 and is used in the IIF level control system.

1.6.8 Surge Tank Outlet Valve SPC-V71

NOTE The normal position for SPC-V-71 is "closed" during the standby mode of operation. The following paragraphs are being retained for information only.

The outlet valve is controlled by switches on panels SPC-PNL-1 and 3. The switches are three-position, open and close with spring return to mid-position. The valve may travel to the fully open or shut position automatically. However, should the control relays fail, the valve can be operated by holding either control switch until valve travel is completed, as indicated by position lights on either panel.

The valve is interlocked, as described previously, with two low level signals from SPC-T-1, to close before the tank drains, to prevent nitrogen injection into the primary system. Should this occur, the valve can be opened by holding either control switch in the open position.

A limit switch on the valve provides local and remote alarms whenever the valve is in an abnormal position (i.e. not fully open). Note that if the valve is shut by a low level signal from SPC-T-1, this alarm is to be expected and does not indicate a fault. Also, during defueling operations, SPC-V-71 will normally be kept closed which puts the SPC system in a standby mode of operation.

1.6.9 SPC Fluid System

The charging water storage tank is protected by relief SPC-R12, set at 75 psig. Charging pumps SPC-P-1A, 1B, & 3 are protected by 600 psig reliefs SPC-R1A, 1B and 8 on the discharge, and 80 psig thermal reliefs SPC-R2A, 2B, and 9 on the suction.

Two relief valves are located in the surge line to the reactor coolant system. Valve SPC-R7 is set at 600 psig for SPC system protection. Valve SPC-R14, set at 125 psig., is used when the mini decay heat removal system is in operation, by locking open the isolation valve SPC-V17.

1.7 SYSTEM INTERFACES

The SPC system interfaces with the following systems.

1.7.1 Makeup and Purification

The means by which the SPC system connects to the Reactor Coolant System.

1.7.2 Demineralized Water

Used to makeup water to the SPC system thru the SPC batching tank SPC-T-5. Also used to fill the packing cooling tanks.

1.7.3 Balance of Plant Electrical; MCC-2-32A, MCC-2-42A, and USS 2-45

Provides power to pumps, valves, and SPC-T-4 tank heaters.

1.7.4 Temporary Nuclear Sampling System

Allows sampling of the SPC System.

1.7.5 Defueling Water Cleanup System

SPC-T-4 will supply the DWCS System with a source of Reactor Coolant grade, borated water.

1.7.6 IIF

Internals Indexing Fixture water level is provided in the control room on SPC-PNL-3.

2.0 SYSTEM LIMITATIONS, SET POINTS, AND PRECAUTIONS

2.1 There is no external level indication for the Borated Water Batching Tank. The water level mist be determined visually so that the tank is not emptied with the heaters energized or the Borated Water Transfer Pump running.

2.2 Do not attempt to operate the Charging Pumps or the VCP with the suction or discharge valves closed.

2.3 Piping from the CWST to the Charging Pumps may be hot (due to heating in the CWST) and could present a burn hazard. (Piping from BWBT to CWST is insulated).

2.4 Makeup pumps MU-P-1A/1B/1C must have their breakers racked out and discharge valves closed at all times to ensure the system is not inadvertently pressurized due to Makeup Pump operation.

2.5 The CWST must be manually vented, and transfer flow verified when operating the borated water transfer pump to avoid running the pump at shutoff head.

2.6 SPC-V-17 must be open to SPC-R14 during Mini-Decay Heat Removal Mode of Operation.

3.0 OPERATION

3.1 INITIAL FILL

Prerequisites to initial fill include the availability of approximately 6600 gallons of demineralized water and sufficient boric acid powder to bring the demineralized water to a borated level of 3500 to 6000 ppm.

The demineralized water and boric acid are mixed in the Borated Water Batching Tank in 500 gallon, 3500-6000 ppm batches. Approximately 14 batches are required.

The batching tank is filled with water and heated before adding the boric acid, to reduce the dissolving time. The acid is added and mixed, and the solution is transferred to the CWST using the Borated Water Transfer Pump. The CWST is filled to approximately 3000 gallons. The CWST heaters are then energized, and filling continues to approximately 4500 gallons.

The charging pumps are filled and vented, and the surge tanks are filled through SPC-V71 by operation of a charging pump. Charging continues until SPC-T-3 is approximately 3/4 full. The CWST is refilled with borated water to approximately 4500 gallons. Manual venting of the CWST is required during filling.

3.2 STARTUP

This section is not applicable to the SPC system. With the SPC system filled, it is ready for operation. No startup is required.

3.3 NORMAL OPERATION

The normal mode of operation for the SPC system, with the RCS depressurized, is stand-by. In stand-by, the SPC system is maintained by maintaining SPC-T-4 with RCS grade make-up water at the proper level. The SPC system will be isolated from the RCS and will only be used for infrequent RCS make-up or for emergency additions to the RCS.

3.4 SHUTDOWN

SPC-T-5 should be drained or its contents pumped to SPC-T-4.

The charging water storage tank heaters should be secured.

3.5 DRAINING

Draining of the SPC system is not anticipated until all fuel has been removed from the reactor vessel. When draining is required, the system will likely be drained to a WDL system tank and handled as

processed water. The final disposition of TMI-2 processed water has not been determined as of yet.

3.6 REFILLING

The appropriate sections of section 3.1, initial fill, apply to refilling the SPC system.

3.7 INFREQUENT OPERATION

Periodic recirculation and sampling are conducted to ensure tne quality of the water in the SPC system.

3.8 TRANSIENT OPERATIONS

Transient operation of the SPC system is included in sections 4.1 (Casualty Events) and 4.2 (Design features to mitigate effects of casualty events).

4.0 CASUALTY EVENTS AND RECOVERY PROCEDURES

4.1 CASUALTY EVENTS

4.1.1 Loss of SPC Pumps

For routine makeup to the RCS, the loss of a single charging pump would limit the makeup rate to approximately 40 gpm. The loss of both charging pumps would require using an alternate make-up source. There are alternate methods of makeup to the RCS, such that loss of all SPC injection capability would not adversely affect nuclear safety.

During a loss of Coolant Accident, assuming the SPC pumps are inoperable, an alternate makeup source (BWST) would be used for makeup to the RCS.

4.1.2 Loss of Level Indication

The loss of level indication in SPC-T-4 could result in the heat tracing in SPC-T-4 being deenergized and/or the loss of the charging pumps. With alternate borated water supplies available, a loss of level indication will not affect nuclear safety.

4.1.3 Valve Malfunctions

To render the SPC system incapable of performing its intended function of injecting makeup water into the RCS, a valve would have to be failed in the closed position blocking the injection flowpath. Between SPC-T-4 and the RCS, there are manually and motor operated valves. The valve(s) would have to be stuck closed or closed with the stem(s) broken. In this instance, the SPC system would be inoperable and an alternate source of borated water would be required for RCS makeup. Valve repairs or replacements would be required to return the SPC system to operation.

4.1.4 System Leakage and Ruptures

The SPC system could experience system leakage or component ruptures. The most likely cause would be a load drop during crane operations. This casualty event would render the SPC system inoperable until repairs could be performed. Alternate makeup sources are available for RCS makeup.

4.1.5 Loss of Electrical Power

This would result in the loss of pumps SPC-P-1A/1B. Makeup to the RCS could be performed using an alternate makeup source..

4.1.6 Abnormal Chemistry

The SPC system (SPC-T-4) is sampled once a week to determine the water quality. Should any parameter be outside the specified limits, the SPC system would not be used as a source of makeup to the RCS. If this should occur, the Chemistry would be adjusted and the system returned to normal standby operation.

4.2 DESIGN FEATURES TO MITIGATE EFFECTS OF CASUALTY EVENTS

A design feature provided to mitigate the effects of casualty events is the instrumentation and alarms provided for the SPC system on control panel SPC-PNL-3 located in the control room. Each alarm has a formalized response procedure which the control room operators use to ensure prompt immediate and follow-up actions are carried out. Panel mounted annunciators are listed in Table 9.

Other features include the use of redundent charging pumps and instrumentation strings using two loops (loop A/loop B).

4.3 RECOVERY PROCEDURES

The only credible event that could affect personnel safety would be a leak in SPC-T-4 causing moderately hot water to burn those nearby. The recovery approach to restore the system to a Safe Condition would be to isolate the leak, repair the break, and restore SPC-T-4 to a normal level, maintaining proper water chemistry.

5.0 MAINTENANCE

5.1 CORRECTIVE MAINTENANCE

There are no special tools or equipment necessary to maintain the SPC system. Replacement of individual components is done using replacement-in-kind parts only. Retesting of the system is conducted following part replacement and generally consists of an operational check or leak check, depending upon the specific repair performed.

5.2 PREVENTIVE MAINTENANCE

The maintenance department performs periodic calibration checks on various installed instruments to verify instrument performance. MTX-508 lists the affected instruments and their data sheets.

5.3 SURVEILLANCE AND IN-SERVICE INSPECTION

The following surveillance procedures are performed on the SPC system to insure compliance with the TMI-2 technical specifications. A summary of each surveillance is provided.

5.3.1 Surveillance 4301-S1. . . Shift and Daily Checks

Once each shift the control room operators verify the Changing Water Storage Tank Water Volume is filled with a minimum of 2300 gallons.

5.3.2 Surveillance 4301-W1/W2 . . Weekly Surveillance Checks

Once each week the boron concentration of the SPC system is checked to verify that the boron concentration is between 3500-6000 ppm.

5.3.3 Surveillance 4303-M4 . . . Boron Injection System Valve Lineup Verification

At least once per 31 days, valves in the flowpath between the SPC system and the RCS are checked to verify that that are in their correct position.

6.0 TESTING

Testing of the SPC system would be required following corrective maintenance or system modifications. The two cases will be addressed separately.

6.1 TESTING FOLLOWING SYSTEM MODIFICATION

Following field work associated with an approved ECM or ECA, testing will be in accordance with the approved change modification or in accordance with the requirements as specified by the Startup and Test Manager. Testing shall ensure that system design, per flow diagram M022, is not compromised.

6.2 TESTING FOLLOWING CORRECTIVE MAINTENANCE

Following any corrective maintenance on the SPC system, testing will be in accordance with the requirements stated on the work request authorization. In the case of a work request authorization, the testing is specified by the unit work instruction preparer and approved by the System Cognizant Plant Engineer. Testing shall ensure that system performance is not compromised.

7.0 HUMAN FACTORS

Human factors reviews are only performed to aid in the development of the system design. As such, this is not an applicable subject for this revision of the SPC system description.

TABLE 1

STANDBY PRESSURE CONTROL SURGE TANKS

Identification	SPC-T-1, SPC-T-2, SPC-T-3
Number Installed	Three
Manufacturer	Southwest Fabrication Co.
Capacity, gallons	900
Installation	Vertical
Outside Diameter & Height	54.17" x 166.55"
Shell Material	Stainless Steel
Design Temperature, °F	300
Design Pressure, psig	2735
Corrosion Allowance, in.	None
Design Code	ASME III, Class 2
Code Stamp required	"N"
Material Thickness	3-1/8"

TABLE 2

CHARGING PUMPS

Pump Details

Identification	SPC-P-1A, SPC-P-1B
Number Installed	Two
Manufacturer	Gaulin Corp.
Model No.	NP18
Type	Triplex Positive Displacement
Rated Speed, RPM	180
Rated Capacity, GPM	40 GPM
Rate Total Dynamic Head, psig	3010
NPSH Required, psia	4.1 psia
Design Pressure, Casing, psig	4700
Design Temperature, °F	250
Lubricant/Coolant	Oil/Water (for seals)

Motor Details

Manufacturer	Louis Allis (Pacemaker)
Type	Induction (COG4C9)
Enclosure	Open Drip Proof
Rate HP	100
Speed, RPM	1775
Lubricant, Coolant	Grease/Air
Power Requirements	480V, 3 Phase, 60 Hz, 118 Amps (full load)
Power Source	SPC-P-1A, MCC 2-32A SPC-P-1B, MCC 2-42A

TABLE 3

CHARGING PUMP PACKING COOLING SUMP PUMP

Pump Details

Number Installed	Two (one per unit)
Manufacturer	Eastern
Model No.	SD-11 Type 103 & 104
Type	Stainless Steel Centrifugal
Rated Speed, RPM	3450
Rated Capacity, GPM	6 GPM (max. at 7 psi head)
Rated Pressure, psig	20 psi (Max. at shutoff)

Motor Details

Manufacturer	Ohio Electric
Type	Split Phase Induction
Enclosure	Totally Enclosed
Rate HP	0.20
Rated Speed, RPM	3450
Lubricant/Coolant	Grease/Air
Power Requirements	115V, 1 Phase, 60 Hz, 3.2 Amps (full load)
Power Source	LPF-4C (Pump 1A) LPF-4D (Pump 1B)

TABLE 4

CHARGING WATER STORAGE TANK

Identification	SPC-T-4
Manufacturer	Progress Equipment Co., Inc.
Capacity, gallons	5110 total, (4185 Max. operating cap)
Installation	Vertical
Outside Diameter & Height	8' O.D. & 18' High
Shell Material	SA-240
Design Temperature, °F	250
Design Pressure, psig	75
Corrosion Allowance, in.	None
Design Code	ASME Section III, Class 2
Code Stamp required	"N"
Material Thickness, in.	0.4375

Heater Details

Capacity, KW	113.4
Type	Strip
Power Requirements	480V, 3 phase, 60 Hz
Power Supply	USS 2-45

TABLE 5

BORATED WATER BATCHING TANK

Identification	SPC-T-5
Manufacturer	CE Air Preheater
Capacity, gallons	632
Installation	Vertical
Outside Diameter & Height	60" O.D. & 72" High
Shell Material	Stainless Steel
Design Temperature, °F	200
Design Pressure, psig	Atmospheric
Corrosion Allowance, in.	None
Design Code	None
Material Thickness, in.	3/16

Heater Details

Number Installed	Three
Manufacturer	Emerson
Model Number	NTS-3150
Type	Immersion
Capacity, KW, per heater	15
Power Requirements	480V, 3 Phase, 60 Hz, Amps (full load) 15 KW
Power Source	MCC 2-32A

Mixer Details

Manufacturer	LFE Corporation
Model No.	RS-3
Type	Clamp on

Motor Details

Manufacturer	Duty Master
Type	P
Enclosure	Totally enclosed
Rated HP	1/2
Speed, RPM	1140
Power Requirements	480V, 3 Phase, 60 Hz
Code	L
Power Source	MCC 2-32A

TABLE 6

BORATED WATER TRANSFER PUMP

Identification	SPC-P-2
Number Installed	One
Manufacturer	Ingersoll Rand
Type	40C
Rated Speed, RPM	1745
Rated Capacity, GPM	50
Rated Total Dynamic Head, ft.	35
NPSH, ft.	3
Design Pressure, Casing, psig	525
Design Temperature, °F	350
Lubricant/Coolant	Oil/Air
Min. flow Requirements, GPM	22

Motor Details

Manufacturer	Gould
Type	SC
Enclosure	Open Drip Proof
Rated HP	1.5
Speed, RPM	1745
Lubricant/Coolant	Sealed bearings/Air
Power Requirements	480V, 3 Phase, 60 Hz
Power Source	MCC 2-32A

TABLE 7

VARIABLE CHARGING PUMP

Identification	SPC-P-3
Number Installed	One
Manufacturer	Cat Pumps
Model No.	820
Type	Positive Displacement
Max. Allowable Speed, RPM	1200
Rated speed, RPM	190 to 940
Rated Capacity, GPM	2 to 10
Rated Total Dynamic Head, ft.	1000
Required Inlet Pressure, psig	-8.5 at 140°F, 0 at 160°F, +5 at 165°F
Design Pressure, Casing, psig	1000
Design Temperature, °F	180
Lubricant/Coolant	Oil/Air

Motor Details

Manufacturer	US Motors
Type	VEV-1-TF-GD
Rated HP	7.5
Speed, RPM	190 to 1575
Lubricant/Coolant	Oil/Air
Power Requirements	480V, 3 Phase, 60 Hz
Power Source	MCC 2-42A

TABLE 8

Instrumentation and Controls

Identification	Description	Function	Location	Type	Input Range	Output Range	Setpoint
SPC HS 1A-01,02	Hand Switch	On/Off control for SPC-P-1A	SPC Panel 1	Two Pushbuttons	N/A	N/A	N/A
SPC HS-1A 03,04	Hand Switch	On/Off control for SPC-P-1A	SPC Panel 3	Two Pushbuttons	N/A	N/A	N/A
SPC HS 1B-01,02	Hand Switch	On/Off control for SPC-P-1B	SPC Panel 1	Two Pushbuttons	N/A	N/A	N/A
SPC HS 1B 03,04	Hand Switch	On/Off control for SPC-P-1B	SPC Panel 3	Two Pushbuttons	N/A	N/A	N/A
SPC HS 3-01,02	Hand Switch	On/Off control for SPC-P-3	SPC-Panel 1	Two Pushbuttons	N/A	N/A	N/A
SPC HS 3 03,04	Hand Switch	On/Off control for SPC-P-3	SPC Panel 3	Two Pushbuttons	N/A	N/A	N/A
SPC PI-1A	Pressure Indicator	Indicates SPC-P-1A discharge pressure	Local	Bourdon	0-1000 psig	0-1000 psig	N/A
SPC PI 1B	Pressure Indicator	Indicates SPC-P-1B discharge pressure	Local	Bourdon	0-1000 psig	0-1000 psig	N/A
SPC PI-1C	Pressure Indicator	Indicates SPC-P-3 discharge pressure	Local	Bourdon	0-1000 psig	0-1000 psig	N/A
SPC PIT-1	Pressure Indicator Transmitter	Indicates charging pumps suction pressure & transmits signal to SPC PI-1	Local	Bellows	0 to 30 psig	10 to 50 madc	N/A
SPC PI-1	Pressure Indicator	Indicates charging pump's suction pressure	SPC-Panel 1	Milliammeter	10 to 50 madc	0 to 30 psig	N/A
SPC HS-1	Hand Switch	Select SPC-P-1A or 1B as the lead charging pump	SPC-Panel 3	Selector	N/A	N/A	N/A
SPC LIT-1A	Level Indicator Transmitter	Level Indication of SPC-T-1, and input to SPC-LI-1A	Local	Twin Diaphragm	0 to 111 in. WG	10 to 50 madc 0-100%	N/A
SPC LI-1A	Level Indicator	Indicates SPC-T-1 level	SPC-Panel 3	Milliammeter	10-50 madc	0-100%	N/A
SPC LIT 1B	Level Indicator Transmitter	Level Indication of SPC-T-1 and input to SPC-LI-1B	Local	Twin Diaphragm	0 to 111 in. WG	10 to 50 madc 0-100%	N/A
SPC LI 1B	Level Indicator	Indicates SPC-T-1 level	SPC-Panel 3	Milliammeter	10-50 madc	0-100%	N/A
SPC LSL 1B	Level Switch	Actuates alarms SPC-LAL-1B-1 and 1B-2, and shuts SPC V71	SPC-Panel 1	Solid state	10-50 madc	N/A	21%

TABLE 8 (Cont'd)

Instrumentation and Controls

Identification	Description	Function	Location	Type	Input Range	Output Range	Setpoint
SPC-LE-1C	Level Element	Provides SPC-T-1 low level input to SPC-LSL-1C	Local	Electrode	N/A	N/A	23 in.
SPC-LSL-1C	Level Switch	Actuates alarms SPC-LAL-1C1 & 1C2 on low level in SPC-T-1 & closes SPC-V71	SPC-Panel 1	Induction Relay	N/A	N/A	N/A
SPC-LIT-2A	Level Indicator Transmitter	Level indication of SPC-T-2 and input to SPC-LI-2A	Local	Twin Diaphragm	0-111 in.WG	10 to 50 madc 0-100%	N/A
SPC-LI-2A	Level Indicator	Indicates SPC-T-2 level	SPC-Panel 3	Milliammeter	10 to 50 madc	0-100%	
SPC-LIT-2B	Level Indicator Transmitter	Level Indication of SPC-T-2	Local	Twin Diaphragm	0-111 in.WG	10 to 50 madc 0-100%	N/A
SPC-LI-2B	Level Indicator	Indicates SPC-T-2 level	SPC-Panel 3	Milliammeter	10 to 50 madc	0-100%	N/A
SPC-LIT-3A	Level Indicator Transmitter	Level Indication of SPC-T-3 and input to SPC-LIC, LI, LSHH, LSH, LSLL, & LSL-3A	Local	Twin Diaphragm	0 to 111 in. WG	10 to 50 madc 0-100%	N/A
SPC-LI-3A	Level Indicator	Level Indication of SPC-T-3	SPC-Panel 3	Milliammeter	10 to 50 madc	0-100%	N/A
SPC-LSL-3A	Low Level Switch	Starts SPC-P-1A (if lead pump) and SPC-P3 on low level in SPC-T-3	SPC-Panel 1	Solid State	10 to 50 madc	N/A	62%
SPC-LSH-3A	High Level Switch	Stops SPC-P-1A on high level in SPC-T-3. Cycles SPC-P-3	SPC-Panel 1	Solid State	10 to 50 madc	N/A	74%
SPC-LR-1-3B	2 Pen Strip Chart Recorder	Provide record of levels in SPC-T-3 and SPC-T-4	SPC-Panel 3	Esterline Angus	10 to 50 madc	0-100%	N/A
SPC-LSLL-3A	Low-Low Level Switch	Starts SPC-P-1A (if backup pump) on low-low level in SPC-T-3, and actuates alarms SPC-LAL-3A1 & 3A2	SPC-Panel 1	Foxboro	10 to 50 madc	N/A	57%
SPC-LSHH-3A	High High Level Switch	Actuates alarm SPC-LAHH-3A1 & 3A2 on high high level in SPC T-3	SPC-Panel 1	Solid State	10 to 50 madc	N/A	78%
SPC-LIT-3B	Level Indicator Transmitter	Level Indication of SPC-T-3 and input to SPC-LI, LSHH, LSH, LSLL & LSL-3B	Local	Twin Diaphragm	0 to 111 in. WG	10 to 50 madc 0-100%	N/A

TABLE 8 (Cont'd)

Instrumentation and Controls

Identification	Description	Function	Location	Type	Input Range	Output Range	Setpoint
SPC LI-3B	Level Indicator	Level Indication of SPC-T-3	SPC-Panel 3	Milliammeter	10 to 50 madc	0-100%	N/A
SPC LSL 3B	Low Level Switch	Starts SPC-P-1B (if lead pump) on low level in SPC-T-3	SPC-Panel 1	Solid State	10 to 50 madc	N/A	62%
SPC LSH 3B	High Level Switch	Stops SPC-P-1B on high level in SPC-T-3	SPC-Panel 1	Solid State	10 to 50 madc	N/A	74%
SPC LSLL 3B	Low-Low Level Switch	Starts SPC-P-1B (if backup pump) on low-low level in SPC-T3, and actuates alarms SPC-LAL-3B1 & 3B2	SPC-Panel 1	Foxboro	10 to 50 madc	N/A	57%
SPC LSHH 3B	High High Level Switch	Actuates alarm SPC-LAHH-3B1 & 3B2 on high high level in SPC-T-3	SPC-Panel 1	Solid State	10 to 50 madc	N/A	78%
SPC HS 3 1/2	Hand Switch	Start/stop control for SPC-P-3	SPC-Panel 1	Two Pushbuttons	N/A	N/A	N/A
SPC HS 3 3/4	Hand Switch	Start/stop control for SPC-P-3	SPC-Panel 3	Two Pushbuttons	N/A	N/A	N/A
SPC LIT 4	Level Indicating Transmitter	Level Indication for SPC-T-4 and input to SPC-LI-4, LSHL-4, and LSLL-4A	Local	Twin Diaphragm	0-139"	10 to 50 madc	N/A
SPC LI-4	Level Indicator	Level Indication for SPC-T-4	SPC-Panel 3	Milliammeter	10 to 50 madc	0-100%	N/A
SPC LSHL-4	Level Switch High, Low	SPC-T-4 low level heater shut off and high low level alarms	SPC-Panel-1	Solid State	10 to 50 madc	N/A	96% Inc. 37% dec.
SPC LSLL-4A	Low Low Level Switch	Stops pumps SPC P-1A & 3 on SPC-T-4 low level	SPC-Panel-1	Solid State	10 to 50 madc	N/A	3%
SPC LSLL 4B	Low Low Level Switch	Stops pump SPC P-1B on SPC-T-4 low level	Local	Diaphragm	2.5 to 45" WG	N/A	24" WG
SPC TE 4	Temperature Element	Measures temp. of water in SPC-T-4 for input to SPC-TIC-4-1 and TT-4	Local	Dual T/C	0 to 300°F	MVDC	N/A
SPC TIC 4-1	Temperature Indicator Controller	Controls heater for SPC T-4	SPC-Panel 1	On/Off	MVDC	N/A	160°F
SPC TI-4 2	Temperature Indicator	Indicates SPC-T-4 temperature	SPC-Panel 3	Milliammeter	10 to 50 madc	0-300°F	N/A

TABLE 6 (Cont'd)

Instrumentation and Controls

Identification	Description	Function	Location	Type	Input Range	Output Range	Setpoint
SPC-TSH-4	High Temperature Switch	Signal for SPC-T-4 High temp. alarm TAHL-4	SPC-Panel 1	Solid State	10 to 50 madc	N/A	170°F
SPC-TSL-4	Low Temperature Switch	Signal for SPC T-4 low temp. alarm TAHL-4	SPC-Panel 1	Solid State	10 to 50 madc	N/A	150°F
SPC-TY-4	Converter	Converts SPC-T-4 temperature signal for input to SPC-TI-4-2, TSH-4 and TSL-4	SPC-Panel 1	E/I	MVDC	10 to 50 madc	N/A
SPC-HS-4	Hand Switch	On/Off control for Heater for SPC-T-4	SPC-Panel 1	2 Position (Maintained) with Indicating lights	N/A	N/A	N/A
SPC-FE-5	Flow Element	Develops differential press. for charging pumps Discharge Flow Measurement for input to SPC-FIT-5	Local	Orifice	0 to 100 GPM	0-312.5"WG	N/A
SPC-FIT-5	Flow Indicating Transmitter	Indicates charging pumps Discharge Flow & Transmits Signal to SPC-FY-5	Local	Twin Diaphragm	0-312.5"WG	10-50madc 0-100%	N/A
SPC-FY-5	Flow Converter	Converts flow signal for input to SPC-FI-5	SPC-Panel 1	Square Root	10 to 50 madc	10 to 50 madc	N/A
SPC-FI-5	Flow Indicator	Indicates charging pumps Discharge Flow	SPC-Panel 3	Milliammeter	10 to 50 madc	0 to 100 GPM	N/A
SPC-HS-6	Hand Switch	On/Off control for SPC T-5 Mixer	SPC-Panel 2	2 Position (Maintained) with Indicating lights	N/A	N/A	N/A
SPC-HS-7	Hand Switch	On/Off control for SPC-T-5 heater	SPC-Panel 2	2 Position (Maintained) with Indicating lights	N/A	N/A	N/A
SPC-HS-8	Hand Switch	On/Off control for SPC-P-2	SPC-Panel 2	2 Position (Maintained) with Indicating lights	N/A	N/A	N/A

TABLE 6 (Cont'd)

Instrumentation and Controls

Identification	Description	Function	Location	Type	Input Range	Output Range	Setpoint
SPC TI-9	Temperature Indicator	Indicates temp. of mixture in SPC T-5	Local	Every Angle	0 to 200°F	0 to 200°F	N/A
SPC PIT 10	Pressure Indication Transmitter	Provides Indication of standby R.C. Press. Cont. SYS. pressure & signal to SPC-DPS-10A & B, PI-10-1 & 2 and DPI-10	Local	Bellows	0 to 1000 psig	10 to 50 MA 0-100%	N/A
SPC UPA 10	Converter	Convert SPC PIT 10 & PY-15 signals into SPC/RC differential pressure signal to SPC-DPI-10	SPC Panel 1	Summing Amplifier	10-50 madc 10-50 madc	10-50 madc	N/A
SPC DPI 10	Differential Pressure Indicator	Indicate SPC/RC differential pressure	SPC-Panel 3	Milliammeter	10-50 madc	100 0-100 psid	N/A
SPC PI 10-1	Pressure Indicator	Indicates SPC system pressure	SPC-Panel 1	Milliammeter	10-50 madc	0-1000 psig	N/A
SPC PI 10-2	Pressure Indicator	Indicates SPC system pressure	SPC-Panel 3	Milliammeter	10-50 madc	0-1000 psig	N/A
SPC DPS-10A	Differential Pressure Switch	SPC/RC pressure difference alarm to SPC-DPA-10A-1&2	SPC-Panel 1	Solid State	10-50 madc	N/A	± 25 psid
SPC DPS-10B	Differential Pressure Switch	SPC pressure/setpoint difference alarm to SPC-DPA-10B-1&2	SPC-Panel 1	Solid State	10-50 madc	N/A	± 25 psid
SPC FE 12	Flow Element	Develops D/P for variable charging pump SPC P-3 flow, and provides input to SPC-FIT-12	Local	Orifice	0-15 gpm	0-100"WG	N/A
SPC FIT 12	Flow Indicating Transmitter	Indicates Variable Charging Pump Disch. Flow & Transmits Signals to SPC-FI-12	Local	Twin Diaphragm	0-100"WG	10-50 madc	N/A
SPC FY 12	Flow Converter	Convert flow signal for input to SPC-FI-12	SPC-Panel 1	Square Root	10-50 madc	10-50 madc	N/A
SPC FI 12	Flow Indicator	Indicates Variable Charging Pump Discharge Flow	SPC-Panel 3	Milliammeter	10 50 madc	0-100 GPM	N/A
SPC PI 13	Pressure Indicator	Indicates Borated Water Transfer Pump SPC-P-2 Discharge Pressure	Local	Bourdon Tube	0 30 psig	0-30 psig	N/A

TABLE 8 (Cont'd)

Instrumentation and Controls

Identification	Description	Function	Location	Type	Input Range	Output Range	Setpoint
SPC PT 15	Pressure Transmitter	Provide RC pressure signal input from DH-V3 to SPC-PY-15	Local	Bellows	0-1000 psig	10-50 madc	N/A
SPC PI 15	Repeater	Transmit RC pressure signal to SPC-PI-15-1, 15-2 & 15-3, DPI-10, DPS-10A, & PR-22	SPC-Panel 1	Current Repeater	10-50 madc	10-50 madc	N/A
SPC PI 15 1	Pressure Indicator	Indicates RC pressure at DH-V3	SPC-Panel 1	Milliammeter	10-50 madc	0-1000 psig	N/A
SPC PI 15 2	Pressure Indicator	Indicates RC pressure at DH-V3	SPC-Panel 3	Milliammeter	10-50 madc	0-500 psig	N/A
SPC PI 15 3	Pressure Indicator	Indicates RC pressure at DH-V3	SPC-Panel 3	Digital	10-50 madc	0-500 psig	N/A
SPC PI 16 2	Pressure Converter	Convert nitrogen pressure setpoint signal to input to SPC-DPS-10B	SPC-Panel 1	V/I Converter	1-5 vdc	10-50 madc	N/A
SPC HS 16	Hand Switch	Select SPC-PIC 16 or 17 to select system pressure setpoint input to SPC-DPS 10B	SPC-Panel 3	Two Position (Maintained)	N/A	N/A	N/A
SPC PI 18	Pressure Indicator	Provide RC pressure indication from DH-V3	Local	Bourdon Tube	0-1000 psig	0-1000 psig	N/A
SPC PI 21	Pressure Indicator	Indicate RC pressure from temporary nuclear sampling (SNS) system	Local	Bourdon Tube	0-1000 psig	0-1000 psig	N/A
SPC PI 23	Pressure Indicator	Indicate RC pressure at SNS system	Local	Bourdon Tube	Later	Later	N/A
SPC PI 24	Pressure Indicator	Indicates N_2 pressure to SPC-T-4	Local	Bourdon Tube	0-5 psig	0-5 psig	N/A
SPC FI 30	Flow Indicator	Indicate SPC-T-4 vent line flow rate	Local	Rotameter	0-28 SCFM	0-100%	N/A
SPC HS 71 1	Hand Switch	Control SPC surge tank SPC-T-1 outlet valve SPC-V71	SPC-Panel 1	3-position spring return	N/A	N/A	N/A
SPC HS 71 2	Hand Switch	Control SPC surge tank SPC-T-1 outlet valve SPC-V71	SPC Panel 3	3-position spring return	N/A	N/A	N/A
SPC ZS 71	Limit Switch	Actuate alarms SPC-ZA-71-1&2 on SPC-V71 abnormal position	SPC V71	Limit Switch	N/A	N/A	N/A

TABLE 8 (Cont'd)

Instrumentation and Controls

Identification	Description	Function	Location	Type	Input Range	Output Range	Setpoint
SPC PI-26	Pressure Indicator	Indicates Packing Coolant pressure from PUMP-1B	Local	Bourdon Tube	0-30 psig	0-30 psig	N/A
SPC PI-25	Pressure Indicator	Packing Coolant Disch. pressure from from PUMP-1A	Local	Bourdon Tube	0-30 psig	0-30 psig	N/A
SPC PSL-27	Pressure Switch	Actuates low packing coolant pressure for PUMP-1A	Local	Bellows	0-50 psig	0-50 psig	4 ± 1 psig
SPC PSL-28	Pressure Switch	Actuates low packing coolant pressure for PUMP-1B	Local	Bellows	0-50 psig	0-50 psig	4 ± 1 psig
SPC HS-1A-5	Hand Switch	Close/Open override switch for SPC-1A control circuit which actuates alarm on SPC-PNL-3	SPC-PNL-3	Selector	N/A	N/A	N/A
SPC-HS-1B-5	Hand Switch	Close/Open override switch for SPC-1B control circuit which actuates alarm on SPC-PNL-3	SPC-PNL-3	Selector	N/A	N/A	N/A
SPC-HS-3-5	Hand Switch	Close/Open override switch for SPC-F-3 control circuit which controls alarm on SPC-PNL-3	SPC-PNL-3	Selector	N/A	N/A	N/A
for RCS Defueling Operations							
RC LI-100A (Formally SPC 22-2)	Level Indicator	Indicate RCS water level during drain down condition.	SPC-PNL-3	Milliammeter	10-50 madc	0-600 inches of water	N/A
RC LR-100/SPC-PR-15 10-50 madc/ (Formally SPC-PR-22/SPC-PR-15)	0-1000 psig/	Level Recorder N/A down	Record level of RCS during drain		0-50 madc	SPC-PNL-3 0-500 psig	Strip Chart
RC LI-100 (Formally SPC PI-22-1)	Level Indicator	Indicate RCS water level during drain down	SPC PNL-1	Milliammeter	10-50 madc	0-600 inches of water	N/A
RC LIC-102 (Formally SPC-LIC-3A)	Level Indicator Controller	Provides signal for RCS level indication	SPC-PNL-3	PAI Controller	10-50 madc	10-50 madc 0-100%	variable
RC LSHL-100	Dual Alarm Switch	Actuates RCS low and high level alarms	SPC-PNL-3	Current Operated	4-20 madc	N/A	N/A

TABLE 9

Panel Mounted Annunciators

Identification	Measured Variable, Units	Alarm High	Alarm Low	Source	Range	Panel
SPC-LAL-1B1	SPC-T-1 low level, %	N/A	21%	SPC-LSL-1B	0-100%	SPC-1
SPC-LAL-1B2	SPC-T-1 low level, %	N/A	21%	SPC-LSL-1B	0-100%	SPC-3
SPC-LAL-1C1	SPC-T-1 low level, %	N/A	21%	SPC-LSL-1C	0-100%	SPC-1
SPC-LAL-1C2	SPC-T-1 low level, %	N/A	21%	SPC-LSL-1C	0-100%	SPC-3
SPC-LALH-3A1	SPC-T-3, hi/low level, %	82%	35%	SPC-LSHH-3A	0-100%	SPC-1
SPC-LALH-3A2	SPC-T-3, hi/low level, %	82%	35%	SPC-LSHH-3A	0-100%	SPC-3
SPC-LALH-3B1	SPC-T-3, hi/low level, %	82%	35%	SPC-LSLL-3B	0-100%	SPC-1
SPC-LALH-3B2	SPC-T-3, hi/low level, %	82%	35%	SPC-LSLL-3B	0-100%	SPC-3
SPC-LALL-3A1	SPC-T-3, low level, %	N/A	35%	SPC-LSLL-3A	0-100%	SPC-1
SPC-LALL-3A2	SPC-T-3, low level, %	N/A	35%	SPC-LSLL-3A	0-100%	SPC-3
SPC-LALL-3B1	SPC-T-3, low level, %	N/A	35%	SPC-LSLL-3B	0-100%	SPC-1
SPC-LALL-3B2	SPC-T-3, low level, %	N/A	35%	SPC-LSLL-3B	0-100%	SPC-3
SPC-TAHL-4-1	SPC-T-4 hi/low temperature, °F	170	150	SPC-TSL-4	0-300%	SPC-1
SPC-TAHL-4-2	SPC-T-4 hi/low temperature, °F	170	150	SPC-TSL-4	0-300%	SPC-3
SPC-LAL-4-1	SPC-T-4 low level, %	N/A	37%	SPC-LSHL-4	0-100%	SPC-1
SPC-LAL-4-2	SPC-T-4 low level, %	N/A	37%	SPC-LSHL-4	0-100%	SPC-3
SPC-LAH-4-1	SPC-T-4 hi level, %	96%	N/A	SPC-LSHL-4	0-100%	SPC-1
SPC-LAH-4-2	SPC-T-4 hi level, %	96%	N/A	SPC-LSHL-4	0-100%	SPC-3
SPC-DPAH-10A-1	SPC/RC differential pressure, psid	+25	-25	SPC-DPS-10A	±1000 psid	SPC-1

0330z LC

TABLE 9 (Cont'd)

Panel Mounted Annunciators

Identification	Measured Variable, Units	Alarm High	Alarm Low	Source	Range	Panel
SPC-DPAH-10A-2	SPC/RC differential pressure, psid	+25	-25	SPC-DPS-10A	±1000 psid	SPC-3
SPC-DPAH-10B-1	SPC pressure/setpoint differential pressure, psid	+25	-25	SPC-DPS-10B	±1000 psid	SPC-1
SPC-DPAH-10B-2	SPC pressure/setpoint differential pressure, psid	+25	-25	SPC-DPS-10B	±1000 psid	SPC-3
SPC-ZA-71-1	SPC V71 valve position	N/A	N/A	SPC-ZS-71	N/A	SPC-1
SPC-ZA-71-2	SPC V71 valve position	N/A	N/A	SPC-ZS-71	N/A	SPC-3
SPC-PAL-27	Low pressure P-1A packing coolant	N/A	5	SPC-PSL-27	0-50 psig	SPC-3
SPC-PAL-28	Low pressure P-1B packing coolant	N/A	5	SPC-PSL-28	0-50 psig	SPC-3
SPC-LAH-3CG	RCS high level, inches	+6	N/A	RC-LSHL-100	4-20 ma	SPC-3
SPC-LAL-3DG	RCS low level, inches	N/A	-6	RC-LSHL-100	4-20 ma	SPC-3