ATTACHMENT 2

SEAL INJECTION ON MAKEUP
SYSTEM STATUS REPORT

Revision 1

(WP2956B/D-0149B)

SEAL INJECTION AND MAKEUP

SYSTEM STATUS REPORT

Revision 1

CONTROLLED
COPY No. 3

SEAL INJECTION AND MAKEUP

SYSTEM STATUS REPORT

REV. 0 INTERIM RELEASE

PREPARED BY: _____ DATE: 9/15/86
SYSTEM ENGINEER

_____ DATE: 9/19/86
DESIGN ENGINEER

APPROVED BY: _____ DATE: 10/12/86
PERFORMANCE ANALYSIS GROUP

_____ DATE: 11/7/86
DEPUTY GENRAL MANAGER/NUCLEAR

REV. 1 TEST APPROVAL

PREPARED BY: _____ DATE: 11/14/86
SYSTEM ENGINEER

_____ DATE: 11/19/86.
SYSTEM DESIGN ENGINEER

APPROVED BY: _____ DATE: 11/20/86
TEST REVIEW GROUP

_____ DATE: 12/4/86
PERFORMANCE ANALYSIS GROUP

_____ DATE: 12/5/86
DEPUTY GENERAL MANAGER NUCLEAR

REV. 2 SYSTEM RESTART APPROVAL

PREPARED BY: _____ DATE: _____
SYSTEM ENGINEER

_____ DATE: _____
SYSTEM DESIGN ENGINEER

APPROVED BY: _____ DATE: _____
TEST REVIEW GROUP

_____ DATE: _____
PERFORMANCE ANALYSIS GROUP

_____ DATE: _____
DEPUTY GENERAL MANAGER NUCLEAR

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LIST OF ILLUSTRATIONS

1.0 EXECUTIVE SUMMARY

1.1 General Report Description

The Restart System Review and Test Program is explained in Quality Control Instruction (QCI) 12, Attachment 11. QCI-12 lists the selected systems for which System Status Reports (SSR) are generated. The Seal Injection and Makeup (SIM) System and High Pressure Injection (HPI) System are selected systems. Since HPI is a portion of the SIM System, and the various plant data bases do not carry a listing for an HPI System, only the SSR for the SIM System will be written.

This report documents the information on the SIM (and HPI) System to verify that they are suitable for return to power operation.

To expedite the start of work, sections of the SSR will be submitted to the Performance Analysis Group (PAG) for interim approval as they are completed or updated.

1.2 System Functional Description

The SIM system is a fluid system, comprised of three identical pumps and associated valves and piping which, during normal operations, provides water to the Reactor Coolant System (RCS) to makeup for losses due to letdown, sampling, and leakage, and to cool and lubricate Reactor Coolant Pump (RCP) bearings.

The system also provides water for emergency core cooling in the event of a Loss of Coolant Accident (LOCA).

1.3 Review of Problems and Resolutions

1.3.1 General Discussion

The problems identified for SIM as of 10/31/86 fall into four categories: modifications, administrative (training, procedures, drawings), maintenance, and studies. Figure 1-1 provides a scope/sequence chart of the problems and resolutions.

1.3.2 Problems and Resolutions

The following is a summary of the significant problems and resolutions that will have an impact on restart:

Repair and testing of the Makeup Pump (P-236), which was destroyed during the 12/26/85 transient, including qualification of its stator.

1.3.2 (Continued)

Training of operators to reinforce the need for maintaining open suction and discharge flowpaths for the Makeup (MU) and HPI Pumps.

Revising Emergency Operating Procedures to inform operators of inaccurate HPI flow indications and to advise them of actions required to recover from an HPI initiation.

Completion and closure of open Work Requests and Nonconformance Reports.

Completion of open Engineering Change Notices which refurbish various motor-operated valves under the MOVATS (Motor Operated Valve Analysis and Test System) Program.

1.4 Test Identification

Section 4.0 identifies, on a system functional basis, the scope of testing that exists, or needs to be developed, to adequately evaluate each function. The following SIM functions are considered important to plant operation and are included in this section:

a. Provide makeup to the RCS for volume and chemistry control.

b. Provide seal injection to RCPs.

c. Provide borated water to RCS on SFAS signal.

d. Provide containment isolation on SFAS signal.

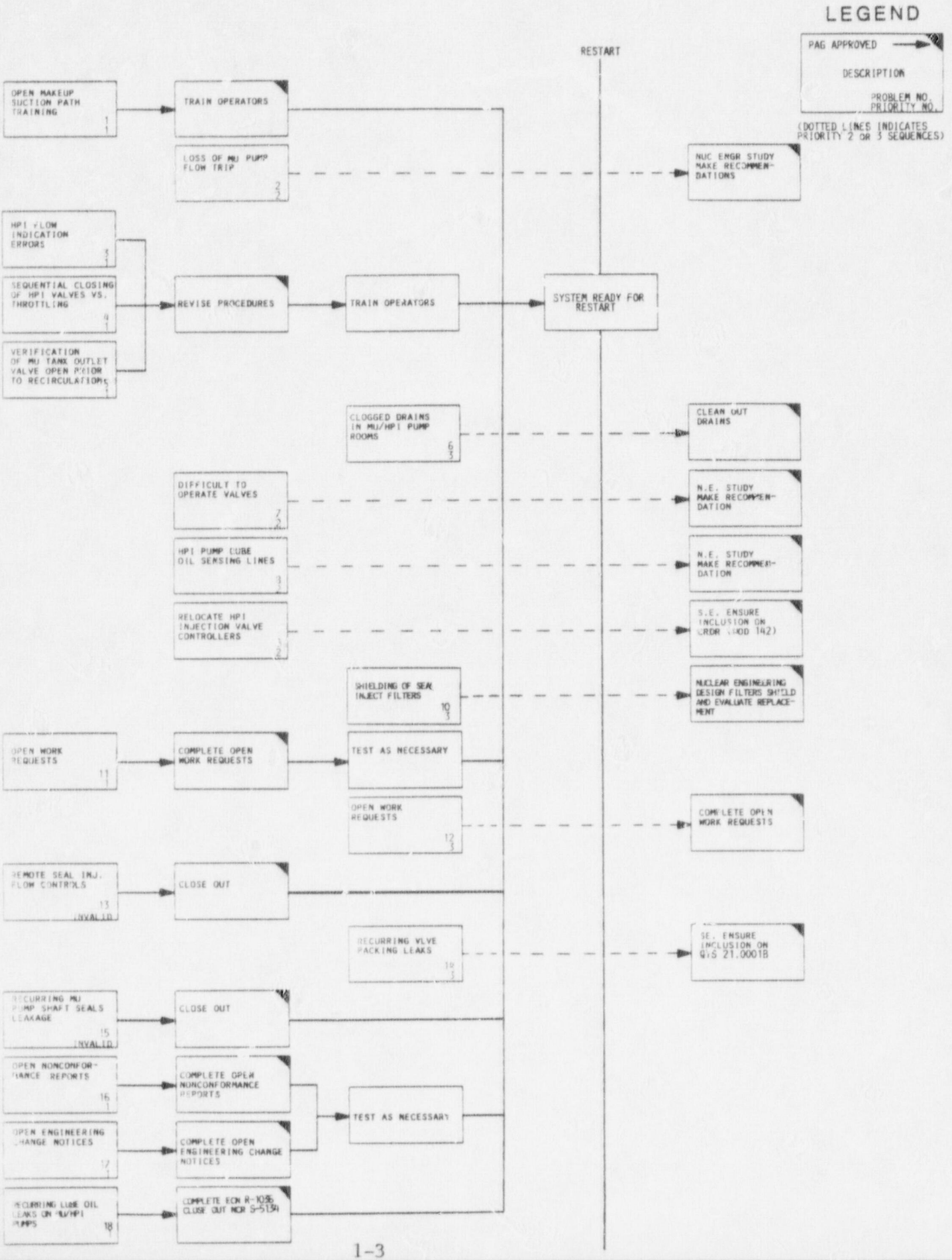
e. Provide RCS pressure boundary.

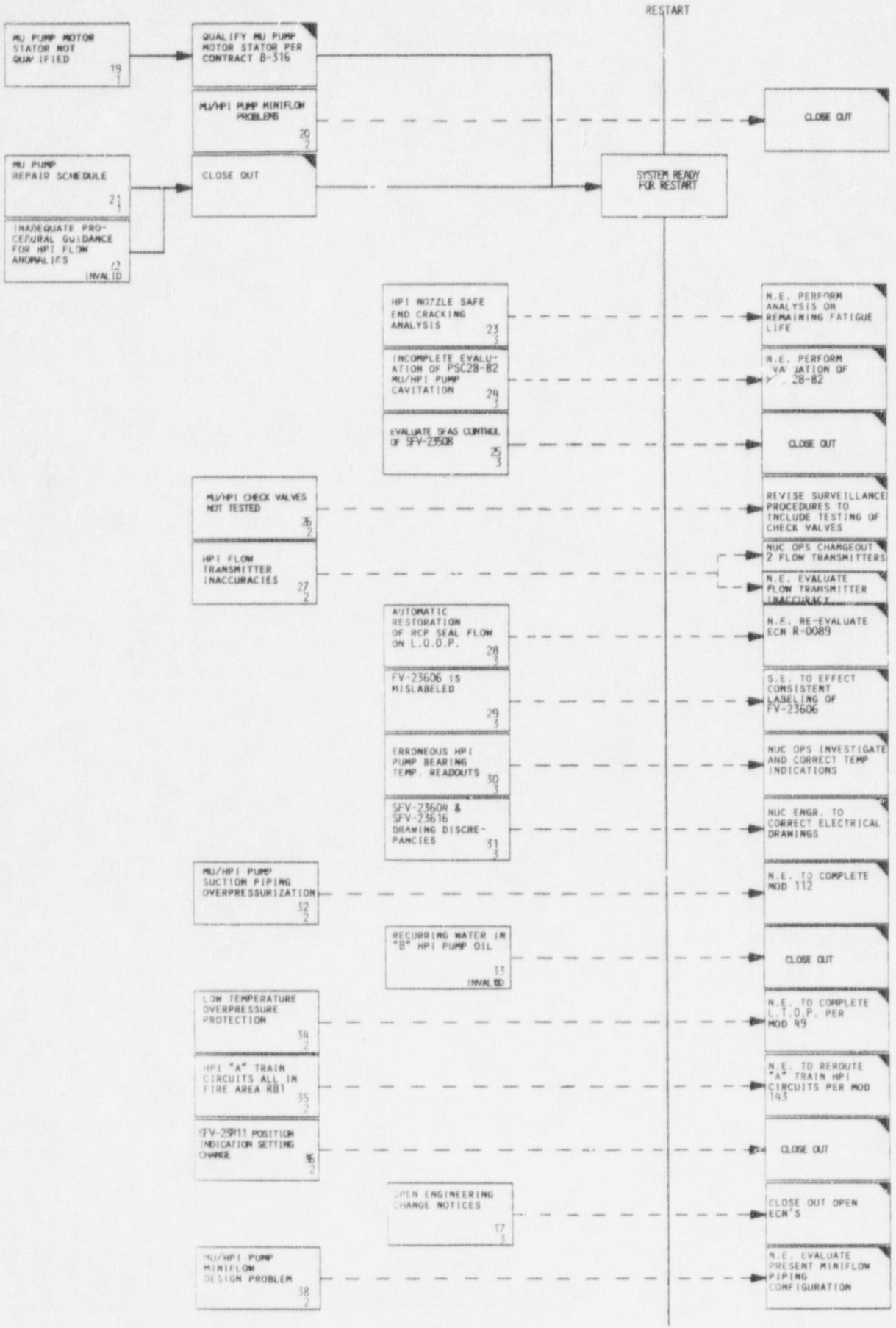
f. Provide alternate pressurizer spray for cooldown or for boron dilution.

g. Fill core flood tanks.

SEAL INJECTION AND MAKEUP SYSTEM

SCOPE / SEQUENCE CHART




RESTART
MU PUMP MOTOR STATOR NOT QUALIFIED
19
1
QUALIFY MU PUMP MOTOR STATOR PER CONTRACT B-316
MU/HPI PUMP MINIFLOW PROBLEMS
20
2
CLOSE OUT
MU PUMP REPAIR SCHEDULE
21
1
CLOSE OUT
INADEQUATE PROCEDURAL GUIDANCE FOR HPI FLOW ANOMALIES
22
INVALID
SYSTEM READY FOR RESTART
HPI NOZZLE SAFE END CRACKING ANALYSIS
23
3
N.E. PERFORM ANALYSIS ON REMAINING FATIGUE LIFE
INCOMPLETE EVALUATION OF PSC28-82 MU/HPI PUMP CAVITATION
24
3
N.E. PERFORM EVALUATION OF PSC 28-82
EVALUATE SFAS CONTROL OF SFV-2550B
25
3
CLOSE OUT
MU/HPI CHECK VALVES NOT TESTED
26
2
REVISE SURVEILLANCE PROCEDURES TO INCLUDE TESTING OF CHECK VALVES
HPI FLOW TRANSMITTER INACCURACIES
27
2
NUC OPS CHANGEOUT 2 FLOW TRANSMITTERS
N.E. EVALUATE FLOW TRANSMITTER INACCURACY
AUTOMATIC RESTORATION OF RCP SEAL FLOW ON L.O.O.P.
28
3
N.E. RE-EVALUATE ECN R-0089
FV-23606 IS MISLABELED
29
3
S.E. TO EFFECT CONSISTENT LABELING OF FV-23606
ERRONEOUS HPI PUMP BEARING TEMP. READOUTS
30
3
NUC OPS INVESTIGATE AND CORRECT TEMP INDICATIONS
SFV-23604 & SFV-23616 DRAWING DISCREPANCIES
31
3
NUC ENGR. TO CORRECT ELECTRICAL DRAWINGS
MU/HPI PUMP SUCTION PIPING OVERPRESSURIZATION
32
2
N.E. TO COMPLETE MOD 112
RECURRING WATER IN "B" HPI PUMP OIL
33
INVALID
CLOSE OUT
LOW TEMPERATURE OVERPRESSURE PROTECTION
34
2
N.E. TO COMPLETE L.T.O.P. PER MOD 49
HPI "A" TRAIN CIRCUITS ALL IN FIRE AREA RB1
35
2
N.E. TO REROUTE "A" TRAIN HPI CIRCUITS PER MOD 143
SFV-2911 POSITION INDICATION SETTING CHANGE
36
2
CLOSE OUT
OPEN ENGINEERING CHANGE NOTICES
37
3
CLOSE OUT OPEN ECN'S
MU/HPI PUMP MINIFLOW DESIGN PROBLEM
38
2
N.E. EVALUATE PRESENT MINIFLOW PIPING CONFIGURATION
REV. 1

2.0 SYSTEM FUNCTIONAL DESCRIPTION

2.1 General Description

The Seal Injection and Makeup (SIM) System provides seal injection water to the reactor coolant pumps and makeup water to the Reactor Coolant System (RCS) during normal operation. It also provides high pressure injection (HPI) of borated water into the RCS in the event of an abnormally low RCS pressure during power operation and/or an abnormally high reactor building pressure.

The SIM System contains three identical pumps:

a. Makeup Pump P-236

b. HPI Pump P-238A

c. HPI Pump P-238B

Each pump is capable of providing the normal makeup and seal injection flows. During normal operation, only one pump is in operation. The Makeup Pump is the one normally in operation while the two HPI pumps are maintained on standby. The three pumps are connected to a common header which takes suction from the makeup tank. The discharge from each of the pumps connects to a common discharge header. Two manually operated stop valves are provided in each cross connection on both the suction and discharge headers enabling any combination of pumps to be operated and providing isolation capability for performing maintenance and/or repair. One pump is isolated from the other two at all times by closing the two cross-connect valves on one side of the suction header. The Borated Water Storage Tank (BWST) discharge valve for this pump is left open. Makeup fluid exiting the pump discharge header is directed into two separate lines. One line supplies seal injection water to the RC pumps and the other line supplies normal makeup to the RCS.

The seal injection line is equipped with a flow control valve which is utilized to maintain the desired flow to the RC pump seals. This valve is opened to allow a larger than normal flow when seal wear or failure is encountered in order to maintain the correct flow pressure on the seals. It can also be isolated, and flow controlled with the bypass valve to permit maintenance of the flow control valve without requiring plant shutdown. Prior to entering the reactor building the seal injection line is split into four individual lines, each of which supplies seal injection to a single RC pump. Each individual line is equipped with a flow indicator and with alarms to identify abnormal flow rates which may indicate seal wear or failure.

2.1 (Continued)

Makeup flow to the RCS is controlled by the makeup flow control valve which regulates the flow rate based on signals from the pressurizer level controller. The flow control valve can be isolated by closing two manually operated block valves located in series on either side of it. A bypass valve has been provided to enable maintenance of the control valve without requiring a plant shutdown. The makeup line is equipped with a remotely operated stop valve which closes to isolate the makeup line upon receipt of a Safety Features Actuation System (SFAS) signal. The line is also equipped with a flow indicator and with an alarm to identify abnormal flow. The makeup line provides makeup to the RCS through the "A" RC Pump discharge line. Letdown flow is taken from the "B" RC Pump suction line drain piping.

When the SIM system is operating in its emergency safeguards mode, it injects borated water from the BWST directly into the RCS through each of the reactor coolant inlet lines. This mode of operation is referred to as High Pressure Injection (HPI). Upon receipt of an SFAS signal, both HPI pumps are automatically started. The second stop valve from the BWST is automatically opened. For long term operation, after the BWST volume has been depleted, suction is taken from the RB Emergency Sump via the decay heat system. Since the cross connection valves are closed, the two pumps are not connected on the suction side. Each individual injection line is equipped with a flow indicator with an alarm to signal abnormal flow. Each of the lines is also equipped with an electric motor-operated valve outside the reactor building and a check valve and a stop-check valve inside the reactor building to provide for reactor building isolation when the lines are not in use.

2.2 Function/Source Cross Reference

This section describes the specific functions performed by the SIM System during both normal operation and emergency conditions to accomplish the general functions previously described.

a. The SIM System provides HPI of borated water from the BWST into the RCS upon receipt of an SFAS signal. (Source: 1, 2)

b. The SIM System provides seal injection to RCPs for cooling and lubrication. (Source: 1, 2)

c. The SIM System provides makeup water to the RCS for volume and chemistry control. (Source: 1, 2)

d. The SIM System provides containment isolation during a LOCA by means of isolation valves in SIM System lines which penetrate the Reactor Building. (Source: 1, 2, 11)

2.2 (Continued)

e. The SIM System provides an RCS pressure boundary. (Source: 1, 2)

f. The SIM System can provide alternate pressurizer spray for cooldown or for boron precipitation mitigation after a LOCA. (Source: 1, 7, 11)

g. The SIM System provides fill water for the Core Flood Tank. (Source: 7, 11)

2.3 System Interfaces

The SIM System interfaces with many other systems. Boundaries with those systems are described as follows:

2.3.1 Purification and Letdown System (PLS)

Downstream of SFV-23508, Makeup Tank Outlet Valve, upstream of SFV-23646, Makeup and HPI Pumps Recirculation Flow First Isolation, and upstream of SIM-062, RCS Fill Line Isolation Valve.

2.3.2 Borated Water System (BWS)

Downstream of BWS-044 and BWS-019, HPI Pump Suction from Concentrated Boric Acid Tank Check Valves.

2.3.3 Core Flood Tanks (CFT)

Downstream of SIM-076, CFT Fill Valve from HPI.

2.3.4 Decay Heat System (DHS)

Upstream of SIM-051 and SIM-042, HPI Pump Suction from Borated Water Storage Tank Isolation Valves, at the piping reducers in HPI pump suction lines from Decay Heat Removal Coolers, downstream of tees for piping drain valves DHS-492 and DHS-493, and downstream of HV-23802, Alternate Pressurizer Spray Isolation Valve.

2.3.5 Radwaste System (RWS)

Downstream of the second-off vent isolation on seal injection lines, SIM-027, SIM-028, SIM-029, and SIM-030.

2.3.6 Reactor Sample System (RSS)

Upstream of RSS-500, Makeup Line Sample Isolation.

2.3 (Continued)

2.3.7 Reactor Coolant Drain System (RCD)

Downstream of second-off vent isolations on HPI lines, SIM-122, SIM-123, and SIM-125.

2.3.8 Reactor Coolant System (RCS)

Downstream of HPI Injection Line Check Valves, SIM-037, SIM-041, SIM-049, and SIM-050 including line drain tees containing SIM valves, and downstream of seal injection line check valves SIM-019, SIM-020, SIM-021, and SIM-022.

2.3.9 Instrument Air System (IAS)

For valves LV-21503, Pressurizer Level Control Valve, and FV-23606, Seal Injection Flow Control Valves, up 2nd including to the first-off component isolations.

2.3.10 Electrical Supply System

Motive electric power to motor operated pumps and valves are at the load side of the motor control center breaker.

2.3.11 Non-Nuclear Instrumentation (NNI)

Electrical/electronic portion of instrumentation is part of NNI. The pressure containing boundary of detection elements is part of SIM.

Control Room indication is part of NNI.

Calibration of NNI instrumentation and loops is included in the NNI system. Testing of interlocks and control functions will be included in SIM.

2.4 Source Documents

(1) Updated Safety Analysis Report, Chapter 6, 9, 14

(2) Rancho Seco System Design Bases, NEPM 5471

(3) Rancho Seco Unit 1 Technical Specifications, Sections 3.2, 3.3, 4.2, 4.3, 4.4, 4.5

(4) Bechtel Corporation Rancho Seco Design Manual, 5.09

(5) Babcock & Wilcox Guide Specifications, 2014, 2017, 2023, 2051

(6) Babcock & Wilcox Topical Report, BAW-10052

2.4 (Continued)

(7) Plant Operations Manual

a. A.15, Rev. 30

b. C.3, Rev. 4

c. C.9, Rev. 3

d. E.02, Rev. 2

e. CP.104, Rev 1

f. Rule 2, Rev. 1

(8) Process Standards, AP.102, Rev. 9

(9) Makeup and Purification System Functional Test, TP202-3

(10) Surveillance Procedures

a. SP.203.02A, Rev. 17

b. SP.203.02B, Rev. 21

c. SP.203.02C, Rev. 21

d. SP.203.02H, Rev. 4

e. SP.203.02I, Rev. 4

f. SP.203.02J, Rev. 4

g. SP.203.02M, Rev. 1

h. SP.203.03, Rev. 10

i. SP.213.01, Rev. 12

j. SP.214.01, Rev. 6

k. SP.200.14, Rev. 13

l. SP.207.02A, Rev. 6

m. SP.207.02B, Rev. 3

n. SP.207.04A, Rev. 1

o. SP.207.04B, Rev. 11

2.4 (Continued)

p. SP.205.02, Rev. 23

q. SP.203.01A, Rev. 14

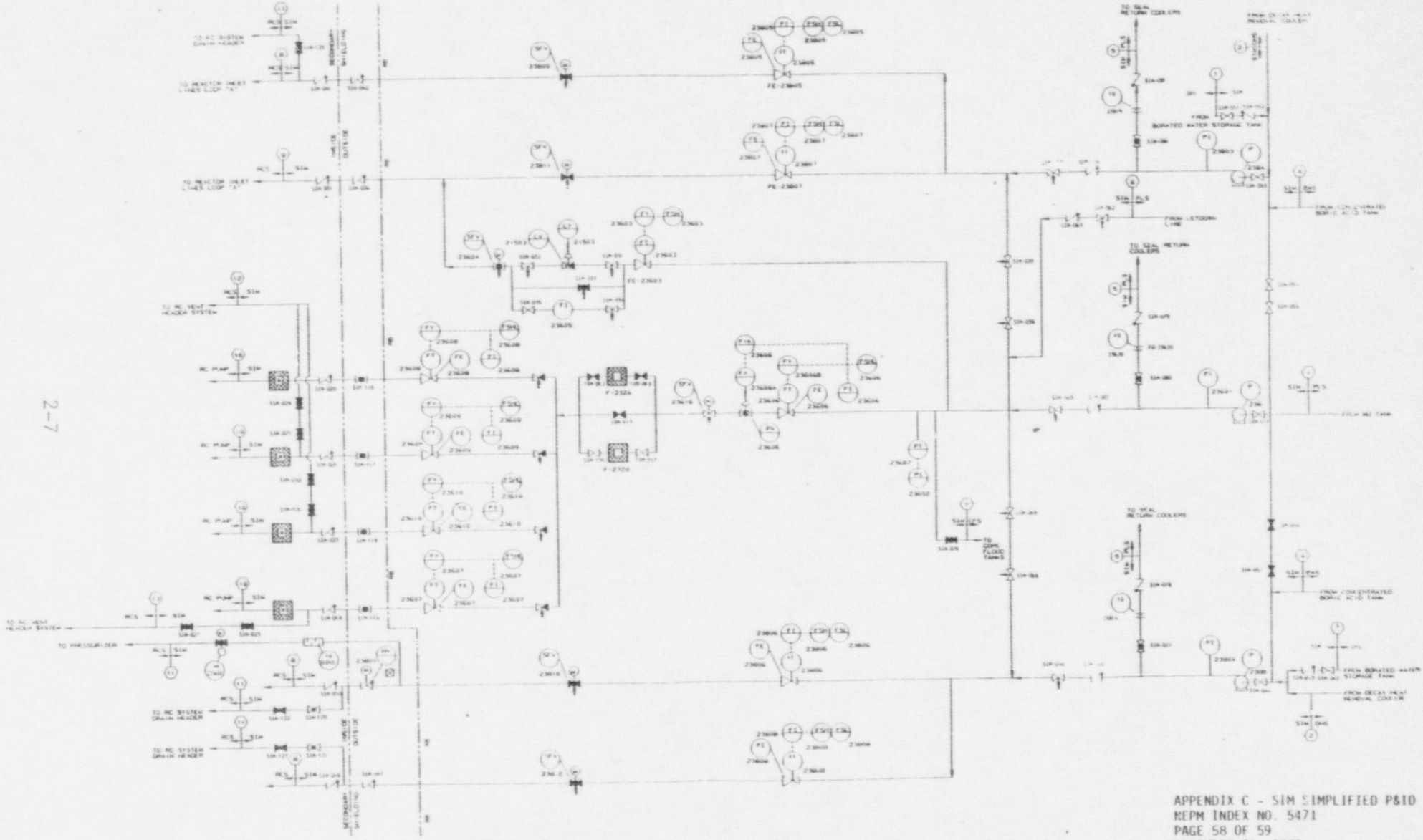
r. SP.203.01B, Rev. 15

(11)Piping and Instrumentation Diagram M-521

(12) Special Test Procedure STP-019

(13) Special Test Procedure STP-1007

(14) Special Test Procedure STP-024



APPENDIX C - SIM SIMPLIFIED P&ID
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INITIAL ISSUE

3.0 REVIEW OF RECOMMENDATIONS AND RESOLUTIONS

3.1 Discussion

This section contains a listing of all problems identified during the systems review. The sources of input include the QCI Tracking System, open Work Requests (WR), open Engineering Change Notices (ECN), open Nonconformance Reports (NRC), and input from plant personnel. There were no Abnormal Tags outstanding for the SIM System. Separate problem statements were written for open NCRs, ECNs, and WRs which are not associated with the problems already identified.

3.2 Index of Problems

Table 3-1 provides summary of the problems associated with the SIM System.

3.3 System Problems

Following Table 3-1 are outlines of the individual system problems.

TABLE 3-1, SIM PROBLEM INDEX

Problem Number	Description	Priority	Original Tracking No.	Current Tracking No.
1	Open Suction Path Training	1	15.0059-1	15.0059-1
2	Loss of Makeup Pump Suction Flow Trip	2	15.0070	15.0070
3	HPI Low Flow Indication Errors	1	15.0113	15.0113
4	Sequential Closing of HPI Valves	1	15.0114	15.0114
5	Verification that Makeup Tank Outlet Valve is Open	1	15.0153	15.0153
6	Cleanout of Makeup and HPI Pump Room Drains	3	15.0248	15.0248
7	Replacement of difficult to operate valves	2	21.0099	26.0093
8	Replacement of HPI Pump Lube Oil Sensing Lines	2	21.0099	26.0094
9	Relocation of HPI Injection Valve Controls	2	21.0099	26.0095
10	Shielding of Seal Inject Filters	3	21.0099	26.0096
11	Open Work Requests	1	26.0225	26.0225
12	Open Work Requests	3	26.0226	26.0226
13	Remote Operation of Individual Seal Injection Flow Controls	Invalid	21.0236	21.0236
14	Recurring Packing Leaks on System Valves	3	26.0100	26.0100
15	Recurring Leakage from Shaft Seals on Makeup Pump	Invalid	26.0101	26.0101
16	Open Nonconformance Reports	1	26.0409	26.0409
17	Open Engineering Change Notices	1	26.0410	26.0410
18	Recurring Lube Oil Leaks on Makeup and HPI Pumps	1	26.0103	26.0103

TABLE 3-1, SIM PROBLEM INDEX (Continued)

Problem Number	Description	Priority	Original Tracking No.	Current Tracking No.
19	Qualification of Spare Stator, P-236-M	1	26.0413	26.0413
20	Makeup/HPI Pump Miniflow Problems	2	16.0008D	16.0008D
21	Repair Schedule for P-236	1	16.0017B	16.0017B
22	Inadequate Procedural Guidance for HPI Flow Anomalies	Invalid	20.0218	20.0218
23	Additional HPI Nozzle Safe-end Cracking Analysis	3	20.0219A	20.0219A
24	Incomplete Evaluation of PSC 28-82; MU/HPI Pump Cavitation	3	20.0222A	20.0222A
25	Evaluate SFAS Control of MU Tank Outlet Valve	3	20.0222B	20.0222B
26	MU/HPI Pump Discharge Check Valves Not Tested	2	20.0224	20.0224
27	Zero-point Shift Anomaly of HPI Flow Transmitters	2	20.0270	20.0270
28	Automatic Restoration of RCP Seal Water	3	20.0279	20.0279
29	FV-23606 Mislabeled	3	22.0183	22.0183
30	Erroneous HPI Pump Bearing Temperature Readouts	3	26.0723	26.0723
31	SFV-23604 and SFV-23616 Electrical Drawing Discrepancies	3	22.0575	22.0575
32	MU/HPI Pump Suction Piping Overpressurization	2	26.0699	26.0699
33	Recurring Water in "B" HPI Pump Lube Oil	Invalid	26.0102	26.0102
34	Low Temperature Overpressure Protection (LTOP)	2	26.0700	26.0700

TABLE 3-1, SIM PROBLEM INDEX (Continued)

Problem Number	Description	Priority	Original Tracking No.	Current Tracking No.
35	Reroute "A" Train HPI Circuits Outside of Fire Area RB1	2	26.0701	26.0701
36	SFV-23811 Position Indication	2	26.0104	26.0104
37	Open Engineering Change Notices	3	26.0702	26.0702
38	Consider Reroute of MU/HPI Miniflow	2	15.0307	15.0307

SYSTEM PROBLEMS

Problem 1: Open Suction Path Training for Pumps in Makeup Flow Path.

Tracking Number: 15.0059-1

Priority: 1 (Approved 6-25-86)

Source: Action List, Item 4.G closure report, 15.0069, 15.0073, 15.0080, 15.0082, 15.0154, 15.0081, 18.0015

Description: Training is required to reinforce the need for maintaining an open suction and discharge path for pumps in the Makeup Flow Path.

Investigation: This item is complete.

Resolution: The training was done on a larger scale than just the makeup flow path.

Testing: N/A

Problem 2: Loss of Flow Trip for Makeup Pump

Tracking Number: 15.0070

Priority: 2

Source: Action List, Item 4.E.1, 15.0071, 15.0072, 16.0007.B, 16.0007D, 16.0015B

Description:

- Determine whether a loss of flow trip on the Makeup Pump is a viable option.
- Determine whether interlocks on SFV-25003, SFV-25004, and SFV-23508, allowing a permissive to close borated water storage tank outlet valves only if Makeup Tank Outlet Valve is open, is a viable option.
- Determine whether a high priority alarm on improper Makeup Pump suction lineup, using a logic which will recognize pump(s) and valve(s) status is a viable option.

Investigation: Nuclear Engineering is evaluating these options.

Resolution: Nuclear Engineering to evaluate and provide recommendations to System Engineer.

Testing: To be determined by results of evaluation.

SYSTEM PROBLEMS

Problem 3:	High Pressure Injection indication errors at low flow rates.
Tracking Number:	15.0113
Priority:	1 (Approved 6-6-86)
Source:	Action List, Item 11.G, 15.0357
Description:	Revise Emergency Procedure Rule No. 2 for High Pressure Injection Flow Control to incorporate a caution that flow indication is inaccurate at low flows.
Investigation:	Work associated with closure of Action List Item 11.G indicates that indication is inaccurate at low flows, below 100 GPM. Flow indicators (FI-23805, FI-23806, FI-23807, and FI-23808) were to be marked with yellow tape below 100 GPM.
Resolution:	Operations to revise Emergency Procedure Rule No. 2 to include this caution. Training on this subject has been completed.
Testing:	N/A

Problem 4: Close High Pressure Injection Valves at Low Flow Rates

Tracking Number: 15.0114

Priority: 1

Source: Action List, Item 11.G Closure Report

Description: Investigate whether, at low High Pressure Injection flow rates, one or more High Pressure Injection Valves should be closed rather than throttling below 100 gpm per nozzle. Modify emergency procedures accordingly.

Investigation: The requirement for balanced HPI flow was investigated. Balanced flow is only required at the high, initial flow rate in the case of an HPI Injection Nozzle break.

Resolution: Operations is to revise Emergency Procedure Rule No. 2 to add a note which recommends maintaining balanced HPI flow down to 100 GPM per nozzle. Below 100 GPM per nozzle, SFVs 23809, 23810, 23811, and 23812 should be shut in order, keeping flow above 100 GPM per nozzle until normal makeup is restored. Training is to include this change in operator requalification training.

Testing: N/A

Problem 5: Verification that Make-up Tank outlet valve is open

Tracking Number: 15.0153

Priority: 1 (Approved 5-23-86)

Source: Action List, Item 10, Section II.D.1 Closure Report, 15.0158, 15.0159

Description: The Emergency Operating Procedures do not require that the Make-up Tank isolation valve be open before miniflow (recirculation) is reestablished when the high pressure injection mode is complete. Failure to follow this procedure could result in overfilling the Make-up Tank. Modify the Emergency Operating Procedure Rule 2 to include the requirement to insure the Make-up Tank outlet isolation valve is open before miniflow is reestablished.

Investigation: Investigation performed during closure of action list item 10.II found that reestablishing miniflow with Makeup Tank outlet isolation valve SFV-23508 shut was the primary cause of overfilling the Makeup Tank and flooding of the Waste Gas Header and Surge Tank.

Resolution: Operations to revise the Emergency Procedure Rule 2 to include the requirement to ensure Makeup Tank outlet isolation valve SFV-23508 is open before miniflow is established.

Testing: N/A

Problem 6:	Drains in Makeup and HPI Pump Rooms
Tracking Number:	15.0248
Priority:	3 (Approved 6-3-86)
Source:	Action List, Item 4.I Closure Report
Description:	Clean the drains in the Makeup and High Pressure Injection Pump Rooms. The rate of drainage from the room on Dec 26, 1985 indicated that the drain line may have been plugged.
Investigation:	N/A
Resolution:	Maintenance to clean out drains in the Makeup and HPI Pump Rooms.
Testing:	N/A

Problem 7: Difficult to operate valves

Tracking Number: 26.0093 (Part of 21.0099)

Priority: 2

Source: Interviews

Description: Evaluate replacing the seal injection filter isolation valves and the HPI cross tie valves (SIM 068, 069, 038 and 039) with valves that can be easily operated. The existing valves are difficult to operate even with a cheater bar.

Investigation: These valves are apparently difficult to open because they must be opened against a 2200 psi differential pressure.

Resolution: Nuclear Engineering to evaluate

Testing: N/A

Problem 8:	HPI Pump lube oil sensing lines
Tracking Number:	26.0094 (Part of 21.0099)
Priority:	2
Source:	Interviews
Description:	Evaluate replacing the HPI pump lube oil sensing lines with stronger hoses.
Investigation:	This item involves replacing a copper line to a pressure switch on each pump.
Resolution:	Nuclear Engineering to evaluate. The evaluation will include observation during pump testing.
Testing:	None required, except data gathering, if any, as determined by Nuclear Engineering to be necessary for their evaluation.

Problem 9:	Relocation of HPI Injection Valve Controls
Tracking Number:	26.0095 (Part of 21.0099)
Priority:	2
Source:	Interviews, 210264.B-1
Description:	Evaluate relocating the HPI injection valve controls to control room panel H1RC. This is more logical in that HPI and pressurizer level/RCS pressure indication would be in a single location.
Investigation:	The Control Room Design Review (CRDR) identified this and recommended to add parallel controls for HPI isolation valves SFV-23809, SFV-23810, SFV-23811, and SFV-23812 to console H1RC.
Resolution:	B&W is providing design details under Mod 142 (Control Room Changes) for Cycle 8 installation.
Testing:	Verify correct operation of controls.

SYSTEM PROBLEMS

Problem 10: Shielding of seal inject filters

Tracking Number: 26.0096 (Part of 21.0099)

Priority: 3

Source: Interviews

Description: Evaluate shielding requirements and consider relocating or permanently shielding the seal injection filters in the East Decay Heat Cooler Room

Investigation: Mod 033 was prepared by Nuclear Engineering to address shielding of the seal inject filters, as well as other filters. The design which was proposed, however, was unsatisfactory from ALARA and maintenance standpoints. The entire task was assumed by Nuclear Operations to provide an alternate design to satisfy their concerns.

Resolution: Nuclear Engineering, Mechanical shall prepare a filter shield design for the seal inject filters (Ref: ECN A-2913A). In addition, they shall evaluate replacing these filters which are considered to be inadequate for the service (Ref: A-2974). This evaluation should include a review of the filter location, since the filters tend to be a source of exposure in the east penetration area. This work shall be completed as manpower and budget permits.

Testing: Testing as required by the modification to verify system integrity and function.

SYSTEM PROBLEMS

Problem 11:	Open work requests
Tracking Number:	26.0225
Priority:	1
Source:	Plant maintenance daily work listing
Description:	A review of open work requests (as of July 12, 1986) was conducted to determine which would require closure prior to plant startup.
Investigation:	The attached work requests were determined to require closure prior to startup.
Resolution:	Complete and close out Priority 1 work requests before plant startup.
Testing:	As required by each work request.

Work Request Number	Problem Description
	VALVES
112740	Repair SIM-040 body to bonnet and packing leak ("A" HPI inside RB isolation stop check).
113068	Replace worn components in LV-21503, pressurizer level control valve.
113151	Fabricate stainless steel packing spacer rings for LV-21503 to replace supplied aluminum ones. This will be investigated for design change implications.
112461	I&C to help restore LV-21503 actuator's control air and circuitry.
110590	Repair SFV-23604 packing leak (makeup isolation).
113763	Adjust SFV-23604 operator so valve will pass LLRT.
111519	Test SFV-23616 per SP203.03 (seal inject filter isolation).
97905	Repair HV-23801 seat leakage, HPI loop B motor operated stop-check (NCR S-4742).
97909	Adjust HV-23801 operator so valve will pass LLRT.
112743	Repair packing leak on HV-23801
114500	E.M. support M.M. to reset HV-23801 limit switches.
97906	Repair HV-23502 seat leakage, alternate PZR spray line isolation (NCR S-4742).
97908	Adjust HV-23802 operator so valve will pass LLRT.
112744	Repair packing leak on HV-23802.
105894	Repair SFV-23810 packing leak, HPI to "B" loop isolation.
105897	Repair SFV-23811 packing and body to bonnet leak, HPI to "A" loop isolation.
113[illegible]7	Adjust SFV-23811 operator so valve will pass LLRT.
111132	Test SFV-23811 per SP203.02A
108284	Repair SFV-23812 packing and body to bonnet leaks, HPI to "B" loop isolation.

Work Request Number	Problem Description
	VALVES (Continued)
114183	Repair packing leak on high root for FT-23603, flow transmitter upstream of LV-21503.
114184	Repair packing leak on low root for FT-23603.
115049	Reposition cocked flange downstream of SIM-538, "B" loop HPI (inside RB) line vent.
	MAKE-UP PUMP P-236
114821	P-236 casing weld repair, machining, and reassembly. (NCR S-5241)
110519	P-236 gear drive disassembly, inspection, and rework. (NCR S-5241).
109376	I & C support P-236 instrument connections and interference removal. (NCR S-5241).
109375	EM. support P-236 electrical connections and bracket removal. (NCR S-5241).
115512	Install Raychem tubing on P-236 motor leads (NCR S-5573).
113022	Decontaminate P-236 motor stator.
115376	Machine Four P-236 casing studs.
109822	Remove P-236 motor and replace stator.
114099	I&C support P-236 motor removal and reinstallation.
113120	Remove unusable P-236 parts, clear disassembly tent for decontamination, prepare for welding and machining repairs, and move pump casing to tent.
113122	Clean P-236 pump studs and nuts, and inspect damage.
108877	Repair P-236 "STOP" BLPB on H2SFB.
114994	Return computer point T-071 to monitor, when work on P-236 is complete.

Work Request Number	Problem Description
	OTHER
113116	Flush line 23620-2 1/2" - CA from drain at SIM-071 to drain at SIM-491 (makeup line through LV-21503).
115402	Test snubber 1SW-23626-3A; repair, retest as necessary.
115471	Test snubber 1SW-23822-7B; repair, retest as necessary.
115459	Remove 1SW-23822-7B, reinstall after testing.
107651	Replace missing support bracket U-bolt near SIM-070.
110916	Replace existing pipe support on line 23829-2"-CA near SIM-086 with one that is project Class 1.
111700	Install missing pipe strap bolt on pipe support 4G-23635-3, near SIM-109. (NCR S-5227)

Collect operator/valve data per IE Bulletin 85-03 for:

115550	SFV-23809-L, HPI to loop "A" isolation
115551	SFV-23810-L, HPI to loop "B" isolation
115552	SFV-23811-L, HPI to loop "A" isolation
115553	SFV-23812-L, HPI to loop "B" isolation
115559	SFV-23616-L, seal to RCPs
115572	SFV-23604-L, makeup to RCS isolation
115573	SFV-23645-L, HPI pumps recirc isolation
115574	SFV-23646-L, HPI pumps recirc isolation

Problem 12: Open work requests

Tracking Number: 26.0226

Priority: 3

Source: Plant maintenance daily work listing

Description: A review of open work requests (as of July 12, 1986) was conducted to determine which would require closure prior to plant startup.

Investigation: It was determined that the following work requests should be worked as soon as possible, however, closure is not required prior to plant startup:

WR Number	Description
105803	Determine size of oil flow restrictor orifice for P-236 thrust bearing.
106998	Inspect SIM-003, P0236 outlet, and repair as necessary.
108231	Replace O-rings on F232A, seal inject filter.
108234	Replace O-rings on F-232B, seal inject filter.
113073	Repair leak on NPT fitting at cyclone separator on P-238B.
115337	Inspect/perform preventive maintenance on selected valves.

Resolution: Complete and close out priority 3 work requests as soon as budgeting and manpower allow.

Testing: As required by each work request.

Problem 13: Remote operation of individual seal injection flow controls.

Tracking Number: 21.0236

Priority: Invalid

Source: Interview B-051-H

Description: There is no remote operation of individual seal injection flow to each RCP. It must be done locally in a potentially high radiation area where there is no flow indication. Provide remote operating station outside radiation areas where individual flows to RCP seals can be adjusted. Provide flow indication with controls. This could be done on H1RC.

Investigation: Interviewed operators to determine how often individual RCP seal flows must be adjusted. Some adjustment is required on Reactor startup and when operating with less than four pump operation. The estimated frequency of operation of the valves (historically) is estimated to be two to three times per year.

Resolution: Remotely operated valves are not warranted.

Testing: N/A

Problem 14: Recurring packing leaks on system valves

Tracking Number: 26.0100

Priority: 3

Source: Machinery History

Description: The following system valves have shown a greater than normal number of packing leaks over the plant's lifetime:

HV-22010
HV-22011
LV-21503
SFV-22025
SFV-23604
SFV-23616
SFV-23810
SIM-020
SIM-036
SIM-046

Investigation: A program of preventive maintenance for plant valves is being developed which will include lubrication of valve stems, examination of packing and other issues. This is a management item to be covered elsewhere.

Resolution: Ensure MGT 21.0001.B resolution is implemented.

Testing: N/A

Problem 15: Recurring leakage from shaft seals on Makeup Pump.

Tracking Number: 26.0101

Priority: Invalid

Source: System Engineer (Machinery History)

Description: Since 1982 there have been multiple work requests to repair leaking shaft seals on Makeup Pump.

Investigation: It was originally surmised that operators, unfamiliar with the amount of leakage acceptable from such seals, were writing work requests unnecessarily, and that, if guidance was provided on acceptable leakage, the problem would be solved. This was the resolution approved by PAG in Rev. 0 of this report.

Later discussion with Mechanical Maintenance, however, indicated that the M/U Pump had been experiencing chronic shaft seal problems in the years prior to the 12/26/85 shutdown, and that maintenance engineers were aware of the problems. He further indicated that these problems were not expected to continue following the rebuild of the M/U Pump, and that, since the mechanical seals used in the pump weren't really expected to leak (much), he thought it more prudent to let the operators bring any shaft seal leakage to the attention of Mechanical Maintenance via a work request. Then, the maintenance foreman or engineer could make a determination of the acceptability of the leakage, and whether or not immediate seal changeout was required.

It was decided to adopt the recommendation of Mechanical Maintenance, subject to acceptance by the Performance Analysis Group. If approved, no further action would be required, and this problem could be closed out.

Resolution: Take no action; close out 26.0101.

Testing: N/A

SYSTEM PROBLEMS

Problem 16: Open Nonconformance Reports.

Tracking Number: 26.0409

Priority: 1

Source: System Engineer/System Design Engineer

Description: A review of open Nonconformance Reports was conducted to determine which would require closure prior to plant startup.

Investigation: The following NCRs were determined to require closure prior to plant startup and are not covered in individual problem statements:

S-5217 Bent SIM Pipe Support (1G-21006-2)
S-5445 SFV-23645 Torque Switch Cracked
S-5503 SFV-23645 Torque Switch Discrepant
S-5697 Oversize Wearing Ring Grooves, P-236
S-5716 P-236 Dowels/Holes Mismatch
S-5918 P-236 Unapproved Supplier

Resolution: Close out priority 1 NCRs prior to startup.

Testing: For SFV-23645 per MOVATS and SP.203.02; for P-236 per SP 203.02C and STP-1007. Also, NCR required testing.

Problem 17: Open Engineering Change Notices.

Tracking Number: 26.0410

Priority: 1

Source: System Engineer/Design Engineer

Description: A review of open Engineering Change Notices was conducted to determine which would require closure prior to startup.

Investigation: The following ECNs were determined to require closure prior to startup. Other priority 1 ECNs are covered by individual problem statements:

R-1027 Change vent and tubing connections on P-236.

R-0914 85-03 MOV Program

R-0968 85-03 Expanded Program, Safety MOVs.

R-1018 Vibration probes for P-236 (the Restart Implementation Manager reviewed this ECN and determined that due to ALARA considerations the work associated with the M/U pump should be completed prior to restart, but that the HPI pump portion should remain as Priority 3. See Problem 37; 26.0702.)

Resolution: Complete and close out priority 1 ECNs prior to startup.

Testing: Testing per the ECN's Test Specifications to verify function and operation.

Problem 18: Recurring lube oil leaks on Makeup and HPI Pumps.

Tracking Number: 26.0103

Priority: 1

Source: System Engineer (Machinery History)
American Nuclear Insurers Letter, May 24, 1985

Description: Recurring lube oil leaks on MU/HPI Pumps.

Investigation: Simultaneous operation of the auxiliary and shaft driven lube oil pumps causes overpressurization which results in leakage through the MU/HPI Pump shaft bearing seals. This problem was identified by the American Nuclear Insurers as a fire hazard. NCR S-5134 was written and Mod 139 (ECN R-1036) developed to correct this problem/nonconformance. ECN R-1036 revises the control logic to provide auto-stop of the auxiliary lube oil pump after the shaft driven pump has built up sufficient pressure. Larger flow capacity pressure relief valves will be installed also.

Resolution: Complete ECN R-1036 prior to plant startup. Close NCR S-5134.

Testing: An STP shall be created to verify the functional changes of ECN R-1036.

Problem 19:	Qualification of Spare Stator for Makeup Pump Motor P-236M.
Tracking Number:	26.0413
Priority:	1
Source:	System Engineer/System Design Engineer
Description:	Since the Makeup Pump was damaged in the December 26, 1985 transient, it was decided to replace the old stator with the new spare stator. (The spare stator was procured from Westinghouse in December 1982 for replacement of the existing stator.) No qualification documentation was found associated with the Purchase order for this procurement.
Investigation:	Following discussions with Westinghouse on the qualification problem, it was decided to seek their assistance to qualify this equipment. Accordingly, Westinghouse submitted a proposal on May 13, 1986, and SMUD Contract Number B316 was issued to Westinghouse on July 10, 1986 to provide qualification service. Westinghouse will not only qualify the spare stator, but will also perform the required data search and analysis to extend the qualified life. (At present, similar motors supplied by Westinghouse to Rancho Seco are qualified for 3.9 years.)
Resolution:	Let Westinghouse qualify the Makeup Pump motor per Contract B316, ensuring qualification is complete and acceptable prior to plant startup.
Testing:	No special tests, other than testing as per EM.125 following installation, need to be performed.

Problem 20:	MU/HPI Pump Miniflow Problems
Tracking Number:	16.00080
Priority:	2
Source:	Action List Item 4H
Description:	IE Information Notice 85-94 identifies problems at other nuclear plants with ECCS pump miniflows. The request was to examine the notice for applicability to Rancho Seco.
Investigation:	The subject Information Notice was evaluated by Nuclear Engineering, and it was determined that the concerns raised therein do not apply to Rancho Seco ECCS pumps (Reference Action Item 4H Closure Report).
Resolution:	Action is completed; close out this problem.
Testing:	N/A

Problem 21:	Repair Schedule for P-236.
Tracking Number:	16.0017.B
Priority:	1
Source:	Action List
Description:	Licensee to provide schedule for repair and replacement of the Makeup Pump. This is a RRRB priority 1 item.
Investigation:	This matter was discussed with Licensing and a RRRB member. The problem was stated prior to the decision being made to repair P-236 before startup. The SMUD Action Plan (Item 4B.5.1.3) identifies rework of P-236 as a restart item, therefore, a schedule of repair is not required.
Resolution:	This item is complete; close it out.
Testing:	N/A

Problem 22: Inadequate Procedural Guidance for HPI Flow Anomalies.

Tracking Number: 20.0218

Priority: Invalid

Source: Precursor PSC 10-83-1R

Description: During review of Preliminary Safety Concern 10-83 the Precursor Group identified that no procedural guidance exists regarding obstructed HPI flow or a failed open HPI valve. The request was to consider providing such guidance. RRRB approved this recommendation as a priority 2.

Investigation: Discussions were held with various Control Room Operators and Shift Technical Advisors. It is the consensus opinion that since the system is analyzed for a failed HPI valve (USAR Section 6.1.1), that operator training regularly addresses similar concerns, and that attempts to proceduralize every eventuality only serve to clutter up the procedures and render them ineffective, it would not be prudent to attempt to provide such guidance.

Resolution: Dismiss the problem as invalid.

Testing: N/A

Problem 23: Additional HPI Nozzle Safe-End Cracking Analysis.

Tracking Number: 20.0219.A

Priority: 3

Source: Precursor PSC 5-82-1R

Description: HPI "A" and "B" Nozzle Safe-Ends were replaced due to cracking. Babcock and Wilcox performed an analysis (Task 370) to determine the remaining fatigue life in the nozzles, however, actual effects of transients on the nozzles were not adequately analyzed.

Investigation: B&W performed a generic stress analysis (Ref: B&W Document # 77-11555880-00) for the Makeup/HPI nozzles with modified safe-ends and thermal sleeves to maintain the original licensing commitment regarding the stress and fatigue usage allowables required by the applicable code. The NRC submitted a letter regarding the resolution of generic issue 69 (HPI/MU nozzle cracking in B&W plants, November 8, 1985) which noted that operating experience for some plants has indicated that the expected fatigue analysis could be substantially exceeded by the end of life due to unanalyzed transients. This concern was supported by a request from Tech Support (Ref: TS 85-1229/GAC 85-926, dated December 3, 1985) for Engineering to provide guidance regarding the allowable number of cycles at various RCS pressures and temperatures normally encountered during heatups and cooldowns.

Resolution: Nuclear Engineering, Mechanical, will perform an analysis which will encompass all anticipated transients to determine the remaining fatigue life in the Makeup/HPI nozzles.

Testing: To be determined by results of analysis.

Problem 24:	Incomplete evaluation of PSC 28-82 - MU/HPI Pump Cavitation.
Tracking Number:	20.0222A
Priority:	3
Source:	Precursor 28-82-2R
Description:	The District has not completed an evaluation of preliminary safety concern 28-82, which identifies a condition which could result in depletion of the makeup tank and cavitation of the Makeup/HPI Pumps.
Investigation:	A review of the files revealed that a response has not been completed to PSC 28-82. The concern was raised that a certain small break LOCA and a failure of the Makeup Tank Low level transmitter could result in the depletion of the inventory in the Makeup Tank and subsequent cavitation of the Makeup Pump due to the loss of NPSH.
Resolution:	Nuclear Engineering, Mechanical, will complete an evaluation of PSC 28-82, prepare a response, and provide a copy for the System Engineer.
Testing:	N/A

Problem 25: Evaluate SFAS control of Makeup Tank Outlet Valve SFV-23508.

Tracking Number: 20.0222.8

Priority: 3

Source: Precursor PSC 28-82-2R

Description: Preliminary Safety Concern 28-82 identifies a condition causing cavitation of the Makeup/HPI pumps and depletion of the Makeup Tank. The request is to evaluate SFAS control of the outlet valve, SFV-23508, and then, if any changes are made, to test the system and provide operators guidance in Process Standards regarding allowable combinations of Makeup Tank level and pressure. This was a RRRB priority 3.

Investigation: This recommendation was previously investigated (Ref: action item closure report 4.g) in response to RJR letter 86-19, and it was determined that the Makeup Tank outlet valve SFV-23508 should not be removed from SFAS. USAR Section 6.2.2.1.1 states that the Makeup Tank outlet valve is to automatically close as the makeup and purification system switches to its emergency operating mode so BWST can be delivered to the reactor vessel. SFV-23508 must close on SFAS to prevent normal makeup water from initially diluting HPI, and more importantly, prevent gas binding of the HPI pumps due to drain down of the Makeup Tank, which would risk the loss of all HPI.

Resolution: This item is complete due to previous evaluation of the problem.

Testing: N/A

Problem 26: MU/HPI Pump Discharge Check Valves not tested.

Tracking Number: 20.0224

Priority: 2

Source: IEN-81-30-1R

Description: Although MU/HPI Pump discharge check valves are tested during Surveillance Procedures SP.203.01A and B, no direct reference to this is mentioned in the procedures.

Investigation: The discharge check valves SIM-002 (P-236), SIM-045 (P-238B), and SIM-058 (P-236A) are full stroked each refueling during SP.203.01A and B, and partial stroke tested quarterly during SP.203.02A, B, and C but no credit is taken specifically in any of the procedures, except for visual inspection of the valves during the quarterly tests. It was also noted that neither these three valves, nor the three HPI/MU Pump recirculation check valves, SIM-079 (P-236), SIM-081 (P-238A), and SIM-078 (P-238B) are identified in these procedures as being tested in the reverse flow direction. Failure of these valves to seat could result in overpressurization of pump suction piping.

Resolution: System Engineer to revise the surveillance procedures indicated to include direct references to these valves. This will provide documentation that they have been tested properly. Also, to ensure all six are tested in the reverse flow direction.

Testing: N/A

Problem 27: Zero Point Shift Anomaly of HPI Flow Transmitters.

Tracking Number: 20.0270

Priority: 2

Source: Precursor IEN-85-100-1R

Description: The zero point shift of certain Rosemont differential pressure transmitters, resulting in erroneous HPI flow indication, has not been completely resolved.

Investigation: Following the 10/02/85 overcooling event, an investigation of the HPI flow transmitters was performed to explain their erratic behavior. The problem surfaced again during the 12/26/85 event and was presented to the PAG as 15.0113. Resolution for this portion of the problem included warnings to operators regarding erroneous indication at low flow rates and a previous commitment to changeout two of the transmitters before startup was identified.

Resolution:

1) I&C Maintenance to changeout the two transmitters, FT-23807 and FT-23808.

2) Nuclear Engineering I&C to review the HPI flow transmitter zero shift anomaly, evaluate a modification to install transmitters of better accuracy, and provide System Engineer with a copy of the evaluation and recommendations.

Testing:

1) Bench or acceptance testing as required.

2) N/A

Problem 28: Automatic Restoration of RCP Seal Water Following a Loss of Offsite Power.

Tracking Number: 20.0279

Priority: 3

Source: Precursor BR-0737-9R

Description: Item II.k.2.16 of Nureg 0737 identified the need to maintain adequate seal water flow to RCP seals during a loss of offsite power. ECN R-0089 was written to accomplish this by providing for automatic starting of the HPI pump which suction is lined up from the BWST, and opening of the seal return valve SFV-24013, on loss of offsite power.

Two recommendations were made:

1) Investigate rescheduling this ECN to be completed when EDG backup power is available, i.e., the TDI Diesels.

2) Consider alternate methods of providing seal cooling water. (Assuring that Component Cooling Water is available to the seals may require actuation or usage of fewer safety system components.) This is stated to be an alternative to seal injection water in the 08/29/84 SER.

Investigation: ECN R-0089 was reviewed. It is believed that there are too many unanswered questions to allow implementation of this ECN as written. It is presently scheduled for Cycle 8, although the TDI Diesels are a startup item.

Resolution: Nuclear Engineering to re-evaluate R-0089 with regard to:

1) Considering alternate methods of supplying seal water on LOOP and

2) Problems associated with present design,

and provide a copy of recommendations/re-evaluation to System Engineer.

Testing: N/A

Problem 29: FV-23606 mislabeled (RCP Seal Supply Flow Control Valve).

Tracking Number: 22.0183

Priority: 3

Source: Deterministic (DFC-430)

Description: Plant records are not consistent in labeling of the RCP Seal Supply Flow Control Valve, FV-23606.

Investigation: FV-23606 is referred to as PV-23606 in most plant literature, including Operating Procedure A.15, the Master Equipment List, P&ID M-521, and Nuclear Engineering Procedure 5471. Casualty Procedure C.23 calls it FV-23606, and it does regulate flow, not pressure.

Resolution: System Engineer to determine correct nomenclature and initiate revisions to plant records as necessary to obtain consistency in the naming of FV-23606.

Testing: N/A

Problem 30: Erroneous HPI Pump Bearing Temperature Readouts.

Tracking Number: 26.0723

Priority: 3

Source: System Engineer

Description: IDADS and SPDS descriptors for two (of four) speed change gear bearing temperature thermocouples appear to be reversed on both "A" and "B" HPI Pumps.

Investigation: This problem was identified at the end of 1985. The thermocouples in question are TE-23843 and TE-23845 for "A" HPI Pump (motor-end and motor-end center bearings) and TE-23840 and TE-23842 for the "B" HPI Pump (pump-end and pump-end center bearings). Work Requests 110097 and 110098 were written (02/22/86) to correct the problem, but they were apparently closed out without it being resolved.

Resolution: I&C Maintenance to yellow-line applicable prints and take action necessary to verify thermocouples, wiring, and computer readouts coincide.

Testing: As required to verify correct bearing temperatures as read.

Problem 31: SFV-23604 and SFV-23616 electrical drawing discrepancies.

Tracking Number: 22.0575

Priority: 3

Source: DFC-0794 and DFC-0801

Description:

(1) No logic diagram exists for the Makeup Isolation Valve SFV-23604 (Ref: E-203, Sh 49).

(2) E-203, Sh 54, shows an auxiliary relay (AX) wired into a circuit although its design function was removed by a prior modification.

Investigation:

(1) A review of the SMUD Drawing System verified that there is no logic diagram for SFV-23604. It could not be determined why this is so.

(2) The design function of relay "AX" was removed from the circuit of valve SFV-23616 by ECN A-1240. This ECN removed the SFAS actuation of the valve and added an interlock with the flow switches to three of the RCP pump seals. In performing this modification the SFAS signal was removed, however, the relay which responded to SFAS (AX) was left in the circuit, although not connected to an initiating signal.

Resolution:

(1) Nuclear Engineering, Instrumentation, shall develop and issue a logic diagram to demonstrate the function of Makeup Isolation Valve SFV-23604. This logic diagram number shall be referenced on the appropriate electrical drawings.

(2) Nuclear Engineering shall prepare a design package to disconnect and remove auxiliary relay coil "AX", which is an inactive component in the circuit of valve SFV-23616.

Testing: N/A

Problem 32: MU/HPI Pump Suction Piping Overpressurization.

Tracking Number: 26.0699

Priority: 2

Source: INPO Significant Operating Experience Report (SOER) 82-3

Description: There exists the possibility for overpressurizing the suction piping to Makeup Pump P-236 and HPI Pumps P-239A and B due to back leakage through check valves SIM-002, SIM-045 and SIM-058.

Investigation: Evaluation of SOER 82-3 by Nuclear Engineering and Nuclear Operations indicated that the concerns brought up by the SOER apply only to the Makeup and High Pressure Injection Pumps' inlet piping.

Resolution: New relief valves shall be installed in the suction lines of the Makeup and HPI Pumps and the valve discharges shall be routed to the Reactor Coolant Drain Tank (V-600) via either the Makeup Tank to the RCS Drain Tank line or the letdown relief line to prevent uncontrolled airborne activity releases. This work shall be implemented through Mod 112 by the end of the Cycle 8 outage.

Testing: To be determined by modification.

Problem 33: Recurring water in "B" HPI Pump Lube Oil

Tracking Number: 26.0102

Priority: Invalid

Source: System Engineer (Machinery History)

Description: Several instances of water being found in bearing oil have been recorded. In 1983 a hydrostatic test of the lube oil cooler showed no leakage but no resolution as to the source was made. No resolution of the problem was recorded.

Investigation: Since the last incident of water in the HPI Pump oil (10/83) a preventive maintenance task has been added to MIMS. This task (05456) requires the periodic (90 da) drawing of an oil sample and analysis of the sample for water and other contaminants. Since the program has been instituted, no additional incidents have occurred. Also, this "B" HPI Pump Raw Water Lube Oil Cooler was changed out in 07/83 76093), which may have resolved the problem.

Resolution: Continue to monitor oil for water under PM program. This item is invalid since no further incidents have occurred.

Testing: N/A

Problem 34: Low Temperature Overpressure Protection (LTOP).

Tracking Number: 26.0700

Priority: 2

Source: NRC to SMUD Letter dated 08/11/76; Mod 049

Description: Incidents identified as "Pressure Transients" have occurred in PWRs, where the pressure limit in the Technical Specifications for a given temperature is exceeded. These incidents generally occur at relatively low temperatures where the reactor vessel material toughness is reduced from that which exists at normal operating temperature and where the primary system is in a "Water-Solid" condition. In various correspondence between SMUD and the NRC, the District made certain commitments to resolve this issued at Rancho Seco.

Investigation: Mod 049 was issued in May 1983 to resolve the concerns of LTOP. The installation of alarms and associated circuitry for certain valve positions, flow indications, pressure indications, and power status for HPI Pumps was completed during the Cycle 7 refueling outage (Ref: ECNs A-4329, A-4887, A-4985).

The installation of a block valve and a parallel restricting orifice in the makeup line to the RCS, including control and monitoring circuitry, is scheduled for completion by the end of the Cycle 9 outage. The installation of a new control valve for controlling makeup flow is also scheduled for completion by the end of the Cycle 9 outage. These valves are long lead procurement items for which Babcock & Wilcox has prepared a procurement specification per Task 442.

Resolution: Nuclear Engineering shall prepare and issue a design package for installing the new block valve, restricting orifice, and associated circuitry as scheduled in the living schedule. The procurement of the valves shall be done in time to support the implementation of the modification.

Testing: To be determined by modification.

Problem 35: Reroute Train "A" HPI Circuits Outside of Fire Area RB1.

Tracking Number: 26.0701

Priority: 2

Source: ERPT-E-0015, Appendix "R" Evaluation

Description: The Appendix R evaluation performed by B&W identified that circuits belonging to HPI Pump P-238A, Makeup Pump P-236, HPI Lube Oil Pump P-238ALOP, and HPI Pump Room Cooler A-529A are all routed through Fire Area RB1. In the event that HPI Pump P-238B is out of service, then both HPI Pump P-238A and Makeup Pump P-236 should be available; however, a fire in area RB1 could disable both of these pumps.

Investigation: None required.

Resolution: Nuclear Engineering, Electrical, shall reroute power and control cables which serve HPI Pump P-238A and HPI Pump Cooler A-529 through Fire Area 48. This work shall be performed under Mod 143 and shall be implemented by the end of Cycle 8 outage. Closure to be provided to System Engineer.

Test: As determined by modification.

Problem 36: SFV-23811 position indication (HPI "A" Loop Injection Isolation).

Tracking Number: 26.0104

Priority: 2

Source: System Engineer (Action List Item 11.g, Nom 86-149)

Description: The final action, on SFV-23811 Action List Item No. 11.g, was to reset the limit switch to one half turn (of the valve handwheel) open. There is a concern that this is not conservative in that the probability of failure of the valve to open may be significantly increased. There appears to be insufficient technical basis for the change from two to one-half turn setting. The closer the limit switch setting is to fully closed, the greater the probability that drift will cause the torque switch to cut in too early, causing failure to open.

Investigation: It is believed that there was sufficient technical basis for setting the limit (torque bypass) switch to 1/2 turn open. This type of valve (globe) does not have a long pull of high resistance as a wedge-type (gate) valve does, and the limit switch was set where the unseating resistance disappeared. Revision 5 of EM.117, Functional Test of Valve Motor Operators, supported this method of setting limit switches.

The whole question became moot when EM.117 was completely rewritten (Rev. 7 issued 10/31/86) per the MOVATS program. SFV-23811 will be reworked under this program, and limit switches set per EM.117.

Resolution: Close this item out per action taken under MOVATS program.

Testing: N/A

Problem 37: Open Engineering Change Notices (ECNs).

Tracking Number: 26.0702

Priority: 3

Source: System Engineer/Design Engineer

Description: A review of open ECNs was conducted to determine which would require closure prior to startup.

Investigation: It was determined that the following ECNs should be completed as soon as budgeting and manpower allow, however, closure is not required prior to plant startup:

R-1018 Install vibration probes on HPI Pumps.

R-1204 Install casing vibration transducer mounting blocks.

Resolution:

1. Nuclear Engineering, Mechanical, complete ECN R-1018 (HPI pumps portions) as priority 3 and provide closure to System Engineer.

2. Nuclear Operations complete ECN R-1204 as priority 3 and provide closure to System Engineer.

Testing: None required.

Problem 38: Consider Reroute of MU/HPI Pump Miniflow.

Tracking Number: 15.0307

Priority: 2

Source: Action List (Item 2.A and 4.F)

Description: During recover from SFAS initiation, HPI and MU pumps may take suction from BWST but discharge miniflows (recirculation) back to Makeup Tank, causing it to overflow.

Investigation: This problem was called valid by the RRRB, but was also considered covered under 15.0075A. 15.0075A does not, however, address what is perceived to be a serious design flaw in the system. This was investigated (reference Closure Report for Action Item 4.F, 01/30/86) and some possible options were recommended for consideration, including a backpressure control valve on the MU Tank, an interlock between the pump suction valve from the MU Tank and the miniflow valves, and installation of two additional miniflow valves and piping to the BWST.

Resolution: Nuclear Engineering, Mechanical to conduct evaluation of present piping configuration, modes of system operation, and the subject closure report, and provide a copy of recommendations to System Engineer.

Testing: N/A

4.0 TEST IDENTIFICATION

4.1 Discussion

This section will identify, for each system function, the scope of testing that exists or which needs to be developed to evaluate the system's ability to perform that function. Also included is that testing which should be conducted prior to startup.

4.2 Test Recommendation

The SIM system functions which will be tested are as follows:

a. Provide makeup to the RCS for volume and chemistry control.

b. Provide seal injection to RCPs.

c. Provide borated water to RCS on SFAS signal.

d. Provide containment isolation on SFAS signal.

e. Provide RCS pressure boundary.

f. Provide alternate pressurizer spray for cooldown or for boron dilution.

g. Fill Core Flood Tanks.

TEST RECOMMENDATIONS

System Function (a): Provide makeup water to the Reactor Coolant System (RCS) for volume and chemistry control.

Testing Recommended to Verify Function:

Operational tests of the Makeup Pump, P-236, and the High Pressure Injection Pumps, P-238A and P-238B, should be conducted quarterly to ensure their performance has not been degraded excessively from accepted values.

The Pressurizer Level Control Valve, LV-21503, should be functionally tested during each refueling outage to ensure that it will full stroke upon a manual mode command, and that is will control pressurizer level satisfactorily in the automatic mode.

The flowpath into the RCS through LV-21503 should be verified.

Scope of Existing Testing:

The "A" and "B" HPI Pumps and the Makeup Pumps are vented monthly, and prior to any ECCS flow tests, per Surveillance Procedures SP.203.02H, I, and J, "Monthly High Pressure Injection Venting Surveillance." The pumps are run quarterly per SP.203.02A, B, and C, "Quarterly HPI and Surveillance Tests," which verify their operability in accordance with ASME Boiler and Pressure Vessel Code Section XI requirements with respect to differential pressures, flows, bearing temperatures and vibration readings, etc.

Special Test Procedure STP-024, "Pressurizer Level Control Valve Flow Test," was conducted in August 1974 to test the capability of LV-21503 to throttle and to pass full flow. SP.200.14, "Process Instrumentation Calibration Surveillance," calibrates the Pressurizer Level Control instrument loop on a refueling interval. The valve is also full stroked remotely during this surveillance. Performance of this valve is also observed, both in manual and automatic modes, during normal plant operations.

Flow through the Pressurizer Level Control Valve into the RCS is verified from the Makeup Pump and both HPI Pumps quarterly per SP.203.02A, B,and C, "Quarterly HPI and Makeup Pump and Valves Inspection and Surveillance Tests." The flowpath is also verified constantly during normal operations.

TEST RECOMMENDATIONS

Recommended Additional Testing: STP-1007, Makeup Pump Acceptance Test.

Testing Recommended Prior to Startup: The following surveillance procedures should be brought current prior to restart:

SP.203.02A - Quarterly HPI Loop A Inspection and Surveillance Test.

SP.203.02B - Quarterly HPI Loop B Inspection and Surveillance Test.

SP.203.02C - Quarterly Makeup Pump and Valves Inspection and Surveillance Test.

SP.200.14 - Process Instrumentation Calibration Surveillance.

(Performance of the pump surveillances will include venting of the pumps, if required.)

The Makeup Pump Acceptance Test, STP-1007, should be performed to verify operability prior to release to Operations.

System Function (b): Provide seal injection to Reactor Coolant Pumps (RCPs) for cooling and lubrication.

Testing Recommended to Verify Function: Operational tests of the Makeup Pump, P-236, and the HPI Pumps, P-238A and P-238B, should be conducted quarterly to ensure their performance has not been degraded excessively from accepted values.

Seal Injection flow instrumentation should be calibrated annually, and the Seal Injection Flow Control Valve, FV-23606, should be observed to verify its ability to control seal flow, and to verify the flowpath to the RCPs.

A test of the Seal Injection Isolation Valve low flow interlock should be conducted (SFV-23616).

Scope of Existing Testing: Both HPI Pumps and the Makeup Pump are vented per SP.203.02H, I, and J, "Monthly HPI Venting Surveillance," and operationally tested per SP.203.02A, B, and C, "Quarterly HPI and Makeup Pumps and Valves Inspection Surveillance" as previously described.

Routine calibration of seal injection flow instrumentation is performed annually per various Preventive Maintenance Tasks. Verification of the flowpath and of the operability of the flow control valves takes place constantly during normal plant operations.

The Seal Injection Isolation Valve, SFV-23616, is stroked, timed, and inspected per SP.203.03, "Quarterly Makeup and Purification System SFAS Valve Inspection and Surveillance Test (48 hour shutdown)." Special Test Procedure STP-019, "Seal Injection, Seal Return Retest," was conducted in August 1974 which tested the seal injection interlock.

Recommended Additional Testing: None

Testing Recommended Prior to Startup:

The following surveillance procedures should be brought current prior to startup:

SP.203.02A - Quarterly HPI Loop A Inspection and Surveillance Test.

SP.203.02B - Quarterly HPI Loop B Inspection and Surveillance Test.

SP.203.02C - Quarterly Makeup Pump and Valves Inspection and Surveillance Test.

SP.203.03 - Quarterly Makeup and Purification System SFAS Valve Inspection and Surveillance Test.

Special Test Procedure STP-019, "Seal Injection, Seal Return Retest," should be performed to test the seal injection low flow interlock.

System Function (c): Provide high pressure injection of borated water into the RCS for emergency core cooling upon receipt of an SFAS signal.

Testing Recommended to Verify Function: Testing should be performed at each refueling shutdown to ensure that HPI Pumps will start and operate satisfactorily upon receipt of an SFAS signal. This should include testing the automatic start features of the Makeup Pump when lined up to act as either the "A" or the "B" HPI Pump. Testing on this interval should verify that operational characteristics of the pumps have not degraded excessively from accepted values.

Testing should be performed at each refueling shutdown to ensure that automatic valves required to direct flow into the RCS actuate on receipt of an SFAS signal and go to their safeguards positions. Further testing should verify that these valves complete their strokes within acceptable time periods, and flows should be observed to verify that injection valves throttle positions result in balanced flow to the RCS cold legs.

Scope of Existing Testing: The HPI Pumps and the Makeup Pump are vented monthly and just prior to any ECCS flow test, per SP.203.02H, I, J, "Monthly HPI Venting Surveillance." The pumps are run per SP.203.02A, B, and C, "Quarterly HPI and Makeup Pumps and Valves Inspection and Surveillance Tests," which verify their operability and performance as previously described. These surveillances also stroke, time, and verify remote position indication for HPI injection valves, SFV-23809, SFV-23810, SFV-23811, and SFV-23812, the makeup line isolation valve, SFV-23604.

SP.203.01A and B, "SFAS Digital Channel 1A and 1B Refueling Tests," initiate SFAS signals and verify safeguards equipment operation including: starting of HPI Pumps and their auxiliary lube oil pumps, starting of the Makeup Pump (and its auxiliary lube oil pump) when lined up electrically to act as either HPI Pump, proper positioning of safety features valves, and indication of flow through all four injection lines.

System Function (c): (Continued)

Scope of Existing Testing: (Continued)

HPI injection line flow instrumentation loops are calibrated annually per SP.200.14, "Process Instrumentation Calibration Surveillance." Pump alarms and pressure gauges are calibrated routinely per various preventive maintenance (PM) tasks.

Recommended Additional Testing: Revise existing Surveillance Procedures to adequately document functional testing of HPI and Makeup Pump discharge check valves, SIM-058, SIM-045, and SIM-002, and recirculation stop check valves, SIM-081, SIM-078, and SIM-079.

Testing Recommended Prior to Startup: The following surveillance procedures should be brought current prior to restart:

SP.203.01A - SFAS Digital Channel 1A Refueling Test

SP.203.01B - SFAS Digital Channel 1B Refueling Test

SP.203.02A - Quarterly HPI Loop A Inspection and Surveillance Test

SP.203.02B - Quarterly HPI Loop B Inspection and Surveillance Test

SP.203.02C - Quarterly Makeup Pump and Valves Inspection and Surveillance Test

SP.200.14 - Process Instrumentation Calibration Surveillance

System Function (d): Provide containment isolation on receipt of an SFAS signal. Also, provide long term containment isolation after SFAS is discontinued.

Testing Recommended to Verify Function: Testing should be performed at each refueling shutdown to ensure that isolation valves in lines not performing an HPI function, and which receive an SFAS signal, go to their SFAS position. The Makeup Isolation Valve, SFV-23604, is the only such valve in the SIM System.

Local leak rate testing should be performed at each refueling on all containment isolation boundary valves.

Scope of Existing Testing: Surveillance Procedures SP.203.01A and B, "SFAS Digital Channels 1A and 1B Refueling Tests," both verify that SFV-23604 closes on receipt of an SFAS signal.

HPI Loop A isolation valves SFV-23809 and SFV-23811 are operationally tested per SP.203.02A, "Quarterly HPI Loop A Inspection and Surveillance Test."

HPI Loop B Isolation Valves SFV-23810 and SFV-28312 are operationally tested per SP.203.02B, "Quarterly HPI Loop B Inspection and Surveillance Test."

Makeup Isolation Valve SFV-23604 is operationally tested per SP.203.02C, "Quarterly Makeup Pump and Valves Inspection and Surveillance Test."

Seal Injection Isolation Valve SFV-23616 is operationally tested per SP.203.03. Quarterly Makeup and Purification System SFAS Valve Inspection and Surveillance Test.

Verification that leakage through all penetration boundary valves is satisfactory is obtained each refueling per SP.205.02, "Local Component Leak Rate Surveillance Testing."

Recommended Additional Testing: None

System Function (d): (Continued)

Testing Recommended Prior to Startup: The following surveillance procedure should be brought current prior to startup:

SP.203.01A - SFAS Digital Channel 1A Refueling Test

SP.203.01B - SFAS Digital Channel 1B Refueling Test

SP.203.02A - Quarterly HPI Loop A Inspection and Surveillance Test

SP.203.02B - Quarterly HPI Loop B Inspection and Surveillance Test

SP.203.02C - Quarterly Makeup Pump and Valves Inspection and Surveillance Test.

SP.203.03 - Quarterly Makeup and Purification system SFAS Valve Inspection and Surveillance Test.

SP.205.02 - Local Component Leak Rate Surveillance Testing.

TEST RECOMMENDATIONS

System Function (e): Provide Reactor Coolant System (RCS) pressure boundary.

Testing Recommended to Verify Function: RCS boundary valves should be operationally tested quarterly. Additionally, inspections should be performed following opening of the system to atmosphere.

Scope of Existing Testing: Two surveillance procedures are run which verify that the RCS meets the leakage limitations of the Technical Specifications, as determined by a water inventory balance. SP.207.04A, "Daily RCS Leak Check," and SP.207.4B, "Weekly RCS Leak Check," both use Pressurizer level, Makeup Tank level, and Pressurizer Relief Tank level differences over an hour elapsed time to determine leakage. (It may be noted that during normal operation most of the SIM system is at a higher pressure than that of the RCS). Routine walk-throughs are also performed by the Auxiliary Operator of rooms containing SIM piping and components. The SIM isolation valves from RCS, HV-23801, HV-23802, and HV-23616 are stroke tested per SP.203.03, "Quarterly Makeup and Purification System SFAS Valve Inspection and Surveillance Test," and SFV-23809, SFV-23810, SFV-23811, SFV-23812, and SFV-23604 are stroke tested during SP.203.02A, B, and C, "Quarterly HPI and Makeup Pump and Valves Inspection and Surveillance." Two other inspection surveillances are performed whenever required: SP.207.02A, "Leakage Testing of the RCS Following Opening of a Mechanical Joint," and SP.207.02B, "Hydrostatic Test of RCS Following a Modification or Welded Repair."

Recommended Additional Testing: None

Testing Recommended Prior to Startup: The following surveillance procedures should be brought current prior to startup: SP.203.02A, B, and C, "Quarterly HPI and Makeup Pump and Valve Inspections," and SP.203.03, "Quarterly Makeup and Purification System SFAS Valve Inspection and Surveillance," to ensure operability of system boundary valves. After reaching operating pressure, SP.207.02A, "Leak Test of RCS Following Opening of a Mechanical Joint," and SP.207.02B, "Hydrostatic Test of RCS Following Modification or Welded Repair" should be performed.

System Function (f): Provide alternate pressurizer spray for cooldown and boron precipitation mitigation.

Testing Recommended to Verify Function: Operational tests of the Makeup Pump, P-236, and the HPI Pumps, P-238A and B, should be conducted quarterly to ensure their performance has not been degraded excessively from accepted values.

Operational testing should be conducted quarterly on motor operated valves SFV-23810, HPI to B loop, and HV-23801 and HV-23802, ECCS Long Term Cooling Valves.

Calibration of FT-23806 flow instrumentation loop should be performed annually.

Flowpath of water into the alternate pressurizer spray line should be verified.

Scope of Existing Testing: Both HPI Pumps and the Makeup Pump are vented per SP.203.02H, I, and J, "Monthly HPI Venting Surveillances," and operationally tested per SP.203.02A, B, and C, "Quarterly HPI and Makeup Pumps and Valves Inspection Surveillances," as previously described. SFV-23810 is also tested in SP.203.02B, including stroke and time.

HV-23801 and HV-23802 are functionally tested including stroke and time per SP.203.03, "Quarterly Makeup and Purification System SFAS Valve Inspection and Surveillance Test."

The flow instrumentation loop of FT-23806 is calibrated annually per SP.200.14, "Process Instrumentation Calibration Surveillance."

The flowpath of water through the alternate pressurizer spray line is verified during normal plant cooldown.

Recommended Additional Testing: None

System Function (f): (Continued)

Testing Recommended Prior to Startup: The following surveillance procedures should be brought current prior to restart:

SP.203.02A - Quarterly HPI Loop A Inspection and Surveillance Test.

SP.203.02B - Quarterly HPI Loop B Inspection and Surveillance Test.

SP.203.02C - Quarterly Makeup Pump and Valves Inspection and Surveillance Test.

SP.203.03 - Quarterly Makeup and Purification System SFAS Valve Inspection and Surveillance Test.

SP.200.14 - Process Instrumentation Calibration Surveillance.

System Function (g): Fill Core Flood Tanks.

Testing Recommended to Verify Function:

Operational tests of the Makeup and HPI Pumps should be conducted quarterly to ensure their performance has not been degraded excessively from accepted values.

The operation of Core Flood Tanks manual fill valve SIM-076 should be checked.

The flowpath of water into the Core Flood Tanks should be verified.

Scope of Existing Testing:

Both HPI Pumps and the Makeup Pump are vented per SP.203.02H, I, and J, "Monthly HPI Venting Surveillances," and operationally tested per SP.203.02A, B, and C, "Quarterly HPI and Makeup Pumps and Valves Inspection Surveillances," as previously described.

The flowpath into the Core Flood Tanks is verified during normal fill operations.

Recommended Additional Testing:

Cycle SIM-076 to verify operability, per OP A.4, Core Flood System.

Testing Recommended Prior to Startup:

The following surveillance procedures should be brought current prior to startup:

SP.203.02A - Quarterly HPI Loop A Inspection and Surveillance Test.

SP.203.02B - Quarterly HPI Loop B Inspection and Surveillance Test.

SP.203.02C - Quarterly Makeup Pump and Valves Inspection and Surveillance Test.

Cycle SIM-076 prior to startup to verify operability.

4.3 Technical Specification Surveillance Requirements Suitability

Existing Surveillance Procedures were compared to Technical Specification requirements. It was noted that TS 4.2.2 requires testing of ASME B&PV Code Section III Class 1, 2, and 3 valves in accordance with Section XI. Discrepancies may exist in the case of HPI/MU Pump discharge check valves (see Problem No. 26), recirculation check valves, HPI injection line check valves, and seal injection line check valves. Investigation into their testability is in progress, and results will be documented. Other Technical Specification requirements appear to be adequately covered by existing surveillances.

4.3 Technical Specification Surveillance Requirements Suitability

Existing Surveillance Procedures were compared to Technical Specification requirements. It was noted that TS 4.2.2 requires testing of ASME B&PV Code Section III Class 1, 2, and 3 valves in accordance with Section XI. Discrepancies may exist in the case of HPI/MU Pump discharge check valves (see Problem No. 26), recirculation check valves, HPI injection line check valves, and seal injection line check valves. Investigation into their testability is in progress, and results will be documented. Other Technical Specification requirements appear to be adequately covered by existing surveillances.