SOUTH CAROLINA ELECTRIC AND GAS COMPANY

VIRGIL C. SUMMER NUCLEAR STATION

NUCLEAR OPERATIONS

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CHEMISTRY OPERATING PROCEDURE

CHP-903

OPERATION OF THE NUCLEAR SAMPLE SYSTEM UNDER NORMAL AND POST ACCIDENT CONDITIONS

REVISION 1

FEBRUARY 17, 1982

MASTER CONTROL COPY

SAFETY RELATED

Reviewed by:

W. [illegible] — 2/17/82
ORIGINATOR (of this revision) — Date

[illegible] — 2-17-82
QUALIFIED REVIEWER — Date

Approved:

M. A. Cooley — 2/18/82
ASST. MGR. TECHNICAL SUPPORT — Date

Attachment to SCE&G Letter to NRC dated 3/30/82

REVIEWED BY PSRC

A. R. Koon — 2/18/82
CHAIRMAN — DATE

Date Issued: FEB 19 1982

Form AP-101-2 (1/80)

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1.0 PURPOSE

1.1 The purpose of this procedure is to outline the steps involved in sampling vital process fluids throughout the plant. This procedure encompasses only those samples that require frequent monitoring and which are radioactive or have a potential for being radioactive and require cooling and depressurization.

1.2 This procedure also outlines the steps required to operate the Normal and Post Accident Sample System, both in normal plant conditions and accident conditions.

1.3 Those actions necessary to meet the post-accident reactor coolant sampling requirements of NUREG-0737 are also specified.

2.0 REFERENCES AND GLOSSARY

2.1 References

2.1.1 GAI System Flow Drawings

A. GAI D-302-771, Rev. 7: Nuclear Sampling

B. GAI D-302-772, Rev. 2: Normal and Post-Accident Sampling

C. GAI D-302-781, Rev. 5: Steam Generator Blowdown

D. GAI D-302-822, Rev. 1: Nuclear Drains to Waste Holdup Tank

E. GAI D-302-182, Rev. 0: Steam Generator Sampling and Turbine Cycle Sample Rack and Recorder - Analyzer Recorder

F. GAI D-302-782, Rev. 8: Nuclear Blowdown Processing System Holdup Tank and Demineralizers

2.1.2 Westinghouse System Flow Drawings

A. 114E072, sheet 1, Rev. 7 & sheet 2, Rev. 7: Reactor Coolant Flow Diagram

B. 114E073, sheet 2, Rev. 8; sheet 3, Rev. 8 & sheet 4, Rev. 8: CVCS Flow Diagram

C. 114E074, Rev. 6: RHRS Flow Diagram

D. 114E075, sheet 2, Rev. 7: Safety Injection System Flow Diagram

E. 114E077, sheet 1, Rev. 7: Waste Processing System Flow Diagram

2.1.3 Plant System Design Description, "Nuclear Sampling System".

2.1.4 Plant System Design Description, "Secondary Cycle Sampling System".

2.1.5 Chemical Analysis Procedures for Pressurized Water Reactors, Westinghouse Electric Corporation, WCAP-7333, revision 1.

2.1.6 Chemistry Criteria and Specifications for Westinghouse PWR, Westinghouse Electric Corporation, WCAP 7452, Revision 1.

2.1.7 Foxboro 2220 pH Monitor Technical Manual

2.1.8 Foxboro 910M Conductivity Monitor Technical Manual

2.1.9 Leeds & Northrup 7070-04 Sodium Ion Monitor Technical Manual

2.1.10 Eberline RM-16 Radiation Monitor Technical Manual

2.1.11 Sepco Pipetting Machine Model 40 Technical Manual

2.1.12 CHP-904, "Operation and Calibration of Sample Analysis Panels"

2.1.13 CHP-156, "Analysis of Hydrogen, Nitrogen and Oxygen Using the Fisher 1200 Gas Partitioner"

2.1.14 NUREG-0737, Sept. 5, 1980.

2.1.15 NUREG-0654, Criteria for Preparation & Evacuation of Radiological Emergency Response Plans & Preparedness in support of Nuclear Power Plants.

2.1.16 V.C. Summer Nuclear Station Emergency Plan, Section 7.6.7.

2.1.17 SOP-107, "Nuclear Sampling System"

2.1.18 CHP-101, "pH Determination".

2.1.19 CHP-102, Conductivity Determination".

2.1.20 CHP-103, "Flouride Determination".

2.1.21 CHP-108, "Chloride Determination".

2.1.22 CHP-110, "Silica Determination".

2.1.23 CHP-116, "Determination of Suspended, Dissolved, and Total Solids".

2.1.24 CHP-125, "Determination of Ammonia".

2.1.25 CHP-126, "Determination of Hydrazine".

2.1.26 CHP-132, "Boron Dete mination".

2.1.27 CHP-152, "Determination of Dissolved O_2 by O_2 meter.

2.1.28 CHP-301, "15 Minute Degassed Gross Activity Determination (Specific Activity)".

2.1.29 CHP-502, "Operation of the Atomic Absorption Spectrophotometer in the Atomic Absorption Mode".

2.1.30 CHP-507, "Operation of the Atomic Absorbtion Unit with the Graphite Furnace Accessory".

2.1.31 CHP-508, "Determination of Boron Using the Fisher Titralyzer II Titration System".

2.1.32 CHP-614, "Reactor Coolant Chemistry Control".

2.1.33 CHP-156, "Determination of Hydrogen, Nitrogen, and Oxygen Using the Fisher 1200 Gas Partitioner".

2.1.34 HPP-812, "Operation & Calibration of the ND-66/HP-9845 Ge(Li) Spectroscopy System".

2.1.35 CHP-608, "Chemistry Group Quality Control Program".

2.1.36 HPP-810, "Sampling of Radioactive Gases and Liquids".

2.1.37 "V.C. Summer Nuclear Station Health Physics Manual".

2.2 Glossary

2.2.1 Abbreviations

Bldg. - Building

CVCS - Chemical and Volume Control System

Demin. - Demineralized

GAI - Gilbert Associates Incorporated

G.P.M. - Gallons per Minute

HX - Heat Exchanger

MCB - Main Control Board

PWR - Pressurized Water Reactor

RCDT - Reactor Coolant Drain Tank

RHRS - Residual Heat Removal System

S/G - Steam Generator

VCT - Volume Control Tank

WHT - Waste Holdup Tank

RCS - Reactor Coolant System

PASS - Normal and Post Accident Sample System

PRT - Pressurizer Relief Tank

IAW - In Accordance With

3.0 DISCUSSION

3.1 Normal and Post Accident Sample System (PASS) Description

3.1.1 The PASS is capable of sampling RHR Train A or B, the Pressurizer, or Reactor Coolant Loop B or C.

3.1.2 The PASS is designed to sample the above points following an accident but may be used under normal plant conditions on a day to day basis. It is preferrable to operate the system under normal plant conditions to insure proficiency of the operators, system integrity, and system operability in the event an accident does occur.

3.1.3 The PASS is designed to:

A. Minimize radiation exposure to the operator by the use of shielding, remote operated valves, remote system indication, and automatic sequencing. The radiation level of the sample purge may be measured.

B. Provide for remote manual operation of values controlled by automatic sequences in the event the automatic sequences fail.

C. Automatically purge and isolate the sample.

D. Provide for rapid sample collection in the event of an accident and to purge an accident sample to the PRT.

E. Provide for analyzer probe calibration.

F. Analyze the sample for pH, conductivity, and boron.

G. Automatically collect a gas sample.

H. Collect a diluted gas or a diluted liquid sample, if the operator desires.

I. Automatically flush its own liquid lines and incoming sample lines with demin. water and its own gas sample lines with nitrogen.

J. Automatically flush an accident gas sample back into the containment building (to the PRT) to minimize radiation exposure.

4.0 PRECAUTIONS AND PREREQUISITES

4.1 Insure samples are handled IAW references 2.1.35 and 2.1.36. Insure the Health Physics procedures outlined in reference 2.1.37 are followed when sampling contaminated or potentially contaminated systems and that all evolutions are consistent with ALARA concept.

4.2 Before sample pressure cylinders are removed from a line the remote manual shut-off valve must be closed and the isolation valve on either side of the disconnects must be closed.

4.3 Hood vent fans must be operating at all times during sampling or if leakage into the sink exists.

4.4 Cooling water must be established to a heat exchanger before sample flow is started.

4.5 Early during unit operation throttle valves should be set to obtain approximate purge flows so that high exit water velocities do not occur at the sample sink.

4.6 Purge volumes should be routed to the volume control tank or blowdown tank, if possible.

4.7 Sample valves should be opened cautiously to prevent a sudden on rush of water.

4.8 Obtain permission from the licensed operator to begin sampling. Inform the licensed operator when sampling has been completed.

4.9 To operate containment isolation valves located on local panels XPN0037 and XPN0036, the associated switch on the MCB must be in the "AUTO" position.

4.10 Only personnel designated by the Director of Chemistry will be permitted to operate the PASS.

4.11 When an accident situation is declared, the on-shift chemist should proceed as soon as practical to the Control Room. When directed by the Shift Supervisor, the chemist will proceed to the radio-chemistry lab and prepare to take the post-accident samples in accordance with Sections 6.10 and 6.11.

NOTE: The measures in Section 6.10 and 6.11 for post accident sampling commence at the time that a decision is made by the Shift Supervisor that an accident situation exists and that a sample is necessary.

4.12 The Nuclear Sample System will be aligned per SOP-107 and Attachments I, II and III.

4.13 Expected dose rates in the vicinity of the PASS sample enclosure during Post Accident sampling, will cause personnel to exceed their quarterly exposure limits in a short period of time. Insure all ALARA considerations are followed during sampling operations.

5.0 SPECIAL EQUIPMENT AND REAGENTS

5.1 Equipment - None

5.2 Reagents

5.2.1 NaOH Solution

5.2.2 pH9 Buffer Solution

5.2.3 pH7 Buffer Solution

6.0 PROCEDURE

6.1 RHR Samples

6.1.1 Initial Conditions

A. The RHR system has been recirculated for approximately 10 minutes and permission from the licensed operator has been obtained to begin sampling.

B. The Component Cooling Water System is in service per SOP-118 supplying cooling water to the sample heat exchangers with heat exchanger inlet valve XVT-9676 and outlet valve XVT-9678 open.

6.1.2 Obtaining a depressurized grab sample.

A. OPEN the appropriate remote manual valve XVX-9350A (train "A") or XVA-9350B (train"B") on local panel XPN-0037.

B. Open valve XVG-9416 on local panel XPN-7251B to establish purge flow.

NOTE: In the event the VCT is not available for transfer, open waste holdup tank inlet valve XVT-9329 and close VCT sample inlet valve XVT-8390.

C. Allow the sample to purge for at least 5 minutes.

D. Insure valve XVG-9306 is open on local panel XPN-7251B.

E. Slowly open valve XVT-9310 inside the sink and allow the flow to run for 2 minutes.

F. Collect the sample and close XVT-9310.

G. Return valve XVG-9416 on local panel XPN-7251B to the "NORM" position.

H. CLOSE the remote manual valve for the appropriate RHR train being sampled, XVX-9350A (train "A") or XVX-9350B (train "B") on local panel XPN-0037.

NOTE: If necessary, the purge may be directed to the sink by opening valve XVT-9310 instead of XVG-9416 in Section 6.1.2.B.

6.1.3 Sample using the PASS IAW Section 6.10.

6.2 Pressurizer Liquid or Steam Space Sample

6.2.1 Initial Conditions

A. Permission has been obtained from the licensed operator to start the sampling operation.

B. The Component Cooling Water System is in service per SOP-118 supplying cooling water to the sample heat exchangers with heat exchanger inlet valve XVT-9664 and outlet valve XVT-9666 open.

6.2.2 Obtaining a depressurized grab sample.

A. OPEN the appropriate remote manual valve, XVX-9356A (steam space) or XVX-9356B (liquid space) from local panel XPN-0037.

B. OPEN the pressurizer sample containment isolation valve XVX-9357 from local panel XPN-0036.

C. Open valve XVG-9416 on local panel XPN-7251B to establish purge flow.

NOTE: In the event the VCT is not available for transfer, throttle OPEN the waste holdup tank inlet valve XVT-9329 and CLOSE VCT sample inlet valve XVT-8390.

D. Allow the sample to purge for (later) minutes.

E. Insure valve XVG-9306 is open on local panel XPN-7251B.

F. Slowly open valve XVT-9310 inside the sink and allow the flow to run for 2 minutes.

G. Collect the sample and close XVT-9310.

H. Return valve XVG-9416 on local panel XPN-7251B to the "NORM" position.

I. CLOSE the remote manual valve for the appropriate pressurizer space being sampled, XVX-9356A (steam space) or XVX-9356B (liquid space) from local panel XPN-0037 or MCB.

J. CLOSE the pressurizer sample containment isolation valve XVX-9357 from local panel XPN-0036 or MCB.

NOTE: If necessary, the purge may be directed to the sink by opening valve XVT-9310 instead of XVG-9416 in Section 6.2.2.C.

6.2.3 Sample using the PASS IAW Section 6.10.

6.3 Reactor Coolant Loop B (C) Samples

NOTE: The following procedure is written for Loop B with the applicable Loop C nomenclature in parentheses.

6.3.1 Initial Conditions

A. Permission has been obtained from the licensed operator to start the sampling operation.

B. The Component Cooling Water System is in service per SOP-118 supplying cooling water to the sample heat exchangers with heat exchanger inlet valve XVT-9673 (XVT-9667) and outlet valve XVT-9675 (XVT-9669) open.

6.3.2 Establishing a Reactor Coolant Loop Sample Purge

NOTE: One reactor coolant loop may be on continuous purge during normal operation to facililate sampling.

A. OPEN or check open remote manual valve XVX-9364 B(C) from local panel XPN-0037.

1. Verify closed or CLOSE XVX-9364C(B) from XPN-0037 or MCB.

B. OPEN or check open the sample containment isolation valve XVX-9365B(C) from local panel XPN-0036.

1. Verify closed or CLOSE XVX-9365C(B) from XPN-0036 or MCB.

NOTE: If necessary, the purge may be directed to the sink by opening valve XVT-9310 instead of XVG-9416 in Section 6.3.2.C.

C. Open valve XVG-9416 on local panel XPN-7251B to establish purge flow.

NOTE: In the event the VCT is not available for transfer, OPEN the Waste Holdup Tank inlet valve XVT-9329 and CLOSE VCT sample inlet valve XVT-8390.

6.3.3 Obtaining a depressurized grab sample.

A. If sample line has been on a continuous purge for at least (later) minutes, go to the next step. If the sample line has not been on a continuous purge for at least (later) minutes, perform Section 6.3.2.

B. Insure Valve XVG-9306 is open on local panel XPN-7251B.

C. Slowly open valve XVT-9310 inside the sink and allow flow to run for 2 minutes.

NOTE: If desired, either loop can be aligned for continuous flow as long as the other loop is isolated.

6.3.4 Securing a Reactor Coolant Loop sample purge.

A. Return valve XVG-9416 on local panel XPN-7251B to the "NORM" position.

B. Close sample containment isolation valve XVX-9365B(C) from local panel XPN-0036 or MCB.

C. Close remote manual valve XVX-9364B(C) from local panel XPN-0037 or MCB.

6.3.5 Sample using the PASS in accordance with Section 6.10.

6.4 Accumulator Sampling

6.4.1 Initial Conditions

A. Permission has been obtained from the licensed operator to start the sampling operation.

6.4.2 OPEN the appropriate remote manual valve XVX-9386A (accumulator "A"), XVX-9386B (accumulator "B"), or XVX-9386C (accumulator "C") from local panel XPN-0037.

6.4.3 START the accumulator sample and purge flow by opening the accumulator sample containment isolation valve XVX-9387 from local panel XPN-0036.

NOTE: In the event the VCT is not available for transfer, OPEN the waste holdup tank inlet valve XVT-9329 and CLOSE VCT sample inlet valve XVT-8390.

6.4.4 Throttle valve XVT-9388 to establish a 0.8 gpm flow indication on IFI-6945 and allow the purge flow to run for 10-18 minutes.

6.4.5 Slowly open sample sink valve XVT-9390 and allow the flow to run for 2 minutes to remove the standing liquid.

6.4.6 Collect the sample and close sample sink valve XVT-9390.

6.4.7 CLOSE the accumulator sample containment isolation valve XVX-9387 from local panel XPN-0036 or MCB.

6.4.8 CLOSE the remote manual valve for the appropriate accumulator being sampled; XVX-9386A (accumulator "A") XVX-9386B (accumulator "B"), or XVX-9386C (accumulator "C").

6.5 Steam Generator Sampling

6.5.1 Initial Conditions

A. Permission has been obtained from the licensed operator to start the sampling operation.

B. Steam generator blowdown sample panel is energized.

C. System is aligned per normal valve lineup per Attachment III and as per SOP-107, except as follows:

1. Remote manual valves XVX-9380A, B and C are closed.

2. Containment isolation valves XVX-9398A, B, and C are closed.

3. Sample cooler demineralized water valves XVA-5296, XVN-5332, XVN-5331, XVN-5298, and XVN-5297 are closed.

D. The Component Cooling Water System is in service per SOP-118 supplying cooling water to the sample heat exchanger with heat exchanger inlet valves XVT-9670A, B and C and outlet valves XVT-9672A, B and C open.

E. The Demineralized Water System is in service to the sodium sample coolers and maintaining sample effluent temperatures at approximately 77°F.

6.5.2 Place Sample Recovery Tank transfer pump control switch in "AUTO".

6.5.3 START sample cooler demineralized water by opening isolation valve XVA-5296 and then opening inlet valves XVN-5332 and XVN-5298, and outlet valves XVT-5221 and XVN-5297.

6.5.4 OPEN either remote manual valves XVN-9380A, B and C (drum samples) or remote manual valves XVX-9381A, B and C (blowdown samples) from local panel XPN-0037.

NOTE: Steam generator drum samples will normally be valved in for continuous flow.

6.5.5 OPEN the sample containment isolation valves XVX-9398A, B and C from local panel XPN-0036.

6.5.6 OPEN flowdown reservoir inlet valves XVT-9385A, B and C, and allow the purge flow to run for at least 5 minutes.

6.5.7 CLOSE blowdown reservoir inlet valves XVT-9385A, B and C.

6.5.8 OPEN monitor inlet manual valves XVT-5287, XVT-5288, and XVT-5289.

6.5.9 Throttle valves XVT-9394A, B and C to provide a continuous flow rate through the monitors. (Reference CHP-904, "Operation and Calibration of Sample Analysis Panels").

6.5.10 Ensure that the sample selector is cycling valves IFV-6869, IFV-6870, and IFV-6871 as per Attachment V.

6.5.11 Ensure that the sodium (Na) monitor flush 3-way valves XVM-5362 and XVM-5363 cycle to the flush position after each steam generator cycle.

6.5.12 Ensure that the sample recovery tank transfer pump auto starts as the sample recovery tank level increases, and auto stops after pumping the sample recovery tank down.

6.5.13 Operate the Steam Generator Blowdown Sample Panel IAW CHP-904.

6.5.14 Shutdown

A. Initial Conditions

1. Permission has been obtained from the licensed operator to shutdown the sampling operation.

2. System is aligned per normal valve lineup per Attachment III and as per SOP-107.

3. The system is in service per section 6.5 of this procedure.

B. CLOSE the containment isolation valves XVX-9398A, B and C.

C. CLOSE the appropriate remote manual valves, either XVX-9380A, B and C (drum samples) or XVX-9381A, B and C (blowdown samples).

D. STOP the sample cooler demineralized water flow by closing the outlet valves XVT-5221 and XVN-5297; then closing the inlet valves XVN-5332 and XVN-5298; and isolation valve XVA-5296.

6.5.15 Sampling at the Sampling Sink

A. Initial Conditions

1. Permission has been obtained from the licensed operator to pull a sample at the sample sink.

2. System is aligned per normal valve lineup per Attachment III and per SOP-107 with the exceptions of the following valves.

a. Remote manual valves XVX-9380A, B and C are closed (XPN-0037).

b. Containment isolation valves XVX-9398A, B and C are closed (XPN-0036).

c. Sample cooler demineralized water valves XVA-5296, XVN-5332, XVN-5331, XVN-5298, and XVN-5297 are closed.

d. The Component Cooling Water System is in service per SOP-118, supplying cooling water to the sample heat exchanger with heat exchanger inlet valves XVT-9670A, B and C and outlet valves XVT-9672A, B and C.

B. OPEN either remote manual valve XVX-9380A(B)(C) (drum samples) or remote manual valve XVX-9381A(B)(C) (Blowdown samples) for the steam generator being sampled. (Local panel XPN-0037)

C. OPEN steam generator containment isolation valve XVX-9398A(B)(C) for the steam generator being sampled.

D. OPEN XVT-9385A(B)(C), sample sink valve, for the steam generator being sampled and allow the sample flow to run for at least 5 minutes.

E. Collect the sample and CLOSE XVT-9385A(B)(C), sample sink valve, for the sampled steam generator.

F. CLOSE XVX-9398A(B)(C), steam generator containment isolation valve, for the sampled steam generator.

G. CLOSE either remote manual valve XVX-9380A(B)(C) (drum samples) or remote manual valve XVX-9381A(B)(C) (Blowdown Samples) for the sampled steam generator (Local Panel XPN-0037).

6.5.16 S/G Sample Isolation Due to Emergency Feedwater Initiation

A. Symptoms

1. Low sample header pressure indication on IPI-6921A, B and C.

2. Low S/G sample flow indication on IFI-6859 through IFI-6866.

B. Automatic Actions

1. S/G sample containment isolation valves XVX-9398A, B and C close.

C. Immediate Corrective Actions

1. OPEN sample containment isolation valves XVX-9398A, B and C with the override switch on local panel XPN-0036.

2. Ensure proper flow rates per CHP-904.

6.6 VCT Gas Space Samples

6.6.1 Initial Conditions

A. If a sample pressure vessel is to be used, it must be installed in the system and the quick disconnects positively latched with the manual valves open and the depressurization valve closed.

B. Permission has been obtained from the licensed operator to start operation.

6.6.2 Start the VCT sample and purge flow by opening XVT-9399, sample vessel bypass valve to establish a (later) flow indication on IFI-6985.

A. Allow the purge to run for (later).

6.6.3 OPEN the sample pressure vessel inlet isolation valve XVT-9395A and then open the outlet isolation valve XVT-9395B.

6.6.4 CLOSE the manual outlet valve on the sample pressure vessel and then CLOSE the inlet valve to the sample pressure vessel.

6.6.5 CLOSE the sample pressure vessel isolation valves XVT-9395A and B.

6.6.6 CLOSE XVT-9399, sample vessel bypass valve.

6.6.7 Slowly OPEN the sample pressure vessel depressurization valve to bleed off pressure from the quick disconnects.

6.6.8 Remove the sample pressure vessel from the system with the quick disconnects and close the depressurization valve.

6.7 CVCS Samples

6.7.1 Initial Conditions

A. Permission has been obtained from the licensed operator to start the sampling operation.

6.7.2 Downstream of letdown heat exchanger.

A. START the sample and purge flow by opening sample isolation valve XVM-9326A.

NOTE: In the event the VCT is not available for transfer, OPEN the waste holdup tank inlet valve XVT-9329 and CLOSE VCT sample inlet valve XVT-8390.

B. Throttle valve XVN-9327A to establish a 0.8 gpm flow indication on IFI-6945 and allow the purge flow to run for 6-10 minutes.

C. Slowly OPEN sample sink valve XVT-9393A and allow the flow to run for 2 minutes to remove the standing liquid.

D. Collect the sample and CLOSE sample sink valve XVT-9393A.

E. CLOSE sample isolation valve XVM-9326A.

6.7.3 Downstream of mixed bed demineralizer No. 1.

A. START the sample and purge flow by opening sample isolation valve XVM-9326B.

NOTE: In the event the VCT is not available for transfer, OPEN the waste holdup tank inlet valve XVT-9329 and CLOSE VCT sample inlet valve XVT-8390.

B. Throttle valve XVN-9327B to establish a 0.8 gpm flow to run for 6-10 minutes.

C. Slowly OPEN sample sink valve XVT-9393B and allow the flow to run for 2 minutes to remove the standing liquid.

D. Collect the sample and CLOSE sample sink valve XVT-9393B.

E. CLOSE sample isolation valve XVM-9326B.

6.7.4 Downstream of mixed bed demineralizer No. 2

A. START CVCS sample and purge flow by opening sample isolation valve XVM-9326C.

NOTE: In the event the VCT is not available for transfer, OPEN the waste holdup tank inlet valve XVT-9329 and CLOSE VCT sample inlet valve XVT-8390.

B. Throttle valve XVN-9327C to establish a 0.8 gpm flow indication of FI-6945 and allow the purge flow to run for 6-10 minutes.

C. Slowly OPEN sample sink valve XVT-9393C and allow the flow to run for 2 minutes to remove the standing liquid.

D. Collect the sample and CLOSE sample sink valve XVT-9393C.

E. CLOSE sample isolation valve XVM-9326C.

6.7.5 Downstream of demineralizers and upstream of R.C. filter

A. START CVCS sample and purge flow by opening sample isolation valve XVM-9326D.

NOTE: In the event the VCT is not available for transfer, throttle OPEN the waste holdup tank inlet valve XVT-9329 and CLOSE VCT sample inlet valve XVT-8390.

B. Throttle valve XVN-9327D to establish a 0.8 gpm flow indication on FI-6945 and allow the purge flow to run for 6-10 minutes.

C. Slowly OPEN sample sink valve XVT-9393D and allow the flow to run for 2 minutes to remove the standing liquid.

D. Collect the sample and close sample sink isolation valve XVT-9393D.

E. CLOSE sample isolation valve XVM-9326D.

6.8 Thermal Regeneration Demineralizer Outlet Samples

6.8.1 Initial Conditions

A. Permission has been obtained from the licensed operator to start the sampling operation.

6.8.2 START the thermal regeneration demineralizer outlet sample and purge flow by opening sample isolation valve XVM-9302.

NOTE: In the event the VCT is not available for transfer, OPEN the waste holdup tank inlet valve XVT-9329 and CLOSE VCT sample inlet valve XVT-8390.

6.8.3 Throttle valve XVN-9330 to establish a 0.8 gpm flow indication on IFI-6945 and allow the purge flow to run for 6-10 minutes.

6.8.4 Slowly OPEN sample sink valve XVM-9394 and allow the flow to run 2 minutes to remove the standing liquid.

6.8.5 Collect the sample and CLOSE sample sink valve XVT-9394.

6.8.6 CLOSE sample isolation valve XVM-9302.

6.9 Reactor Coolant Drain Tank Samples

6.9.1 Initial Conditions

A. The reactor coolant drain tank has been recirculated for at least 1 hour and permission has been obtained from the licensed operator to start the sampling operation.

6.9.2 OPEN XVM-9326E sample isolation valve.

6.9.3 START the reactor coolant drain tank sample and purge flow by slowly opening sample sink valve XVT-9393E.

6.9.4 Throttle valve XVN-9327E to establish a steady flow rate and allow the flow to run for at least 5 minutes.

6.9.5 Collect the sample and CLOSE sample sink valve XVT-9393E.

6.9.6 CLOSE sample isolation valve XVM-9326E.

6.10 Operation of the Normal and Post Accident Sample System (PASS)

NOTE: The line to the right of each step is provided to check off each step as it is performed.

6.10.1 Initial Conditions

A. Permission has been obtained from the licensed operator to start sample operation. _____

B. PASS control panels XPN-7251A and XPN-7251B are energized. _____

C. Open valves XVA-9433, XVA-9320A, and XVA-9320B (Nitrogen and Argon cylinder valves). Verify and/or adjust the setting of the Nitrogen and Argon cylinder regulators as follows: _____

1. 9318A (later)

2. 9318B (later)

3. 9434 (later) _____

D. Select "WHT" or "VCT" at switch SS-6 on local panel XPN-7251B to determine where the purge will be directed to. _____

E. If sampling during normal plant conditions, place switch SS-4 on local panel XPN-7251B in "NORM". If the Shift Supervisor has directed a sample to be taken following an accident, place switch SS-4 in "EMER", and open containment isolation valves XVT-9339 and XVT-9341 on panels XPN-0036 and XPN-0037 respectively. _____

F. Select the sample point at switch SS-7 on local panel XPN-7251B. _____

G. Sampling RHR or the Pressurizer

1. If there is a reactor coolant loop on continuous purge:

a. Return valve XVG-9416 on local panel XPN-7251B to the "NORM" position.

_____

b. Close sample containment isolation valve XVX-9365B(C) from local panel XPN-0036 or MCB.

_____

c. Close remote manual valve XVX-9364B(C) from local panel XPN-0037 or MCB.

_____

2. For sampling RHR, go to section 6.10.1.I.

3. For sampling the pressurizer:

a. Open the appropriate remote manual valve, XVX-9356A (steam space) or XVX-9365B (liquid space) from local panel XPN-0037.

_____

b. OPEN the pressurizer sample containment isolation valve XVX-9357 from local panel XPN-0036.

_____

H. Sampling a Reactor Coolant Loop

NOTE: The following procedure is written for Loop B with the applicable Loop C nomenclature in parentheses.

1. If the loop desired to be sampled is on continuous purge, go to Section 6.10.1.I.

_____

2. If there is no reactor coolant loop on continuous purge:

a. OPEN or check open remote manual valve XVX-9364 B(C) from local panel XPN-0037.

_____

Verify closed or CLOSE XVX-9364C(B) from XPN-0037 or MCB.

_____

b. OPEN or check open the sample containment isolation valve XVX-9365B(C) from local panel XPN-0036.

_____

Verify closed or CLOSE XVX-9365C(B) from XPN-0036 or MCB.

_____

3. If there is a reactor coolant loop on continuous purge but it is not the loop to be sampled:

a. Close sample containment isolation valve XVX-9365B(C) from local panel XPN-0036 or MCB.

_____

b. Close remote manual valve XVX-9364B(C) from local panel XPN-0037 or MCB.

_____

c. OPEN or check open the sample containment isolation valve XVX-9365B(C) from local panel XPN-0036.

_____

d. OPEN or check open remote manual valve XVX-9364 B(C) from local panel XPN-0037.

_____

I. Set the purge timer and the inlet and outlet pressure controllers as follows:

	Purge Timer	ICP6982	ICP6984	
RHR	(LATER)	(LATER)	(LATER)	_____
PZR	(LATER)	(LATER)	(LATER)	_____
RCS Loop	(LATER)	(LATER)	(LATER)	_____
RCS Loop that was on Cont. Purge	(LATER)	(LATER)	(LATER)	_____

NOTE: If the calibration of the probes is to be performed, the purge timer must be set for a sufficient length of time to perform the calibration.

6.10.2 Sample Purge/Probe Calibration/Sample Isolation

A. Place switch SS-1 on local panel XPN-7252B in the "Step 1" position. Return valve XVG-9416 on local panel XPN-9251B to "NORM" if it was open.

_____

B. Observe vacuum being drawn on IPI6988 on local panel XPN-7251A.

_____

C. Calibrate pH, conductivity, and sodium probes, if necessary, IAW applicable technical manual.

1. Turn on Flush/Dilution Pump at switch SS-2 on local panel XPN-7251B.

_____

2. Switch SS-10 on local panel XPN-7251B is used to control the flow of pH9 buffer solution to the probes.

3. Flush the probes with demin water between pH probe standardization and sodium probe calibration. _____

4. Switch SS-11 on local panel XPN-7251B is used to control the flow of sodium standard to the probes.

5. At completion of probe calibration, flush the probes with demin water and follow with Argon, using switches SS-9 and SS-12 respectively, located on local panel XPN-7251B.

_____

6. Turn off the Flush/Dilution Pump at switch SS-2 on local panel XPN-7251B.

_____

D. Note the radiation reading on IRI-6992 located on the top of local panel XPN-7251A.

_____

NOTE: When the purge timer times out, an alarm will sound at local panel XPN-7251B and the pressurized sample will automatically be isolated.

E. A grab sample may be taken, if desired, by opening valve XVT-9310 located inside the sink. Open XVT-9310 for 1 minute, collect the sample, and close XVT-9310. Analyze the sample using references 2.1.18 through 2.1.34 as required. Insure samples are handled IAW references 2.1.35, 2.1.36, and 2.1.37.

_____

6.10.3 Sample Depressurization and Recirculation/Sample Line Flush

A. If sampling a reactor coolant loop:

1. Close sample containment isolation valve XVX-9365B(C) from local panel XPN-0036 or MCB.

_____

2. Close remote manual valve XVX-9364B(C) from local panel XPN-0037 or MCB.

_____

B. If sampling the pressurizer:

1. CLOSE the remote manual valve for the appropriate pressurizer space being sampled, XVX-9356A (steam space) or XVX-9356B (liquid space) from local panel XPN-0037 or MCB.

_____

2. CLOSE the pressurizer sample containment isolation valve XVX-9357 from local panel XPN-0036 or MCB.

_____

C. Place switch SS-1 on local panel XPN-7251B in the "Step 2" position.

_____

D. Read and record the pH and conductivity, if desired.

_____

E. Obtain a diluted liquid sample, if desired, IAW the following:

1. Using Attachment IV as a guide, set the "% Dilution" timer located on panel XPN-7251B to the required time to obtain the desired dilution.

_____

2. Cycle switch SS-3 on panel XPN-7251B the required number of times (from Attachment IV) for the desired dilution.

_____

NOTE: When cycling switch SS-3, pause approximately 5 seconds in each position.

CAUTION: Leave switch SS-3 in the "DILUTE" position after the last cycle of switch SS-3.

_____

3. Turn on Flush/Dilution Pump at switch SS-2 on local panel XPN-7251B.

_____

4. Place switch SS-14 on local panel XPN-7251B in the "Start" position to initiate automatic liquid dilution sequence.

_____

5. Turn off Flush/Dilution Pump at switch SS-2 on local panel XPN-7251B at the completion of the sequence.

_____

F. Obtain a diluted gas sample, if desired, by placing switch SS-15 on local panel XPN 7251B in the "START" position to initiate automatic gas dilution sequence.

_____

G. Obtain boron results, if necessary, as follows:

_____

1. Place switch SS-3 in "Recirc" position.

_____

2. If Containment Spray Additive Tank has been injected, read pH and sodium concentration when levels have stabilized. Record pH and Na^+ on CHP-614, Attachment I, Daily Reactor Coolant System Chemistry Worksheet, in Remarks section. Using the following equation, calculate the boron concentration:

$$\text{ppm Boron} = \frac{[\text{ppmNa}/2.29\times10^{4}][10^{-\text{pH}}][1.08\times10^{4}]}{5.8\times10^{-10}}$$

Place calculation and results in the Remarks section of CHP-614, Attachment I.

_____

3. If the Containment Spray Additive Tank has not been injected, run the NaOH injection pump, XPP-161, using PP-3 until pH is between 8.4 and 8.7. Record pH and Na^+, and calculate boron concentration as per step 2.

_____

4. The ppm boron concentration from step 2 should be multiplied by 0.9 and then reported to the Control Room. This is done to provide a conservative boron concentration since the analysis is considered to be ± 10% accurate.

H. Place switches SS-14 and SS-15 in "STOP" after liquid and/or gas dilutions have been made.

6.10.4 Sample Loop Isolation

A. Place switch SS-1 on panel XPN-7251B in the "Step 3" position.

B. Obtain a gas, a diluted gas, or a diluted liquid sample for analysis from the sample loops, as required (XVA-9429, XVA-9430, or XVA-9454 respectively). Analyze gas samples IAW reference 2.1.33 and/or 2.1.34. Analyze the diluted liquid sample IAW reference 2.1.34.

6.10.5 System Flush/System Layup

A. Turn on Flush/Dilution Pump at switch SS-2 on local panel XPN-7251B.

B. Place switch SS-1 on panel XPN-7251B in "Step 4" for a normal flush or in "Step 5" for an emergency flush.

C. After switch SS-1 has been in "Step 4" for about 3 minutes, or "Step 5" for about 5 minutes, place switch SS-1 in the "Step 6" position.

D. When the pH and conductivity meters indicate an adequate flush of the probes has occurred, place switch SS-1 on panel XPN-7251B in the "OFF" position.

_____

E. Place switch SS-2 on panel XPN-7251B in "OFF" to secure the Flush/Dilution pump.

_____

F. Place switch SS-7 on panel XPN-7251B in the "OFF" position.

_____

G. Close valves XVT-9339 and XVT-9341 if they were opened.

_____

H. Close valves XVA-9433, XVA-9320A, and XVA-9320B.

_____

6.11 Analysis Priorities Following and Accident

NOTE: This section is written assuming the worst situation, i.e., the accident occurs on the backshift and there is one chemist on site and no supervision. With additional personnel and supervisory assistance, analytical and sampling activities may be carried out with more than one chemist. Priorities however will remain as stated.

6.11.1 From the time a decision is made to sample, the chemist has three hours to perform radiological, boron, and gas analyses. In drawing and analyzing samples, the following priorities should be observed.

A. The first sample taken should be for boron to give the shift supervisor an indiction of the reactivity condition of the core.

B. The next sample in priority is the reactor coolant activity sample. This is to determine the physical condition of the core. Noble gases indicate possible cadding failure, iodines, and cesiums indicate high fuel temperatures, and other non-volatile isotopes indicate possible fuel melting.

6.11.2 After the priority samples and analyses of section 6.11.1 are completed, the next sample should be for chlorides. A chloride result should be available within 24 hours of the time the initial decision to take a post accident sample was made.

6.11.3 Results of all analyses should be reported by phone to the technical support center, with written data sheets to follow.

NOTE: It is vital that results be channeled immediately to the shift supervisor, who requires knowledge of the Boron concentration and the radioactivity of the fluid.

7.0 CALCULATIONS

7.1 None

Approved for use: _____

_____

Person(s) completing checklist (print)	Initial	POWER SUPPLY LINEUP

Reviewed _____ Date/Time _____ Date/Time started _____

Date/Time completed _____

Equipment Line Up

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIAL
01DER/ XMC1B4X	SG BLOWDOWN PANEL (XSR-2-WA)	CLOSED		
01DEL/ XMC1B4X	SAMPLE RECOVERY TANK XFER PUMP (XPP-88-WA)	CLOSED		
1HI/ XMC1B4X	SS WASTE PUMP (XPP-159-SS)	CLOSED		
1JK/ XMC1B4X	FLUSH WATER PUMP B (XPP-162B-SS)	CLOSED		
2CD/ XMC1B4X	FLUSH WATER PUMP A (XPP-162A-SS)	CLOSED		
31JL/ XMC1B4X	AUXILLIARY SAMPLE COOLER CHILLER (XHX-0006-SS)	CLOSED		
30/ XPN1FX1	POST ACCIDENT SAMPLE RELAY PANEL (XPN-7252-SS)	CLOSED		
04/ DPN1HX1	XPN-0035	CLOSED		

Approved for use: _____

_____

Person(s) completing checklist (print)	Initial	SWITCH LINEUP

Reviewed _____ Date/Time _____ Date/Time started _____

Date/Time completed _____

Equipment Line Up

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIAL
XVX09380A-SS/ XPN-0035	SG A DRUM SAMPLE VALVE	CLOSE		
XVX09381A-SS/ XPN-0035	SG A BLOWDOWN SAMPLE VALVE	CLOSE		
XVX09386A-SS/ XPN-0035	SI ACCUM A SAMPLE VALVE	CLOSE		
XVX09350A-SS/ XPN-0035	RHR LOOP A SAMPLE HEADER ISOLATION VLV	CLOSE		
XVX09380B-SS/ XPN-0035	SG B DRUM SAMPLE VALVE	CLOSE		
XVX09381B-SS/ XPN-0035	SG B BLOWDOWN SAMPLE VALVE	CLOSE		
XVX09386B-SS/ XPN-0035	SI ACCUM B SAMPLE VALVE	CLOSE		
XVX09350B-SS/ XPN-0035	RHR LOOP B SAMPLE HEADER ISOLATION VLV	CLOSE		
XVX09380C-SS/ XPN-0035	SG C DRUM SAMPLE VALVE	AUTO		
XVX09381C-SS/ XPN-0035	SG C BLOWDOWN SAMPLE VALVE	AUTO		
XVX09386C-SS/ XPN-0035	SI ACCUM C SAMPLE VALVE	AUTO		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVX09398A SS/ XPN-0035	SG A BLOWDOWN SAMPLE HEADER ISOL VALVE	AUTO		
XVX09387-SS/ XPN-0036	ACCUMULATOR TANKS SAMPLE HDR ISOL VALVE	AUTO		
XVX09365B-SS/ XPN-0036	RC LOOP B HOT LEG SAMPLE HDR ISOL VALVE	AUTO		
XVX09398B-SS/ XPN-0036	SG B BLOWDOWN SAMPLE HEADER ISOL VALVE	AUTO		
SS24B/ XPN-0036	EMERGENCY FEEDWATER BYPASS SWITCH	NORMAL		
XVX09365C-SS/ XPN-0036	RC LOOP C HOT LEG SAMPLE HDR ISOL VALVE	AUTO		
XVX09398C-SS/ XPN-0036	SG C BLOWDOWN SAMPLE HEADER ISOL VALVE	AUTO		
XVT09339/ XPN-0036	PRT SS SYS DISCH HEADER ISOLATION VLV	AUTO		
XVX09357-SS/ XPN-0036	PRESSURIZER SAMPLE HEADER ISOLATION VLV	AUTO		
XVX09364B-SS/ XPN-0037	RCS LOOP B SAMPLE HEADER ISOL VLV	AUTO		
XVX09364C-SS/ XPN-0037	RCS LOOP C SAMPLE HEADER ISOL VLV	AUTO		
XVX09456B-SS/ XPN-0037	PZR LIQUID SAMPLE HDR ISOL VALVE	AUTO		
XVT09341-SS/ XPN-0037	PRT SS SYS DISCH HEADER CNTRUT ISOL VLV	AUTO		
XVX09356A-SS/ XPN-0037	PZR GAS SAMPLE HDR ISOL VALVE	AUTO		
SS-1/ XPN-7251B	STEP SELECTOR SWITCH	OFF		
SS-2/ XPN-7251B	XPP-163-SS	OFF		
SS-3/ XPN-7251B	9418-SS	RECIRC		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
SS-4/ XPN-7251B	NORM/EMER SWITCH	NORM		
SS-5/ XPN-7251B	XPP-162 A/B SELECTOR SWITCH	A		
SS-6/ XPN-7251B	9426B-SS	VCT		
SS-7/ XPN-7251B	SAMPLE POINT SELECTOR SWITCH	OFF		
SS-8/ XPN-7251B	XVG-9306-SS	OPEN		
SS-9/ XPN-7251B	XVA-9442-SS	CLOSE		
SS-11/ XPN-7251B	XVA-9443A-SS	CLOSE		
SS-10/ XPN-7251B	XVA-9443B-SS	CLOSE		
SS-12/ XPN-7251B	XVA-9436-SS	CLOSE		
SS-13/ XPN-7251B	XVA-9471-SS	CLOSE		
SS-14/ XPN-7251B	LIQ DILUTION SELECTOR SWITCH	STOP		
SS-15/ XPN-7251B	GAS DILUTION SELECTOR SWITCH	STOP		
BS-XPP159/ XPN-7251B	XPP-159 BYPASS SWITCH	NORM		
BS-9432/ XPN-7251B	XVG-9432 BYPASS SWITCH	NORM		
BS-XPP160/ XPN-7251B	XPP-160 BYPASS SWITCH	NORM		
BS-9431B/ XPN-7251B	XVG-9431B BYPASS SWITCH	NORM		
BS-9431A/ XPN-7251B	XVG-9431A BYPASS SWITCH	NORM		
BS-9429/ XPN-7251B	9429 BYPASS SWITCH	NORM		
BS-9430/ XPN-7251B	9430 BYPASS SWITCH	NORM		
BS-9454/ XPN-7251B	9454 BYPASS SWITCH	NORM		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
BS-9468/ XPN-7251B	XVA-9468 BYPASS SWITCH	NORM		
BS-9426A/ XPN-7251B	9426A BYPASS SWITCH	NORM		
BS-9439/ XPN-7251B	XVA-9439 BYPASS SWITCH	NORM		
BS-9427B/ XPN-7251B	9427B BYPASS SWITCH	NORM		
BS-9427A/ XPN-7251B	9427A BYPASS SWITCH	NORM		
BS-9419/ XPN-7251B	XVG-9419 BYPASS SWITCH	NORM		
BS-9414/ XPN-7251B	XVG-9414 BYPASS SWITCH	NORM		
BS-9421/ XPN-7251B	9421 BYPASS SWITCH	NORM		
BS-9422A/ XPN-7251B	9422A BYPASS SWITCH	NORM		
BS-9324C/ XPN-7251B	XVG-9324C BYPASS SWITCH	NORM		
BS-9324D/ XPN-7251B	XVG-9324D BYPASS SWITCH	NORM		
BS-9324B/ XPN-7251B	XVG-9324B BYPASS SWITCH	NORM		
BS-9324A/ XPN-7251B	XVG-9324A BYPASS SWITCH	NORM		
BS-9360/ XPN-7251B	XVG-9360 BYPASS SWITCH	NORM		
BS-9415/ XPN-7251B	XVG-9415 BYPASS SWITCH	NORM		
BS-9416/ XPN-7251B	XVG-9416 BYPASS SWITCH	NORM		
BS-9425/ XPN-7251B	XVA-9328 BYPASS SWITCH	NORM		
BS-9425/ XPN-7251B	XVG-9425 BYPASS SWITCH	NORM		
BS-XPP162A XPN-7251B	XPP-162A BYPASS SWITCH	NORM		
BS-XPP162B/ XPN-7251B	XPP-162B BYPASS SWITCH	NORM		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
BS-9462/ XPN-7251B	XVA-9462 BYPASS SWITCH	NORM		
BS-9417B/ XPN-7251B	XVG-9417B BYPASS SWITCH	NORM		
BS-9422B/ XPN-7251B	9422B BYPASS SWITCH	NORM		
BS-9417A/ XPN-7251B	XVG-9417A BYPASS SWITCH	NORM		
BS-XPP158/ XPN-7251B	XPP158 (CR7) BYPASS SWITCH	NORM		
BS-9428/ XPN-7251B	XVA-9428 BYPASS SWITCH	NORM		
BS-9435/ XPN-7251B	XVG-9435 BYPASS SWITCH	NORM		
BS-9460/ XPN-7251B	XVA-9460 BYPASS SWITCH	NORM		
BS-9421/ XPN-7251B	XVA-9321 BYPASS SWITCH	NORM		
BS-9352/ XPN-7251B	9452 BYPASS SWITCH	NORM		
BS-9357/ XPN-7251B	XVA-9457 BYPASS SWITCH	NORM		
BS-9353/ XPN-7251B	XVA-9453 BYPASS SWITCH	NORM		
BS-9355/ XPN-7251B	XVG-9455 BYPASS SWITCH	NORM		
BS-9350B/ XPN-7251B	XVA-9450B BYPASS SWITCH	NORM		
BS-9450A/ XPN-7251B	XVA-9450A BYPASS SWITCH	NORM		
BS-9417A/ XPN-7251B	XVA-9317A BYPASS SWITCH	NORM		
BS-9317B/ XPN-7251B	XVA-9317B BYPASS SWITCH	NORM		
BS-9475/ XPN-7251B	XVG-9475 BYPASS SWITCH	NORM		

Approved for use: _____

_____

Person(s) completing checklist (print)	Initial	VALVE LINEUP

Reviewed _____ Date/Time _____ Date/Time started _____

Date/Time completed _____

Equipment Line Up

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIAL
XVA09462-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09462-SS	OPEN		
XVG09414-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09414-SS	OPEN		
XVG09416-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09416-SS	OPEN		
XVG09417B-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09417B-SS	OPEN		
XVG-09419-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09419-SS	OPEN		
XVA09421-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09421-SS	OPEN		
XVA09439-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09439-SS	OPEN		
XVG09417A-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09417A-SS	OPEN		
XVG09455-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09455-SS	OPEN		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVA09450B-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09450B-SS	OPEN		
XVA09450A-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09450A-SS	OPEN		
XVA09426B-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09426B-SS	OPEN		
XVA09426A-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09426A-SS	OPEN		
XVA09468-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09468-SS	OPEN		
XVG09425-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09425-SS	OPEN		
XVG09422A-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09422A-SS	OPEN		
XVG09427A-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09427A-SS	OPEN		
XVG09422B-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09422B-SS	OPEN		
XVG09435-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09435-SS	OPEN		
XVA09428-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09428-SS	OPEN		
XVG09431A-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09431A-SS	OPEN		
XVG09431B-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09431B-SS	OPEN		
XVG09427B-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09427B-SS	OPEN		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVA09453-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09453-SS	OPEN		
XVA09452-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09452-SS	OPEN		
XVA09418-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09418-SS	OPEN		
XVG09415-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09415-SS	OPEN		
XVG09475-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09475-SS	OPEN		
XVA09317B-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09317B-SS	OPEN		
XVA09317A-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09317A-SS	OPEN		
XVG09432-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVG09432-SS	OPEN		
XVA09471-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09471-SS	OPEN		
XVA09457-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09457-SS	OPEN		
XVA09321-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09321-SS	OPEN		
XVA09436-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09436-SS	OPEN		
XVA09443A-20A-SS CB-412	AIR SUPPLY SOLLNOID FOR XVA09443A-SS	OPEN		
XVA09443B-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09432B-SS	OPEN		
XVA09442-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09442-SS	OPEN		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVA09460-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09460-SS	OPEN		
XVG09306-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09306-SS	OPEN		
	AIR SUPPLY TO IPC-6984	OPEN		
	AIR SUPPLY TO IPT-6982	OPEN		
	AIR SUPPLY TO IPC-6982	OPEN		
	AIR SUPPLY TO PRESS REG FOR 9413	OPEN		
	AIR SUPPLY TO PRESS REG FOR 9424	OPEN		
	AIR SUPPLY SOLENOID FOR 09454-SS	OPEN		
	AIR SUPPLY SOLENOID FOR 09429-SS	OPEN		
	AIR SUPPLY SOLENOID FOR 09430-SS	OPEN		
XVT09390-SS CB-412	ACCUM TANKS SAMPLE SINK INLET ISOL VLV	CLOSED		
XVT09393D-SS CB-412	RC FILTER SAMPLE SINK SUPPLY VLV	CLOSED		
XVT09393C-SS CB-412	CS MIXED BED B SAMP SINK SUP VLV	CLOSED		
XVT09393B-SS CB-412	CS MIXED BED A SAMP SINK SUP VLV	CLOSED		
XVT09393A-SS CB-412	LTDN Hx EFFLUENT SAMP SINK SUPPLY VALVE	CLOSED		
XVT09394-SS CB-412	TR DEMIN EFFLUENT SAMPLE SINK SUP VALVE	CLOSED		
XVT09393E-SS CB-412	RC DRAIN TANK SAMPLE SINK SUPPLY VALVE	CLOSED		
XVT09409-SS CB-412	CVCS VCT GAS SAMPLE HEADER VENT VALVE	CLOSED		
XVT09385C-SS CB-412	SG C BLOWDOWN SAMPLE SINK SUPPLY VALVE	CLOSED		
XVT09385B-SS CB-412	SG B BLOWDOWN SAMPLE SINK SUPPLY VALVE	CLOSED		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVT09385A SS CB-412	SG A BLOWDOWN SAMPLE SINK SUPPLY VALVE	CLOSED		
XVT09325-SS CB-412	STEAM GENERATOR SAMPLE SINK DN SUP VLV	CLOSED		
XVG09463-SS CB-412	FLUSHING/DILUTION WATER HEADER ISOL VLV	OPEN		
XVN09327E-SS CB-412	RC DRAIN TANK SAMPLE HDR THROTTLE VALVE	OPEN		
XVM09326E-SS CB-412	RC DRAIN TANK SAMPLE HDR ISOL VLV	CLOSED		
XVD09465-SS CB-412	SS SYSTEM WASTE PUMP SUCTION VALVE	OPEN		
XVA09467-SS CB-412	SS SYSTEM WASTE PUMP DISCHARGE VALVE	OPEN		
XVT09395A-SS CB-412	CVCS VCT GAS SAMPLE SINK INLET VALVE	CLOSED		
XVT09395B-SS CB-412	CVCS VCT GAS SAMPLE SINK OUTLET VALVE	CLOSED		
XVT09399-SS CB-412	CVCS VCT GAS SAMPLE SINK BYPASS VALVE	CLOSED		
XVT09397-SS CB-412	CVCS VCT GAS SAMPLE VENT HDR ISOL VALVE	OPEN		
IPX06981-HR-SS CB-412	HIGH ROOT TO IPX-6981	CLOSED		
CB-412	GAGE ISOLATION FOR IPX-6981	CLOSED		
CB-412	TEST CON FOR IPX-6981	CLOSED		
XVT09331-SS CB-412	NUCLEAR SAMPLING PURGE HEADER ISOL VLV	CLOSED		
XVN09330-SS CB-412	TR DEMIN EFFLUENT SAMP HDR THROTTLE VLV	OPEN		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVN09327A SS CB-412	LTDN Hx EFFLUENT SAMP HDR THROTTLE VLV	OPEN		
XVN09327B-SS CB-412	CS MIXED BED DEMIN A SAMP THROTTLE VLV	OPEN		
XVN09327C-SS CB-412	CS MIXED BED DEMIN B SAMP THROTTLE VLV	OPEN		
XVN09327D-SS CB-412	RC FILTER INFLUENT SAMP HDR THROTTLE VLV	OPEN		
XVT09388-SS CB-412	ACCUM TANKS SAMPLE SINK INLET ISOL VLV	OPEN		
XVM09302-SS CB-412	TR DEMIN EFFLUENT SAMPLE HDR ISOL VALVE	CLOSED		
XVM09326D-SS CB-412	RC FILT INFLUENT SAMPLE HDR ISOL VALVE	CLOSED		
XVT09389-SS CB-412	ACCUMULATOR TANKS SAMPLE SINK INLET VALVE	OPEN		
XVM09326A-SS CB-412	LTDN HX EFFLUENT SAMPLE HDR ISOL VALVE	CLOSED		
XVM09326C-SS CB-412	CS MIXED BED DEMIN B SAMP HDR ISOL VLV	CLOSED		
IPX06971-HR-SS CB-412	HIGH ROOT TO IPX-06971	CLOSED		
IPX06961A-HR-SS CB-412	HIGH ROOT TO IPX-06961A	CLOSED		
IPX06961B-HR-SS CB-412	HIGH ROOT TO IPX-06961B	CLOSED		
IPX06961C-HR-SS CB-412	HIGH ROOT TO IPX-06961C	CLOSED		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
IPX06961D-HR-SS CB-412	HIGH ROOT TO IPX-06961S	CLOSED		
IPX06951-HR-SS CB-412	HIGH ROOT TO IPX-06951	CLOSED		
CB-412	TEST CON FOR IPX06971	CLOSED		
CB-412	GAGE ISOL FOR IPX06971	CLOSED		
CB-412	TEST CON FOR IPX06961A	CLOSED		
CB-412	GAGE ISOL FOR IPX06961A	CLOSED		
CB-412	TEST CON FOR IPX06961B	CLOSED		
CB-412	GAGE ISOL FOR IPX06961B	CLOSED		
CB-412	TEST CON FOR IPX06961C	CLOSED		
CB-412	GAGE ISOL FOR IPX06961C	CLOSED		
CB-412	TEST CON FOR IPX-06961D	CLOSED		
CB-412	GAGE ISOL FOR IPX06961D	CLOSED		
CB-412	TEST CON FOR IPX-06951	CLOSED		
CB-412	GAGE ISOL FOR IPX06951	CLOSED		
XVT09383A-SS CB-412	SG A BLOWDOWN SAMPLE PANEL SUPPLY VALVE	OPEN		
XVT09383B-SS CB-412	SG B BLOWDOWN SAMPLE PANEL SUPPLY VALVE	OPEN		
XVT09383C-SS CB-412	SG C BLOWDOWN SAMPLE PANEL SUPPLY VALVE	OPEN		
XVT05287-WA CB-412	SG A B/D ANAL SUPPLY HEADER ISOL VALVE	OPEN		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVT05288-WA CB-412	SG B B/D ANAL SUPPLY HEADER ISOL VALVE	OPEN		
XVT05289-WA CB-412	SG C B/D ANAL SUPPLY HEADER ISOL VALVE	OPEN		
XVN05293-WA CB-412	HIGH ROOT TO IPI06856	OPEN		
XVN05294-WA CB-412	HIGH ROOT TO IPI06857	OPEN		
XVN05295-WA CB-412	HIGH ROOT TO IPI06858	OPEN		
XVA05296-WA CB-412	SG B/D SAMPLE CLRS DW CLG WTR SUP VALVE	OPEN		
XVN05331-WA CB-412	S/G B/D N_2H_4 SAMPLE CLR CLG WTR RET VLV	OPEN		
XVN05297-WA CB-412	S/G/ B/D SODIUM SAMP CLR CLG WTR RET VLV	OPEN		
XVN05398-WA CB-412	SG B/D SODIUM SAMP CLR CLG WTR SUP VLV	OPEN		
XVN05332-WA CB-412	SG B/D N_2H_4 SAMPLE CLR CLG WTR SUP VLV	OPEN		
XVN05339-WA CB-412	HIGH ROOT TO ILI06723	OPEN		
XVN05340-WA CB-412	LOW ROOT TO ILI06723	OPEN		
XVA05379-WA CB-412	SAMPLE RECOVERY TANK XFER PUMP SUCT VLV	OPEN		
XVN05377-WA CB-412	WA SAMPLE RECOVERY TANK DRAIN VLV	CLOSED		
XVN05380-WA CB-412	HIGH ROOT TO IPI06868	OPEN		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVA05378-WA CB-412	SAMPLE RECOVERY TK XFER PUMP RECIRC VLV	OPEN		
XVA05381-WA CB-412	SAMPLE RECOVERY TK XFER PUMP DISCH VLV	OPEN		
	AIR SUPPLY TO SODIUM ANALYZER PRESS REGULATOR	OPEN		
XVA09449-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09449-SS	OPEN		
XVA09446-20A-SS CB-412	AIR SUPPLY SOLENOID FOR XVA09446-SS	OPEN		
XVD09447-SS CB-412	FLUSHING/DILUTION WATER PUMP SUCT VALVE	OPEN		
XVG09411A-SS CB-425	RHR LOOP A & B SAMPLE HEADER ISOL VALVE	OPEN		
XVG09411B-SS CB-425	PRESSURIZER SAMPLE HEADER ISOLATION VALVE	OPEN		
XVG09411C-SS CB-425	RC LOOP B SAMPLE HEADER ISOLATION VALVE	OPEN		
XVG09411D-SS CB-425	RC LOOP C SAMPLE HEADER ISOLATION VALVE	OPEN		
XVT09384A-SS CB-425	SG A BLOWDOWN SAMPLE COOLER OUTLET VLV	OPEN		
XVT09384B-SS CB-425	SG B BLOWDOWN SAMPLE COOLER OUTLET VLV	OPEN		
XVT09384C-SS CB-425	SG C BLOWDOWN SAMPLE COOLER OUTLET VLV	OPEN		
XVT09474-SS CB-425	SS AUX SAMPLE COOLERS CHILL WTR SUP VLV	OPEN		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVT09473-SS CB-425	SS AUX SAMPLE CLR CHILL WTR SUP HDR DRN	CLOSED		
IPX06921A-HR-SS CB-425	HIGH ROOT TO IPX06921A	CLOSED		
IPX06921B-HR-SS CB-425	HIGH ROOT TO IPX06921B	CLOSED		
IPX06921C-HR-SS CB-425	HIGH ROOT TO IPX06921C	CLOSED		
XVG09324B-20A-SS AB-436	AIR SUPPLY SOLENOID FOR XVG09324B-SS	OPEN		
XVG09324C-20A-SS AB-412	AIR SUPPLY SOLENOID FOR XVG09324C-SS	OPEN		
XVD09348A-SS AB-412	SS FLUSHING WATER PUMP A SUCTION VALVE	OPEN		
XVD09348B-SS AB-412	SS FLUSHING WATER PUMP B SUCTION VALVE	OPEN		
XVT09367A-SS AB-412	SS FLUSHING WATER PUMP A DISCHARGE VALVE	OPEN		
XVT09367B-SS AB-412	SS FLUSHING WATER PUMP B DISCHARGE VALVE	OPEN		
XVT09343-SS AB-412	HIGH ROOT TO IPT06998	OPEN		
XVG09360-20A-SS AB-412	AIR SUPPLY SOLENOID FOR XVG09360-SS	OPEN		
XVA09328-20A-SS AB-412	AIR SUPPLY SOLENOID FOR XVA09328-SS	OPEN		
XVT09342-SS AB-412	HIGH ROOT TO IPS06999	OPEN		

Equipment Line Up (con't)

COMPONENT/ LOCATION	DESCRIPTION	REQUIRED POSITION	ACTUAL POSITION	INITIALS
XVG09324D- 20A-SS I.B.-412	AIR SUPPLY SOLENOID FOR XVG09324D-SS	OPEN		
XVG09324A- 20A-SS A.B.-412	AIR SUPPLY SOLENOID FOR XVG09324A-SS	OPEN		

LIQUID DILUTION PARAMETERS

RI 6992 Reading	Number of Cycles of Switch SS-3	% Dilution Timer Setting (min)	Dilution Factor
(later)	1	1.45	9444
	2	1.45	4722
	3	1.45	3148
	4	1.45	2361
	5	1.45	1889
	6	1.45	1574
	7	1.45	1349
	8	1.45	1181
	9	1.45	1049
	10	1.45	944

NOTES:

1. Above parameters are based on valve XVT-9458 set at 2.0.
2. Multiply analysis results by Dilution Factor.