Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

June 10, 2014

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

Subject: **Watts Bar Nuclear Plant (WBN) Unit 2 - Submittal of Pre-operational Test Instruction**

The following approved WBN Unit 2 Pre-op Test Instruction (PTI) is enclosed:

PTI NUMBER	Rev.	TITLE
2-PTI-068-14	0	Reactor Coolant Primary Hydrostatic Test, U2

If you have any questions, please contact Nick Welch at (423) 365-7820.

Respectfully,

R. A. Hruby, Jr.

Raymond A. Hruby, Jr.
General Manager, Technical Services
Watts Bar Unit 2

Enclosure

cc (Enclosure):

U. S. Nuclear Regulatory Commission
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NRC Resident Inspector Unit 2
Watts Bar Nuclear Plant
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Spring City, Tennessee 37381

WATTS BAR NUCLEAR PLANT
UNIT 2 PREOPERATIONAL TEST

TITLE: _Reactor Coolant Primary Hydrostatic Test, U2_____

Instruction No: ___2-PTI-068-14_____

Revision No: _____0000_____

PREPARED BY: David R. Branham/ _____ DATE: 5/29/2014
PRINT NAME / SIGNATURE

REVIEWED BY: Dirk R. Cooper/ _____ DATE: 5/29/14
PRINT NAME / SIGNATURE

INSTRUCTION APPROVAL

JTG MEETING No: 2-14-017

JTG CHAIRMAN: _____ DATE: 6/5/14

APPROVED BY : _____ DATE: 6/5/14
PREOPERATIONAL STARTUP MANAGER

TEST RESULTS APPROVAL

JTG MEETING No: _____

JTG CHAIRMAN: _____ DATE: _____

APPROVED BY : _____ DATE: _____
PREOPERATIONAL STARTUP MANAGER

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0000	6/5/14	ALL	INITIAL ISSUE

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Table of Contents (continued)

1.0 INTRODUCTION

1.1 Test Objectives

This PTI describes the pressure and temperature controls for performance and documentation of the Reactor Coolant Primary Hydrostatic Test for the Reactor Coolant System and high pressure portion of systems connected to the RCS being performed per Bechtel Work Order 111751832. All operational controls and adjustments will be performed in accordance with approved TOPs or SOIs. All inspections will be controlled by instructions included in Work Order(s).

1.2 Scope

The provisions of this PTI are applicable to cold (less than 200°F) hydrostatic testing of the Unit 2 Reactor Coolant System.

Items to be tested include:

A. Reactor Vessel

B. Pressurizer

C. Steam Generators

D. Reactor Coolant Pumps

E. Reactor Coolant System

F. Primary System piping within the boundary

G. Instrument lines to their root valves and if possible, to the panel isolation valves

H. The excess letdown line to the first isolation valve 2-ISV-68-579

I. The in-core instrumentation 3/4" pipe from Reactor Vessel to the seal table

J. The letdown line from Loop 3 to valve 2-ISV-68-580

K. The Charging System, including Normal Charging, Alternate Charging, and Pressurizer Auxiliary Spray Line, from the reactor out to the first isolation valves 2-FCV-62-84, 2-FCV-62-85, 2-FCV-62-86 and 2-CKV-62-658.

L. The RHR, SIS, RCS and CVCS systems per the "attached" cold hydro maps 2-47W809-1, 2-47W810-1, 2-47W811-1, and 2-47W813-1, located at the following location, \\wbngf2\startup engineering\Cold Hydro Boundary.

2.0 REFERENCES

2.1 Performance References

A. SMP-9.0, Watts Bar Nuclear Plant Unit 2 Conduct of Test

B. CCPP 25402-000-GPP-0000-N3506, Pressure Testing of Piping, Tubing and Components

C. SMP-19.0, Off-Normal Condition Control Process

D. SMP-7.0, Watts Bar Nuclear Plant Unit 2 Control of Cleanness, Layup and Flushing

E. 2-TOP-068-12, Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations

F. Bechtel Work Order 111751832

G. Work Order(s) containing PCI work instructions

2.2 Developmental References

A. Procedures and Correspondence

1. NRC Regulatory Guide 1.68, Initial Test Program for Water-Cooled Nuclear Power Plants, Revision 2, July 1978.

2. FSAR Table 14.2-1 Sheet 76 of 89, Reactor Coolant System Cold Hydrostatic Test, Test Summary, Amendment 112

3. General Engineering Specification G-29B, R64, "VOL IV Materials Handling and Process Specifications," P.S. 3.M.9.1 (R8) "Specification for Hydrostatic Testing"

4. ASME Section III, "Nuclear Power Plant Components", are as follows:

   a. Reactor Vessel, 1971 Edition with Addenda to and including Winter 1971 Addenda

   b. Steam Generator, 1971 Edition with Addenda to and including Summer 1971 Addenda (Design Specification Construction Code) 1974 Edition, No Addenda (for Hydrotest)

2.2 Developmental References (continued)

c. Pressurizer, 1971 Edition with Addenda to and including Summer 1971 Addenda

d. Reactor Coolant Pumps, 1971 Edition, to and including Summer 1972 Addenda

5. Memorandum from R.W. Cantrell to G.G. Stack dated December 12, 1980, "Sequoyah Nuclear Plant Units 1 & 2 - Over Pressurization of Piping During Hydrostatic Testing (SWP801212 050)

6. Memorandum from R.W. Cantrell to J.E. Wilkins dated January 28, 1981, "Watts Bar Nuclear Plant Quality Control Test Procedure WBNP-QCT-4.37 - Hydrostatic Testing of ASME Section III, Class 2 and 3 Systems" (SWP810128 079)

7. Memorandum to T.B. Northern from R.M. Pierce dated January 1, 1979, Subject-Minimum Hydro Test Temperature for Reactor Coolant System

8. 2-TSD-68-14 Rev. 2, Reactor Coolant System - Hydro Static Test

9. Bechtel Work Order 111751832 Rev 0, Hydrostatic Test Package, Test 2-068-47W813-1-3-B1, Attachments

10. RCS System Description Document NPG-SDD-WBN2-68-4001 Rev 4, Table 3 lists Reactor Coolant Pipe as 1971 Edition with Addenda to and including Winter 1971 Addenda

11. 10CFR50 Appendix G Table 1

12. WBN 2 Supplemental Chemistry Requirements for Startup and Operation RIMS# L59 140204 001

B. Westinghouse Electric Company documents:

1. RVM-WBT, Rev. 1, Updated Instruction Manual for the Watts Bar Unit #2 Reactor Vessel

2. Technical Manual 1440-C257, Rev 3, Pressurizer Instructions for Tennessee Valley Authority Watts Bar Unit No. 2 transmitted by Westinghouse letter WBT-D-2921

3. Technical Manual 1440-C256, Draft Rev 3, Vertical Steam Generator Instructions for Tennessee Valley Authority Watts Bar Unit No. 2 transmitted by Westinghouse letter WBT-D-3178

2.2 Developmental References (continued)

4. Westinghouse Instruction and Operating Book for Reactor Coolant Pump Model W-11010-A1(93-ACS) for Tennessee Valley Authority Watts Bar Unit No. 1 and Unit No. 2 WBN-VTD-W120-0670 Rev. 27 and supplemented by the RCP Manual supplied by Westinghouse in letter WBT-D-2402

5. Westinghouse WAT/WBT-SU-1.3.1 Rev. 1 dated November 3, 1981, General Hydrostatic Test Procedure Reactor Coolant System and High Pressure Portions of Associated Systems

6. Deleted

7. Westinghouse PLS WBT-D-2988 Rev. 0 March 2011, "Precautions, Limitations and Setpoints"

8. Westinghouse Design Specification G-679059 Rev 9, "Model D3 Steam Generator"

9. Westinghouse Design Specification G-676413 Rev 2, "Reactor Vessel"

10. Drawing 114E968 Rev. 6, "Casing, Final Machining, Shaft Seal Pump - Type 93A"

11. Westinghouse Letter WBT-D-4864, dated May 23, 2014, entitled "Temperature Requirements for the Watts Bar Unit 2 Pre-Service Hydrostatic Test" including attached Westinghouse document number MCOE-LTR-14-58, Revision 0.

C. Flow diagrams:

1. 2-47W809-1, Rev. 31, (CC) Flow Diagram, Chemical & Volume Control System

2. 2-47W810-1, Rev. 19, (CC) Flow Diagram, Residual Heat Removal System

3. 2-47W811-1, Rev. 34, (CC) Flow Diagram, Safety Injection System

4. 2-47W813-1, Rev. 22, (CC) Flow Diagram, Reactor Coolant System

5. 2-47W625-1, Rev. 3, (CC) "Sampling System"

6. 2-47W809-9, Rev. 8 (CC) Flow Diagram, Chemical & Volume Control System

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions and Limitations for General Operations

A. Standard precautions shall be followed for working around energized electrical equipment in accordance with TVA-TSP-18.1021 "Working On or Near Energized Electrical Equipment".

B. Steps may be repeated if all components **CANNOT** be tested in a step. However, if the test has been exited, prerequisite steps must be re-verified and a Chronological Test Log (CTL) entry made.

C. Discrepancies between component ID tags and the description in a procedure/instruction do **NOT** require a Test Deficiency Notice, TDN, in accordance with SMP-14.0, if the UNIDs match, exclusive of place-keeping zeros and train designators (e.g., 2-HS-31-468 vs. 2-HS-031-0468), and the noun description is sufficient to identify the component. If the component label needs to be changed, a Tag Request Form (TR Card) should be processed in accordance with TI-12.14. Make an entry in the CTL and continue testing.

D. All open problems are to be tracked by a corrective action document and entered on the appropriate system punch list.

E. Problems identified during the test shall be annotated on the Chronological Test Log (CTL) from SMP-9.0, including a description of the problem, the procedure step when/where the problem was identified, corrective action steps taken to resolve the problem, and the number of the corrective action document, if one was required.

F. Observe all Radiation Protection (RP) requirements when working in or near radiological areas.

G. Ensure there are **NO** adverse effects to the operation of Unit 1 structures, systems, or components.

H. Test personnel will coordinate with Unit 1 Operations when manipulating Unit 1 equipment.

I. Valves should be opened and closed slowly to prevent pressure transients.

J. Access to the test areas will be restricted by the Test Director.

3.1 Precautions and Limitations for General Operations (continued)

K. Before depressurizing the system to repair leaks, each leak should be documented on a TDN and evaluated as to severity and detriment to successful completion of the hydro test, especially when the test pressure is above 2,450 psiG. The test director will evaluate the leak and determine whether to proceed or repair the leak. All repaired and unrepaired leaks will be logged in the Bechtel Work Order.

L. The RCS piping and the RCPs shall be visually observed for vibration during initial system operation.

M. If any abnormal vibration or other anomaly is observed the Test Director is to be notified immediately to determine if the test should continue.

N. The reactor coolant pumps are operational.

O. The minimum test temperature is 154 degrees F (surface temperature) as required for the most limiting component which is the Steam Generator tube plate to channel head region. Refer to Figure 1 of this PTI as a guide for layout of temperature sensors.

P. A water supply within the acceptable chemistry and temperature limits is available for pressurizing the RCS. Water Chemistry shall be maintained within acceptable limits during testing.

Q. Temporary temperature and pressure test instrumentation is calibrated and installed or available.

R. Temporary test pump with sufficient discharge pressure and flow is used to obtain RCS test pressure.

S. Temporary relief valve is installed with valve range and accuracy that is capable of relieving test pump capacity to prevent over pressurization of the RCS.

T. High pressure portions of systems connected to the RCS are properly aligned with low pressure portions isolated and/or vented.

U. Relief/Safety valves that are set below the test pressure shall be gagged, replaced with valves with higher setpoints or blanked off when not required.

V. DELETED.

W. The RCP operating parameters are listed in Attachment 5.

X. The test pressure shall **NOT** exceed the maximum test pressure for any component within the test boundaries.

3.1 Precautions and Limitations for General Operations (continued)

Y. The reactor lower internals, reactor upper internals and the reactor vessel head are installed and the head studs are tensioned for hydrostatic test pressure.

Z. Cold Hydrostatic Testing will be performed with maximum temperatures in the 162-185°F and maximum pressures will be established >2300 psiG. CHT will be carried out with the following primary chemistry specifications:

- $pH_{77°F}$ 9.0 to 10.4 range.
- DO <2000 ppb and hydrazine ≥2 x DO prior to heat up > 180°F.
- Hydrazine (50PPM - 300 PPM with a target of 200 PPM) and/or ammonia being consist with $pH_{77°F}$ control.
- Chloride ≤150 ppb at all times, and ≤50 ppb prior to heat up > 180°F.
- Fluoride ≤150 ppb at all times, and ≤50 ppb prior to heat up > 180°F.
- Sulfate ≤150 ppb at all times, and ≤50 ppb prior to heat up > 180°F

AA. ASME Section III provides a 6 percent allowance above the minimum test pressure when defining the maximum permissible hydrostatic test pressure, but it also limits the test pressure so as to not exceed the maximum test pressure of any component in the system. The steam generators are limiting components during the cold hydrostatic test. As specified in the Unit 2 ASME Steam Generator Technical Manual 1440-C256, the test pressure on the primary side of the steam generators shall not exceed 3170 psiG.

BB. When reducing system pressure from test pressure to design pressure for the inspection of leaks from welds, joints, piping and components, the required inspection pressure may vary between the minimum required inspection pressure of 2485 psiG (design pressure) plus 100 psi maximum.

CC. During the test, prior to exceeding the design pressure of 2485 psiG, it is essential that the test director be made cognizant of any system abnormality so that a decision may be made to depressurize or continue the test since the specification for the Reactor Vessel only permits 5 primary side hydrostatic tests before startup. Any pressure above 2485 psiG is considered hydrostatic test pressure; therefore, to pressurize above 2485 psiG and depressurize below this value will be considered one cycle.

DD. Standard precautions and requirements shall be followed for working in elevated temperatures around uninsulated piping using procedure TVA-TSP-18.906 "Heat Stress".

EE. Continuous RCP operation is prohibited UNTIL RCS is filled and vented.

FF. Start one RCP at a time allowing approximately 5 minutes between starts.

3.1 Precautions and Limitations for General Operations (continued)

GG. RCP Vibration Limits:

1. SHAFT (as recorded on 2-PnI-275-R176, U2 Aux Inst Rm):

   Normal: Less than 15 mils
   Trip: greater than 15 mils AND rate of rise
   greater than 1 mil/hr, OR
   greater than 20 mils

2. FRAME (as recorded on 2-PnI-275-R176, U2 Aux Inst Rm):

   Normal: less than 3 mils
   Trip: 5 milCP Maximum Starting Duty limits:

3. For Restart after any period running or attempted start where motor failed to achieve full speed before it is stopped: Motor must be idle at least 30 min before restart.

4. Consecutive Starts: In any 2 hr. period: Maximum of 3 starts with a minimum 30 min. idle period before each restart. When 3 starts (or attempted starts) are made in 2 hrs., then a fourth start should **NOT** be made until motor is idle at least 1 hr.

HH. When RCS is greater than 150°F, backup power shall be available to continue CCS flow to the Thermal Barriers.

II. If CCS is lost to the motor bearing oil coolers, RCP operation may continue for a maximum of 10 minutes.

JJ. CCS to an Idle RCP is to remain in service at least 30 min, or until RCS is less than 150°F.

KK. RCP seal injection should be in service when RCS level is above RCP seals. The leakoff valves must be closed when the injection water is **NOT** supplied and the RCS pressure is less than 100 psiG.

LL. Do **NOT** start or operate an RCP without seal flow, UNLESS:

   RCS is less than 150°F, OR

   #1 seal leakoff is less than 5 gpm, AND at least 23 gpm CCS flow through thermal barrier at an inlet temp less than 100°F.

MM. Maintain VCT pressure 15 to 30 psiG with RCP(s) operating to ensure 15 psiG backpressure on #1 seals.

3.1 Precautions and Limitations for General Operations (continued)

NN. A minimum RCS pressure of 325 psiG is required before an RCP may be operated. This assures #1 seal ΔP is maintained greater than 200 psi during RCP operation. Maximum RCS pressure is below design pressure of 2485 psiG for a RCP may be operated.

OO. Maintain seal injection temperature less than 130°F, and flow 8 to 13 gpm to each RCP.

PP. Do **NOT** open #1 seal bypass valve during loss of seal injection water.

QQ. Maintain RCP pump bearing less than 160°F (alarm at 170°F). If pump bearing water temperature reaches 225°F, the RCP must **NOT** remain in operation.

RR. The #1 seal bypass may be opened if RCP Bearing temperature (seal inlet) or #1 seal leakoff temperature approaches the alarm and all the following exist:

1. RCS pressure 100 to 1000 psiG.
2. #1 seal leakoff valve open.
3. #1 seal leakoff flow less than 1 gpm.
4. Seal flow is 8 to 13 gpm to each pump.

SS. Ear Protection must be worn in the area where the RCPs are running.

Date _____

4.0 PREREQUISITE ACTIONS

NOTES

1) 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Valve Alignment and Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations to pressurize the RCS, may occur before or in parallel with steps in Section 4.1 with concurrence of the Test Director.
2) Steps in Section 4.1 and 4.2 may be performed out of sequence or concurrently with the approval of the Test Director.
3) Administrative type steps in Section 4.1 may be performed at any time with the concurrence of the Test Director.
4) Operations group will notify the Test Director prior to filling any tanks such as Refueling Water Storage Tank, or Primary Water Storage Tank.

4.1 Preliminary Actions

[1] **ENSURE** Bechtel Power Corporation has **VERIFIED** all work required in the test boundary for the ASME "N" Stamp Certification of Watts Bar Unit 2 is complete and the project is ready for cold hydro testing as implemented by the Reactor Coolant System Cold Hydrostatic Test 2-PTI-068-14 and WO 111751832 . _____

_____ _____
Bechtel Construction Manager Signature Date

[2] **ENSURE** Westinghouse has **VERIFIED** all work required for the ASME "N" Stamp Certification of Watts Bar Unit 2 is complete and the project is ready for cold hydro testing as implemented by the Reactor Coolant System Cold Hydrostatic Test 2-PTI-068-14 and WO# _____. _____

_____ _____
Westinghouse Manager Signature Date

Date _____

4.1 Preliminary Actions (continued)

[3] **EVALUATE** open items on Watts Bar Integrated Task Equipment List (WITEL) and

ENSURE they will **NOT** adversely affect the test performance with respect to the RCS Primary Inspection Boundary Valves, as listed in Attachment 4. _____

[4] **ENSURE** the reactor coolant pumps temporary operating plan 2-TOP-068-03 precautions and limitations and RCP operating parameters do not differ from 2-PTI-068-14 precautions and limitations and Attachment 5 RCP Operating Parameters. _____

[5] **ENSURE** the reactor coolant pumps are operational and will be operated as required to properly vent the RCS and establish the required temperature prior to pressurizing the RCS to test pressure. _____

[6] **ENSURE** changes to the references listed on Appendix A, have been reviewed, and determined **NOT** to adversely affect the test results. _____

[7] **VERIFY** current revisions and change paper for referenced drawings have been reviewed and determined **NOT** to adversely affect the test performance, and

ATTACH documentation of the current drawing revision numbers and change paper that were reviewed to the data package. _____

[8] **ENSURE** the test/performance copy of this Preoperational Test Instruction (PTI) is the current revision including any change notices and as needed,

ENSURE each test person assisting in this test has the current revision including any change notices. _____

[9] **ENSURE** a set of drawings indicating the hydro test boundary along with a copy of this procedure is available in the control room. _____

[10] **PERFORM** a pretest walk down on equipment and piping to be tested to ensure no conditions exist that will impact test performance. _____

Date _____

4.1 Preliminary Actions (continued)

[11] **ENSURE** appropriate test and operations personnel have been notified and are available to support the test. _____

[12] **ENSURE** Bechtel has written a Work Order and it is ready to work with all prerequisite work complete for performing this procedure and all of the required inspections and documentation.

Work Order No. 111751832 _____

[13] **ENSURE** Work Order(s) containing PCI work instructions are ready to work and prerequisite work is complete for performing the required inspections.

Work Order No. _____ _____

[14] **OBTAIN** the Authorized Nuclear Inspector (ANI) review of the Bechtel Work Order(s) and Work Order(s) containing PCI work instructions required for implementation of the Reactor Coolant System Cold Hydrostatic Test 2-PTI-068-14. _____

_____ _____
ANI Signature Date

4.2 Field Preparations

[1] **ENSURE** temporary hydrostatic pump with sufficient discharge pressure and flow is used to obtain RCS test pressure. _____

[2] **ENSURE** temporary hydrostatic pump has been installed, flushed, leak checked and functionally checked. _____

[3] **ENSURE** temporary temperature and pressure test instrumentation is calibrated and installed or available. _____

[4] **ENSURE** Measuring and Test Equipment (M&TE) required for test performance has been (as required) filled, vented, place in service and recorded on Measuring and Test Equipment Log in SMP-9.0. _____

[5] **ENSURE** temporary relief valve is installed with valve range and accuracy that is capable of relieving test pump capacity to prevent over pressurization of the RCS. _____

Date _____

4.2 Field Preparations (continued)

[6] **ENSURE** all Relief/Safety valves that are set below the test pressure shall be gagged, replaced with valves with higher setpoints or blanked off when not required. _____

[7] **ENSURE** minimum water temperature is > 70°F for the piping systems associated with this hydrostatic test. _____

[8] **ENSURE** the reactor lower internals, reactor upper internals and the reactor vessel head are installed and the head studs are tensioned for hydrostatic test pressure. _____

[9] **REQUEST** Chemistry Group to perform an analysis of the water in the U2 Refueling Water Storage Tank (RWST) and Primary Water Storage Tank (PWST) to Grade A water quality, as shown below in preparation for use in the RCS, RHR, and CVCS systems, per SMP-7.0 Appendix B. _____

Chemistry Contact _____

WATER QUALITY REQUIREMENTS BASED ON WATER GRADES			
	WATER GRADES		
PROPERTY	A	B	C
pH range @ 77 °F	6.0 - 8.0	6.0 - 8.0	5.0 - 10.0
Chloride ion, PPM (max.)	0.15	1.0	25.0
Fluoride ion, PPM (max.)	0.15	0.15	5.0
Silica, PPM (max.)	0.05	0.05	N/A
Conductivity @ 77°F in MICROMHO/CM (max.)	2.0	20.0	400.0
Turbidity, NTU (max.)	1.0	1.0	5.0
Sulfide, PPM (max.)	1.0	1.0	1.0
Particulate (max.)	1/32" x 1/32" x 1/16"	1/32" x 1/32" x 1/16"	1/16" x1/16" x 1/8"

[10] **ENSURE** Bechtel Work Order and Work Order(s) containing PCI work instructions include a Job Hazard Analysis (JHA) addressing proper Personal Protective Equipment and Clothing for working in elevated temperatures and around hot uninsulated piping. _____

[11] **CONDUCT** a pretest briefing with test group and Operations personnel in accordance with SMP-9.0. _____

Date _____

4.2 Field Preparations (continued)

[12] **ENSURE** direct communications are established between the Inside Containment Reactor Coolant area, the Charging Pump rooms, other areas as delineated by the test director and the Main Control Room. _____

[13] **ENSURE** direct communications are established between the official pressure gauge observer, the Main Control Room, and the temporary Hydrostatic Test Pump(s). _____

4.3 Approvals and Notifications

[1] **OBTAIN** permission of the Preoperational Startup Manager to start the test.

_____ _____
Preoperational Startup Manager Signature — Date

[2] **OBTAIN** permission of the Bechtel Construction Manager to start the test.

_____ _____
Bechtel Construction Manager Signature — Date

[3] **OBTAIN** permission of the Westinghouse Manager to start the test.

_____ _____
Westinghouse Manager Signature — Date

[4] **OBTAIN** the Unit 2 Supervisor's (US/SRO) or Shift Manager's (SM) authorization.

_____ _____
US/SRO/SM Signature — Date

5.0 ACCEPTANCE CRITERIA

NOTES

1) Hydrostatic testing requirements may be found in ASME Boiler and Pressure Vessel Code, Section III, Article NB-6000.
2) Any leakage found to be unacceptable, will require repair and retest.
3) Leakage from the following list is acceptable until the Reactor Vessel Hydrostatic Test is affected:

- Leakage from temporary seals installed for the test
- Leakage specifically permitted by the system design
- Internal leakage in pumps and valves
- Leakage from valve or pump packings

4) Attachment 1 contains information used to establish specific test pressures and Acceptance Criteria.
5) Attachment 2 contains Test Results and Review.

A. The system shall be subjected to a hydrostatic test pressure not less than 1.25 times the system design pressure and maintained for a minimum of at least 10 minutes before leak inspections can formally begin excluding the Reactor Coolant Pumps and maintained for a minimum of at least an additional 65 minutes for the Reactor Coolant Pumps (Hold time 75 minutes), as set forth in the Section III of the ASME Boiler and Pressure Vessel Code. Minimum pressure at elevation 760' is 3119 psiG. Steps 6.6[4], 6.6[6] & 6.6[8]..

B. After holding test pressure to a minimum of 3119 psiG at elevation 760' for the required time, inspection of reactor coolant pumps is performed at test pressure with **NO OBSERVED LEAKAGE** (See Note 3). Steps 6.6[7] & 6.6[9].

C. Pressure is reduced to examination pressure minimum of 2497 psiG at elevation 760'which is equal to or greater than Design Pressure and is maintained for a time period required for the inspection of welds, joints, piping and components. Step Section 6.7[4].

D. There shall be **NO OBSERVED LEAKAGE** from welds within the test pressure boundary (See Note 3). Steps Section 6.7[5] and Section 6.7[6].

Date _____

6.0 PERFORMANCE

6.1 Pressurizing RCS to 350 PSIG

[1] **ENSURE** the 4 Steam Generator Sludge Lance ports, for each Steam Generator, have been removed to permit the inspection of the tube sheets and the tubes for leakage during the Reactor Vessel Hydrostatic Test and setup the appropriate FME controls. _____

[2] **ENSURE** Cold Hydrostatic Testing will be carried out with the following primary chemistry specifications:

- $pH_{77°F}$ 9.0 to 10.4 range.
- DO <2000 ppb and hydrazine ≥2 x DO prior to heat up > 180°F.
- Hydrazine (50PPM - 300 PPM with a target of 200 PPM) and/or ammonia being consist with $pH_{77°F}$ control.
- Chloride ≤150 ppb at all times, and ≤50 ppb prior to heat up > 180°F.
- Fluoride ≤150 ppb at all times, and ≤50 ppb prior to heat up > 180°F.
- Sulfate ≤150 ppb at all times, and ≤50 ppb prior to heat up > 180°F _____

[3] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations to fill and vent RCS.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____
_____

[4] **ENSURE** all venting has been completed per Work Order 111751832. _____

[5] **ENSURE** all high pressure hoses are installed, vented and in service providing the necessary flow paths per Work Order 111751832 and SMP-19.0. _____

[6] **ENSURE** the pressurizer, steam generators, and the reactor vessel and the reactor head metal temperatures are > 74°F prior to pressurization from ambient conditions to 350 psiG (max pressure is 400 psiG). _____

Date _____

6.1 Pressurizing RCS to 350 PSIG (continued)

[7] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations to pressurize RCS to 350 psiG.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____ _____

[8] **ENSURE NO** leakage from valve 2-DRV-68-503, REACTOR VESSEL FLANGE LEAKOFF TELLTALE DRAIN. _____

[9] **IF** leaks are found, **THEN**

NOTIFY the Test Director and

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

[10] **ENSURE** Bechtel Power Corporation has INSPECTED all piping from the Vessel Hydro Inspection Boundary Valves, shown on the Test Boundary Map, Work Order 111751832, and Test 2-068-47W813-1-3-B1, Attachments, to the Reactor Vessel, Steam Generators, Reactor Coolant Pumps and the Pressurizer for leakage. _____

_____ _____
Bechtel Test Director Signature Date

[11] Westinghouse has **INSPECTED** the Steam Generator tube sheet and tubes, Reactor Vessel, Reactor Coolant Pumps and Pressurizer welds, as specified in the Work Order(s) containing PCI work instructions . _____

[12] **ENSURE** temporary and support systems leak integrity is adequate to allow escalation to next test pressure. Reference flow diagrams listed in Section 2.2.C. _____

[13] **IF** leaks are found, **THEN**

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

[14] **WHEN** ALL leaks have been EVALUATED or REPAIRED **AND** leakage < 75 GPM, **THEN**

GO TO Section 6.2. _____

Date _____

6.2 Pressurizing RCS to 600 PSIG

[1] **ENSURE** the high pressure portions of systems connected to the RCS are properly aligned with low pressure portions isolated and/or vented. _____

[2] **ENSURE** reactor vessel and reactor head metal temperatures are > 154°F prior to pressurization from 400 psiG to 600 psiG. _____

[3] **ENSURE** pressurizer metal temperatures are > 154°F prior to pressurization from 400 psiG to 600 psiG. _____

[4] **ENSURE** steam generator metal temperatures are > 154°F prior to pressurization from 400 psiG to 600 psiG. _____

[5] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations to pressurize RCS to 600 psiG.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____ _____

[6] **IF** metal skin temperature for the Reactor Vessel, Pressurizer and/or Steam Generators decreases below 160°F, **THEN**

START RCP(s) using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or **DECREASE** RCS pressure to below 400 psiG and maintain metal skin temperature above 74°F using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations, otherwise MARK N/A. _____

[7] **ENSURE NO** leakage from valve 2-DRV-68-503, REACTOR VESSEL FLANGE LEAKOFF TELLTALE DRAIN. _____

[8] **IF** leaks are found, **THEN**

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

Date _____

6.2 Pressurizing RCS to 600 PSIG (continued)

[9] **ENSURE** Bechtel Power Corporation has INSPECTED all piping from the Vessel Hydro Inspection Boundary Valves, shown on the Test Boundary Map, Work Order 111751832, and Test 2-068-47W813-1-3-B1, Attachments, to the Reactor Vessel, Steam Generators, Reactor Coolant Pumps and the Pressurizer for leakage. _____

_____ _____
Bechtel Test Director Signature Date

[10] **ENSURE** Westinghouse has INSPECTED the Steam Generator tube sheet and tubes, Reactor Vessel, Reactor Coolant Pumps and Pressurizer welds, as specified in the Work Order(s) containing PCI work instructions . _____

[11] **ENSURE** temporary and support systems leak integrity is adequate to allow escalation to next test pressure. Reference flow diagrams listed in Section 2.2.C. _____

[12] **IF** leaks are found, **THEN**

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

[13] **WHEN** all leaks have been evaluated or repaired, **THEN**

GO TO Section 6.3. _____

6.3 Pressurizing RCS to 1100 PSIG

[1] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations to pressurize RCS to 1100 psiG.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____

_____

Date _____

6.3 Pressurizing RCS to 1100 PSIG (continued)

[2] **IF** metal skin temperature for the Reactor Vessel, Pressurizer and/or Steam Generators decreases below 160°F, **THEN**

START RCP(s) using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or **DECREASE** RCS pressure to below 400 psiG and maintain metal skin temperature above 74°F using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Valve Alignment and Pump Operations, otherwise MARK N/A. _____

[3] **ENSURE NO** leakage from valve 2-DRV-68-503, REACTOR VESSEL FLANGE LEAKOFF TELLTALE DRAIN. _____

[4] **IF** leaks are found, **THEN**

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

[5] **ENSURE** Bechtel Power Corporation has INSPECTED all piping from the Vessel Hydro Inspection Boundary Valves, shown on the Test Boundary Map, Work Order 111751832, and Test 2-068-47W813-1-3-B1, Attachments, to the Reactor Vessel, Steam Generators, Reactor Coolant Pumps and the Pressurizer for leakage. _____

_____ _____
Bechtel Test Director Signature Date

[6] **ENSURE** Westinghouse has INSPECTED the Steam Generator tube sheet and tubes, Reactor Vessel, Reactor Coolant Pumps and Pressurizer welds, as specified in the Work Order(s) containing PCI work instructions . _____

[7] **ENSURE** temporary and support systems leak integrity is adequate to allow escalation to next test pressure. Reference flow diagrams listed in Section 2.2.C. _____

[8] **IF** leaks are found, **THEN**

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

[9] **WHEN** all leaks have been evaluated or repaired, **THEN**

GO TO Section 6.4. _____

Date _____

6.4 Pressurizing RCS to 1600 PSIG

[1] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations to pressurize RCS to 1600 psiG.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____ _____

[2] **IF** metal skin temperature for the Reactor Vessel, Pressurizer and/or Steam Generators decreases below 160°F, **THEN**

START RCP(s) using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or **DECREASE** RCS pressure to below 400 psiG and maintain metal skin temperature above 74°F using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations, otherwise MARK N/A. _____

[3] **ENSURE NO** leakage from 2-DRV-68-503, REACTOR VESSEL FLANGE LEAKOFF TELLTALE DRAIN. _____

[4] **IF** leaks are found, **THEN**

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

[5] **ENSURE** Bechtel Power Corporation has INSPECTED all piping from the Vessel Hydro Inspection Boundary Valves, shown on the Test Boundary Map, Work Order 111751832, and Test 2-068-47W813-1-3-B1, Attachments, to the Reactor Vessel, Steam Generators, Reactor Coolant Pumps and the Pressurizer for leakage. _____

_____ _____
Bechtel Test Director Signature Date

[6] **ENSURE** Westinghouse has INSPECTED the Steam Generator tube sheet and tubes, Reactor Vessel, Reactor Coolant Pumps and Pressurizer welds, as specified in the Work Order(s) containing PCI work instructions . _____

Date _____

6.4 Pressurizing RCS to 1600 PSIG (continued)

[7] **ENSURE** temporary and support systems leak integrity is adequate to allow escalation to next test pressure. Reference flow diagrams listed in Section 2.2.C. _____

[8] **IF** leaks are found, **THEN**

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

[9] **WHEN** all leaks have been evaluated or repaired, **THEN**

GO TO Section 6.5. _____

6.5 Pressurizing RCS to 2100 PSIG

[1] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations to pressurize RCS to 2100 psiG.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____

_____

[2] **IF** metal skin temperature for the Reactor Vessel, Pressurizer and/or Steam Generators decreases below 160°F, **THEN**

START RCP(s) using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or **DECREASE** RCS pressure to below 400 psiG and maintain metal skin temperature above 74°F using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations, otherwise MARK N/A. _____

[3] **ENSURE NO** leakage from 2-DRV-68-503, REACTOR VESSEL FLANGE LEAKOFF TELLTALE DRAIN. _____

Date _____

6.5 Pressurizing RCS to 2100 PSIG (continued)

[4] **IF** leaks are found, **THEN**

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

[5] **ENSURE** Bechtel Power Corporation has INSPECTED all piping from the Vessel Hydro Inspection Boundary Valves, shown on the Test Boundary Map, Work Order 111751832, and Test 2-068-47W813-1-3-B1, Attachments, to the Reactor Vessel, Steam Generators, Reactor Coolant Pumps and the Pressurizer for leakage. _____

_____ _____
Bechtel Test Director Signature Date

[6] **ENSURE** Westinghouse has INSPECTED the Steam Generator tube sheet and tubes, Reactor Vessel, Reactor Coolant Pumps and Pressurizer welds, as specified in the Work Order(s) containing PCI work instructions . _____

[7] **ENSURE** temporary and support systems leak integrity is adequate to allow escalation to next test pressure. Reference flow diagrams listed in Section 2.2.C. _____

[8] **IF** leaks are found, **THEN**

ENTER in the Chronological Test Log, otherwise MARK N/A. _____

[9] **IF** leakage is > 75 GPM, **THEN**

REDUCE leakage by determining the cause of the leak and repair or isolate. _____

[10] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of temperature drop test to ensure sufficient time exist to complete the hydro inspections.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____

_____

Date _____

6.5 Pressurizing RCS to 2100 PSIG (continued)

[11] **ENSURE** Cold Hydrostatic Testing will be carried out with the following primary chemistry specifications:

- $pH_{77°F}$ 9.0 to 10.4 range.
- DO <2000 ppb and hydrazine ≥2 x DO prior to heat up > 180°F.
- Hydrazine (50PPM - 300 PPM with a target of 200 PPM) and/or ammonia being consist with $pH_{77°F}$ control.
- Chloride ≤150 ppb at all times, and ≤50 ppb prior to heat up > 180°F.
- Fluoride ≤150 ppb at all times, and ≤50 ppb prior to heat up > 180°F.
- Sulfate ≤150 ppb at all times, and ≤50 ppb prior to heat up > 180°F

_____

[12] **WHEN** leakage < 75 GPM, **THEN**

GO TO Step 13. _____

[13] **WHEN** all leaks have been evaluated or repaired, **THEN**

GO TO Step 14. _____

[14] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for raising the Reactor Vessel, Pressurizer and Steam Generators temperatures to ≤ 185°F to establish sufficient time to complete the hydro inspections.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____

_____

[15] **WHEN** desired temperature has been established , **THEN**

GO TO Section 6.6.

6.6 Pressurizing RCS to Hydrostatic Test Pressure

[1] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations to pressurize RCS to Hydrostatic pressure.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____

_____

Date _____

6.6 Pressurizing RCS to Hydrostatic Test Pressure (continued)

[2] **IF** metal skin temperature decreases below 160°F for the Reactor Vessel, Pressurizer and/or Steam Generators **THEN**

DECREASE RCS pressure to below 400 psiG and maintain metal skin temperature above 74°F using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations, otherwise MARK N/A. _____

[3] **IDENTIFY** problems (example: not being able to maintain temperature long enough to perform inspections) during the test shall be annotated on the Chronological Test Log (CTL) from SMP-9.0, including a description of the problem, the procedure step when/where the problem was identified, corrective action steps to be taken to resolve the problem, and the number of the corrective action document, if one was required, otherwise MARK N/A. _____

NOTE

Hydrostatic Test Pressure must be held for at least 10 minutes before leak inspections can formally begin. Hydrostatic Test Pressure must be held for at least 75 minutes before leak inspections can begin on the four Reactor Coolant Pumps. The maximum temperature change is ≤ 10°F per hour during hydrostatic testing above design pressure. After the required inspections are conducted on the RCPs at 3119 to 3152 psiG, the pressure can be dropped to between 2497 and 2597 psiG for the remaining inspections.

[4] **ENSURE** the RCS pressure is at the Hydrostatic Test Pressure of ≥ 3119 psiG and ≤ 3152 psiG at the official pressure gauge (EL. 760').**(ACC CRIT 5.0**A**)** _____

[5] **NOTIFY** Bechtel, ANI, Westinghouse and any other inspection personnel, that the systems are at Hydrostatic Test Pressure. _____

[6] **ENSURE** Hydrostatic Test pressure is held for 10 minutes at the official pressure gauge (EL. 760').**(ACC CRIT 5.0**A**)** _____

[7] **START** the inspection of the cold hydrostatic boundary excluding the reactor coolant pumps at test pressure of ≥ 3119 psiG and ≤ 3152 psiG at the official pressure gauge (EL. 760') with **NO** observed leakage.**(ACC CRIT 5.0B)** _____

[8] **ENSURE** Hydrostatic Test pressure is held for 75 minutes (an additional 65 minutes after the first 10 minute hold of step [6]) at the official pressure gauge (EL. 760').**(ACC CRIT 5.0**A**)** _____

Date _____

6.6 Pressurizing RCS to Hydrostatic Test Pressure (continued)

[9] **ENSURE** the inspection of the reactor coolant pumps is performed at test pressure of ≥ 3119 psiG and ≤ 3152 psiG at the official pressure gauge (EL. 760') with **NO** observed leakage.**(ACC CRIT 5.0B)** _____

[10] **ENSURE** Attachment 4 has been completed showing that all components have reached Hydrostatic Test Pressure. _____

[11] **ENSURE** Westinghouse has INSPECTED the Reactor Coolant Pumps welds, as specified in the Work Order(s) containing PCI work instructions . _____

[12] **WHEN** Section 6.6 has been completed, **THEN**

GO TO Section 6.7 to reduce system pressure to design pressure. _____

6.7 Reduce RCS Pressure to Design Pressure

[1] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations for the Final Inspection at between 2,497 psiG and 2,597 psiG.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____

_____

[2] **IF** metal skin temperature decreases below 160°F for the Reactor Vessel, Pressurizer and/or Steam Generators **THEN**

DECREASE RCS pressure to below 400 psiG and maintain metal skin temperature above 74°F using 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations, otherwise MARK N/A. _____

[3] **IDENTIFY** problems (example: not being able to maintain temperature long enough to perform inspections) during the test shall be annotated on the Chronological Test Log (CTL) from SMP-9.0, including a description of the problem, the procedure step when/where the problem was identified, corrective action steps to be taken to resolve the problem, and the number of the corrective action document, if one was required, otherwise MARK N/A. _____

Date _____

6.7 Reduce RCS Pressure to Design Pressure (continued)

[4] **ENSURE** RCS pressure is between 2,497 psiG and 2,597 psiG for performance of the final RCS inspection. **(ACC CRIT 5.0**C) _____

[5] **ENSURE** Bechtel Power Corporation has INSPECTED all piping from the Vessel Hydro Inspection Boundary Valves, shown on the Test Boundary Map, Work Order 111751832, and Test 2-068-47W813-1-3-B1, Attachments, to the Reactor Vessel, Steam Generators, Reactor Coolant Pumps and the Pressurizer for leakage. **(ACC CRIT 5.0**D) _____

_____ _____
Bechtel Test Director Signature Date

[6] **ENSURE** Westinghouse has performed the required inspections in accordance with the PCI work instructions and verify there are no leaks observed from welds in the test boundary: **(ACC CRIT 5.0**D)

[6.1] Reactor Vessel _____

[6.2] Steam Generators _____

[6.3] Pressurizer _____

[6.4] Reactor Coolant Pumps _____

[7] **WHEN** all inspections have been COMPLETED **AND** are ACCEPTABLE, , **THEN**

GO TO Section 7.0. _____

Date _____

7.0 POST PERFORMANCE ACTIVITY

[1] **NOTIFY** the Unit 2 US/SRO of the test completion and system alignment. _____

[2] **VERIFY** RCS pressure boundary meets Section 5.0, Acceptance Criteria. _____

[3] **GO TO** 2-TOP-068-12 Reactor Vessel Primary Hydrostatic Test Fill, Vent, Pump Operations or equivalent approved TOP(s) or SOI for the performance of preparations to depressurize RCS.
Instruction Used: ☐ 2-TOP-068-12 ☐: _____ _____

[4] **VERIFY NO** excessive vibration of the piping system and components associated with the performance of this procedure was observed. _____

[5] **ATTACH** copies of the completed Bechtel Work Order(s) and the completed Work Order(s) containing PCI work instructions required for completion of the Reactor Coolant System Cold Hydrostatic Test 2-PTI-068-14 to this PTI. _____

[6] **OBTAIN** the Authorized Nuclear Inspector (ANI) review of the Bechtel Work Order(s) and Work Order(s) containing PCI work instructions required for completion of the Reactor Coolant System Cold Hydrostatic Test 2-PTI-068-14. _____

_____ _____
ANI Signature Date

8.0 RECORDS

A. QA Records

Completed Test Package

B. Non-QA Records

None

Appendix A
(Page 1 of 2)

TEST PROCEDURES/INSTRUCTIONS REFERENCE REVIEW

Date _____

NOTES

1) Additional copies of this table may be made as necessary.
2) Initial and date indicates review has been completed for impact.
3) Procedures, instructions and drawings may be added as necessary.

PROCEDURE/ INSTRUCTION	REVISION/CHANGES	IMPACT Yes/No	INITIAL AND DATE
Unit 2 FSAR-Amendment 112, Chapter 14 Table 14.2-1 Sheet 76 of 89			
WAT/WBT-SU-1.3.1 Rev 1			
2-TSD-68-14 Rev 2			
General Engineering Specification G-29B, R64, "VOL IV Materials Handling and Process Specifications," P.S. 3.M.9.1 (R8) "Specification for Hydrostatic Testing			
RVM-WBT, Rev. 1 Reactor Vessel			
Technical Manual 1440-C257, Rev 3, Pressurizer			
Technical Manual 1440-C256, Draft Rev 3, Vertical Steam Generator			
WBN-VTD-W120-0670 Rev. 27 and supplemented by the RCP Manual supplied by Westinghouse in letter WBT-D-2402			
Westinghouse PLS WBT-D-2988 Rev. 0 March 2011, "Precautions, Limitations and Setpoints			
RCS System Description Document NPG-SDD-WBN2-68-4001 Rev 4			
Westinghouse Design Specification G-679059 Rev 9, "Model D3 Steam Generator"			

Appendix A
(Page 2 of 2)

TEST PROCEDURES/INSTRUCTIONS REFERENCE REVIEW

Date _____

PROCEDURE/ INSTRUCTION	REVISION/CHANGES	IMPACT Yes/No	INITIAL AND DATE

Reviewed by: _____ _____
Signature Date

Appendix B
(Page 1 of 1)

TEMPORARY CONDITION LOG

Date _____

NOTE

These steps will be MARKED N/A if **NO** temporary condition existed. Additional copies of this table may be made as necessary.

ITEM NUMBER	TEMPORARY CONDITION DESCRIPTION	PERFORMED		RETURNED TO NORMAL	
		Step Number	Performed By/Date CV By/Date	Step Number	Returned By/Date CV By/Date

Attachment 1
(Page 1 of 1)

SYSTEM DESIGN CRITERIA

System Name	Reactor Coolant System			System No.	68
TVA Class	A	ANS Safety	1	Seismic Category	I
Cleanliness Classification		B		Water Grade Minimum	A
Governing Code		ASME		Class	1
System Design Pressure		2485	PSI		
System Design Temperature		680	°F		
Minimum Hydrostatic Test Pressure		3107	psiG @ el. 788'		
		3119	psiG @ gauge 760'		
Maximum Hydrostatic Test Pressure		3170	psiG @ el. 720'		
		3152	psiG @ gauge 760'		
		3189	psiG @ low point el. 676'		
Based on:	6% over minimum:		psiG		
	90% of yield strength:		psiG		
	Limiting component:	Steam Generator	@	3170	psiG
	Other:				
Valve within test boundary with lowest nameplate pressure				none	
	lower than rated	2485	psiG		

TEST ACCEPTANCE CRITERIA

Minimum Test Duration:	10 minutes	75 mins for RCPs
Minimum Test Temperature:	154°F	
Design Leakage Criteria:	None except valve and pump packing, internal leakage in pumps and valves, and temporary seals installed for test.(5.0 note 3)	

High Point El. 788' Low Point El. 676' Pressure Gauge El. 760'

Attachment 2
(Page 1 of 1)

TEST RESULTS AND REVIEW

Date _____

Refer to Attachment 1 for Acceptance Criteria

Refer to Attachment 3 of this procedure and Bechtel Work Order 111751832 for results data

	Inspector	Date
Water Grade Acceptable		
Test Temperatures Acceptable		
Leakage Acceptable		
Test Pressure Acceptable		
Test Duration Acceptable		

Time Held at Test Pressure (3119 psiG @ EL 760')			
Start Time:		Stop Time:	
Time Held at Examination Pressure (2497 to 2597 psiG @ EL 760')			
Start Time:		Stop Time:	

Remarks: _____

Test performed in accordance with Rev. _____ of this package.

		Date
Test Director:		
ANI:		

Attachment 3
(Page 1 of 1)

RCS PRIMARY HYDROSTATIC TEST LEAK LOG

Date _____

Date/Time	TDN/Leak Description	Evaluation	Corrective Action	WO Number	Remarks	Initial/Date

Attachment 4
(Page 1 of 8)

RCS PRIMARY HYDRO INSPECTION BOUNDARY VALVES

RECORD when component is experiencing Hydrostatic Test Pressure of ≥ 3119 psiG and ≤ 3152 psiG.

NOMENCLATURE	LOCATION	UNID	INITIALS
PZR AUXILIARY SPRAY LINE ISOLATION	AZ130/716	2-FCV-62-84	
CVCS NORMAL CHARGING FLOW CONTROL	AZ130/716	2-FCV-62-85	
CVCS ALT CHARGING FLOW CONTROL	AZ130/716	2-FCV-62-86	
CVCS NORM CHARGING 2-FCV-62-85 BYPASS CKV	AZ130/716	2-CKV-62-658	
COLD LEG 2 RHR INJ LINE VENT	AZ142/716	2-VTV-63-30	
COLD LEG 1 RHR INJ LINE VENT	AZ18/741	2-VTV-63-34	
COLD LEG 3 RHR INJ LINE VENT	AZ210/742	2-VTV-63-54	
SIS COLD LEG ACCUM 4 OUTLET ISOLATION	AZ320/716	2-FCV-63-67	
SIS COLD LEG ACCUM 4 CKV LEAK TEST ISOL	AZ322/728	2-FCV-63-68	
SI PUMP TO COLD LEG 4 CHK VLV LEAK TEST ISOL	AZ320/730	2-FCV-63-69	
SIS COLD LEG ACCUM 3 CKV LEAK TEST ISOL	AZ219/725	2-FCV-63-78	
SI PUMP TO COLD LEG 3 CHK VLV LEAK TEST ISOL	AZ215/725	2-FCV-63-79	
SIS COLD LEG ACCUM 3 OUTLET ISOLATION	AZ215/725	2-FCV-63-80	
RHR TO RCS 2&3	A11W/713	2-FCV-63-93	
RHR TO RCS 1&4	A11W/713	2-FCV-63-94	
SIS ACCUM TK 2 CHECK VLV LEAK TEST	AZ145/723	2-FCV-63-96	
SI PUMP TO COLD LEG 2 CHK VLV LEAK TEST ISOL	AZ145/723	2-FCV-63-97	
SIS COLD LEG ACCUM 2 OUTLET ISOLATION	AZ142/722	2-FCV-63-98	
COLD LEG 1 RHR INJ LINE VENT	AZ18/741 FAN RM 1	2-VTV-63-101	
COLD LEG 2 RHR INJ LINE VENT	AZ145/742 ACCUM 2	2-VTV-63-105	

Attachment 4
(Page 2 of 8)

RCS PRIMARY HYDRO INSPECTION BOUNDARY VALVES

RECORD when component is experiencing Hydrostatic Test Pressure of ≥ 3119 psiG and ≤ 3152 psiG.

NOMENCLATURE	LOCATION	UNID	INITIALS
COLD LEG 2 & 3 RHR CHK VLV LEAK TEST ISOL	AZ289/738 ACUM 4	2-FCV-63-111	
COLD LEG 1 & 4 RHR CHK VLV LEAK TEST ISOL	AZ291/735 ACUM 4	2-FCV-63-112	
SIS COLD LEG ACCUM 1 CKV LEAK TEST ISOL	AZ36/725 ACUM 1	2-FCV-63-116	
SI PMP TO COLD LEG 1 CKV VLV LEAK TEST ISOL	AZ38/730 ACUM 1	2-FCV-63-117	
SIS COLD LEG ACCUM 1 OUTLET ISOLATION	AZ38/716 ACUM 1	2-FCV-63-118	
RHR HOT LEG 1 & 3 CKV LEAK TEST ISOL	AZ294/734 ACUM 4	2-FCV-63-158	
HOT LEG 1 SIS CHECK VLV LEAK TEST ISOLATION	AZ38/730 ACUM 1	2-FCV-63-163	
HOT LEG 2 SIS CHECK VLV LEAK TEST ISOLATION	AZ145/723 ACUM 2	2-FCV-63-164	
HOT LEG 3 SIS CHECK VLV LEAK TEST ISOLATION	AZ180/720 FAN RM 2	2-FCV-63-165	
HOT LEG 4 SIS CHECK VLV LEAK TEST ISOLATION	AZ360/726 FAN RM 1	2-FCV-63-166	
RHR TO HOT LEG 1 & 3 INJECTION ISOLATION	A11W/713 BIT RM	2-FCV-63-172	
2-FCV-63-172 RLF LINE ISOL	A11W/713 BIT RM	2-ISV-63-172	
HOT LEG 3 RHR INJECTION LINE VENT	AZ143/716 ACUM 2	2-VTV-63-190	
RHR SUPPLY 2-FCV-74-1 LEAK TEST LINE ISOL	AZ297/718 ACUM 4	2-FCV-63-186	
COLD LEG 3 SAFETY INJECTION LINE VENT	AZ215/716 FAN RM 2	2-VTV-63-154	
HOT LEG 4 SAFETY INJECTION LINE VENT	AZ360/716 FAN RM 1	2-VTV-63-171	

Attachment 4
(Page 3 of 8)

RCS PRIMARY HYDRO INSPECTION BOUNDARY VALVES

RECORD when component is experiencing Hydrostatic Test Pressure of ≥ 3119 psiG and ≤ 3152 psiG.

NOMENCLATURE	LOCATION	UNID	INITIALS
HOT LEG 1 RHR INJECTION LINE VENT	AZ40/730 ACUM 1	2-VTV-63-192	
SIS PMP OUT TO LP 1 HL	AZ38/732 ACUM1	2-FE-63-162	
SIS PMP OUT TO LP 3 HL	AZ135/723 ACUM 2	2-FE-63-161	
SIS PMP OUT TO LP 2 HL	AZ178/727 FAN RM 2	2-FE-63-160	
SIS PMP OUT TO LP 4 HL	AZ001/739 FAN RM 1	2-FE-63-159	
SIS FLOW TO CL 1 FLOW ELEMENT	AZ37/732 ACUM 1	2-FE-63-122	
SIS FLOW TO CL 2 FLOW ELEMENT	AZ144/732 ACUM 2	2-FE-63-123	
SIS FLOW TO CL 3 FLOW ELEMENT	AZ210/730 FAN RM 2	2-FE-63-124	
SIS FLOW TO CL 4 FLOW ELEMENT	AZ321/727 ACUM 4	2-FE-63-125	
SIS BORON INJ TNK FLOW TO CL RCS LOOP 1	AZ358/729 FAN RM 1	2-FE-63-33	
SIS BORON INJ TNK FLOW TO CL RCS LOOP 2	AZ140/729 ACUM 2	2-FE-63-31	
SIS BORON INJ TNK FLOW TO CL RCS LOOP 3	AZ216/727 ACUM 3	2-FE-63-29	
SIS BORON INJ TNK FLOW TO CL RCS LOOP 4	AZ295/726 ACUM 4	2-FE-63-27	
RHR TO HOT LEG 1 & 3 INJ LINE TEST CONN	A11W/725 BIT RM	2-DRV-63-691A	
RHR TO HOT LEG 1 & 3 INJ LINE TEST CONN	AZ285/742 ACUM 4	2-TV-63-692	

Attachment 4
(Page 4 of 8)

RCS PRIMARY HYDRO INSPECTION BOUNDARY VALVES

RECORD when component is experiencing Hydrostatic Test Pressure of ≥ 3119 psiG and ≤ 3152 psiG.

NOMENCLATURE	LOCATION	UNID	INITIALS
RHR TO COLD LEG 1 & 4 INJ LINE TEST CONN	A11W/730 BIT RM	2-TV-63-694	
RHR TO COLD LEG 2 & 3 INJ LINE TEST CONN	A11W/730 BIT RM	2-TV-63-697	
COLD LEG 1 SIS CHK VLV LEAK TEST CONN	AZ38/730 ACUM 1	2-TV-63-703	
COLD LEG 4 SIS CHK VLV LEAK TEST CONN	AZ322/730 ACUM 4	2-TV-63-704	
COLD LEG 1 RHR INJ LINE DRAIN	AZ19/735 FAN RM 1	2-DRV-63-705	
COLD LEG 2 SIS CHK VLV LEAK TEST CONN	AZ145/723 ACUM 2	2-TV-63-706	
HOT LEG 1 INJECTION HEADER TEST CONN	AZ40/725 ACUM 1	2-TV-63-707	
COLD LEG 3 SIS CHK VLV LEAK TEST CONN	AZ215/725 ACUM 3	2-TV-63-709	
RCS LOOP 1 TYGON HOSE CONNECTION ISOL	AZ40/702 RAD 40	2-DRV-68-551	
PRESSURIZER PORV	AZ99/785	2-PCV-68-334 flange and blank	
PRESSURIZER PORV	AZ105/786	2-PCV-68-340A	
2-FT-68-6A ROOT	AZ39/710 RAD 41	2-RTV-68-401A	
2-FT-68-6D ROOT	AZ39/710 RAD 41	2-RTV-68-402A	
2-FT-68-6B ROOT	AZ39/710 RAD 41	2-RTV-68-403A	
2-FT-68-6A/2-FT-68-6D/2-FT-68-6B ROOT	AZ35/708 RAD 45	2-RTV-68-404A	
2-FT-68-29B ROOT	AZ140/710 RAD 34	2-RTV-68-411A	

Attachment 4
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RCS PRIMARY HYDRO INSPECTION BOUNDARY VALVES

RECORD when component is experiencing Hydrostatic Test Pressure of ≥ 3119 psiG and ≤ 3152 psiG.

NOMENCLATURE	LOCATION	UNID	INITIALS
2-FT-68-29D ROOT	AZ145/710 RAD 33	2-RTV-68-412A	
2-FT-68-29A ROOT	AZ140/710 RAD 33	2-RTV-68-413A	
2-FT-68-29B/2-FT-68-29D/2-FT-68-29A ROOT	AZ155/710 ICQ2	2-RTV-68-414A	
2-FT-68-48A ROOT	AZ215/710 ICQ3	2-RTV-68-421A	
2-FT-68-48B ROOT	AZ215/710 ICQ3	2-RTV-68-422A	
2-FT-68-48D ROOT	AZ215/710I CQ3	2-RTV-68-423A	
2-FT-68-48A/2-FT-68-48B/2-FT-68-48D ROOT	AZ210/710 ICQ3	2-RTV-68-424A	
2-PT-68-68/2-XIS-68-70 ROOT	AZ350/709 RAD 22	2-RTV-68-428A	
2-PT-68-66 ROOT	AZ350/708 RAD 22	2-RTV-68-429A	
2-FT-68-71B ROOT	AZ327/710 RAD 34	2-RTV-68-431A	
2-FT-68-71D ROOT	AZ327/710 RAD 33	2-RTV-68-432A	
2-FT-68-71A ROOT	AZ330/710 RAD 32	2-RTV-68-433A	
2-FT-68-71B/2-FT-68-71D/2-FT-68-71A ROOT	AZ325/710 RAD 34	2-RTV-68-434A	
2-LT-68-320 ROOT	AZ100/735 RAD 39	2-RTV-68-441A	
2-PT-68-322/FT-68-322 ROOT	AZ107/776 RAD 38	2-RTV-68-442A	
2-PT-68-334 ROOT	AZ110/777 RAD 31	2-RTV-68-443A	

Attachment 4
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RCS PRIMARY HYDRO INSPECTION BOUNDARY VALVES

RECORD when component is experiencing Hydrostatic Test Pressure of ≥ 3119 psiG and ≤ 3152 psiG.

NOMENCLATURE	LOCATION	UNID	INITIALS
2-LT-68-335 ROOT	AZ100/735 RAD31	2-RTV-68-444A	
2-LT-68-339 ROOT	AZ95/735 RAD 36	2-RTV-68-445A	
2-PT-68-340 ROOT	AZ99/775 RAD 37	2-RTV-68-446A	
RT VLV TO XIS-68-391	AZ30/733	2-RTV-68-453A	
2-XIS-68-389/LT-68-367/LT-68-368/ LT-68-369 RT	AZ43/723 RAD 54	2-RTV-68-454A	
2-XIS-68-392/LT-68-370/LT-68-371/ LT-68-372 RT	AZ223/723	2-RTV-68-455A	
RCS LOOP 1 HOT LEG SAMPLE	AZ43/723 RAD 54	2-SMV-68-548	
RCS LOOP 1 DRAIN	AZ40/702 RAD 40	2-DRV-68-550	
RCS LOOP 2 DRAIN	AZ138/704 RAD 39	2-DRV-68-553	
RCS LOOP 4 DRAIN	AZ325/702 RAD 48	2-DRV-68-558	
PRESSURIZER SAFETY VALVE	AZ90/780 RAD 38	2-RFV-68-563	
PRESSURIZER SAFETY VALVE	AZ90/780 ICQ4	2-RFV-68-564	
PRESSURIZER SAFETY VALVE	AZ90/780 RAD 36	2-RFV-68-565	
2-LT-68-320-ROOT	AZ100/735 RAD 40	2-RTV-68-569A	
PRESSURIZER SAMPLE	AZ102/734 RAD 30	2-SMV-68-575	
PRESSURIZER SAMPLE	AZ102/786 RAD 31	2-SMV-68-576	

Attachment 4
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RCS PRIMARY HYDRO INSPECTION BOUNDARY VALVES

RECORD when component is experiencing Hydrostatic Test Pressure of ≥ 3119 psiG and ≤ 3152 psiG.

NOMENCLATURE	LOCATION	UNID	INITIALS
PRESSURIZER VENT	AZ102/787 RAD 32	2-VTV-68-577	
RCS LOOP 3 HOT LEG SAMPLE	AZ213/723 RAD 19	2-SMV-68-578	
RCS LOOP 3 EXCESS LETDOWN ISOL	AZ323/720 RAD 25	2-ISV-68-579	
RCS LOOP 3 LETDOWN ISOL	AZ215/705 ICQ3	2-ISV-68-580	
RCS LOOP 3 DRAIN	AZ220/702 RAD 37	2-DRV-68-582	
RCS LOOP 2 PZR SPRAY LINE DRAIN	AZ110/730 RAD 33	2-DRV-68-593	
PRESSURIZER SPRAY LINE VENT	AZ105/783 RAD 38	2-VTV-68-594	
REACTOR VESSEL VENT	AZ135/755	2-VTV-68-603	
HEAD VENT ISV	AZ30/755	2-VTV-68-607	
RCS LEVEL INDICATOR ISOLATION	AZ85/722	2-ISV-68-1108	
2-XIS-68-387,390 ROOT	AZ65/716	2-RTV-68-387A	
LOOP 4 HOT LEG TO RHR SUCTION	AZ301/716 NO 4 ACC	2-FCV-74-2	
2-FCV-74-2 BYPASS RHR SUCTION	AZ301/716 NO 4 ACC	2-FCV-74-8	
RHR SUCTION HDR DRAIN	AZ345/702	2-DRV-74-541	
RHR SUCTION HDR VLV LOW POINT DRAIN	AZ315/702	2-DRV-74-542	
2-FE-63-33 ROOT VALVE	AZ358/730 FAN RM 1	2-RTV-63-408A	
2-FE-63-31 ROOT VALVE	AZ141/728 ACUM 2	2-RTV-63-406A	
2-FE-63-29 ROOT VALVE	AZ213/725 ACUM 3	2-RTV-63-404A	

Attachment 4
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RCS PRIMARY HYDRO INSPECTION BOUNDARY VALVES

RECORD when component is experiencing Hydrostatic Test Pressure of ≥ 3119 psiG and ≤ 3152 psiG.

NOMENCLATURE	LOCATION	UNID	INITIALS
2-FE-63-27 ROOT VALVE	AZ296/730 ACUM 4	2-RTV-63-402A	
2-FE-63-162 ROOT VALVE	AZ36/727 ACUM 1	2-RTV-63-410A	
2-FE-63-161 ROOT VALVE	AZ135/723 ACUM 2	2-RTV-63-390A	
2-FE-63-160 ROOT VALVE	AZ178/727 FAN RM 2	2-RTV-63-388A	
2-FE-63-159 ROOT VALVE	AZ001/739 FAN RM 1	2-RTV-63-392A	
2-FE-63-122 ROOT VALVE	AZ37/732 ACUM 1	2-RTV-63-394A	
2-FE-63-123 ROOT VALVE	AZ144/732 ACUM 2	2-RTV-63-396A	
2-FE-63-124 ROOT VALVE	AZ210/726 FAN RM 2	2-RTV-63-398A	
2-FE-63-125 ROOT VALVE	AZ321/727 ACUM 4	2-RTV-63-400A	

Attachment 5
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RCP OPERATING PARAMETERS

PUMP OPERATING PARAMETERS

PARAMETER	NORMAL	MINIMUM	MAXIMUM
1. RCS:			
Press	2235 psiG	(3) 325 psi for fill & vent	2485 psiG
Temp	557°F	N/A	650°F
2. #1 seal leakoff:			
Flow	1.0-5.0 gpm	(1,2) 0.8 gpm NORM 0.2 gpm STARTUP	(1,2) 6.0 gpm
ΔP	2250 psid	2150 psid NORM 200 psid STARTUP	2300 psid
Inlet Temp	130 (30-40°F above injection temp)	60°F	180°F
3. #2 seal leakoff:			
Flow	3 gph	Negligible	60 gph
ΔP	27 psid	8 psid	80 psid
#3 Seal leakoff			
Flow	100 cc/hr	Negligible	250 cc/hr
ΔP	3 psid	2 psid	4 psid
4. Seal Water Inj:			
Flow:	8-13 gpm	6 gpm	20 gpm
Temp	60-130°F	60°F	130°F
5. Thermal Barrier (CCS):			
Flow	40 gpm	35 gpm	(4) 50 gpm
Inlet Temp	80°F	60°F	105°F
Pressure	150 PSI	N/A	200 psi
6. Brg (Water):			
Temp (RTD)	100-190°F (30-40°F above injection temp)	60°F	225°F

(1) If #1 seal leak rates are outside normal range (1.0-5.0 gpm) but within operating limits (0.8-6.0 gpm), continue pump operation. Ensure seal injection flow exceeds #1 seal leak rate for affected RCP. Closely monitor pump and seal parameters and contact System Engineer for further instructions.[C.3]

(2) For #1 seal leak rates outside the operating limits (0.8-6.0 gpm), remove RCP from service as soon as practical.[C.3]

(3) 325 psiG applies only during fill & vent. Minimum loop press for subsequent operations is controlled by the minimum ΔP (200 psid) across the #1 seal.

(4) Maximum readable flow, maximum design flow is 60 gpm (System Description, WBN2-68-4001, Reactor Coolant System)

Attachment 5
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RCP OPERATING P

MOTOR OPERATING PARAMETERS

PARAMETER	NORMAL	MINIMUM	MAXIMUM
1. Upper Bearing (CCS):			
Flow	150 gpm	140 gpm	N/A
Inlet Press	82-108 psiG	N/A	200 psiG
Inlet Temp	(5) 100°-110°F	60°F	110°F
ΔP	3 psi	N/A	N/A
2. Lower Bearing (CCS):			
Flow	5 gpm	5 gpm	N/A
Inlet Press	N/A	N/A	200 psiG
Inlet Temp	(5) 100°-110°F	60°F	110°F
ΔP	2 psi	N/A	N/A
3. Air Cooler			
Flow	110 gpm(55/ cooler)	100 gpm	N/A
Inlet Press	N/A	N/A	200 psiG
Inlet Temp	(7)80°F	60°F	105°F
ΔP	6 psi	N/A	N/A
4. Motor Brg Temp (RTDs)			
Upper	160°F	N/A	190°F
Lower	160°F	N/A	190°F
5. Motor			
Winding Temp RTD	110°C (230°F)	N/A	150°C (302°F)
Voltage	6600v	5940v	7260v
Current	505 amps	N/A	(1) 732 amps
6a. (6) Oil Levels (Non-Running RCP)	At mark on sight glass	1/16 inch below mark	At mark on sight glass
6b. (6) Oil Levels (Running RCP)	1/4 inch below mark	3/8 inch below mark	1/8 inch below mark
7. (2) Oil Lift Pressure	1200 psiG	600psiG	2000psi
8. Vibration			
(3) Shaft	less than 15 mils	N/A	15 mils
(4) Frame	less than 3 mils	N/A	5mils

(1) Max is at cold loop and Min volts.

(2) Run the Oil Lift Pump at least 2 min before starting RCP, and 1 min after RCP start.

(3) Measured at 2-Pnl-275-R176, U2 Aux Inst Rm.

(4) Measured at Vibration Monitor Test Cabinet [2-JB-292-3242].

(5) 30-40°F above Injection Temp.

(6) Notify System Engineer for oil levels outside of maximum or minimum values.

Attachment 5
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RCP OPERATING P

(7) Criteria based on Thermal Barrier (CCS) Inlet Temp requirements

Figure 1
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TEMPORARY INSTALLATION LOCATIONS FOR TEMPERATURE SENSORS FOR USE DURING HYDROSTATIC TEST